Ravensdown – Remediation Action Plan

For Bluehaven Management Ltd

May 2018

REPORT INFORMATION AND QUALITY CONTROL

Prepared for:	Nathan York Bluehaven Management Ltd

Author:	James Blackwell Senior Land and Water Quality Consultant	
Reviewer:	Nigel Mather Senior Land and Water Quality Consultant	
Approved for Release:	Alice Andrew Director	

Document Name	R_Nikau_Ravensdown Rap_V6

Version History:	5.0	17 May 2018

CONTENTS

List of Tables

List of Figures

List of Appendices

1 INTRODUCTION

1.1 General

4Sight Consulting Ltd (4Sight) has been engaged by Nikau Contractors Limited (Nikau) to develop this remedial action plan (RAP) for the Ravensdown Fertiliser Co-operative Limited (Ravensdown) fertiliser manufacturing facility located at 51 Smart Road, Waiwhakaiho, New Plymouth (the Site). The location of the Site is shown in Figure 1.

The Site is to be developed as a Commercial and Retail Complex (including a recontoured Pa site to be used as community/recreation space, large format retail, visitor accommodation, supermarket, offices, food and beverage premises, cinema, other complementary retail, and associated parking and landscaping). The proposed development plan is provided as Appendix A. The purpose of this RAP is to provide direction for remediation of Site soils to a concentration suitable for the planned land use.

1.2 Background

The majority of the Site is currently occupied by Ravensdown who currently utilise the Site for blending and distribution of fertilisers and agri-chemicals. The Site has numerous structures present including large warehouses; storage sheds; administration and amenity buildings; and associated structures of varying age. It is understood that the Site has historically been used for industrial and manufacturing purposes (primarily fertiliser and agri-chemical production) since circa-1930s. Prior to this, during the 1920s, a portion of the Site is understood to have been utilised as an abattoir. While the Site is currently occupied, Ravensdown is in the process of transferring all on-site operations to a new facility. It is anticipated the Site will be vacated in 2018 to facilitate the proposed remediation and redevelopment of the Site.

Given the long industrial history of the Site, many potentially contaminating activities are known to have occurred, or have likely occurred at the Site, including: manufacture, production, storage and distribution of fertilisers / agri-chemicals; bulk storage of hydrocarbon based fuels (including waste oils); and livestock treatments associated with abattoirs. Anecdotal information also indicates that railway sidings were historically present at the Site to facilitate the distribution of product from the Site. A number of buildings at the Site contain asbestos / asbestos containing materials (ACM), some of which, given the age of the buildings, are noted to be in a deteriorated condition. While the Pa was not used for industrial purposes, sampling and analysis has confirmed the presence of asbestos in soil.

A number of historical uses of the Site are present on the Ministry for the Environment's (MfE's) (October 2001) *Hazardous Activities and Industries List (HAIL)*, including:

Chemical manufacture, application and bulk storage (fertiliser and agrichemicals manufacture and bulk storage, and bulk storage of fuel in underground / above ground storage systems);

- Corrosives including formulation or bulk storage; and
- Vehicle refuelling, service and repair (anecdotal evidence of railways sidings present at the Site).

In addition, due to the presence of asbestos in soil, HAIL Category I applies:

- 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.

Therefore, given the above, consideration is required to be given to the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (NESCS). Land covered in the NESCS is defined in regulation 5(7) as:

A piece of land that is described by one of the following:

a) An activity or industry described in the HAIL is being undertaken on it:

b) An activity or industry described in the HAIL has been undertaken on it:

c) It is more likely than not that an activity or industry described in the HAIL is being or has been undertaken on it.

Under the NESCS, assessment of contamination in soil is required if specific activities, such as sub-division, soil disturbance, or change of land use are undertaken.

Several extensive environmental investigations have been completed at the Site (taking into consideration the requirements of the NESCS) and asbestos has been identified in soil at concentrations above risk-based guideline values for protection of human health. Therefore, the purpose of this RAP is to develop and implement a suitable and appropriate remediation strategy for the Site prior to the proposed redevelopment.

A contaminated site management plan (CSMP) and assessment of environmental effects (AEE) report have been developed to support remediation process, and should be read in conjunction with this RAP.

1.3 Objectives and Purpose

The RAP has been developed to support the land use resource consent application for the development. It also details the management of contaminant impacted soil (primarily asbestos and ACM) at the Site to facilitate the proposed redevelopment of the Site as a commercial facility.

The RAP has been developed in general accordance with the following legislation and guidelines:

- MfE (revised 2011) Contaminated Land Management Guidelines No.1 – Reporting on Contaminated Sites in New Zealand (CLM No.1, 2011);
- MfE (revised 2011) Contaminated Land Management Guidelines No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (CLM No.2, 2011);
- MfE (revised 2011) Contaminated Land Management Guidelines No.3 – Risk Screening System (CLM No.3, 2011);
- MfE (revised 2011) Contaminated Land Management Guidelines No.4 – Classification and Information Management Protocols (CLM No.4, 2011);
- MfE (revised 2011) Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils (CLM No.5 2011);
- MfE (1999, amended 2011) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (PHC, 2011);
- NESCS (2011);
- Western Australia Department of Health (WA DoH) (2009) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia (WA Asbestos Guidelines);
- Worksafe (2016). Approved Code of Practice: Management and Removal of Asbestos; and
- Health and Safety at Work Act, 2015 (HSWA) regulations and guidelines.

It is noted that the Business Research Association of New Zealand (BRANZ) has developed a flowchart and guideline for managing asbestos in soil. This information was publicly released in early November 2017. The guidance will be considered as part of the controls for remediation of asbestos in soils as appropriate and applicable for this remedial action.

1.3.1 Purpose

The purpose of this RAP is to provide the rationale and method for the remediation / removal of contaminant impacted soil from the Site (including any necessary further soil investigation works); and to outline the steps necessary to validate and verify the success of the remediation.

This RAP is intended to be used in conjunction with the CSMP and the contractor's site-specific documents, which include an asbestos management plan, health and safety plan, dust and erosion control plan, and noise and vibration control plan.

1.3.2 Objectives

The primary objective of this RAP is to summarise the options and provide an appropriate plan for the remediation of contaminant impacted soil at the Site so there is no significant risk to human health.

A key objective of the remediation strategy is the source removal and bulk excavation of identified contaminant impacted soils across the Site. The soil excavation works are proposed to be undertaken in conjunction with proposed cut and fill activities proposed for the redevelopment of the Site.

1.3.3 Description of Enabling Works

The planned enabling works will include:

- Additional Site investigation;
- Removal of contaminant impacted soils;
- Removal of buildings and structures (leaving foundations in-situ whenever possible);
- Off-site disposal of contaminant impacted soils with contaminant concentrations above adopted guideline / remediation values, or when unsuitable for on-site re-use;
- Contaminant status validation through sampling and analysis; and
- Site reinstatement as required to prepare for future major earthworks, manage storm water, and minimise generation of dust.

An underground storage tank (UST) which reportedly contained waste oil may be present at the site. This will be further investigated during the enabling works. If the UST is present, it will be removed in accordance with permitted activity requirements NESCS and underlying soil will be validated in accordance with applicable guidelines. Should more than 30 cubic metres of soil require removal due to contaminant concentrations, the activity will be a restricted discretionary activity and conducted as part of the remedial action outlined under this RAP.

1.3.4 Data Quality Objectives (DQOs)

In order to provide a robust scientific investigation of the potential presence of contamination to soil at the Site, 4Sight has developed data quality objective (DQOs) for this RAP.

The DQO process is a seven-step assessment that represents a systematic planning approach that is uses to define the type, quantity and quality of data needed to make informed decisions relating to the environmental condition of a Site. A copy of the DQOs prepared for validation sampling is provided as Appendix B.

1.4 Scope of Works

To achieve the soil remediation objectives and goals, the scope of this RAP includes:

- Confirming the current soil contamination status and reasons remediation is required / necessary;
- Refinement of the conceptual site model (CSM) prepared by others for the Site;
- Remediation drivers, goals and targets (including regulatory compliance);
- Remediation options assessment regarding the current known soil contamination status;
- Chosen remediation option scope, design and implementation strategy; and
- Contingency measures, and triggers for implementing detailed contingencies.

1.5 RAP Roles and Responsibilities

The following roles and responsibilities for the activities associated with the implementation of this RAP have been identified, as detailed in Table 1.

Table 1 : RAP Roles and Responsibilities

Role	Organisation	Responsibility
Client	Bluehaven Management Ltd	Overall responsibility for ensuring that this RAP is appropriately carried out and completed (following approval by New Plymouth District Council).
Client Representative / Project Manager	Kaitiaki Property	Agents for the Client, responsible for overall project management and ensuring the contents of this RAP are appropriately actioned following the necessary approvals.
Environmental Consultant	4Sight Consulting Ltd	Project management and coordination of remediation strategy in accordance with this RAP. Must verify the Remediation Contractor(s) and Hazardous Waste Contractor(s) work in accordance with this RAP, and all applicable legislation and guidelines.
Remediation Contractor	Nikau Contractors Ltd	Undertaking soil remediation works in accordance with this RAP, under the direction of the Environmental Consultant.
Hazardous Waste Contractor	Waste hauler to be determined Disposal at Colson Road Landfill	To be engaged by the Remediation Contractor. Responsible for the haulage of contaminated soil to a suitably licensed disposal facility and assuring appropriate disposal of contaminated soil.
Local Authority	New Plymouth District Council (NPDC)	Responsible for authorising the suitability of this RAP to meet all applicable legislative and regulatory guidelines in addressing the management and remediation of contaminant impacted soil at the Site, considering the risk to human health in light of the proposed redevelopment.

2 SITE DETAILS

2.1 Site Description and Features

This RAP applies to the remediation of soil at the Ravensdown fertiliser manufacturing and distribution facility located at 51 Smart Road, Waiwhakaiho, New Plymouth (as detailed in Figure 1). Site Details are provided in Table 2.

Table 2: Site Details

Site Address	51 Smart Road, Waiwhakaiho, New Plymouth	
Registered Owner	Ravensdown Limited (sale pending)	
Representative of Future Owner	Bluehaven Management Limited	
Title Description	Lot 1 DP 498141 and Lot 1 DP 339878 and Lot 1 DP 440933	
Site Area	7.18 hectares (ha)	
Surrounding Land Use	North:	Devon Road forms the norther boundary of the Site, beyond which is 'The Valley' commercial / shopping centre. The Waiwhakaiho River is present beyond 'The Valley' (approximately 195m north of the Site).
	South:	Railway line, including rail freight yards, beyond which are open paddocks / agricultural land and NPDC Colson Road Landfill south of the rail yard.
	East:	Mangaone Stream forms the eastern boundary of the Site, beyond which is a light industrial precinct, including: a New Zealand Couriers distribution facility, building supplies and timber yard; and a garden supplies nursery.
	West:	Light industrial and commercial properties, including a plant and machinery hire outlet, and a petroleum retail service station. The Waiwhakaiho River is present approximately 355m to the west.
Topography	The Site itself is generally flat. However, two distinct levels are present on the Site. The Lower Platform is topographically lower than the Upper Platform, separated by a natural ridge (approximately 5m vertical difference).	
Vegetation	Grassed areas are present across the Site, as is the presence of numerous trees, plants and bushes. Vegetation appears to be healthy and not stressed.	
Land Use / Zoning	Industrial C Environment Area	
Reason for Remediation	The purpose of the remediation is to remove or cap soil where asbestos is present above guideline values so the development can safely proceed.	

2.2 Land Use Zoning and Proposed Future Land Use

2.2.1 Land Use Zoning

The Site is zoned 'IndustrialC Environmental Area' in the NPDC District Plan, and is currently utilised as a large fertiliser distribution facility by Ravensdown.

2.2.2 Proposed Development

The Site is proposed to be redeveloped into a commercial and shopping area, including: a shopping mall; dining area; hotel and separate household hardware store (including associated car-parking). A portion of the Site (in the southern corner) is also to be redeveloped as a Pa (re-creation of historical Pa). The proposed development plans are provided in Appendix A.

It is understood that existing Site buildings and structure are to be demolished as part of the proposed redevelopment works at the Site. Additionally, it is understood that significant earthworks (involving cut and fill) are likely required in specific areas of the Site in preparation for the proposed redevelopment. A preliminary cut and fill diagram is provided in Appendix C (prepared by BTW, and included in the September 2017 Geotechnical and Foundation Report).

Aerial imagery sourced from New Plymouth District Council GIS viewer.

Scale 1:2500 @ A4

0 50 100m

AA2773 – Ravensdown New Plymouth

Figure 1: Site Location Plan

Plan prepared for Nikau Contractors Limited by 4Sight Consulting.

Date: 10/10/2017
Version: 1.0
Drawn: Sam Hendrikse
Checked: Terre Maize
Approved: Alice Andrew

4SIGHT CONSULTING

2.3 Site History Summary

Detailed summaries of the historical usage of the Site have been provided in previous environmental investigation reports completed by others (as detailed in Table 3). It is not within the scope of this RAP to repeat, verify or complete data gaps (if present) from previously conducted Site history summaries. 4Sight assumes that the information presented in reports prepared by others is accurate and complete and was conducted in accordance with applicable guidelines and industry practices.

Table 3: Previous Environmental Investigations (and associated reports)

Company	Date	Title
Tonkin and Taylor Limited	*1994*	*Farmers Fertiliser New Plymouth: Monitoring Well Installation Report (Prepared for Fernz Corporation)*
BTW Company Limited	*July 2013*	*Preliminary Site Investigation Report: in accordance with NESCS (Prepared for Ravensdown Fertiliser Co-operative Limited)*
Golder Associates (New Zealand) Limited	October 2013	Detailed Site Investigation: Ravensdown New Plymouth Store – Proposed Lot 1 (Prepared for Ravensdown Fertiliser Co-operative Limited)
Jacobs New Zealand Ltd	*September 2014*	*Ravensdown New Plymouth Store: Sediment, Water and Soil Fieldwork Short Report (Prepared for Ravensdown Fertiliser Co-operative)*
Golder Associates (New Zealand) Limited	November 2015	Detailed Site Investigation: Ravensdown New Plymouth Facility (Prepared for Ravensdown Fertiliser Co-operative Limited)
AECOM New Zealand Limited	May 2017	Ravensdown NESCS Peer review of 2013 and 2015 Golder DSI reports for purpose of a 3-lot subdivision proposal (Prepared for New Plymouth District Council (NPDC).
ERM New Zealand Pty Ltd	June 2017	Asbestos Survey Report: Ravensdown, 51 Smart Road, New Plymouth (Prepared for Bluehaven Ltd)
BTW Company Limited	September 2017	Geotechnical and Foundation Report (DRAFT): Development of Ravensdown Site, Devon Road, New Plymouth (Prepared for Blue Haven Commercial).
Golder Associates (New Zealand) Limited	October 2017	Ravensdown New Plymouth, Supplementary Environmental Assessment (Prepared for Bluehaven Ltd)

Note:
Italics = report was not available to 4Sight for review as part of the development of this RAP.

In summary, the Site is a large industrial / manufacturing facility with a long history of chemical use and storage. Most notably, the Site has been utilised as a fertiliser manufacturing and distribution facility since circa-1930s. Prior to this, it is understood at least a small portion of the Site was used as an abattoir (circa-1920s). Little information is available on the use of the Site prior to the 1920s; however, it is understood that prior to development of the land, the Site was historically part of low-lying swamp and wetlands, with numerous streams feeding the Mangaone Stream. Fertiliser manufacture and production ceased at the Site in the easly-2000s, and since then the Site has been mainly utilised as a storage and distribution facility.

Fertiliser products manufactured and stored on-site have included lime based (and other alkali based products), sulphur based, phosphate based, potassium based, and nitrogen based products. In addition to the presence of fertiliser and fertiliser-based products, other potential contaminants associated with such a long and varied industrial history of the Site include hydrofluorosilicic acid (fertiliser production by-product), diesel fuel and waste oil tanks, sulphuric acid (by-product from manufacture of sulphur-based fertilisers), polychlorinated biphenyls (PCBs) (oils used in on-site transformers), lead (lead based paints), and asbestos / ACM (building materials and cladding).

Anecdotal information provided during a Site inspection in September 2017 also indicate railway sidings were present at the Site, and were used for distribution from the main-line freight yards located to the south of the Site.

The presence and extent of known contamination on-site is detailed further in Section 3.

2.4 Site Profile

2.4.1 Geology

The Institute of Geological and Nuclear Sciences (GNS) 1:250,000 map series *Map 7 – Taranaki* (2008) indicated the regional geology likely consists of Quaternary aged Pouakai Group (part of the Rangitikei Supergroup) 'Beach Deposits', described as *marine terrace cover beds (conglomerate, sand, peat and clay), and undifferentiated sand deposits and dunes*. The geological cross-section provided on the GNS map descries a complex mix of Quaternary ages lahar flows, marine deposits, and sand dunes in the vicinity of the Site.

Site-specific geology from intrusive investigations completed at the Site indicate the Site is underlain by silty sandy gravel to approximately 2.0 metres below ground level (m bgl), which in turn is underlain by alluvial sands with gravels and cobbles to approximately 4.80 m bgl. Lenses of clay, silt and peat are also noted to be present at the Site, but are not considered to be laterally extensive. Intrusive investigations under by BTW in their September 2017 Geotechnical Investigation extended to a maximum depth of 20.0 m bgl at the Site, and indicated that typical sub-surface conditions encountered were consistent with those described in published information. However, BTW noted that due to the historical presence of swamp / wetlands at the Site (which have been drained), some areas of the Site have been subject to historical filling to variable depths (up to 3.0 m bgl in places), with material of variable quality.

The typical encountered geology at the Site is summarised in Table 4.

Table 4: Encountered Site-Specific Geology

Encountered Depth (m bgl)	Material	Description
0.0 – 0.5	Fill	Light brown to grey, medium to coarse sandy GRAVEL.
0.5 – 2.0	Natural	Light brown SILT with occasional medium to coarse sands and fine to medium gravels.
2.0 – 4.80	Natural	Orange / brown SILT.
4.80 – 20.00	Natural	Medium to coarse Sandy GRAVEL, with occasional cobbles and indications of peat and volcanic ash.

Note:
Maximum depth of investigations undertaken to date by others is 20.00 m bgl.

2.4.2 Hydrogeology

Groundwater at the Site is typically present within the shallow Marine Terrace aquifer, typified by sands, gravels and silts as described in the New Zealand Hydrological Society publication *Groundwaters of New Zealand* (Rosen and White, 2001).

Five groundwater monitoring wells (MWs) are present on-site (understood to have been installed for investigation purposes). Historical groundwater investigations have reported that groundwater in these MWs is typically encountered between 2.0 and 2.30 m bgl. Regional groundwater flow is generally toward the north toward the Waiwhakaiho River however, it is noted that localised flows on-site towards the Mangaone Stream (to the east) are likely, particularly in the eastern portion of the Site. Given the relatively shallow groundwater level, groundwater flow may be influenced by the presence of buried storm water drains and other underground utility service conduits.

A search of the Taranaki Regional Council (TRC) online groundwater maps indicated that there are five groundwater MWs present on-site (for investigation purposes). It is understood these MWs were installed by Tonkin & Taylor in 1994 as part of the environmental investigation works completed at the time. Five groundwater MWs are also located in the property located at 674 Devon Road (immediately northeast of the Site). This property is understood to have been a former petroleum retail service station (now New Zealand Couriers distribution facility). It is understood that these groundwater MWs were also installed for investigation purposes.

A review of the TRC online groundwater map indicated no record of groundwater take consents within a 500m radius of the Site.

2.4.3 Hydrology

The nearest surface water body is the Mangaone Stream, which forms the eastern boundary of the Site. Drainage and storm water from the Site (most notably the 'Upper Level' / Lot 2) discharge to the Mangaone Stream. It is noted that the Mangaone Stream is a tributary of the Waiwhakaiho River, which meanders to the west and north of the Site, flowing generally northward to discharge to the Tasman Sea. At its closest point, the Waiwhakaiho River is approximately 200 m from the Site (from northern boundary).

The Waiwhakaiho River is classified by TRC as a resource of regional significance, while the Mangaone Stream is of high ecological value owing to its particularly high native fish diversity.

It is noted that the Site was historically part of a low-lying swamp (prior to industrial development in the 1920s). It is understood that the swamp was likely drained, and material imported onto Site to fill the drained low-lying areas.

3 EXTENT OF KNOWN CONTAMINATION

The intent of this section of the RAP is to summarise the confirmed and identified soil contamination at the Site, as based on information provided in environmental investigations completed by others (detailed in Table 1).

3.1 Soil Contamination

As described in Section 1, several investigations of the site have been conducted. The most recent investigations are described in this section. A number of potential contaminants in soil were identified in these investigations, including:

- Sulphur (as oxidised sulphuric acid, or reduced hydrogen sulphide);
- Selenium-based and phosphate-based fertilisers;
- Organochloride pesticides (OCPs);
- Dichloro-diphenyl-trichloroethane (DDT);
- 2,4-Dichlorophenoxyacetic acid (2-4 D);
- Trace elements such as cadmium, fluoride and uranium;
- Asbestos and ACM;
- Lead (from lead based paints);
- Total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene compounds (BTEX);
- Polycyclic aromatic hydrocarbons (PAHS);
- Polychlorinated biphenyls (PCBs); and
- Heavy metals (arsenic, boron, chromium, cobalt, copper, nickel, zinc).

With the exception of asbestos in soil, all analyses returned results below applicable guideline values for protection of human health in a commercial/industrial or recreational setting.

3.1.1 Golder, 2013, Detailed Site Investigation. Proposed Lot 1 DSI (Lower Platform)

A DSI conducted by Golder in 2013 for Proposed Lot 1 (Lower Platform) in support of a consent application for subdivision. The scope of work included a desktop study, including review of Council records and historic aerial photos and development of a preliminary conceptual site model (CSM). Based on the CSM, sampling and analysis of shallow soils was conducted with laboratory analytical results compared to risk-based guideline values. The CSM was then revised to incorporate findings.

The investigation concluded that arsenic, copper, mercury and selenium were present at background concentrations and are not considered contaminants of concern. Cadmium and lead were present above background concentrations but well below adopted guideline values.

Hydrocarbons were also below laboratory reporting limits. There were traces of DDT in the samples, but concentrations were well below guideline values for commercial/industrial land use.

Traces of PCBs were found in two composite samples and one composite sample contained 1.7 mg/kg PCB, which is below guideline values selected in this report. The PCB congeners detected indicate that the source was likely Aroclor 1260, which was commonly used in electrical transformers. Three individual samples (RNP 51 0.0, RMP32 0.0, and RNP 61 0.0) had total PCB concentrations of 1.8 mg/kg, 1.7 mg/kg and 9.9 mg/kg respectively. The concentrations of dioxin-like PCBs are below the NES Soil Contaminant Standard of 1.2 µg/kg for dioxin-like PCBs for commercial/industrial land use. The value of 9.9 mg/kg is above the adopted National Environment Protection Measure (Assessment of Site Contamination), 2013 *Health Investigation Level D – commercial / industrial* (NEPM HIL-D) concentration of 8 mg/kg for total PCBs; however, the remaining concentrations are = below this value.

The paint flakes sampled and analysed did not contain lead.

Asbestos cladding was identified in the cement sheeting covering the Sulphur Store and Shed 6. The fabric of the shed adjacent to the dosing tank east of the Sulphur Store did not contain asbestos. Asbestos was observed in soils surrounding some of the asbestos-clad buildings.

3.1.2 Golder, 2015. Detailed Site Investigation. Upper Level

In 2015, Golder conducted a DSI of the upper level of the site. The DSI focused on the areas of concern which had been identified in the Preliminary Site Investigation (PSI) conducted by BTW in 2013. The DSI encompassed an intrusive investigation which targeted the areas of concern, which included sulfuric acid manufacturing; use of waste oil for dust suppression; use of 2-4 D in the mixture bag area; uncontrolled filling within a concrete-lined fire-fighting pond; unknown practices regarding PCBs; an un-bunded above-ground diesel fuel storage tank; and asbestos-containing building materials in poor condition. The areas where USTs were formerly present were also investigated.

The DSI found:

- There is a low likelihood of hydrocarbon contamination from the USTs and above-ground diesel fuel tank;
- Asbestos was detected in two surface soil samples in the southern unpaved yard with concentrations above the Western Australia commercial/industrial criteria;
- Elevated concentrations of nutrients were detected in areas of uncontrolled fill in the fire-fighting pond and garden and within the footprint of the former Rock Store; and
- Acidic soils were detected northeast of the No. 5 Store and within the southern yard.

Samples analysed for heavy metals, hydrocarbons, and PCBs were below adopted guideline concentrations for commercial/industrial land use.

The waste oil tank could not be thoroughly investigated at the time of this DSI. The fill material within the pond and garden were reportedly removed to a licensed landfill in 2016. This removal has not been confirmed.

3.1.3 ERM, 2017. Asbestos Survey Report

An ACM survey was conducted by ERM in June 2017, with assistance from BTW. The survey identified cement board fragments in soil from corrugated roofing, edging, and exterior walls. Asbestos-containing pipes were also identified. A detailed asbestos register which lists the location, product type, condition, approximate extent, type of asbestos, and risk of disturbance is included in the report. The report also contains photos of the ACM and a risk rating. This report forms the basis for the contractor's asbestos management and removal plan.

3.1.4 Golder 2017 DSI Update

An independent peer review of the 2013 and 2015 Golder DSI reports was conducted by AECOM on behalf of New Plymouth District Council (NPDC) in support of a 3-lot subdivision application submitted by Ravensdown. The review identified several data gaps, most of which are addressed in the 2017 DSI Supplementary Environmental Assessment, prepared by Golder. This report is provided in Appendix D. Fourteen boreholes were advanced with samples collected from 11 boreholes and analysed for area-specific contaminants of concern. With the exception of asbestos, all samples returned results below applicable guideline values.

Asbestos at or above the commercial/industrial investigation value of 0.001% wt/wt was detected in three samples. Combined friable asbestos and asbestos fibres (FA/AF) concentrations of 0.057% and 0.047% wt/wt were detected in BH07 and BH12, respectively, at a depth of 100 mm below land surface. Loose fibres were detected in all but one of the other samples analysed for asbestos, but the concentrations were below the investigation value. The sample from BH14, in the Pa, had no asbestos fibres detected.

A sample collected from 0.4 m below ground surface (bgs) was collected from the location of sample RNP61 0.0 and analysed for PCBs. Sample RNP61 0.0 had a total PCB concentration of 9.9 mg/kg. Sample RNP61 0.4 had a total PCB concentration of 0.9 mg/kg. While some PCB congeners were detected in RNP61 0.4, the analysis indicates that PBC concentrations are likely to decrease with depth. It is noted that this assumption is based on one sample result; additional validation sampling will be required to demonstrate that the site is adequately remediated.

3.2 Potential Impact to Groundwater

Limited groundwater assessments have been completed at the Site to date (Tonkin & Taylor (1994), and Jacobs (2014)). The Tonkin and Taylor (1994) investigation noted elevated concentrations of cadmium and fluoride in groundwater sampled from one MW at the Site.

It is also noted that TRC conduct periodic sampling and analysis of groundwater from existing MWs at the Site. It is understood that these sampling events focus mainly on the pH level of sampled groundwater.

The concentrations of contaminants in shallow groundwater at the Site are likely to be as a direct result of historical use, manufacture and storage of fertilisers and other chemicals at the Site. Given the potential hydraulic connectivity between shallow groundwater at the Site and the Mangaone Stream, there is potential for contaminant impacted groundwater at the Site to impact nearby receiving surface water bodies.

4 CONCEPTUAL SITE MODEL

Central to the requirement of the assessment of risk is the development of a conceptual site model (CSM), identifying each contaminant source and the associated receptor exposures. The environmental risk assessment is based on a 'contaminant (source) → exposure pathway → receptor' methodology. This relationship allows an assessment of potential environmental risk to be determined in accordance with the requirements of MfE CLM No.5, 2011

The CSM presented in the following sub-sections summarises the identified and likely pollutant linkages at the Site, and specifically addresses soil. This CSM updates the previous CSMs produced in the Golder DSIs.

4.1 Sources

4.1.1 On-Site Sources of Potential Contamination

Based on our review of previous environmental assessment reports (as listed in Table 1), and our knowledge of the Site, the identified potential sources of contamination are summarised in Table 5.

Table 5: Summary of Potential On-site Sources of Contamination

Main Potential Sources	Source Status	Main Potential Contaminants	Media
Current and historical use, manufacture, and storage of; fertilisers and fertiliser based chemicals, and compounds across the Site.	Existing	Phosphate, sulphur, cadmium, fluoride.	Soils
Production of sulphuric acid, and generation of waste by-products (particularly in 'Acid Plant', 'Potash Store' and 'High Analysis Store'.	Existing	Sulphuric Acid, fluoride.	Soils
Numerous warehouses, buildings and structures (Super Six cladding).	Existing	Asbestos, ACM, lead.	Soils

Main Potential Sources	Source Status	Main Potential Contaminants	Media
Former fuel USTs (near 'Admin. Office'), and waste oil tank (near 'Workshop'). It is also likely that small fuel spillages across the Site (particularly in current / former un-sealed areas) are present.	Inferred Existing*	TPH, BTEX, PAHs.	Soil
Electrical transformers are known to have been historically present on-site (location unknown).	Inferred Existing*	PCBs.	Soil
Potential presence of imported fill.	Existing	Metals, PAHs, petroleum hydrocarbons, asbestos / ACM).	Soil
Site maintenance	Existing	Organochlorine pesticides.	Soil
Railway siding	Existing	Heavy metals.	Soil
Mixture bag area	Existing	2-4 D	Soil

*Fuel USTs are reportedly removed but waste oil UST may still be present. Low concentrations of PCB are present in the vicinity of the transformer.

With the exception of asbestos, all CoPCs in soil analysed as part of existing environmental reports are below applicable commercial/industrial guideline values. It is noted that heavy metals at the railway siding and 2-4 D in the mixture bag area have not been previously analysed. Further sampling of soil in this area will occur as part of the execution of this RAP to characterise soils prior to the implementation of the appropriate management option (as described in this RAP).

It is noted that at least one waste oil tank was historically known to have been present on-site. It is not clear at this time whether the waste oil tank is still present, and has therefore been exclude from the CSM.

4.1.2 Off-Site Sources of Contamination

Based on our review of previous environmental investigations completed by others (as listed in Table 1) and our knowledge of the Site, the following potential off-site sources of contaminant impact to soil and groundwater at the Site are noted:

- Rail yards (and associated sidings) immediately to the south of the Site. Potential contaminants likely to be associated with rail yards include: diesel (and other petroleum hydrocarbons), PAHs, asbestos, and heavy metals.
- Former petroleum retail service station immediately adjacent to the northeast of the Site (now a New Zealand Couriers distribution centre). Potential contaminants likely to be associated with former petroleum retail service stations includes TPH, BTEX, PAHs, and lead.

It is noted however, that previous environmental investigations completed at the Site have not identified contaminant impacts on-site that are inferred to be sourced from off-site.

4.2 Transport Mechanisms and Pathways

4.2.1 Transport Mechanisms

The main transport mechanisms by which potential receptors could be affected by contaminant impacts sourced from the Site (or nearby vicinity) include:

- Deterioration of buildings and structures constructed from / containing hazardous building materials (including 'Super Six' cladding, asbestos, ACM and lead paint), impacting shallow soils in the vicinity surrounding on-site buildings and structures;
- Wind-blown atmospheric dispersion of contaminant impacted surface soils;
- Surface contact, spills and leaks from historical use and storage of chemicals (fertilisers, acids and fuels) resulting in impacts to soil and/or shallow groundwater;
- Leaching of any contaminants in soil to shallow groundwater;
- Overland flow from any surface spills and leaks to on-site sewer and storm water infrastructure;

- Migration of any contaminants via sub-surface utility conduits;
- Migration of any contaminants to surface water bodies (Mangaone Stream and Waiwhakaiho River); and
- Volatilisation of volatile contaminants in soil and/or shallow groundwater into ambient (indoor / outdoor) air.

4.2.2 Pathways

The main pathways by which potential human receptors could be affected by contaminant impacts source from the Site or nearby vicinity include:

- Inhalation of air-borne contaminants (as dust or asbestos fibres);
- Direct contact (dermal) with contaminant impacted soils, shallow groundwater and surface water; and
- Ingestion of contaminant impacted soil, groundwater or surface water.

Contaminants from soil may migrate through the soil to groundwater, which can then be expressed as surface water. Contaminants may also be transported via surface run-off (such as from stormwater) into nearby surface water bodies or into stormwater drains which eventually discharge to the Tasman Sea.
Ecological receptors may also be affected by nutrients such as sulphur and nitrates which can migrate through surface water runoff or groundwater.

4.3 Potential Receptors

Identified potential sensitive receptors to contaminant impacts sources from the Site include:

- **Human-Health:**
  - Current and future workers and visitors;
  - Workers and visitors to surrounding commercial / light industrial / retails properties;
  - Deconstruction workers / remediation contractors;
  - Construction workers (i.e., workers on-site during retail / commercial construction and redevelopment); and
  - Sub-surface maintenance workers (i.e. workers on-site or at surrounding properties).
- **Environmental / Ecological:**
  - Soil and shallow groundwater beneath the Site;
  - Soil and shallow groundwater down-gradient of the Site;
  - Nearby surface water bodies: Waiwhakaiho River and Mangaone Stream; the latter of which is designated of high ecological value due to high native fish diversity; and
  - Future plants / vegetation on-site.

4.4 Potentially Complete Pollutant Linkages

Based on the above identified potential contaminant sources, pathways and receptors at the Site, a number of potentially complete pollutant linkages have been identified. Table 6 summarises the revised CSM for the Site.

Table 6: Summary of Potentially Complete Pollutant Linkages

Media	Source	Pathway	Receptor	On- / Off-Site	Discussion	Pollutant Linkage	
						Currently Complete?	Potential to Become Complete?
Soil	Asbestos / ACM impacted soils	Direct contact with impacted soils	Human Health (HH): Current site users and visitors via inhalation and ingestion.	On-Site	Fibrous and friable asbestos / ACM has been identified in surface soils across the majority of the Site. The asbestos / ACM is inferred to be sourced from building materials used in on-site buildings and infrastructure which is now deteriorated. Impact of asbestos / ACM appears to be most concentrated within approximately 5.0 linear metres extending from most on-site buildings and structures. While in the soil, the asbestos / ACM are relatively inert, however, soil disturbance, particularly on in windy conditions following dry periods (where soil is dry) have the potential to disburse asbestos fines into the atmosphere.	**Likely** Site users and workers involved in soil disturbances may come into contact with soils containing asbestos above acceptable limits.	**Likely** In light of the proposed redevelopment of the Site, disturbance of asbestos / ACM impacted soil may occur. Remedial action works will be conducted under an Asbestos Management Plan and this RAP, which will minimise potential exposures and risk. Personal protective equipment, decontamination processes, and other controls also minimise potential exposures.
			HH: Construction workers / remediation contractor via inhalation and ingestion.				
			HH: sub-surface maintenance workers via inhalation and ingestion.				
			HH: Users and visitors of adjacent properties via inhalation and ingestion.	Off-Site	Asbestos / ACM impacts to shallow soils appear to be limited to on-site soils. Adjacent property users would only likely be at risk from inhalation of asbestos fines sourced from the Site at times of significant soil disturbance, where given the known presence of asbestos / ACM in soils, works would be conducted under controlled conditions to minimise dust generation, and thus mobilisation of asbestos fines to atmosphere in order to limit the potential impact to the public / adjacent property users.	**Unlikely** Any soil disturbance works on-site will be conducted under controlled conditions.	**Unlikely** Soil disturbance as part of redevelopment would be in accordance with an Asbestos Management Plan which will minimise potential risk of exposure.

Media	Source	Pathway	Receptor	On- / Off-Site	Discussion	Pollutant Linkage	
						Currently Complete?	Potential to Become Complete?
Soil	CoPC impacted soils (i.e. petroleum hydrocarbons, heavy metals, PCBs, fertiliser products, and acids)	Direct Contact with impacted soils	Flora and Fauna in contact with soil.	On-Site	Minimal localised soil impacts have been noted in shallow soils at the Site. Where impacts by secondary CoPC have been noted in shallow soils (<0.1m depth) on-site, they appear to be discrete 'hot-spots' and not considered to be representative of widespread contamination to soil across the Site. The majority of the Site is also covered in hard-stand (concrete and asphalt), with small areas of accessible soils (with the exception of the south-western portion of the Site). In general, where vegetation was present, it appeared healthy and not distressed. No significant evidence of animal habitats were noted on-site. Therefore, it is considered unlikely that secondary CoPC impacted soils will pose an unacceptable risk to on- and off-site flora and fauna.	**Unlikely** Impacts appear to be limited to 'hot-spots' and not laterally extensive.	**Unlikely** Unless significant further impact occurs / is identified.
				Off-site		**No** Soil impacts limited to Site and does not appear to have impacted off-site soils.	
			HH: Site users and visitors via dermal contact / ingestion.	On-Site	As above, given the likely localised nature of impacts of secondary CoPC at the Site, and 'normal' activities at the Site not routinely accessing impacted soils; it is considered unlikely that secondary CoPC impacted soil would pose an unacceptable risk to on-site users. However, during redevelopment works, remediation / earthworks contractors are likely to contact potentially impacted soils. Exposure, controls and risks can be managed through the development of a CSMP.	**Unlikely** Impacts appear to be limited to 'hot-spots' and not laterally extensive, with limited access to soils.	**Possible** Site maintenance workers, remediation contractors and earthworks contractors in excavations may be exposed to CoPC impacted soils.
			HH: Construction workers / remediation contractor via dermal contact / ingestion.				
			HH: sub-surface maintenance workers via dermal contact / ingestion.				

Media	Source	Pathway	Receptor	On- / Off-Site	Discussion	Pollutant Linkage	
						Currently Complete?	Potential to Become Complete?
Soil	Secondary CoPC impacted soils (i.e. petroleum hydrocarbons, heavy metals, PCBs, fertiliser products, and acids)	Direct Contact with impacted soils	HH: Users and visitors of adjacent properties via dermal contact / ingestion.	Off-Site	Identified CoPC impacts on-site are not considered to have significantly impacted soils off-site.	**No** Soil impacts identified to-date are limited to on-site, and do not appear to have impacted off-site soils.	**Unlikely** Unless significant further impact occurs.
			Direct Contact with building footings and / or sub-surface structures	On-Site	Soil pH at the Site is variable, owing to historical manufacture of fertilisers (using alkali products) and subsequent generation of acidic by-products and wastes. Overly acidic / alkali sub-surface conditions can adversely affect the structural integrity of building footings and underground infrastructure / utilities. The presence of other CoPCs in soil at the Site are not considered to pose a direct structural risk to the fabric of buildings and structures.	**Possible** Existing buildings on-site may be present in aggressive soils that have caused as yet un-seen damage.	**Possible** Consideration on potentially aggressive ground conditions will be required in light of the proposed redevelopment.
				Off-Site			
		Leaching of CoPC in soil	Shallow groundwater	On-Site	Routine groundwater monitoring at the Site does not appear to indicate significant contamination of shallow groundwater by CoPC sourced from the Site (other than variably acidic conditions). Soil disturbance (during remediation & development works), has potential to increase concentrations of CoPC in shallow groundwater through leaching during wet weather / from soil dampening.	**Unlikely** Groundwater does not appear to be significant impacted by site-sourced CoPC.	**Possible** Potential to occur during soil disturbance
				Off-Site			

Media	Source	Pathway	Receptor	On- / Off-Site	Discussion	Pollutant Linkage	
						Currently Complete?	Potential to Become Complete?
Groundwater	Secondary CoPC impacted groundwater (i.e. petroleum hydrocarbons, heavy metals, PCBs, and acids	Direct contact with impacted shallow groundwater	Humans via dermal contact and / or ingestion.	On-Site	As above, routine groundwater monitoring does not indicate significant impact to shallow groundwater at the Site from site-sourced CoPC. However, it is noted that a comprehensive analysis and monitoring for a broad suite of potential CoPC has not been conducted. Additionally, 4Sight have not had access to all available groundwater monitoring data to conduct a complete review. Groundwater at the Site and in nearby vicinity is understood to be approximately 2.0 m bgl. It is feasible that excavations at the Site could intersect groundwater and humans could come into contact. Notwithstanding, no groundwater take consents are active for the Site or immediate surrounds.	**Unlikely** Groundwater does not appear to be significant impacted by site-sourced CoPC.	**Unlikely** Unless significant further impact occurs.
				Off-Site			
			Direct Contact with building footings and / or sub-surface structures	On-Site	Shallow groundwater pH (acidic) is likely to pose a risk to building footings and buried structures if present within the groundwater vadose zone. However, groundwater is present at approximately 2.0m bgl and it is unlikely that existing buildings present on Site have footings that extend to such depth. Consideration of direct contact of acidic groundwater with the footings and structures of the proposed development should be given.	**Possible** Shallow groundwater pH may adversely affect building footings (if present to ~2.0m depth)	**Possible** Unless acidic shallow groundwater is removed or remediated (neutralised).
				Off-Site			
		Lateral migration of shallow groundwater impacted by CoPC	Aquatic systems in, and users of surface water cross- and down-gradient of the Site	On-Site	Acidic pH in shallow groundwater at the Site is inferred to be directly as a result of historical usages of the Site. Routine groundwater monitoring does not indicate significant impact to shallow groundwater at the Site from site-sourced CoPC. The lower Waiwhakaiho River is considered a regionally significant resource (suitable for fishing and recreational activities such as swimming). The Mangaone Stream is also an area of high ecological significance.	**Unlikely** Groundwater does not appear to be significantly impacted by site-sourced CoPC.	**Unlikely** Unless significant further impact occurs.
				Off-Site			

Media	Source	Pathway	Receptor	On- / Off-Site	Discussion	Pollutant Linkage	
						Currently Complete?	Potential to Become Complete?
Groundwater	Secondary CoPC impacted groundwater (i.e. petroleum hydrocarbons, heavy metals, PCBs, fertiliser products, acids and PFCs (PFAS/PFOS)	Off-Site transport of CoPcC impacted groundwater via underground utility conduits and annular material	Aquatic systems in, and users of surface water cross- and down-gradient of the Site	On-Site	Elevated nitrogen and phosphorous in storm water discharge from the Site (to the Waiwhakaiho River) has historically been in excess of TRC consent conditions (TRC monitoring in 2010). The lower Waiwhakaiho River is considered a regionally significant resource (suitable for fishing and recreational activities such as swimming). The Mangaone Stream is also an area of high ecological significance. There is potential for CoPC impacted shallow groundwater to leak into buried services and utilities (including storm water) and be transported to other parts of the Site, or off-site and discharged to the received surface water body (Waiwhakaiho River). Previous environmental investigations by others have not identified storm water discharge from Site to the Mangaone Stream	**Likely** This pollutant linkage is potentially complete. However, the source of elevated nitrogen and ammonia may not be wholly from shallow groundwater.	**Likely** Unless impacted shallow groundwater (if present) is removed or remediated and necessary upgrades to storm water management system occur as part of proposed redevelopment.
				Off-Site			

5 REMEDIATION DRIVERS, GOALS, OBJECTIVES AND TARGETS

5.1 Remediation Drivers

5.1.1 Regulatory Requirements

Under the NESCS (regulation 10), remediation or soil management is required when contaminants are present above guideline values for protection of human health. According to the NESCS:

> *Remediation targets – where contamination is above the soil contaminant standard (SCS), then the SCS represents the maximum target concentrations of contaminants at or beneath which the land can again be considered "safe for human use" and the risk to people is considered to be acceptable.*

There are no SCS for asbestos in soil for asbestos. Therefore, the WA Asbestos Guidelines have been selected in accordance with Contaminated Land Management Guidelines No. 2. Other contaminants evaluated on site are below commercial/industrial SCS or other applicable guideline values. Therefore, remediation is required only for asbestos in soil.

For the Pa area of the Site, applicable recreational guidelines will apply. The soil sample collected from the Pa was analysed for asbestos, with none detected; however, additional assessment will be required as part of enabling works. Any soil imported to the Pa area of the Site must meet applicable recreational guideline values, such as NESCS Soil Contaminant Standards. It is noted that the PHC, 2011 Guidelines do not address recreational land use.

The plan for the Pa is to remove the topsoil and import fill material to build the site up. The Site is then to be capped with imported 'clean' soil and grassed. Therefore, contaminants will be capped by the imported 'clean' material and grass. The primary risk scenario to future uses to the Site will be minimal contact with grass and topsoil. It is unlikely significant direct contact with soil is likely by future users of the Pa Site.

Therefore:

- soils imported to the Pa site to build up the Site will be compared to the PHC, 2011 Commercial / Industrial guidelines.
- a conservative approach will be taken to soils imported to the Site for the use as capping, these soils will be compared to the PHC, 2011 Residential guidelines.
- consideration will also be given to maintenance/excavation workers during the remediation works, or if excavation is required in the future. On this basis, the PHC, 2011 Guidelines for Maintenance / Excavation workers has been selected for soils being used to build up the Site.

Consideration will also be given to the PHC, 2011 Guideline for protection of groundwater to assure that, if hydrocarbons are present, groundwater will not be adversely affected if soil is left in place. If soil from the commercial development site is to be placed at the Pa site, laboratory data for the imported soil will be evaluated against recreational guideline values. If adequate data are available, additional sampling and analysis will be conducted to verify that the soil is appropriate for use at the Pa site.

The NESCS states that remediation is a restricted discretionary activity if a detailed Site investigation has been conducted and accepted by the regulatory agency. As described earlier in this RAP, numerous investigations have been conducted at the site and the information available has been determined by NPDC to be adequate for decision making for remedial action.

If there is unexpected discovery of contamination during the remedial action works, sampling and analysis will be conducted to determine whether the contaminants are above applicable guideline values and whether remediation is required. This process is set out in the CSMP.

While the NESCS is the primary regulatory driver for remediation, the Health and Safety at Work Act 2015 is the primary driver for asbestos removal and management. The Worksafe Approved Code of Practice: Management and Removal of Asbestos (2016) establishes standards and requirements for asbestos removal. The remediation contractor is required to have qualified licensed personnel who will be responsible for asbestos removal and management. An asbestos removal plan, supplemented by dust and erosion control plans, a health and safety plan, and noise and vibration control plan will be required to support the remedial work. The contractor's plans are to be used in conjunction with this RAP and its associated CSMP.

5.2 Remediation Goals and Endpoints

The overall goal of the remediation is to: remove or encapsulate / cap contaminant impacted soils such that the proposed redevelopment can commence.

5.3 Remediation Objectives

The remediation objectives are the soil quality objectives as outlined in Table 7 (protection of human health) and Table 8 (protection of ecological receptors). Guideline values have been selected in accordance with the MfE Contaminated Land Management Guidelines No.2 (revised 2011).

Table 7: Soil Quality Objective – Protection of Human Health

CoPC	Guideline Value	Source Guideline	Rationale for Selection
Asbestos (as FA / AF)	0.001% w/w (all site uses)	Western Australia (WA) Department of Health (DoH) *Guidelines for the Assessment and Remediation of Asbestos Contaminated Sites in WA* (May 2009)	Most appropriate guideline available for evaluation of asbestos in soil risk. The "all Site uses" value will be used for the Pa area of the Site; the commercial/industrial value will be used for the remainder of the Site.
Asbestos (as ACM)	0.05% w/w (commercial / industrial)		
Arsenic, boron, cadmium, copper, inorganic lead, inorganic mercury, B(a)P, DDT, Dieldrin, PCBs, dioxins.	NES-Soil SCS 'Commercial / Industrial' or 'Recreational' (Pa area only)	MfE (2011) *NES for Assessing and Managing Contaminants in Soil to Protect Human Health*	Most applicable guideline and land-use scenario based on current and proposed future use.
TPH, BTEX, PAHs	Tier 1 PHC Guidelines for sand <1.0m – 'Commercial / Industrial' or 'Maintenance/ Excavation Workers' and 'Protection of Groundwater' (Pa area only)	MfE (revised 2011) *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Site in New Zealand*	MfE CLM Guidelines (revised 2011) requires application of New Zealand risk-based guideline values in the absence of NES. Guidelines chosen based on current and proposed use, soil type and sampling depth. Commercial / Industrial and Maintenance/Excavation worker criteria have been selected for the Pa site because Recreational values are not available in the guidance and because the Pa site will receive a significant amount cleanfill over the area which will act as a cap. Therefore, maintenance and excavation workers would be the only people likely to be exposed to contaminants at this portion of the site. Protection of groundwater values will also be used for the Pa site to verify that groundwater is adequately protected from contamination.
2-4 D	NEPM HIL, 'Commercial' or	NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999*	MfE CLM Guidelines (revised 2011) requires application of New Zealand risk-

CoPC	Guideline Value	Source Guideline	Rationale for Selection
	'Recreational' for Pa site.	*(Amendment No.1)* (2013), Schedule B7	based guideline values in the absence of NES. Where no New Zealand derived risk-based guideline is available, it is acceptable to use applicable overseas risk-based guideline values in accordance with the *Hierarchy of Documents Containing Guideline Values for Soil* (Table 5 - CLM Management Guidelines No.2). The NEPM HIL is relatively recent and a risk-based guideline that has guideline values for commercial and recreational land use activities.

Notes:
FA = Friable Asbestos
AF = Asbestos Fines
B(a)P = Benzo(a)pyrene
PCP = pentachlorophenol
PHC = Petroleum Hydrocarbon
Commercial / Industrial = commercial or industrial land use setting where limited exposure to accessible soils is likely by Site users.

Table 8: Soil Quality Objective – Protection of Ecological Receptors / Environment

CoPC	Guideline Value*	Source Guideline	Rationale for Selection
Heavy Metals	CCME *Canadian Environment Quality Guidelines – Soil* 'Commercial' ANZECC 2000 Guidelines – Leachate – 90% species protection	CCME *Canadian Environmental Quality Standards – Soil Quality Guidelines for the Protection of Environmental and Human Health (for total metals)* *ANZECC 2000 Guidelines for Freshwater Environments (for leachate)*	MfE CLM Guidelines (revised 2011) requires application of New Zealand risk-based guideline values in the absence of NES. Where no New Zealand derived risk-based guideline is available, it is acceptable to use applicable overseas risk-based guideline values in accordance with the *Hierarchy of Documents Containing Guideline Values for Soil* (Table 5 - CLM Management Guidelines No.2).
BTEX	CCME *Canadian Environment Quality Guidelines – Coarse Soil* 'Commercial'	CCME *Canadian Environmental Quality Standards – Soil Quality Guidelines for the Protection of Environmental and Human Health*	
TPH	NEPM ESLs – *Coarse Soils* 'Commercial and Industrial'	NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment No.1)* (2013)	
Nutrients (Sulphur	MfE EGV Database – Ecological Investigation Levels (EILs)	*National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment No.1)* (2013)	
Nutrients (Nitrates)	ANZECC 2000 Guidelines – Leachate – 90% species protection	*ANZECC 2000 Guidelines for Freshwater Environments (for leachate)*	

Notes:
CCME = Canadian Council of Ministers of the Environment
EGV = Environmental Guideline Value
NEPC = National Environment Protection Council (Australia)
Commercial / Industrial = commercial or industrial land use setting where limited exposure to accessible soils is likely by Site users.
Heavy Metals = Arsenic, cadmium, chromium, copper, lead, nickel, zinc.
*Recreational guideline values will be used for the Pa area of the Site.

5.4 Site Validation

Following the completion of the implemented soil remediation strategy, the soil validation and verification program will be implemented. The purpose of the soil validation and verification program is to confirm contaminant impacted soils have been remediated or are being properly managed.

6 REMEDIATION OPTIONS ASSESSMENT

6.1 Remediation Options Screening and Evaluation

Removal of primary sources of contamination, such as on-site buildings and structures with deteriorating building materials will remove future / ongoing potential risk to human health.

Thus, it is considered pertinent to undertake soil remediation concurrently with the implementation of deconstruction works at the Site. The main CoPC identified at the Site is asbestos / ACM, and is the main focus of this RAP. However, it is noted that any remediation option implemented, must be suitable for the remediation of secondary CoPC, including petroleum hydrocarbons, heavy metals, fertilisers (phosphate based and sulphate based), and acid impacted soils.

The remediation options summarised in our evaluations assessment (Table 9) focus on technically feasible technologies that would facilitate the remediation of soils at the Site. Remediation technologies that are not tailored towards the remediation of asbestos / ACM in soils (key CoPC) have been eliminated at the pre-assessment stage. This includes remediation technologies that while may be suitable for the remediation of other identified CoPC (such as hydrocarbons), may exacerbate the risk posed to human health by asbestos / ACM in soils during the execution of the remediation strategy (i.e. by mobilising asbestos / AC fines to atmosphere). Such remediation technologies not considered as part of this remediation options screening and evaluation include (but are not limited to) thermal desorption, soil vapour extraction (SVE), and *in-situ* chemical oxidation (ISCO) (and variants thereof).

Table 9 details the plausible remediation technologies / strategies that could be utilised at the Site to specifically target the remediation of asbestos / ACM contaminated soils (and by association, the secondary CoPC).

Table 9: Soil Remediation Options and Feasibility Summary

Remediation Technology	Remediation Technology Summary	Site Specific Application	Estimated Efficiency	Feasibility
Do nothing / status quo	No remediation undertaken. Redevelopment / earthworks undertaken in accordance with an Asbestos Management Plan, and significant contaminant impacts managed on an 'as required' basis in accordance with the CSMP. **Advantages:** Cost effective; minimises potential disturbance of soil and therefore dust generation. **Disadvantages:** Asbestos remains *in-situ* and therefore may pose a risk to future users; relies on minimal soil disturbance during redevelopment.	This method is not considered appropriate in light of the known extent of asbestos impacts to soil at the Site; and the known high likelihood of significant soil disturbance works required for the proposed development.	<10%	Technically possible.
Soil excavation and off-site disposal	Excavation of contaminant impacted soils from the Site, and subsequent disposal off-site at a suitably licensed waste disposal facility. Post-remediation / excavation validation will be required to confirm success of remediation. **Advantages:** Proven strategy, with a high success rate; targets areas of contaminant impact effectively; removes contaminants from the Site and thus reduces overall risk; and can be easily refined in the field based on observations and field screening. **Disadvantages:** Relies on adequate delineation of contaminant distribution (vertically and laterally); can be cost prohibitive; requires large number of samples for adequate stockpile characterisation; logistical constraints of ongoing truck / haulage movements; logistics of on-site stockpile management post excavation; and environmental impacts of disposing contaminated soils to landfill (and additional plant / haulage vehicles on road).	This strategy could be easily employed at the Site in consultation with the Remediation Contractor. Logistical issues such as space, open excavations and soil movements to and around the Site would require appropriate management. Most appropriate application on-site would be to categorise soils *in-situ* and bulk excavate for immediate off-site disposal. Subsequent validation sampling of resultant excavations would be required to confirm success of remediation (i.e. no concentrations of CoPC remaining above 'Remediation Objectives' in soil remaining *in-situ*).	>90%	Feasible, but potentially cost prohibitive.

Remediation Technology	Remediation Technology Summary	Site Specific Application	Estimated Efficiency	Feasibility
Excavation and relocation on-site to controlled area	Excavation and characterisation of soils to determine whether contaminant concentrations are such that while being unsuitable for use as clean-fill, may be possible to re-use on-site in a 'controlled area'. **Advantages:** Proven strategy; minimises cost and environmental effect of transport and off-site disposal; targets areas of actual contaminant impact; can minimise number of samples requiring analysis. **Disadvantages:** Contamination remains on-site; requires appropriate management before, during and after 'disposal'; can affect Site levels and future uses; can be additional up-front costs for 'Controlled Area' preparation; over-excavation of contaminated area is likely as a conservative approach to confirm no impacted soils remain *in-situ*.	This strategy could be easily employed at the Site in consultation with the Remediation Contractor. Logistical issues such as space, open excavations and soil movements to and around the Site would require appropriate management. Most appropriate action would be to prepare a 'Controlled Area' (typically a pre-existing excavation / in-ground pit) and line with a membrane that is not water permeable; highly visible; rot-proof and chemically inert) to prevent movement of contamination, and to act as a visual locator to future users should the area be excavated. The membrane should be installed to over-lap the boundary of the contaminated 'Controlled Area' by approximately 0.50m; with individual sheets also, over-lapping by 20cm and installed in accordance with manufacturers specifications. The proposed 'Controlled Area' is designated on ***Figure 2***.	>90%	Feasible, and likely suitable option for the Site.
Stabilisation *in-situ*	Leaving contaminant impacted soils *in-situ* with subsequent addition of lime (or similar) to stabilise pH and limit potential ongoing leaching of contamination to groundwater, followed by complete coverage by hard-stand (e.g. concrete / asphalt). **Advantages:** Minimal disturbance of soil, therefore minimal generation of dust; assumes all soils in a given area are contaminated so minimal additional classification samples required; significantly lower costs; greater confidence of outcomes. **Disadvantages:** Asbestos remains on-site; some future uses of Site eliminated (e.g. gardens, housing foundations).	Stabilisation is not considered appropriate for the Site given the proposed redevelopment will require significant soil disturbance; and the requirement for soils to be geotechnically suitable for building footings. In addition, stabilisation through addition of lime (or similar) is not considered an appropriate technique for asbestos stabilisation. Addition of concrete or polymer compounds to the soil to stabilise the soil would stablise the asbestos in soil; however, the cost is very high and the benefit is relatively small given that the site will be covered with hard stand.	>90%	Feasible, but very costly with minimal benefit.

Remediation Technology	Remediation Technology Summary	Site Specific Application	Estimated Efficiency	Feasibility
Chicken pick / visual clearance	Known as 'emu-bob' in the WA DoH guidance, involves hand picking all visible ACM greater than 7mm wide. The process involves three passes over an area collecting surface and shallow sub-surface ACM with a manual / mechanical rake capable of probing to 10cm depth (or to 30cm depth with a mechanical aid; known as 'Tiling'). The spacing between rake teeth should be no more than 7mm. ACM removed to be appropriately bagged and disposed of. **Advantages:** No contaminated soil requires off-site disposal; sampling can be combined with remediation works; cost effective. **Disadvantages:** Time consuming; not very efficient; not suitable for significant contamination of where FA or AF are present; only manages asbestos impacts (not other CoPC); limited suitability to sandy soils only; can generate significant amounts of dust; 'clearance' only valid on day of certificate.	This strategy could be employed at the Site as a first stage in an overall remediation strategy to remove larger pieces of visible ACM form the surface and shallow sub-surface prior to employing more intrusive remediation methods. The application would involve 'gridding' each area and deploying teams of personnel to conduct a walk over and rake of the areas, manually picking up visible pieces of ACM. Following this, further remediation strategies could be employed to complete the remediation works.	>75%	Feasible

Remediation Technology	Remediation Technology Summary	Site Specific Application	Estimated Efficiency	Feasibility
On-site screening of all soils (3-stage separation) prior to re-use on-site / off-site disposal as clean fill	Dry soils are excavated from source and screened through a 3-stage separator (mesh of 3 difference sizes – final mesh of 7 x 7 mm) that segregates larger material from finer material. The resultant 3-stockpiles are then hand screened to remove pieces of bonded ACM. The resultant stockpiled soils are then considered to be clean fill (assuming acceptable concentrations of other CoPC are present) and can be re-used on-site / disposed off-site as clean-fill. **Advantages:** Effective method of removing bonded ACM; can be completed in conjunction with other remediation techniques; allows an accurate w/w % to be calculated based on amount of ACM removed and volume of soils screened; efficient when large volumes of soil require remediation. **Disadvantages:** Limited to soils impacted with bonded ACM only, if FA/AF asbestos present, technique is not suitable; does not remediate other CoPC; required ongoing air monitoring; equipment subject to regular maintenance and shut-downs due to blocked screen / mesh; can be cost ineffective; requires large areas and ongoing logistical management that affect other Site activities.	This method is not considered a viable option for the Site given the logistical constraints on space and other activities taking place on-site. Additionally, a large portion of identified asbestos impact at the Site is as FA/AF and this technique is unsuitable. It is also noted that this method does not remediation the other CoPC in soil and would therefore require further sampling / treatment prior to characterisation as suitable for 'clean-fill'.	>80%	Unfeasible. Too cost and schedule prohibitive.

6.2 Conclusions and Preferred Remediation Strategy

Based on asbestos / ACM being the primary contaminant in soil at the Site, remediation strategies screened and evaluated have been those that are specifically proven in minimising / abating the risk posed by asbestos in soil. 4Sight acknowledges that the remediation options presented in Table 9 is not an exhaustive list of all potential remediation technologies available. However, 4Sight has pre-screened remediation strategies deemed inappropriate, unfeasible or unsuitable for the remediation of asbestos / ACM in soil from the assessment. Additionally, 4Sight has not considered remediation technologies where limited or no evidence was available for their successful application within New Zealand.

Due to the impracticalities and limitations of physically screening all asbestos / ACM impacted soils at the Site (especially given the noted presence of friable asbestos from deteriorating building materials), soil remediation will be conducted in a staged approach as follows, incorporating a mix of remediation strategies outlined above:

1) Initial 'Chicken-pick' across likely remediation areas, extending approximately 5.0 linear metres from buildings to visually inspect and manually remove visible pieces of ACM to the extent practicable.

2) Adopting a 'Presumptive Remedy' approach, assume all soils in upper 50mm of landscaped areas within an approximate 5.0 linear metres adjacent to on-site buildings containing ACM are 'asbestos contaminated' unless demonstrated 'clean' by sampling and analysis. These soils will be bulk excavated and disposed of off-site at a suitably licensed facility as 'asbestos waste'.

3) Subsequent inspection of soil, excavation and stockpiling on-site for further characterisation as to whether soil is: Contaminated – requires off-site disposal, or can be managed on-site in a *Controlled Area* or under buildings/hard stand in specific areas; or Not Contaminated – suitable for on-site re-use in all areas.

4) Subsequent validation of remediated areas to determine appropriate management of the area, as described in Section 8.

Further details on the proposed approach for the execution of the soil remediation strategy is provided in Section 8.

In general, contaminant impact to soils by other CoPCs (petroleum hydrocarbons, PCBs, acidic soils and heavy metals) are consistent with the areas of impact of the primary CoPC (asbestos / ACM). Therefore, it is considered that remediation of secondary CoPC will occur concurrently with that of the primary CoPC, given the proposed remediation strategy of excavation and subsequent management based on contaminant concentrations. Note that none of the secondary CoPC have been reported concentrations above applicable guideline values.

This remediation strategy has been chosen as the most likely to achieve the success required with consideration to the proposed retail / commercial redevelopment of the Site, in the desired timeframes. It also provides for beneficial reuse of soil on Site.

7 REMEDIATION FEASIBILITY STUDIES

7.1 Technical Aspects

The proposed remediation strategy of soil excavation and a combination of: excavation and off-site disposal; on-site management; and capping and covering impacted soil is a proven method of soil remediation.

Currently, 4Sight has a reasonable understanding as to the distribution of asbestos / ACM within soils at the Site (based on findings from previous environmental investigations conducted by others). Based on the available data, and by taking a 'presumptive remedy' approach (of assuming all soils in landscaped areas extending 5.0m laterally from ACM buildings are contaminated unless proven otherwise), 4Sight has inferred the lateral and vertical (0.05 to 1.0 m depth) extent of asbestos / ACM impacted soils. The areas shown on Figure 2 indicate areas that require active remediation to facilitate the proposed retail / commercial redevelopment of the Site. As such Figure 2 is to be utilised as a primary reference of areas requiring remediation during the execution of the remediation strategy as detailed in this RAP.

Following the completion of the asbestos in soils remediation strategy, a validation and verification soil sampling program comprising of soil sampling at the vertical and lateral extents of remediation area, will be implemented to confirm the success and completion of remediation (i.e. no asbestos / ACM impacted soils remaining *in*-situ in remediation areas). If concentrations of asbestos / ACM remain in soil at concentrations above the respective remediation objectives, further delineation and remediation may be required.

4Sight proposes to undertake post-remediation soil validation following the decommissioning and removal of the waste oil UST and associated infrastructure (if present), and bulk excavation of immediately abutting soils. If concentrations of petroleum hydrocarbons (and other CoPCs) remain in soil at concentrations above the respective guideline values, further delineation and remediation may be required. This RAP will be updated to reflect this.

The advantages and disadvantages of the proposed remediation strategy are discussed in Table 9. 4Sight concludes that the disadvantages associated with this remediation strategy can be adequately mitigated by undertaking the remediation strategy as per the approach detailed in this RAP.

It is acknowledged however, that this remediation strategy, while an established technique, is perceived as being rudimentary, and that the net benefit to the environment is minimal (i.e. relocation of contaminant impacted soils from one location to another). However, in the absence of other proven or more feasible technologies to cost-effectively remediate asbestos / ACM impacted soils, 4Sight concludes that this strategy is the most appropriate for the Site.

The proposed excavations and 'controlled area' (for on-site management) as shown in Figure 2 are considered appropriate based on our current understanding of the extent of asbestos, ACM and other CoPC impacts to soils at the Site.

Remedial action controls, such as stockpile management, erosion and sediment control, dust controls, worker health and safety precautions, and response to unexpected discovery of contamination are described in detail in the Contaminated Site Management Plan (CSMP).

Scale 1:2500 @ A4

0 50 100m

AA2773 – Ravensdown New Plymouth

Figure 2: Remedial Action Areas

Plan prepared for Nikau Contractors Limited by 4Sight Consulting.

Date: 27/02/2018
Version: 1.1
Drawn: Sam Hendrikse
Checked: James Blackwell
Approved: Terre Maize

4SIGHT CONSULTING

8 REMEDIATION STRATEGY

8.1 Proposed Approach

Prior to implementing the remediation strategy, existing soil contamination data will be reviewed and maps/figures will be verified.

Table 10 details the approximate chronology of activities to be undertaken in the implementation of the remediation strategy in the commercial/industrial area. A flow-chart detailing this chronology is provided in Appendix E. The Pa area of the Site is discussed separately in Section 8.3.

Table 10: Chronology of Proposed Remediation Activities

Chronology	Activity	Description
1	Review of proposed remediation excavation location and dimensions.	Data reported in previous environmental investigations (by others) will be reviewed to verify the extent of the proposed excavations are suitable to meet the remediation goals and objectives.
2	Pre-works additional sampling and analysis	Additional soil sampling and analysis will be conducted and will include: ▪ Fire pond and garden area; ▪ The mixture bag area; ▪ Rail siding area; and ▪ Pa site.
3	Soil Excavation of top-soil (top 50mm) from landscaped areas and off-site disposal	Utilising a 'Presumptive Remedy' approach, all landscaped soils not demonstrated to be free of ACM in the upper 50mm of the soil profile, extending approximately 5.0m laterally from buildings containing / suspected to contain asbestos / ACM are considered to be 'asbestos contaminated' for the purpose of the soil remediation works. All 'asbestos contaminated' soils will be bulk excavated from the source into suitably licensed haulage trucks and disposed of off-site at a suitable licensed facility as 'asbestos waste'. All contaminated soil / waste disposed of off-site to be conducted as per the 'cradle to grave' policy as outlined in the CSMP.
4	Soil excavation to depth through fill material and stockpiling	Remediation of soils below 50mm depth within 5.0m laterally from buildings on-site will be completed through a targeted approach based on a review of previous environmental investigation data, and field observations obtained during the initial bulk excavation of the upper 50mm of the soil profile. Excavated soils will be stockpiled on-site as 'fill' or 'natural'; with further separation of stockpiled soils as to whether they are likely to be contaminant impacted (based on field observation and existing sampling data). Soil samples will be collected from each of the stockpiles for subsequent laboratory analysis for a quantitative evaluation of asbestos. Other CoPCs may also be analysed, depending on the location of the excavation, field observations, and previous data. Stockpiles will be appropriately managed in accordance with the CSMP. Once the stockpiled soil has been adequately assessed, it will be reused on -site, sequestered onsite, or transported off-site for appropriate disposal.

Chronology		Activity	Description
5	a	Off-Site disposal of 'Contaminated Soil'	If soils require off-site disposal, a suitably licensed haulage contractor will be engaged to transport and dispose of contaminated soils to a suitably licensed facility, licensed to receive contaminated (asbestos impacted) soils. Soil that contains contaminants other than asbestos above background concentrations (which cannot be considered 'Clean Fill'), but below selected remediation goals will be disposed of at an appropriately licensed facility; or reused on-site if contaminant concentrations are at concentrations that would not pose a risk to the protection of groundwater/surface water Additional details are provided in the CSMP.
	b	On-Site management in 'Controlled Area' of 'Contaminated Soil'	If soils can remain on-site, they may be disposed of in a 'Controlled Area' as part of a 'Cut and Cover' approach. The 'Controlled Area' has been chosen as an area of minimal impact to the proposed redevelopment (likely to be covered by customer and staff car-parking). The 'Controlled Area' will be lined with 'industrial-grade' polyethylene sheeting prior to depositing any soils. The purpose of the liner is to protect the surrounding soils, groundwater, and nearby Mangaone Stream from potential contamination. Soils deposited in the 'Controlled Area' will be covered at the end of each working day, and permanently covered at the completion of the soil remediation works with an 'industrial grade' polyethylene sheeting prior to subsequent 'entombment' as part of the construction of a car-park in the area (as part of the proposed redevelopment). Soils will be tracked to the 'Controlled Area' from the excavation areas by the remediation contractor. A 'cradle to grave' policy as outlined in the CSMP will be adopted to track and document waste soils disposed of in the 'Controlled Area'.
	c	On-Site re-use of 'Non-Contaminated Soil' as 'Clean-fill'	If soils are designated as 'Non-contaminated' and are suitable for re-use on-site as 'Clean-Fill', they will be stored / stockpiled on-site in a suitable area in preparation for use for as 'Cut and Fill' material as part of the proposed redevelopment of the Site. "Non-contaminated" soil is defined as soil with all CoPC concentrations below applicable guideline values. Consideration will be given to potential ecological risk from CoPCs when determining appropriate soil placement and reuse to ensure protection of the stream. Any material to be reused on the Pa area must meet Recreational guideline values for all CoPCs. The number of samples collected and analyses conducted will be dependent on the area from which the soil is sourced and the amount of data available. Where adequate data are not available, additional sampling and analysis will be conducted at the discretion of the SQEP overseeing the works. In general, ▪ A minimum of one sample per 500 m^3 of non-native soil will be collected and analysed for CoPCs. ▪ Native soil will be sampled at a minimum rate of one sample per 1,000 m^3. Fewer samples may be collected and analysed if the SQEP overseeing the works can provide evidence that less sampling is required. CoPCs will be determined based on results of previous environmental investigations. Suitable reuse locations will be determined by the SQEP overseeing the works and will be based on laboratory analytical

Chronology		Activity	Description
			results, which may include leachability testing, such as through the synthetic precipitation leaching procedure (SPLP) or toxicity characteristic leaching procedure (TCLP). Soil imported from off-site must be certified "clean" by the supplier. Material direct from a quarry will not require sampling and analysis. Material imported from other sites must have adequate data to demonstrate that concentrations of metals are at or below background values and other contaminants (such as hydrocarbons) are below guideline values for the intended land use. Soil which has not been adequately assessed (as determined by the SQEP overseeing the works) will not be imported or used on site. During storage, soils will be appropriately managed in accordance with the CSMP to minimise the generation of dust and waste tracked across the Site. It is noted that "non-contaminated soil" as defined herein may not meet the cleanfill landfill disposal requirements as concentrations of specific CoPCs may be above recognised background values or hydrocarbons may be present. Only soil verified as meeting the cleanfill disposal requirements will be transported to and disposed of at a cleanfill facility. Other material which is transported off-site will be disposed of at an appropriately licensed facility.
6		Confirmation sampling of excavation extent	Throughout the soil remediation works (specifically the excavation phase), confirmation samples will be collected from the walls and base of the excavation to ascertain whether further excavation is necessary to remove contaminant impacted soils. If further excavation is necessary, return to item 1.
7		Validation and Verification Sampling	Following confirmation sampling and completion of all soil excavation works to remove contaminant impacted soils; validation and verification soil samples will be collected to confirm that soils remaining *in-situ* are below the remediation objectives, and do not pose a risk to human health and/or the environment in light of the proposed redevelopment.
7		Excavation backfill / earthworks (as per Cut and Fill requirements for the proposed redevelopment).	Following the completion of excavation and soil remediation works as scoped in this RAP, a decision will be made as to the backfill requirement of the excavations. It is currently proposed to discuss with the Client and earthworks contractor as to the most appropriate course of action (i.e. whether the remediation excavation locations require backfill, or whether management of excavations post-remediation will occur as part of the Cut and Fill enabling works for the proposed redevelopment.

The methodology for the tasks listed in Table 10 is detailed in the following sub-sections.

8.2 General Site Remediation

8.2.1 Pre-works Sampling and Analysis

While the Golder reports have addressed most of the data gaps for the site, there is some remaining information required. These remaining data gaps will be addressed as described below.

8.2.1.1 Fire Pond and Garden Area

The fire pond and garden area reportedly had uncontrolled fill present. Soil was reportedly removed from the fire pond and garden area; however, documentation to demonstrate this removal or the contamination status of the remaining soil is not available. Therefore, additional sampling and analysis is required to validate the soil remaining in place. Soil samples will be collected using a shovel, trowel, and/or hand auger and analysed for heavy metals, TPH, PAH, and asbestos. A minimum of four samples will be collected from each area. Samples will be collected from the near-surface (approximately 0 to 150 mm) and the shallow subsurface soils (approximately 150 to 300 mm) bgs (or below the topsoil layer). The deeper samples will be placed on cold hold and the upper samples will be analysed by an accredited laboratory.

8.2.1.2 Mixture Bag Area

The DSI report conducted by Golder indicated that 2-4 D had been used in the mixture bag area; however, this analyte was not included in the laboratory analyses. A minimum of three locations will be sampled in this area. Soil samples will be collected from the near-surface (approximately 0 to 150 mm) and the shallow subsurface soils (approximately 150 to 300 mm) bgl at each location. All four samples will be analysed for 2-4 D. It is noted that the 2017 Golder investigation found a concrete pad adjacent to the building; therefore, sampling could not be completed. A concrete cutting contractor will be organised to allow access to underlying soils. Alternatively, the Deconstruction Contractor may choose to remove the slab to allow access.

8.2.1.3 Rail Siding Area

The rail siding area was sampled and analysed for a wide variety of contaminants; however, heavy metals were not analysed. Attempts by Golder to sample this area in 2017 were not successful due to the presence of large rocks and gravel. Therefore, an excavator will be used to access the soil and collect samples to be analysed for heavy metals. A minimum of four samples will be collected from this area.

8.2.1.4 Pa Site

There was limited sampling for asbestos conducted at the Pa Site; however, it has not been fully assessed. The source of the fill material is not known, therefore, it must be treated as uncontrolled fill. As described in Section 8.3, below, soil sampling will be conducted following removal of the topsoil. A minimum of 12 sample locations will be identified across the site. A grid-based sampling scheme will be used with samples collected from at least two depths. Where there are variable soil layers present, additional samples may be collected and analysed. A small excavator will be utilised for sample collection. All shallow samples will be analysed for heavy metals, TPH, and asbestos. A minimum of three samples will also be analysed for PAH and PCBs. If hydrocarbon staining is present, the hydrocarbon-stained soils will also be analysed for PAH and PCBs. If required for disposal, TCLP analysis will also be conducted for heavy metals on the sample(s) with the highest concentrations.

8.2.2 Excavation Methodology

As briefly described in Table 10, excavation activities will proceed as follows.

1) Erosion and sediment controls will be installed;
2) Hard-stand areas will be identified for soil stockpiling and run-on/run-off controls established;
3) Plastic-line bermed areas will be established where hard stand is not available for stockpiling soil;
4) Dust control equipment will be established;
5) The containment area will be lined with high-density polyethylene sheeting in preparation for receiving contaminated soil;

6) The top 50mm of soil in landscaped areas adjacent to buildings with ACM will be excavated and transported off-site for disposal at an appropriately licensed landfill;

7) Where asbestos has been detected above guideline values at depths greater than 50 mm, an additional 70 to 100 mm of soil will be excavated and stockpiled;

8) The uppermost 50 to 120mm of soil in unpaved areas adjacent to buildings with ACM will be excavated and stockpiled. The depth of the excavation will be based on the previous sampling results;

9) Stockpiled soil will be sampled and analysed with a minimum of one representative sample per 100 cubic metres of soil collected and analysed for asbestos (quantified). If the area previously had heavy metals present above background concentrations, samples will also be analysed for those metals using the Toxicity Characteristic Leaching Procedure (TCLP):

   a) If stockpiled soil concentrations are below commercial/industrial guideline values for asbestos and leachable metals are below ANZECC 2000 guidelines for 90% freshwater species protection the soil may be reused anywhere on site or disposed of as cleanfill provided it meets the cleanfill facility's guidelines.

   b) If stockpiled soil concentrations are below commercial/industrial guideline values for asbestos and leachable metals are above ANZECC 2000 guidelines for 90% freshwater species protection the soil may be reused on site in areas at least 50m away from the stream and where the soil will be capped with cleanfill and pavement and the excavation does not intercept groundwater. It may also be disposed of off-site at an appropriately licensed facility.

   c) If stockpiled soil concentrations are above commercial/industrial guideline values for asbestos and leachable metals are below ANZECC 2000 guidelines for 90% freshwater species protection, the soil may be placed in the controlled area or in areas where at least 200 mm of soil and pavement will be placed over the impacted soil. Placement of soil will be documented and shown on site drawings. It may also be disposed of off-site at an appropriately licensed facility.

   d) If stockpiled soil concentrations are above commercial/industrial guideline values for asbestos and leachable metals are above ANZECC 2000 guidelines for 90% freshwater species protection, the soil may be placed in the controlled area or areas at least 50m away from the stream where at least 200 mm of soil and pavement will be placed over the impacted soil. Placement of soil will be documented and shown on-site drawings. It may also be disposed of off-site at an appropriately licensed facility.

   e) If hydrocarbons are present in the soil below guideline values and analysis of other CoPCs demonstrate the soil is suitable for reused on site, the soil may be reused on-site provided it is placed at least 50m away from the stream, under a building, or in the controlled area. It may also be disposed of off-site at an appropriately licensed facility. If the hydrocarbons detected are degraded "heavy end" hydrocarbons, it may be placed in the controlled area.

10) Underlying soil will be sampled and analysed for asbestos to determine whether additional excavation is required. The current plan calls for excavation to at least 200 mm below ground surface in all areas which are not covered with hard stand material. The underlying soil will be sampled using a grid-based approach as described in Contaminated Land Management Guidelines No. 5. Samples will be analysed for asbestos (quantified):

   a) If underlying soil is below guideline values for asbestos and leachable heavy metals it will be considered "non-contaminated" and may remain in place or be excavated and reused on site. No additional management controls will be required beyond good construction practices and the requirements listed in the CSMP.

   b) If underlying soil is excavated to the required final depth (per cut and fill plans) and is geotechnically suitable for final intended use, and:

      i. If soil is above guideline values for asbestos and below ANZECC 2000 guidelines for leachable metals, it may remain in place provided a geotechnical marker fabric is placed over the in-situ soil and the location documented on site drawings.

ii. If soil is above guideline values for asbestos and above ANZECC 2000 guidelines for leachable metals, it may remain in place provided a geotechnical marker fabric is placed over the in-situ soil and the location documented on site drawings.

11) If the soil is less than 50m from the stream, a qualified ecologist will evaluate whether the leachable metals may pose a risk to local ecology. If so, the soil may be reused elsewhere (i.e., at least 50m away from the stream or under a building) or disposed of off-site at an appropriately licensed facility. If not, the soil may remain in place.

Note that all soil reused on site must be geotechnically appropriate for its end use.

8.2.3 Validation Sampling and Analysis

Validation sampling will be conducted in accordance with Contaminated Land Management Guidelines No. 5 and the Western Australia Asbestos Guidelines.

The Contaminated Land Management Guidelines No. 5 will be used to guide the sampling strategy. A grid-based sampling strategy will be used with the grid size based on approximate 10 to 30 metre centres, depending on the overall size of the area. Where areas are smaller than 10 by 10 metres, a minimum of three samples will be collected from the area.

Collection of soil samples will be in accordance with WA Asbestos Guidelines. Soil will be placed in a clean (decontaminated) bucket and visible asbestos fragments removed and collected in a clean plastic zipper bag. Soil will then be placed in a laboratory-provided container and sieved by the laboratory to separate sample fractions >10 mm, 10 mm to >2 mm, and <2 mm fractions. Samples will be evaluated for weight/weight percent (wt/wt %) of asbestos and compared with WA Asbestos Guidelines for commercial/industrial land uses.

Hills Laboratories, an International Accreditation New Zealand (IANZ) accredited laboratory, will be utilised for the semi-quantitative analysis of asbestos in soil. Standard quality control/quality assurance protocols will be used with a minimum of 5% duplicate samples collected from across the Site. All equipment will be decontaminated prior to use and following each use (i.e., between samples). Personnel will wear appropriate personal protection equipment and change gloves between samples. Samples will be shipped to the laboratory under chain of custody protocols.

8.2.4 Validation Report

A validation report will be prepared in accordance with Contaminated Land Management Guidelines No. 1. The report will include a summary description of activities conducted, variations from this RAP, validation sampling and analytical results, and an evaluation of risk. The report will also state whether the site is appropriate for its intended future use.

The CSMP will be updated/revised to reflect precautions to be taken during post-remediation earthworks and will include a procedure for unexpected discovery of contamination. A long-term management plan will also be developed and will include scaled drawings showing where impacted soils have remained on site.

8.3 Pa Area

The redevelopment plan calls for the Pa area to be built up to the approximate grade of the existing commercial Site. A qualified archaeologist has evaluated the Site and concurs with the plan for remedial action as the planned cap will protect any underlying artefacts.

Only limited sampling has been conducted at the Pa area; therefore, additional assessment will be conducted prior to any excavation works. The first step will be to remove topsoil to a depth of approximately 50 mm (below the root zone of the grass). The topsoil will be disposed of off-site at an appropriately licensed facility. The remaining fill material will be removed as it is not geotechnically appropriate for use at the site. This fill material will be stockpiled and assessed as described in Section 8.2, and disposed of off-site or reused on the adjacent commercial site if CoPCs are below commercial/industrial guideline values.

A layer of geotextile marker fabric will be emplaced over the soil to remain in situ. Soil imported from the adjacent commercial development site or from off-site will be used to build up the Pa area to the desired grade. Should contaminated soil be left in-situ, it will be essentially capped in place by the imported fill. Note that only soil meeting recreational guideline values will be imported to the Pa area. It should be noted that the historian who has conducted research at the site believes that this capping scenario is the most appropriate method for preservation.

Validation sampling and reporting will be as described in Section 8.2.

8.4 Potential UST

The previous environmental investigations stated that USTs were historically present at the site. With the exception of a waste oil UST, the other USTs were reportedly removed. At this time, it is not clear whether the waste oil UST was previously removed or if it is still present. As part of the RAP, the reported location of the waste oils UST will be investigated. If the UST is still present, it will be removed in accordance with permitted activity NESCS standards. Associated fill material and soil will be field screened using a photoionisation detector (PID). Soil samples will be collected to evaluate the concentrations of hydrocarbons present (if any) in soils remaining following removal of the UST. Shallow soil (less than 2 m deep) impacted by hydrocarbons that is above commercial/industrial guidelines will be removed from the site and disposed of at a licensed facility. Soil with concentrations below commercial/industrial guidelines may be reused on site beneath buildings (assuming geotechnical suitability). If hydrocarbons are present in the soil, it will not be placed adjacent to the stream. Any contaminated soil remaining on site will be surveyed and noted on drawings. Should soil beyond the permitted activity threshold require removal, it will be conducted under this RAP as a restricted discretionary activity.

8.5 Excavation Backfill

Only on-site soil evaluated for re-use or off-site soil which has been certified clean, may be used as backfill on the site. Before re-use on site, soil will be evaluated to ensure that it will not contribute to groundwater contamination or elevated risk to human health or the environment. As described earlier, sample frequency and analytes will be determined based on the source of the soil as well as its proposed placement. Where it is possible that contaminants could impact groundwater, additional analyses (such as for nutrients and/or leachability) will be added to the analytical suite.

8.6 Health and Safety

The Health and Safety at Work Act 2015 provides requirements for worker health and safety during asbestos removal and construction activities. These requirements, as they apply to this project, are detailed in the contractor's site-specific health and safety plan and the 4Sight site-specific health and safety plan. Information is also provided in the CSMP.

REFERENCES

Australian Government. 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Ammendment No. 1 2013)*. National Environment Protection Council, Canberra, Australia.

BTW Company, 2017. *Geotechnical and Foundation Report*.

Canadian Council of Ministers of the Government, 2017. *Canadian Environmental Quality Guidelines*. http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/

Environmental Protection Agency [EPA]. (2011). *Hazardous Substance Incidents Reports*. Retrieved from http://www.epa.govt.nz/about-us/monitoring/Pages/HS-incident-reports-archive.aspx, accessed 28 August 2017.

EPA, 2015. *Health and Safety at Work Act*.

ERM, 2017. *Ravensdown, 51 Smart Road, New Plymouth, Asbestos Survey Report*.

Geological and Nuclear Sciences (GNS). 2000. 1: 250,000 map series *Map 10 – Wellington*.

Golder Associates (Golder), 2013. *Detailed Site Investigation, Ravensdown New Plymouth Store, Proposed Lot 1.*

Golder, 2015. *Detailed Site Investigation of Upper Level, Ravensdown New Plymouth Facility.*

Google® Earth™. (2017).

Ministry for the Environment. 2004 (revised 2011). *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*. Ministry for the Environment, Wellington, New Zealand.

Ministry for the Environment. 2011. *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*. Ministry for the Environment, Wellington, New Zealand.

Ministry for the Environment. 2011. *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*. Ministry for the Environment, Wellington, New Zealand.

Ministry for the Environment, 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Nikau Group, 2017. *Asbestos Removal Control Plan, Ravensdown New Plymouth*.

Rosen and White, 2001. New Zealand Hydrological Society publication *Groundwaters of New Zealand.*

URS New Zealand Limited. 2003. *Determination of Common Pollutant Background Soil Concentrations for the Wellington Region* (Prepared for Greater Wellington Regional Council).

United Stated Environment Protection Agency. 1993. *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons*.

Worksafe (2016). Approved Code of Practice: Management and Removal of Asbestos

LIMITATIONS

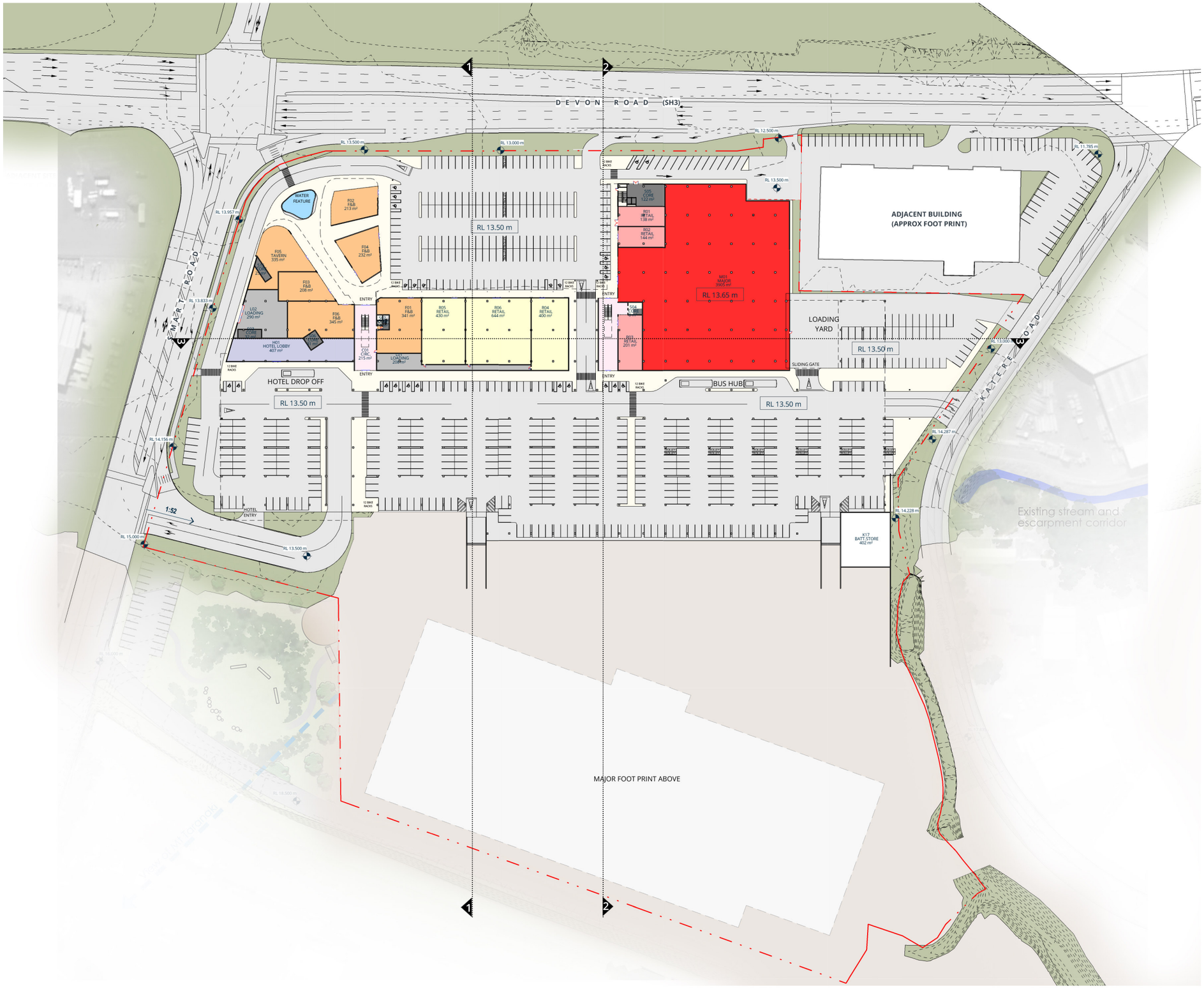
This document does not include any assessment or consideration of potential health and safety issues under the Health and Safety at Work Act 2015. 4Sight Consulting has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by 4Sight Consulting. This document may be transmitted, reproduced or disseminated only in its entirety.

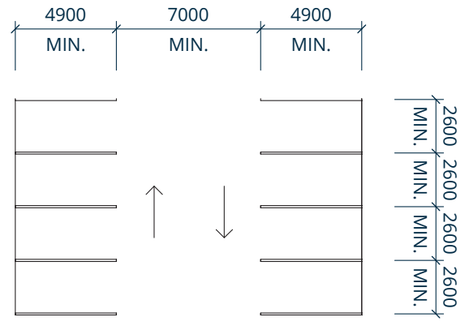
From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour and chemical movement. 4Sight Consulting's professional opinions are based on its professional judgement, experience, and training. No amount of sampling and analysis can guarantee that a site is free from contamination. These opinions are also based upon data derived from the testing and analysis described in this document. It is possible that additional testing and analysis might produce different results and/or different opinions. This RAP has been prepared based on available information. While industry best practice will be followed during the remediation, the remedial action and validation cannot guarantee that the site is free of contamination.

This document was prepared based on information provided by others. Should additional information become available, this report should be updated accordingly.

Appendix A:

Proposed Development Plans





MINIMUM SITE PARKING STANDARD

- AMENITIES
- CARPARKING
- CINEMA
- CIRCULATION
- COMMERCIAL
- CORE
- F&B SEATING
- FOOD & BEVERAGE
- HOTEL
- KIOSK
- LOADING / BOH
- MAJOR 1
- MAJOR 2
- RETAIL - LFR
- RETAIL - SPECIALTY
- SERVICES
- HARDWARE SHOP

SCALE
1:1500
@ A3

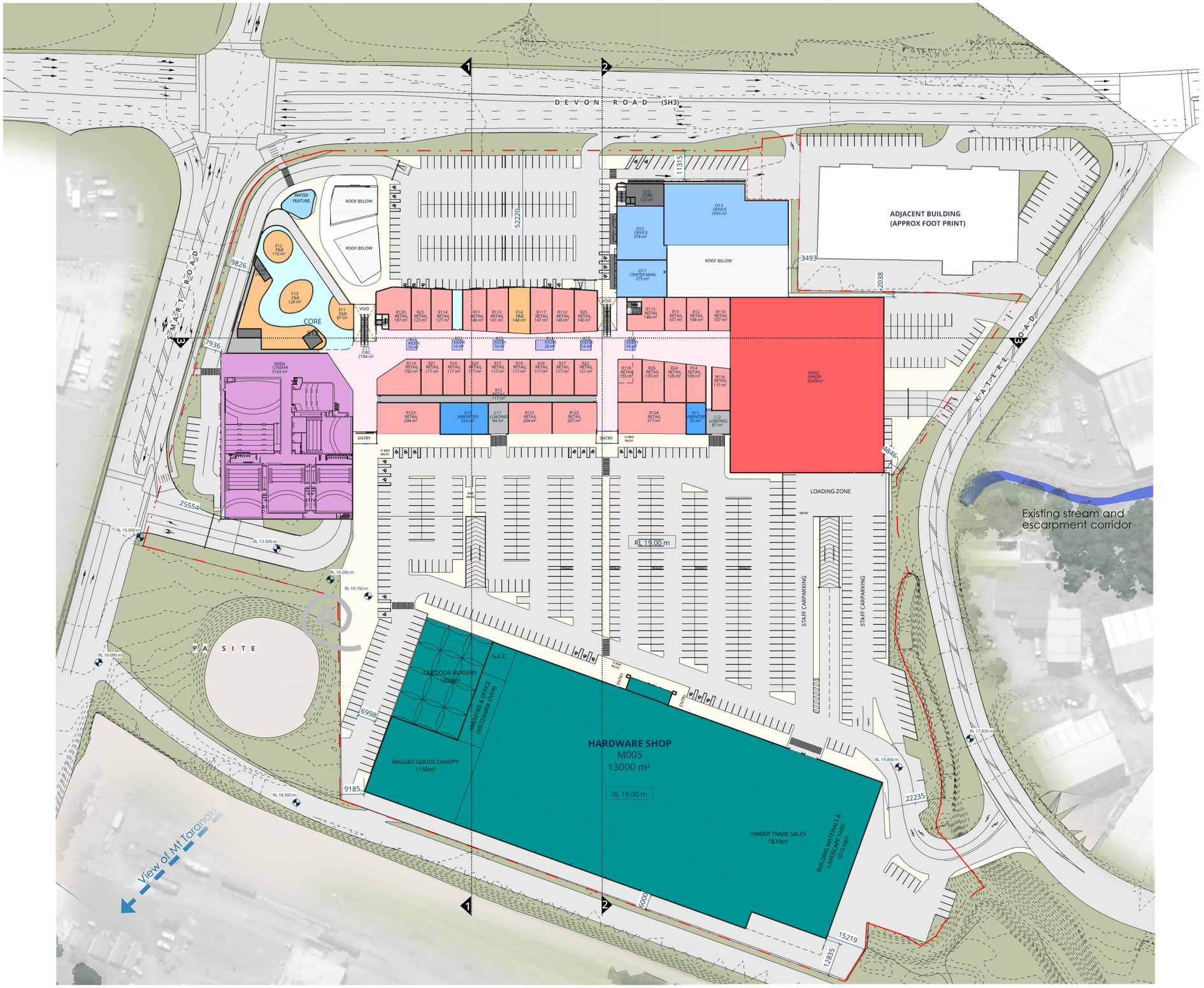
LOWER GROUND SITE PLAN

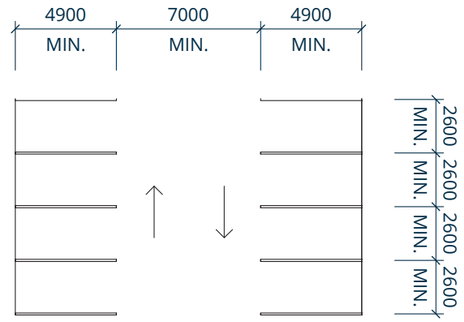
BLUEHAVEN MANAGEMENT

1433-002 SHT - RC 012

REV 2 | JULY 2018

IGNITE





MINIMUM SITE PARKING STANDARD

- AMENITIES
- CARPARKING
- CINEMA
- CIRCULATION
- COMMERCIAL
- CORE
- F&B SEATING
- FOOD & BEVERAGE
- HOTEL
- KIOSK
- LOADING / BOH
- MAJOR 1
- MAJOR 2
- RETAIL - LFR
- RETAIL - SPECIALTY
- SERVICES
- HARDWARE SHOP

SCALE 1:1500 @ A3

UPPER GROUND SITE PLAN

BLUEHAVEN MANAGEMENT

1433-002 SHT - RC 013

REV 2 | JULY 2018

IGNITE

Appendix B:

Data Quality Objectives

Data Quality Objectives

The data quality objectives (DQO) process represents a systematic planning approach that is used to define the type, quantity and quality of data needed to make informed decisions relating to the environmental condition of a Site. The DQO process was developed to ensure that efforts relating to data collection are cost effective, by eliminating unnecessary, duplicative or overly precise data, whilst at the same time ensuring the data collected is of sufficient quality and quantity to support defensible decision making.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before the data collection begins, and then develop a data collection design based on these criteria. By using the DQO process to plan the assessment effort, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resourceful and cost-effective manner.

The DQOs for the Remedial Action Plan are defined in seven steps as, as detailed below:

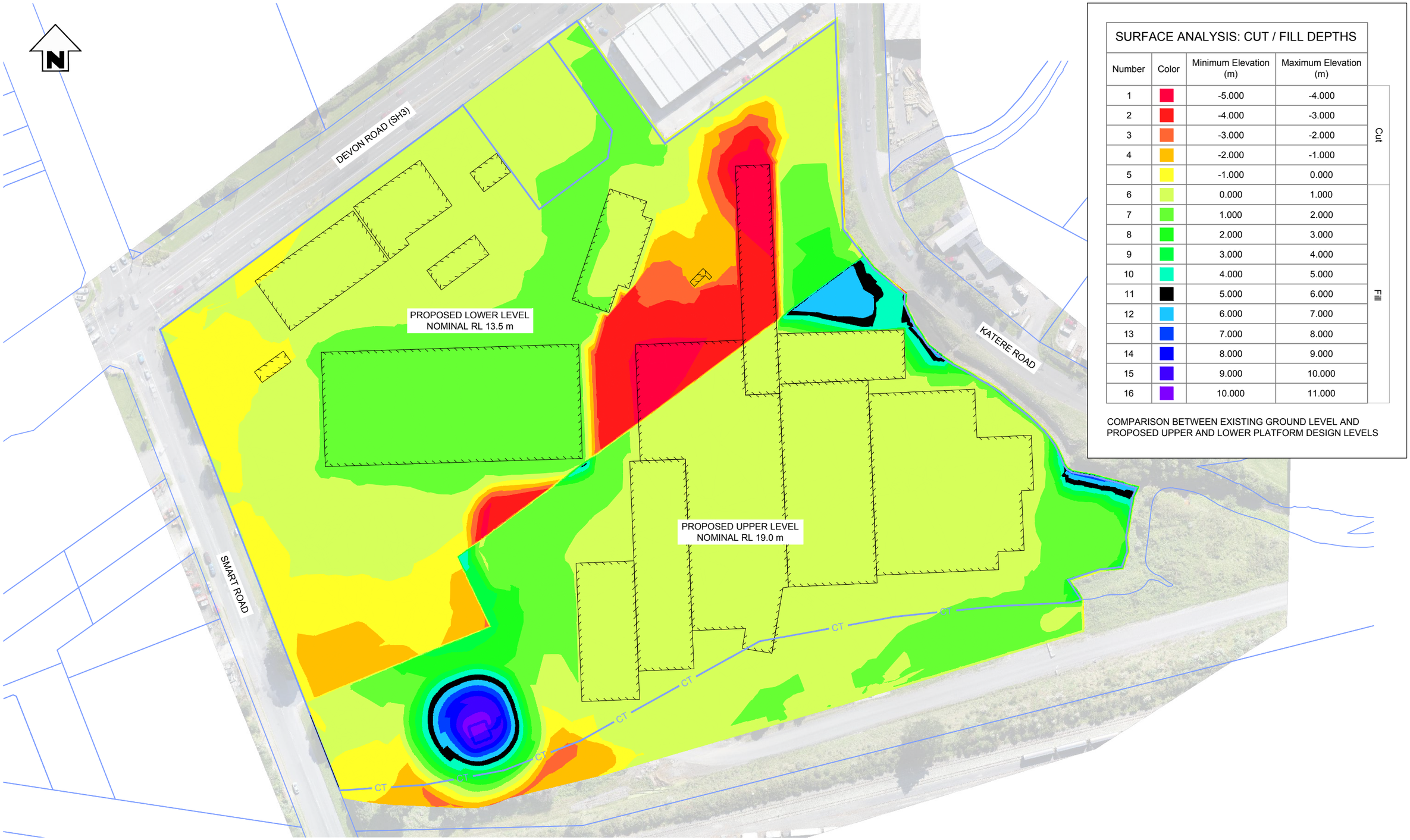
State the Problem	The Site is located at 51 Smart Road, Waiwhakaiho, New Plymouth (as detailed in ***Figure 1***). The purpose of the Soil RAP is to document the methodology of remediating soil at the Site to support the proposed retail / commercial redevelopment of the Site. The Site has historically been used for fertiliser manufacture, storage and distribution. The Site is currently utilised by Ravensdown as a fertiliser storage and distribution facility. Manufacture of fertilisers no longer occurs at the Site. The Site is separated into 3 portions; Lower Platform (northern portion of the Site); Upper Platform (southern portion of the Site); and the Pa Area (south-western corner of the Site). Asbestos contaminated soils have been identified as being present at the Site at concentrations that would preclude the proposed development of the Site. Remediation of asbestos impacted soils at the Site is required to protect future Site users (including construction workers).
Identify the Decision/Goal of the Study	The following preliminary decisions will shape the ultimate decision: ▪ Is visible asbestos present in surface and shallow soils? ▪ Are concentrations of contaminants of potential concern (CoPC) within soils present at concentrations that could pose a risk to human health and/or the environment? ▪ Is the Site suitable for the proposed development (i.e. retail/commercial) following remediation? The ultimate goals of the study are: ▪ Understand the suitability of the Site for the proposed development.
Identify the information Inputs	The following inputs to the decision-making process are required: ▪ Data from previously completed environmental and geotechnical investigations at the Site. ▪ Available geological / hydrogeological information for the Site. ▪ Field observations, including any visual/olfactory evidence of contamination. ▪ Analytical data from intrusive soil investigation and assessment. – Collection of surface and shallow soil samples from remediation excavations using a hand trowel. – Submission of soil samples for laboratory analysis for the presence of asbestos and other CoPC as required. – If soil samples contain concentrations of metals above adopted assessment criteria, soil samples will be subsequently analysed using TCLP to assess leachable concentrations.

	▪ Analytical data from the soil sample analysis. – It is proposed that during all phases of soil investigation, soil samples will be screened in the field for the potential presence of CoPC. – It is proposed that approximately 50% of soil samples collected will be submitted for laboratory analysis for the presence of asbestos and other CoPC (as required). ▪ A review of contaminants of concern in relation to sampling methodologies and sample locations. ▪ Results of QA/QC samples collected, so that it can be ascertained whether the data set generated is defensible and usable for the purpose of the assessment. – QA/QC samples collected will include: inter-laboratory duplicates, equipment rinsate samples, field blank samples and trip blank samples (where applicable). ▪ The adopted soil assessment criteria for the Site (including published 'typical' background concentrations.
Define the Study Boundaries	For the purpose of this assessment, the Site is considered to be the Upper and Lower Platforms and Pa area of 51 Smart Road Waiwhakaiho, New Plymouth as shown in ***Figure 1***. Access to the Site will be controlled by the Remediation Contractor. No access or other restrictions have been determined.
Develop a Decision Rule	The analytical data for CoPC in soil will be compared against appropriate published investigation levels: ▪ National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Soil Contaminant Standards (SCS) using the 'Commercial / Industrial land use scenario; ▪ WA Asbestos Guidelines (2009) ▪ Ministry for the Environment Contaminated Land Management Guidelines (2011). ▪ Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbons in Soil
Specify Performance or Acceptance Criteria	4Sight will adopt a robust QA/QC procedure for the assessment of field quality data during each phase of work (based on *MfE 2011*), including: ▪ Duplicate samples (for all media): +/- 50% relative percentage difference (RPD). ▪ Blank samples (during soil sampling): no detectable concentrations. Potential decision errors in this investigation could include: ▪ Failure to meet laboratory analysis holding times. ▪ Incorrect storage of samples between the field and analytical laboratory. The acceptable limits for samples are: ▪ Relative percentage difference (%RPD) for field duplicates is less than 50% for all analytes. Where acceptable limits for field duplicates are not met, a discussion on low biased error will be provided. The potential decision errors must be identified, the potential consequences evaluated and the severity of decision error consequences assessed, the null hypothesis must be defined and what level of false positive or false negative decision error will be acceptable for the validation assessment must be specified. The consequences of deciding that contaminant concentrations exceed the assessment criteria when they truly do not, will be that additional investigation may need to be carried out, which could add cost and time delays to the project.

	The consequence of deciding that contaminant concentrations do not exceed the assessment criteria when they truly do, will be that contamination may be left unmanaged and may potentially pose a risk to human health and/or the environment.
Optimise the Design for Obtaining Data	The RAP has been designed to ensure that the objectives can be met within the time and budget constraints of the project. The scope and methodology presented in this soil RAP has been designed to reduce sample or measurement errors. The purpose of this step is to identify a resource-effective sampling design that generates data that are expected to satisfy the decision performance criteria, as specified in the preceding steps of the DQO process. This step provides a general description of the activities necessary to generate and select data collection designs that satisfy the decision performance criteria.

Appendix C:

Cut and Fill Plans



SURFACE ANALYSIS: CUT / FILL DEPTHS				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	
1		-5.000	-4.000	Cut
2		-4.000	-3.000	
3		-3.000	-2.000	
4		-2.000	-1.000	
5		-1.000	0.000	
6		0.000	1.000	Fill
7		1.000	2.000	
8		2.000	3.000	
9		3.000	4.000	
10		4.000	5.000	
11		5.000	6.000	
12		6.000	7.000	
13		7.000	8.000	
14		8.000	9.000	
15		9.000	10.000	
16		10.000	11.000	

COMPARISON BETWEEN EXISTING GROUND LEVEL AND PROPOSED UPPER AND LOWER PLATFORM DESIGN LEVELS

Disclaimer:
Photographic imagery has been imported from external sources.
Areas and dimensions may be subject to scale error.
Scaling from this drawing is at the users risk.

15 0 15 30 45 60 75m
SCALE 1 : 1500

ISSUED FOR CONSENT

BTWCOMPANY
SURVEYING | ENGINEERING | PLANNING & ENVIRONMENT

NO	DATE	BY	CHKD.	APPR.	OPER.	DESCRIPTION	NUMBER	TITLE
2	18/10/17	LB	IS	.	.	ISSUED FOR CONSENT		
1	28/09/17	LB	IS	.	.	ISSUED FOR COMMENT		

REVISIONS | REFERENCE DRAWINGS

GENERAL NOTES
1. Coordinates in terms of : Geodetic Datum (Taranaki 2000)
2. Elevations in terms of : Mean Sea Level (Taranaki Datum 1970)
3. Contour interval is : -

BLUEHAVEN
COMMERCIAL

LOCATION: 622 DEVON ROAD
PROJECT No.: 16216
A3 SCALE: AS SHOWN
SURVEYED: - -
DRAWN: L BUNN 27/09/17
CHECKED: I STEELE 27/09/17

TITLE
PROJECT ROBYN
BULK EARTHWORKS PLAN
CUT FILL DEPTH ANALYSIS

ORIGINAL SIZE: A3
DRAWING No: 16216-05
SHEET: 9
REVISION: 2

File Name: J:\16216\Dwgs\16216-05 EARTHWORKS PLAN.dwg - SHT 9 Plot Date: 27/10/2017 Plot Time: 10:29

Appendix D:

Supplementary Environmental Assessment

October 2017

RAVENSDOWN NEW PLYMOUTH

Supplementary Environmental Assessment

Submitted to:
Bluehaven Management Limited
PO Box 11057
Palm Beach
Papamoa 3151

Report Number: 1784599-002-R-Rev0

REPORT

Golder Associates

Record of Issue

Company	Version	Date issued	Method of delivery
Bluehaven Management Limited	Rev0	4 October 2017	PDF/Email

Table of Contents

1.0 INTRODUCTION

Bluehaven Holdings Limited (Bluehaven) is proposing to acquire and redevelop the former Ravensdown Fertiliser Co-operative Limited (Ravensdown) fertiliser plant located at the corner of Smart Road and Devon Road, New Plymouth. The redevelopment is proposed to comprise a mixture of commercial/industrial and retail land use, which will involve soil disturbance as well as change of land use.

The property has been used for fertiliser manufacture and storage for around a century. Products manufactured and stored on site have included lime and other alkalis, sulfur, phosphate (super phosphate), potassium (potash) and nitrogen (urea) fertilisers, and by-products. Sulfuric acid has also been manufactured on the property. Since approximately 2002, activities have been restricted to the storage and dispatch of fertilisers (manufacturing is no longer undertaken).

A number of contaminated land investigations have been completed at the facility. The most recent of which include a limited preliminary site investigation (PSI) completed for the whole site by BTW Company (BTW 2013), and detailed site investigations (DSI) by Golder Associates (NZ) Limited (Golder 2013, 2015).

In April 2017, the DSI reports were submitted to New Plymouth District Council (NPDC) as part of a subdivision application for the site (Comber Consultancy Ltd (Comber) 2017). NPDC subsequently engaged AECOM New Zealand Limited (AECOM) to undertake a review of the subdivision application against the requirements of Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NES). AECOM (2017) considered that generally the DSIs were adequate for the purposes of the original application (i.e., subdivision) but identified data gaps that would need to be addressed in the event that change of land use or soil disturbance was planned.

Golder was engaged by Bluehaven to undertake a supplementary environmental site assessment (ESA) of the site. The objective of this assessment was to address the data gaps identified by AECOM (2017) and assist with establishing protocols during soil disturbance works during redevelopment.

This report has been prepared to document the findings of the supplementary ESA. Golder notes that this report has been prepared to supplement the previous DSI reports and address data gaps identified by AECOM (2017). As such, it has not been prepared to satisfy the DSI reporting requirements under the NES and Ministry for the Environment (MfE 2011a) guidance.

2.0 SITE DESCRIPTION

2.1 Site Location

The New Plymouth facility is located southeast of the junction of Devon and Smart Roads, approximately 3 kilometres (km) east of the New Plymouth town centre (Figure 1). The physical address is 662 Devon Road. The facility is legally described as Lot 2 DP 339878 SEC 18 PT SECS 142, 143, 166, 175 PT SBDN 5 of SEC 162 HUA District BLK VI Paritutu SD, and is approximately 7.1 hectares (ha) in total area.

For the purposes of this report, the property is divided into an upper level and a lower level which are demarcated by an internal roadway. The lower level is some 3.12 ha in area and fronts Devon and Smart Roads. The upper level, and the subject of this investigation, is approximately 3.97 ha in area and is bound by a railway siding to the south, Katere Road to the east and Smart Road to the west (Figure 1).

2.2 Site History Summary

A detailed description of the site history was presented in the Golder 2013 and 2015 DSIs. In summary, the site has been used for manufacture and storage of fertiliser for around a century. Products included lime and other alkalis, sulfur, phosphate (super phosphate), potassium (potash) and nitrogen (urea) fertilisers, and by-products. Sulfuric acid has also been manufactured on the property. Since 2002, activities have been restricted to storage and dispatch (i.e., manufacturing is no longer undertaken at the site).

LEGEND

- 2017 Sample location
- 2015 Borehole sample location
- 2015 Testpit sample location
- 2013 Exploratory hole
- Parcel boundary

NOTES

1. Aerial: map server from Taranaki Regional Council aerial imagery, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA Taranaki Regional Council
3. 2017 Sample location based on Golder consultant approximate markout.
4. 2015 Borehole sample location and Testpit sample location sourced from Golder report 1541407-001-Rev0 Figure 4.
5. 2013 Exploratory hole sourced from Golder report 1378503343-002-Rev0 Figure 3.
6. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

0 50 100
METRES

REFERENCE SCALE: 1:1,622 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
BLUEHAVEN

PROJECT
RAVENSDOWN REDEVELOPMENT

TITLE
SITE LOCATION AND SAMPLE MAP

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-10-02
PREPARED	KC
REVIEW	XX
APPROVED	XX

PROJECT NO.	REPORT	REV.	FIGURE
1784599	002	0	**01**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3
25mm
0

The buildings on site used asbestos containing materials (ACM) in their construction, notably in roofing materials, which have weathered, resulting in release of asbestos fines and friable asbestos.

The 2013 and 2015 DSIs identified the presence of an underground waste oil tank near the northern area of the site, and it was noted that soil benchmarking would be required at the time of tank removal. During the 2017 Golder investigation no evidence was found to suggest that the underground tank has been removed.

Since 2015, the site is understood to have been used for the ongoing distribution of fertiliser products, this land use is not considered to have potentially impacted soils beyond the previously identified land uses.

3.0 2017 INVESTIGATION WORKS

3.1 Sampling Strategy

The objective of these ESA works was to address data gaps identified by AECOM (2017) in its review of the previous DSI reports (Golder 2013, 2015). The location and rationale for the investigation locations is summarised in Table 1 and shown on Figure 1.

Table 1: Rationale for soil sampling.

Site area	Investigation location	Rationale	Contaminants of interest
Upper level	BH01	Obtain deeper soil samples from the areas which are understood to be possibly disturbed as part of the proposed earthworks.	Metals[1] total petroleum hydrocarbons (TPH) polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP).
Mixture Bag Area	BH04 and BH05	Sample Locations J and L from the Golder 2015 DSI which were previously not investigated due to the concrete slab. Previous investigations had identified the potential for presence of selenium, cobalt, and DDT at these locations which were not sampled or analysed.	Selenium, cobalt, OCP.
Railway Siding	BH02, BH03 and BH06	AECOM (2017) identified that only one location had been previously investigated along this length of siding, and that this location had not been analysed for hydrocarbons.	TPH, PAH.
Site coverage	BH07 to BH14	Aid in determining the presence of asbestos in soils, based on the presence of ACM in building materials on site and the identified site history.	Asbestos.
	RNP61-0.4	Assess the potential extent of polychlorinated bisphenol (PCB) impacted soils identified in the 2013 DSI.	PCB.

Note: [1] Metals (metals and metalloids) refers to arsenic, cadmium, chromium, copper, lead, nickel, zinc.

3.2 Field Works

Golder visited the site on 13 September 2017 for the purposes of soil sampling. Service clearance and removal of the concrete slab at the proposed locations was completed by others in advance.

Due to obstructions in the ground beneath the concrete slab, and unfavourable conditions, not all of the sample locations were able to be extended to the target depth.

At BH02 (railway siding) and BH04 (mixture bag area), a second concrete slab was uncovered beneath the surface which was unable to be penetrated. These holes were abandoned. At BH06 (railway siding), large rocks and bricks were uncovered immediately beneath the concrete slab, and the borehole was filled with water. The hole was subsequently abandoned. Bore logs for BH01 to BH06 are included in Appendix A.

3.3 Sample Analysis

Based on ground conditions encountered during the intrusive investigation, select samples were collected for laboratory analysis. The analytical schedule is summarised in Table 2.

Samples were submitted to RJ Hill Laboratories Limited (Hills) in Hamilton under chain of custody conditions. Hills is International Accreditation New Zealand (IANZ) accredited for the selected analyses. The laboratory analysis reports are reproduced in Appendix B.

Table 2: Soil sampling analytical schedule.

Investigation location	Sample depth (m bgl)	Matrix sampled	Analytes
BH01	0.2	Fill	Metals, TPH and PAH.
	1.5	Fill	Metals, TPH and OCP.
BH02	No samples collected due to obstruction.		
BH03	0.5	Natural soil	TPH and PAH.
BH04	No samples collected due to obstruction		
BH05	0.5	Fill	Selenium, cobalt and OCP.
BH06	No samples collected due to obstruction		
BH07 to BH14	0 to 0.1 m	Fill	Asbestos
RNP61-0.4	0.4	Natural soil	PCBs

3.4 Assessment Criteria

Summary tables of results from the 2013, 2015 and the 2017 investigation is presented in Appendix C.

The analytical results have been compared to applicable standards for a commercial/industrial land use exposure scenario. Applicable standards have been selected in accordance with Regulation 7 of the NES, and MfE (2011b) guidance as follows:

- Soil Contaminant Standards (SCS) for priority contaminants prescribed by the NES.
- National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) Health Investigation Levels for Commercial/Industrial (HIL-D) land use scenario.
- MfE (2011c) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.
- Western Australia Department of Health (WADoH 2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

3.5 Analytical Results

Soil samples collected and analysed during the supplementary ESA works did not identify, with the exception of asbestos (refer Section 3.6), the presence of contaminant concentrations exceeding applicable standards for the protection of human health. A comparison analytical results against the applicable standards is presented in Appendix C.

Trace elements and organic compounds

Evidence of low level contamination was detected during these supplementary ESA works as follows:

- Trace concentrations of select trace elements were detected at sample location BH01. Cobalt was detected above the laboratory limit of reporting (LOR) at location BH05 (0.5 metres below ground level (m bgl)) but below the applicable standard.
- C_{15}-C_{36} TPH fraction at 250 mg/kg (milligrams per kilogram) in sample BH01 at a depth of 1.5 m bgl.
- Individual PAHs (pyrene and fluoranthene) were detected in the sample collected at BH03 at 0.5 m bgl.
- Select PCB congeners were detected in sample RNP61 at depth of 0.4 m bgl. The total PCB congeners concentration was less than the applicable standard. The detected concentration was approximately 10 % of the concentrations detected in 2013.

Asbestos

Asbestos was detected in six out of nine samples collected from across the site. Asbestos, where detected, was present as a combination of fibre cement, fibre board, ACM debris and loose fibres (Table 3).

Friable asbestos, comprising the concentration of fibrous asbestos (FA) and asbestos fines (AF), was detected above 0.001 % weight/weight (w/w) in three of the six samples. Concentrations of FA and AF exceeding the investigation criterion for asbestos in soil (0.001 % w/w as per WADoH (2009) guidelines)) were detected at locations BH07 and BH12. Trace concentrations at the investigation criterion were detected at location BH09.

Asbestos as ACM was detected at locations BH07 and BH12 at concentrations of 0.027 % w/w and 0.044 % w/w respectively. The detected concentrations were below the investigation criterion of 0.05 % w/w for a commercial/industrial use.

Table 3: Summary of asbestos in soil data.

Sample location (depth)	Qualitative identification of asbestos	Description of asbestos form	ACM (% w/w)	Combined FA + AF (% w/w)
Investigation criteria[1]			**0.05**	**0.001**
BH01 (0.2)	Chrysotile (White Asbestos) detected.	Loose fibres.	<0.001	<0.001
BH07 (0.15)	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Fibre cement, ACM debris and loose fibres.	0.027	**0.057**
BH09 (0.15)	Amosite (Brown Asbestos), Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	ACM debris and loose fibres.	<0.001	0.001
BH11 (0.15)	Chrysotile (white asbestos) detected.	Loose fibres.	<0.001	<0.001

Sample location (depth)	Qualitative identification of asbestos	Description of asbestos form	ACM (% w/w)	Combined FA + AF (% w/w)
Investigation criteria[1]			**0.05**	**0.001**
BH12 (0.15)	Chrysotile (white asbestos) detected.	Fibre board, ACM debris and loose fibres.	0.044	**0.047**
BH13 (0.15)	Amosite (brown asbestos) and chrysotile (white asbestos) detected.	Loose fibres.	<0.001	<0.001

Notes: [1] WADoH (2009) – 0.001 % for FA and AF for all site uses and 0.05 % for ACM for commercial/industrial use.

4.0 POTENTIAL DATA GAPS

Soil samples were not able to be collected at proposed locations BH02, BH04 and BH06 due to the presence of subsurface obstructions.

The absence of data from location BH04 is not considered a significant data gap as a sample was able to be collected at location BH05 (approximately 15 m south). Samples collected from location BH05 did not contain concentrations of contaminants of concern above the relevant human health criteria.

Remaining sample locations (BH02 and BH06) were proposed to target areas beneath existing buildings and the former railway siding not able to be accessed during previous investigation. Ground conditions encountered during the current ESA work restricted the ability to collect additional samples. The relevance of these data gaps should be determined in the context of the proposed development and soil disturbance activities.

No further information has been obtained at the time of writing as to whether the former waste oil tank identified near sample locations WO1 and WO2 (Golder 2015) has been removed or remains in place.

5.0 SUMMARY

Supplementary ESA works were undertaken at the Ravensdown fertiliser plant site. The objective of these works was to address data gaps identified in previous DSIs undertaken at the site (Golder 2013, 2015) and assist with establishing protocols during soil disturbance works during redevelopment.

With the exception of asbestos, the analysis of soil samples from locations targeted for further assessment did not detect the presence of contaminant concentrations exceeding applicable standards for the protection of human health.

Asbestos was detected in the form of ACM and friable asbestos (FA+AF) in samples collected across the site. Three of the nine samples selected for analysis contained concentrations of FA+AF exceeding the investigation criterion of 0.001 % w/w (WADoH 2009).

The presence of asbestos, as well as the potential to encounter other contaminants associated with the use of the site for fertiliser manufacturing will require the implementation of management controls during soil disturbance activities to ensure there is no unacceptable risk to human health and the environment.

6.0 LIMITATIONS

Your attention is drawn to the document, "Report Limitations", attached as Appendix D. The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

7.0 REFERENCES

AECOM 2017. Ravensdown, NES-CS Consent Review. Letter report, dated 30 May 2017.

BTW 2013. Preliminary site investigation report: in accordance with National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011. Report for Ravensdown Fertiliser Co-operative Limited. BTW Company Limited. New Plymouth. July 2013.

Comber 2017. Application for Subdivision Resource Consent: Ravensdown Ltd 662-272 Devon Road, New Plymouth. Report prepared by Comber Consultancy Ltd for Ravensdown Fertiliser Co-operative Limited, April 2017.

Golder 2013. Detailed Site Investigation: Ravensdown New Plymouth Store – Proposed Lot 1. Report prepared by Golder Associates (NZ) Limited for Ravensdown Fertiliser Co-operative Limited, October 2013.

Golder 2015. Ravensdown New Plymouth Facility – Detailed Site Investigation of Upper Level. Report prepared by Golder Associates (NZ) Limited for Ravensdown Fertiliser Co-operative Limited, April 2016.

MfE 2011a. Contaminated Land Management Guideline No. 1 – Reporting on Contaminated Sites in New Zealand. Ministry for the Environment, Wellington.

MfE 2011b. Contaminated Land Management Guidelines NO 2. Hierarchy and Application in New Zealand of Environmental Guideline Values. Ministry for the Environment, Wellington.

MfE 2011c. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Ministry for the Environment, Wellington.

WADoH 2009. Guidelines or the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. Western Australia Department of Health, 2009.

APPENDIX A

Bore Logs

October 2017
Report No. 1784599-002-R-Rev0

PRELIMINARY REPORT OF BOREHOLE: BH1(0)

CLIENT: Blackhaven
PROJECT: Ravensdown
LOCATION: 622 Devon Rd, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: ~~10.00~~ m

SHEET: 1 OF 1
DRILL RIG: Hollow stem Auger
DRILLER: Drill Force
LOGGED: CMM DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0 0.2 0.5 1 1.5 2 3 4 5 6 7 8 9 10		BH01-0.2 0.0 PID BH01-0.5 PID: 0.0 BH01-1.5 PID: 0.0 BH01-3.0 PID: 0.0 BH01-6.0 PID: 0.0			Sandy SILT, brown with rocks. FILL grey Gravelly SILT, with minor inclusions of sand. loose, dry. FILL 0.7 - Concrete and Phanescent yellow fertiliser (sulphur) 1.1 - Clayey SILT, brown with minor inclusions of sand. FILL 1.25 - Gravelly SILT, grey with minor inclusions of sand and rocks. Concrete throughout. FILL 1.7 - SILT, brown with minor inclusions of sand. NATURAL 2.3 - Clayey SILT, brown. NATURAL end of sampling		BH01-0.2 (ACM sample)

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAP5_1.GDT 26/02/2008 3:23:37 PM

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GANZL Form. F64 RL1

BH2 (2)

PRELIMINARY REPORT OF BOREHOLE: BH1

SHEET: 1 OF 1

CLIENT: Blueheaven
PROJECT: Ravensdown
LOCATION: 622 Devon Rd, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

DRILL RIG: Hand Auger
DRILLER: LMM
LOGGED: LMM DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ	0.5	0					0.470 concrete slab Second concrete slab refusal - unable to sample		
	1.0	1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GANZL Form. F64 RL1

BH3

PRELIMINARY REPORT OF BOREHOLE: BH1 3(Y)

SHEET: 1 OF 1

CLIENT: Blueheaven
PROJECT: Ravensdown
LOCATION: 622 Devon Road, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

DRILL RIG: Hand Auger
DRILLER: LLM
LOGGED: LLM DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0		~~0.2~~ BH3_0.270 PID=0.3			0.270 - concrete slab SILT, brown with rocks, FILL.		
		1					0.3 - increasing clay content		
		2		BH3_0.5 Dup_1.0 PID=0.3			0.5 - Silty CLAY, brown. NATURAL		
		3					end of borehole		
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

Golder Associates

PRELIMINARY REPORT OF BOREHOLE: ~~BH1~~ BH4 (X)

CLIENT: Blackaton
PROJECT: Ravensdown
LOCATION: 622 Devon Rd, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
DRILL RIG: Hand Auger
DRILLER: [illegible]
LOGGED: [illegible] DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0					0.05 concrete slab Bricks with silt, brown. FILL 0.2 - second concrete slab refusal - unable to sample		
		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

BH5

PRELIMINARY REPORT OF BOREHOLE: BH1 (cw)

SHEET: 1 OF 1

CLIENT: Bluehaven
PROJECT: Ravensdown
LOCATION: 622 Devon Rd, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

DRILL RIG: Hand Auger
DRILLER: [illegible]
LOGGED: [illegible] DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0					0.110 - concrete slab 0.1 silty CLAY, brown with gravel. FILL 0.2 silty CLAY, brown. NATURAL		
		1		BH05-0.2 PID 0.0 Dup-2.0					
		2							
				BH05-0.5 PID: 0.0			0.5 end of borehole		
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GANZL Form. F64
RL1

PRELIMINARY REPORT OF BOREHOLE: BH1

BH6 (V)

CLIENT: Bluehaven
PROJECT: Ravensdown
LOCATION: 622 Devon Rd, New Plymouth
JOB NO: 1784599

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
DRILL RIG: Hand Auger
DRILLER: Lun
LOGGED: Lun DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0					0.190 - Concrete slab large gravel rocks/boulders. Borehole pull with water.		
		1					Borehole terminated - unable to sample		
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

RNP-61

PRELIMINARY REPORT OF BOREHOLE: BH1

RNP61

SHEET: 1 OF 1

CLIENT: Blueharvin
PROJECT: Ravensdown
LOCATION: 622 Devon Road, New Plymouth
JOB NO: 17845799

POSITION:
SURFACE RL: m DATUM:
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

DRILL RIG: Hand Auger
DRILLER: Lum
LOGGED: Lum DATE: 13/9/17
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HQ		0		RNP61_0.4 PID:0.0			SILT, brown with rocks. FILL 0.3 – SILT, light brown. NATURAL 0.4 Borehole Terminated		
		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

GANZL_250208_CURRENT.GLB WELL C:\PROGRAM FILES\GINT\PROJECTS\NEW_TEMPLATE_250208.GPJ GAPS_1.GDT 26/02/2008 3:23:37 PM

APPENDIX B

Laboratory Reports

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

ANALYSIS REPORT

Client:	Golder Associates (NZ) Limited	**Lab No:**	1842903	SPv2
Contact:	Jamie Rhodes	**Date Received:**	14-Sep-2017	
	C/- Golder Associates (NZ) Limited	**Date Reported:**	25-Sep-2017	
	PO Box 33849	**Quote No:**	81152	
	Takapuna	**Order No:**		
	Auckland 0740	**Client Reference:**	1784599	
		Submitted By:	Laurence Main	

Sample Type: Soil

Sample Name:		BH01_0.2 13-Sep-2017	BH01_1.5 13-Sep-2017	BH03_0.5 13-Sep-2017	BH05_0.5 13-Sep-2017	RNP61_0.4 13-Sep-2017
Lab Number:		1842903.1	1842903.3	1842903.7	1842903.9	1842903.10
Individual Tests						
Dry Matter	g/100g as rcvd	79	86	63	51	-
Total Recoverable Cobalt	mg/kg dry wt	-	-	-	17.4	-
Total Recoverable Selenium	mg/kg dry wt	-	-	-	< 20	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	3	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	11.8	23	-	-	-
Total Recoverable Chromium	mg/kg dry wt	51	54	-	-	-
Total Recoverable Copper	mg/kg dry wt	76	29	-	-	-
Total Recoverable Lead	mg/kg dry wt	39	68	-	-	-
Total Recoverable Nickel	mg/kg dry wt	12	6	-	-	-
Total Recoverable Zinc	mg/kg dry wt	183	300	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.012	-	< 0.02	-
alpha-BHC	mg/kg dry wt	-	< 0.012	-	< 0.02	-
beta-BHC	mg/kg dry wt	-	< 0.012	-	< 0.02	-
delta-BHC	mg/kg dry wt	-	< 0.012	-	< 0.02	-
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.012	-	< 0.02	-
cis-Chlordane	mg/kg dry wt	-	< 0.012	-	< 0.02	-
trans-Chlordane	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	< 0.04	-	< 0.04	-
2,4'-DDD	mg/kg dry wt	-	< 0.012	-	< 0.02	-
4,4'-DDD	mg/kg dry wt	-	< 0.012	-	< 0.02	-
2,4'-DDE	mg/kg dry wt	-	< 0.012	-	< 0.02	-
4,4'-DDE	mg/kg dry wt	-	< 0.012	-	< 0.02	-
2,4'-DDT	mg/kg dry wt	-	< 0.012	-	< 0.02	-
4,4'-DDT	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Total DDT Isomers	mg/kg dry wt	-	< 0.07	-	< 0.12	-
Dieldrin	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endosulfan I	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endosulfan II	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endosulfan sulphate	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endrin	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endrin aldehyde	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Endrin ketone	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Heptachlor	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.012	-	< 0.02	-

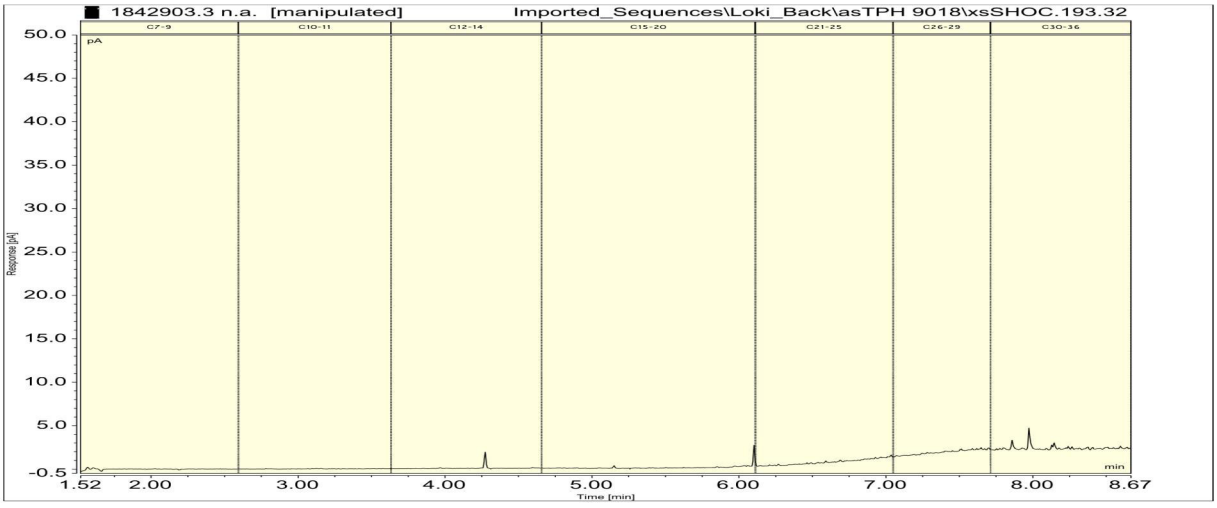
Sample Type: Soil						
Sample Name:		BH01_0.2 13-Sep-2017	BH01_1.5 13-Sep-2017	BH03_0.5 13-Sep-2017	BH05_0.5 13-Sep-2017	RNP61_0.4 13-Sep-2017
Lab Number:		1842903.1	1842903.3	1842903.7	1842903.9	1842903.10
Organochlorine Pesticides Screening in Soil						
Methoxychlor	mg/kg dry wt	-	< 0.012	-	< 0.02	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	0.036	-	< 0.016	-	-
2-Methylnaphthalene	mg/kg dry wt	0.033	-	< 0.016	-	-
Perylene	mg/kg dry wt	0.030	-	< 0.016	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.14	-	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.14	-	< 0.04	-	-
Acenaphthylene	mg/kg dry wt	0.013	-	< 0.016	-	-
Acenaphthene	mg/kg dry wt	< 0.013	-	< 0.016	-	-
Anthracene	mg/kg dry wt	0.021	-	< 0.016	-	-
Benzo[a]anthracene	mg/kg dry wt	0.083	-	< 0.016	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.097	-	< 0.016	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.110	-	< 0.016	-	-
Benzo[e]pyrene	mg/kg dry wt	0.071	-	< 0.016	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.091	-	< 0.016	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.051	-	< 0.016	-	-
Chrysene	mg/kg dry wt	0.094	-	< 0.016	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	-	< 0.016	-	-
Fluoranthene	mg/kg dry wt	0.186	-	0.026	-	-
Fluorene	mg/kg dry wt	< 0.013	-	< 0.016	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.187	-	< 0.016	-	-
Naphthalene	mg/kg dry wt	< 0.07	-	< 0.08	-	-
Phenanthrene	mg/kg dry wt	0.112	-	< 0.016	-	-
Pyrene	mg/kg dry wt	0.190	-	0.019	-	-
Polychlorinated Biphenyls Screening in Soil						
PCB-18	mg/kg dry wt	-	-	-	-	< 0.010
PCB-28	mg/kg dry wt	-	-	-	-	< 0.010
PCB-31	mg/kg dry wt	-	-	-	-	< 0.010
PCB-44	mg/kg dry wt	-	-	-	-	< 0.010
PCB-49	mg/kg dry wt	-	-	-	-	< 0.010
PCB-52	mg/kg dry wt	-	-	-	-	< 0.010
PCB-60	mg/kg dry wt	-	-	-	-	< 0.010
PCB-77	mg/kg dry wt	-	-	-	-	< 0.010
PCB-81	mg/kg dry wt	-	-	-	-	< 0.010
PCB-86	mg/kg dry wt	-	-	-	-	< 0.010
PCB-101	mg/kg dry wt	-	-	-	-	0.060
PCB-105	mg/kg dry wt	-	-	-	-	< 0.010
PCB-110	mg/kg dry wt	-	-	-	-	0.035
PCB-114	mg/kg dry wt	-	-	-	-	< 0.010
PCB-118	mg/kg dry wt	-	-	-	-	0.020
PCB-121	mg/kg dry wt	-	-	-	-	0.031
PCB-123	mg/kg dry wt	-	-	-	-	< 0.010
PCB-126	mg/kg dry wt	-	-	-	-	< 0.010
PCB-128	mg/kg dry wt	-	-	-	-	0.020
PCB-138	mg/kg dry wt	-	-	-	-	0.180
PCB-141	mg/kg dry wt	-	-	-	-	0.043
PCB-149	mg/kg dry wt	-	-	-	-	0.109
PCB-151	mg/kg dry wt	-	-	-	-	0.037
PCB-153	mg/kg dry wt	-	-	-	-	0.138
PCB-156	mg/kg dry wt	-	-	-	-	0.014
PCB-157	mg/kg dry wt	-	-	-	-	< 0.010
PCB-159	mg/kg dry wt	-	-	-	-	< 0.010
PCB-167	mg/kg dry wt	-	-	-	-	0.011

Document Set ID: 8334594
Version: 1, Version Date: 28/07/2020

Sample Type: Soil						
Sample Name:		BH01_0.2 13-Sep-2017	BH01_1.5 13-Sep-2017	BH03_0.5 13-Sep-2017	BH05_0.5 13-Sep-2017	RNP61_0.4 13-Sep-2017
Lab Number:		1842903.1	1842903.3	1842903.7	1842903.9	1842903.10
Polychlorinated Biphenyls Screening in Soil						
PCB-169	mg/kg dry wt	-	-	-	-	< 0.010
PCB-170	mg/kg dry wt	-	-	-	-	0.055
PCB-180	mg/kg dry wt	-	-	-	-	0.107
PCB-189	mg/kg dry wt	-	-	-	-	< 0.010
PCB-194	mg/kg dry wt	-	-	-	-	0.018
PCB-206	mg/kg dry wt	-	-	-	-	< 0.010
PCB-209	mg/kg dry wt	-	-	-	-	< 0.010
Mono-Ortho PCB Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 0.0010
Non-Ortho PCB Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 0.0013
Total PCB (Sum of 35 congeners)	mg/kg dry wt	-	-	-	-	0.9
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 10	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	250	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	250	< 70	-	-

Sample Name:		DUP_1.0 13-Sep-2017				
Lab Number:		1842903.11				
Individual Tests						
Dry Matter	g/100g as rcvd	66	-	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	-	-	-	-
C10 - C14	mg/kg dry wt	< 20	-	-	-	-
C15 - C36	mg/kg dry wt	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

1842903.3
BH01_1.5 13-Sep-2017
Client Chromatogram for TPH by FID



SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**

Document Set ID: 8334594
Version: 1, Version Date: 28/07/2020

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%. Analysis performed at 1 Clyde Street, Hamilton.	-	9
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:5786,2805,10734;2695] Analysis performed at 1 Clyde Street, Hamilton	0.002 - 60 mg/kg dry wt	1, 7
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample Analysis performed at 1 Clyde Street, Hamilton	0.010 - 0.06 mg/kg dry wt	3, 9
Polychlorinated Biphenyls Screening in Soil*	Sonication extraction, SPE cleanup, GC-MS analysis. Tested on dried sample Analysis performed at 1 Clyde Street, Hamilton	0.0010 - 0.2 mg/kg dry wt	10
Total Petroleum Hydrocarbons in Soil*	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734] Analysis performed at 1 Clyde Street, Hamilton	8 - 60 mg/kg dry wt	3, 11
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). Analysis performed at 1 Clyde Street, Hamilton. US EPA 3550.	0.10 g/100g as rcvd	1, 3, 7, 9, 11
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	9
Total Recoverable Cobalt	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	9
Total Recoverable Selenium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	9
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1 Analysis performed at 1 Clyde Street, Hamilton. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1, 7
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1 Analysis performed at 1 Clyde Street, Hamilton. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1, 7

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

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

ANALYSIS REPORT

Client:	Golder Associates (NZ) Limited	**Lab No:**	1843544 A2Pv1
Contact:	Jamie Rhodes	**Date Received:**	14-Sep-2017
	C/- Golder Associates (NZ) Limited	**Date Reported:**	19-Sep-2017
	PO Box 33849	**Quote No:**	74988
	Takapuna	**Order No:**	
	Auckland 0740	**Client Reference:**	Golder Job #: 1734599
		Submitted By:	Laurence Main

Sample Type: Soil

Sample Name:		13H07 13-Sep-2017	13H08 13-Sep-2017	13H09 13-Sep-2017	13H10 13-Sep-2017	13H11 13-Sep-2017
Lab Number:		1843544.1	1843544.2	1843544.3	1843544.4	1843544.5
Asbestos Presence / Absence		Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Amosite (Brown Asbestos), Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.
Description of Asbestos Form		Fibre Cement, ACM Debris and Loose Fibres	-	ACM Debris and Loose Fibres	-	Loose Fibres
Asbestos in ACM as % of Total Sample*	% w/w	0.027	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	0.057	< 0.001	0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	0.057	< 0.001	0.001	< 0.001	< 0.001
As Received Weight	g	619.6	537.2	798.4	738.6	607.8
Dry Weight	g	446.7	277.0	614.2	480.6	328.9
Ashed Weight	g	421.8	250.4	585.3	439.0	285.6
Dry Sample Fraction >10mm	g ashed wt	18.9	< 0.1	86.0	< 0.1	2.0
Sample Fraction <10mm to >2mm	g ashed wt	79.4	15.2	117.1	20.9	7.5
Sample Fraction <2mm	g ashed wt	323.4	235.3	381.9	417.7	276.4
<2mm Subsample Weight	g ashed wt	59.1	57.6	57.9	56.4	56.7
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	0.11925	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	0.2546	< 0.00001	0.00829	< 0.00001	0.00005

Sample Name:		13H12 13-Sep-2017	13H13 13-Sep-2017	13H14 13-Sep-2017	13H01.0.2 13-Sep-2017	
Lab Number:		1843544.6	1843544.7	1843544.8	1843544.9	
Asbestos Presence / Absence		Chrysotile (White Asbestos) detected.	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	-
Description of Asbestos Form		Fibre Board, ACM Debris and Loose Fibres	Loose Fibres	-	Loose Fibres	-
Asbestos in ACM as % of Total Sample*	% w/w	0.044	< 0.001	< 0.001	< 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	0.047	< 0.001	< 0.001	< 0.001	-

Sample Type: Soil						
Sample Name:		13H12 13-Sep-2017	13H13 13-Sep-2017	13H14 13-Sep-2017	13H01.0.2 13-Sep-2017	
Lab Number:		1843544.6	1843544.7	1843544.8	1843544.9	
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	0.047	< 0.001	< 0.001	< 0.001	-
As Received Weight	g	656.2	720.5	765.2	772.0	-
Dry Weight	g	465.7	520.7	589.9	619.2	-
Ashed Weight	g	434.2	488.6	562.3	596.4	-
Dry Sample Fraction >10mm	g ashed wt	23.6	8.6	179.8	119.0	-
Sample Fraction <10mm to >2mm	g ashed wt	39.3	28.4	80.9	161.6	-
Sample Fraction <2mm	g ashed wt	371.3	451.7	301.4	315.9	-
<2mm Subsample Weight	g ashed wt	56.8	58.2	56.8	59.0	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	0.2056	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	0.2197	0.00078	< 0.00001	0.00016	-

Soil asbestos investigation criteria
0.001 % w/w asbestos for FA and AF – All site uses
0.01 % w/w asbestos for ACM – Residential use, day care centres, preschools, etc.
0.04 % w/w asbestos for ACM – Residential, minimal soil access
0.02 % w/w asbestos for ACM – Parks, public open spaces, playing fields, etc.
0.05 % w/w asbestos for ACM – Commercial/Industrial
(Taken from the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009').

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Western Australian Guidelines Semi Quantitative Asbestos in Soil*		-	1-9
Western Australian Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-9
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-9
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-9
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-9
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-9
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-9
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-9
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-9

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.00001 g ashed wt	1-9
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.001 % w/w	1-9
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.00001 g ashed wt	1-9
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.001 % w/w	1-9
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.00001 g ashed wt	1-9
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.001 % w/w	1-9
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; May 2009.	0.001 % w/w	1-9

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

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Rhodri Williams BSc (Hons)
Asbestos Section Manager

APPENDIX C

Summary Tables

October 2017
Report No. 1784599-002-R-Rev0

Golder Associates
Bluehaven Management Limited
Ravensdown New Plymouth

Table X1: Tier 1 soil quality assessement

Sample Name	Sample Date	Lab Number	Matrix	Depth (m)	Total Petroleum Hydrocarbons: C7 - C9	C10 - C14	C15 - C36	Total hydrocarbons (C7 - C36)	BTEX: Benzene	Toluene	Ethylbenzene	m&p-Xylene	o-Xylene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (heath) [1]	Commercial / Industrial (unpaved)												
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]	Commercial / Industrial - Sand Geology			Surface (<1m)	120 [m]	(1500) [x]	NA		3.0 [m]	(94) [m]	(180) [v]	(150) [m]	
				1m-4m	120 [m]	(1900) [x]	NA		3.0 [m]	(94) [m]	(300) [v]	(150) [m]	
NEPM (2013) HIL(D) [3]	Commercial / Industrial												
WADoH (2009) [4]	Commercial/Industrial												
RNP51 0.0	9-Sep-13	1178314.3	Soil	0	-	-	-	-	-	-	-	-	-
RNP31 0.5	9-Sep-13	1178314.4	Soil	0.5	-	-	-	-	-	-	-	-	-
RNP41 0.0	9-Sep-13	1178314.7	Soil	0	-	-	-	-	-	-	-	-	-
RNP31 0.0	9-Sep-13	1178314.8	Soil	0	-	-	-	-	-	-	-	-	-
RNP32 0.0	9-Sep-13	1178314.9	Soil	0	-	-	-	-	-	-	-	-	-
RNP72 2.0	9-Sep-13	1178314.21	Soil	2	< 13	< 30	< 50	< 90	-	-	-	-	-
RNP21 0.0	9-Sep-13	1178314.22	Soil	0	-	-	-	-	-	-	-	-	-
RNP22 0.0	9-Sep-13	1178314.27	Soil	0	-	-	-	-	-	-	-	-	-
RNP72 1.0	9-Sep-13	1178314.31	Soil	1	< 10	< 20	< 40	< 70	-	-	-	-	-
RNP61 0.0	9-Sep-13	1178314.32	Soil	0	-	-	-	-	-	-	-	-	-
RNP61_0.4	13-Sep-17	1842903.1	Soil	0.4									
RNP62 0.0	9-Sep-13	1178314.33	Soil	0	-	-	-	-	-	-	-	-	-
RNP42 0.0	9-Sep-13	1178314.38	Soil	0	-	-	-	-	-	-	-	-	-
RNP33 0.0	9-Sep-13	1178314.41	Soil	0	-	-	-	-	-	-	-	-	-
RNP25 0.4	10-Sep-13	1178314.54	Soil	0.4	-	-	-	-	-	-	-	-	-
RNP45 0.0	10-Sep-13	1178314.55	Soil	0	-	-	-	-	-	-	-	-	-
RNP46 0.0	10-Sep-13	1178314.57	Soil	0	-	-	-	-	-	-	-	-	-
RNP56 0.0	10-Sep-13	1178314.58	Soil	0	-	-	-	-	-	-	-	-	-
RNP34 0.0	10-Sep-13	1178314.6	Soil	0	-	-	-	-	-	-	-	-	-
Composite A of RNP21 0.0 + RNP22 0.0 + RNP31 0.0 + RNP32 0.0 + RNP41 0.0 + RNP42 0.0 + RNP51 0.0 + RNP61 0.0 + RNP62 0.0		1178314.71	Soil	-	-	-	-	-	-	-	-	-	-
Composite B of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0		1178314.72	Soil	-	-	-	-	-	-	-	-	-	-
Composite C of RNP33 0.0 + RNP34 0.0 + RNP45 0.0 + RNP46 0.0 + RNP56 0.0 + RNP65 0.0		1178314.73	Soil	-	-	-	-	-	-	-	-	-	-
Composite D of RNP71 0.0 + RNP72 0.0 + RNP81 0.0 + RNP82 0.0		1178314.74	Soil	-	-	-	-	-	-	-	-	-	-
Composite E of RNP53 0.0 + RNP63 0.0 + RNP64 0.0 + RNP73 0.0 + RNP74 0.0 + RNP83 0.0		1178314.75	Soil	-	< 8	< 20	< 40	< 70	-	-	-	-	-
Composite F of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0 [duplicate]		1178314.76	Soil	-	-	-	-	-	-	-	-	-	-
RNP71 0.8	9-Sep-13	1178314.14	Rock or Mineral	0.8	-	-	-	-	-	-	-	-	-
RNP45		1045892	Soil	-	-	-	-	-	-	-	-	-	-
RNP		1045893	Soil	-	-	-	-	-	-	-	-	-	-
RNP11	9-Sep-13	1045894	Soil	-	-	-	-	-	-	-	-	-	-
RNP15	10-Sep-13	1045895	Soil	-	-	-	-	-	-	-	-	-	-
RNP25	10-Sep-13	1045896	Soil	-	-	-	-	-	-	-	-	-	-
RNP26	10-Sep-13	1045897	Soil	-	-	-	-	-	-	-	-	-	-
RNP31	9-Sep-13	1045898	Soil	-	-	-	-	-	-	-	-	-	-
RNP32	9-Sep-13	1045899	Soil	-	-	-	-	-	-	-	-	-	-
RNP33	9-Sep-13	1045900	Soil	-	-	-	-	-	-	-	-	-	-
RNP34	10-Sep-13	1045901	Soil	-	-	-	-	-	-	-	-	-	-
RNP35	10-Sep-13	1045902	Soil	-	-	-	-	-	-	-	-	-	-
RNP36	10-Sep-13	1045903	Soil	-	-	-	-	-	-	-	-	-	-
RNP41	9-Sep-13	1045904	Soil	-	-	-	-	-	-	-	-	-	-
RNP42	9-Sep-13	1045905	Soil	-	-	-	-	-	-	-	-	-	-
RNP44	9-Sep-13	1045906	Soil	-	-	-	-	-	-	-	-	-	-
RNP46	10-Sep-13	1045907	Soil	-	-	-	-	-	-	-	-	-	-
RNP51	9-Sep-13	1045908	Soil	-	-	-	-	-	-	-	-	-	-
RNP53	9-Sep-13	1045909	Soil	-	-	-	-	-	-	-	-	-	-
RNP56	10-Sep-13	1045910	Soil	-	-	-	-	-	-	-	-	-	-
RNP61	9-Sep-13	1045911	Soil	-	-	-	-	-	-	-	-	-	-
RNP62	9-Sep-13	1045912	Soil	-	-	-	-	-	-	-	-	-	-
RNP63	9-Sep-13	1045913	Soil	-	-	-	-	-	-	-	-	-	-
RNP64	9-Sep-13	1045914	Soil	-	-	-	-	-	-	-	-	-	-
RNP65	10-Sep-13	1045915	Soil	-	-	-	-	-	-	-	-	-	-
RNP71	9-Sep-13	1045916	Soil	-	-	-	-	-	-	-	-	-	-
RNP73	9-Sep-13	1045917	Soil	-	-	-	-	-	-	-	-	-	-
RNP74	9-Sep-13	1045918	Soil	-	-	-	-	-	-	-	-	-	-
RNP81	9-Sep-13	1045919	Soil	-	-	-	-	-	-	-	-	-	-
RNP82	9-Sep-13	1045920	Soil	-	-	-	-	-	-	-	-	-	-
RNP83	9-Sep-13	1045921	Soil	-	-	-	-	-	-	-	-	-	-
RNP84	9-Sep-13	1045922	Soil	-	-	-	-	-	-	-	-	-	-
RNP14	9-Sep-13	1045923	Soil	-	-	-	-	-	-	-	-	-	-
RNP21	9-Sep-13	1045924	Soil	-	-	-	-	-	-	-	-	-	-
RNP22	9-Sep-13	1045925	Soil	-	-	-	-	-	-	-	-	-	-
RNP23	9-Sep-13	1045926	Soil	-	-	-	-	-	-	-	-	-	-
RNP24	9-Sep-13	1045927	Soil	-	-	-	-	-	-	-	-	-	-
RNP34	9-Sep-13	1045928	Soil	-	-	-	-	-	-	-	-	-	-
Sample 8	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-
Sample 11	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-
O-0	20/10/2015	ES1535280001	Soil	0	-	-	-	-	-	-	-	-	-
O-0.5	20/10/2015	ES1535280002	Soil	0.5	-	-	-	-	-	-	-	-	-
N-0	20/10/2015	ES1535280004	Soil	0	-	-	-	-	-	-	-	-	-
N-0.5	20/10/2015	ES1535280005	Soil	0.5	-	-	-	-	-	-	-	-	-
UPSS1-0.5	20/10/2015	ES1535280007	Soil	0.5	-	-	-	-	-	-	-	-	-
UPSS1-1.8	20/10/2015	ES1535280008	Soil	1.8	-	-	-	-	-	-	-	-	-
UPSS2-0.5	20/10/2015	ES1535280009	Soil	0.5	-	-	-	-	-	-	-	-	-
UPSS2-2.4	20/10/2015	ES1535280010	Soil	2.4	-	-	-	-	-	-	-	-	-
UPSS3-0.5	20/10/2015	ES1535280011	Soil	0.5	-	-	-	-	-	-	-	-	-
UPSS3-1.2	20/10/2015	ES1535280012	Soil	1.2	-	-	-	-	-	-	-	-	-
W01-0.5	20/10/2015	ES1535280013	Soil	0.5	-	-	-	-	-	-	-	-	-
W01-1.0	20/10/2015	ES1535280014	Soil	1	-	-	-	-	-	-	-	-	-
W02-0.5	20/10/2015	ES1535280015	Soil	0.5	-	-	-	-	-	-	-	-	-
W02-1.0	20/10/2015	ES1535280016	Soil	1	-	-	-	-	-	-	-	-	-
P-0.0	21/10/2015	ES1535280017	Soil	0	-	-	-	-	-	-	-	-	-
P-1.0	21/10/2015	ES1535280018	Soil	1	-	-	-	-	-	-	-	-	-
Q-0	21/10/2015	ES1535280019	Soil	0	-	-	-	-	-	-	-	-	-
Q-0.5	21/10/2015	ES1535280020	Soil	0.5	-	-	-	-	-	-	-	-	-
R-0	21/10/2015	ES1535280022	Soil	0	-	-	-	-	-	-	-	-	-
R-0.5	21/10/2015	ES1535280023	Soil	0.5	-	-	-	-	-	-	-	-	-
G-0	21/10/2015	ES1535280025	Soil	0	-	-	-	-	-	-	-	-	-
G-0.5	21/10/2015	ES1535280026	Soil	0.5	-	-	-	-	-	-	-	-	-
F-0	21/10/2015	ES1535280028	Soil	0	-	-	-	-	-	-	-	-	-
F-0.5	21/10/2015	ES1535280029	Soil	0.5	-	-	-	-	-	-	-	-	-
E-0	21/10/2015	ES1535280031	Soil	0	-	-	-	-	-	-	-	-	-
E-0.5	21/10/2015	ES1535280032	Soil	0.5	-	-	-	-	-	-	-	-	-
D-0	21/10/2015	ES1535280034	Soil	0	-	-	-	-	-	-	-	-	-
D-0.5	21/10/2015	ES1535280035	Soil	0.5	-	-	-	-	-	-	-	-	-
C-0	21/10/2015	ES1535280037	Soil	0	-	-	-	-	-	-	-	-	-
C-0.5	21/10/2015	ES1535280038	Soil	0.5	-	-	-	-	-	-	-	-	-
M-0	21/10/2015	ES1535280040	Soil	0	-	-	-	-	-	-	-	-	-
M-0.5	21/10/2015	ES1535280041	Soil	0.5	-	-	-	-	-	-	-	-	-
K-0	21/10/2015	ES1535280043	Soil	0	-	-	-	-	-	-	-	-	-
K-0.5	21/10/2015	ES1535280044	Soil	0.5	-	-	-	-	-	-	-	-	-
I-0	21/10/2015	ES1535280046	Soil	0	-	-	-	-	-	-	-	-	-
I-0.5	21/10/2015	ES1535280047	Soil	0.5	-	-	-	-	-	-	-	-	-
H-0	21/10/2015	ES1535280049	Soil	0	-	-	-	-	-	-	-	-	-
H-0.5	21/10/2015	ES1535280050	Soil	0.5	-	-	-	-	-	-	-	-	-
L-0	21/10/2015	ES1535280053	Soil	0	-	-	-	-	-	-	-	-	-
A-0	22/10/2015	ES1535280058	Soil	0	-	-	-	-	-	-	-	-	-
H-1.0	21/10/2015	ES1535280051	Soil	1	-	-	-	-	-	-	-	-	-
L-0.5	21/10/2015	ES1535280054	Soil	0.5	-	-	-	-	-	-	-	-	-
J-0.5	21/10/2015	ES1535280057	Soil	0.5	-	-	-	-	-	-	-	-	-
J-0	21/10/2015	ES1535280056	Soil	0	-	-	-	-	-	-	-	-	-
A-0.6	22/10/2015	ES1535280059	Soil	0.6	-	-	-	-	-	-	-	-	-
B-0	22/10/2015	ES1535280060	Soil	0	-	-	-	-	-	-	-	-	-
B-1.0	22/10/2015	ES1535280062	Soil	1	-	-	-	-	-	-	-	-	-
UPSS1 - 0.5	20-Oct-15	1491669.1	Soil	0.5	< 9	< 20	< 40	< 70	< 0.06	< 0.06	< 0.06	< 0.12	< 0.06
UPSS1 - 1.8	20-Oct-15	1491669.2	Soil	1.8	< 12	< 30	< 50	< 90	< 0.09	< 0.09	< 0.09	< 0.17	< 0.09
UPSS2 - 0.5	20-Oct-15	1491669.3	Soil	0.5	< 8	< 20	< 40	< 70	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
UPSS2 - 2.4	20-Oct-15	1491669.4	Soil	2.4	< 8	< 20	< 40	< 70	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
UPSS3 - 0.5	20-Oct-15	1491669.5	Soil	0.5	< 9	< 20	145	145	< 0.06	< 0.06	< 0.06	< 0.11	< 0.06
UPSS3 - 1.2	20-Oct-15	1491669.6	Soil	1.2	< 8	< 20	91	91	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
WO1 - 0.5	20-Oct-15	1491669.7	Soil	0.5	< 8	< 20	310	310	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
WO1 - 1.0	20-Oct-15	1491669.8	Soil	1	< 8	< 20	94	94	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
WO2 - 0.5	20-Oct-15	1491669.9	Soil	0.5	< 8	< 20	99	99	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
WO2 - 1.0	20-Oct-15	1491669.1	Soil	1	< 8	< 20	124	124	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05
C - 0	21-Oct-15	1491669.16	Soil	0	< 10	< 20	112	112	-	-	-	-	-
C - 0.5	21-Oct-15	1491669.17	Soil	0.5	< 10	< 20	57	< 70	-	-	-	-	-
C - 2.15	21-Oct-15	1491669.18	Soil	2.15	< 12	< 30	< 50	< 90	-	-	-	-	-
L - 0	21-Oct-15	1491669.2	Soil	0	-	-	-	-	-	-	-	-	-
L - 0.5	21-Oct-15	1491669.21	Soil	0.5	-	-	-	-	-	-	-	-	-
J - 0	21-Oct-15	1491669.22	Soil	0	-	-	-	-	-	-	-	-	-
J - 0.5	21-Oct-15	1491669.23	Soil	0.5	-	-	-	-	-	-	-	-	-
BH01_0.2	13/09/2017	1843544.9 / 1842903.1	Soil	0.2	< 8	< 20	< 40	< 70	-	-	-	-	-
BH01_1.5	13/09/2017	1842903.3	Soil	1.5	< 8	< 20	250	250	-	-	-	-	-
BH03_0.5	13/09/2017	1842903.7	Soil	0.5	< 10	< 20	< 40	< 70	-	-	-	-	-
BH05_0.5	13/09/2017	1842903.9	Soil	0.5	-	-	-	-	-	-	-	-	-
BH07	13/09/2017	1843544.1	Soil	0.15	-	-	-	-	-	-	-	-	-
BH08	13/09/2017	1843544.2	Soil	0.15	-	-	-	-	-	-	-	-	-
BH09	13/09/2017	1843544.3	Soil	0.15	-	-	-	-	-	-	-	-	-
BH10	13/09/2017	1843544.4	Soil	0.15	-	-	-	-	-	-	-	-	-
BH11	13/09/2017	1843544.5	Soil	0.15	-	-	-	-	-	-	-	-	-
BH12	13/09/2017	1843544.6	Soil	0.15	-	-	-	-	-	-	-	-	-
BH13	13/09/2017	1843544.7	Soil	0.15	-	-	-	-	-	-	-	-	-
BH14	13/09/2017	1843544.8	Soil	0.15	-	-	-	-	-	-	-	-	-

Sample Name	Asbestos: Qualitative Identification of Asbestos	Description of Asbestos Form	Asbestos in ACM	Combined Fibrous Asbestos + Asbestos Fines	Trace Elements: Total Recoverable Arsenic	Total Recoverable Cadmium	Total Recoverable Calcium	Total Recoverable Chromium	Total recoverable Cobalt
			% w/w	%	mg/kg	mg/kg	mg/kg	mg/kg	
SCS (heath) [1]					70	1,300		6,300	
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]									
NEPM (2013) HIL(D) [3]									4,000
WADoH (2009) [4]			0.05	0.001					
RNP51 0.0	Chrysotile and Amosite	-	-	-	-	-	-	-	-
RNP31 0.5	-	-	-	-	-	-	-	-	-
RNP41 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
RNP31 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
RNP32 0.0	Chrysotile	-	-	-	-	-	-	-	-
RNP72 2.0	-	-	-	-	-	-	-	-	-
RNP21 0.0	Chrysotile	-	-	-	-	-	-	-	-
RNP22 0.0	Chrysotile	-	-	-	-	-	-	-	-
RNP72 1.0	-	-	-	-	-	-	-	-	-
RNP61 0.0	Chrysotile and Amosite	-	-	-	-	-	-	-	-
RNP61_0.4	-	-	-	-	-	-	-	-	-
RNP62 0.0	Chrysotile and Amosite	-	-	-	-	-	-	-	-
RNP42 0.0	Chrysotile and Amosite	-	-	-	-	-	-	-	-
RNP33 0.0	Chrysotile and Amosite	-	-	-	-	-	-	-	-
RNP25 0.4	-	-	-	-	< 2	< 0.10	-	5	-
RNP45 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
RNP46 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
RNP56 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
RNP34 0.0	Asbestos NOT detected	-	-	-	-	-	-	-	-
Composite A	Chrysotile and Amosite	-	-	-	3	-	-	21	-
Composite B	Asbestos NOT detected	-	-	-	6	-	-	19	-
Composite C	Chrysotile and Amosite	-	-	-	6	-	-	35	-
Composite D	Asbestos NOT detected	-	-	-	14	-	-	146	-
Composite E	Asbestos NOT detected	-	-	-	4	-	-	25	-
Composite F [duplicate]	Asbestos NOT detected	-	-	-	5	-	-	19	-
RNP71 0.8	-	-	-	-	-	0.27	119,000	-	-
RNP45	-	-	-	-	-	3.973	-	-	-
RNP	-	-	-	-	-	2.265	-	-	-
RNP11	-	-	-	-	-	0.772	-	-	-
RNP15	-	-	-	-	-	0.847	-	-	-
RNP25	-	-	-	-	-	0.72	-	-	-
RNP26	-	-	-	-	-	1.821	-	-	-
RNP31	-	-	-	-	-	0.438	-	-	-
RNP32	-	-	-	-	-	1.159	-	-	-
RNP33	-	-	-	-	-	2.757	-	-	-
RNP34	-	-	-	-	-	0.819	-	-	-
RNP35	-	-	-	-	-	2.362	-	-	-
RNP36	-	-	-	-	-	2.958	-	-	-
RNP41	-	-	-	-	-	0.599	-	-	-
RNP42	-	-	-	-	-	0.121	-	-	-
RNP44	-	-	-	-	-	4.126	-	-	-
RNP46	-	-	-	-	-	0.411	-	-	-
RNP51	-	-	-	-	-	1.207	-	-	-
RNP53	-	-	-	-	-	0.548	-	-	-
RNP56	-	-	-	-	-	4.495	-	-	-
RNP61	-	-	-	-	-	2.912	-	-	-
RNP62	-	-	-	-	-	1.208	-	-	-
RNP63	-	-	-	-	-	0.146	-	-	-
RNP64	-	-	-	-	-	8.943	-	-	-
RNP65	-	-	-	-	-	3.267	-	-	-
RNP71	-	-	-	-	-	2.566	-	-	-
RNP73	-	-	-	-	-	0.714	-	-	-
RNP74	-	-	-	-	-	2.742	-	-	-
RNP81	-	-	-	-	-	1.419	-	-	-
RNP82	-	-	-	-	-	13.313	-	-	-
RNP83	-	-	-	-	-	0.218	-	-	-
RNP84	-	-	-	-	-	5.018	-	-	-
RNP14	-	-	-	-	-	0.896	-	-	-
RNP21	-	-	-	-	-	1.383	-	-	-
RNP22	-	-	-	-	-	1.703	-	-	-
RNP23	-	-	-	-	-	4.994	-	-	-
RNP24	-	-	-	-	-	1.209	-	-	-
RNP34	-	-	-	-	-	6.639	-	-	-
Sample 8	Chrysotile and Amosite	-	-	-	-	-	-	-	-
Sample 11	Asbestos NOT detected	-	-	-	-	-	-	-	-
O-0	Asbestos NOT detected	-	-	<0.001	11	10	-	62	-
O-0.5	-	-	-	-	<5	<1	-	4	-
N-0	Asbestos NOT detected	-	-	<0.001	11	5	-	73	-
N-0.5	-	-	-	-	7	<1	-	10	-
UPSS1-0.5	-	-	-	-	<5	1	-	10	-
UPSS1-1.8	-	-	-	-	<5	<1	-	16	-
UPSS2-0.5	-	-	-	-	<5	<1	-	5	-
UPSS2-2.4	-	-	-	-	<5	<1	-	3	-
UPSS3-0.5	-	-	-	-	<5	<1	-	197	-
UPSS3-1.2	-	-	-	-	<5	<1	-	77	-
W01-0.5	-	-	-	-	<5	<1	-	6	-
W01-1.0	-	-	-	-	<5	<1	-	19	-
W02-0.5	-	-	-	-	<5	<1	-	2	-
W02-1.0	-	-	-	-	<5	<1	-	13	-
P-0.0	Asbestos NOT detected	-	-	<0.001	8	4	-	22	-
P-1.0	Asbestos NOT detected	-	-	<0.001	-	-	-	-	-
Q-0	Asbestos NOT detected	-	-	<0.001	<5	3	-	16	-
Q-0.5	-	-	-	-	-	-	-	-	-
R-0	Asbestos NOT detected	-	-	<0.001	8	5	-	35	-
R-0.5	-	-	-	-	-	-	-	-	-
G-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	5	-
G-0.5	-	-	-	-	<5	<1	-	22	-
F-0	Chrysotile and Amosite	-	-	0.004	8	4	-	40	-
F-0.5	-	-	-	-	6	<1	-	8	-
E-0	Asbestos NOT detected	-	-	<0.001	<5	9	-	46	-
E-0.5	-	-	-	-	<5	<1	-	10	-
D-0	Chrysotile	-	-	<0.001	6	13	-	36	-
D-0.5	-	-	-	-	<5	<1	-	15	-
C-0	Chrysotile and Amosite	-	-	**0.022**	5	3	-	20	-
C-0.5	-	-	-	-	5	1	-	15	-
M-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	11	-
M-0.5	-	-	-	-	<5	<1	-	13	-
K-0	Chrysotile	-	-	<0.001	<5	<1	-	6	-
K-0.5	-	-	-	-	<5	<1	-	8	-
I-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	12	-
I-0.5	-	-	-	-	<5	<1	-	12	-
H-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	10	-
H-0.5	-	-	-	-	<5	<1	-	13	-
L-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	10	-
A-0	Chrysotile and Amosite	-	**0.06**	<0.001	8	21	-	56	-
H-1.0	-	-	-	-	<5	<1	-	14	-
L-0.5	-	-	-	-	<5	<1	-	9	-
J-0.5	-	-	-	-	6	<1	-	10	-
J-0	Asbestos NOT detected	-	-	<0.001	<5	<1	-	10	-
A-0.6	-	-	-	-	-	-	-	-	-
B-0	Chrysotile	-	-	**0.272**	-	-	-	-	-
B-1.0	-	-	-	-	<5	2	-	12	-
UPSS1 - 0.5	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	-	-	-	-	-	-	-	-	-
WO1 - 0.5	-	-	-	-	-	-	-	-	-
WO1 - 1.0	-	-	-	-	-	-	-	-	-
WO2 - 0.5	-	-	-	-	-	-	-	-	-
WO2 - 1.0	-	-	-	-	-	-	-	-	-
C - 0	-	-	-	-	-	-	-	-	-
C - 0.5	-	-	-	-	-	-	-	-	-
C - 2.15	-	-	-	-	-	-	-	-	-
L - 0	-	-	-	-	-	-	-	-	-
L - 0.5	-	-	-	-	-	-	-	-	-
J - 0	-	-	-	-	-	-	-	-	-
J - 0.5	-	-	-	-	-	-	-	-	-
BH01_0.2	Chrysotile	Loose Fibres	<0.001	<0.001	8	11.8	-	51	-
BH01_1.5	-	-	-	-	3	23	-	54	-
BH03_0.5	-	-	-	-	-	-	-	-	-
BH05_0.5	-	-	-	-		-	-	-	17.4
BH07	Chrysotile and Amosite	Fibre Cement, ACM Debris and Loose Fibres	0.027	**0.057**		-	-	-	-
BH08	Asbestos NOT detected.	-	<0.001	<0.001		-	-	-	-
BH09	Amosite, Chrysotile and Crocidolite	ACM Debris and Loose Fibres	<0.001	0.001		-	-	-	-
BH10	Asbestos NOT detected.	-	<0.001	<0.001		-	-	-	-
BH11	Chrysotile	Loose Fibres	<0.001	<0.001		-	-	-	-
BH12	Chrysotile	Fibre Board, ACM Debris and Loose Fibres	0.044	**0.047**		-	-	-	-
BH13	Chrysotile and Amosite	Loose Fibres	<0.001	<0.001		-	-	-	-
BH14	Asbestos NOT detected.	-	<0.001	<0.001	-	-	-	-	-

Sample Name	Total Recoverable Copper	Total Recoverable Lead	Total Recoverable Mercury	Total Recoverable Nickel	Total Recoverable Phosphorus	Total Recoverable Selenium	Total Recoverable Uranium	Total Recoverable Zinc	Total Sulphur	Total Sulphur	Total Sulphur	pH	Fluoride	Total Phosphorus as P
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g/100g dry wt	mg/kg dry wt	%	pH units	mg/kg	mg/kg
SCS (heath) [1]	NL	3,300	4,200											
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]														
NEPM (2013) HIL(D) [3]	240,000			6,000		10,000		400,000						
WADoH (2009) [4]														
RNP51 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.5	-	-	-	-	-	-	-	-	0.05	-	-	-	-	-
RNP41 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61_0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	88	7.1	-	-	-	-	-	-	-	-	-	-	-	-
RNP45 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite A	49	-	< 0.10	-	-	< 20	3.3	-	-	-	-	-	-	-
Composite B	57	-	< 0.10	-	-	< 20	4.5	-	-	-	-	-	-	-
Composite C	69	-	< 0.10	-	-	< 20	8.3	-	-	-	-	-	-	-
Composite D	70	-	< 0.10	-	-	< 20	7.5	-	-	-	-	-	-	-
Composite E	58	-	< 0.10	-	-	< 20	4.8	-	-	-	-	-	-	-
Composite F [duplicate]	58	-	0.12	-	-	< 20	4.3	-	-	-	-	-	-	-
RNP71 0.8	-	-	-	-	760	-	-	-	10.2	-	-	-	-	-
RNP45	-	67.8	-	-	-	-	-	-	-	810	-	6.9	-	-
RNP	-	8.5	-	-	-	-	-	-	-	735	-	4.7	-	-
RNP11	-	32.3	-	-	-	-	-	-	-	2648	-	4.2	-	-
RNP15	-	63.4	-	-	-	-	-	-	-	1059	-	6.1	-	-
RNP25	-	15.2	-	-	-	-	-	-	-	671	-	6.5	-	-
RNP26	-	100.8	-	-	-	-	-	-	-	1074	-	5.7	-	-
RNP31	-	22.2	-	-	-	-	-	-	-	4657	-	3.6	-	-
RNP32	-	15.6	-	-	-	-	-	-	-	1058	-	4.7	-	-
RNP33	-	83.7	-	-	-	-	-	-	-	1381	-	5.8	-	-
RNP34	-	65.2	-	-	-	-	-	-	-	910	-	6.2	-	-
RNP35	-	31.4	-	-	-	-	-	-	-	1502	-	7.1	-	-
RNP36	-	213.6	-	-	-	-	-	-	-	819	-	5.4	-	-
RNP41	-	22.1	-	-	-	-	-	-	-	2846	-	6.2	-	-
RNP42	-	5.9	-	-	-	-	-	-	-	1429	-	7.2	-	-
RNP44	-	118.2	-	-	-	-	-	-	-	1507	-	6.5	-	-
RNP46	-	9.3	-	-	-	-	-	-	-	1179	-	7	-	-
RNP51	-	217.2	-	-	-	-	-	-	-	1276	-	5.6	-	-
RNP53	-	16.2	-	-	-	-	-	-	-	458	-	6.9	-	-
RNP56	-	141.3	-	-	-	-	-	-	-	1460	-	5.4	-	-
RNP61	-	138.6	-	-	-	-	-	-	-	2035	-	7.2	-	-
RNP62	-	23.5	-	-	-	-	-	-	-	15435	-	4.7	-	-
RNP63	-	8.3	-	-	-	-	-	-	-	749	-	6.2	-	-
RNP64	-	176.9	-	-	-	-	-	-	-	851	-	6.1	-	-
RNP65	-	42.8	-	-	-	-	-	-	-	808	-	6.4	-	-
RNP71	-	87.8	-	-	-	-	-	-	-	815	-	6.2	-	-
RNP73	-	6.4	-	-	-	-	-	-	-	1387	-	6.9	-	-
RNP74	-	41.8	-	-	-	-	-	-	-	454	-	6.5	-	-
RNP81	-	13.1	-	-	-	-	-	-	-	342	-	6.9	-	-
RNP82	-	46.8	-	-	-	-	-	-	-	1728	-	7	-	-
RNP83	-	5.1	-	-	-	-	-	-	-	321	-	6.6	-	-
RNP84	-	112.6	-	-	-	-	-	-	-	1123	-	7.1	-	-
RNP14	-	31.8	-	-	-	-	-	-	-	1192	-	6	-	-
RNP21	-	41.2	-	-	-	-	-	-	-	1728	-	6.1	-	-
RNP22	-	16.4	-	-	-	-	-	-	-	869	-	5.8	-	-
RNP23	-	47.1	-	-	-	-	-	-	-	1034	-	6.2	-	-
RNP24	-	22.8	-	-	-	-	-	-	-	1033	-	5.8	-	-
RNP34	-	14.5	-	-	-	-	-	-	-	475	-	5.4	-	-
Sample 8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0	95	53	-	19	-	-	33.7	290	-	-	-	-	-	-
O-0.5	48	5	-	4	-	-	0.9	27	-	-	0.04	-	330	1050
N-0	52	164	-	10	-	-	20.2	216	-	-	-	-	-	-
N-0.5	50	26	-	8	-	-	1.1	84	-	-	0.04	-	2400	3560
UPSS1-0.5	67	13	-	13	-	-	0.9	127	-	-	-	-	-	-
UPSS1-1.8	108	13	-	10	-	-	1.2	70	-	-	-	-	-	-
UPSS2-0.5	54	<5	-	3	-	-	0.2	28	-	-	-	-	-	-
UPSS2-2.4	59	<5	-	4	-	-	0.2	97	-	-	-	-	-	-
UPSS3-0.5	34	7	-	253	-	-	0.4	42	-	-	-	-	-	-
UPSS3-1.2	42	<5	-	34	-	-	0.4	30	-	-	-	-	-	-
W01-0.5	12	10	-	2	-	-	0.3	15	-	-	-	-	-	-
W01-1.0	24	6	-	6	-	-	0.6	22	-	-	-	-	-	-
W02-0.5	10	12	-	<2	-	-	<0.1	9	-	-	-	-	-	-
W02-1.0	15	7	-	<2	-	-	0.2	15	-	-	-	-	-	-
P-0.0	103	11	-	9	-	-	7.9	71	-	-	-	-	-	-
P-1.0	-	-	-	-	-	-	-	-	-	-	0.1	8	9000	37500
Q-0	49	24	-	5	-	-	3.3	68	-	-	-	-	-	-
Q-0.5	-	-	-	-	-	-	-	-	-	-	0.73	4.3	610	5030
R-0	60	20	-	10	-	-	11.2	168	-	-	-	-	-	-
R-0.5	-	-	-	-	-	-	-	-	-	-	0.15	5.2	490	654
G-0	71	16	-	4	-	-	0.6	37	-	-	-	-	-	-
G-0.5	73	45	-	15	-	-	1.3	78	-	-	0.52	4.3	420	478
F-0	92	75	-	10	-	-	11.8	140	-	-	0.13	7.1	3630	20800
F-0.5	55	146	-	6	-	-	0.8	44	-	-	-	-	-	-
E-0	86	139	-	8	-	-	40.9	204	-	-	-	-	-	-
E-0.5	80	51	-	7	-	-	1.4	36	-	-	0.8	4.4	590	2700
D-0	100	110	-	6	-	-	24	373	-	-	0.75	5.9	3600	27400
D-0.5	100	13	-	12	-	-	1.6	70	-	-	-	-	-	-
C-0	57	50	-	14	-	-	6.5	127	-	-	-	-	-	-
C-0.5	71	45	-	11	-	-	3.6	112	-	-	0.28	----	1780	4790
M-0	87	8	-	6	-	-	1	39	-	-	-	-	-	-
M-0.5	76	9	-	7	-	-	1.3	38	-	-	0.13	5.8	290	913
K-0	53	8	-	5	-	-	0.7	35	-	-	-	-	-	-
K-0.5	35	8	-	7	-	-	0.9	46	-	-	0.04	8.5	610	1640
I-0	78	8	-	5	-	-	2.5	36	-	-	-	-	-	-
I-0.5	67	8	-	5	-	-	0.9	35	-	-	0.09	6.1	270	577
H-0	111	9	-	8	-	-	0.9	36	-	-	0.08	7.3	330	728
H-0.5	98	7	-	7	-	-	1	35	-	-	-	-	-	-
L-0	89	10	-	5	-	-	1.5	40	-	-	-	-	-	-
A-0	45	27	-	9	-	-	41.1	281	-	-	-	-	-	-
H-1.0	94	7	-	7	-	-	1	40	-	-	0.07	6.6	340	612
L-0.5	65	10	-	5	-	-	1.3	45	-	-	0.08	6.5	320	965
J-0.5	87	13	-	5	-	-	1.2	42	-	-	-	-	-	-
J-0	77	11	-	5	-	-	1.1	41	-	-	0.13	6.4	340	984
A-0.6	-	-	-	-	-	-	-	-	-	-	0.67	8.6	14200	102000
B-0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-1.0	48	16	-	20	-	-	4.2	128	-	-	0.17	7.6	1790	22400
UPSS1 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 2.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01_0.2	76	39	-	12	-	-	-	183	-	-	-	-	-	-
BH01_1.5	29	68	-	6	-	-	-	300	-	-	-	-	-	-
BH03_0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05_0.5	-	-	-	-	-	< 20	-	-	-	-	-	-	-	-
BH07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample Name	Po[lycyclic aromatic hydrocarbons]: Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene (BAP)	Benzo[b]fluoranthene + Benzo[j]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (heath) [1]									
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2] (Surface (<1m))					(11) [d]				
MfE (2011) (1m-4m)					(25) [m]				
NEPM (2013) HIL(D) [3]									
WADoH (2009) [4]									
RNP51 0.0	-	-	-	-	-	-	-	-	-
RNP31 0.5	-	-	-	-	-	-	-	-	-
RNP41 0.0	-	-	-	-	-	-	-	-	-
RNP31 0.0	-	-	-	-	-	-	-	-	-
RNP32 0.0	-	-	-	-	-	-	-	-	-
RNP72 2.0	-	-	-	-	-	-	-	-	-
RNP21 0.0	-	-	-	-	-	-	-	-	-
RNP22 0.0	-	-	-	-	-	-	-	-	-
RNP72 1.0	-	-	-	-	-	-	-	-	-
RNP61 0.0	-	-	-	-	-	-	-	-	-
RNP61_0.4	-	-	-	-	-	-	-	-	-
RNP62 0.0	-	-	-	-	-	-	-	-	-
RNP42 0.0	-	-	-	-	-	-	-	-	-
RNP33 0.0	-	-	-	-	-	-	-	-	-
RNP25 0.4	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
RNP45 0.0 to RNP34 (1045928), Sample 8, Sample 11 (each row)	-	-	-	-	-	-	-	-	-
O-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
O-0.5	-	-	-	-	-	-	-	-	-
N-0	-	-	-	-	-	-	-	-	-
N-0.5	-	-	-	-	-	-	-	-	-
UPSS1-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
UPSS1-1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
UPSS2-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
UPSS2-2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
UPSS3-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
UPSS3-1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W01-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W01-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W02-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W02-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P-0.0	-	-	-	-	-	-	-	-	-
P-1.0	-	-	-	-	-	-	-	-	-
Q-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Q-0.5	-	-	-	-	-	-	-	-	-
R-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-0.5	-	-	-	-	-	-	-	-	-
G-0	-	-	-	-	-	-	-	-	-
G-0.5	-	-	-	-	-	-	-	-	-
F-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
F-0.5	-	-	-	-	-	-	-	-	-
E-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
E-0.5	-	-	-	-	-	-	-	-	-
D-0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D-0.5 to J-0 (each row)	-	-	-	-	-	-	-	-	-
A-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B-0	-	-	-	-	-	-	-	-	-
B-1.0	-	-	-	-	-	-	-	-	-
UPSS1 - 0.5 to WO2 - 1.0 (each row)	-	-	-	-	-	-	-	-	-
C - 0	< 0.04	< 0.04	< 0.04	0.05	0.05	0.09	0.04	0.04	0.04
C - 0.5	< 0.04	< 0.04	< 0.04	0.03	< 0.04	0.05	< 0.04	0.03	< 0.04
C - 2.15	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
L - 0	< 1.2	< 1.2	< 1.2	< 1.2	< 3	< 3	< 3	< 3	< 1.2
L - 0.5	< 1.2	< 1.2	< 1.2	< 1.2	< 3	< 3	< 3	< 3	< 1.2
J - 0	< 1.1	< 1.1	< 1.1	< 1.1	< 3	< 3	< 3	< 3	< 1.1
J - 0.5	< 1.1	< 1.1	< 1.1	< 1.1	< 3	< 3	< 3	< 3	< 1.1
BH01_0.2	< 0.013	0.013	0.021	0.083	0.097	0.11	0.091	0.051	0.094
BH01_1.5	-	-	-	-	-	-	-	-	-
BH03_0.5	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016
BH05_0.5	-	-	-	-	-	-	-	-	-
BH07	-	-	-	-	-	-	-	-	-
BH08	-	-	-	-	-	-	-	-	-
BH09	-	-	-	-	-	-	-	-	-
BH10	-	-	-	-	-	-	-	-	-
BH11	-	-	-	-	-	-	-	-	-
BH12	-	-	-	-	-	-	-	-	-
BH13	-	-	-	-	-	-	-	-	-
BH14	-	-	-	-	-	-	-	-	-

Table X1: Tier 1 soil quality assessement

Sample Name:	Sample Date	Lab Number:	Matrix:	Depth (m):	Dibenzo[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	BaP equivalent	1-Methylnaphthalene	2-Methylnaphthalene	1&2-Chloronaphthalene	Perylene
					Polycyclic Aromatic Hydrocarbons (PAH)											
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (health) [1]	Commercial / Industrial (unpaved)											35				
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]	Commercial / Industrial - Sand Geology			Surface (<1m)					(190)[v]		NA					
				1m-4m					(230)[v]		NA					
NEPM (2013) HIL(D) [3]	Commercial / Industrial															
WADoH (2009) [4]	Commercial/Industrial															
RNP51 0.0	9-Sep-13	1178314.3	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.5	9-Sep-13	1178314.4	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
RNP41 0.0	9-Sep-13	1178314.7	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.0	9-Sep-13	1178314.8	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP32 0.0	9-Sep-13	1178314.9	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 2.0	9-Sep-13	1178314.21	Soil	2	-	-	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	9-Sep-13	1178314.22	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP22 0.0	9-Sep-13	1178314.27	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 1.0	9-Sep-13	1178314.31	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	9-Sep-13	1178314.32	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP61_0.4	13-Sep-17	1842903.1	Soil	0.4	-	-	-	-	-	-	-	-	-	-	-	-
RNP62 0.0	9-Sep-13	1178314.33	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP42 0.0	9-Sep-13	1178314.38	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP33 0.0	9-Sep-13	1178314.41	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	10-Sep-13	1178314.54	Soil	0.4	< 0.03	< 0.03	< 0.03	< 0.03	< 0.14	< 0.03	< 0.03	<0.076	-	-	-	-
RNP45 0.0	10-Sep-13	1178314.55	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	10-Sep-13	1178314.57	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	10-Sep-13	1178314.58	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	10-Sep-13	1178314.6	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
Composite A of RNP21 0.0 + RNP22 0.0 + RNP31 0.0 + RNP32 0.0 + RNP41 0.0 + RNP42 0.0 + RNP51 0.0 + RNP61 0.0 + RNP62 0.0		1178314.71	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite B of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0		1178314.72	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite C of RNP33 0.0 + RNP34 0.0 + RNP45 0.0 + RNP46 0.0 + RNP56 0.0 + RNP65 0.0		1178314.73	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite D of RNP71 0.0 + RNP72 0.0 + RNP81 0.0 + RNP82 0.0		1178314.74	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite E of RNP53 0.0 + RNP63 0.0 + RNP64 0.0 + RNP73 0.0 + RNP74 0.0 + RNP83 0.0		1178314.75	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite F of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0 [duplicate]		1178314.76	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP71 0.8	9-Sep-13	1178314.14	Rock or Mineral	0.8	-	-	-	-	-	-	-	-	-	-	-	-
RNP45		1045892	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP		1045893	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP11	9-Sep-13	1045894	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP15	10-Sep-13	1045895	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25	10-Sep-13	1045896	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP26	10-Sep-13	1045897	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31	9-Sep-13	1045898	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32	9-Sep-13	1045899	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33	9-Sep-13	1045900	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	10-Sep-13	1045901	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP35	10-Sep-13	1045902	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP36	10-Sep-13	1045903	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41	9-Sep-13	1045904	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42	9-Sep-13	1045905	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP44	9-Sep-13	1045906	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46	10-Sep-13	1045907	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP51	9-Sep-13	1045908	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP53	9-Sep-13	1045909	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56	10-Sep-13	1045910	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61	9-Sep-13	1045911	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62	9-Sep-13	1045912	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP63	9-Sep-13	1045913	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP64	9-Sep-13	1045914	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP65	10-Sep-13	1045915	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP71	9-Sep-13	1045916	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP73	9-Sep-13	1045917	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP74	9-Sep-13	1045918	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP81	9-Sep-13	1045919	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP82	9-Sep-13	1045920	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP83	9-Sep-13	1045921	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP84	9-Sep-13	1045922	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP14	9-Sep-13	1045923	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21	9-Sep-13	1045924	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22	9-Sep-13	1045925	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP23	9-Sep-13	1045926	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP24	9-Sep-13	1045927	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	9-Sep-13	1045928	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 8	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 11	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0	20/10/2015	ES1535280001	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
O-0.5	20/10/2015	ES1535280002	Soil	0.5	-	-	-	-	-	-	-		-	-	-	-
N-0	20/10/2015	ES1535280004	Soil	0	-	-	-	-	-	-	-		-	-	-	-
N-0.5	20/10/2015	ES1535280005	Soil	0.5	-	-	-	-	-	-	-		-	-	-	-
UPSS1-0.5	20/10/2015	ES1535280007	Soil	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
UPSS1-1.8	20/10/2015	ES1535280008	Soil	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
UPSS2-0.5	20/10/2015	ES1535280009	Soil	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
UPSS2-2.4	20/10/2015	ES1535280010	Soil	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
UPSS3-0.5	20/10/2015	ES1535280011	Soil	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
UPSS3-1.2	20/10/2015	ES1535280012	Soil	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
W01-0.5	20/10/2015	ES1535280013	Soil	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
W01-1.0	20/10/2015	ES1535280014	Soil	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
W02-0.5	20/10/2015	ES1535280015	Soil	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
W02-1.0	20/10/2015	ES1535280016	Soil	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
P-0.0	21/10/2015	ES1535280017	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
P-1.0	21/10/2015	ES1535280018	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
Q-0	21/10/2015	ES1535280019	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
Q-0.5	21/10/2015	ES1535280020	Soil	0.5	-	-	-	-	-	-	-		-	-	-	-
R-0	21/10/2015	ES1535280022	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
R-0.5	21/10/2015	ES1535280023	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
G-0	21/10/2015	ES1535280025	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
G-0.5	21/10/2015	ES1535280026	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
F-0	21/10/2015	ES1535280028	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
F-0.5	21/10/2015	ES1535280029	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
E-0	21/10/2015	ES1535280031	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
E-0.5	21/10/2015	ES1535280032	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
D-0	21/10/2015	ES1535280034	Soil	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
D-0.5	21/10/2015	ES1535280035	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
C-0	21/10/2015	ES1535280037	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
C-0.5	21/10/2015	ES1535280038	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
M-0	21/10/2015	ES1535280040	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
M-0.5	21/10/2015	ES1535280041	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
K-0	21/10/2015	ES1535280043	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
K-0.5	21/10/2015	ES1535280044	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
I-0	21/10/2015	ES1535280046	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
I-0.5	21/10/2015	ES1535280047	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
H-0	21/10/2015	ES1535280049	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
H-0.5	21/10/2015	ES1535280050	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
L-0	21/10/2015	ES1535280053	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
A-0	22/10/2015	ES1535280058	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
H-1.0	21/10/2015	ES1535280051	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
L-0.5	21/10/2015	ES1535280054	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
J-0.5	21/10/2015	ES1535280057	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
J-0	21/10/2015	ES1535280056	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
A-0.6	22/10/2015	ES1535280059	Soil	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.26	-	-	-	-
B-0	22/10/2015	ES1535280060	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-
B-1.0	22/10/2015	ES1535280062	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 0.5	20-Oct-15	1491669.1	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	20-Oct-15	1491669.2	Soil	1.8	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	20-Oct-15	1491669.3	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	20-Oct-15	1491669.4	Soil	2.4	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	20-Oct-15	1491669.5	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	20-Oct-15	1491669.6	Soil	1.2	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	20-Oct-15	1491669.7	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	20-Oct-15	1491669.8	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	20-Oct-15	1491669.9	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	20-Oct-15	1491669.1	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-
C - 0	21-Oct-15	1491669.16	Soil	0	< 0.04	0.1	< 0.04	0.04	< 0.16	0.03	0.09	0.1224	-	-	-	-
C - 0.5	21-Oct-15	1491669.17	Soil	0.5	< 0.04	0.05	< 0.04	< 0.04	< 0.16	< 0.04	0.04	0.10124	-	-	-	-
C - 2.15	21-Oct-15	1491669.18	Soil	2.15	< 0.04	< 0.04	< 0.04	< 0.04	< 0.2	< 0.04	< 0.04	0.1	-	-	-	-
L - 0	21-Oct-15	1491669.2	Soil	0	< 3	< 1.2	< 1.2	< 3	< 1.2	< 1.2	< 1.2	<3.38	-	< 1.2	< 1.2	-
L - 0.5	21-Oct-15	1491669.21	Soil	0.5	< 3	< 1.2	< 1.2	< 3	< 1.2	< 1.2	< 1.2	<3.39	-	< 1.2	< 1.2	-
J - 0	21-Oct-15	1491669.22	Soil	0	< 3	< 1.1	< 1.1	< 3	< 1.1	< 1.1	< 1.1	<3.40	-	< 1.1	< 1.1	-
J - 0.5	21-Oct-15	1491669.23	Soil	0.5	< 3	< 1.1	< 1.1	< 3	< 1.1	< 1.1	< 1.1	<3.41	-	< 1.1	< 1.1	-
BH01_0.2	13/09/2017	1843544.9 / 1842903.1	Soil	0.2	< 0.013	0.186	< 0.013	0.187	< 0.07	0.112	0.19	0.1669	0.036	0.033	-	0.03
BH01_1.5	13/09/2017	1842903.3	Soil	1.5	-	-	-	-	-	-	-	-	-	-	-	-
BH03_0.5	13/09/2017	1842903.7	Soil	0.5	< 0.016	0.026	< 0.016	< 0.016	< 0.08	< 0.016	0.019	<0.04	< 0.016	< 0.016	-	< 0.016
BH05_0.5	13/09/2017	1842903.9	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-
BH07	13/09/2017	1843544.1	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH08	13/09/2017	1843544.2	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH09	13/09/2017	1843544.3	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH10	13/09/2017	1843544.4	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH11	13/09/2017	1843544.5	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH12	13/09/2017	1843544.6	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH13	13/09/2017	1843544.7	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-
BH14	13/09/2017	1843544.8	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-

Sample Name:	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Nitrobenzene	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine + Diphenylamine
	Haloethers					Nitrogen containing compounds				
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (health) [1]										
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2] – Surface (<1m)										
MfE (2011) – 1m-4m										
NEPM (2013) HIL(D) [3]										
WADoH (2009) [4]										
RNP51 0.0	-	-	-	-	-	-	-	-	-	-
RNP31 0.5	-	-	-	-	-	-	-	-	-	-
RNP41 0.0	-	-	-	-	-	-	-	-	-	-
RNP31 0.0	-	-	-	-	-	-	-	-	-	-
RNP32 0.0	-	-	-	-	-	-	-	-	-	-
RNP72 2.0	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	-	-	-	-	-	-	-	-	-	-
RNP22 0.0	-	-	-	-	-	-	-	-	-	-
RNP72 1.0	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	-	-	-	-	-	-	-	-	-	-
RNP61_0.4	-	-	-	-	-	-	-	-	-	-
RNP62 0.0	-	-	-	-	-	-	-	-	-	-
RNP42 0.0	-	-	-	-	-	-	-	-	-	-
RNP33 0.0	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	-	-	-	-	-	-	-	-	-	-
RNP45 0.0	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	-	-	-	-	-	-	-	-	-	-
Composite A	-	-	-	-	-	-	-	-	-	-
Composite B	-	-	-	-	-	-	-	-	-	-
Composite C	-	-	-	-	-	-	-	-	-	-
Composite D	-	-	-	-	-	-	-	-	-	-
Composite E	-	-	-	-	-	-	-	-	-	-
Composite F	-	-	-	-	-	-	-	-	-	-
RNP71 0.8	-	-	-	-	-	-	-	-	-	-
RNP45	-	-	-	-	-	-	-	-	-	-
RNP	-	-	-	-	-	-	-	-	-	-
RNP11	-	-	-	-	-	-	-	-	-	-
RNP15	-	-	-	-	-	-	-	-	-	-
RNP25	-	-	-	-	-	-	-	-	-	-
RNP26	-	-	-	-	-	-	-	-	-	-
RNP31	-	-	-	-	-	-	-	-	-	-
RNP32	-	-	-	-	-	-	-	-	-	-
RNP33	-	-	-	-	-	-	-	-	-	-
RNP34	-	-	-	-	-	-	-	-	-	-
RNP35	-	-	-	-	-	-	-	-	-	-
RNP36	-	-	-	-	-	-	-	-	-	-
RNP41	-	-	-	-	-	-	-	-	-	-
RNP42	-	-	-	-	-	-	-	-	-	-
RNP44	-	-	-	-	-	-	-	-	-	-
RNP46	-	-	-	-	-	-	-	-	-	-
RNP51	-	-	-	-	-	-	-	-	-	-
RNP53	-	-	-	-	-	-	-	-	-	-
RNP56	-	-	-	-	-	-	-	-	-	-
RNP61	-	-	-	-	-	-	-	-	-	-
RNP62	-	-	-	-	-	-	-	-	-	-
RNP63	-	-	-	-	-	-	-	-	-	-
RNP64	-	-	-	-	-	-	-	-	-	-
RNP65	-	-	-	-	-	-	-	-	-	-
RNP71	-	-	-	-	-	-	-	-	-	-
RNP73	-	-	-	-	-	-	-	-	-	-
RNP74	-	-	-	-	-	-	-	-	-	-
RNP81	-	-	-	-	-	-	-	-	-	-
RNP82	-	-	-	-	-	-	-	-	-	-
RNP83	-	-	-	-	-	-	-	-	-	-
RNP84	-	-	-	-	-	-	-	-	-	-
RNP14	-	-	-	-	-	-	-	-	-	-
RNP21	-	-	-	-	-	-	-	-	-	-
RNP22	-	-	-	-	-	-	-	-	-	-
RNP23	-	-	-	-	-	-	-	-	-	-
RNP24	-	-	-	-	-	-	-	-	-	-
RNP34	-	-	-	-	-	-	-	-	-	-
Sample 8	-	-	-	-	-	-	-	-	-	-
Sample 11	-	-	-	-	-	-	-	-	-	-
O-0	-	-	-	-	-	-	-	-	-	-
O-0.5	-	-	-	-	-	-	-	-	-	-
N-0	-	-	-	-	-	-	-	-	-	-
N-0.5	-	-	-	-	-	-	-	-	-	-
UPSS1-0.5	-	-	-	-	-	-	-	-	-	-
UPSS1-1.8	-	-	-	-	-	-	-	-	-	-
UPSS2-0.5	-	-	-	-	-	-	-	-	-	-
UPSS2-2.4	-	-	-	-	-	-	-	-	-	-
UPSS3-0.5	-	-	-	-	-	-	-	-	-	-
UPSS3-1.2	-	-	-	-	-	-	-	-	-	-
W01-0.5	-	-	-	-	-	-	-	-	-	-
W01-1.0	-	-	-	-	-	-	-	-	-	-
W02-0.5	-	-	-	-	-	-	-	-	-	-
W02-1.0	-	-	-	-	-	-	-	-	-	-
P-0.0	-	-	-	-	-	-	-	-	-	-
P-1.0	-	-	-	-	-	-	-	-	-	-
Q-0	-	-	-	-	-	-	-	-	-	-
Q-0.5	-	-	-	-	-	-	-	-	-	-
R-0	-	-	-	-	-	-	-	-	-	-
R-0.5	-	-	-	-	-	-	-	-	-	-
G-0	-	-	-	-	-	-	-	-	-	-
G-0.5	-	-	-	-	-	-	-	-	-	-
F-0	-	-	-	-	-	-	-	-	-	-
F-0.5	-	-	-	-	-	-	-	-	-	-
E-0	-	-	-	-	-	-	-	-	-	-
E-0.5	-	-	-	-	-	-	-	-	-	-
D-0	-	-	-	-	-	-	-	-	-	-
D-0.5	-	-	-	-	-	-	-	-	-	-
C-0	-	-	-	-	-	-	-	-	-	-
C-0.5	-	-	-	-	-	-	-	-	-	-
M-0	-	-	-	-	-	-	-	-	-	-
M-0.5	-	-	-	-	-	-	-	-	-	-
K-0	-	-	-	-	-	-	-	-	-	-
K-0.5	-	-	-	-	-	-	-	-	-	-
I-0	-	-	-	-	-	-	-	-	-	-
I-0.5	-	-	-	-	-	-	-	-	-	-
H-0	-	-	-	-	-	-	-	-	-	-
H-0.5	-	-	-	-	-	-	-	-	-	-
L-0	-	-	-	-	-	-	-	-	-	-
A-0	-	-	-	-	-	-	-	-	-	-
H-1.0	-	-	-	-	-	-	-	-	-	-
L-0.5	-	-	-	-	-	-	-	-	-	-
J-0.5	-	-	-	-	-	-	-	-	-	-
J-0	-	-	-	-	-	-	-	-	-	-
A-0.6	-	-	-	-	-	-	-	-	-	-
B-0	-	-	-	-	-	-	-	-	-	-
B-1.0	-	-	-	-	-	-	-	-	-	-
UPSS1 - 0.5	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	-	-	-	-	-	-	-	-	-	-
C - 0	-	-	-	-	-	-	-	-	-	-
C - 0.5	-	-	-	-	-	-	-	-	-	-
C - 2.15	-	-	-	-	-	-	-	-	-	-
L - 0	< 3	< 3	< 3	< 3	< 3	< 5	< 5	< 3	< 5	< 5
L - 0.5	< 3	< 3	< 3	< 3	< 3	< 5	< 5	< 3	< 5	< 5
J - 0	< 3	< 3	< 3	< 3	< 3	< 5	< 5	< 3	< 5	< 5
J - 0.5	< 3	< 3	< 3	< 3	< 3	< 5	< 5	< 3	< 5	< 5
BH01_0.2	-	-	-	-	-	-	-	-	-	-
BH01_1.5	-	-	-	-	-	-	-	-	-	-
BH03_0.5	-	-	-	-	-	-	-	-	-	-
BH05_0.5	-	-	-	-	-	-	-	-	-	-
BH07	-	-	-	-	-	-	-	-	-	-
BH08	-	-	-	-	-	-	-	-	-	-
BH09	-	-	-	-	-	-	-	-	-	-
BH10	-	-	-	-	-	-	-	-	-	-
BH11	-	-	-	-	-	-	-	-	-	-
BH12	-	-	-	-	-	-	-	-	-	-
BH13	-	-	-	-	-	-	-	-	-	-
BH14	-	-	-	-	-	-	-	-	-	-

Sample Name:	Aldrin	alpha-BHC	beta-BHC	delta-BHC	gamma-BHC (Lindane)	cis-Chlordane	trans-Chlordane	Total Chlordane [(cis+trans)*100/42]	2,4'-DDD	4,4'-DDD	2,4'-DDE	4,4'-DDE	2,4'-DDT	4,4'-DDT	Sum of DDD + DDE + DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan (sum)	Endosulfan sulphate	Endrin	Endrin Aldehyde	Endrin ketone
	Organochlorine Pesticides																						
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (health) [1]															1000								
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2] – Surface (<1m)																							
MfE (2011) – 1m-4m																							
NEPM (2013) HIL(D) [3]								560							4000				2000		100		
WADoH (2009) [4]																							
RNP51 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP72 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61_0.4						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite A	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	0.048	< 0.010	0.029	0.019	0.26	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
Composite B	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	< 0.010	< 0.010	0.088	0.014	0.076	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
Composite C	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	0.031	< 0.010	0.076	0.046	0.24	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
Composite D	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	0.018	< 0.010	0.186	0.028	0.22	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
Composite E	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	0.046	< 0.010	0.035	0.017	0.26	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
Composite F	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.04	< 0.010	< 0.010	< 0.010	0.054	< 0.010	0.05	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
RNP71 0.8						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP11						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP15						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP26						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP35						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP36						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP44						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP51						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP53						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP63						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP64						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP65						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP71						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP73						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP74						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP81						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP82						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP83						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP84						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP14						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP23						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP24						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 8						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 11						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05		<0.2	<0.05	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05
N-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1-1.8	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-2.4	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-1.2	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-1.0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-1.0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-0.0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Q-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F-0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.07	-	0.06	-	0.2	0.33	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
F-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
D-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.2	-	<0.05	-	<0.2	0.2	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
C-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
K-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
H-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-1.0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0.5	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0.6	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-0	----	----	----	----	----	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
UPSS1 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 2.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0	< 3	< 3	< 3	< 3	< 3	-	-	-	-	< 3	-	< 3	-	< 5	-	< 3	< 5	< 5	-	< 5	< 5	-	< 5
L - 0.5	< 3	< 3	< 3	< 3	< 3	-	-	-	-	< 3	-	< 3	-	< 5	-	< 3	< 5	< 5	-	< 5	< 5	-	< 5
J - 0	< 3	< 3	< 3	< 3	< 3	-	-	-	-	< 3	-	< 3	-	< 5	-	< 3	< 5	< 5	-	< 5	< 5	-	< 5
J - 0.5	< 3	< 3	< 3	< 3	< 3	-	-	-	-	< 3	-	< 3	-	< 5	-	< 3	< 5	< 5	-	< 5	< 5	-	< 5
BH01_0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01_1.5	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.04	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.07	< 0.012	< 0.012	< 0.012	-	< 0.012	< 0.012	< 0.012	< 0.012
BH03_0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05_0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.12	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02
BH07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table X1: Tier 1 soil quality assessement

												Phenols											Plasticisers							Other Halogenated compounds						Other compounds													
					Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	alpha-Endosulfan	beta-Endosulfan	Sum of Aldrin + Dieldrin	4-Chloro-3-methylphenol	2-Chlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	3 & 4-Methylphenol (m- + p-cresol)	2-Methylphenol (o-Cresol)	2-Nitrophenol	Pentachlorophenol (PCP)	Phenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	Bis(2-ethylhexyl)phthalate	Butylbenzylphthalate	Di(2-ethylhexyl)adipate	Diethylphthalate	Dimethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Hexachlorobutadiene	Hexachloroethane	1,2,4-Trichlorobenzene	Benzyl alcohol	Carbazole	Dibenzofuran	Isophorone	PCB-18	PCB-28	PCB-31	PCB-44	PCB-49	PCB-52	PCB-60	PCB-77	PCB-81	PCB-86
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS (health) [1]	Commercial / Industrial (unpaved)																		360																														
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]	Commercial / Industrial - Sand Geology			Surface (<1m)																																													
				1m-4m																																													
NEPM (2013) HIL(D) [3]	Commercial / Industrial				50		85	2700			50								700	250000																													
WADoH (2009) [4]	Commercial/Industrial																																																
Sample Name:	Sample Date	Lab Number:	Matrix:	Depth (m):																																													
RNP51 0.0	9-Sep-13	1178314.3	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP31 0.5	9-Sep-13	1178314.4	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41 0.0	9-Sep-13	1178314.7	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP31 0.0	9-Sep-13	1178314.8	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP32 0.0	9-Sep-13	1178314.9	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.010	< 0.010	< 0.010	< 0.010
RNP72 2.0	9-Sep-13	1178314.21	Soil	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	9-Sep-13	1178314.22	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP22 0.0	9-Sep-13	1178314.27	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP72 1.0	9-Sep-13	1178314.31	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	9-Sep-13	1178314.32	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.048	< 0.010	< 0.010	< 0.010	< 0.010
RNP61_0.4	13-Sep-17	1842903.1	Soil	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP62 0.0	9-Sep-13	1178314.33	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP42 0.0	9-Sep-13	1178314.38	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP33 0.0	9-Sep-13	1178314.41	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	10-Sep-13	1178314.54	Soil	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45 0.0	10-Sep-13	1178314.55	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	10-Sep-13	1178314.57	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	10-Sep-13	1178314.58	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	10-Sep-13	1178314.6	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite A of RNP21 0.0 + RNP22 0.0 + RNP31 0.0 + RNP32 0.0 + RNP41 0.0 + RNP42 0.0 + RNP51 0.0 + RNP61 0.0 + RNP62 0.0		1178314.71	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Composite B of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0		1178314.72	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Composite C of RNP33 0.0 + RNP34 0.0 + RNP45 0.0 + RNP46 0.0 + RNP56 0.0 + RNP65 0.0		1178314.73	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Composite D of RNP71 0.0 + RNP72 0.0 + RNP81 0.0 + RNP82 0.0		1178314.74	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Composite E of RNP53 0.0 + RNP63 0.0 + RNP64 0.0 + RNP73 0.0 + RNP74 0.0 + RNP83 0.0		1178314.75	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Composite F of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0 [duplicate]		1178314.76	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
RNP71 0.8	9-Sep-13	1178314.14	Rock or Mineral	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45		1045892	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP		1045893	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP11	9-Sep-13	1045894	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP15	10-Sep-13	1045895	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25	10-Sep-13	1045896	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP26	10-Sep-13	1045897	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31	9-Sep-13	1045898	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32	9-Sep-13	1045899	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33	9-Sep-13	1045900	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	10-Sep-13	1045901	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP35	10-Sep-13	1045902	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP36	10-Sep-13	1045903	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41	9-Sep-13	1045904	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42	9-Sep-13	1045905	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP44	9-Sep-13	1045906	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46	10-Sep-13	1045907	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP51	9-Sep-13	1045908	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP53	9-Sep-13	1045909	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56	10-Sep-13	1045910	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61	9-Sep-13	1045911	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62	9-Sep-13	1045912	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP63	9-Sep-13	1045913	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP64	9-Sep-13	1045914	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP65	10-Sep-13	1045915	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP71	9-Sep-13	1045916	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP73	9-Sep-13	1045917	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP74	9-Sep-13	1045918	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP81	9-Sep-13	1045919	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP82	9-Sep-13	1045920	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP83	9-Sep-13	1045921	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP84	9-Sep-13	1045922	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP14	9-Sep-13	1045923	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21	9-Sep-13	1045924	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22	9-Sep-13	1045925	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP23	9-Sep-13	1045926	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP24	9-Sep-13	1045927	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	9-Sep-13	1045928	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 8	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 11	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0	20/10/2015	ES1535280001	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0.5	20/10/2015	ES1535280002	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-0	20/10/2015	ES1535280004	Soil	0	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-0.5	20/10/2015	ES1535280005	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1-0.5	20/10/2015	ES1535280007	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1-1.8	20/10/2015	ES1535280008	Soil	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-0.5	20/10/2015	ES1535280009	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-2.4	20/10/2015	ES1535280010	Soil	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-0.5	20/10/2015	ES1535280011	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-1.2	20/10/2015	ES1535280012	Soil	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-0.5	20/10/2015	ES1535280013	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-1.0	20/10/2015	ES1535280014	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-0.5	20/10/2015	ES1535280015	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-1.0	20/10/2015	ES1535280016	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-0.0	21/10/2015	ES1535280017	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-1.0	21/10/2015	ES1535280018	Soil	1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-0	21/10/2015	ES1535280019	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-0.5	21/10/2015	ES1535280020	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0	21/10/2015	ES1535280022	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0.5	21/10/2015	ES1535280023	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0	21/10/2015	ES1535280025	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0.5	21/10/2015	ES1535280026	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F-0	21/10/2015	ES1535280028	Soil	0	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F-0.5	21/10/2015	ES1535280029	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-0	21/10/2015	ES1535280031	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-0.5	21/10/2015	ES1535280032	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-0	21/10/2015	ES1535280034	Soil	0	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-0.5	21/10/2015	ES1535280035	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-0	21/10/2015	ES1535280037	Soil	0	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-0.5	21/10/2015	ES1535280038	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0	21/10/2015	ES1535280040	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0.5	21/10/2015	ES1535280041	Soil	0.5	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-0	21/10/2015	ES1535280043	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-0.5	21/10/2015	ES1535280044	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0	21/10/2015	ES1535280046	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0.5	21/10/2015	ES1535280047	Soil	0.5	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-0	21/10/2015	ES1535280049	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-0.5	21/10/2015	ES1535280050	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0	21/10/2015	ES1535280053	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0	22/10/2015	ES1535280058	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-1.0	21/10/2015	ES1535280051	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0.5	21/10/2015	ES1535280054	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0.5	21/10/2015	ES1535280057	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0	21/10/2015	ES1535280056	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0.6	22/10/2015	ES1535280059	Soil	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-0	22/10/2015	ES1535280060	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-1.0	22/10/2015	ES1535280062	Soil	1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 0.5	20-Oct-15	1491669.1	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	20-Oct-15	1491669.2	Soil	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	20-Oct-15	1491669.3	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	20-Oct-15	1491669.4	Soil	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	20-Oct-15	1491669.5	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	20-Oct-15	1491669.6	Soil	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	20-Oct-15	1491669.7	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	20-Oct-15	1491669.8	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	20-Oct-15	1491669.9	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	20-Oct-15	1491669.1	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0	21-Oct-15	1491669.16	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0.5	21-Oct-15	1491669.17	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 2.15	21-Oct-15	1491669.18	Soil	2.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0	21-Oct-15	1491669.2	Soil	0	< 3	< 3	< 3	-	-	-	-	< 5	< 3	< 3	< 3	< 5	< 3	< 5	< 50	< 5	< 5	< 5	< 9	< 5	< 3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 3	< 30	< 3	< 3	< 3	-	-	-	-	-	-	-	-	-	-
L - 0.5	21-Oct-15	1491669.21	Soil	0.5	< 3	< 3	< 3	-	-	-	-	< 5	< 3	< 3	< 3	< 5	< 3	< 5	< 50	< 5	< 5	< 5	< 10	< 5	< 3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 3	< 30	< 3	< 3	< 3	-	-	-	-	-	-	-	-	-	-
J - 0	21-Oct-15	1491669.22	Soil	0	< 3	< 3	< 3	-	-	-	-	< 5	< 3	< 3	< 3	< 5	< 3	< 5	< 50	< 5	< 5	< 5	< 9	< 5	< 3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 3	< 30	< 3	< 3	< 3	-	-	-	-	-	-	-	-	-	-
J - 0.5	21-Oct-15	1491669.23	Soil	0.5	< 3	< 3	< 3	-	-	-	-	< 5	< 3	< 3	< 3	< 5	< 3	< 5	< 50	< 5	< 5	< 5	< 9	< 5	< 3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 3	< 30	< 3	< 3	< 3	-	-	-	-	-	-	-	-	-	-
BH01_0.2	13/09/2017	1843544.9 / 1842903.1	Soil	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01_1.5	13/09/2017	1842903.3	Soil	1.5	< 0.012	< 0.012	< 0.012	< 0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03_0.5	13/09/2017	1842903.7	Soil	0.5	-	-	-	-	-	-	-												-	-	-	-	-	-	-	-	-	-	-	-	-	-				-									
BH05_0.5	13/09/2017	1842903.9	Soil	0.5	< 0.02	< 0.02	< 0.02	< 0.02	-	-	-												-	-	-	-	-	-	-	-	-	-	-	-	-	-				-									
BH07	13/09/2017	1843544.1	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	13/09/2017	1843544.2	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	13/09/2017	1843544.3	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	13/09/2017	1843544.4	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	13/09/2017	1843544.5	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	13/09/2017	1843544.6	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	13/09/2017	1843544.7	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	13/09/2017	1843544.8	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Golder Associates
Bluehaven Management Limited
Ravensdown New Plymouth

Table X1: Tier 1 soil quality assessement

					Polychlorinated Biphenyls (PCB)																									
					PCB-101	PCB-105	PCB-110	PCB-114	PCB-118	PCB-121	PCB-123	PCB-126	PCB-128	PCB-138	PCB-141	PCB-149	PCB-151	PCB-153	PCB-156	PCB-157	PCB-159	PCB-167	PCB-169	PCB-170	PCB-180	PCB-189	PCB-194	PCB-206	PCB-209	Total PCB (Sum of 35 congeners)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SCS$_{(health)}$ [1]	**Commercial / Industrial (unpaved)**																													
MfE (2011) Tier 1 All Pathway Acceptance Criteria [2]	**Commercial / Industrial - Sand Geology**			**Surface (<1m)**																										
				1m-4m																										
NEPM (2013) HIL(D) [3]	**Commercial / Industrial**																													**8**
WADoH (2009) [4]	**Commercial/Industrial**																													
Sample Name:	**Sample Date**	**Lab Number:**	**Matrix:**	**Depth (m):**																										
RNP51 0.0	9-Sep-13	1178314.3	Soil	0	0.111	< 0.010	0.064	< 0.010	0.037	0.056	< 0.010	< 0.010	0.033	0.34	0.083	0.23	0.078	0.28	0.029	< 0.010	< 0.010	0.017	< 0.010	0.13	0.25	< 0.010	0.032	< 0.010	< 0.010	1.8
RNP31 0.5	9-Sep-13	1178314.4	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41 0.0	9-Sep-13	1178314.7	Soil	0	0.011	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.025	< 0.010	0.02	< 0.010	0.023	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011	0.02	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP31 0.0	9-Sep-13	1178314.8	Soil	0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.010	0.01	< 0.010	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP32 0.0	9-Sep-13	1178314.9	Soil	0	0.105	< 0.010	0.068	< 0.010	0.034	0.055	< 0.010	< 0.010	0.022	0.23	0.057	0.171	0.054	0.196	0.017	< 0.010	< 0.010	0.011	< 0.010	0.067	0.138	< 0.010	0.021	< 0.010	< 0.010	1.3
RNP72 2.0	9-Sep-13	1178314.21	Soil	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21 0.0	9-Sep-13	1178314.22	Soil	0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.02	< 0.010	0.015	< 0.010	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP22 0.0	9-Sep-13	1178314.27	Soil	0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.022	< 0.010	0.016	< 0.010	0.017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.01	0.016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP72 1.0	9-Sep-13	1178314.31	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61 0.0	9-Sep-13	1178314.32	Soil	0	0.64	0.017	0.35	< 0.010	0.19	0.31	< 0.010	< 0.010	0.178	1.84	0.46	1.28	0.43	1.54	0.156	< 0.010	< 0.010	0.088	< 0.010	0.72	1.38	0.035	0.174	0.019	< 0.010	**9.9**
RNP61_0.4	13-Sep-17	1842903.1	Soil	0.4	0.06	< 0.010	0.035	< 0.010	0.02	0.031	< 0.010	< 0.010	0.02	0.18	0.043	0.109	0.037	0.138	0.014	< 0.010	< 0.010	0.011	< 0.010	0.055	0.107	< 0.010	0.018	< 0.010	< 0.010	0.9
RNP62 0.0	9-Sep-13	1178314.33	Soil	0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.010	< 0.010	< 0.010	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP42 0.0	9-Sep-13	1178314.38	Soil	0	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP33 0.0	9-Sep-13	1178314.41	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25 0.4	10-Sep-13	1178314.54	Soil	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45 0.0	10-Sep-13	1178314.55	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46 0.0	10-Sep-13	1178314.57	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56 0.0	10-Sep-13	1178314.58	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34 0.0	10-Sep-13	1178314.6	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite A of RNP21 0.0 + RNP22 0.0 + RNP31 0.0 + RNP32 0.0 + RNP41 0.0 + RNP42 0.0 + RNP51 0.0 + RNP61 0.0 + RNP62 0.0		1178314.71	Soil	-	0.109	< 0.010	0.06	< 0.010	0.031	< 0.010	< 0.010	< 0.010	0.034	0.32	0.079	0.22	0.07	0.27	0.028	< 0.010	< 0.010	0.015	< 0.010	0.126	0.24	< 0.010	0.031	< 0.010	< 0.010	1.7
Composite B of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0		1178314.72	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
Composite C of RNP33 0.0 + RNP34 0.0 + RNP45 0.0 + RNP46 0.0 + RNP56 0.0 + RNP65 0.0		1178314.73	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
Composite D of RNP71 0.0 + RNP72 0.0 + RNP81 0.0 + RNP82 0.0		1178314.74	Soil	-	0.014	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.046	0.011	0.031	0.01	0.039	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.017	0.032	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
Composite E of RNP53 0.0 + RNP63 0.0 + RNP64 0.0 + RNP73 0.0 + RNP74 0.0 + RNP83 0.0		1178314.75	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.038	< 0.010	0.026	< 0.010	0.033	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.014	0.027	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
Composite F of RNP14 0.0 + RNP15 0.0 + RNP23 0.0 + RNP24 0.0 + RNP25 0.0 + RNP26 0.0 + RNP35 0.0 + RNP36 0.0 [duplicate]		1178314.76	Soil	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.4
RNP71 0.8	9-Sep-13	1178314.14	Rock or Mineral	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP45		1045892	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP		1045893	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP11	9-Sep-13	1045894	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP15	10-Sep-13	1045895	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP25	10-Sep-13	1045896	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP26	10-Sep-13	1045897	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP31	9-Sep-13	1045898	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP32	9-Sep-13	1045899	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP33	9-Sep-13	1045900	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	10-Sep-13	1045901	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP35	10-Sep-13	1045902	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP36	10-Sep-13	1045903	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP41	9-Sep-13	1045904	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP42	9-Sep-13	1045905	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP44	9-Sep-13	1045906	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP46	10-Sep-13	1045907	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP51	9-Sep-13	1045908	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP53	9-Sep-13	1045909	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP56	10-Sep-13	1045910	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP61	9-Sep-13	1045911	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP62	9-Sep-13	1045912	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP63	9-Sep-13	1045913	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP64	9-Sep-13	1045914	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP65	10-Sep-13	1045915	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP71	9-Sep-13	1045916	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP73	9-Sep-13	1045917	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP74	9-Sep-13	1045918	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP81	9-Sep-13	1045919	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP82	9-Sep-13	1045920	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP83	9-Sep-13	1045921	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP84	9-Sep-13	1045922	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP14	9-Sep-13	1045923	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP21	9-Sep-13	1045924	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP22	9-Sep-13	1045925	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP23	9-Sep-13	1045926	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP24	9-Sep-13	1045927	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RNP34	9-Sep-13	1045928	Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 8	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample 11	24-Sep-13	1378503343	Cement Sheet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-0	20/10/2015	ES1535280001	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
O-0.5	20/10/2015	ES1535280002	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
N-0	20/10/2015	ES1535280004	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
N-0.5	20/10/2015	ES1535280005	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
UPSS1-0.5	20/10/2015	ES1535280007	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1-1.8	20/10/2015	ES1535280008	Soil	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-0.5	20/10/2015	ES1535280009	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2-2.4	20/10/2015	ES1535280010	Soil	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-0.5	20/10/2015	ES1535280011	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3-1.2	20/10/2015	ES1535280012	Soil	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-0.5	20/10/2015	ES1535280013	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W01-1.0	20/10/2015	ES1535280014	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-0.5	20/10/2015	ES1535280015	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W02-1.0	20/10/2015	ES1535280016	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-0.0	21/10/2015	ES1535280017	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-1.0	21/10/2015	ES1535280018	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-0	21/10/2015	ES1535280019	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-0.5	21/10/2015	ES1535280020	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0	21/10/2015	ES1535280022	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R-0.5	21/10/2015	ES1535280023	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0	21/10/2015	ES1535280025	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G-0.5	21/10/2015	ES1535280026	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F-0	21/10/2015	ES1535280028	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
F-0.5	21/10/2015	ES1535280029	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-0	21/10/2015	ES1535280031	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
E-0.5	21/10/2015	ES1535280032	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-0	21/10/2015	ES1535280034	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
D-0.5	21/10/2015	ES1535280035	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-0	21/10/2015	ES1535280037	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
C-0.5	21/10/2015	ES1535280038	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0	21/10/2015	ES1535280040	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-0.5	21/10/2015	ES1535280041	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-0	21/10/2015	ES1535280043	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-0.5	21/10/2015	ES1535280044	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0	21/10/2015	ES1535280046	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-0.5	21/10/2015	ES1535280047	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-0	21/10/2015	ES1535280049	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-0.5	21/10/2015	ES1535280050	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0	21/10/2015	ES1535280053	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0	22/10/2015	ES1535280058	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-1.0	21/10/2015	ES1535280051	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L-0.5	21/10/2015	ES1535280054	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0.5	21/10/2015	ES1535280057	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J-0	21/10/2015	ES1535280056	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-0.6	22/10/2015	ES1535280059	Soil	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
B-0	22/10/2015	ES1535280060	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-1.0	22/10/2015	ES1535280062	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
UPSS1 - 0.5	20-Oct-15	1491669.1	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS1 - 1.8	20-Oct-15	1491669.2	Soil	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 0.5	20-Oct-15	1491669.3	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS2 - 2.4	20-Oct-15	1491669.4	Soil	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 0.5	20-Oct-15	1491669.5	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UPSS3 - 1.2	20-Oct-15	1491669.6	Soil	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 0.5	20-Oct-15	1491669.7	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO1 - 1.0	20-Oct-15	1491669.8	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 0.5	20-Oct-15	1491669.9	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WO2 - 1.0	20-Oct-15	1491669.1	Soil	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0	21-Oct-15	1491669.16	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 0.5	21-Oct-15	1491669.17	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C - 2.15	21-Oct-15	1491669.18	Soil	2.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0	21-Oct-15	1491669.2	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L - 0.5	21-Oct-15	1491669.21	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J - 0	21-Oct-15	1491669.22	Soil	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J - 0.5	21-Oct-15	1491669.23	Soil	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01_0.2	13/09/2017	1843544.9 / 1842903.1	Soil	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01_1.5	13/09/2017	1842903.3	Soil	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03_0.5	13/09/2017	1842903.7	Soil	0.5																										
BH05_0.5	13/09/2017	1842903.9	Soil	0.5																										
BH07	13/09/2017	1843544.1	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	13/09/2017	1843544.2	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	13/09/2017	1843544.3	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	13/09/2017	1843544.4	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	13/09/2017	1843544.5	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	13/09/2017	1843544.6	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	13/09/2017	1843544.7	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	13/09/2017	1843544.8	Soil	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX D

Report Limitations

APPENDIX D
Report Limitations

This Report/Document has been provided by Golder Associates (NZ) Limited ("Golder") subject to the following limitations:

i) This Report/Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Report/Document, in whole or in part, in other contexts or for any other purpose.

ii) The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report/Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.

iii) Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Report/Document. Accordingly, if information in addition to that contained in this report is sought, additional studies and actions may be required.

iv) The passage of time affects the information and assessment provided in this Report/Document. Golder's opinions are based upon information that existed at the time of the production of the Report/Document. The Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

v) Any assessments, designs and advice made in this Report/Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Report/Document.

vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

vii) The Client acknowledges that Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. Golder will be fully responsible to the Client for the Services and work done by all of its subconsultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Golder and not Golder's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against Golder's affiliated companies, and their employees, officers and directors.

viii) This Report/Document is provided for sole use by the Client and is confidential to it. No responsibility whatsoever for the contents of this Report/Document will be accepted to any person other than the Client. Any use which a third party makes of this Report/Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Report/Document.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australia & NZ	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

AUCKLAND

Tel +64 9 486 8068
Fax +64 9 486 8072

Level 2
Nielsen Centre
129 Hurstmere Road
Takapuna
Auckland 0622

PO Box 33-849
Takapuna 0740

WELLINGTON

Tel +64 3 377 5696

Level 1
93 The Terrace
Wellington 6011

PO Box 5234
Wellington 6145

NELSON

Tel +64 3 548 1707
Fax +64 3 548 1727

Level 3
295 Trafalgar Street
Nelson 7010

PO Box 1724
Nelson 7040

CHRISTCHURCH

Tel +64 3 377 5696
Fax +64 3 377 9944

Level 1
214 Durham Street
Christchurch 8011

PO Box 2281
Christchurch 8140

Golder Associates

Appendix E:

Remedial Action Flow Chart

PROPOSED REMEDIATION STRATEGY