Watercare Services Limited

Whenuapai-Redhills Wastewater Servicing Package 1

Environmental Assessment: Detailed Site Investigation - Summary Report

June 2021

Executive summary

GHD Limited (GHD) has been engaged by Watercare Services Limited (Watercare) to prepare a contaminated land Detailed Site Investigation (DSI) report to support consenting requirements for construction of the proposed Whenuapai-Redhills Package 1 wastewater rising main/gravity main and interim pump station (the alignment).

The proposed method of construction for the alignment is a combination of open-cut trench, which will be opened and closed progressively as the construction moves along the alignment, and horizontal directional drilling (HDD). Open cut excavations will be required for construction of the interim pump station.

The purpose of this report is to provide information on the potential for soil and groundwater contamination along the proposed alignment, and to assess compliance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011(NES CS) and Auckland Unitary Plan Operative in Part (AUP (OP)) rules for discharges to the environment.

Contamination investigations were carried out by Tonkin & Taylor Ltd (T+T) in conjunction with the geotechnical investigations along the alignment from 2 November 2020 to 18 December 2020. The investigations were undertaken in accordance with the environmental investigation specifications prepared by GHD in October 2020 titled "*Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station Ground Investigation Scope (Package 1)"* (GHD Ground Investigation Scope).

The findings of the DSI identified soil concentrations in the vicinity of the alignment reported below the adopted human health criteria under the NES CS Regulations, the permitted activity discharge criteria under the AUP (OP) E.30, and background where soil will be disturbed during construction.

The NES CS Regulations are considered to no longer apply to soil disturbance and removal activities during construction works as the DSI demonstrates concentrations of select inorganic and organic contaminants are below naturally occurring background levels. Therefore, resource consent is not required in accordance with Regulation 5(9) of the NES CS.

The discharge of groundwater onto or into land and/or into water for the purpose of dewatering trenches or other excavations during construction of the watermain (where dewatering is required) along the alignment is a **Permitted Activity** under the AUP (OP) Rule E4.4.1 (A5).

The maximum reported concentrations of copper, nickel, and zinc were found to exceed the respective ANZECC Guidelines for the protection of 80% and 95% freshwater species, which applies to discharge of groundwater to surface water receptors along the alignment. Testing of groundwater during dewatering activities is recommended prior to discharge and testing and treatment procedures are to be outlined in a SMP.

Based on the results of the DSI, soil is considered suitable for reuse as backfill (if geotechnically suitable) or disposal offsite to a licenced managed landfill facility i.e., Redvale Landfill. It is recommended that licensed landfill operators be provided a copy of the laboratory reports and consulted to confirm acceptance requirements prior to delivery of the material to respective facilities.

It is recommended that Site Management Plan (SMP) be prepared, and the controls implemented to manage discharges into the environment from construction dewatering, and soil disposal during construction. Any groundwater encountered during construction would be

managed onsite using appropriate management controls as provided in the SMP and by the implementation of appropriate sediment control measures.

Soil and groundwater management procedures outlined in a SMP are recommended to be adhered to during the construction and that contamination discovery protocols be adopted. This relates to situations encountering any unexpected contamination, to manage any potential risks to human health and the environment during construction. The contaminant discovery protocols provided in a SMP should be followed and if further contamination is discovered, soils should be tested and disposed of to an appropriately licensed facility as required.

This report is subject to, and must be read in conjunction with, the limitations set out in this report and the assumptions and qualifications contained throughout the Report.

Limitations

This report: has been prepared by GHD for Watercare Services Limited and may only be used and relied on by Watercare Services Limited for the purpose agreed between GHD and the Watercare Services Limited as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Watercare Services Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Watercare Services Limited and others (Tonkin & Taylor Ltd) who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

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1. Introduction

1.1 General project background

GHD Limited (GHD) has been engaged by Watercare Services Limited (Watercare) to prepare a contaminated land Detailed Site Investigation (DSI) report to support resource consenting requirements for the proposed Whenuapai-Redhills Package 1 wastewater rising main/gravity main and interim pump station (the proposed alignment) as shown in Figure 1-1.

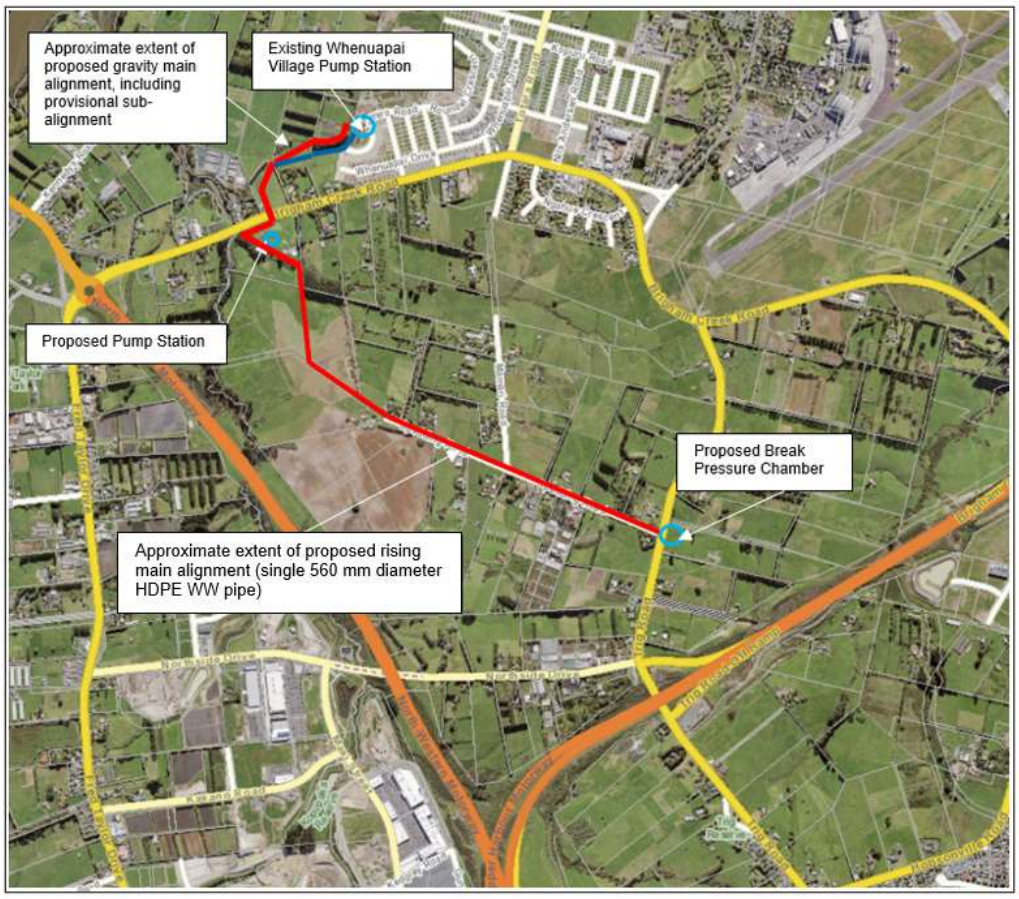


Figure 1-1: Indicative location and extent of the proposed alignment

1.1.1 Previous site investigations

A Preliminary Site Investigation (PSI) was completed by GHD in October 2020 (GHD, 2020a)[1] for the proposed alignment. The PSI report assessed potential risks to human health where potential activities listed on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL)[2] were identified as having 'more likely than not occurred' along the proposed alignment.

A detailed summary of the PSI findings and risk assessment related to the proposed construction along the alignment is provided in section 2 of this report. The PSI report has not been appended to this report; however, it is available upon request.

Watercare engaged Tonkin and Taylor Ltd (T+T) to undertake geotechnical and contaminated land field investigations. The geotechnical and contaminated land field investigations were

[1] GHD Limited. (2020a). Whenuapai-Redhills Wastewater Servicing Environmental Assessment: Preliminary Site Investigation. Report prepared for Watercare Services Limited dated June 2020.
[2] Ministry for the Environment. (2011). Hazardous Activities and Industries List.

undertaken in accordance with the "Whenuapai-Redhills Wastewater Servicing Rising Main /Gravity Main and Interim Pump Station Investigation Scope" (GHD Investigation Scope) prepared by GHD in October 2020 (GHD, 2020b)[3]. This report summarises the ground contamination findings of the T+T contaminated land investigation undertaken for the proposed alignment.

1.2 Construction methodology

The overall development comprises approximately 3 km of pipeline upgrade, an interim pump-station and a new break-pressure chamber.

The construction methodology along the proposed alignment for the proposed rising and gravity main sections will be a combination of trenching and horizontal directional drilling (HDD) to a depth of 3 to 7 metres below ground level (mbgl), except for the crossing of the Sinton Stream which could see depths extending to approximately 15.0 mbgl. The maximum depth of soil disturbance at the proposed pump station is anticipated to be at 15 mbgl. The maximum depth of soil disturbance at the new break pressure chamber will be approximately 5 mbgl.

The excavation volumes along the proposed alignment are anticipated to exceed Ministry for the Environment (MfE) National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, 2011(NES CS)[4] permitted activity criteria of 25 m^3 per 500 m^2 for soil disturbance and 5 m^3 per 500 m^2 for soil removal.

1.3 Purpose of this report

The purpose of this report is to provide information on the potential for soil and groundwater contamination along the proposed alignment and to assess compliance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health), Regulations 2011(NES CS) [5] and Auckland Unitary Plan Operative in Part (AUP (OP))[6].

1.4 Objectives

The objectives of this DSI are to:

- Assess the contamination status of soil along the alignment to evaluate whether the proposed construction poses a risk to human health and the environment; during soil disturbance activities;
- Identify the consent requirements under the NES CS Regulations and AUP (OP);and
- Identify any extra considerations or management that may need to be addressed during construction and design due to possible contamination along the alignment.

[3] GHD Limited. (2020b). Whenuapai-Redhills Wastewater Servicing Rising Main /Gravity Main and Interim Pump Station Investigation Scope (Package 1). Prepared for Watercare Services Limited dated October 2020 (Revision 2).
[4] Ministry for the Environment Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. In. Ministry for the Environment. (2012). Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
[5] Ministry for the Environment Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.
[6] The Auckland Unitary Plan Operative in Part 2016 (updated 09 April 2021).

1.5 Scope of work

The scope of work for this DSI included the following:

- A review of the reported ground conditions and contamination results from the soil and groundwater investigations undertaken by T+T for the purpose of chemical characterisation to inform disposal and resource consent requirements;
- Preparation of this DSI report to summarise the investigation findings undertaken and the assessment of the soil and groundwater analytical results in accordance with the MfE *Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand (Revised 2011)*; and
- Recommendations on off-site disposal and on-site reuse options for soil excavated during the proposed works, including any contaminated land management controls that may be required based on the reported findings.

1.6 Assumptions

This report was developed with consideration given to the following assumptions:

- The ground contamination investigations that were scoped as part of the DSI are based on the proposed alignment design as described in the GHD Investigation Scope (Revision 2) dated October 2020 (GHD, 2020b). Reassessment of the soil and groundwater analytical findings and an update of this DSI report will be required should any additional changes of the design occur.
- The level of environmental investigations scoped is considered sufficient to assess the contamination risk along the proposed alignment to inform resource consent status under the Resource Management National Environmental Standard Assessing and Managing Contaminants in Soil to Protect Human Health, 2011 (NES CS) and the Auckland Unitary Plan – Operative in Part (AUP (OP)) Chapter E.30 for discharges to the environment.
- The level of environmental investigations scoped is considered sufficient for the purpose of characterising the soil and groundwater risk along the proposed alignment for disposal purposes.
- It is assumed that the maximum depth of soil disturbance from opencut excavations at the proposed pump station is 15 mbgl. As such, the proposed sampling locations and depths specified in the environmental investigation have been scoped to allow representative sampling of the soil profile.
- It is assumed that the construction methodology along the proposed alignment will be a combination of trenching and HDD to a depth of 3 to 7 mbgl, except for the crossing of the Sinton Stream which could see depths extending to approximately 15.0 mbgl. The soil disturbance and dewatering will occur along trench excavations and at drilling pit/shaft sites along the proposed alignment. As such, the sampling locations and depths outlined in this investigation were scoped to characterise both the deep and shallow soil profile and underlying aquifers.
- The analytical testing suites adopted as part of this investigation intended to assess the contamination risk to human health and the environment, and suitability for soil disposal and groundwater discharges.
- The information obtained from third parties including Watercare and T+T is complete and accurate and represents existing ground conditions.
- The observations made during the investigation are representative of the activities that have occurred onsite; and

- The observable and inferred site condition is representative of the actual site condition.

2. Preliminary Site Investigation – Summary

2.1 PSI Overview

The purpose of the PSI was to inform Watercare of the potential risks to human health and environment from identified potential or known HAIL sites and the likely resource consent requirements under the NES CS Regulations and AUP (OP).

The scope of work primarily involved a desktop-based review of historical aerial photographs and Auckland Council contaminated sites register searches.

The potential risk in relation to the presence of HAIL activities was also considered as part of the investigation and a qualitative risk rating, as per below, was allocated to sites where potential or known HAIL items were identified:

- **Low** – HAIL activities are within 500 m of a proposed alignment and are unlikely to impact the proposed works.
- **Medium** – HAIL activities identified with potential contaminating activities or industries occurring on land adjacent to a proposed alignment. There is some potential for contact during proposed works.
- **High** – HAIL activities have been identified and contamination is known to have occurred on land either adjacent to or beneath a proposed alignment.

The findings of the PSI indicated that there is the potential for contaminated land associated with historical and existing HAIL activities to be encountered along the proposed alignment.

The PSI identified six sites where HAIL activities associated with commercial/industrial wastewater treatment and disposal, storage and use of hazardous goods, and horticultural activities have 'more likely than not' occurred.

The findings of the PSI reported two high risk and nine medium risk category HAIL activities identified along the proposed alignment. Low risk HAIL activities were identified within a distance within 500 m; however, were considered unlikely to present a risk to the proposed works. The supplementary information provided by Auckland Council did not suggest any significant contaminant issues along the proposed alignment.

The potential soil contaminants of concern related to the HAIL activities identified were as follows:

- Heavy metals
- Organochlorine pesticides (OCPs)
- Total petroleum hydrocarbons (TPH)
- Benzene, ethylbenzene, toluene, xylene (BTEX)
- Volatile organic compounds (VOCs)

2.2 Further Investigation Requirements

Upon completion of the PSI, a DSI was recommended to be undertaken to confirm resource consent status under the NES CS and AUP (OP), to characterise the soil for off-site disposal, and inform appropriate management of soil in the event of contamination discovery during construction.

3. Statutory Context

3.1 The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

3.1.1 Overview

The NES CS regulates activities undertaken on contaminated land and provides nationally consistent human health risk-based standards for management of such activities.

The NES CS does not include criteria for environmental risk assessment; however, this is covered by the AUP (OP) and is discussed in section 3.2.

The NES CS applies to 'pieces of land' on which any activity in the HAIL is 'more likely than not' to have occurred and for soil disturbance where the following permitted activity thresholds are exceeded:

- Soil disturbance greater than 25 m^3 per 500 m^2 of the piece of land associated with the HAIL
- Soil removal greater than 5 m^3 per 25 m^2 of the piece of land associated with the HAIL.

These permitted activity thresholds as well as other triggers are detailed in Regulation 8 (3) of the NES CS.

The NES CS also regulates:

- Site investigation and reporting
- The sampling of soils for contamination assessment
- Removing underground fuel storage systems
- Contamination investigations and health risk assessments when subdividing land and changing land use.

3.1.2 Applicability

The NES CS applies to areas ('pieces of land') on which a HAIL activity is 'more likely than not' to have occurred and restricts activities, such as soil disturbance, from being undertaken on the 'pieces of land'. The PSI undertaken by GHD (2020a) assessed the likelihood of contaminated soil and groundwater existing in the area(s) of proposed earthworks by means of a desktop review of available information pertaining to the location of the site. The term defined as the 'pieces of land' in the NES CS was applied to the linear section of the road carriageway and land parcels intersected by the proposed alignment where soil disturbance is proposed during construction.

Where a HAIL activity is identified as having 'more likely than not' occurred along the alignment, the NES CS will be considered to apply to the proposed works under Regulation 5(1)(a) of the NES CS. Soil disturbance of up to 25 m^3 per 500 m^2 of the 'piece of land' is considered a permitted activity. However, only 5 m^3 per 500 m^2 would be permitted for soil removal from the site. If these criteria, among others, are not met then resource consent will be required for the proposed works. If a resource consent is required, then the NES CS requires that a DSI be undertaken to assess whether the activity is a controlled or restricted discretionary activity. However, the NES CS would be deemed to no longer apply to the 'pieces of land' if the DSI demonstrates that any contaminants in, or on, the 'pieces of land' are at or below background concentrations under Regulation 5(9).

The applicability of the NES CS Regulations based on the DSI findings is discussed further in section 7.1.1 of this report.

3.2 The Auckland Unitary Plan – Operative in Part

3.2.1 Overview

Councils are required to manage both the use of land containing elevated levels of contaminants and the discharge of contaminants from land containing elevated levels of contaminants. Therefore, Councils may impose controls in addition to the NES CS for environmental protection.

The AUP (OP) includes the regulations associated with Contaminated Land (Chapter E30) and specifies rules that relate to the discharges of contaminants from disturbing soil on land and discharges of surface and groundwater containing elevated levels of contaminants.

3.2.2 Applicability

Soil disturbance

The AUP (OP) section E30 Contaminated Land applies to soil disturbance activities where the following thresholds are exceeded:

- Soil disturbance greater than 200 m^3 (refer E30.6.1.2(1)(b)),on a site with contaminant concentrations above the permitted activity criteria as outlined in Table E30.6.1.4.1 of the AUP (OP)

Dewatering

The discharge of groundwater onto or into land and/or into water for the purpose of dewatering trenches or other excavations during construction of the interim pump station and rising main (where dewatering is required) is a Permitted Activity under the AUP (OP) Rule E4.4.1 (A5).

Therefore, groundwater testing is not required to further inform resource consent status for the purpose of dewatering under the AUP (OP) during construction. However, groundwater testing has been undertaken to assess concentrations of contaminants for disposal purposes during construction dewatering i.e., to inform whether dewatered groundwater can be discharged to surface water or requires further treatment and/or offsite disposal.

The applicability of the AUP(OP) based on the DSI findings is discussed further in section 7.1.2 of this report.

3.3 Contaminated Land Management Guidelines

The MfE has prepared a series of guideline documents on contaminated land management. These guidelines are intended to provide consistency of reporting on the investigation, assessment and remediation of contaminated sites in New Zealand. The NES CS Regulations incorporates MfE Contaminated Land Management Guidelines (CLMG) by reference and therefore gives them regulatory effect.

To achieve a uniform approach to reporting in New Zealand the first of the series, the CLMG No. 1 provides guidance and a checklist for the content of reports. This DSI has been prepared in general accordance with these guidelines.

4. Detailed Site Investigation

4.1 Field investigations

Contamination investigations were carried out by T+T in conjunction with the geotechnical investigations along the alignment from 2 November 2020 to 18 December 2020. The investigations were undertaken in accordance with the sampling scope prepared by GHD (2020b)[7] *Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station Ground Investigation Scope (Package 1)* Revision 2 (GHD Ground Investigation Scope).

The soil and groundwater sampling methodology and testing schedule were completed by T+T in accordance with the GHD Ground Investigation Scope and the *Ministry for the Environment Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*.

The soil and groundwater sampling locations are shown in Appendix A of the T+T (2021a) Ground Contamination Factual Report[8] (refer **Appendix A)**. The hand auger and machine drilled borehole logs have been documented in the T+T (2021b) Geotechnical Ground Investigation Factual Report (Appendix C and D)[9] and copies are provided in **Appendix B** of this report.

The soil and groundwater sampling methodologies undertaken during the investigations are provided in section 4.2 of the T+T (2021a) Report in **Appendix A**.

4.2 Analytical testing suites

4.2.1 Soil suites

The soil testing schedule specification had been determined by the GHD Investigation Scope (GHD, 2020b) and implemented in the field by T+T.

[7]GHD Limited. (2020b). Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station Ground Investigation Scope (Package 1). Prepared for Watercare Services Limited Revision 2 dated 13 October 2020.

[8]Tonkin & Taylor Ltd. (2021a). Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station Ground Contamination Factual Report. Report prepared for Watercare Services Limited dated February 2021. Report number: 1014985.v2

[9] Tonkin & Taylor Ltd. (2021a). Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station Geotechnical Ground Investigation Factual Report. Report prepared for Watercare Services Limited dated January 2021. Report number: 1014985.0000

The soil testing undertaken comprised the following analytical suites:

Soil Suite 1 – Commercial Wastewater Discharge Sites

A specific analytical suite to target where soil disturbance is proposed on Commercial Wastewater Discharge Sites (HAIL G5).

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- PAHs.
- Volatile organic compounds (VOCs) including BTEX[10].
- Total petroleum hydrocarbons (TPH).

Soil Suite 2 – Horticultural / Agricultural Sites

A specific analytical suite to target where soil disturbance is proposed on Horticultural / Agricultural Sites (HAIL A8 and HAIL A10)

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- Semi Volatile Organic Compounds (SVOCs).

Soil Suite 3 – Soil Disposal

A general analytical suite for characterisation for soil waste disposal comprising:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- TPH.
- Polycyclic aromatic hydrocarbons (PAH).
- Asbestos semi quantitative analysis.

Samples were tested for TPH to provide an initial screening to inform whether further assessment of polycyclic aromatic hydrocarbons (PAH) was required. It was intended that samples would be further analysed for PAH if the PAH surrogate assessment criteria for TPH was exceeded.

Semi-quantitative analysis of asbestos presence in soils was included in the testing schedule where required.

Collection of field duplicates were also included in the testing schedule part of the project QAQC procedures.

4.2.2 Groundwater suites

The groundwater testing schedule specification had been determined by the GHD Investigation Scope (GHD, 2020b) and implemented in the field by T+T. The analytical suites adopted for the groundwater testing are detailed in Section 5.2 (Table 5.2) of the T+T (2021a) Report (refer **Appendix A**). There was sampling and testing of groundwater from HAIL sites where analytical Suites 1 and 2 were required.

[10] Benzene, toluene, ethylbenzene and xylene

Groundwater Suite 1 - Commercial Wastewater Discharge Sites

A specific analytical suite for characterisation of groundwater where construction dewatering is proposed on Commercial Wastewater Discharge Sites (HAIL G5).

- pH
- Dissolved metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
- PAH.
- BTEX
- Nutrient suite dissolved (nitrate, nitrite, ammonium, dissolved reactive phosphorous).

Groundwater Suite 2 - Horticultural / Agricultural Sites

A specific analytical suite for characterisation of groundwater where construction dewatering is proposed on Horticultural / Agricultural Sites (HAIL A8 and HAIL A10)

- pH
- Dissolved metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
- SVOCs.

Groundwater Suite 3 - General disposal

A general analytical suite for characterisation of groundwater for disposal during dewatering comprised:

- pH
- Dissolved metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
- PAH.
- TPH.

4.2.3 Additional testing

Relocation of ground investigation locations

The soil and groundwater sampling suites were revised by GHD prior to the investigation when sampling locations had to be removed or relocated. Scheduling at locations ENVR-HA03, ENVR-HA04, and ENVR-HA05 was adjusted by T+T as per GHDs request from the original Suite 2 testing to Suite 3 because the locations were moved from the southern side of the road to the northern side. OCP testing was added to the surface samples collected to assess for the potential migration of pesticide sprays used on the adjacent properties for horticultural purposes.

Unexpected ground contamination

The soil and groundwater sampling suites were revised by GHD during the investigations when unexpected, potential contamination in soils and/or groundwater were encountered (refer Section 4.3.1). The revised analytical tests were scheduled by T+T when the samples were submitted for laboratory analysis under the chain of custody process.

Suitability for landfill disposal

Further Toxicity Characteristic Leaching Procedure (TCLP) analysis of the cold hold samples submitted was not undertaken as part of this investigation. This was based on the initial concentrations of contaminants reporting below the adopted managed fill criteria.

4.3 Summary of observed field conditions

Field observations made my T+T field staff during the investigations are provided in section 4.3 of the T+T (2021a) Report in **Appendix A**.

4.3.1 Soil

The ground conditions T+T observed during sampling comprised fill material (reworked topsoil fill) to depths ranging between 0.1 mbgl and 3.4 mbgl. There was one location (HA112) where fill comprised a strong chemical odour was observed at 1.8 m bgl and a white/cream coloured powder present at 2.0 m bgl. The property where these samples were collected was not a potential or known HAIL site identified in GHD (2020a) PSI. The property at 23 Brigham Creek Road where these samples were collected appeared rural residential, comprising a house and a few outbuildings. There were no other contamination indicators encountered in the soil sampled. The soil testing suite for samples collected at location HA112 and the adjacent HA117 was revised by GHD. As a result, the testing schedule amended by T+T was adjusted as per GHDs request from the original Suite 3 testing to include heavy metals, VOCs, SVOCs, organo nitrogen and organo phosphorus pesticides (ONOPs), asbestos, and ammonium.

Photo Ionisation Detector (PID) readings were taken from soil samples collected at each location at 0.5 and 1.0 mbgl (or where core was able to be recovered). PID readings ranged from 0 to 6.0 (ppm). The results are summarised in Table 4-1 and detailed on the logs provided in **Appendix B**.

4.3.2 Groundwater

Groundwater levels were encountered between 1 mbgl and 5 mbgl. There were no visual indicators of contamination observed in groundwater during the investigation programme. The groundwater sampled was slightly silty or clear with no odours.

Table 4-1: PID Field Readings

Location	Depth (mbgl)	Soil Type	PID ppm
BH05A	0.35	TGA Group Silty Clay	1.3
BH05A	2	TGA Group Silty Clay	0.4
BH06	0.5	TGA Group Silt	0.1
BH06	1	TGA Group Silt	0
BH07	0.5	Topsoil	0.1
BH07	1	TGA Group Clayey Silt	0
BH08	0.5	FILL - Silty Sandy Clay	0.2
BH08	1	TGA Group Silty Clay	0.8
BH110	0.5	TGA Group Silt	0.6
BH110	1	TGA Group Silty Clay	0.3
BH111A/BH111	0.5	TGA Group Clayey Silt	0.3
BH111A/BH111	1	TGA Group Clayey Silt	0.5
BH113	0.1	Topsoil	0.3
BH113	0.5	TGA Group Sandy Silt	0
BH113	1	CORELOSS	PID not attainable due to coreloss
BH113	2.2	TGA Group Sandy Silt	0
BH116	0.1	FILL - Silty Clay	0.1
BH116	0.5	FILL - Silty Clay	0
BH116	1	TGA Group Silty Clay	0
BH116	2	TGA Group Sandy Silt	0.2
BH117	0.1	Topsoil	0
BH117	0.5	TGA Group Sandy Silt	0.5
ENVR-HA03	0.5	TGA Group Clayey Silt	0
ENVR-HA03	1	TGA Group Silty Clay	0
ENVR-HA04	0.5	TGA Group Clayey Silt	0
ENVR-HA04	1	TGA Group Silty Clay	0
ENVR-HA05	0.5	TGA Group Silt	0
ENVR-HA05	1	TGA Group Clayey Silt	0
ENVR-HA101	0.5	TGA Group Clayey Silt	0
ENVR-HA101	1	TGA Group Clayey Silt	0
HA03	0.5	TGA Group Silty Clay	0
HA03	1	TGA Group Silty Clay	0
HA04	0.5	TGA Group Silty Clay	0
HA04	1	TGA Group Silty Clay	0.1
HA05	0.5	TGA Group Silty Clay	0.1
HA05	1	TGA Group Silty Clay	0.1
HA06	0.5	TGA Group Clayey Silt	0.2
HA06	1	TGA Group Clayey Silt	0.3
HA07	0.5	TGA Group Sandy Silt	0.1
HA07	1	TGA Group Clayey Silt	0.2
HA07a	0.51	TGA Group Clayey Silt	0
HA07a	1	TGA Group Clayey Silt	0.8
HA08	0.5	TGA Group Sandy Silt	1.8
HA08	1	TGA Group Sandy Silt	2.5
HA08a	0.5	Topsoil	1.8
HA08a	1	TGA Group Sandy Silt	2.5
HA107a	0.51	TGA Group Silty Clay	0
HA107a	1	TGA Group Silty Clay	0
HA107b	0.51	FILL - Sandy Silt	0.5
HA107b	1	FILL - Sandy Silt	0.1
HA108	0.5	TGA Group Sandy Silt	0
HA108	1	TGA Group Sandy Silt	0
HA109	0.5	TGA Group Silt	0.3
HA109	1	TGA Group Silt	0.1
HA110a	0.51	FILL - Sandy Clayey Silts	0
HA110a	1	FILL - Sandy Clayey Silts	0
HA110b	0.51	FILL - Sandy Silt	0
HA110b	1	FILL - Silty Clay	0
HA111	0.5	FILL - Silt with sand	1.2
HA111	1	FILL - Silt with sand	0.3
HA112	0.5	FILL - Sandy Silt	0.9
HA112	1	FILL - Sandy Silt	1.8
HA113	0.5	TGA Group Silt	0
HA113	1	TGA Group Clayey Silt	0.4
HA114	0.5	TGA Group Silt	0
HA114	1	TGA Group Clayey Silt	0
HA115	0.5	FILL - Sandy Silt	0.5
HA115	1	TGA Group Sandy Silt	0.3
HA116	0.5	TGA Group Clayey Silt	0.5
HA116	1	TGA Group Clayey Silt	1
HA117	0.5	FILL - Silty Clay	0.8
HA117	1	FILL - Sandy Silt	6
HA119	0.5	TGA Group Silty Clay	0
HA119	1	TGA Group Silty Clay	0

Notes:
TGA Group - Tauranga Group (Geological Unit)

5. Assessment of soil and groundwater contamination

5.1 Soil Screening Criteria

5.1.1 The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

The NES CS has been adopted for the purposes of undertaking a screening level (Tier 1) risk assessment with respect to potential risk to human health associated with exposure to potential contaminants during the proposed works.

The NES CS sets national standards for contaminants in soil to protect human health. It contains a set of soil contaminant standards for 12 priority contaminants for five standard land use scenarios. The Soil Contaminant Standards (SCSs (health)) residential 10% produce and commercial/industrial land use screening criteria was adopted, as they most closely reflect the exposure pathways (including ingestion and dermal contact) for maintenance and construction work and adjacent residential land use.

5.1.2 The National Environment Protection Measure Guidelines

In the absence of New Zealand risk based human health screening criteria for nickel and zinc; The Australian National Environment Protection Measure 2013 (NEPM)[11] guidelines have been adopted for this assessment. These guidelines are consistent with the requirements of CLMG No. 2[12], which outlines the hierarchy of guidelines to be adopted in human health risk assessment in New Zealand.

The NEPM covers a range of land uses. For the purposes of this assessment, the NEPM Health-based Investigation Levels (HILs) for Residential (HIL A) and Commercial/industrial (HIL D) have been selected to best represent likely exposure pathways, similar with the NES CS standards adopted for this investigation for trace elements (nickel and zinc).

5.1.3 Health and Safety at Work (Asbestos) Regulations 2016

The management and/or removal of asbestos in soils is regulated under the Health and Safety at Work (Asbestos) Regulations 2016[13] (Asbestos Regulations). However; the Asbestos Regulations do not provide guidance regarding the definitions of what constitutes an asbestos contaminated site. Rather, simply states the Asbestos Regulations apply where a competent person advises that the disturbance and/or removal of soil is likely to lead to airborne contamination at a level that exceeds trace concentrations.

The New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Guidelines 2017)

The BRANZ Guidelines 2017[14] provides a methodology consistent with the MfE CLMG for New Zealand and NES Soil for the assessment of asbestos in soil. The analysis for the

[11] National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) Schedule B (1); Guideline on the Investigation Levels for Soil and Groundwater. Table 1A (1) Health investigation levels for soil contaminants.
[12] Ministry for the Environment. 2011. Contaminated Land Management Guidelines No. 2 Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011). Wellington: Ministry for the Environment.
[13] Health and Safety at Work (Asbestos) Regulations 2016 (15 February 2016) made under sections 24(1) (m), 211, and 218 of the Health and Safety at Work Act 2015
[14] New Zealand Guidelines for Assessing and Managing Asbestos in Soil - Building Research Association of New Zealand (BRANZ), November 2017

presence/absence of asbestos fibres and or asbestos containing material (ACM) debris in soil was undertaken in accordance with sampling under the NES CS and BRANZ guidelines.

5.1.4 Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand 1999 (Revised 2011)

The MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand 1999 (Revised 2011)[15] ('MfE OIG Guidelines') has been adopted for the purposes of undertaking a Tier 1 screening level risk assessment with respect to potential risk to human health associated with exposure to potential contaminants during the proposed works.

The MfE OIG Guidelines provide nationally consistent risk-based criteria for the assessment of risks from petroleum-based contaminants found in typical fuel products (petrol and diesel) to human health. The MfE OIG Guidelines can be applied to a range of land uses, environmental settings and exposure pathways.

Module 4 Soil

The soil analytical results were compared to the MfE OIG Guideline criteria for silty clay substrates in a residential and maintenance/excavation land use setting. These options cover all the current land uses and the excavation workers who will be working along the alignment during construction.

The soil analytical results were also compared against the MfE OIG Guideline criteria for silty clay substrates for the protection of groundwater quality. The guidelines selected are to ascertain whether there are high concentrations of hydrocarbons present in soil (within 1 m depth) that may be leaching into shallow groundwater.

5.1.5 Auckland Unitary Plan – Operative in Part

Chapter E30 Contaminated Land

The Auckland Council is required to regulate both the use of land containing elevated levels of contaminants and the discharge of contaminants from land containing elevated levels of contaminants. The AUP (OP) includes regulations associated with contaminated land and specifies rules that relate to the discharges of contaminants from disturbing soil of land greater than 200 m^3 per project (E30.6.1.2(1)(b)) and containing contamination above the permitted activity criteria outlined in Table E30.6.1.4.1 (replicated as Table 5-1).

[15] Ministry for the Environment. 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011). Wellington: Ministry for the Environment.

Table 5-1: AUP (OP) Permitted Activity Criteria

Table E30.6.1.4.1 Permitted activity soil acceptance criteria

Contaminant	Permitted activity criteria (mg/kg)
Arsenic	100.0
Benzo (a) pyrene (equivalent)	20
Cadmium	7.5
Chromium (total)	400.0
Copper	325.0
Total DDT	12.0
Lead	250.0
Mercury	0.75
Nickel	105.0
Zinc	400.0

Note 1
Total DDT includes the sum of DDT (dichlorodiphenyltrichloroethane), DDD (dichlorodiphenyldichloroethane) and DDE (dichlorodiphenyldichloroethylene).

In addition, Table E30.6.1.4.2 outlines naturally occurring background ranges of trace elements in non-volcanic and volcanic Auckland soils (replicated as Table 5-2).

Table 5-2: Background Concentrations in the Auckland Region

Table E30.6.1.4.2 Background ranges of trace elements in Auckland soils sources from Table 3 of TP153:2001 Background Concentrations of Inorganic Elements in Soils from the Auckland Region

Element (total recoverable)	Non-volcanic range mg/kg	Volcanic range mg/kg
Arsenic (As)	0.4 – 12	
Boron (B)	2 – 45	<2 - 260
Cadmium (Cd)	<0.1 – 0.65	
Chromium (Cr)	2 – 55	3 – 125*
Copper (Cu)	1 – 45	20 – 90
Lead (Pb)	<5 – 65*	
Mercury (Hg)	<0.03 – 0.45	
Nickel (Ni)	0.9 – 35	4 – 320
Zinc (Zn)	9 – 180	54 – 1160

* Work suggests special cases have been found to apply for Ti Point Basalts (Cr), Mt Smart Volcanics (Pb) and as such these lithologies need to be considered individually.

If the concentration of contaminants exceeds the permitted activity criteria and the other permitted activity standards are unable to be met as outlined within the AUP (OP) then a resource consent is required.

However, where nickel and zinc are found in volcanic soils, the natural background level should be applied as the permitted activity criteria.

Chapter E.4 Other Discharges of Contaminants

Chapter E.4 of the AUP (OP) applies to discharges of contaminants onto or into land /or water.

The discharge of groundwater onto or into land and/or into water for the purpose of dewatering trenches or other excavations during construction of the watermain (where dewatering is required) along the alignment is a **Permitted Activity** under the AUP (OP) Rule E4.4.1 (A5).

However, groundwater testing was undertaken for disposal purposes during construction dewatering i.e., to inform whether dewatered groundwater can be discharged to surface water or requires further treatment and/or offsite disposal. The adopted criteria used to assess contaminant concentrations in groundwater is outlined in section 5.2.1.

5.1.6 Technical Publication No. 153

As defined in Chapter E.30 of the AUP (OP), the Auckland Regional Council Technical Publication No. 153 (TP153)[16] provides the range of trace element concentrations considered representative of natural or background soils in the Auckland Region.

The concentrations outlined in TP153 are used to assess whether sampled material is consistent with natural background trace element concentrations for volcanic material and informs the applicability and activity status under the NES CS and AUP (OP) as well as options for soil reuse and/or disposal considerations to respective disposal facilities in the Auckland Region.

If the results from the DSI demonstrate that soil contaminant concentrations are at or below background levels, consent under the NES CS is not required under the NES CS Regulation 5(9).

The site is underlain by undifferentiated alluvium of the Tauranga Group for the northern section of the alignment. Pumiceous deposits of the Tauranga Group occur near the surface for the remainder of the alignment and alternating sandstone and mudstone deposits of the East Coast Bays Formation (ECBF) is the basement geology for the area.

The TP153 volcanic background screening criteria was adopted for soil samples analysed from sections along the alignment where Puketoka and East Coast Bays Formation (ECBF) geology was encountered. The TP153 non-volcanic background screening criteria was also adopted where shallow alluvium was encountered along the alignment.

5.1.7 Soil Disposal Guidelines

The AUP (OP) [17] Section E13.1 defines the types of material that may be disposed of in cleanfills, managed fills and landfills. Where the AUP (OP) does not specify cleanfill waste acceptance criteria, guidance has been adopted from the Technical Guidelines for Disposal to Land Waste Management Institute New Zealand (WasteMINZ) August 2018[18].

In the event that soil material is to be disposed off-site, the background soil concentrations defined in the AUP (OP) and TP153 will be used to inform cleanfill disposal criteria for the purpose of this assessment.

[16] Auckland Regional Council (2001). Background Concentrations of Inorganic Elements in Soils from the Auckland Region. Technical Publication 153.
[17] Auckland Unitary Plan Operative in Part. (2016). E.13. Cleanfills, managed fills and landfills
[18] Waste Management New Zealand. (2018) Technical Guideline for Disposal to Land.

Redvale Landfill Waste Acceptance Criteria

Watercare's Contractor advised GHD that soil was likely to be disposed offsite to Redvale Landfill. The landfill's acceptance criteria[19] was adopted in addition to the WasteMINZ managed fill criteria.

Acceptance of soil from the project should be confirmed by Redvale in advance, to allow them to review compliance with their landfill resource consents.

5.2 Groundwater Screening Criteria

5.2.1 The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines)

The ANZECC 2000 Guidelines have been developed to provide trigger levels protective of surface water ecology, and in this case have been used where discharges of dewatered groundwater into Sinton Creek and Totara Creek (Brigham Creek tributaries), and Slaughterhouse Stream may occur during construction.

The 80% and 95% criteria for freshwater species were adopted as best practise under guidance of the AUP (OP) Sections E.4 and E.30 to assess contaminant discharges into surface freshwater receptors along the alignment, where construction dewatering is proposed.

It should be noted that the ANZECC 2000 Guidelines are intended to be applied after reasonable mixing in the receiving water body and, as such, groundwater analytical results are not directly comparable to the ANZECC 2000 Guidelines for groundwater since the environmental values, which they protect, relate to above-ground uses and surface water receptors.

5.3 Soil and Groundwater Analytical Results

The soil and groundwater analytical results are tabulated in Appendix G of the T+T (2021a) Report **Appendix A**. The laboratory analytical reports are provided in Appendix F of the T+T (2021a) Report **Appendix A**.

For the purpose of this assessment, the soil and groundwater analytical results have been separated into HAIL Sites (refer subsection 5.3.1) and Non-HAIL Sites (refer subsection 5.3.2).

5.3.1 HAIL Sites

The contaminant concentrations in soil and groundwater from samples collected from HAIL Sites have been assessed to inform resource consent applicability under the NES CS Regulations for the protection of human health and the AUP (OP) Section E.30 for discharges into the environment.

The concentrations of heavy metals in soil and groundwater are compared with relevant guideline criteria presented in **Appendix C**.

The results of SVOCs in soil and groundwater reported concentrations below laboratory detection limit and have been excluded from the assessment tables.

[19] Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

Heavy Metals (Trace Elements)

Soil

- All concentrations reported below the adopted NES SCS health criteria.
- All concentrations reported within naturally occurring background levels for volcanic and non-volcanic soils.
- All concentrations reported below the adopted AUP (OP) permitted activity discharge criteria.
- All concentrations reported below the Redvale Landfill Disposal Criteria.

Groundwater

- The concentrations of dissolved heavy metals in groundwater reported below laboratory detection limit and the adopted ANZECC 80% and 95% freshwater criteria.

Organic Compounds

Soil

- OCPs, VOCs, SVOCs reported concentrations below the laboratory detection limit.

Groundwater

- SVOCs reported concentrations below laboratory detection limit.

5.3.2 Non-HAIL Sites

The contaminant concentrations in soil from samples collected from Non-HAIL Sites have been assessed to inform suitability for reuse and disposal.

The human health criteria under the NES CS, BRANZ, and MfE OIG was adopted to screen for potential human health issues and consider if any mitigation is required to manage contaminant exposure to construction and maintenance workers and adjacent residential land users during construction. The primary criteria adopted for assessing hydrocarbon contamination risks to human health is the NES SCS for residential and commercial/industrial outdoor worker exposure. This criterion has been used in preference to the MfE OIG for general characterisation of fill material encountered along the alignment, which is not linked to hydrocarbon contamination sources.

The environmental criteria under the AUP (OP) and ANZECC 2000 FW Guidelines was adopted to screen soil and groundwater contaminants to consider if management of discharges from excavations and construction dewatering is required during the proposed works.

The concentrations of heavy metals, TPH, PAH, and asbestos in soil, and heavy metals and TPH in groundwater are compared with relevant guideline criteria presented in **Appendix C**.

Heavy Metals (Trace Elements)

Soil

- All concentrations reported below the adopted NES SCS health criteria.
- All concentrations reported within naturally occurring background levels for volcanic and non-volcanic soils.
- All concentrations reported below the adopted AUP (OP) permitted activity discharge criteria.

- All concentrations reported below the Redvale Landfill Disposal Criteria.

Groundwater

- The concentrations of Copper reported above the adopted ANZECC 95% freshwater criteria.
- The concentrations Nickel reported above the adopted ANZECC 80% freshwater criteria.
- The concentrations of Zinc reported above the adopted ANZECC 80% and 95% freshwater criteria.

Organic Compounds

Soil

- Concentrations of PAH and TPH reported above the respective laboratory detection limit in shallow soil (0-0.5 m depth) along the proposed alignment.
- The maximum concentration of benzo(a)pyrene at 1.37 mg/kg reported below the adopted NES SCS health criteria, MfE OIG maintenance worker exposure criteria, and protection of groundwater quality. The concentration of 1.37 mg/kg reported above the MfE OIG residential land use criteria for the produce ingestion pathway (0.27 mg/kg) but is still below the NES SCS health criteria for residential land use (10 mg/kg). GHD note these samples were collected from shallow fill along the existing road carriageway and are not linked to any hydrocarbon source (i.e., fuel storage and use).
- The maximum TPH concentration (heavy end C_{15}-C_{36}) reported above the laboratory detection limit, but below MfE OIG residential land use, maintenance worker, and protection of groundwater quality.
- The maximum concentrations of TPH and PAH reported below Redvale Landfill's Disposal Criteria.

Groundwater

- All concentrations of TPH and PAH reported below laboratory detect apart from one sample reporting TPH (C_7-C_9) at 0.14 mg/l (g/m^3).

Asbestos in Soil

Only one sample out of 62 samples submitted detected chrysotile fibres at a concentration of <0.001 w/w%, reporting below the adopted BRANZ Guidelines for residential land use. The removal of soil with concentrations below <0.001 w/w% can be undertaken as unlicensed asbestos work in accordance with the BRANZ Guidelines.

5.4 Field Quality Assurance and Quality Control Procedures

5.4.1 Quality Control Procedures

GHD quality assurance/quality control (QA/QC) procedures to assess data quality were maintained throughout the project. All laboratory analysis was undertaken by IANZ or NATA accredited laboratories.

The QA/QC programme undertaken as part of the assessment by GHD included the following:

- Use of appropriately qualified and trained staff;
- Preservation of samples with ice during transport from the field to the laboratory;
- Transportation of samples with accompanying chain-of-custody documentation;
- Compliance with sample holding times; and
- Review of results of field duplicate samples.

5.4.2 Duplicates

Field duplicates involve the collection of two separate samples from a single sample location, stored in separate containers and submitted for analysis to the laboratory as two separate samples for QC purposes. The QC program included the collection and analysis of one field duplicate soil sample.

5.4.3 Relative Percentage Difference

A quantitative measure of the accuracy of the check analyses results obtained was made using calculated relative percentage difference (RPD) values. The RPD values were calculated using the following equation.

$$\text{RPD (\%)} = \frac{\langle Co - Cs \rangle}{\left\langle \frac{Co + Cs}{2} \right\rangle} \times 100$$

Where Co = concentration obtained from the original sample

Cs = concentration obtained from the duplicate sample

The soil and groundwater duplicate QA/QC results are provided in section 5.4.1 of the T+T (2021a) Report in **Appendix A**.

The relative percentage difference (RPD) values were calculated as between 0% and 67% for the soil duplicate samples, 0% and 10% for the groundwater duplicate sample analysed for heavy metals.

The usual acceptance criteria for RPD values are between 0 and 40% in soils and 0 – 20% in water. However, a large percentage differential can occur particularly in soils due to the following:

- A small analytical differential between two samples based on the low levels of detection from the primary and duplicate soil sample; and
- Samples analysed in soil collected from non-homogenous (heterogeneous) soil profile.

5.4.4 QA/QC Discussion

The results of the QA/QC program are considered to provide an acceptable degree of confidence in the sampling and analytical program. Overall, the analytical data provided by accredited laboratories is considered to be acceptable for the purposes of this assessment.

6. Conceptual Site Model

6.1 Refinement of the Conceptual Site Model

A conceptual site model (CSM) is used to communicate information about a site where contamination may pose a risk to human health or the environment. This model provides details of contamination source(s) on the site, the pathways these contaminants could travel through, and the potential receptors they could affect.

The PSI undertaken by GHD in 2020, identified a number of potential high and medium risk contamination sources based on historical and current land uses along the proposed alignment. The findings from the DSI detailed in this report have been applied to the conceptual site model summarised in the following sections.

6.1.1 Sources of Contamination

The testing undertaken has found that concentrations of inorganic (trace elements) in soil are within naturally occurring background levels. Low concentrations of hydrocarbons and asbestos fibres were detected in shallow soils along the alignment. The concentrations of hydrocarbons identified in shallow fill along the proposed alignment are considered to be commensurate with concentrations identified in soils within road carriageways.

Asbestos fibres were detected in soils below the adopted human health criteria under the BRANZ Guidelines and can be managed appropriately onsite for disturbance and removal under unlicensed asbestos works.

Dissolved heavy metal concentrations of copper, nickel, and zinc in groundwater were reported above the adopted ANZECC 80% and 95% screening criteria for the protection of freshwater species, however results for remaining dissolved heavy metals tested, organics, and presence of volatiles were generally non-detected and / or at low concentrations.

6.1.2 Migration and Exposure Pathways

Given the contamination sources, the intended works and the resulting land use, the potential pathways for exposure to the contamination sources include dermal contact, inhalation and ingestion of soil during construction work. Inhalation of dust is most likely to occur during the works as this is when the soil is most likely to be made airborne or be exposed to aeolian processes.

However, less likely, ingestion of soil may also occur during the proposed works. Despite being potential pathway, the likelihood of sufficient exposure occurring through ingestion to cause harm to human health (i.e., construction workers) is very low as health and safety measures such as personal protective equipment (PPE) would be implemented during construction.

Migration of contaminants from the soil into groundwater is considered low risk based on the following considerations:

- There were no high concentrations of inorganic and/or organic compounds detected in soil samples that pose a risk to construction worker and rural residential land users on properties where soil disturbance is required during construction.
- None of the contamination identified in the underlying soils is in sufficient concentrations that it is considered likely o impact on groundwater, and therefore groundwater has not been considered as a pathway or receiving environment.

- The PSI (GHD, 2020a) did not report any sensitive shallow groundwater abstractions within 200 m of the alignment. Therefore, shallow groundwater is unlikely used for drinking water purposes in the area.

6.1.3 Receptors

The receptors that could potentially be exposed to the contaminants during the construction works include; the construction workers, the neighbouring rural residential properties, and the receiving environment (streams or reticulated networks).

The exposure to the soil is expected to be minimal due to the following considerations:

- Construction along an open-cut trench, will involve the trench to be opened and closed progressively as the construction moves along the alignment. Therefore, minimising the length of time soil is exposed during trenching in one location.
- All excavated material shall be taken offsite to a licensed landfill facility for disposal.
- The trench is backfilled with inert quarry subgrade gravels and cleanfill.

Whilst dissolved heavy metal concentrations of copper, nickel, and zinc were reported above the ANZECC screening criteria for the protection of 80% and 95% freshwater species and the laboratory lower limit of detection, it is considered that they would cause less than minor adverse effects on the environment due to the following:

- There were no concentrations of inorganic and/or organic compounds detected in soil samples above naturally occurring background concentrations or at concentrations that would impact groundwater, as contamination is confined at depths between 0 – 1.0.
- The ANZECC freshwater criteria apply at the point of discharge after reasonable mixing and if present at trace concentrations, the contaminants would be expected to be significantly diluted through this process.
- Groundwater dewatered during construction would be managed onsite using appropriate management controls provided in a site management plan.
- Shallow groundwater is unlikely to be used for drinking water purposes in the area, as the PSI did not identify any sensitive groundwater takes in the area.

6.2 Conceptual Site Model Summary

As the earthworks (including areas of cut and fill) are likely to be confined to trenches, drill pits, and the footprint of the new pumpstation during construction, and will include offsite disposal of excavated soil, the contaminated land risk to construction worker health, environmental discharges, and end land use is considered low.

It is recommended that a Site Management Plan (SMP) be prepared, and the controls implemented to manage discharges into the environment from construction dewatering, and soil disposal during construction. Any groundwater encountered during construction would be managed onsite using appropriate management controls as provided in the SMP and by the implementation of appropriate sediment control measures.

Soil and groundwater management procedures outlined in a SMP are recommended to be adhered to during the construction and that contamination discovery protocols be adopted in the case of encountering any unexpected contamination, to manage any potential risks to human health and the environment during construction. The contaminant discovery protocols provided in a SMP should be followed and if further contamination is discovered, soils should be tested and disposed of to an appropriately licensed facility as required.

Groundwater encountered during construction would be managed onsite using appropriate management controls as provided in the SMP and by the implementation of appropriate sediment control measures.

The findings from the CSM have further informed the resource consent requirements which are outlined in section 7.1 of this report.

7. Conclusions and Recommendations

This DSI was undertaken to assess the presence of soil contamination and inform soil disposal requirements in order to assist Watercare in achieving regulatory compliance under the NES CS for the protection of human health and the AUP (OP) for discharges to the environment, during construction along the proposed alignment.

7.1 Statutory Requirements

7.1.1 Protection of human health

The NES CS Regulations are considered to no longer apply to soil disturbance and removal activities during construction works at HAIL Sites along the proposed alignment, as the DSI demonstrates concentrations of select inorganic and organic contaminants are below naturally occurring background levels. Therefore, resource consent is not required in accordance with Regulation 5(9) of the NES CS.

7.1.2 Protection of the environment

The discharge of groundwater onto or into land and/or into water for the purpose of dewatering trenches or other excavations during construction of the watermain (where dewatering is required) along the alignment is a **Permitted Activity** under the AUP (OP) Rule E4.4.1 (A5).

The maximum reported concentrations of nickel and zinc were found to exceed the respective ANZECC Guidelines for the protection of freshwater species, which applies to discharge of groundwater to surface water receptors along the alignment. Testing of groundwater during dewatering activities is recommended prior to discharge and testing and treatment procedures to be implemented under a SMP.

7.2 Recommendations

7.2.1 Management of site earthworks and dewatering activities

Soil and groundwater management procedures outlined in a SMP are recommended to be adhered to during the construction and that contamination discovery protocols be adopted in the case of encountering any unexpected contamination. The contaminant discovery protocols provided in a SMP should be followed and if further contamination is discovered, should be disposed of to an appropriately licensed facility as required.

7.2.2 Soil reuse and disposal

Based on the results of the DSI, soil is considered suitable for reuse as backfill (if geotechnically suitable) or disposal offsite to a licenced managed landfill facility i.e., Redvale Landfill. It is recommended that licensed landfill operators be provided a copy of the laboratory reports and consulted to confirm acceptance requirements prior to delivery of the material to respective facilities.

Appendices

Appendix A – Tonkin & Taylor Ground Contamination Factual Report

REPORT

Tonkin+Taylor



Whenuapai-Redhills Wastewater Servicing Rising Main/ Gravity Main and Interim Pump Station - Package 1

Ground contamination factual report

Prepared for
Watercare Services Limited
Prepared by
Tonkin & Taylor Ltd
Date
March 2021
Job Number
1014985.v3

Exceptional thinking together
www.tonkintaylor.co.nz

Document Control

Title: Whenuapai-Redhills Wastewater Servicing Rising Main/ Gravity Main and Interim Pump Station - Package 1					
Date	Version	Description	Prepared by:	Reviewed by:	Authorised by:
December 2020	1	Draft – incomplete laboratory data set	Rebecca van der Krogt	Lucy Hine	Robert Hillier
February 2021	2	Ground contamination factual report	Rebecca van der Krogt	Chris Monk	Robert Hillier
March 2021	3	Ground contamination factual report – minor updates and revisions.	Rebecca van der Krogt	Lucy Hine	Robert Hillier

Distribution:

Watercare Services Limited	1 PDF copy
Tonkin & Taylor Ltd (FILE)	1 PDF copy

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1 Introduction

Tonkin & Taylor Ltd (T+T) has been commissioned by Watercare Services Limited (Watercare) to collect soil and groundwater contamination testing data during the geotechnical investigation for the proposed Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station - Package 1.

The location of the proposed Package 1 works is shown in Section 3 below. The geotechnical data is provided under a separate cover[1].

T+T provided ground contamination investigation services in accordance with our proposal dated 21st October 2020[2].

The persons undertaking, managing, reviewing, and certifying this investigation are suitably qualified and experienced practitioners as defined in the NES Soil regulations[3].

[1] T+T, January 2021, Whenuapai-Redhills Wastewater Servicing Rising Main/ Gravity Main and Interim Pump Station – Package 1, Geotechnical Ground Investigation Factual Report.
[2] Tonkin + Taylor Ltd (21 October 2020), Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station - Package 1 - Geotechnical Ground Investigation. Job Ref: 1014985.
[3] Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

2 Scope of work

The ground contamination investigation included the following scope of works based on the scope provided by GHD[4] and in response to observations of suspected contamination during drilling:

- Collection of soil samples for contamination testing during the geotechnical investigation programme from:
  - Three surface sample locations.
  - Twenty-three hand auger locations.
  - Ten machine borehole locations.
- Laboratory testing of soil samples for contaminants of concern. In total, testing comprised 97 soil samples for various analytes generally as per the GHD scope (some additional analyses were conducted based on observations during the works).
- The collection of nine groundwater samples from piezometers installed within BH05a, BH05b, BH06, BH08, BH110, BH111, BH113, BH116 and BH117.
- Laboratory testing was undertaken on all groundwater samples for heavy metals (dissolved), PAH and TPH with the exception of BH113 which was analysed for heavy metals (dissolved) and SVOCs.
- Preparation of this factual report.

[4] GHD, October 2020 – Watercare Service Limited, Whenuapai-Redhills Wastewater Servicing Rising Main/ Gravity Main and Interim Pump Station, Ground Investigation Scope (Package 1) REVISION 2.

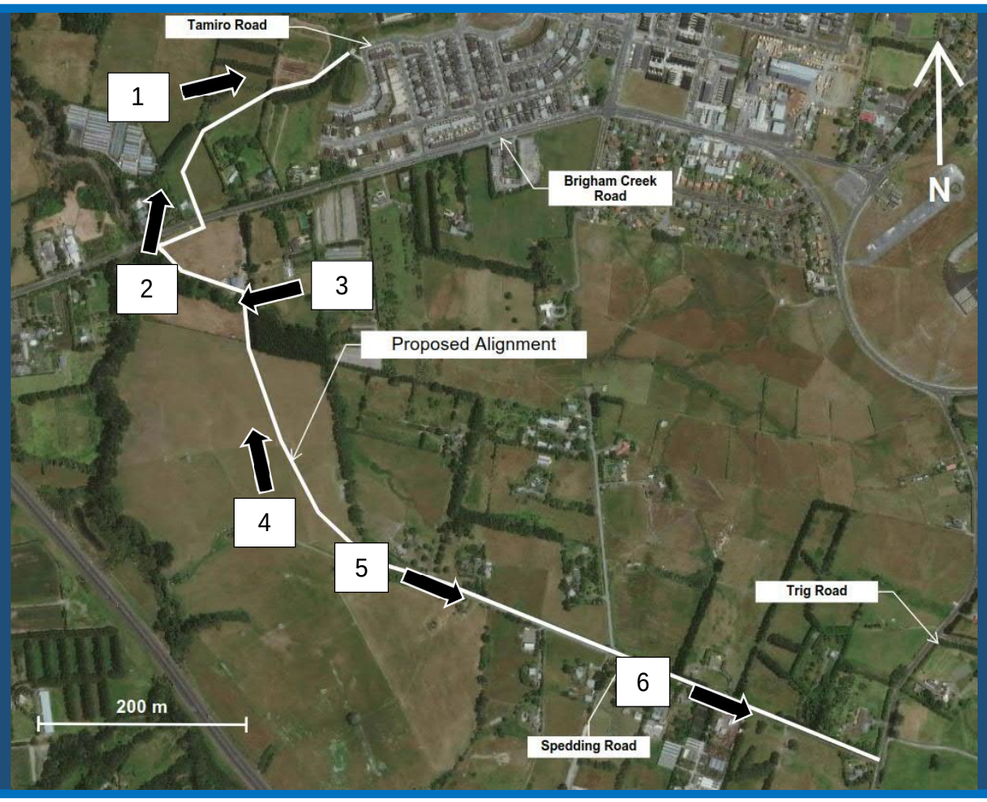
3 Site description

1



2





Site Description

The Package 1 ground investigation site is located in Whenuapai Auckland, between Tamiro Road at the northern end and Trig Road at the southern end.

This section of the proposed alignment is approximately 2.5 km in length.

The alignment crosses private residential properties at the northern end of the alignment between Tamiro Road and Brigham Creek Road. This section is relatively flat and crosses paddocks and farmland with occasional minor gully features.

The section of the alignment from Brigham Creek Road to Spedding Road consists of gently rolling hills and is across farmland with a gully in the centre.

The section of the alignment between Spedding Road and Trig Road extends along the road berm and is flat with a small hill at the Trig Road end.

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4 Field investigation

4.1 Investigation programme

The scope and location of the investigations were defined by GHD in their geotechnical scope and supporting ground contamination sampling plan. The sampling works were completed over the period from 2 November 2020 – 18 December 2020. The overall investigation programme comprised:

- Three environmental surface sample locations along the southern side of Spedding Road:
  - ENVR-SS03, ENVR-SS04 and ENVR-SS05.
- Twenty-two hand augered boreholes:
  - HA03 and HA04 south of the properties at 23-31 Brigham Creek Road.
  - HA05, HA06, HA07 and HA08 along Spedding Road.
  - ENVR-HA03, ENVR-HA04, ENVR-HA05 along the northern side of Spedding Road.
  - HA107 at 28 Brigham Creek Road.
  - HA108, HA109 and HA119 at 26 Brigham Creek Road.
  - HA114, HA115 at 20-22 Brigham Creek Road.
  - ENVR-HA101, HA110 and HA111 north of Tamiro Road.
  - HA112, HA113, HA116 and HA117 at 23-27 Brigham Creek Road.
- Eleven machine drilled boreholes:
  - BH05a and BH05b at 23-27 Brigham Creek Road.
  - BH06 and BH07 south of the properties at 23-31 Brigham Creek Road.
  - BH08 south of 14 Spedding Road.
  - BH110, BH111 (and BH111A), and BH117 at 23-27 Brigham Creek Road.
  - BH113 and BH116 west of Tamiro Road.
- Fifteen cone pentameter tests (CPTs):
  - CPT02, CPT03, CPT04, CPT05, CPT06, CPT07, CPT08, CPT111, CPT112, CPT117, CPT121, CPT126, CPT128, CPT129 and CPT131.
- Piezometers were installed in nine of the machine drilled boreholes:
  - BH05a, BH05b, BH06, BH08, BH110, BH111, BH113, BH116 and BH117.

All sampling locations are presented in Figures 1 in Appendix A and logs of the boreholes and hand augers are presented in Appendix B.

Soil samples were collected from all boreholes and hand augered locations at the surface and at intervals throughout the soil profile. Soil samples were collected to the environmental target depth specified by GHD. Groundwater samples were collected from all nine piezometers.

4.2 Sampling methodology

4.2.1 Soil sample collection

Soil sampling was completed by T+T field staff under the guidance of a Suitably Qualified and Experienced Practitioner as defined in the Users' Guide for the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (SQEP). Soil samples were collected in general accordance with MfE Contaminated Land Guideline No. 5 as follows:

- Freshly gloved hands were used to collect soil samples from the hand auger or borehole core after first removing the smeared outer zone.
- Photoionisation Detector (PID) readings were taken from soil samples collected at each location at 0.5 and 1.0 m below ground level (bgl).
- All samples were placed immediately into laboratory supplied sample containers – 500 ml plastic sample containers for asbestos testing and 300 ml glass jars for chemical analyses.
- One duplicate sample was collected for every 10 samples.
- One split sample was collected for at least every 20 samples.
- Any non-dedicated/ non-disposable equipment used to collect the samples was decontaminated between sample locations using a three-stage decontamination process including initial scrub in tap water with Decon 90 (a phosphate-free detergent), a rinse in tap water and a final rinse using deionised water.
- Samples were shipped in chilled containers to Hill Laboratories and Analytica Laboratories under chain of custody documentation.

4.2.2 Groundwater sampling

Groundwater sampling was undertaken by SQEP and in accordance industry best practice and the GHD scope. Prior to sampling groundwater wells were developed to remove suspended fines and water affected by the drilling and installation works.

Groundwater sampling was conducted using low flow procedures. A peristaltic pump was used for sampling from BH05b, BH06, BH08, BH111, BH113 and BH116 on 27 November 2020. On 2 December 2020 a bladder pump was used for sampling deeper wells BH05a, BH110 and BH117.The following methodology was followed:

- Depth to water was measured using an oil/water interface probe.
- Prior to sampling, purging was conducted following low flow procedures.
- Water quality parameters including electrical conductivity, temperature, redox, dissolved oxygen (DO), and pH were measured and recorded at regular intervals.
- Samples were collected following the stabilisation of the observed water quality parameters.
- Two sets of groundwater samples were collected into laboratory supplied sample containers from each of the monitoring wells.
- One duplicate sample, field blank and trip blank were collected per each sampling day. Additional to this a rinsate sample was collected from the bladder pump used on 2 December 2020.
- Any non-dedicated/ non-disposable equipment used to collect the samples was decontaminated between sample locations using a three-stage decontamination process including initial scrub in tap water with Decon 90 (a phosphate-free detergent), a rinse in tap water and a final rinse using deionised water.

- Samples were shipped in chilled containers to Hill Laboratories under chain of custody documentation.

4.3 Field observations

4.3.1 Soil observations

4.3.1.1 Borehole and hand auger observations

Borehole and hand auger logs are presented in Appendix B. Fill materials were encountered in a number of investigation locations as summarised in Table 5.1. The fill ranged between 0.1 m and 3.4 m thick. Materials interpreted as fill typically comprised reworked local soils, containing gravel and/or sand. The fill materials encountered in HA112 were distinguishable by a strong chemical odour associated with a white/ cream coloured powder (at depths of 1.8 mbgl, and 2.0 mbgl).

No anthropogenic materials such as waste or demolition fill was observed in the fill at any of the sampling locations.

No other indicators of contamination were observed in soil during the investigation programme.

4.3.1.2 Surface samples Spedding Road

Three surface samples (ENVR-SS03, ENVR-SS04 and ENVR-SS05) were collected along the southern side of Spedding Road. The material sampled was collected from a depth between 0.1-0.2 mbgl. The material encountered was described as clayey silt, dark brown, soft, moist, low plasticity.

4.3.2 Groundwater observations

Field parameters prior to sampling and depth to groundwater prior to pumping are summarised in Table 4.1. Complete field parameters and depth to groundwater recorded during the investigation are provided on groundwater sampling field sheets in Appendix C.

Table 4.1: Stabilised parameters prior to collecting groundwater samples

Date Sampled	Borehole ID	GW level prior to pumping (m)	Dissolved Oxygen (DO) % (final)	Electrical Conductivity (EC) (µs/cm) (final)	pH (final)	Oxidation-reduction potential (mV) (final)
2 December 2020	BH05a	1.001	0.54	376.9	7.23	117.2
	BH110	5.329	0.41	338.9	8.04	56.7
	BH117	2.965	1.70	497.1	6.58	64.4
27 November 2020	BH05b	3.330	1.58	287.7	5.68	190.5
	BH06	3.185	1.08	269.1	3.73	450.0
	BH08	1.829	1.17	282.4	6.51	150.3
	BH111	2.819	0.70	140.3	4.95	253.4
	BH113	2.655	0.41	223.7	5.68	237.7
	BH116	1.286	3.22	400.5	5.63	238.2

No indicators of contamination were observed in groundwater during the investigation programme.

5 Laboratory testing

5.1 Soil

Soil samples were selected for laboratory analysis based on both the GHD scope and on observations of suspected contamination identified during drilling. A total of 97 samples were tested. The samples were analysed as per the original scope with any deviations summarised in Table 5.1.

Table 5.1: Soil sample testing

Investigation location	Depth of sample(s) tested (m)	Analysis suite	Purpose
BH05A	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.2 mbgl.
	1.0	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
BH06	0.1-0.3	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.4 mbgl
	0.35-0.6	Heavy metals, TPH, PAH, asbestos	
	1.0-1.2	Heavy metals, TPH, PAH, asbestos	
BH07	0.1-0.4	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.5 mbgl
	0.5-0.65	Heavy metals, TPH, PAH, asbestos	
	1.0-1.35	Heavy metals, TPH, PAH, asbestos	
BH08	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.7 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
BH110	0.1-0.35	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.35 mbgl
	0.5-0.75	Heavy metals, TPH, PAH, asbestos	
	0.9-1.15	Heavy metals, TPH, PAH, asbestos	
BH111/ BH111A	0.05-0.2 (BH111)	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.35 mbgl
	0.4-0.7 (BH111A)	Heavy metals, TPH, PAH, asbestos	
	1.0-1.3 (BH11A)	Heavy metals, TPH, PAH, asbestos	

Investigation location	Depth of sample(s) tested (m)	Analysis suite	Purpose
BH113/ ENVR-HA102	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.1 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
BH116	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.6 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
BH117	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.4 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
HA03	0.0	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.25 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
HA04	0.0	Heavy metals, SVOCs	As per GHD scope. Fill to 0.2 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA05	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.25 mbgl
	1.0	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
HA06	0	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.2 mbgl
	0.4-0.6	Heavy metals, TPH, PAH	
	1.0	Heavy metals, TPH, PAH, asbestos	
	2.0	asbestos	
HA07	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.25 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	

Investigation location	Depth of sample(s) tested (m)	Analysis suite	Purpose
HA08	0.1	Heavy metals, SVOCs	As per GHD scope. Fill to 0.6 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA107a	0.1	Heavy metals, SVOCs	As per GHD scope. Fill to 0.5 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA108	0.1	Heavy metals, SVOCs	As per GHD scope. Fill to 0.4 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA109	0.0	Heavy metals, SVOCs	As per GHD scope. Fill to 0.3 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA110a	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 3.4 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
HA111	0.1	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 2.6 mbgl
	1.0	Heavy metals, TPH, PAH, asbestos	
	2.0	Heavy metals, TPH, PAH, asbestos	
HA112	0.1	Heavy metals, VOCS, SVOCS, ONOPS, ammonium	Scheduling was adjusted as per GHDs request from the original Suite 3 testing to Heavy metals, VOCS, SVOCS, ONOPS, asbestos due to site observations. A strong chemical odour was present at 1.8 mbgl with a white/cream coloured powder present at 2.0 m. Ammonium was also tested for. Fill to 2.00 mbgl. Refusal at 2.0 mbgl.
	0.5	Asbestos	
	1.8	Heavy metals, VOCS, SVOCS, ONOPS, ammonium	
	1.0	Asbestos	
	2.0	Heavy metals, VOCS, SVOCS, ONOPS, ammonium	
HA113	0	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.4 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
HA114	0.0	Heavy metals, SVOCs	As per GHD scope. Fill to 0.4 mbgl
	0.5	Heavy metals, SVOCs	

Investigation location	Depth of sample(s) tested (m)	Analysis suite	Purpose
	1.0	Heavy metals, SVOCs	
HA115	0.1	Heavy metals, SVOCs	As per GHD scope. Fill to 0.6 mbgl
	0.5	Heavy metals, SVOCs	
	1.0	Heavy metals, SVOCs	
HA116	0	Heavy metals, TPH, PAH, asbestos	As per GHD scope. Fill to 0.25 mbgl
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
HA117	0.1	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	Scheduling was adjusted as per GHDs request from the original Suite 3 testing to Heavy metals, VOCS, SVOCS, ONOPS, asbestos due to site observations. Fill to 1.05 mbgl.
	0.5	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	
	2.0	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	
ENVR-HA03	0.0-0.1	Heavy metals, TPH, PAH, OCPs, asbestos	Scheduling was adjusted as per GHDs request from the original Suite 2 testing to Suite 3 because the location was moved from the southern side of the road to the northern side, OCP testing was added to the surface sample. Fill to 0.80 mbgl.
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
ENVR-HA04	0.0-0.1	Heavy metals, TPH, PAH, OCPs, asbestos	Scheduling was adjusted as per GHDs request from the original Suite 2 testing to Suite 3 because the location was moved from the southern side of the road to the northern side, OCP testing was added to the surface sample. Fill to 0.10 mbgl.
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
ENVR-HA05	0.0-0.1	Heavy metals, TPH, PAH, OCPs, asbestos	Scheduling was adjusted as per GHDs request from the original Suite 2 testing to Suite 3 because the location was moved from the southern side of the road to the northern side, OCP testing was added to the surface sample. Fill to 0.30 mbgl.
	0.5	Heavy metals, TPH, PAH, asbestos	
	1.0	Heavy metals, TPH, PAH, asbestos	
ENVR-HA101	0.0-0.1	Heavy metals, SVOCs	As per GHD scope. Fill to 0.5 mbgl
	0.5-0.6	Heavy metals, SVOCs	
	1.6-1.8	Heavy metals, SVOCs	

5.2 Groundwater

Groundwater samples were collected from nine boreholes where piezometers were installed and tested for the suite of contaminants listed in to Table 5.2.

Table 5.2: Groundwater sample testing

Investigation location	Screen depth	Analysis suite [5]
BH05a	8.5-11.8 m bgl	Suite 3
BH05b	3.5-5.5 m bgl	Suite 3
BH06	3.5-5.0 m bgl	Suite 3
BH08	3-6 m bgl	Suite 3
BH110	8-11 m bgl	Suite 3
BH111	3-5 m bgl	Suite 3
BH113	2.0-4.0 m bgl	Suite 2
BH116	2.0-5.0 m bgl	Suite 3
BH117	9.5-12 m bgl	Suite 3

5.3 Acid Sulphate Soil Testing

Select samples were scheduled for pH, acid soluble sulphate and sulphate content (refer to the results in Appendix E.

[5] Suite 3 - pH, dissolved metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc, polyaromatic hydrocarbons and total petroleum hydrocarbons.

Suite 2 – pH, dissolved metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc, and semi-volatile organic compounds.

5.4 Data quality

A Quality Assurance and Quality Control (QA/QC) programme was implemented during sample collection and testing, which included:

- Non-dedicated sampling equipment decontamination between sampling locations (following a three-stage decontamination procedure as outlined in Section 4.2.1 and Section 4.2.2).
- All samples were collected and placed directly into laboratory-supplied sample containers labelled with the unique sample location, depth, and date of collection.
- Following collection all samples were placed directly into chilled storage and managed under standard T+T chain of custody procedures (copies of chain of custody documentation is provided Appendix D).
- Sample analysis was conducted by Hill Laboratories and Analytica Laboratories, both of which are accredited by International Accreditation New Zealand (IANZ). As such, these Laboratories are expected to comply with the accreditation requirements that include the confirmation of validity and suitability of results. Any breaches in laboratory control would be expected to be notified at the time of release of the analytical results. No breaches were reported.
- Duplicate soil samples were obtained at approximately one per ten soil samples. Of these samples nine were analysed.
- Split soil samples were obtained at approximately one per twenty soil samples. Of these samples two were analysed.
- A rinsate sample was collected each day that hand augers were undertaken. A total of eight hand auger rinsate samples were collected with one analysed.
- Filed blanks, trip blanks and duplicate samples were collected during the groundwater sampling and analysed per consignment.

5.4.1 Duplicate analysis

5.4.1.1 Soil

It is typically considered acceptable (refer to MfE Guideline No. 5) if a relative percentage difference (RPD) range of less than 50% is achieved for soil samples. As shown in Table 5.3, concentrations in soil in the duplicate samples generally reported RPDs within this range indicating that variability in sample collection, handling and analysis is acceptable. The RPDs for some organic compounds were higher than 50% and consideration should be given to these results during data interpretation.

Table 5.3: Duplicate soil sampling results

Sample ID	ENVR-HA101-0.01-0.1m	Duplicate 1 – 4/11/2020	RPD %	ENVR-SS05-0.1-0.2	Duplicate 1 – 10/11/2020	RPD %
Arsenic	< 2	<2	0	< 2	< 2	0
Cadmium	0.16	0.15	6	< 0.10	< 0.10	0
Chromium	7	7	0	4	5	22
Copper	10	10	0	42	39	7
Lead	5.3	5.5	4	10	10.6	6
Mercury	< 0.10	<0.10	0	< 0.10	< 0.10	0
Nickel	< 2	<2	0	6	6	0
Zinc	12	10	18	42	43	2
Sample ID	HA06-0.0m	Dup A	RPD %	HA04-0.0m	Dup B	RPD %
Arsenic	6	6	0	< 2	< 2	0
Cadmium	0.26	0.3	14	0.34	0.34	0
Chromium	13	14	7	6	7	15
Copper	26	26	0	9	9	0
Lead	21	21	0	7.3	7.4	1
Mercury	0.13	0.14	7	< 0.10	< 0.10	0
Nickel	7	8	13	< 2	< 2	0
Zinc	42	42	0	13	15	14
Fluoranthene	<0.016	0.021	NA	<0.5	<0.5	0
C15 - C36	55	110	67	-	-	-
Total hydrocarbons (C7 - C36)	<70	121	NA	-	-	-

Sample ID	HA113-0m	Dup C	RPD %	HA114-0m	Dup D	RPD %
Arsenic	< 2	< 2	0	4	5	22
Cadmium	0.29	0.3	3	0.15	0.15	0
Chromium	8	7	13	11	10	10
Copper	5	4	22	78	72	8
Lead	11	10.5	5	14.9	13.2	12
Mercury	< 0.10	< 0.10	0	<0.10	<0.10	0
Nickel	< 2	< 2	0	22	11	67
Zinc	13	12	8	53	54	2
Benzo[a]anthracene	0.016	<0.013	NA	-	-	-
Benzo[a]pyrene (BAP)	0.018	<0.013	NA	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.02	<0.013	NA	-	-	-
Chrysene	0.014	<0.013	NA	-	-	-
Fluoranthene	0.041	0.014	98	-	-	-
C15 - C36	<40	59	NA	-	-	-
Total hydrocarbons (C7 - C36)	<70	<70	0	-	-	-
Sample ID	HA119-0m	Dup E	RPD %	HA108-0.5m	HA108 duplicate	RPD %
Arsenic	<2	<2	0	2	<2	0
Cadmium	0.23	0.23	0	<0.10	<0.10	0
Chromium	6	6	0	8	8	12

Copper	9	9	0	6	6	15
Lead	4.2	4.4	5	8.4	8.4	10
Mercury	<0.10	<0.10	0	<0.10	<0.10	0
Nickel	<2	<2	0	2	2	0
Zinc	8	8	0	5	5	0
Sample ID	HA115-1.0m	HA115 duplicate	RPD %			
Arsenic	2	2	0			
Cadmium	<0.10	<0.10	0			
Chromium	10	9	11			
Copper	6	6	0			
Lead	9.8	10.4	6			
Mercury	0.11	0.1	10			
Nickel	2	3	40			
Zinc	8	7	13			

NA: RPD% could not be calculated correctly due to compound in either the sample or the duplicate detected at a concentration less than the laboratory limit of reporting.

Where both results were below the laboratory limit of reporting the RPD has been recorded as 0%.

5.4.1.2 Groundwater

Groundwater results reported limited variability as shown below in Table 5.4.

Table 5.4: Duplicate groundwater sampling results

Sample ID	BH111	Dup 1	RPD %	BH110	Duplicate 2	RPD %
Arsenic	< 0.0010	< 0.0010	0	< 0.0010	< 0.0010	0
Cadmium	< 0.00005	< 0.00005	0	< 0.00005	< 0.00005	0
Chromium	< 0.0005	< 0.0005	0	< 0.0005	< 0.0005	0
Copper	< 0.0005	< 0.0005	0	0.0012	0.0012	0
Lead	< 0.00010	< 0.00010	0	< 0.00010	< 0.00010	0
Nickel	0.0022	0.002	10	0.0012	0.0011	9
Zinc	0.0136	0.0131	4	< 0.0010	< 0.0010	0

Where both results were below the laboratory limit of reporting the RPD has been recorded as 0%.

5.5 Analytical results

A summary of the laboratory testing data is provided in Appendix E with full laboratory transcripts provided in Appendix F.

6 Applicability

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

Tonkin & Taylor Ltd

Report prepared by:



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Rebecca van der Krogt

Contaminated Land Consultant

Authorised for Tonkin & Taylor Ltd by:



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Robert Hillier

Project Director

Report reviewed by:



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Lucy Hine

Contaminated Land Specialist

RVDK
\\ttgroup.local\files\aklprojects\1014985\issueddocuments\contam land\updated following feedback from ghd\whenuapai redhills_factual_contamrep_march 2021.docx

Appendix A: Figure

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\\ttgroup.local\infrastructure\CAD\1014985\WorkingMaterial\CAD\FIG\1014985-F1.dwg 2020-Dec-18 12:25:15 PM Plotted By: JONALD CASTRO



LEGEND

PROPERTY BOUNDARY

TONKIN + TAYLOR INVESTIGATION:

- BOREHOLE LOCATION (2020)
- CONE PENETRATION TEST LOCATION (2020)
- HAND AUGER LOCATION (2020)

TONKIN + TAYLOR HISTORICAL INVESTIGATION:

- BOREHOLE LOCATION
- CONE PENETRATION TEST

A3 SCALE 1:7500

0 0.1 0.2 0.3 0.4 (km)

ORIGINAL IN COLOUR

NOTE:

1. AERIAL PHOTO SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/95497-auckland-0075m-urban-aerial-photos-2017/> , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 17/12/2020.
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Tonkin+Taylor

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PROJECT No.	1014985		
DESIGNED	CBM	Dec.20	
DRAWN	JC	Dec.20	
CHECKED	CBM	Dec.20	
APPROVED	DATE		

CLIENT **WATERCARE SERVICES LIMITED**

PROJECT **WHENUAPAI AND REDHILLS WASTEWATER SCHEME**

TITLE GEOTECHNICAL INVESTIGATION
SITE INVESTIGATION PLAN

SCALE (A3) 1:7500 FIG No. FIGURE 1 REV 1

Appendix B: Hand auger and machine drilled borehole logs

Refer to the geotechnical draft report for copies of the hand auger and machine drilled borehole logs.

Appendix C: Groundwater sampling field sheets

BH05a 12.230 Stick up = 0.55m RVDK

removed level logger 1:06pm

Monitoring Well	Water level	Time	Cumulative purge volume	Controller pressure	Drive duration	Refill duration (purge)	Temp	Dissolved Oxygen	Conductivity	pH	ORP	Comments
	mbTOC	NZST	L	(psi)	(sec)	(sec)	°C	mg/L	µS/cm		mV	
	1.001m	1:06pm										
	0.981m	1:20pm										
	0.980m	1:28pm	0.150L	40	6	114	23.4	2.48	390.7	7.71	199.9	Slightly silty no odour
	0.984m	1.30pm	0.30L	40	6	114	23.4	2.26	390.7	7.61	202.4	"
	0.985m	1:32pm	0.45L	40	6	114	22.5	2.18	383.5	7.48	192.4	"
	1.01m	1:34pm	0.60L	40	6	114	22.5	2.00	384.5	7.45	186.8	"
	0.990m	1:36pm	0.75L	40	6	"	22.7	1.89	386.6	7.42	181.1	"
	0.985m	1:38pm	0.9L	40	6	"	22.7	1.20	389.5	7.35	171.0	"
	0.985m	1:40pm	1.05L	40	6	"	22.8	1.14	390.5	7.35	169.8	"
	0.970m	1:42pm	1.2	40	6	"	22.7	0.94	392.4	7.28	161.4	"
	0.995m	1:44pm	1.35	40	6	"	22.3	0.76	390.0	7.26	151.4	"
	1.002m	1:46pm	1.5	40	6	"	22.1	0.74	388.9	7.25	143.5	"
	1.015m	1:48pm	1.65	40	6	"	21.4	0.68	385.0	7.24	135.6	"
	0.995m	1:50pm	1.8	40	6	"	20.8	0.59	379.7	7.23	126.2	"
	0.994m	1:52pm	1.95	40	6	"	20.9	0.55	380.4	7.23	123.9	"
	0.994m	1:54pm	2.1	40	6	"	20.8	0.57	377.1	7.23	119.3	"
	0.983m	1:56pm	2.25	40	6	"	20.8	0.54	376.9	7.23	117.2	"
			Stabilised parameters			samples collected			from 1:57pm			
		WL	after collecting samples			= 1.012m btoc						

Tonkin+Taylor

Groundwater Sampling Field Sheet

Site:		Job Number: 1014985	Date: 27/11/20
Well ID: BH056	Well Location: N: E:		Field Staff: RVDK

EQUIPMENT

Water meter: Interface/dip meter/other _____ **Water Quality Meter type:** YSI

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: Peri

Bailer type: disposable/stainless steel

Weather Conditions: Sunny / Cloudy / Rain Warm / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up:	0.66m	**Depth to PSH (m bTOC):**	NA
Standing Water Level (m bTOC):	3.333m	**PSH visually confirmed**	Yes / No
Total well depth (m bTOC):	6.08m	**PID Headspace(ppm):**	NA
Water column (m) :		**Well head condition:**	Good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

*Slowed pump rate

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µg/cm)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	3.330	11:10am						
0.5L	3.614	11:13am	0.75	285.7	6.03	203.0	15.2	mostly clear, slightly silty no odour
1	3.698	11:16am	0.54	282.2	5.84	209.6	15.1	mostly clear, slightly silty no odour
1.5	3.745m	11.19am	3.57	264.9	5.58	211.4	15.3	Same
2	3.882m	11:22	2.82	303.0	5.69	196.8	15.4	Same
2.5	3.932	11:25	2.51	297.8	5.68	193.5	15.3	same
3	4.156	11:28	1.58	287.7	5.68	190.5	15.2	same
			Stabilised parameters collected					2 sets of suite
					3	bottles	@	11:30am
								SWL after sampling (pump removed) 4.472m
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

SAMPLING

Equipment decontaminated prior to use: Yes/No

Samples stored on ice: Yes/No

Metals samples filtered: Yes/No

QC Sample ID (if any): No

Containers collected:

☐ Organics ☐ Inorganics ☐ Biological

☐ VOC (Vial) ☐ Nutrients ☐

☐ Metals ☐ Cyanide ☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~4.5m Pump pressure regulator:

Fill timer: Discharge timer:

COMMENTS Was only able to field filter 1x metal bottle used 3 x filter kits - collected 2nd metal bottle unfiltered

Tonkin+Taylor

Groundwater Sampling Field Sheet

Site:		Job Number: 1014985	Date: 27/11/20
Well ID: BH06	Well Location: N:	E:	Field Staff: RVDK

EQUIPMENT

Water meter: Interface/dip meter/other 451 **Water Quality Meter type:**

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: peri

Bailer type: disposable/stainless steel

Weather Conditions: Sunny / Cloudy / Rain Warm / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up:	0.61	**Depth to PSH (m bTOC):**	NA
Standing Water Level (m bTOC):	3.193	**PSH visually confirmed**	Yes / No
Total well depth (m bTOC):	5.660	**PID Headspace(ppm):**	NA
Water column (m) :		**Well head condition:**	Good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µS/cm)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	3.185	2.09pm						
0.5	3.430	2.13pm	1.45	267.2	3.97	420.8	17.0	Clear no odour
1	3.535	2.16pm	1.38	269.6	3.77	452.7	16.8	Clear no odour
1.5	3.602	2.18pm	1.21	271.7	3.70	456.9	16.8	Clear no odour
2	3.692	2:20pm	1.08	269.1	3.73	450.0	17.0	Clear no odour
			Stabilised parameters collected					
			2 sets of bottles Suite 3					
								SWL after sampling (pump removed) 3.810
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

SAMPLING

Equipment decontaminated prior to use: Yes/No

Samples stored on ice: Yes/No

Metals samples filtered: Yes/No

QC Sample ID (if any): No

Containers collected:

☒ Organics ☒ Inorganics ☐ Biological

☐ VOC (Vial) ☐ Nutrients ☐

☒ Metals ☐ Cyanide ☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~4.0m Pump pressure regulator:

Fill timer: Discharge timer:

COMMENTS

Tonkin+Taylor

Groundwater Sampling Field Sheet

Site:		Job Number: 1014985	Date: 27/11/20
Well ID: BH08	Well Location: N: E:		Field Staff: RVDK

EQUIPMENT

Water meter: Interface/dip meter/other _____ **Water Quality Meter type:** YSI

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: Peri

Bailer type: disposable/stainless steel

Weather Conditions: Sunny / Cloudy / Rain Warm / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up: 0.64m **Depth to PSH (m bTOC):** NA

Standing Water Level (m bTOC): 1.844m **PSH visually confirmed** Yes / No

Total well depth (m bTOC): 6.800m **PID Headspace(ppm):** NA

Water column (m) : _____ **Well head condition:** Good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µscm)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	1.820m	1:00pm						
0.5	2.124	1:05pm	1.29	285.6	6.75	175.0	17.3	mostly cleary, v slightly turbid no odour
1	2.420	1:08	0.98	285.7	6.71	161.3	17.2	same
1.5	2.685	1:10	0.97	285.5	6.64	155.3	17.2	same
2.0	2.780	1:13	1.08	283.8	6.58	151.6	17.3	same
2.5		1:16	1.17	282.4	6.51	150.3	17.3	
								SWL after sampling (pump removed) 3.645m
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

* Slow speed of pump

Stabilised parameters collected 2 sets of suite 3 bottle samples @ 1:18pm

SAMPLING

Equipment decontaminated prior to use: Yes/No

Samples stored on ice: Yes/No

Metals samples filtered: Yes/No

QC Sample ID (if any): None

Containers collected:

- ☒ Organics
- ☒ Inorganics
- ☐ Biological
- ☐ VOC (Vial)
- ☐ Nutrients
- ☐
- ☒ Metals
- ☐ Cyanide
- ☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~ 4.5m Pump pressure regulator:

Fill timer: Discharge timer:

COMMENTS

BH110 Bottom = 11.59m btoc Stick up = 0.575m

Field staff : RVOK

Monitoring Well	Water level	Time	Cumulative purge volume	Controller pressure	Drive duration	Refill duration (purge)	Temp	Dissolved Oxygen	Conductivity	pH	ORP	Comments
	mbTOC	NZST	L	(psi)	(sec)	(sec)	°C	mg/L	µS/cm		mV	
	5.329	11:33am	0.30	40	6	114	19.5	2.13	347.7	8.06	116.1	Slightly silty no odo
		11:49am →										
	5.320	11:51	0.45	"	"	"	19.6	1.67	342.6	8.02	109.3	"
		11:53	Unable to record readings									"
		11:55										"
	5.365	12:00	1.00	40	6	114	19.4	0.64	336.0	8.01	73.7	"
	5.396	12:03	1.15	40	6	114	19.5	0.59	337.2	8.02	67.3	"
	5.415	12:05	1.30	40	6	114	19.8	0.54	340.2	8.02	64.1	"
	5.419	12:07	1.45	40	6	114	19.6	0.54	340.0	8.01	62.2	"
	5.401	12:09	1.60	40	6	114	19.9	0.53	340.8	8.03	60.1	"
	5.405	12:11	1.75	40	6	114	19.2	0.52	338.2	8.03	59.3	"
	5.412	12:13	1.90	40	6	114	19.8	0.53	341.7	8.03	58.9	"
	5.409	12:15	2.05	40	6	114	19.5	0.48	340.1	8.04	58.2	"
	5.443	12:17	2.20	40	6	114	19.5	0.42	339.2	8.04	57.7	"
	5.390	12:19	2.35	40	6	114	19.5	0.41	338.9	8.04	56.7	"
				Stabilised parameters samples collected from 12:20pm								
				- not able to field filter water is too								
					silty collected lab filtered bottles instead							
		WL after collecting samples				5.632m btoc						

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Groundwater Sampling Field Sheet

Site:		Job Number: 1014985	Date: 27/11/20
Well ID: BH11	Well Location: N: E:		Field Staff: RVDK

EQUIPMENT

Water meter: (Interface)/dip meter/other _____ **Water Quality Meter type:** YSI

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: peristaltic pump

Bailer type: disposable/stainless steel

Weather Conditions: (Sunny) / (Cloudy) / Rain (Warm) / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up:	0.56m	**Depth to PSH (m bTOC):**	Na
Standing Water Level (m bTOC):	2.817m	**PSH visually confirmed**	Yes / (No)
Total well depth (m bTOC):	5.555m	**PID Headspace(ppm):**	Na
Water column (m) :		**Well head condition:**	Good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µscm⁻¹)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	2.819	10:02 am						
0.5	3.025	10:05	0.97	140.0	5.17	252.0	16.6	clear, no odour
1	3.211	10:08	0.67	138.7	4.97	271.7	16.6	clear, no odour
1.5	3.347	10:11	0.69	140.4	4.96	258.0	16.8	clear, no odour
2.0	3.395	10:14	0.70	140.3	4.95	253.4	16.8	clear, no odour
		Stabilised	parameters		collected			
		2	sets	of	suite	3		sample
			bottles		@	10:16 am		
								SWL after sampling (pump removed) 3.326m
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

SAMPLING

Equipment decontaminated prior to use: (Yes)/No

Samples stored on ice: (Yes)/No

Metals samples filtered: (Yes)/No

QC Sample ID (if any): Dup1

Containers collected:

☒ Organics	☒ Inorganics	☐ Biological
☐ VOC (Vial)	☐ Nutrients	☐
☒ Metals	☐ Cyanide	☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~4m

Fill timer: 0.5L per 3 min

Pump pressure regulator:

Discharge timer:

COMMENTS

Tonkin+Taylor

Groundwater Sampling Field Sheet

and ENVRHATION

Site:	**Job Number:** 1014985	**Date:** 27/11/20
Well ID: BH113	**Well Location: N:** **E:**	**Field Staff:** RVDK

EQUIPMENT

Water meter: Interface / dip meter / other _____ **Water Quality Meter type:** YSI

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: peri pump

Bailer type: disposable / stainless steel

Weather Conditions: Sunny / Cloudy / Rain Warm / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up:	0.47m	**Depth to PSH (m bTOC):**	Na
Standing Water Level (m bTOC):	2.660m	**PSH visually confirmed**	Yes / No
Total well depth (m bTOC):	4.530m	**PID Headspace(ppm):**	Na
Water column (m) :		**Well head condition:**	Good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µS/cm)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	2.655m	8:35am						
0.5L	2.745	8:38am	0.62	227.8	5.80	228.9	16.6°	clear no odour
1L	2.785	8:41am	0.50	221.5	5.72	238.0	16.5°	clear no odour
1.5L	2.839	8:44am	0.45	222.5	5.70	238.4	16.5°	clear no odour
2.0L	2.879	8:47am	0.41	223.7	5.68	237.7	16.5	clear no odour
			Stabilised	parameters		collected	2 sets	
				of	suite	2	sample	bottles
					@	8:45am		
								SWL after sampling (pump removed) 2.910m
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

SAMPLING

Equipment decontaminated prior to use: Yes / No

Samples stored on ice: Yes / No

Metals samples filtered: Yes / No

QC Sample ID (if any): None

Containers collected:

- ☐ Organics
- ☒ Inorganics
- ☐ Biological
- ☐ VOC (Vial)
- ☐ Nutrients
- ☐
- ☒ Metals
- ☐ Cyanide
- ☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~3.0m Pump pressure regulator:

Fill timer: Discharge timer:

COMMENTS

Tonkin+Taylor

Groundwater Sampling Field Sheet

Site:		Job Number: 1014985	Date: 27/11/20
Well ID: BH116	Well Location: N: E:		Field Staff: RVDK

EQUIPMENT

Water meter: Interface/dip meter/other _____ **Water Quality Meter type:** 451

Pump type: Micropurge / wattera / bailer / downhole submersible / Hydrasleeve / other: Pevi

Bailer type: disposable/stainless steel

Weather Conditions: Sunny / Cloudy / Rain Warm / Hot / Cold

PRE-PURGE INFORMATION

TOC Stick-up:	0.46m	**Depth to PSH (m bTOC):**	Na
Standing Water Level (m bTOC):	1.302 m	**PSH visually confirmed**	Yes / No
Total well depth (m bTOC):	5.540 m	**PID Headspace(ppm):**	Na
Water column (m) :		**Well head condition:**	good

PURGE VOLUME CALCULATIONS

Well Volume (approximate) _____ **(L)**

nb Well volume (L) = Water column (m) x conversion factor (L/m), assuming well screened across water table

Casing diameter	25mm	50mm	100 mm	125m
Conversion factor (L/m):	0.98	1.96	7.85	31.4

WATER QUALITY PARAMETERS

Vol (L)	SWL (m bTOC)	Time	DO (mg/L)	Conduct. (µS/cm)	pH	Redox (mV)	Temp (°C)	Comments (e.g., colour, turbidity, odour)
0	1.286m	7:28 am						
0.15	1.642	7:31 am	2.32	4763	5.86	220.6	14.9°C	clear, no odour
1	1.725	7:33 am	2.81	426.6	5.75	227.5	14.9°C	clear, no odour
1.5	1.975	7.35 am	3.27	403.3	5.65	235.6	15.0°C	clear, no odour
2.0	2.110	7:37 am	3.22	400.5	5.63	238.2	15.0°C	Clear, no odour
		Stabilised parameters collected 2 sets						
			of suite 3			sample		bottles
					@	7:45 am		
								SWL after sampling (pump removed) 2.540m
Stabilisation Criteria (3 readings)				+/- 3%	+/- 0.1		+/- 0.2	

getting sunny

SAMPLING

Equipment decontaminated prior to use: Yes/No

Samples stored on ice: Yes/No

Metals samples filtered: Yes/No

QC Sample ID (if any): trip blank filled here

Containers collected:

- ☒ Organics
- ☒ Inorganics
- ☐ Biological
- ☐ VOC (Vial)
- ☐ Nutrients
- ☐
- ☒ Metals
- ☐ Cyanide
- ☐

MICROPURGE SETTINGS

Depth of pump inlet (mTOC): ~2.5

Fill timer: 1L per 5 minutes

Pump pressure regulator:

Discharge timer:

COMMENTS

BH117 8:39am removed levelloggen 0.53 stick up 12.785m to bottom RVDK

→ issue w/ nitrogen seal Field staff: XIJI

Monitoring Well	Water level	Time	Cumulative purge volume	Controller pressure	Drive duration	Refill duration (purge)	Temp	Dissolved Oxygen	Conductivity	pH	ORP	Comments
	mbTOC	NZST	L	(psi)	(sec)	(sec)	°C	mg/L	µS/cm		mV	
* 8:39am	2.965			40								
10:10	2.732		0.25 L	36	6	114	20.6	2.65	574	6.60	99.6	Clear no odour
10:13	2.785		0.30 L	36	6	114	19.6	1.76	547	6.57	91.5	"
10:16	2.836		0.45 L	36	6	114						"
10:19	2.876		0.60 L	36	6	114	17.9	2.31	501	6.61	87.4	"
10:20	2.915		0.75 L	"	"	"	18.1	2.16	501	6.60	83.8	"
10:22	2.957		0.90 L	"	"	"	18.0	2.06	502	6.59	80.1	"
10:24	2.972		1.05 L	"	"	"	18.0	2.06	503	6.59	77.1	"
10:26	3.002		1.20 L	"	"	"	17.8	2.06	501	6.58	74.3	"
10:28	3.026		1.35 L	"	"	"	17.6	2.01	500	6.58	72.9	"
10:30	3.051		1.50 L	"	"	"	17.8	1.85	500	6.58	70.9	"
10:32	3.076		1.65 L	"	"	"	17.6	1.87	497	6.58	69.8	"
10:34	3.105		1.80 L	"	"	"	17.8	1.80	498.0	6.58	68.0	"
10:36	3.125		1.95 L	"	"	"	17.6	1.75	499.1	6.58	66.7	"
10:38	3.146		2.20 L	"	"	"	17.5	1.72	496.5	6.58	65.6	"
10:40	3.172		2.35 L	"	"	"	17.4	1.70	498.1	6.58	64.7	"
10:42	3.189		2.50 L	"	"	"	17.5	1.70	497.1	6.58	64.4	"
			Stabilised parameters collected samples from 10:49am									
11:22	3.629	WL after collecting samples										

Equipment = Bladder pump, YSI, Interface probe

Field Blank 2 sample filled here

Appendix D: Chain of custody documentation

- Soil
- Groundwater
- Soil (Acid Sulphate)

Not registered yet

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 8am 10/12/20
Name: Rebecca van der Krogt
☒ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)
	GW Ground Water	L Leachate	☐ Audit Monitoring	Pot3 Potable Water (other)
	SW Surface Water	S Saline	☐ Check Monitoring	Pool Swimming/Spa Pool
	TW Trade Waste			
Solids	ES Soil	SE Sediment	SL Sludge	PL Plant
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota	BM BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA110a-0.1m	8/12/20	ES	Asbestos Semi Q will update
2	" -0.5m	↓	↓	Asbestos Semi Q
3	" -1.0m			Hold
4	" -2.0m			Asbestos Semi Q
5	HA110b-0.1m	7/12/20		Hold
6	" -0.5m	↓		↓
7	" -1.0m			
8	" -2.0m	↓		
9	HA110a 3.0m	8/12/20		
10	HA110a-Duplicate	↓	↓	↓

Hill Laboratories
BETTER TESTING BETTER RESULTS

Job No: 249 1712 Date Recv: 11-Dec-20 06:03

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Kyah Flynn

3124917125

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 8am 10/12/20

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 11.6

☐ Sample Analysis details checked

Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)			Pot2 Potable Water (NZDWS)	
	GW Ground Water	L Leachate	☐ Audit Monitoring			Pot3 Potable Water (other)	
	SW Surface Water	S Saline	☐ Check Monitoring			Pool Swimming/Spa Pool	
	TW Trade Waste						
Solids	ES Soil	SE Sediment	SL Sludge			PL Plant	
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota			BM BM Biological Material	

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA110a-0.1m	8/12/20	ES	Hold cold will update
2	" -0.5m	↓	↓	
3	" -1.0m			
4	" -2.0m	↓		
5	HA110b-0.1m	7/12/20		
6	" -0.5m	↓		
7	" -1.0m			
8	" -2.0m	↓		
9	HA110a-3.0m	8/12/20		
10	HA110a-Duplicate	↓	↓	

Hills CHCH

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

ANALYSIS Job No: **249 0317** Date Recv: 09-Dec-20 11:00

Received by: Torin Wilson

3124903176

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☒ *Please tick if you require COC to be faxed back*

Date & Time: 8/12/20 12:30pm

Name: Rebecca van der Krogt

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HA111-0.1m	7/12/20	ES	Hold
2	" -0.5m	↓	↓	↓
3	" -1.0m			
4	" -2.0m			
5	" -3.0m			
6				
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 9833**
Date Recv: 09-Dec-20 05:45
Received by: Simon Argent

3124898337

Client

Name Tonkin & Taylor
Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*
Client Reference 1014985
Quote No *Order Number*

Primary Contact Rebecca van der Krogt
Submitted By Rebecca van der Krogt
Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email
lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 8/12/20 12:30pm
Name: Rebecca van der Krogt
☐ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 12.7
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E** Effluent	**G** Geothermal	**Pot1** Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW Ground Water	**L** Leachate	☐ Audit Monitoring	**Pot3** Potable Water (other)
	SW Surface Water	**S** Saline	☐ Check Monitoring	**Pool** Swimming/Spa Pool
	TW Trade Waste			
Solids	**ES** Soil	**SE** Sediment	**SL** Sludge	**PL** Plant
Other	**O** O Oil	**M** Miscellaneous	**FS** FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA111 - 0.5m	8/12/20	ES	Hold cold
2	" - 0.5m			
3	" - 1.0m			
4	" - 2.0m			
5	" - 3.0m			
6				
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 9832**
Date Recv: 09-Dec-20 05:45
Received by: Simon Argent
3124898325

Client

Name Tonkin & Taylor
Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*
Client Reference 1014985
Quote No *Order Number*

Primary Contact Rebecca van der Krogt
Submitted By Rebecca van der Krogt
Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 8/12/20 12:30 pm
Name: Rebecca van der Krogt
☒ *Please tick if you require COC to be faxed back*
Signature: Rvd Krogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 12.7
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HAIII Rinsate	8/12/20	rinsate	hold cold
2				
3				
4				
5				
6				
7				
8				
9				
10				

Chilly bin 1 of 2

Hills CHCH

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 9334**
Date Recv: 08-Dec-20 11:37
Received by: Torin Wilson

3124893348

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	*Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 7/12/20 3:30pm
Name: Rebecca van der Krogt
☑ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition *Temp:*
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA109-0m	as per jar	ES	Hold will update scheduling
2	" -0.5m			
3	" -1.0m			
4	" -2.0m			
5	" -3.0m			
6	" -4.0m			
7	" -5.0m			
8	HA114-0m			
9	" -0.5m			
10	" -1.0m			

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA114 - -2			
12	" - -3			
13	" - -4			
14	" - -5			
15	HA119- 0			
16	" - 0.5			
17	" -1			
18	" -2			
19	" -3			
20	" -4			
21	" -5			
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 9094**

Date Recv: 08-Dec-20 09:24

Received by: Reshmi Kumar

3124890948

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email
lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 3:30pm 4/12/20

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition *Temp:*

☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

☐ Sample Analysis details checked

Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA115 rinsate	3/12/20	rinsate	Hold cold
2	HA1076 rinsate	4/12/20	rinsate	Hold cold
3				
4				
5				
6				
7				
8				
9				
10				

Chilly bin 1 of 2

Hills Ham

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014986

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 3:30pm 7/12/20

Name: Rebecca van der Krogt

☑ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA107a-0.1m	as per jar	ES	hold cold
2	" -0.5m			hold cold
3	" -1.0m			hold cold
4	" -2.0m			hold cold
5	HA107b-0.1m			hold cold
6	" -0.5m			hold cold
7	" -1.0m			hold cold
8	" -2.0m			hold cold
9	HA108-0.1m			hold cold
10	" -0.5m	✓	✓	hold cold

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA108 - 1.0m			hold cold
12	" - 2.0m			hold cold
13	HA109 - 0m			heavy metals+Hg+SVOCS
14	" - 0.5m			heavy metals+Hg+SVOCS
15	" - 1.0m			heavy metals+Hg+SVOCS
16	" - 2.0m			hold cold
17	" - 3.0m			hold cold
18	" - 4.0m			hold cold
19	" - 5.0m			hold cold
20	HA114 - 0.0m			heavy metals+Hg+SVOCS
21	" - 0.5m			heavy metals+Hg+SVOCS
22	" - 1.0m			heavy metals+Hg+SVOCS
23	" - 2.0m			hold cold
24	" - 3.0m			hold cold
25	" - 4.0m			hold cold
26	" - 5.0m			hold cold
27	HA116 - 0.1m			heavy metals+Hg+SVOCS
28	" - 0.5m			heavy metals+Hg+SVOCS
29	" - 1.0m			heavy metals+Hg+SVOCS
30	" - 2.0m			hold cold
31	HA119 - 0m			heavy metals+Hg+SVOCS
32	" - 0.5m			heavy metals+Hg+SVOCS
33	" - 1m			heavy metals+Hg+SVOCS
34	" - 2m			hold cold
35	" - 4m			hold cold
36	" - 5m			hold cold
37	HA107b - dupe			heavy metals+Hg+SVOCS
38	HA108 duplicate			heavy metals+Hg+SVOCS
39	Dup D			heavy metals+Hg+SVOCS
40	Dup E			heavy metals+Hg+SVOCS
41	HA115 Duplicate			heavy metals+Hg+SVOCS

CHILLY 1/2

Hills CHCH

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYS

Job No: **248 7331**

Date Recv: 04-Dec-20 11:56

R J Hill Laboratories Limite
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zeala

Received by: Courtney Case

3124873310

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhume@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 3/12/20 7:30am

Name: Rebecca van der Krogt

☑ *Please tick if you require COC to be faxed back*

Signature: Rvdkrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3** Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool** Swimming/Spa Pool
	TW	Trade Waste					
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL** Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA03-0m	2/12/20	ES	semi Q asbestos
2	" -0.5			semi Q asbestos
3	" -1.0m			semi Q asbestos
4	" -3.0m			Hold
5	" -5m			Hold
6	HA04-0m			Hold
7	" -0.5m			Hold
8	" -1.0m			Hold
9	" -3.0m			Hold
10	" -5.0m			Hold

KB Item: 23775 Version: 2

CHLOY 1/2

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA05-0m	1/12/20	ES	semi Q asbestos
12	" -1m			semi Q asbestos
13	" -2m			semi Q asbestos
14	" -3m			Hold
15	" -5m			Hold
16	HA06-0m			semi Q asbestos
17	" -1m			semi Q asbestos
18	" -2m			semi Q asbestos
19	" -3m			Hold
20	" -5m			Hold
21	HA07-0.1m			Hold
22	" -0.5m			Hold
23	" -1.0m			Hold
24	" -2.0m			Hold
25	" -3.0m			Hold
26	" -4.0m			Hold
27	" -5.0m			Hold
28	HA112-0.5m	2/12/20		Hold
29	" -1.0m			Hold
30	HA113-0m			semi Q asbestos
31	" -0.5m			semi Q asbestos
32	" -1.0m			semi Q asbestos
33	HA116-0m			semi Q asbestos
34	" -0.5m			semi Q asbestos
35	" -1.0m			semi Q asbestos
36	HA117-0.1m			Semi Q asbestos
37	" -0.5m			Semi Q asbestos
38	" -1.0m			Semi Q asbestos
39				
40				

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

ANALYS Job No: **248 6815** Date Recv: 04-Dec-20 05:42

Received by: Simon Argent

3124868157

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 3/12/20 11am

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 17.6

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email

lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA112 Rinsate	2/12/20	rinsate	Hold cold
2	HA07 Rinsate	↓	rinsate	Hold cold
3				
4				
5				
6				
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 6812**
Date Recv: 04-Dec-20 05:42
Received by: Simon Argent

3124866120

Client

Name Tonkin & Taylor
Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*
Client Reference
Quote No *Order Number*

Primary Contact Rebecca van der Krogt
Submitted By Rebecca van der Krogt
Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 3/12/20 11am
Name: Rebecca van der Krogt
☑ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 9.2
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

also email
lhare@tonkintaylor.co.nz

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	Dup A	1/12/20	ES	heavy metals+Hg+TPH+PAH
2	HA05-0m			heavy metals+Hg+TPH+PAH
3	" -0.5m			heavy metals+Hg+TPH+PAH
4	" -1.0m			heavy metals+Hg+TPH+PAH
5	" -2.0m			hold cold
6	" -3.0m			hold cold
7	" -4.0m			hold cold
8	" -5.0m			hold cold
9	HA06-0m			heavy metals+Hg+TPH+PAH
10	" -0.4-0.6			heavy metals+Hg+TPH+PAH

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA06 - 1.0m			heavy metals+Hg+TPH+PAH
12	" - 2.0m			hold cold
13	" - 3.0m			hold cold
14	" - 4.0m			hold cold
15	" - 5.0m			hold cold
16	HA07 - 0.1m			hold cold
17	" - 0.5m			hold cold
18	" - 1.0m			hold cold
19	" - 2.0m			hold cold
20	" - 3.0m			hold cold
21	" - 4.0m			hold cold
22	" - 5.0m			hold cold
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 6806**
Date Recv: 04-Dec-20 05:42
Received by: Simon Argent

Client

Name Tonkin & Taylor
Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*
Client Reference 1014995
Quote No *Order Number*

Primary Contact Rebecca van der Krogt
Submitted By Rebecca van der Krogt
Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 3/12/20 7:30am
Name: Rebecca van der Krogt
☑ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 4.6
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E** Effluent	**G** Geothermal	**Pot1** Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW Ground Water	**L** Leachate	☐ Audit Monitoring	**Pot3** Potable Water (other)
	SW Surface Water	**S** Saline	☐ Check Monitoring	**Pool** Swimming/Spa Pool
	TW Trade Waste			
Solids	**ES** Soil	**SE** Sediment	**SL** Sludge	**PL** Plant
Other	**O** O Oil	**M** Miscellaneous	**FS** FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA03-0m	2/12/20	ES	heavy metals+Hg+TPH+PAH
2	" -0.5m			heavy metals+Hg+TPH+PAH
3	" -1m			heavy metals+Hg+TPH+PAH
4	" -2m			Hold cold
5	" -3m			Hold cold
6	" -4m			Hold cold
7	" -5m			Hold cold
8	HA04-0m			heavy metals+Hg+SVOCS
9	" -0.5m			heavy metals+Hg+SVOCS
10	" -1.0m	"	"	heavy metals+Hg+SVOCS

rescheduling

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA04 - 2.0m			Hold cold
12	" - 3.0m			Hold cold
13	" - 4.0m			Hold cold
14	" - 5.0m			Hold cold
15	HA12 - 0.1m			Hold cold
16	" - 0.5m			Hold cold
17	" - 1.0m			Hold cold
18	" - 1.8m			Hold cold
19	" - 2.0m			Hold cold
20	HA13 - 0m			heavy metals+Hg+TPH+PAH
21	" - 0.5m			heavy metals+Hg+TPH+PAH
22	" - 1.0m			heavy metals+Hg+TPH+PAH
23	" - 2.0m			Hold cold
24	HA16 - 0m			heavy metals+Hg+TPH+PAH
25	" - 0.5m			heavy metals+Hg+TPH+PAH
26	" - 1.0m			heavy metals+Hg+TPH+PAH
27	" - 2.0m			Hold cold
28	HA17 - 0.1m			heavy metals + Hg+TPH+PAH
29	" - 0.5m			heavy metals + Hg+TPH+PAH
30	" - 1.0m			Hold cold
31	" - 2.0m			heavy metals + Hg+TPH+PAH
32	Dup B			heavy metals+Hg+SVOCS
33	Dup C	"	"	heavy metals+Hg+TPH+PAH
34				
35				
36				
37				
38				
39				
40				

Job No: Date Recv: 27-Nov-20 17:42

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS 248 2696

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Alexa Badenhorst

3124826969

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☑ *Please tick if you require COC to be faxed back*

Date & Time: 5pm 27/11/20

Name: Rebecca van der Krogt

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA07a - 0.1-0.3	25/11/20	ES	Hold
2	-0.5			
3	-1.0			
4	-1.8			
5	-3.0			
6	-5.0			
7				
8				
9				
10				

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

Job No: **248 2695**

Date Recv: 27-Nov-20 17:42

Received by: Alexa Badenhorst

3124826957

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	*Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email

lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 27/11/20 5 p.m

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 8°C

☐ Sample Analysis details checked

Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA07a - 0.1m	23/11/20	ES	Hold cold
2	" - 0.5m			
3	- 1.0m			
4	- 2.0m			
5	- 3.0m			
6	- 4.0m			
7	- 5.0m			
8				
9				
10				

Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 2687**
Date Recv: **27-Nov-20 17:25**
Received by: **Alexa Badenhorst**
3124826870

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	*Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 5pm 27/11/20
Name: Rebecca van der Krogt
☒ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 1.3 °C
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Hold frozen we intend to schedule for corrosivity in future please add to current job number

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3** Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool** Swimming/Spa Pool
	TW	Trade Waste					
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL** Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM** BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HA07a	25/11/20	ES	Hold frozen (500g jar)
2	HA08a	↓	↓	↓ (500g jar)
3				
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 2686**

Date Recv: 27-Nov-20 17:25

Received by: Alexa Badenhorst

3124826866

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 27/11/20 5pm

Name: Rebecca van der Krogt

☐ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 17 °C

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email Nhinehine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HaO8a rinsate	25/11/20	Rinsate	Hold cold
2				
3				
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

ANALYSIS

Job No: **248 1821**

Date Recv: **27-Nov-20 05:30**

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Joe Varey

3124818214

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 26/11/20 11am

Name: Rebecca van der Krogt

☐ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 11.0

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please hold samples frozen we intend to schedule future as a large batch for acid sulphate analysis - also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HA08a-1.2m	24/11/20	ES	Hold frozen
2	HA08a-3.5	↓	ES	Hold frozen
3				
4				
5				
6				
7				
8				
9				
10				

Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 1820**

Date Recv: 27-Nov-20 05:30

Received by: Joe Varey

3124818202

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 26/11/20 11am

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 11.0

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HA08 Rinsate	24/11/20	Rinsate	hold cold will update scheduling
2				
3				
4				
5				
6				
7				
8				
9				
10				

Hamilton

HOLD/COLD

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

20-47057

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland			also email			
Project Leader				lhine@tonkintaylor.co.nz			
Project ID	1014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY							
Laboratory Job #	20-47057	Seal Status		Priority (mark with X)			
Date Received	10/12/20 --/--/--	Received By	KW	Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: Metals (7)	PAH	[Enter Test Name]	[Enter Test Name]	[Enter Test Name]	Sample Comments
	Split	HA107b - 1.0 m			0:00	S or W							
	Split	HA108 - 0.5 m			0:00	S or W		Hold cold all					
	Split	HA109 - 0 m			0:00	S or W							
	Split	HA115 - 1.0 m			0:00	S or W							
					0:00	S or W							
					0:00	S or W							

HOLD COLD

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

20-47783

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland			also email			
Project Leader				lhine@tonkintaylor.co.nz			
Project ID	1014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #		20-47783	Seal Status		Priority (mark with X)			
Date Received	11/12/20	Received By	KW	Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: Metals (7)	PAH	[Enter Test Name]	[Enter Test Name]	[Enter Test Name]	Sample Comments
8/12/20	Split HA 110a-2.0m				0:00	S or W		Hold	cold				
7/12/20	Split HA 110b-2.0m				0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
Relinquished by		R van der Krogt		Relinquished by		KW		Courier	NZC				
Date		Time	8am	Date	--/--/--	Time	0:00	Courier #	JQQ0001034 62				

10/12/20 11/12/20 645am Sealed/chilled

Analytica Laboratories Ltd
Ruakura Research Centre
10 Bisley Road, Private Bag 3123
Hamilton 3240, New Zealand
Phone +64 7 974 4740
Email enviro.reception@analytica.co.nz
analytica.co.nz

Analytica Hamilton

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

20-46634

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland			also email			
Project Leader				lhine@tonkintaylor.co.nz			
Project ID	1014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #	20-46634			Seal Status		Priority (mark with X)		
Date Received	--/--/--	Received By		Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites					Sample Comments
								Metals (7)	PAH	[Enter Test Name]	[Enter Test Name]	[Enter Test Name]	
	Split	HA03 - 0m		2/12/20	0:00	S or W							
	Split	HA116 - 0m		2/12/20	0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
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					0:00	S or W							
					0:00	S or W							
Relinquished by		R van der Krogt		Relinquished by		Cobd		Courier	NZC				
Date		Time	7:30	Date	--/--/--	Time	0:00	Courier #	JDQ0000347 1				

3/12/20

Analytica Laboratories Ltd
Ruakura Research Centre
10 Bisley Road, Private Bag 3123
Hamilton 3240, New Zealand
Phone +64 7 974 4740
Email enviro.reception@analytica.co.nz
analytica.co.nz

HOLD/COLD

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

20-46738

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland			also email			
Project Leader				lhine@tonkintaylor.co.nz			
Project ID	014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #	20-16738		Seal Status		Priority (mark with X)			
Date Received	4/12/20 --/--/--	Received By	KW	Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites					Sample Comments
								Metals (7)	PAH	[Enter Test Name]	[Enter Test Name]	[Enter Test Name]	
1/12/20		HA05-0m Split			0:00	S or W		Hold cold					
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
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					0:00	S or W							
Relinquished by		R van der Krogt		Relinquished by		Ginny		Courier		5D400003472			
Date		Time	1130	Date	4/12	Time	0:00	Courier #					

Analytica Laboratories Ltd
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Hamilton 3240, New Zealand
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Email enviro.reception@analytica.co.nz
analytica.co.nz

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

20-41900

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland			also email			
Project Leader				Lhine@tonkintaylor.co.nz			
Project ID	1014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #		20-41900		Seal Status		Priority (mark with X)		
Date Received	--/--/-- 5/11/20	Received By	KW	Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: Metals (7)	PAH	[Enter Test Name]	[Enter Test Name]	[Enter Test Name]	Sample Comments
				4/11/20									
	Split ENVIRHA101		0.0-0.1m		0:00	S or W		Hold cold					
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
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					0:00	S or W							
					0:00	S or W							
Relinquished by		R van der Krogt		Relinquished by	Rvdkrogt	Courier	NZC						
Date		Time		Date	--/--/--	Time	0:00	Courier #	JD000000 1461				

Analytica Laboratories Ltd
Ruakura Research Centre
10 Bisley Road, Private Bag 3123
Hamilton 3240, New Zealand
Phone +64 7 974 4740
Email enviro.reception@analytica.co.nz
analytica.co.nz

KW 5/11/20 7:30am

2:30pm 4/11/20

Hamilton

20-42713

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland						
Project Leader	Rebecca van der Krogt						
Project ID	1014985	PO #					
Site							
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz						
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #		20-42713		Seal Status		Priority (mark with X)		
Date Received	11/11/20	Received by	Emily	Sample Temp Status		Routine		Urgent

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: Metals (7)	PAH	Hold [Enter Test Name]	[Enter Test Name]	[Enter Test Name]	Sample Comments
		BH113-5.0m Split		9/11/20	0:00	S or W		hold					
10/11/20		Split Envr-SS03-0.1-0.2m			0:00	S or W		heavy metals + Hg, SVOCS					
					0:00	S or W							
					0:00	S or W							
					0:00	S or W	

HOLD COLD

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #		of	
Client	Tonkin and Taylor			Customer Comments / Instructions			
Address	105 Carlton Gore Road, Newmaket, Auckland						
Project Leader							
Project ID	1014985	PO #					
Site				also email lhine@tonkintaylor.co.nz			
Sampler	Rebecca van der Krogt						
Phone	273040134						
Email	rvanderkrogt@tonkintaylor.co.nz			20-44791			
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #		20-44791		Seal Status		Priority (mark with X)		
Date Received	24/11/2020	Received By	Cobb	Sample Temp Status		Routine		Urgent	

TESTS REQUESTED

Lab ID	Location ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites					Sample Comments
								Metals (7)	PAH	Hold cold	[Enter Test Name]	[Enter Test Name]	
		BH05a-2.0 split			0:00	S or W				x			
		BH07-0.1-0.4m split			0:00	S or W				x			
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
					0:00	S or W							
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					0:00	S or W							
Relinquished by			R van der Krogt		Relinquished by		KW		Courier	NZC			
Date			Time		Date	--/--/--	Time	0:00	Courier #	JD000003532			

24/11/20 6:45 sealed/chilled

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Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 6837** Date Recv: 04-Dec-20 06:37

Received by: Simon Argent

3124868373

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014986

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☒ *Please tick if you require COC to be faxed back*

Date & Time: 3/12/20 7:30am

Name: Rebecca van der Krogt

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 16.5

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

also email
lhine@tonkintaylor.conz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	Trip blank 2	2/12/20	GW	Hold cold
2	Field blank 2			Hold cold
3	BH110			pH, diss metals(7) + Hg + PAH + TPH
4	BH117			pH, diss metals(7) + Hg + PAH + TPH
5	BH05a			pH, diss metals(7) + Hg + PAH + TPH
6	Rinsate	3/12/20	GW	Hold cold
7				
8				
9				
10				

Job No: 248 2688 Date Recv: 27-Nov-20 17:25

Received by: Alexa Badenhorst

3124826882

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time:

Name: Rebecca van der Krogt

☐ *Please tick if you require COC to be faxed back*

Signature:

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 17°C

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz
*Please can the second set of samples be placed on hold cold

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)		Pot2 Potable Water (NZDWS)		
	GW Ground Water	L Leachate	☐ Audit Monitoring		Pot3 Potable Water (other)		
	SW Surface Water	S Saline	☐ Check Monitoring		Pool Swimming/Spa Pool		
	TW Trade Waste						
Solids	ES Soil	SE Sediment	SL Sludge		PL Plant		
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota		BM BM Biological Material		

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	Dup 1	27/11/20	GW	dissolved metals (7) + Hg, pH, PAH, TPH
2	field blank 27/11/20			diss metals (7) + Hg, pH, PAH, TPH + SVOCs
3	trip blank 27/11/20			diss metals (7) + Hg, pH, PAH, TPH + SVOCs
4	~~BH05~~ BH05b			diss metals (7) + Hg, pH, PAH, TPH + SVOCs
5	BH06			diss metals (7) + Hg, pH, PAH, TPH + SVOCs
6	BH08			diss metals (7) + Hg + pH, PAH, TPH, SVOCs
7	BH111			diss metals (7) + Hg + pH, PAH, TPH, SVOCs
8	BH113			diss metals (7) + Hg + pH, SVOCs
9	BH116	↓	↓	diss metals (7) + Hg, pH, PAH, TPH, SVOCs
10				

KB Item: 23775 Version: 2

Job No: 247 3291 Date Recv: 14-Nov-20 07:33

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYS

R J Hill Laboratories Limite
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealan

Received by: Joe Varey

3124732918

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	*Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

Please hold samples frozen we intend to schedule in future as a large batch for acid sulphate analysis.
- also email lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 13/11/20 9:45am
Name: Rebecca van der Krogt
☒ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 5.2°C
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	BH111-3.7-3.9m	11/11/20		Please hold frozen
2	BH111-3.9-4.1m	11/11/20		Please hold frozen
3				
4				
5				
6				
7				
8				
9				
10				

Job No: 247 3291 Date Recv: 14-Nov-20 07:33

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Joe Varey

3124732918

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results also lhine@tonkintaylor.co.nz

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☒ *Please tick if you require COC to be faxed back*

Date & Time: 12:30pm 13/11/20

Name: Rebecca van der Krogt

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 9.9°C

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please freeze samples on arrival we intend to schedule for acid sulphate analysis at a future date.

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Please can we add to same job no as BH111 frozen samples

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1** ☐	Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3** Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool** Swimming/Spa Pool
	TW	Trade Waste					
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL** Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	BH113-0.45-0.55m	13/11/20	ES	Freeze all please
2	BH113-2.2-2.3m			
3	BH113-5.5-5.6m			
4	BH116-0.75-0.85m			
5	BH116-5.0-5.1m			
6	BH117-0.7-0.8m			
7	BH117-3.45-3.55m			
8	BH117-5.9-6.0m			
9				
10				

Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **247 3291**
Date Recv: 14-Nov-20 07:33
Received by: Joe Varey

3124732918

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name: Rebecca van der Krogt
☐ Please tick if you require COC to be faxed back
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp:
☐ Sample Analysis details checked
Signature:

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134
Fax	
Client Reference	1014985
Fax	1014985
Quote No	
Order Number	
Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results lhine@tonkintaylor.co.nz
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

Please hold frozen and add to job number 2473291
Thankyou

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	BH110-0.8-0.9m	13/11/20	ES	Hold frozen please
2	BH110-2.3-2.45m	↓	↓	↓
3				
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

Job No: 247 3291

Date Recv: 14-Nov-20 07:33

Received by: Joe Varey

3124732918

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	108286 *Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz please hold samples frozen we intend to schedule in future as a large bvatch for acid sulphate analysis. Please add to job number 247 3291

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories *Date & Time:*

Name: Rebecca van der Krogt

☐ *Please tick if you require COC to be faxed back* *Signature:*

Received at Hill Laboratories *Date & Time:*

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 1.9

☐ Sample Analysis details checked
Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E** Effluent	**G** Geothermal	**Pot1** Potable Water (LAS/EU)		**Pot2** Potable Water (NZDWS)		
	GW Ground Water	**L** Leachate	☐ Audit Monitoring		**Pot3** Potable Water (other)		
	SW Surface Water	**S** Saline	☐ Check Monitoring		**Pool** Swimming/Spa Pool		
	TW Trade Waste						
Solids	**ES** Soil	**SE** Sediment	**SL** Sludge		**PL** Plant		
Other	**O** O Oil	**M** Miscellaneous	**FS** FS Fish/shellfish/biota		**BM** BM Biological Material		

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	BH05a-0.35		ES	Hold frozen will update scheduling
2	BH05a-2.9		ES	Hold frozen will update scheduling
3	BH06-0.85-1.0		ES	Hold frozen will update scheduling
4	BH06-2.7-2.9		ES	Hold frozen will update scheduling
5	BH07-0.9-1.0		ES	Hold frozen will update scheduling
6	BH07-2.7-2.8		ES	Hold frozen will update scheduling
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **247 3291**

Date Recv: 14-Nov-20 07:33

Received by: Joe Varey

3124732918

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 3:35pm 25/11/20

Name: Rebecca van der Krogt

☑ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 7.2 °C

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please hold samples frozen we intend to schedule in future as a large batch for acid sulphate analysis - also email lhine@tonkintaylor.co.nz Please add to job number 247 3291.

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	BH08-0.25m		ES	Hold frozen
2	BH08-2.3m		ES	Hold frozen
3				
4				
5				
6				
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **247 3291**
Date Recv: 14-Nov-20 07:33
Received by: Joe Varey

3124732918

Client

Name: Tonkin & Taylor
Address: 105 Carlton Gore Road, Newmarket, Auckland
Phone: 273040134 Fax:
Client Reference: 1014985
Quote No: Order Number:

Primary Contact Rebecca van der Krogt
Submitted By Rebecca van der Krogt
Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 7:30am 3/12/20
Name: Rebecca van der Krogt
☒ Please tick if you require COC to be faxed back
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp:
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please freeze all samples + add to job number 2473291 - we intend to analyze for conductivity as a bulk batch

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA03-2m	as per jar	ES	Hold FROZEN Please
2	HA03-4m			
3	HA04-2m			
4	HA04-4m			
5	HA05-0.5m			
6	HA05-4m			
7	HA06-0.4-0.6m			
8	HA06-4m			
9	HA07-1.8m			
10	HA07-2.4m			

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA112-0.1m			
12	HA113-2m			
13	HA116-2m			
14	HA117-2m			
15				
16				
17				
18				
19				
20				
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40				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS R

Job No: 247 3291

Date Recv: 14-Nov-20 07:33

Received by: Joe Varey

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand
Te
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Em
We

3124732918

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☒ *Please tick if you require COC to be faxed back*

Date & Time: 3:30pm 7/12/20

Name: Rebecca van der Krogt

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please hold frozen
add to job number : 2473291
also email lhine@tonkintaylor.co.nz

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA107a - 2.2m	as per jar	ES	Hold frozen
2	" - 3.5m			
3	HA107b - 1.2m			
4	" - 2.7m			
5	HA108 - 1.0m			
6	HA115 - 2.0m			
7				
8				
9				
10				

Hills Hamilton

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

Job No: **247 3291**

Date Recv: 14-Nov-20 07:33

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Joe Varey

3124732918

Client

Name: Tonkin & Taylor

Address: 105 Carlton Gore Road, Newmarket, Auckland

Phone: 273040134 Fax:

Client Reference: 1014985

Quote No: Order Number:

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 8/12/20 12:30pm

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* Temp: 12.7

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz
Please hold frozen and add to job no: 2473291

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA111 - 1.2m	7/12/20	ES	Hold FROZEN
2	HA111 - 2.4m	↓	↓	↓
3				
4				
5				
6				
7				
8				
9				
10				

Job No: 2473291 Date Recv: 14-Nov-20 07:33

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Received by: Joe Varey

3124732918

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 273040134 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca van der Krogt

Submitted By Rebecca van der Krogt

Charge To T+T

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

Please add to job 2473291
also email lhine@tonkintaylor.conz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 8am 10/12/20

Name: Rebecca van der Krogt

☒ *Please tick if you require COC to be faxed back*

Signature: RvdKrogt

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* //

☐ Sample Analysis details checked
Signature:

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA110a-2.4m	8/12/20	ES	Hold all FROZEN please
2	HA110b-0.6m	7/12/20	↓	
3	HA110b-2.9m	↓	↓	
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories

Kelly Mahar <kelly.mahar@hill-labs.co.nz>

Quote 108315 T+T ref 1014985

1 message

Sami Hutchings <SHutchings@tonkintaylor.co.nz> 21 December 2020 at 13:28
To: Kelly Mahar <kelly.mahar@hill-labs.co.nz>
Cc: Rebecca van der Krogt <RvanderKrogt@tonkintaylor.co.nz>, Alice Tilley <ATilley@tonkintaylor.co.nz>, Lucy Hine <LHine@tonkintaylor.co.nz>

Hi Kelly,

Happy Monday! Only 1.25 more days to go!!!!

Rebecca has finished up for the year and the client has asked for the testing of the samples Hills have frozen (plus some additional ones) to be tested.

Alice has arranged for the final samples to be put on the courier this morning. Can we please schedule everything at once with one set up fee under quote number 108315? Please only analyse for pH and acid soluble sulphate and sulphate content.

Sample location & interval		Lab job number	Lab sample number	Comment
BH05a	0.35	2473291	2473291.13	
BH05a	6.5			With the courier today. COC requests for these samples to be added to job 2473291
BH06	1	2473291	2473291.15	
BH06	2.9	2473291	2473291.16	
BH07	1	2473291	2473291.17	
BH07	4.5			With the courier today. COC requests for these samples to be added to job 2473291
BH08	0.3	2473291	2473291.19	
BH08	7			With the courier today. COC requests for these samples to be added to job 2473291
BH110	0.8-0.9	2473291	2473291.11	
BH110	3			With the courier today. COC requests for these samples to be added to job 2473291
BH111	2			With the courier today. COC requests for these samples to be added to job 2473291
BH111	3.7	2473291	2473291.1	
BH113	2.3	2473291	2473291.4	
BH113	5.8			With the courier today. COC requests for these samples to be added to job 2473291
BH116	0.75	2473291	2473291.6	
BH116	5	2473291	2473291.7	
BH117	3.45	2473291	2473291.9	
BH117	5.9	2473291	2473291.10	
HA108	1	2473291	2473291.39	
HA109	4	2489334	2489334.6	

HA111	2.4	2473291	2473291.42	
HA114	3	2489334	2489334.12	
HA115	2	2473291	2473291.40	
HA119	5	2489334	2489334.21	

Thanks,

Sami

Sami Hutchings | Contaminated Land Consultant
BSc PGDip (Geology)
Tonkin + Taylor - *Exceptional thinking together*
Level 2, 105 Carlton Gore Rd, Newmarket, Auckland 1023 | PO Box 5271, Wellesley Street, Auckland 1142, New Zealand
T + M +64276409639 www.tonkintaylor.co.nz T+T profile

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Job No: 247 3291 Date Recv: 14-Nov-20 07:33

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Web www.hill-labs.co.nz

Received by: Joe Varey

3124732918

Client

Name Tonkin & Taylor

Address 105 Carlton Gore Road, Newmarket, Auckland

Phone 09 3622038 *Fax*

Client Reference 1014985

Quote No *Order Number*

Primary Contact Rebecca Van der Krogt

Submitted By Sami Hutchings

Charge To

Results To ☑ Mail Client ☑ Mail Submitter

☐ Fax Results

☑ Email Results Shutchings@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 21/12/2020

Name: Sami Hutchings

☑ *Please tick if you require COC to be faxed back*

Signature:

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E** Effluent	**G** Geothermal	**Pot1** Potable Water (LAS/EU)		**Pot2** Potable Water (NZDWS)		
	GW Ground Water	**L** Leachate	☐ Audit Monitoring		**Pot3** Potable Water (other)		
	SW Surface Water	**S** Saline	☐ Check Monitoring		**Pool** Swimming/Spa Pool		
	TW Trade Waste						
Solids	**ES** Soil	**SE** Sediment	**SL** Sludge		**PL** Plant		
Other	**O** O Oil	**M** Miscellaneous	**FS** FS Fish/shellfish/biota		**BM** BM Biological Material		

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	BH5a 6.5m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
2	BH07 4.5m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
3	BH08 7m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
4	BH110 ~~4.5m~~ 1.2m - 1.3m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
5	BH110 3m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
6	BH111 2m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
7	BH113 5.8m	21/12/2020	ES	Please add samples to job number 2473291 & freeeze please
8	~~BH117 5.9m~~	~~21/12/2020~~	~~ES~~	~~Please add samples to job number 2473291 & freeeze please~~
9				
10				

Chilly bin 1 of 2

Hills CHCH

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **248 9334**
Date Recv: 08-Dec-20 11:37
Received by: Torin Wilson

3124893348

Client

Name	Tonkin & Taylor
Address	105 Carlton Gore Road, Newmarket, Auckland
Phone	273040134 *Fax*
Client Reference	1014985
Quote No	*Order Number*

Primary Contact	Rebecca van der Krogt
Submitted By	Rebecca van der Krogt
Charge To	T+T

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results rvanderkrogt@tonkintaylor.co.nz

ADDITIONAL INFORMATION

also email lhine@tonkintaylor.co.nz

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 7/12/20 3:30pm
Name: Rebecca van der Krogt
☑ *Please tick if you require COC to be faxed back*
Signature: RvdKrogt

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition *Temp:*
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA109-0m	as per jar	ES	Hold will update scheduling
2	" -0.5m			
3	" -1.0m			
4	" -2.0m			
5	" -3.0m			
6	" -4.0m			
7	" -5.0m			
8	HA114-0m			
9	" -0.5m			
10	" -1.0m			

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA114 - -2			
12	" - -3			
13	" - -4			
14	" - -5			
15	HA119- 0			
16	" - 0.5			
17	" -1			
18	" -2			
19	" -3			
20	" -4			
21	" -5			
22				
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36				
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38				
39				
40				

Hill Laboratories

Kelly Mahar <kelly.mahar@hill-labs.co.nz>

Quote 108315 T+T ref 1014985

1 message

Sami Hutchings <SHutchings@tonkintaylor.co.nz> 21 December 2020 at 13:28
To: Kelly Mahar <kelly.mahar@hill-labs.co.nz>
Cc: Rebecca van der Krogt <RvanderKrogt@tonkintaylor.co.nz>, Alice Tilley <ATilley@tonkintaylor.co.nz>, Lucy Hine <LHine@tonkintaylor.co.nz>

Hi Kelly,

Happy Monday! Only 1.25 more days to go!!!!

Rebecca has finished up for the year and the client has asked for the testing of the samples Hills have frozen (plus some additional ones) to be tested.

Alice has arranged for the final samples to be put on the courier this morning. Can we please schedule everything at once with one set up fee under quote number 108315? Please only analyse for pH and acid soluble sulphate and sulphate content.

Sample location & interval		Lab job number	Lab sample number	Comment
BH05a	0.35	2473291	2473291.13	
BH05a	6.5			With the courier today. COC requests for these samples to be added to job 2473291
BH06	1	2473291	2473291.15	
BH06	2.9	2473291	2473291.16	
BH07	1	2473291	2473291.17	
BH07	4.5			With the courier today. COC requests for these samples to be added to job 2473291
BH08	0.3	2473291	2473291.19	
BH08	7			With the courier today. COC requests for these samples to be added to job 2473291
BH110	0.8-0.9	2473291	2473291.11	
BH110	3			With the courier today. COC requests for these samples to be added to job 2473291
BH111	2			With the courier today. COC requests for these samples to be added to job 2473291
BH111	3.7	2473291	2473291.1	
BH113	2.3	2473291	2473291.4	
BH113	5.8			With the courier today. COC requests for these samples to be added to job 2473291
BH116	0.75	2473291	2473291.6	
BH116	5	2473291	2473291.7	
BH117	3.45	2473291	2473291.9	
BH117	5.9	2473291	2473291.10	
HA108	1	2473291	2473291.39	
HA109	4	2489334	2489334.6	

HA111	2.4	2473291	2473291.42	
HA114	3	2489334	2489334.12	
HA115	2	2473291	2473291.40	
HA119	5	2489334	2489334.21	

Thanks,

Sami

Sami Hutchings | Contaminated Land Consultant
BSc PGDip (Geology)
Tonkin + Taylor - *Exceptional thinking together*
Level 2, 105 Carlton Gore Rd, Newmarket, Auckland 1023 | PO Box 5271, Wellesley Street, Auckland 1142, New Zealand
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Appendix E: Summary of laboratory testing results

- Soil
- Groundwater
- Acid Sulphate soil results

Table E1: Summary of soil sampling

Location		BH05A	BH05A	BH05A	BH06	BH06	BH06	HA03	HA03	HA03	BH07	BH07	BH07	HA04
Sample		BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020	BH06 - 1.0-1.2m 19-Nov-2020	HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	BH07 - 0.1-0.4m 20-Nov-2020	BH07 - 0.5-0.65m 20-Nov-2020	BH07 - 1.0-1.35m 20-Nov-2020	HA04 0m 02-Dec-2020 7:10 am
Date		17/11/2020	17/11/2020	17/11/2020	19/11/2020	19/11/2020	19/11/2020	2/12/2020	2/12/2020	2/12/2020	20/11/2020	20/11/2020	20/11/2020	2/12/2020
Lab number	**Maximum**	2478987.2/ 2479563.1	2478987.3/ 2479563.2	2478987.4/ 2479563.3	2478987.9/ 2479563.7	2478987.10/ 2479563.8	2478987.11/ 2479563.9	2486806.1/ 2487331.1	2486806.2/ 2487331.2	2486806.3/ 2487331.3	2478987.17/ 2479563.15	2478987.18/ 2479563.16	2478987.19/ 2479563.17	2486806.8
Soil suite		Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 2
Asbestos type		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Asbestos form														
Asbestos as ACM (w/w%)														
Asbestos Fibres/Fine (w/w%)														
Heavy Metals with Mercury, Screen Level														
Total Recoverable Arsenic	8	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium	0.49	< 0.10	< 0.10	< 0.10	0.33	< 0.10	< 0.10	0.49	< 0.10	< 0.10	0.21	< 0.10	< 0.10	0.34
Total Recoverable Chromium	101	8	7	7	5	3	4	6	5	4	3	3	8	6
Total Recoverable Copper	78	22	5	6	9	4	7	8	< 2	< 2	3	3	3	9
Total Recoverable Lead	31	6.1	9.5	9	7.7	11.5	11.6	7.1	6.7	5.9	4.1	6.4	7.1	7.3
Total Recoverable Mercury	0.42	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	51	16	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total Recoverable Zinc	57	23	6	4	6	< 4	< 4	13	< 4	< 4	< 4	< 4	< 4	13
Polycyclic Aromatic Hydrocarbons Screening in Soil														
Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4	< 0.4	< 0.3	< 0.3	< 0.3	< 0.4	-
1-Methylnaphthalene	0	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
2-Methylnaphthalene	0	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Acenaphthylene	0.065	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Acenaphthene	0.02	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Anthracene	0.123	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]anthracene	0.74	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.03	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.04	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[e]pyrene	0.65	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[g,h,i]perylene	0.72	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[k]fluoranthene	0.38	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Chrysene	0.7	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Dibenzo[a,h]anthracene	0.132	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Fluoranthene	1.19	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Fluorene	0.016	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Naphthalene	0	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.06	< 0.06	< 0.07	-
Perylene	0.24	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Phenanthrene	0.38	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Pyrene	1.48	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.014	-
Total Petroleum Hydrocarbons in Soil														
C7 - C9	0	< 9	< 9	< 10	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 9	-
C10 - C14	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-
C15 - C36	2300	< 40	< 40	< 40	< 40	< 40	< 40	57	< 40	< 40	< 40	< 40	< 40	-
Total hydrocarbons (C7 - C36)	2300	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	-
Organochlorine Pesticides Screening in Soil														
Aldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested												
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested												
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested												
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested												
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested												
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested												
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested												
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested												
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested												
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested												
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested												
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested												
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested												
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested												
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested												
Other VOC in Soils by Headspace GC-MS		<LoR where tested												

Location		HA04	HA04	BH08	BH08	BH08	HA05	HA05	HA05	HA05	HA06	HA06	HA06	HA06	HA07
Sample		HA04 0.5m 02-Dec-2020 7:25 am	HA04 1m 02-Dec-2020 7:33 am	0.1	0.5	1	HA05 - 0m 01-Dec-2020 1:15 pm	HA05 - 0.5m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA05-2m 01-Dec-2020	HA06 - 0m 01-Dec-2020 10:45 am	HA06 - 0.4-0.6m 01-Dec-2020 11:00 am	HA06 - 1.0m 01-Dec-2020 11:12 am	HA06-2m 01-Dec-2020	HA07 - 0.1m 01-Dec-2020
Date	**Maximum**	2/12/2020	2/12/2020	BH08-0.1m	BH08-0.5m	BH08-1.0m	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020
Lab number		2486806.9	2486806.1	2481161.1/ 2480946.1	2481161.2/ 2480946.2	2481161.3/ 2480946.3	2486812.2/ 2487331.11	2486812.3	2486812.4/ 2487331.12	2487331.13	2486812.9/ 2487331.16	2486812.10	2486812.11/ 2487331.17	2487331.18	2486812.16/ 2487331.21
Soil suite		Soil suite 2	Soil suite 2	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3
Asbestos type		-	-	ND	ND	ND	ND	-	ND	ND	ND	-	ND	ND	ND
Asbestos form															
Asbestos as ACM (w/w%)															
Asbestos Fibres/Fine (w/w%)															
Heavy Metals with Mercury, Screen Level															
Total Recoverable Arsenic	8	< 2	< 2	7	< 2	< 2	2	< 2	< 2	-	6	5	2	-	4
Total Recoverable Cadmium	0.49	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.1	< 0.10	< 0.10	-	0.26	< 0.10	< 0.10	-	0.17
Total Recoverable Chromium	101	4	7	101	5	3	6	6	7	-	13	21	11	-	9
Total Recoverable Copper	78	2	5	66	6	3	43	3	2	-	26	12	16	-	31
Total Recoverable Lead	31	6	9.3	11.3	11.8	6.3	20	9.2	5.5	-	21	26	24	-	15.7
Total Recoverable Mercury	0.42	< 0.10	0.11	0.1	0.11	< 0.10	< 0.10	0.16	< 0.10	-	0.13	0.19	0.3	-	< 0.10
Total Recoverable Nickel	51	< 2	4	51	< 2	< 2	8	3	< 2	-	7	11	8	-	6
Total Recoverable Zinc	57	< 4	5	18	4	< 4	40	< 4	< 4	-	42	12	5	-	49
Polycyclic Aromatic Hydrocarbons Screening in Soil															
Total of Reported PAHs in Soil	9.5	-	-	< 0.4	< 0.4	< 0.4	9.5	< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4	-	< 0.4
1-Methylnaphthalene	0	-	-	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
2-Methylnaphthalene	0	-	-	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Acenaphthylene	0.065	-	-	< 0.014	< 0.014	< 0.013	0.065	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Acenaphthene	0.02	-	-	< 0.014	< 0.014	< 0.013	0.02	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Anthracene	0.123	-	-	< 0.014	< 0.014	< 0.013	0.123	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[a]anthracene	0.74	-	-	< 0.014	< 0.014	< 0.013	0.74	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[a]pyrene (BAP)	0.94	-	-	< 0.014	< 0.014	< 0.013	0.94	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	-	-	< 0.04	< 0.04	< 0.04	1.37	< 0.04	< 0.04	-	< 0.04	< 0.04	< 0.04	-	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	-	-	< 0.04	< 0.04	< 0.04	1.36	< 0.04	< 0.04	-	< 0.04	< 0.04	< 0.04	-	< 0.04
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	-	-	< 0.014	< 0.014	< 0.013	1.01	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[e]pyrene	0.65	-	-	< 0.014	< 0.014	< 0.013	0.65	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[g,h,i]perylene	0.72	-	-	< 0.014	< 0.014	< 0.013	0.72	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Benzo[k]fluoranthene	0.38	-	-	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Chrysene	0.7	-	-	< 0.014	< 0.014	< 0.013	0.7	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Dibenzo[a,h]anthracene	0.132	-	-	< 0.014	< 0.014	< 0.013	0.132	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Fluoranthene	1.19	-	-	< 0.014	< 0.014	< 0.013	1.19	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Fluorene	0.016	-	-	< 0.014	< 0.014	< 0.013	0.016	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Indeno(1,2,3-c,d)pyrene	0.68	-	-	< 0.014	< 0.014	< 0.013	0.68	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Naphthalene	0	-	-	< 0.07	< 0.07	< 0.07	< 0.06	< 0.07	< 0.08	-	< 0.08	< 0.07	< 0.08	-	< 0.07
Perylene	0.24	-	-	< 0.014	< 0.014	< 0.013	0.24	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Phenanthrene	0.38	-	-	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Pyrene	1.48	-	-	< 0.014	< 0.014	< 0.013	1.48	< 0.014	< 0.015	-	< 0.016	< 0.014	< 0.015	-	< 0.014
Total Petroleum Hydrocarbons in Soil															
C7 - C9	0	-	-	< 9	< 8	< 8	< 8	< 8	< 9	-	< 10	< 9	< 9	-	< 8
C10 - C14	69	-	-	< 20	< 20	< 20	< 20	< 20	< 20	-	< 20	< 20	< 20	-	< 20
C15 - C36	2300	-	-	< 40	< 40	< 40	123	< 40	< 40	-	55	< 40	< 40	-	< 40
Total hydrocarbons (C7 - C36)	2300	-	-	< 70	< 70	< 70	126	< 70	< 70	-	< 70	< 70	< 70	-	< 70
Organochlorine Pesticides Screening in Soil															
Aldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested													
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested													
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested													
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested													
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested													
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested													
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested													
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested													
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested													
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested													
Other VOC in Soils by Headspace GC-MS		<LoR where tested													

Location		HA07	HA07	HA08	HA08	HA08	ENVR-HA03	ENVR-HA03	ENVR-HA03	ENVR-SS03	ENVR-HA04	ENVR-HA04	ENVR-HA04	ENVR-SS04	ENVR-HA05
Sample		HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020	HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020	ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020	ENVR-HA04-0.5m 10-Nov-2020	ENVR-HA04-1.0m 10-Nov-2020	ENVR-SS04-0.1-0.2m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020
Date	**Maximum**	1/12/2020	1/12/2020	24/11/2020	24/11/2020	24/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020
Lab number		2486812.17/ 2487331.22	2486812.18/ 2487331.23	2481819.8	2481819.9	2481819.10	2470910.1/ 2471363.1	2470910.2/ 2471363.2	2470910.3/ 2471363.3	2470910.4	2470910.5/ 2471363.5	2470910.6/ 2471363.6	2470910.7/ 2471363.7	2470910.8	2470910.9/ 2471363.9
Soil suite		Soil suite 3	Soil suite 3	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 2	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 2	Soil suite 3 + OCP
Asbestos type		ND	ND	-	-	-	ND	ND	ND	-	Chrysotile (White Asbestos) detected.	ND	ND	-	ND
Asbestos form											Loose fibres				
Asbestos as ACM (w/w%)											< 0.001				
Asbestos Fibres/Fine (w/w%)											< 0.001				
Heavy Metals with Mercury, Screen Level															
Total Recoverable Arsenic	8	2	< 2	4	< 2	2	< 2	< 2	< 2	< 2	< 5	2	< 2	< 2	< 2
Total Recoverable Cadmium	0.49	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	101	7	10	9	< 2	4	3	3	7	2	< 5	7	5	3	5
Total Recoverable Copper	78	6	5	21	4	5	24	< 2	2	20	12	2	2	35	16
Total Recoverable Lead	31	13.8	8.5	11.3	3.7	5.9	7.6	3.3	6.6	7.5	31	10.6	8.9	7.8	7.1
Total Recoverable Mercury	0.42	0.1	0.16	< 0.10	< 0.10	0.22	< 0.10	0.24	0.25	< 0.10	< 0.3	0.2	0.17	< 0.10	< 0.10
Total Recoverable Nickel	51	2	3	8	< 2	2	3	< 2	< 2	< 2	< 5	< 2	3	4	2
Total Recoverable Zinc	57	5	5	38	5	10	18	< 4	5	20	17	< 4	< 4	22	20
Polycyclic Aromatic Hydrocarbons Screening in Soil															
Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	-	-	-	< 0.4	< 0.3	< 0.4	-	< 0.5	< 0.4	< 0.4	-	< 0.4
1-Methylnaphthalene	0	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
2-Methylnaphthalene	0	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Acenaphthylene	0.065	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Acenaphthene	0.02	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Anthracene	0.123	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[a]anthracene	0.74	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	-	-	-	< 0.04	< 0.03	< 0.04	-	< 0.05	< 0.04	< 0.04	-	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	-	-	-	< 0.04	< 0.03	< 0.04	-	< 0.05	< 0.04	< 0.04	-	< 0.04
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[e]pyrene	0.65	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[g,h,i]perylene	0.72	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Benzo[k]fluoranthene	0.38	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Chrysene	0.7	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Dibenzo[a,h]anthracene	0.132	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Fluoranthene	1.19	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Fluorene	0.016	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Naphthalene	0	< 0.07	< 0.08	-	-	-	< 0.07	< 0.07	< 0.08	-	< 0.09	< 0.08	< 0.08	-	< 0.07
Perylene	0.24	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Phenanthrene	0.38	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Pyrene	1.48	< 0.014	< 0.016	-	-	-	< 0.013	< 0.013	< 0.015	-	< 0.017	< 0.016	< 0.015	-	< 0.014
Total Petroleum Hydrocarbons in Soil															
C7 - C9	0	< 8	< 10	-	-	-	< 8	< 8	< 9	-	< 11	< 10	< 9	-	< 8
C10 - C14	69	< 20	< 20	-	-	-	< 20	< 20	< 20	-	69	< 20	< 20	-	< 20
C15 - C36	2300	< 40	< 40	-	-	-	< 40	< 40	< 40	-	2,300	< 40	46	-	< 40
Total hydrocarbons (C7 - C36)	2300	< 70	< 70	-	-	-	< 70	< 70	< 70	-	2,300	< 70	< 70	-	< 70
Organochlorine Pesticides Screening in Soil															
Aldrin	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
alpha-BHC	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
beta-BHC	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
delta-BHC	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
cis-Chlordane	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
trans-Chlordane	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
2,4'-DDD	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
4,4'-DDD	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
2,4'-DDE	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
4,4'-DDE	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
2,4'-DDT	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
4,4'-DDT	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Total DDT Isomers	<LoR	-	-	-	-	-	< 0.08	-	-	-	< 0.11	-	-	-	< 0.08
Dieldrin	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endosulfan I	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endosulfan II	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endosulfan sulphate	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endrin	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endrin aldehyde	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Endrin ketone	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Heptachlor	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Heptachlor epoxide	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Hexachlorobenzene	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Methoxychlor	<LoR	-	-	-	-	-	< 0.013	-	-	-	< 0.017	-	-	-	< 0.014
Haloethers in SVOC Soil Samples by GC-MS											<LoR where tested				
Nitrogen containing compounds in SVOC Soil Samples by GC-MS											<LoR where tested				
Organochlorine Pesticides in SVOC Soil Samples by GC-MS											<LoR where tested				
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS											<LoR where tested				
Phenols in SVOC Soil Samples by GC-MS											<LoR where tested				
Plasticisers in SVOC Soil Samples by GC-MS											<LoR where tested				
Other Halogenated compounds in SVOC Soil Samples by GC-MS											<LoR where tested				
Other compounds in SVOC Soil Samples by GC-MS											<LoR where tested				
Organonitro&phosphorus Pesticides Screen in Soil by GCMS											<LoR where tested				
BTEX in VOC Soils by Headspace GC-MS											<LoR where tested				
Halogenated Aliphatics in VOC Soils by Headspace GC-MS											<LoR where tested				
Haloaromatics in VOC Soils by Headspace GC-MS											<LoR where tested				
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS											<LoR where tested				
Ketones in VOC Soils by Headspace GC-MS											<LoR where tested				
Trihalomethanes in VOC Soils by Headspace GC-MS											<LoR where tested				
Other VOC in Soils by Headspace GC-MS											<LoR where tested				

Location		ENVR-HA05	ENVR-HA05	ENVR-SS05	BH110	BH110	BH110	BH111	BH111A	BH111A	ENVR-HA101	ENVR-HA101	ENVR-HA101	BH113/ ENVR-HA102	BH113/ ENVR-HA102
Sample		ENVR-HA05-0.5m 10-Nov-2020	ENVR-HA05-1.0m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH111-0.05-0.2m 10-Nov-2020	BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020	ENVR - HA101 - 1.6-1.8m 04-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020
Date	**Maximum**	10/11/2020	10/11/2020	10/11/2020	13/11/2020	13/11/2020	13/11/2020	10/11/2020	13/11/2020	13/11/2020	4/12/2020	4/12/2020	4/12/2020	9/11/2020	9/11/2020
Lab number		2470910.10/ 2471363.10	2470910.11/ 2471363.11	2470910.12	2474527.1/ 2474175.1	2474527.2/ 2474175.2	2474527.3/ 2474175.3	2472606.1/ 2473434.1	2474175.8/ 2474527.8	2474175.9/ 2474527.9	2467662.5	2467662.6	2467662.8	2470943.5	2470943.6
Soil suite		Soil suite 3	Soil suite 3	Soil suite 2	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 3	Soil suite 3
Asbestos type		ND	ND	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-
Asbestos form															
Asbestos as ACM (w/w%)															
Asbestos Fibres/Fine (w/w%)															
Heavy Metals with Mercury, Screen Level															
Total Recoverable Arsenic	8	< 2	< 2	< 2	< 2	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium	0.49	< 0.10	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.31	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	101	5	6	4	5	8	6	7	5	4	7	7	5	6	7
Total Recoverable Copper	78	5	4	42	2	5	4	4	5	5	10	9	6	11	6
Total Recoverable Lead	31	5.6	8.2	10	6.1	11.2	8.4	7	8.1	11.2	5.3	10.7	8.5	4.2	6.7
Total Recoverable Mercury	0.42	0.18	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	51	< 2	4	6	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2
Total Recoverable Zinc	57	5	11	42	6	5	< 4	11	5	< 4	12	5	5	8	5
Polycyclic Aromatic Hydrocarbons Screening in Soil															
Total of Reported PAHs in Soil	9.5	< 0.3	< 0.4	-	< 0.3	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	-	-	-	-
1-Methylnaphthalene	0	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
2-Methylnaphthalene	0	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Acenaphthylene	0.065	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Acenaphthene	0.02	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Anthracene	0.123	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[a]anthracene	0.74	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[a]pyrene (BAP)	0.94	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	-	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	-	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.03	< 0.04	-	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	-	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[e]pyrene	0.65	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[g,h,i]perylene	0.72	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Benzo[k]fluoranthene	0.38	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Chrysene	0.7	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Dibenzo[a,h]anthracene	0.132	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Fluoranthene	1.19	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Fluorene	0.016	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	0.68	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Naphthalene	0	< 0.07	< 0.07	-	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	-	-	-	-	-
Perylene	0.24	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Phenanthrene	0.38	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Pyrene	1.48	< 0.013	< 0.014	-	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014	< 0.014	-	-	-	-	-
Total Petroleum Hydrocarbons in Soil															
C7 - C9	0	< 8	< 8	-	< 8	< 9	< 8	< 9	< 8	< 8	-	-	-	-	-
C10 - C14	69	< 20	< 20	-	< 20	< 20	< 20	< 20	< 20	< 20	-	-	-	-	-
C15 - C36	2300	108	< 40	-	< 40	< 40	< 40	53	< 40	101	-	-	-	-	-
Total hydrocarbons (C7 - C36)	2300	110	< 70	-	< 70	< 70	< 70	< 70	< 70	102	-	-	-	-	-
Organochlorine Pesticides Screening in Soil															
Aldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested													
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested													
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested													
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested													
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested													
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested													
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested													
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested													
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested													
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested													
Other VOC in Soils by Headspace GC-MS		<LoR where tested													

Location		BH113/ ENVR-HA102	HA107a	HA107a	HA107a	HA108	HA108	HA108	HA109	HA109	HA109	HA110a	HA110a	HA110a	HA111	HA111
Sample		BH113 - 2.0m 09-Nov-2020	HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	HA108 - 0.1m 03-Dec-2020	HA108 - 0.5m 03-Dec-2020	HA108 - 1.0m 03-Dec-2020	HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020	HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020
Date	**Maximum**	9/11/2020	4/11/2020	4/11/2020	4/11/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	8/12/2020	8/12/2020	8/12/2020	7/12/2020	7/12/2020
Lab number		2470943.7	2470943.1	2470943.2	2470943.3	2488783.9	2488783.10	2488783.11	2488783.13	2488783.14	2488783.15	2491712.1/ 2492155.1	2491712.2/ 2492155.2	2491712.4/ 2492155.4	2490317.1/ 2489833.1	2490317.3/ 2489833.3
Soil suite		Soil suite 3	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3
Asbestos type		-	-	-	-	-	-	-	-	-	-	ND	ND	ND	ND	ND
Asbestos form																
Asbestos as ACM (w/w%)																
Asbestos Fibres/Fine (w/w%)																
Heavy Metals with Mercury, Screen Level																
Total Recoverable Arsenic	8	< 2	< 2	< 2	< 2	< 2	2	3	< 2	< 2	8	< 2	< 2	2	7	3
Total Recoverable Cadmium	0.49	< 0.10	0.15	< 0.10	< 0.10	0.16	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10
Total Recoverable Chromium	101	5	6	6	8	5	8	8	6	8	11	7	10	10	14	10
Total Recoverable Copper	78	8	19	5	11	10	6	8	9	6	12	4	8	10	16	10
Total Recoverable Lead	31	9.8	4.9	5.7	12.5	3.7	8.4	11.3	4.3	9.1	22	7.8	13.2	10.9	19.3	12.1
Total Recoverable Mercury	0.42	< 0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.18	0.13	0.21	0.15	0.42	0.13
Total Recoverable Nickel	51	< 2	< 2	< 2	< 2	< 2	2	2	< 2	2	6	2	4	4	5	3
Total Recoverable Zinc	57	5	10	< 4	9	7	5	6	8	6	10	6	12	8	18	14
Polycyclic Aromatic Hydrocarbons Screening in Soil																
Total of Reported PAHs in Soil	9.5	-	-	-	-	-	-	-	-	-	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	0	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
2-Methylnaphthalene	0	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Acenaphthylene	0.065	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Acenaphthene	0.02	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Anthracene	0.123	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Benzo[a]anthracene	0.74	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.02	< 0.014
Benzo[a]pyrene (BAP)	0.94	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.027	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	-	-	-	-	-	-	-	-	-	-	< 0.04	< 0.04	< 0.04	0.03	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	-	-	-	-	-	-	-	-	-	-	< 0.04	< 0.04	< 0.04	0.03	< 0.04
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.025	< 0.014
Benzo[e]pyrene	0.65	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.017	< 0.014
Benzo[g,h,i]perylene	0.72	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.019	< 0.014
Benzo[k]fluoranthene	0.38	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Chrysene	0.7	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.016	< 0.014
Dibenzo[a,h]anthracene	0.132	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Fluoranthene	1.19	-	-	-	-	-	-	-	-	-	-	0.014	< 0.013	< 0.015	0.035	< 0.014
Fluorene	0.016	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Indeno(1,2,3-c,d)pyrene	0.68	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	0.017	< 0.014
Naphthalene	0	-	-	-	-	-	-	-	-	-	-	< 0.07	< 0.07	< 0.08	< 0.08	< 0.07
Perylene	0.24	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Phenanthrene	0.38	-	-	-	-	-	-	-	-	-	-	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014
Pyrene	1.48	-	-	-	-	-	-	-	-	-	-	0.018	0.014	< 0.015	0.036	< 0.014
Total Petroleum Hydrocarbons in Soil																
C7 - C9	0	-	-	-	-	-	-	-	-	-	-	< 8	< 8	< 9	< 9	< 9
C10 - C14	69	-	-	-	-	-	-	-	-	-	-	< 20	< 20	< 20	< 20	< 20
C15 - C36	2300	-	-	-	-	-	-	-	-	-	-	< 40	< 40	< 40	47	< 40
Total hydrocarbons (C7 - C36)	2300	-	-	-	-	-	-	-	-	-	-	< 70	< 70	< 70	< 70	< 70
Organochlorine Pesticides Screening in Soil																
Aldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested														
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested														
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested														
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested														
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested														
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested														
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested														
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested														
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested														
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested														
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested														
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested														
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested														
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested														
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested														
Other VOC in Soils by Headspace GC-MS		<LoR where tested														

Location		HA111	HA112	HA112	HA112	HA112	HA112	HA113	HA113	HA113	BH116	BH116	BH116	BH117	BH117
Sample		HA111-2.0m 07-Dec-2020	HA112 0.1m 02-Dec-2020	HA112-0.5m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112-1.0m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am	HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm	BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020
Date	**Maximum**	7/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/11/2020	2/11/2020	2/11/2020	9/11/2020	9/11/2020
Lab number		2490317.4/ 2489833.4	2486806.15	2487331.28	2486806.18	2487331.29	2486806.19	2486806.2/ 2487331.3	2486806.21/ 2487331.31	2486806.22/ 2487331.32	2467662.1/ 2471441.8	2467662.2/ 2471441.9	2467662.4/ 2471441.10	2470943.8/ 2471441.14	2470943.9/ 2471441.15
Soil suite		Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3
Asbestos type		ND	-	ND	-	ND	-	ND	ND	ND	ND	ND	ND	ND	ND
Asbestos form															
Asbestos as ACM (w/w%)															
Asbestos Fibres/Fine (w/w%)															
Heavy Metals with Mercury, Screen Level															
Total Recoverable Arsenic	8	4	5	-	< 2	-	< 2	< 2	< 2	< 2	3	4	< 2	< 2	< 2
Total Recoverable Cadmium	0.49	< 0.10	< 0.10	-	< 0.10	-	< 0.10	0.29	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.26	< 0.10
Total Recoverable Chromium	101	12	5	-	6	-	6	8	5	7	10	12	6	5	4
Total Recoverable Copper	78	13	3	-	4	-	3	5	< 2	4	14	22	7	5	< 2
Total Recoverable Lead	31	13.1	7.1	-	6.7	-	5.8	11	4.4	7.7	11.9	11.3	7.7	10.8	5.3
Total Recoverable Mercury	0.42	0.14	< 0.10	-	0.13	-	0.11	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	51	4	< 2	-	< 2	-	< 2	< 2	< 2	< 2	8	10	< 2	2	< 2
Total Recoverable Zinc	57	18	7	-	5	-	5	13	< 4	4	20	30	6	11	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil															
Total of Reported PAHs in Soil	9.5	< 0.4	-	-	-	-	-	< 0.4	< 0.3	< 0.4	0.6	< 0.3	< 0.4	0.8	< 0.3
1-Methylnaphthalene	0	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
2-Methylnaphthalene	0	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
Acenaphthylene	0.065	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
Acenaphthene	0.02	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
Anthracene	0.123	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	0.019	< 0.013	< 0.014	< 0.014	< 0.013
Benzo[a]anthracene	0.74	< 0.015	-	-	-	-	-	0.016	< 0.013	< 0.015	0.038	< 0.013	< 0.014	0.048	< 0.013
Benzo[a]pyrene (BAP)	0.94	< 0.015	-	-	-	-	-	0.018	< 0.013	< 0.015	0.04	< 0.013	< 0.014	0.07	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	-	-	-	-	-	< 0.04	< 0.03	< 0.04	0.05	< 0.03	< 0.04	0.1	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	-	-	-	-	-	< 0.04	< 0.03	< 0.04	0.05	< 0.03	< 0.04	0.1	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.015	-	-	-	-	-	0.02	< 0.013	< 0.015	0.044	< 0.013	< 0.014	0.079	< 0.013
Benzo[e]pyrene	0.65	< 0.015	-	-	-	-	-	0.014	< 0.013	< 0.015	0.03	< 0.013	< 0.014	0.047	< 0.013
Benzo[g,h,i]perylene	0.72	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	0.027	< 0.013	< 0.014	0.05	< 0.013
Benzo[k]fluoranthene	0.38	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	0.018	< 0.013	< 0.014	0.033	< 0.013
Chrysene	0.7	< 0.015	-	-	-	-	-	0.014	< 0.013	< 0.015	0.034	< 0.013	< 0.014	0.061	< 0.013
Dibenzo[a,h]anthracene	0.132	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
Fluoranthene	1.19	< 0.015	-	-	-	-	-	0.041	< 0.013	< 0.015	0.088	< 0.013	< 0.014	0.118	< 0.013
Fluorene	0.016	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013
Indeno(1,2,3-c,d)pyrene	0.68	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	0.026	< 0.013	< 0.014	0.05	< 0.013
Naphthalene	0	< 0.08	-	-	-	-	-	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	0.24	< 0.015	-	-	-	-	-	< 0.014	< 0.013	< 0.015	0.017	< 0.013	< 0.014	0.015	< 0.013
Phenanthrene	0.38	< 0.015	-	-	-	-	-	0.023	< 0.013	< 0.015	0.078	< 0.013	< 0.014	0.037	< 0.013
Pyrene	1.48	< 0.015	-	-	-	-	-	0.036	< 0.013	< 0.015	0.081	< 0.013	< 0.014	0.135	< 0.013
Total Petroleum Hydrocarbons in Soil															
C7 - C9	0	< 9	-	-	-	-	-	< 8	< 8	< 9	< 8	< 8	< 8	< 9	< 8
C10 - C14	69	< 20	-	-	-	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
C15 - C36	2300	< 40	-	-	-	-	-	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	2300	< 70	-	-	-	-	-	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Organochlorine Pesticides Screening in Soil											-	-			
Aldrin	<LoR	-	-	-	-	-	-	-	-	-					
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR	-	-	-	-	-	-	-	-	-					
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR	-	-	-	-	-	-	-	-	-					
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested													
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested													
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested													
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested													
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested													
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested													
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested													
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested													
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested													
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested													
Other VOC in Soils by Headspace GC-MS		<LoR where tested													

Location		BH117	HA114	HA114	HA114	HA115	HA115	HA115	HA116	HA116	HA116	HA117	HA117	HA117	HA117
Sample		BH117 - 2.0m 09-Nov-2020	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am	HA114 - 1.0m 03-Dec-2020 8:32 am	HA115 - 0.1m 03-Dec-2020	HA115 - 0.5m 03-Dec-2020	HA115 - 1.0m 03-Dec-2020	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm	HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117-1.0m 02-Dec-2020	HA117 2.0m 02-Dec-2020
Date	**Maximum**	9/11/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020
Lab number		2470943.10/ 2471441.16	2488783.20	2488783.21	2488783.22	2488783.27	2488783.28	2488783.29	2486806.24/ 2487331.33	2486806.25/ 2487331.34	2486806.26/ 2487331.35	2486806.28/ 2487331.36	2486806.29/ 2487331.37	2487331.38	2486806.31
Soil suite		Soil suite 3	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 3	Soil suite 3	Soil suite 3	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	Asbestos	Heavy metals, VOCS, SVOCS, ONOPS
Asbestos type		ND	-	-	-	-	-	-	ND	ND	ND	ND	ND	ND	-
Asbestos form															
Asbestos as ACM (w/w%)															
Asbestos Fibres/Fine (w/w%)															
Heavy Metals with Mercury, Screen Level															
Total Recoverable Arsenic	8	< 2	4	< 2	< 2	3	< 2	2	2	< 2	< 2	< 2	< 2	-	< 2
Total Recoverable Cadmium	0.49	< 0.10	0.15	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.28	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10
Total Recoverable Chromium	101	2	11	8	10	15	7	10	8	4	4	7	7	-	6
Total Recoverable Copper	78	2	78	4	7	34	4	6	9	2	5	7	4	-	5
Total Recoverable Lead	31	3.9	14.9	4.8	9.6	22	5.8	9.8	16.3	4.4	8.4	8.8	9.4	-	12.5
Total Recoverable Mercury	0.42	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10
Total Recoverable Nickel	51	2	22	< 2	2	11	< 2	2	5	< 2	< 2	4	3	-	< 2
Total Recoverable Zinc	57	24	53	4	7	57	7	8	19	< 4	< 4	11	7	-	5
Polycyclic Aromatic Hydrocarbons Screening in Soil															
Total of Reported PAHs in Soil	9.5	< 0.4	-	-	-	-	-	-	1.6	< 0.4	< 0.4	-	-	-	-
1-Methylnaphthalene	0	< 0.016	-	-	-	-	-	-	< 0.014	< 0.013	< 0.014	-	-	-	-
2-Methylnaphthalene	0	< 0.016	-	-	-	-	-	-	< 0.014	< 0.013	< 0.014	-	-	-	-
Acenaphthylene	0.065	< 0.016	-	-	-	-	-	-	< 0.014	< 0.013	< 0.014	-	-	-	-
Acenaphthene	0.02	< 0.016	-	-	-	-	-	-	< 0.014	< 0.013	< 0.014	-	-	-	-
Anthracene	0.123	< 0.016	-	-	-	-	-	-	0.018	< 0.013	< 0.014	-	-	-	-
Benzo[a]anthracene	0.74	< 0.016	-	-	-	-	-	-	0.114	< 0.013	< 0.014	-	-	-	-
Benzo[a]pyrene (BAP)	0.94	< 0.016	-	-	-	-	-	-	0.152	< 0.013	< 0.014	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	-	-	-	-	-	-	0.23	< 0.04	< 0.04	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	-	-	-	-	-	-	0.22	< 0.04	< 0.04	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.016	-	-	-	-	-	-	0.171	< 0.013	< 0.014	-	-	-	-
Benzo[e]pyrene	0.65	< 0.016	-	-	-	-	-	-	0.11	< 0.013	< 0.014	-	-	-	-
Benzo[g,h,i]perylene	0.72	< 0.016	-	-	-	-	-	-	0.129	< 0.013	< 0.014	-	-	-	-
Benzo[k]fluoranthene	0.38	< 0.016	-	-	-	-	-	-	0.068	< 0.013	< 0.014	-	-	-	-
Chrysene	0.7	< 0.016	-	-	-	-	-	-	0.123	< 0.013	< 0.014	-	-	-	-
Dibenzo[a,h]anthracene	0.132	< 0.016	-	-	-	-	-	-	0.022	< 0.013	< 0.014	-	-	-	-
Fluoranthene	1.19	< 0.016	-	-	-	-	-	-	0.25	< 0.013	< 0.014	-	-	-	-
Fluorene	0.016	< 0.016	-	-	-	-	-	-	< 0.014	< 0.013	< 0.014	-	-	-	-
Indeno(1,2,3-c,d)pyrene	0.68	< 0.016	-	-	-	-	-	-	0.122	< 0.013	< 0.014	-	-	-	-
Naphthalene	0	< 0.08	-	-	-	-	-	-	< 0.07	< 0.07	< 0.07	-	-	-	-
Perylene	0.24	0.154	-	-	-	-	-	-	0.034	< 0.013	< 0.014	-	-	-	-
Phenanthrene	0.38	< 0.016	-	-	-	-	-	-	0.076	< 0.013	< 0.014	-	-	-	-
Pyrene	1.48	< 0.016	-	-	-	-	-	-	0.25	< 0.013	< 0.014	-	-	-	-
Total Petroleum Hydrocarbons in Soil															
C7 - C9	0	< 10	-	-	-	-	-	-	< 9	< 8	< 9	-	-	-	-
C10 - C14	69	< 20	-	-	-	-	-	-	< 20	< 20	< 20	-	-	-	-
C15 - C36	2300	< 40	-	-	-	-	-	-	41	< 40	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	2300	< 70	-	-	-	-	-	-	< 70	< 70	< 70	-	-	-	-
Organochlorine Pesticides Screening in Soil															
Aldrin	<LoR		-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	<LoR		-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	<LoR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	<LoR		-	-	-	-	-	-	-	-	-	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS		<LoR where tested													
Nitrogen containing compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organochlorine Pesticides in SVOC Soil Samples by GC-MS		<LoR where tested													
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS		<LoR where tested													
Phenols in SVOC Soil Samples by GC-MS		<LoR where tested													
Plasticisers in SVOC Soil Samples by GC-MS		<LoR where tested													
Other Halogenated compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Other compounds in SVOC Soil Samples by GC-MS		<LoR where tested													
Organonitro&phosphorus Pesticides Screen in Soil by GCMS		<LoR where tested													
BTEX in VOC Soils by Headspace GC-MS		<LoR where tested													
Halogenated Aliphatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Haloaromatics in VOC Soils by Headspace GC-MS		<LoR where tested													
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS		<LoR where tested													
Ketones in VOC Soils by Headspace GC-MS		<LoR where tested													
Trihalomethanes in VOC Soils by Headspace GC-MS		<LoR where tested													
Other VOC in Soils by Headspace GC-MS		<LoR where tested													

Location	Maximum	HA119	HA119	HA119
Sample		HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm
Date		3/12/2020	3/12/2020	3/12/2020
Lab number		2488783.31	2488783.32	2488783.33
Soil suite		Soil suite 2	Soil suite 2	Soil suite 2
Asbestos type		-	-	-
Asbestos form				
Asbestos as ACM (w/w%)				
Asbestos Fibres/Fine (w/w%)				
Heavy Metals with Mercury, Screen Level				
Total Recoverable Arsenic	8	< 2	< 2	< 2
Total Recoverable Cadmium	0.49	0.23	< 0.10	< 0.10
Total Recoverable Chromium	101	6	9	6
Total Recoverable Copper	78	9	6	4
Total Recoverable Lead	31	4.2	8.7	7.1
Total Recoverable Mercury	0.42	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	51	< 2	< 2	< 2
Total Recoverable Zinc	57	8	5	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil				
Total of Reported PAHs in Soil	9.5	-	-	-
1-Methylnaphthalene	0	-	-	-
2-Methylnaphthalene	0	-	-	-
Acenaphthylene	0.065	-	-	-
Acenaphthene	0.02	-	-	-
Anthracene	0.123	-	-	-
Benzo[a]anthracene	0.74	-	-	-
Benzo[a]pyrene (BAP)	0.94	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	-	-	-
Benzo[e]pyrene	0.65	-	-	-
Benzo[g,h,i]perylene	0.72	-	-	-
Benzo[k]fluoranthene	0.38	-	-	-
Chrysene	0.7	-	-	-
Dibenzo[a,h]anthracene	0.132	-	-	-
Fluoranthene	1.19	-	-	-
Fluorene	0.016	-	-	-
Indeno(1,2,3-c,d)pyrene	0.68	-	-	-
Naphthalene	0	-	-	-
Perylene	0.24	-	-	-
Phenanthrene	0.38	-	-	-
Pyrene	1.48	-	-	-
Total Petroleum Hydrocarbons in Soil				
C7 - C9	0	-	-	-
C10 - C14	69	-	-	-
C15 - C36	2300	-	-	-
Total hydrocarbons (C7 - C36)	2300	-	-	-
Organochlorine Pesticides Screening in Soil				
Aldrin	<LoR	-	-	-
alpha-BHC	<LoR	-	-	-
beta-BHC	<LoR	-	-	-
delta-BHC	<LoR	-	-	-
gamma-BHC (Lindane)	<LoR	-	-	-
cis-Chlordane	<LoR	-	-	-
trans-Chlordane	<LoR	-	-	-
2,4'-DDD	<LoR	-	-	-
4,4'-DDD	<LoR	-	-	-
2,4'-DDE	<LoR	-	-	-
4,4'-DDE	<LoR	-	-	-
2,4'-DDT	<LoR	-	-	-
4,4'-DDT	<LoR	-	-	-
Total DDT Isomers	<LoR	-	-	-
Dieldrin	<LoR	-	-	-
Endosulfan I	<LoR	-	-	-
Endosulfan II	<LoR	-	-	-
Endosulfan sulphate	<LoR	-	-	-
Endrin	<LoR	-	-	-
Endrin aldehyde	<LoR	-	-	-
Endrin ketone	<LoR	-	-	-
Heptachlor	<LoR	-	-	-
Heptachlor epoxide	<LoR	-	-	-
Hexachlorobenzene	<LoR	-	-	-
Methoxychlor	<LoR	-	-	-
Haloethers in SVOC Soil Samples by GC-MS				
Nitrogen containing compounds in SVOC Soil Samples by GC-MS				
Organochlorine Pesticides in SVOC Soil Samples by GC-MS				
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS				
Phenols in SVOC Soil Samples by GC-MS				
Plasticisers in SVOC Soil Samples by GC-MS				
Other Halogenated compounds in SVOC Soil Samples by GC-MS				
Other compounds in SVOC Soil Samples by GC-MS				
Organonitro&phosphorus Pesticides Screen in Soil by GCMS				
BTEX in VOC Soils by Headspace GC-MS				
Halogenated Aliphatics in VOC Soils by Headspace GC-MS				
Haloaromatics in VOC Soils by Headspace GC-MS				
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS				
Ketones in VOC Soils by Headspace GC-MS				
Trihalomethanes in VOC Soils by Headspace GC-MS				
Other VOC in Soils by Headspace GC-MS				

Table E2: Summary of groundwater sampling

Location	Maximum	BH05A	BH05B	BH06	BH08	BH110	BH111	BH113	BH116	BH117
Sample		BH05A	BH05B	BH06	BH08	BH110	BH111	BH113	BH116	BH117
Date		2/12/2020	27/11/2020	27/11/2020	27/11/2020	2/12/2020	27/11/2020	27/11/2020	27/11/2020	2/12/2020
Lab number		2486837.7/ 2486837.8	2482688.4	2482688.5	2482688.6	2486837.3	2482688.7	2482688.8	2482688.9	2486837.5
Groundwater suite		Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 2	Suite 3	Suite 3
pH	8.1	7.5	6.4	4	6.8	8.1	5.5	6.3	6.2	6.8
Dissolved Mercury	0	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn										
Dissolved Arsenic	0.0016	0.0016	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0016
Dissolved Cadmium	0.00023	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00023	< 0.00005
Dissolved Chromium	0.0007	< 0.0005	< 0.0005	0.0007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dissolved Copper	0.003	< 0.0005	0.0007	0.003	0.0006	0.0012	< 0.0005	0.0008	0.0025	< 0.0005
Dissolved Lead	0.00052	< 0.00010	0.00011	0.00052	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Nickel	0.072	0.0015	0.0014	0.072	0.0009	0.0012	0.0022	0.0025	0.0099	0.0048
Dissolved Zinc	0.042	0.0026	0.022	0.042	0.0081	< 0.0010	0.0136	0.0071	0.036	0.022
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq										
Acenaphthene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Acenaphthylene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Anthracene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Benzo[a]anthracene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Benzo[a]pyrene (BAP)	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Benzo[g,h,i]perylene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Benzo[k]fluoranthene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Chrysene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Dibenzo[a,h]anthracene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Fluoranthene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Fluorene	0	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	< 0.0002	< 0.0002
Indeno(1,2,3-c,d)pyrene	0	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Naphthalene	0	< 0.0005	< 0.0006	< 0.0006	< 0.0006	< 0.0005	< 0.0006	-	< 0.0006	< 0.0005
Phenanthrene	0	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	-	< 0.0004	< 0.0004
Pyrene	0	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	< 0.0002	< 0.0002
Haloethers in SVOC Water Samples by GC-MS										
Bis(2-chloroethoxy) methane	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Bis(2-chloroethyl)ether	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Bis(2-chloroisopropyl)ether	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
4-Bromophenyl phenyl ether	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
4-Chlorophenyl phenyl ether	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Nitrogen containing compounds in SVOC Water Samples by GC-MS										
2,4-Dinitrotoluene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
2,6-Dinitrotoluene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Nitrobenzene	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
N-Nitrosodi-n-propylamine	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
N-Nitrosodiphenylamine + Diphenylamine	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Organochlorine Pesticides in SVOC Water Samples by GC-MS										
Aldrin	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
alpha-BHC	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
beta-BHC	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
delta-BHC	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
gamma-BHC (Lindane)	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
4,4'-DDD	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
4,4'-DDE	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
4,4'-DDT	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Dieldrin	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Endosulfan I	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Endosulfan II	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Endosulfan sulfate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Endrin	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Endrin ketone	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Heptachlor	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Heptachlor epoxide	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Hexachlorobenzene	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS										
Acenaphthene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Acenaphthylene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Anthracene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[a]anthracene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[a]pyrene (BAP)	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[g,h,i]perylene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[k]fluoranthene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
1&2-Chloronaphthalene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Chrysene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Dibenzo[a,h]anthracene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Fluoranthene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Fluorene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Indeno(1,2,3-c,d)pyrene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
2-Methylnaphthalene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Naphthalene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Phenanthrene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Pyrene	0	-	< 0.003	< 0.003	< 0.003	-	< 0.003	< 0.003	< 0.003	-
Benzo[a]pyrene Toxic Equivalence (TEF)	0	-	< 0.008	< 0.008	< 0.008	-	< 0.008	< 0.008	< 0.008	-
Phenols in SVOC Water Samples by GC-MS										
4-Chloro-3-methylphenol	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
2-Chlorophenol	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
2,4-Dichlorophenol	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
2,4-Dimethylphenol	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
3 & 4-Methylphenol (m- + p-cresol)	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
2-Methylphenol (o-Cresol)	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
2-Nitrophenol	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Pentachlorophenol (PCP)	0	-	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	< 0.10	-
Phenol	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
2,4,5-Trichlorophenol	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
2,4,6-Trichlorophenol	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Plasticisers in SVOC Water Samples by GC-MS										
Bis(2-ethylhexyl)phthalate	0	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Butylbenzylphthalate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Di(2-ethylhexyl)adipate	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Diethylphthalate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Dimethylphthalate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Di-n-butylphthalate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Di-n-octylphthalate	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Other Halogenated compounds in SVOC Water Samples by GC-MS										
1,2-Dichlorobenzene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
1,3-Dichlorobenzene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
1,4-Dichlorobenzene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Hexachlorobutadiene	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
Hexachloroethane	0	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-
1,2,4-Trichlorobenzene	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Other compounds in SVOC Water Samples by GC-MS										
Benzyl alcohol	0	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	-
Carbazole	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Dibenzofuran	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Isophorone	0	-	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	-
Total Petroleum Hydrocarbons in Water										
C7 - C9	0.14	< 0.10	0.14	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10
C10 - C14	0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2
C15 - C36	0	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	0	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	-	< 0.7	< 0.7

Table E3: Summary of acid sulphate soil results

Sample	BH05a-0.35m	BH05a-6.5m	BH06-0.85-1.0m	BH06-2.7-2.9m	BH07-0.9-1.0m	BH07-4.5m	BH08-0.25m	BH08-7m	BH110-0.8-0.9m
Lab number	2473291.13	2473291.46	2473291.15	2473291.16	2473291.17	2473291.47	2473291.19	2473291.48	2473291.11
pH	4.8	5.3	4.6	3.8	4.3	5	4.9	6.6	4.6
Acid Soluble Sulphate and Sulphate Content									
Acid Soluble Sulphate	0.036	0.044	0.026	0.3	0.024	0.017	0.026	0.026	0.017
Sulphate Content	0.036	0.035	0.026	0.3	0.024	0.017	0.026	0.026	0.017

Sample	BH110 - 3m	BH111 - 2m	BH111-3.7-3.9m	BH113-2.2-2.3m	BH113 - 5.8m	BH116-0.75-0.85m	BH116-5.0-5.1m	BH117-3.45-3.55m	BH117-5.9-6.0m
Lab number	2473291.5	2473291.51	2473291.1	2473291.4	2473291.52	2473291.6	2473291.7	2473291.9	2473291.1
pH	3.8	4.6	4.6	5.1	5.2	6.5	5.9	6.9	6.8
Acid Soluble Sulphate and Sulphate Content									
Acid Soluble Sulphate	0.43	0.035	0.197	0.034	0.152	0.016	0.024	0.027	0.025
Sulphate Content	0.43	0.035	0.197	0.034	0.151	0.013	0.024	0.027	0.024

Sample	HA108-1.0m	HA109-4.0m	HA111-2.4m	HA114-3.0m	HA115-2.0m	HA119-5.0m
Lab number	2473291.39	2489334.6	2473291.42	2489334.12	2473291.4	2489334.21
pH	4.7	5.3	6.4	4.8	4.7	5.4
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	0.033	0.043	0.026	0.033	0.172	0.043
Sulphate Content	0.033	0.043	0.024	0.033	0.171	0.043

Appendix F: Laboratory transcripts

Note: .csv files have also been provided.

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2478987 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	24-Nov-2020
		Date Reported:	27-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020
Lab Number:		2478987.2	2478987.3	2478987.4	2478987.9	2478987.10
Individual Tests						
Dry Matter	g/100g as rcvd	73	70	63	78	77
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	2	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.33	< 0.10
Total Recoverable Chromium	mg/kg dry wt	8	7	7	5	3
Total Recoverable Copper	mg/kg dry wt	22	5	6	9	4
Total Recoverable Lead	mg/kg dry wt	6.1	9.5	9.0	7.7	11.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	16	< 2	< 2	3	< 2
Total Recoverable Zinc	mg/kg dry wt	23	6	4	6	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Acenaphthene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Chrysene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Fluorene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Phenanthrene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013
Pyrene	mg/kg dry wt	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020
Lab Number:		2478987.2	2478987.3	2478987.4	2478987.9	2478987.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 9	< 10	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70

Sample Name:		BH06 - 1.0-1.2m 19-Nov-2020	BH07 - 0.1-0.4m 20-Nov-2020	BH07 - 0.5-0.65m 20-Nov-2020	BH07 - 1.0-1.35m 20-Nov-2020	
Lab Number:		2478987.11	2478987.17	2478987.18	2478987.19	
Individual Tests						
Dry Matter	g/100g as rcvd	78	87	83	73	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.21	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	4	3	3	8	-
Total Recoverable Copper	mg/kg dry wt	7	3	3	3	-
Total Recoverable Lead	mg/kg dry wt	11.6	4.1	6.4	7.1	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Total Recoverable Nickel	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Total Recoverable Zinc	mg/kg dry wt	< 4	< 4	< 4	< 4	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.4	-
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Acenaphthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.04	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Chrysene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Fluoranthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Fluorene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.07	-
Perylene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Phenanthrene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Pyrene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.014	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 9	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	-

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2-4, 9-11, 17-19
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2-4, 9-11, 17-19
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). US EPA 3550.	0.10 g/100g as rcvd	2-4, 9-11, 17-19
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	2-4, 9-11, 17-19
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	2-4, 9-11, 17-19
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	2-4, 9-11, 17-19
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2-4, 9-11, 17-19
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	2-4, 9-11, 17-19
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	2-4, 9-11, 17-19
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	2-4, 9-11, 17-19
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	2-4, 9-11, 17-19

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

Testing was completed between 26-Nov-2020 and 27-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2479563 A2Pv1
Contact:	Rebecca van der Krogt	**Date Received:**	24-Nov-2020
	C/- Tonkin & Taylor	**Date Reported:**	27-Nov-2020
	PO Box 5271	**Quote No:**	108286
	Auckland 1141	**Order No:**	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		BH05a-0.1m	BH05a-1.0m	BH05a-2.0m	BH06-0.1-0.3m	BH06-0.35-0.6m
Lab Number:		2479563.1	2479563.2	2479563.3	2479563.7	2479563.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 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	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	590.4	621.6	629.5	691.4	789.7
Dry Weight	g	458.0	436.4	396.7	554.9	602.3
Moisture	%	22	30	37	20	24
Sample Fraction >10mm	g dry wt	89.0	< 0.1	< 0.1	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	188.5	123.8	212.7	54.8	21.2
Sample Fraction <2mm	g dry wt	180.5	312.1	182.9	499.1	581.0
<2mm Subsample Weight	g dry wt	59.2	52.3	57.0	55.3	51.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		BH06-1.0-1.2m	BH07-0.1-.04m	BH07-0.5-0.65m	BH07-1.35m	
Lab Number:		2479563.9	2479563.15	2479563.16	2479563.17	
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 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	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
As Received Weight	g	961.9	829.9	976.2	717.0	-
Dry Weight	g	720.0	669.1	814.7	527.0	-
Moisture	%	25	19	17	27	-
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	< 0.1	-

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

Sample Type: Soil						
Sample Name:		BH06-1.0-1.2m	BH07-0.1-.04m	BH07-0.5-0.65m	BH07-1.35m	
Lab Number:		2479563.9	2479563.15	2479563.16	2479563.17	
Sample Fraction <10mm to >2mm	g dry wt	27.8	35.7	176.3	62.0	-
Sample Fraction <2mm	g dry wt	691.6	632.1	636.1	464.3	-
<2mm Subsample Weight	g dry wt	52.6	55.0	50.5	55.3	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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 simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3, 7-9, 15-17
New Zealand 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	1-3, 7-9, 15-17
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3, 7-9, 15-17
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3, 7-9, 15-17
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 7-9, 15-17
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 7-9, 15-17
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 7-9, 15-17
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.	0.01%	1-3, 7-9, 15-17
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3, 7-9, 15-17

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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 7-9, 15-17
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 7-9, 15-17
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 7-9, 15-17
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 7-9, 15-17
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 7-9, 15-17
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 7-9, 15-17
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 7-9, 15-17

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

Testing was completed on 27-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2480946	SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:** **Date Reported:** **Quote No:** **Order No:** **Client Reference:** **Submitted By:**	26-Nov-2020 08-Dec-2020 80842 1014985 1014985 Rebecca van der Krogt	

Sample Type: Soil

		Sample Name:	BH08-0.1m	BH08-0.5m	BH08-1.0m		
		Lab Number:	2480946.1	2480946.2	2480946.3		
Individual Tests							
Dry Matter	g/100g as rcvd		73	75	78	-	-
Heavy Metals with Mercury, Screen Level							
Total Recoverable Arsenic	mg/kg dry wt		7	< 2	< 2	-	-
Total Recoverable Cadmium	mg/kg dry wt		< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt		101	5	3	-	-
Total Recoverable Copper	mg/kg dry wt		66	6	3	-	-
Total Recoverable Lead	mg/kg dry wt		11.3	11.8	6.3	-	-
Total Recoverable Mercury	mg/kg dry wt		0.10	0.11	< 0.10	-	-
Total Recoverable Nickel	mg/kg dry wt		51	< 2	< 2	-	-
Total Recoverable Zinc	mg/kg dry wt		18	4	< 4	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*							
Total of Reported PAHs in Soil	mg/kg dry wt		< 0.4	< 0.4	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
2-Methylnaphthalene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Acenaphthylene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Acenaphthene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Anthracene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[a]anthracene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt		< 0.04	< 0.04	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt		< 0.04	< 0.04	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[e]pyrene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[g,h,i]perylene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Benzo[k]fluoranthene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Chrysene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Fluoranthene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Fluorene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Naphthalene	mg/kg dry wt		< 0.07	< 0.07	< 0.07	-	-
Perylene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Phenanthrene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-
Pyrene	mg/kg dry wt		< 0.014	< 0.014	< 0.013	-	-

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

Sample Type: Soil						
Sample Name:		BH08-0.1m	BH08-0.5m	BH08-1.0m		
Lab Number:		2480946.1	2480946.2	2480946.3		
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 8	< 8	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3
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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-3
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-3
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-3
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-3
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3

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

Testing was completed on 08-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2481161	A2Pv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	26-Nov-2020	
		Date Reported:	07-Dec-2020	
		Quote No:	80842	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH08-0.1m 23-Nov-2020	BH08-0.5m 23-Nov-2020	BH08-1.0m 23-Nov-2020		
Lab Number:		2481161.1	2481161.2	2481161.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
As Received Weight	g	519.5	580.8	700.6	-	-
Dry Weight	g	381.5	432.4	547.8	-	-
Moisture	%	27	26	22	-	-
Sample Fraction >10mm	g dry wt	49.7	< 0.1	< 0.1	-	-
Sample Fraction <10mm to >2mm	g dry wt	154.4	166.3	135.4	-	-
Sample Fraction <2mm	g dry wt	175.7	263.8	410.0	-	-
<2mm Subsample Weight	g dry wt	54.0	58.0	55.7	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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.

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

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3
New Zealand 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	1-3
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
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.	0.01%	1-3
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3

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

Testing was completed on 07-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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W www.hill-laboratories.com

Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2474527	A2Pv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	17-Nov-2020	
		Date Reported:	26-Nov-2020	
		Quote No:	80842	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020		
Lab Number:		2474527.1	2474527.2	2474527.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
As Received Weight	g	910.3	863.7	885.2	-	-
Dry Weight	g	688.8	640.6	650.3	-	-
Moisture	%	24	26	27	-	-
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	171.6	-	-
Sample Fraction <10mm to >2mm	g dry wt	166.9	10.4	249.9	-	-
Sample Fraction <2mm	g dry wt	519.8	628.7	227.1	-	-
<2mm Subsample Weight	g dry wt	59.6	58.9	58.4	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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.

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Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3
New Zealand 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	1-3
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
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.	0.01%	1-3
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3

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

Testing was completed on 26-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2474175 SPv2
Contact:	Rebecca van der Krogt	**Date Received:**	17-Nov-2020
	C/- Tonkin & Taylor	**Date Reported:**	27-Nov-2020 **(Amended)**
	PO Box 5271	**Quote No:**	80842
	Auckland 1141	**Order No:**	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

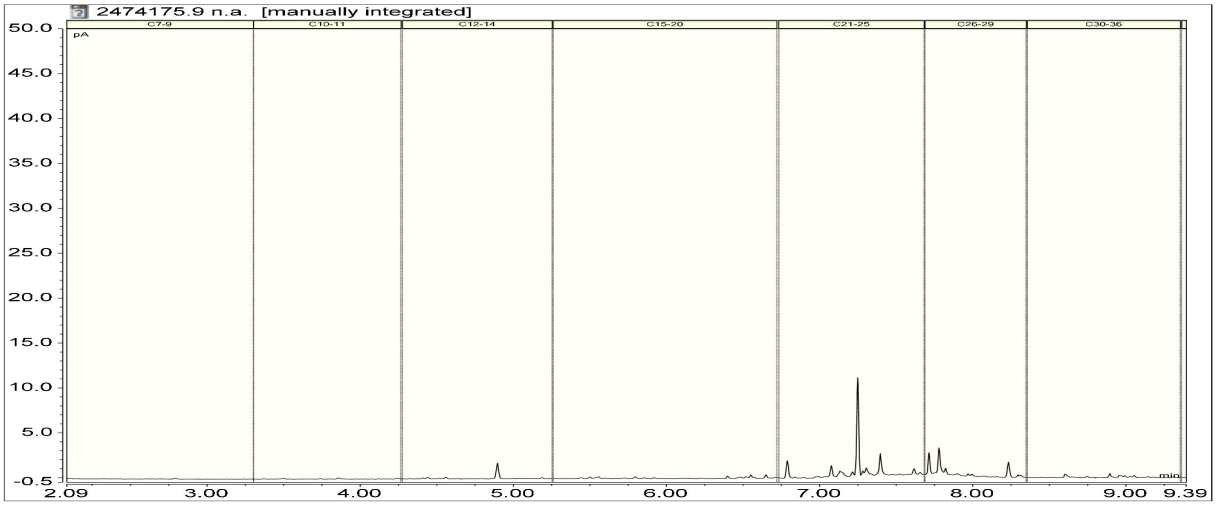
Sample Type: Soil

Sample Name:		BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020
Lab Number:		2474175.1	2474175.2	2474175.3	2474175.8	2474175.9
Individual Tests						
Dry Matter	g/100g as rcvd	77	74	75	75	75
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	5	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.15	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	5	8	6	5	4
Total Recoverable Copper	mg/kg dry wt	2	5	4	5	5
Total Recoverable Lead	mg/kg dry wt	6.1	11.2	8.4	8.1	11.2
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	< 2	3	< 2	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	6	5	< 4	5	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Acenaphthene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Chrysene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Fluorene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Phenanthrene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014
Pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	< 0.014	< 0.014

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Sample Type: Soil						
Sample Name:		BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020
Lab Number:		2474175.1	2474175.2	2474175.3	2474175.8	2474175.9
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 9	< 8	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	101
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	102

2474175.9
BH111A-1.0-1.3m 13-Nov-2020
Client Chromatogram for TPH by FID



Analyst's Comments

Amended Report: This certificate of analysis replaces report '2474175-SPv1' issued on 19-Nov-2020 at 4:20 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 8-9
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3, 8-9
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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 8-9
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-3, 8-9
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-3, 8-9
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-3, 8-9

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 8-9
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	9
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-3, 8-9
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3, 8-9
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3, 8-9
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3, 8-9

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

Testing was completed between 18-Nov-2020 and 27-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2474527	A2Pv2
Contact:	Rebecca van der Krogt	**Date Received:**	17-Nov-2020	
	C/- Tonkin & Taylor	**Date Reported:**	10-Dec-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH11A-0.4-0.7m 13-Nov-2020	BH11A-1.0-1.3m 13-Nov-2020
Lab Number:		2474527.1	2474527.2	2474527.3	2474527.8	2474527.9
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 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	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	910.3	863.7	885.2	747.1	982.0
Dry Weight	g	688.8	640.6	650.3	549.4	712.0
Moisture	%	24	26	27	26	27
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	171.6	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	166.9	10.4	249.9	177.8	218.6
Sample Fraction <2mm	g dry wt	519.8	628.7	227.1	369.5	491.6
<2mm Subsample Weight	g dry wt	59.6	58.9	58.4	52.0	54.8
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
- Trace - Trace levels of asbestos, as defined by AS4964-2004.

For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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.

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

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2474527-A2Pv1' issued on 26-Nov-2020 at 3:35 pm. Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3, 8-9
New Zealand 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	1-3, 8-9
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3, 8-9
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3, 8-9
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 8-9
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 8-9
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 8-9
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.	0.01%	1-3, 8-9
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3, 8-9
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 8-9
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 8-9
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 8-9
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 8-9
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 8-9
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 8-9
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 8-9

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

Testing was completed between 26-Nov-2020 and 10-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2472606 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:** **Date Reported:** **Quote No:** **Order No:** **Client Reference:** **Submitted By:**	13-Nov-2020 18-Nov-2020 80842 1014985 1014985 Rebecca van der Krogt

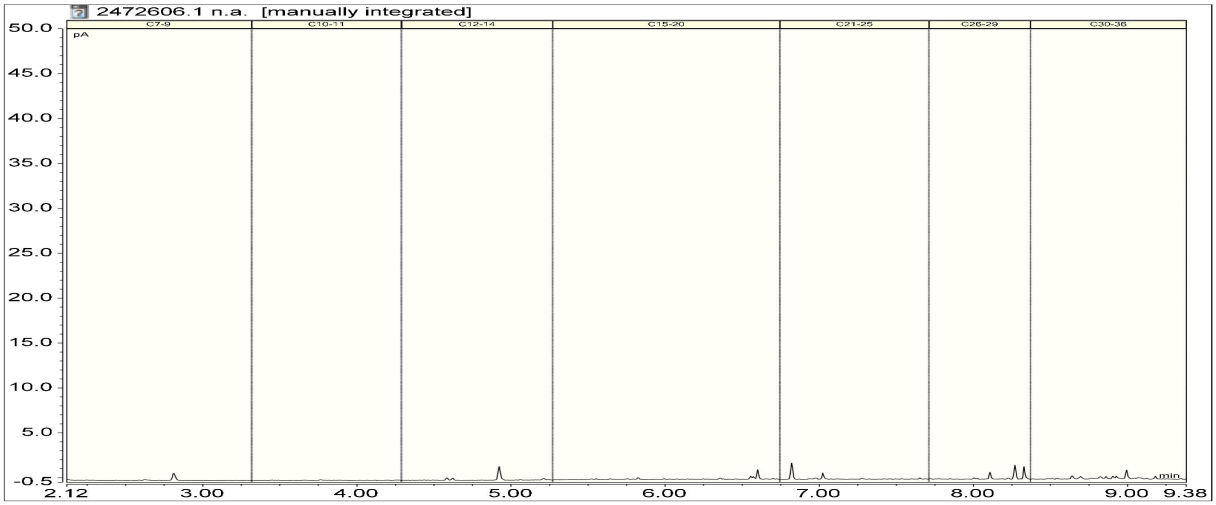
Sample Type: Soil

Sample Name:		BH111-0.05-0.2m 10-Nov-2020				
Lab Number:		2472606.1				
Individual Tests						
Dry Matter	g/100g as rcvd	68	-	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.31	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	7	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	4	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	7.0	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	11	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	-	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.015	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.015	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.015	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.015	-	-	-	-
Anthracene	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.015	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.015	-	-	-	-
Chrysene	mg/kg dry wt	< 0.015	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.015	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.015	-	-	-	-
Fluorene	mg/kg dry wt	< 0.015	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.015	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.08	-	-	-	-
Perylene	mg/kg dry wt	< 0.015	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.015	-	-	-	-
Pyrene	mg/kg dry wt	< 0.015	-	-	-	-

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Sample Type: Soil						
Sample Name:		BH111-0.05-0.2m 10-Nov-2020				
Lab Number:		2472606.1				
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	53	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

2472606.1
BH111-0.05-0.2m 10-Nov-2020
Client Chromatogram for TPH by FID



Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1
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). US EPA 3550.	0.10 g/100g as rcvd	1
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1

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

Testing was completed between 17-Nov-2020 and 18-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2473431	A2Pv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	14-Nov-2020	
		Date Reported:	20-Nov-2020	
		Quote No:	80842	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH111-0.05-0.2m 10-Nov-2020				
Lab Number:		2473431.1				
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
As Received Weight	g	554.0	-	-	-	-
Dry Weight	g	389.6	-	-	-	-
Moisture	%	30	-	-	-	-
Sample Fraction >10mm	g dry wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g dry wt	158.0	-	-	-	-
Sample Fraction <2mm	g dry wt	229.5	-	-	-	-
<2mm Subsample Weight	g dry wt	55.8	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	-	-	-	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
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• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
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• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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.

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Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1
New Zealand 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
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
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1
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.	0.01%	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

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

Testing was completed on 20-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2474175 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	17-Nov-2020
		Date Reported:	19-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

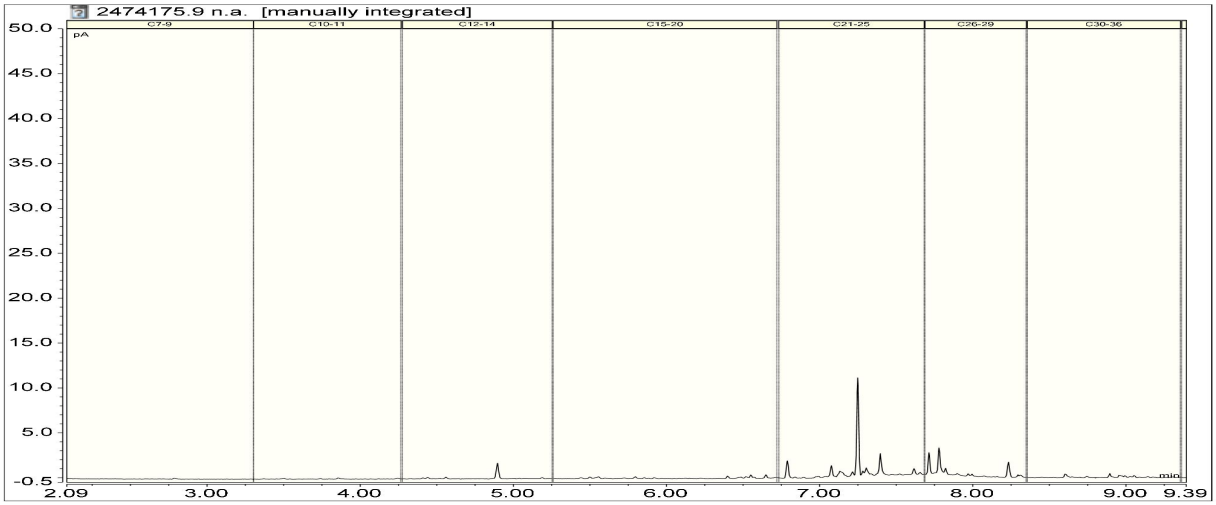
Sample Type: Soil

Sample Name:		BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020			
Lab Number:		2474175.8	2474175.9			
Individual Tests						
Dry Matter	g/100g as rcvd	75	75	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	5	4	-	-	-
Total Recoverable Copper	mg/kg dry wt	5	5	-	-	-
Total Recoverable Lead	mg/kg dry wt	8.1	11.2	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Nickel	mg/kg dry wt	< 2	< 2	-	-	-
Total Recoverable Zinc	mg/kg dry wt	5	< 4	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Acenaphthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Chrysene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluorene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	-	-	-
Perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Phenanthrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-

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

Sample Type: Soil						
Sample Name:		BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020			
Lab Number:		2474175.8	2474175.9			
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	-
C15 - C36	mg/kg dry wt	< 40	101	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	102	-	-	-

2474175.9
BH111A-1.0-1.3m 13-Nov-2020
Client Chromatogram for TPH by FID



Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-9
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	8-9
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). US EPA 3550.	0.10 g/100g as rcvd	8-9
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	8-9
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	8-9
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	8-9
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	8-9

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	9
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	8-9
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	8-9
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	8-9
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	8-9

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

Testing was completed between 18-Nov-2020 and 19-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Martin Cowell - BSc
Client Services Manager - Environmental

Hill Laboratories
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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2467662	SPv1
Contact:	Lucy Hine	**Date Received:**	05-Nov-2020	
	C/- Tonkin & Taylor	**Date Reported:**	11-Nov-2020	
	PO Box 13055	**Quote No:**	80842	
	Christchurch 8141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020
Lab Number:		2467662.1	2467662.2	2467662.4	2467662.5	2467662.6
Individual Tests						
Dry Matter	g/100g as rcvd	74	80	75	82	78
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.10	< 0.10	< 0.10	0.16	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	12	6	7	7
Total Recoverable Copper	mg/kg dry wt	14	22	7	10	9
Total Recoverable Lead	mg/kg dry wt	11.9	11.3	7.7	5.3	10.7
Total Recoverable Mercury	mg/kg dry wt	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	8	10	< 2	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	20	30	6	12	5
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.6	< 0.3	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
Acenaphthene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
Anthracene	mg/kg dry wt	0.019	< 0.013	< 0.014	-	-
Benzo[a]anthracene	mg/kg dry wt	0.038	< 0.013	< 0.014	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.040	< 0.013	< 0.014	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.05	< 0.03	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.05	< 0.03	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	0.044	< 0.013	< 0.014	-	-
Benzo[e]pyrene	mg/kg dry wt	0.030	< 0.013	< 0.014	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.027	< 0.013	< 0.014	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.018	< 0.013	< 0.014	-	-
Chrysene	mg/kg dry wt	0.034	< 0.013	< 0.014	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
Fluoranthene	mg/kg dry wt	0.088	< 0.013	< 0.014	-	-
Fluorene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.026	< 0.013	< 0.014	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	-	-
Perylene	mg/kg dry wt	0.017	< 0.013	< 0.014	-	-
Phenanthrene	mg/kg dry wt	0.078	< 0.013	< 0.014	-	-
Pyrene	mg/kg dry wt	0.081	< 0.013	< 0.014	-	-

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Sample Type: Soil						
Sample Name:		BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020
Lab Number:		2467662.1	2467662.2	2467662.4	2467662.5	2467662.6
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	-	-	-	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endrin	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Endrin ketone	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Chrysene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Fluorene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Pyrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	< 1.3	< 1.3

Sample Type: Soil							
Sample Name:		BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020
Lab Number:		2467662.1	2467662.2	2467662.4	2467662.5	2467662.6
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	-	< 5	< 5
2-Chlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	-	-	-	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	-	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	-	-	-	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 30	< 30
Phenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	-	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Hexachloroethane	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	-	< 10	< 10
Carbazole	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Isophorone	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

Sample Name:		ENVR - HA101 - 1.6-1.8m 04-Nov-2020	Duplicate 1 - 4/11/20 04-Nov-2020			
Lab Number:		2467662.8	2467662.9			
Individual Tests						
Dry Matter	g/100g as rcvd	78	83	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.15	-	-	-
Total Recoverable Chromium	mg/kg dry wt	5	7	-	-	-
Total Recoverable Copper	mg/kg dry wt	6	10	-	-	-
Total Recoverable Lead	mg/kg dry wt	8.5	5.5	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Nickel	mg/kg dry wt	2	< 2	-	-	-
Total Recoverable Zinc	mg/kg dry wt	5	10	-	-	-

Sample Type: Soil						
Sample Name:		ENVR - HA101 - 1.6-1.8m 04-Nov-2020	Duplicate 1 - 4/11/20 04-Nov-2020			
Lab Number:		2467662.8	2467662.9			
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Endosulfan II	mg/kg dry wt	< 2	< 2	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Endrin	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	-	-	-

Sample Type: Soil							
Sample Name:		ENVR - HA101 - 1.6-1.8m 04-Nov-2020	Duplicate 1 - 4/11/20 04-Nov-2020			
Lab Number:		2467662.8	2467662.9			
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	-	-	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	-	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	-	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	-	-	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	-	-	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	-	-	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	-	-	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 4-6, 8-9
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-2, 4
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). US EPA 3550.	0.10 g/100g as rcvd	1-2, 4-6, 8-9
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-2, 4

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-2, 4
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-2, 4
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2, 4-6, 8-9
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	5-6, 8-9
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-2, 4
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-2, 4
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-2, 4
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-2, 4

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

Testing was completed between 10-Nov-2020 and 11-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Martin Cowell - BSc
Client Services Manager - Environmental

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TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2471441	A2Pv2
Contact:	Rebecca van der Krogt	**Date Received:**	11-Nov-2020	
	C/- Tonkin & Taylor	**Date Reported:**	26-Nov-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH116-0.1m 09-Nov-2020	BH116-0.5m 09-Nov-2020	BH116-2.0m 09-Nov-2020	BH117-0.1m 09-Nov-2020	BH117-0.5m 09-Nov-2020
Lab Number:		2471441.8	2471441.9	2471441.10	2471441.14	2471441.15
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	408.0	448.7	522.4	488.4	484.8
Dry Weight	g	293.8	374.1	390.4	363.2	389.2
Sample Fraction >10mm	g dry wt	13.1	76.7	6.2	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	137.4	172.1	125.1	1.6	0.7
Sample Fraction <2mm	g dry wt	142.5	124.3	257.3	361.1	386.8
<2mm Subsample Weight	g dry wt	58.7	55.2	57.6	53.2	58.4
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		BH117-2.0m 09-Nov-2020				
Lab Number:		2471441.16				
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	394.4	-	-	-	-
Dry Weight	g	263.6	-	-	-	-
Sample Fraction >10mm	g dry wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g dry wt	1.5	-	-	-	-
Sample Fraction <2mm	g dry wt	259.7	-	-	-	-
<2mm Subsample Weight	g dry wt	58.7	-	-	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-

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

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Testing has been carried out under the assumption that the weight of asbestos in the sample is unaffected by the ashing process.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2471441-A2Pv1' issued on 20-Nov-2020 at 3:51 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	8-10, 14-16
Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	8-10, 14-16
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	8-10, 14-16
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
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.	0.01%	8-10, 14-16
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	8-10, 14-16
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16

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

Testing was completed between 20-Nov-2020 and 26-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2486812	SPv2
Contact:	Rebecca van der Krogt	**Date Received:**	04-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	16-Dec-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

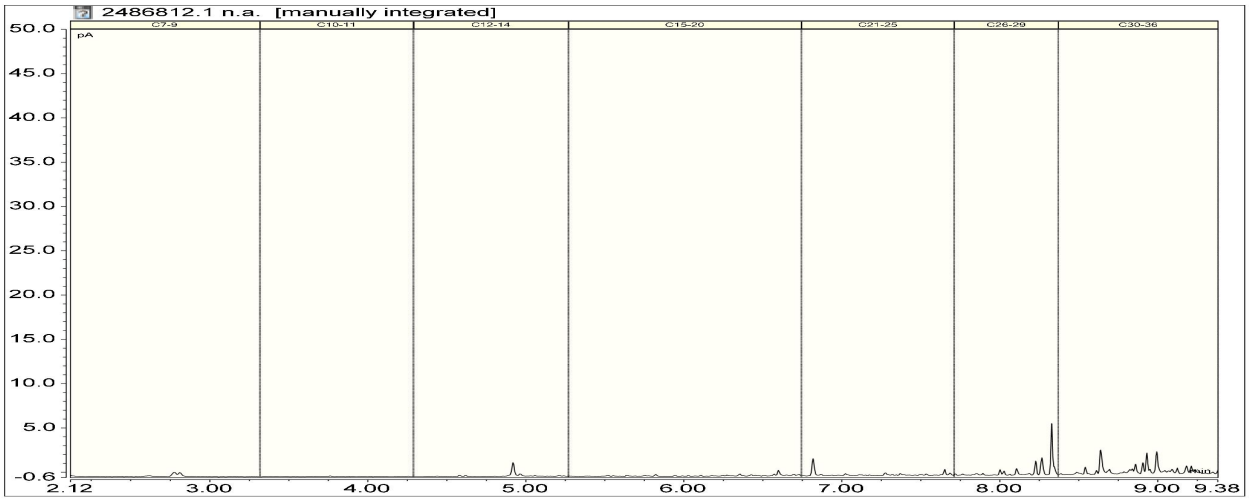
Sample Name:		DUP A 01-Dec-2020	HA05 - 0m 01-Dec-2020 1:15 pm	HA05 - 0.5m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA06 - 0m 01-Dec-2020 10:45 am
Lab Number:		2486812.1	2486812.2	2486812.3	2486812.4	2486812.9
Individual Tests						
Dry Matter	g/100g as rcvd	62	82	74	69	63
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	2	< 2	< 2	6
Total Recoverable Cadmium	mg/kg dry wt	0.30	0.10	< 0.10	< 0.10	0.26
Total Recoverable Chromium	mg/kg dry wt	14	6	6	7	13
Total Recoverable Copper	mg/kg dry wt	26	43	3	2	26
Total Recoverable Lead	mg/kg dry wt	21	20	9.2	5.5	21
Total Recoverable Mercury	mg/kg dry wt	0.14	< 0.10	0.16	< 0.10	0.13
Total Recoverable Nickel	mg/kg dry wt	8	8	3	< 2	7
Total Recoverable Zinc	mg/kg dry wt	42	40	< 4	< 4	42
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	9.5	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.012	< 0.014	< 0.015	< 0.016
2-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.012	< 0.014	< 0.015	< 0.016
Acenaphthylene	mg/kg dry wt	< 0.016	0.065	< 0.014	< 0.015	< 0.016
Acenaphthene	mg/kg dry wt	< 0.016	0.020	< 0.014	< 0.015	< 0.016
Anthracene	mg/kg dry wt	< 0.016	0.123	< 0.014	< 0.015	< 0.016
Benzo[a]anthracene	mg/kg dry wt	< 0.016	0.74	< 0.014	< 0.015	< 0.016
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.016	0.94	< 0.014	< 0.015	< 0.016
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	1.37	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	1.36	< 0.04	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.016	1.01	< 0.014	< 0.015	< 0.016
Benzo[e]pyrene	mg/kg dry wt	< 0.016	0.65	< 0.014	< 0.015	< 0.016
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.016	0.72	< 0.014	< 0.015	< 0.016
Benzo[k]fluoranthene	mg/kg dry wt	< 0.016	0.38	< 0.014	< 0.015	< 0.016
Chrysene	mg/kg dry wt	< 0.016	0.70	< 0.014	< 0.015	< 0.016
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.016	0.132	< 0.014	< 0.015	< 0.016
Fluoranthene	mg/kg dry wt	0.021	1.19	< 0.014	< 0.015	< 0.016
Fluorene	mg/kg dry wt	< 0.016	0.016	< 0.014	< 0.015	< 0.016
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.016	0.68	< 0.014	< 0.015	< 0.016
Naphthalene	mg/kg dry wt	< 0.08	< 0.06	< 0.07	< 0.08	< 0.08
Perylene	mg/kg dry wt	< 0.016	0.24	< 0.014	< 0.015	< 0.016
Phenanthrene	mg/kg dry wt	< 0.016	0.38	< 0.014	< 0.015	< 0.016
Pyrene	mg/kg dry wt	0.017	1.48	< 0.014	< 0.015	< 0.016

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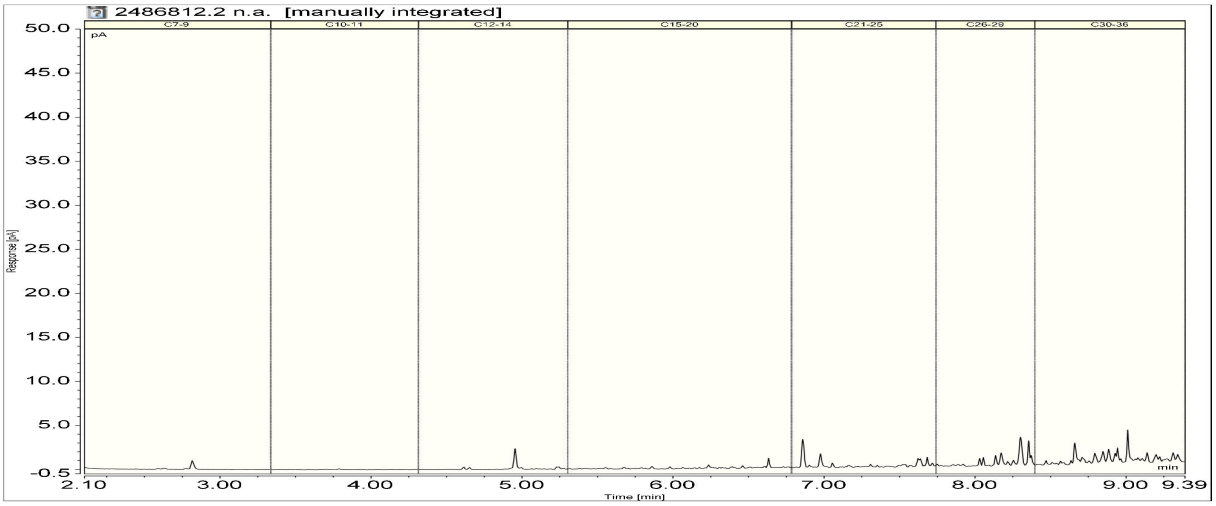
Sample Type: Soil						
Sample Name:		DUP A 01-Dec-2020	HA05 - 0m 01-Dec-2020 1:15 pm	HA05 - 0.5m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA06 - 0m 01-Dec-2020 10:45 am
Lab Number:		2486812.1	2486812.2	2486812.3	2486812.4	2486812.9
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	< 8	< 8	< 9	< 10
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	110	123	< 40	< 40	55
Total hydrocarbons (C7 - C36)	mg/kg dry wt	121	126	< 70	< 70	< 70

Sample Name:		HA06 - 0.4-0.6m 01-Dec-2020 11:00 am	HA06 - 1.0m 01-Dec-2020 11:12 am	HA07 - 0.1m 01-Dec-2020	HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020
Lab Number:		2486812.10	2486812.11	2486812.16	2486812.17	2486812.18
Individual Tests						
Dry Matter	g/100g as rcvd	70	67	74	74	65
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	2	4	2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.17	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	21	11	9	7	10
Total Recoverable Copper	mg/kg dry wt	12	16	31	6	5
Total Recoverable Lead	mg/kg dry wt	26	24	15.7	13.8	8.5
Total Recoverable Mercury	mg/kg dry wt	0.19	0.30	< 0.10	0.10	0.16
Total Recoverable Nickel	mg/kg dry wt	11	8	6	2	3
Total Recoverable Zinc	mg/kg dry wt	12	5	49	5	5
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Acenaphthene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Anthracene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Chrysene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Fluoranthene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Fluorene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Naphthalene	mg/kg dry wt	< 0.07	< 0.08	< 0.07	< 0.07	< 0.08
Perylene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Phenanthrene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Pyrene	mg/kg dry wt	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 9	< 8	< 8	< 10
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70

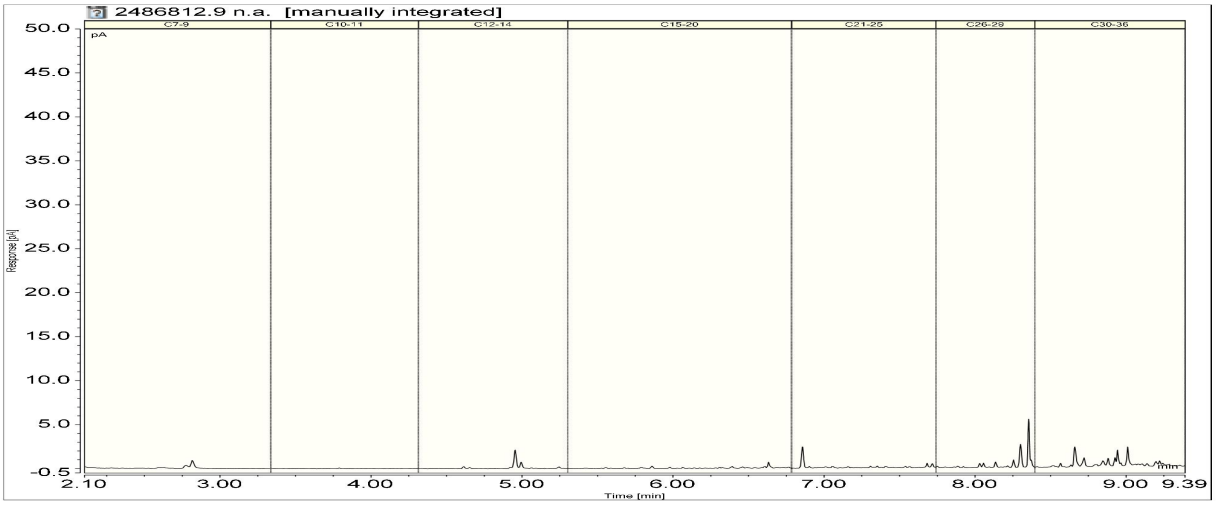
2486812.1
DUP A 01-Dec-2020
Client Chromatogram for TPH by FID



2486812.2
HA05 - 0m 01-Dec-2020 1:15 pm
Client Chromatogram for TPH by FID



2486812.9
HA06 - 0m 01-Dec-2020 10:45 am
Client Chromatogram for TPH by FID



Analyst's Comments

Amended Report: This certificate of analysis replaces report '2486812-SPv1' issued on 10-Dec-2020 at 2:29 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-4, 9-11, 16-18
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-4, 9-11, 16-18
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). US EPA 3550.	0.10 g/100g as rcvd	1-4, 9-11, 16-18
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-4, 9-11, 16-18
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-4, 9-11, 16-18
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-4, 9-11, 16-18
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-4, 9-11, 16-18
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1-2, 9
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-4, 9-11, 16-18
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-4, 9-11, 16-18
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-4, 9-11, 16-18
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-4, 9-11, 16-18

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

Testing was completed between 07-Dec-2020 and 16-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2470910 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	11-Nov-2020
		Date Reported:	17-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5 m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020
Lab Number:		2470910.1	2470910.2	2470910.3	2470910.4	2470910.5
Individual Tests						
Dry Matter	g/100g as rcvd	77	82	69	70	59
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	< 5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.3
Total Recoverable Chromium	mg/kg dry wt	3	3	7	2	< 5
Total Recoverable Copper	mg/kg dry wt	24	< 2	2	20	12
Total Recoverable Lead	mg/kg dry wt	7.6	3.3	6.6	7.5	31
Total Recoverable Mercury	mg/kg dry wt	< 0.10	0.24	0.25	< 0.10	< 0.3
Total Recoverable Nickel	mg/kg dry wt	3	< 2	< 2	< 2	< 5
Total Recoverable Zinc	mg/kg dry wt	18	< 4	5	20	17
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.017
alpha-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.017
beta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.017
delta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.017
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	-	-	-	< 0.017
cis-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.017
trans-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.017
2,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.017
4,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.017
2,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.017
4,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.017
2,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.017
4,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Total DDT Isomers	mg/kg dry wt	< 0.08	-	-	-	< 0.11
Dieldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endosulfan I	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endosulfan II	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endosulfan sulphate	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endrin	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endrin aldehyde	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Endrin ketone	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Heptachlor	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Heptachlor epoxide	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Hexachlorobenzene	mg/kg dry wt	< 0.013	-	-	-	< 0.017
Methoxychlor	mg/kg dry wt	< 0.013	-	-	-	< 0.017

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

Sample Type: Soil						
Sample Name:		ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5 m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020
Lab Number:		2470910.1	2470910.2	2470910.3	2470910.4	2470910.5
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.3	< 0.4	-	< 0.5
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.03	< 0.04	-	< 0.05
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.03	< 0.04	-	< 0.05
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Chrysene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Fluorene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	-	< 0.09
Perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Phenanthrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	< 0.017
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	-	< 0.5	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	-	< 0.5	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	-	< 0.5	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.5	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.5	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	-
Nitrobenzene	mg/kg dry wt	-	-	-	< 0.5	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	-	< 0.9	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	-	< 0.9	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	-	< 0.5	-
alpha-BHC	mg/kg dry wt	-	-	-	< 0.5	-
beta-BHC	mg/kg dry wt	-	-	-	< 0.5	-
delta-BHC	mg/kg dry wt	-	-	-	< 0.5	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.5	-
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.5	-
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.5	-
4,4'-DDT	mg/kg dry wt	-	-	-	< 1.0	-
Dieldrin	mg/kg dry wt	-	-	-	< 0.5	-
Endosulfan I	mg/kg dry wt	-	-	-	< 1.0	-
Endosulfan II	mg/kg dry wt	-	-	-	< 2	-
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 1.0	-
Endrin	mg/kg dry wt	-	-	-	< 0.9	-
Endrin ketone	mg/kg dry wt	-	-	-	< 1.0	-
Heptachlor	mg/kg dry wt	-	-	-	< 0.5	-

Sample Type: Soil						
Sample Name:		ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5 m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020
Lab Number:		2470910.1	2470910.2	2470910.3	2470910.4	2470910.5
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.5	-
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.5	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	-	< 0.5	-
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.5	-
Anthracene	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.5	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	-	< 0.5	-
Chrysene	mg/kg dry wt	-	-	-	< 0.5	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.5	-
Fluoranthene	mg/kg dry wt	-	-	-	< 0.5	-
Fluorene	mg/kg dry wt	-	-	-	< 0.5	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.5	-
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.5	-
Naphthalene	mg/kg dry wt	-	-	-	< 0.5	-
Phenanthrene	mg/kg dry wt	-	-	-	< 0.5	-
Pyrene	mg/kg dry wt	-	-	-	< 0.5	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	< 1.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	< 1.3	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	-	< 5	-
2-Chlorophenol	mg/kg dry wt	-	-	-	< 1.0	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	-	< 1.0	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	-	< 3	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	-	< 3	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	-	< 1.0	-
2-Nitrophenol	mg/kg dry wt	-	-	-	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 30	-
Phenol	mg/kg dry wt	-	-	-	< 1.0	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	-	< 5	-
Butylbenzylphthalate	mg/kg dry wt	-	-	-	< 1.0	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	-	< 1.0	-
Diethylphthalate	mg/kg dry wt	-	-	-	< 1.0	-
Dimethylphthalate	mg/kg dry wt	-	-	-	< 1.0	-
Di-n-butylphthalate	mg/kg dry wt	-	-	-	< 1.0	-
Di-n-octylphthalate	mg/kg dry wt	-	-	-	< 1.0	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.9	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.9	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.9	-
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.9	-
Hexachloroethane	mg/kg dry wt	-	-	-	< 0.9	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.5	-

Sample Type: Soil						
Sample Name:		ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5 m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020
Lab Number:		2470910.1	2470910.2	2470910.3	2470910.4	2470910.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	-	< 10	-
Carbazole	mg/kg dry wt	-	-	-	< 0.5	-
Dibenzofuran	mg/kg dry wt	-	-	-	< 0.5	-
Isophorone	mg/kg dry wt	-	-	-	< 0.5	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 9	-	< 11
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	69
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	2,300
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	2,300

Sample Name:		ENVR-HA04-0.5 m 10-Nov-2020	ENVR-HA04-1.0 m 10-Nov-2020	ENVR-SS04-0.1-0 .2m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5 m 10-Nov-2020
Lab Number:		2470910.6	2470910.7	2470910.8	2470910.9	2470910.10
Individual Tests						
Dry Matter	g/100g as rcvd	65	67	77	73	78
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	5	3	5	5
Total Recoverable Copper	mg/kg dry wt	2	2	35	16	5
Total Recoverable Lead	mg/kg dry wt	10.6	8.9	7.8	7.1	5.6
Total Recoverable Mercury	mg/kg dry wt	0.20	0.17	< 0.10	< 0.10	0.18
Total Recoverable Nickel	mg/kg dry wt	< 2	3	4	2	< 2
Total Recoverable Zinc	mg/kg dry wt	< 4	< 4	22	20	5
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	< 0.014	-
alpha-BHC	mg/kg dry wt	-	-	-	< 0.014	-
beta-BHC	mg/kg dry wt	-	-	-	< 0.014	-
delta-BHC	mg/kg dry wt	-	-	-	< 0.014	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.014	-
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.014	-
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.014	-
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.014	-
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.014	-
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.014	-
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.014	-
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.014	-
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.014	-
Total DDT Isomers	mg/kg dry wt	-	-	-	< 0.08	-
Dieldrin	mg/kg dry wt	-	-	-	< 0.014	-
Endosulfan I	mg/kg dry wt	-	-	-	< 0.014	-
Endosulfan II	mg/kg dry wt	-	-	-	< 0.014	-
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.014	-
Endrin	mg/kg dry wt	-	-	-	< 0.014	-
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.014	-
Endrin ketone	mg/kg dry wt	-	-	-	< 0.014	-
Heptachlor	mg/kg dry wt	-	-	-	< 0.014	-
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.014	-
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.014	-
Methoxychlor	mg/kg dry wt	-	-	-	< 0.014	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	-	< 0.4	< 0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013

Sample Type: Soil						
Sample Name:		ENVR-HA04-0.5 m 10-Nov-2020	ENVR-HA04-1.0 m 10-Nov-2020	ENVR-SS04-0.1-0 .2m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5 m 10-Nov-2020
Lab Number:		2470910.6	2470910.7	2470910.8	2470910.9	2470910.10
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Acenaphthylene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Acenaphthene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Anthracene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[a]anthracene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	-	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	-	< 0.04	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[e]pyrene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Chrysene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Fluoranthene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Fluorene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Naphthalene	mg/kg dry wt	< 0.08	< 0.08	-	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Phenanthrene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Pyrene	mg/kg dry wt	< 0.016	< 0.015	-	< 0.014	< 0.013
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		ENVR-HA04-0.5 m 10-Nov-2020	ENVR-HA04-1.0 m 10-Nov-2020	ENVR-SS04-0.1-0 .2m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5 m 10-Nov-2020
Lab Number:		2470910.6	2470910.7	2470910.8	2470910.9	2470910.10
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-

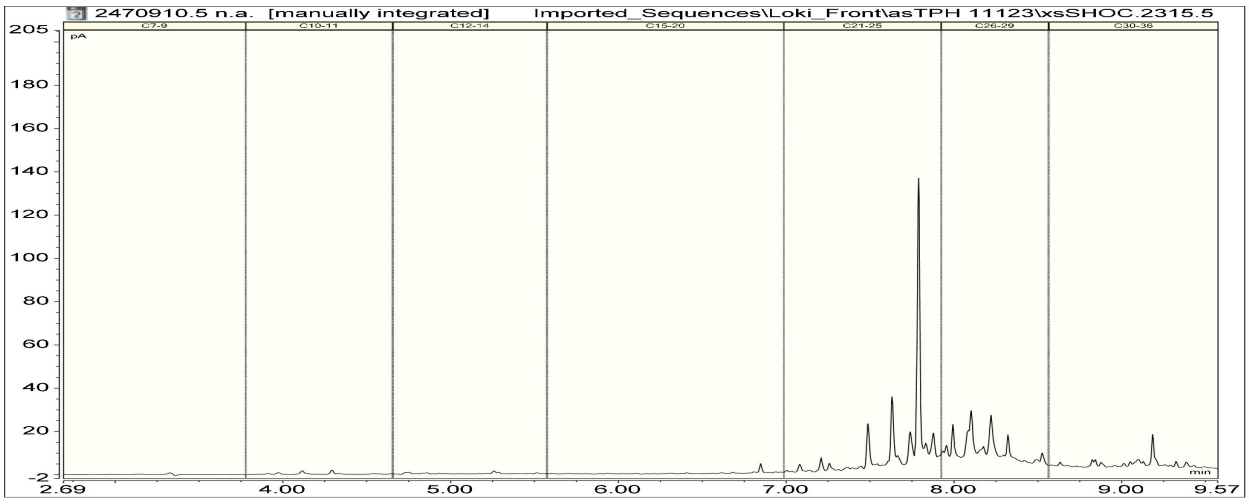
Sample Type: Soil						
Sample Name:		ENVR-HA04-0.5 m 10-Nov-2020	ENVR-HA04-1.0 m 10-Nov-2020	ENVR-SS04-0.1-0 .2m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5 m 10-Nov-2020
Lab Number:		2470910.6	2470910.7	2470910.8	2470910.9	2470910.10
Other compounds in SVOC Soil Samples by GC-MS						
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	< 9	-	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	-	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	46	-	< 40	108
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	-	< 70	110

Sample Name:		ENVR-HA05-1.0 m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	Duplicate 1 -10/11/20 10-Nov-2020		
Lab Number:		2470910.11	2470910.12	2470910.13		
Individual Tests						
Dry Matter	g/100g as rcvd	72	71	70	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	6	4	5	-	-
Total Recoverable Copper	mg/kg dry wt	4	42	39	-	-
Total Recoverable Lead	mg/kg dry wt	8.2	10.0	10.6	-	-
Total Recoverable Mercury	mg/kg dry wt	0.21	< 0.10	< 0.10	-	-
Total Recoverable Nickel	mg/kg dry wt	4	6	6	-	-
Total Recoverable Zinc	mg/kg dry wt	11	42	43	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	-	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.014	-	-	-	-
Anthracene	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	-	-	-	-
Chrysene	mg/kg dry wt	< 0.014	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.014	-	-	-	-
Fluorene	mg/kg dry wt	< 0.014	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	-	-	-	-
Perylene	mg/kg dry wt	< 0.014	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.014	-	-	-	-
Pyrene	mg/kg dry wt	< 0.014	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	< 0.5	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	< 0.5	< 0.5	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	< 0.5	< 0.5	-	-

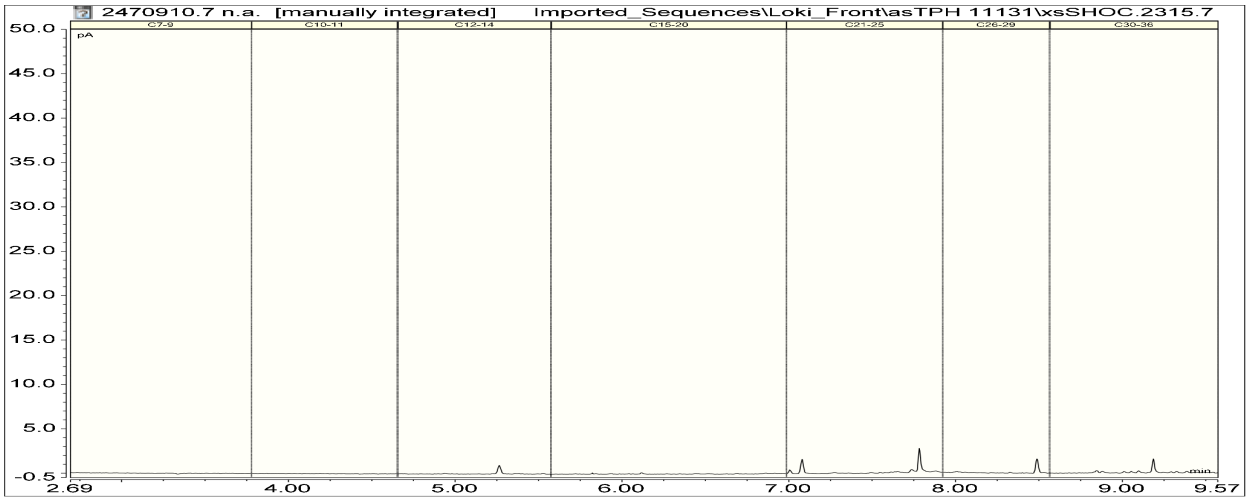
Sample Type: Soil							
Sample Name:		ENVR-HA05-1.0 m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	Duplicate 1 -10/11/20 10-Nov-2020		
Lab Number:		2470910.11	2470910.12	2470910.13		
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	< 0.9	< 0.9	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	< 0.9	< 0.9	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	< 0.5	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	< 0.5	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	< 0.5	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	< 0.5	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.5	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	< 0.5	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	< 0.5	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	< 2	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Endrin	mg/kg dry wt	-	< 0.9	< 0.9	-	-
Endrin ketone	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Anthracene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Chrysene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Fluorene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Pyrene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 1.3	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 1.3	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	< 5	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	< 3	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	< 3	< 3	-	-

Sample Type: Soil							
Sample Name:		ENVR-HA05-1.0 m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	Duplicate 1 -10/11/20 10-Nov-2020		
Lab Number:		2470910.11	2470910.12	2470910.13		
Phenols in SVOC Soil Samples by GC-MS						
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	< 5	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	< 30	< 30	-	-
Phenol	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	< 1.0	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	< 5	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	< 1.0	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	< 0.9	< 0.9	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	< 0.9	< 0.9	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	< 0.9	< 0.9	-	-
Hexachlorobutadiene	mg/kg dry wt	-	< 0.9	< 0.9	-	-
Hexachloroethane	mg/kg dry wt	-	< 0.9	< 0.9	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	< 10	< 10	-	-
Carbazole	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Isophorone	mg/kg dry wt	-	< 0.5	< 0.5	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	-	-	-	-
C10 - C14	mg/kg dry wt	< 20	-	-	-	-
C15 - C36	mg/kg dry wt	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

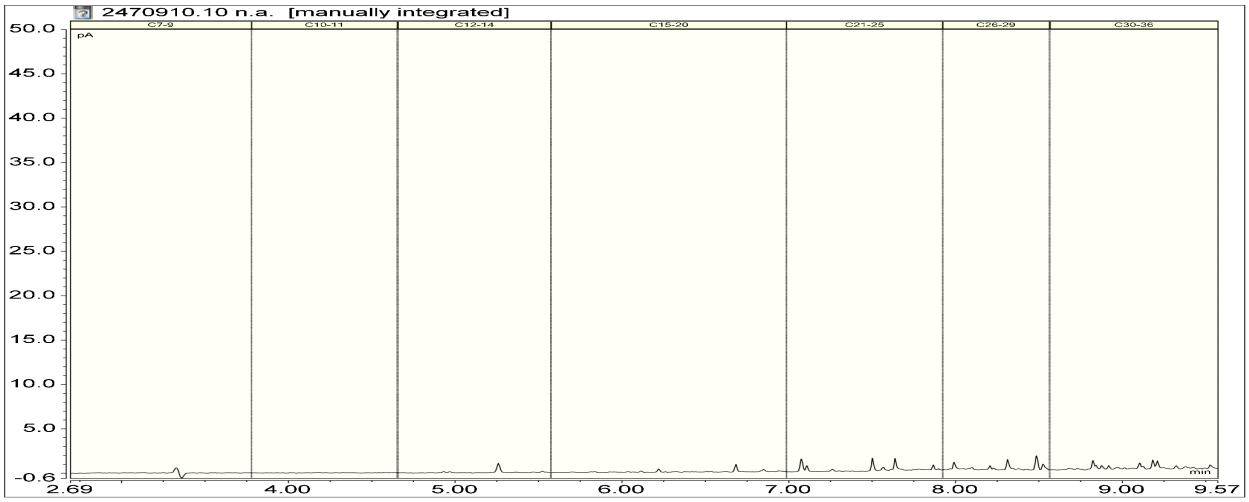
2470910.5
ENVR-HA04-0.0-0.1m 10-Nov-2020
Client Chromatogram for TPH by FID



2470910.7
ENVR-HA04-1.0m 10-Nov-2020
Client Chromatogram for TPH by FID



2470910.10
ENVR-HA05-0.5m 10-Nov-2020
Client Chromatogram for TPH by FID



Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-13
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3, 5-7, 9-11
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). US EPA 3550.	0.10 g/100g as rcvd	1-13
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-3, 5-7, 9-11

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-3, 5-7, 9-11
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-3, 5-7, 9-11
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-13
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1, 5, 9
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	4, 8, 12-13
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	5, 7, 10
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-3, 5-7, 9-11
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3, 5-7, 9-11
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3, 5-7, 9-11
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3, 5-7, 9-11

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

Testing was completed between 12-Nov-2020 and 17-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2471363 A2Pv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	11-Nov-2020
		Date Reported:	20-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		ENVR-HA-03-0.0-0.1m 10-Nov-2020	ENVR-HA-03-0.5m 10-Nov-2020	ENVR-HA-03-1.0m 10-Nov-2020	ENVR-HA-04-0.0-0.1m 10-Nov-2020	ENVR-HA-04-0.5m 10-Nov-2020
Lab Number:		2471363.1	2471363.2	2471363.3	2471363.5	2471363.6
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	Loose fibres	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 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	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	667.7	573.6	579.5	296.8	551.9
Dry Weight	g	527.5	488.6	422.0	193.5	396.6
Moisture	%	21	15	27	35	28
Sample Fraction >10mm	g dry wt	94.3	44.2	< 0.1	3.4	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	98.0	54.5	93.1	30.5	24.4
Sample Fraction <2mm	g dry wt	333.3	388.9	326.0	159.0	371.4
<2mm Subsample Weight	g dry wt	56.8	51.3	52.0	50.4	51.7
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	0.00004	< 0.00001

Sample Name:		ENVR-HA-04-1.0m 10-Nov-2020	ENVR-HA-05-0.0-0.1m 10-Nov-2020	ENVR-HA-05-0.5m 10-Nov-2020	ENVR-HA-05-1.0m 10-Nov-2020	
Lab Number:		2471363.7	2471363.9	2471363.10	2471363.11	
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 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	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
As Received Weight	g	505.1	689.4	572.2	516.7	-
Dry Weight	g	329.4	481.6	466.7	360.7	-

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

Sample Type: Soil						
Sample Name:		ENVR-HA-04-1.0m 10-Nov-2020	ENVR-HA-05-0.0-0.1m 10-Nov-2020	ENVR-HA-05-0.5m 10-Nov-2020	ENVR-HA-05-1.0m 10-Nov-2020	
Lab Number:		2471363.7	2471363.9	2471363.10	2471363.11	
Moisture	%	35	30	18	30	-
Sample Fraction >10mm	g dry wt	< 0.1	9.1	< 0.1	< 0.1	-
Sample Fraction <10mm to >2mm	g dry wt	20.8	82.6	67.8	79.9	-
Sample Fraction <2mm	g dry wt	308.1	389.3	396.6	277.9	-
<2mm Subsample Weight	g dry wt	51.8	50.3	51.9	50.1	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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 simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3, 5-7, 9-11
New Zealand 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	1-3, 5-7, 9-11
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3, 5-7, 9-11
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3, 5-7, 9-11
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 5-7, 9-11
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 5-7, 9-11
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 5-7, 9-11
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.	0.01%	1-3, 5-7, 9-11

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3, 5-7, 9-11
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 5-7, 9-11
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 5-7, 9-11
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 5-7, 9-11
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 5-7, 9-11
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 5-7, 9-11
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 5-7, 9-11
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 5-7, 9-11

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

Testing was completed between 19-Nov-2020 and 20-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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John Keneth Paglingayen
Bachelor of Applied Science
Laboratory Technician - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2481819	SPv1
Contact:	Rebecca van der Krogt	**Date Received:**	27-Nov-2020	
	C/- Tonkin & Taylor	**Date Reported:**	08-Dec-2020	
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020		
Lab Number:		2481819.8	2481819.9	2481819.10		
Individual Tests						
Dry Matter	g/100g as rcvd	67	78	72	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	< 2	2	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.18	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	9	< 2	4	-	-
Total Recoverable Copper	mg/kg dry wt	21	4	5	-	-
Total Recoverable Lead	mg/kg dry wt	11.3	3.7	5.9	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	0.22	-	-
Total Recoverable Nickel	mg/kg dry wt	8	< 2	2	-	-
Total Recoverable Zinc	mg/kg dry wt	38	5	10	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.4	< 0.5	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Endrin	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020		
Lab Number:		2481819.8	2481819.9	2481819.10		
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	-	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	-	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
Hexachloroethane	mg/kg dry wt	< 0.9	< 0.8	< 0.9	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-

Sample Type: Soil						
Sample Name:		HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020		
Lab Number:		2481819.8	2481819.9	2481819.10		
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	-	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-10
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	8-10
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	8-10
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). US EPA 3550.	0.10 g/100g as rcvd	8-10

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

Testing was completed between 07-Dec-2020 and 08-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2470943 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	11-Nov-2020
		Date Reported:	16-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:	HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020
Lab Number:	2470943.1	2470943.2	2470943.3	2470943.5	2470943.6
Individual Tests					
Dry Matter g/100g as rcvd	80	82	64	80	81
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium mg/kg dry wt	0.15	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium mg/kg dry wt	6	6	8	6	7
Total Recoverable Copper mg/kg dry wt	19	5	11	11	6
Total Recoverable Lead mg/kg dry wt	4.9	5.7	12.5	4.2	6.7
Total Recoverable Mercury mg/kg dry wt	< 0.10	< 0.10	0.13	< 0.10	< 0.10
Total Recoverable Nickel mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Total Recoverable Zinc mg/kg dry wt	10	< 4	9	8	5
Haloethers in SVOC Soil Samples by GC-MS					
Bis(2-chloroethoxy) methane mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether mg/kg dry wt	< 0.4	< 0.4	< 0.5	< 0.4	< 0.4
4-Chlorophenyl phenyl ether mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS					
2,4-Dinitrotoluene mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
N-Nitrosodiphenylamine + Diphenylamine mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS					
Aldrin mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane) mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
Endrin ketone mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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

Sample Type: Soil						
Sample Name:		HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020
Lab Number:		2470943.1	2470943.2	2470943.3	2470943.5	2470943.6
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020
Lab Number:		2470943.1	2470943.2	2470943.3	2470943.5	2470943.6
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		BH113 - 2.0m 09-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	
Lab Number:		2470943.7	2470943.8	2470943.9	2470943.10	
Individual Tests						
Dry Matter	g/100g as rcvd	77	72	80	63	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.26	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	5	5	4	2	-
Total Recoverable Copper	mg/kg dry wt	8	5	< 2	2	-
Total Recoverable Lead	mg/kg dry wt	9.8	10.8	5.3	3.9	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Total Recoverable Nickel	mg/kg dry wt	< 2	2	< 2	2	-
Total Recoverable Zinc	mg/kg dry wt	5	11	< 4	24	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	0.8	< 0.3	< 0.4	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Acenaphthylene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Acenaphthene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Anthracene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Benzo[a]anthracene	mg/kg dry wt	-	0.048	< 0.013	< 0.016	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.070	< 0.013	< 0.016	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	0.10	< 0.03	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	0.10	< 0.03	< 0.04	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.079	< 0.013	< 0.016	-
Benzo[e]pyrene	mg/kg dry wt	-	0.047	< 0.013	< 0.016	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.050	< 0.013	< 0.016	-
Benzo[k]fluoranthene	mg/kg dry wt	-	0.033	< 0.013	< 0.016	-
Chrysene	mg/kg dry wt	-	0.061	< 0.013	< 0.016	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Fluoranthene	mg/kg dry wt	-	0.118	< 0.013	< 0.016	-
Fluorene	mg/kg dry wt	-	< 0.014	< 0.013	< 0.016	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.050	< 0.013	< 0.016	-
Naphthalene	mg/kg dry wt	-	< 0.07	< 0.07	< 0.08	-
Perylene	mg/kg dry wt	-	0.015	< 0.013	0.154	-
Phenanthrene	mg/kg dry wt	-	0.037	< 0.013	< 0.016	-
Pyrene	mg/kg dry wt	-	0.135	< 0.013	< 0.016	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	-	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	-	-	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	-	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	-	-	-	-
Nitrobenzene	mg/kg dry wt	< 0.5	-	-	-	-

Sample Type: Soil						
Sample Name:		BH113 - 2.0m 09-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	
Lab Number:		2470943.7	2470943.8	2470943.9	2470943.10	
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	-	-	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	-	-	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.5	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.5	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.5	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.5	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.5	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 1.0	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.5	-	-	-	-
Endosulfan I	mg/kg dry wt	< 1.0	-	-	-	-
Endosulfan II	mg/kg dry wt	< 2	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	-	-	-	-
Endrin	mg/kg dry wt	< 0.8	-	-	-	-
Endrin ketone	mg/kg dry wt	< 1.0	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.5	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	-	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.5	-	-	-	-
Anthracene	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	-	-	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	-	-	-	-
Chrysene	mg/kg dry wt	< 0.5	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.5	-	-	-	-
Fluorene	mg/kg dry wt	< 0.5	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.5	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.5	-	-	-	-
Pyrene	mg/kg dry wt	< 0.5	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	-	-	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	-	-	-	-
2-Chlorophenol	mg/kg dry wt	< 1.0	-	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	-	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	-	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	-	-	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	-	-	-	-
2-Nitrophenol	mg/kg dry wt	< 5	-	-	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	-	-	-	-
Phenol	mg/kg dry wt	< 1.0	-	-	-	-

Sample Type: Soil						
Sample Name:		BH113 - 2.0m 09-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	
Lab Number:		2470943.7	2470943.8	2470943.9	2470943.10	
Phenols in SVOC Soil Samples by GC-MS						
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	-	-	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	-	-	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	-	-	-	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	-	-	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	-	-	-	-
Diethylphthalate	mg/kg dry wt	< 1.0	-	-	-	-
Dimethylphthalate	mg/kg dry wt	< 1.0	-	-	-	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	-	-	-	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	-	-	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	-	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	-	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	-	-	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	-	-	-	-
Hexachloroethane	mg/kg dry wt	< 0.8	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	-	-	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	-	-	-	-
Carbazole	mg/kg dry wt	< 0.5	-	-	-	-
Dibenzofuran	mg/kg dry wt	< 0.5	-	-	-	-
Isophorone	mg/kg dry wt	< 0.5	-	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 9	< 8	< 10	-
C10 - C14	mg/kg dry wt	-	< 20	< 20	< 20	-
C15 - C36	mg/kg dry wt	-	< 40	< 40	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 70	< 70	< 70	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 5-10
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	8-10
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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 5-10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	8-10
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	8-10

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	8-10
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 5-10
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	1-3, 5-7
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	8-10
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	8-10
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	8-10
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	8-10

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

Testing was completed between 12-Nov-2020 and 16-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2471441	A2Pv2
Contact:	Rebecca van der Krogt	**Date Received:**	11-Nov-2020	
	C/- Tonkin & Taylor	**Date Reported:**	26-Nov-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		BH116-0.1m 09-Nov-2020	BH116-0.5m 09-Nov-2020	BH116-2.0m 09-Nov-2020	BH117-0.1m 09-Nov-2020	BH117-0.5m 09-Nov-2020
Lab Number:		2471441.8	2471441.9	2471441.10	2471441.14	2471441.15
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	408.0	448.7	522.4	488.4	484.8
Dry Weight	g	293.8	374.1	390.4	363.2	389.2
Sample Fraction >10mm	g dry wt	13.1	76.7	6.2	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	137.4	172.1	125.1	1.6	0.7
Sample Fraction <2mm	g dry wt	142.5	124.3	257.3	361.1	386.8
<2mm Subsample Weight	g dry wt	58.7	55.2	57.6	53.2	58.4
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		BH117-2.0m 09-Nov-2020				
Lab Number:		2471441.16				
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	394.4	-	-	-	-
Dry Weight	g	263.6	-	-	-	-
Sample Fraction >10mm	g dry wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g dry wt	1.5	-	-	-	-
Sample Fraction <2mm	g dry wt	259.7	-	-	-	-
<2mm Subsample Weight	g dry wt	58.7	-	-	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-

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

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Testing has been carried out under the assumption that the weight of asbestos in the sample is unaffected by the ashing process.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2471441-A2Pv1' issued on 20-Nov-2020 at 3:51 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	8-10, 14-16
Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	8-10, 14-16
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	8-10, 14-16
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	8-10, 14-16
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.	0.01%	8-10, 14-16
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	8-10, 14-16
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	8-10, 14-16

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

Testing was completed between 20-Nov-2020 and 26-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

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Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2488783 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	08-Dec-2020
		Date Reported:	11-Dec-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am
Lab Number:		2488783.13	2488783.14	2488783.15	2488783.20	2488783.21
Individual Tests						
Dry Matter	g/100g as rcvd	75	74	66	87	79
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	8	4	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	< 0.10	0.15	< 0.10
Total Recoverable Chromium	mg/kg dry wt	6	8	11	11	8
Total Recoverable Copper	mg/kg dry wt	9	6	12	78	4
Total Recoverable Lead	mg/kg dry wt	4.3	9.1	22	14.9	4.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	0.18	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	< 2	2	6	22	< 2
Total Recoverable Zinc	mg/kg dry wt	8	6	10	53	4
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.5	< 0.5	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am
Lab Number:		2488783.13	2488783.14	2488783.15	2488783.20	2488783.21
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.7	< 0.8

Sample Type: Soil						
Sample Name:		HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am
Lab Number:		2488783.13	2488783.14	2488783.15	2488783.20	2488783.21
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		HA114 - 1.0m 03-Dec-2020 8:32 am	HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020
Lab Number:		2488783.22	2488783.31	2488783.32	2488783.33	2488783.37
Individual Tests						
Dry Matter	g/100g as rcvd	69	82	71	72	77
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	3
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.23	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	6	9	6	8
Total Recoverable Copper	mg/kg dry wt	7	9	6	4	8
Total Recoverable Lead	mg/kg dry wt	9.6	4.2	8.7	7.1	9.7
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	2	< 2	< 2	< 2	2
Total Recoverable Zinc	mg/kg dry wt	7	8	5	< 4	6
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.4	< 0.5	< 0.5	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA114 - 1.0m 03-Dec-2020 8:32 am	HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020
Lab Number:		2488783.22	2488783.31	2488783.32	2488783.33	2488783.37
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.9	< 0.7	< 0.9	< 0.9	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA114 - 1.0m 03-Dec-2020 8:32 am	HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020
Lab Number:		2488783.22	2488783.31	2488783.32	2488783.33	2488783.37
Other compounds in SVOC Soil Samples by GC-MS						
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		HA108 - dup 03-Dec-2020	Dup - D	Dup - E	HA115 Duplicate	
Lab Number:		2488783.38	2488783.39	2488783.40	2488783.41	
Individual Tests						
Dry Matter	g/100g as rcvd	69	85	82	71	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	5	< 2	2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.15	0.23	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	9	10	6	9	-
Total Recoverable Copper	mg/kg dry wt	7	72	9	6	-
Total Recoverable Lead	mg/kg dry wt	9.3	13.2	4.4	10.4	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.10	-
Total Recoverable Nickel	mg/kg dry wt	< 2	11	< 2	3	-
Total Recoverable Zinc	mg/kg dry wt	5	54	8	7	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.5	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endrin	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

Sample Type: Soil						
Sample Name:		HA108 - dup 03-Dec-2020	Dup - D	Dup - E	HA115 Duplicate	
Lab Number:		2488783.38	2488783.39	2488783.40	2488783.41	
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
Hexachlorobutadiene	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
Hexachloroethane	mg/kg dry wt	< 0.9	< 0.7	< 0.8	< 0.9	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

Summary of Methods

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

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	13-15, 20-22, 31-33, 37-41
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	13-15, 20-22, 31-33, 37-41
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	13-15, 20-22, 31-33, 37-41
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). US EPA 3550.	0.10 g/100g as rcvd	13-15, 20-22, 31-33, 37-41

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

Testing was completed between 09-Dec-2020 and 11-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2491712 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	11-Dec-2020
		Date Reported:	16-Dec-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020		
Lab Number:		2491712.1	2491712.2	2491712.4		
Individual Tests						
Dry Matter	g/100g as rcvd	77	78	69	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	2	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	7	10	10	-	-
Total Recoverable Copper	mg/kg dry wt	4	8	10	-	-
Total Recoverable Lead	mg/kg dry wt	7.8	13.2	10.9	-	-
Total Recoverable Mercury	mg/kg dry wt	0.13	0.21	0.15	-	-
Total Recoverable Nickel	mg/kg dry wt	2	4	4	-	-
Total Recoverable Zinc	mg/kg dry wt	6	12	8	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Chrysene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Fluoranthene	mg/kg dry wt	0.014	< 0.013	< 0.015	-	-
Fluorene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	-	-
Perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Phenanthrene	mg/kg dry wt	< 0.013	< 0.013	< 0.015	-	-
Pyrene	mg/kg dry wt	0.018	0.014	< 0.015	-	-

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020		
Lab Number:		2491712.1	2491712.2	2491712.4		
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 9	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 4
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-2, 4
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). US EPA 3550.	0.10 g/100g as rcvd	1-2, 4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-2, 4
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-2, 4
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-2, 4
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2, 4
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-2, 4
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-2, 4
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-2, 4
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-2, 4

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

Testing was completed between 15-Dec-2020 and 16-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2489833	SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	09-Dec-2020	
		Date Reported:	16-Dec-2020	
		Quote No:	80842	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

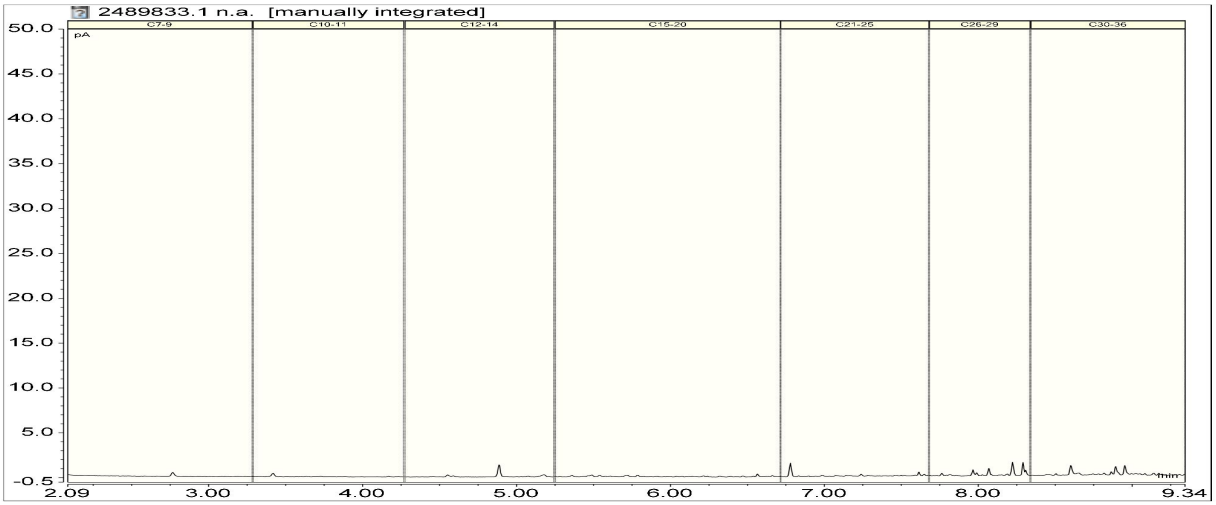
Sample Type: Soil

Sample Name:		HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020		
Lab Number:		2489833.1	2489833.3	2489833.4		
Individual Tests						
Dry Matter	g/100g as rcvd	69	72	69	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	3	4	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.24	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	14	10	12	-	-
Total Recoverable Copper	mg/kg dry wt	16	10	13	-	-
Total Recoverable Lead	mg/kg dry wt	19.3	12.1	13.1	-	-
Total Recoverable Mercury	mg/kg dry wt	0.42	0.13	0.14	-	-
Total Recoverable Nickel	mg/kg dry wt	5	3	4	-	-
Total Recoverable Zinc	mg/kg dry wt	18	14	18	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Acenaphthylene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Acenaphthene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Benzo[a]anthracene	mg/kg dry wt	0.020	< 0.014	< 0.015	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.027	< 0.014	< 0.015	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.03	< 0.04	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.03	< 0.04	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.025	< 0.014	< 0.015	-	-
Benzo[e]pyrene	mg/kg dry wt	0.017	< 0.014	< 0.015	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.019	< 0.014	< 0.015	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Chrysene	mg/kg dry wt	0.016	< 0.014	< 0.015	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Fluoranthene	mg/kg dry wt	0.035	< 0.014	< 0.015	-	-
Fluorene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.017	< 0.014	< 0.015	-	-
Naphthalene	mg/kg dry wt	< 0.08	< 0.07	< 0.08	-	-
Perylene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Phenanthrene	mg/kg dry wt	< 0.015	< 0.014	< 0.015	-	-
Pyrene	mg/kg dry wt	0.036	< 0.014	< 0.015	-	-

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020		
Lab Number:		2489833.1	2489833.3	2489833.4		
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 9	< 9	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	47	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

2489833.1
HA111-0.1m 07-Dec-2020
Client Chromatogram for TPH by FID



Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3-4
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1, 3-4
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). US EPA 3550.	0.10 g/100g as rcvd	1, 3-4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1, 3-4
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1, 3-4
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1, 3-4
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3-4

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1, 3-4
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1, 3-4
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1, 3-4
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1, 3-4

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

Testing was completed between 15-Dec-2020 and 16-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2467651 SPv1
Contact:	Lucy Hine C/- Tonkin & Taylor PO Box 13055 Christchurch 8141	**Date Received:**	05-Nov-2020
		Date Reported:	13-Nov-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Aqueous

Sample Name:		Rinsate 4/11/20 04-Nov-2020 10:40 am				
Lab Number:		2467651.1				
Individual Tests						
Total Mercury	g/m³	< 0.00008	-	-	-	-
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Arsenic	g/m³	< 0.0011	-	-	-	-
Total Cadmium	g/m³	< 0.000053	-	-	-	-
Total Chromium	g/m³	0.00071	-	-	-	-
Total Copper	g/m³	0.00076	-	-	-	-
Total Lead	g/m³	0.00048	-	-	-	-
Total Nickel	g/m³	0.00195	-	-	-	-
Total Zinc	g/m³	0.0031	-	-	-	-
Haloethers in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m³	< 0.005	-	-	-	-
Bis(2-chloroethyl)ether	g/m³	< 0.005	-	-	-	-
Bis(2-chloroisopropyl)ether	g/m³	< 0.005	-	-	-	-
4-Bromophenyl phenyl ether	g/m³	< 0.005	-	-	-	-
4-Chlorophenyl phenyl ether	g/m³	< 0.005	-	-	-	-
Nitrogen containing compounds in SVOC Water Samples by GC-MS*						
2,4-Dinitrotoluene	g/m³	< 0.010	-	-	-	-
2,6-Dinitrotoluene	g/m³	< 0.010	-	-	-	-
Nitrobenzene	g/m³	< 0.005	-	-	-	-
N-Nitrosodi-n-propylamine	g/m³	< 0.010	-	-	-	-
N-Nitrosodiphenylamine + Diphenylamine*	g/m3	< 0.010	-	-	-	-
Organochlorine Pesticides in SVOC Water Samples by GC-MS						
Aldrin	g/m³	< 0.005	-	-	-	-
alpha-BHC	g/m³	< 0.005	-	-	-	-
beta-BHC	g/m³	< 0.005	-	-	-	-
delta-BHC	g/m³	< 0.005	-	-	-	-
gamma-BHC (Lindane)	g/m³	< 0.005	-	-	-	-
4,4'-DDD	g/m³	< 0.005	-	-	-	-
4,4'-DDE	g/m³	< 0.005	-	-	-	-
4,4'-DDT	g/m³	< 0.010	-	-	-	-
Dieldrin	g/m³	< 0.005	-	-	-	-
Endosulfan I	g/m³	< 0.010	-	-	-	-
Endosulfan II	g/m³	< 0.010	-	-	-	-
Endosulfan sulfate	g/m³	< 0.010	-	-	-	-
Endrin	g/m³	< 0.010	-	-	-	-
Endrin ketone	g/m³	< 0.010	-	-	-	-

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Aqueous						
Sample Name:		Rinsate 4/11/20 04-Nov-2020 10:40 am				
Lab Number:		2467651.1				
Organochlorine Pesticides in SVOC Water Samples by GC-MS						
Heptachlor	g/m³	< 0.005	-	-	-	-
Heptachlor epoxide	g/m³	< 0.005	-	-	-	-
Hexachlorobenzene	g/m³	< 0.005	-	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS*						
Acenaphthene	g/m³	< 0.003	-	-	-	-
Acenaphthylene	g/m³	< 0.003	-	-	-	-
Anthracene	g/m³	< 0.003	-	-	-	-
Benzo[a]anthracene	g/m³	< 0.003	-	-	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.003	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.003	-	-	-	-
Benzo[g,h,i]perylene	g/m³	< 0.003	-	-	-	-
Benzo[k]fluoranthene	g/m³	< 0.003	-	-	-	-
1&2-Chloronaphthalene	g/m³	< 0.003	-	-	-	-
Chrysene	g/m³	< 0.003	-	-	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.003	-	-	-	-
Fluoranthene	g/m³	< 0.003	-	-	-	-
Fluorene	g/m³	< 0.003	-	-	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.003	-	-	-	-
2-Methylnaphthalene	g/m³	< 0.003	-	-	-	-
Naphthalene	g/m³	< 0.003	-	-	-	-
Phenanthrene	g/m³	< 0.003	-	-	-	-
Pyrene	g/m³	< 0.003	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	g/m³	< 0.008	-	-	-	-
Phenols in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	< 0.010	-	-	-	-
2-Chlorophenol	g/m³	< 0.005	-	-	-	-
2,4-Dichlorophenol	g/m³	< 0.005	-	-	-	-
2,4-Dimethylphenol	g/m³	< 0.005	-	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m³	< 0.010	-	-	-	-
2-Methylphenol (o-Cresol)	g/m³	< 0.005	-	-	-	-
2-Nitrophenol	g/m³	< 0.010	-	-	-	-
Pentachlorophenol (PCP)	g/m³	< 0.10	-	-	-	-
Phenol	g/m³	< 0.010	-	-	-	-
2,4,5-Trichlorophenol	g/m³	< 0.010	-	-	-	-
2,4,6-Trichlorophenol	g/m³	< 0.010	-	-	-	-
Plasticisers in SVOC Water Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	g/m³	< 0.03	-	-	-	-
Butylbenzylphthalate	g/m³	< 0.010	-	-	-	-
Di(2-ethylhexyl)adipate	g/m³	< 0.005	-	-	-	-
Diethylphthalate	g/m³	< 0.010	-	-	-	-
Dimethylphthalate	g/m³	< 0.010	-	-	-	-
Di-n-butylphthalate	g/m³	< 0.010	-	-	-	-
Di-n-octylphthalate	g/m³	< 0.010	-	-	-	-
Other Halogenated compounds in SVOC Water Samples by GC-MS						
1,2-Dichlorobenzene	g/m³	< 0.010	-	-	-	-
1,3-Dichlorobenzene	g/m³	< 0.010	-	-	-	-
1,4-Dichlorobenzene	g/m³	< 0.010	-	-	-	-
Hexachlorobutadiene	g/m³	< 0.010	-	-	-	-
Hexachloroethane	g/m³	< 0.010	-	-	-	-
1,2,4-Trichlorobenzene	g/m³	< 0.005	-	-	-	-
Other compounds in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m³	< 0.05	-	-	-	-
Carbazole	g/m³	< 0.005	-	-	-	-

Sample Type: Aqueous						
Sample Name:	Rinsate 4/11/20 04-Nov-2020 10:40 am					
Lab Number:	2467651.1					
Other compounds in SVOC Water Samples by GC-MS						
Dibenzofuran g/m³	< 0.005	-	-	-	-	
Isophorone g/m³	< 0.005	-	-	-	-	

Summary of Methods

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

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23rd ed. 2017 / US EPA 200.8.	0.000053 - 0.0011 g/m³	1
Semivolatile Organic Compounds Screening in Water by GC-MS	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) 23rd ed. 2017.	-	1
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	1

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

Testing was completed between 11-Nov-2020 and 13-Nov-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

Hill Laboratories
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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2487331	A2Pv2
Contact:	Rebecca van der Krogt	**Date Received:**	04-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	22-Dec-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		HA03-0m 02-Dec-2020	HA03-0.5m 02-Dec-2020	HA03-1.0m 02-Dec-2020	HA05-0m 01-Dec-2020	HA05-1m 01-Dec-2020
Lab Number:		2487331.1	2487331.2	2487331.3	2487331.11	2487331.12
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 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	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	820.9	864.6	976.6	896.6	913.3
Dry Weight	g	641.6	648.1	790.1	695.7	633.8
Moisture	%	22	25	19	22	31
Sample Fraction >10mm	g dry wt	2.0	23.4	< 0.1	15.3	171.5
Sample Fraction <10mm to >2mm	g dry wt	8.8	265.4	26.1	96.6	222.5
Sample Fraction <2mm	g dry wt	628.6	357.0	763.0	582.5	238.4
<2mm Subsample Weight	g dry wt	57.8	58.1	57.8	58.3	53.6
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA05-2m 01-Dec-2020	HA06-0m 01-Dec-2020	HA06-1m 01-Dec-2020	HA06-2m 01-Dec-2020	HA07-0.1m 01-Dec-2020
Lab Number:		2487331.13	2487331.16	2487331.17	2487331.18	2487331.21
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 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	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
As Received Weight	g	1,080.7	817.3	997.3	895.4	422.3
Dry Weight	g	817.2	518.2	666.6	664.6	320.4
Moisture	%	24	37	33	26	-

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Sample Type: Soil						
Sample Name:		HA05-2m 01-Dec-2020	HA06-0m 01-Dec-2020	HA06-1m 01-Dec-2020	HA06-2m 01-Dec-2020	HA07-0.1m 01-Dec-2020
Lab Number:		2487331.13	2487331.16	2487331.17	2487331.18	2487331.21
Sample Fraction >10mm	g dry wt	< 0.1	5.8	101.5	93.4	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	1.7	49.0	252.4	229.9	113.7
Sample Fraction <2mm	g dry wt	815.0	462.3	310.1	339.5	204.7
<2mm Subsample Weight	g dry wt	57.7	52.4	53.8	57.6	56.5
Weight of Asbestos in >10mm Sample Fraction	g dry wt	-	-	-	-	< 0.00001
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	-	-	-	-	< 0.00001
Weight of Asbestos in <2mm Sample Fraction	g dry wt	-	-	-	-	< 0.00001
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-

Sample Name:		HA07-0.5m 01-Dec-2020	HA07-1.0m 01-Dec-2020	HA112-0.5m 02-Dec-2020	HA112-1.0m 02-Dec-2020	HA113-0m 02-Dec-2020
Lab Number:		2487331.22	2487331.23	2487331.28	2487331.29	2487331.30
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	-	-	-	-	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	-	-	-	-	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	-	-	-	-	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	-	-	-	-	< 0.001
As Received Weight	g	451.3	528.0	427.5	426.6	786.3
Dry Weight	g	323.9	347.2	309.1	311.4	593.1
Moisture	%	-	-	-	-	25
Sample Fraction >10mm	g dry wt	< 0.1	2.5	0.3	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	117.7	151.0	95.9	95.5	153.0
Sample Fraction <2mm	g dry wt	204.5	191.6	211.6	215.0	439.6
<2mm Subsample Weight	g dry wt	58.3	51.5	57.0	53.0	57.8
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	-	-	-	-	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	-	-	-	-	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	-	-	-	-	< 0.00001

Sample Name:		HA113-0.5m 02-Dec-2020	HA113-1.0m 02-Dec-2020	HA116-0m 02-Dec-2020	HA116-0.5m 02-Dec-2020	HA116-1.0m 02-Dec-2020
Lab Number:		2487331.31	2487331.32	2487331.33	2487331.34	2487331.35
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 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

Sample Type: Soil						
Sample Name:		HA113-0.5m 02-Dec-2020	HA113-1.0m 02-Dec-2020	HA116-0m 02-Dec-2020	HA116-0.5m 02-Dec-2020	HA116-1.0m 02-Dec-2020
Lab Number:		2487331.31	2487331.32	2487331.33	2487331.34	2487331.35
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	824.4	762.4	785.3	921.7	938.3
Dry Weight	g	660.1	546.6	552.7	681.3	650.7
Moisture	%	20	28	30	26	31
Sample Fraction >10mm	g dry wt	< 0.1	132.4	0.7	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	196.2	222.4	47.8	228.2	88.1
Sample Fraction <2mm	g dry wt	462.2	189.7	503.1	449.5	561.4
<2mm Subsample Weight	g dry wt	57.7	58.8	52.3	56.1	55.7
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA117-0.1m 02-Dec-2020	HA117-0.5m 02-Dec-2020	HA117-1.0m 02-Dec-2020		
Lab Number:		2487331.36	2487331.37	2487331.38		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	338.4	410.8	380.2	-	-
Dry Weight	g	280.0	317.5	287.8	-	-
Sample Fraction >10mm	g dry wt	3.9	< 0.1	< 0.1	-	-
Sample Fraction <10mm to >2mm	g dry wt	154.4	169.4	142.3	-	-
Sample Fraction <2mm	g dry wt	120.9	147.4	144.8	-	-
<2mm Subsample Weight	g dry wt	58.6	58.6	52.6	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

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.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2487331-A2Pv1' issued on 11-Dec-2020 at 12:50 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3, 11-13, 16-18, 30-35
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	21-23, 28-29, 36-38
Semi Quantitative Asbestos in Soil			
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	21-23, 28-29, 36-38
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	21-23, 28-29, 36-38
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	21-23, 28-29, 36-38
New Zealand 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	1-3, 11-13, 16-18, 21-23, 28-38
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3, 11-13, 16-18, 21-23, 28-38
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3, 11-13, 16-18, 30-35
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 11-13, 16-18, 21-23, 28-38
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 11-13, 16-18, 21-23, 28-38
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3, 11-13, 16-18, 21-23, 28-38
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.	0.01%	1-3, 11-13, 16-18, 21-23, 28-38
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3, 11-13, 16-18, 21-23, 28-38
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. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 11-13, 16-18, 30-35
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 11-13, 16-18, 30-35
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 11-13, 16-18, 30-35
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 11-13, 16-18, 30-35

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3, 11-13, 16-18, 30-35
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 11-13, 16-18, 30-35
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3, 11-13, 16-18, 30-35

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

Testing was completed between 11-Dec-2020 and 22-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2486806 SPv2
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	04-Dec-2020
		Date Reported:	24-Dec-2020 **(Amended)**
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Soil

Sample Name:		HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	HA04 0m 02-Dec-2020 7:10 am	HA04 0.5m 02-Dec-2020 7:25 am
Lab Number:		2486806.1	2486806.2	2486806.3	2486806.8	2486806.9
Individual Tests						
Dry Matter	g/100g as rcvd	77	74	80	82	84
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.49	< 0.10	< 0.10	0.34	< 0.10
Total Recoverable Chromium	mg/kg dry wt	6	5	4	6	4
Total Recoverable Copper	mg/kg dry wt	8	< 2	< 2	9	2
Total Recoverable Lead	mg/kg dry wt	7.1	6.7	5.9	7.3	6.0
Total Recoverable Mercury	mg/kg dry wt	< 0.10	0.14	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	13	< 4	< 4	13	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.3	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Acenaphthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.03	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.03	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Chrysene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Fluorene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	-	-
Perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Phenanthrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-
Pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	-	-

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

Sample Type: Soil						
Sample Name:		HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	HA04 0m 02-Dec-2020 7:10 am	HA04 0.5m 02-Dec-2020 7:25 am
Lab Number:		2486806.1	2486806.2	2486806.3	2486806.8	2486806.9
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.7
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.7
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	-	-	-	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endrin	mg/kg dry wt	-	-	-	< 0.8	< 0.7
Endrin ketone	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Chrysene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Fluorene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Pyrene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	< 1.3	< 1.3

Sample Type: Soil						
Sample Name:		HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	HA04 0m 02-Dec-2020 7:10 am	HA04 0.5m 02-Dec-2020 7:25 am
Lab Number:		2486806.1	2486806.2	2486806.3	2486806.8	2486806.9
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	-	< 5	< 5
2-Chlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	-	-	-	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	-	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	-	-	-	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 30	< 30
Phenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	-	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.7
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.7
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.7
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.8	< 0.7
Hexachloroethane	mg/kg dry wt	-	-	-	< 0.8	< 0.7
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	-	< 10	< 10
Carbazole	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Isophorone	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	57	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Individual Tests						
Dry Matter	g/100g as rcvd	78	72	75	70	74
Ammonium-N*	mg/kg dry wt	-	< 5	22	20	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	5	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.29
Total Recoverable Chromium	mg/kg dry wt	7	5	6	6	8
Total Recoverable Copper	mg/kg dry wt	5	3	4	3	5
Total Recoverable Lead	mg/kg dry wt	9.3	7.1	6.7	5.8	11.0
Total Recoverable Mercury	mg/kg dry wt	0.11	< 0.10	0.13	0.11	< 0.10
Total Recoverable Nickel	mg/kg dry wt	4	< 2	< 2	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	5	7	5	5	13

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Alachlor	mg/kg	-	< 0.05	< 0.05	< 0.05	-
Atrazine	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Atrazine-desethyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Atrazine-desisopropyl	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Azaconazole	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Azinphos-methyl	mg/kg	-	< 0.14	< 0.13	< 1.4	-
Benalaxyl	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Bitertanol	mg/kg	-	< 0.14	< 0.13	< 1.4	-
Bromacil	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Bromopropylate	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Butachlor	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Captan	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Carbaryl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Carbofuran	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Chlorfluazuron	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Chlorothalonil	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Chlorpyrifos	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Chlorpyrifos-methyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Chlortoluron	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Cyanazine	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Cyfluthrin	mg/kg	-	< 0.08	< 0.08	< 0.9	-
Cyhalothrin	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Cypermethrin	mg/kg	-	< 0.16	< 0.16	< 1.7	-
Deltamethrin (including Tralomethrin)	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Diazinon	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Dichlofluanid	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Dichloran	mg/kg	-	< 0.2	< 0.2	< 0.2	-
Dichlorvos	mg/kg	-	< 0.09	< 0.09	< 0.09	-
Difenoconazole	mg/kg	-	< 0.10	< 0.09	< 1.0	-
Dimethoate	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Diphenylamine	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Diuron	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Fenpropimorph	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Fluazifop-butyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Fluometuron	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Flusilazole	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Fluvalinate	mg/kg	-	< 0.05	< 0.05	< 0.5	-
Furalaxyl	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Haloxyfop-methyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Hexaconazole	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Hexazinone	mg/kg	-	< 0.04	< 0.04	< 0.4	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	-	< 0.4	< 0.4	< 0.4	-
Kresoxim-methyl	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Linuron	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Malathion	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Metalaxyl (Mefenoxam)	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Methamidophos	mg/kg	-	< 0.4	< 0.4	< 0.4	-
Metolachlor	mg/kg	-	< 0.05	< 0.05	< 0.05	-
Metribuzin	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Molinate	mg/kg	-	< 0.14	< 0.13	< 0.14	-
Myclobutanil	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Naled	mg/kg	-	< 0.4	< 0.4	< 0.4	-
Norflurazon	mg/kg	-	< 0.14	< 0.13	< 0.14	-

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Oxadiazon	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Oxyfluorfen	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Paclobutrazol	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Parathion-ethyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Parathion-methyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Pendimethalin	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Permethrin	mg/kg	-	< 0.03	< 0.03	< 0.19	-
Pirimicarb	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Pirimiphos-methyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Prochloraz	mg/kg	-	< 0.4	< 0.4	< 4	-
Procymidone	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Prometryn	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Propachlor	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Propanil	mg/kg	-	< 0.2	< 0.2	< 0.2	-
Propazine	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Propiconazole	mg/kg	-	< 0.05	< 0.05	< 0.5	-
Pyriproxyfen	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Quizalofop-ethyl	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Simazine	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Simetryn	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Sulfentrazone	mg/kg	-	< 0.4	< 0.4	< 4	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	-	< 0.14	< 0.13	< 0.14	-
Tebuconazole	mg/kg	-	< 0.07	< 0.07	< 0.7	-
Terbacil	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Terbufos	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Terbumeton	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Terbuthylazine	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Terbuthylazine-desethyl	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Terbutryn	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Thiabendazole	mg/kg	-	< 0.4	< 0.4	< 0.4	-
Thiobencarb	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Tolylfluanid	mg/kg	-	< 0.04	< 0.04	< 0.04	-
Triazophos	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Trifluralin	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Vinclozolin	mg/kg	-	< 0.07	< 0.07	< 0.07	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	-	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.014
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.014
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.014
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.014
Anthracene	mg/kg dry wt	-	-	-	-	< 0.014
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	0.016
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	0.018
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	0.020
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	0.014
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.014
Chrysene	mg/kg dry wt	-	-	-	-	0.014

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.014
Fluoranthene	mg/kg dry wt	-	-	-	-	0.041
Fluorene	mg/kg dry wt	-	-	-	-	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	< 0.014
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.07
Perylene	mg/kg dry wt	-	-	-	-	< 0.014
Phenanthrene	mg/kg dry wt	-	-	-	-	0.023
Pyrene	mg/kg dry wt	-	-	-	-	0.036
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.5	< 0.5	< 0.5	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 9	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 9	-
Endrin	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 9	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 3	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 3	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 3	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 5	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 10	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 10	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 17	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 9	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 5	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 9	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.9	< 0.9	< 0.9	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	-	< 8
C10 - C14	mg/kg dry wt	-	-	-	-	< 20
C15 - C36	mg/kg dry wt	-	-	-	-	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	-	< 70
BTEX in VOC Soils by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Ethylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Toluene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
m&p-Xylene	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
o-Xylene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
Bromomethane (Methyl Bromide)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Carbon tetrachloride	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Chloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Chloromethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Dibromomethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,3-Dichloropropane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Dichlorodifluoromethane	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
1,1-Dichloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2-Dichloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,1-Dichloroethene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
cis-1,2-Dichloroethene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
trans-1,2-Dichloroethene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Dichloromethane (methylene chloride)	mg/kg dry wt	-	< 9	< 9	< 10	-
1,2-Dichloropropane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,1-Dichloropropene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
cis-1,3-Dichloropropene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
trans-1,3-Dichloropropene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Hexachlorobutadiene	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,1,1-Trichloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,1,2-Trichloroethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Trichlorofluoromethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2,3-Trichloropropane	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Vinyl chloride	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Haloaromatics in VOC Soils by Headspace GC-MS						
Bromobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,3-Dichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
4-Chlorotoluene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2-Dichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,4-Dichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
2-Chlorotoluene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2,3-Trichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,3,5-Trichlorobenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
n-Butylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
tert-Butylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Isopropylbenzene (Cumene)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	-	< 0.3	16.1	105	-
n-Propylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
sec-Butylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Styrene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
1,2,4-Trimethylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-

Sample Type: Soil						
Sample Name:		HA04 1m 02-Dec-2020 7:33 am	HA112 0.1m 02-Dec-2020	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am
Lab Number:		2486806.10	2486806.15	2486806.18	2486806.19	2486806.20
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
1,3,5-Trimethylbenzene	mg/kg dry wt	-	< 0.3	< 0.3	3.0	-
Ketones in VOC Soils by Headspace GC-MS						
2-Butanone (MEK)	mg/kg dry wt	-	< 50	< 50	< 50	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	-	< 9	< 9	< 10	-
Acetone	mg/kg dry wt	-	< 50	< 50	< 50	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Trihalomethanes in VOC Soils by Headspace GC-MS						
Bromodichloromethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Bromoform (tribromomethane)	mg/kg dry wt	-	< 0.5	< 0.5	< 0.5	-
Chloroform (Trichloromethane)	mg/kg as rcvd	-	< 0.3	< 0.3	< 0.3	-
Dibromochloromethane	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Other VOC in Soils by Headspace GC-MS						
Carbon disulphide	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-
Naphthalene	mg/kg dry wt	-	< 0.3	< 0.3	< 0.3	-

Sample Name:		HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm
Lab Number:		2486806.21	2486806.22	2486806.24	2486806.25	2486806.26
Individual Tests						
Dry Matter	g/100g as rcvd	80	69	72	75	71
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.28	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	5	7	8	4	4
Total Recoverable Copper	mg/kg dry wt	< 2	4	9	2	5
Total Recoverable Lead	mg/kg dry wt	4.4	7.7	16.3	4.4	8.4
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	< 2	< 2	5	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	< 4	4	19	< 4	< 4
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	1.6	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014
Acenaphthene	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014
Anthracene	mg/kg dry wt	< 0.013	< 0.015	0.018	< 0.013	< 0.014
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.015	0.114	< 0.013	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.015	0.152	< 0.013	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	< 0.04	0.23	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	< 0.04	0.22	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.015	0.171	< 0.013	< 0.014
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.015	0.110	< 0.013	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.015	0.129	< 0.013	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.015	0.068	< 0.013	< 0.014
Chrysene	mg/kg dry wt	< 0.013	< 0.015	0.123	< 0.013	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.015	0.022	< 0.013	< 0.014
Fluoranthene	mg/kg dry wt	< 0.013	< 0.015	0.25	< 0.013	< 0.014
Fluorene	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.013	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.015	0.122	< 0.013	< 0.014
Naphthalene	mg/kg dry wt	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.013	< 0.015	0.034	< 0.013	< 0.014
Phenanthrene	mg/kg dry wt	< 0.013	< 0.015	0.076	< 0.013	< 0.014

Sample Type: Soil						
Sample Name:		HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm
Lab Number:		2486806.21	2486806.22	2486806.24	2486806.25	2486806.26
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Pyrene	mg/kg dry wt	< 0.013	< 0.015	0.25	< 0.013	< 0.014
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 9	< 9	< 8	< 9
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	41	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70

Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Individual Tests						
Dry Matter	g/100g as rcvd	81	79	73	79	75
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.34	0.30
Total Recoverable Chromium	mg/kg dry wt	7	7	6	7	7
Total Recoverable Copper	mg/kg dry wt	7	4	5	9	4
Total Recoverable Lead	mg/kg dry wt	8.8	9.4	12.5	7.4	10.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	4	3	< 2	< 2	< 2
Total Recoverable Zinc	mg/kg dry wt	11	7	5	15	12
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Alachlor	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Atrazine	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Atrazine-desethyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Atrazine-desisopropyl	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Azaconazole	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Azinphos-methyl	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Benalaxyl	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Bitertanol	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Bromacil	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Bromopropylate	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Butachlor	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Captan	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Carbaryl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Carbofuran	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Chlorfluazuron	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Chlorothalonil	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Chlorpyrifos	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Chlorpyrifos-methyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Chlortoluron	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Cyanazine	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Cyfluthrin	mg/kg	< 0.08	< 0.08	< 0.08	-	-
Cyhalothrin	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Cypermethrin	mg/kg	< 0.15	< 0.15	< 0.16	-	-
Deltamethrin (including Tralomethrin)	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Diazinon	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Dichlofluanid	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Dichloran	mg/kg	< 0.2	< 0.2	< 0.2	-	-
Dichlorvos	mg/kg	< 0.09	< 0.09	< 0.09	-	-
Difenoconazole	mg/kg	< 0.09	< 0.09	< 0.10	-	-
Dimethoate	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Diphenylamine	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Diuron	mg/kg	< 0.06	< 0.06	< 0.07	-	-

Sample Type: Soil						
Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Fenpropimorph	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Fluazifop-butyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Fluometuron	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Flusilazole	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Fluvalinate	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Furalaxyl	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Haloxyfop-methyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Hexaconazole	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Hexazinone	mg/kg	< 0.03	< 0.03	< 0.04	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3	< 0.3	< 0.4	-	-
Kresoxim-methyl	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Linuron	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Malathion	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Metalaxyl (Mefenoxam)	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Methamidophos	mg/kg	< 0.3	< 0.3	< 0.4	-	-
Metolachlor	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Metribuzin	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Molinate	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Myclobutanil	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Naled	mg/kg	< 0.3	< 0.3	< 0.4	-	-
Norflurazon	mg/kg	< 0.12	< 0.12	< 0.13	-	-
Oxadiazon	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Oxyfluorfen	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Paclobutrazol	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Parathion-ethyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Parathion-methyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Pendimethalin	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Permethrin	mg/kg	< 0.03	< 0.03	< 0.03	-	-
Pirimicarb	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Pirimiphos-methyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Prochloraz	mg/kg	< 0.3	< 0.3	< 0.4	-	-
Procymidone	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Prometryn	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Propachlor	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Propanil	mg/kg	< 0.2	< 0.2	< 0.2	-	-
Propazine	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Propiconazole	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Pyriproxyfen	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Quizalofop-ethyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Simazine	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Simetryn	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Sulfentrazone	mg/kg	< 0.3	< 0.3	< 0.4	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.12	< 0.12	< 0.13	-	-
Tebuconazole	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Terbacil	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Terbufos	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Terbumeton	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Terbuthylazine	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Terbuthylazine-desethyl	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Terbutryn	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Thiabendazole	mg/kg	< 0.3	< 0.3	< 0.4	-	-
Thiobencarb	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Tolylfluanid	mg/kg	< 0.03	< 0.03	< 0.04	-	-
Triazophos	mg/kg	< 0.06	< 0.06	< 0.07	-	-

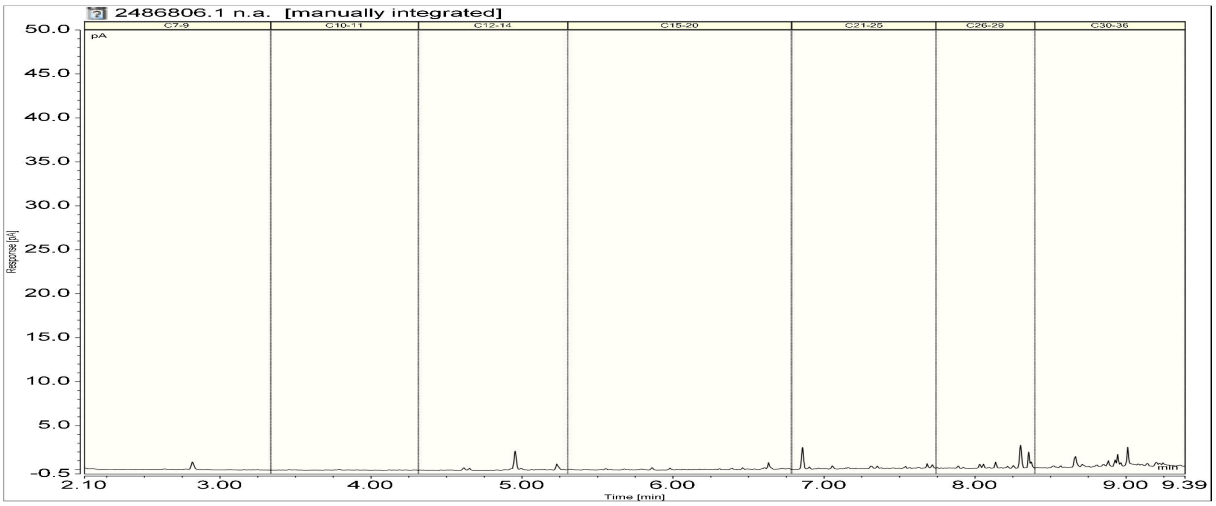
Sample Type: Soil						
Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Trifluralin	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Vinclozolin	mg/kg	< 0.06	< 0.06	< 0.07	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	-	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.013
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.013
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.013
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.013
Anthracene	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.013
Chrysene	mg/kg dry wt	-	-	-	-	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.013
Fluoranthene	mg/kg dry wt	-	-	-	-	0.014
Fluorene	mg/kg dry wt	-	-	-	-	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	< 0.013
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.07
Perylene	mg/kg dry wt	-	-	-	-	< 0.013
Phenanthrene	mg/kg dry wt	-	-	-	-	< 0.013
Pyrene	mg/kg dry wt	-	-	-	-	< 0.013
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endrin	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-

Sample Type: Soil						
Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

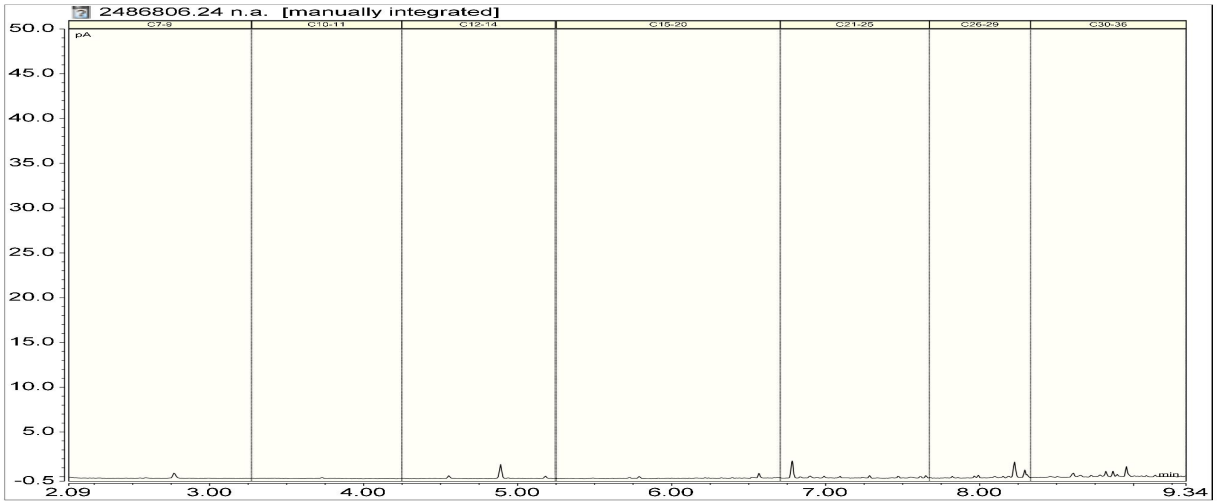
Sample Type: Soil						
Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	-	< 8
C10 - C14	mg/kg dry wt	-	-	-	-	< 20
C15 - C36	mg/kg dry wt	-	-	-	-	59
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	-	< 70
BTEX in VOC Soils by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.19	< 0.2	< 0.3	-	-
Ethylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Toluene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
m&p-Xylene	mg/kg dry wt	< 0.4	< 0.4	< 0.5	-	-
o-Xylene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
Bromomethane (Methyl Bromide)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Carbon tetrachloride	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Chloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Chloromethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Dibromomethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,3-Dichloropropane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Dichlorodifluoromethane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
1,1-Dichloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2-Dichloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1-Dichloroethene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
cis-1,2-Dichloroethene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
trans-1,2-Dichloroethene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Dichloromethane (methylene chloride)	mg/kg dry wt	< 4	< 4	< 5	-	-
1,2-Dichloropropane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1-Dichloropropene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
cis-1,3-Dichloropropene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
trans-1,3-Dichloropropene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1,1-Trichloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,1,2-Trichloroethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Trichlorofluoromethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2,3-Trichloropropane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Vinyl chloride	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Haloaromatics in VOC Soils by Headspace GC-MS						
Bromobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
4-Chlorotoluene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-

Sample Type: Soil						
Sample Name:		HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020	HA117 2.0m 02-Dec-2020	Dup B 02-Dec-2020	Dup C 02-Dec-2020
Lab Number:		2486806.28	2486806.29	2486806.31	2486806.32	2486806.33
Haloaromatics in VOC Soils by Headspace GC-MS						
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2-Dichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
2-Chlorotoluene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2,3-Trichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,3,5-Trichlorobenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
n-Butylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
tert-Butylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Isopropylbenzene (Cumene)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
n-Propylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
sec-Butylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Styrene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,2,4-Trimethylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1,3,5-Trimethylbenzene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Ketones in VOC Soils by Headspace GC-MS						
2-Butanone (MEK)	mg/kg dry wt	< 40	< 40	< 50	-	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	< 8	< 8	< 9	-	-
Acetone	mg/kg dry wt	< 40	< 40	< 50	-	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Trihalomethanes in VOC Soils by Headspace GC-MS						
Bromodichloromethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Bromoform (tribromomethane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Chloroform (Trichloromethane)	mg/kg as rcvd	< 0.3	< 0.3	< 0.3	-	-
Dibromochloromethane	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Other VOC in Soils by Headspace GC-MS						
Carbon disulphide	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Naphthalene	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-

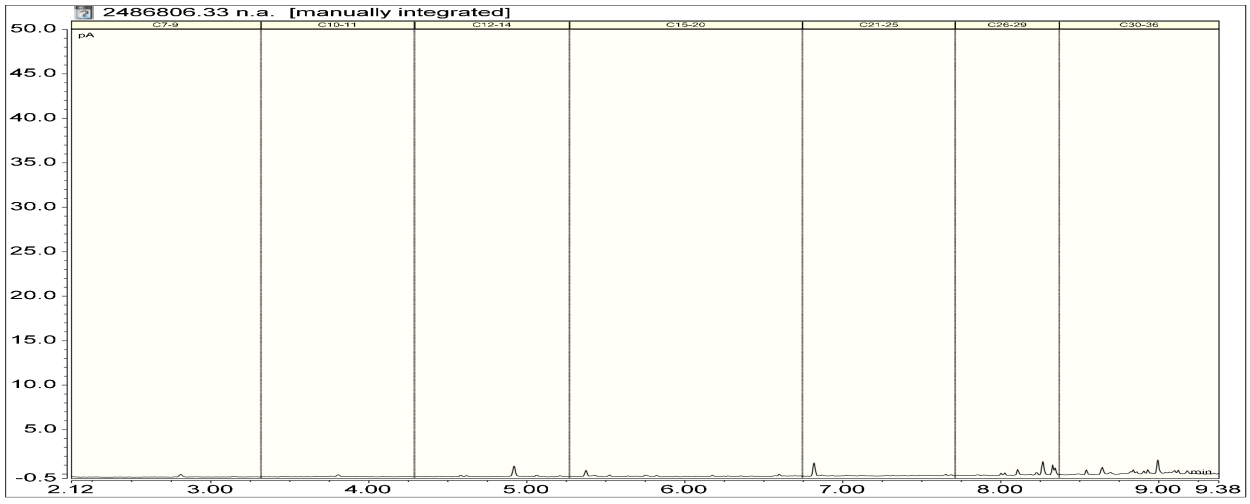
2486806.1
HA03 0m 02-Dec-2020 9:25 am
Client Chromatogram for TPH by FID



2486806.24
HA116 0m 02-Dec-2020 1:10 pm
Client Chromatogram for TPH by FID



2486806.33
Dup C 02-Dec-2020
Client Chromatogram for TPH by FID



Analyst's Comments

It was observed that the container(s) for sample(s) {JOB NUMBER- 2486806/15,18,&19} were not completely filled. Volatile loss may have occurred due to the headspace created in the container.

Amended Report: This certificate of analysis replaces report '2486806-SPv1' issued on 10-Dec-2020 at 3:40 pm. Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 8-10, 15, 18-22, 24-26, 28-29, 31-33
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3, 20-22, 24-26, 33

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 8-10, 15, 18-22, 24-26, 28-29, 31-33
2M KCl Extraction*	2M potassium chloride extraction of as received fraction for analysis of NH4N, NO2N and NO3N. Analyst, 109, 549, (1984).	-	15, 18-19
Ammonium-N*	2M potassium chloride extraction on as received fraction. Phenol/hypochlorite colorimetry. Flow Injection Analyser. APHA 4500-NH_3 H (modified) 23rd ed. 2017.	5 mg/kg dry wt	15, 18-19
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-3, 20-22, 24-26, 33
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-3, 20-22, 24-26, 33
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	1-3, 20-22, 24-26, 33
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 8-10, 15, 18-22, 24-26, 28-29, 31-33
Organonitro&phosphorus Pesticides Screen in Soil by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	-	15, 18-19, 28-29, 31
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	8-10, 15, 18-19, 28-29, 31-32
Volatile Organic Compounds Screening in Soil by Headspace GC-MS	Sonication extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	-	15, 18-19, 28-29, 31
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1, 24, 33
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1-3, 20-22, 24-26, 33
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3, 20-22, 24-26, 33
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3, 20-22, 24-26, 33
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3, 20-22, 24-26, 33

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

Testing was completed between 07-Dec-2020 and 24-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2488783	SPv2
Contact:	Rebecca van der Krogt	**Date Received:**	08-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	18-Dec-2020	**(Amended)**
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		HA107a - 0.1m 04-Dec-2020	HA107a - 0.5m 04-Dec-2020	HA107a - 1.0m 04-Dec-2020	HA108 - 0.1m 03-Dec-2020	HA108 - 0.5m 03-Dec-2020
Lab Number:		2488783.1	2488783.2	2488783.3	2488783.9	2488783.10
Individual Tests						
Dry Matter	g/100g as rcvd	84	79	78	79	75
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	< 2	2
Total Recoverable Cadmium	mg/kg dry wt	0.14	< 0.10	< 0.10	0.16	< 0.10
Total Recoverable Chromium	mg/kg dry wt	5	9	6	5	8
Total Recoverable Copper	mg/kg dry wt	19	7	6	10	6
Total Recoverable Lead	mg/kg dry wt	6.5	10.4	8.3	3.7	8.4
Total Recoverable Mercury	mg/kg dry wt	< 0.10	0.12	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	2	2	< 2	< 2	2
Total Recoverable Zinc	mg/kg dry wt	12	4	< 4	7	5
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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

Sample Type: Soil						
Sample Name:		HA107a - 0.1m 04-Dec-2020	HA107a - 0.5m 04-Dec-2020	HA107a - 1.0m 04-Dec-2020	HA108 - 0.1m 03-Dec-2020	HA108 - 0.5m 03-Dec-2020
Lab Number:		2488783.1	2488783.2	2488783.3	2488783.9	2488783.10
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.7	< 0.8	< 0.8	< 0.8	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA107a - 0.1m 04-Dec-2020	HA107a - 0.5m 04-Dec-2020	HA107a - 1.0m 04-Dec-2020	HA108 - 0.1m 03-Dec-2020	HA108 - 0.5m 03-Dec-2020
Lab Number:		2488783.1	2488783.2	2488783.3	2488783.9	2488783.10
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		HA108 - 1.0m 03-Dec-2020	HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am
Lab Number:		2488783.11	2488783.13	2488783.14	2488783.15	2488783.20
Individual Tests						
Dry Matter	g/100g as rcvd	70	75	74	66	87
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	< 2	< 2	8	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	0.15
Total Recoverable Chromium	mg/kg dry wt	8	6	8	11	11
Total Recoverable Copper	mg/kg dry wt	8	9	6	12	78
Total Recoverable Lead	mg/kg dry wt	11.3	4.3	9.1	22	14.9
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.18	< 0.10
Total Recoverable Nickel	mg/kg dry wt	2	< 2	2	6	22
Total Recoverable Zinc	mg/kg dry wt	6	8	6	10	53
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.4	< 0.5	< 0.5	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA108 - 1.0m 03-Dec-2020	HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am
Lab Number:		2488783.11	2488783.13	2488783.14	2488783.15	2488783.20
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
1,3-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
1,4-Dichlorobenzene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
Hexachlorobutadiene	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
Hexachloroethane	mg/kg dry wt	< 0.9	< 0.8	< 0.9	< 0.9	< 0.7
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA114 - 0.5m 03-Dec-2020 8:25 am	HA114 - 1.0m 03-Dec-2020 8:32 am	HA115 - 0.1m 03-Dec-2020	HA115 - 0.5m 03-Dec-2020	HA115 - 1.0m 03-Dec-2020
Lab Number:		2488783.21	2488783.22	2488783.27	2488783.28	2488783.29
Individual Tests						
Dry Matter	g/100g as rcvd	79	69	77	81	71
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	3	< 2	2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.15	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	8	10	15	7	10
Total Recoverable Copper	mg/kg dry wt	4	7	34	4	6
Total Recoverable Lead	mg/kg dry wt	4.8	9.6	22	5.8	9.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.11
Total Recoverable Nickel	mg/kg dry wt	< 2	2	11	< 2	2
Total Recoverable Zinc	mg/kg dry wt	4	7	57	7	8
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.5	< 0.4	< 0.4	< 0.5
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA114 - 0.5m 03-Dec-2020 8:25 am	HA114 - 1.0m 03-Dec-2020 8:32 am	HA115 - 0.1m 03-Dec-2020	HA115 - 0.5m 03-Dec-2020	HA115 - 1.0m 03-Dec-2020
Lab Number:		2488783.21	2488783.22	2488783.27	2488783.28	2488783.29
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020	HA108 - dup 03-Dec-2020
Lab Number:		2488783.31	2488783.32	2488783.33	2488783.37	2488783.38
Individual Tests						
Dry Matter	g/100g as rcvd	82	71	72	77	69
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	3	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.23	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	6	9	6	8	9
Total Recoverable Copper	mg/kg dry wt	9	6	4	8	7

Sample Type: Soil						
Sample Name:		HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020	HA108 - dup 03-Dec-2020
Lab Number:		2488783.31	2488783.32	2488783.33	2488783.37	2488783.38
Heavy Metals with Mercury, Screen Level						
Total Recoverable Lead	mg/kg dry wt	4.2	8.7	7.1	9.7	9.3
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	< 2	< 2	< 2	2	< 2
Total Recoverable Zinc	mg/kg dry wt	8	5	< 4	6	5
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.5	< 0.5	< 0.4	< 0.5
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm	HA107b dup 04-Dec-2020	HA108 - dup 03-Dec-2020
Lab Number:		2488783.31	2488783.32	2488783.33	2488783.37	2488783.38
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
1,3-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
1,4-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
Hexachlorobutadiene	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
Hexachloroethane	mg/kg dry wt	< 0.7	< 0.9	< 0.9	< 0.8	< 0.9
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Name:		Dup - D	Dup - E	HA115 Duplicate		
Lab Number:		2488783.39	2488783.40	2488783.41		
Individual Tests						
Dry Matter	g/100g as rcvd	85	82	71	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	< 2	2	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.15	0.23	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	10	6	9	-	-
Total Recoverable Copper	mg/kg dry wt	72	9	6	-	-
Total Recoverable Lead	mg/kg dry wt	13.2	4.4	10.4	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	0.10	-	-
Total Recoverable Nickel	mg/kg dry wt	11	< 2	3	-	-
Total Recoverable Zinc	mg/kg dry wt	54	8	7	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-

Sample Type: Soil						
Sample Name:		Dup - D	Dup - E	HA115 Duplicate		
Lab Number:		2488783.39	2488783.40	2488783.41		
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.5	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Endrin	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	-	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-

Sample Type: Soil						
Sample Name:		Dup - D	Dup - E	HA115 Duplicate		
Lab Number:		2488783.39	2488783.40	2488783.41		
Phenols in SVOC Soil Samples by GC-MS						
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	-	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
Hexachloroethane	mg/kg dry wt	< 0.7	< 0.8	< 0.9	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	-	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2488783-SPv1' issued on 11-Dec-2020 at 2:15 pm.
Reason for amendment: Additional testing added as per clients request.

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 9-11, 13-15, 20-22, 27-29, 31-33, 37-41
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 9-11, 13-15, 20-22, 27-29, 31-33, 37-41
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	1-3, 9-11, 13-15, 20-22, 27-29, 31-33, 37-41

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 9-11, 13-15, 20-22, 27-29, 31-33, 37-41

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

Testing was completed between 09-Dec-2020 and 18-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2492155	A2Pv1
Contact:	Rebecca van der Krogt	**Date Received:**	11-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	19-Dec-2020	
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020		
Lab Number:		2492155.1	2492155.2	2492155.4		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	395.0	515.2	478.1	-	-
Dry Weight	g	302.7	397.2	319.4	-	-
Sample Fraction >10mm	g dry wt	2.6	< 0.1	< 0.1	-	-
Sample Fraction <10mm to >2mm	g dry wt	146.1	168.7	138.7	-	-
Sample Fraction <2mm	g dry wt	153.0	227.5	180.6	-	-
<2mm Subsample Weight	g dry wt	53.6	53.2	53.1	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
- Trace - Trace levels of asbestos, as defined by AS4964-2004.

For further details, please contact the Asbestos Team.

Testing has been carried out under the assumption that the weight of asbestos in the sample is unaffected by the ashing process.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	1-2, 4
Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-2, 4
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-2, 4

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-2, 4
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-2, 4
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-2, 4
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.	0.01%	1-2, 4
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2, 4
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-2, 4
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-2, 4
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-2, 4

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

Testing was completed on 19-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2490317	A2Pv1
Contact:	Rebecca van der Krogt	**Date Received:**	09-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	21-Dec-2020	
	PO Box 5271	**Quote No:**	80842	
	Auckland 1141	**Order No:**	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Soil

Sample Name:		HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020		
Lab Number:		2490317.1	2490317.3	2490317.4		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
As Received Weight	g	246.2	394.7	482.5	-	-
Dry Weight	g	172.5	285.7	332.4	-	-
Sample Fraction >10mm	g dry wt	29.5	9.8	11.7	-	-
Sample Fraction <10mm to >2mm	g dry wt	55.2	111.7	117.8	-	-
Sample Fraction <2mm	g dry wt	87.4	164.0	202.3	-	-
<2mm Subsample Weight	g dry wt	50.7	54.3	53.7	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
- Trace - Trace levels of asbestos, as defined by AS4964-2004.

For further details, please contact the Asbestos Team.

Testing has been carried out under the assumption that the weight of asbestos in the sample is unaffected by the ashing process.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	1, 3-4
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, 3-4
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, 3-4

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1, 3-4
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1, 3-4
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1, 3-4
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.	0.01%	1, 3-4
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1, 3-4
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1, 3-4
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1, 3-4
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1, 3-4

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Testing was completed between 19-Dec-2020 and 21-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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Technical Manager - Asbestos

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Certificate of Analysis

Tonkin and Taylor Ltd
105 Carlton Gore Road, Newmarket
Auckland

Attention: Rebecca Van der Krogt
Phone: 027 304 0134
Email: rvanderkrogt@tonkintaylor.co.nz

Lab Reference: 20-42713
Submitted by: Rebecca van der Krogt
Date Received: 11/11/2020
Testing Initiated: 11/11/2020
Date Completed: 18/11/2020
Order Number:
Reference: 1014985

Sampling Site:

Report Comments

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

Heavy Metals in Soil

			Client Sample ID	Split Envr - SS03 - 0.1-0.2m
			Date Sampled	9/11/2020
Analyte	Unit	*Reporting Limit*	20-42713-2	
Arsenic	mg/kg dry wt	*0.125*	0.84	
Cadmium	mg/kg dry wt	*0.005*	0.061	
Chromium	mg/kg dry wt	*0.125*	2.7	
Copper	mg/kg dry wt	*0.075*	19.8	
Lead	mg/kg dry wt	*0.25*	7.50	
Mercury	mg/kg dry wt	*0.025*	0.047	
Nickel	mg/kg dry wt	*0.05*	1.8	
Zinc	mg/kg dry wt	*0.05*	20.7	

Semivolatile Organic Compounds - Soil

			Client Sample ID	Split Envr - SS03 - 0.1-0.2m
			Date Sampled	9/11/2020
Analyte	Unit	*Reporting Limit*	20-42713-2	
Phenol	mg/kg dry wt	*0.3*	<0.3	
2-Chlorophenol	mg/kg dry wt	*0.3*	<0.3	
2-Methylphenol	mg/kg dry wt	*0.3*	<0.3	
2-Nitrophenol	mg/kg dry wt	*1.0*	<1.0	
2,4-Dimethylphenol	mg/kg dry wt	*0.3*	<0.3	
2,4-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3	

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Semivolatile Organic Compounds - Soil

			Client Sample ID	Split Envr - SS03 - 0.1-0.2m
			Date Sampled	9/11/2020
2,6-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3
4-Chloro-3-methylphenol	mg/kg dry wt	*0.3*	<0.3
2,4,5-Trichlorophenol	mg/kg dry wt	*5*	<5
2,4,6-Trichlorophenol	mg/kg dry wt	*5*	<5.0
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	*5*	<5
4-Methylphenol	mg/kg dry wt	*0.3*	<0.3
4-Nitrophenol	mg/kg dry wt	*5*	<5
Naphthalene	mg/kg dry wt	*0.1*	<0.11
2-Methylnaphthalene	mg/kg dry wt	*0.1*	<0.11
2-Chloronaphthalene	mg/kg dry wt	*0.3*	<0.3
Acenaphthene	mg/kg dry wt	*0.1*	<0.11
Acenaphthylene	mg/kg dry wt	*0.1*	<0.11
Fluorene	mg/kg dry wt	*0.1*	<0.11
Phenanthrene	mg/kg dry wt	*0.1*	<0.11
Anthracene	mg/kg dry wt	*0.1*	<0.11
2-Phenylphenol	mg/kg dry wt	*0.5*	<0.5
Fluoranthene	mg/kg dry wt	*0.1*	<0.11
Benzo[a]anthracene	mg/kg dry wt	*0.1*	<0.11
Chrysene	mg/kg dry wt	*0.1*	<0.11
Bis(2-ethylhexyl) adipate	mg/kg dry wt	*0.5*	<0.5
Benzo[b]fluoranthene	mg/kg dry wt	*0.1*	<0.11
Benzo[k]fluoranthene	mg/kg dry wt	*0.1*	<0.11
Benzo[a]pyrene	mg/kg dry wt	*0.1*	<0.11
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	*0.1*	<0.11
Dibenzo[a,h]anthracene	mg/kg dry wt	*0.1*	<0.11
Benzo[g,h,i]perylene	mg/kg dry wt	*0.1*	<0.11
Pyrene	mg/kg dry wt	*0.2*	<0.2
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.2*	0.3
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.1*	<0.1
4,4'-DDD	mg/kg dry wt	*0.3*	<0.3
4,4'-DDE	mg/kg dry wt	*0.3*	<0.3
4,4'-DDT	mg/kg dry wt	*0.5*	<0.5
alpha-BHC	mg/kg dry wt	*0.3*	<0.3
beta-BHC	mg/kg dry wt	*0.3*	<0.3
gamma-BHC	mg/kg dry wt	*0.3*	<0.3
delta-BHC	mg/kg dry wt	*0.3*	<0.3
Aldrin	mg/kg dry wt	*0.3*	<0.3
cis-Chlordane	mg/kg dry wt	*0.3*	<0.3
trans-Chlordane	mg/kg dry wt	*0.3*	<0.3
Dieldrin	mg/kg dry wt	*0.5*	<0.5
Endosulfan I	mg/kg dry wt	*0.3*	<0.3
Endosulfan II	mg/kg dry wt	*0.5*	<0.5
Endosulfan sulfate	mg/kg dry wt	*0.5*	<0.5
Endrin	mg/kg dry wt	*0.5*	<0.5
Endrin aldehyde	mg/kg dry wt	*0.5*	<0.5
Endrin ketone	mg/kg dry wt	*0.5*	<0.5
Hexachlorobenzene	mg/kg dry wt	*0.3*	<0.3
Heptachlor	mg/kg dry wt	*0.3*	<0.3
Heptachlor epoxide	mg/kg dry wt	*0.3*	<0.3
Methoxychlor	mg/kg dry wt	*0.5*	<0.5

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Semivolatile Organic Compounds - Soil

			Client Sample ID	Split Envr - SS03 - 0.1-0.2m
			Date Sampled	9/11/2020
Bis(2-ethylhexyl) phthalate	mg/kg dry wt	*0.5*	<0.5
Butyl benzyl phthalate	mg/kg dry wt	*0.5*	<0.5
Di-n-butyl phthalate	mg/kg dry wt	*1*	<1
Di-n-octyl phthalate	mg/kg dry wt	*0.5*	<0.5
Diethyl phthalate	mg/kg dry wt	*0.3*	<0.3
Dimethyl phthalate	mg/kg dry wt	*0.3*	<0.3
N-Nitrosodiphenylamine	mg/kg dry wt	*0.3*	<0.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	*0.3*	<0.3
2,4-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3
2,6-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3
Azobenzene	mg/kg dry wt	*0.5*	<0.5
Isophorone	mg/kg dry wt	*0.5*	<0.5
Nitrobenzene	mg/kg dry wt	*0.3*	<0.3
4-Bromophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloroethyl) ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloro-1-methylethyl) ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloroethoxy) methane	mg/kg dry wt	*0.3*	<0.3
1,2-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
1,3-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
1,4-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
Hexachlorobutadiene	mg/kg dry wt	*0.3*	<0.3
Hexachlorocylopentadiene	mg/kg dry wt	*0.3*	<0.3
Hexachloroethane	mg/kg dry wt	*0.3*	<0.3
4-Chloroaniline	mg/kg dry wt	*1.0*	<1.0
2-Nitroaniline	mg/kg dry wt	*0.3*	<0.3
3-Nitroaniline	mg/kg dry wt	*0.5*	<0.5
Aniline	mg/kg dry wt	*1.0*	<1.0
3,3'-Dichlorobenzidine	mg/kg dry wt	*0.5*	<0.5
Dibenzofuran	mg/kg dry wt	*0.3*	<0.3
Methyl methanesulfonate	mg/kg dry wt	*1.0*	<1.0
Ethyl methanesulfonate	mg/kg dry wt	*1*	<1
Benzyl alcohol	mg/kg dry wt	*1*	<1
Phenol-d5 (Surrogate)	%	*1*	84.4
2-Fluorophenol (Surrogate)	%	*1*	83.9
2-Fluorobiphenyl (Surrogate)	%	*1*	122.6
2,4,6-Tribromophenol (Surrogate)	%	*1*	109.7
p-Terphenyl-d14 (Surrogate)	%	*1*	101.2
Nitrobenzene-d5 (Surrogate)	%	*1*	100.0

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Moisture Content

		Client Sample ID	Split Envr - SS03 - 0.1-0.2m
		Date Sampled	9/11/2020
Analyte	Unit	*Reporting Limit*	20-42713-2
Moisture Content	%	*1*	30

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
SVOC in Soil	Solvent extraction, followed by GC-MS analysis.(In-house based on US EPA 8270).
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.



Sharelle Frank, B.Sc. (Tech)
Technologist



Rong Zhang
Technician

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Certificate of Analysis

Tonkin and Taylor Ltd
105 Carlton Gore Road, Newmarket
Auckland

Attention: Rebecca van der Krogt
Phone: 027 304 0134
Email: rvanderkrogt@tonkintaylor.co.nz

Lab Reference: 20-41900
Submitted by: Rebecca van der Krogt
Date Received: 5/11/2020
Testing Initiated: 9/11/2020
Date Completed: 12/11/2020
Order Number:
Reference: 1014985

Sampling Site:

Report Comments

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

Heavy Metals in Soil

			Client Sample ID	Split ENVR HA101_0.0-0.1m 0.0-0.1m
			Date Sampled	4/11/2020
Analyte	Unit	*Reporting Limit*	20-41900-1	
Arsenic	mg/kg dry wt	*0.125*	1.9	
Cadmium	mg/kg dry wt	*0.005*	0.17	
Chromium	mg/kg dry wt	*0.125*	8.4	
Copper	mg/kg dry wt	*0.075*	11.6	
Lead	mg/kg dry wt	*0.25*	5.53	
Mercury	mg/kg dry wt	*0.025*	0.058	
Nickel	mg/kg dry wt	*0.05*	1.7	
Zinc	mg/kg dry wt	*0.05*	14.8	

Semivolatile Organic Compounds - Soil

			Client Sample ID	Split ENVR HA101_0.0-0.1m 0.0-0.1m
			Date Sampled	4/11/2020
Analyte	Unit	*Reporting Limit*	20-41900-1	
Phenol	mg/kg dry wt	*0.3*	<0.3	
2-Chlorophenol	mg/kg dry wt	*0.3*	<0.3	
2-Methylphenol	mg/kg dry wt	*0.3*	<0.3	
2-Nitrophenol	mg/kg dry wt	*1.0*	<1.0	

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Semivolatile Organic Compounds - Soil

			Client Sample ID	Split ENVR HA101_0.0-0.1m 0.0-0.1m
			Date Sampled	4/11/2020
2,4-Dimethylphenol	mg/kg dry wt	*0.3*	<0.3
2,4-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3
2,6-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3
4-Chloro-3-methylphenol	mg/kg dry wt	*0.3*	<0.3
2,4,5-Trichlorophenol	mg/kg dry wt	*5*	<5
2,4,6-Trichlorophenol	mg/kg dry wt	*5*	<5.0
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	*5*	<5
4-Methylphenol	mg/kg dry wt	*0.3*	<0.3
4-Nitrophenol	mg/kg dry wt	*5*	<5
Naphthalene	mg/kg dry wt	*0.1*	<0.1
2-Methylnaphthalene	mg/kg dry wt	*0.1*	<0.1
2-Chloronaphthalene	mg/kg dry wt	*0.3*	<0.3
Acenaphthene	mg/kg dry wt	*0.1*	<0.1
Acenaphthylene	mg/kg dry wt	*0.1*	<0.1
Fluorene	mg/kg dry wt	*0.1*	<0.1
Phenanthrene	mg/kg dry wt	*0.1*	<0.1
Anthracene	mg/kg dry wt	*0.1*	<0.1
2-Phenylphenol	mg/kg dry wt	*0.5*	<0.5
Fluoranthene	mg/kg dry wt	*0.1*	<0.1
Benzo[a]anthracene	mg/kg dry wt	*0.1*	<0.1
Chrysene	mg/kg dry wt	*0.1*	<0.1
Bis(2-ethylhexyl) adipate	mg/kg dry wt	*0.5*	<0.5
Benzo[b]fluoranthene	mg/kg dry wt	*0.1*	<0.1
Benzo[k]fluoranthene	mg/kg dry wt	*0.1*	<0.1
Benzo[a]pyrene	mg/kg dry wt	*0.1*	<0.1
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	*0.1*	<0.1
Dibenzo[a,h]anthracene	mg/kg dry wt	*0.1*	<0.1
Benzo[g,h,i]perylene	mg/kg dry wt	*0.1*	<0.1
Pyrene	mg/kg dry wt	*0.2*	<0.2
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.2*	0.2
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.1*	<0.1
4,4'-DDD	mg/kg dry wt	*0.3*	<0.3
4,4'-DDE	mg/kg dry wt	*0.3*	<0.3
4,4'-DDT	mg/kg dry wt	*0.5*	<0.5
alpha-BHC	mg/kg dry wt	*0.3*	<0.3
beta-BHC	mg/kg dry wt	*0.3*	<0.3
gamma-BHC	mg/kg dry wt	*0.3*	<0.3
delta-BHC	mg/kg dry wt	*0.3*	<0.3
Aldrin	mg/kg dry wt	*0.3*	<0.3
cis-Chlordane	mg/kg dry wt	*0.3*	<0.3
trans-Chlordane	mg/kg dry wt	*0.3*	<0.3
Dieldrin	mg/kg dry wt	*0.5*	<0.5
Endosulfan I	mg/kg dry wt	*0.3*	<0.3
Endosulfan II	mg/kg dry wt	*0.5*	<0.5
Endosulfan sulfate	mg/kg dry wt	*0.5*	<0.5
Endrin	mg/kg dry wt	*0.5*	<0.5
Endrin aldehyde	mg/kg dry wt	*0.5*	<0.5
Endrin ketone	mg/kg dry wt	*0.5*	<0.5
Hexachlorobenzene	mg/kg dry wt	*0.3*	<0.3
Heptachlor	mg/kg dry wt	*0.3*	<0.3

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Semivolatile Organic Compounds - Soil

			Client Sample ID	Split ENVR HA101_0.0-0.1m 0.0-0.1m
			Date Sampled	4/11/2020
Heptachlor epoxide	mg/kg dry wt	*0.3*	<0.3
Methoxychlor	mg/kg dry wt	*0.5*	<0.5
Bis(2-ethylhexyl) phthalate	mg/kg dry wt	*0.5*	<0.5
Butyl benzyl phthalate	mg/kg dry wt	*0.5*	<0.5
Di-n-butyl phthalate	mg/kg dry wt	*1*	<1
Di-n-octyl phthalate	mg/kg dry wt	*0.5*	<0.5
Diethyl phthalate	mg/kg dry wt	*0.3*	<0.3
Dimethyl phthalate	mg/kg dry wt	*0.3*	<0.3
N-Nitrosodiphenylamine	mg/kg dry wt	*0.3*	<0.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	*0.3*	<0.3
2,4-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3
2,6-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3
Azobenzene	mg/kg dry wt	*0.5*	<0.5
Isophorone	mg/kg dry wt	*0.5*	<0.5
Nitrobenzene	mg/kg dry wt	*0.3*	<0.3
4-Bromophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloroethyl) ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloro-1-methylethyl) ether	mg/kg dry wt	*0.3*	<0.3
Bis(2-Chloroethoxy) methane	mg/kg dry wt	*0.3*	<0.3
1,2-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
1,3-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
1,4-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3
Hexachlorobutadiene	mg/kg dry wt	*0.3*	<0.3
Hexachlorocylopentadiene	mg/kg dry wt	*0.3*	<0.3
Hexachloroethane	mg/kg dry wt	*0.3*	<0.3
4-Chloroaniline	mg/kg dry wt	*1.0*	<1.0
2-Nitroaniline	mg/kg dry wt	*0.3*	<0.3
3-Nitroaniline	mg/kg dry wt	*0.5*	<0.5
Aniline	mg/kg dry wt	*1.0*	<1.0
3,3'-Dichlorobenzidine	mg/kg dry wt	*0.5*	<0.5
Dibenzofuran	mg/kg dry wt	*0.3*	<0.3
Methyl methanesulfonate	mg/kg dry wt	*1.0*	<1.0
Ethyl methanesulfonate	mg/kg dry wt	*1*	<1
Benzyl alcohol	mg/kg dry wt	*1*	<1
Phenol-d5 (Surrogate)	%	*1*	93.9
2-Fluorophenol (Surrogate)	%	*1*	95.3
2-Fluorobiphenyl (Surrogate)	%	*1*	120.4
2,4,6-Tribromophenol (Surrogate)	%	*1*	82.3
p-Terphenyl-d14 (Surrogate)	%	*1*	106.7
Nitrobenzene-d5 (Surrogate)	%	*1*	100.9

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Moisture Content

		Client Sample ID	Split ENVR HA101_0.0-0.1m 0.0-0.1m
		Date Sampled	4/11/2020
Analyte	Unit	*Reporting Limit*	20-41900-1
Moisture Content	%	*1*	21

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
SVOC in Soil	Solvent extraction, followed by GC-MS analysis.(In-house based on US EPA 8270).
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.



Sharelle Frank, B.Sc. (Tech)
Technologist



Rong Zhang
Technician

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2482688 SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	27-Nov-2020
		Date Reported:	10-Dec-2020
		Quote No:	80842
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Rebecca van der Krogt

Sample Type: Aqueous

Sample Name:		Dup 1 27-Nov-2020	Field Blank 27/11/20 27-Nov-2020 7:00 am	Trip Blank 27/11/20 27-Nov-2020	BH05b [A] 27-Nov-2020 11:30 am	BH06 [A] 27-Nov-2020
Lab Number:		2482688.1	2482688.2	2482688.3	2482688.4	2482688.5
Individual Tests						
pH	pH Units	5.6	6.6	5.8	6.4	4.0
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0007
Dissolved Copper	g/m³	< 0.0005	< 0.0005	< 0.0005	0.0007	0.0030
Dissolved Lead	g/m³	< 0.00010	< 0.00010	< 0.00010	0.00011	0.00052
Dissolved Nickel	g/m³	0.0020	< 0.0005	< 0.0005	0.0014	0.072
Dissolved Zinc	g/m³	0.0131	< 0.0010	< 0.0010	0.022	0.042
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Acenaphthylene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[a]anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[a]pyrene (BAP)	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[g,h,i]perylene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[k]fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Chrysene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dibenzo[a,h]anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Fluorene	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Naphthalene	g/m³	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Phenanthrene	g/m³	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Pyrene	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Haloethers in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Bis(2-chloroethyl)ether	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Bis(2-chloroisopropyl)ether	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
4-Bromophenyl phenyl ether	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
4-Chlorophenyl phenyl ether	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005

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

Sample Type: Aqueous						
Sample Name:		Dup 1 27-Nov-2020	Field Blank 27/11/20 27-Nov-2020 7:00 am	Trip Blank 27/11/20 27-Nov-2020	BH05b [A] 27-Nov-2020 11:30 am	BH06 [A] 27-Nov-2020
Lab Number:		2482688.1	2482688.2	2482688.3	2482688.4	2482688.5
Nitrogen containing compounds in SVOC Water Samples by GC-MS*						
2,4-Dinitrotoluene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
2,6-Dinitrotoluene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Nitrobenzene	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
N-Nitrosodi-n-propylamine	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
N-Nitrosodiphenylamine + Diphenylamine*	g/m3	-	< 0.010	< 0.010	< 0.010	< 0.010
Organochlorine Pesticides in SVOC Water Samples by GC-MS						
Aldrin	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
alpha-BHC	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
beta-BHC	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
delta-BHC	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
gamma-BHC (Lindane)	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
4,4'-DDD	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
4,4'-DDE	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
4,4'-DDT	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Endosulfan I	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulfate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Heptachlor epoxide	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Hexachlorobenzene	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS*						
Acenaphthene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Acenaphthylene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Anthracene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[a]anthracene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[a]pyrene (BAP)	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[g,h,i]perylene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[k]fluoranthene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
1&2-Chloronaphthalene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Chrysene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Dibenzo[a,h]anthracene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Fluoranthene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Fluorene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Indeno(1,2,3-c,d)pyrene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
2-Methylnaphthalene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Naphthalene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Phenanthrene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Pyrene	g/m³	-	< 0.003	< 0.003	< 0.003	< 0.003
Benzo[a]pyrene Toxic Equivalence (TEF)*	g/m³	-	< 0.008	< 0.008	< 0.008	< 0.008
Phenols in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
2-Chlorophenol	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
2,4-Dichlorophenol	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
2,4-Dimethylphenol	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
3 & 4-Methylphenol (m- + p-cresol)	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
2-Methylphenol (o-Cresol)	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
2-Nitrophenol	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Pentachlorophenol (PCP)	g/m³	-	< 0.10	< 0.10	< 0.10	< 0.10

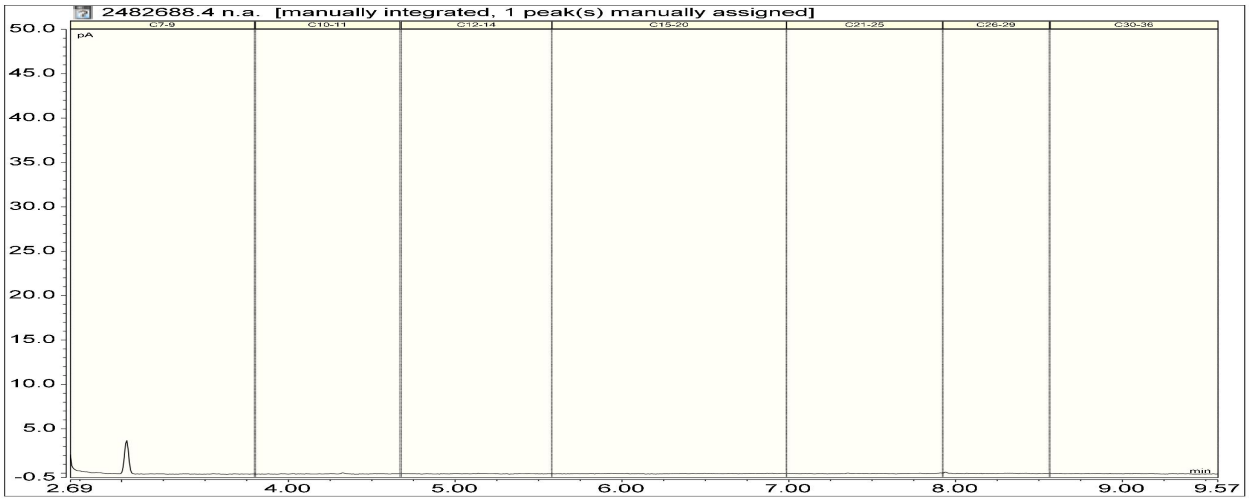
Sample Type: Aqueous						
Sample Name:		Dup 1 27-Nov-2020	Field Blank 27/11/20 27-Nov-2020 7:00 am	Trip Blank 27/11/20 27-Nov-2020	BH05b [A] 27-Nov-2020 11:30 am	BH06 [A] 27-Nov-2020
Lab Number:		2482688.1	2482688.2	2482688.3	2482688.4	2482688.5
Phenols in SVOC Water Samples by GC-MS						
Phenol	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
2,4,5-Trichlorophenol	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
2,4,6-Trichlorophenol	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Plasticisers in SVOC Water Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	g/m³	-	< 0.03	< 0.03	< 0.03	< 0.03
Butylbenzylphthalate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Di(2-ethylhexyl)adipate	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Diethylphthalate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Dimethylphthalate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Di-n-butylphthalate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Di-n-octylphthalate	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Other Halogenated compounds in SVOC Water Samples by GC-MS						
1,2-Dichlorobenzene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
1,3-Dichlorobenzene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
1,4-Dichlorobenzene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobutadiene	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
Hexachloroethane	g/m³	-	< 0.010	< 0.010	< 0.010	< 0.010
1,2,4-Trichlorobenzene	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Other compounds in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m³	-	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Dibenzofuran	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Isophorone	g/m³	-	< 0.005	< 0.005	< 0.005	< 0.005
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	0.14	< 0.10
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

Sample Name:		BH08 [A] 27-Nov-2020 1:18 pm	BH111 [A] 27-Nov-2020 10:16 am	BH113 [A] 27-Nov-2020 8:45 am	BH116 [A] 27-Nov-2020 7:45 am	
Lab Number:		2482688.6	2482688.7	2482688.8	2482688.9	
Individual Tests						
pH	pH Units	6.8	5.5	6.3	6.2	-
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	-
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	0.00023	-
Dissolved Chromium	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	-
Dissolved Copper	g/m³	0.0006	< 0.0005	0.0008	0.0025	-
Dissolved Lead	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-
Dissolved Nickel	g/m³	0.0009	0.0022	0.0025	0.0099	-
Dissolved Zinc	g/m³	0.0081	0.0136	0.0071	0.036	-
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Acenaphthylene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Anthracene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Benzo[a]anthracene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Benzo[a]pyrene (BAP)	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Benzo[g,h,i]perylene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Benzo[k]fluoranthene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-

Sample Type: Aqueous						
Sample Name:		BH08 [A] 27-Nov-2020 1:18 pm	BH111 [A] 27-Nov-2020 10:16 am	BH113 [A] 27-Nov-2020 8:45 am	BH116 [A] 27-Nov-2020 7:45 am	
Lab Number:		2482688.6	2482688.7	2482688.8	2482688.9	
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Chrysene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Dibenzo[a,h]anthracene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Fluoranthene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Fluorene	g/m³	< 0.0002	< 0.0002	-	< 0.0002	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.00010	< 0.00010	-	< 0.00010	-
Naphthalene	g/m³	< 0.0006	< 0.0006	-	< 0.0006	-
Phenanthrene	g/m³	< 0.0004	< 0.0004	-	< 0.0004	-
Pyrene	g/m³	< 0.0002	< 0.0002	-	< 0.0002	-
Haloethers in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Bis(2-chloroethyl)ether	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Bis(2-chloroisopropyl)ether	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
4-Bromophenyl phenyl ether	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
4-Chlorophenyl phenyl ether	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Nitrogen containing compounds in SVOC Water Samples by GC-MS*						
2,4-Dinitrotoluene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
2,6-Dinitrotoluene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Nitrobenzene	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
N-Nitrosodi-n-propylamine	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
N-Nitrosodiphenylamine + Diphenylamine*	g/m3	< 0.010	< 0.010	< 0.010	< 0.010	-
Organochlorine Pesticides in SVOC Water Samples by GC-MS						
Aldrin	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
alpha-BHC	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
beta-BHC	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
delta-BHC	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
gamma-BHC (Lindane)	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
4,4'-DDD	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
4,4'-DDE	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
4,4'-DDT	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Dieldrin	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Endosulfan I	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Endosulfan II	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Endosulfan sulfate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Endrin	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Endrin ketone	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Heptachlor	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Heptachlor epoxide	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Hexachlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS*						
Acenaphthene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Acenaphthylene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Anthracene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[a]anthracene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[a]pyrene (BAP)	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[g,h,i]perylene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[k]fluoranthene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
1&2-Chloronaphthalene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Chrysene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Dibenzo[a,h]anthracene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Fluoranthene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Fluorene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-

Sample Type: Aqueous						
Sample Name:		BH08 [A] 27-Nov-2020 1:18 pm	BH111 [A] 27-Nov-2020 10:16 am	BH113 [A] 27-Nov-2020 8:45 am	BH116 [A] 27-Nov-2020 7:45 am	
Lab Number:		2482688.6	2482688.7	2482688.8	2482688.9	
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS*						
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
2-Methylnaphthalene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Naphthalene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Phenanthrene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Pyrene	g/m³	< 0.003	< 0.003	< 0.003	< 0.003	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	g/m³	< 0.008	< 0.008	< 0.008	< 0.008	-
Phenols in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
2-Chlorophenol	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
2,4-Dichlorophenol	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
2,4-Dimethylphenol	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
3 & 4-Methylphenol (m- + p-cresol)	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
2-Methylphenol (o-Cresol)	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
2-Nitrophenol	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Pentachlorophenol (PCP)	g/m³	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenol	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4,5-Trichlorophenol	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4,6-Trichlorophenol	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Plasticisers in SVOC Water Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	g/m³	< 0.03	< 0.03	< 0.03	< 0.03	-
Butylbenzylphthalate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Di(2-ethylhexyl)adipate	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Diethylphthalate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Dimethylphthalate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Di-n-butylphthalate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Di-n-octylphthalate	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Other Halogenated compounds in SVOC Water Samples by GC-MS						
1,2-Dichlorobenzene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
1,3-Dichlorobenzene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
1,4-Dichlorobenzene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Hexachlorobutadiene	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
Hexachloroethane	g/m³	< 0.010	< 0.010	< 0.010	< 0.010	-
1,2,4-Trichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Other compounds in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m³	< 0.05	< 0.05	< 0.05	< 0.05	-
Carbazole	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Dibenzofuran	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Isophorone	g/m³	< 0.005	< 0.005	< 0.005	< 0.005	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	-	< 0.10	-
C10 - C14	g/m³	< 0.2	< 0.2	-	< 0.2	-
C15 - C36	g/m³	< 0.4	< 0.4	-	< 0.4	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	-	< 0.7	-

2482688.4
BH05b [A] 27-Nov-2020 11:30 am
Client Chromatogram for TPH by FID



Analyst's Comments

It has been noted that the System Monitoring Compounds 2-fluorophenol, Phenol-d5 and 2,4,6-tribromophenol in the SVOC analysis on sample 2482688.5, had lower than expected recoveries at 22%, 26% and 38% respectively. Therefore the phenolic related compounds may be underestimated.
The System Monitoring Compounds 2-fluorophenol and Phenol-d5 were also lower than expected at 26% & 37% respectively for sample 2482688.6 and 27% & 35% respectively for sample 2482688.8.

Summary of Methods

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

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
pH	pH meter. APHA 4500-H^+ B 23rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1-9
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 23rd ed. 2017.	-	2-3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	1-9
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B 23rd ed. 2017.	0.00005 - 0.0010 g/m³	1-9
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m³	1-7, 9
Semivolatile Organic Compounds Screening in Water by GC-MS	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	-	2-9
Total Petroleum Hydrocarbons in Water			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m³	1-7, 9
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m³	1-7, 9
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m³	1-7, 9
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m³	1-7, 9

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

Testing was completed between 01-Dec-2020 and 10-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2486837	SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	04-Dec-2020	
		Date Reported:	14-Dec-2020	
		Quote No:	80842	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Rebecca van der Krogt	

Sample Type: Aqueous

Sample Name:		Trip Blank 2 02-Dec-2020	Field Blank 2 02-Dec-2020	BH110 02-Dec-2020 12:20 pm	Duplicate 2 02-Dec-2020 12:20 pm	BH117 [A] 02-Dec-2020 10:45 am
Lab Number:		2486837.1	2486837.2	2486837.3	2486837.4	2486837.5
Individual Tests						
pH	pH Units	-	-	8.1	8.1	6.8
Dissolved Mercury	g/m³	-	-	< 0.00008	< 0.00008	< 0.00008
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	-	-	< 0.0010	< 0.0010	0.0016
Dissolved Cadmium	g/m³	-	-	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	-	-	< 0.0005	< 0.0005	< 0.0005
Dissolved Copper	g/m³	-	-	0.0012	0.0012	< 0.0005
Dissolved Lead	g/m³	-	-	< 0.00010	< 0.00010	< 0.00010
Dissolved Nickel	g/m³	-	-	0.0012	0.0011	0.0048
Dissolved Zinc	g/m³	-	-	< 0.0010	< 0.0010	0.022
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Acenaphthylene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[a]anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[a]pyrene (BAP)	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[g,h,i]perylene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Benzo[k]fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Chrysene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dibenzo[a,h]anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Fluorene	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Naphthalene	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Phenanthrene	g/m³	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Pyrene	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

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

Sample Type: Aqueous						
Sample Name:		BH05a [A] 02-Dec-2020 1:57 pm	BH05a [B] 02-Dec-2020 1:57 pm	Rinsate 03-Oct-2020		
Lab Number:		2486837.7	2486837.8	2486837.9		
Individual Tests						
pH	pH Units	7.5	-	-	-	-
Dissolved Mercury	g/m³	-	< 0.00008	-	-	-
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	-	0.0016	-	-	-
Dissolved Cadmium	g/m³	-	< 0.00005	-	-	-
Dissolved Chromium	g/m³	-	< 0.0005	-	-	-
Dissolved Copper	g/m³	-	< 0.0005	-	-	-
Dissolved Lead	g/m³	-	< 0.00010	-	-	-
Dissolved Nickel	g/m³	-	0.0015	-	-	-
Dissolved Zinc	g/m³	-	0.0026	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.00010	-	< 0.00010	-	-
Acenaphthylene	g/m³	< 0.00010	-	< 0.00010	-	-
Anthracene	g/m³	< 0.00010	-	< 0.00010	-	-
Benzo[a]anthracene	g/m³	< 0.00010	-	< 0.00010	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.00010	-	< 0.00010	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.00010	-	< 0.00010	-	-
Benzo[g,h,i]perylene	g/m³	< 0.00010	-	< 0.00010	-	-
Benzo[k]fluoranthene	g/m³	< 0.00010	-	< 0.00010	-	-
Chrysene	g/m³	< 0.00010	-	< 0.00010	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.00010	-	< 0.00010	-	-
Fluoranthene	g/m³	< 0.00010	-	< 0.00010	-	-
Fluorene	g/m³	< 0.0002	-	< 0.0002	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.00010	-	< 0.00010	-	-
Naphthalene	g/m³	< 0.0005	-	< 0.0005	-	-
Phenanthrene	g/m³	< 0.0004	-	< 0.0004	-	-
Pyrene	g/m³	< 0.0002	-	< 0.0002	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	-	< 0.10	-	-
C10 - C14	g/m³	< 0.2	-	< 0.2	-	-
C15 - C36	g/m³	< 0.4	-	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	-	< 0.7	-	-

Summary of Methods

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

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
pH	pH meter. APHA 4500-H^+ B 23rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	3-5, 7
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 23rd ed. 2017.	-	3-4
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	3-5, 8
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B 23rd ed. 2017.	0.00005 - 0.0010 g/m³	3-5, 8
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m³	1-5, 7, 9
Total Petroleum Hydrocarbons in Water			

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m³	1-5, 7, 9
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m³	1-5, 7, 9
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m³	1-5, 7, 9
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m³	1-5, 7, 9

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

Testing was completed between 06-Dec-2020 and 14-Dec-2020. For completion dates of individual analyses please contact the laboratory.

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

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Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2473291 SPv2
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	14-Nov-2020
		Date Reported:	27-Jan-2021
		Quote No:	108315
		Order No:	1014985
		Client Reference:	1014985
		Submitted By:	Lucy Hine

Sample Type: Soil

	Sample Name:	BH111-3.7-3.9m 11-Nov-2020	BH113-2.2-2.3m 13-Nov-2020	BH116-0.75-0.85 m 13-Nov-2020	BH116-5.0-5.1m 13-Nov-2020	BH117-3.45-3.55 m 13-Nov-2020
	Lab Number:	2473291.1	2473291.4	2473291.6	2473291.7	2473291.9
Individual Tests						
pH	pH Units	4.6	5.1	6.5	5.9	6.9
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.197	0.034	0.016	0.024	0.027
Sulphate Content	%	0.197	0.034	0.013	0.024	0.027

	Sample Name:	BH117-5.9-6.0m 13-Nov-2020	BH110-0.8-0.9m 13-Nov-2020	BH05a-0.35	BH06-0.85-1.0	BH06-2.7-2.9
	Lab Number:	2473291.10	2473291.11	2473291.13	2473291.15	2473291.16
Individual Tests						
pH	pH Units	6.8	4.6	4.8	4.6	3.8
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.025	0.017	0.036	0.026	0.30
Sulphate Content	%	0.024	0.017	0.036	0.026	0.30

	Sample Name:	BH07-0.9-1.0	BH08-0.25m	HA108-1.0m 03-Dec-2020	HA115-2.0m 03-Dec-2020	HA111-2.4m 07-Dec-2020
	Lab Number:	2473291.17	2473291.19	2473291.39	2473291.40	2473291.42
Individual Tests						
pH	pH Units	4.3	4.9	4.7	4.7	6.4
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.024	0.026	0.033	0.172	0.026
Sulphate Content	%	0.024	0.026	0.033	0.171	0.024

	Sample Name:	BH05a 6.5m 21-Dec-2020	BH07 4.5m 21-Dec-2020	BH 08 7m 21-Dec-2020	BH110 3m 21-Dec-2020	BH111 2m 21-Dec-2020
	Lab Number:	2473291.46	2473291.47	2473291.48	2473291.50	2473291.51
Individual Tests						
pH	pH Units	5.3	5.0	6.6	3.8	4.6
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.044	0.017	0.026	0.43	0.035
Sulphate Content	%	0.035	0.017	0.026	0.43	0.035

	Sample Name:	BH113 5.8m 21-Dec-2020				
	Lab Number:	2473291.52				
Individual Tests						
pH	pH Units	5.2	-	-	-	-
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.152	-	-	-	-
Sulphate Content	%	0.151	-	-	-	-

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Acid Soluble Sulphate and Sulphate Content		-	1, 4, 6-7, 9-11, 13, 15-17, 19, 39-40, 42, 46-48, 50-52
Non-Routine Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 4, 6-7, 9-11, 13, 15-17, 19, 39-40, 42, 46-48, 50-52
pH	2.5:1 water:air dried, sub-2mm sieved soil, vol:wt, stand 8 hrs, electrometric with a pH meter. BS 1377: Part 3: 1990 section 9.5.	0.1 pH Units	1, 4, 6-7, 9-11, 13, 15-17, 19, 39-40, 42, 46-48, 50-52
Acid Soluble Sulphate	Gravimetric after HCl acid extn of sub-425um sample, dried at 103°C, and pptn as BaSO4. NZS 4402:1986 Test 3.2 "Determination of the Total Sulphate Content".	0.010 g/100g dry wt	1, 4, 6-7, 9-11, 13, 15-17, 19, 39-40, 42, 46-48, 50-52
Acid Soluble Sulphate Content	Gravimetric after HCl acid extn of sub-425um sample, dried at 103°C, and pptn as BaSO4. NZS 4402:1986 Test 3.2 "Determination of the Total Sulphate Content".	0.010 %	1, 4, 6-7, 9-11, 13, 15-17, 19, 39-40, 42, 46-48, 50-52

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

Testing was completed between 11-Jan-2021 and 27-Jan-2021. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

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W www.hill-laboratories.com

Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2489334	SPv1
Contact:	Rebecca van der Krogt C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	08-Dec-2020	
		Date Reported:	22-Jan-2021	
		Quote No:	108315	
		Order No:	1014985	
		Client Reference:	1014985	
		Submitted By:	Lucy Hine	

Sample Type: Soil

Sample Name:		HA109-4.0m	HA114-3.0m	HA119-5.0m		
Lab Number:		2489334.6	2489334.12	2489334.21		
Individual Tests						
pH	pH Units	5.3	4.8	5.4	-	-
Acid Soluble Sulphate and Sulphate Content						
Acid Soluble Sulphate	g/100g dry wt	0.043	0.033	0.043	-	-
Sulphate Content	%	0.043	0.033	0.043	-	-

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Acid Soluble Sulphate and Sulphate Content		-	6, 12, 21
Non-Routine Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	6, 12, 21
pH	2.5:1 water:air dried, sub-2mm sieved soil, vol:wt, stand 8 hrs, electrometric with a pH meter. BS 1377: Part 3: 1990 section 9.5.	0.1 pH Units	6, 12, 21
Acid Soluble Sulphate	Gravimetric after HCl acid extn of sub-425um sample, dried at 103°C, and pptn as BaSO4. NZS 4402:1986 Test 3.2 "Determination of the Total Sulphate Content".	0.010 g/100g dry wt	6, 12, 21
Acid Soluble Sulphate Content	Gravimetric after HCl acid extn of sub-425um sample, dried at 103°C, and pptn as BaSO4. NZS 4402:1986 Test 3.2 "Determination of the Total Sulphate Content".	0.010 %	6, 12, 21

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

Testing was completed between 07-Jan-2021 and 22-Jan-2021. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

www.tonkintaylor.co.nz

Appendix B – Tonkin & Taylor Geotechnical Logs

Appendix B – Copies of T+T Machine Borehole Logs

Tonkin & Taylor Ltd. January 2021 (Version 1.0). Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station (Package 1), Geotechnical Ground Investigation Factual Report - Appendix C: Machine Borehole Logs[1]

[1] Subsequent revisions made by T+T (March 2021) include PID readings in logs BH08 and BH117.

Appendix C: Machine Borehole Logs

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05A

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926551.90 mN 1743191.10 mE

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.00m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Vincent

LOGGED BY: ROM

CHECKED: CBM

START DATE: 17/11/2020

FINISH DATE: 18/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Top	Sandy gravelly SILT, trace organics; brown & grey. Firm, moist, low plasticity; sand, fine to coarse, Quartz, gravel, fine to coarse, subangular, unweathered, Basalt & Concrete; organics, rootlets.			PQTT	46	1 @ 0.10m 1 x Glass Jar 1x plastic Jar; 7 @ 0.35m 1 x plastic jar (Corrosivity)		0	TS									
Tauranga Group	Silty CLAY, minor sand, trace organics; light brown mottled orange and dark brown, speckled black, homogeneous. Stiff, moist, high plasticity; sand, fine; organics, rootlets.							0.5					*0.35m:* PID - 1.3ppm		01/12/2020			
	0.35 - 0.75m: CORE LOSS																	
	Silty CLAY, minor sand, trace organics; light brown mottled orange & dark brown, speckled black, homogeneous. Stiff, moist, high plasticity; sand, fine; organics, rootlets.			SPT	86	0/- kPa; 2 @ 1.00m 1 x Glass Jar 1x plastic Jar		1.0					*0.75m:* Shear Vane failed					
	Sandy SILT, some clay; light brown mottled orange & dark brown speckled white and black, homogeneous. Stiff, moist, high plasticity; sand, fine.																	
	Silty CLAY, minor sand, trace organics; light brown mottled orange & dark brown speckled black & white, homogeneous. Stiff, moist; sand, fine; organics, rootlets.							1.5										
	Sandy SILT, trace organics; brown spotted black, homogeneous. Stiff, moist, low plasticity; sand, fine; organics, rootlets.			PQTT	124	93/44 kPa 0/1 1/0 1/1 **N=3**												
	SILT, some sand, minor clay, trace organics; light brown mottled orange, homogeneous. Stiff, moist, low plasticity; sand, fine; organics, rootlets.							2.0					*2.00m:* PID - 0.4ppm					
	SILT, minor clay, trace organics; light green - grey, speckled black. Firm to stiff, moist, low plasticity; organics, fibrous.			SPT	100	3 @ 2.00m 1 x Glass Jar 1x plastic Jar 1 x Split 1 x Duplicate	7											
	2.00 - 2.17m: Grey-brown mottled brown, speckled black							2.5										
	SILT, trace clay; grey-brown mottled brown, speckled black. Firm to stiff, moist, low plasticity.																	Box 1, 0.0-3.0m
	3.0 - 3.5 m: Push Tube			PQTT	0	8 @ 2.90m 1 x plastic jar (Corrosivity) 4 @ 3.00m 1 x Glass Jar 1x plastic Jar 9 @ 3.00m	6	3.0										
	SILT, trace clay; grey-brown mottled brown, speckled black. Firm, moist, low plasticity.			PT	173	28/9 kPa 0/0 0/1 1/1 **N=3**		3.5										
	SILT, trace organics; brown speckled black. Firm, moist, low plasticity; organics, fibrous.																	
	3.85m: grades light brown																	
	SILT, minor sand, trace organics and clay; light green, speckled black. Firm, moist, medium plasticity; sand, fine; organics, fibrous.			PQTT	100	5 @ 4.00m 1 x Glass Jar 1x plastic Jar	5	4.0										
	4.03m: Light brown mottled brown, speckled black																	
	Sandy SILT, trace organics; light brown mottled brown, speckled black. Stiff, moist, low plasticity; sand, fine; organics, fibrous.							4.5										
	Silty SAND; green speckled black, homogeneous. Medium dense, moist, poorly graded; sand, fine.			SPT	100	19/4 kPa Core disturbed by drilling process 2/3 3/3 3/4 **N=13**												
	SAND, minor silt; light brown speckled black. Medium dense, moist, poorly graded; sand, fine.																	

COMMENTS: Piezometer installed with screened interval from 8.5 - 11.5 m.

Hole Depth 15.15m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:13:06 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05A

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926551.90 mN 1743191.10 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.00m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: ROM
CHECKED: CBM
START DATE: 17/11/2020
FINISH DATE: 18/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	4.95 - 5.35 m: CORE LOSS			PQTT	61	6 @ 5.00m 1 x Glass Jar 1x plastic Jar	3	6.0					*6.00m:* Shear Vane failed					Box 2, 3.0-6.8m
	Organic clayey SILT, trace rootlets; dark brown speckled black. Stiff, moist, high plasticity. Organics; amorphous							5.5										
	6.25 - 6.45 m: CORE LOSS			SPT	55	0/- kPa 1/0 0/1 0/1 **N=2**		6.0										
	PEAT (AMORPHOUS), minor sand; dark brown, homogeneous. Firm to stiff, moist; sand, fine.			PQTT	100		2	6.5										
	Organic SILT; dark brown speckled black. Stiff, moist, low plasticity. Organics; amorphous							7.0										
	PEAT (AMORPHOUS), minor sand; dark brown. Firm to stiff, moist; sand, fine. *7.50m:* Very stiff							7.5										
Albany Conglomerate	Completely weathered, grey, SANDSTONE. Extremely Weak, (Recovered as SAND; grey. Medium dense, moist, poorly graded; sand, fine).			SPT	106	116/29 kPa 0/1 2/2 3/4 **N=11**	1	8.0										
	8.2 - 9.0 m: CORE LOSS			PQTT	23			8.5										
	9.0 - 9.45 m: Solid Cone SPT			SPT	0	UTP 3/3 5/5 5/6 **N=21** Solid	0	9.0					*9.00 - 10.50m:* Re-drilled due to core loss					
	Completely weathered, brown-grey, massive, SANDSTONE. Extremely Weak, (Recovered as SAND, minor gravel; brown-grey. Medium dense, moist, poorly graded; sand, fine to coarse; gravel, fine to coarse, subangular, unweathered, Sandstone & Siltstone).						-1	9.5										

COMMENTS: Piezometer installed with screened interval from 8.5 - 11.5 m.

Hole Depth 15.15m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:13:07 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05A

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926551.90 mN 1743191.10 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.00m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: ROM
CHECKED: CBM
START DATE: 17/11/2020
FINISH DATE: 18/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Albany Conglomerate	10.05 - 10.5 m: CORE LOSS			PQTT	57			10.5										Box 3, 6.8-10.5m
	Highly weathered, brown and dark grey, CONGLOMERATE. Extremely Weak, Very weakly cemented (Recovered as Gravelly SAND; brown & dark grey. Medium dense, moist; sand, fine to coarse; gravel, fine to coarse, subangular, unweathered).			SPT	93	UTP 4/4 5/5 7/7 N=24	-2	11.0										
	Highly weathered, grey, CONGLOMERATE. Extremely Weak, Very weakly cemented (Recovered as GRAVEL; grey. Moist; gravel, fine to coarse, subrounded to subangular, unweathered, Sandstone & Siltstone).																	
	Moderately weathered, grey, SANDSTONE. Extremely Weak, Weakly cemented. SAND; grey. Very dense, moist, poorly graded; sand, fine.			PQTT	76			11.5				0						
	11.75 - 12.0 m: CORE LOSS												11.80m: J, 60° dip, VN, CN 11.84m: J, 65° dip, CN					
	12.0 - 12.25 m: Solid cone SPT			SPT	100	UTP 5/21 27/23 N>=50	-3	12.0										
	Highly weathered, brown & grey, CONGLOMERATE. Extremely Weak, Very weakly cemented (Recovered as Sandy GRAVEL; brown & grey. Medium dense, moist, poorly graded; gravel, fine to coarse, subrounded to subangular, unweathered, Sandstone & siltstone; sand, fine to coarse).							12.5										
	Highly weathered, grey, CONGLOMERATE. Extremely Weak, Very weakly cemented (recovered as GRAVEL; grey. Gravel, fine to coarse, subrounded to subangular, unweathered, Sandstone & Siltstone) .			PQTT	56		-4	13.0				0					Box 4, 10.5-13.2m	
	Moderately weathered, grey, SANDSTONE. Extremely Weak, very weakly cemented. (Recovered as SAND; grey. Very dense, moist, poorly graded; sand, fine).																	
	13.5 - 13.64 m: Solid Cone SPT			SPT	0	15/35 for 65mm N>=50 Solid		13.5										
	Unweathered, grey, SANDSTONE. Extremely Weak, Widely spaced fractures. (Recovered as SAND; grey. Very dense, moist, poorly graded; sand, fine). *13.96 - 13.98m:* Slightly weathered, grey, SILTSTONE. Extremely Weak. SILT; grey. Hard, moist, low plasticity.			PQTT	129		-5	14.0				63						
								14.5										
							-6											

COMMENTS: Piezometer installed with screened interval from 8.5 - 11.5 m.

Hole Depth 15.15m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:13:07 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05A

SHEET: 4 OF 4

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926551.90 mN 1743191.10 mE

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.00m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Vincent

LOGGED BY: ROM

CHECKED: CBM

START DATE: 17/11/2020

FINISH DATE: 18/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS WS MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	15.0 - 15.14 m: Solid Cone SPT			SPT	0	13/37 for 70mm **N>=50** Solid	-7	16.0										
							-8	17.0										
							-9	18.0										
							-10	19.0										

COMMENTS: Piezometer installed with screened interval from 8.5 - 11.5 m.

Hole Depth 15.15m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:13:07 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH05A**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926551.90 mN (NZTM2000) 1743191.10 mE R.L.: 9.00m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 17/11/2020 HOLE FINISHED: 18/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



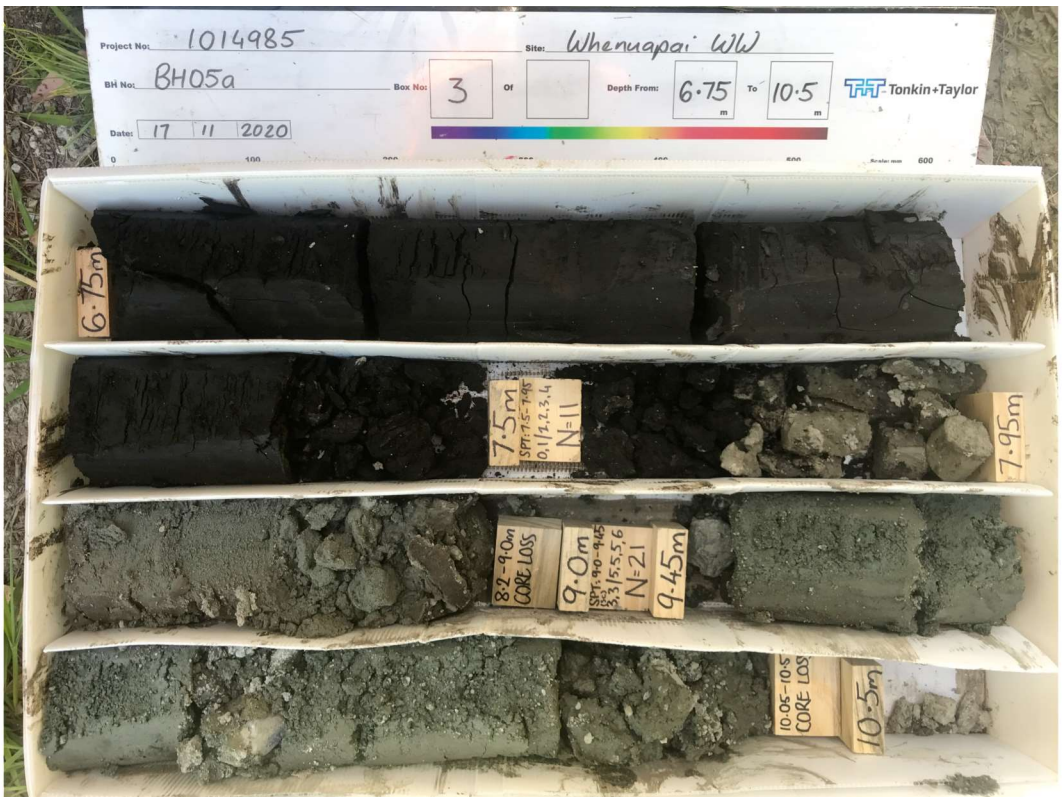
3.00-6.75m

General Log - 21/12/2020 8:13:07 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH05A**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926551.90 mN 1743191.10 mE	DRILL TYPE: Track-mounted	HOLE STARTED: 17/11/2020
R.L.: 9.00m	DRILL METHOD: RC	HOLE FINISHED: 18/11/2020
DATUM: NZVD2016		DRILLED BY: McMillan Drilling
		LOGGED BY: ROM CHECKED: CBM



6.75-10.50m



10.50-13.20m

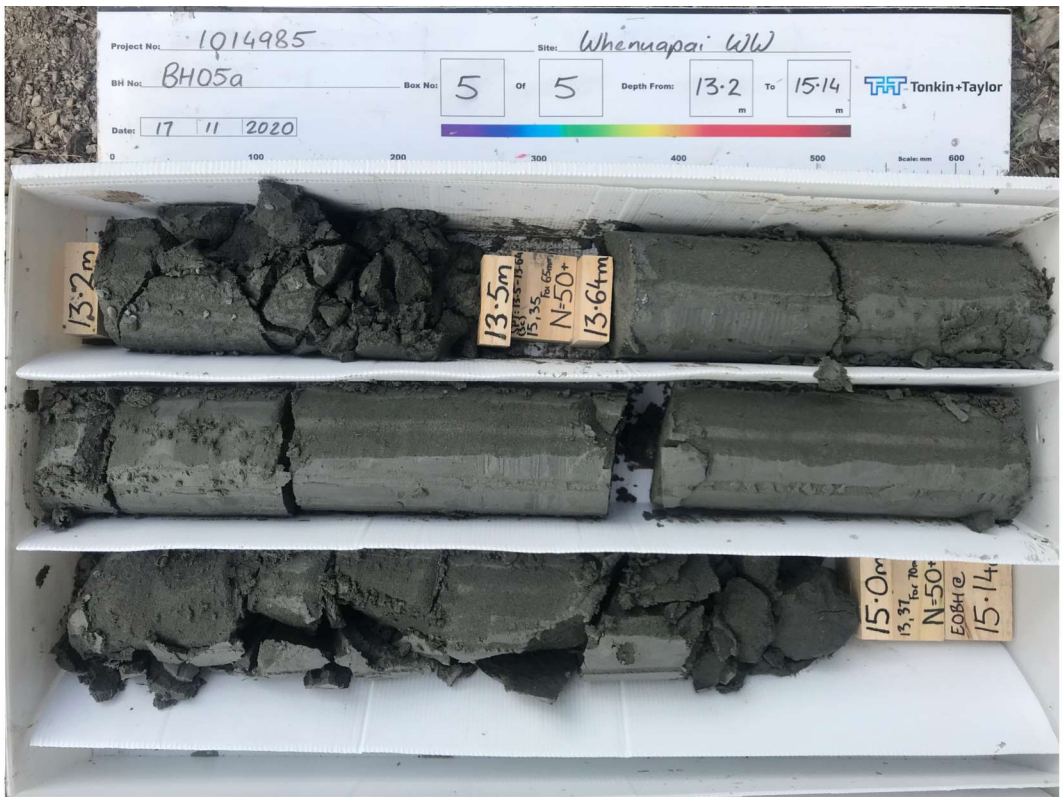
General Log - 21/12/2020 8:13:08 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH05A**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926551.90 mN (NZTM2000) 1743191.10 mE R.L.: 9.00m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 17/11/2020 HOLE FINISHED: 18/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



13.20-15.14m

General Log - 21/12/2020 8:13:09 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH05B

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	CO-ORDINATES: 5926553.70 mN 1743191.30 mE (NZTM2000)	R.L. GROUND: 9.20m
JOB No.: 1014985.0000	DIRECTION:	R.L. COLLAR:
LOCATION: Whenuapai	ANGLE FROM HORIZ.: -90°	DATUM: NZVD2016
		SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: ROM
CHECKED: CBM
START DATE: 18/11/2020
FINISH DATE: 18/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DG)	Rock Strength (ES VS VS MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	Wash drilled to 7.0 m BGL. See BH05A for geology details						9 8 7 6 5	0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5							01/12/2020			

COMMENTS: 50 mm standpipe piezometer with screened interval from 3.5 - 5.5 m.

Hole Depth 7m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:28:00 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: BH05B

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: 5926553.70 mN, 1743191.30 mE (NZTM2000)

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.20m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Vincent

LOGGED BY: ROM

CHECKED: CBM

START DATE: 18/11/2020

FINISH DATE: 18/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MSW HSW DW CW)	Rock Strength (ES VS S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	Wash drilled to 7.0 m BGL. See BH05A for geology details			W	0		4 3	5.5 6.0 6.5										
	7m: END OF INVESTIGATION						2 1 0	7.0 7.5 8.0 8.5 9.0 9.5										

COMMENTS: 50 mm standpipe piezometer with screened interval from 3.5 - 5.5 m.

Hole Depth 7m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:28:00 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926435.00 mN 1743208.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 19/11/2020
FINISH DATE: 19/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Depth (m)
TSoil	Organic SILT; brown. Hard, moist, non-plastic.	0.0
	0.30 - 0.40m: Very stiff; [Recovered from next run].	0.4
Tauranga Group	SILT, trace sand; light brown mottled orangish brown. Stiff, moist, low plasticity; sand, fine.	0.5
	0.6 - 0.75 m: CORE LOSS	0.75
	SILT, trace sand; light grey mottled orangish brown. Stiff, moist, low plasticity; sand, fine.	1.0
	Clayey SILT, trace sand; light grey mottled orangish brown. Firm, moist, high plasticity; sand, fine.	1.5
	SILT, some clay, trace organics; light grey. Firm, moist, medium plasticity; organics, rootlets.	2.0
	Sandy SILT, trace organics; light grey mottled orangish brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.	2.5
	SILT, some clay and sand; grey. Stiff, moist, medium plasticity; sand, fine.	3.0
	SAND; grey. Loose, moist; sand, fine.	3.45
	3.45 - 3.55 m: CORE LOSS	3.55
East Coast Bays Formation	SILT; grey. Stiff, moist, low plasticity.	3.8
	Clayey SILT; grey. Stiff, moist, high plasticity.	4.0
	Sandy SILT; grey. Stiff, moist; sand, fine.	4.5
	Silty SAND; grey. Loose, moist; sand, fine.	5.0

Depth (m)	Sampling Method	Core Recovery (%)	Testing	RL (m)
0.0 - 0.4	PQTT	40	UTP	12
0.4 - 0.75				
0.75 - 1.0	PQTT	140		
1.0 - 1.5				11
1.5 - 2.0	SPT	100	36/5 kPa; 0/0 0/1 1/1 N=3	
2.0 - 2.5	PQTT	100		10
2.5 - 3.0				
3.0 - 3.45	SPT	100	34/8 kPa; 1/0 1/1 1/1 N=4	
3.45 - 3.55				
3.55 - 4.0	PQTT	90		9
4.0 - 4.5				
4.5 - 5.0	SPT	100	0/- kPa crumble soils; 1/1 1/2 1/2 N=6	8

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%)

Description & Additional Observations:
- *0.50m:* PID - 0.1 ppm
- *1.00m:* PID - 0.0 ppm

Fluid Loss (%): 25, 50, 75

Water Level: 01/12/2020; 20/11/2020

Casing

Installation: Box 1, 0.0-2.7m

Core Box No

COMMENTS: Piezometer installed with screened interval from 3.5 - 5.0 m

Hole Depth 15.12m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: BH06

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926435.00 mN 1743208.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 19/11/2020
FINISH DATE: 19/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS WS S W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[Cont.] Silty SAND; grey. Loose, moist; sand, fine.																	
	Highly weathered, grey, SILTSTONE. Extremely Weak. (Recovered as SILT, trace sand; grey. Very Stiff, moist; sand, fine.).			PQTT	100			5.5										Box 2, 2.7-5.6m
	Highly weathered, grey, SILTSTONE. Extremely Weak. (Recovered as Sandy SILT; grey. Very Stiff, moist, non-plastic; sand, fine).						7											
	Highly weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Loose, moist; sand, fine).			SPT	100	● 0/- kPa crumble soils 1/2 1/3 2/3 **N=9**		6.0										
	6.45 - 6.6 m: CORE LOSE							6.5										
	Highly weathered, grey, SILTSTONE. Extremely Weak. (Recovered as Sandy SILT; grey. Hard, moist, non-plastic; sand, fine). *6.90 - 6.95m:* Silty SAND; grey. Loosely packed, moist; sand, fine. *6.95 - 7.17m:* Very stiff. *7.17 - 7.25m:* Very stiff; carbonaceous.			PQTT	85		6	7.0										
	Highly weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Medium dense, moist; sand, fine). *7.40 - 7.50m:* Sandy SILT; light grey. Very stiff, moist, non-plastic; sand, fine. *7.50 - 7.95m:* Sand, coarse.			SPT	100	● 0/- kPa crumble soils 2/2 2/3 3/3 **N=11**	5	7.5										
	7.95 - 8.1 m: CORE LOSS							8.0										
	Highly weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Medium dense, moist; sand, fine).			PQTT	85							9						
	Highly weathered, grey, SILTSTONE. Extremely Weak. (Recovered as Clayey SILT, minor sand; grey. Hard, moist, high plasticity; sand, fine).						4	8.5										Box 3, 5.6-8.6m
	Moderately weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Medium dense, moist; sand, fine). *9.00 - 9.20m:* Sand, coarse.			SPT	100	● 0/- kPa crumble soils 2/3 4/5 6/7 **N=22**		9.0				0						
	Moderately weathered, grey, SILTSTONE. Extremely Weak. (Recovered as SILT, trace sand; grey. Hard, moist; sand, fine).						3	9.5										
	Moderately weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Tightly packed, moist; sand, fine). *9.54 - 9.57m:* Highly weathered, grey, SILTSTONE. Extremely Weak, (SILT; grey. Hard, moist, low plasticity).											81						

COMMENTS: Piezometer installed with screened interval from 3.5 - 5.0 m

Hole Depth 15.12m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926435.00 mN, 1743208.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 19/11/2020
FINISH DATE: 19/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[Cont.] Moderately weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Tightly packed, moist; sand, fine).			PQTT	100							81						
	Moderately weathered, grey, SANDSTONE. Extremely Weak, (Recovered as SAND; grey. Dense, moist; sand, medium). - INTERBEDDED WITH - Moderately weathered, grey, SILTSTONE. Extremely Weak.			SPT	100	UTP 9/15 20/26 4 for 10mm N>=50	2	10.5				0						
	Moderately weathered, grey, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Dense, moist; sand, medium).																	
	10.81 - 11.1 m: CORE LOSS							11.0										
	Unweathered, medium grained, SANDSTONE. Very Weak, very weakly cemented. *11.21 - 11.25m:* Moderately weathered, SILTSTONE. Extremely Weak. *11.50 - 11.57m:* Unweathered, grey, SILTSTONE. Very Weak.			PQTT	75		1	11.5				75	11.24m: BF, 0° dip, N, CN 11.44 - 11.48m: BF, 0° dip, MN, Sands					Box 4, 8.6-11.5m
	Unweathered, grey, medium grained, SANDSTONE. Very Weak. *11.78 - 11.84m:* Unweathered, grey, SILTSTONE. Very Weak, Carbonaceous. *11.84 - 12.00m:* Unweathered, grey, medium grained, SANDSTONE. Very Weak.												11.76m: BF, 0° dip, N, CN 11.88m: DD					
	12 - 12.12 m: SOLID SPT			SPT	0	25/25 for 45mm N>=50 Solid	0	12.0				0						
	12.12 - 12.6 m: CORE LOSS							12.5										
	Unweathered, grey, medium grained, SANDSTONE. Very Weak. *13.18 - 13.26m:* Unweathered, grey, SILTSTONE. Very Weak.			PQTT	65			13.0				28	12.76 - 12.80m: BF, 0° dip, MN, Sands 12.90 - 12.93m: BF, 0° dip, MN, Sands 13.00 - 13.15m: BZ, 70° dip, N, CN 13.18m: BF, 0° dip, VN, CN 13.21m: DD 13.34m: BF, 0° dip, VN, CN 13.41m: BF, 0° dip, VN, CN					
	13.5 13.65 m: SOLID SPT			SPT	0	16/34 for 55mm N>=50 Solid	-1	13.5				0						
	13.63 - 13.8 m: CORE LOSS																	
	Unweathered, grey, medium grained, SANDSTONE. Very Weak. *13.80 - 13.84m:* Unweathered, grey, SILTSTONE. Very Weak. *14.40 - 14.90m:* medium to coaarse grained SANDSTONE *14.90 - 15.00m:* Unweathered, grey, medium to coarse grained, SANDSTONE. Extremely Weak, Weakly cemented.			PQTT	87		-2	14.0 14.5				73	13.86m: DD 14.09m: BF, 0° dip, N, CN 14.23m: BF, 0° dip, T, CN 14.26m: BF, 0° dip, VN, CN 14.41m: BF, 0° dip, VN, CN 14.57m: BF, 0° dip, T, CN 14.64m: BF, 0° dip, T, CN 14.79m: BF, 0° dip, T, CN 14.86m: BF, 0° dip, MN, CN					Box 5, 11.5-14.3m

COMMENTS: Piezometer installed with screened interval from 3.5 - 5.0 m

Hole Depth 15.12m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 4 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926435.00 mN 1743208.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 19/11/2020
FINISH DATE: 19/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (XW SW MW HW CW)	Rock Strength (ES VS WS S W XW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	15 - 15.12 m: SOLID SPT			SPT	0	21/29 for 45mm **N>=50** Solid						0	14.94m: BF, 10° dip, N, CN					
	15.12m: END OF INVESTIGATION						-3	15.5										
								16.0										
							-4	16.5										
								17.0										
							-5	17.5										
								18.0										
							-6	18.5										
								19.0										
							-7	19.5										

COMMENTS: Piezometer installed with screened interval from 3.5 - 5.0 m

Hole Depth 15.12m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

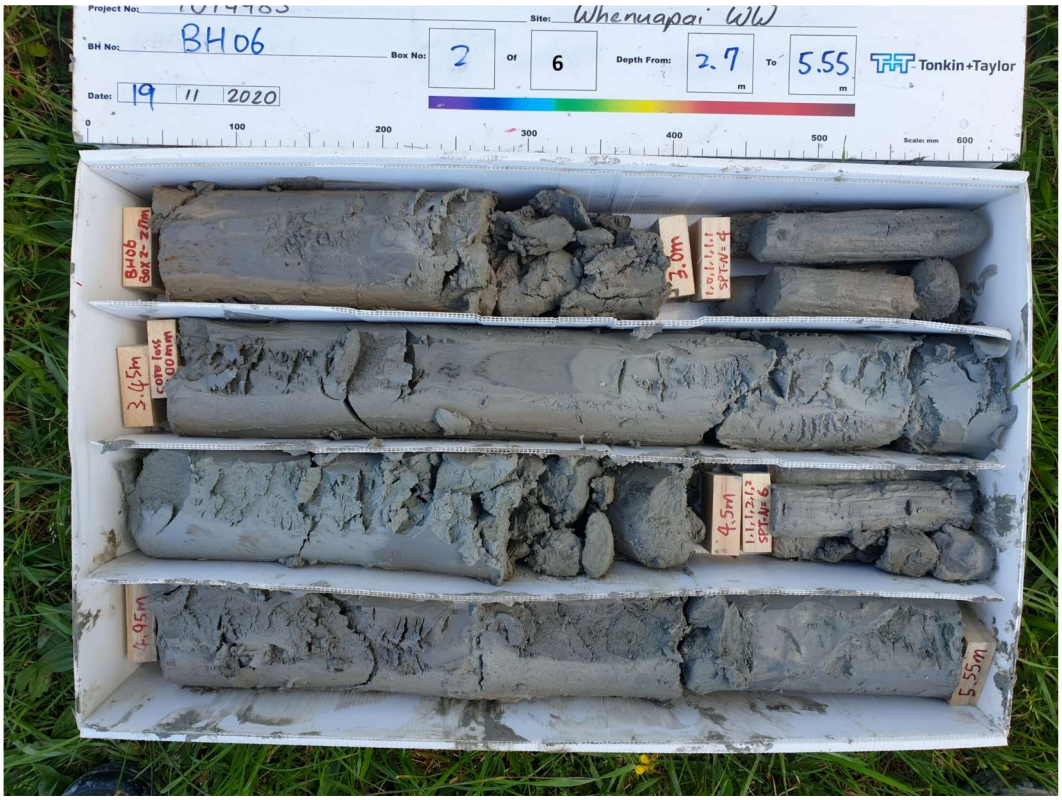
CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926435.00 mN (NZTM2000) 1743208.20 mE R.L.: 12.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 19/11/2020 HOLE FINISHED: 19/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



0.00-2.70m



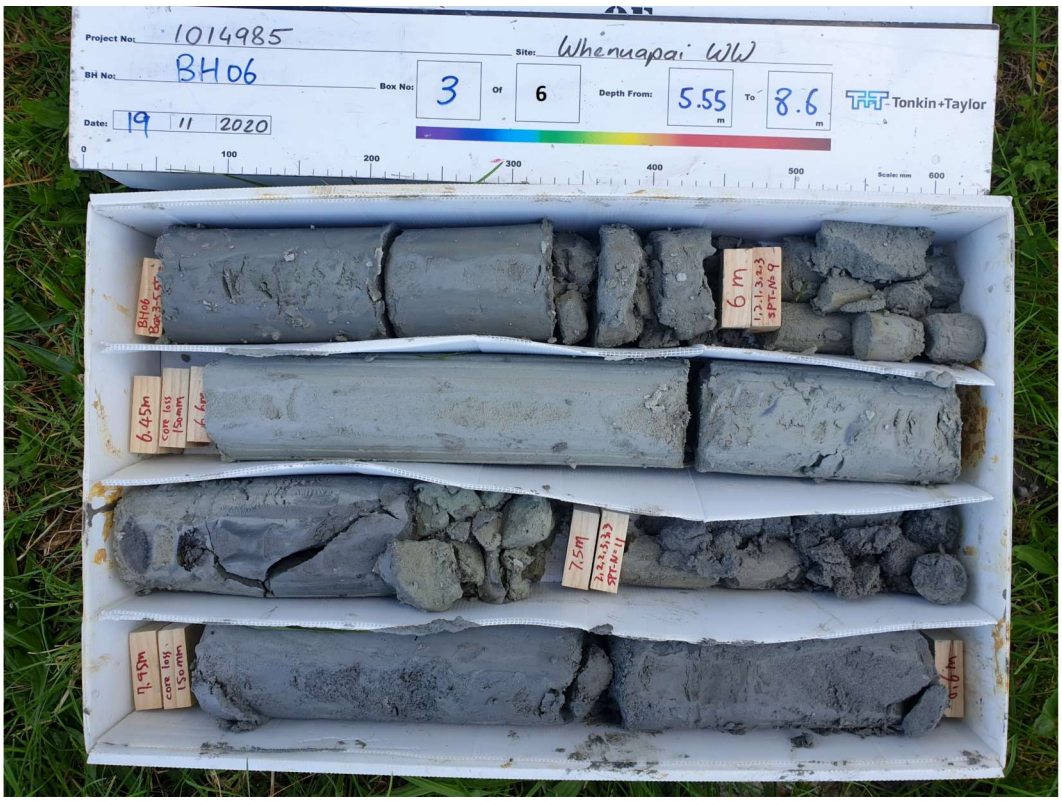
2.70-5.55m

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926435.00 mN (NZTM2000) 1743208.20 mE	DRILL TYPE: Track-mounted	HOLE STARTED: 19/11/2020
R.L.: 12.60m	DRILL METHOD: RC	HOLE FINISHED: 19/11/2020
DATUM: NZVD2016		DRILLED BY: McMillan Drilling
		LOGGED BY: YCWA CHECKED: CBM



5.55-8.60m



8.60-11.48m

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926435.00 mN (NZTM2000) 1743208.20 mE	DRILL TYPE: Track-mounted	HOLE STARTED: 19/11/2020
R.L.: 12.60m	DRILL METHOD: RC	HOLE FINISHED: 19/11/2020
DATUM: NZVD2016		DRILLED BY: McMillan Drilling
		LOGGED BY: YCWA CHECKED: CBM



11.48-14.26m



14.26-15.12m

General Log - 21/12/2020 8:31:50 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926205.30 mN, 1743224.80 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 21.80m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 20/11/2020
FINISH DATE: 20/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
TSoil	Organic SILT; brown. Stiff, moist, low plasticity; organics, amorphous and rootlets.			PQTT	100			0.5	TS									
	0.35 - 0.50m: Light brown mottled orangish brown.								TS				*0.50m:* PID - 0.1 ppm					
Tauranga Group	Clayey SILT; light grey mottled orangish brownm. Very stiff, moist, high plasticity.			PQTT	100	● 168/67 kPa	21	1.0					*1.00m:* PID - 0.0 ppm					
	1.95 - 2.40m: Stiff.			SPT	66	1/1 1/1 1/2 **N=5**		1.5							▼ 20/11/2020			
	2.40 - 3.00m: Firm to stiff.			PQTT	100		20	2.0										
	3.0 - 3.5 m:PUSH TUBE			PT	100	● 58/11 kPa Push tube @ 3.00m	19	2.5 3.0										Box 1, 0.0-2.6m
East Coast Bays Formation	Clayey SILT; organish brown. Firm, moist, medium plasticity.			SPT	100	1/0 1/0 1/1 **N=3**		3.5										
	Sandy SILT; grey. Firm, moist, non-plastic; sand, fine.						18	4.0										
	Clayey SILT; grey. Firm, moist, high plasticity.			PQTT	100	● 40/9 kPa												
	Sandy SILT; grey. Firm, moist, low plasticity; sand, fine.			SPT	100	1/0 1/1 1/1 **N=4**	17	4.5										

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:32:53 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH07

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926205.30 mN, 1743224.80 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 21.80m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 20/11/2020
FINISH DATE: 20/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS WS S W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[Cont.] Sandy SILT; grey. Firm, moist, low plasticity; sand, fine.			PQTT	100	93/17 kPa	16	5.5										Box 2, 2.6-6.0m
	SILT, some clay, minor sand; grey. Stiff, moist, low plasticity; sand, fine.																	
	6m: END OF INVESTIGATION						15	6.0										
							14	7.0										
							13	8.0										
							12	9.0										

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:32:53 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

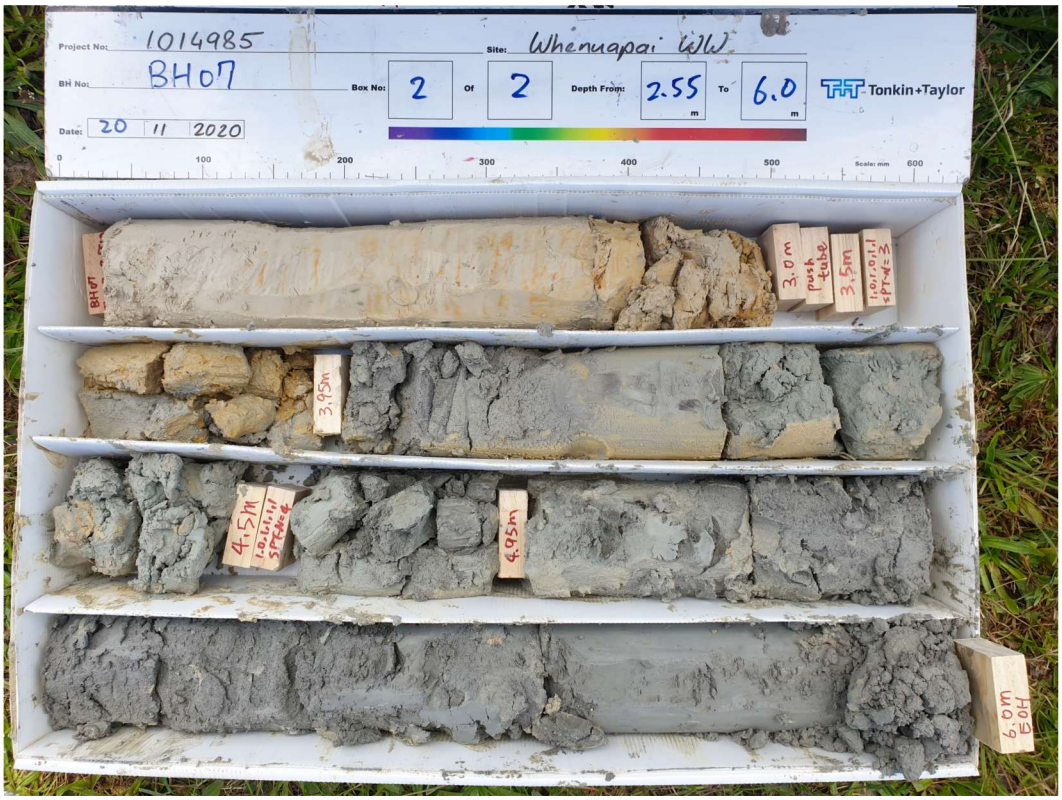
BOREHOLE No.: **BH07**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926205.30 mN (NZTM2000) 1743224.80 mE R.L.: 21.80m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 20/11/2020 HOLE FINISHED: 20/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



0.00-2.55m



2.55-6.00m

General Log - 21/12/2020 8:32:53 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 1 OF 3

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: 5926036.50 mN, 1743457.30 mE (NZTM2000)

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 24.60m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Vincent

LOGGED BY: ROM

CHECKED: CBM

START DATE: 23/11/2020

FINISH DATE: 23/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	Sandy SILT, trace organics; brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.			PQTT	100	3 @ 0.10m 1 x Glass Jar 1 x Plastic Jar	24	0.5										
	Silty sandy CLAY, trace organics; brown, orange & light grey mottled orange. Stiff, moist, medium plasticity; sand, fine; organics, rootlets.					1 @ 0.25m 1 x Plastic Jar Corrosivity												
	Sandy SILT; brown mottled orange. Stiff, moist, low plasticity; sand, fine.					4 @ 0.50m 1 x Glass Jar 1 x Plastic Jar							*0.50m:* PID - 0.2ppm		01/12/2020			
Tauranga Group	Clayey sandy SILT; brown & orange mottled orange. Stiff, moist, medium plasticity; sand, fine.																	
	Silty CLAY, trace organics; light grey-grey mottled orange & brown. Stiff, moist, high plasticity; organics, rootlets.			PQTT	100	5 @ 1.00m 1 x Glass Jar 1 x Plastic Jar	23	1.0					*1.00m:* PID - 0.8ppm					
	Clayey sandy SILT, trace organics; grey mottled orange. Stiff, moist, medium plasticity; sand, fine; organics, rootlets.			SPT	100	81/41 kPa 1/1 1/1 1/2 **N=5**		1.5										
	1.95 - 2.05 m: CORE LOSS																	
	Clayey sandy SILT, trace organics; grey mottled orange. Stiff, moist, medium plasticity; sand, fine; organics, fibrous.			PQTT	90	6 @ 2.00m 1 x Glass Jar 1 x Plastic Jar	22	2.0										
	Clayey SILT, minor sand, trace organics; light grey-brown mottled orange. Stiff, moist, medium plasticity; sand, fine; organics, fibrous.					2 @ 2.30m 1 x Plastic Jar Corrosivity												
	Sandy SILT, trace organics; light grey-brown mottled orange. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.					7 @ 3.00m 1 x Glass Jar 1 x Plastic Jar		2.5										
	SILT, minor sand, trace organics; light brown mottled orange, speckled black. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.			SPT	122	51/28 kPa 1/0 1/1 1/1 **N=4**		3.0										
	SILT, minor clay and sand, trace organics; brown-grey spotted dark brown. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.			PQTT	66	8 @ 4.00m 1 x Glass Jar 1 x Plastic Jar	21	3.5										
	Sandy SILT, trace organics; brown-grey spotted dark brown. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.							4.0										
	Sandy SILT, trace organics; grey speckled black. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.			SPT	155	52/12 kPa 0/1 1/0 1/0 **N=4**	20	4.5										

Box 1, 0.0-2.4m

COMMENTS: Piezometer installed with screened interval from 3.0 to 6.0 m

Hole Depth 10.95m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:03 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 2 OF 3

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926036.50 mN 1743457.30 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 24.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: ROM
CHECKED: CBM
START DATE: 23/11/2020
FINISH DATE: 23/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	SILT, minor clay, trace organics; brown-grey spotted dark brown. Firm to stiff, moist, low plasticity; organics, fibrous.			PQTT	100	9 @ 5.00m 1 x Glass Jar 1 x Plastic Jar	19	5.5										Box 2, 2.4-3.2m
	6.0 - 6.5 m: Push tube			PT	0	47/19 kPa 1/0 1/1 1/2 **N=5**		6.0										
	SILT, minor clay, trace organics; brown-grey spotted dark brown. Firm to stiff, moist, low plasticity; organics, fibrous. *6.80 - 6.92m:* Grades to: Sandy SILT			SPT	100		18	6.5										
	SILT, minor sand, trace organics; brown speckled black. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous. *7.00m:* Grades to: some sand			PQTT	100			7.0										
	Sandy SILT, trace organics; light brown & brown speckled black. Very loose, moist, poorly graded; sand, fine; organics, fibrous.							7.5					*7.40 - 7.65m:* Core disturbed due to core drop-out and re-drilling					
	SILT, some sand, trace organics; brown mottled light brown speckled black. Firm, moist, low plasticity; sand, fine; organics, fibrous.			SPT	100	0/0 0/1 1/1 **N=3**	17						*7.65m:* Core run extended to 7.65m due to core drop out of barrel					
	Sandy SILT, trace organics; light brown speckled black. Firm, moist, low plasticity; sand, fine; organics, fibrous.			PQTT	100			8.0										
								8.5					*8.10 - 9.00m:* Core disturbed due to core drop-out and re-drilling					Box 3, 5.2-8.4m
	Sandy SILT, trace organics; dark brown speckled black. Firm to stiff, moist, low plasticity; sand, fine; organics, fibrous.						16											
	Sandy SILT, minor organics and clay; brown spotted black. Stiff, moist, low plasticity; sand, fine; organics, fibrous. *9.35m:* Grades to: No Sand			SPT	117	59/19 kPa 1/1 2/2 2/2 **N=8**		9.0										
							15	9.5										

COMMENTS: Piezometer installed with screened interval from 3.0 to 6.0 m

Hole Depth 10.95m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:05 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 3 OF 3

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926036.50 mN 1743457.30 mE

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 24.60m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Vincent

LOGGED BY: ROM

CHECKED: CBM

START DATE: 23/11/2020

FINISH DATE: 23/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[CONT] Sandy SILT, minor clay and organics; brown spotted black. Stiff, moist, low plasticity; sand, fine; organics, fibrous			PQTT	100													
	Silty SAND, trace organics; light brown-grey spotted black. Loose to medium dense, moist, poorly graded; sand, fine; organics, fibrous. *10.88 - 10.93m:* Decomposed wood *10.93m:* Brown spotted black			SPT	100	133/31 kPa 1/2 2/2 3/3 **N=10**	14	10.5										Box 4, 8.4-11.0m
	10.95m: END OF INVESTIGATION						13	11.0										
							12	12.5										
							11	13.5										
							10	14.5										

COMMENTS: Piezometer installed with screened interval from 3.0 to 6.0 m

Hole Depth 10.95m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:05 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH08**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926036.50 mN (NZTM2000) 1743457.30 mE R.L.: 24.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 23/11/2020 HOLE FINISHED: 23/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



0.00-2.40m



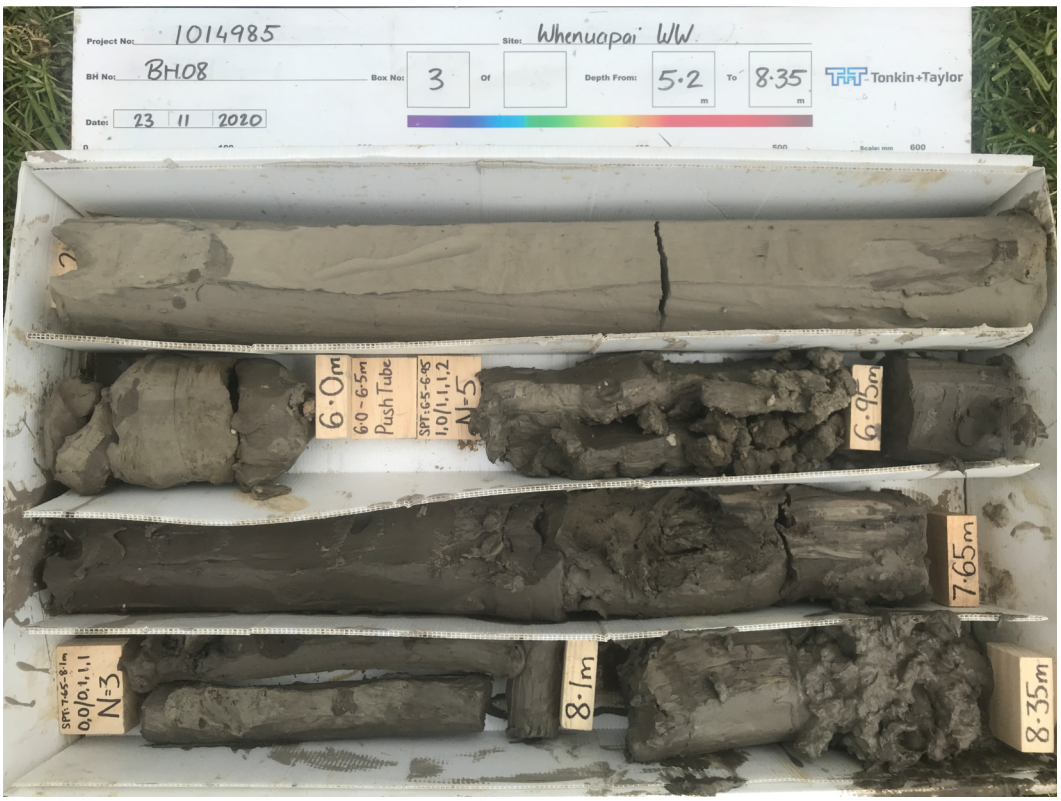
2.40-5.20m

General Log - 1/03/2021 9:34:05 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH08**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926036.50 mN 1743457.30 mE R.L.: 24.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 23/11/2020 HOLE FINISHED: 23/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



5.20-8.35m



8.35-10.95m

General Log - 1/03/2021 9:34:07 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH110

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926611.70 mN 1743051.90 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie, Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 13/11/2020
FINISH DATE: 16/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
TSoil	SILT, trace rootlets; brown. Stiff, moist, non-plastic.			PQTT	100	1 @ 0.10m	9	0.5	TS									
Tauranga Group	SILT, trace sand; light brown mottled orangish brown. Stiff to very stiff, moist, low plasticity; sand, fine. *0.50 - 0.80m:* Trace rootlets.					2 @ 0.50m							*0.50m:* PID - 0.6 ppm					
	Silty CLAY; light brown motled orangish brown. Very stiff, moist, high plasticity. *0.80 - 0.90m:* Trace rootlets.					8 @ 0.80m 3 @ 0.90m		1.0					*1.00m:* PID - 0.3 ppm					
	1.50 - 2.45m: Light brown.					4 @ 1.25m 153/59 kPa		1.5										
				SPT	84	1/1 2/1 3/2 **N=8**	8											
				PQTT	100	5 @ 1.95m		2.0										
						9 @ 2.30m 96/16 kPa												
East Coast Bays Formation	Silty SAND; light brown mottled orangish brown. Loosely packed, saturated; sand, fine.						7	2.5										
	Sandy SILT; grey. Tightly packed, moist; sand, fine.			PQTT	100	6 @ 2.90m 0/- kPa crumble		3.0							16/11/2020			
	3.1 - 3.5 m: PUSH TUBE			PT	100	Push Tube @ 3.10m												
	Sandy SILT; grey. Hard, moist, non-plastic; sand, fine.			SPT	100	5/10 15/17 18 for 65mm **N>=50**	6	3.5										
	3.87 - 4.0 m: CORE LOSS							4.0										
	Moderately weathered, grey, SANDSTONE. Extremely weak. (Recovered as SAND, grey. Very dense, moist; sand fine)			PQTT	79	7 @ 4.00m UTP						17			07/12/2020			
	Moderately weathered, grey, SILTSTONE. Extremely weak. (Recovered as Sandy SILT, grey. hard, moist, low plasticity; sand fine)			SPT	0	6/25 20/30 for 45mm **N>=50** Solid	5	4.5				0						
	4.77 - 4.87 m: CORE LOSS											55						Box 1, 0.0-2.5m

COMMENTS: Piezometer installed with screened interval from 8.0 - 11.0 m

Hole Depth 15.11m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:45:30 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH110

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926611.70 mN, 1743051.90 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie, Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 13/11/2020
FINISH DATE: 16/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	Moderately weathered, grey, fine, SANDSTONE. Extremely Weak. (Recovered as SAND; grey. Tightly packed, moist; sand, fine)			PQTT	91		4	5.5				55	5.16m: DD 5.32m: BF, 0° dip, N, CN 5.40m: BF, 0° dip, N, CN 5.44m: DD					
	Moderately weathered, grey, SILTSTONE. Very Weak.																	
	Moderately weathered, grey, fine SANDSTONE. Extremely weak. (Recovered as Silty SAND, grey. Very dense, moist; sand fine)												5.59m: DD					
	Slightly weathered, grey, SANDSTONE. Extremely weak, very weakly cemented. (Recovered as Silty SAND, grey. Very dense, moist; sand fine)			SPT	0	10/25 35/15 for 10mm **N>=50** Solid		6.0				0	5.90m: DD					
	6.93m: Carbonaceous			PQTT	100		3	6.5				67	6.60m: BF, 0° dip, N, CN 6.85m: BF, 0° dip, T, CN 7.10 - 7.30m: BZ, 80° dip, N, CN					
	Unweathered, grey, SANDSTONE. Very Weak.							7.0										
	7.5 - 7.63 m: Solid SPT			SPT	0	11/39 for 55mm **N>=50** Solid	2	7.5				0						
	Unweathered, grey, fine to coarse, SANDSTONE. Very Weak.																	
	8.00 - 8.15m: Unweathered SILTSTONE. Very Weak.							8.0					7.91 - 7.93m: BF, 10° dip, N, CN 7.98m: BF, 0° dip, N, CN 8.07m: BF, 0° dip, VN, CN					
	8.15 - 8.3 m: CORE LOSS																	
	Unweathered, grey, fine to coarse, SANDSTONE. Very Weak.			PQTT	89							45						
	Unweathered, grey, fine, SANDSTONE. Very Weak.						1	8.5					8.42m: BF, 0° dip, N, CN 8.65 - 8.67m: BF, 0° dip, N, coarse sands 8.70m: BF, 0° dip, VN, CN 8.73 - 8.77m: BZ, 30° dip, VN, CN					
	9.0 - 9.18 m: SOLID SPT			SPT	0	5/21 50 for 25mm **N>=50** Solid		9.0				0	8.82m: BF, 0° dip, MN, medium grained sands 8.86m: BF, 0° dip, VN, CN					
	Unweathered, grey, fine, SANDSTONE. Very Weak.												8.91m: BF, 0° dip, VN, CN 8.94m: BF, 0° dip, VN, CN 9.23m: DD					
	9.30 - 9.40m: Unweathered SILTSTONE. Very Weak.						0	9.5				54	9.36m: BF, 10° dip, VN, CN 9.42m: BF, 0° dip, VN, CN 9.61m: BF, 10° dip, VN, CN					
	9.90 - 9.97m: Unweathered SILTSTONE. Very Weak.												9.77m: BF, 0° dip, VN, CN 9.90m: BF, 0° dip, VN, CN					

Box 3, 5.1-7.1m

Box 4, 7.1-9.6m

COMMENTS: Piezometer installed with screened interval from 8.0 - 11.0 m

Hole Depth 15.11m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH110

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926611.70 mN 1743051.90 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie, Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 13/11/2020
FINISH DATE: 16/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	Unweathered, grey, medium to coarse, SANDSTONE. Very Weak, Weakly cemented.			PQTT	100							54	10.13m: BF, 0° dip, VN, CN 10.22m: BF, 0° dip, N, CN 10.30m: BF, 0° dip, VN, CN 10.37m: BF, 0° dip, VN, CN					
	Unweathered, grey, SILTSTONE. Very Weak.			SPT	0	20/30 for 35mm N>=50 Solid	-1	10.5				0						
	Unweathered, grey, fine, SANDSTONE. Very Weak.			PQTT	100							48	10.74 - 10.77m: BF, 30° dip, N, CN 10.84m: BF, 0° dip, N, CN 10.94m: DD 11.09m: DD 11.22m: BF, 0° dip, VN, CN 11.29m: BF, 0° dip, VN, CN 11.36m: BF, 20° dip, VN, CN					
	11.22 - 11.23m: Unweathered SILTSTONE. Very Weak.																	
	11.35 - 11.53m: SANDSTONE grades fine to medium grained																	
	11.85 - 11.95m: Unweathered SILTSTONE. Very Weak			PQTT	100		-2	11.0				21	11.53 - 11.57m: BF, 0° dip, MN, Sands 11.65 - 11.73m: BZ, VN, CN 11.79m: BF, 0° dip, VN, CN 11.85m: DD					Box 5, 9.6-11.9m
	12.0 - 12.09 m: SOILD SPT			SPT	0	32/18 for 15mm N>=50 Solid		11.5				0						
	Unweathered, grey, fine, SANDSTONE. Very Weak.																	
	Unweathered, grey, SILTSTONE. Very Weak. *12.21 - 12.29m:* Carbonaceous *12.29 - 12.35m:* Carbonaceous *12.63 - 12.64m:* SANDSTONE interbed *12.69 - 12.70m:* SANDSTONE interbed							12.0					12.19m: BF, 0° dip, VN, CN 12.23m: DD 12.29m: BF, 10° dip, VN, CN					
	Unweathered, grey, fine, SANDSTONE. Very Weak, Weakly cemented.			PQTT	100		-3	12.5				55	12.48m: BF, 0° dip, VN, CN 12.59m: BF, 0° dip, N, Sandstone gravels 12.64m: BF, 10° dip, N, CN 12.68m: BF, 0° dip, VN, CN 12.70m: DD 12.75m: DD 12.99m: DD					
	13.37 - 13.46m: Unweathered SILTSTONE. Very Weak.							13.0					13.17m: BF, 0° dip, VN, CN 13.29m: BF, 0° dip, VN, CN					
				SPT	0	32/18 for 20mm N>=50 Solid	-4	13.5				0						
	Unweathered, grey mottled light grey, fine to medium grained, SANDSTONE. Weak, Moderately cemented.												13.63m: BF, 10° dip, N, CN 13.74m: BF, 0° dip, MN, CN 13.77m: BF, 0° dip, N, CN 13.88m: BF, 0° dip, MN, CN					Box 6, 11.9-14.1m
	Unweathered, grey, fine, SANDSTONE. Very Weak. *14.21 - 14.22m:* Unweathered SILTSTONE. Very Weak.			PQTT	75			14.0				32	14.10m: DD 14.16m: BF, 0° dip, N, CN 14.25 - 14.29m: BF, VN, CN					
	14.4 - 14.75 m: CORE LOSS						-5	14.5										
	Unweathered, grey, SANDSTONE. Very weak																	
	Unweathered, grey, SILTSTONE. Very Weak.																	

COMMENTS: Piezometer installed with screened interval from 8.0 - 11.0 m

Hole Depth 15.11m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH110

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926611.70 mN, 1743051.90 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie, Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 13/11/2020
FINISH DATE: 16/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS WS MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	15.0 - 15.11 m: SOLID SPT			SPT	0	23/27 for 35mm **N>=50** Solid						0						
	15.11m: END OF INVESTIGATION						-6	15.5										
								16.0										
							-7	16.5										
								17.0										
							-8	17.5										
								18.0										
							-9	18.5										
								19.0										
							-10	19.5										

COMMENTS: Piezometer installed with screened interval from 8.0 - 11.0 m

Hole Depth 15.11m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH110**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926611.70 mN (NZTM2000) 1743051.90 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 13/11/2020 HOLE FINISHED: 16/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



0.00-2.50m



2.50-5.10m

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH110**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926611.70 mN 1743051.90 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 13/11/2020 HOLE FINISHED: 16/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



5.10-7.10m



7.10-9.61m

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH110**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926611.70 mN 1743051.90 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 13/11/2020 HOLE FINISHED: 16/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



9.61-11.90m



11.90-14.10m

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH110**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926611.70 mN (NZTM2000) 1743051.90 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 13/11/2020 HOLE FINISHED: 16/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



14.10-15.11m

General Log - 21/12/2020 8:45:31 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH111

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 10/11/2020
FINISH DATE: 11/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Depth (m)	RL (m)	Sampling Method	Core Recovery (%)	Testing	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations
Top	Clayey SILT, some organics; brown. Very stiff, moist, high plasticity; organics, rootlets.	0.5	9	PQTT	26	BH111 Sample 1 @ 0.05m	TS				
Tauranga Group	Clayey SILT, trace sand; light brown. Stiff, moist, high plasticity; sand, fine.	1.0									
	0.3 - 1.4 m: CORE LOSS	1.5	8	SPT	100	73/31 kPa 1/1 0/1 1/2 N=4					
	Clayey SILT, trace sand; light brown mottled brown. Stiff, moist, high plasticity; sand, fine.	2.0		PQTT	100	BH111 Sample 2 @ 2.00m BH111 Sample 3 @ 2.20m					
	Clayey SILT, minor organics, trace sand; brown. Firm, moist, high plasticity; sand, fine; organics, rootlets.	2.5	7								
	Sandy SILT; grey mottled orangish brown. Firm, moist, non-plastic; sand, fine.	3.0		SPT	100	BH111 Sample 4 @ 2.80m 2/3 5/6 7/7 N=25					
East Coast Bays Formation	Silty SAND; grey. Medium dense, moist; sand, fine.	3.5									
	3.45 - 3.7 m: CORE LOSS	4.0	6	PQTT	76	BH111 Sample 5 @ 3.70m BH111 Sample 6 @ 3.90m				20	
	Moderately weathered, grey, fine grained, SANDSTONE. Extremely Weak, (Recovered as Silty SAND; grey. Medium dense, moist; sand, fine) *3.90 - 4.05m:* Recovered as GRAVEL	4.5									
	Moderately weathered, grey fine grained SANDSTONE; Extremely weak. (Recovered as fine grained SAND; grey. Dense, moist.)	5		SPT	100	0/- kPa Crumble. 6/5 5/9 15/21 N>=50 Solid				0	
	Moderately weathered, grey SILTONE; Extremely weak. (Sandy SILT; grey. Hard, moist, low plasticity; sand, fine.) *4.70 - 4.72m:* SILT; light brown. Moist, low plasticity. *4.85m:* 2 mm thick SILT; light brown. *4.90 - 4.95m:* SAND; grey. Dense, moist; sand, fine.										

Water Level: 17/11/2020, 11/11/2020

Installation: Box 1, 0.0-3.5m

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 3.0 - 5.0 m.

Hole Depth 18.04m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:46:56 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH111

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926614.20 mN, 1743088.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 10/11/2020
FINISH DATE: 11/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	ROCK DEFECTS: RQD (%)	Description & Additional Observations
East Coast Bays Formation	4.95 - 5.05 m: CORE LOSS							
	Slightly weathered, grey, fine grained SANDSTONE. Very Weak.	PQTT	81				65	5.23m: BF, 10° dip, VN, CN
	5.05 - 5.15m: SAND; grey. Dense, moist; sand, fine.							5.27 - 5.28m: BF, 0° dip, MN, light brown veneer
	5.28 - 5.32m: Slightly weathered, grey, SILTSTONE. Very Weak.							
	5.40m: Carbonaceous							
	Unweathered, light grey, fine grained SANDSTONE. Weak.	PQTT	12			5.5	0	
	5.56 - 6.0 m: CORE LOSS							
	Slightly weathered, grey, fine grained SANDSTONE. Very Weak, Carbonaceous [logged after solid SPT testing].	SPT	100	8/15 15/25 10 for 15mm N>=50 Solid		6.0	0	
	Slightly weathered, grey, fine, SANDSTONE. Very Weak, {Recovered as GRAVEL).							
	6.42 - 6.6 m: CORE LOSS					6.5		
	Unweathered, grey, fine grained SANDSTONE. Very Weak.	PQTT	84				53	6.60m: BF, 0° dip, N, CN
	6.68 - 6.72m: SILTSTONE							6.68m: BF, 0° dip, N, CN
	6.90 - 6.92m: SILTSTONE							6.77m: BF, 0° dip, N, CN
								6.87m: BF, 0° dip, N, CN
						7.0		7.00m: DD
	7.20 - 7.26m: SILTSTONE							7.20m: DD
								7.40m: BF, 0° dip, VN, CN
	Unweathered, grey, SILTSTONE. Very Weak. - INTERBEDDED WITH - Unweathered, grey, fine, SANDSTONE. Very Weak.	SPT	100	8/12 17/23 10 for 20mm N>=50 Solid		7.5	0	
	Unweathered, grey, fine grained SANDSTONE. Very Weak.	PQTT	80				45	8.15m: DD
	8.32 - 8.33m: SILTSTONE							8.30m: BF, 0° dip, VN, CN
	8.37 - 8.38m: SILTSTONE							8.42m: BF, 0° dip, VN, CN
	8.44 - 8.53m: SILTSTONE							8.44m: BF, 0° dip, VN, CN
	8.53 - 8.90m: Weakly cemented SANDSTONE					8.5		8.49m: BF, 0° dip, VN, CN
								8.53m: DD
	8.9 - 9.0 m: CORE LOSS							
	Unweathered, grey, SANDSTONE. Very Weak, carbonaceous. [logged after solid SPT test].	SPT	95	15/25 35/15 for 10mm N>=50 Solid		9.0	0	
	9.24 - 9.45 m: CORE LOSS							
	Unweathered, grey, fine grained SANDSTONE. Very Weak.					9.5	31	9.50m: DD
								9.68m: DD
	9.78 - 9.80m: SILTSTONE							9.78m: BF, 0° dip, N, CN
	9.86 - 9.97m: SILTSTONE							9.83m: DD
								9.86m: DD

Rock Weathering: UW, SW, MW, HW, CW
Rock Strength: ES, VS, WS, S, W, VW, EW
Defect Log: Fracture Spacing (mm): 2000, 600, 200, 60, 20
Fluid Loss (%): 25, 50, 75
Water Level
Casing
Installation
Core Box No: Box 2, 3.5-6.0m; Box 3, 6.0-8.3m

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 3.0 - 5.0 m.

Hole Depth 18.04m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH111

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 10/11/2020
FINISH DATE: 11/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[CONT] unweathered, grey, fine grained SANDSTONE. Very Weak. *10.02 - 10.06m:* Fine to coarse grained SANDSTONE *10.24 - 10.48m:* Fine to coarse grained SANDSTONE			PQTT	83							31	10.02m: BF, 0° dip, VN, CN 10.06 - 10.11m: BF, 0° dip, N, CG (grey silt) 10.15m: DD 10.21m: BF, 0° dip, N, CN 10.24m: BF, 0° dip, N, CN 10.38m: DD 10.44m: DD					
	10.5 - 10.63 m: Solid SPT			SPT	0	20/27 for 50mm **N>=50** Solid		10.5				0						
	10.63 - 11.15 m: CORE LOSS						-1	11.0										
	Unweathered, grey, fine grained SANDSTONE. Very Weak.			PQTT	62							9	11.22m: BF, 0° dip, N, CN 11.28m: BF, 0° dip, N, CN 11.36m: BF, 0° dip, N, CN					Box 4, 8.3-11.5m
	Unweathered, grey, coarse grained SANDSTONE. Very Weak.																	
	Unweathered, grey, fine grained SANDSTONE. Very Weak. *11.61 - 11.65m:* SILTSTONE *11.77 - 11.82m:* Coarse grained SANDSTONE							11.5					11.45m: DD 11.50m: DD 11.59m: DD 11.73m: DD 11.77m: BF, 0° dip, N, CN 11.82m: DD 11.88m: DD					
	Unweathered, grey, SILTSTONE. Very Weak.						-2	12.0										
	Unweathered, grey, fine grained SANDSTONE. Very Weak.			SPT	80	5/14 30/20 for 25mm **N>=50** Solid						0						
	12.74 - 12.77m: SILTSTONE			PQTT	100		-3	12.5				61	12.46m: DD 12.63 - 12.73m: BZ, 70° dip, VN, CN 12.87m: DD					
	13.14 - 13.20m: SILTSTONE							13.0					13.14m: DD 13.27m: DD 13.32m: BF, 0° dip, N, CN 13.42m: DD					
	Unweathered, grey, SILTSTONE. Very Weak.			SPT	100	20/30 for 30mm **N>=50** Solid		13.5				0						Box 5, 11.5-13.6m
	Unweathered, grey, fine grained SANDSTONE. Very Weak.						-4	14.0					13.76m: DD 13.85m: DD 14.02m: DD 14.10m: DD 14.15m: DD					
	14.26 - 14.41m: Weakly cemented			PQTT	73							46						
	14.41 - 14.78 m: CORE LOSS							14.5										
	Unweathered, grey, fine grained SANDSTONE. Very Weak.						-5						14.88m: DD					

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 3.0 - 5.0 m.

Hole Depth 18.04m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH111

SHEET: 4 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 10/11/2020
FINISH DATE: 11/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS WS MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm) (2000 600 200 60 20)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[CONT] Unweathered, grey, fine grained SANDSTONE. Very Weak.			SPT	100	20/30 for 45mm N>=50 Solid						0						
				PQTT	84			15.5				38	15.27m: DD 15.35m: DD 15.40m: DD					
	15.65 - 15.75 m: CORE LOSS																	
	Unweathered, grey, coarse grained SANDSTONE. Very Weak.			PQTT	100		-6	16.0				52	15.89m: DD 15.96m: DD 16.13m: DD 16.22m: DD 16.28m: DD 16.40m: DD					Box 6, 13.6-16.5m
				SPT	100	16/34 for 40mm N>=50 Solid		16.5				0						
	16.62 - 16.77 m: CORE LOSS																	
	Unweathered, grey, coarse grained SANDSTONE. Weak.			PQTT	76		-7	17.0				66	16.93m: DD 17.10m: DD 17.16m: DD					
	Unweathered, grey, SILTSTONE. Very Weak.																	
	17.25 - 17.4 m: CORE LOSS																	
	Unweathered, grey, fine grained SANDSTONE. Very Weak. *17.46 - 17.48m:* SILTSTONE *17.51 - 17.55m:* SILTSTONE *17.67 - 17.86m:* SILTSTONE			PQTT	80			17.5				44	17.60m: BF, 0° dip, N, CN					Box 7, 16.5-18.0m
	Unweathered, grey, medium grained SANDSTONE. Very Weak.						-8	18.0				0	*18.00m:* SPT calibration undertaken between 10.5 - 18.0m					
	18.0 - 18.04 m: Soild SPT				0	7 for 35mm N>=50 Solid Bouncing												
	18.04m: END OF INVESTIGATION						-9	18.5										
								19.0										
							-10	19.5										

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 3.0 - 5.0 m.

Hole Depth 18.04m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH111**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926614.20 mN (NZTM2000) 1743088.20 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 10/11/2020 HOLE FINISHED: 11/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



0.00-3.45m



3.45-6.00m

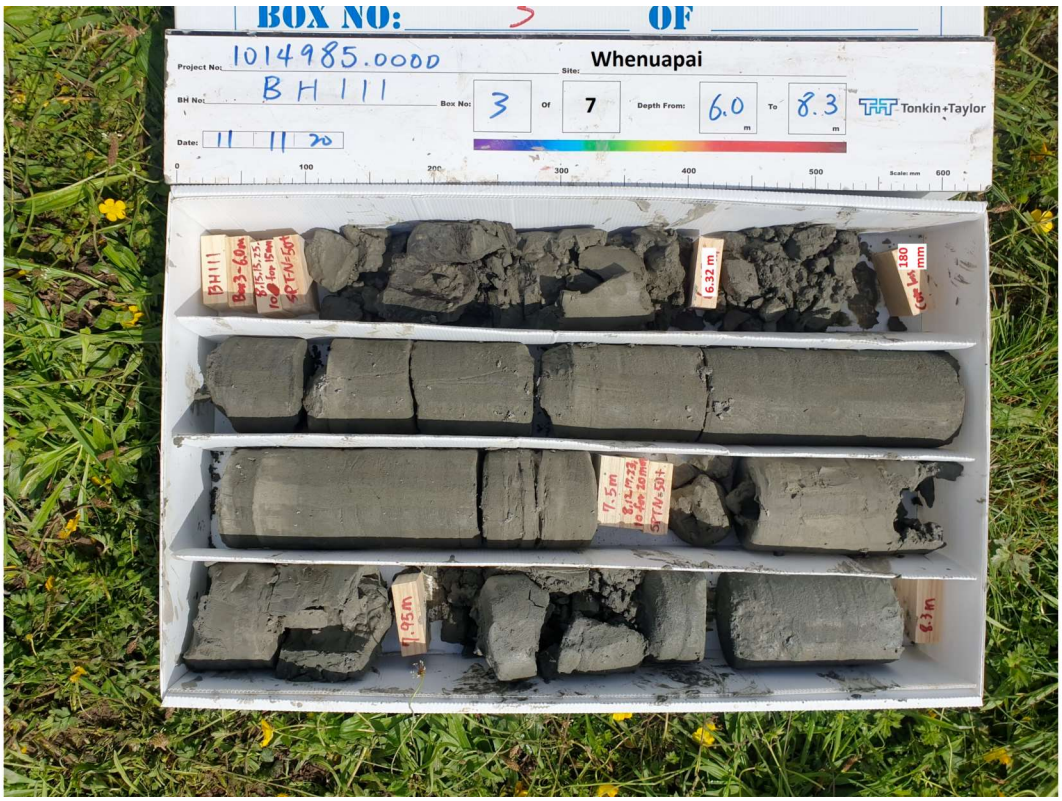
General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH111**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 10/11/2020 HOLE FINISHED: 11/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



6.00-8.30m



8.30-11.45m

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH111**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 10/11/2020 HOLE FINISHED: 11/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



11.45-13.60m



13.60-16.50m

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH111**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743088.20 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 10/11/2020 HOLE FINISHED: 11/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



16.50-18.00m

General Log - 21/12/2020 8:46:57 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH111A

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926614.20 mN 1743090.20 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Vincent
LOGGED BY: YCWA
CHECKED: CBM
START DATE: 12/11/2020
FINISH DATE: 12/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	SILT, minor rootlets; brown. Stiff to very stiff, low plasticity.								TS									
	Clayey SILT; light brown mottled orangish brown. Stiff, moist, high plasticity. *0.60 - 0.80m:* Trace rootlets. Firm.			HQTT	87	BH11A Sample 1 @ 0.40m		0.5					*0.50m:* PID - 0.3 ppm					
						BH11A Sample 2 @ 1.00m	9	1.0					*1.00m:* PID - 0.5 ppm					
	Clayey SILT, minor organics, trace sand; brown. Firm, moist, high plasticity; organics, fleck; sand, fine.							1.5										
	1.75 - 2.0 m: CORE LOSS						8											
	2.0 - 2.5 m: PUSH TUBE			PT	100	Push tube @ 2.00m		2.0										Box 1, 0.0-2.5m
	2.5m: END OF BOREHOLE							2.5										
							7	3.0										
								3.5										
							6	4.0										
								4.5										
							5											

COMMENTS: Drilled 1.5 m from BH111 to recover core in the upper 2.5 m.

Hole Depth 2.5m

Scale 1:25

Rev.: A

General Log - 21/12/2020 8:48:20 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH111A**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926614.20 mN (NZTM2000) 1743090.20 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 12/11/2020 HOLE FINISHED: 12/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: YCWA CHECKED: CBM



0.00-2.50m

General Log - 21/12/2020 8:48:20 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH113

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926965.50 mN, 1743286.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 04/11/2020
FINISH DATE: 05/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Depth (m)	RL (m)	Sampling Method	Core Recovery (%)	Testing	Description & Additional Observations
Top	Sandy SILT, trace organics; dark brown. Firm, saturated, low plasticity; Sand, fine grained; sand, fine; organics, rootlets.	0.0	12			2 @ 0.10m	*0.10m:* PID - 0.3ppm
	Sandy SILT, minor clay, trace organics: brown mottled orange & dark brown. Stiff, dry to moist, low plasticity; Sand, fine; organics, rootlets	0.5				3 @ 0.50m	*0.50m:* PID - 0.0ppm
	0.55 - 1.5 m: CORE LOSS	1.0	11	PQTT	36		*1.00m:* PID - not attainable (core loss)
	SILT, minor clay, minor sand, trace organics: brown mottled orange. Stiff,moist, low plasticity; Sand, fine; organics, rootlets	1.5		SPT	33	0/- kPa Shear vane failed - core 1/1 0/1 1/1 N=3	
	1.65 - 2.2 m: CORE LOSS	2.0	10			4 @ 2.00m	*2.00m:* PID - 0.0ppm
Tauranga Group	Sandy SILT, trace organics; brown mottled orange, speckled white & black. Firm, moist, low plasticity; Sand, fine; organics, rootlets	2.5		PQTT	76		
	Fine to coarse SAND, some gravel, minor silt; green-grey speckled white. Loose, saturated, moderately well graded; gravel, fine to medium grained, sub-rounded gravel.	3.0	9	SPT	68	16/0 kPa Soil shear strength value 1/1 1/1 1/2 N=5	
		3.5				5 @ 3.50m	
	4.17 - 14.20m: SILTSTONE gravel	4.0	8	PQTT	80		
	4.3 - 4.5 m: CORE LOSS	4.5				6 @ 4.50m	
	SILT, some clay, trace organics; grey-green. Stiff, moist, moderate plasticity; organics, rootlets			SPT	108	0/- kPa No shear vane - Cohesionl 0/0 0/1 1/0 N=2	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm); RQD (%)

Fluid Loss (%)

Water Level: 05/11/2020 8/11/2020

Casing

Installation: Box 1, 0.0-4.0m

Core Box No

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 4.0 m. SPT calibration undertaken between 13.5 - 18.0 m.

Hole Depth 20m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:09:47 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH113

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926965.50 mN, 1743286.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 04/11/2020
FINISH DATE: 05/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[CONT] SILT, some clay, trace organics; grey-green. Stiff, moist, moderate plasticity; organics, rootlets			PQTT	100			5.5										
	5.50m: Grades: Light brown																	
	Organic SILT, minor clay, trace organics; brown speckled black. Firm, moist, low plasticity; organics, rootlets																	
	6.0 - 6.5 m: Push Tube			PT	0	96/10 kPa 1 @ 6.00m		6.0										
	SILT, trace clay, trace organics; grey speckled black. Firm to stiff, moist, low plasticity; organics, carbonaceous.			SPT	100	0/0 0/0 0/1 **N=1**		6.5										
				PQTT	100			7.0										Box 2, 4.0-7.3m
				SPT	111	0/- kPa 0/0 1/0 0/1 **N=2**		7.5										
	Clayey SILT, trace organics; grey-green speckled black. Stiff, moist, moderate plasticity; organics, rootlets.			PQTT	100			8.0										
	9.00 - 9.05m: Brown mottled grey-green, speckled black.			SPT	148	79/30 kPa 0/1 2/0 1/1 **N=4**		9.0										
	9.50m: Grey-brown speckled black.							9.5										Box 3, 7.3-9.8m

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 4.0 m. SPT calibration undertaken between 13.5 - 18.0 m.

Hole Depth 20m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:09:47 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH113

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926965.50 mN, 1743286.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 04/11/2020
FINISH DATE: 05/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Depth (m)	RL (m)	Graphic Log	Sampling Method	Core Recovery (%)	Testing	Rock Weathering	Rock Strength	ROCK DEFECTS: Defect Log / Fracture Spacing (mm) / RQD (%) / Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[CONT] Clayey SILT, trace organics; grey-green speckled black. Stiff, moist, moderate plasticity; organics, rootlets.	10.5	2		PQTT	100									
	Clayey SILT, minor sand, trace organics; light green speckled black. Stiff, moist, moderate plasticity; Sand, fine; organics, rootlets.				SPT	122	78/38 kPa 1/1 1/2 1/3 **N=7**								
	SILT, trace organics; grey, brown & light green. Firm, moist, low plasticity; organics, rootlets.	11.0	1												
	Clayey SILT, trace organics; grey-brown & light green speckled black. Stiff, moist, moderate plasticity; organics, rootlets.				PQTT	100									
	SILT, trace organics; brown, grey-brown & light green. Firm - stiff, moist, low plasticity; organics, rootlets.	11.5													
	Clayey SILT, trace organics; grey-brown & light green speckled black. Stiff, moist, moderate plasticity; organics, rootlets.	12.0	0												
	Sandy SILT, trace organics; grey & grey-green. Stiff, moist, low plasticity; Sand, fine; organics, wood fragments.				SPT	128	44/10 kPa 0/1 3/3 3/3 **N=12**								
	13.05m: Grey	12.5			PQTT	100									
	Silty fine to coarse SAND, trace gravel, trace organics; grey & grey-green. Medium dense, moist, well graded; Gravel, fine to coarse grained, sub-angular Siltstone & Sandstone; organics, wood fragments.	13.0	-1												
		13.5			SPT	124	UTP 5/5 6/12 10/12 **N=40**								
East Coast Bays Formation	Moderately weathered, grey and grey-green, fine, SANDSTONE. Extremely Weak, bedded, thin. - INTERBEDDED WITH - Moderately weathered, grey and grey-green, SILTSTONE. Extremely Weak, thin, (recovered as Gravelly SAND).	14.0	-2												
	Moderately weathered, grey SILTSTONE; Extremely weak (Recovered as, Clayey SILT, some sand; grey. Hard, moist, low plasticity).	14.5			PQTT	100				37 — 14.53m: BF, 15° dip, VN, CN; 14.70m: BF, 15° dip, VN, CN; 14.73m: BF, 12° dip, VN, CN					
	Slightly weathered, grey, SANDSTONE; EW														Box 4, 9.8-12.5m; Box 5, 12.5-14.9m

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 4.0 m. SPT calibration undertaken between 13.5 - 18.0 m.

Hole Depth 20m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:09:47 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH113

SHEET: 4 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926965.50 mN, 1743286.20 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 04/11/2020
FINISH DATE: 05/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	15.0 - 5.37 m: Core Loss			SPT	0	2/5 10/17 24 for 75mm N>=50 Solid	-3	15.5				0						
	Slightly weathered, grey SILTSTONE; Very weak *15.65m:* Very weak			PQTT	100		-4	16.0				36	15.66m: BF, 12° dip, VN, CN 15.85 - 15.87m: BZ 15.90m: BF, 18° dip, VN, CN 15.98m: BF, 15° dip, VN, CN 16.10 - 16.19m: BZ 16.25 - 16.32m: BZ 16.35m: BF, 12° dip, VN, CN					
	16.5 - 16.91m: Solid cone SPT			SPT	0	2/4 6/8 23/13 for 35mm N>=50 Solid	-5	16.5				0						
	Unweathered, grey, SILTSTONE. Weak, laminated. - INTERBEDDED WITH - Unweathered, grey, SANDSTONE. Weak.			PQTT	100			17.0				28	17.15m: BF, 15° dip, VN, CN 17.26m: BF, 0° dip, VN, CN 17.30m: BF, 15° dip, VN, CN 17.45m: BF, 13° dip 17.49m: BF, 12° dip, VN, Brown veneer 17.51 - 18.00m: BZ 17.55m: J, 55° dip, N 17.60m: J, 55° dip, VN 17.88m: J, 55° dip, VN					Box 6, 14.3-17.4m
	18.0 - 18.28 m: Solid cone SPT			SPT	0	12/25 30/20 for 50mm N>=50 Solid	-6	17.5				0						Box 7, 17.4-18.3m
							-7	18.0										
								18.5										
								19.0										
								19.5										

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 4.0 m. SPT calibration undertaken between 13.5 - 18.0 m.

Hole Depth 20m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:09:47 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH113**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926965.50 mN (NZTM2000) 1743286.20 mE R.L.: 12.20m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 04/11/2020 HOLE FINISHED: 05/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



0.00-4.00m



4.00-7.30m

General Log - 21/12/2020 9:09:47 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

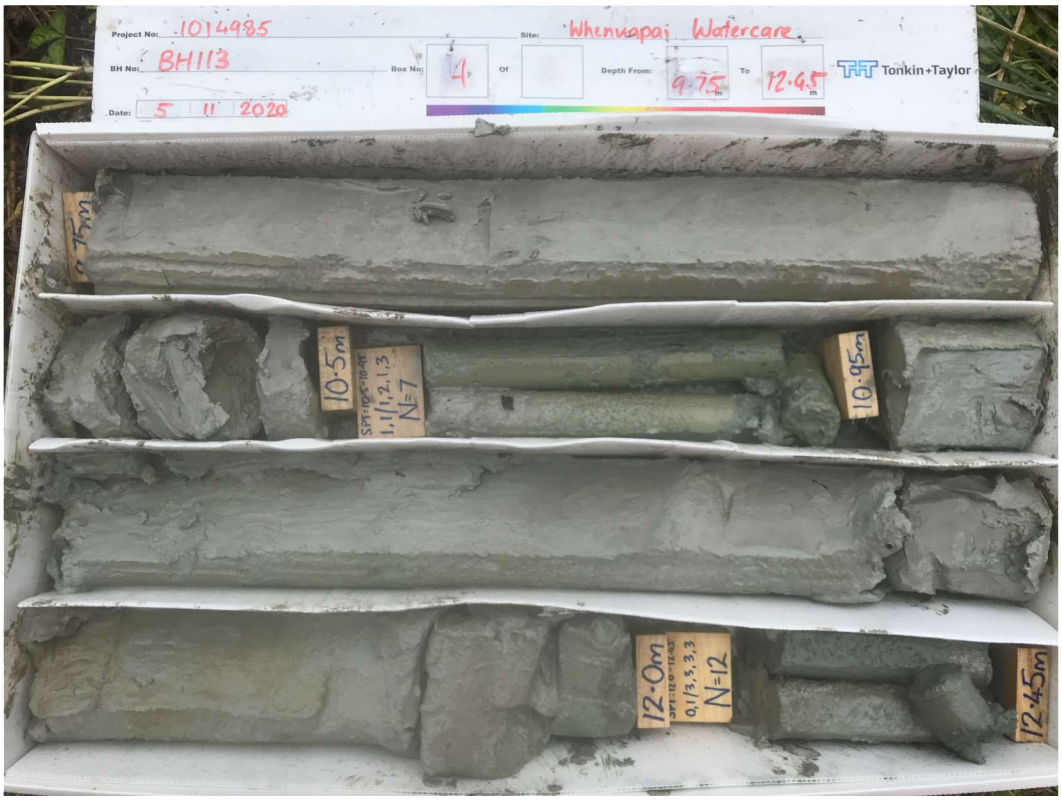
CORE PHOTOS

BOREHOLE No.: **BH113**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926965.50 mN (NZTM2000) 1743286.20 mE R.L.: 12.20m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 04/11/2020 HOLE FINISHED: 05/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



7.30-9.75m



9.75-12.45m

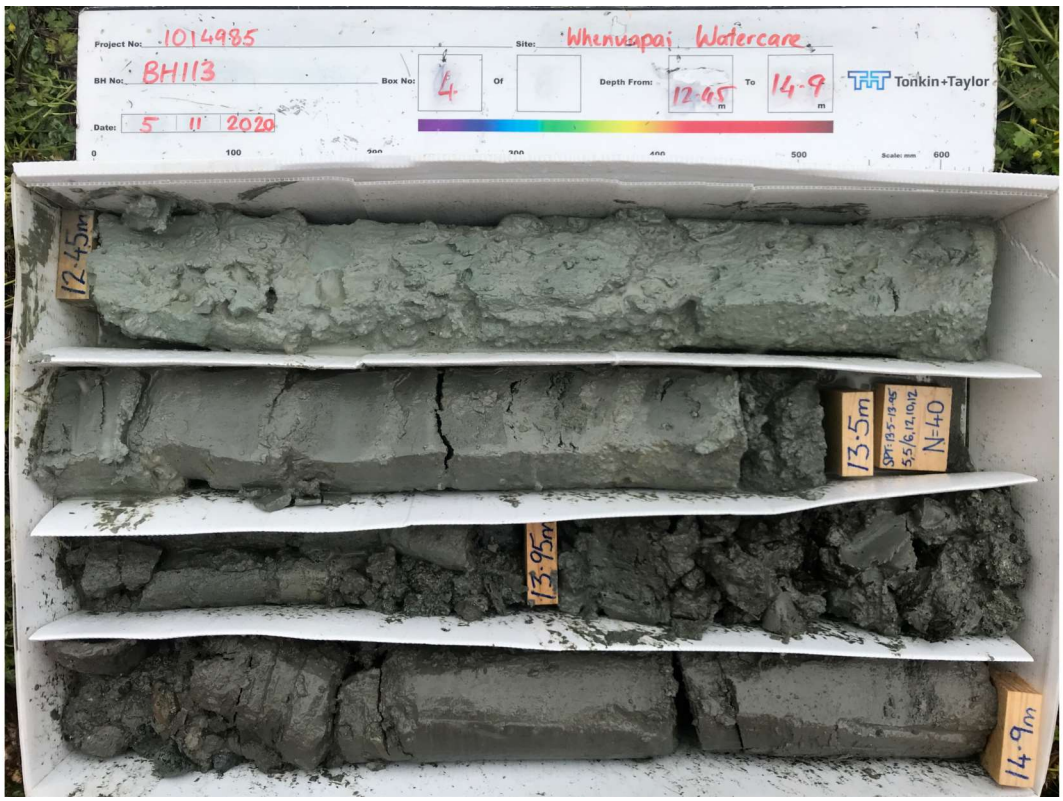
General Log - 21/12/2020 9:09:48 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH113**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926965.50 mN (NZTM2000) 1743286.20 mE R.L.: 12.20m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 04/11/2020 HOLE FINISHED: 05/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



12.45-14.90m



14.90-17.40m

General Log - 21/12/2020 9:09:48 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH113**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926965.50 mN (NZTM2000) 1743286.20 mE R.L.: 12.20m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 04/11/2020 HOLE FINISHED: 05/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



17.40-18.28m

General Log - 21/12/2020 9:09:49 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH116

SHEET: 1 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926934.40 mN, 1743342.70 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 13.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 02/11/2020
FINISH DATE: 03/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Description & Additional Observations
Fill	SILT, some sand, minor clay, trace gravel, trace organics; Dark brown. Stiff, moist, moderate plasticity; Sand, fine grained; Gravel, fine grained, angular; organics, rootlets [FILL]	PQTT	56	1 @ 0.10m	13	0.5	*0.10m:* PID - 0.1ppm
	Silty CLAY; some sand, trace gravel; trace organics; Brown mottled orange and dark brown. Very stiff, moist, high plasticity.Sand, fine to coarse grained; Gravel; fine grained, angular Basalt; organics, rootlets [FILL].			2 @ 0.50m			*0.50m:* PID - 0.0ppm
	Silty CLAY, some sand, trace organics; grey-brown mottled orange, speckled white. Very stiff, moist, high plasticity; Sand, fine grained; Gravel, fine grained, angular; organics, rootlets.			3 @ 1.00m		1.0	*1.00m:* PID - 0.0ppm
	0.85 - 1.5 m: CORE LOSS						
Tauranga Group	Sandy SILT, trace organics; grey mottled orange & brown. Stiff, moist, low plasticity; Sand, fine grained; organics, rootlets.	SPT	77	0/- kPa Geo not present - service clearance 1/0 1/1 1/1 N=4	12	1.5	
		PQTT	138	4 @ 2.00m		2.0	*2.00m:* PID - 0.2ppm
	Grades to: Silty fine grained SAND, trace organics; grey mottled orange & brown. Loose, moist, poorly graded; Sand, fine; organics, rootlets				11	2.5	
	2.80m: Grades: grey			7 @ 3.00m			
	3.05 - 3.45 m: CORE LOSS	SPT	11	0/- kPa Geo not present - service clearance 0/1 0/1 0/1 N=2		3.0	
	3.45 - 3.95 m: PUSH TUBE	PT	0	5 @ 3.45m	10	3.5	
	Silty CLAY, minor sand; green-grey. Very stiff, moist, high plasticity; Sand, fine.	PQTT	100	8 @ 4.00m		4.0	
	Organic Silty CLAY, trace organics; dark brown speckled black, Firm, moist, high plasticity; organics, carbonaceous			6 @ 4.50m	9	4.5	
	4.5 - 5.0 m: PUSH TUBE	PT	0	0/- kPa Geo not present - service clearance			

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%)

Fluid Loss (%) (25, 50, 75)

Water Level: 18/11/2020; 03/11/2020

Casing

Installation: Box 1, 0.0-2.9m

Core Box No

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 5.0 m.

Hole Depth 18.23m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:52:52 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH116

SHEET: 2 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926934.40 mN, 1743342.70 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 13.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 02/11/2020
FINISH DATE: 03/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[CONT] Organic Silty CLAY, trace organics; dark brown speckled black, Firm, moist, high plasticity; organics, carbonaceous			SPT	140	9 @ 5.00m 0/0 0/0 1/1 **N=2**	8	5.5					*5.00 - 5.45m:* Core extended					
	Silty CLAY, trace organics; grey speckled black. Stiff, moist, high plasticity; organics, rootlets			PQTT	100													
	6.00m: Grades: green speckled black			SPT	106	0/- kPa 1/1 1/1 0/1 **N=3**	7	6.0 6.5										Box 2, 2.9-6.8m
	6.90m: Grades: brown speckled black			PQTT	100			7.0										
	Grades to: Clayey SILT; grey-green. Firm to stiff, moist, moderate plasticity.			SPT	100	69/31 kPa 0/0 1/0 1/1 **N=3**	6	7.5										
	Grades to: SILT; grey. Soft to firm, moist, low plasticity, slightly sensitive.			PQTT	60		5	8.0 8.5										
	Grades to: Clayey SILT; grey-green. Stiff, moist, moderate plasticity, slightly sensitive.																	
	Grades to: SILT, minor clay; brown. Firm to stiff, moist, low plasticity, slightly sensitive.																	
	Silty CLAY, grey-green. Stiff, moist, high plasticity.			SPT	133	53/9 kPa 1/1 1/1 1/2 **N=5**		9.0					*9.00m:* Shear vane indicates material is sensitive. Minimal sensitivity recognized during tactile remoulding					Box 3, 6.8-9.5m
	SILT; grey-brown & grey-green. Soft to firm, moist, low plasticity, slightly sensitive.						4	9.5										
	SILT, minor clay; grey-green & brown-grey. Firm to stiff, moist, low plasticity, slightly sensitive.																	

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 5.0 m.

Hole Depth 18.23m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:52:52 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH116

SHEET: 3 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926934.40 mN 1743342.70 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 13.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 02/11/2020
FINISH DATE: 03/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	Silty CLAY, grey-green. Stiff, moist, high plasticity.			PQTT	100													
	Sandy CLAY, some silt, trace organics. Grey-green speckled black. Stiff, moist, moderate plasticity; Sand, fine; organics, carbonaceous			SPT	142	98/32 kPa 1/1 2/1 2/3 **N=8**	3	10.5										
				PQTT	100		2	11.0 11.5					11.62 - 11.76m: J, 25° dip, VN, CN					Box 4, 9.5-11.9m
				SPT	128	85/31 kPa 0/1 2/1 2/2 **N=7**		12.0										
	12.6 - 13.5 m: CORE LOSS			PQTT	100		1	12.5 13.0					*12.60m:* Core bound. Core loss due to washout					
Albany Conglomerate	Completely weathered, grey speckled black, SANDSTONE. Extremely Weak, (Recovered as Fine SAND, some silt, trace carbonaceous material; grey speckled black. Medium dense, moist, poorly graded) .			SPT	115	119/57 kPa 2/2 3/4 3/4 **N=14**	0	13.5										
	14.70m: Sand, fine to medium grained *14.85m:* SILTSTONE coarse gravel-sized clasts x2			PQTT	100		-1	14.0 14.5										
	Completely weathered, grey-green, SANDSTONE. Extremely Weak, (Recovered as Gravelly SAND).																	

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 5.0 m.

Hole Depth 18.23m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:52:52 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH116

SHEET: 4 OF 4

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926934.40 mN 1743342.70 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 13.60m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 02/11/2020
FINISH DATE: 03/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Albany Conglomerate	[CONT] Completely weathered, grey-green, SANDSTONE. Extremely weak (Recovered as Gravelly SAND)			SPT	100	4/3 6/12 13/20 for 40mm **N>=50**												Box 5, 11.9-15.4m
	Slightly weathered, grey fine to medium grained SANDSTONE; Very weak *15.92 - 15.94m:* Slightly weathered, grey SILTSTONE; Extremely weak *16.00 - 16.50m:* Recovered as: Gravelly SAND due to core drop-out and re-drilling.			PQTT	100		-2	15.5 16.0				12	15.42 - 15.53m: J, 35° dip, VN, CN 15.50m: BF, 6° dip, VN, CN 15.57m: BF, 6° dip, VN, CN 15.63m: BF, 15° dip, VN, CN 15.63 - 15.75m: J, VN, CN 15.74 - 15.84m: BZ, CN						
	16.5 - 16.88 m: Solid cone SPT			SPT	0	8/14 18/16 16 for 75mm **N>=50** Solid	-3	16.5				0	*16.00 - 16.50m:* Core disturbed due to drilling process (fell out of barrell)					
	Slightly weathered, grey, SANDSTONE. Very Weak, moderately thick, (60%). - INTERBEDDED WITH - Slightly weathered, grey, SILTSTONE. Very Weak, thin, (40%).			PQTT	84		-4	17.0 17.5				36	16.88m: BF, 6° dip, VN, CN 16.94m: BF, 6° dip, VN, CN 16.95m: BF, 4° dip, VN, CN 16.97m: BF, 12° dip, VN, CN 17.11m: BF, 25° dip, VN, CN 17.11 - 17.28m: J, 45° dip, VN, CN 17.15m: BF, 4° dip, VN, CN 17.28m: BF, 10° dip, VN, CN 17.49m: BF, 10° dip, VN, CN 17.80m: DD					
	17.83 - 18.0 m: CORE LOSS																	Box 6, 15.4-18.2m
	18.0 - 18.23 m: Solid cone SPT			SPT	0	11/22 45/5 for 5mm **N>=50** Solid		18.0				0						
	18.23m: END OF INVESTIGATION						-5 -6	18.5 19.0 19.5										

COMMENTS: 50 mm standpipe piezometer installed with screened interval from 2.0 - 5.0 m.

Hole Depth 18.23m

Scale 1:25

Rev.: A

General Log - 21/12/2020 9:52:52 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH116**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926934.40 mN (NZTM2000) 1743342.70 mE R.L.: 13.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 02/11/2020 HOLE FINISHED: 03/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



0.00-2.90m



2.90-6.75m

General Log - 21/12/2020 9:52:52 AM - Produced with Core-GS by GeRoc

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CORE PHOTOS

BOREHOLE No.: **BH116**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926934.40 mN (NZTM2000) 1743342.70 mE R.L.: 13.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 02/11/2020 HOLE FINISHED: 03/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



6.75-9.45m



9.45-11.85m

General Log - 21/12/2020 9:52:53 AM - Produced with Core-GS by GeRoc

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CORE PHOTOS

BOREHOLE No.: **BH116**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926934.40 mN (NZTM2000) 1743342.70 mE R.L.: 13.60m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 02/11/2020 HOLE FINISHED: 03/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



11.85-15.42m



15.42-18.23m

General Log - 21/12/2020 9:52:54 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH117

SHEET: 1 OF 5

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926691.00 mN 1743092.70 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 10.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 06/11/2020
FINISH DATE: 09/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
TSoil	Sandy SILT, trace organics; dark brown. Firm, saturated, low plasticity; Sand, fine; organics, rootlets [TOPSOIL].			PQTT	52	2 @ 0.10m	10	0	TS				*0.10m:* PID - 0.0ppm					
Tauranga Group	Sandy SILT, some clay, trace organics; Brown mottled orange. Stiff, moist, moderate plasticity; Sand, fine; organics, rootlets *0.55m:* Brown mottled orange speckled white					3 @ 0.50m		0.5					*0.50m:* PID - 0.5ppm					
	0.78 - 1.5m: Core Loss							1.0										
	Silty fine grained SAND, minor organics; brown-grey. Medium dense, moist, poorly graded; organics, wood.			SPT	84	1/3 4/5 5/5 **N=19**	9	1.5							17/11/2020			
	Clayey SILT, minor sand, trace organics; grey-brown speckled black. Stiff, moist, moderate plasticity; Sand, fine; organics, rootlets			PQTT	64	4 @ 2.00m		2.0										
	2.63 - 3.0m: Core Loss						8	2.5										
	Organic SILT, some clay, trace organics; dark grey - brown. Stiff, moist, low plasticity; organics, wood.			SPT	100	5 @ 3.00m 1/0 1/1 1/1 **N=4**		3.0										
	Grades to: Organic Clayey SILT, trace organics; dark grey-brown. Stiff, moist, low plasticity; organics, wood.			PQTT	83	6 @ 4.00m	7	3.5										
	4.5 - 5.0m: PUSH TUBE			PT	0	1 @ 4.50m		4.0										
							6	4.5										

Box 1, 0.0-3.8m

COMMENTS: 50 mm standpipe piezometer with screened interval from 2.0 - 4.0 m.

Hole Depth 21.15m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:31 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH117

SHEET: 2 OF 5

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926691.00 mN 1743092.70 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 10.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 06/11/2020
FINISH DATE: 09/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	Organic Clayey SILT; dark grey-brown. Stiff, moist, low plasticity; organics, wood. *5.20m:* grey-brown, mottled brown speckled black			SPT	100	7 @ 5.00m 0/0 1/1 2/1 **N=5**												
				PQTT	100			5.5										
				SPT	133	0/0 1/1 1/1 **N=4**	5	6.0										
	Sandy organic SILT; dark brown speckled black. Stiff, moist, low plasticity; Sand, fine; organics, fibrous *6.85m:* Sand inclusions (5%); dark brown, speckled black spotted grey *7.10m:* Grades: grey-brown			PQTT	100		4	6.5 7.0										Box 2, 3.8-7.1m
	Sandy SILT, trace organics; light grey-green, speckled black. Stiff, moist, low plasticity; Sand, fine; organics, fibrous			SPT	100	0/0 2/1 2/2 **N=7**	3	7.5										
	8.10m: Grades: grey-brown, mottled brown, speckled black			PQTT	100			8.0										
	8.90 - 9.00m: Fine to medium grained SAND; grey. Medium dense, moist, poorly graded.							8.5										
	Sandy SILT, trace organics; grey speckled black. Stiff, moist, low plasticity; Sand, fine; organics, fibrous *9.28 - 9.29m:* Wood (10mm) *9.34 - 9.35m:* Wood (10mm)			SPT	100	1/2 2/3 4/3 **N=12**	2	9.0										
	Fine to coarse SAND, minor silt, trace organics; grey. Medium dense, moist, poorly graded; organics, wood.							9.5										Box 3, 7.1-9.8m
	Sandy SILT, some clay, trace organics; grey speckled black. Stiff, moist, low plasticity; sand, fine; organics, fibrous.						1											

COMMENTS: 50 mm standpipe piezometer with screened interval from 2.0 - 4.0 m.

Hole Depth 21.15m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH117

SHEET: 3 OF 5

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926691.00 mN, 1743092.70 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 10.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 06/11/2020
FINISH DATE: 09/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	Fine SAND, some silt, trace organics; grey & brown. Loose, moist, poorly graded; organics, wood			PQTT	100													
	Fine SAND, some silt, some organics; grey. Loose, moist, poorly graded; organics, wood *9.75 - 9.80m:* Wood							10.5										
	Clayey SILT, trace organics; light green. Stiff, moist, moderate plasticity; organics, fibrous. *10.34 - 10.39m:* Wood			SPT	113	1/2 1/2 2/2 **N=7**												
	Sandy SILT, some clay, trace organics; light grey-green. Stiff, moist, low plasticity; organics, fibrous. *10.40m:* brown						0	11.0										
	Silty SAND, trace organics; brown mottled grey. Medium dense, moist, poorly graded; sand, fine; organics, fibrous. *11.03 - 11.07m:* Wood			PQTT	80			11.5										
	Silty SAND, some clay, trace organics; brown. Medium dense, moist, poorly graded; sand, fine; organics, wood.			SPT	108	1/2 3/4 4/4 **N=15**	-1	12.0										
	SAND, some silt, trace organics; grey. Medium dense, moist, poorly graded; sand, fine; organics, wood.							12.5										Box 4, 9.8-12.6m
	Grades to: Sandy SILT, minor clay, trace organics; grey. Very stiff, moist, low plasticity; Sand, fine; organics, wood *13.50m:* Grey & brown, speckled black			PQTT	90		-2	13.0										
	13.90m: Grey			SPT	124	1/1 2/2 3/3 **N=10**	-3	13.5										
	Sandy SILT, some clay, trace organics. Grey & brown speckled black. Very stiff, moist, low plasticity; Sand, fine; organics, carbonaceous.			PQTT	100			14.0										
							-4	14.5										Box 5, 12.6-15.0m

COMMENTS: 50 mm standpipe piezometer with screened interval from 2.0 - 4.0 m.

Hole Depth 21.15m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH117

SHEET: 4 OF 5

PROJECT: Watercare Whenuapai-Redhill GI

JOB No.: 1014985.0000

LOCATION: Whenuapai

CO-ORDINATES: (NZTM2000) 5926691.00 mN 1743092.70 mE

DIRECTION:

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 10.90m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie

LOGGED BY: ROM

CHECKED: CBM

START DATE: 06/11/2020

FINISH DATE: 09/11/2020

CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	Sandy SILT, some clay, trace carbonaceous. Grey & brown speckled black. Very stiff, moist, low plasticity; Sand, fine			SPT	144	2/2 3/3 3/5 **N=14**						0						
	Fine to medium grained SAND, some silt, trace carbonaceous; light green & brown. Medium dense, moist, poorly graded			PQTT	85		-5	15.5 16.0				0						
	16.35 - 16.5m: Core Loss																	
	Sandy SILT, some clay, trace carbonaceous light green. Stiff, moist, low plasticity; Sand, fine			SPT	128	2/3 2/4 3/4 **N=13**	-6	16.5				0						
	Fine SAND, some silt, trace carbonaceous; light green - grey. Loosely packed, moist, poorly graded *17.30m:* minor silt. *17.60m:* some silt *18.10 - 18.14m:* Wood (40mm)			PQTT	80		-7	17.0 17.5 18.0				0						Box 6, 15.0-17.8m
	Slight weathered, brown, fine grained SANDSTONE; Very weak Highly weathered, grey-green speckled white, coarse, SANDSTONE. Extremely Weak, (Recovered as fine to coarse SAND, minor gravel; grey-green speckled white, red, brown & green. Medium dense, moist, poorly graded).			SPT	100	6/6 4/4 4/6 **N=18**						0						
	18.75 - 19.5m: Core Loss			PQTT	28		-8	18.5 19.0				0						
	Highly weathered, grey-green speckled white, red, brown & green, coarse, SANDSTONE. Extremely Weak, (Recovered as Fine to coarse SAND, minor gravel; grey-green speckled white, red, brown & green. Very dense, moist, poorly graded).			SPT	77	4/4 5/7 21/18 for 50mm **N>=50**	-9	19.5				0						

COMMENTS: 50 mm standpipe piezometer with screened interval from 2.0 - 4.0 m.

Hole Depth 21.15m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH117

SHEET: 5 OF 5

Tonkin+Taylor

PROJECT: Watercare Whenuapai-Redhill GI
JOB No.: 1014985.0000
LOCATION: Whenuapai

CO-ORDINATES: 5926691.00 mN, 1743092.70 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 10.90m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Mackenzie
LOGGED BY: ROM
CHECKED: CBM
START DATE: 06/11/2020
FINISH DATE: 09/11/2020
CONTRACTOR: McMillan Drilling

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW, EW, HW, MW, CW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	Moderately weathered, grey, fine SANDSTONE; Extremely weak, weakly cemented (Recovered as Fine grained SAND, trace silt; grey. Very dense, moist, poorly graded)			PQTT	42		-10	20.5				0						
	20.38 - 21.0 m: Core Loss																	
	Moderately weathered, grey, fine SANDSTONE; Extremely weak, weakly cemented (Recovered as Fine grained SAND, trace silt; grey. Very dense, moist, poorly graded)			SPT	100	17/33 for 30mm N>=50		21.0				0						Box 7, 17.8-21.2m
	21.15m: END OF INVESTIGATION						-11	21.5										
								22.0										
								22.5										
							-12	23.0										
								23.5										
							-13	24.0										
								24.5										
							-14											

COMMENTS: 50 mm standpipe piezometer with screened interval from 2.0 - 4.0 m.

Hole Depth 21.15m

Scale 1:25

Rev.: A

General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926691.00 mN (NZTM2000) 1743092.70 mE R.L.: 10.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 06/11/2020 HOLE FINISHED: 09/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



0.00-3.75m



3.75-7.05m

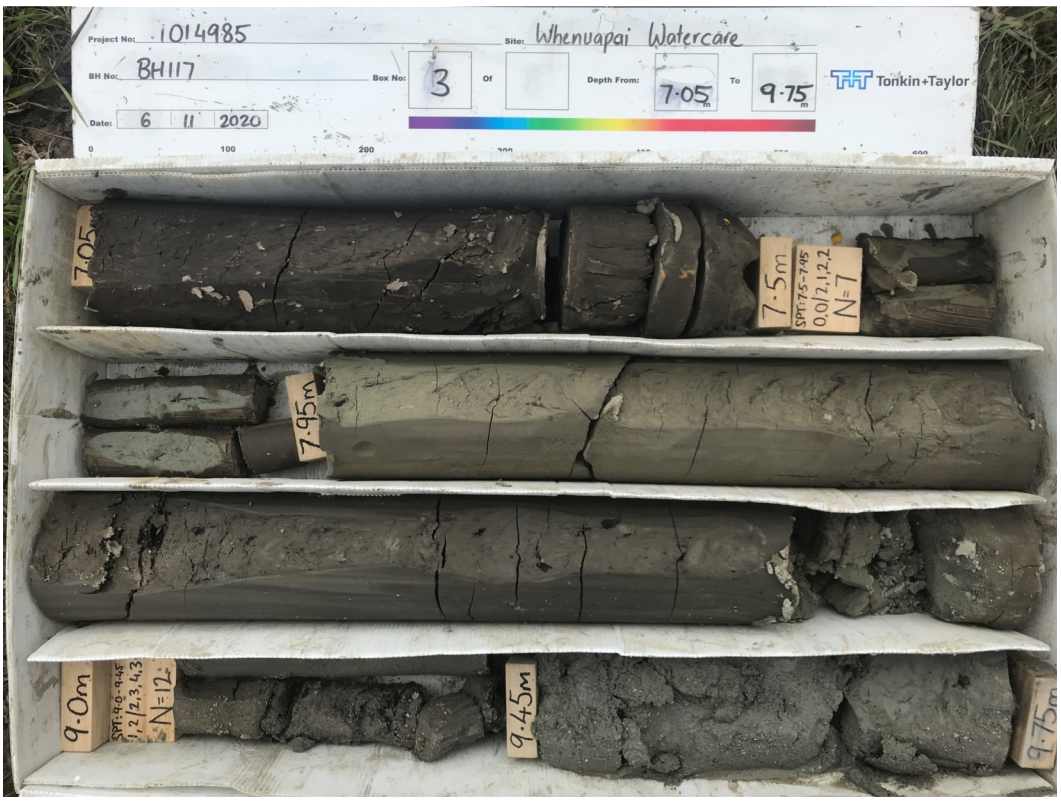
General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

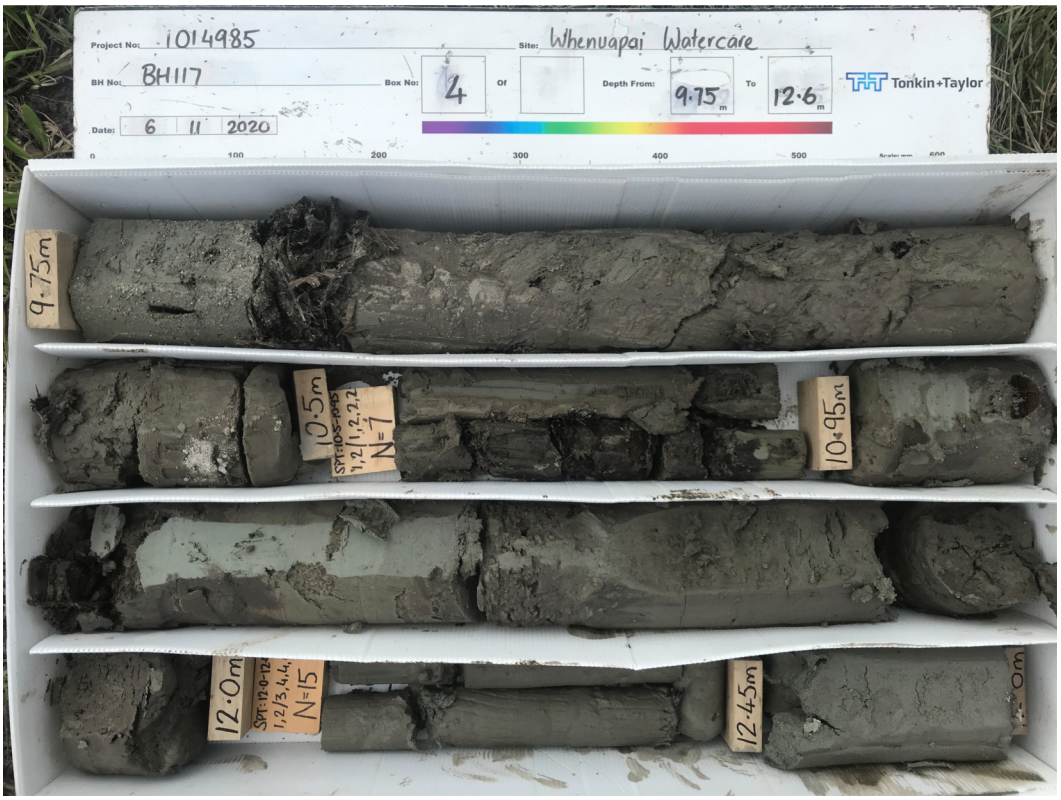
CORE PHOTOS

BOREHOLE No.: **BH117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926691.00 mN (NZTM2000) 1743092.70 mE R.L.: 10.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 06/11/2020 HOLE FINISHED: 09/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



7.05-9.75m



9.75-12.60m

General Log - 1/03/2021 9:34:32 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926691.00 mN 1743092.70 mE R.L.: 10.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 06/11/2020 HOLE FINISHED: 09/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



12.60-15.00m



15.00-17.80m

General Log - 1/03/2021 9:34:33 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926691.00 mN (NZTM2000) 1743092.70 mE R.L.: 10.90m DATUM: NZVD2016	DRILL TYPE: Track-mounted DRILL METHOD: RC	HOLE STARTED: 06/11/2020 HOLE FINISHED: 09/11/2020 DRILLED BY: McMillan Drilling LOGGED BY: ROM CHECKED: CBM



17.80-21.15m

General Log - 1/03/2021 9:34:33 AM - Produced with Core-GS by GeRoc v10

Appendix B – Copies of T+T Hand Auger Logs

Tonkin & Taylor Ltd. January 2021 (Version 1.0). Whenuapai-Redhills Wastewater Servicing Rising Main/Gravity Main and Interim Pump Station (Package 1), Geotechnical Ground Investigation Factual Report - Appendix E: Hand Auger Logs[2]

[2] Subsequent revisions made by T+T (March 2021) include PID readings in logs HA108, HA109, HA111, HA114, HA115, and HA119.

Appendix E: Hand Auger Logs

HAND AUGER LOG

HOLE Id: **ENVR-HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925787.00 mN 1744024.40 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.: 36.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA03 -0.0-0.1 @ 0.00m ENVR-HA03 -0.5 @ 0.50m ENVR-HA03 -1.0 @ 0.90m		36 35 34 33 32	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; dark brown trace orange mottle. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM SILT; grey. Very stiff, dry. Silty CLAY; grey. Very stiff, moist, medium plasticity. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:16:26 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **ENVR-HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5925787.00 mN 1744024.40 mE	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd
R.L.:	36.70m		
DATUM:	NZVD2016		LOGGED BY: RVDK CHECKED: CBM



0.00-1.00m

HandAugerLog - 21/12/2020 10:16:26 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **ENVR-HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925759.80 mN 1744104.70 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.: 39.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA04 -0.0-0.1m @ 0.00m ENVR-HA04 -0.5 @ 0.50m ENVR-HA04 -1.0 @ 0.90m		39 38 37 36 35	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					SILT, some organics; dark brown. Very stiff, moist, non-plastic; organics, rootlets. Clayey SILT, trace sand; greyish brown. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM Clayey SILT; dark brown minor black mottle. Very stiff, moist, non-plastic. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:17:07 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **ENVR-HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925759.80 mN 1744104.70 mE R.L.: 39.50m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM



0.00-1.00m

HandAugerLog - 21/12/2020 10:17:07 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **ENVR-HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925739.90 mN 1744151.80 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.: 41.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA05 -0.0-0.1m @ 0.00m ENVR-HA05 -0.5 @ 0.50m ENVR-HA05 -1.0 @ 0.90m		40 39 38 37	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; dark brown. Very stiff, moist, non-plastic. SILT, trace sand; light grey. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM Clayey SILT; dark brown minor black mottle. Very stiff, moist, non-plastic. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:17:34 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **ENVR-HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925739.90 mN (NZTM2000) 1744151.80 mE R.L.: 41.00m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM



0.00-1.00m

HandAugerLog - 21/12/2020 10:17:34 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **ENVR-HA101**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926989.60 mN 1743340.30 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 04/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 04/11/2020
R.L.: 12.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-2.0m	04/11/2020				ENVR-HA 101-0.0-0.1m @ 0.00m ENVR-HA 101-0.5-0.6m @ 0.50m ENVR-HA 101-1.6-1.8m @ 1.60m		12 11 10 9 8	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; greyish brown. Stiff, dry, non-plastic. Clayey SILT; brown, minor black streaking. Stiff, dry, low plasticity. 0.5m: PID= 0.0ppm Clayey SILT; brownish grey with orange mottle. Stiff, moist, medium plasticity. 1.0m: PID= 0.0ppm SILT, trace sand; light greyish brown with orange mottle. Stiff, moist, non-plastic. 2m: Target depth

COMMENTS:

Hole Depth 2m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:18:05 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **ENVR-HA101**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926989.60 mN (NZTM2000) 1743340.30 mE R.L.: 12.80m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 04/11/2020 HOLE FINISHED: 04/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM



0.00-2.00m

HandAugerLog - 21/12/2020 10:18:05 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA03**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926343.50 mN 1743214.30 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 19.40m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	Description and Additional Observations
Topsoil	SILT; brown. Moist, non-plastic.
	SILT; friable. Very stiff, moist, non-plastic.
Tauranga Group	Silty CLAY; light greyish white mottled orange brown. Very stiff, moist, high plasticity.
	0.5m: mottled yellowish brown
	2.1m: light greyish white, low plasticity
	Sandy SILT; light whitish grey. Moist to wet, non-plastic.
	SILT; light greyish white mottled yellowish brown. Very stiff, moist, non-plastic.
	Clayey SILT; light whitish grey mottled yellowish brown and brown. Very stiff to stiff, moist, low plasticity.
	3.7m: Light brown with black mottles. Medium plasticity.
	4.7m: Dark brown, organic stained.
	Peaty clayey SILT; black. Stiff, moist, low

DEPTH (m)	RL (m)	TESTS	MOISTURE CONDITION	STRENGTH/DENSITY CLASSIFICATION
0.0	19	asb/gl/split @ 0.00m	M	
		186/56 kPa		VSt
0.5		asb/gl @ 0.40m; PID, 0.0ppm		
		@ 0.50m; 121/48 kPa		
1.0	18	180/77 kPa; asb/gl @ 0.90m; PID, 0.0ppm		
		@ 1.00m; 104/54 kPa		
1.5		att/psd @ 1.45m		
		114/60 kPa; asb/gl @ 1.90m		
2.0	17	162/77 kPa		
		122/66 kPa		
2.5		119/72 kPa; asb/gl @ 2.80m		
3.0		175/74 kPa		St-VSt
	16	122/85 kPa		
3.5		att/psd @ 3.45m; 186/85 kPa		
		122/82 kPa; asb/gl @ 3.80m		
4.0		123/77 kPa		
	15	147/101 kPa		
4.5		96/32 kPa; asb/gl @		St

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.45m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:19:06 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA03**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926343.50 mN 1743214.30 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 19.40m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group	trace water flow on			1 2 1 2 2 2 2 2 3 3 6 7 9 10 6 7 6 7 9 9 10 10 10 11	4.80m ● 104/21 kPa		14 13	5.5 6.0		M	VSt		plasticity. Organic clayey SILT; dark brown. Very stiff, moist, medium plasticity; organics, amorphous. End of handauger 5.2m. Scala (blows per 100mm): 3,3,4,4,6,13,19,13 13,18,20,21 Organic clayey silt, dark brown, adhering to lowest rod on withdrawal
							12 11 10	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6.45m: Refusal

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.45m

Scale 1:25

Rev.: A

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Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926343.50 mN (NZTM2000) 1743214.30 mE R.L.: 19.40m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

HandAugerLog - 21/12/2020 10:19:06 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA04**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926082.10 mN 1743388.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.:	21.20m		DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	Description and Additional Observations
Topsoil	SILT; dark brown. Stiff, moist, non-plastic; inclusion of agricultural plastic sheet.
	Sandy SILT; light whitish brown. Very stiff, moist, non-plastic.
	Silty CLAY; light greyish white mottled yellowish brown. Very stiff to stiff, moist, high plasticity.
	1.0m: light grey mottled yellowish brown
	1.8m: some sand, light brownish white
	Clayey SILT; light brown. Very stiff, moist, low plasticity.
Tauranga Group	Silty SAND; white. Moist to wet; sand, fine to medium; well packed.
	2.5m: Scala (blows per 100mm): 13,22,22,20,18
	3.0m: light brown
	SILT; light brown. Stiff, moist, non-plastic; Scala (blows per 100mm): 5,6,8.
	Clayey SILT; grey. Stiff, moist, low plasticity.
	Silty SAND; greyish brown. Wet; sand, fine to medium.
	SILT; brown and grey. Very stiff, moist, non-plastic.
	4.4m: abundant organics and inclusions of decomposed wood
	Clayey SILT; light grey. Very stiff, moist, low plasticity.

DEPTH (m)	RL (m)	WATER	TESTS	SCALA PENETROMETER (Blows/100mm)	MOISTURE CONDITION	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)
0.0	21		asb/gI/dupB @ 0.00m		M	St	
			>186 kPa			VSt	
0.5			asb/gI @ 0.40m			St-VSt	
			PID, 0.0ppm @ 0.50m				
			179/50 kPa				
1.0	20		159/61 kPa				
			asb/gI @ 0.90m				
			PID, 0.1ppm @ 1.00m				
			122/54 kPa				
1.5			109/44 kPa				
			att/psd @ 1.45m				
			90/35 kPa				
			asb/gI @ 1.90m				
2.0	19		127/46 kPa			VSt	
		02/12/2020 W/L +2hrs	att/psd @ 2.45m	6, 7	M-W		
2.5			asb/gI @ 2.80m	11, 11, 11, 11, 10, 10, 9, 9			
3.0	18			2	M	St	
				3, 3, 3, 4, 4			
3.5			97/45 kPa				
			asb/gI @ 3.80m		W		
4.0	17		90/32 kPa		M	VSt	
			101/28 kPa				
4.5			159/32 kPa				
			117/33 kPa				
			asb/gI @				

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:22:17 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA04**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926082.10 mN 1743388.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 21.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				1 2 2 2 2 3 3 3 3 4 4 4 5 6 6 6 5 6 6 6 7 7 7 8 8 8 8 8 10 11 2 2	4.80m ● 117/42 kPa		16 15 14 13 12	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					[CONT] Clayey SILT; light grey. Very stiff, moist, low plasticity. 5.15m: brown with some organics End of handauger 5.2m. Scala (blows per 100mm): 3,4,5,6,7,8,11,12,11,12, 14,15,16,16,21,24 6.85m: Refusal

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:22:18 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926082.10 mN (NZTM2000) 1743388.90 mE R.L.: 21.20m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

HandAugerLog - 21/12/2020 10:22:18 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA05**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925977.70 mN 1743549.70 mE	DRILL TYPE: 75 and 50mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 27.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	TESTS	RL (m)	DEPTH (m)	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	Description and Additional Observations
Fill	asb/gI/split @ 0.00m	27	0	M		SILT; dark brown. Moist, non-plastic; inclusions of gravel, black plastic twine.
	130/32 kPa asb/gI @ 0.40m PID, 0.1ppm @ 0.50m		0.5		St-VSt	Silty CLAY; light grey. Stiff to very stiff, moist, high plasticity.
	88/29 kPa					
	82/32 kPa asb/gI @ 0.90m PID, 0.1ppm @ 1.00m	26	1.0			
	108/35 kPa					
	80/33 kPa att/psd @ 1.45m		1.5			1.8m: light greyish brown. Low plasticity
	96/41 kPa asb/gI @ 1.90m		2.0	W	St	Sandy SILT; light greyish brown. Stiff, wet, non-plastic.
		25		M	F-St	Clayey SILT, trace sand; light brown. Stiff to firm, moist, low plasticity.
Tauranga Group	56/19 kPa att/psd2 @ 2.45m		2.5			
	37/20 kPa asb/gI @ 2.70m					
	41/21 kPa		3.0		F	Silty CLAY; light grey. Firm, moist, high plasticity.
	40/24 kPa	24				
	35/16 kPa asb/gI @ 3.70m		3.5			
	35/13 kPa		4.0			4.0m: brown
	35/13 kPa	23				4.2m: blackish brown
	41/21 kPa		4.5			4.5m: brown
	45/21 kPa					
	asb/gI @				St	

WATER: 01/12/2020 W/L on completion; 01/12/2020

SCALA PENETROMETER (Blows/100mm): 0 2 4 6 8 10 12 14 16 18

SHEAR STRENGTH (kPa): 10 25 50 100 200

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:25:34 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA05**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925977.70 mN 1743549.70 mE	DRILL TYPE: 75 and 50mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 27.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group					4.70m ● 77/31 kPa		22 21 20 19 18	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5		M	St		Clayey SILT, some organics; light brown. Stiff, moist, medium plasticity; amorphous. End of handauger 5.2m Scala only (blows per 100mm) 1,3,3,3,3,4,4,5 5,5,6,6,6,8,6,6,6,7 6,8 7.25m: Target depth

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:25:34 AM - Produced with Core-GS by GeRoc

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CORE PHOTOS

BOREHOLE No.: **HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925977.70 mN (NZTM2000) 1743549.70 mE R.L.: 27.20m DATUM: NZVD2016	DRILL TYPE: 75 and 50mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

HandAugerLog - 21/12/2020 10:25:34 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA06**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5925924.30 mN 1743672.80 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020
R.L.:	30.70m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group	01/12/2020 W/L on completion 01/12/2020				asb/gI/dupA @ 0.00m 157/66 kPa 122/56 kPa asb/gI @ 0.40m PID, 0.2ppm @ 0.50m 106/48 kPa asb/gI @ 0.90m PID, 0.3ppm @ 1.00m 98/44 kPa 119/42 kPa att/psd @ 1.45m 108/73 kPa asb/gI @ 1.90m 141/82 kPa 129/84 kPa 86/66 kPa asb/gI/att/psd @ 2.70m 58/37 kPa 69/37 kPa 61/31 kPa asb/gI @ 3.70m 66/29 kPa 74/21 kPa 64/42 kPa 64/31 kPa asb/gI @		30 29 28 27 26	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	TS				SILT; dark brown. Moist, non-plastic; friable. SILT; light yellowish brown. Very stiff, moist, non-plastic. Clayey SILT; yellowish brown. Stiff to very stiff, moist; low to medium plasticity. Silty CLAY; light brownish grey. Very stiff, moist, high plasticity. Clayey SILT; light brown. Stiff to very stiff, moist, medium plasticity. Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine.

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:26:49 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA06**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925924.30 mN 1743672.80 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 30.70m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				3 4 4 5 6 8 9 9 10 13 11 11 13 14 15 16 16 16 16 17	4.70m ● 96/32 kPa		25 24 23 22 21	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					[CONT] Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine. End of hand auger 5.2m. Scala only (blows per 100mm) 3,4,4,5,6,8,9,9 10,13,11,11,13,14,15,16,16,16, 16,17 7.25m: Target depth

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:26:49 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA06**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925924.30 mN (NZTM2000) 1743672.80 mE R.L.: 30.70m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

HandAugerLog - 21/12/2020 10:26:49 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA07**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925859.50 mN 1743823.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 32.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl @ 0.10m				TS	M	F		Sandy SILT; dark brown. Firm, moist, low plasticity; sand, fine.
					85/22 kPa PID, 0.1ppm @ 0.50m asb/gl @ 0.50m			0.5			St		Sandy SILT, trace organics; brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 0.5m: Light brown, mottled orange. PID test, 0.1ppm.
					att/psd @ 0.80m		32						
					82/47 kPa PID, 0.2ppm @ 1.00m asb/gl & att/psd @ 1.00m			1.0					Clayey SILT, minor sand, trace organics; light brown. Stiff, moist, medium plasticity; sand, fine; organics, rootlets. 1.0m: PID test, 0.2ppm
					69/37 kPa			1.5					SILT, some clay, minor sand; light brown, mottled orange. Stiff, moist, medium plasticity; sand, fine.
	01/12/2020				corrosivity @ 1.80m		31						SILT, some clay and sand; light brown, mottled orange and brown. Stiff, moist, medium plasticity; sand, fine.
					63/33 kPa asb/gl @ 2.00m			2.0					
Tauranga Group		100	HA		corrosivity @ 2.40m 90/47 kPa			2.5					Sandy SILT, trace organics and clay; light brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 2.5m: Grey and orange.
Box 1, 0.0-3.0m					87/31 kPa asb/gl @ 3.00m		30	3.0					Sandy SILT, trace organics; light brown, mottled orange. Stiff to very stiff, moist, low plasticity; sand, fine; organics, rootlets. 3.4m: Light brown, mottled orange. 3.5m: Grey.
					131/31 kPa			3.5					
					>218 kPa asb/gl @ 4.00m		29	4.0			D-VD		Silty SAND, trace organics; light brown mottled orange. Dense to very dense, moist, poorly graded; sand, fine to medium; organics, rootlets.
					UTP			4.5					
Box 2, 3.0-5.0m					UTP		28						

COMMENTS:

Hole Depth 5.9m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 2:43:19 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA07**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925859.50 mN 1743823.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 32.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	Description and Additional Observations
		0	DCP	2,3,5,6,5,5,6,6,9,9,9,9,11,12,13,13,12,13	asb/gl @ 5.00m		27	5.5		M	St		5.9m: END OF HAND AUGER. Scala only to 5.9 m (blows per 50 mm): 2,3,5,6,5,5,6,6,9,9,9,9,11,12,13,13,12,13
							26	6.0					5.9m: END OF INVESTIGATION
							25	7.0					
							24	8.0					
							23	9.0					

COMMENTS:

Hole Depth 5.9m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 2:43:20 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA07**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925859.50 mN (NZTM2000) 1743823.00 mE R.L.: 32.90m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 2:43:20 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA07a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925813.70 mN 1743968.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 25/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 25/11/2020
R.L.: 35.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb @ 0.10m			0.0	TS	M			Sandy SILT, trace organics; dark brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
					● >218 kPa asb @ 0.50m PID, 0.0ppm @ 0.51m		35	0.5			VSt-H		SILT, some sand, minor clay, trace organics; orange, mottled brown-red and brown. Very stiff, moist, low plasticity. Organics, rootlets.
													Grades to: clayey SILT, minor sand, trace organics; grey and brown mottled orange. Very stiff to hard, moist, medium plasticity. Sand, fine; organics, rootlets.
					● 174/62 kPa asb @ 1.00m PID, 0.8ppm @ 1.01m corrosivity @ 1.20m			1.0					
					● 187/75 kPa			1.5					
							34				VSt		Sandy SILT, some clay, trace organics; grey mottled orange and brown. Very stiff, moist, low to medium plasticity. Organics, rootlets.
					● 159/87 kPa asb @ 2.00m			2.0					2.1m: trace clay; grey, mottled orange.
					geo @ 2.20m								
					geo @ 2.40m			2.5					Silty CLAY; grey, mottled orange and pink. Very stiff, moist, high plasticity.
Tauranga Group		100	HA+DCP		● 188/73 kPa		33						Sandy SILT, some clay, trace organics; grey mottled orange and brown. Very stiff, moist, low to medium plasticity. 2.8 - 2.9m: orange, mottled grey.
Box 1, 0.0-3.0m					● 199/84 kPa asb @ 3.00m			3.0					
					● >218 kPa			3.5			VSt-H		Sandy SILT; grey, speckled white. Very stiff to hard, moist, low plasticity; sand, fine to coarse.
							32				VD		Grades to: Silty, fine to coarse SAND; grey, speckled white. Very dense, moist, well graded.
					● UTP asb @ 4.00m			4.0			VSt-H		Sandy SILT; grey, speckled white. Very stiff to hard, moist, low plasticity; sand, fine to coarse.
					● UTP			4.5					4.6m: minor fine, rounded gravel.
Box 2, 3.0-5.0m					● UTP		31				H		

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 2:58:27 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA07a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925813.70 mN 1743968.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 25/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 25/11/2020
R.L.: 35.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				5 5 6 7 8 5 7 8 11 10 11 10 11 10 10 11 11	asb @ 5.00m		30	5.5		M			Silty CLAY; grey. Hard, moist, high plasticity. 5.0 m: END OF HAND AUGER. Scala only to 5.85 m (blows per 50 mm): 5,5,6,7,8,5,7,8,11,10,11,10,11,10,10,11,11
							29	6.0 6.5 7.0					5.85m: END OF INVESTIGATION
							28	7.5 8.0					
							27	8.5 9.0					
							26	9.5					

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 2:58:27 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA07a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925813.70 mN (NZTM2000) 1743968.70 mE R.L.: 35.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 25/11/2020 HOLE FINISHED: 25/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 2:58:27 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA08**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925683.60 mN 1744277.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 49.10m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m		49		TS	M	F		Sandy SILT, trace organics; brown. Firm, moist, low plasticity; sand, fine. Organics, rootlets
					48/16 kPa Env @ 0.50m PID, 1.8ppm @ 0.50m			0.5					Sandy SILT, minor organics; grey-brown, moittled orange. Firm, moist, low plasticity; sand, fine; organics, rootlets.
	24/11/2020				57/11 kPa Env @ 1.00m PID, 2.5ppm @ 1.00m		48	1.0					
		94											1.2-1.5m: CORE LOSS
					82/6 kPa			1.5			St		SILT, some sand, mior clay, trace organics; grey-brown, speckled black. Stiff, moist, high plasticity; sand, fine; organics, rootlets.
											VSt-H		Grades to: Silty CLAY, minor sand, trace organics; brown, mottled orange, speckled brown. Very stiff to hard, moist, high plasticity; sand, fine; organics, rootlets.
					>200 kPa Env @ 2.00m		47	2.0					
			HA+DCP		>200 kPa			2.5					2.4m: dark brown.
Tauranga Group													Sandy SILT, minor clay, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine ; organics, rootlets.
					>200 kPa Env @ 3.00m		46	3.0					Sandy, clayey SILT, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine; organics, rootlets.
					135/73 kPa						VSt		Sandy, silty CLAY, trace organics; brown, spotted dark brown. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets.
								3.5			VSt-H		Grades to: Sandy, SILT, minor clay, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine; organics, rootlets.
					149/72 kPa Env @ 4.00m		45	4.0			VSt		Grades to: Sandy SILT; brown, mottled orange, spotted black and dark brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					129/56 kPa			4.5					4.2m: light grey-brown, spotted black.
					>200 kPa						H		4.9m: hard.

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:03:38 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA08**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925683.60 mN 1744277.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 49.10m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				4 5 5 6 6 7 9 8 14 8 8 9 10 10 11 11 12	Env @ 5.00m		44	5.5					5.0m: END OF HAND AUGER. Scala only to 5.85m(blows per 50mm): 4,5,5,6,6,7,9,8,14,8,8,9,10,10,11,11,12
							43	6.0 6.5					5.85m: END OF INVESTIGATION
							42	7.0 7.5					
							41	8.0 8.5					
							40	9.0 9.5					

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

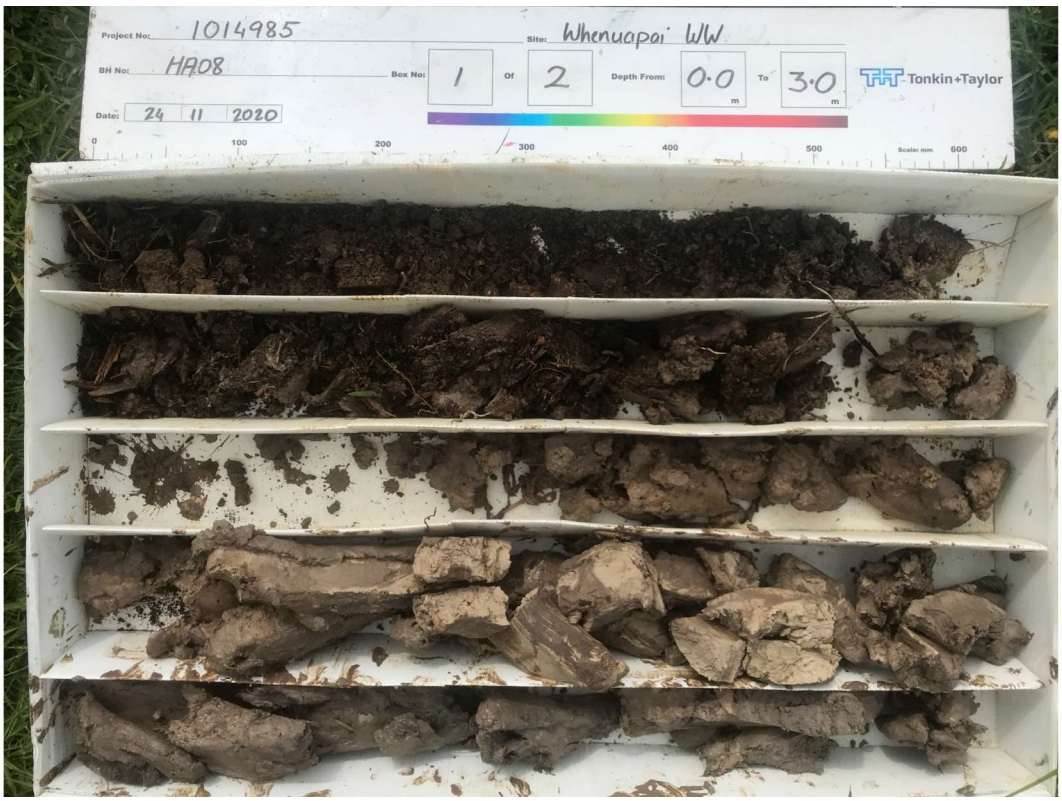
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CORE PHOTOS

BOREHOLE No.: **HA08**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925683.60 mN 1744277.50 mE R.L.: 49.10m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 24/11/2020 HOLE FINISHED: 24/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:03:38 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA08a**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925734.60 mN (NZTM2000) 1744164.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 41.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl @ 0.10m 1 x Glass Jar 1x plastic Jar			0	TS	M	F		Sandy SILT, trace organics; dark brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
					● >218 kPa asb/gl @ 0.50m 1 x Glass Jar 1x plastic Jar			0.5					0.55m: Rootlet
Tauranga Group	24/11/2020				PID - 27.3ppm @ 0.51m PID - 27.3ppm ● 130/44 kPa asb/gl @ 1.00m 1 x Glass Jar 1x plastic Jar		41	1.0			VSt		Silty CLAY, minor sand, trace organics; light brown mottled orange. Very stiff, moist, high plasticity; sand, fine; organics, rootlets.
					PID - 17.2ppm @ 1.01m PID - 17.2ppm ● 184/93 kPa Corrosivity @ 1.20m 1 x plastic jar			1.5					Clayey SILT, some sand, trace organics; light brown & brown. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets.
							40	2.0					Sandy SILT, some clay, trace organics; light brown & brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 181/83 kPa asb/gl @ 2.00m 1 x Glass Jar 1x plastic Jar								
					● 171/78 kPa			2.5					
					att/psd @ 2.70m Atterberg/PSD		39						
					● 106/53 kPa asb/gl @ 3.00m 1 x Glass Jar 1x plastic Jar			3.0					
										W			Sandy SILT, trace organics; light brown. Very stiff, wet, low plasticity; sand, fine; organics, rootlets.
					● 131/59 kPa Corrosivity @ 3.50m 1 x plastic jar			3.5					
							38						
					● 149/62 kPa asb/gl @ 4.00m 1 x Glass Jar 1x plastic Jar			4.0					
					● 188/62 kPa			4.5					
				2 2 3 2 4 5 4	● 177/84 kPa		37						

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 6.2m

Scale 1:25

Rev.: A

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Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA08a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925734.60 mN 1744164.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 41.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				5 4 4 4 7 5 5 7 7 7 7 8 9 8 7 9 10 10 10 10 12 12	asb/gl @ 5.00m 1 x Glass Jar 1x plastic Jar		36	5.5 6.0					5.0m: END OF HAND AUGER. Scala only to 6.2 m (blows per 50 mm): 2,2,3,2,4,5,4,5,4,4,4,7,5,5,7,7,7,7,8,9,8,7,9,10,10 ,9,10,10,10,12,12
							35	6.5 7.0					
							34	7.5 8.0					
							33	8.5 9.0					
							32	9.5					

COMMENTS:

Hole Depth 6.2m

Scale 1:25

Rev.: A

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Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA08a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925734.60 mN (NZTM2000) 1744164.50 mE R.L.: 41.80m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 24/11/2020 HOLE FINISHED: 24/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:08:03 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA107a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926927.60 mN 1743320.80 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 13.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m				TS	M	L		Silty SAND, trace organics; brown. Loose, moist, poorly graded; sand, fine; organics, rootlets.
Tauranga Group	03/12/2020	100	HA+DCP		● 202/47 kPa Env @ 0.50m PID - 0.0ppm @ 0.51m		13	0.5			VSt-H		Silty CLAY, minor sand, trace organics; brown mottled orange and dark brown, speckled white. Very stiff to hard, moist, high plasticity; sand, fine; organics, rootlets.
					● 137/31 kPa Env @ 1.00m PID 0.0ppm @ 1.01m			1.0					
					● 81/31 kPa		12	1.5			St		Clayey SILT, minor sand; grey and grey brown mottled orange speckled black. Stiff, moist, high plasticity; sand, fine.
					● 67/31 kPa Env @ 2.00m			2.0					Sandy SILT, minor clay, trace organics; brown mottled orange, speckled white. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					att/psd//corrosivity @ 2.20m								Sandy SILT, trace organics; grey & brown motled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 38/16 kPa		11	2.5					
					● 31/22 kPa			3.0					
					● 68/28 kPa corrosivity @ 3.50m		10	3.5		W	L		Silty SAND, trace organics; grey. Loose, wet, poorly graded; sand, fine; organics, rootlets.
					● 87/34 kPa			4.0		M	St		Sandy SILT, trace organics; grey and brown speckled black. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 72/30 kPa		9	4.5					SILT, some clay and sand, trace organics; brown speckled dark brown. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
				2 1 2 2 2 1	● 100/31 kPa								

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 6.65m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:11:16 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA107a**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926927.60 mN 1743320.80 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 13.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				2 4 3 3 3 4 5 4 3 4 4 4 5 6 5 5 7 7 6 7 6 7 10 9 11 10 10 8 8 9 8 8 8			8 7	5.5 6.0 6.5					5.0 m: END OF HAND AUGER. Scala only to 6.65 m (blows per 50 mm): 1,2,2,2,1,2,4,3,3,3,4,5,4,3,4,4,4,5,6,5,5,7,7,6,7,6, 7,10,9,11,10,10,8,8,9,8,8
							6 5 4	7.0 7.5 8.0 8.5 9.0 9.5					6.65m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.65m

Scale 1:25

Rev.: A

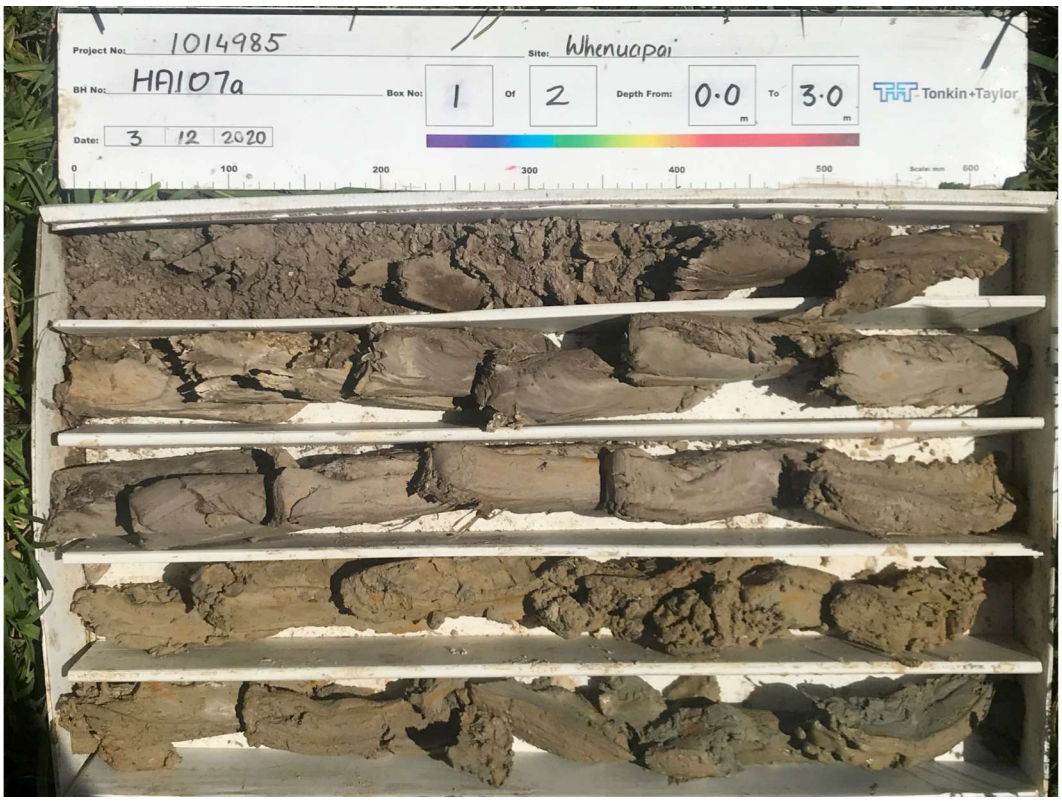
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CORE PHOTOS

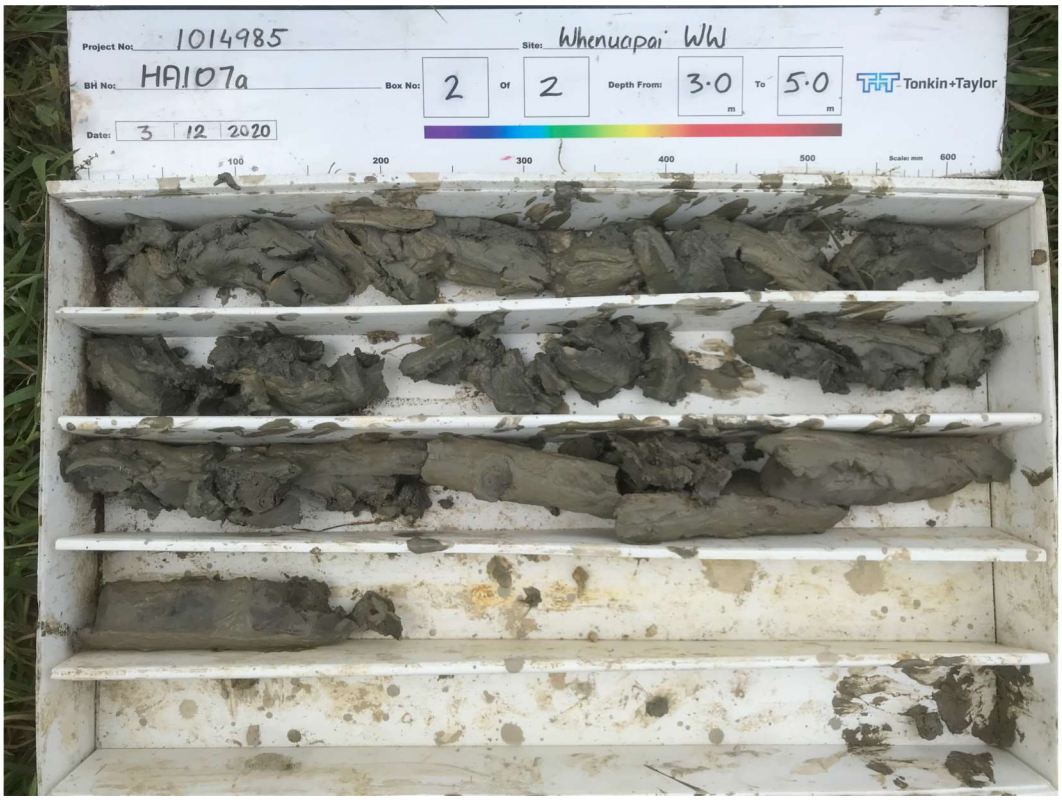
BOREHOLE No.: **HA107a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926927.60 mN 1743320.80 mE R.L.: 13.50m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:11:16 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA107b**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926922.30 mN 1743265.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 04/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 04/12/2020
R.L.: 12.30m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	Description and Additional Observations
Topsoil	Sandy SILT, trace organics; brown. Firm, dry to moist, low plasticity; sand, fine; organics, rootlets.
Fill	Sandy SILT, trace organics; light brown and orange brown. Very stiff, dry to moist, low plasticity; sand, fine; organics, rootlets.
Tauranga Group	Sandy SILT, trace organics and clay; grey-brown mottled orange speckled white and black. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
	SILT, some sand, trace organics; dark brown speckled black. Firm, moist, low plasticity; sand, fine; organics, rootlets.
	Sandy SILT, trace organics; grey mottled orange speckled white. Very stiff, low plasticity; sand, fine; organics, rootlets.
	Silty SAND; grey mottled orange speckled white. Very stiff, moist, poorly graded; sand, fine.
	Sandy SILT, trace organics; grey mottled orange. Firm, moist to wet, low plasticity; sand, fine; organics, rootlets.
	SILT, some sand, minor clay, trace organics; grey mottled brown. Firm, moist, low plasticity; organics, rootlets.
	Silty SAND, trace organics; grey mottled brown. Loose to medium dense, moist to wet, poorly graded; sand, fine; organics, rootlets.
	4.3 - 4.45m: SILT, some sand, minor clay, trace rootlets; grey. Stiff, moist, high plasticity; sand, fine.

DEPTH (m)	RL (m)	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)	TESTS	SAMPLES	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)
0.0	12		100	HA+DCP	0 2 4 6 8 10 12 14 16 18	Env @ 0.10m	Box 1, 0.0-3.0m	TS	D-M	F	10 25 50 100 200
0.5						124/31 kPa; Env @ 0.50m; PID 0.5ppm @ 0.51m			D	VSt	
1.0	11					152/34 kPa; Env @ 1.00m; PID 0.1ppm @ 1.01m; corrosivity @ 1.20m			M	St	
1.5						93/53 kPa					
2.0						35/16 kPa; Env @ 2.00m				F	
2.5	10					82/22 kPa; corrosivity @ 2.70m				VSt	
3.0						51/19 kPa	Box 2, 3.0-5.0m		M-W	F	
3.5	9					75/20 kPa			M		
4.0						45/28 kPa			M-W	L-MD	
4.5	8					59/34 kPa					
						62/32 kPa					

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:13:28 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA107b**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926922.30 mN 1743265.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 04/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 04/12/2020
R.L.: 12.30m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1 1 1 2 2 2 2 2 4 4 3 4 4 4 5 4 7 6 6 9 8 8 11 10 10 9 10 8 9 9 9			7 6 5 4 3	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					5.0 m: END OF HAND AUGER. Scala only to 6.85 m (blows per 50 mm): 1,1,1,2,2,2,2,4,4,3,4,4,4,5,4,7,6,6,7,6,9,8,6,8,8,1 1,10,10,9,10,11,10,9,8,9,9,9 6.85m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:13:28 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

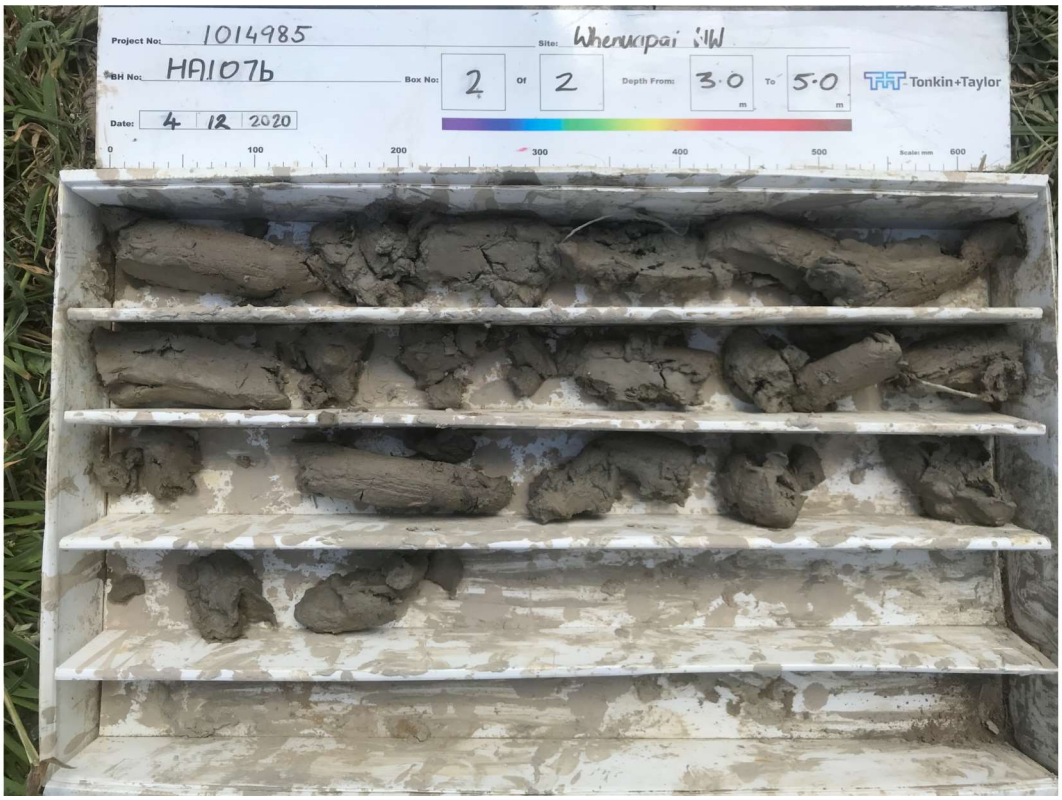
BOREHOLE No.: **HA107b**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926922.30 mN 1743265.20 mE R.L.: 12.30m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 04/12/2020 HOLE FINISHED: 04/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:13:28 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA108**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926898.60 mN 1743173.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m				TS	M	F		Sandy SILT, trace organics; brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
Tauranga Group	03/12/2020	100	HA+DCP		● 131/25 kPa PID, 0.0ppm @ 0.50m Env @ 0.50m		11	0.5			VSt		Sandy SILT, trace organics; brown, mottled orange. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
											St		Sandy SILT, minor clay, trace organics; brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 73/28 kPa PID, 0.0ppm @ 1.00m Env @ 1.00m			1.0					SILT, minor sand and clay, trace organics; light brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 54/21 kPa		10	1.5		W	F-St		Sandy SILT, trace organics; greyish brown, mottled orange, spotted blue. Firm to stiff, wet, low plasticity; sand, fine; organics, rootlets.
					● 26/9 kPa Env @ 2.00m			2.0					
					Att/psd @ 2.40m ● 37/28 kPa		9	2.5		S	F		SILT, minor sand, trace organics; brown. Firm, saturated, low plasticity; sand, fine; organics, rootlets.
					● 32/17 kPa			3.0					
					● 51/17 kPa		8	3.5					
					● 22/9 kPa			4.0					3.95m: grades to soft
					● 31/16 kPa		7	4.5					4.45m: grades to firm
					● 40/18 kPa								

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 6.7m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:34:45 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA108**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926898.60 mN 1743173.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1 1 1 1 2 2 2 2 1 2 3 2 2 2 2 2 1 3 4 4 3 4 3 4 3 3 3 3 3 3 4 4 3 4 5			6 5	5.5 6.0 6.5					5.0 m: END OF HAND AUGER. Scala only to 6.7 m (blows per 50 mm): 1,1,1,1,2,2,2,1,2,3,2,2,2,2,1,3,4,4,3,4,3,4,3,3,3,3,3,3,3,4,4,3,4,5
							4 3 2	7.0 7.5 8.0 8.5 9.0 9.5					6.7m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.7m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:34:46 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

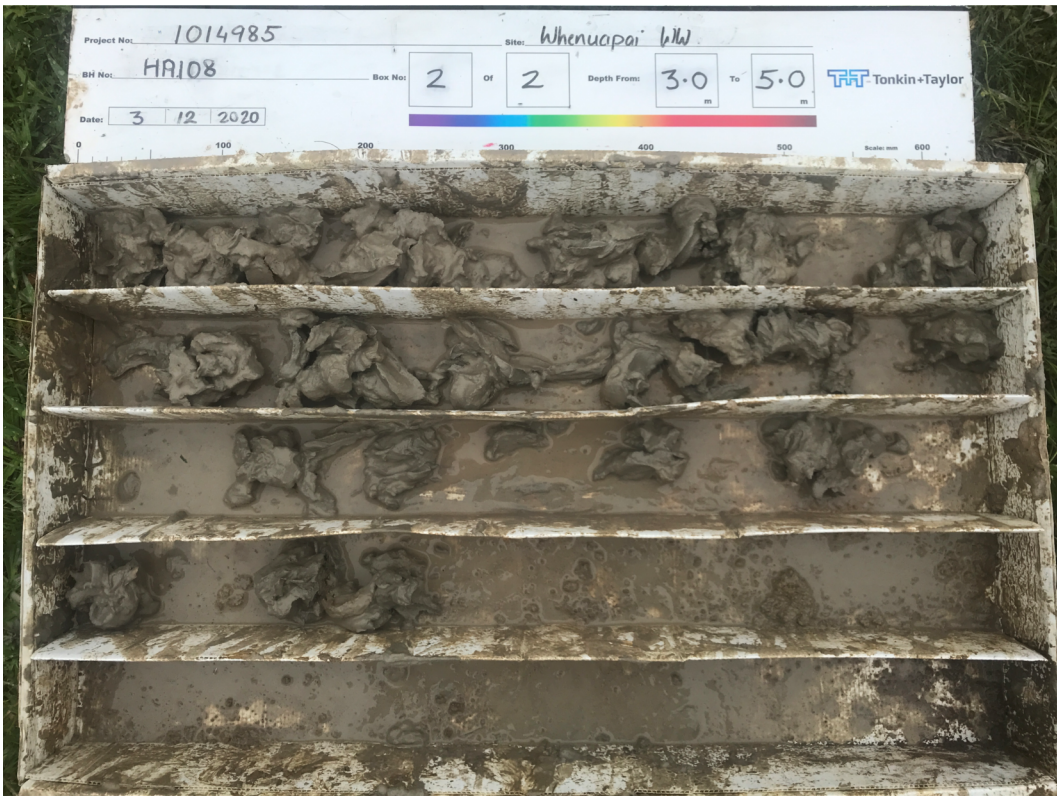
BOREHOLE No.: **HA108**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926898.60 mN (NZTM2000) 1743173.50 mE R.L.: 11.50m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 1/03/2021 9:34:46 AM - Produced with Core-GS by GeRoc v1.0

HAND AUGER LOG

HOLE Id: **HA109**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926901.80 mN 1743136.40 mE	DRILL TYPE: 75 and 50mm handauger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Topsoil	SILT; light brown. Dry to moist, non-plastic.
Tauranga Group	SILT; yellowish brown. Very stiff, moist, non-plastic.
	SILT, some clay; light brown mottled yellowish brown. Very stiff, moist; low to no plasticity.
	SILT; light brown. Stiff, moist, non-plastic.
	Silty CLAY; light brown mottled yellowish brown. Firm, moist, high plasticity.
	Clayey SILT; light brown. Firm, moist, low plasticity.
	Silty CLAY; light brown mottled yellowish brown. Firm, moist, medium plasticity.
	Clayey SILT; light grey. Firm, wet, low plasticity.
	Silty CLAY; light brownish grey. Soft, moist, high plasticity.
	Sandy SILT; grey. Soft, saturated, non-plastic.
	Clayey SILT; grey. Firm, wet, medium plasticity.
	Clayey sandy SILT; grey. Firm to stiff, wet, low plasticity.
	Silty CLAY; light grey. Firm, wet, medium plasticity.
	Clayey SILT; light grey. Firm, wet, medium plasticity.
	Clayey sandy SILT; light grey. Firm, wet, low plasticity.
	Clayey SILT; light grey. Firm to stiff, moist, medium plasticity; sandy layers at 4.8m and 5m.

WATER: 03/12/2020 inflow 1.5m W/L+2hrs

SCALA PENETROMETER (Blows/100mm): 0 2 4 6 8 10 12 14 16 18

TESTS / SAMPLES:
- asb/gl/split @ 0.00m
- 122/21 kPa
- asb/gl @ 0.40m
- 76/15 kPa, PID, 0.3ppm @ 0.50m
- 76/8 kPa
- asb/gl @ 0.90m
- 29/16 kPa
- 48/19 kPa, PID, 0.1ppm @ 1.00m
- att/psd @ 1.40m
- 32/8 kPa
- asb/gl @ 1.70m
- 40/21 kPa
- 24/13 kPa
- att/psd @ 2.45m
- 24/13 kPa
- asb/gl @ 2.70m
- 27/16 kPa
- 62/24 kPa
- 32/20 kPa
- asb/gl @ 3.70m
- 32/16 kPa
- 37/15 kPa
- 36/20 kPa
- 32/17 kPa
- asb/gl @

RL (m): 10, 9, 8, 7

DEPTH (m): 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

MOISTURE CONDITION / WEATHERING: D-M, M, W, M, S, W

STRENGTH/DENSITY CLASSIFICATION: VSt, St, F, S, F, F-St, F, F-St

SHEAR STRENGTH (kPa): 10, 25, 50, 100, 200

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

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HAND AUGER LOG

HOLE Id: **HA109**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926901.80 mN 1743136.40 mE	DRILL TYPE: 75 and 50mm handauger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group	[CONT] Clayey SILT; light grey. Firm to stiff, moist, medium plasticity; sandy layers at 4.8m and 5m.
	End of handauger at 5.2 m Scala (blows per 50 mm) 1,2,2,3,3,3,5,5,4,4 5,6,6,5,5,4,5,7,7,10
	7.25m: Target depth

WATER | CORE RECOVERY (%) | METHOD | SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18 | TESTS | SAMPLES | RL (m) | DEPTH (m) | GRAPHIC LOG | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200

TESTS: 4.70m ● 60/24 kPa

RL (m): 5 4 3 2

DEPTH (m): 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:34:54 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA109**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926901.80 mN (NZTM2000) 1743136.40 mE R.L.: 11.00m DATUM: NZVD2016	DRILL TYPE: 75 and 50mm handauger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA110a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926999.30 mN 1743387.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
		HOLE FINISHED: 08/12/2020
R.L.: 14.60m	DRILL METHOD: HA+DCP	DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		Env/asb @ 0.10m	Box 1, 0.0-3.0m	14	0.5		M	MD		Silty, fine SAND, minor gravel, trace organics; brown. Medium dense, moist, poorly graded; organics, rootlets.
					>218 kPa Env/asb @ 0.50m PID,0.0ppm @ 0.51m					D-M	H		Silty CLAY, some sand, trace organics; grey, mottled orange and dark brown. Hard, dry to moist, high plasticity; sand, fine; organics, rootlets.
										M			Sandy, silty CLAY, trace organics; grey, mottled orange and dark brown. Hard, moist, medium plasticity; sand, fine; organics, rootlets.
					>218 kPa PID, 0.0ppm @ 1.00m Env/asb @ 1.00m		13	1.0					Sandy, clayey SILT, trace organics; light grey, mottled orange and brown. Hard, moist, medium plasticity; sand, fine; organics, rootlets.
											VSt		Silty CLAY, minor sand, trace organics; light grey, mottled orange. Hard, moist, high plasticity; sand, fine; organics, rootlets.
					163/31 kPa			1.5					Sandy SILT, trace organics; dark brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
													SILT, minor sand and clay, trace organics; brown, grey, red. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					141/81 kPa Env/asb @ 2.00m		12	2.0			H		SILT, some sand, trace organics; brown, grey, red. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
													Silty CLAY, minor sand, trace organics; light grey, mottled orange. Hard, moist, high plasticity; sand, fine; organics, rootlets.
											St		Grades to: SILT, some sand, minor clay, trace organics; light grey, mottled orange and dark brown. Stiff, moist, low to medium plasticity; sand, fine; organics, rootlets.
					84/34 kPa			2.5					
					121/68 kPa Env/asb @ 3.00m			3.0					Sandy SILT, trace organics; light grey, mottled orange and dark brown. Stiff, moist low plasticity; sand, fine; organics, rootlets.
Tauranga Group					109/75 kPa	Box 2, 3.0-5.0m	11	3.5					Organic SILT, some sand; dark brown. Stiff, moist, low plasticity; sand, fine.
	08/12/2020										VSt		SILT, minor sand, minor clay, trace organics; grey, streaked brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					112/34 kPa			4.0		W	St		Sandy SILT, trace organics; grey, streaked brown. Stiff, wet, low plasticity; sand, fine; organics, rootlets.
					82/38 kPa		10	4.5		M	L		Fine SAND, some silt, trace organics; grey. Loose, moist, poorly graded; organics, rootlets.
											St		Sandy SILT, some gravel, trace organicsl; grey

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

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HAND AUGER LOG

HOLE Id: **HA110a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926999.30 mN 1743387.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.: 14.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group				1 1 1 2 1 2 1 2 2 2 2 3 1 2 2 3 2 3 2 3 4 3 4 3 4 4, 4 4 3 4 4 5 5 4 4 5 4	UTP		9	5.5					and brown, speckled black. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
							8	6.0					5.0 m: END OF HAND AUGER. Scala only to 6.85 m (blows per 50 mm): 1,1,1,2,1,2,1,2,2,2,2,3,1,2,2,3,2,3,2,3,4,3,4,3,4,4, 4,4,3,4,4,5,5,4,4,5,4
								6.5					
								7.0					6.85m: END OF INVESTIGATION
							7	7.5					
								8.0					
							6	8.5					
								9.0					
								9.5					
							5						

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

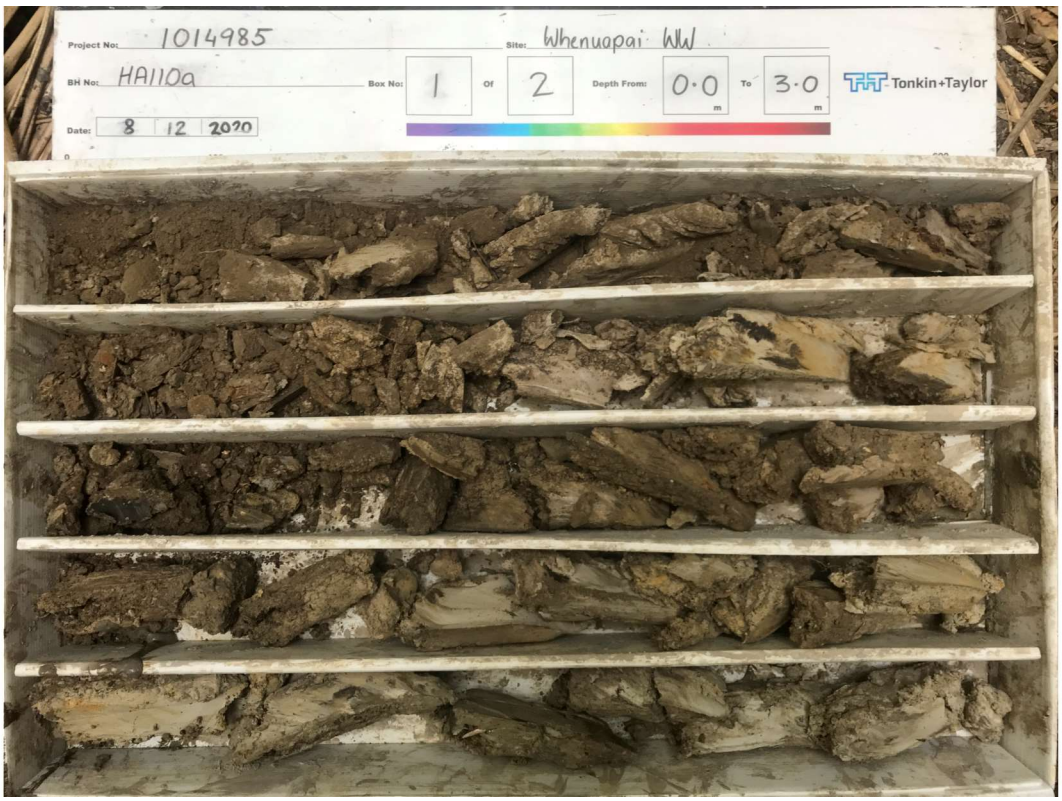
HandAugerLog - 22/12/2020 3:49:16 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA110a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926999.30 mN 1743387.70 mE R.L.: 14.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 08/12/2020 HOLE FINISHED: 08/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:49:16 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA110b**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926965.40 mN 1743376.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.: 14.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA+DCP		Env/asb @ 0.10m		14	0.5		M	MD		Silty, fine SAND, minor gravel, trace organics; brown. Tightly packed, moist, poorly graded; organics, rootlets.
					UTP Env/asb @ 0.50m PID, 0.0ppm @ 0.51m Corrosivity @ 0.60m						St		Sandy SILT, minor gravel, trace organics; light grey-brown. Stiff, moist, low plasticity; organics, rootlets.
					UTP Env/asb @ 1.00m PID, 0.0ppm @ 1.01m		13	1.0			VSt		Silty CLAY, minor sand and gravel, trace organics; brown, mottled orange and dark brown. Very stiff, moist, high plasticity; sand, fine; gravel, fine to medium, sub-angular, sandstone; organics, rootlets.
					79/25 kPa			1.5					
					65/34 kPa Env/asb @ 2.00m		12	2.0			St		Grades to: SILT, some sand, minor clay, trace organics; brown and grey. Stiff, moist, medium plasticity; sand, fine; organics, rootlets.
					93/37 kPa			2.5					
Box 1, 0.0-3.0m	08/12/2020				Corrosivity @ 2.90m			3.0					Sandy SILT, minor organics; brown, speckled black and white, mottled orange. Stiff, moist, low plasticity; sand, fine to medium; organics, rootlets.
Tauranga Group					att/psd @ 3.35m		11	3.5		W	L-MD		Silty, fine to coarse SAND, trace gravel and organics; grey, speckled white.Loosely packed, wet, poorly graded; gravel, fine, sub-angular, mudstone; organics, rootlets.
								4.0					
							10	4.5		M	St		Sandy SILT, minor organics; brown, speckled black and white, mottled orange. Stiff, moist, low plasticity; sand, fine to medium; organics, rootlets.
Box 2, 3.0-5.0m											F		Organic SILT; brown. Firm, moist, low plasticity.

COMMENTS:

Hole Depth 6.95m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:52:30 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA110b**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926965.40 mN 1743376.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.: 14.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1,1,1,2,1,2,2,2,3,2,3,3,3,4,4,3,5,4,5,5,6,6,5,5,6,6,8,7,7,8,7,8,6,8,9,9,8,9			9	5.5					5.0 m: END OF HAND AUGER. Scala only to 6.95 m (blows per 50 mm): 1,1,1,2,1,2,2,2,3,2,3,3,3,4,4,3,5,4,5,5,6,6,5,5,6,6, 6,8,7,7,8,7,8,6,8,9,9,8,9
							8	6.0					
								6.5					
							7	7.0					6.95m: END OF INVESTIGATION
								7.5					
								8.0					
							6	8.5					
								9.0					
								9.5					
							5						

COMMENTS:

Hole Depth 6.95m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:52:30 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

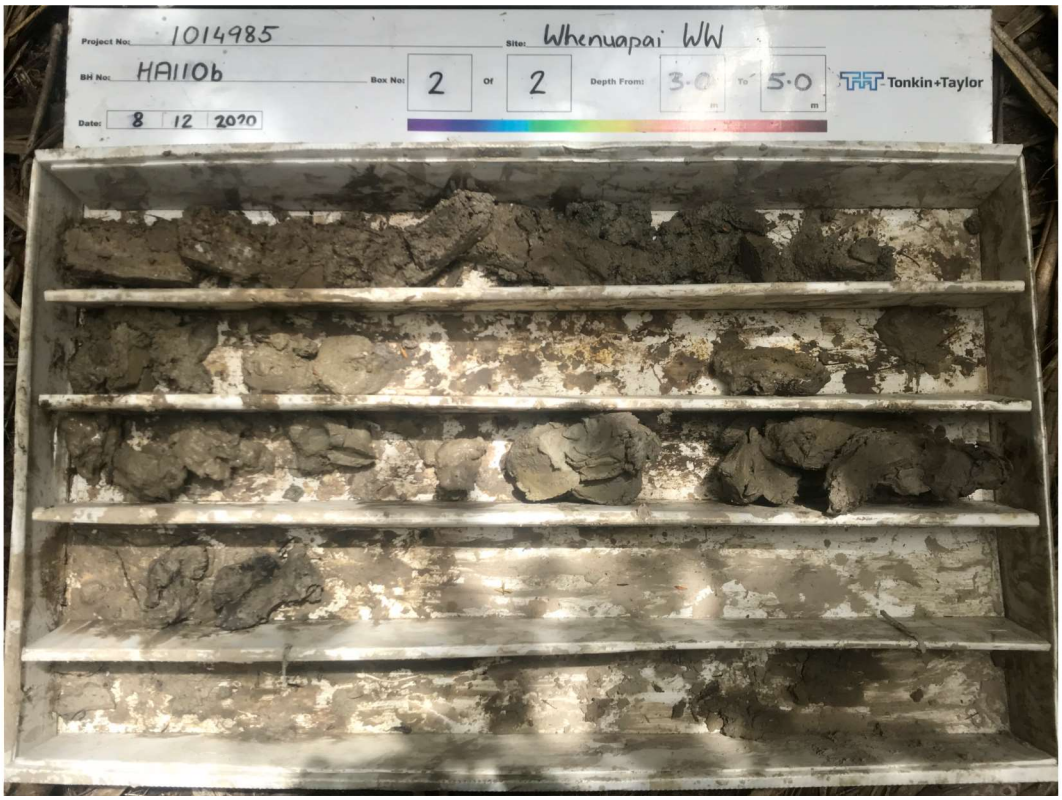
BOREHOLE No.: **HA110b**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926965.40 mN 1743376.70 mE R.L.: 14.70m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 08/12/2020 HOLE FINISHED: 08/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 22/12/2020 3:52:30 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA111**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5927039.30 mN 1743395.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 07/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 07/12/2020
R.L.: 14.40m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill	07/12/2020	88	HA+DCP		Env/asb @ 0.10m 65/34 kPa PID, 1.2ppm @ 0.50m Env/asb @ 0.50m 31/16 kPa PID, 0.3ppm @ 1.00m Env/asb @ 1.00m Corrosivity @ 1.20m 16/9 kPa 31/20 kPa Env/asb @ 2.00m Corrosivity @ 2.40m		14 13 12 11 10	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		D M W	F		Sandy SILT, trace organics; dark brown. Firm, dry, low plasticity; sand, fine; organics, rootlets. SILT, some sand, minor clay, trace gravel, and organics; light brown, mottled orange, dark grey and grey. Sand, fine; gravel, fine to medium, sub-angular, sandstone; organics, rootlets. Sandy SILT, some gravel; dark brown. Firm, moist, low plasticity; sand, fine; gravel, fine, angular, sandstone. 1.6m: wet.
Tauranga Group					Env/asb @ 3.00m	Box 1, 0.0-3.1m					St L		SILT, some sand, minor clay and gravel, trace organics; dark brown and black. Stiff, moist, low plasticity; sand, fine; gravel, fine, sub-angular, sandstone; organics, rootlets. Gravelly, fine SAND, some silt; dark brown. Loosely packed, wet, poorly graded; gravel, fine to medium, sub-angular, sandstone. 3.1 - 3.5m: NO RECOVERY 3.5 m: END OF HAND AUGER. Scala only to 6.5 m (blows per 50 mm): 1,0,1,1,0,2,2,2,2,1,2,1,1,2,2,3,4,3,4,3,3,3,3,3,3,4, 3,4,3,4,3,4,3,4,5,4,4,5,6,5,5,6,6,7,7,6,7,6,9,8,7,8, 9,7,8,8,7,9,9,9

COMMENTS:

Hole Depth 6.45m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:01 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA111**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5927039.30 mN 1743395.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 07/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 07/12/2020
R.L.: 14.40m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group				4 3 4 5 4 4 5 6 5 5 6 6 7 7 6 7 6 9 8 7 8 9 7 8 9 9 9			9 8	5.5 6.0					[CONT] 3.5 m: END OF HAND AUGER. Scala only to 6.5 m (blows per 50 mm): 1,0,1,1,0,2,2,2,2,1,2,1,1,2,2,3,4,3,4,3,3,3,3,3,3,4, 3,4,3,4,3,4,3,4,5,4,4,5,6,5,5,6,6,7,7,6,7,6,9,8,7,8, 9,7,8,8,7,9,9,9
							7 6 5	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6.45m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.45m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:01 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA111**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5927039.30 mN (NZTM2000) 1743395.90 mE R.L.: 14.40m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 07/12/2020 HOLE FINISHED: 07/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.10m

HandAugerLog - 1/03/2021 9:35:02 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA112**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926554.90 mN 1743164.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 9.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL														ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill Box 1, 0.0-2.0m					Env/asb @ 0.10m 72/16 kPa Env/asb @ 0.50m PID 0.9ppm @ 0.51m 116/22 kPa Env/asb @ 1.00m PID 1.8ppm @ 1.01m UTP Env @ 1.80m Env/corrosivity @ 2.00m		9 8 7 6 5	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		M	St VSt		Sandy SILT, trace organics; brown and grey mottled orange, spotted black and white. Stiff, moist, low plasticity; sand, fine; organics, rootlets & carbonaceous material. Sandy SILT, trace organics; dark grey brown, spotted black. Stiff, moist, low plasticity; sand, fine; organics, rootlets. Silty CLAY, some sand, trace organics; grey, some orange spots. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets. 1.8m: Strong chemical odour 2.0m: roots, white/cream coloured powder. 2m: Refusal

COMMENTS:

Hole Depth 2m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:59:05 PM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA112**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926554.90 mN (NZTM2000) 1743164.20 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-2.00m

HandAugerLog - 22/12/2020 3:59:05 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA113**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926630.20 mN 1743032.10 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		HOLE FINISHED: 02/12/2020
R.L.: 7.90m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl/dupC @ 0.00m		7	0	TS	M			SILT; brown with yellowish brown inclusions. Very stiff, moist, non-plastic.
					● 161/21 kPa				TS		VSt		SILT; dark brown. Very stiff, moist, non-plastic.
Tauranga Group					asb/gl @ 0.40m PID, 0.0ppm @ 0.50m			0.5					SILT, some clay; light brown. Very stiff, moist; low to no plasticity.
					● 150/37 kPa						St-VSt		Clayey SILT; light brown. Stiff to very stiff, moist; low to medium plasticity.
					● 96/32 kPa asb/gl @ 0.90m PID, 0.4ppm @ 1.00m			1.0					1.1m: medium plasticity
					● 66/21 kPa								
					● 54/16 kPa att/psd @ 1.45m			1.5			St		Sandy SILT; light brown mottled orange brown. Stiff, moist, non-plastic; sand, fine.
	02/12/2020 Water inflow/level on completion				● 88/24 kPa asb/gl @ 1.90m		6	2.0		S			Silty SAND; brown, grey from 2.2m. Saturated, non-plastic.
East Coast Bays Formation					● 114/13 kPa								
Box 1, 0.0-2.6m				4,5 4,5 12 26 >>	att/psd @ 2.45m			2.5					2.4m: Scala (blows per 50mm): 4.5, 4.5,12,26, bouncinig Over augered, solid refusal at 2.6m
							5	3.0					2.6m: Refusal
							4	3.5					
							3	4.0					
								4.5					

COMMENTS: Brigham Creek Road. ECBF outcrop in nearby creek bed.

Hole Depth 2.6m

Scale 1:25

Rev.: A

HandAugerLog - 23/12/2020 7:57:26 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA113**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926630.20 mN (NZTM2000) 1743032.10 mE R.L.: 7.90m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-2.60m

HandAugerLog - 23/12/2020 7:57:26 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA114**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926872.80 mN 1743108.40 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
		HOLE FINISHED: 03/12/2020
R.L.: 11.00m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					Dup D, Asb/gl @ 0.00m					D			Gravelly SILT; brown. Dry, non-plastic; (farm track).
Topsoil					184/32 kPa				TS	M	VSt		SILT; greyish brown. Very stiff, moist, non-plastic.
					asb/gl @ 0.40m			0.5					SILT; light brown. Very stiff, moist, non-plastic.
					186/29 kPa PID, 0.0ppm @ 0.50m								
					109/33 kPa asb/gl @ 0.90m		10	1.0			St-VSt		Clayey SILT; light grey mottled yellowish brown. Stiff to very stiff, moist, low plasticity. 1.0m: medium plasticity 1.2m: low plasticity
					104/42 kPa PID, 0.0ppm @ 1.00m								
					56/27 kPa att/psd @ 1.45m			1.5			F		Silty CLAY; light greyish brown. Firm, moist, high plasticity.
	03/12/2020 inflow 2.6m, w/l after 4hrs				40/24 kPa asb/gl @ 1.90m		9	2.0		W			SILT; light brown. Firm, wet, non-plastic.
					41/27 kPa					M			Clayey SILT; light brown mottled orange brown. Firm, moist, medium plasticity.
					42/21 kPa			2.5					
Tauranga Group					61/16 kPa asb/gl @ 2.70m						F-St		Sandy SILT; light brown. Stiff to firm, moist, non-plastic. 3.0m: grey
					56/15 kPa		8	3.0					
					37/16 kPa att/psd @ 3.45m					M-W	F		Silty CLAY; light greyish brown. Firm, moist to wet, high plasticity; difficult to recover.
					40/9 kPa asb/gl @ 3.70m			3.5					
					27/11 kPa		7	4.0					
					27/11 kPa								
					49/24 kPa			4.5					
					37/20 kPa asb/gl @					M	F-St		Clayey SILT; greyish brown. Firm to stiff, moist, low plasticity.

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:08 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA114**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926872.80 mN 1743108.40 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				0 0 0 0 1 0 1 1 1 1 2 2 2 2 2 2 2 3 3 3 4 3 3 2 3 2 3 2 3 2 2 2 3 2 3 3 3 4 4 4 4 4	4.70m ● 50/11 kPa		5 4	5.5 6.0 6.5 7.0					[CONT] Clayey SILT; greyish brown. Firm to stiff, moist, low plasticity. End of hand auger 5.2 m Scala (blows per 50 mm) 0,0,0,0,1,0,1,1,1,1,2,2,2,2,2,2 3,3,3,4,3,3,2,3,2,3,2,3,2,2,2,3 3,3,4,4,4,4,
							3 2	7.5 8.0 8.5 9.0 9.5					7.25m: Target depth

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:09 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA114**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926872.80 mN (NZTM2000) 1743108.40 mE R.L.: 11.00m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA115**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926794.20 mN 1743054.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 9.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					env @ 0.10m			0.0		M	L		Silty SAND, trace organics; brown. Moist, poorly graded; sand, fine, loosely packed; organics, rootlets.
											VSt		Silty CLAY, minor sand; orange-brown mottled orange. Very stiff, moist; sand, fine.
					168/40 kPa env @ 0.50m PID, 0.5ppm @ 0.50m			0.5					Sandy SILT, trace organics; brown. Stiff, moist, low plasticity; sand, fine; organics, rootlets.. 0.4m: Brown & light brown
Tauranga Group											St-VSt		Sandy SILT, minor clay, trace organics; brown and light brown mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
Box 1, 0.0-3.0m					171/51 kPa PID, 0.3ppm @ 1.00m env @ 1.00m split/dup @ 1.01m		9	1.0					
					82/19 kPa			1.5			St		SILT, minor clay and sand, trace organics; light grey-brown mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 1.9m: Brown mottled orange
					81/25 kPa env @ 2.00m		8	2.0					
					56/22 kPa geo @ 2.60m			2.5					2.6 - 2.65m: organics, decomposed wood
	24/11/2020	100	HA+DCP		56/25 kPa		7	3.0		W	F		Sandy SILT, trace organics; grey speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
					34/16 kPa			3.5					3.55m: Organics, wood
													SILT, minor sand, trace organics; brown speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
					40/19 kPa		6	4.0		W-S			Sandy SILT, trace organics; grey speckled black. Firm, saturated to wet, low plasticity; sand, fine; organics, rootlets.
					37/28 kPa			4.5		W	St		SILT, some sand, trace organics; brown speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
Box 2, 3.0-5.0m					88/54 kPa		5						

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:19 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA115**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926794.20 mN 1743054.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 9.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				2 2 3 2 4 4 4 6 5 7 7 8 9 9 9 9 10 10 12 20			4	5.5 6.0					5.0m: END OF HAND AUGER. Scala only to 6.0m(blows per 50mm): 2,2,3,2,4,4,4,6,5,7,7,8,9,7,9,9,10,10,12,20
							3 2 1 0	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6m: Refusal

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:19 AM - Produced with Core-GS by GeRoc

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CORE PHOTOS

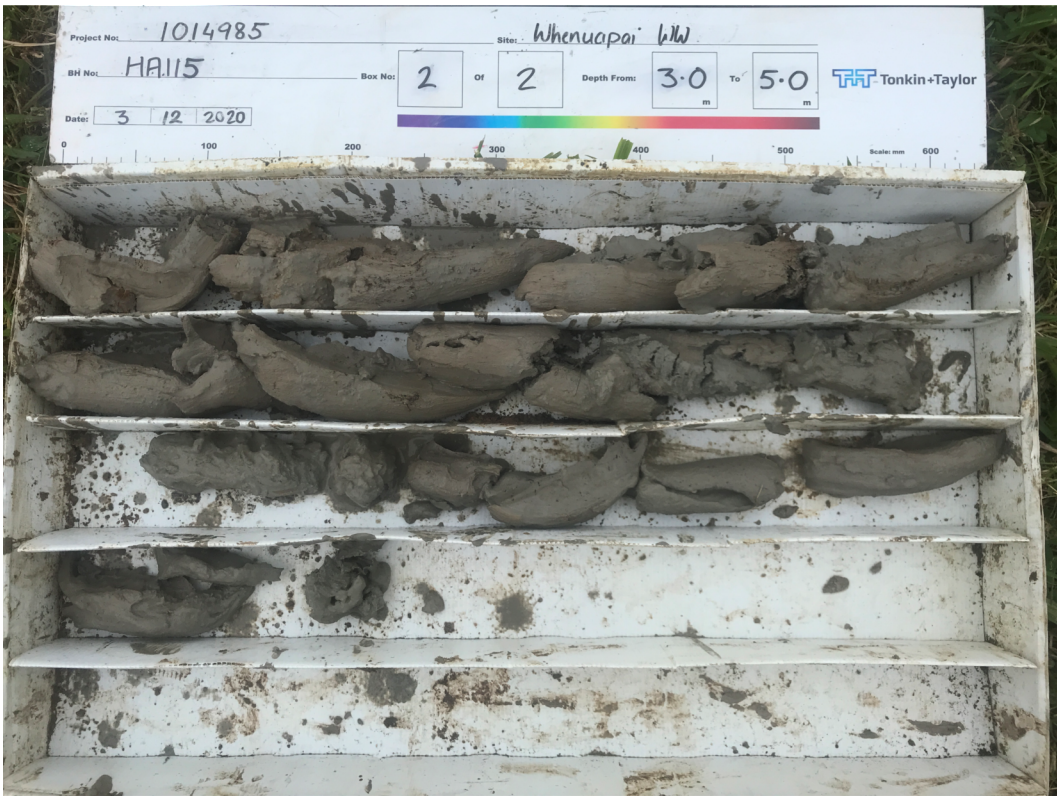
BOREHOLE No.: **HA115**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926794.20 mN 1743054.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.:	9.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM:	NZVD2016		LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 1/03/2021 9:35:19 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA116**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926675.90 mN 1743047.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		HOLE FINISHED: 02/12/2020
R.L.: 8.80m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl/split @ 0.00m				TS	M			SILT; dark brown. Moist, non-plastic.
Tauranga Group	02/12/2020 level on completion				● 86/27 kPa asb/gl @ 0.40m PID, 0.5ppm @ 0.50m ● 72/7 kPa ● 49/12 kPa asb/gl @ 0.90m PID, 1.0ppm @ 1.00m ● 58/5 kPa ● 80/19 kPa att/psd @ 1.45m ● 73/24 kPa asb/gl @ 1.90m ● 66/20 kPa		8 7	0.5 1.0 1.5 2.0		M-W	F-St		Clayey SILT; greyish brown. Stiff to firm, moist, medium plasticity. 1.0m: wet to saturated
East Coast Bays Formation					● >186 kPa ● UTP		6	2.5		W M	St-VSt VSt		Sandy SILT; brown and orange brown; grey from 2.3m. Stiff to very stiff, wet, non-plastic. Clayey SILT; grey. Very stiff, moist, low plasticity.
Box 1, 0.0-3.4m				7 7 7 8 11 16 18 23 >>	att/psd @ 2.95m		3.0			S			Silty SAND; grey. Saturated; well packed. 2.95m: Scala (blows per 50mm) 7,7,7,8,11,16,18,23 then bouncing Over augered, solid refusal at 3.35m
							5 4	3.5 4.0 4.5					3.35m: Refusal

COMMENTS: Brigham Creek

Hole Depth 3.35m

Scale 1:25

Rev.: A

HandAugerLog - 23/12/2020 8:08:00 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA116**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926675.90 mN (NZTM2000) 1743047.90 mE R.L.: 8.80m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM



0.00-3.35m

HandAugerLog - 23/12/2020 8:08:00 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926564.40 mN 1743138.40 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 10.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA+DCP		Env/asb @ 0.10m					D	St		Sandy SILT, trace organics; light brown mottled orange and brown. Stiff, dry, low plasticity; sand, fine; organics, rootlets..
					152/19 kPa Env/asb @ 0.50m PID 0.8ppm @ 0.51m			0.5		M	VSt		Silty CLAY, minor sand, trace organics & insulation fibres; light brown mottled orange. Very stiff, moist, high plasticity; sand, fine; organics, rootlets.
					137/16 kPa Env/asb @ 1.00m PID 6.0ppm @ 1.01m		9	1.0		D-M			Sandy SILT, trace organics; dark brown and light brown mottled orange. Very stiff, dry to moist, low plasticity; sand, fine; organics, rootlets.
					112/25 kPa			1.5		M			Silty CLAY, trace organics; light brown mottled orange. Very stiff, moist, high plasticity; organics, rootlets.
					186/76 kPa Env/corrosivity @ 2.00m		8	2.0					
Tauranga Group Box 1, 0.0-3.0m					218/81 kPa			2.5			VSt-H		Silty CLAY, some sand, minor organics; brown spotted black, speckled white and orange. Very stiff, moist, high plasticity; sand, fine; organics, carbonaceous.
					att/psd @ 2.70m		7	3.0					Sandy SILT; grey and brown speckled orange. Very stiff to hard, moist, low plasticity; sand, fine.
					171/48 kPa						VSt		SILT, some clay and sand, trace peat (spongy); brown mottled orange, streaked black. Very stiff, moist, low plasticity; sand, fine.
					156/75 kPa			3.5					3.6m: Grey mottled orange
					199/75 kPa		6	4.0					Sandy SILT, trace organics; light brown mottled orange, streaked black. Very stiff, moist, low plasticity; sand, fine; carbonaceous & decomposed wood.
					209/72 kPa			4.5			D		Silty SAND, trace organics; grey streaked black and brown. Moist, poorly graded; sand, fine, tightly packed; carbonaceous & decomposed wood.
Box 2, 3.0-5.0m					184/73 kPa								

COMMENTS:

Hole Depth 6.3m

Scale 1:25

Rev.: A

HandAugerLog - 23/12/2020 8:17:30 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA117**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926564.40 mN 1743138.40 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 10.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION,	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				3 4 4 4 7 7 6 7 7 9 7 7 7 8 7 7 7 6 8 8 8 10 11 10 11 11			4	5.5 6.0					5.0 m: END OF HAND AUGER. Scala only to 6.3 m (blows per 50 mm): 3,4,4,4,7,7,6,7,7,9,7,7,7,8,7,7,7,6,8,8,8,10,11,10, 11,11
							3 2 1	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6.3m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.3m

Scale 1:25

Rev.: A

HandAugerLog - 23/12/2020 8:17:30 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA117**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926564.40 mN 1743138.40 mE R.L.: 10.00m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HandAugerLog - 23/12/2020 8:17:30 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA119**

PROJECT: Watercare Whenuapai-Redhill GI | LOCATION: Whenuapai | JOB No.: 1014985.0000

CO-ORDINATES: (NZTM2000) 5926938.00 mN 1743195.90 mE
R.L.: 11.40m
DATUM: NZVD2016

DRILL TYPE: 75 and 50 mm Hand auger
DRILL METHOD: HA+DCP

HOLE STARTED: 03/12/2020
HOLE FINISHED: 03/12/2020
DRILLED BY: GEOTECHNICS
LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL											ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Dup E/asb/gl @ 0.00m			0	TS	D			SILT; light brown. Dry, non-plastic.
					125/4 kPa asb/gl @ 0.40m		11	0.5		M	VSt		Clayey SILT; light brown. Very stiff, moist, low plasticity.
					81/32 kPa PID, 0.0ppm @ 0.50m						St		Silty CLAY; light brown mottled yellowish brown. Stiff, moist, medium plasticity.
					74/21 kPa asb/gl @ 0.90m			1.0					1.1m: sandy layer
	03/12/2020 inflow 1.6m, W/L after 45mins				56/19 kPa PID, 0.0ppm @ 1.00m		10	1.5					Clayey SILT; light brown mottled yellowish brown. Stiff, moist, low plasticity.
					58/19 kPa att/psd @ 1.45m					S	F-St		Sandy SILT; brown mottled yellowish brown. Firm to stiff, saturated, non-plastic.
					60/11 kPa asb/gl @ 1.90m			2.0					
					42/19 kPa					W	S-F		Clayey SILT; grey. Soft to firm, wet, medium plasticity.
Tauranga Group					66/16 kPa att/psd @ 2.45m		9	2.5					
					23/8 kPa asb/gl @ 2.70m								
					29/11 kPa			3.0					
					48/20 kPa		8				F		Clayey sandy SILT; grey. Firm, wet, low plasticity.
					50/20 kPa asb/gl @ 3.70m			3.5		M	St		Clayey SILT; grey. Stiff, moist, medium plasticity.
					56/19 kPa			4.0					Clayey sandy SILT; light grey. Stiff, moist, low plasticity.
					61/32 kPa		7			W			Sandy SILT; grey. Stiff, wet, non-plastic.
					25/11 kPa			4.5		M	F-St		Clayey SILT; grey. Firm to stiff, moist, medium plasticity.
					32/19 kPa asb/gl @								

COMMENTS: 26 Brigham Ck Rd. No core photograph, the soil is very similar to HA109

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:26 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA119**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926938.00 mN 1743195.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.40m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group	[CONT] Clayey SILT; grey. Firm to stiff, moist, medium plasticity. 5.1m: some sand, minor organics
	end of handauger 5.2m Scala (blows per 100mm) 0,0,2,2,2,6,5,7,5,5, 5,6,6,6,8,12,13,12,10,13
	7.25m: Target depth

WATER | CORE RECOVERY (%) | METHOD | SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18 | TESTS | SAMPLES | RL (m) | DEPTH (m) | GRAPHIC LOG | MOISTURE CONDITION \ WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200

TESTS: 4.70m ● 54/13 kPa

RL (m): 6, 5, 4, 3, 2

DEPTH (m): 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5

SCALA PENETROMETER (Blows/50mm): 0,0,0,0,1,1,1,1,1,1,3,3,2,3,3,4,2,3,2,3,2,3,3,3,3,3,3,3,3,4,4,6,6,6,7,6,6,5,5,6,7

COMMENTS: 26 Brigham Ck Rd. No core photograph, the soil is very similar to HA109

Hole Depth 7.25m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:35:26 AM - Produced with Core-GS by GeRoc

Appendix C – Soil and Groundwater Analytical Results – Summary Tables

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site								
Location	HA04	HA04	HA04	HA08	HA08	HA08	ENVR-SS03								
Sample	HA04 0m 02-Dec-2020 7:10 am	HA04 0.5m 02-Dec-2020 7:25 am	HA04 1m 02-Dec-2020 7:33 am	HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020								
Date	2/12/2020	2/12/2020	2/12/2020	24/11/2020	24/11/2020	24/11/2020	10/11/2020								
Lab number	2486806.8	2486806.9	2486806.1	2481819.8	2481819.9	2481819.1	2470910.4								
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2								
Heavy Metals - Screen Level (mg/kg)								**NES SCS Health Rural Residential 10% produce [1]**	**NEPM Residential HIL A [2]**	**NES Commercial / Industrial Outdoor Worker (unpaved) [3]**	**NEPM Commercial / Industrial HIL D [4]**	**AUP (OP) Permitted Activity Soil Acceptance Criteria [5]**	**TP153 Volcanic Auckland Background Concentrations [6]**	**TP153 Non-Volcanic Auckland Background Concentrations [7]**	**WasteMINZ Soil Disposal Managed Fill Criteria[8]**	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]**
Total Recoverable Arsenic	< 2	< 2	< 2	4	< 2	2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	0.34	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	6	4	7	9	< 2	4	2	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	9	2	5	21	4	5	20	>10,000	-	>10,000	-	325	90	45	*44[A]*	N/L
Total Recoverable Lead	7.3	6	9.3	11.3	3.7	5.9	7.5	210	-	3300	-	250	65		*60[B]*	N/L
Total Recoverable Mercury	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.22	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	< 2	4	8	< 2	2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	13	< 4	5	38	5	10	20		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	NEPM Commercial / Industrial HIL D [4]	AUP (OP) Permitted Activity Soil Acceptance Criteria [5]	TP153 Volcanic Auckland Background Concentrations [6]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria[8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	ENVR-SS04	ENVR-SS05	ENVR-HA101	ENVR-HA101	ENVR-HA101	HA107a	HA107a	HA107a	HA108									
Sample	ENVR-SS04-0.1-0.2m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020	ENVR - HA101 - 1.6-1.8m 04-Nov-2020	HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	HA108 - 0.1m 03-Dec-2020									
Date	10/11/2020	10/11/2020	4/12/2020	4/12/2020	4/12/2020	4/11/2020	4/11/2020	4/11/2020	3/12/2020									
Lab number	2470910.8	2470910.12	2467662.5	2467662.6	2467662.8	2470943.1	2470943.2	2470943.3	2488783.9									
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2									
Heavy Metals - Screen Level (mg/kg)																		
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	20	-	70	-	100		12	*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.16	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.16	3	-	1300	-	7.5		0.65	*0.8*	N/L
Total Recoverable Chromium	3	4	7	7	5	6	6	8	5	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	35	42	10	9	6	19	5	11	10	>10,000	-	>10,000	-	325	90	45	*44 A*	N/L
Total Recoverable Lead	7.8	10	5.3	10.7	8.5	4.9	5.7	12.5	3.7	210	-	3300	-	250		65	*60 B*	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	310	-		-	0.75		0.45	*0.7*	N/L
Total Recoverable Nickel	4	6	< 2	< 2	2	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	22	42	12	5	5	10	< 4	9	7		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:
(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	NEPM Commercial / Industrial HIL D [4]	AUP (OP) Permitted Activity Soil Acceptance Criteria [5]	TP153 Volcanic Auckland Background Concentrations [6]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria[8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	HA108	HA108	HA109	HA109	HA109	HA114	HA114	HA114	HA115									
Sample	HA108 - 0.5m 03-Dec-2020	HA108 - 1.0m 03-Dec-2020	HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am	HA114 - 1.0m 03-Dec-2020 8:32 am	HA115 - 0.1m 03-Dec-2020									
Date	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020									
Lab number	2488783.1	2488783.11	2488783.13	2488783.14	2488783.15	2488783.2	2488783.21	2488783.22	2488783.27									
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2									
Heavy Metals - Screen Level (mg/kg)																		
Total Recoverable Arsenic	2	3	< 2	< 2	8	4	< 2	< 2	3	20	-	70	-	100		12	*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.15	3	-	1300	-	7.5		0.65	*0.8*	N/L
Total Recoverable Chromium	8	8	6	8	11	11	8	10	15	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	6	8	9	6	12	78	4	7	34	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	8.4	11.3	4.3	9.1	22	14.9	4.8	9.6	22	210	-	3300	-	250		65	*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75		0.45	*0.7*	N/L
Total Recoverable Nickel	2	2	< 2	2	6	22	< 2	2	11		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	5	6	8	6	10	53	4	7	57		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	NEPM Commercial / Industrial HIL D [4]	AUP (OP) Permitted Activity Soil Acceptance Criteria [5]	TP153 Volcanic Auckland Background Concentrations [6]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria[8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	HA115	HA115	HA117	HA117									
Sample	HA115 - 0.5m 03-Dec-2020	HA115 - 1.0m 03-Dec-2020	HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020									
Date	3/12/2020	3/12/2020	2/12/2020	2/12/2020									
Lab number	2488783.28	2488783.29	2486806.28/ 2487331.36	2486806.29/ 2487331.37									
Soil suite	Soil suite 2	Soil suite 2	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	Heavy metals, VOCS, SVOCS, ONOPS, asbestos									
Heavy Metals - Screen Level (mg/kg)													
Total Recoverable Arsenic	< 2	2	< 2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	7	10	7	7	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	4	6	7	4	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	5.8	9.8	8.8	9.4	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	0.11	< 0.10	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	2	4	3		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	7	8	11	7		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site								
Location	HA117	HA119	HA119	HA119								
Sample	HA117 2.0m 02-Dec-2020	HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm								
Date	2/12/2020	3/12/2020	3/12/2020	3/12/2020								
Lab number	2486806.31	2488783.31	2488783.32	2488783.33								
Soil suite	Heavy metals, VOCS, SVOCS, ONOPS	Soil suite 2	Soil suite 2	Soil suite 2								
Heavy Metals - Screen Level (mg/kg)					**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	< 0.10	0.23	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	6	6	9	6	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	5	9	6	4	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	12.5	4.2	8.7	7.1	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	5	8	5	< 4		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:
(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce (1)	NEPM Residential HIL A (2)	NES Commercial / Industrial Outdoor Worker (unpaved) (3)	NEPM Commercial / Industrial HIL D (4)	AUP (OP) Permitted Activity Soil Acceptance Criteria (6)	TP153 Volcanic Auckland Background Concentrations (6)	TP153 Non-Volcanic Auckland Background Concentrations (7)	WasteMINZ Soil Disposal Managed Fill Criteria(8)	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration (9)
Location	BH05A	BH05A	BH05A	BH06	BH06	BH06	HA03	HA03	HA03	BH07	BH07	BH07									
Sample	BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020	BH06 - 1.0-1.2m 19-Nov-2020	HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	BH07 - 0.1-0.4m 20-Nov-2020	BH07 - 0.5-0.65m 20-Nov-2020	BH07 - 1.0-1.35m 20-Nov-2020									
Date	17/11/2020	17/11/2020	17/11/2020	19/11/2020	19/11/2020	19/11/2020	2/12/2020	2/12/2020	2/12/2020	20/11/2020	20/11/2020	20/11/2020									
Lab number	2478987.2/ 2479563.1	2478987.3/ 2479563.2	2478987.4/ 2479563.3	2478987.9/ 2479563.7	2478987.10/ 2479563.8	2478987.11/ 2479563.9	2486806.1/ 2487331.1	2486806.2/ 2487331.2	2486806.3/ 2487331.3	2478987.17/ 2479563.15	2478987.18/ 2479563.16	2478987.19/ 2479563.17									
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																					
Total Recoverable Arsenic	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	0.33	< 0.10	< 0.10	0.49	< 0.10	< 0.10	0.21	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	8	7	7	5	3	4	6	5	4	3	3	8	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	22	5	6	9	4	7	8	< 2	< 2	3	3	3	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	6.1	9.5	9	7.7	11.5	11.6	7.1	6.7	5.9	4.1	6.4	7.1	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	16	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	310	N/L
Total Recoverable Zinc	23	6	4	6	< 4	< 4	13	< 4	< 4	< 4	< 4	< 4		7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.*
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce (1)	NEPM Residential HIL A (2)	NES Commercial / Industrial Outdoor Worker (unpaved) (3)	NEPM Commercial / Industrial HIL D (4)	AUP (OP) Permitted Activity Soil Acceptance Criteria (5)	TP153 Volcanic Auckland Background Concentrations (6)	TP153 Non-Volcanic Auckland Background Concentrations (7)	WasteMINZ Soil Disposal Managed Fill Criteria(8)	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration (9)
Location	BH08	BH08	BH08	HA05	HA05	HA05	HA06	HA06	HA06	HA07	HA07	HA07									
Sample	0.1	0.5	1	HA05 - 0m 01-Dec-2020 1:15 pm	HA05 - 0.5m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA06 - 0m 01-Dec-2020 10:45 am	HA06 - 0.4-0.6m 01-Dec-2020 11:00 am	HA06 - 1.0m 01-Dec-2020 11:12 am	HA07 - 0.1m 01-Dec-2020	HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020									
Date	BH08-0.1m	BH08-0.5m	BH08-1.0m	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020									
Lab number	2481161.1/ 2480946.1	2481161.2/ 2480946.2	2481161.3/ 2480946.3	2486812.2/ 2487331.11	2486812.3	2486812.4/ 2487331.12	2486812.9/ 2487331.16	2486812.10	2486812.11/ 2487331.17	2486812.16/ 2487331.21	2486812.17/ 2487331.22	2486812.18/ 2487331.23									
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																					
Total Recoverable Arsenic	7	< 2	< 2	2	< 2	< 2	6	5	2	4	2	< 2	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.26	< 0.10	< 0.10	0.17	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		0.8	N/L
Total Recoverable Chromium	101	5	3	6	6	7	13	21	11	9	7	10	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	66	6	3	43	3	2	26	12	16	31	6	5	>10,000	-	>10,000	-	325	90	45	44[A]	N/L
Total Recoverable Lead	11.3	11.8	6.3	20	9.2	5.5	21	26	24	15.7	13.8	8.5	210	-	3300	-	250	65		60[B]	N/L
Total Recoverable Mercury	0.1	0.11	< 0.10	< 0.10	0.16	< 0.10	0.13	0.19	0.3	< 0.10	0.1	0.16	310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	51	< 2	< 2	8	3	< 2	7	11	8	6	2	3		400	-	6000	105	320	35	310	N/L
Total Recoverable Zinc	18	4	< 4	40	< 4	< 4	42	12	5	49	5	5		7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site						
Location	ENVR-HA03	ENVR-HA03	ENVR-HA03	ENVR-HA04	ENVR-HA04	ENVR-HA04	ENVR-HA05	ENVR-HA05	ENVR-HA05	BH110	BH110	BH110	BH111						
Sample	ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020	ENVR-HA04-0.5m 10-Nov-2020	ENVR-HA04-1.0m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5m 10-Nov-2020	ENVR-HA05-1.0m 10-Nov-2020	BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH111-0.05-0.2m 10-Nov-2020						
Date	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	13/11/2020	13/11/2020	13/11/2020	10/11/2020						
Lab number	2470910.1/ 2471363.1	2470910.2/ 2471363.2	2470910.3/ 2471363.3	2470910.5/ 2471363.5	2470910.6/ 2471363.6	2470910.7/ 2471363.7	2470910.9/ 2471363.9	2470910.10/ 2471363.10	2470910.11/ 2471363.11	2474527.1/ 2474175.1	2474527.2/ 2474175.2	2474527.3/ 2474175.3	2472606.1/ 2473434.1						
Soil suite	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCP	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3						
Heavy Metals - Screen Level (mg/kg)														**NES SCS Health Rural Residential 10% produce [1]**	**NEPM Residential HIL A [2]**	**NES Commercial / Industrial Outdoor Worker (unpaved) [3]**	**NEPM Commercial / Industrial HIL D [4]**	**AUP (OP) Permitted Activity Soil Acceptance Criteria [5]**	**TP153 Volcanic Auckland Background Concentrations [6]**	**TP153 Non-Volcanic Auckland Background Concentrations [7]**	**WasteMINZ Soil Disposal Managed Fill Criteria[8]**	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]**
Total Recoverable Arsenic	< 2	< 2	< 2	< 5	2	< 2	< 2	< 2	< 2	< 2	5	< 2	< 2	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.31	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	3	3	7	< 5	7	5	5	5	6	5	8	6	7	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	24	< 2	2	12	2	2	16	5	4	2	5	4	4	>10,000	-	>10,000	-	325	90	45	*44[A]*	N/L
Total Recoverable Lead	7.6	3.3	6.6	31	10.6	8.9	7.1	5.6	8.2	6.1	11.2	8.4	7	210	-	3300	-	250	65		*60[B]*	N/L
Total Recoverable Mercury	< 0.10	0.24	0.25	< 0.3	0.2	0.17	< 0.10	0.18	0.21	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	3	< 2	< 2	< 5	< 2	3	2	< 2	4	< 2	3	< 2	< 2		400	-	6000	105	320	35	310	N/L
Total Recoverable Zinc	18	< 4	5	17	< 4	< 4	20	5	11	6	5	< 4	11		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site						
Location	BH111A	BH111A	BH113/ ENVR-HA102	BH113/ ENVR-HA102	BH113/ ENVR-HA102	HA110a	HA110a	HA110a	HA111	HA111	HA111	HA112	NES SCS Health Rural Residential 10% produce (1)	NEPM Residential HIL A (2)	NES Commercial / Industrial Outdoor Worker (unpaved) (3)	NEPM Commercial / Industrial HIL D (4)	AUP (OP) Permitted Activity Soil Acceptance Criteria (6)	TP153 Volcanic Auckland Background Concentrations (6)	TP153 Non-Volcanic Auckland Background Concentrations (7)	WasteMINZ Soil Disposal Managed Fill Criteria(8)	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration (9)
Sample	BH111A-0.4-0.7m 13-Nov-2020	BH111A-1.0-1.3m 13-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020	BH113 - 2.0m 09-Nov-2020	HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020	HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020	HA112 0.1m 02-Dec-2020									
Date	13/11/2020	13/11/2020	9/11/2020	9/11/2020	9/11/2020	8/12/2020	8/12/2020	8/12/2020	7/12/2020	7/12/2020	7/12/2020	2/12/2020									
Lab number	2474175.8/ 2474527.8	2474175.9/ 2474527.9	2470943.5	2470943.6	2470943.7	2491712.1/ 2492155.1	2491712.2/ 2492155.2	2491712.4/ 2492155.4	2490317.1/ 2489833.1	2490317.3/ 2489833.3	2490317.4/ 2489833.4	2488806.15									
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																					
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	7	3	4	5	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	5	4	6	7	5	7	10	10	14	10	12	5	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	5	5	11	6	8	4	8	10	16	10	13	3	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	8.1	11.2	4.2	6.7	9.8	7.8	13.2	10.9	19.3	12.1	13.1	7.1	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	0.21	0.15	0.42	0.13	0.14	< 0.10	310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2	< 2	2	4	4	5	3	4	< 2		400	-	6000	105	320	35	310	N/L
Total Recoverable Zinc	5	< 4	8	5	5	6	12	8	18	14	18	7		7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.*
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site								
Location	HA112	HA112	HA113	HA113	HA113	BH116	BH116	BH116	BH117	BH117	BH117	HA116	HA116	HA116								
Sample	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am	HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm	BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm								
Date	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/11/2020	2/11/2020	2/11/2020	9/11/2020	9/11/2020	9/11/2020	2/12/2020	2/12/2020	2/12/2020								
Lab number	2486806.18	2486806.19	2486806.2/ 2487331.3	2486806.21/ 2487331.31	2486806.22/ 2487331.32	2467662.1/ 2471441.8	2467662.2/ 2471441.9	2467662.4/ 2471441.10	2470943.8/ 2471441.14	2470943.9/ 2471441.15	2470943.10/ 2471441.16	2486806.24/ 2487331.33	2486806.25/ 2487331.34	2486806.26/ 2487331.35								
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Heavy Metals - Screen Level (mg/kg)															**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	3	4	< 2	< 2	< 2	< 2	2	< 2	< 2	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.29	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.26	< 0.10	< 0.10	0.28	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		0.8	N/L
Total Recoverable Chromium	6	6	8	5	7	10	12	6	5	4	2	8	4	4	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	4	3	5	< 2	4	14	22	7	5	< 2	2	9	2	5	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	6.7	5.8	11	4.4	7.7	11.9	11.3	7.7	10.8	5.3	3.9	16.3	4.4	8.4	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	0.13	0.11	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2	< 2	8	10	< 2	2	< 2	2	5	< 2	< 2		400	-	6000	105	320	35	310	N/L
Total Recoverable Zinc	5	5	13	< 4	4	20	30	6	11	< 4	24	19	< 4	< 4		7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.*
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [4]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [4]	WasteMINZ Soil Disposal Managed Fill Criteria [7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH05A	BH05A	BH05A	BH06	BH06	BH06	BH06	HA03	HA03	HA03	BH07	BH07	BH07								
		Sample	BH05a - 0. 1m 17-Nov -2020	BH05a - 1.0m 17-Nov -2020	BH05a - 2.0m 17-Nov -2020	BH06 - 0.1-0.3m 19-Nov - 2020	BH06 - 0.35-0.6m 19-Nov - 2020	BH06 - 1.0-1.2m 19-Nov - 2020	HA03 0m 02-Dec -2020 9:25 am	HA03 0.3m 02-Dec -2020 9.32 am	HA03 1m 02-Dec -2020 9.41 am	HA03 2m 02-Dec -2020	BH07 - 0.1-0.4m 20-Nov - 2020	BH07 - 0.5-0.65m 20-Nov - 2020	BH07 - 1.0-1.35m 20-Nov - 2020								
		Date	17/11/2020	17/11/2020	17/11/2020	19/11/2020	19/11/2020	19/11/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	20/11/2020	20/11/2020	20/11/2020								
		Lab number	2478987.2/ 2479563.1	2478987.3/ 2479563.2	2478987.4/ 2479563.3	2478987.9/ 2479563.7	2478987.10/ 2479563.8	2478987.11/ 2479563.9	2486806.1/ 2487331.1	2486806.2/ 2487331.2	2486806.3/ 2487331.3	2486806.4/ 2487331.4	2478987.17/ 2479563.15	2478987.18/ 2479563.16	2478987.19/ 2479563.17								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																					
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 9	< 9	< 10	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 9				2,700[2.4]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[7.4]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	< 40	< 40	< 40	< 40	< 40	< 40	57	< 40	< 40	< 40	< 40	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4	< 0.4	< 0.4	< 0.3	< 0.3	< 0.3	< 0.4								200
	1-Methylnaphthalene	0	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	2-Methylnaphthalene	0	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Acenaphthylene	0.065	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Acenaphthene	0.02	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Anthracene	0.123	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[a]anthracene	0.74	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	10	35	20	0.27[6]	25	NA[2.2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.03	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[e]pyrene	0.65	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[g,h,i]perylene	0.72	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Benzo[k]fluoranthene	0.38	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Chrysene	0.7	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Dibenz[a,h]anthracene	0.132	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Fluoranthene	1.19	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Fluorene	0.016	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Naphthalene	0	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.06	< 0.06	< 0.07				69[5]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Phenanthrene	0.38	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014								
	Pyrene	1.48	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.014				(1,600)[5.4]	NA[2.1]	NA[2.2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedence of the adopted Class 4 WasteMINZ Mongedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [7.4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [5.4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [7]	NES Commercial / Industrial Outdoor Worker (unpaved) [8]	AUP Permitted Activity Soil Acceptance Criteria [5]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [4]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [4]	WasteMINZ Soil Disposal Managed Fill Criteria [7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [6]
		Location	BH08	BH08	BH08	HA05	HA05	HA05	HA05	HA06	HA06	HA06	HA07	HA07	HA07	ENVR-HA02	ENVR-HA03							
		Sample	0.1	0.5	1	HA05 - 0m 01-Dec-2020 1.15 pm	HA05 - 0.3m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA05 - 2m 01-Dec-2020 10:45 am	HA06 - 0.4-0.6m 01-Dec-2020 11:00 am	HA06 - 1.0m 01-Dec-2020 11:12 am	HA07 - 0.1m 01-Dec-2020	HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020	ENVR-HA02-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5m 10-Nov-2020							
		Date	BH08-0.1m	BH08-0.5m	BH08-1.0m	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	10/11/2020	10/11/2020								
		Lab number	2481161.1/ 2480946.1	2481161.2/ 2480946.2	2481161.3/ 2480946.3	2486812.2/ 2487331.11	2486812.3	2486812.4/ 2487331.12	2486812.9/ 2487331.16	2486812.10	2486812.11/ 2487331.17	2486812.16/ 2487331.21	2486812.17/ 2487331.22	2486812.18/ 2487331.23	2470910.1/ 2471363.1	2470910.2/ 2471363.2								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																						
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 9	< 8	< 8	< 8	< 8	< 9	< 10	< 9	< 9	< 8	< 8	< 10	< 8	< 8				2,700[7,4]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[N]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	< 40	< 40	< 40	123	< 40	< 40	55	< 40	< 40	< 40	< 40	< 40	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	< 70	< 70	126	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	9.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.3								200
	1-Methylnaphthalene	0	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	2-Methylnaphthalene	0	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Acenaphthylene	0.065	< 0.014	< 0.014	< 0.013	0.065	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Acenaphthene	0.02	< 0.014	< 0.014	< 0.013	0.02	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Anthracene	0.123	< 0.014	< 0.014	< 0.013	0.123	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]anthracene	0.74	< 0.014	< 0.014	< 0.013	0.74	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.014	< 0.013	0.94	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	1.37	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03	10	35	20	0.27[N]	25	NA[2.2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	1.36	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.014	< 0.013	1.01	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[e]pyrene	0.65	< 0.014	< 0.014	< 0.013	0.65	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[g,h,i]perylene	0.72	< 0.014	< 0.014	< 0.013	0.72	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[k]fluoranthene	0.38	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Chrysene	0.7	< 0.014	< 0.014	< 0.013	0.7	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Dibenzo[a,h]anthracene	0.132	< 0.014	< 0.014	< 0.013	0.132	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Fluoranthene	1.19	< 0.014	< 0.014	< 0.013	1.19	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Fluorene	0.016	< 0.014	< 0.014	< 0.013	0.016	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.014	< 0.013	0.68	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.06	< 0.07	< 0.08	< 0.08	< 0.07	< 0.08	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07				69[N]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.014	< 0.014	< 0.013	0.24	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Phenanthrene	0.38	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Pyrene	1.48	< 0.014	< 0.014	< 0.013	1.48	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013				(1,600)[E,E]	NA[2.1]	NA[2.2]		

Notes:

-All units in mg/kg except if specifically mentioned

-Shaded values exceed the corresponding guideline

-*Italic values represent an exceedence of the adopted Class 4 WasteMINZ Managedfill Criteria*

-**Bold values represent concentrations report above the laboratory detection limit.**

-[7,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

-[N,E] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

-[2.1] NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).

-[2.2] NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.

-v: volatisation

-p: produce

-s: PAH surrogate

-m: maintenance/excavation

-PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site						
		Location	ENVR-HA03	ENVR-HA04	ENVR-HA04	ENVR-HA04	ENVR-HA05	ENVR-HA05	ENVR-HA05	BH110	BH110	BH110	BH110	BH111						
		Sample	ENVR-HA03-1.0m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020	ENVR-HA04-0.9m 10-Nov-2020	ENVR-HA04-1.0m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.3m 10-Nov-2020	ENVR-HA05-1.0m 10-Nov-2020	BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH110-2.9-3.15m 13-Nov-2020	BH111-0.05-0.2m 10-Nov-2020						
		Date	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	13/11/2020	13/11/2020	13/11/2020	13/11/2020	10/11/2020						
		Lab number	2470910.3/ 2471363.3	2470910.5/ 2471363.5	2470910.6/ 2471363.6	2470910.7/ 2471363.7	2470910.9/ 2471363.9	2470910.10/ 2471363.10	2470910.11/ 2471363.11	2474527.1/ 2474175.1	2474527.2/ 2474175.2	2474527.3/ 2474175.3	2472606.1/ 2473434.1	2474175.8/ 2476527.8						
		Soil suite	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCP	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3						
Hydrocarbons		Maximum Reported Concentrations (mg/kg)													NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [6]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 9	< 11	< 10	< 9	< 8	< 8	< 8	< 8	< 9	< 8	< 9	< 8				2,700[2.4]	20,000	NA[2.2]	*120*	500
	C_{10} - C_{14}	69	< 20	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[2.4]	NA[2.1]	NA[2.2]	*58*	510
	C_{15} - C_{36}	2300	< 40	2,300	< 40	46	< 40	108	< 40	< 40	< 40	< 40	53	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	2,300	< 70	< 70	< 70	110	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.5	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4	< 0.4	< 0.4	< 0.4								200
	1-Methylnaphthalene	0	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	2-Methylnaphthalene	0	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Acenaphthylene	0.065	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Acenaphthene	0.02	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Anthracene	0.123	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]anthracene	0.74	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]pyrene (BAP)	0.94	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	10	35	20	0.27[4]	25	NA[2.2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[e]pyrene	0.65	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[g,h,i]perylene	0.72	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[k]fluoranthene	0.38	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Chrysene	0.7	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Dibenz(a,h)anthracene	0.132	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Fluoranthene	1.19	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Fluorene	0.016	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Indeno(1,2,3-c,d)pyrene	0.68	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Naphthalene	0	< 0.08	< 0.09	< 0.08	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07				69[5]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Phenanthrene	0.38	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Pyrene	1.48	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014				(1,600)[2.4]	NA[2.1]	NA[2.2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Mongedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [7,8] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [8,8] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [5]	NES Commercial / Industrial Outdoor Worker (unpaved) [4]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [6]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [6]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [6]	WasteMINZ Soil Disposal Managed Fill Criteria [7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH11A	HA110a	HA110a	HA110a	HA111	HA111	HA111	HA112	HA113	HA113								
		Sample	BH11A-1.0-1.3m 13-Nov-2020	HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020	HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020	HA113 0.1m 02-Dec-2020 11:45 am	HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm								
		Date	13/11/2020	8/12/2020	8/12/2020	8/12/2020	7/12/2020	7/12/2020	7/12/2020	2/12/2020	2/12/2020	2/12/2020								
		Lab number	2474175.9/ 2474527.9	2491712.1/ 2492155.1	2491712.2/ 2492155.2	2491712.4/ 2492155.4	2490317.1/ 2489833.1	2490317.2/ 2489833.3	2490317.4/ 2489833.4	2488806.2/ 2487331.3	2488806.21/ 2487331.31	2488806.22/ 2487331.32								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
	Hydrocarbons		Maximum Reported Concentrations (mg/kg)																	
Total Petroleum Hydrocarbons in Soil (mg/kg)	$C_7 - C_9$	0	< 8	< 8	< 8	< 9	< 9	< 9	< 9	< 8	< 8	< 9	10	35	20	2,700[7,v]	20,000	NA[2.2]	120	500
	$C_{10} - C_{14}$	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[7x]	NA[2.1]	NA[2.2]	58	510
	$C_{15} - C_{36}$	2300	101	< 40	< 40	< 40	47	< 40	< 40	< 40	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons ($C_7 - C_{36}$)	2300	102	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4								200
	1-Methylnaphthalene	0	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	2-Methylnaphthalene	0	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Acenaphthylene	0.065	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Acenaphthene	0.02	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Anthracene	0.123	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Benzo[a]anthracene	0.74	< 0.014	< 0.013	< 0.013	< 0.015	0.02	< 0.014	< 0.015	0.016	< 0.013	< 0.015								
	Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.013	< 0.013	< 0.015	0.027	< 0.014	< 0.015	0.018	< 0.013	< 0.015								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	< 0.04	0.03	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04								
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	< 0.04	0.03	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.013	< 0.013	< 0.015	0.025	< 0.014	< 0.015	0.02	< 0.013	< 0.015								
	Benzo[e]pyrene	0.65	< 0.014	< 0.013	< 0.013	< 0.015	0.017	< 0.014	< 0.015	0.014	< 0.013	< 0.015								
	Benzo[g,h,i]perylene	0.72	< 0.014	< 0.013	< 0.013	< 0.015	0.019	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Benzo[k]fluoranthene	0.38	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Chrysene	0.7	< 0.014	< 0.013	< 0.013	< 0.015	0.016	< 0.014	< 0.015	0.014	< 0.013	< 0.015								
	Dibenzo[a,h]anthracene	0.132	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Fluoranthene	1.19	< 0.014	0.014	< 0.013	< 0.015	0.035	< 0.014	< 0.015	0.041	< 0.013	< 0.015								
	Fluorene	0.016	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.013	< 0.013	< 0.015	0.017	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.08	< 0.08	< 0.07	< 0.08	< 0.07	< 0.07	< 0.08				69[x]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Phenanthrene	0.38	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	0.023	< 0.013	< 0.015								
	Pyrene	1.48	< 0.014	0.018	0.014	< 0.015	0.036	< 0.014	< 0.015	0.036	< 0.013	< 0.015				(1,600)[#,x]	NA[2.1]	NA[2.2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [7,v] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [#,x] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table 83 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [3]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [4]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH116	BH116	BH116	BH117	BH117	BH117	HA116	HA116	HA116								
		Sample	BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm								
		Date	2/11/2020	2/11/2020	2/11/2020	9/11/2020	9/11/2020	9/11/2020	2/12/2020	2/12/2020	2/12/2020								
		Lab number	2467662.1/ 2471441.8	2467662.2/ 2471441.9	2467662.4/ 2471441.10	2470943.8/ 2471441.14	2470943.9/ 2471441.15	2470943.10/ 2471441.16	2468606.24/ 2487331.33	2468606.25/ 2487331.34	2468606.26/ 2487331.35								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																	
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 8	< 8	< 8	< 9	< 8	< 10	< 9	< 8	< 9				2,700[2.4]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[2.4]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	< 40	< 40	< 40	< 40	< 40	< 40	41	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	0.6	< 0.3	< 0.4	0.8	< 0.3	< 0.4	1.6	< 0.4	< 0.4								200
	1-Methylnaphthalene	0	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	2-Methylnaphthalene	0	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Acenaphthylene	0.065	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Acenaphthene	0.02	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Anthracene	0.123	0.019	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	0.018	< 0.013	< 0.014								
	Benzo[a]anthracene	0.74	0.056	< 0.013	< 0.014	0.048	< 0.013	< 0.016	0.114	< 0.013	< 0.014								
	Benzo[a]pyrene (BAP)	0.94	0.04	< 0.013	< 0.014	0.07	< 0.013	< 0.016	0.152	< 0.013	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	0.05	< 0.03	< 0.04	0.1	< 0.03	< 0.04	0.23	< 0.04	< 0.04								
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	0.05	< 0.03	< 0.04	0.1	< 0.03	< 0.04	0.22	< 0.04	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	0.044	< 0.013	< 0.014	0.079	< 0.013	< 0.016	0.177	< 0.013	< 0.014								
	Benzo[b]pyrene	0.65	0.03	< 0.013	< 0.014	0.047	< 0.013	< 0.016	0.11	< 0.013	< 0.014								
	Benzo[g,h,i]perylene	0.72	0.027	< 0.013	< 0.014	0.05	< 0.013	< 0.016	0.129	< 0.013	< 0.014								
	Benzo[k]fluoranthene	0.38	0.018	< 0.013	< 0.014	0.033	< 0.013	< 0.016	0.068	< 0.013	< 0.014								
	Chrysene	0.7	0.034	< 0.013	< 0.014	0.061	< 0.013	< 0.016	0.123	< 0.013	< 0.014								
	Dibenzo[a,h]anthracene	0.132	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	0.022	< 0.013	< 0.014								
	Fluoranthene	1.19	0.088	< 0.013	< 0.014	0.118	< 0.013	< 0.016	0.25	< 0.013	< 0.014								
	Fluorene	0.016	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Indeno(1,2,3-c,d)pyrene	0.68	0.026	< 0.013	< 0.014	0.05	< 0.013	< 0.016	0.122	< 0.013	< 0.014								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07				69[4]	NA[2.1]	NA[2.2]		
	Perylene	0.24	0.017	< 0.013	< 0.014	0.015	< 0.013	0.154	0.034	< 0.013	< 0.014								
	Phenanthrene	0.38	0.078	< 0.013	< 0.014	0.037	< 0.013	< 0.016	0.076	< 0.013	< 0.014								
	Pyrene	1.48	0.081	< 0.013	< 0.014	0.135	< 0.013	< 0.016	0.25	< 0.013	< 0.014	10	35	20	0.27[6]	25	NA[2.2]	2	
															(1,600)[4.4]	NA[2.1]	NA[2.2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedence of the adopted Class 4 WasteMINZ Monged Fill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**

[7,7A] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

[8, 8A] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) -values taken from Table 83 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) -values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) -values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) -values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) -values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) -values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) -values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

Soil Analytical Results Maximum Reported Concentrations of Asbestos in Soil

	Non HAIL Site		
Location	ENVR-HA04		
Sample	ENVR-HA04-0.0-0.1m 10-Nov-2020		
Date	10/11/2020		
Lab number	2470910.5/ 2471363.5		
Soil suite	Soil suite 3 + OCPs		
Semi-Quantitative Asbestos in Soils		**Units**	**BRANZ - Soil Guideline Values for Asbestos in Soil - Residential [1]**
Asbestos type	Chrysotile (White Asbestos) detected.		
Asbestos form	Loose fibres		
Asbestos as ACM	< 0.001	(w/w%)	0.01
Asbestos Fibres/Fine	< 0.001	(w/w%)	0.001

Notes

Shaded values exceed the corresponding guidelines.

ND - indicates asbestos not detected.

Guideline References

[1] - values taken from Table 5 of BRANZ: New Zealand Guidelines for Assessing and Managing Asbestos in Soil (2017). Residential criteria under the BRANZ guidelines *"Single dwelling site with garden and/or accessible soil. Also includes daycare centres, preschools, primary and secondary schools and rural residential."*

Groundwater Analytical Results Summary of Reported Concentrations of Dissolved Heavy Metals and TPH in Water

			HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site		
		Location	BH113	BH05A	BH05B	BH06	BH08	BH110	BH111	BH116	BH117		
		Sample	BH113	BH05A	BH05B	BH06	BH08	BH110	BH111	BH116	BH117		
		Date	27/11/2020	2/12/2020	27/11/2020	27/11/2020	27/11/2020	2/12/2020	27/11/2020	27/11/2020	2/12/2020		
		Lab number	2482688.8	2486837.7/ 2486837.8	2482688.4	2482688.5	2482688.6	2486837.3	2482688.7	2482688.9	2486837.5		
		Groundwater suite	Suite 2	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3		
		pH	6.3	7.5	6.4	4	6.8	8.1	5.5	6.2	6.8	ANZECC 2000 FW 80%[1]	ANZECC 2000 FW 95%[2]
Heavy Metals (Dissolved)	Dissolved Arsenic	**0.0016**	< 0.0010	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0016**	**0.14**	**0.013**
	Dissolved Cadmium	**0.00023**	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	**0.00023**	< 0.00005	**0.0008**	**0.0002**
	Dissolved Chromium	**0.0007**	< 0.0005	< 0.0005	< 0.0005	**0.0007**	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	**0.04**	**0.004**
	Dissolved Copper	**0.003**	0.0008	< 0.0005	0.0007	**0.003**	0.0006	0.0012	< 0.0005	0.0025	< 0.0005	**0.0025**	**0.0013**
	Dissolved Lead	**0.00052**	< 0.00010	< 0.00010	0.00011	**0.00052**	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	**0.0094**	**0.0044**
	Dissolved Mercury	**0**	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	**0.0054**	**0.0006**
	Dissolved Nickel	**0.072**	0.0025	0.0015	0.0014	**0.072***	0.0009	0.0012	0.0022	0.0099	0.0048	**0.017**	**0.07**
	Dissolved Zinc	**0.042**	0.0071	0.0026	0.022	**0.042***	0.0081	< 0.0010	0.0136	0.036*	0.022	**0.031**	**0.015**
Total Petroleum Hydrocarbons	C_7 - C_9	**0.14**	-	< 0.10	**0.14**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
	C_{10} - C_{14}	**0**	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		
	C_{15} - C_{36}	**0**	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4		
	Total hydrocarbons (C_7 - C_{36})	**0**	-	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7		

Notes

*Calculated water criteria exceeds solubility limit for pure compound in water.

- All units in g/m^3 except if specifically mentioned

- Shaded values exceed the corresponding guideline

- * Concentrations exceeds both criteria adopted.

- **BOLD values maximum reported concentrations (g/m3)**

Guidelines:

(1) - Criteria from Table 3.4.1 Trigger values for toxicants at alternative levels of protection in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines) for 80% freshwater species.

(2) - Criteria from Table 3.4.1 Trigger values for toxicants at alternative levels of protection in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines) for 95% freshwater species.

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	H. Berger	M. Ballard (SQEP)				
Rev 0	H. Berger	pp. M. Ballard (SQEP)			Digitally signed by Dragan Jovanovic Date: 2021.06.11 15:55:04 +12'00'	

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