REMEDIAL ACTION PLAN AND SITE MANAGEMENT PLAN PROPOSED RETIREMENT VILLAGE 578 SPRINGS ROAD, PREBBLETON

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REMEDIAL ACTION PLAN AND SITE MANAGEMENT PLAN
PROPOSED RETIREMENT VILLAGE
578 SPRINGS ROAD, PREBBLETON

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Copies to: Summerset Villages (Prebbleton) Ltd 1 electronic copy

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1.0 Introduction

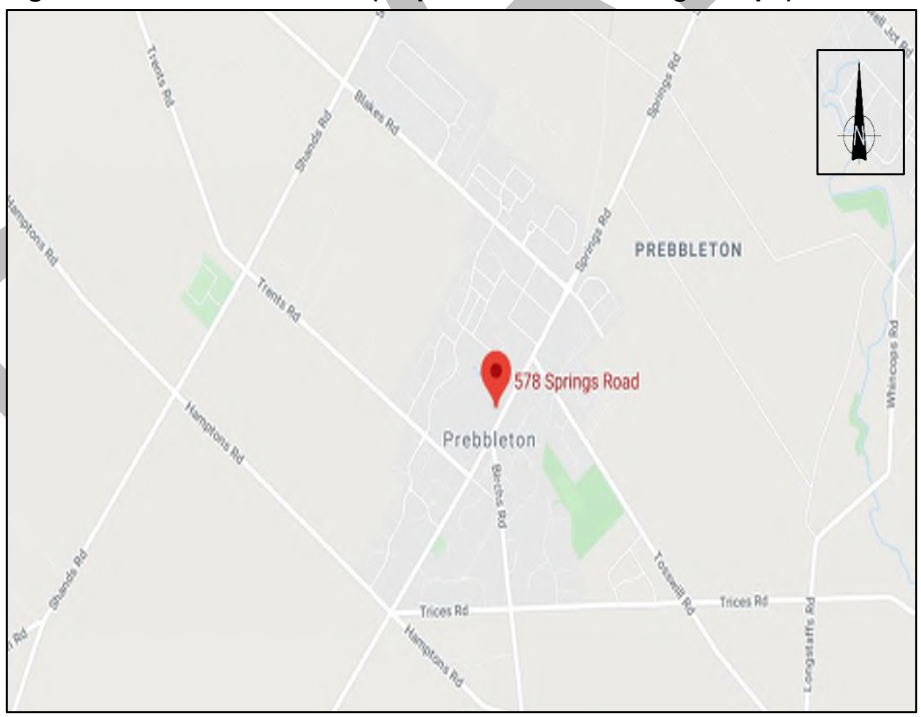
Riley Consultants Ltd (RILEY) has been engaged by Summerset Villages (Prebbleton) Ltd (Summerset) to prepare a Remedial Action Plan and Site Management Plan (RAP/SMP) for the remediation of the identified hot spots and management of soils at 578 Springs Road, Prebbleton (the site).

This RAP/SMP has been reviewed by suitably qualified and experienced practitioners in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS).

Appendix A of this report contains our combined Preliminary and Detailed Site Investigation (PSI/DSI) for 578 Springs Road (RILEY Ref: 190417-H), dated 20 July 2020. Further information regarding the history of the site, previous reports reviewed, site photographs, health risks, and consenting requirements are included within the RILEY PSI/DSI.

The location of the site is presented in Figure 1.

Figure 1: Site Location Plan (map sourced from Google Maps)



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1.1 Applicability

When using this RAP/SMP, the following aspects should be recognised:

- This document provides a framework for managing contamination hazards associated with soil contamination on the site and should be used in conjunction with earthworks, sediment and dust control procedures outlined within RILEY's Earthworks and Sediment Control Report (RILEY Ref: 190417-M), and with all relevant Selwyn District Council (SDC) resource and building consent conditions and requirements.
- It is the responsibility of the person conducting a business or undertaking (PCBU) to ensure that the procedures outlined in this document are implemented and followed when encountering known or potential soil contamination, including asbestos in soils.
- This RAP/SMP does not relieve contractors of their responsibilities under the Health and Safety at Work (HSW) Act 2015, the HSW (Asbestos) Regulations 2016, the HSW (General Risk and Workplace Management) Regulations 2016, and any subsequent amendments or revisions of these documents.
- A site-specific Contamination Health and Safety Plan (CHSP) will need to be developed by the PCBU to complement this RAP/SMP and to address other health and safety requirements applicable to their site works. Section 5.0 of this RAP/SMP provides further information regarding the CHSP.

1.2 Plan Review and Revision

The PCBU with management or control of the workplace must have a copy of this RAP/SMP and other health and safety documentation on site. The PCBU should ensure all contractors and sub-contractors are familiar with the RAP/SMP and related documents and procedures.

The PCBU should review this RAP/SMP and request that it be updated if:

- The earthworks plan and/or the design for the village has significantly changed.
- A review is requested by a worker representative under Regulation 14 of the HSW (Asbestos) Regulations 2016.

1.3 Resource Consent Requirements – Soil Contamination

Assessment of the analytical results against the adopted health protection criteria indicates that the earthworks associated with construction of the proposed village will require:

- A restricted discretionary activity consent under the NES-CS.
- Preparation of a draft RAP/SMP (i.e. this document).

Other regulatory requirements relevant to asbestos containing material (ACM) and asbestos in soils are noted in Sections 5.3 and 5.3.1 of this document.

2.0 Site Identification

2.1 Site Location and Description

The legal description of the site is Lot 1 DP 548161, with an associated area of 8.0113 ha. The site is located within an area designated by the Canterbury Map Viewer as 'Residential Zone'.

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The site is rectangular in shape and is located in Prebbleton to the west of Springs Road. It is situated within 7km of Hornby Town Centre and 16km from Christchurch City Centre.

The site currently features several commercial/industrial buildings on the northern half (approximately 1,000m^2) surrounded by various hardstand areas (concrete, gravel). The northern half of the site was previously used by Meadow Mushrooms as a mushroom growing/processing factory[1], and the southern grassed half as a horse training facility.

Residential properties are present immediately adjacent to the property, with lifestyle dwellings and agricultural land in close proximity.

2.2 Proposed Retirement Village

The proposal is for the construction and operation of a comprehensive care retirement village which comprises a two and three-storey central Main Building, including assisted living suites, memory care suites and care beds with a of approximately 4000m2. The Main Building is surrounded by 224 single-storey villas and cottages, several ancillary buildings, roads, car parks, rain-gardens and landscaping

3.0 Preliminary/Detailed Site Investigation Report Summary

Key findings of the historical review and soil testing regime, described in the above-mentioned PSI/DSI report were as follows:

- Assessment of the analytical results identified localised arsenic exceedances against relevant NES-CS soil contaminant standards for construction workers and site end users.
- Various heavy metals (mainly arsenic, zinc, chromium, lead, nickel and copper) exceeded published regional background levels. Localised TPH was also identified, as were trace levels of organochlorine pesticides (OCPs) and a trace poly-aromatic hydrocarbon (PAH) concentration.
- One sample identified asbestos in soil at a concentration exceeding the NZ Asbestos Guidelines. Further delineation of this area should be carried out prior to earthworks occurring.
- Demolition of buildings containing asbestos in the northern hard sealed area will require approval from WorkSafe NZ. Post-demolition soil validation testing for potential residual asbestos and lead will be required.

3.1 Implications

Three contamination hotspots were identified in the PSI/DSI:

- The discharge bunded area in the vicinity of HA11. One contaminant of concern (arsenic) exceeded the relevant NES-CS soil contaminant standards, for protection of intended site end-users and for outdoor workers. Arsenic was identified in surface soil (0.1m below ground level (bgl)) at a concentration of 201mg/kg, over four times the NES-CS soil contaminant standard for high-density residential land use (45mg/kg) and nearly three times over the soil contaminant standard for protection of outdoor workers (unpaved) (70mg/kg).

[1] Meadow Mushrooms is a large-scale producer of mushrooms for both domestic and international markets and have occupied the site since the early 1970's. The site has undergone several upgrading developments as the levels of production increased.

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- The boundary along the residential dwelling in the southern corner had two locations (S1 and S3) with a contaminant of concern (arsenic: 69mg/kg and 67mg/kg) that exceeded the NES-CS soil contaminant standard for intended site end-use (high density residential).
- Asbestos fibres (chrysotile form, 0.0016% w/w) were identified in one soil sample and is above the relevant human health criterion of 0.001% w/w.

Comparison of the analytical results against applicable regional background concentrations, relevant NES-CS soil contaminant standards, and the NZ Asbestos in Soil Guidelines[2] confirms that the site works associated with the construction of the proposed retirement village is considered to be a Restricted Discretionary Activity and will require consenting under the NES-CS.

4.0 Roles and Responsibilities

4.1 Site Controller

The Site Controller is a key member of the earthworks team. Prior to commencing any physical works on site, the Contractor shall nominate a Site Controller who shall be responsible for ensuring that all requirements of this RAP/SMP are complied with, in particular:

- Ensuring the procedures outlined in this RAP/SMP are implemented for all works involving soil disturbance.
- The timely securing of permissions and documentation to dispose of contaminated or unsuitable excavated materials to a suitably licensed off-site facility.
- Adherence to the First Responders Checklist described in Section 6.5.2 of this document.
- Compliance with all WorkSafe NZ requirements during demolition of the existing warehouse buildings in the northern portion of the site, and (if relevant) the residential dwelling in the south-eastern corner.
- Compliance with all resource consent conditions during site enabling, excavation, and reinstatement works.

4.2 Contaminated Land Specialist

A Contaminated Land Specialist (CLS) shall be engaged by the consent holder/site owner to provide advice as required during the earthworks (e.g. assessment of unexpected contamination).

The nominated CLS for this project will be a member of RILEY's Site Contamination Team.

4.3 Environmental Safety Officer

An Environmental Safety Officer (ESO) shall be appointed by the Contractor for the duration of the works to ensure that contaminated land related health and safety procedures are adhered to when soil disturbance occurs, alongside those required under the Contractor's Health and Safety Plan. The ESO shall have basic First Aid training.

[2] *BRANZ, November 2017 – New Zealand Guidelines for Assessing and Managing Asbestos in Soil.*

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The ESO shall ensure that all relevant personnel are familiar with the application and use of Personal Protective Equipment (PPE) and procedures specified in this RAP/SMP before commencement of site work.

The role of the ESO will be to ensure that workers are wearing the correct PPE and to respond to any new hazards that may arise.

4.4 Implementation

Responsibility for the implementation of the SMP/RAP lies with the Contractor and their sub-contractors. In the case of unexpected contamination, the Contractor shall notify SDC. Further information regarding first response is provided in Section 5.5.

A CLS will be required to carry out inspections and provide advice on an as-required basis, during the works.

4.5 Distribution

A copy of the RAP/SMP shall be kept on-site at all times. It is the Contractor's responsibility to distribute the RAP/SMP to any sub-contractors or parties carrying out the earthworks.

4.6 Review and Update

Statutory requirements, operating procedures, and/or site conditions may vary and may require that this plan be amended or updated.

Any variations to the RAP/SMP proposed by the Contractor shall be approved by the CLS prior to works commencing, or the variation shall be implemented if works have already commenced. If the changes are substantive, they will need to be approved by SDC prior to implementation.

5.0 Contamination Health and Safety Plan

A number of measures will need to be put in place to address site worker and public health and safety protection requirements. The Contractor is required to nominate a Site Controller to prepare a Contamination Health & Safety Plan (CHSP).

The purpose of the Contractor's CHSP is to:

- Provide and maintain a safe working environment.
- Document safety facilities and procedures.
- Identify and ensure awareness of potential hazards.
- Protect the health and safety of the general public.
- Describe emergency procedures.
- Meet WorkSafe requirements under the Health and Safety at Work Act 2015.

The CHSP should be specific to the potential presence of contaminated soils and asbestos, in addition to standard Site Safe (or equivalent) procedures.

The CHSP will need to consider items outlined in Sections 5.1 to 5.4 below, relevant to soil contamination risks. The CHSP will need to be reviewed by the appointed CLS prior to commencement of works to ensure these elements have been included or referenced.

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5.1 Identification of Hazards

The following potential hazards may be encountered during the proposed works:

- Dermal contact with, inhalation (via dust), or ingestion of heavy metal-contaminated soils.
- Exposure to asbestos through inhalation of asbestos containing dust (ACD) during earthworks.

There is always a risk of unspecified further hazards occurring during works. The Site Controller is responsible for communicating any new hazards (relevant to soil contamination) to the nominated CLS. The Site Controller should also liaise with the CLS as to whether the hazard can be eliminated, isolated, or minimised and the Site Controller will then instruct staff on the H&S procedures associated with the new hazard.

5.1.1 Contaminants of Potential Concern

The primary contaminants of potential concern identified at the site to date are as follows:

- **Asbestos:** Asbestos has previously been identified in a survey report[3] within the warehouse buildings in the northern half of the site and has also been detected in soil (S3) in the south-eastern corner of the site.
    - Health risks: "Asbestos is a proven carcinogen and cause of lung disease. People can be exposed to asbestos by breathing in tiny asbestos fibres in the air. Asbestos causes a number of lung diseases, including asbestosis – when lung issue becomes inflamed and scarred; and lung cancer and mesothelioma. The risk to health increases with the number of fibres you breathe in and how often you are exposed to these fibres. The fibres are released into the air when something disturbs them in soil, rock, or when building materials containing asbestos are disturbed because of building construction or demolition."[4]
- **Arsenic:** Localised surficial soils have been confirmed to contain elevated arsenic concentrations (maximum 201mg/kg, exceeding the NES-CS high-density residential soil contaminant standard for protection of human health).
    - Health risks: "Inorganic arsenic is a confirmed carcinogen and is the most significant chemical contaminant in drinking-water globally. Arsenic can also occur in an organic form. Inorganic arsenic compounds (such as those found in water) are highly toxic. Long-term exposure to inorganic arsenic, mainly through drinking-water and food, can lead to chronic arsenic poisoning. Skin lesions and skin cancer are the most characteristic effects."[5]

5.2 Health and Safety Requirements Prior to Remedial Work Commencing

Prior to works commencing, a number of structures and systems are required to be put in place to ensure the site is secure and that appropriate health and safety requirements can be met. These include:

- The earthworks area is to be secured to prevent unauthorised access. This may require security fencing.

[3] *Chemsafety, 16 December 2006: 578 Springs Road, Prebbleton – Asbestos Survey Report and Register*
[4] *Auckland Regional Public Health Service (ARPHS): https://www.arphs.health.nz/public-health-topics/healthy-environments/asbestos/*
[5] *World Health Organization Fact Sheet: https://www.who.int/news-room/fact-sheets/detail/arsenic*

- Signage for earthworks information, health and safety requirements, and reporting requirements shall be in place.
- Health and safety inductions for all site staff shall be carried out prior to works.
- Notification to WorkSafe of demolition and removal of asbestos-containing buildings must be provided in advance by a licensed asbestos removalist firm (refer Section 5.4.1), together with an Asbestos Removal Control Plan (ARCP). The ARCP will be provided to the CLS for review and input in advance.

5.3 Health and Safety Procedures During Remedial Works

As per Section 5.0, the appointed Contractor will prepare and adhere to a CHSP covering all relevant matters and it will be a component of the Contractor's overall Health and Safety Plan.

All workers will be inducted prior to being involved in the remedial works. The induction will describe the PPE requirements, outline the hazards of working with the particular contaminants, and provide the following key safety information:

- Wash facilities will be provided for hand washing before staff leave the remediation area or take breaks.
- The remediation area will either be smoke-free, or smoking will only be permitted within a designated smoking area in accordance with relevant health and safety requirements.
- Hand to mouth contact will be avoided within the remediation area (i.e. no eating, drinking, or smoking).
- In addition to standard health and safety requirements such as hard hat, visibility jacket, and steel capped boots, all workers will be required to wear the following PPE when required:
    - Waterproof (latex, vinyl or rubber) gloves
    - Disposable chemical resistant overalls (e.g. Tyvek)
    - P2/P3 half face masks (asbestos and dust protection)
- All persons working in the remediation area will have spare PPE available to them.

5.3.1 Asbestos Management Procedures

Due to the identified presence of multiple sources of ACM on site, a precautionary approach shall be taken by the Contractor with the following measures to be implemented:

- All demolition and removal works associated with the northern buildings and structures, and the dwelling to the south-east (if asbestos survey confirms presence of ACM here) must be carried out by a licensed asbestos removalist in accordance with the ARCP and all WorkSafe requirements.
- Post-removal of structures containing ACM and hard seal in the northern area, validation of soils within these areas will be undertaken by RILEY as per the RAP specified in Section 6.0 of this report.
- Remediation works within areas where asbestos has been identified must be supervised by the CLS[6].

[6] In accordance with the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil, Nov 2017, page 8: *"Asbestos-related work involving soil should be overseen by a person competent at managing asbestos in soil, i.e. a suitably qualified and experienced practitioner (SQEP).*

- Air monitoring for asbestos fibres shall be undertaken by the CLS, in conjunction with visual assessments of excavations and spoil.
- Soils are to be dampened down prior to excavation works taking place on site in designated asbestos remediation areas, and periodically throughout the course of earthworks. A water cart will be available at all times for this purpose.

5.4 Decontamination Procedures

Boots and non-disposable gloves will be washed with brushes in detergent water and rinsed with clean water in the worker decontamination zone. All workers are obligated to wash any non-disposable clothes that have come into direct contact with contaminated spoil before returning to work.

5.5 Emergency Procedures

The Contractor will provide a disposal drum for disposable overalls and gloves. Such drums will be disposed, together with the excavated contaminated soils or fill.

Boots and non-disposable gloves will be washed with brushes in detergent water and rinsed with clean water in the worker decontamination zone. All non-disposable overalls will be collected at the end of each workday and cleaned by a commercial laundromat.

5.6 Emergency Procedures

The following contact details should be used in an emergency:

- Emergency — Fire, Ambulance, Police
  Phone: **111**
- Nearest Hospital — Templeton Medical Centre
  5 Kirk Road, Templeton
  Christchurch, 8042
  Phone: **03-349 6716**
- WorkSafe New Zealand: **0800 030 040**
- Environment Canterbury pollution hotline: **0800 765 588**
- Selwyn District Council call centre: **0800 735 996**

5.6.1 Contingency Measures

In the event that unexpected contamination is identified during the works, the First Response Checklist procedures outlined in Section 5.6.2 shall be followed.

In the event of an uncontrolled discharge of potentially contaminated soil or water to the environment, the following notification process shall be used:

- Cease work in the area immediately and take all practical steps to contain and prevent further discharge.
- Update the site hazard board and prevent unnecessary access to the area.
- The Contractor shall notify SDC and the CLS.

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- A strategy to address the uncontrolled discharge is to be determined by the CLS in consultation with SDC and the Contractor. The agreed strategy shall then be implemented by the Contractor.
- All details of the discharge (volume, type, location) and procedures taken to remedy the situation are to be recorded and included within the validation report, to be submitted to all parties on the completion of works.

If there is any doubt as to whether a discharge of contaminants has occurred, the Contractor shall contact the CLS for further advice.

5.6.2 Unforeseen Contamination Procedures

It is possible, given the history of previous use of the site, that unforeseen contamination may be encountered. Visual and olfactory indicators of contamination could include the following:

- Odour (petroleum hydrocarbons, oil).
- Discoloured soil (black and green staining is most common).
- ACM (e.g. plasterboard, cement board, lagging).

The following is a first response checklist for the Contractor to follow should visual or olfactory evidence of contamination be encountered during the works on site, to ensure contamination is appropriately contained while decisions about its management or remediation are made.

First Response Checklist:	
Stop work in the immediate vicinity of the contamination discovery and isolate the area by taping, coning, or fencing off.	☐
Advise the Site Controller.	☐
Update the Site Hazard Board and prevent unnecessary access to the area by personnel.	☐
The Site Controller is to contact the CLS to inspect, sample, and advise of specific controls if appropriate.	☐
The Site Controller is to contact Selwyn District Council	☐

6.0 Remedial Action Plan

The remedial actions undertaken on site are required to be systematically and clearly recorded, to include any management or regulatory decisions made during or following the issuance of the RAP/SMP, including (but not necessarily limited to) dates, quantities, sampling, excavation, and off-site soil disposal locations. Such data and management or regulatory decisions made during the remedial process will be required for reporting at a later stage, as well as:

1. Environmental remediation of the site must be completed prior to other earthworks for the proposed retirement village to avoid mixing contaminated materials with clean materials.
2. SDC's environmental health officer and/or consent compliance monitoring officer shall be informed in writing at least five days prior to the start date of the works on site.
3. An appropriately experienced CLS, familiar with the contents of this report and previous investigations for the works, will be engaged to monitor the earthworks when required.

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4. All remedial work and validation sampling shall be carried out in accordance with this RAP and all relevant NES-CS consent conditions.
5. Within three months from completion of the retirement village, a Site Validation Report (SVR) shall be completed and provided to SDC, as outlined in Section 8.0.

6.1 Remediation

Remediation of the site will be staged. Prior to removing contaminated soil from site, approval from a suitably licensed off-site facility operator must be obtained.

The remediation programme is to be followed for the three identified areas of concern, being:

- Area 1 located in the vicinity of the discharge bunded area (HA11).
- Area 2 located in the south-eastern corner in the vicinity of the residential dwelling (S1).
- Area 3 located in the south-eastern corner in the vicinity of the residential dwelling (S3).

Please refer to RILEY Dwg: 190417-53, Appendix C for approximate locations.

Before remedial works can be undertaken, all three areas will need to be delineated. The outcomes of these delineation exercises will inform the extent of remediation required.

6.1.1 Area 1 Delineation and Removal (Pre-demolition)

The following outlines the delineation process for Area 1 prior to demolition of the northern warehouses:

- Validation sampling for arsenic will be carried out by the nominated CLS.
- The sampling regime will include:
    - Collecting samples along the residential boundary in 0.5m increments.
    - Collecting samples away from the residential boundary in 0.5m increments.
- If arsenic samples fail the validation process, the Contractor will strip the affected surficial 150mm of topsoil. The extent will be defined as per the delineation outcomes. Excavated material will be safely placed into covered trucks for transfer to a suitably licensed off-site facility.
- It will be necessary to retain all tracking information for soil disposal (i.e. landfill receipts for each truckload) so that appropriate disposal methods can be confirmed in the SVR.

6.1.2 Area 2 Delineation and Removal (Pre-Demolition)

The following outlines the delineation process for Area 2, prior to demolition of the residential dwelling:

- Validation sampling for arsenic will be carried out by the nominated CLS.
- The sampling regime will include:
    - Collecting samples along the residential boundary in 0.5m increments.
    - Collecting samples away from the residential boundary in 0.5m increments.

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- If arsenic samples fail the validation process, the Contractor will strip the affected surficial 150mm of topsoil. The extent will be defined as per the delineation outcomes. Excavated material will be safely placed into covered trucks for transfer to a suitably licensed off-site facility.
- It will be necessary to retain all tracking information for soil disposal (i.e. landfill receipts for each truckload) so that appropriate disposal methods can be confirmed in the SVR.

6.1.3 Area 3 Delineation and Removal (Pre-Demolition)

The following outlines the delineation process for Area 3, prior to demolition of the residential dwelling:

- Validation sampling for arsenic and asbestos will be carried out by the nominated CLS.
- The sampling regime will include:
    - Collecting samples along the residential boundary in 0.5m increments.
    - Collecting samples away from the residential boundary in 0.5m increments.
- If asbestos and/or arsenic samples fail the validation process, the Contractor will strip the surficial 150mm of topsoil. The extent will be defined as per the delineation outcomes. Excavated material will be safely placed into covered trucks for transfer to a suitably licensed off-site facility.
- It will be necessary to retain all tracking information for soil disposal (i.e. landfill receipts for each truckload) so that appropriate disposal methods can be confirmed in the SVR.

Note: If the asbestos survey for the south-eastern dwelling identifies ACM present within or on the dwelling, a licensed asbestos removalist firm will need to prepare an ARCP specific to this dwelling, and address WorkSafe legislative requirements with respect to asbestos. In this event, the CLS should be provided with the ARCP prior to its implementation. A soil sampling validation round will be carried out post-demolition to ensure no residual asbestos remains on site.

6.2 Northern Remediation (Post-Demolition)

The following remediation programme is to be followed post-demolition of northern warehouses and after removal of hard seal:

- Post-demolition of northern warehouses and removal of hard seal, surficial validation sampling for asbestos and lead will be carried out by RILEY within the footprint, side walls, and adjacent areas of exposed soil. The number of samples taken will be defined and implemented by the CLS.
- If validation samples confirm no asbestos exceeding NZ Asbestos in Soil Guidelines, and lead concentrations meet relevant NES-CS soil contaminant standards, then no further remediation of this area will be required.
- If samples fail health protection validation criteria as set by the CLS; the areas of failure are to be removed to a suitable off-site facility.
- Soils are to be dampened down prior to excavation works taking place on site in designated asbestos remediation areas, and periodically throughout the course of earthworks. A water cart will be available at all times for this purpose.

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- Where necessary, air monitoring for asbestos fibres shall be undertaken by the CLS, in conjunction with visual assessments of excavations and spoil.
- It will be necessary to retain all tracking information for soil disposal (i.e. landfill receipts for each truckload) so that appropriate disposal methods can be confirmed in the SVR.

6.3 Imported Fill Material

Receipts for every truckload of imported soil fill material will be kept so that the material source can be confirmed in the SVR. It would also be prudent to keep receipts for quarry-sourced hardfill as well.

Depending on the soil/fill material source, it may be necessary to carry out environmental laboratory testing to confirm the suitability of the material. Testing will be carried out in accordance with cleanfill criteria, as outlined in the Ministry for the Environment (MfE) Guide for Managing Cleanfills (2002), and evidence in the form of laboratory certificates will be provided to SDC as part of site validation requirements (Section 8.0).

6.4 Stockpiling

Stockpiling of soils from the site intended for off-site disposal shall be avoided where possible. Excavation and cartage from site will be limited to reduce the likelihood of stockpiling excessive amounts of material on any given day.

If conditions change, resulting in the need for soils intended for off-site disposal to be temporarily kept on site prior to cartage, the materials are to be stored in such a manner that discharges and runoff from these materials are contained or managed.

6.5 Unexpected Contaminated Material

During earthworks, regular visual checks will be made for unexpected, contaminated material by the ESO. Should hazardous material be encountered during site works, all works in the area will cease until inspected by the CLS. These areas will be assessed and investigated in accordance with national standards and local statutory requirements.

7.0 Mitigation of Potential Environmental Effects

Several environmental protection measures will be put in place within the areas requiring remedial work, to mitigate potential environmental effects from contaminated soils for the proposed earthworks.

7.1 Stormwater, Sediment, and Dust Control

Any temporary stockpiles of contaminated soil or hazardous materials will be covered with an impervious cover when not in operation. At all times, the consent holder will control any dust emissions in accordance with the MfE's Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions, 2001.

All earthworks on site shall be carried out in accordance with RILEY's Earthworks and Sediment Control Plan (RILEY Ref. 190417-M).

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7.2 Odour Control

If odours of any description are noted in soil or surface water, all work will cease until the CLS has assessed the potential risks from the odours and advised on H&S requirements.

RILEY notes that Environment Canterbury (ECan) may have additional resource consenting requirements relating to sediment and earthworks controls. This contaminated land RAP/SMP does not include provisions related to any such ECan requirements.

8.0 Site Validation Report

A SVR will be prepared after completion of the site works in accordance with MfE Contaminated Land Management Guide (CLMG) #1 and #5[7].

The SVR for the site will document the following:

- Confirmation that earthworks were carried out in accordance with the RAP/SMP, or details of any changes to the approved methodologies.
- Volumes of soil removed from site and waste disposal receipts.
- Delineation and soil validation results.
- Results from laboratory testing for any soil/fill materials imported to site.
- Relevant correspondence and site visit notes from SDC, ECan and/or WorkSafe NZ, if available.

9.0 Limitation

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

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

The recommendations and remediation options expressed are based on data from limited test positions. The nature and continuity of subsoil conditions away from the positions are inferred, and it must be appreciated that actual conditions could vary from the assumed model.

Furthermore, there is no investigation which is thorough enough to preclude the presence of materials at the site which presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable may, in the future, become subject to different regulatory standards which cause them to become unacceptable and require further remediation for this site to be suitable for the existing or proposed land use activities.

DRAFT

[7] *Ministry for the Environment, 2011: Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils.*

APPENDIX A

Preliminary and Detailed Site Investigation
RILEY Ref: 190417-H

RILEY CONSULTANTS

PRELIMINARY AND DETAILED SITE INVESTIGATION CONTAMINATED LAND PROPOSED RETIREMENT VILLAGE 578 SPRINGS ROAD, PREBBLETON

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PRELIMINARY AND DETAILED SITE INVESTIGATION
CONTAMINATED LAND
PROPOSED RETIREMENT VILLAGE
578 SPRINGS ROAD, PREBBLETON

Report prepared for: Summerset Villages (Prebbleton) Ltd

Report prepared by: Cherise Martin, Environmental Geologist



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Report reviewed by: Marcus Herrmann, Principal – Contaminated Land



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Approved for issue by: Rob Burden, Technical Director



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Report reference: 190417-H

Date: 22 September 2020

Copies to: Summerset Villages (Prebbleton) Ltd 1electronic copy

Riley Consultants Ltd 1 copy

Issue:	Details:	Date:
1.0	Preliminary and Detailed Site Investigation	20 July 2020
2.0	Preliminary and Detailed Site Investigation	22 September 2020

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PRELIMINARY AND DETAILED SITE INVESTIGATION CONTAMINATED LAND PROPOSED RETIREMENT VILLAGE 578 SPRINGS ROAD, PREBBLETON

1.0 Introduction

Riley Consultants Ltd (RILEY) has been engaged to provide ground contamination input for the above site at the request of Summerset Villages (Prebbleton) Ltd (Summerset).

The following Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) report describes the findings from a desktop assessment of available information relating to ground contamination and an intrusive soil sampling investigation at 578 Springs Road, Prebbleton (the site).

This document is to support the resource consent application to Selwyn District Council (Council) under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, or NES-CS.

This report has been developed in general accordance with the Ministry for the Environment's Contaminated Land Management Guidelines No.1 and No. 5. It has been reviewed by suitably qualified and experienced practitioners in contaminated land as required by the NES-CS.

2.0 Site Description

2.1 Site Location

The location of the site is presented in Figure 1.

Figure 1: Site Location Plan (map sourced from Google Maps)



The legal description of the site is Lot 1 DP 548161, with an associated area of 9.1154 ha. The site is located within an area designated by the Canterbury Map Viewer as 'Residential Zone'.

2.2 Site Description and Background

The site is rectangular in shape and is located in Prebbleton to the west of Springs Road. It is situated within 7km of Hornby Town Centre and 16km from Christchurch City Centre.

The site features several commercial/industrial buildings on the northern half (approximately 1,000m^2) surrounded by various hardstand areas (concrete, gravel). The northern half of the site was previously used by Meadow Mushrooms as a mushroom growing/processing factory[1], and the southern half as a horse training facility. RILEY understands that historically wastewater from the processing plant was pumped to boulder pits on the southern half of the site.

Residential properties are present immediately adjacent to the property, with lifestyle dwellings and agricultural land in close proximity.

2.3 Proposed Retirement Village

The proposal is for the construction and operation of a comprehensive care retirement village which comprises a two and three-storey central Main Building, including assisted living suites, memory care suites and care beds with a of approximately 4000m2. The Main Building is surrounded by 224 single-storey villas and cottages, several ancillary buildings, roads, car parks, rain-gardens and landscaping.

2.4 Geology and Hydrogeology

The published geological map of the area (Geology of Christchurch area, GNS, 1:250,000 geological maps) indicates that the site is underlain by Springston Formation river alluvium beneath plains or low-level terraces (Q1a).

Logs from previous RILEY investigations indicate ground conditions likely to comprise 0.2m to 0.3m of topsoil and fill, underlain by sandy silt or silty sand, further underlain by gravel which extends to greater than 100m depth. The depth to gravel is highly variable in the area ranging from 0.7m to 6.0m depth, and it appears depth to gravel increases to the north and east of the site.

Based on Environment Canterbury (ECan) borehole data and groundwater contours, groundwater is anticipated to be present 5m to 6m below ground level (bgl), with some seasonal variation expected. This was confirmed by monitoring groundwater levels via two piezometers installed by RILEY. Groundwater was measured at 6.1m and 6.2m bgl after a week of heavy rain on 3 July 2020.

3.0 Previous Investigations and Reports

For the preparation of this report we have reviewed the findings and recommendations presented in the following reports and publications:

- Aqualinc, September 2004: Preliminary Assessment of Potential Contamination Issues at the Meadow Mushrooms Ltd, Prebbleton Site.
- Tonkin and Taylor, March 2012: Desk-based Ground Contamination Assessment - Proposed Plan Change 21, Prebbleton (for Selwyn District Council).

[1] *Meadow Mushrooms is a large-scale producer of mushrooms for both domestic and international markets and have occupied the site since the early 1970's. The site has undergone several upgrading developments as the levels of production increased.*

- Chemsafety, November 2016: 578 Springs Road, Prebbleton Asbestos Survey Report and Register
- RILEY Consultants, September 2019: Due Diligence, Rapid Assessment.

3.1 Aqualinc Report

The Aqualinc report is a preliminary desktop assessment for the site undertaken in September 2004.

Key findings of the report are summarised below:

- A number of chemicals used on site for the production of mushrooms were identified.
- No persistent pesticides were confirmed to have been used on site.
- Light fuel oil and diesel has been stored on the site in various locations.
- Up until 1984 all surface water runoff was pumped to the southern half of the site.

3.2 Tonkin and Taylor Report

The Tonkin and Taylor report is a PSI of the site as well as five additional sites, undertaken in March 2012.

Key findings of the report are summarised below:

- Hazardous Activities and Industries List (HAIL) activities have historically occurred and were currently occurring on-site at the time of the investigation.
- The potential for ground contamination was identified at the site. Sources, types of contamination and likely locations are summarised below:
    - Pesticide and timber treatment chemicals likely to be beneath and around historical boulder soakage pits.
    - Pesticides and heavy metals within surficial soils around cropping areas.
    - Propiconazole likely in surficial soils under cracked pavement from the mushroom processing plant.
    - Hydrocarbons, pesticides and heavy metals from the use of storage tanks and drum storage for fuel, chemicals, and liquid waste.
    - Heavy metals as a result of disposing wastewater to land from the mushroom processing plant.
    - Heavy metals from painted dwellings and vegetable gardens on site, particularly lead and arsenic.

3.3 Chemsafety Report

A Chemsafety asbestos survey report[2] was carried out in November 2016, involving an inspection of the buildings on site for asbestos containing building materials (ACM).

[2] *Chemsafety, 16 December 2006: 578 Springs Road, Prebbleton - Asbestos Survey Report and Register*

Eighteen locations were confirmed to have ACM present: These included ACM observed within cement boards in gabble ends, exterior cladding, soffits, interior walls, ceilings, and wall panels. Five other locations were presumed to have ACM present. Due to operations and accessibility some areas were not tested or inspected.

3.4 RILEY 2019 Due Diligence Investigation

RILEY undertook a due diligence intrusive investigation at the site on 30 October 2019 and 1 November 2019.

The objective of this investigation was to assess the potential for current and historic on-site activities to have resulted in ground contamination at the site, and to identify contamination types and concentrations in soils at the site. Due to operations at the site and limited timeframes, the central-northern hardsealed area was inaccessible. The south-east corner of the site was occupied by Hunter Civil at the time of investigation and RILEY were also unable access this area at the time.

Twenty hand augers were drilled across the site to variable depths (maximum 2.3m bgl) and a total of 33 soil samples were collected and tested for heavy metals/metalloids. Certain areas were also tested for organochlorine pesticides (OCP) and polycyclic aromatic hydrocarbons (PAH).

With the exception of one hotspot, results from accessible site areas identified soil contamination at managed fill levels i.e. above regional background levels but within relevant health and environmental protection criteria.

The results from this investigation have been included in this report to complement RILEY's Detailed Site Investigation (Section 5.0).

4.0 Preliminary Site Investigation

As part of the investigation, a PSI was undertaken to identify the potential risk of soil contamination relating to past and current activities carried out on-site. The PSI was carried out in accordance with MfE's CLMG #1.

The PSI includes the following:

- A review of historical aerial photographs.
- Obtaining and reviewing Council property files
- Obtaining and reviewing Council site contamination enquiries.
- A site walkover to identify and visually inspect any potential contamination risk areas and existing HAIL activities.

4.1 Historic Aerial Photograph Review

A historic aerial photograph review dated 1942 to 2019 (Appendix A) is presented in Table 1.

Table 1: Review of Available Historic Photographs

Date	Site Description	Adjacent Properties
1942	The site is bounded by Springs Road to the east and a residential property to the west. The site is vacant and appears to be used for agricultural purposes.	The majority of the surrounding properties appear to be used for agricultural purposes with minor scattered residential properties.
1950	There are no significant changes observed.	Minor increase in residential properties beyond Springs Road to the east and north of the site.
1964	Two small sheds are observed along the north-western boundary of the site.	Minor increase in residential properties to the north of the site.
1973	The two sheds have been removed. Two large square warehouses occupy the north-eastern portion of the site, one long rectangular building conjoined to a smaller building occupies the north central portion and two long sheds occupy the north-western portion of the site.	Increase in residential properties to the north of the site.
1974	Three additional long sheds have been added to the north-western portion of the site.	There are no significant changes observed.
1984	All five long sheds in the north-western portion of the site have been removed. A large rectangular warehouse has been added to the central northern area, alongside the long rectangular building described in the 1973 photograph. One square pond is observed in the north-western corner. A car park entered from Springs Road is seen along the western boundary of the site. A new dwelling and small shed are seen in the south-western corner. The southern half of the site appears to have been earth worked.	Increase in residential properties surrounding the site.
1994	The resolution of the photograph is not clear; however, a small pond has been added alongside the square pond in the north-western corner. The southern portion is separated by bunds.	Minor increase in residential properties surrounding the site.
2000	The resolution of the photograph is not clear, however majority of the southern half of the site appears to be covered in grass, except for the central southern portion.	Increase in residential properties surrounding the site.
2004	The southern half of the site is grassed. Majority of the bunds described in the 1994 photograph have been removed with a bund remaining separating the site (north and south). An additional bund is seen north of the warehouse buildings.	
2008	The southern half is separated by bunds.	
2010 - 2019	There are no significant changes observed.	There are no significant changes observed.

4.2 Selwyn District Council File Searches

4.2.1 Site Contamination Enquiries

RILEY contacted the Records Team within Selwyn District Council (SDC) on 30 June 2020 to enquire whether the site was included on SDC's potentially contaminated sites list. The site was listed on this register (refer to Appendix B).

The activities were identified in 2002 and 2014 by SDC and the activities were listed as:

- A17 - Storage tanks or drums for fuel, chemicals, or liquid waste
- G5 - Waste disposal to land
- A14 - Pharmaceutical manufacture
- Notes - Possible pentachlorophenol (PCP) contaminated soil

4.2.2 Property File Review

The property files for the site were received from SDC on 1 July 2020. Documents in the file dated from 1970 to 2018 were reviewed. Majority of the files were related to erections, alteration, and additions to new and existing buildings. The documents reviewed are summarised below:

- 15 October 1970 – The first building permit was issued to erect a staff and packing room.
- 24 November – 5 December 1978 – Building permits were issued to erect a packing shed, compost shed, growing sheds, peat and chalk shed, multiple chimney stacks, fire wall, temporary boiler.
- 18 September 1979 - Installation of a fuel storage tank.
- 19 November 1979 – 31 August 1983 – Building permits were issued to erect offices, storage shed, toilet block, 21 porchways, a dwelling, a garage, equipment shed, and a tray repair shed.
- 18 February 1992 – Extension to a septic tank.
- 16 July 1997 – Building consent for a sewer connection.
- 11 May 1998 – Building consent for a solid fuel heater.
- 17 November 1999 – 18 June 2012 Multiple extensions, and alterations to existing buildings and sheds.
- 1 November 2018 – Resource consent for a new terminal wastewater pump station.

4.4 Interviews and Site Walkover

While on site Leov William Laugesen and Colin Ladbrook were interviewed. Leov is Meadow Mushrooms' Engineering Coordinator and has been for almost 18 years, while Colin is the Production Team Leader.

The discussions on-site are summarised below:

- The site was operated by Meadow Mushrooms as a mushroom growing facility and has been so since the early 1970's.

- Growing mushrooms involves three general processes:
    - The first process is preparing the compost. This includes mixing wheat straw, chicken manure, gypsum and water.
    - The second process is inoculating the prepared compost with mushroom mycelium (spawning)
    - The final process involves covering the colonised compost with a casing layer which allows the mushroom growing phase to commence. Each crop produces a series of batches (flushes) until production drops and then the cycle is repeated. When the batches are at the end of their production, the product is cooked (on-site) to kill spores and is used as compost off-site.
- The first two phases are undertaken on site while the final growing phase occurs at an off-site location. These are collected and dropped off by trucks. A truck wash is present near the peat and lime storage facility.
- On a weekly basis all hard seal and concreated areas are washed off and all run off is collected into a tank. The wastewater is then pumped from the tank into the square settling pond which is lined with rubber. The wastewater is then pumped from the pond into the town sewer. This was estimated to be approximately 30,000L per week.
- Historically wastewater was pumped into boulder pits. The specific locations of the boulder pits are unknown; however these are believed to be located within the southern half of site.

A site walkover was carried out by a RILEY Environmental Geologist on 30 October 2019 and 15 June 2020. (refer to Appendix C for site photographs and RILEY Dwg: 190417-51 in Appendix G for site layout and key site observations).

The following observations were made:

- The northern half of the site was mostly sealed with concrete and loose hard seal (gravel).
    - Cracked concrete was noted on the washdown area, but no significant staining was observed. (Photo 1).
    - Various warehouse and rooms were utilised for the different stages of mushroom growing. Some facilities included steam rooms, pasteurising units, grow rooms and spawn chillers.
    - ACM was noted on exterior cladding on the front office building (Photo 2).
    - Lime and peat storage facilities are located in the western corner of the site. Stockpiles of lime and peat were observed on cracked concrete pads. (Photo 3)
    - Historical above ground storage tanks (ASTs) and current ASTs were noted, refer to RILEY Dwg: 190417-51 (Photo 4-6)
    - An engineering workshop was noted on site, where lubricants, petrol, diesel, and a below ground drip tank was observed. Minor staining was noted on the concrete pad (Photo 7-8). Works included fixing machinery, welding and general metal works.
    - A small chemical storage/pump room was located on-site. Chemicals on-site at the time of inspection included: Sodium Hydrochlorite, HC Foam Clean 210, and HC Protect 801Q (Photo 9).
    - A small boiler room (two boilers) was located on the northern half of the site (Photo 10).

- Two settling ponds in the north-western corner. The most western pond has been decommissioned for approximately 10 years (Photo 11).
- A wrapped ACM pipe was noted in the November 2019 investigation from the renovation on the Hunter Civil site in the south-east corner of the site near the residential building.

- The southern half of the site was mostly grassed with bunds separating paddocks (Photo 12-14). A residential property occupies the south-eastern corner.

4.5 Hazardous Activities and Industries List Activities On-site

The aerial photographs, Council files, and the site walkover indicate the following activities listed on the HAIL have occurred on-site. Table 2 outlines the potential sources and likelihood of contaminants.

4.5.1 Potential Contamination Sources

Table 2: Potential Contamination Sources

Activity	Potential contaminants	Likelihood of contamination	HAIL reference
Agrichemicals for storing or washing	• Heavy metals • Organochlorine pesticides (OCPs)	Likely to occur across areas where washing down has occurred and historical boulder soakage pits.	A1: Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical applications
Compost manufacture	• Heavy metals • OCPs	Likely to occur across areas where washing down has occurred, historical boulder soakage pits and areas where trays have been stored.	A6: Fertiliser manufacture or bulk storage
AST	• Heavy metals • Total petroleum hydrocarbons (TPH) • Polycyclic aromatic hydrocarbons (PAH)	Likely to occur in the vicinity of the AST's, engineering works shop drip tray and the chemical storage room.	A17: Storage tanks or drums for fuel, chemicals or liquid waste
Trays that were historically treated	• Heavy metals • Pentachlorophenol (PCP)	Likely to occur across areas where washing down has occurred, historical boulder soakage pits and areas where trays have been stored.	A18: Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside.

Activity	Potential contaminants	Likelihood of contamination	HAIL reference
Engineering workshop	• Heavy metals • Total petroleum hydrocarbons (TPH) • Polycyclic aromatic hydrocarbons (PAH)	Likely to occur in close proximity to the engineering workshop.	D5: Engineering workshops with metal fabrication
Lime and Peat storage	• Calcium hydroxide[3], alkalis. • Heavy metals (boron and arsenic)	Likely to occur across areas where washing down has occurred and historical boulder soakage pits.	E3: Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process.
Wastewater	• Heavy metals • PCP • OCPs	Likely to occur across areas where washing down has occurred and historical boulder soakage pits.	G5: Waste disposal to land (excluding where biosolids have been used as soil conditioners).
ACM within building structures	• ACM • Heavy metals (particularly arsenic and lead)	Likely to occur in surficial soils along the northern half and the south-eastern corner of the site.	I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.
Uncertified fill	• ACM • Heavy metals • PAH	Likely to occur in surficial soils along the northern half of the site	I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

4.6 Preliminary Site Investigation Conclusions

As HAIL activities have been confirmed to have historically and currently occurred on-site, a detailed site investigation (DSI) was deemed to be required to quantify the risks from potential soil contamination on site to construction workers and site end-users, as well as to assess the consent activity status of the proposed ground disturbance associated with the establishment of a retirement village.

5.0 Detailed Site Investigation

The intrusive field investigations were undertaken in two stages. 30 October - 1 November 2019 and 15 June to 19 June 2020[4].

A total of 24 machine boreholes (EH 201- EH 224), 23 hand augers (HA1 -HA20 and HA207-HA208), and four test pits (TP 208 – TP 211) were advanced. An additional five surficial samples were collected around building boundaries. Samples were collected in order to assess on-site soil quality and are shown on RILEY Dwg: 190417-52 (Appendix G). All logs from the site investigation are included in Appendix D

5.1 Soil Sampling Procedures

Soil sampling was undertaken in general accordance with the requirements of the NES-CS and the MfE CLMG No. 5[5]. Soil samples for chemical testing were collected according to the following procedure:

- Samples were collected from the boreholes near surface and within changes of lithology to a depth of at least 1.bgl.
- Samples were collected from the test pits within the bunded material at various depths above natural soils to a depth of at least 2.0m bgl.
- All surficial samples were collected, using a trowel.
- The materials encountered were logged in general accordance with the New Zealand Geotechnical Society Guidelines for the classification and field description of soils and rocks for engineering purposes and any obvious indications of contamination (e.g. odours or staining).
- Freshly gloved hands were used to collect soil samples from the recovered core and trowel. All samples were placed immediately into laboratory-supplied sample containers and stored in iced chilly-bins.
- Any equipment used to collect the samples was decontaminated between locations using clean water and Decon 90 (a phosphate-free detergent).
- Samples were shipped in chilled containers to IANZ-accredited Eurofins Laboratories under chain of custody documentation.
- A total of 147 soil samples were collected from 52 locations. Samples were selected to provide general coverage of the site and targeting various HAIL activities identified in the Preliminary Site Investigation.

[4] The first investigation was part of a due diligence assessment; the second investigation targeted areas previously inaccessible.
[5] Ministry for the Environment, 2011: Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils.

5.2 Observations

In general, the site can be divided into two areas:

1. The developed hard sealed area which generally covers most of the northern half of the site.
2. The undeveloped and unsealed area, which predominantly covers the southern half of the site, as well as a thin strip along the entirety of the north-eastern boundary.

1. Developed Hard-Sealed Area

Twenty-four machine boreholes were drilled within the hard-sealed area of the site in the June 2020 investigation. Concrete/Hard fill was observed to be up to 0.3m thick. Fill was observed underlying concrete/hardfill in 19 locations. Petroleum hydrocarbon and/or organic odours were noted in EH203, EH209, EH211, EH212, EH216 - EH218 and EH220. Black residue staining was noted in EH202 and EH206.

Table 3 describes the primary geological units based on field observations within the hard-sealed area.

Table 3: Summary of Primary Geologic Units

Unit	Generalised NZGS Description	Depth (m)
Concrete/ Hardfill	SILT with some organics; dark brown; loose to medium dense; dry. Organics, rootlets.	Range 0.0 – 0.3
Fill	Varied between locations: Sandy GRAVEL; grey; moist. Gravel, fine to coarse; subangular to rounded. Some visual and olfactory contamination noted in some. Gravelly SILT with some sand; dark greyish brown. Dense to very dense; moist. Gravel, fine to coarse; subangular to rounded. Some visual and olfactory contamination noted in some.	Range 0.11 – 0.8
Silt	Sandy SILT; light orangey brown with grey mottling; loose to dense; dry to moist. Sand, fine.	Range 0.25 – 1.7
Gravel	Sandy GRAVEL with some cobbles; grey; dense to very dense; moist. Gravel, fine to coarse; subangular to rounded; sandstone. Sand, fine to coarse. Cobbles, rounded.	Range 1.2 – Unknown

2. Undeveloped and Unsealed Area

Twenty hand augers were advanced on 30 October and 1 November 2019 and an additional three hand augers were advanced on 19 June 2020 within the undeveloped area. At all locations within the undeveloped area, topsoil was encountered to a maximum depth of 0.7m. Underlying the topsoil was the Springston Formation which consisted of interbedded silts and sands with deeper gravels. Gravels were encountered between 1.0m and 2.0m bgl and some hand augers did not encounter gravel at all.

No visual or olfactory evidence of contamination was noted.

Table 4 describes the primary geological units based on field observations within the undeveloped area.

Table 4: Summary of Primary Geologic Units

Unit	Generalised NZGS Description	Depth (m)
Topsoil	SILT with some organics; dark brown; loose to medium dense; dry. Organics, rootlets.	Range 0.0 – 0.7
Silt	Sandy SILT; light orangey brown with grey mottling; loose to dense; dry to moist. Sand, fine.	Range 0.1 – 2
Gravel	Sandy GRAVEL with some cobbles; grey; dense to very dense; moist. Gravel, fine to coarse; subangular to rounded; sandstone. Sand, fine to coarse. Cobbles, rounded.	Range 1.0 – Unknown

Three test pits were advanced within the southern half of the site in the bunded material, and one test pit was advanced adjacent to the decommissioned settling pond in the June 2020 investigation. Material observed appeared to be re-worked Springston Formation. An additional four surficial samples were collected in June 2020 around the dwelling in the southern corner, and one surficial sample was collected in the October 2019 investigation along the office block in the north-eastern portion of the site.

6.0 Laboratory Testing and Acceptance Criteria

A total of 33 soil samples were collected and couriered to IANZ accredited Analytica Laboratory for testing 30 and 31 October 2019. Table 5 summarises the testing regime for 2019:

Table 5: 2019 Testing Regime

Southern grassed portion of the site	HA1 1.8: Heavy metals, OCPs HA2 0.1: OCPs HA2 1.0: Heavy metals, OCPs HA2 1.7: Heavy metals HA3 0.2: OCPs HA3 0.7: Heavy metals, OCPs, PAH HA3 1.5: Heavy metals, OCPs HA4 0.3: Heavy metals, OCPs, PAH HA4 0.7: Heavy metals, OCP's HA5 0.1: Heavy metals HA5 0.6: Heavy metals, OCPs, PAH HA6 0.6: Heavy metals, OCPs, PAH HA6 1.0: Heavy metals, OCPs HA6 1.2: Heavy metals, OCPs, PAH HA7 0.6: PAH HA7 1.55: Heavy metals, OCPs HA8 0.7: Heavy metals, OCPs HA9 0.1: Heavy metals HA9 0.6: Heavy metals, OCPs, PAH HA10 0.4: Heavy metals, PAH HA10 0.8: Heavy metals, OCPs HA11 0.1: Heavy metals, OCPs HA11 0.5: Heavy metals, OCPs HA12 0.6: Heavy metals, PAH HA12 1.1: Heavy metals, PAH HA13 0.1: Heavy metals
Northern grassed portion of the site	HA14 0.6: Heavy metals, PAH HA15 0.6: Heavy metals, OCPs HA16 0.6: Heavy metals, OCPs HA17 0.5: Heavy metals, OCPs, PAH HA18 0.2: Heavy metals, OCPs HA19 0.2: Heavy metals HA19 0.5: Heavy metals, OCPs HA20 0.6: Heavy metals, OCPs, PAH HA20 1.1: Heavy metals S1: Semi quantitative asbestos S1: Fragment Asbestos

A total of 111 soil samples were collected and couriered to IANZ accredited Eurofins Laboratory for testing 15 to 19 June 2020. Table 6 summarises the testing regime for 2020:

Table 6: 2020 Testing Regime

EH201 0.2: Asbestos	EH215 0.5: Asbestos
EH201 0.3: Heavy metals, PAH, PCP, OCPs	EH215 1.4: Heavy metals, PAH
EH201 1.0: Heavy metals, PAH, OCPs	EH216 0.4: Heavy metals, PAH, TPH, OCPs
EH202 0.8: Heavy metals, PAH, TPH	EH216 1.0: Heavy metals, PAH, TPH
EH202 1.3: Heavy metals, PAH, TPH	EH217 0.3: Heavy metals, PAH, TPH
EH203 0.6: Heavy metals, PAH, TPH, PCPs	EH217 1.0: Heavy metals, PAH, TPH
EH203 1.3: Heavy metals, PAH, TPH, OCPs	EH218 0.3: Heavy metals, PAH
EH204 0.4: Heavy metals, PAH, PCP, OCPs	EH218 1.4: Heavy metals, PAH, TPH
EH204 0.7: Asbestos	EH219 0.3: Heavy metals, PAH, TPH, OCPs
EH204 1.3 Heavy metals, PAH	EH219 0.9: Heavy metals, PAH
EH204 1.4: Heavy metals, PAH	EH220 0.3: Heavy metals, PAH, OCPs
EH205 0.5: Heavy metals, PAH, PCP, OCPs	EH220 0.4: Asbestos
EH205 1.4: Heavy metals, PAH, OCPs	EH220 1.0: Heavy metals, PAH, OCPs
EH206 0.3: Heavy metals, PAH, TPH, OCPs	EH221 0.4: Heavy metals, PAH, OCPs
EH206 0.4: Asbestos	EH221 1.5: Heavy metals, PAH
EH206 1.1: Heavy metals, PAH	EH222 0.4: Asbestos
EH208 0.5: Heavy metals, PAH, TPH, OCPs	EH222 0.5: Heavy metals, PAH, OCPs
EH208 0.8: Asbestos	EH222 1.4: Heavy metals, PAH
EH208 1.0: Heavy metals, PAH	EH223 0.4: Asbestos
EH209 0.4: Asbestos	EH223 0.5: Heavy metals, PAH, OCPs
EH209 0.5: Heavy metals, PAH, TPH, OCPs	EH223 1.4: Heavy metals, PAH
EH209 1.2: Heavy metals, PAH, TPH, OCPs	EH224 0.2: Heavy metals, PAH
EH210 0.3: Heavy metals, PAH, TPH, OCPs	EH224 0.7: Heavy metals, PAH
EH210 1.3: Heavy metals, PAH	EH224 1.4: Heavy metals, PAH
EH211 0.5: Heavy metals, PAH, TPH	TP207 0.5: Asbestos, Heavy metals, PAH
EH211 0.7: Asbestos	TP207 1.0: Heavy metals, PAH
EH211 1.4: Heavy metals, PAH	TP208 1.0: Heavy metals, PAH
EH212 0.3: Heavy metals, PAH, TPH, OCPs	TP208 2.0: Heavy metals, PAH
EH212 0.5: Asbestos	TP209 0.8: Asbestos, Heavy metals, PAH
EH212 1.3: Heavy metals, PAH	TP209 1.5: Heavy metals, PAH
EH213 0.3 Heavy metals, PAH, TPH, OCPs	TP210 1.0: Heavy metals, PAH
EH213 1.5: Heavy metals, PAH	TP211 1.0: Heavy metals, PAH
EH214 0.4: Asbestos	HA206 0.4: Heavy metals, PAH, OCPs
EH214 0.5: Heavy metals, PAH, TPH, PCP, OCPs	HA206 1.5: Heavy metals, PAH, OCPs
EH214 1.3: Heavy metals, PAH	HA207 1.5: Heavy metals, PAH
EH215 0.4: Heavy metals, PAH, TPH, PCP, OCPs	HA208 0.5 Heavy metals, PAH, OCPs
	S1-S4: Asbestos, Heavy metals

The results have been evaluated against the following criteria:

- Background Concentrations: Environment Canterbury (Background Concentrations of Trace Elements in Canterbury Soils, Environment Canterbury (ECan)).
- NES-CS soil contaminant standards for outdoor worker land use (unpaved), with respect to the protection of workers during the soil disturbance.

- NES-CS soil contaminant standard for high-density residential land use, with respect to the protection of future residents.
- Where soil contaminant standards are not provided in the NES-CS, health investigation levels for soil contaminants were obtained via MfE's Contaminated Land Management Guideline No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011).
    - Guideline on the Investigation Levels for Soil and Groundwater, NEPM, Australia, updated 2013 (high-density residential and commercial values).
    - BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017 (NZ Asbestos Guidelines).

6.1 Data Quality

A quality assurance and quality control (QA/QC) programme was implemented as part of field procedures to confirm that the soil analytical data was fit for purpose.

The programme included:

- Transportation of samples with accompanying chain of custody documentation.
- Laboratory testing by IANZ accredited laboratories.
- Comparison of field and analytical data.
- Compliance with sample holding times.

Laboratory QA/QC reports are available on request.

7.0 Results

A summary of the laboratory test results is provided in Appendix E with full laboratory transcripts included within Appendix F.

7.1 Developed hard sealed area

Regional background exceedances

- The 2020 investigation showed one or more heavy metal exceedances against published regional background levels (EH201 – EH224). The most common contaminants to exceed background concentrations were arsenic, chromium, copper, lead, nickel, and zinc with maximum concentrations of 45mg/kg, 22mg/kg, 18mg/kg, 29mg/kg, and 19mg/kg respectively.
- Low-level heavy-end (C15 to C36) TPH were identified in six samples from five testing locations, at depths between 0.3m to 1.2m bgl, at concentrations ranging from 21mg/kg to 680mg/kg. Additionally, EH216 had low-level mid-range (C10 to C14) TPH. All five locations (EH209, EH213 and EH216 - EH218) are located where known HAIL activities have historically and/or are currently occurring on site (AST – HAIL category A17 and an engineering workshop – HAIL category D5).
- Trace PAH were identified in one sample (EH213), at a depth of 0.3m bgl. All other 46 samples were below laboratory detection limits.
- Six locations were tested for phenols; all six locations were below laboratory detection limits.
- Four of 22 samples identified trace levels of OCPs.

The fragment of ACM tested in the 2019 investigation identified that all three major forms of asbestos were present (chrysotile, amosite, and crocidolite). The associated soil sample showed a non-detect for asbestos fibres.

Health protection exceedances

- No relevant NES-CS soil contaminant exceedances were identified in soils within the sealed area of the site.

7.2 Undeveloped and unsealed area

Regional background exceedances

- The 2019 investigation showed one or more heavy metal exceedances against published regional background levels (HA1 – HA20). The most common contaminants to exceed background concentrations were arsenic, nickel, and chromium. The 2020 investigation observed similar concentrations for heavy metals (HA206 - HA208 and TP207 - TP211) with elevated zinc concentrations in the southern corner along the residential property(S1-S4). Zinc concentrations ranged between 110mg/kg and 1300 mg/kg for four samples, these elevated concentrations are above published regional background levels however are well below relevant health protection standards.
- The 2019 investigation tested 25 samples for OCPs. Results identified two trace levels of DDE 0.013mg/kg and 0.008mg/kg in HA2 0.1 and HA3 0.2 respectively; all other testing results in 2019 across the site were below laboratory detection limits. Two of three hand augered samples in the 2020 investigation showed trace levels of DDE. A concentration of 0.01mg/kg was identified in both HA206 0.4 and HA208 0.5; all other testing results from the undeveloped area in 2020 were below laboratory detection limits.
- No PAH were detected in selected samples taken from grassed site areas for both the 2019 and the 2020 investigation.

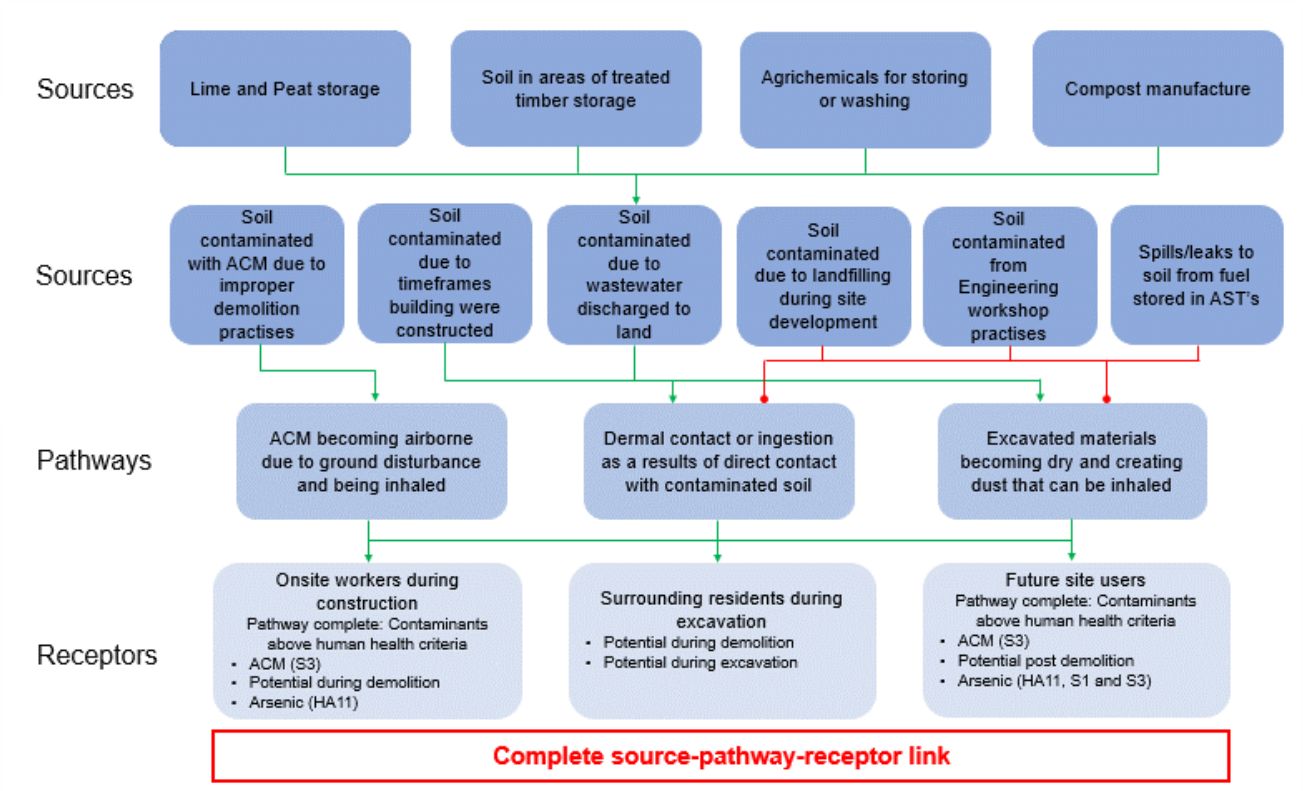
Health protection exceedances

- The 2019 investigation identified HA 11 as a hotspot. One contaminant of concern (arsenic) exceeded the relevant health protection standards, both for intended site end-use and for outdoor workers. Arsenic was identified in surface soil (0.1m bgl) at a concentration of 201mg/kg, over four times the NES-CS soil contaminant standard for high-density residential land use (45mg/kg) and nearly three times over the soil contaminant standard for protection of outdoor workers (unpaved) (70mg/kg).
- The 2020 investigation identified an additional two hotspots (S1 and S3) in the southern corner along the residential dwelling boundary. One contaminant of concern (arsenic: 69mg/kg and 67mg/kg) exceeded the NES-CS soil contaminant standard for intended site end-use (high density residential).
- Asbestos fibres (chrysotile form, 0.0016%) were identified in one soil sample and is above relevant human health criteria of <0.001%. The sample (S3) was collected in the southern corner alongside the residential property.

8.0 Conceptual Site Model

A post-investigation conceptual site model (CSM) has been developed to summarise the sources of contamination at the site, the human receptors that may be exposed to those contaminants, and the potential pathways for exposure.

Figure 2: Conceptual Site Model



9.0 Regulatory Implications

The rules relating to the control of contaminated sites and potentially contaminated sites, specific to the protection of human health are specified in the NES-CS.

9.1 NES-CS

The NES-CS came into effect on 1 January 2012. The NES-CS generally considers issues relating to land use and the protection of human health. The need, or otherwise, for contamination related resource consents for the proposal has been evaluated against this regulatory requirement.

The NES-CS applies to specific activities on land where a HAIL activity has or is more likely than not to have occurred. Activities covered under the NES-CS include soil disturbance, soil sampling, fuel systems removal, subdivision, and land use change.

9.1.1 NES-CS Activity Status

Based on the results of the intrusive sampling investigation (exceedances detected against relevant NES-CS soil contaminant standards), the proposal will require a restricted discretionary activity consent under the NES-CS and a Remedial Action Plan/Site Management Plan (RAP/SMP) will be required.

10.0 Conclusions and Implications

The findings of the desktop review and soil testing regime described in the previous sections indicate:

- Assessment of the analytical results identified localised arsenic exceedances against relevant NES-CS soil contaminant standards for construction workers and site end-users.
- Various heavy metals (mainly arsenic, zinc, chromium, lead, nickel and copper) exceeded published regional background levels. Localised TPH was also identified, as were trace levels of OCPs and a trace PAH concentration.
- One sample identified asbestos in soil at a concentration exceeding the NZ Asbestos Guidelines. Further delineation of this area should be carried out prior to earthworks occurring.
- Demolition of buildings containing asbestos in the northern hardsealed area will require approval from WorkSafe NZ. Post-demolition, soil validation testing for potential residual asbestos will be required.
- The proposal is considered a restricted discretionary activity and will require consenting by SDC under the NES-CS.
- A RAP/SMP will be required to manage the earthworks associated with the proposal, including remediation and validation of identified hotspots. The RAP/SMP will contain protocols for any unexpected contamination discovered during works, and guidance to the civil works contractor regarding on-site soil re-use and off-site soil disposal options and requirements.

11.0 Limitation

This report has been prepared solely for the benefit of Summerset Villages (Prebbleton) Ltd as our client with respect to the brief given to us. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

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

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards and should not be construed as legal or planning opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate advice.

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

APPENDIX A

Historic Aerial Photographs



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©Sourced from http://retrolens.nz and licensed by LINZ CC-BY 3.0

158 Springs Road,
Prebbleton
1964 Photograph

©Sourced from http://retrolens.nz and licensed by LINZ CC–BY 3.0



SN2634 D/42

155

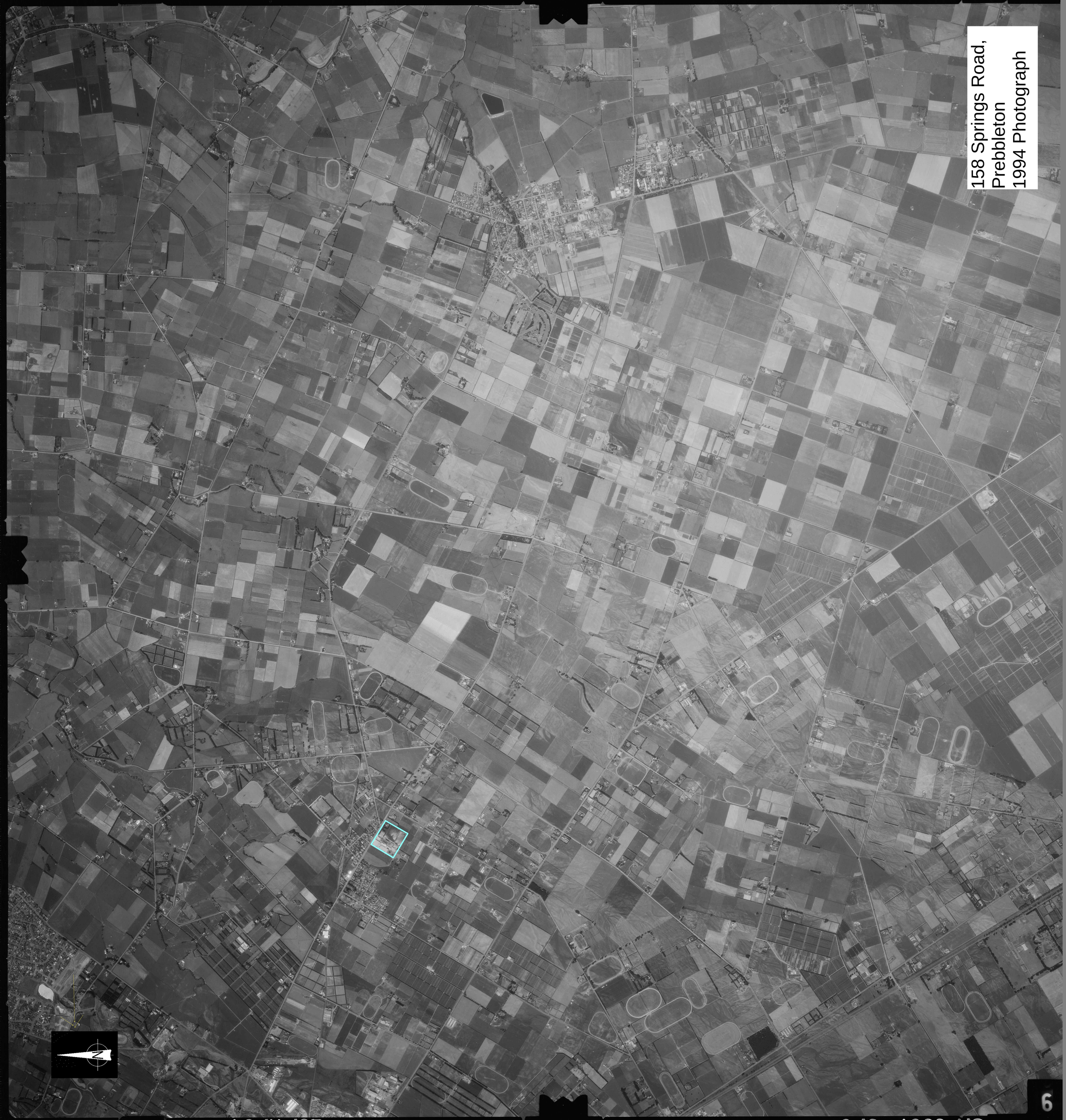
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158 Springs Road,
Prebbleton
1974 Photograph

158 Springs Road,
Prebbleton
1984 Photograph

©Sourced from http://retrolens.nz and licensed by LINZ CC-BY 3.0

158 Springs Road,
Prebbleton
1994 Photograph



26/11/94

SN 9381 C/8

9

9 5 L h 0 9 - - 1 0 5 I 2 9 2 1 0 0 0 0 0 0 0 0
0 0 0 0 3 4
TL 102
WILD 15/4 UAGA-F
Nr 13177 152,54
AIRESEARCH MAPPING P/L
158 Springs Road,
Prebbleton
2000 Photograph
097
- 9 5 0 0 0 1 - - - - 0 0 2 8 5 - 1 L 2 5 - h 5 1 5 -
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Prebbleton
158 Springs Road,
Prebbleton
2004 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2008 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2010 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2013 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2015 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2017 Photograph


Prebbleton
158 Springs Road,
Prebbleton
2019 Photograph

APPENDIX B

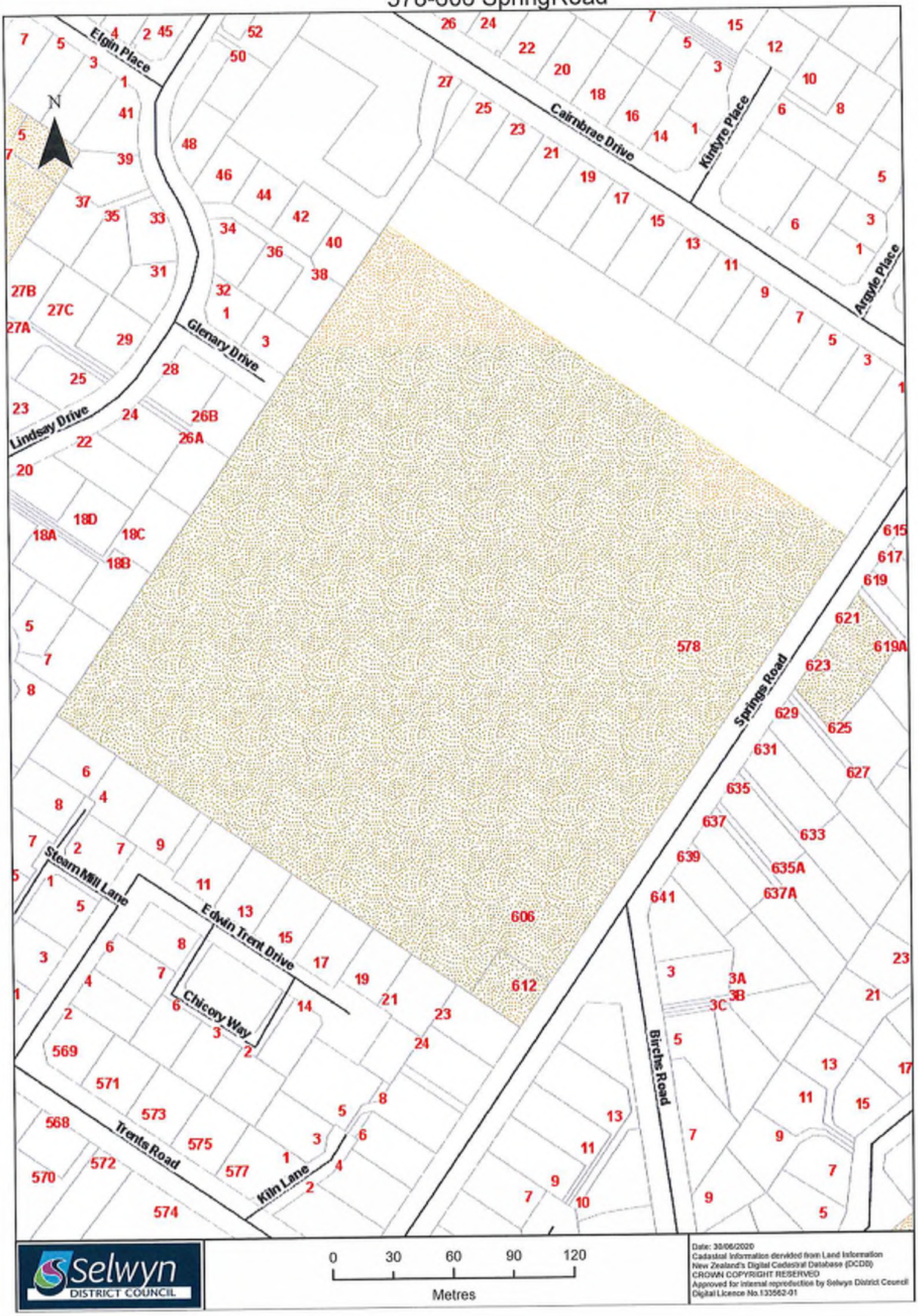
Selwyn District Council Site Contamination Enquiry

Zoom toClear Selected

Potentially Contaminated Site

OBJECTID	11201
Identified Date	13/01/2002, 2014
Identified By	Alan Minnery - SDC, Stephen Wright - SDC Records
Status Update	Update with ECAN LLUR info
Update Date	23/10/2015
Activity Type	A17 - Storage tanks or drums for fuel, chemicals or liquid waste, G5 - Waste disposal to land, A14 - Pharmaceutical manufacture
Notes	Meadow Mushrooms established 1970. Possible PCP contaminated soil
Source Data	

578-606 SpringRoad



APPENDIX C

Site Walkover Photographs

Photographs



Photo 1: Cracked concrete noted on the lime and peat washdown area.



Photo 2: ACM noted on exterior cladding on the front office building.



Photo 3: Lime and peat storage and washdown facilities.



Photo 4: Historical above ground storage tank bund.



Photo 5: Historical above ground storage tank bund.



Photo 6: Current above ground storage tank.



Photo 7: Lubricants, petrol, diesel noted in the engineering workshop.



Photo 8: Below ground drip tank noted in the engineering workshop.



Photo 9: Chemical storage, inaccessible at the time of inspection.



Photo 10: Boiler room.



Photo 11: Decommissioned settling pond.



Photo 12: Southern portion of the site.



Photo 13: Bund separating the paddocks in the southern portion of the site.



Photo 14: Exposed bund in the southern portion of the site.

APPENDIX D

2019 and 2020 Hand Auger Borehole, Machine Borehole Logs

RILEY CONSULTANTS

Christchurch:
22 Moorhouse Ave. Addington, Christchurch 8011
PO Box 4355, Christchurch 8140
Tel. 03 379 4402 Email: rileychch@riley.co.nz

Auckland:
4 Fred Thomas Drive, Takapuna, Auckland 0622
PO Box 100253, North Shore, Auckland 0745
Tel. 09 489 7872 Email: riley@riley.co.nz

GEOTECHNICAL AND GEOLOGICAL INFORMATION

SOIL TYPES AND SYMBOLS


FILL


TOPSOIL


SILT


SAND


GRAVEL


CLAY


PEAT


GROUNDWATER LEVEL


10,11,10

SCALA PENETROMETER
LAST 3 NUMBER OF BLOWS PER 50mm INCREMENT

ROCK TYPES AND SYMBOLS


SANDSTONE


SILTSTONE


MUDSTONE


LIMESTONE


BASALT


TUFF


IGNIMBRITE


GREYWACKE

SOIL STRENGTH CLASSIFICATION

FINE GRAINED COHESIVE SOILS

TERM	FIELD IDENTIFICATION	UNDRAINED SHEAR STRENGTH (KPa)
Very Soft (Vs)	Exudes between fingers when squeezed.	<12
Soft (S)	Easily indented by fingers.	12 – 25
Firm (F)	Indented only by strong finger pressure.	25 – 50
Stiff (St)	Indented by thumb pressure.	50 – 100
Very Stiff (VSt)	Indented by thumbnail.	100 – 200
Hard (H)	Difficult to indent by thumbnail.	200+

SPT & SCALA PENETROMETER RESULTS

TERM	SPT VALUE No. of BLOWS/300mm	SCALA PENETROMETER No. of BLOWS/100mm
very dense	>50	17+
dense	30 – 50	7 – 17
medium dense	10 – 30	3 – 7
loose	4 – 10	1 – 3
very loose	0 – 4	0 – 2

ROCK STRENGTH CLASSIFICATION

TERM		FIELD IDENTIFICATION	UNCONFINED UNIAXIAL COMPRESSIVE STRENGTH (MPa)
Extremely weak	(EW)	Indented by thumbnail.	< 1
Very weak	(VW)	Crumbles under firm blows with point of geological hammer. Can be peeled with pocket knife.	1 – 5
Weak	(W)	Difficult to peel with pocket knife.	5 – 20
Moderately strong	(MS)	Cannot be scraped or peeled with pocket knife.	20 – 50
Strong	(S)	More than one blow of geological hammer to fracture.	50 – 100
Very strong	(VS)	Many blows of geological hammer to break.	100 – 250
Extremely strong	(ES)	Can only be chipped with geological hammer.	250+

MOISTURE CONDITION

Dry (D)	Looks and feels dry; powdery and friable.
Moist (M)	Feels cool; darkened in colour; no free water when remoulded.
Wet (W)	Feels cool; darkened in colour; free water forms on hands.
Saturated (S)	Free water is present on sample.

SAMPLE TYPES


UNDISTURBED


MACHINE AUGER DISTURBED

D
HAND AUGER DISTURBED


STANDARD PENETRATION TEST (solid cone)


STANDARD PENETRATION TEST (hollow cone)

DRILLING METHOD

OB	OPEN BARREL
TT	TRIPLE TUBE
WB	WASH BORE
SH	UNDISTURBED SHELBY TUBE
RC	ROCK CORE
SPT	STANDARD PENETRATION TEST

FIELD TESTS

V	SHEAR VANE (corrected to BS:1377)
R	REMOULDED STRENGTH
P	POCKET PENETROMETER
CH	CLEGG HAMMER

INFORMATION BASED ON THE NZ GEOTECHNICAL SOCIETY INC. GUIDELINES FOR THE CLASSIFICATION AND DESCRIPTION OF SOIL AND ROCK FOR ENGINEERING PURPOSES

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA01

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,125.5 N 5,174,288.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.80 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
+21.80	0.20		Fine to medium SAND with minor silt and minor organics; dark brown. Dry; organics, root and rootlets [TOPSOIL].
			Silty fine to medium SAND; medium brown. Dry [SPRINGSTON FORMATION].
			0.50m Grades to sand with some silt; greyish brown with orange mottling.
	1		1.00m Grades to SAND with trace silt.
			1.50m Grades to sand with some silt. Moist.
+20.20	1.80		EOH @ 1.80 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.50m

Groundwater | Soil Moisture | Samples

Tests: No. 1 2, 1, 2, 3, 3, 3, 2, 5, 4, 6, 7, 25

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA02

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,151.2 N 5,174,324.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.00 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+22.00											
+21.80	0.20		Fine to medium SAND with minor silt and organics; dark brown. Dry, friable; organics, root and rootlets [TOPSOIL].								
			Fine to medium SAND with minor silt; dark yellowish brown with orange mottling. Dry, friable; silt, slightly plastic [SPRINGSTON FORMATION].								
			0.50m Grades to slightly moist								
	1		1.00m - 1.20m Grades to include silt lenses.								
			1.20m Grades to include some silt								
			1.70m Grades to moist								
+20.00	2.00										
	2		EOH @ 2.00 m								
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA03

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,177.6 N 5,174,366.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
+21.30	0.70		Sandy SILT with minor organics; medium dark brown. Stiff; dry to moist; organics, rootlets [TOPSOIL]. 0.25m Grades to greyish brown 0.30m Grades to no organics
+20.40	1.60		Silty SAND; greyish brown. Medium dense to dense; dry to moist [SPRINGSTON FORMATION].
			EOH @ 1.60 m

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.75m

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

No. 1
2, 6, 9

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA04

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,167.1 N 5,174,281.3

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
+21.80	0.20		Sandy SILT with minor organics; medium brown. Dry to moist [TOPSOIL].
+20.40	1.60		Silty SAND; orangish and greyish brown. Dry to moist [SPRINGSTON FORMATION].
			EOH @ 1.60 m

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.10m

Groundwater | Soil Moisture | Samples

Tests: No. 1 1, 2, 2, 1, 2, 2, 2, 2, 2, 2

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA05

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,192.8 N 5,174,333.7

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.85 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
+21.80	0.20		SAND with minor silt and organics; dark brown. Dry, friable; organics, roots and rootlets [TOPSOIL].
			SAND with some silt; greyish brown with orange mottling. Dry, friable; silt, slightly plastic [SPRINGSTON FORMATION].
			0.90m Grades to trace silt
	1		
			1.20m - 1.30m Grades to some silt lenses
			1.30m Grades to trace silt
+20.15	1.85		1.80m Grades to very stiff. Difficult to auger.
			EOH @ 1.85 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.00m

1.90m

Groundwater

Soil Moisture

Samples

Tests

No. 1
1, 1, 1,
2, 2, 1,
2, 2, 2,
2, 2, 2,
2, 2, 2,
2, 2, 3,
2, 2

No. 2
2, 2, 1,
2, 1, 2,
2, 2, 2,
2, 2, 3,
2, 3, 3,
3, 15,
18

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

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Auckland 0622
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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA06

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,224.1 N 5,174,278.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.20 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend
+21.00			SILT with minor organics; medium brown. Stiff; dry to moist; organics, rootlets	
			0.40m Grades to include minor orange mottling	
			0.50m Grades to trace organics. Organics, rootlets	
+20.35	0.65			
			SILT; medium greyish brown with orange mottling. Stiff; dry to moist [SPRINGSTON FORMATION].	
+20.25	0.75			
			SAND; medium greyish brown orange mottling. Medium dense to dense; dry to moist.	
	1			
			1.10m Grades to include gravels.	
+19.80	1.20			
			EOH @ 1.20 m	

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

Tests: No. 1 11, 20, 32

Scala Penetrometer: 1.35m

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.
2. Strength terms for soil layers are based on NZGS field testing guidelines and scala test results.

All dimensions in metres Scale 1:11	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA07

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,251.4 N 5,174,316.0

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend
+21.00				
+20.80	0.20		SILT with minor organics; medium brown. Moist; organics, rootlets [TOPSOIL].	
	1		Silty SAND with trace organics; greyish brown with orange mottling. Medium dense; moist; organics, rootlets [SPRINGSTON FORMATION].	
+19.40	1.60		1.50m Grades to SAND; orangish brown. Moist.	
			EOH @ 1.60 m	

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

Tests: No. 1 3, 4, 3, 4, 6, 20

1.90m

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:11	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA08

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,195.2 N 5,174,240.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.90 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend
+21.00				
+20.90	0.10		Silty SAND with minor organics; medium brown. Moist; organics, rootlets	
			Fine to medium SAND with minor silt; greyish brown with orange mottling. Dry [SPRINGSTON FORMATION].	
			0.10m Grades to include trace organics; greyish brown. Organics, rootlets 0.20m Grades to orange mottling 0.30m Grades to include no organics. Dry. 0.50m Grades to SAND with minor silt	
			0.80m Grades to include no mottling. Moist	
	1		1.00m Grades to inlcude to orange mottling	
			1.65m - 1.80m Grades to include silty SAND lenses.	
+19.15	1.85			
	2		EOH @ 1.90 m	
	3			

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.40m

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

No. 1
3, 4, 4,
3, 2, 3,
3, 2, 7,
23

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA09

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,239.9 N 5,174,238.5

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.30 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+21.00			
+20.85	0.15		SILT with some sand and organics; dark brown. Dry; sand, fine to medium; organics, root and rootlets [TOPSOIL].
			SILT with some sand and trace organics; light greyish brown. Dry, friable; organic, rootlets; sand, fine to medium [SPRINGSTON FORMATION].
			0.50m Grades to sandy SILT
			0.70m Grades to include silty SAND; greyish brown with orange mottling. Moist.
	1		
+19.30	1.70		1.60m Grades to dark greyish brown. Moist
			Fine to medium SAND with some silt; brown. Moist.
	2		2.00m Grades to slightly plastic; greyish brown with orange mottling. Moist
+18.70	2.30		2.20m Grades to include minor silt
			EOH @ 2.30 m
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA10

Job No.:	Start Date: 30-10-19 Finish Date: 30-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,265.2 N 5,174,283.0

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.20 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+21.00			
+20.90	0.10		Fine to medium SAND with some organics and trace to minor silt; greyish brown.
			Fine to medium SAND with trace silt; brown. Dry [SPRINGSTON FORMATION].
			0.30m Grades to minor silt. Dry
			0.70m Grades to SAND with trace silt; greyish brown with orange mottling. Dry; silt, slightly plastic.
	1		
+19.80	1.20		Becoming difficult to auger EOH @ 1.20 m

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.00m

Groundwater

Soil Moisture

Samples

Tests: No. 1 4, 4, 3, 3, 4, 4, 4, 3

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [ ] Refusal [X] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:10	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA11

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,202.7 N 5,174,374.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.00 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+22.00											
			Fine to medium SAND with minor silt; dark brown. Dry, friable [TOPSOIL].								
+21.80	0.20										
			Sandy SILT; greyish brown. Dry, friable [SPRINGSTON FORMATION].								
			0.60m Grades to include some SAND with trace silt; greyish brown with orange mottling. Dry.								
+21.00	1.00										
			EOH @ 1.00 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:10	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA12

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,324.5 N 5,174,234.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.70 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+20.00			
+19.80	0.20		Fine to medium SAND with minor silt and organics; dark brown. Dry; organics, rootlets and roots [TOPSOIL].
			Fine to medium SAND with some silt; yellowish brown with orange mottling. Dry [SPRINGSTON FORMATION].
			0.70m Grades to silty SAND.
	1		
			1.30m Grades to minor silt
+18.30	1.70		
			EOH @ 1.70 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.95m

Groundwater

Soil Moisture

Samples

Tests

No. 1
2, 3, 3,
2, 2, 3,
3, 3, 3,
3, 3, 3,
2, 3, 3,
4, 4, 3,
3, 3, 2,
4, 6, 6,
6

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA13

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,384.0 N 5,174,246.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	0.10 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa)	Scala Penetrometer (blows / 50 mm)	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00			UTP due to tree roots		50 100 150 200	3 6 9 12 15				No. 1 1, 1, 2, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 6, 4, 3, 4, 4	
			EOH @ 0.10 m			0.95m					
	1										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.
2. Strength terms for soil layers are based on Scala test results.

All dimensions in metres Scale 1:10	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA14

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,302.4 N 5,174,327.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.00 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+21.00			
+20.85	0.15		Silty fine to medium SAND with trace organics; dark greyish brown. Dry [TOPSOIL].
			Silty fine to medium SAND with trace organics; orange brown. Dry [SPRINGSTON FORMATION].
+20.50	0.50		Sandy SILT; orangish brown. Dry
			0.60m Grades to moist
	1		
			1.40m Grades to moist to wet
			1.60m Grades to include some sand. Dry to moist
			1.90m Grades to include gravels and trace organics; dark grey inclusions. Organics, tree roots
+19.00	2.00		EOH @ 2.00 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.20m

Groundwater

Soil Moisture

Samples

Tests: No. 1 10, 7, 10, 15, 20

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.
2. Strength terms for soil layers are based on NZGS field testing guidelines and Scala test results.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA15

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,253.2 N 5,174,362.5

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.80 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+21.00			
+20.92	0.08		Silty fine to medium SAND with minor rootlets; dark greyish brown. Dry, friable [TOPSOIL].
			Silty fine to medium SAND; greyish brown. Dry, friable [SPRINGSTON FORMATION].
			0.20m Grades to orangish brown with dark orange mottling
			0.90m Grades to moist
	1		
			1.40m Grades to include dark grey organic inclusions
+19.20	1.80		EOH @ 1.80 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.50m

Groundwater | Soil Moisture | Samples

Tests: No. 1 — 1, 1, 1, 3, 2, 1, 2, 3, 2, 3, 3, 2, 9, 30

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA16

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,207.8 N 5,174,444.4

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.95 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
+21.80	0.20		Silty fine to medium SAND with minor organics and trace gravel; dark greyish brown. Dry to moist; organics, rootlets and roots; gravels, medium, subangular [TOPSOIL].
+21.30	0.70		Silty fine to medium SAND with minor organics; dark greyish brown. Dry to moist; organics, rootlets and roots [SPRINGSTON FORMATION]. 0.40m Grades to no organics
	1		Fine to medium SAND with some silt; orangish brown and dark orange mottling. Moist. 1.60m Grades to silty SAND 1.80m Grades to include minor silt
+20.05	1.95		EOH @ 1.95 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

2.15m

Groundwater | Soil Moisture | Samples

Tests: No. 1 2, 8, 15, 22

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

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Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA17

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,285.2 N 5,174,478.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.65 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.00			
			Silty fine to medium SAND with minor organics and trace gravel; dark greyish brown. Dry to moist; organics, rootlets and roots; gravels, medium, subangular [TOPSOIL].
+21.55	0.45		
			Silty fine to medium SAND; dark yellowish brown with orange mottling. Dry to moist [SPRINGSTON FORMATION].
			0.70m Grades to moist
	1		
			1.30m Grades to include greyish brown with orange mottling. Dry to moist
+20.35	1.65		1.60m Grades to include trace gravel. Very stiff, difficult to auger
			EOH @ 1.65 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.90m

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

No. 2
8, 16,
18, 20

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Level 1, 4 Fred Thomas Drive
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Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA18

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,330.4 N 5,174,487.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.20 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend
+21.00				
+20.70	0.30		Fine to medium SAND with some silt and organics; dark greyish brown. Dry; organics, roots and rootlets [TOPSOIL].	
			Silty fine to medium SAND; yellowish brown with orange mottling. Moist [SPRINGSTON FORMATION].	
+19.80	1.20		1.10m Grades to greyish brown with orange mottling	
			EOH @ 1.20 m	

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.53m

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

No. 1
7, 20, 20

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.
2. Strength terms for soil layers are based on NZGS field testing guidelines and Scala test results.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA19

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,382.1 N 5,174,452.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.30 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend
+21.00				
+20.65	0.35		Silty fine to medium SAND with minor organics; dark greyish brown. Dry; organics, rootlets [TOPSOIL].	
	1		Fine to medium SAND with some silt; greyish brown with orange mottling. Stiff; dry to moist [SPRINGSTON FORMATION]. 0.50m Grades to moist	
+19.70	1.30		1.20m Grades to include trace silt and gravel. Very stiff; dry to moist; gravel, subangular	
	2		EOH @ 1.30 m	
	3			

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.50m

Groundwater | Soil Moisture | Samples | Tests: No. 1, 5, 10, 26 | Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

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Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA20

Job No.:	Start Date: 31-10-19 Finish Date: 31-10-19	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,428.4 N 5,174,418.0

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.50 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+20.00			
+19.70	0.30		Silty fine to medium SAND with minor organics; dark greyish brown. Dry; organics, rootlets [TOPSOIL].
			Silty fine to medium SAND; greyish brown with orange mottling. Dry to moist [SPRINGSTON FORMATION].
	1		
			1.20m Grades to sand with some silt; greyish brown
+18.50	1.50		Grades to include gravel. Difficult to auger
			EOH @ 1.50 m
	2		
	3		

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

1.65m

Groundwater | Soil Moisture | Samples | Tests | Instrument/ Backfill

No. 1
12, 15, 17

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates and elevations based on aerial photo and subject to survey confirmation.

All dimensions in metres Scale 1:20	Contractor:	Rig/Plant Used: Hand Auger 70 mm	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2019.GPJ <<DrawingFile>> 17/07/2020 14:50 Produced by gINT Professional

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH201

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,351.1 N 5,174,255.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.40 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.80	0.20		Sandy GRAVEL [HARDFILL].								
+19.25	0.75		SILT with minor clay; medium brown. Moist [FILL].						EH201 0.2m A EH201 0.3m G		
+18.60	1.40		SILT with minor clay; grey brown with orange brown mottling [SPRINGSTON FORMATION].						EH201 0.8m G EH201 1.0m A		
			EOH @ 1.40 m						EH201 1.4m G		

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:47 Produced by gINT Professional

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH202

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,361.5 N 5,174,335.4

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.30	0.70		Gravels [FILL].								
	1		Clayey SILT; green grey with orange brown mottling, black residue. Moist [SPRINGSTON FORMATION].						EH202 0.8m G EH202 0.9m A		
			1.20m Grades to no black residue.						EH202 1.3m G		
+19.40	1.60								EH202 1.5m A		
			EOH @ 1.60 m								
	2										
	3										

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH203

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,323.8 N 5,174,337.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.55	0.45		Silty sandy GRAVEL; black. Moist [FILL].								
+19.85	1.15		Sandy SILT; black. Moist; organic odour; black resiude [SPRINGSTON FORMATION]						EH203 0.6m G EH203 0.7m A		
+19.40	1.60		Sandy SILT; grey brown with orange mottling; black residue. Moist 1.15m Grades to no black residue.						EH203 1.3m G EH203 1.5m A		
			EOH @ 1.60 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH204

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,324.3 N 5,174,360.4

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.80 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.75	0.25		[CONCRETE SLAB].								
			Clayey SILT; grey brown with orange brown mottles. Moist [SPRINGSTON FORMATION].						EH204 0.4m G EH204 0.7m A		
+19.65	1.35		Silty SAND; grey brown with orange brown mottles. Moist.						EH204 1.3m A EH204 1.4m G		
+19.40	1.60		Sandy GRAVEL.								
+19.20	1.80		EOH @ 1.80 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH205

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,297.9 N 5,174,355.6

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.75	0.25		[CONCRETE SLAB].								
+20.10	0.90		Sandy SILT; grey brown. Moist [SPRINGSTON FORMATION].						EH205 0.5m G EH205 0.8m A		
+19.40	1.60		Silty SAND; grey brown.						EH205 1.4m A EH205 1.5m G		
			EOH @ 1.60 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH206

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,350.3 N 5,174,363.3

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
			Sandy clayey SILT; grey brown with orange brown mottles with minor dark grey and black residue. Moist [SPRINGSTON FORMATION].						EH206 0.3m G EH206 0.4m A		
			0.60m Grades to no black residue.								
	1								EH206 1.1m G		
+19.40	1.60								EH206 1.4m A		
			EOH @ 1.60 m								
	2										
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH207

Job No.:	Start Date: 15-06-20 Finish Date: 15-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,299.7 N 5,174,395.7

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.70 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.75	0.25		[CONCRETE SLAB].								
			Sandy clayey SILT; medium grey brown with orange brown mottling. Moist [SPRINGSTON FORMATION].						EH207 0.4m G EH207 0.7m A EH207 1.1m A EH207 1.3m G		
+19.30	1.70		EOH @ 1.70 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH208

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,305.6 N 5,174,292.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.40 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00			Gravelly SILT with some sand; dark greyish brown. Dense to very dense; moist. Gravel, subrounded to angular, fine to coarse sandstone; sand, fine to medium [FILL].								
			0.30m Grades to SILT with some gravel, minor sand; brown. Gravel, fine to medium.						EH208 0.4m A		
+20.50	0.50								EH208 0.5m G		
			SILT with minor to trace sand; greyish brown with orange mottling. Moist to wet; slightly plastic. Sand, fine to medium [SPRINGSTON FORMATION].						EH208 0.8m A		
	1								EH208 1.0m G		
+19.80	1.20										
			Silty SAND/Sandy SILT with some gravels; brown with orange mottling. Moist; slightly plastic. Sand, fine to medium; gravel, fine to medium, subrounded to subangular								
			1.50m Grades to gravelly sandy SILT								
			1.70m Grades back to sandy SILT and minor to trace gravels.								
	2										
+18.60	2.40										
			EOH @ 2.40 m								
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig to 1.4m.
3. Hand auger extended from the toe of environmental machine auger hole.
4. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: DL	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH209

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,381.9 N 5,174,348.5

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.20	0.80		Gravelly SILT; dark grey. Moist; organic odour/hydrocarbon odour [FILL]. 0.60m - 0.80m Grades to no gravels. Dark grey.						EH209 0.4m A EH209 0.5m G		
+19.40	1.60		SILT; orange brown with light grey mottling [SPRINGSTON FORMATION].						EH209 1.0m A EH209 1.2m G		
			EOH @ 1.60 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH210

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,393.3 N 5,174,342.3

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.50 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.85	0.15		[CONCRETE SLAB].								
+19.80	0.20		Sandy silty GRAVEL [SPRINGSTON FORMATION].								
			SILT; orange brown with light grey mottling. Moist.						EH210 0.3m G EH210 0.5m A EH210 1.0m A EH210 1.3m G		
+18.50	1.50		EOH @ 1.50 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH211

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,413.6 N 5,174,302.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.50 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.75	0.25		[CONCRETE SLAB].								
+19.60	0.40		Sandy silty GRAVEL [FILL].								
			Clayey SILT; black. Moist; hydrocarbon and chemical odour; black residue.						EH211 0.5m G		
			0.60m Grades to no black residue.						EH211 0.7m A		
	1										
+18.50	1.50								EH211 1.3m G EH211 1.4m A		
			EOH @ 1.50 m								
	2										
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH212

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,386.6 N 5,174,305.3

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.50 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.85	0.15		[CONCRETE SLAB].								
			Sandy clayey SILT; grey to dark greyish brown. Moist; minor organic odour, black residue [SPRINGSTON FORMATION].						EH212 0.3m G		
			0.40m Grades to no black residue.						EH212 0.5m A		
	1										
									EH212 1.3m G		
+18.50	1.50								EH212 1.4m A		
			EOH @ 1.50 m								
	2										
	3										

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Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH213

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,344.4 N 5,174,295.6

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.70	0.30		SILT with some organics; medium to dark brown. Moist; organics, rootlets [TOPSOIL].								
			SILT; brown. Moist [SPRINGSTON FORMATION].						EH213 0.3m G EH213 0.5m A		
+19.40	1.60		EOH @ 1.60 m						EH213 1.2m A EH213 1.5m G		

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH214

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,221.1 N 5,174,403.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.55 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa)	Scala Penetrometer (blows / 50 mm)	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+22.00					50 100 150 200	3 6 9 12 15					
+21.85	0.15		[CONCRETE SLAB].								
+21.55	0.45		Silty sandy GRAVEL; greyish brown [FILL].						EH214 0.4m A		
			Silty SAND; black residue [SPRINGSTON FORMATION].						EH214 0.5m G		
	1								EH214 1.1m A		
+20.45	1.55								EH214 1.3m G		
			EOH @ 1.55 m								
	2										
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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Auckland 0622
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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH215

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		22.00	E 1,560,243.2 N 5,174,430.9

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+22.00											
+21.85	0.15		[CONCRETE SLAB].								
+21.50	0.50		Silty Sandy GRAVEL; greyish brown. Moist [FILL].						EH215 0.4m G		
+21.20	0.80		Clayey SILT; greyish brown with orange brown mottling. Moist [SPRINGSTON FORMATION].						EH215 0.5m A		
+20.40	1.60		Sandy SILT.						EH215 1.1m A EH215 1.4m G		
			EOH @ 1.60 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH216

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,322.2 N 5,174,306.7

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.40	0.60		Sandy GRAVEL; dark grey. Hydrocarbon odour, black residue [FILL].						EH216 0.4m G EH216 0.5m A		
+19.40	1.60		Sandy SILT; orange brown with light grey mottling. Moist [SPRINGSTON FORMATION]. 0.60m Grades to no black residue.						EH216 1.1m G EH216 1.3m A		
			EOH @ 1.60 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH217

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,393.6 N 5,174,404.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.30	0.70		Sandy SILT; orangish brown with grey mottling. Moist; hydrocarbon odour [FILL].						EH217 0.3m G EH217 0.6m A		
+19.70	1.30		Silty SAND; greyish brown with orange brown mottling [SPRINGSTON FORMATION].						EH217 1.0m G		
+19.40	1.60		Sandy SILT; light grey with orange brown mottling.						EH217 1.5m G		
			EOH @ 1.60 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH218

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,398.3 N 5,174,394.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.90	0.10		[CONCRETE SLAB].								
+20.65	0.35		Clayey SILT; orangish brown with dark to light grey mottling. Minor hydro/organic odour [FILL].						EH218 0.3m G		
			Clayey SILT; orangish brown with dark to light grey mottling. Minor hydro carbon/organic odour, black residue [SPRINGSTON FORMATION]. 0.40m Grades to no black residue.						EH218 0.7m G		
+19.40	1.60		EOH @ 1.60 m						EH218 1.4m G		

1 2 3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH219

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,381.5 N 5,174,393.0

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.30	0.70		Sandy SILT; light greyish brown with orange mottling. Moist [SPRINGSTON FORMATION].						EH219 0.3m G		
+19.90	1.10		SAND; light greyish brown with orange mottling. Moist.						EH219 0.9m G		
+19.40	1.60		Sandy SILT: light greyish brown with orange mottling. Moist.						EH219 1.5m G		
			EOH @ 1.60 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH220

Job No.:	Start Date: 18-06-20 Finish Date: 18-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,413.6 N 5,174,363.7

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.85	0.15		[CONCRETE SLAB].								
			SILT; dark greyish brown. Minor odour [FILL].						EH220 0.3m G EH220 0.4m A		
+19.30	0.70										
			Silty SAND; greyish brown with orange mottling [SPRINGSTON FORMATION].								
+19.10	0.90										
	1		Sandy SILT; greyish brown with orange brown mottling.						EH220 1.0m G		
+18.40	1.60										
			EOH @ 1.60 m								
	2										
	3										

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Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH221

Job No.:	Start Date: 19-06-20 Finish Date: 19-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,289.6 N 5,174,371.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.30 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.85	0.15		[CONCRETE SLAB].								
+20.50	0.50		Sandy fine to coarse GRAVEL with minor silt; greyish brown. Medium dense. Sand, fine to medium; gravel, subrounded to angular [FILL].						EH221 0.4m G		
+20.30	0.70		SILT with some sand; brown with orange mottling. Sand, fine to medium [SPRINGSTON FORMATION].								
+19.20	1.80		Sandy SILT; brown. Firm to stiff. Sand, fine to medium						EH221 1.0m G EH221 1.5m G		
+18.90	2.10		Fine to medium SAND with some silt; greyish brown with orange mottling. 2.00m Grades to include some gravels								
+18.70	2.30		Sandy fine to coarse GRAVEL with some cobbles; dark brown. Sand, fine to medium; cobbles, fine.								
			EOH @ 2.30 m								

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Geotechnical information indicated as HA210.
4. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

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HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH222

Job No.:	Start Date: 19-06-20 Finish Date: 19-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,316.3 N 5,174,434.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.35 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.45	0.55		Sandy Silty GRAVEL; greyish brown [FILL].						EH222 0.5m G		
+19.65	1.35		Sandy SILT; greyish brown with orange brown mottling. Moist [SPRINGSTON FORMATION].						EH222 1.0m G		
			EOH @ 1.35 m						EH222 1.35m G		

1
2
3

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

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Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH223

Job No.:	Start Date: 19-06-20 Finish Date: 19-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		21.00	E 1,560,290.9 N 5,174,378.0

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+21.00											
+20.80	0.20		[CONCRETE SLAB].								
+20.50	0.50		Sandy GRAVEL; brown [FILL].						EH223 0.4m A EH223 0.5m G		
+19.75	1.25		Sandy SILT, light grey with orange mottling. Moist [SPRINGSTON FORMATION].						EH223 1.0m G		
+19.40	1.60		Sandy GRAVEL.						EH223 1.4m G		
			EOH @ 1.60 m								

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	EH224

Job No.:	Start Date: 19-06-20 Finish Date: 19-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,443.4 N 5,174,349.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	1.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.90	0.10		[CONCRETE SLAB].								
			Clayey SILT; brown to dark brown. Moist [FILL].						EH224 0.2m G		
+19.50	0.50								EH224 0.4m A		
			SILT; orangish brown with light grey mottling [SPRINGSTON FORMATION].								
+19.30	0.70								EH224 0.7m G		
			Silty SAND; greyish brown.								
+19.10	0.90										
	1		Sandy SILT								
+18.70	1.30										
			Silty SAND						EH224 1.4m G		
+18.55	1.45										
			Sandy SILT								
+18.40	1.60										
			EOH @ 1.60 m								
	2										
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: CHM	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

RILEY CONSULTANTS
Riley Consultants Limited
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Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA207

Job No.:	Start Date: 17-06-20 Finish Date: 17-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,260.9 N 5,174,174.3

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	3.00 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+20.00			
+19.85	0.15		Gravelly fine to medium SAND with some cobbles; greyish brown. Very densely packed; dry. Gravel, fine to coarse, subrounded and subangular [FILL].
			SILT with some sand and trace organics; dark brown. "Firm" to "stiff"; dry to moist. Sand, fine to medium; organics, root and rootlets [SPRINGSTON FORMATION].
+19.50	0.50		0.25m Grades to brown with orange mottling
			Sandy SILT; yellowish brown with orange mottling. "Firm"; moist. Sand, fine to medium.
	1		
			1.20m Grades to SILT with some sand; yellowish brown with orange mottling and grey staining. Moist.
+18.10	1.90		
	2		Fine to medium SAND with some silt; brown. Medium dense to dense; moist.
+17.00	3.00		
			EOH @ 3.00 m

Legend

Soil Shear Strength (kPa): 50 100 150 200

Scala Penetrometer (blows / 50 mm): 3 6 9 12 15

Groundwater

Soil Moisture

Samples: HA207 1.5m G

Tests

Instrument/ Backfill

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[X] Target depth [ ] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

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Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

HAND AUGER LOG

Project:	Location:	Hole position:	No.:
Summerset Prebbleton Springs Road	578-606 Springs Road, Prebbleton	Refer to Site Plan	HA208

Job No.:	Start Date: 18-06-20 Finish Date: 18-06-20	Ground Level (m LINZ):	Co-Ordinates (NZTM2000):
190417		20.00	E 1,560,336.0 N 5,174,188.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	0.60 m	1 of 1

Elevation (m LINZ)	Depth (m)	Geological Unit	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Soil Shear Strength (kPa) 50 100 150 200	Scala Penetrometer (blows / 50 mm) 3 6 9 12 15	Groundwater	Soil Moisture	Samples	Tests	Instrument/ Backfill
+20.00											
+19.70	0.30		Fine to medium SAND with some silt and organics; dark brown. Dry; organics, rootlets [TOPSOIL].								
+19.40	0.60		Fine to medium SAND with minor silt; yellowish brown. Dry (friable) [SPRINGSTON FORMATION]. 0.55m No recovery. Dry (friable).						HA208 0.5m G		
			EOH @ 0.60 m								
	1										
	2										
	3										

Explanations:

- Scala Penetrometer - blows/50mm
- Permeability Test
- Schmidt Hammer
- Insitu Vane Shear Strength (kPa) V=Peak, R=Residual, UTP=Unable to penetrate
- Small Disturbed Sample
- Large Disturbed Sample
- U100 Undisturbed Sample
- Water Strike (1st, 2nd ...)
- Water Rise (1st, 2nd ...) and Rise Time (minutes)

Soil Moisture:
D = dry; M = moist; W = wet; S = saturated

GROUNDWATER

- [X] Not Encountered
- [ ] Slow Seep (depth)
- [ ] Rapid Inflow (depth)

HOLE TERMINATED DUE TO:
[ ] Target depth [X] Refusal [ ] Collapse

Remarks

1. Coordinates based on handheld GPS and elevation from Google Earth.
2. Environmental window sampling with percussion drill rig.
3. Asbestos sampling abbreviated as A and glass jar sampling as G.

All dimensions in metres Scale 1:20	Contractor: Geotechnics	Rig/Plant Used: Window Sampler	Logged by: DL	Checked by: SRO

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH HA 190417 - SUMMERSET PREBBLETON SPRINGS ROAD (ENVIRO) - 2020 V1.GPJ <<DrawingFile>> 17/07/2020 14:48 Produced by gINT Professional

RILEY CONSULTANTS
Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

TEST PIT LOG

Project:	Location:	Hole position:	No.:
Geotech Assessment Resource Consent	578-606 Springs Road, Prebbleton	Refer to Site Plan	TP207

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (NZVD2016):	Co-Ordinates (NZTM2000):
190417		23.4m	E 1,560,140.8 N 5,174,343.5

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	5.00 m	1 of 1

Elevation (m NZVD2016)	Depth (m)	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+23.40	0	
	1	SILT with some gravel minor cobbles and trace organics; medium brown; dry. Gravel, medium to coarse; subrounded to rounded. (NON-ENGINEERED FILL).
+21.40	2.00	
+21.25	2.15	SILT with trace organics; "firm"; moist; dark brown. Organics, rootlets [BURIED TOPSOIL]. (BURIED TOPSOIL)
		SILT with some sand; light orangish brown with grey mottling; very stiff; moist; low plasticity. (SPRINGSTON FORMATION)
+20.40	3.00	
		Silty fine SAND; medium dense; moist.
+19.40	4.00	
		Sandy medium to coarse GRAVEL with some cobbles; brownish grey; moist. Sand, fine to coarse. Gravel, subrounded to rounded. Cobbles max intermediate/long axis 150mm/200mm.
+18.40	5.00	
		END OF HOLE @ 5.00m

Legend: VS/VL, S/L, F/MD, S/VD, VS/VD, F/FR, W, Ms, VS, ES

Groundwater

Scala Penetrometer (blows / 50 mm): 0 3 6 9 12 15 18

Samples + Lab Testing

2.2m: Not tested

Field Testing Results

No. 1
1, 2, 2, 3, 2, 3, 2, 2, 4, 4, 5, 4, 4, 3, 4, 3, 2, 2, 3, 3
P= 182 R= 43
P= 134 R= 25

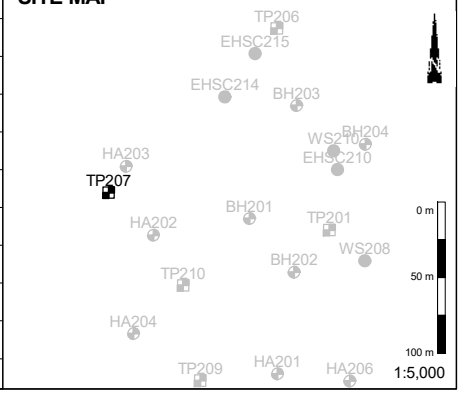
No. 2
2, 2, 2, 2, 2, 1, 2, 2, 2, 2, 3, 2, 2, 3, 3, 2, 1, 2, 2, 2

Instrument/ Backfill

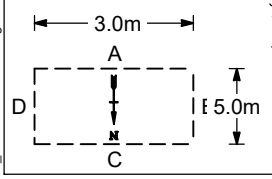
SKETCH



SITE MAP



Shoring/Support:
Stability: Stable



SAMPLES AND TESTING
- Grab Sample (Disturbed)
- Bulk Sample (Disturbed)
- Scala Penetrometer (blows/50mm)
- Insitu Vane Shear Strength (kPa): P: Peak; R: Residual; UTP: Unable to penetrate
- Lab Testing: PSD: particle size dist. OMC: optimum moisture cont.; MDD: max dry density; Disp: dispersivity

GROUNDWATER
- [X] None
- [ ] Slow Seep
- [ ] Rapid Inflow
- Water Strike
- Water Rise
- Time (minutes)

TERMINATION DUE TO
- [X] Target depth
- [ ] Refusal
- [ ] Collapse
- [ ] Machine limit

Remarks
1. Coordinates based on handheld GPS and subject to survey confirmation. Elevation based on data from Graham Surveying (27/02/2020).
2. Strength terms for cohesive soils based on Scala test results, indicated in quotation marks.
3. Test pit starts within bund 2.0m above natural ground level.

All dimensions in metres Scale 1:50	Contractor: Taggart Earthmoving Ltd	Rig/Plant Used: Machine Excavator (13 tonne)	Logged by: DDH	Checked by: AVD

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH TP - SOIL 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2020.GPJ <<DrawingFile>> 17/07/2020 15:08 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

TEST PIT LOG

Project:	Location:	Hole position:	No.:
Geotech Assessment Resource Consent	578-606 Springs Road, Prebbleton	Refer to Site Plan	TP208

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (NZVD2016): 22.9m	Co-Ordinates (NZTM2000): E 1,560,263.5 N 5,174,474.8

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	5.00 m	1 of 1

Elevation (m NZVD2016)	Depth (m)	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+22.90	0	
	1	Gravelly SILT with minor organics; brown; medium brown; moist; low plasticity index. (NON-ENGINEERED FILL).
	2	
+20.40	2.50	
+20.25	2.65	SILT with trace organics; dark brown; "firm"; moist. (BURIED TOPSOIL)
+19.90	3.00	SILT with some sand; light orangish brown with grey mottling; "firm"; moist. (SPRINGSTON FORMATION)
	3	
	4	Fine SAND; grey; dense to very dense; moist. Becoming silty towards base.
+18.80	4.10	
		Sandy medium to coarse GRAVEL with some cobbles; brownish grey; moist. Sand, fine to coarse. Gravel, subrounded to rounded. Cobbles max intermediate/long axis 150mm/200mm.
+17.90	5.00	
	5	END OF HOLE @ 5.00m

Legend

Field Strength: Soil | Rock — VS/VL, S/L, F/MD, St/VD, VSt/VD, H/EW, VW, W, Ms, Vs, ES

Groundwater

Scala Penetrometer (blows / 50 mm): 0 3 6 9 12 15 18

Samples + Lab Testing

Field Testing Results

No. 1
1, 1, 1,
2, 1, 1,
2, 1, 1, UTP
1, 2, 1,
2, 4, 4,
4, 4, 6,
5, 5

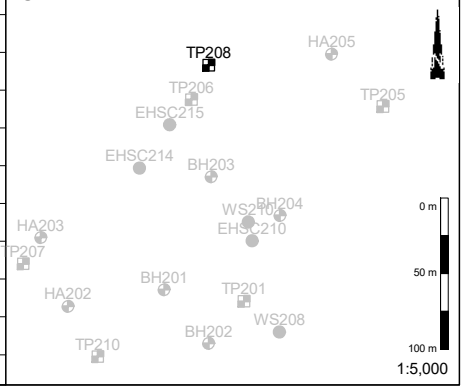
No. 2
6, 8,
11, 10,
9, 9, 9,
5, 6, 9,
7, 9,
10, 16,
18

Instrument/ Backfill

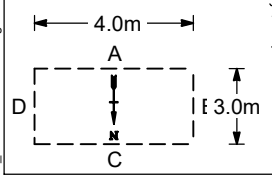
SKETCH/PHOTO



SITE MAP



Shoring/Support:
Stability: Stable



SAMPLES AND TESTING
- Grab Sample (Disturbed)
- Bulk Sample (Disturbed)
- Scala Penetrometer (blows/50mm)
- Insitu Vane Shear Strength (kPa): P: Peak; R: Residual; UTP: Unable to penetrate
- Lab Testing: PSD: particle size dist. OMC: optimum moisture cont.; MDD: max dry density; Disp: dispersivity

GROUNDWATER
- [X] None
- [ ] Slow Seep
- [ ] Rapid Inflow
- Water Strike
- Water Rise
- Time (minutes)

TERMINATION DUE TO
- [X] Target depth
- [ ] Refusal
- [ ] Collapse
- [ ] Machine limit

Remarks
1. Coordinates based on handheld GPS and subject to survey confirmation. Elevation based on data from Graham Surveying (27/02/2020).
2. Strength terms for cohesive soils based on Scala test results, indicated in quotation marks.
3. Test pit starts within bund 2.5m above natural ground level.

All dimensions in metres Scale 1:50	Contractor: Taggart Earthmoving Ltd	Rig/Plant Used: Machine Excavator (13 tonne)	Logged by: DDH	Checked by: AVD

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH TP - SOIL 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2020.GPJ <<DrawingFile>> 17/07/2020 15:09 Produced by gINT Professional

Riley Consultants Limited
Level 1, 4 Fred Thomas Drive
Auckland 0622
Tel: 09 489 7872
Fax:

TEST PIT LOG

Project:	Location:	Hole position:	No.:
Geotech Assessment Resource Consent	578-606 Springs Road, Prebbleton	Refer to Site Plan	TP209

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (NZVD2016):	Co-Ordinates (NZTM2000):
190417		23.0m	E 1,560,201.4 N 5,174,219.1

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	5.60 m	1 of 1

Elevation (m NZVD2016)	Depth (m)	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+23.00	0	
	1	SILT with minor organics and gravel; medium brown; dry. Organics, rootletes. Gravel, fine to mediuml; subrounded to rounded. (NON-ENGINEERED FILL).
+21.00	2.00	
+20.80	2.20	SILT with minor organics; dark brown; "firm to stiff"; dry. Organics, rootlets. (BURIED TOPSOIL)
	3	SILT; mottled greyish brown; very stiff; dry to moist; low plasticity index. (SPRINGSTON FORMATION)
+20.00	3.00	
	4	SILT with some sand; brownish grey; "very stiff" to hard; moist. Sand, fine.
+18.40	4.60	
	5	Sandy medium to coarse GRAVEL with some cobbles; brownish grey; moist. Sand, fine to coarse. Gravel, subrounded to rounded. Cobbles max intermediate/long axis 150mm/200mm.
+17.40	5.60	END OF HOLE @ 5.60m

Legend; Field Strength (Soil | Rock): VSVL, SFT, FWD, STIF, VSTIVD, VSTIV, HDEW, VW, W, MS, VS, ES

Groundwater

Scala Penetrometer (blows / 50 mm): 0 3 6 9 12 15 18

Samples + Lab Testing:
- 2.5m: Not tested
- 3.0m: Grading and compaction

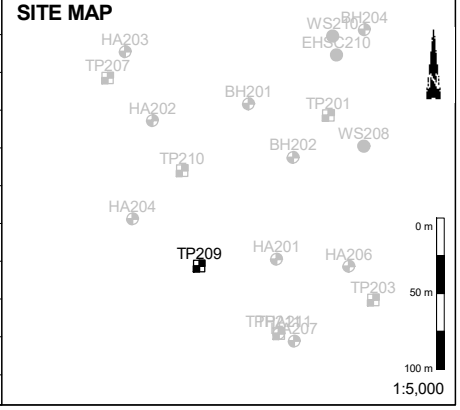
Field Testing Results:
- No. 1: 1, 1, 2, 3, 3, 3, 5, 5, 5, 4, 5, 6, 6, 4, 4, 5, 3, 5, 4, 4
- No. 2: 8, 7, 12, 15, 15
- P= 169 R= 40
- P= >216

Instrument/ Backfill

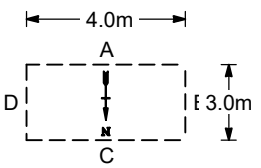
SKETCH/PHC



SITE MAP



Shoring/Support:
Stability: Stable



SAMPLES AND TESTING
- Grab Sample (Disturbed)
- Bulk Sample (Disturbed)
- Scala Penetrometer (blows/50mm)
- Insitu Vane Shear Strength (kPa): P: Peak; R: Residual; UTP: Unable to penetrate
- Lab Testing: PSD: particle size dist. OMC: optimum moisture cont.; MDD: max dry density; Disp: dispersivity

GROUNDWATER
- [ ] None
- [ ] Slow Seep
- [ ] Rapid Inflow
- Water Strike
- Water Rise
- Time (minutes)

TERMINATION DUE TO
- [X] Target depth
- [ ] Refusal
- [ ] Collapse
- [ ] Machine limit

Remarks
1. Coordinates based on handheld GPS and subject to survey confirmation. Elevation based on data from Graham Surveying (27/02/2020).
2. Strength terms for cohesive soils based on Scala test results, indicated in quotation marks.
3. Test pit starts within bund 2.0m above natural ground level.

All dimensions in metres Scale 1:50	Contractor: Taggart Earthmoving Ltd	Rig/Plant Used: Machine Excavator (13 tonne)	Logged by: DDH	Checked by: AVD

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH TP - SOIL 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2020.GPJ <<DrawingFile>> 17/07/2020 15:09 Produced by gINT Professional

Riley Consultants Limited
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Auckland 0622
Tel: 09 489 7872
Fax:

TEST PIT LOG

Project:	Location:	Hole position:	No.:
Geotech Assessment Resource Consent	578-606 Springs Road, Prebbleton	Refer to Site Plan	TP210

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (NZVD2016):	Co-ordinates (NZTM2000):
190417		23.4m	E 1,560,190.1 N 5,174,282.2

Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	5.00 m	1 of 1

Elevation (m NZVD2016)	Depth (m)	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)
+23.40	0	
+21.90	1.50	SILT with some organics; medium brown; dry. (NON-ENGINEERED FILL).
+21.30	2.10	Clayey SILT with trace organics; dark brown; "firm becoming very stiff" with depth; moist. Organics, rootlets. FILL
+19.40	4.00	SILT with some sand; light orangish brown with grey mottling; very stiff; dry to moist. (SPRINGSTON FORMATION)
+18.40	5.00	Sandy medium to coarse GRAVEL with some cobbles; brownish grey; moist. Sand, fine to coarse. Gravel, subrounded to rounded.
		END OF HOLE @ 5.00m

Legend; Field Strength (Soil | Rock): VS/VL, S/L, F/MD, S/MD, VS/VD, F/FW, MW, W, Ms, VS, ES

Groundwater

Scala Penetrometer (blows / 50 mm): 0 3 6 9 12 15 18

Samples + Lab Testing

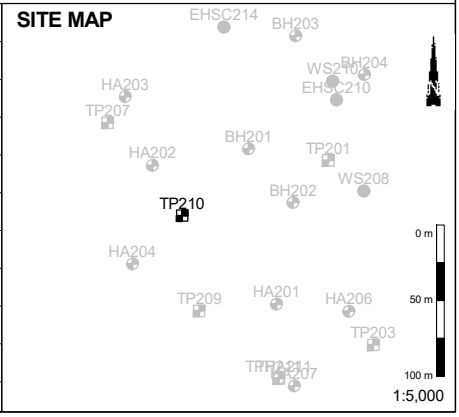
Field Testing Results:
No. 1 1, 1, 1, 3, 3, 4, 5, 6, 6, 6, 6, 3, 3, 2, 2, 3, 3, 3, 2, 3 — P= 200 R= 52
No. 2 4, 8, 4, 5, 12, 19, 19, 20

Instrument/ Backfill

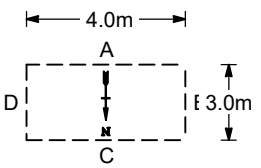
SKETCH/PHOT



SITE MAP



Shoring/Support:
Stability: Stable



SAMPLES AND TESTING
- Grab Sample (Disturbed)
- Bulk Sample (Disturbed)
- Scala Penetrometer (blows/50mm)
- Insitu Vane Shear Strength (kPa): P: Peak; R: Residual; UTP: Unable to penetrate
- Lab Testing: PSD: particle size dist. OMC: optimum moisture cont.; MDD: max dry density; Disp: dispersivity

GROUNDWATER
- [X] None
- [ ] Slow Seep
- [ ] Rapid Inflow
- Water Strike
- Water Rise
- Time (minutes)

TERMINATION DUE TO
- [X] Target depth
- [ ] Refusal
- [ ] Collapse
- [ ] Machine limit

Remarks
1. Coordinates based on handheld GPS and subject to survey confirmation. Elevation based on data from Graham Surveying (27/02/2020).
2. Strength terms for cohesive soils based on Scala test results, indicated in quotation marks.
3. Test pit starts within bund 2.1m above natural ground level.

All dimensions in metres Scale 1:50	Contractor: Taggart Earthmoving Ltd	Rig/Plant Used: Machine Excavator (13 tonne)	Logged by: DDH	Checked by: AVD

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH TP - SOIL 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2020.GPJ <<DrawingFile>> 17/07/2020 15:09 Produced by gINT Professional

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Level 1, 4 Fred Thomas Drive
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Fax:

TEST PIT LOG

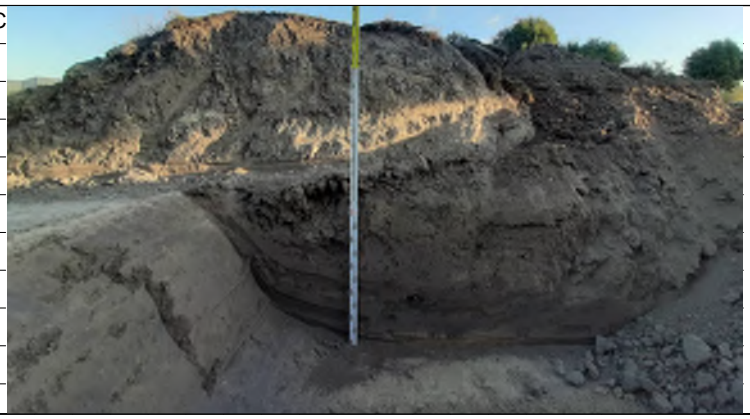
Project:	Location:	Hole position:	No.:
Geotech Assessment Resource Consent	578-606 Springs Road, Prebbleton	Refer to Site Plan	TP211

Job No.:	Start Date: 16-06-20 Finish Date: 16-06-20	Ground Level (NZVD2016): 23.0m	Co-ordinates (NZTM2000): E 1,560,254.0 N 5,174,174.5

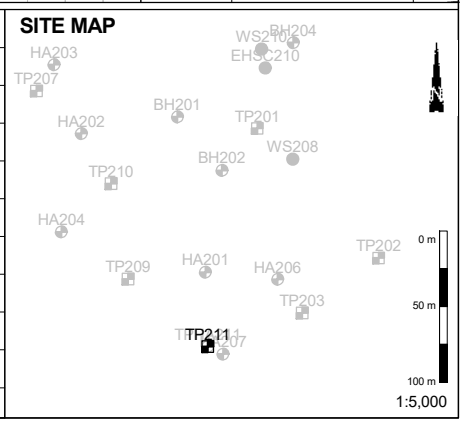
Client:	Hole Depth:	Sheet:
Summerset Group Holdings Ltd	2.60 m	1 of 1

Elevation (m NZVD2016)	Depth (m)	Geological Description (refer to separate Geotechnical and Geological Information sheet for further information)	Legend	Field Strength (Soil / Rock)	Groundwater	Scala Penetrometer (blows / 50 mm)	Samples + Lab Testing	Field Testing Results	Instrument/ Backfill
+23.00	0					0 3 6 9 12 15 18			
+21.60	1.40	SILT with some gravel and minor organics; brown; dry. Gravel, fine to coarse; subangular to rounded. Organics, rootlets. (NON-ENGINEERED FILL).							
+20.40	2.60	SILT with some organics; dark brown; moist. Organics, small tree roots. (FILL)							
		END OF HOLE @ 2.60m							

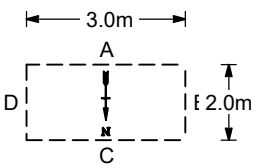
SKETCH



SITE MAP



Shoring/Support:
Stability: Stable



SAMPLES AND TESTING
- Grab Sample (Disturbed)
- Bulk Sample (Disturbed)
- Scala Penetrometer (blows/50mm)
- Insitu Vane Shear Strength (kPa): P: Peak; R: Residual; UTP: Unable to penetrate
- Lab Testing: PSD: particle size dist. OMC: optimum moisture cont.; MDD: max dry density; Disp: dispersivity

GROUNDWATER
- [X] None
- [ ] Slow Seep
- [ ] Rapid Inflow
- Water Strike
- Water Rise
- Time (minutes)

TERMINATION DUE TO
- [ ] Target depth
- [ ] Refusal
- [ ] Collapse
- [X] Machine limit

Remarks
1. Coordinates based on handheld GPS and subject to survey confirmation. Elevation based on data from Graham Surveying (27/02/2020).
2. Test pit starts within bund 1.4m above natural ground level.
3. Excavator broke down at 2.6m depth.
4. Hand auger TPHA211 undertaken from ground level beside bund due to excavator breakdown.

All dimensions in metres Scale 1:50	Contractor: Taggart Earthmoving Ltd	Rig/Plant Used: Machine Excavator (13 tonne)	Logged by: DDH	Checked by: AVD

RILEY AGS 3_1 NZ LIB 13.GLB Log RILEY CHCH TP - SOIL 190417 - SUMMERSET PREBBLETON SPRINGS ROAD - 2020.GPJ <<DrawingFile>> 17/07/2020 15:09 Produced by gINT Professional

APPENDIX E

2019 and 2020 Results Tables

Appendix E: 2019 Soil Analytical Results

Sample	NES-CS Outdoor Worker [6] (unpaved)	NES-CS High-density residential [1]	Burwood Resource Recovery Park acceptance criteria[2]	Background Concentrations[4] (default cleanfill criteria)	HA1 1.8	HA2 0.1	HA2 1.0	HA2 1.7	HA3 0.2	HA3 0.7	HA3 1.5	HA4 0.3	HA4 0.7	HA5 0.1	HA5 0.6	HA6 0.6	HA6 1.0
Depth (m)					1.8	0.1	1	1.7	0.2	0.7	1.5	0.3	0.7	0.1	0.6	0.6	1
Location					Southern grassed portion of the site												
Date					30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19
Asbestos in Soils [5]																	
Presence/Absence	-		ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Arsenic	70	45	80	4.9	**9.5**	-	**5.8**	4.5	-	**5.6**	3.7	**5.5**	4.5	**6.1**	**5.3**	**7.6**	3.7
Cadmium	1,300	230	400	0.1	0.045	-	0.026	0.033	-	0.025	0.024	0.064	0.03	**0.11**	0.035	0.046	0.036
Chromium	>10,000	1,500	2700	16.9	**20.5**	-	**18.6**	16.9	-	**19.9**	12.7	16.4	**17.5**	16.7	**19.1**	**22.5**	**18.4**
Copper	>10,000	>10,000	>10,000	12.4	**13.1**	-	**14.3**	10.8	-	9.58	6.9	6.7	6.3	8.13	8.01	**16.5**	11.8
Lead	3,300	500	880	21.3	**23.1**	-	18.5	16.8	-	17.8	10.6	16.9	14.3	16.9	15.3	**23.7**	16.4
Nickel	6,000 [7]	400 [9]	600	13.1	**18.8**	-	**15.7**	**14.2**	-	**14.9**	10.8	12.5	**14.2**	11.7	**15.2**	**19.1**	**14.3**
Zinc	400,000 [7]	7400 [9]	14,000	69.6	69.4	-	54.1	52.2	-	53	37	59.1	47.5	**74.5**	48.5	67.7	51.6
Polycyclic Aromatic Hydrocarbons (PAH) *																	
Acenaphthene	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Acenaphthylene	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Anthracene	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Benzo[a]anthracene*	-	-	-	-	-	-	-	-	-	<0.02	-	<0.02	-	-	<0.02	<0.02	
Benzo[a]pyrene (BAP)*	-	-	40	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Benzo[b]fluoranthene + Benzo[j]fluoranthene*	-	-	-	-	-	-	-	-	-	<0.02	-	<0.02	-	-	<0.02	<0.02	
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-	<0.02	-	<0.02	-	-	<0.02	<0.02	
Benzo[k]fluoranthene*	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Chrysene*	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Dibenzo[a,h]anthracene*	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Fluoranthene*	-	-	-	-	-	-	-	-	-	<0.02	-	<0.02	-	-	<0.02	<0.02	
Fluorene	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Indeno(1,2,3-c,d)pyrene*	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Naphthalene	230 [3]	70 [8]	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Phenanthrene	-		-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	<0.01	
Pyrene	-		-	-	-	-	-	-	-	<0.02	-	<0.02	-	-	<0.02	<0.02	
BaP Equivalent	35	24	-	-	-	-	-	-	-		-		-	-			
Organochlorine Pesticides^																	
4.4'-DDE	-	-	-	-	<0.005	**0.013**	<0.005	-	**0.008**	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005

Notes:

BOLD indicates concentrations exceed Background concentration (default cleanfill criteria)

Underlined values indicate concentrations exceed Environmental Protection Criteria, permitted activity criteria set out in the AUP-OP

GREY SHADING indicates concentrations exceed Human Health protection criteria for residential landuse 10% Produce

All values in mg/kg

^ - Full suites OCP's were anaylised, only concentration >LOR are recorded

- indicates not analysed or no relevant acceptance criteria

< indicates concentrations reported are below the laboratory limit of reporting (LOR)

NA - indicates astimated criterion exceeds 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. / contaminant not limiting as estimated health- based criterion is significantly higher than that likely to be encountered on site (ie 20,000mg/kg for TPH, 10,000 mg/kg for other contaminants)

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of

1 - NES-CS Users' Guide soil contminant standard for High-density residential landuse, Ministry for the Environment (MfE, April 2012).

2 - Burwood Resource Recovery Park acceptance criteria.

3 - MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commercial Industrial, Table 4.11 and 4.14, Sand 1-4m

4 - Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch Region.

5 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Table 4.14: Tier 1 soil acceptance criteria for TPH, Commercial / Industrial, Sandy Silt

6 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Table 4.11: Tier 1 soil acceptance criteria , Commercial / Industrial, Sandy Silt

7 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Table 4.20: Tier 1 soil acceptance criteria for the protection of groundwater quality, Sandy Silt 1m-4m and GW 4m

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

6 - NES-CS Users' Guide soil contminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for the Environment (MfE, April 2012).

7 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Industrial, Table 1A

8 - MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Residential use , Table 4.20, Sand 1-4m

9 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL A, Table 1A

Appendix E: 2019 Soil Analytical Results

Sample	NES-CS Outdoor Worker [6] (unpaved)	NES-CS High-density residential [1]	Burwood Resource Recovery Park acceptance criteria[2]	Background Concentrations[4] (default cleanfill criteria)	HA6 1.2	HA7 0.6	HA7 1.55	HA8 0.7	HA9 0.1	HA9 0.6	HA10 0.4	HA10 0.8	HA11 0.1	HA11 0.5	HA12 0.6	HA12 1.1	HA13 0.1
Depth (m)					1.2	0.6	1.55	0.7	0.1	0.6	0.4	0.8	0.1	0.5	0.6	1.1	0.1
Location					Southern grassed portion of the site										Eastern portion of the site, located at the middle entrance off Springs road		
Date					30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19
Asbestos in Soils [5]																	
Presence/Absence	-		ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Arsenic	70	45	80	4.9	3.1	**5.8**	3.6	3.1	**6**	**5**	**6.3**	**5.2**	**201**	**11**	**5**	**5.5**	**5.6**
Cadmium	1,300	230	400	0.1	0.029	0.033	0.017	0.041	0.06	0.035	0.033	0.022	**0.733**	**0.13**	0.052	0.031	**0.12**
Chromium	>10,000	1,500	2700	16.9	14.4	**20.4**	11	14.5	**20.4**	16.8	**19.9**	16.4	**320**	**24.3**	16.5	**19.2**	16.6
Copper	>10,000	>10,000	>10,000	12.4	6.8	10.6	4.9	7.85	7.99	6.3	12	9.13	**243**	**17**	7.91	**13.1**	8.94
Lead	3,300	500	880	21.3	11.1	15.6	9.95	14	17.9	14	17.7	15.4	**30.6**	18.7	15.9	20.1	35
Nickel	6,000 [7]	400 [9]	600	13.1	11	**15.2**	10.4	12.3	**14.8**	12.5	**15.8**	12.8	**33.9**	13.9	12.6	**17.1**	12.4
Zinc	400,000 [7]	7400 [9]	14,000	69.6	41.9	48.6	32.9	54.5	63.7	43.7	57.4	48.4	**1160**	**127**	45.6	63.9	**78.6**
Polycyclic Aromatic Hydrocarbons (PAH) *																	
Acenaphthene	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Acenaphthylene	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Anthracene	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Benzo[a]anthracene*	-	-	-	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	-
Benzo[a]pyrene (BAP)*	-	-	40	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene*	-	-	-	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	-
Benzo[g,h,i]perylene	-	-	-	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	-
Benzo[k]fluoranthene*	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Chrysene*	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Dibenzo[a,h]anthracene*	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Fluoranthene*	-	-	-	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	-
Fluorene	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Indeno(1,2,3-c,d)pyrene*	-	-	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Naphthalene	230 [3]	70 [8]	-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Phenanthrene	-		-	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01	-
Pyrene	-		-	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	-
BaP Equivalent	35	24	-	-				-	-			-	-	-			-
Organochlorine Pesticides^																	
4.4'-DDE	-	-	-	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	<0.005	-	-	-

Notes:

BOLD indicates concentrations exceed Background concentration (default cleanfill criteria)

Underlined values indicate concentrations exceed Environmental Protection Criteria, permitted activity criteria set out in the

GREY SHADING indicates concentrations exceed Human Health protection criteria for residential landuse 10% Produce

All values in mg/kg

^ - Full suites OCP's were anaylised, only concentration >LOR are recorded

- indicates not analysed or no relevant acceptance criteria

< indicates concentrations reported are below the laboratory limit of reporting (LOR)

NA - indicates astimated criterion exceeds 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. /

health- based criterion is significantly higher than that likely to be encountered on site (ie 20,000mg/kg for TPH, 10,000 mg/k

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent c

1 - NES-CS Users' Guide soil contminant standard for High-density residential landuse, Ministry for the Environment (MfE, A

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7 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydı

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6 - NES-CS Users' Guide soil contminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for

7 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Inc

8 - MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 20

9 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL

Appendix E: 2019 Soil Analytical Results

Sample	NES-CS Outdoor Worker [6] (unpaved)	NES-CS High-density residential [1]	Burwood Resource Recovery Park acceptance criteria[2]	Background Concentrations[4] (default cleanfill criteria)	HA14 0.6	HA15 0.6	HA16 0.6	HA17 0.5	HA18 0.2	HA19 0.2	HA19 0.5	HA20 0.6	HA20 1.1	S1	S1 Fragment
Depth (m)					0.6	0.6	0.6	0.5	0.2	0.2	0.5	0.6	1.1	surficial soil	fragment
Location					Central grass seperating the warehouse from the southern paddock		Western Boundary	Northern grass strip						Located next to the northern most entrance	
Date					31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	31-Oct-19	30-Oct-19	30-Oct-19
Asbestos in Soils [5]															
Presence/Absence	-		ND	-	-	-	-	-	-	-	-	-	-	ND	Chrysotile, Amosite, Crocidolite Fibres
Metals															
Arsenic	70	45	80	4.9	**8.2**	**6.3**	**5.1**	4.1	4.4	4.5	**5.7**	**7.1**	3.9	-	-
Cadmium	1,300	230	400	0.1	0.032	0.028	0.031	0.053	**0.14**	**0.11**	0.036	0.033	0.018	-	-
Chromium	>10,000	1,500	2700	16.9	**21.7**	**22.1**	16.7	16.1	15.6	15.2	**22.2**	**19.4**	14.7	-	-
Copper	>10,000	>10,000	>10,000	12.4	**12.8**	11.4	6.5	5.4	5.4	5.1	5.4	12.7	6.9	-	-
Lead	3,300	500	880	21.3	24	18.5	15.6	13.4	**25.3**	**24.9**	18.3	**24**	11.5	-	-
Nickel	6,000 [7]	400 [9]	600	13.1	**18.4**	**17.9**	**14**	**13.6**	11.8	11.7	**14.8**	**17.4**	11.7	-	-
Zinc	400,000 [7]	7400 [9]	14,000	69.6	62.1	56.8	47.7	47.3	**71.7**	**75.9**	54.4	59.1	41.5	-	-
Polycyclic Aromatic Hydrocarbons (PAH) *															
Acenaphthene	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Acenaphthylene	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Anthracene	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Benzo[a]anthracene*	-	-	-	-	<0.02	-	-	<0.02	-	-	-	<0.02	-	-	-
Benzo[a]pyrene (BAP)*	-	-	40	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene*	-	-	-	-	<0.02	-	-	<0.02	-	-	-	<0.02	-	-	-
Benzo[g,h,i]perylene	-	-	-	-	<0.02	-	-	<0.02	-	-	-	<0.02	-	-	-
Benzo[k]fluoranthene*	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Chrysene*	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Dibenzo[a,h]anthracene*	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Fluoranthene*	-	-	-	-	<0.02	-	-	<0.02	-	-	-	<0.02	-	-	-
Fluorene	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Indeno(1,2,3-c,d)pyrene*	-	-	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Naphthalene	230 [3]	70 [8]	-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Phenanthrene	-		-	-	<0.01	-	-	<0.01	-	-	-	<0.01	-	-	-
Pyrene	-		-	-	<0.02	-	-	<0.02	-	-	-	<0.02	-	-	-
BaP Equivalent	35	24	-	-		-	-		-	-	-		-	-	-
Organochlorine Pesticides^															
4.4'-DDE	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	-	-

Notes:

BOLD indicates concentrations exceed Background concentration (default cleanfill criteria)

Underlined values indicate concentrations exceed Environmental Protection Criteria, permitted activity criteria set out in the

GREY SHADING indicates concentrations exceed Human Health protection criteria for residential landuse 10% Produce

All values in mg/kg

^ - Full suites OCP's were anaylised, only concentration >LOR are recorded

- indicates not analysed or no relevant acceptance criteria

< indicates concentrations reported are below the laboratory limit of reporting (LOR)

NA - indicates astimated criterion exceeds 20,000 mg/kg residual separate phase is expected to have formed in soil matrix.

health- based criterion is significantly higher than that likely to be encountered on site (ie 20,000mg/kg for TPH, 10,000 mg/k

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent c

1 - NES-CS Users' Guide soil contminant standard for High-density residential landuse, Ministry for the Environment (MfE, A

2 - Burwood Resource Recovery Park acceptance criteria.

3 - MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 20

4 - Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch

5 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hyc

6 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydi

7 - Ministry for the Environment (MfE, Revised 2011). Users Guide: Guidelines for Assessing and Managing Petroleum Hydi

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

6 - NES-CS Users' Guide soil contminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for

7 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Inc

8 - MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 20

9 - NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL

Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	EH201	EH201	EH201	EH202	EH202	EH203	EH203	EH204	EH204	EH204	EH205	EH205
Depth (m)					0.2	0.3	1	0.8	1.3	0.6	1.3	0.4	0.7	1.4	0.5	1.4
Location					Parking bay			Historical location of AST		Wash bay						
Date Sampled					15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20
Asbestos in Soils [5]																
Presence/Absence					ND								ND			
Metals																
Arsenic	70	45	80	4.9	-	**5.6**	**8.8**	**9.1**	**8.2**	4	**5.6**	**8.1**	-	3.7	**9.2**	**8.4**
Cadmium	1300	230	400	0	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4
Chromium	>10,000	1,500	2,700	17	-	14	17	17	17	**19**	16	17	**-**	13	**19**	16
Copper	>10,000	>10,000	>10,000	12.4	-	7.4	8.7	**13**	10	**15**	9.3	9	**-**	6.9	9	12
Lead	3300	500	880	21	-	17	21	**22**	19	**28**	14	17	**-**	13	21	21
Nickel	6,000 [6]	400 [7]	600	13	-	11	**15**	**16**	**14**	**17**	**14**	**14**	**-**	10	**16**	13
Zinc	400,000 [6]	7400 [7]	14,000	70	**-**	70	69	69	64	**74**	58	56	**-**	46	59	61
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Acenaphthylene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Anthracene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Benzo[b +j]fluoranthene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Benzo[g,h,i]perylene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Benzo[k]fluoranthene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Chrysene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Dibenzo[a,h]anthracene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Fluoranthene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Fluorene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	-	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Naphthalene	210 [8]	63 [9]	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
Phenanthrene	-		-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Pyrene	-		-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
BaP Equivalent *	11 [8]	0.27 [9]	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03
Total Petroleum Hydrocarbons																
C7 - C9	500 [10]	500 [11]	-	-	-	-	-	< 5	< 5	< 5	< 5	-	-	-	-	-
C10 - C14	1,700 [10]	510 [11]	-	-	-	-	-	< 10	< 10	< 10	< 10	-	-	-	-	-
C15 - C36	NA	NA	-	-	-	-	-	< 20	< 20	< 20	< 20	-	-	-	-	-
Phenols																
Pentachlorophenol	360	110	-	-		< 1				< 1		< 1			< 1	
Organochlorine Pesticides^																
2.4'-DDT	1000	240	-	-	-	< 0.01	< 0.01	-	-	-	< 0.01	< 0.01	-	-	< 0.01	< 0.01
4.4'-DDD	-	-	-	-	-	**0.01**	< 0.01	-	-	-	< 0.01	< 0.01	-	-	< 0.01	< 0.01
4.4'-DDE	-	-	-	-	-	**0.04**	< 0.01	-	-	-	< 0.01	< 0.01	-	-	< 0.01	< 0.01
4.4'-DDT	-	-	-	-	-	< 0.01	< 0.01	-	-	-	< 0.01	< 0.01	-	-	< 0.01	< 0.01
DDT + DDE + DDD (Total)*	-	-	-	-	-	**0.05**	< 0.01	-	-	-	< 0.01	< 0.01	-	-	< 0.01	< 0.01

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.

^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

1 NES-CS Users' Guide soil contaminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for the Environment (MfE, April 2012).

2 MfE, 2011. NES User's guide soil contaminant standards for High-density residential landuse.

3 Burwood Resource Recovery Park acceptance criteria.

4 Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch Region.

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

6 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Industrial, Table 1A

7 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL A, Table 1A

8 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commercial/Industrial use , Table 4.11, Sandy Silt (<1m)

9 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Residential use , Table 4.10, Sandy Silt (<1m)

10 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commercial/Industrial use , Table 4.14, Sandy Silt (<1m)

11 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Residential use , Table 4.13, Sandy Silt (<1m)

Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	EH206	EH206	EH206	EH208	EH208	EH208	EH209	EH209	EH209	EH210	EH210	EH211
Depth (m)					0.3	0.4	1.1	0.5	0.8	1	0.4	0.5	1.2	0.3	1.3	0.5
Location					Processing line			Parking bay			Engineering workshop					Chemical Storage room
Date Sampled					15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20
Asbestos in Soils [5]																
Presence/Absence						ND			ND		ND					
Metals																
Arsenic	70	45	80	4.9	**7.3**	-	**6.9**	**7.8**	-	**11**	-	**10**	**6.9**	**6.8**	**9**	**29**
Cadmium	1300	230	400	0	< 0.4	-	< 0.4	< 0.4	-	< 0.4	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	>10,000	1,500	2,700	17	**18**	**-**	**18**	**18**	**-**	**20**	**-**	15	14	17	**18**	**22**
Copper	>10,000	>10,000	>10,000	12.4	7.2	**-**	**14**	8.2	**-**	**15**	**-**	**13**	8.4	5.3	11	10
Lead	3300	500	880	21	17	**-**	**24**	21	**-**	**29**	**-**	16	15	17	21	21
Nickel	6,000 [6]	400 [7]	600	13	**14**	**-**	**15**	**14**	**-**	**19**	**-**	11	12	13	**15**	**15**
Zinc	400,000 [6]	7400 [7]	14,000	70	55	**-**	**72**	60	**-**	**80**	**-**	**81**	48	55	63	63
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[b +j]fluoranthene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[g,h,i]perylene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[k]fluoranthene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo[a,h]anthracene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	-	-	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	210 [8]	63 [9]	-	-	< 0.1	-	< 0.1	< 0.1	-	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	-		-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	-		-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
BaP Equivalent *	11 [8]	0.27 [9]	-	-	< 0.03	-	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Total Petroleum Hydrocarbons																
C7 - C9	500 [10]	500 [11]	-	-	< 5	-	-	< 5	-	-	-	< 5	< 5	< 5	-	< 5
C10 - C14	1,700 [10]	510 [11]	-	-	< 10	-	-	< 10	-	-	-	< 10	< 10	< 10	-	< 10
C15 - C36	NA	NA	-	-	< 20	-	-	< 20	-	-	-	**55**	**21**	< 20	-	< 20
Phenols																
Pentachlorophenol	360	110	-	-												
Organochlorine Pesticides^																
2.4'-DDT	1000	240	-	-	< 0.01	-	-	< 0.01	-	-	-	< 0.01	< 0.01	< 0.01	-	-
4.4'-DDD	-	-	-	-	< 0.01	-	-	< 0.01	-	-	-	< 0.01	< 0.01	< 0.01	-	-
4.4'-DDE	-	-	-	-	< 0.01	-	-	< 0.01	-	-	-	**0.03**	< 0.01	< 0.01	-	-
4.4'-DDT	-	-	-	-	< 0.01	-	-	< 0.01	-	-	-	< 0.01	< 0.01	< 0.01	-	-
DDT + DDE + DDD (Total)*	-	-	-	-	< 0.01	-	-	< 0.01	-	-	-	**0.03**	< 0.01	< 0.01	-	-

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.

^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

1 NES-CS Users' Guide soil contaminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for the Environme

2 MfE, 2011. NES User's guide soil contaminant standards for High-density residential landuse.

3 Burwood Resource Recovery Park acceptance criteria.

4 Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch Region.

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

6 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Industrial, Table 1

7 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL A, Table 1A

8 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commerci

9 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Residentia

10 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commer

11 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Resident

Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	EH211	EH211	EH212	EH212	EH212	EH213	EH213	EH214	EH214	EH214	EH215	EH215
Depth (m)					0.7	1.4	0.3	0.5	1.3	0.3	1.5	0.4	0.5	1.3	0.4	0.5
Location					Chemical Storage room		Growing room			Historical location of AST		Lime and Peat storage				
Date Sampled					16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20
Asbestos in Soils [5]																
Presence/Absence					ND			ND				ND				ND
Metals																
Arsenic	70	45	80	4.9	-	**6**	**7.8**	-	**11**	**7.9**	**6.2**	-	**8.5**	**5.6**	4.3	-
Cadmium	1300	230	400	0	-	< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4	-
Chromium	>10,000	1,500	2,700	17	-	14	**19**	-	**19**	14	**19**	-	17	16	13	-
Copper	>10,000	>10,000	>10,000	12.4	-	7.6	6.3	-	**18**	6.8	8.1	-	7.5	12	9.5	-
Lead	3300	500	880	21	-	15	20	-	**22**	19	18	-	18	18	14	-
Nickel	6,000 [6]	400 [7]	600	13	-	12	**14**	-	**18**	11	**15**	-	13	**15**	10	-
Zinc	400,000 [6]	7400 [7]	14,000	70	-	49	67	-	**82**	**80**	69	-	55	63	44	-
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Acenaphthylene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Anthracene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Benzo[a]anthracene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Benzo[a]pyrene (BAP)	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Benzo[b +j]fluoranthene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Benzo[g,h,i]perylene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Benzo[k]fluoranthene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Chrysene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Dibenzo[a,h]anthracene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Fluoranthene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	**0.04**	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Fluorene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Indeno(1,2,3-c,d)pyrene	-	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Naphthalene	210 [8]	63 [9]	-	-	-	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	-
Phenanthrene	-		-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Pyrene	-		-	-	-	< 0.03	< 0.03	-	< 0.03	**0.04**	< 0.03	-	< 0.03	< 0.03	< 0.03	-
BaP Equivalent *	11 [8]	0.27 [9]	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-
Total Petroleum Hydrocarbons																
C7 - C9	500 [10]	500 [11]	-	-	-	-	< 5	-	-	< 5	-	-	< 5	-	< 5	-
C10 - C14	1,700 [10]	510 [11]	-	-	-	-	< 10	-	-	< 10	-	-	< 10	-	< 10	-
C15 - C36	NA	NA	-	-	-	-	< 20	-	-	**27**	-	-	< 20	-	< 20	-
Phenols																
Pentachlorophenol	360	110	-	-									< 1		< 1	
Organochlorine Pesticides^																
2.4'-DDT	1000	240	-	-	-	-	< 0.01	-	-	**0.02**	-	-	< 0.01	-	< 0.01	-
4.4'-DDD	-	-	-	-	-	-	< 0.01	-	-	**0.01**	-	-	< 0.01	-	< 0.01	-
4.4'-DDE	-	-	-	-	-	-	< 0.01	-	-	**0.22**	-	-	< 0.01	-	< 0.01	-
4.4'-DDT	-	-	-	-	-	-	< 0.01	-	-	**0.08**	-	-	< 0.01	-	< 0.01	-
DDT + DDE + DDD (Total)*	-	-	-	-	-	-	< 0.01	-	-	**0.33**	-	-	< 0.01	-	< 0.01	-

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.

^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

1 NES-CS Users' Guide soil contaminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for the Environme

2 MfE, 2011. NES User's guide soil contaminant standards for High-density residential landuse.

3 Burwood Resource Recovery Park acceptance criteria.

4 Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch Region.

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

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7 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL A, Table 1A

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11 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Resident

Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	EH215	EH216	EH216	EH217	EH217	EH218	EH218	EH219	EH219	EH220	EH220	EH220
Depth (m)					1.4	0.4	1	0.3	1	0.3	1.4	0.3	0.9	0.3	0.4	1
Location					Lime and Peat storage	Historical location of AST		Boiler room and Historical and current AST						Growing room		
Date Sampled					17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20
Asbestos in Soils [5]																
Presence/Absence															ND	
Metals																
Arsenic	70	45	80	4.9	**8.5**	**9.4**	**8**	**9.5**	3.8	**7.5**	**7.3**	**8.4**	**45**	**6.6**	-	**6.6**
Cadmium	1300	230	400	0	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	< 0.4
Chromium	>10,000	1,500	2,700	17	17	**19**	**18**	**19**	15	17	17	**18**	13	13	**-**	**22**
Copper	>10,000	>10,000	>10,000	12.4	11	12	12	8.8	6.1	5.9	10	**< 5**	9.2	7.2	**-**	10
Lead	3300	500	880	21	21	21	19	20	12	19	17	20	12	14	**-**	18
Nickel	6,000 [6]	400 [7]	600	13	**14**	**15**	**16**	**16**	11	12	13	**14**	13	9.8	**-**	**16**
Zinc	400,000 [6]	7400 [7]	14,000	70	60	60	64	**71**	49	**77**	**76**	**76**	**160**	49	**-**	63
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Acenaphthylene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Benzo[a]anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Benzo[a]pyrene (BAP)	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Benzo[b +j]fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Benzo[g,h,i]perylene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Benzo[k]fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Chrysene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Dibenzo[a,h]anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Fluorene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Indeno(1,2,3-c,d)pyrene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Naphthalene	210 [8]	63 [9]	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
Phenanthrene	-		-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Pyrene	-		-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
BaP Equivalent *	11 [8]	0.27 [9]	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03
Total Petroleum Hydrocarbons																
C7 - C9	500 [10]	500 [11]	-	-	-	< 5	< 5	< 5	< 5	< 5	< 5	< 5	-	-	-	-
C10 - C14	1,700 [10]	510 [11]	-	-	-	**99**	< 10	< 10	< 10	< 10	< 10	< 10	-	-	-	-
C15 - C36	NA	NA	-	-	-	**680**	< 20	**82**	< 20	**29**	< 20	< 20	-	-	-	-
Phenols																
Pentachlorophenol	360	110	-	-												
Organochlorine Pesticides^																
2.4'-DDT	1000	240	-	-	-	< 0.01	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01
4.4'-DDD	-	-	-	-	-	< 0.01	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01
4.4'-DDE	-	-	-	-	-	< 0.01	-	-	-	-	-	< 0.01	-	**0.01**	-	< 0.01
4.4'-DDT	-	-	-	-	-	< 0.01	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01
DDT + DDE + DDD (Total)*	-	-	-	-	-	< 0.01	-	-	-	-	-	< 0.01	-	**0.01**	-	< 0.01

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.

^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

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2 MfE, 2011. NES User's guide soil contaminant standards for High-density residential landuse.

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Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	EH221	EH221	EH222	EH222	EH222	EH223	EH223	EH223	EH224	EH224	EH224	TP207	TP207	TP208
Depth (m)					0.4	1.5	0.4	0.5	1.4	0.4	0.5	1.4	0.2	0.7	1.4	0.5	1	1
Location					Pasteurizing unit		Growing room						Main office/reception			Bund		Decommisioned setteling tank
Date Sampled					19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20
Asbestos in Soils [5]																		
Presence/Absence							ND			ND						ND		
Metals																		
Arsenic	70	45	80	4.9	**5.5**	**5.7**	-	**5.8**	4.4	-	2.4	**6.3**	**5.7**	**7.1**	**5.4**	**7.9**	**5.7**	**6.1**
Cadmium	1300	230	400	0	< 0.4	< 0.4	-	< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	>10,000	1,500	2,700	17	12	17	-	17	15	-	15	16	14	**19**	15	16	14	15
Copper	>10,000	>10,000	>10,000	12.4	7.5	9.5	-	9	6.8	-	5.9	8.8	**< 5**	8.8	7.6	8	6.8	5.2
Lead	3300	500	880	21	13	16	-	16	16	-	11	18	17	19	14	21	18	17
Nickel	6,000 [6]	400 [7]	600	13	10	13	-	**14**	12	-	12	12	11	13	12	11	11	11
Zinc	400,000 [6]	7400 [7]	14,000	70	50	58	-	55	51	-	49	62	64	56	53	**74**	**72**	65
Polycyclic Aromatic Hydrocarbons																		
Acenaphthene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[b +j]fluoranthene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[g,h,i]perylene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[k]fluoranthene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo[a,h]anthracene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	-	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	210 [8]	63 [9]	-	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	-		-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	-		-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
BaP Equivalent *	11 [8]	0.27 [9]	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Total Petroleum Hydrocarbons																		
C7 - C9	500 [10]	500 [11]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10 - C14	1,700 [10]	510 [11]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15 - C36	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols																		
Pentachlorophenol	360	110	-	-														
Organochlorine Pesticides^																		
2.4'-DDT	1000	240	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-	-	-	-	-	-	-
4.4'-DDD	-	-	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-	-	-	-	-	-	-
4.4'-DDE	-	-	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-	-	-	-	-	-	-
4.4'-DDT	-	-	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-	-	-	-	-	-	-
DDT + DDE + DDD (Total)*	-	-	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-	-	-	-	-	-	-

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.
* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.
^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

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Appendix E: 2020 Soil Analytical Results

Sample ID	NES-CS Outdoor Worker [1] (unpaved)	NES-CS High-density residential [2]	Burwood Resource Recovery Park acceptance criteria[3]	Background Concentrations[4]	TP208	TP209	TP209	TP210	TP211	HA206	HA206	HA207	HA208	S1	S2	S3	S4
Depth (m)					2	0.8	1.5	1	1	0.4	1.5	1.5	0.5	0	0	0	0
Location					Decommissioned setteling tank	Bund				Eastern grassed portion				Southern corner (residential property)			
Date Sampled					16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20				
Asbestos in Soils [5]																	
Presence/Absence						ND								ND	ND	Chrysotile 0.0016%	ND
Metals																	
Arsenic	70	45	80	4.9	4.8	**6.5**	**5.5**	**6.6**	**5.6**	**5.9**	**7.9**	**5.8**	**6.4**	69	**44**	67	**11**
Cadmium	1300	230	400	0	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	>10,000	1,500	2,700	17	11	15	14	14	15	16	**19**	16	16	**70**	17	**40**	15
Copper	>10,000	>10,000	>10,000	12.4	5.5	6.9	6.8	6.7	6.9	5.5	12	11	7.1	**84**	**14**	**37**	**13**
Lead	3300	500	880	21	9.6	16	18	18	17	17	21	18	18	**33**	19	20	**25**
Nickel	6,000 [6]	400 [7]	600	13	8.6	11	**18**	11	11	12	**16**	13	12	**34**	9.2	9.8	9.4
Zinc	400,000 [6]	7400 [7]	14,000	70	40	68	**72**	**71**	**71**	64	70	59	63	**1300**	**340**	**400**	**110**
Polycyclic Aromatic Hydrocarbons																	
Acenaphthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Acenaphthylene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Benzo[a]anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Benzo[a]pyrene (BAP)	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Benzo[b +j]fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Benzo[g,h,i]perylene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Benzo[k]fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Chrysene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Dibenzo[a,h]anthracene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Fluoranthene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Fluorene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Indeno(1,2,3-c,d)pyrene	-	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Naphthalene	210 [8]	63 [9]	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-
Phenanthrene	-		-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Pyrene	-		-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
BaP Equivalent *	11 [8]	0.27 [9]	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-	-
Total Petroleum Hydrocarbons																	
C7 - C9	500 [10]	500 [11]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10 - C14	1,700 [10]	510 [11]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15 - C36	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols																	
Pentachlorophenol	360	110	-	-													
Organochlorine Pesticides^																	
2.4'-DDT	1000	240	-	-	-	-	-	-	-	< 0.01	< 0.01	-	< 0.01	-	-	-	-
4.4'-DDD	-	-	-	-	-	-	-	-	-	< 0.01	< 0.01	-	< 0.01	-	-	-	-
4.4'-DDE	-	-	-	-	-	-	-	-	-	**0.01**	< 0.01	-	**0.01**	-	-	-	-
4.4'-DDT	-	-	-	-	-	-	-	-	-	< 0.01	< 0.01	-	< 0.01	-	-	-	-
DDT + DDE + DDD (Total)*	-	-	-	-	-	-	-	-	-	**0.01**	< 0.01	-	**0.01**	-	-	-	-

Notes

BOLD results exceed background concentrations.

Italics results exceed NES-CS for Commercial landuse.

SHADED results exceed NES-CS for high-density residential landuse.

UNDERLINED results exceed the Burwood Resource Recovery Park acceptance criteria

NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

* The carcinogenic suite of PAHs is represented by benzo(a)pyrene potency equivalency factor (B[a]Peq). The equivalent concentration of benzo(a)pyrene is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalency factors.

^ A full suite of Organochlorine Pesticides were anaylised, all compounds not tabulated were below laboratory detection limits.

1 NES-CS Users' Guide soil contaminant standard for commercial/industrial outdoor worker (unpaved) landuse, Ministry for the Environme

2 MfE, 2011. NES User's guide soil contaminant standards for High-density residential landuse.

3 Burwood Resource Recovery Park acceptance criteria.

4 Ecan GIS, Soil Trace Elements Level 2, Background Concentrations of inorganic elements in soils from the Christchurch Region.

5 - BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil

6 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Commercial/Industrial, Table 1

7 NEPM: Guideline on the Investigation Levels for Soil and Groundwater, Australia, 1999, (updated 2013) - Residential HIL A, Table 1A

8 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commerci

9 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Residentia

10 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Commer

11 MfE Guideline for assessing and managing petroleum hydrocarbon contaminated site in New Zealand 1999, (updated 2011) - Resident

APPENDIX F

Laboratory Transcripts

Analytica Laboratories Limited
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Certificate of Analysis

Riley Consultants Ltd
Level 1, 4 Fred Thomas Drive
Auckland
Attention: Cherise Martin
Phone: 027 5368751
Email: cmartin@riley.co.nz

Lab Reference: 19-38136
Submitted by: Cherise Martin
Date Received: 1/11/2019
Date Completed: 5/11/2019
Order Number: 190417
Reference:

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.

Heavy Metals in Soil

			Client Sample ID	HA1 1.8	HA2 1.0	HA2 1.7	HA3 0.7	HA3 1.5
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-2	19-38136-4	19-38136-5	19-38136-7	19-38136-8
Arsenic	mg/kg dry wt	*0.125*		9.5	5.8	4.5	5.6	3.7
Cadmium	mg/kg dry wt	*0.005*		0.045	0.026	0.033	0.025	0.024
Chromium	mg/kg dry wt	*0.125*		20.5	18.6	16.9	19.9	12.7
Copper	mg/kg dry wt	*0.075*		13.1	14.3	10.8	9.58	6.9
Lead	mg/kg dry wt	*0.05*		23.1	18.5	16.8	17.8	10.6
Nickel	mg/kg dry wt	*0.05*		18.8	15.7	14.2	14.9	10.8
Zinc	mg/kg dry wt	*0.05*		69.4	54.1	52.2	53.0	37.0

Heavy Metals in Soil

			Client Sample ID	HA4 0.3	HA4 0.7	HA5 0.1	HA5 0.6	HA6 0.6
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-9	19-38136-10	19-38136-12	19-38136-13	19-38136-16
Arsenic	mg/kg dry wt	*0.125*		5.5	4.5	6.1	5.3	7.6
Cadmium	mg/kg dry wt	*0.005*		0.064	0.030	0.11	0.035	0.046
Chromium	mg/kg dry wt	*0.125*		16.4	17.5	16.7	19.1	22.5
Copper	mg/kg dry wt	*0.075*		6.7	6.3	8.13	8.01	16.5
Lead	mg/kg dry wt	*0.05*		16.9	14.3	16.9	15.3	23.7
Nickel	mg/kg dry wt	*0.05*		12.5	14.2	11.7	15.2	19.1
Zinc	mg/kg dry wt	*0.05*		59.1	47.5	74.5	48.5	67.7

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

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Heavy Metals in Soil

Client Sample ID			HA6 1.0	HA6 1.2	HA7 0.6	HA7 1.55	HA8 0.7
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-17	19-38136-18	19-38136-20	19-38136-22	19-38136-24
Arsenic	mg/kg dry wt	*0.125*	3.7	3.1	5.8	3.6	3.1
Cadmium	mg/kg dry wt	*0.005*	0.036	0.029	0.033	0.017	0.041
Chromium	mg/kg dry wt	*0.125*	18.4	14.4	20.4	11	14.5
Copper	mg/kg dry wt	*0.075*	11.8	6.8	10.6	4.9	7.85
Lead	mg/kg dry wt	*0.05*	16.4	11.1	15.6	9.95	14.0
Nickel	mg/kg dry wt	*0.05*	14.3	11.0	15.2	10.4	12.3
Zinc	mg/kg dry wt	*0.05*	51.6	41.9	48.6	32.9	54.5

Heavy Metals in Soil

Client Sample ID			HA9 0.1	HA9 0.6	HA10 0.4	HA10 0.8	HA11 0.1
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-27	19-38136-28	19-38136-32	19-38136-33	19-38136-34
Arsenic	mg/kg dry wt	*0.125*	6.0	5.0	6.3	5.2	201
Cadmium	mg/kg dry wt	*0.005*	0.060	0.035	0.033	0.022	0.733
Chromium	mg/kg dry wt	*0.125*	20.4	16.8	19.9	16.4	320
Copper	mg/kg dry wt	*0.075*	7.99	6.3	12.0	9.13	243
Lead	mg/kg dry wt	*0.05*	17.9	14.0	17.7	15.4	30.6
Nickel	mg/kg dry wt	*0.05*	14.8	12.5	15.8	12.8	33.9
Zinc	mg/kg dry wt	*0.05*	63.7	43.7	57.4	48.4	1,160

Heavy Metals in Soil

Client Sample ID			HA11 0.5	HA12 0.6	HA12 1.1	HA13 0.1	HA14 0.6
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-35	19-38136-37	19-38136-38	19-38136-40	19-38136-42
Arsenic	mg/kg dry wt	*0.125*	11	5.0	5.5	5.6	8.2
Cadmium	mg/kg dry wt	*0.005*	0.13	0.052	0.031	0.12	0.032
Chromium	mg/kg dry wt	*0.125*	24.3	16.5	19.2	16.6	21.7
Copper	mg/kg dry wt	*0.075*	17.0	7.91	13.1	8.94	12.8
Lead	mg/kg dry wt	*0.05*	18.7	15.9	20.1	35.0	24.0
Nickel	mg/kg dry wt	*0.05*	13.9	12.6	17.1	12.4	18.4
Zinc	mg/kg dry wt	*0.05*	127	45.6	63.9	78.6	62.1

Heavy Metals in Soil

Client Sample ID			HA15 0.6	HA16 0.6	HA17 0.5	HA18 0.2	HA19 0.2
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-47	19-38136-51	19-38136-55	19-38136-58	19-38136-60
Arsenic	mg/kg dry wt	*0.125*	6.3	5.1	4.1	4.4	4.5
Cadmium	mg/kg dry wt	*0.005*	0.028	0.031	0.053	0.14	0.11
Chromium	mg/kg dry wt	*0.125*	22.1	16.7	16.1	15.6	15.2
Copper	mg/kg dry wt	*0.075*	11.4	6.5	5.4	5.4	5.1
Lead	mg/kg dry wt	*0.05*	18.5	15.6	13.4	25.3	24.9
Nickel	mg/kg dry wt	*0.05*	17.9	14.0	13.6	11.8	11.7
Zinc	mg/kg dry wt	*0.05*	56.8	47.7	47.3	71.7	75.9

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Heavy Metals in Soil

Client Sample ID			HA19 0.5	HA20 0.6	HA20 1.1
Date Sampled					
Analyte	Unit	*Reporting Limit*	19-38136-61	19-38136-64	19-38136-65
Arsenic	mg/kg dry wt	*0.125*	5.7	7.1	3.9
Cadmium	mg/kg dry wt	*0.005*	0.036	0.033	0.018
Chromium	mg/kg dry wt	*0.125*	22.2	19.4	14.7
Copper	mg/kg dry wt	*0.075*	5.4	12.7	6.9
Lead	mg/kg dry wt	*0.05*	18.3	24.0	11.5
Nickel	mg/kg dry wt	*0.05*	14.8	17.4	11.7
Zinc	mg/kg dry wt	*0.05*	54.4	59.1	41.5

Organochlorine Pesticides - Soil

Client Sample ID			HA1 1.8	HA2 0.1	HA2 1.0	HA3 0.2	HA3 0.7
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-2	19-38136-3	19-38136-4	19-38136-6	19-38136-7
2,4'-DDD	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	*0.003*	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	*0.005*	<0.005	0.013	<0.005	0.008	<0.005
4,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	94.0	90.5	93.6	90.1	91.2

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Organochlorine Pesticides - Soil

Client Sample ID			HA3 1.5	HA4 0.3	HA4 0.7	HA5 0.6	HA6 0.6
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-8	19-38136-9	19-38136-10	19-38136-13	19-38136-16
2,4'-DDD	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	*0.003*	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	91.8	92.7	91.5	91.5	90.7

Organochlorine Pesticides - Soil

Client Sample ID			HA6 1.0	HA6 1.2	HA7 0.6	HA7 1.55	HA8 0.7
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-38136-17	19-38136-18	19-38136-20	19-38136-22	19-38136-24
2,4'-DDD	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	*0.003*	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01

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Organochlorine Pesticides - Soil

			Client Sample ID	HA6 1.0	HA6 1.2	HA7 0.6	HA7 1.55	HA8 0.7
			Date Sampled					
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	*0.05*		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		90.2	90.9	90.9	91.8	94.2

Organochlorine Pesticides - Soil

			Client Sample ID	HA9 0.6	HA10 0.8	HA11 0.1	HA11 0.5	HA15 0.6
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-28	19-38136-33	19-38136-34	19-38136-35	19-38136-47
2,4'-DDD	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	*0.003*		<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	*0.005*		<0.005	<0.005	0.011	0.006	<0.005
4,4'-DDT	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	*0.05*		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	*0.05*		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		94.6	90.6	91.7	87.5	87.9

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Organochlorine Pesticides - Soil

	Client Sample ID		HA16 0.6	HA17 0.5	HA18 0.2	HA19 0.5	HA20 0.6
	Date Sampled						
Analyte	Unit	*Reporting Limit*	19-38136-51	19-38136-55	19-38136-58	19-38136-61	19-38136-64
2,4'-DDD	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	*0.003*	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	*0.05*	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	93.9	94.5	94.5	91.4	95.3

Polycyclic Aromatic Hydrocarbons - Soil

	Client Sample ID		HA3 0.7	HA4 0.3	HA5 0.6	HA6 0.6	HA6 1.2
	Date Sampled						
Analyte	Unit	*Reporting Limit*	19-38136-7	19-38136-9	19-38136-13	19-38136-16	19-38136-18
1-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
2-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg dry wt	*0.02*	<0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*	<0.01	<0.01	<0.01	<0.01	<0.01

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Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	HA3 0.7	HA4 0.3	HA5 0.6	HA6 0.6	HA6 1.2
			Date Sampled					
Naphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.03	0.03	0.03	0.03	0.03
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene-d10 (Surrogate)	%	*1*		84.3	82.6	84.0	82.3	82.5

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	HA7 0.6	HA7 1.55	HA9 0.6	HA10 0.4	HA12 0.6
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-20	19-38136-22	19-38136-28	19-38136-32	19-38136-37
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.03	0.03	0.03	0.03	0.03
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene-d10 (Surrogate)	%	*1*		83.5	82.2	82.0	82.9	81.7

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	HA12 1.1	HA14 0.6	HA17 0.5	HA20 0.6
			Date Sampled				
Analyte	Unit	*Reporting Limit*		19-38136-38	19-38136-42	19-38136-55	19-38136-64
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Acenaphthene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01

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Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	HA12 1.1	HA14 0.6	HA17 0.5	HA20 0.6
			Date Sampled				
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02
Fluorene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Naphthalene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg dry wt	*0.02*		<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.03	0.03	0.03	0.03
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.01	<0.01	<0.01	<0.01
Anthracene-d10 (Surrogate)	%	*1*		80.8	81.9	81.6	82.1

Moisture Content

			Client Sample ID	HA3 0.7	HA4 0.3	HA5 0.6	HA6 0.6	HA6 1.2
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-7	19-38136-9	19-38136-13	19-38136-16	19-38136-18
Moisture Content	%	*1*		17	14	19	17	15

Moisture Content

			Client Sample ID	HA7 0.6	HA7 1.55	HA9 0.6	HA10 0.4	HA12 0.6
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-38136-20	19-38136-22	19-38136-28	19-38136-32	19-38136-37
Moisture Content	%	*1*		19	6	15	13	13

Moisture Content

			Client Sample ID	HA12 1.1	HA14 0.6	HA17 0.5	HA20 0.6
			Date Sampled				
Analyte	Unit	*Reporting Limit*		19-38136-38	19-38136-42	19-38136-55	19-38136-64
Moisture Content	%	*1*		19	19	18	19

Method Summary

Elements in Soil Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).
Results are based on a dried sample passed through a 2 mm sieve.

OCP in Soil Samples are extracted with hexane, pre-concetrated then analysed by GC-MSMS.(In-house procedure).
(Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor)

Total DDT Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)

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Method Summary

PAH in Soil	Solvent extraction, silica cleanup, followed by GC-MS analysis. **Benzo[a]pyrene TEQ (LOR)**: The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH. **Benzo[a]pyrene TEQ (Zero)**: The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation. Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to *'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'*. Ministry for the Environment. 2011.
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.



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Nathan Howse, B.Sc.
Technologist

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Certificate of Analysis

Riley Consultants Ltd
Level 1, 4 Fred Thomas Drive
Auckland
Attention: Cherise Martin
Phone: 09 489 7872
Email: cmartin@riley.co.nz

Lab Reference: 19-38089
Submitted by: Cherise Martin
Date Received: 31/10/2019
Date Completed: 1/11/2019
Order Number: 190417
Reference:

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.

Asbestos Fibres in Bulk (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
19-38089-2	S1 Frag		Bulk Materials (100 x 80 x 5 mm)		1/11/2019

All information in the above table has been supplied by the client with the exception of "Sample Description" dimensions and "Date Analysed"

Analysis Results

Laboratory ID	Client Sample ID	Sample Layers	Fibre Types	Asbestos (Present / Absent)
19-38089-1	S1			
19-38089-2	S1 Frag	L1 - Cement sheet	Chrysotile Fibres Amosite Fibres Crocidolite Fibres Organic Fibres	Present

All information in the above table has been generated by the laboratory

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

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Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed	ACM Weight*
	Units					g
19-38089-1	S1		Soil		1/11/2019	0.0000

All information in the above table has been supplied by the client with the exception of "Date Analysed" and "Sample Weight as Received"

Analysis Results

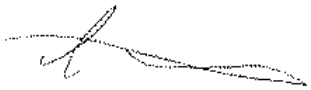
Laboratory ID	Sample ID	ACM Weight*	ACM Types*	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
	Units					
19-38089-1	S1	0.0000	No Asbestos Detected	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres	Absent	Absent
19-38089-2	S1 Frag					

All information in the above table has been generated by the laboratory

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Method Summary

Asbestos Fibres in Bulk Materials (Qualitative)	Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with the guidelines of AS4964-2004 Method for the qualitative identification of asbestos in bulk samples. Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques. Note 2: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised. Note 3: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.
Asbestos Fibres in Soil (Qualitative)	Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in bulk samples. Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques. Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present. Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised. Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.



Tamiko Watson, M.Sc. (Hons)
Technician

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Takapuna
NZ 0622

ilac-MRA IANZ ACCREDITED LABORATORY Accreditation No. :1290
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Attention: **Cherise Martin**

Report **726363-S-V2**
Project name
Project ID 190417
Received Date Jun 18, 2020

Client Sample ID			**EH201 0.3**	**EH201 1.0**	**EH202 0.8**	**EH202 1.3**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**Z20-Jn30534**	**Z20-Jn30536**	**Z20-Jn30538**	**Z20-Jn30540**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Pentachlorophenol	1	mg/kg	< 1	-	-	-
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	-
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	-
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
4.4'-DDD	0.01	mg/kg	0.01	< 0.01	-	-
4.4'-DDE	0.01	mg/kg	0.04	< 0.01	-	-
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	0.05	< 0.01	-	-
a-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
b-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	-	-
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	-
d-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	-	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	-	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	-	-
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	-	-
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	-	-
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	-
Dibutylchlorendate (surr.)	1	%	93	82	-	-
Tetrachloro-m-xylene (surr.)	1	%	82	80	-	-

Client Sample ID			EH201 0.3	EH201 1.0	EH202 0.8	EH202 1.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30534	Z20-Jn30536	Z20-Jn30538	Z20-Jn30540
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	89	96	83	85
2-Fluorobiphenyl (surr.)	1	%	82	66	70	81
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	5.6	8.8	9.1	8.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	17	17	17
Copper	5	mg/kg	7.4	8.7	13	10
Lead	5	mg/kg	17	21	22	19
Nickel	5	mg/kg	11	15	16	14
Zinc	5	mg/kg	70	69	69	64
% Moisture	1	%	22	20	18	20
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	< 5
TPH-SG C10-C14	10	mg/kg	-	-	< 10	< 10
TPH-SG C15-C36	20	mg/kg	-	-	< 20	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	< 35

Client Sample ID			EH203 0.6	EH203 1.3	EH204 0.4	EH204 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30542	Z20-Jn30544	Z20-Jn30546	Z20-Jn30549
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Pentachlorophenol	1	mg/kg	< 1	-	< 1	-

Client Sample ID			EH203 0.6	EH203 1.3	EH204 0.4	EH204 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30542	Z20-Jn30544	Z20-Jn30546	Z20-Jn30549
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	-	< 0.01	< 0.01	-
2.4'-DDE	0.01	mg/kg	-	< 0.01	< 0.01	-
2.4'-DDT	0.01	mg/kg	-	< 0.01	< 0.01	-
4.4'-DDD	0.01	mg/kg	-	< 0.01	< 0.01	-
4.4'-DDE	0.01	mg/kg	-	< 0.01	< 0.01	-
4.4'-DDT	0.01	mg/kg	-	< 0.01	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	-	< 0.01	< 0.01	-
a-BHC	0.01	mg/kg	-	< 0.01	< 0.01	-
Aldrin	0.01	mg/kg	-	< 0.01	< 0.01	-
b-BHC	0.01	mg/kg	-	< 0.01	< 0.01	-
Chlordanes - Total	0.01	mg/kg	-	< 0.01	< 0.01	-
cis-Chlordane	0.01	mg/kg	-	< 0.01	< 0.01	-
d-BHC	0.01	mg/kg	-	< 0.01	< 0.01	-
Dieldrin	0.01	mg/kg	-	< 0.01	< 0.01	-
Endosulfan I	0.01	mg/kg	-	< 0.01	< 0.01	-
Endosulfan II	0.01	mg/kg	-	< 0.01	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	-	< 0.01	< 0.01	-
Endrin	0.01	mg/kg	-	< 0.01	< 0.01	-
Endrin aldehyde	0.01	mg/kg	-	< 0.01	< 0.01	-
Endrin ketone	0.01	mg/kg	-	< 0.01	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	-	< 0.01	< 0.01	-
Heptachlor	0.01	mg/kg	-	< 0.01	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	-	< 0.01	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	-	< 0.01	< 0.01	-
Methoxychlor	0.01	mg/kg	-	< 0.01	< 0.01	-
Toxaphene	0.1	mg/kg	-	< 0.1	< 0.1	-
trans-Chlordane	0.01	mg/kg	-	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	-	83	80	-
Tetrachloro-m-xylene (surr.)	1	%	-	77	75	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Client Sample ID			EH203 0.6	EH203 1.3	EH204 0.4	EH204 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30542	Z20-Jn30544	Z20-Jn30546	Z20-Jn30549
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
p-Terphenyl-d14 (surr.)	1	%	50	79	77	80
2-Fluorobiphenyl (surr.)	1	%	68	87	82	81
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	4.0	5.6	8.1	3.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	16	17	13
Copper	5	mg/kg	15	9.3	9.0	6.9
Lead	5	mg/kg	28	14	17	13
Nickel	5	mg/kg	17	14	14	10
Zinc	5	mg/kg	74	58	56	46
% Moisture	1	%	21	23	20	15
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	-	-
TPH-SG C10-C14	10	mg/kg	< 10	< 10	-	-
TPH-SG C15-C36	20	mg/kg	< 20	< 20	-	-
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	< 35	-	-

Client Sample ID			EH205 0.5	EH205 1.4	EH206 0.3	EH206 1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30550	Z20-Jn30552	Z20-Jn30554	Z20-Jn30556
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Pentachlorophenol	1	mg/kg	< 1	-	-	-
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-

Client Sample ID			EH205 0.5	EH205 1.4	EH206 0.3	EH206 1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30550	Z20-Jn30552	Z20-Jn30554	Z20-Jn30556
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	75	79	82	-
Tetrachloro-m-xylene (surr.)	1	%	76	78	76	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	80	90	79	85
2-Fluorobiphenyl (surr.)	1	%	72	59	88	118
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	9.2	8.4	7.3	6.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	16	18	18
Copper	5	mg/kg	9.0	12	7.2	14
Lead	5	mg/kg	21	21	17	24
Nickel	5	mg/kg	16	13	14	15
Zinc	5	mg/kg	59	61	55	72
% Moisture	1	%	17	21	17	19
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	-
TPH-SG C10-C14	10	mg/kg	-	-	< 10	-
TPH-SG C15-C36	20	mg/kg	-	-	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	-

Client Sample ID			EH208 0.5	EH208 1.0	EH209 0.5	EH209 1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30563	Z20-Jn30565	Z20-Jn30567	Z20-Jn30569
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	-	0.03	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	0.03	< 0.01
a-BHC	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	82	-	103	97
Tetrachloro-m-xylene (surr.)	1	%	80	-	83	77
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Client Sample ID			EH208 0.5	EH208 1.0	EH209 0.5	EH209 1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30563	Z20-Jn30565	Z20-Jn30567	Z20-Jn30569
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
p-Terphenyl-d14 (surr.)	1	%	82	67	89	81
2-Fluorobiphenyl (surr.)	1	%	111	101	108	109
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	7.8	11	10	6.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	18	20	15	14
Copper	5	mg/kg	8.2	15	13	8.4
Lead	5	mg/kg	21	29	16	15
Nickel	5	mg/kg	14	19	11	12
Zinc	5	mg/kg	60	80	81	48
% Moisture	1	%	15	19	38	15
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	-	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	-	< 10	< 10
TPH-SG C15-C36	20	mg/kg	< 20	-	55	21
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	-	62	< 35

Client Sample ID			EH210 0.3	EH210 1.3	EH211 0.5	EH211 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30570	Z20-Jn30573	Z20-Jn30574	Z20-Jn30577
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	-	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	-	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	-	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	-	-
a-BHC	0.01	mg/kg	< 0.01	-	-	-
Aldrin	0.01	mg/kg	< 0.01	-	-	-
b-BHC	0.01	mg/kg	< 0.01	-	-	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-	-	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	-	-
d-BHC	0.01	mg/kg	< 0.01	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	-	-
Endrin ketone	0.01	mg/kg	< 0.01	-	-	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	-	-

Client Sample ID			EH210 0.3	EH210 1.3	EH211 0.5	EH211 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30570	Z20-Jn30573	Z20-Jn30574	Z20-Jn30577
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Methoxychlor	0.01	mg/kg	< 0.01	-	-	-
Toxaphene	0.1	mg/kg	< 0.1	-	-	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	-	-
Dibutylchlorendate (surr.)	1	%	84	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	75	-	-	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	84	74	80	96
2-Fluorobiphenyl (surr.)	1	%	107	101	93	81
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	6.8	9.0	29	6.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	18	22	14
Copper	5	mg/kg	5.3	11	10.0	7.6
Lead	5	mg/kg	17	21	21	15
Nickel	5	mg/kg	13	15	15	12
Zinc	5	mg/kg	55	63	63	49
% Moisture	1	%	16	17	18	17
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	-	< 5	-
TPH-SG C10-C14	10	mg/kg	< 10	-	< 10	-
TPH-SG C15-C36	20	mg/kg	< 20	-	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	-	< 35	-

Client Sample ID			EH212 0.3	EH212 1.3	EH213 0.3	EH213 1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30578	Z20-Jn30580	Z20-Jn30582	Z20-Jn30585
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	0.02	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	0.22	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	0.08	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	0.33	-
a-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	83	-	75	-
Tetrachloro-m-xylene (surr.)	1	%	81	-	75	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.07	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03

Client Sample ID			EH212 0.3	EH212 1.3	EH213 0.3	EH213 1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30578	Z20-Jn30580	Z20-Jn30582	Z20-Jn30585
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
p-Terphenyl-d14 (surr.)	1	%	79	75	80	75
2-Fluorobiphenyl (surr.)	1	%	113	107	107	108
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	7.8	11	7.9	6.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	19	14	19
Copper	5	mg/kg	6.3	18	6.8	8.1
Lead	5	mg/kg	20	22	19	18
Nickel	5	mg/kg	14	18	11	15
Zinc	5	mg/kg	67	82	80	69
% Moisture	1	%	17	18	17	18
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	-	< 5	-
TPH-SG C10-C14	10	mg/kg	< 10	-	< 10	-
TPH-SG C15-C36	20	mg/kg	< 20	-	27	-
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	-	< 35	-

Client Sample ID			EH214 0.5	EH214 1.3	EH215 0.4	EH215 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30587	Z20-Jn30589	Z20-Jn30590	Z20-Jn30593
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Pentachlorophenol	1	mg/kg	< 1	-	< 1	-
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-

Client Sample ID			EH214 0.5	EH214 1.3	EH215 0.4	EH215 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30587	Z20-Jn30589	Z20-Jn30590	Z20-Jn30593
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	96	-	87	-
Tetrachloro-m-xylene (surr.)	1	%	71	-	74	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	74	68	79	77
2-Fluorobiphenyl (surr.)	1	%	102	98	100	107
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	8.5	5.6	4.3	8.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	16	13	17
Copper	5	mg/kg	7.5	12	9.5	11
Lead	5	mg/kg	18	18	14	21
Nickel	5	mg/kg	13	15	10	14
Zinc	5	mg/kg	55	63	44	60
% Moisture	1	%	17	17	5.7	18
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	-	< 5	-
TPH-SG C10-C14	10	mg/kg	< 10	-	< 10	-
TPH-SG C15-C36	20	mg/kg	< 20	-	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	-	< 35	-

Client Sample ID			EH216 0.4	EH216 1.0	EH217 0.3	EH217 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30594	Z20-Jn30596	Z20-Jn30598	Z20-Jn30600
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	-	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	-	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	-	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	-	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	-	-
a-BHC	0.01	mg/kg	< 0.01	-	-	-
Aldrin	0.01	mg/kg	< 0.01	-	-	-
b-BHC	0.01	mg/kg	< 0.01	-	-	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-	-	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	-	-
d-BHC	0.01	mg/kg	< 0.01	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	-	-
Endrin ketone	0.01	mg/kg	< 0.01	-	-	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	-	-
Methoxychlor	0.01	mg/kg	< 0.01	-	-	-
Toxaphene	0.1	mg/kg	< 0.1	-	-	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	-	-
Dibutylchlorendate (surr.)	1	%	67	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	78	-	-	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Client Sample ID			EH216 0.4	EH216 1.0	EH217 0.3	EH217 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30594	Z20-Jn30596	Z20-Jn30598	Z20-Jn30600
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
p-Terphenyl-d14 (surr.)	1	%	83	68	97	73
2-Fluorobiphenyl (surr.)	1	%	95	109	100	111
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	9.4	8.0	9.5	3.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	18	19	15
Copper	5	mg/kg	12	12	8.8	6.1
Lead	5	mg/kg	21	19	20	12
Nickel	5	mg/kg	15	16	16	11
Zinc	5	mg/kg	60	64	71	49
% Moisture	1	%	18	22	17	19
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	99	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	680	< 20	82	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	780	< 35	90	< 35

Client Sample ID			EH218 0.3	EH218 1.4	EH219 0.3	EH219 0.9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30602	Z20-Jn30604	Z20-Jn30605	Z20-Jn30606
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	-	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	-	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDD	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDE	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDT	0.01	mg/kg	-	-	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	-	-	< 0.01	-
a-BHC	0.01	mg/kg	-	-	< 0.01	-
Aldrin	0.01	mg/kg	-	-	< 0.01	-
b-BHC	0.01	mg/kg	-	-	< 0.01	-
Chlordanes - Total	0.01	mg/kg	-	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	-	-	< 0.01	-
d-BHC	0.01	mg/kg	-	-	< 0.01	-
Dieldrin	0.01	mg/kg	-	-	< 0.01	-
Endosulfan I	0.01	mg/kg	-	-	< 0.01	-
Endosulfan II	0.01	mg/kg	-	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	-	-	< 0.01	-
Endrin	0.01	mg/kg	-	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	-	-	< 0.01	-
Endrin ketone	0.01	mg/kg	-	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	-	-	< 0.01	-
Heptachlor	0.01	mg/kg	-	-	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	-	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	-	-	< 0.01	-

Client Sample ID			EH218 0.3	EH218 1.4	EH219 0.3	EH219 0.9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30602	Z20-Jn30604	Z20-Jn30605	Z20-Jn30606
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Methoxychlor	0.01	mg/kg	-	-	< 0.01	-
Toxaphene	0.1	mg/kg	-	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	-	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	-	-	72	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	70	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	86	74	80	77
2-Fluorobiphenyl (surr.)	1	%	103	108	123	95
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	7.5	7.3	8.4	45
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	17	18	13
Copper	5	mg/kg	5.9	10	< 5	9.2
Lead	5	mg/kg	19	17	20	12
Nickel	5	mg/kg	12	13	14	13
Zinc	5	mg/kg	77	76	76	160
% Moisture	1	%	18	20	13	20
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	-
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10	-
TPH-SG C15-C36	20	mg/kg	29	< 20	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	< 35	< 35	-

Client Sample ID			EH220 0.3	EH220 1.0	EH221 0.4	EH221 1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30608	Z20-Jn30610	Z20-Jn30611	Z20-Jn30613
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDE	0.01	mg/kg	0.01	< 0.01	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	0.01	< 0.01	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	83	87	82	-
Tetrachloro-m-xylene (surr.)	1	%	74	74	75	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Client Sample ID			EH220 0.3	EH220 1.0	EH221 0.4	EH221 1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30608	Z20-Jn30610	Z20-Jn30611	Z20-Jn30613
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
p-Terphenyl-d14 (surr.)	1	%	87	79	81	76
2-Fluorobiphenyl (surr.)	1	%	96	110	114	96
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	6.6	6.6	5.5	5.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	13	22	12	17
Copper	5	mg/kg	7.2	10	7.5	9.5
Lead	5	mg/kg	14	18	13	16
Nickel	5	mg/kg	9.8	16	10	13
Zinc	5	mg/kg	49	63	50	58
% Moisture	1	%	21	17	5.1	21

Client Sample ID			EH222 0.5	EH222 1.4	EH223 0.5	EH223 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30614	Z20-Jn30616	Z20-Jn30619	Z20-Jn30621
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	78	-	76	-
Tetrachloro-m-xylene (surr.)	1	%	67	-	71	-

Client Sample ID			EH222 0.5	EH222 1.4	EH223 0.5	EH223 1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30614	Z20-Jn30616	Z20-Jn30619	Z20-Jn30621
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	66	70	69	74
2-Fluorobiphenyl (surr.)	1	%	96	101	102	139
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	5.8	4.4	2.4	6.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	15	15	16
Copper	5	mg/kg	9.0	6.8	5.9	8.8
Lead	5	mg/kg	16	16	11	18
Nickel	5	mg/kg	14	12	12	12
Zinc	5	mg/kg	55	51	49	62
% Moisture	1	%	16	5.9	19	11

Client Sample ID			EH224 0.2	EH224 0.7	EH224 1.4	TP207 0.5 JAR
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30622	Z20-Jn30624	Z20-Jn30625	Z20-Jn30627
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Client Sample ID			EH224 0.2	EH224 0.7	EH224 1.4	TP207 0.5 JAR
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30622	Z20-Jn30624	Z20-Jn30625	Z20-Jn30627
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	72	69	78	79
2-Fluorobiphenyl (surr.)	1	%	106	117	116	110
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	5.7	7.1	5.4	7.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	19	15	16
Copper	5	mg/kg	< 5	8.8	7.6	8.0
Lead	5	mg/kg	17	19	14	21
Nickel	5	mg/kg	11	13	12	11
Zinc	5	mg/kg	64	56	53	74
% Moisture	1	%	15	14	8.9	7.4

Client Sample ID			TP207 1.0 JAR	TP208 1.0 JAR	TP208 2.0 JAR	TP209 0.8 JAR
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30629	Z20-Jn30631	Z20-Jn30633	Z20-Jn30634
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	89	78	82	85
2-Fluorobiphenyl (surr.)	1	%	124	105	83	94

Client Sample ID			TP207 1.0 JAR	TP208 1.0 JAR	TP208 2.0 JAR	TP209 0.8 JAR
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30629	Z20-Jn30631	Z20-Jn30633	Z20-Jn30634
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	5.7	6.1	4.8	6.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	15	11	15
Copper	5	mg/kg	6.8	5.2	5.5	6.9
Lead	5	mg/kg	18	17	9.6	16
Nickel	5	mg/kg	11	11	8.6	11
Zinc	5	mg/kg	72	65	40	68
% Moisture	1	%	9.2	9.1	22	7.8

Client Sample ID			TP209 1.5 JAR	TP210 1.0 JAR	TP211 1.0 JAR	HA206 0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30637	Z20-Jn30639	Z20-Jn30641	Z20-Jn30642
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	-	-	-	< 0.01
2.4'-DDE	0.01	mg/kg	-	-	-	< 0.01
2.4'-DDT	0.01	mg/kg	-	-	-	< 0.01
4.4'-DDD	0.01	mg/kg	-	-	-	< 0.01
4.4'-DDE	0.01	mg/kg	-	-	-	0.01
4.4'-DDT	0.01	mg/kg	-	-	-	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	-	-	-	0.01
a-BHC	0.01	mg/kg	-	-	-	< 0.01
Aldrin	0.01	mg/kg	-	-	-	< 0.01
b-BHC	0.01	mg/kg	-	-	-	< 0.01
Chlordanes - Total	0.01	mg/kg	-	-	-	< 0.01
cis-Chlordane	0.01	mg/kg	-	-	-	< 0.01
d-BHC	0.01	mg/kg	-	-	-	< 0.01
Dieldrin	0.01	mg/kg	-	-	-	< 0.01
Endosulfan I	0.01	mg/kg	-	-	-	< 0.01
Endosulfan II	0.01	mg/kg	-	-	-	< 0.01
Endosulfan sulphate	0.01	mg/kg	-	-	-	< 0.01
Endrin	0.01	mg/kg	-	-	-	< 0.01
Endrin aldehyde	0.01	mg/kg	-	-	-	< 0.01
Endrin ketone	0.01	mg/kg	-	-	-	< 0.01
g-BHC (Lindane)	0.01	mg/kg	-	-	-	< 0.01
Heptachlor	0.01	mg/kg	-	-	-	< 0.01
Heptachlor epoxide	0.01	mg/kg	-	-	-	< 0.01
Hexachlorobenzene	0.01	mg/kg	-	-	-	< 0.01
Methoxychlor	0.01	mg/kg	-	-	-	< 0.01
Toxaphene	0.1	mg/kg	-	-	-	< 0.1
trans-Chlordane	0.01	mg/kg	-	-	-	< 0.01
Dibutylchlorendate (surr.)	1	%	-	-	-	73
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	75

Client Sample ID			TP209 1.5 JAR	TP210 1.0 JAR	TP211 1.0 JAR	HA206 0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30637	Z20-Jn30639	Z20-Jn30641	Z20-Jn30642
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	92	88	78	82
2-Fluorobiphenyl (surr.)	1	%	98	97	93	104
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	5.5	6.6	5.6	5.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	14	15	16
Copper	5	mg/kg	6.8	6.7	6.9	5.5
Lead	5	mg/kg	18	18	17	17
Nickel	5	mg/kg	18	11	11	12
Zinc	5	mg/kg	72	71	71	64
% Moisture	1	%	11	10	4.9	15

Client Sample ID			HA206 1.5 JAR	HA207 1.5	HA208 0.5	S1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30644	Z20-Jn30646	Z20-Jn30647	Z20-Jn30648
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-	0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	-	0.01	-
a-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-

Client Sample ID			HA206 1.5 JAR	HA207 1.5	HA208 0.5	S1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30644	Z20-Jn30646	Z20-Jn30647	Z20-Jn30648
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Chlordanes - Total	0.01	mg/kg	< 0.01	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	-	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	82	-	81	-
Tetrachloro-m-xylene (surr.)	1	%	71	-	76	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.08	0.08	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Chrysene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
Pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	-
p-Terphenyl-d14 (surr.)	1	%	80	79	84	-
2-Fluorobiphenyl (surr.)	1	%	79	105	108	-
Metals M7 (NZ MfE)						
Arsenic	2	mg/kg	7.9	5.8	6.4	69
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	16	16	70
Copper	5	mg/kg	12	11	7.1	84
Lead	5	mg/kg	21	18	18	33
Nickel	5	mg/kg	16	13	12	34
Zinc	5	mg/kg	70	59	63	1300

Client Sample ID			HA206 1.5 JAR	HA207 1.5	HA208 0.5	S1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30644	Z20-Jn30646	Z20-Jn30647	Z20-Jn30648
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
% Moisture	1	%	19	19	9.0	29

Client Sample ID			S2	S3	S4
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			Z20-Jn30649	Z20-Jn30650	Z20-Jn30651
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit			
Metals M7 (NZ MfE)					
Arsenic	2	mg/kg	44	67	11
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	40	15
Copper	5	mg/kg	14	37	13
Lead	5	mg/kg	19	20	25
Nickel	5	mg/kg	9.2	9.8	9.4
Zinc	5	mg/kg	340	400	110
% Moisture	1	%	17	8.7	33

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

Riley Consultants Ltd
4 Fred Thomas Drive
Takapuna
NZ 0622

Attention:	Cherise Martin
Report	726363-V2-AID
Project Name	
Project ID	190417
Received Date	Jun 18, 2020
Date Reported	Jun 29, 2020

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name
Project ID 190417
Date Sampled
Report 726363-V2-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
EH201 0.2	20-Jn30533	not provided	Approximate Sample 467g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH204 0.7	20-Jn30547	not provided	Approximate Sample 509g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH206 0.4	20-Jn30555	not provided	Approximate Sample 262g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH208 0.8	20-Jn30564	not provided	Approximate Sample 307g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH209 0.4	20-Jn30566	not provided	Approximate Sample 407g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH211 0.7	20-Jn30575	not provided	Approximate Sample 339g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH212 0.5	20-Jn30579	not provided	Approximate Sample 473g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH214 0.4	20-Jn30586	not provided	Approximate Sample 456g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
EH215 0.5	20-Jn30591	not provided	Approximate Sample 396g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH220 0.4	20-Jn30609	not provided	Approximate Sample 447g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH222 0.4	20-Jn30617	not provided	Approximate Sample 394g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
EH223 0.4	20-Jn30618	not provided	Approximate Sample 310g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
EH224 0.4	20-Jn30623	not provided	Approximate Sample 226g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
TP207 0.5	20-Jn30626	not provided	Approximate Sample 395g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
TP209 0.8	20-Jn30635	not provided	Approximate Sample 318g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
S1	20-Jn30648	not provided	Approximate Sample 82g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
S2	20-Jn30649	not provided	Approximate Sample 195g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
S3	20-Jn30650	not provided	Approximate Sample 323g Sample consisted of: Fine grained soil and rocks	Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of asbestos containing material = 0.0063g Total estimated asbestos content in the sample = 0.0050g* Total estimated asbestos concentration = 0.0016% w/w* No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
S4	20-Jn30651	not provided	Approximate Sample 144g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.

APPENDIX G

RILEY Dwgs:
190417-51 and
190417-52



USED TO MIX LIME & PEAT ON THE CONCRETE PAD, CONCRETE PAD WAS THEN WASHED ONCE A WEEK, WITH ALL WASTE WATER DIVERTED TO POND 1.

PASTEURIZING UNITS, FRESH COMPOST IS STORED FOR ~1WEEK.

USED TO DUMP FRESH COMPOST FOR LOADING INTO THE MAIN LINE & TRAY STORAGE. THE AREA GETS WASHED DOWN ~ONCE A WEEK. WASTE WATER IS DIRECTED INTO POND 1.

FENCE SEPARATING PADDOCKS

BUNDS SEPARATING PADDOCKS

PROPERTY BOUNDARY

BOILER ROOM, CURRENTLY HAS 2 BOILERS, THE 3rd HAS RECENTLY BEEN REMOVED.

ABOVE GROUND STORAGE TANK (AST), CURRENTLY IN USE(DIESEL).

HISTORICAL AST, CURRENTLY ONLY CONCRETE BUND REMAINS.

PACKING SHED & SPAWN CHILLERS

CARPORT

ASBESTOS LABELED BUILDINGS, FRAGMENT FROM PLANTER BOX SAMPLED AS WELL AS SOIL.

VEHICLE STORAGE.

MAIN OFFICE/RECEPTION & CAFFETERIA

WORKSHOP/ ENGINEERING ROOM, LUBRICANTS, PETROL, DIESEL & OIL ARE STORED IN A SMALL ROOM. AN OIL SUMP 2mx1m IS LOCATED CLOSE TO THE WORKSHOP ENTRANCE. THE FLOOR IS CONCRETED.

GROWING ROOMS.

AST WAS OBSERVED OCTOBER 2019, NO LONGER THERE IN JUNE 2020

PUMP ROOM & CHEMICAL STORAGE ROOM, (CHEMICAL: SODIUM HYPOCHLORITE, HC FOAM CLEAN 210, HC PROTECT 801Q)

REPAIR TRAYS & LADDERS.

GROWING ROOMS

STEAM ROOM, HOLDS MUSHROOMS TEMPORARILY (HOURS)

HISTORICALLY USED AS AN AST, A SEALED CONCRETE BUND REMAINS

20 0 40 80m

SCALE 1:2000

RESOURCE CONSENT

REV	DATE	ISSUE	BY
1		ISSUED FOR INFORMATION	RBT

DESIGN	DES CHECK	APPROVED FOR ISSUE
CM	CM	B BLACK
DRAWN	CAD CHECK	
RBT	JM	
DATE DRAWN		ISSUE DATE
4.11.19		14 / 07 / 20

RILEY CONSULTANTS
www.riley.co.nz

CLIENT	WELHOM DEVELOPMENTS LTD.
ADDRESS	578 SPRINGS ROAD
PROJECT	ENVIROMENTAL INVESTIGATIONS
SHEET TITLE	SITE OBSERVATIONS

ACENZ ISO CERTIFIED GCS

CADFILE	190417-51.dwg
SCALE (A3)	1:2000
ORIG. SHEET SIZE	A3
DRAWING No.	190417-51
REV.	1



LEGEND

HA1	RILEY TEST LOCATIONS 2019
EH201	RILEY TEST LOCATIONS 2020
S3	RILEY TEST LOCATIONS 2020
HA208	RILEY TEST LOCATIONS 2020

RESOURCE CONSENT

REV	DATE	ISSUE	BY
1		ISSUED FOR INFORMATION	MD

DESIGN	CM
DES CHECK	CM
APPROVED FOR ISSUE	B BLACK
DRAWN	MD
CAD CHECK	JM
DATE DRAWN	FEB 2020
ISSUE DATE	14 / 07 / 20

RILEY CONSULTANTS
www.riley.co.nz

CLIENT	WELHOM DEVELOPMENTS LTD.
ADDRESS	579 SPRINGS ROAD
PROJECT	ENVIROMENTAL INVESTIGATIONS
SHEET TITLE	SAMPLING LOCATIONS

ACENZ ISO 9001 CERTIFIED GCS

CADFILE	190417-52.dwg
SCALE (A3)	1:2000
ORIG. SHEET SIZE	A3
DRAWING No.	190417-52
REV.	1

APPENDIX B

Contractor Checklist

Contractor Checklist

Summary of Key RAP/SMP requirements for Contractor

Timing	Key task	Details	Completed
Prior to ground works commencing	Site setup and enabling works	a Summerset Holdings Ltd to advise Selwyn District Council and WorkSafe of works commencing;	
		b Appoint a Contaminated Land Specialist (CLS): Name: Contact:	
		c Establish earthworks (dust, erosion, sediment, stormwater, odour) controls in line with any relevant Erosion and Sediment Control Plan required by Northland Regional Council, and noting additional requirements for contaminated land in **Section 7**;	
		d Hazard board to state contaminated soil may be present and indicating health and safety requirements for workers;	
		e Obtain PPE: disposable gloves, disposable masks, etc.;	
		f Arrange disposal permits;	
		g Follow site delineation and disposal programme for Area 1, Area 2 and Area 3 in conjunction with CLS as per **Section 6.1.1, 6.1.2 and 6.1.2**;	
During the works	General RAP/SMP Compliance	h Licensed asbestos removalist firm to carry out demolition programme for northern warehouses and hard seal removal in accordance with Asbestos Removal Control Plan (ARCP) and all WorkSafe NZ requirements, followed by CLS validation of footprint and adjacent areas (**Section 6.2**);	
		i Maintain earthworks (dust, erosion, sediment, stormwater, odour) controls in line with RILEY's Earthworks and Sediment Control Plan, and noting additional requirements for contaminated soils and hazardous materials in **Section 7.1**;	
		j Ensure all health and safety procedures in **Section 5** have been implemented prior to and throughout the works.	
		k Retain all weighbridge and disposal dockets and provide to RILEY;	
		l Ensure imported material meets requirements in **Section 6.3**;	
	Alert Project Manager and Contaminated Land Specialist if any of the following situations arise:	m Ensure compliance with any other procedures outlined by the Contaminated Land Specialist.	
		Contaminated soil is encountered that includes: - Odours (petroleum, oil) - Discolouration (black, green/blue staining most common) - Inclusions of non-cleanfill allowable (refer Table B1 and B2 below MfE Cleanfill Guidelines), deleterious materials (e.g. plastic, rubber, metal) - Asbestos Containing Materials (ACM)	
		Groundwater with an oily sheen, odour or discolouration is encountered;	
Within one month of completion of the relevant works	Provide contaminated land-related information to RILEY	n Details of any complaints relating to odour or dust made during the works	
		o Details of unexpected encounters/events, actions taken, and communications made;	
		p Details of visits made or correspondence received from Selwyn District Council, ECan and/or WorkSafe representatives;	
		q Summary of weighbridge information for disposal verification;	
		r Complete works verification form.	

APPENDIX C

Remediation Areas
RILEY Dwg: 190417-53



N

LEGEND

- HA1 — RILEY TEST LOCATIONS 2019
- S1 — RILEY TEST LOCATIONS 2020
- POST DEMOLITION REQUIRED VALIDATION TESTING
- CONTAMINATION HOTSPOT

NOTE: AERIAL PHOTO SOURCED FROM LINZ

20 0 40 80m

SCALE 1:2000

RESOURCE CONSENT

REV	DATE	ISSUE	BY
2	31.08.20	TITLE CHANGE	JM
1	01.09.20	ISSUED FOR RESOURCE CONSENT	MD

DESIGN	DES CHECK	APPROVED FOR ISSUE
CM	CM	R BURDEN
DRAWN	CAD CHECK	
MD	JM	
DATE DRAWN		ISSUE DATE
AUG 2020		31 / 08 / 20

RILEY CONSULTANTS
www.riley.co.nz

CLIENT	WELHOM DEVELOPMENTS LTD.
ADDRESS	579 SPRINGS ROAD, PREBBLETON 7604
PROJECT	SITE MANAGEMENT PLAN AND REMEDIAL ACTION
SHEET TITLE	HOTSPOTS LOCATIONS AND SAMPLING LOCATIONS

ACENZ ISO 9001 GCS

CADFILE	190417-53.dwg
SCALE (A3)	ORIG. SHEET SIZE
1:2000	A3
DRAWING No.	REV.
190417-53	2