

PRELIMINARY AND DETAILED SITE INVESTIGATION TO SUPPORT PROPOSED PLAN CHANGE 104 TOWNSEND ROAD AND 141 SOUTH BELT, WAIMAKARIRI, RANGIORA

Engineers and Geologists

RILEY CONSULTANTS LTD New Zealand Email: riley@riley.co.nz Email: rileychch@riley.co.nz Web: www.riley.co.nz AUCKLAND

4 Fred Thomas Drive, Takapuna, Auckland 0622 PO Box 100253, North Shore, Auckland 0745 Tel: +64 9 489 7872 Fax: +64 9 489 7873 CHRISTCHURCH 22 Moorhouse Avenue, Addington, Christchurch 8011 PO Box 4355, Christchurch 8140 Tel: +64 3 379 4402 Fax: +64 3 379 4403



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Report prepared for:

Summerset Villages (Rangiora) Limited

Report prepared by:

Chloe Cameron, Engineering Geologist

non

Report reviewed by:

Marcus Herrmann, Principal - Contaminated Land

Marayberminn

Report approved for issue by:

Brett Black, Director, CPEng

.

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RILEY CONSULTANTS LTD New Zealand Email: riley@riley.co.nz Email: rileychch@riley.co.nz Web: www.riley.co.nz AUCKLAND

4 Fred Thomas Drive, Takapuna, Auckland 0622 PO Box 100253, North Shore, Auckland 0745 Tel: +64 9 489 7872 Fax: +64 9 489 7873 CHRISTCHURCH 22 Moorhouse Avenue, Addington, Christchurch 8011 PO Box 4355, Christchurch 8140 Tel: +64 3 379 4402 Fax: +64 3 379 4403



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1.0 Introduction

Riley Consultants Ltd (RILEY) has been engaged by Summerset Villages (Rangiora) Limited to undertake a Preliminary and Detailed Site Investigation (PSI/DSI) on a 13.83ha greenfield site, located in south-west Rangiora at 104 Townsend Road and 141 South Belt.

This is an update of our previous PSI/DSI (RILEY Ref. 170743-B, 7 August 2019) which was prepared in support of a boundary readjustment for the site. This report has been prepared to support a private plan change to amend parts of the Waimakariri District Plan (WDP) pursuant to Section 73(2) and Clauses 21(1) and 22 of the First Schedule to the Resource Management Act 1991 (RMA).

A PSI/DSI was necessary to assess the potential for on-site soil contamination, as the proposed plan change will enable more intensive residential use of the land and thus requires consideration in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS).

This report has been reviewed by a suitably qualified and experienced practitioner in contaminated land as required by the NES-CS. This report meets the general requirements of a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) in accordance with the Ministry for the Environment (MfE)'s Contaminated Land Management Guidelines (CLMG) No. 1: Reporting on Contaminated Sites in New Zealand (revised 2011), the MfE's CLMG No. 5: Site Investigation and Management of Soils (revised 2011) and the NES-CS.

1.1 Summary

Key outcomes from this report are as follows:

- Samples tested across the site contained heavy metals (mainly lead, chromium and zinc) at concentrations greater than regional background criteria.
- Apart from one minor lead exceedance, no sampling results across the site were found to exceed relevant human health or ecological protection criteria.
- A Restricted Discretionary Activity resource consent will be required to be applied for under the NES-CS prior to future site development works. The NES-CS consent status will reduce to Controlled Activity if a retirement village rather than residential end-use is intended.
- Subject to remediation or management of a small area of the site and in accordance with a development-specific Site Management Plan (SMP) for the site, all land subject to the plan change is considered to be suitable for residential development and use, based on testing information to date.



2.0 Site Description, Location and Current Land Use

The property is located on the corner of Townsend Road and South Belt, within a flat-lying rural area in the town of Rangiora, approximately 29km north of Christchurch Central Business District. The is legally described as (shown in Figure 1 below):

• Lot 1 DP 45826 and Lot 3 DP 73557.



Figure 1: Plan Change Site Location

Legal Lot boundaries are shown on RILEY Dwg: 170743-2 (Appendix G).

The site is located in the south-western area of Rangiora township, with the northern site boundary adjoining South Belt, and Townsend Road adjoining the western boundary. East of the site is Southbrook Park, and the southern boundary adjoins Southbrook Stream (which flows west to east). The site slopes down very gently from the north-west to south-east.

The majority of the site area is currently grassed, with a horse training track present at the northern end, adjacent to South Belt. There are two dwellings and numerous farm buildings located in the north-western corner of the site.

Medium density residential property is located to the north of the site, and a substantial new residential subdivision known as Townsend Fields is currently under construction to the north-west of the site. Southbrook Park is located to the east of the site, with the remainder of the site is bounded by rural land. Vehicle access to the site is via two access points; one on the western boundary from Townsend Road and one from South Belt.

Contours derived from publicly available Light Detection and Ranging (LiDAR) data (September 2011) indicate a maximum ground surface elevation of approximately RL 26.0m at the north-western boundary and a minimum elevation of approximately RL 22.0m at the south-eastern boundary (Lyttelton Vertical Datum).

From a development perspective, the site is located within an area designated by the Waimakariri District Council (WDC) Planning Map as Residential 4B. However, it is proposed to change the zoning of the land to Residential 2 which would enable typical residential dwellings to be constructed on the site.

2.1 Proposed Development

With reference to the WDP, the site is currently zoned Residential 4B. It is proposed to change the zoning of the land to Residential 2 zone which would enable typical residential sections and dwellings to be constructed on the site. It is also proposed to incorporate within the zone some specific rules to provide for the construction of a retirement village. This would result in allowing a retirement village to be constructed on all or part of the site, or all or part of the site to be developed for typical residential dwellings (in accordance with the Residential 2 zone rules).

In its current status (Residential 4B), the site can be developed into approximately 13 sections comprising lifestyle blocks with dwellings. The proposed new provisions for the Residential 2 zone will allow for up to 150 sections (and dwellings).

The proposed plan change will enable residential and high-density residential land uses. Soil testing results will therefore be assessed against these health-based soil contaminant standards, in addition to outdoor worker (unpaved) land use during works, environmental discharge criteria and regional background concentrations (please refer to Section 6.2 of this report).

3.0 Geology and Hydrogeology

The published geological map of the area as described in the Institute of Geological and Nuclear Science (GNS) geological QMAP for the area (Geology of the Christchurch Urban Area, 1:250,000 Geological Maps, 2008), indicates the site has surface geology consisting of dominantly alluvial river deposits (brownish-grey river alluvium) belonging to the Yaldhurst Member of the Springston Formation.

A review of the contours of depth to groundwater in metres below ground level (m bgl) presented by Canterbury Maps, indicates the unconfined groundwater table is expected to be encountered between 1.0m and 2.5m bgl across the site. A total of 15 groundwater wells were identified on the Environment Canterbury (ECan) Geographic Information System (GIS) database as being located within a 500m radius of the property.

4.0 **Preliminary Site Investigation**

A PSI was undertaken by RILEY to assess the potential risk of soil contamination relating to past and current activities carried out on-site in accordance with the Ministry for the Environment's Contaminated Land Management Guidelines No. 1 (MfE CLMG No. 1): Reporting on contaminated sites in New Zealand (revised 2011), and the NES-CS.

The PSI includes the following:

- Review of historic aerial photographs;
- ECan Listed Land Use Register (LLUR) check;
- Search and review of WDC property files and previous site investigations;
- Site walkover.

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4.1 Historic Aerial Photographs

As part of the investigation, historic aerial photographs for the site have been reviewed from 1940 to 2015 using the ECan online GIS database. A summary of the aerial photograph search is provided below. All images have been included within Appendix A.

1940 to 1944:

- The majority of the site is rural grassed farmland, with shelterbelts and paddocks which are similar to today's land use (neighbouring land is currently farmland).
- The initial buildings appear to comprise a farmhouse, pig pens, a barn, and several smaller sheds.
- The Southbrook Stream, located along the southern property boundary, meanders significantly more than today: i.e. the watercourse has been straightened over time.

1945 to 1959:

• There are no historic aerial photographs available for the site.

1960 to 1964:

- Several of the abovementioned buildings and the pig pens located in the north-western corner of the site appear to have been removed.
- Several sheds and barns, and a steel-trussed chicken cage building (measuring approximately 70m in length and 5m in width) have been constructed in the north-western corner of the site.
- A driveway has been formed in the north-western corner of the site, providing access to South Belt.

1965 to 1969:

• A second steel-trussed chicken cage building has been constructed in the north-western corner of the site, adjacent to the existing chicken cage building. The two poultry sheds cover an area of approximately 900m².

1970 to 1989:

• A dirt horse track is now visible on the north-east part of the site with associated horse stalls nearby.

1990 to 1999:

- A second (smaller) dirt horse track is now visible inside the existing (larger) track at the northern end of the site.
- A residential dwelling has been constructed at the western end of the site, with a driveway providing access to Townsend Road.

2000 to 2010:

• Several horse stables, a shed, a barn, two residential dwellings and a large horse racecourse have now been established in the northern half of the site.

- A large shed (possibly used for packing/cooling) is located in the north-western end of the site. One of the two steel-trussed chicken cage buildings appears to have been removed.
- Most of the land appears to be being used for grazing horses, cattle and sheep.
- The land adjacent to the northern property boundary has been partially developed as a residential subdivision. No further significant change in land use is identified.

2010 to 2015:

- Both chicken cage buildings have now been removed. Concrete from the eastern shed remains.
- A burn pad appears to be present between the residential dwelling of 104 Townsend Road and the Southbrook between March 2010 and January 2011.
- A stockpile¹ is visible on the left bank of the watercourse.
- Most of the land still appears to be being used for grazing horses, cattle and sheep.
- Ongoing residential development is occurring on the land adjacent to the northern property boundary.

4.2 Waimakariri District Council Property Files

The property files for the subject site were obtained from the WDC in January 2019. The files comprise the following documents:

- Ground Contamination Assessment, 141 South Belt and 104 Townsend Road, Rangiora (Eliot Sinclair & Partners Ltd, 15 October 2014);
- Infrastructure Servicing Assessment, 141 South Belt and 104 Townsend Road, Rangiora (Eliot Sinclair & Partners Ltd, October 2014);
- Correspondence with WDC regarding drainage, survey and land development proposals;
- Consent application documents and construction details for buildings and heating appliances.

A review of the files indicates a ground contamination assessment was undertaken by Eliot Sinclair & Partners Ltd (Eliot Sinclair) on 15 October 2014, in association with an application for a plan change, which would have resulted in a change in the land use from farmland to residential on the area between South Belt Road and the Southbrook River.

In summary, the Eliot Sinclair PSI identified caged chicken farming and a burn pad on-site. Consequently, a DSI was carried out by Eliot Sinclair targeting these two activities. Surficial soils in both these areas were tested for arsenic and heavy metals, with additional PAH² testing carried out for the burn pad and OCP³ testing carried out for the caged chicken operation.

¹ The Eliot Sinclair ground contamination report identifies that this stockpile comprises excavation material from the Southbrook.

² Polycyclic aromatic hydrocarbons.

³ Organochlorine pesticides.

- Results for the former caged chicken area showed arsenic, chromium and lead concentrations above regional background levels but below the NES-CS soil contaminant standard for residential land use (10% produce). Two low-level total DDT detects were also identified here. No remedial or management actions were recommended nor taken for this area.
- Results for the burn pad showed arsenic, chromium, copper and lead above regional background levels. One arsenic sample exceeded the relevant NES-CS soil contaminant standard (residential, 10% produce).

The report states that two sequences of removal/disposal of surface soils, each followed by validation testing programmes (July and September 2014) were undertaken thereafter, with contaminated soils disposed to the Kate Valley landfill. The final validation sampling regime from the remediated area confirmed that the concentration of arsenic was now below the relevant NES-CS soil contaminant standard, and that the land was considered suitable for residential zoning.

4.3 Environment Canterbury Listed Land Use Register

An online search of ECan's LLUR has been undertaken as part of the PSI. The LLUR is a database containing contaminated and potentially contaminated sites where hazardous activities as detailed in the MfE's Hazardous Activities and Industries List (HAIL) have been identified by ECan to have occurred or to be currently occurring in the Canterbury region.

A review of ECan's LLUR indicates the site is registered as a HAIL site, specifically *Category A10 - Persistent pesticide bulk storage or use*. Furthermore, a land parcel located approximately 500m south-east (downgradient) of the site is recorded on the LLUR as having historical and current timber treatment and/or preservation and bulk storage of timber. RILEY considers that potential ground contamination from the timber treatment site is highly unlikely to have impacted soils at the subject site.

4.4 Previous Site Investigations

As noted in Section 4.2, a limited DSI was undertaken by Eliot Sinclair on 15 October 2014 to support a proposed plan change. Soil types encountered in the upper layers were generally consistent across the site, comprising shallow topsoil to a maximum depth of 0.5m bgl, underlain by alluvium comprising clayey silt and sandy clayey silt to between 0.9m and 2m depth, in turn underlain by silty and sandy gravels where deeper testing with hand equipment became impractical.

Additionally, a geotechnical investigation was undertaken by RILEY and McMillan Drilling Limited (overviewed by RILEY) between 17 December and 21 December 2018, comprising a site walkover, buried services clearance check and completion of 29 subsurface tests. Subsurface investigations confirmed the presence of a surficial layer of topsoil, underlain by Quaternary aged alluvial river deposits belonging to the Yaldhurst Member of the Springston Formation across the site, comprising silt and clay mixtures to between 0.45m and 1.7m depth, in turn underlain by silty sandy gravel from between 0.45m and 1.7m bgl to a depth of at least 15.2m bgl. Fill was encountered within one of the shallow tests from between 0.2m and 0.4m depth and comprised dark brown (mottled) organic silt with trace gravel and rootlets.

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4.5 Site Walkover and Interview

A review by RILEY of the report "Ground Contamination Assessment, 141 South Belt and 104 Townsend Road, Rangiora (Eliot Sinclair & Partners Ltd, 15 October 2014)", which was prepared for an earlier residential plan change application, indicates an interview with Mr Clarke (current owner) was undertaken during the site inspection. The information from the site inspection and interview is summarised as follows:

- Mrs Clarke's father bought the land around 1946 from the previous farmer.
- In 2014, the land was then being used to graze approximately 30 horses, ten cattle and less than ten sheep. No goods are produced on the farm.
- Previous land uses (approximately 40-years ago) comprised cattle, horses, pig and chicken farming.
- A historical farm pit was situated on a now neighbouring parcel south-east of the site (Lot 2 DP73557). This land has been sold to WDC, and subsequent to the sale three stormwater detention and treatment ponds have been constructed.
- Silt and gravel were stockpiled on the true left bank of the Southbrook in 2011. The material is from deepening and straightening the watercourse.
- In 2014, horse manure and sawdust were stockpiled behind a horse stable. The material is regularly removed by a Rangiora Landscaping company and used for gardening.
- Mr Clarke stated that the farm was run on a low budget and grass grub was not treated in the 1960s and 1970s.
- Spraying (from 2014 onwards) is undertaken by a registered sprayer who also works for council and occurs mostly along the Southbrook.
- Mr Clarke advised that no friable asbestos or cement fibreboards in deteriorated condition were noticed on farm buildings during the 2014 site inspection.
- A burn pad is situated between the existing residential dwelling at 104 Townsend Road and the Southbrook.
- An above-ground storage tank (AST) is located amongst the horse stables. The tank was used to store diesel but has not been used for many years. The soil under the tank is densely vegetated with grass. No hydrocarbon stains were visible at the time of inspection.
- The two residential dwellings are serviced by septic wastewater systems.
- Two steel-trussed chicken cage buildings were located in the north-western part of the site and operated between 1965 and 1974. The buildings were constructed with steel frames and roofs but no walls, and the floor was unsealed, apart from two concrete strips to access the caged chicken.
- No bulk-storage of chemicals was identified on the land. Chemicals from the poultry operation were probably stored in the adjacent packing and cooling shed on concrete floor.

Additionally, a site walkover was undertaken by RILEY staff on 17 December 2018. The findings of the walkover have been summarised below, and the site photographs are appended (Appendix C).

• Sawdust has been imported to site and stockpiled next to a shed for use in the horse stables.

- Horse manure has been stockpiled next to horse stables.
- The AST has been moved from its original location and was not identified elsewhere on the site.
- A 3m diameter hole is present next to shed possibly formerly utilised as a sump or septic tank.
- Two burn pads are present near the existing home/sheds one larger (previously referenced in this report), and a smaller one: both have been used recently.
- An underground sewer main crosses site from north to south-east. Three on-site manholes indicate its approximate location. Signs of ground disturbance were observed near the south-east alignment.
- Approximately 20 sheep/lambs are grazing near the existing dwelling and approximately 12 horses are also visible on-site. No other animals (e.g. cattle, chickens) were observed at the time of inspection.
- No cropping is present on the site. Several patches of cracked bare earth were observed inside the horse training track, however, most of the site is pastureland with thistles and other weeds.
- The horse training track is used daily; machinery on-site to grade the track was visible.
- Southbrook flows along south boundary of site (west to east), flowing approximately 1 cumec at the time of assessment. The brook appears to have been straightened.

No further land uses or activities were observed during the site visits by Eliot Sinclair (2014) and RILEY (2018) that raised concerns regarding potential soil contaminant risks to human health or the environment.

4.6 HAIL Activities and PSI Conclusion

Based on a review of the historical aerial photographs, council files and the aforementioned on-site observations, RILEY considers that several HAIL activities have been identified to have occurred on-site which have not been previously addressed in the ground contamination assessment undertaken by Eliot Sinclair in 2014.

Potential contaminants and sources are presented below in Table 1.

| Activity | Potential Contaminants | Likelihood of Contamination | HAIL Reference |
|---|---------------------------|---|---|
| Above-Ground Storage Tank (AST) • Heavy metals • Petroleum hydrocarbon contamination | | Likely to occur via tank failure, poor maintenance or dispensing problems. The proposed development works would include ground disturbance and potential exposure of construction workers and future site end users to contaminants. This would complete a source-pathway-receptor link. | Activity A2: Chemical manufacture, application or bulk storage. |
| Construction and demolition of farm buildings with potential asbestos-containing materials or lead-based paintsLikely to oc buildings (p lead-based removed/de the building becomes fla falls off. Th developmen include group potential ex construction site end-us This would source-path | | Likely to occur when older buildings (painted with lead-based paint) have being removed/demolished or when the building deteriorates (paint becomes flaky or powdery) and falls off. The proposed development works would include ground disturbance and potential exposure of construction workers and future site end-users to contaminants. This would complete a source-pathway-receptor link. | Activity 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. |
| Burn Pads • Asbestos | | Likely to occur if the buildings/materials incinerated had asbestos containing materials. The proposed development works would include ground disturbance and potential exposure of construction workers and future site end-users to contaminants. This would complete a source-pathway-receptor link. | Activity 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. |

| Table 1: | Potential | Contamination | Sources |
|----------|-----------|---------------|---------|

A DSI is required to quantify the risks to construction workers and site end-users, as well as to assess the consenting activity status of ground disturbance associated with future development.

5.0 Detailed Site Investigation

A DSI was undertaken by RILEY on 17 December 2018, following the PSI. A total of 33 test locations (HA1 to HA23, BP1 to BP3, FT1 and HA-BH1 to HA-BH6) were hand excavated to visually assess the encountered material and to collect soil samples for analysis. The test locations are shown on RILEY Dwg: 170743-2 (Appendix G).

5.1 Sampling Methodology

Soil sampling was undertaken in accordance with the MfE's CLMG No. 5: Site Investigation and Management of Soils (revised 2011).

Soil samples for analytical testing were collected according to the following procedure:

- Test locations were evenly spread across the site (within both the proposed development area and the balance land), including around the three burn pad areas and beneath where the AST was once located.
- Soil samples were collected within the near surface topsoil material (0m to 0.2m depth), and within natural soils at approximately 0.5m and 1m depth, where applicable.
- Standard sampling procedures such as changing gloves and decontamination of • sampling equipment (hand auger) were observed.
- Samples were placed directly into glass jars, supplied by the laboratory (such that no • headspace remained in the jar), and were sealed, labelled and placed in a non-transparent, chilly-bin filled with ice.
- Chain of custody documentation detailing the sample handling, transport procedures from the point of collection at the site to the laboratory, and instructions for the laboratory analysis was then completed and sent with the samples to the laboratory (via same-day courier).
- For most of the test locations, only the top two samples undertaken within topsoil at • approximately 0.2m bgl and natural soil at approximately 0.5m bgl, were analysed initially, and it was proposed that if guideline values were exceeded, testing of the underlying natural soils, undertaken at approximately 1m bgl, would then be carried out.

Sampling locations are shown on RILEY Dwg: 170743-2 (Appendix G). All test locations across the site encountered topsoil to a maximum depth of 0.35m bgl, underlain by natural material.

All soil samples were logged on-site by a qualified engineering geologist in general accordance with the New Zealand Geotechnical Society Guidelines. The co-ordinates for all test locations were marked using a hand-held GPS.

The test logs from the on-site sample locations are presented in Appendix D and are representative of material encountered across the site. There were no signs of visual or olfactory contamination in any of the samples taken.

6.0 Laboratory Testing and Acceptance Criteria

A total of 70 soil samples were taken across the site. Of the 70 samples, 64 were analysed for heavy metals (arsenic, cadmium, chromium, copper, nickel, lead and zinc) and organochlorine pesticides (OCP); 62 samples were tested for polycyclic aromatic hydrocarbons (PAH). Additionally, two samples were tested for BTEX (benzene/toluene/ethylbenzene/xylene), and 21 samples were tested for asbestos (presence/absence).

The analytical results are discussed in Section 6.3 below, and are presented in Appendix E. The full laboratory transcripts are presented in Appendix F.

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 an IANZ-accredited laboratory. •
- Comparison of field and analytical data.
- Compliance with sample holding times. •

Laboratory QA/QC reports are available on request.

6.2 Risk Assessment

For the purposes of this report, a Tier 1 risk assessment was carried out by comparing the concentrations of the contaminants of concern against the following criteria:

- 1. Background Concentrations: ECan (Background Concentrations of Selected Trace Elements in Canterbury Soils, 2006.
- 2. NES-CS health-based soil contaminant standards for residential (10% produce), high-density residential, and outdoor worker (unpaved) land uses.
- 3. AUP-OP⁴ Table E.30.6.1.4.1: Permitted Activity Soil Acceptance Criteria (environmental discharge).
- 4. Ministry for the Environment: Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, revised 2011.

6.3 Results

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

6.3.1 Heavy Metals

The analytical results shown in Appendix E indicate that one lead reading at FT1 (223mg/kg) marginally exceeds the most sensitive NES-CS soil contaminant standard (residential, 10% produce land use - 210mg/kg criterion). No other heavy metal results were found to exceed this standard.

With the exception of HA-BH6 and HA21, all sampling locations contained various heavy metals at concentrations greater than regional background criteria.

6.3.2 Asbestos (presence/absence)

No asbestos was detected within any soil samples tested across the site.

6.3.3 **TPH and BTEX**

The soil underlying the AST was tested for total petroleum hydrocarbons (TPH) and BTEX (Benzene/Toluene/Ethylbenzene/Xylene) to assess whether poor maintenance or dispensing problems had resulted in contamination, and if so whether the fuel hydrocarbon concentrations recorded pose a potential risk to human health or the environment.

⁴ Auckland Unitary Plan – Operative in Part, chapter E30.6, Table E30.6.1.4.1 - Permitted activity soil acceptance criteria. These have been referenced as the Canterbury LWRP does not currently specify soil criteria for environmental discharges.

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A summary of the laboratory test results is provided in Table 3 and Table 4 below (soil samples), with full laboratory transcripts included in Appendix F.

| Sample IDs | Sample Depth (m) | Units | Total Petroleum Hydrocarbons | | |
|--|------------------|-------|---------------------------------|---------|---------|
| | | | C7-C9 | C10-C14 | C15-C36 |
| FT1_0.1 | 0.1 | mg/kg | <10 | <15 | 149 |
| FT1_0.3 | 0.3 | mg/kg | <10 | <15 | <25 |
| Petroleum Guidelines Reside | mg/kg | 2,700 | 3,200 | NA | |
| Petroleum Guidelines Reside PATHWAYS ² | mg/kg | 2,700 | 560 | NA | |

Table 3: Soil Analytical Results (TPH)

Notes: 1. Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, Tier 1 TPH soil acceptance criteria, residential use - inhalation pathways, silty clay surface (<1m).

2. Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, Tier 1 TPH soil acceptance criteria, residential use - all pathways, silty clay surface (<1m).

| Comula IDo | Comula Douth (m) | Units | Total BTEX | | | |
|---|---------------------|-------|------------|---------|--------------|---------|
| Sample IDS | Sample Depth (m) | | Benzene | Toluene | Ethylbenzene | Xylenes |
| FT1_0.1 | 0.1 | mg/kg | <0.05 | 0.08 | <0.05 | <0.05 |
| FT1_0.3 | 0.3 | mg/kg | <0.05 | <0.05 | <0.05 | <0.05 |
| Petroleum Guidelines Residential - INHALATION ¹ | | mg/kg | 1.7 | 210 | 110 | 160 |
| Petroleum Guide | lines Residential - | mg/kg | 1.7 | 210 | 110 | 160 |

Table 4: Soil Analytical Results (BTEX)

Notes: 1: Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, Tier 1 TPH soil acceptance criteria, residential use - inhalation pathways, silty clay surface (<1m).

2: Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, Tier 1 TPH soil acceptance criteria, residential use - all pathways, silty clay surface (<1m).

Evaluation of the soil laboratory results indicates one heavy-end carbon fraction TPH reading at 149 mg/kg, and one low-level toluene detect at 0.08 mg/kg⁵. Neither reading exceeded the adopted human health acceptance criteria thresholds, as set out in the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011).

6.3.4 Polycyclic Aromatic Hydrocarbons

Low-level detection of PAHs was found in six of the 64 samples (HA4, HA10, HA8, HA-BH3 and FT1), ranging from 0.01mg/kg to 0.09mg/kg. These detected levels are well below relevant NES-CS health-based soil contaminant standards and AUP-OP environmental discharge criteria.

6.3.5 Organochlorine Pesticides

No OCP's were detected within any soil samples tested across the site.

⁵ No published background levels are available for TPH nor BTEX.

7.0 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



8.0 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.

8.1 NES-CS

The NES-CS⁶ 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 proposed development has been evaluated against this regulatory requirement.

As one lead concentration exceeds the NES-CS soil contaminant standard for residential (10% produce) land use and several contaminants of concern exceed regional background concentrations, a Restricted Discretionary resource consent will be required under the NES-CS in relation to intended site development works if a standard residential subdivision is proposed once the zone is changed. In the event of standard residential subdivision not being undertaken in the future, i.e. if only a retirement village was intended for the site, then the NES-CS consent activity status would change from Restricted Discretionary activity to Controlled activity. A SMP will be required as part of consent conditions likely to be provided by (WDC), the responsible authority for issuing and regulating land use consents under the NES-CS.

⁶ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

It is considered that the most appropriate timing to develop a SMP and apply for resource consent under the NES-CS will be subsequent to the plan change, in association with a specific development proposal. The SMP will include methodologies to delineate, remediate or manage, and validate the minor localised exceedance of lead and will provide guidance to the civil works contractor regarding potential re-use of soils on-site. The NES-CS resource consent application and associated SMP would most appropriately be submitted for assessment and approval by WDC in conjunction with a future earthworks consent, residential subdivision application or land use consents, whichever comes first.

Environmental Implications 8.2

A review of the Canterbury Land and Water Regional Plan (LWRP), Map 051, indicates the site is located within an area of semi-confined or unconfined aguifers, and within the Ashley Groundwater Allocation Zone.

The LWRP does not specify permitted activity soil acceptance criteria for discharges of contaminants into air, or into water, or onto or into land from land not used for rural production The Auckland Unitary Plan - Operative in Part (AUP-OP) does specify soil activities. assessment criteria for environmental discharges, as follows:

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

Table 5: Environmental Discharges

Note: Permitted activity soil acceptance criteria (AUP-OP, chapter E.30.6, Table E30.6.1.4.1)

Comparing these environmental discharge values with the analytical results for the site (Appendix E) demonstrates that the contaminant concentrations encountered across the site meet these criteria. It is therefore considered that soil disturbance associated with the proposed development is not reasonably likely to pose adverse effects to ecological receptors.

9.0 Soil Reuse and Disposal Options

All topsoil/underlying natural soils from the site are considered suitable for reuse on-site, with the exception of soils in the vicinity of the sole lead exceedance (sampling location FT1). The SMP to be developed in conjunction with a future NES-CS consent application (please refer to Section 8.1) will include delineation and validation testing to ensure soils in the vicinity of this area are appropriately remediated or managed.

Any other excavated topsoil and underlying natural material which is not required for reuse on-site, and with contamination concentrations exceeding background criteria, should be disposed of at an appropriately licensed managed fill facility. Approval from the nominated facility should be granted prior to removing surplus soils off-site.

10.0 Conclusion and Recommendations

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

- No obvious visual (e.g. staining) or olfactory (e.g. hydrocarbon odours) signs of ground contamination was noted during the intrusive investigation.
- No asbestos was encountered across the site.
- One lead sample marginally exceeded one of the health-based NES-CS soil • contaminant standards, being residential (10% produce) land use.
- No soil samples exceeded relevant NES-CS health-based soil contaminant standards • for high-density residential or outdoor worker (unpaved) land uses.
- No soil samples exceeded environmental discharge assessment criteria under the AUP-OP, indicating no ecological impacts from soil contamination are anticipated from disturbing surficial soils on-site.
- Samples tested across the site contained heavy metals (mainly lead, chromium and zinc) at concentrations greater than regional background criteria.
- A Restricted Discretionary Activity resource consent will be required to be applied for • under the NES-CS prior to future site development works, as lead exceeds the most sensitive health-based soil contaminant standard in one location and several heavy metals exceed regional background criteria across most of the site. The NES-CS consent status will reduce to Controlled Activity if a retirement village rather than residential end-use is intended.
- A SMP will be required to be prepared in conjunction with an NES-CS consent application for future development works.
- With the exception of soils in the vicinity of the lead exceedance recorded, surficial • soils are considered suitable for on-site reuse. Any excavated topsoil and underlying natural material which is not required for reuse on-site, and with contamination concentrations exceeding background criteria, should be disposed of at an appropriately licensed managed fill facility.
- Specific consents and management approaches to deal with these issues will be • sought and undertaken as part of future land use change enablement.
- Subject to remediation or management of a small area of the site and in accordance • with a WDC approved SMP for the site, all land subject to the plan change is considered to be suitable for residential development and use, based on soil testing information to date.

11.0 Limitation

This report has been prepared solely for the benefit of Summerset Villages (Rangiora) Limited as our client with respect to the brief and Waimakariri District Council in processing the consents. 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 opinions 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 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 that 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

Historical Aerial Photographs





72



6 5

6 6

53

Highfield Lane

CoronationStream











75

11

OakTreatene

12

South Belt

141

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Information from this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it.



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Scale: 1:2,257 @A3

Map Created by canterburymaps.govt.nz on 9/01/2019 at 11:26:37 a.m.









2004 to 2010

Oak

84

Tree Lar

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South Belt

141





Map Created by canterburymaps.govt.nz on 9/01/2019 at 11:27:14 a.m.





11

2010 to 2015

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South Belt



APPENDIX B

Listed Land Use Register



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140 P. 03 365 3828 F. 03 365 3194 E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information. For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140

P. 03 365 3828 F. 03 365 3194 E. <u>ecinfo@ecan.govt.nz</u>

www.ecan.govt.nz

Date: Land Parcels:

| 15 January 2019 | |
|-----------------|-----------------------------|
| Lot 3 DP 73557 | Valuation No(s): 2159120656 |



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

There are no sites associated with the area of enquiry.

Information held about the sites on the Listed Land Use Register

There are no sites associated with the area of enquiry.

Information held about other investigations on the Listed Land Use Register

 15 Oct 2014
 INV 24498: Ground Contamination Assessment: 141 South Belt & 104 Townsend Road, Rangiora (Detailed Site Investigation)

 Eliot Sinclair & Partners Ltd

Summary of investigation(s):

To facilitate a plan change from 'Residential 4B' to 'Residential 2' a detailed site investigation occurred at 141 South Belt and 104 Townsend Road, Rangiora. The farm had been in family ownership from 1946 to the present and had been used for grazing cattle and horses as well as pig and chicken farming. Chicken sheds were identified on the north of 104 Townsend Road and was opperational from 1965 to 1974 with an unsealed floor. A burn pad was also identified between the residence at 104 and the South Brook. An unused 400 litre above ground storage tank for diesel was located among the horse stalls on the west side of 141 South Belt. 6 soil samples were collected from the chicken shed area and analysed for a suite of metals and organochlorine pesticides with all results compliant with applicable standards. 2 soil samples were collected from the burn pad and analysed for a suite of metals. Arsenic was elevated in one of the samples. The surface 200 mm of soil from the burn pad was excavated and disposed of at Kate Valley. Validation samples of remaining soil complied with residential land use standards.

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ225559.

Disclaimer:

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.


Listed Land Use Register

What you need to know



Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012. For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)'. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

¹The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website <u>www.mfe.govt.nz</u>, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at <u>www.llur.ecan.govt.nz</u>. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit <u>www.ecan.govt.nz/HAIL</u>.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of

the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:

Calling from Christchurch: (03) 353 9007 Calling from any other area: 0800 EC INFO (32 4636)



Everything is connected

Promoting quality of life through balanced resource management. www.ecan.govt.nz E13/101

Listed Land Use Register Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.



Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- · have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free on 0800 EC INFO (32 4636) email ecinfo@ecan.govt.nz



E13/102



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140 P. 03 365 3828 F. 03 365 3194 E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

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The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

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Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information. For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140

P. 03 365 3828 F. 03 365 3194 E. <u>ecinfo@ecan.govt.nz</u>

www.ecan.govt.nz

| Date: | 15 January 2019 | |
|---------------|-----------------|-----------------------------|
| Land Parcels: | Lot 1 DP 45826 | Valuation No(s): 2159206901 |



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

| Site ID | Site Name | Location | HAIL Activity(s) | Category |
|--------------------|--|---|----------------------------|--------------------------|
| 169991 | 104 Townsend Road, Rangiora | 104 Townsend Road, | A10 - Persistent pesticide | Below guideline values - |
| | | Rangiora | bulk storage or use; | Residential |
| Please note that t | he above table represents a summary of sites a | nd HAIIs intersecting the area α | f enquiry only | |

Information held about the sites on the Listed Land Use Register

Site 169991: 104 Townsend Road, Rangiora (Intersects enquiry area.) Site Address: 104 Townsend Road, Rangiora Legal Description(s): Lot 1 DP 45826

| Site Category: | Below guideline values - Residential |
|----------------|---|
| Definition: | Investigation results demonstrate that hazardous substances present at the site, but below applicable |
| | guidelines Residential |

| Land Uses (from HAIL): | Period From | Period To | HAIL land use |
|------------------------|-------------|-----------|---|
| | 1973 | 1994 | Persistent pesticide bulk storage or use including sports turfs, market |
| | | | gardens, orchards, glass houses or spray sheds |

Notes: 19 Dec 2016 This record was created as part of the Waimakariri District Council 2016 HAIL identification project. 7 Jul 2017 Area defined from 1973 to 1994 aerial photographs. A10 - Horticultural activities, a poultry farm or sports turf were noted in aerial photographs reviewed.

Investigations:

15 Oct 2014 INV 24498: Ground Contamination Assessment: 141 South Belt & 104 Townsend Road, Rangiora (Detailed Site Investigation) Eliot Sinclair & Partners Ltd

Summary of investigation(s):

To facilitate a plan change from 'Residential 4B' to 'Residential 2' a detailed site investigation occurred at 141 South Belt and 104 Townsend Road, Rangiora. The farm had been in family ownership from 1946 to the present and had been used for grazing cattle and horses as well as pig and chicken farming. Chicken sheds were identified on the north of 104 Townsend Road and was opperational from 1965 to 1974 with an unsealed floor. A burn pad was also identified between the residence at 104 and the South Brook. An unused 400 litre above ground storage tank for diesel was located among the horse stalls on the west side of 141 South Belt. 6 soil samples were collected from the chicken shed area and analysed for a suite of metals and organochlorine pesticides with all results compliant with applicable standards. 2 soil samples were collected from the burn pad and analysed for a suite of metals. Arsenic was elevated in one of the samples. The surface 200 mm of soil from the burn pad was excavated and disposed of at Kate Valley. Validation samples of remaining soil complied with residential land use standards.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ225563.

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Listed Land Use Register

What you need to know



Everything is connected

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How does Environment Canterbury identify sites to be included on the LLUR?

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We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

¹The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website <u>www.mfe.govt.nz</u>, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at <u>www.llur.ecan.govt.nz</u>. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit <u>www.ecan.govt.nz/HAIL</u>.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of

the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:

Calling from Christchurch: (03) 353 9007 Calling from any other area: 0800 EC INFO (32 4636)



Everything is connected

Promoting quality of life through balanced resource management. www.ecan.govt.nz E13/101

Listed Land Use Register Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.



Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- · have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free on 0800 EC INFO (32 4636) email ecinfo@ecan.govt.nz



E13/102

APPENDIX C Site Photographs

Page 1

Site Photographs 1 to 8



Photo 1: Site



Photo 2: South Brook Stream



Photo 3: Area where AST was once located



Photo 4: Horse manure stockpiled adjacent to horse stables



Photo 5: Sawdust manure stockpiled adjacent to shed



Photo 6: Burn pad 1



Photo 7: Burn pad 2



Photo 8: Hand auger excavations - example of subsurface soils encountered

APPENDIX D Test Pit Logs



| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS cologists | Riley Cons 2 Moorhouse A Christchurch fel: +643 37944 fax: +643 3794 | ultants ^{ve} 402 403 | | | | | | | HAN | D | AU | G | ER LO | C | |
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| | - | | 0.60m Gra | des to very stiff. | go mouning. | | × × × × | | x | | | | ES0.5 NOV | | V= 184 R= 46 | |
| | - - - 1 - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | 1.00m Gra | des to hard. | | | × × × × × × × × × × × × × × | | | | | | ES0.9 NOV | No. 2 1, 2, 2, 2, 2, 2, 2, 2, 1, 4, 4, 7, 9, 20 | ✓ V= 230 | |
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| +25.55 | - | N FORMATION) | SILT, mir orange m sand, fine SPRINGS | nor to some clay ottling. Firm to e to medium. (Y STON FORMAT | y, trace s stiff; moi ALDHUF ION) | and; light <u>(</u> ist; low pla RST MEME | grey and sticity; BER, | x x x x x x x x x x x x x x x x x x x | | | | | | | | | | | | | |
| | - | T MEMBER, SPRINGSTO | 0.45m Gi | ades to 'stiff'. | | | | * ^ ^ * ^ ^ ^ * ^ ^ ^ | `← <- <- | | | | | | | | | ES0.5 | | | |
| +25.10 | 0.70 | (YALDHURS | 0.60m Au recovered | uger grating on i d). | inferred (| gravel (non | e | × - ^ × - ^ - × - ^ | | | | × | | | | | | | | Y V= 230 | |
| | | | EOH @ (|).70 m | | | | | | | | | | `+_ | | | | | | | |
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| Expl | anatio | าร: | | | | | | GROU | INDV | VATER | | 1 | | | Remarl | <pre></pre> | <u> </u> | <u> </u> | | | |
| | Scala Pe blows/50 Permeat Schmidt | netro mm ility T Hamr | meter - est ner | ● S □ La ■ U ■ U | mall Dist arge Dist 100 Und /ater Stri | turbed San turbed San isturbed Sa ike (1st, 2n | nple nple ample id) | X N SI | lot Ei ow S apid I | ncounte eep (de Inflow (| ered epth) depth |) | | | 1. Coordin and subject 2. Strength shear vand cohesive s | ates a ct to s n term e test soil st | and e surve ns for whe reng | elevation y confin r cohes re avail th terma | ns based on ha mation. ive soil layers a able. Where no s are based on | and-held GF are based o o shear van correlation | PS on le, with |
| Soil D = 0 | /=Peak, Moisture dry; M = | R=Re able to moist | esidual, o penetrate ;; W = wet; | S = | /ater Ris ise Time | e (1st, 2nd (minutes) | , I) and | HOLE | TER get d | MINATE | ED DU | , IE TO: Isal | Colla | pse | Scala test | resul | ts ar | nd indic | ated in quotatio | on marks. | |
| All d | limensi Sca | ons le 1: | in metres 10 | Contract | tor: | | | | | Rig/P Hand | lant L Auge | Jsed: r 70 m | ım | | | | | | Logged by: AvD | Checke | ed by: C |

| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS cologists | Riley Consu 22 Moorhouse Ave Christchurch Tel: +643 379440 Tax: +643 379440 | ltants | | | | | | | | | H/ | ١N |) | AI | UG | ER L | OG | |
|-------------------|-------------------------------------|-----------------|---------------------------|---|------------------------------------|---------------------------------------|-------------------|-------------|-------------------------|----------------------------|------------------------------|-----------|---------------------------|-------------------------|----------------------------------|------------------|---------------------------|------------------------------|---|-------------|-------------------------|
| Proje | ect: | Ra | naiora Du | e Diligence | | Locatio | n: end Rd | /Sour | th Be | elt Randio | ra | | Hole p | oositio | n: e Plan | 1 | | | Ν | lo.: | |
| Job N | No.: | 1743 | | Start Date | : 18- | 12-18 | Grour | nd Le | evel (| m LINZ): | Co-Ordi | inate | s (NZ | TM200 |)0): | -04 | | | H | A03 | |
| Clier | nt: | <i></i> | , | | .e. 10- | 12-10 | | Hole | 4.40 e De | pth: | E | 1,50 | 6,431. | 0 115 | 5,203,5 | 581 | .4 | | Sheet: | | |
| W | elhom | Dev | elopment | s Ltd | | | | 0.7 | 75 m | | | | | | | | | | 1 | of 1 | |
| 07.14 (m LINZ) | Depth (m) | Geological Uni | (refer In | Geologica to separate G formation shee | I Desc eotechnie t for furth | ription cal and Geo ner informa | ological tion) | | Legend | Soil Shea (kF 50 100 | r Strength Pa) 150 200 | | Scala Pe (blows 3 6 | enetrom / 50 mr 9 | eter n) 12 15 | Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| | | | SILT, trac low plasti | e clay, organic city; organics, | s; dark b rootlets. | rown. "Firm (TOPSOIL) | n"; moist; | 1 | <u></u> | | | , | | | | | | | No. 1 2, 1, 1, 2, 1, 1, | | |
| | - | OIL) | | | | | | : | <u></u> | | | 4 | | | | | | ``` | 1, 2, 1, 2, 1, 2, 2, 2, 3, | | |
| | | (TOPS(| | | | | | | <u> </u> | i i | i i | | | i | | | E | ES0.1 NOV | 19 | | |
| | | | 0.25m Gr | ades to include | e minor c | orange mott | ling. | 1 | <u> </u> | | | | | | | | | | | | |
| +24.10 | 0.30 | | SII T min | or to some cla | v trace s | and: arev y | with oran | : > | <u>\\/</u> < | | | ł | | | | | | | | | |
| | _ | (NOTION) | and yellow plasticity; | sand, fine to n | ttling. "F nedium. | irm"; moist (YALDHUR | ; low ST | yc > | <u>×</u> | | | | | | | | | | | | |
| | | TON FOR | MEMBER | | | AHON) | | 7 | ~~ ~~ | | | | | | | | | | | | |
| | - | SPRINGS | | | | | | Ĺ | ~~ | | | | | | | | | ``` | | | |
| | | MEMBER, | | | | | | <u>></u> | <u>×</u> | | | | | i | | | E | ES0.5 NOV | | , V= 197 | |
| | | -DHURST | 0.60m Gr | ades to very st | π. | | | > | $\frac{\times}{\times}$ | | | | | | | | | | | R- 50 | |
| +23.65 | 0.75 | (VAL | | | | | | > | < | | | 4 | N | | | | | | | | |
| 20.00 | - | | EOH @ 0 | .75 m | | | | | | | | | | | | | | | | | - |
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| Exp ∎ | lanation Scala Pe | าร: netro | meter - | • s | mall Dis | turbed Sam | nple | GRO | | DWATER | ed | | | 1. Co | marks | tes a | nd el | evatio | ns based on ha | and-held G | iPS |
| | blows/50 Permeab | mm ility T | est | | arge Dis 100 Und | turbed Sam listurbed Sa | nple ample | | Slov | v Seep (de | pth) | | | and 2. St | subject rength t ar vane f | to su terma | urvey s for (where | confin cohesi e avail: | mation. ve soil layers a able. Where no | are based o | on ne. |
| | Scnmidt Insitu Va | Hami ne Sł | mer near Strengt | h (kPa) 🛓 V ī v | /ater Str /ater Ris | ike (1st, 2n se (1st, 2nd | d)) and | | Rap | id Inflow (c | lepth) | | | cohe | a test re | il stre esult | ength s and | terms indica | are based on ated in quotatic | correlation | n with |
| Soil | v=reak, <u>WTP=Un</u> | nt=Ri able t | esiqual, o penetrate | , Ž P | ise Time | (minutes) | | HOL T | LE TI arge | | D DUE TO Refusal |):] C | ollapse | | | | | | | | |
| All c | dry; M = rated dimensi Sca | ons le 1· | in metres | s = | tor: | | [L | | | Rig/Pland | ant Used: | mm | | | | | | | Logged by: AvD | Check | ed by: C |

| 2 | RI CONS Engineers | Rise Consultants 2040mtaxe Mini- 2040mtaxe Mini | | | | | | | | | | | | | | UC | GER LO | OG | _ |
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| Proje | ect: | _ | | D.I. | | Locatio | n: | | | | | Hole p | osition: | | | | N | lo.: | |
| Job N | No.: | Rai | ngiora Du | Start Date | : 17- | 10wns 12-18 | Grour | d Level | (m LINZ): | co-Ordir | nate | s (NZT | to Site M2000 | Pian.): | | | H/ | 404 | |
| Clier | 170 |)743 | 3 | Finish Dat | e: 17- | 12-18 | | 23.7 |) onth: | E 1 | ,566 | 6,509.8 | 8 N 5,2 | 203,59 | 1.9 | | Sheet [.] | | |
| W | elhom | Dev | elopment | s Ltd | | | | 0.70 n | אָרָיי. ו | | | | | | | | 1 | of 1 | |
| (m LINZ) | Depth (m) | Geological Unit | (refer Inf | Geologica to separate Ge ormation shee | I Desci eotechnic t for furth | r iption cal and Ge er informa | ological tion) | Legend | Soil Shea (kl | r Strength Pa) | S | Scala Pe (blows) 3 6 | netromete / 50 mm) 9 12 | er Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| | - | (TOPSOIL) | SILT, trac low plasti | e clay, organic: city; organics, r | s; dark b ootlets. | rown. "Firm (TOPSOIL) | n"; moist; | | | | | | | | | ES0.1 NOV | No. 1 2, 1, 2, 1, 2, 3, 2, 3, 4, 3, 3, 3, 3, 4, 16, 20 | | |
| +23.45 | 0.25 | | 0.20m Gra | ades to 'stiff'. | | | | | | | | | | | | | | | |
| | - | R, SPRINGSTON FORMATION) | SILT, min and yellov plasticity; MEMBER | or to some clay vish-brown mo sand, fine to m , SPRINGSTOI | /, trace s ttling. Ve ιedium. (Ν FORM | and; grey v ry stiff; mo YALDHUR ATION) | with orang ist; low SST | | | | • • | | | | | | | | |
| +23.00 | 0.70 | (YALDHURST MEMBER | 0.60m Gr | ades to hard. | | | | | | X X | | | | | | ES0.5 NOV | | Y V= 230 | - |
| | - - - - | | | | | | | | | | | | | | | | | | - |
| Exp ↓ ↓ Soil D = | lanation Scala Pe blows/50 Permeat Schmidt Insitu Va V=Peak, Woisture dry; M = | netro mm ility T Ham ne Sh R=R able t mois | rest Fest mer hear Strengt esidual, o penetrate t; W = wet; : | ● S □ La ■ U ■ W 1 W 1 W 2 R S = | mall Dist arge Dist 100 Und /ater Stri /ater Ris ise Time | urbed San urbed San isturbed Si ke (1st, 2n e (1st, 2nd (minutes) | nple nple ample id) I) and | GROUN | IDWATER of Encounter w Seep (de bid Inflow (d ERMINATE et depth X | red lepth) D DUE TO: Refusal | :] Co | ollapse | Rem 1. Cool and su 2. Street shear v cohesiv Scala t | arks object to so ngth term vane test ve soil st est resul | and surve ns fo whe treng lts ar | elevatic y confi r cohes re avai th term nd indic | ons based on ha rmation. sive soil layers a lable. Where no s are based on ared in quotatic | and-held GF are based o o shear van correlation on marks. | ⊃S n e, with |
| All c | ^{rated} limensi Sca | ons le 1 | in metres | Contract | tor: | | | | Rig/Pl Hand | ant Used: Auger 70 n | nm | | ┘└─── | | | | Logged by: AvD | Checke CF | d by: C |

| 2 | RI CONS Engineer | SULT. | EY ANTS eologists | Riley Consulta 2 Moorhouse Ave hristchurch el: +643 3794402 ax: +643 3794403 | ants | | | | | | | | HAN | ١D | A | UC | GER LO | OG | |
|-------------------|--|----------------------------------|--|--|---|-------------------------------|-------------------|-----------------------------|-------------------------------|-----------------------------------|----------|-----------------------|--|--|-----------------------------------|--|--|---|-------------------------|
| Proje | ct: merse | t Rai | ndiora Du | e Diligence | Locatio | on: send Rd | /South I | Relt F | Pandior | a | | Hole p | osition: to Site P | lan | | | N | lo.: | |
| Job N | No.: 17 | 0743 | 3 | Start Date: | 20-12-18 | Grour | nd Level | l (m Ll | NZ): | Co-Ordi | inate | s (NZT | M2000): | 2 612 | 2 / | | H | A05 | |
| Clier | nt: | | | | | | Hole D | epth: | | L | 1,500 | , | 14 3,20 | 5,010 | J. 4 | | Sheet: | -6.4 | |
| vv E G | | Dev E | | | | | 0.95 | m | | | | | | 2 | ė | | | or 1 | |
| 06.22+ (m LINZ | Depth (m | Geological L | (refer Inf | Geological to separate Geo ormation sheet t | Description otechnical and Ge for further informa | eological ation) | Legend | Soil | Shear (kPa 0 100 | Strength a) 1 <u>50 200</u> | 1 S | Scala Pe (blows) | netrometer / 50 mm) <u>9 12</u> | Croundwate | Soil Moistur | Samples | Tes | sts | Instrument/ Backfill |
| | | | SILT, tract to moist; I | e clay, organics; ow plasticity; org | ; dark brown. "Ve ganics, rootlets. (| ry stiff"; dr TOPSOIL) | y <u>// /</u> | | | | | | | | | | No. 1 0, 0, 1, 0, 1, 1, 1, 1, 2, | | |
| +22.65 | - | (TOPSOIL) | 0.20m Gra | ades to 'soft'. | | | | | | | | | | | | ES0.1 NOV | 1, 1, 2, 2, 1, 2, 1, 2, 2, 4 | | |
| +22.03 | - | | SILT, min orange m sand, fine SPRINGS | or to some clay, ottling. "Soft" mo to medium. (YA TON FORMATIC | trace sand; light bist to wet; low pl LDHURST MEM DN) | grey and asticity; BER, | × × × | | | | | | | | | | | | |
| | - | FORMATION) | 0.40m Gra | ades to 'firm'. | | | * * * * * * | ← ← ← | | | | | | | | | | | |
| | - | BER, SPRINGSTON | | | | | × × × | | | | | | | | | ES0.5 NOV | | | |
| | - | (YALDHURST MEN | | | | | × × × × × | | | | | | | | | | | | |
| _ | - | | 0.80m Gra | ades to 'stiff'. | | | | ← ≤ | | | | | | | | | | | |
| +21.95 | 0.95 | 5 | 0.90m Gra grey with greywack | ades to include s orange mottling; e; sand, fine to r | some gravel and ; ; gravel, medium, nedium. | sand; light subround | t ed, × × | | | | | | 0.95r | ⊓ ┣ | | ES0.9 NOV | No. 2 | Q Q Q | |
| | - 1 | | EOH @ 0 | 95 m | | | | | | | | <i>T</i> | | | | | 4, 6, 5, 9, 12, 17 | | |
| | - | | | | | | | | | | | | | | | | | | |
| | _ | | | | | | | | | | | | 1.25r | **• | | | ¥ | | - |
| 5-11amin-2-5 | - | | | | | | | | | | | | | | | | | | - |
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| 100 00-00 C4/ | _ | | | | | | | | | | | | | | | | | | - |
| | - | | | | | | | | | | | | | | | | | | |
| Exp | lanatio | ns: | | | | | GROU | NDWA | TER | | | I | Rema | rks | | | | | |
| | Scala Pe blows/50 Permeal Schmidt | enetro)mm pility 1 Ham | rest mer | Sm Lar U10 1 | nall Disturbed Sar rge Disturbed Sar 00 Undisturbed S | npie nple ample | | lot Enc ow See | ountere ep (dep | d th) | | | 1. Coord and subj 2. Streng Scala tes | inates a ect to s oth term st resul | and o surve ns fo lts ar | elevatio y confi r cohes nd indic | ons based on ha rmation. sive soil layers a cated in quotatio | and-held GPS are based on on marks. | ; |
| Soil | lnsitu Va V=Peak Moistur dn/: M = | R=R Able t | near Strengt esidual, to penetrate | n (kPa) ⊻ Wa 1 Wa ⊻ Ris | ater Strike (1st, 2) ater Rise (1st, 2) se Time (minutes) | nd) d) and) | HOLE Tar | apid Inf TERM get dep | flow (de INATED oth X F | epth) DUE TC Refusal |): Co | ollapse | | | | | | | |
| Satu All c | rated limens | ions | in metres | Contracto | or: | | | | Rig/Pla | nt Used: | mm | |] | | | | Logged by: | Checked | by: |

| 2 | RI CONS Engineers | ULT/ and Ge | EY 2 ANTS To tologists F | Riley Consult 2 Moorhouse Ave hristchurch el: +643 3794402 ax: +643 379440 | tants | | | | | | | | HAN | D | A | UG | ER L | OG | |
|---------------|---|---|--|--|--|---|--|---------------------------------------|-----------------------|----------------------------------|----------------|------------------------------|---|--|-------------------------|-----------------------------------|---|---|-------------------------|
| Proje | ect: | Rar | ngiora Du | e Diliaence | | Locatio Towns | n: end Rd/ | South R | elt. Randi | ora | | Hole po | sition: o Site Pla | an | | | 1 | No.: | |
| Job | No.: 17 |)742 | | Start Date: | 20-1 e 20-1 | 12-18 | Groun | d Level | (m LINZ): | Co-Ord | linate | es (NZTN | /2000): | | Л | | H | A06 | |
| Clie | nt: | | | | J. 20- | .2 10 | | Hole De | epth: | | 1,00 | 0,013.0 | N 0,200 | ,usz | 4 | | Sheet: | | |
| | /elhom | Dev E | elopments | Ltd | | | | 1.00 m | n | | | | | | 0 | | 1 | of 2 | |
| (m LINZ | Depth (m | Geological U | (refer Infe | Geological to separate Ge ormation sheet | Descr otechnic | iption al and Geo er informat | ological tion) | Legend | Soil Shea (k | ar Strength Pa) 150 200 | h ^s | Scala Pen (blows / 3 6 | etrometer 50 mm) 9 12 | 5 Groundwate | Soil Moistur | Samples | Те | sts | Instrument/ Backfill |
| +21.15 | 0.15 | (TOPSOIL) | SILT, trace moist; low (<2mm) (1 SILT, mind and yellow plasticity; MEMBER 0.20m Gra | e clay, organics plasticity; orga OPSOIL) or to some clay rish-brown mot sand, fine to m SPRINGSTON ides to 'firm'. | s; greyish anics, roo r, trace s. ttling. Ve edium. (N FORM, | and; grey v ry soft; mo YALDHUR ATION) | /ery soft"; roots vith orang ist; low ST | | | | | | | | | ES0.1 × NOV | 1,0,1, 0,1,1,2, 1,1,2,1,2, 1,1,2,2,1,2, 2,1,2,2,1,2, 2,1,2, 2,8 | | |
| | - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | 0.55m Tra 0.60m Gra | ce charcoal, bl | ack. | | | × × × × × × × × × × × × × × × × × × × | | | < | | | | | ES0.5 NOV | | ✓ V= 230 | |
| +20.30 | - <u>1 1.00</u> - | 1.00 EOH @ 1.00 m | | | | | | | | | | | 1.00m | | | ES0.95 NOV | No. 2 6, 8, 10, 9, 6, 9, 8, 8, 9, 7, 5, 4, 7, 8, 6, 5, 6, 5 | | |
| | - - - - - - - - - - - - - - - - - - - | ns: netro mm | meter - est | ● Sr □ La ■ U | mall Dist arge Dist 100 Undi | urbed Sam urbed Sam sturbed Sa | nple ample | GROUN X No Slo | IDWATER w Seep (dd | red | | | Image: Network of the second | Image: start | and e urvey s for | elevatio y confir | ns based on h mation. ive soil layers | and-held G | |
| | Schmidt Insitu Va V=Peak, WTP=Un dry; M = | Hamr ne Sh R=Re able to moist | ner lear Strength esidual, o penetrate :; W = wet; \$ | ∎ (kPa) ∎ (kPa) ∎ W ↓ W ↓ W ↓ W ↓ W ↓ W ↓ W ↓ W ↓ | ater Stri ater Rise ise Time | ke (1st, 2n e (1st, 2nd (minutes) | d)) and | HOLE T | ERMINATE | depth) ED DUE TC] Refusal | D: | ollapse | shear van cohesive s Scala test | e test soil str result | wher rengt ts an | re avail th terms id indica | able. Where n s are based or ated in quotati | o shear van l correlation on marks. | e, with |
| i satu All | dimens | ons le 1· | in metres | Contract | or: | | | | Rig/P Hand | lant Used: Auger 70 | : mm | | | | | | Logged by: | Checke | ed by: C |

| 2 | RI | ULTA and Ge | NTS ologists F | Riley Cor 2 Moorhouse hristchurch el: +643 379 ax: +643 37 | n sultar ∍ Ave 94402 '94403 | nts | | | | | | | | HAN | D | A | UC | SER LO | OG | |
|--------------------|--|---|---|--|---|--|--|----------------|--------------------------------|--------------------------------|--|---|---------------------------|--|---|---|---|---|--|-------------------------|
| Proj Sun Job | ect: nmerse No.: | Ran | igiora Du | e Diligen Start D | ate: | 20-12 | Location: Townsend 2-18 Gi | l Rd/ roun | /South | Belt, | Rangio LINZ): | ora Co-Ordir | Hole Reference | to Site Pla TM2000): | n. | | | ⊾ H | lo.: 406 | |
| Clie | nt: | 0743 | | Finish | Date: | 20-12 | 2-18 | | 21.3 Hole D | 30 Depth | 1: | E1 | ,566,673. | 8 N 5,203 | ,632 | 2.4 | | Sheet: | | |
| V | Velhom | Deve | elopments | s Ltd | | | | | 1.00 | m | | | | | | | | 2 | of 2 | |
| (m LINZ) | Depth (m) | Geological Unit | (refer Inf | Geoloc to separat ormation s | gical D e Geote sheet for | Descrip echnica or furthe | o tion I and Geologi r information) | ical | Leaend | S | oil Shea (kl 50 100 | r Strength Pa) 150 200 | Scala Pe (blows 3 6 | enetrometer ; / 50 mm) 9 12 1 | ம Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| | -2 | | | | | | | | | | | | | 2.00m | | | | | | |
| | planatio Scala Pe blows/50 Permeal Schmidt Insitu Va V=Peak, | ns: metror mm bility Tr Hamn ne Sh R=Re able to moist | neter - est ear Strengtl esidual, o penetrate ; W = wet; S | • (kPa) | Sma Large U100 Wate Wate | II Distur e Distur 0 Undis er Strike er Rise : Time (| rbed Sample rbed Sample turbed Sampl e (1st, 2nd) (1st, 2nd) minutes) | le) and | GROL X N SI R HOLE | JNDV Not E Iow S apid | VATER ncounter Geep (de Inflow (d MINATE epth X | red epth) depth) CD DUE TO: Refusal | Collapse | Remark 1. Coordin: and subjec 2. Strength shear vane cohesive s Scala test | ates a ates a t to s t term t test oil stu result | and e surve ns for whe rengt ts an | elevatic y confir cohes re avail h terma d indic | Ins based on ha mation. ive soil layers a able. Where nc s are based on ated in quotatic | and-held GP are based or s shear vane correlation n marks. | PS n s, with |
| All | urated dimens Sca | ons i le 1: | n metres 10 | Cont | ractor | : | | | | | Rig/Pl Hand | ant Used: Auger 70 n | าm | | | | | Logged by: AvD | Checker CF(| d by: C |

| | | RI | ULTA and Ge | NTS ologists Ril 22 f Chri Tel: Fax | ey Consult Moorhouse Ave istchurch +643 3794402 :: +643 3794402 | ants | | | | | | | | | | | HAI | ND | A | UG | GER | LC | DG | |
|--|---|---|---|---|---|---------------------------------|---|--|-------------------------------------|--------------------------------------|------------------|-------------|---------------------------------------|---|---|--|---|---|---|---|---|----------------------------------|-----------------|-------------------------|
| Pro Su | ject mm | : ierset | Rar | ngiora Due | Diligence | - | Locatio | on: send Rd | /Sout | th Be | elt, R | angio | ra | | Ho | le po efer t | sition: o Site F | Plan. | | | | Ν | o .: | |
| Job | No |).: 17(|)743 | | Start Date: Finish Date | 18- e: 18- | -12-18 -12-18 | Groun | nd Lev 24 | vel (r 4.50 | m LII | NZ): | Co- | Ordin E 1, | ates (1 566,20 | NZTN 67.9 | //2000) N 5,2 | : 03,47 | 8.6 | | | HÆ | 07 | |
| | ent: Wel | hom | Deve | elopments l | Ltd | | | | Hole 1.2 | e Dep 25 m | oth: | | 1 | | | | | | | | Sheet | : 1 (| of 1 | |
| Elevation | (TINC) | Depth (m) | Geological Unit | (refer to Infor | Geological separate Ge mation sheet | Desc otechni for furt | ription cal and Ge her informa | ological tion) | | Legend | Soil : | Shea (kF | Stre Pa) | ngth | Scal: (bl | a Pen ows / | etromete 50 mm) 9 12 | r Groundwater | Soil Moisture | Samples | | Tes | ts | Instrument/ Backfill |
| +24.1 | - | 0.35 | (TOPSOIL) | SILT, trace soft"; moist; | clay, organics low plasticity | ; greyis ; organ | h brown. "\ ics, rootlets | Very soft t | o NL) シ ン レ ン ン レ | | | | | | | | | | | ES0.1 NOV | No. 1, 0, 1, 1, 1, 2, 2, 1, 2, 2, 4, 5 | 0, 1, 1, 1, 1, 3, | | |
| | - | | SPRINGSTON FORMATION) | SILT, minor and yellowis plasticity; sa MEMBER, \$ 0.50m Grad | with orang ; low RST | ge x x | × × × × × × | | | | | | | | | | ES0.5 NOV | | | \/- 128 | | | | |
| HT Professional +53 | 0.70m Grades to very stiff. | | | | | | | | | × × × × × × × | | | < | | | | | | | | | ~ | v= 128 R= 43 | |
| 0/01/2019 09:33 Produced by | - | 1 25 | | Sandy grave orange mott fine to medi coarse. | elly SILT, traco ling. Medium um, subround | e clay; dense; led, gre | light greyisl ⊨ moist; dila eywacke; sa | h brown w Itant; grav and, fine to | vith el, × o × × × | °.×. °.×. °.×. °.×. °.×. | | | | | | | - $ -$ | ···· ··· → | | | 2, 3, 15, 7 3, 2, 3, 5, 11, 1 8, 8, 12, 1 | - 3, 3, 4 | | |
| 21 HA 170743 SS-KANGIORA ALL LUGS. GPU < | 3.25 1.25 - EOH @ 1.25 m EOH @ 1.25 m | | | | | | | | | <u> </u> | | | | | | | | | | | V | | | - |
| E) | xpla Sc | natior ala Pe | IS: netro | meter - | ● Sr | nple | GRC | DUNE Not | DWA Enco | TER | ed | | | | Rema | arks dinates | and | elevatio | ons based | on hai | nd-held Gl | PS | | |
| | blo Pe Sc Ins V= <u>oil W</u> | ows/50 rmeab hmidt situ Var Peak, <u>P=Un</u> oisture y; M = | mm Hamr he Sh R=Re able to moist | est ner ear Strength (esidual, p penetrate ; W = wet; S : | nple ample nd) d) and | | Slow Rapi E TE arget | Enco / See id Infl ERMII | p (de ow (c NATE | eu pth) epth D DUE Refus |) E TO: al |] Colla | pse | and sub 2. Stren shear va cohesiv Scala te 3. Loca 4. Scala | iject to gth terr ane tes e soil s est resu ted on t a device | surve ms fo treng ilts ar idy k wet | ey confii r cohes re avail th term nd indic ept law below | mation. ive soil la able. Who s are base ated in qu n. 1.25m on | yers ar ere no ed on o iotatior extract | e based o shear van correlation n marks. | on ie, with | | | |
| | itural I din | ^{ted} nensi Sca | ons e 1: | in metres 10 | | | | F H | Rig/Pla land / | ant Us Auger | sed: 70 m | m | | | | | | Logged AvD | by:) | Checke CF | ed by: C | | | |

| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS Pologists | Riley Consu 2 Moorhouse Av Christchurch fel: +643 379440 fax: +643 37944 | Itants | | | | | | | | HAN | ID | A | UG | BER L | OG | |
|--|---|---|--|--|--|--|--|---------------------------------------|--|--|------------|---|---|---|--|--|--|--|--------------------------------|
| Proje | ct: merset | Rar | ndiora Du | e Diliaence | | Locatio | on: Send Rd | South R | elt. Randi | ora | | Hole p | to Site Pla | an | | | ١ | No.: | |
| Job N | lo.: 17(| 1743 | 3 | Start Date | e: 18- | 12-18 | Groun | d Level | (m LINZ): | Co-Or | rdinat | es (NZ1 | [M2000): | 2 502 | . 7 | | H | A08 | |
| Clien | it: | | | | le. 10- | 12-10 | | Hole De | pth: | | = 1,50 | 00,300. | 5 IN 5,204 | 5,503 | o. <i>1</i> | | Sheet: | | |
| W C | | Dev E | elopment | s Ltd | | | | 0.70 m | ז | | | | | | 0 | | 1 | of 1 | |
| the catio (m LINZ | Depth (m | Geological U | (refer Int | Geologica to separate G formation shee | al Desc eotechniet for furth | ription cal and Ge ner informa | ological tion) | Legend | Soil Shea (k | ar Streng Pa) 150 200 | th | Scala Pe (blows 3 6 | enetrometer / 50 mm) 9 12 | 51 Groundwate | Soil Moistur | Samples | Te | sts | Instrument/ Backfill |
| +24.40 | 0.10 | (TOPSOIL) | SILT, trac soft"; wet | e clay, organic low plasticity | s; greyis organics | h brown. "\ s, rootlets. | /ery soft to (TOPSOIL |) <u>///</u> .) <u>// //</u> | | | , | | | | | | No. 1 0, 1, 1, 1, 2, 1, 2, 1, 1, 1, 1, 1, | | |
| | - | URST MEMBER, SPRINGSTON FORMATION) | SILT, trac yellowish, sand, fine SPRINGS 0.20m Gr | e clay, trace s brown mottlin to medium. (TON FORMA ades to 'soft to | and; grey g. "Soft"; (ALDHUI FION) firm'. Ve | with orang moist; low RST MEME | je and plasticity; 3ER, | × × × × × × × × × × | | | | | | | | ES0.1 NOV | 2, 1, 4, 9, 12, 14 | | |
| +23.80 | - 0.70 | (АЧГРН | 0.60m Gr | ades to includ | e minor fi | ine to medi | um sand. | × × × × * × | | | | $\left. \right\} \left \left. \right] \right \left \left. \right \left \left. \right \right \left \left \left. \right \left | | | | ES0.5 NOV | | V= 141 R= 59 | |
| | - 1 | | | | | | | | | | | | | | | | V | | |
| Expl | anation Scala Pe blows/50 Permeab Schmidt nsitu Va /=Peak, //Peak, // Peak, // Peak, // Peak, // Peak, | netro mm ility T Ham ne Sh R=Re able t moist | meter - rest mer sear Strengt esidual, o penetrate t; W = wet; | ● S □ L ■ L ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ | Small Dis arge Dis J100 Und Vater Str Vater Ris Rise Time | turbed San turbed San listurbed S ike (1st, 2n se (1st, 2nd e (minutes) | nple nple ample Id) I) and | GROUN X No Slov Rap HOLE T Targe | IDWATER of Encounter w Seep (d bid Inflow (ERMINATI et depth X | ered epth) depth) ED DUE T Refusal | | Collapse | Remar 1. Coordin and subje 2. Strengt shear van cohesive Scala test 3. Locatee mounds. 4. First ha abandone | ks hates a cct to s h term e test soil str t result d next and au | and e urve is for whe rengt ts an to sa ger a to e | elevatio y confir r cohes re avail th terms id indica awdust attempt ncounte | ns based on hi mation. ive soil layers a able. Where nu s are based on ated in quotatic mound and ne near south enc ering gravel (as | and-held Gl are based o o shear van correlation on marks. ar horse du d of gate ssumed fill). | PS on le, with ing |
| All d | limensi Sca | ons | in metres | Contrac | tor: | | | | Rig/P | lant Use | d: 0 mm | | | | | | Logged by: | Checke | ed by: |

| | | RII CONS | JLTA and Ge | NTS ologists | iley Consultants Moorhouse Ave hristchurch 1: +643 3794402 | | | | | | | | | HAN | D. | A | UG | ER LO | COG | |
|--------------------------------------|--|---|--|---|---|---|--|---|---|--|--|-------------------|----------------------------------|--|---|---|--|--|--|--------------------------|
| Pr | oject | erset | Par | aiora Due | Diligence | Locatio | n: end Rd/ | South | Balt | Pano | iora | | Hole p | osition: | 'n | | | N | lo.: | |
| Jo | b No | 170 | 7/2 | | Start Date: 17- | 12-18 | Groun | d Leve | el (m | LINZ) | : Co- | Ordina | ates (NZT | M2000): | | _ | | H | 409 | |
| C | lient: | | | | Finish Date. 17- | 12-10 | | 24. Hole I | .30 Depti | h: | | E 1, | 566,444.(|) N 5,203 | ,508 | .5 | | Sheet: | | |
| | Wel | hom | Deve | elopments | Ltd | | | 1.25 | 5 m | | | | | | | | | 1 | of 1 | |
| +4 Elevation | (ZNI m) .30 | Depth (m) | Geological Un | (refer t Info | Geological Desc o separate Geotechnio prmation sheet for furth | ription cal and Geo ner informa | ological tion) | - Anand | S Legelu | oil She (50 10 | ear Stre kPa) 00 150 2 | ngth | Scala Pe (blows <u>3 6</u> | netrometer / 50 mm) <u>9 12 1</u> | ਯ Groundwater | Soil Moisture | Samples | Tes | ts | Instrument/ Backfill |
| | | | | SILT, trace plasticity; o | clay, organics; dark b organics, rootlets. (TO | rown. "Soft PSOIL) | t"; dry; low | ' <u>'</u> | <u>~</u> | | | | • | | | | | 2, 1, 0, 1, 1, 1, 1, | | |
| +24 | - | 0.30 | (TOPSOIL) | 0.02m Gra 0.05m Gra | des to moist. des to minor clay. | | | | | | | | | | | | ES0.1 NOV | 1, 1, 1, 1, 2, 2, 1, 1, 2, 1, 1, 2, 1, 0, 4 | | |
| | - | | | SILT, minc and yellow plasticity; s MEMBER, | r to some clay, trace s ish-brown mottling. "S sand, fine to medium. SPRINGSTON FORM | and; grey v oft"; moist; (YALDHUR ATION) | with orang low tST | le × - × - × - × - | ×××× | | | | | | | | | | | |
| | - | | MEMBER, SPRINGSTON FORMATION) | 0.50m Gra | des to 'firm'. | | - × - × - × - × - × - × - × - × - × - × | × × × × × × × × × × | | | | | | | | ES0.5 NOV | | | | |
| duced by gIN I Professional | _ | 1 | (YALDHURST | 0.90m Gra 1.00m Gra subrounde | des to very stiff. des to include minor g d, greywacke | ravel, fine t | to medium | x x x x x x x x x x x x x x x x x x x | × × × × | | | | / | 1.00m | | | ES0.9 NOV | No. 2 4, 4, 4, 3, 4, 6, 11, 14, | V= 164 R= 39 | |
| 23 +23 | - | 1.25 | | 1.15m Gra gravel; nor | des to include minor to plastic; gravel, as abo | o some sar ove; sand, f | nd, trace fine. | ×- ×- ×- | × × × | | | | | | | | | 14 | | |
| HA 1/0/45 55-KANGIOKA ALL LUGS.GFJ < | 3.05 1.25 EOH @ 1.25 m | | | | | | | | | | | | | | | | | ↓ | | - |
| | Expla | natior | IS: | | | | | GROL | UNDV | VATER | 2 | | | Remark | ś | <u> </u> | | | | |
| | So blo Pe So Ins V= Soil W D = dr satura | ala Per ws/500 meab hmidt l situ Var Peak, Peune v; M = 1 ted | netror mm llity To Hamm ne Sh R=Re ble to moist | meter - est ear Strength sidual, penetrate ; W = wet; S in metres | Small Dis Large Dis U100 Und (kPa) KPa) Contractor: | turbed Sam turbed Sam listurbed Sa ike (1st, 2n se (1st, 2nd e (minutes) | nple nple ample id) I) and | X I S R HOLE | Not E Slow S Rapid E TER rget d | ncount Seep (d Inflow RMINAT Iepth | ered depth) (depth ED DUI (Refus Plant Us |) E TO: sal | Collapse | 1. Coordin. and subjec 2. Strength shear vane cohesive s Scala test | ates a ct to su terms test v coil stro results | and e urvey s for wher engtl s and | elevatior / confirr cohesi re availa h terms d indica | s based on ha mation. ve soil layers a able. Where no are based on ated in quotatio | nd-held Gi re based o shear van correlation n marks. | PS on with with |

| 2 | RI CONS Engineers | ULTA and Ge | NTS ologists Fa | iley Consulta Moorhouse Ave rristchurch I: +643 3794402 x: +643 3794403 | ints | | | | | | HANI | D A | AUC | SER LO | OG |
|---|--|--|--|--|---|---|--|---|--|----------------------|---|--|--|--|--|
| Proje | ct: merset | Rar | ndiora Due | Diligence | Lo | cation: | 1/South F | Belt Rangin | ra | Hole p | osition: to Site Plan | <u></u> | | Ν | lo.: |
| Job | No.: 17(|)743 | | Start Date: | 17-12-1 17-12-1 | 8 Grou | nd Level | (m LINZ): | Co-Ordin | ates (NZT | M2000): | | | H | A10 |
| Clier W | nt: 'elhom | Deve | elopments | Ltd | 17-12-1 | | 24.0 Hole Do 1.10 r | epth: n | | ,300,323.0 | IN 5,203, | 513.0 | 0 | Sheet: 1 | of 2 |
| (m LINZ) | Depth (m) | Geological Unit | (refer t Info | Geological I o separate Geo rmation sheet fo | Descriptio technical an further inf | on nd Geological formation) | Legend | Soil Shea (kł | r Strength Pa) | Scala Per (blows) | netrometer / 50 mm) 9 12 15 | Groundwater | Soil Moisture Samples | Tes | st Instrument/ Backfill |
| +23.75 | - 0.25 | (TOPSOIL) | SILT, trace low plastici SILT, mino and yellow plasticity; s | clay, organics; ity; organics, roo r to some clay, ish-brown mottl and, fine to me | dark brown. tilets. (TOPS race sand; i dium. (YALE | "Firm"; moist SOIL) grey with oran moist; low DHURST | $\frac{1}{2} \frac{1}{2} \frac{1}$ | | | | | | ES0.1 NOV | No. 1 1, 1, 2, 2, 1, 2 | |
| | O.60m Grades to hard. O.80m Grades to light grey with orange mottling. | | | | | | | | | | | | ES0.5 NOV | | V= 203 R= 46 |
| +222.95 +222.95 +222.90 | O.80m Grades to light grey with orange mottling. O.80m Grades to light grey with orange mottling. | | | | | | * * * * * * * * * * * * * * * * | | | | | | ES1.0 NOV | ▼ No. 2 9, 10, 7, 8, 7, 9, 6, 7, | |
| H A 1/0/43 SS-KANGIORA ALL LUGS.GPJ < <td>-</td> <td></td> <td>EOH @ 1.1</td> <td>10 m</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7, 5, 6, 5, 8, 9, 12, 20</td> <td></td> | - | | EOH @ 1.1 | 10 m | | | | | | | | | | 7, 5, 6, 5, 8, 9, 12, 20 | |
| Exp | lanation | ns: | | • • | | d Constants | GROU | NDWATER | | | Remarks | s | | | |
| a 1 NZ LIB 13.GLB Log RILE □ S □ □ S | Scala Pe blows/50 Permeab Schmidt Insitu Var V=Peak, WoistUré dry; M = | netroi mm ility T Hamr ne Sh R=Re able to moist | meter - est ner ear Strength esidual, o penetrate ; W = wet; S | ● Sm. Larg U10 (kPa) ♥ Wa Ţ Wa Ţ Risc | all Disturbed ge Disturbed 10 Undisturb ter Strike (1: ter Rise (1si e Time (min | d Sample d Sample bed Sample st, 2nd) t, 2nd) and nutes) | X No Slo Ra HOLE T Targ | ot Encounter ow Seep (de pid Inflow (d FERMINATE et depth X | ed pth) lepth) D DUE TO: Refusal | Collapse | 1. Coordina and subject 2. Strength shear vane cohesive so Scala test rr 3. Located 4. Scala roc | tes and terms terms test who bil strer esults on tidy d wet b | d elevation vey confi for cohese here avait ngth term and indice kept law below 1.5 | ons based on ha rmation. sive soil layers a lable. Where no s are based on ated in quotatio n. Om on extraction | and-held GPS re based on shear vane, correlation with n marks. n. |
| | ^{rated} limensi Sca | ons e 1: | in metres 10 | Contracto | r: | | | Rig/Pl Hand | ant Used: Auger | | | | | Logged by: RBW | Checked by: CFC |

| 2 | R CONS Enginee | SULTA s and Ge | Ril 22 M 22 M Chri Tel: Fax: | ey Cons Noorhouse A stchurch +643 3794 ± +643 3794 | ave 402 4403 | | | | | | | | | HAN | D | A | UG | SER L | OG | |
|-------------|--|--|--|--|---|--|--------------------------------------|----------------|--|--|-----------------------------------|---------------------------------------|----------------------------|---|--|--|--|---|---|-----------------------|
| Proj Sur | ect: nmerse No : | t Rar | ngiora Due | Diligenc Start Da | e te [.] 17 | Locatio Towns | n: end Ro | l/Sou | ith B | elt, Ranç m LINZ | giora | ı Co-Ordir | Hole p Refer | osition: to Site Plai M2000) [.] | n. | | | N H | lo.: Δ1Λ | |
| | 17 | 0743 | i i | Finish D | ate: 17 | -12-18 | Crou | 2 | 24.00 |) | | E 1 | ,566,523.0 | N 5,203, | ,513 | 3.6 | | 11/ | | |
| Clie V | ent: Velhom | Deve | elopments l | _td | | | | Hol | e De 10 m | pth: 1 | | | | | | | | Sheet: 2 | of 2 | |
| БŃ | Ì Ê | Unit | | | | | | | 77 | | | | | | ter | are | s | | | |
| (m LIN | Depth (I | Geological | (refer to Infor | Geologi separate mation sh | cal Des Geotechr eet for fur | cription nical and Geo ther information | ological tion) | | Legen | Soil She | ear \$ (kPa _{00 1} | Strength) 50 200 | Scala Pe (blows) 3 6 | netrometer / 50 mm) 9 12 1 | دم Groundwa | Soil Moist | Sample | Tes | sts | Instrumen Backfill |
| | - 2 - 2 | | | | | | | | | | | | | | | | | | | |
| | | <u> </u> | | | | | | | | | | | | | | | | | | <u> </u> |
| | planatic Scala P blows/5 Permea Schmid Insitu V V=Peak il Woistul = dry; M = | ns: enetro Dmm bility T Hamr Hamr ane Sh , R=Re able to moist | meter - est ner lear Strength (esidual, o penetrate ;; W = wet; S = | • ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | Small Di Large Di U100 Ur Water S Water R Rise Tin | isturbed Sam isturbed Sam disturbed Sa trike (1st, 2n tise (1st, 2nd ne (minutes) | nple nple ample d)) and | GR X HO | OUN] No] Slov] Rap LE TI Targe | DWATEI t Encoun w Seep (id Inflow ERMINA ⁻ et depth | R (dept (dept TED X R | d h) pth) DUE TO: tefusal | Collapse | Remark 1. Coordina and subjec 2. Strength shear vane cohesive so Scala test r 3. Located 4. Scala roo | s ates a t to s term test oil str result on tio d we | and e surve surve whe rengt ts ar dy ke t bel | elevatic y confir r cohes re avail th terma nd indic ept lawn ow 1.50 | ons based on ha mation. ive soil layers a able. Where a s are based on ated in quotatio n. Om on extractio | and-held GF are based of b shear vane correlation on marks. n. | PS n e, with |
| All | urated dimens Sca | in metres 10 | | | | | Rig/ Han | /Plar Id Au | nt Used: Iger | | | | | | Logged by: RBW | Checke CF | d by: C | | | |

| 2 | RI CONS Engineers | ULT/ and Ge | | Riley Consults 22 Moorhouse Av Christchurch Tel: +643 37944 Fax: +643 37944 | ultants | _ | | _ | | | | | | | HA | ND | A | UG | SER L | OG | _ |
|------------------|---------------------------------|--------------------------|--|---|--|---|----------------------------|---------|------------------|-------------------|----------------|--------------|---------------------|-----------------------|--------------------------------|-------------------------------------|---------------------|-----------------------|--|---|-------------------------|
| Proje | ect: | Rar | ndiora Du | e Diligence | | Locatio | on: Send Rd/ | South F | Belt I | Randi | ora | | H | ole po | sition: | Plan | | | ١ | No.: | |
| Job I | No.: 17 |)743 | | Start Date | e: 20- | 12-18 | Groun | d Level | (m L | .INZ): | Co | -Ordir | nates (| (NZTN | 12000) |): ()2 E2 | 77 | | H | A11 | |
| Clie | nt: | - | , | | ite. 20- | 12-10 | | Hole De | epth: | | | E 1 | ,000,0 | 507.1 | IN 3,2 | 03,53 | 1.1 | | Sheet: | | |
| N L | /elhom | Deve | elopment | s Ltd | | | | 0.80 r | n | | | | | | | - | a | | 1 | of 1 | |
| multiple (m LINZ | Depth (m | Geological U | (refer In | Geologic to separate G formation she | al Desci eotechnic et for furth | r iption cal and Ge per informa | ological ition) | Legend | Soi | I Shea (k | ar Stre Pa) | ength 200 | Sca (t | ala Pene blows / { | etromete 50 mm) 9 12 | Eroundwate | Soil Moistur | Samples | Te | sts | Instrument/ Backfill |
| +22.25 | - 0.15 | (TOPSOIL) | SILT, trac soft"; moi (TOPSOII | e clay, organi ist; low plastic L) | cs; dark b ity; organi | rown. "Ver cs, rootlets | y soft to s. | | / | | | | | | | | | | No. 1 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 2, 3, 2, 3, 3, | | |
| | - | | SILT, min and yellov plasticity; MEMBEF | or to some cla wish-brown m sand, fine to R, SPRINGSTO | ay, trace s ottling. "S medium. (DN FORM | and; grey v oft"; moist; (YALDHUF ATION) | with orang ; low {ST | e × × | - | | | | • • • | | | | | ES0.1 NOV | 12, 15 | | |
| | - | SPRINGSTON FORMATION) | 0.30m Gr | ades to "stiff". | | | - | | | | | | | | | | | | | | |
| | - | (YALDHURST MEMBER, | 0.60m Gr | ades to light g | ttling. | * * × × × × × × × × × × × × × × × × × × | - | | × | | | | | | | ES0.5 NOV | | , V= 172 R= 43 | | | |
| . 04.00 | | | 0.75m Gr | ades to includ | e minor m | nedium gra | avel, | × × | - | | | | + | | | | | ES0.75 | | | |
| +21.60 | 0.80 | | EOH @ 0 | ed, greywacke 1.80 m | e. very su | | | | | | | | • | | | i | | NOV | | | |
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| | - | | | | | | | | | | | | | | | i | | | | | |
| Exp | lanatio | ns: | | | | | | GROUM | | ATER | | | | | Rem | arks | | <u> </u> | | | |
| Į <u>▼</u> . | Scala Pe blows/50 | netro mm | meter - | | Small Dist .arge Dist | turbed San turbed San | nple nple | X No | ot En | counte | red | | | | 1. Coor and sul | dinates | and | elevatio ey confir | ns based on h mation. | and hand G | €PS |
| ▼ | Permeat Schmidt Insitu Va | ility T Hamr ne Sh | est ner lear Strend | th (kPa) | J100 Und Nater Stri | isturbed Si ike (1st, 2n | ample nd) | Slc | ow Se pid Ir | ep (den flow (| epth) depth |) | | | 2. Strer shear v cohesiv | igin tern ane test /e soil st | whe whe treng | th terms | able. Where not a safe based on a stand in the safe based on a stand in th | are based o o shear van i correlation | มา ne, n with |
| Soil | V=Peak, UTP=Un | R=Re | esidual, o penetrate | | Nater Ris Rise Time | e (1st, 2nd (minutes) | 1) and | HOLE 1 | TERN | /INATE | ED DU | IE TO: | : Colli | apse | Scala t | est resu | its ar | na Indic | ated in quotatio | on marks. | |
| D = | dry; M = trated dimensi | moist | in metres | s = | ctor: | | | | | Rig/P | lant L | Jsed: | | | | | | | Logged by: | Checke | ed by: |

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|----------------------------|--|---|---|--|--|--|---|----------------------------------|---|---|---|---------|---|--|--|---|--|--|---|-------------------------|
| Proje | ct: | Por | ndiora Dur | Diligence | | Locatio | n: | South | Relt | Rancio | ra | | Hole p | osition: | an | | | N | lo.: | |
| Job N | No.: 17 | 1741 | | Start Date | 20- | 12-18 | Groun | d Level | l (m L | INZ): | Co-Ordi | inate | s (NZT | M2000): | an. | | | H | 412 | |
| Clier W | nt: elhom | Deve | elopments | | e. 20- | 12-10 | | 21.5 Hole D 0.95 | ou Depth: m | | | 1,50 | 0,094.0 | N 5,20 | 3,555 | 0.4 | | Sheet: 1 | of 1 | |
| ion (Z) | Ê | Unit | | | | | | σ | | | | | | | ater | ture | SS | | | īt/ |
| (m LIN (m LIN +21.50 | Depth (| Geological | (refer Info | Geologica to separate Ge ormation sheet | l Desci otechnic for furth | ription al and Ge er informa | ological tion) | Legen | Soi | l Shea (kF 50 100 | r Strength ² a) <u>150 200</u> | 1 | Scala Per (blows) | 9 12 | impunou 15 | Soil Mois | Sample | Tes | sts | Instrumer Backfill |
| +21.35 | - 0.15 | (TOPSOIL) | SILT, trace soft"; mois (TOPSOIL | e clay, organice t; low plasticit) | s; dark b y; organi | rown. "Ver cs, rootlets | y soft to s. | | | | | | | | | | ES0.1 NOV | NO. 1 0, 0, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 2, 1, 1, 2, 2, 3, 8, 8 | | |
| | - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | SILT, mind and yellow (surface in sand, fine SPRINGS 0.60m Lig | or to some clay ish-brown mo filtration after r to medium. (Y TON FORMAT | r, trace s ttling. "S ain); Iow ALDHUF ION) | with orang to wet n plasticit BER, | e y; x x x x x x x x x x | | | | | | | | | ES0.5 NOV | 8,8 | . V= 167 R= 34 | | |
| +20.55 | - - 0.95 - 1 - - - - | | 0.90m Gra gravel, sut EOH @ 0. | ides to include <u>rounded, grey</u> 95 m | trace to wacke. | minor fine | to mediu | n x | | | | | $ \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $ | | · · · · · · · · · · · · · · · · · · · | | ES0.9 NOV | No. 2 11, 12, 10 | | |
| | lanation Scala Pe blows/50 Permeat Schmidt Insitu Va V=Peak, WTP=Un Moisture | netro mm illity T Hamr ne Sh R=Re able to | meter - est ner ear Strength esidual, o penetrate | ● SI □ La ■ U 1 W 1 W 2 R | mall Dist arge Dist 100 Und /ater Stri /ater Ris ise Time | urbed San urbed San isturbed Sa ke (1st, 2n e (1st, 2nd (minutes) | nple nple ample id) I) and | GROU X N Slo Ra HOLE | INDW lot En- ow Se apid Ir TERN | ATER counter ep (de iflow (c 1INATE | ed pth) lepth) D DUE TC Refusel |):] | ollanse | Remar 1. Coordi and subje 2. Streng shear var cohesive Scala tes | ks nates a ect to s th term ne test soil sti t resul | and o surve ns fo whe reng ts ar | elevatic y confi r cohes re avai th term nd indic | ons based on ha rmation. sive soil layers a lable. Where no s are based on ated in quotatic | and hand G are based o shear van correlation n marks. | iPS in e, with |
| All c | dry; M = rated limensi Sca | moist ons le 1: | ;; W = wet; S in metres 10 | S = | or: | | | | | Rig/Pland | ant Used: | mm | | | | | | Logged by: AvD | Checke | d by: C |
| 2 | RI CONS Engineers | JLT/ and Ge | ANTS Pologists Fax | ley Consulta Moorhouse Ave istchurch : +643 3794402 : +643 3794403 | nts | | | | | | HAN | D | AU | G | ER LO | C | |
|-------------------------------------|---|--|--|--|--|---|----------------------------------|--|---------------------------|-----------------------|---|--|---|--|---|--------------------------------------|-------------|
| Proje | ct: | Por | | Diligonoo | Locat | tion: | South P | olt Dongi | | Hole po | osition: | 2 | | | N | 0.: | |
| Job N | | | | Start Date: | 18-12-18 | Groun | d Level (| (m LINZ): | Co-Ordir | nates (NZT | M2000): | 1. | | | HA | \13 | |
| Clien | 170 t· | 0743 | | Finish Date: | 18-12-18 | | 23.20 Hole De |) epth: | E 1 | ,566,374.5 | N 5,203, | 418. | 2 | | Sheet: | | |
| W | elhom | Deve | elopments | Ltd | | | 0.45 m | 1 | | | | | | | 1 | of 1 | |
| Elevation (m LINZ) | Depth (m) | Geological Unit | (refer to Info | Geological I separate Geot mation sheet fo | Description echnical and C or further inform | Geological nation) | Legend | Soil Shea (k | r Strength Pa) | Scala Per (blows / | netrometer 50 mm) | n Groundwater | Soil Moisture | Samples | Tes | strument/ | Backfill |
| A = U +23.20 +23.05 +22.75 | - 0.15 - 0.15 - 0.45 | (YALDHURST MEMBER, SPRINGSTON FORMATION) (TOPSOLU | (refer tr Info SILT, trace low plastici and yellowin medium pla MEMBER, Refusal on EOH @ 0.4 | separate Geol mation sheet fo clay, organics; ly, organics, roc to some clay, t sh-brown mottli isticity; sand, fir SPRINGSTON I inferred cobble. 5 m | echnical and (or further inform dark brown, "S dark brown, "S titets. (TOPSO race sand: gre ng. "Stiff"; moi te to medium. FORMATION) | Geological nation) tiff"; moist; IL) y with orang st; low to (YALDHURS) | | | 150 200 | (blows / | 50 mm) 9 12 1 | Ground | OM IIOS | Zami | Tes | | |
| Expl Expl F Soil Soil | - anatior Scala Pe Jows/50 Permeab Schmidt I nsitu Var /=Peak, // | ns: metro mm lity T Hamr ne Sh R=Re ble to moist | meter - est ner sear Strength ssidual, o penetrate ;; W = wet; S | ● Sma □ Larg ■ U10 (kPa) ↓ Wa ↓ Wa ↓ Rise = | all Disturbed S je Disturbed S 0 Undisturbed ter Strike (1st, ter Rise (1st, 2 a Time (minute | ample ample Sample 2nd) nd) and s) | GROUN X No Slov Rap HOLE T Targe | DWATER t Encounte w Seep (de pid Inflow (ERMINATE | red epth) DDUE TO: | Collapse | Remark: 1. Coordina and subject 2. Strength test results | S attes at to su terms and i | nd elev rvey cc for co ndicate | ations onfirma hesive d in qu | based on ha ation. soil layers a jotation mark | nd hand GPS re based Scala (s. | - - - |
| All d | ary; M = moist; W = wet; S = I dimensions in metres Contractor: Rig/Plant U | | | | | | | | | | | | | Lo | ogged by: | Checked b | y: |

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|----------------------|-------------------------------|-----------------------|--|---|--|---|---------------------------|-----------------|---|----------------|-------------------------|-------------------------|----------------|--------------------------------|------------------------------|--------------------------------|------------------|------------------------|-------------------------------|---|----------------------------|-----------------------|
| Proje Sum | ct: merset | Rar | ngiora Du | e Diligence | | Locatio Towns | on: send Ro | /South | Beli | t, Ran | igiora | | | Hole Refe | positioner to Si | n: te Plar | ۱. | | | ١ | No.: | |
| Job N | lo.: 17(|)743 | 3 | Start Date Finish Dat | : 21- e: 21- | 12-18 12-18 | Grour | nd Leve 26. | el (m 70 | n LINZ | <u>z):</u> | Co-Orc E | dinate 1,56 | es (NZ 6,464 | TM20 .6 N | 00): 5,203,4 | 422 | .0 | | H | A14 | |
| Clien W | t: elhom | Dev | elopment | s Ltd | | | | Hole D | Dept m | th: | | | | | | | | | | Sheet: 1 | of 1 | |
| lo IZ | Ê | Unit | | | | | | | 5 | | | | | | | | iter | ure | s | | | ť |
| (m LIN +26.70 | Depth (| Geological | (refer In | Geologica to separate Ge formation shee | I Desc eotechni t for furth | ription cal and Ge her informa | ological tion) | Leden | S S S S | Soil Sh | near S (kPa 100_1 | Strengtl) 50 200 | h | Scala F (blow <u>3 6</u> | Penetror /s / 50 m 8 9 | neter im) <u>12 1</u> 5 | Groundwa | Soil Moist | Sample | Te | sts | Instrumen Backfill |
| | _ | | SILT, trac soft"; moi (TOPSOII | e clay, organic ist; low plasticit L) | s; dark b y; organ | prown. "Ver ics, rootlets | y soft to s. | | <u>× </u> | | | | Ļ | | | | | | | No. 1 0, 1, 1, 1, 0, 1, 2, 1, 2, 1, 2, 2, | | |
| | - | (TOPSOIL) | | | | | | <u>// \</u> | <u>_ /</u> | | | | + | | | | | | ES0.1 NOV | 1, 5, 12, 8, 8, 16 | | |
| +26.40 | 0.30 | | 0.25m Gr | ades to "firm". | | | | <u>た</u> 、 ル | <u>, , , , , , , , , , , , , , , , , , , </u> | | | | ľ, | | | | | | | | | |
| | _ | VGSTON FORMATION) | SILT, min and yellov plasticity; MEMBEF | or to some cla wish-brown mo sand, fine to n R, SPRINGSTO | y, trace s ittling. "F nedium. N FORM | sand; grey v 'irm"; moist (YALDHUF IATION) | with oran ; low &ST | | ××× | | | | | | | | | | | | | |
| | - | RST MEMBER, SPRIN | | | | | | | × × × × | | | | | | | | | | ES0.5 NOV | | V= 134 | |
| +26.05 | 0.65 | WALDHUF | 0.60m Gr medium s | ades to include sand. Very stiff | e some c | clay and tra | ce fine to | × | × | ▲ | × | | | | | | | | | | R= 36 | |
| | _ | | EOH @ 0 | 0.65 m | | | | | | Ì | | | | | | | | | | | | |
| | - | | | | | | | | | | | | | | | | | | | | | |
| | _ | | | | | | | | | | | | | | | 0.90m* | | | | ¥ | | |
| | -1 | | | | | | | | | | | | | | | | | | | | | - |
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| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Expl | anation Scala Pe | ns: netro | meter - | • s | mall Dis | turbed San | nple | GROU | JND | WATE | R | | | | R | emarks | S tes c | and o | | ns based on h | and band C | |
| | olows/50 Permeab | mm ility T | est | | arge Dis 100 Und | turbed San listurbed Sa | nple ample | | NOT E | ≟ncoui Seep | ntered (deptl | ו) | | | 2. S | subject strength ar vane | to si term | urvey s for wher | y confir cohes re avail | mation. ive soil layers a able. Where n | are based o o shear van | on ie, |
| | ⊳cnmidt nsitu Va /=Peak | Hami he Sh R=Ri | ner iear Strengt esidual. | th (kPa) 🛓 V <u>1</u> V | /ater Str ∕ater Ris | rike (1st, 2n se (1st, 2nd | nd) I) and | R | apid | I Inflow | v (dep | oth) | _ | | coh | esive so la test re | oil str esult | engt s an | h terms d indic | s are based on ated in quotation | correlation on marks. | with |
| <u>Soil</u> D = 0 | <u>Moisture</u> dry; M = | ble t | o penetrate ; W = wet; | ⊊ F S= | tise Time | e (minutes) | [| HOLE Tar | TEF get o | RMINA depth | X R | DUE To efusal | 0: C | ollaps | e | | | | | | | |
| All d | ^{rated} limensi | ons e 1· | in metres | Contrac | tor: | | I | | | Rig | /Plan | t Used der | l: | | | | | | | Logged by: | Checke | d by: |

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|--|---|--|--|--|--|--|--|------------------------------------|---|---|-------------|---|--|---|--|--|---|--|---------------------------|
| Proje | ct: | Por | | Diligonoo | | Locatio | n: | /South I | Polt Done | ioro | | Hole p | osition: | lon | | | ١ | No.: | |
| Job N | lo.: 17(|)743 | | Start Date | e: 21- | 12-18 12-18 | Grour | id Level | (m LINZ) | : Co-Ordi | inates | 6 (NZT | M2000): | 13 436 | 3.4 | | H | A15 | |
| Clien | t: elhom | Deve | elopments | s Ltd | | | | Hole D 0.70 i | epth: n | | 1,000 | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 110,20 | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | Sheet: 1 | of 1 | |
| Elevation (m LINZ) | Depth (m) | Seological Unit | (refer Inf | Geologica to separate G ormation shee | al Desci Geotechnic et for furth | r iption cal and Ge ler informa | ological tion) | Legend | Soil She | ear Strength kPa) | s | icala Per (blows / | netrometer 50 mm) | Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| +24.70 | - | (TOPSOLL) | SILT, trace low plastic | e clay, organic ity; organics, | cs; dark b rootlets. | rown. "Sof (TOPSOIL) | t"; moist;) | | | 10 150 200 | • • • | 3 6 | 9 12 | 15 - | | ES0.1 NOV | No. 1 1, 1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 4, 6, 13, 20 | | |
| +24.45 | - | SPRINGSTON FORMATION) | SILT, mind and yellow plasticity; MEMBER | or to some cla vish-brown me sand, fine to r , SPRINGSTC | ay, trace s ottling. "S medium. (DN FORM | and; grey (tiff"; moist; YALDHUF ATION) | with orang low RST | | - - - - - - - | | | | | | | | | | |
| +24.00 | - 0.70 | (YALDHURST MEMBER, S | 0.50m Gra 0.60m Gra | ades to some ades to very s | clay. tiff. | | | × × × × × × × × × | - - - - - - - - | | | | | | | ES0.5 NOV | | , V= 195 R= 49 | |
| | - 1 - 1 - | | | 70 m | | | | | | | | | | | | | | | - |
| Expl | anation Scala Pe Dolows/50 Permeab Schmidt nsitu Va /=Peak, Moisture dry; M = | netro mm ility T Hamr ne Sh R=Re able t moist | meter - est ner esar Strength esidual, o penetrate t; W = wet; S | • 5 • 1 • 1 • 1 • 1 • 1 • 1 • 1 • 1 | Small Dist Large Dist J100 Und Water Stri Water Ris Rise Time | turbed San curbed San isturbed S ike (1st, 2n e (1st, 2nd (minutes) | nple nple ample id) i) and | GROUI | NDWATER ot Encount ow Seep (in upid Inflow TERMINAT | ered depth) (depth) ED DUE TO |): Cc | llapse | Rema 1. Coord and subj 2. Streng shear va cohesive Scala ter | rks inates a ect to s gth term ne test a soil st st resul | and e surve ns for whe rengt its an | elevatic y confii r cohes re avail th term id indic | ons based on ha rmation. ive soil layers a lable. Where no s are based on ated in quotatic | and hand G are based o o shear van correlation on marks. | PS ۳۵ ۱۳۹۶, with |
| All d | imensi Sca | ons le 1 [.] | in metres 10 | Contrac | ctor: | | | | Rig/ Hand | Plant Used: d Auger | | | | | | | Logged by: RBW | Checke | d by: C |

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|--|--|---|--|---|---|--|-------------------------------|--|---------------------------------|-------------------------------|--------------------------|-------------------------|-----------|-------------------------|---|---|--|--|--|--|------------------------------|
| Projec | ct: merset | Ra | ndiora Du | e Diligenc | e | Locatio | on: send Rd | l/South | Relf | Rand | iora | | H | lole po Refer t | sition: | Plan | | | | No.: | |
| Job N | |)74? | | Start Da | - te: 21 | -12-18 -12-18 | Grour | nd Leve | el (m | LINZ): | : C | o-Ordi ⊏ 1 | nates | (NZTN | /2000 |): 202 // | 52.1 | | | HA16 | |
| Clien | t: | | | s I td | | | | Hole [| Dept | h: | | | 1,000,0 | 024.0 | N 0, | 200,4 | JJ. 1 | | Sheet: | 1 of 1 | |
| л Го П | | Juit | | | | | | 0.70 | | | | | | | | | ler Ire | s | | | |
| 0.02+ (m LIN | Depth (r | Geological I | (refer In | Geologi to separate formation sh | cal Des Geotechr eet for fur | cription nical and Ge ther informa | eological ation) | | | oil She (I <u>50 10</u> | ear St kPa) 10 150 | rength | Sca (I | ala Pen blows / 6 | etrome 50 mm 9 1: | er) 2 15 | Soil Moist | Sample | | Tests | Instrument Backfill |
| +20.65 | - - 0.25 | (TOPSOIL) | SILT, trac moist; lov | e clay, organ v plasticity; c | nics; dark organics, r | brown. "Vei ootlets. (TO | ry soft"; PSOIL) | | | | | | | | | | | ES0.1 NOV | No. 1 1, 0, 1 1, 0, 1 2, 1, 2 1, 0, 1 1, 2, 4 10, 10 8, 7, 8 | , , , | |
| | - | R, SPRINGSTON FORMATION) | SILT, min and yellou plasticity; MEMBEF 0.45m Gr | or to some o wish-brown r sand, fine to R, SPRINGS ades to "soft | lay, trace nottling. " o medium FON FOR | sand; grey Firm"; mois . (YALDHUF MATION) | with orang t; low RST | ge X - X - X - X - X - X - X - | × × × × × | | | | | | | | | | | | |
| +20.20 | - 0.70 | (YALDHURST MEMBER | 0.60m Ve 0.65m Sa | ery stiff. and, fine. | | | | | × × × × × | | | | | | | 50m ► | | ES0.5 NOV | V | ∨ V= 136 ≻ R= 45 | |
| | - 1 - - | | | | | | | | | | | | | | | | | | No. 2 10, 10 11 | | |
| Expl | - anatior Scala Pe Iows/50 Permeab Schmidt I nsitu Var | netro mm ility T Hami ne Sh | meter - Test mer near Strengt | • ■ th (kPa) ₹ | Small Di Large Di U100 Ur Water S Water R | sturbed Sar sturbed Sar idisturbed S trike (1st, 2n ise (1st, 2n | mple mple sample nd) | GROL X I S R | JND Not E Slow S Rapid | WATER | ered depth (dept |) h) | | | Ren 1. Coc and su 2. Stre shear cohes Scala | narks ordinate ubject to ength te vane te ive soil test res | s and o surv rms fe st wh streng | elevatii ey confi or cohe: ere ava gth term and indii | ons based o irmation. sive soil laye ilable. When s are based cated in quot | n hand-held (rrs are based e no shear va lon correlatio tation marks. | GPS on ine, on with |
| D = c Soil ^l D = c All d | Iry; M = ated imensi | mois | o penetrate t; W = wet; in metres | s = <mark>} Contra</mark> | Rise Tim | e (minutes) |)[| HOLE Tar | TEF | RMINAT | ED D Re Plant | UE TO fusal Used: | : Coll | apse | auger (assur | attemp ned sev | ai all(abar ver pi | ipe bacl | due to enco (fill). | y: Check | ind ind ied by: |

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|------------------------------------|--|---|---|---|--|--|---------------------------------------|---|--|-----------------|---------------------------|--|---|---|--|---|---|-------------------------|
| Proje | ct: merset | Rar | ndiora Due | Diligence | Locati | on: send Rd | South P | elt Ran | niora | | Hole p | osition: | an | | | Ν | lo.: | |
| Job N | lo.: 17(|)743 | 3 | Start Date: Finish Date: | 21-12-18 21-12-18 | Groun | d Level | (m LINZ) |): Co-(| Ordina E 1,5 | tes (NZ1 | M2000): N 5,20 | 3,470 | 0.0 | | H | 417 | |
| Clien We | t: elhom | Deve | elopments | Ltd | | | Hole De 0.85 n | epth: | | | | | | | | Sheet: 1 | of 1 | |
| 01 (m LINZ) | Depth (m) | Geological Unit | (refer to Info | Geological [o separate Geot rmation sheet fo | Description technical and Ge or further information | eological ation) | Legend | Soil She | ear Strer (kPa) 00 150 2 | ngth | Scala Pe (blows 3 6 | netrometer / 50 mm) 9 12 | Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| +21.90 | - 0.20 | (TOP SOIL) | SILT, trace low plastici | clay, organics; ty; organics, roc | dark brown. "So ttlets. (TOPSOIL | ft"; moist; .) | | | | | | | | EN | SS0.1 | No. 1 1, 1, 1, 1, 0, 2, 1, 1, 2, 2, 2, 1, 2, 2, 1, 2, 6, 6, 6, 13 | | |
| | - | (TION) | SILT, minor and yellowi plasticity; s MEMBER, | to some clay, t sh-brown mottli and, fine to meo SPRINGSTON I | race sand; grey ng. "Firm"; mois dium. (YALDHU FORMATION) | with orang st; low RST | | | | | | | | | | | | |
| | - | BER, SPRINGSTON FORMA | 0.40m Grad | des to clayey. | | | | | | | | | | EN | S0.5 V | | | |
| | - | (YALDHURST MEN | 0.60m Grad | des to very stiff. s mottled. | | | × × × | | x | | | | | | | | . V= 138 R= 43 | |
| +21.25 | - 0.85 | | FOH @ 0.8 | 5 m | | | × × | | | | | | | E | ES0.85 NOV | | | |
| | - - - - | | | | | | | | | | | | | | | | | |
| Expl | anation | าร: | 1 | | | | GROUN | IDWATE | <u>।</u> २ | | | Remar | ks | | | | | <u> </u> |
| ▼ S ▼ F × S Soil D = c | Scala Pe plows/50 Permeab Schmidt nsitu Va /=Peak, // Peak, // Officient dry; M = rated | netro mm ility T Hamr ne Sh R=Re able to moist | meter - iest ner lear Strength esidual, o penetrate t; W = wet; S | | all Disturbed Sa ge Disturbed Sa 0 Undisturbed S ter Strike (1st, 2 ter Rise (1st, 2n e Time (minutes | mple mple Sample nd) d) and) | X No Slo Raj HOLE T Targo | ot Encoun w Seep (bid Inflow ERMINA | tered depth) (depth) TED DUE C Refus | TO: | Collapse | 1. Coordii and subje 2. Streng shear var cohesive Scala tes | nates a ect to s th term ne test soil str t result | and ele urvey is for c where rength is and | evatior confirr cohesire availa terms i terms | ns based on ha mation. ve soil layers a able. Where no are based on ated in quotatio | and hand G are based o o shear van correlation n marks. | PS n e, with |
| All d | saturated All dimensions in metres Contractor: Rig/Plan Scale 1:10 Hand Au | | | | | | | | | | | | | | | Logged by: RBW | Checke | ia by: C |

| 2 | RI CONS Engineers | ULT/ and Ge | | Riley Consul 22 Moorhouse Ave Christchurch Tel: +643 3794402 Tax: +643 379440 | | | | | | | | | | H | IAN | D | A | UG | ER LO | OG | |
|--|--|---|---|---|--|---|--|------------------|---|---|---|----------------|----------------|----------------------------|---|--|--|--|--|--|-------------------------|
| Projec | t: nerset | Rar | ndiora Du | e Diligence | | Locatio | n: end Rd | /South I | Belt R | andior | a | | Hole | e positi | tion: Site Pla | an | | | Ν | lo.: | |
| Job N | 0.: 17(|)743 | | Start Date | : 21- e: 21- | 12-18 12-18 | Grour | nd Level | (m Lll | NZ): | Co-O | rdina F 1 5 | ites (N | ZTM2 | 2000): N 5 202 | 3 362 | | | H | A18 | |
| Client We | t: elhom | Deve | elopment | s Ltd | | | | Hole D 0.65 I | epth: n | | | L 1,0 | | 0.0 1 | 10,200 | ,002 | | | Sheet: 1 | of 1 | |
| Elevation (m LINZ) | Depth (m) | Geological Unit | (refer In | Geologica to separate Ge formation sheet | I Desci eotechnic t for furth | ription cal and Ge ner informa | ological tion) | Legend | Soil | Shear (kP | Strenç a) | gth | Scala (blov | Penetr ws / 50 | ometer mm) | Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| +24 35 | - - 0.25 | (TOPSOIL) | SILT, trac low plasti 0.20m Gr | e clay, organics city; organics, r ades to "firm". | s; dark b ootlets. | rown. "Sof (TOPSOIL) | t"; moist;) | | | | | | | | | | | ES0.1 NOV | No. 1 1, 1, 1, 1, 0, 2, 1, 1, 1, 2, 1, 1, 2, 3, 2, 3, 3, 2, 3, 7, 11, 22 | | |
| | - | BER, SPRINGSTON FORMATION) | SILT, min and yellov plasticity; MEMBEF | or to some clay wish-brown mo sand, fine to m t, SPRINGSTOI | /, trace s ttling. "F iedium. (N FORM | and; grey v irm"; moist (YALDHUR ATION) | with orang ;; Iow RST | | | | | | | | | | | | | | |
| +23.95 | - 0.65 | (YALDHURST MEM | 0.50m Gr 0.60m Gr sand. Ver | ades to "stiff". ades to include y stiff. | trace to | minor fine | to mediu | m × × | - - - | | | | | | | | | ES0.5 NOV | | , V= 157 R= 46 | |
| | - 1 - 1 - - | | | | | | | | | | | | | | +.bom | | | | V | | |
| Expla Expla Solution Solution | anatior cala Pe lows/50 ermeab chmidt situ Var =Peak, <u>Noisture</u> | netroi mm ility T Hamr ne Sh R=Re able to | meter - est ner ear Strengt esidual, o penetrate | ● Si □ La ■ U h (kPa) ↓ W ↓ R | mall Dist arge Dist 100 Und /ater Stri /ater Ris ise Time | turbed San turbed San isturbed Si ike (1st, 2n e (1st, 2nd e (minutes) | nple nple ample nd) I) and | GROUI | NDWA ot Enco ow See upid Infl TERMII get dep | TER puntere p (der ow (de NATEI | ed oth) epth) D DUE ⁻ Refusa | TO: | Collaps | 1 a 2 s c S | Remarl . Coordin nd subje . Strengti hear van ohesive s cala test | ks nates a ct to s h term e test soil str result | and e urvey is for wher rengt is an | elevatio y confir cohes re avail h term d indic | ns based on ha mation. ive soil layers a able. Where nc s are based on ated in quotatio | and hand G are based c o shear van correlation on marks. | PS on e, with |
| satur All di | ated imensi | ons e 1. | in metres | Contract | tor: | | | | | Rig/Pla | nt Use uaer | ed: | · | | | | | | Logged by: RBW | Checke | ed by: |

| 2 | RI CONS Engineers | ULT/ and Ge | ANTS Hologists | Riley Consulta 2 Moorhouse Ave hristchurch el: +643 3794402 ax: +643 3794403 | ants | | | | | | ł | HAN | D | A | UG | ER L | OG | |
|----------|--|--|---|---|---|---|-------------------------------|--|---|------------|----------------------------|---|---|--|---|---|--|----------------------------|
| Proje | ect: merset | Rar | ngiora Du | e Diligence | Locati | on: send Rd | /South F | Selt Randid | ora | H | ole pos | ition: Site Pla | an | | | Ν | lo.: | |
| Job | No.: 17(| 1743 | | Start Date: | 21-12-18 | Grour | nd Level | (m LINZ): | Co-Ordi | nates (| (NZTM | 2000): | | 7 | | H | A19 | |
| Clie | nt: | <i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | , | | . 21-12-10 | | Hole De | epth: | E1 | 1,000,0 | 000.7 | N 5,203 | 6,355 | 0.7 | | Sheet: | | |
| N | /elhom | Deve | elopments | s Ltd | | | 0.90 r | n I | | 1 | | | | | | 1 | of 1 | |
| (m LINZ) | Depth (m) | Geological Un | (refer Inf | Geological to separate Geo ormation sheet f | Description technical and Ge or further inform | eological ation) | Legend | Soil Shea (k | ar Strength Pa) 150 200 | Sca (b | ala Pene blows / 5 6 | trometer 0 mm) 9 12 | 5 Groundwater | Soil Moisture | Samples | Tes | sts | Instrument/ Backfill |
| +25.40 | - 0.30 | (YALDHURST MEMBER, SPRINGSTON FORMATION) (TOPSOIL) | SILT, trac soft"; mois (TOPSOIL soft"; mois and yellow plasticity; MEMBER 0.50m Gra 0.60m Gra 0.70m Gra 0.70m Gra 0.85m Gra greywackt EOH @ 0. | e clay, organics; st; low plasticity;) or to some clay, rish-brown mottl sand, fine to me , SPRINGSTON ades to clayey; n ades to clayey; n ades to include t ades to include t <u>a</u> | dark brown. "Ve organics, rootlef trace sand; grey ing. "Stiff"; mois dium. (YALDHU FORMATION) nedium plasticity race fine sand. | ry soft to ts. | | | | | | | | | 580.5 \ 580.5 \ 580.5 \ | No. 1 1, 1, 0, 1, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3, 4, 10, 14, 20 | , V= 184 R= 50 | |
| Ext | lanatio | ns: | | | | | GROUM | | | | | Remarl | il (s | | | | | |
| | Scala Pe blows/50 Permeab Schmidt Insitu Va V=Peak, WBSUA dry; M = urated dimensi | netro mm ility T Hamr ne Sh R=Re able to moist moist | meter - eest ner eear Strengtl openetrate ;; W = wet; \$ m metres | • Sm Lar I U10 • (kPa) $\frac{1}{2}$ Wa Z Ris S = Contractor | all Disturbed Sa ge Disturbed Sa 00 Undisturbed S iter Strike (1st, 2 iter Rise (1st, 2n e Time (minutes | mple mple Sample Ind) id) and ;) | X No Slo HOLE 1 Targ | ot Encounte w Seep (de pid Inflow (ERMINATE et depth X Rig/P | red epth) depth) ED DUE TO Refusal ant Used: | : Colla | apse | 1. Coordin and subje 2. Strengti shear van cohesive s Scala test | ates a ct to s n term e test soil str result | and el urvey is for where rength is and | levatior confirr cohesiv e availa terms l indica | ns based on ha nation. ve soil layers a able. Where no are based on ated in quotatio | and hand C are based o o shear var correlation on marks. | GPS on he, h with |

| 2 | RI CONS Engineers | JLT/ and Ge | EY ANTS Pologists | Riley Cons 2 Moorhouse hristchurch el: +643 3794 ax: +643 379 | sultants ^{Ave} 4402 4403 | | | | | | | HAN | D | AU | GEF | r L(| DG | |
|-----------------------|---|--|---|---|--|--|---|--|--|------------------------------|----------------------------|--|--|--|---|---|---------------------------------------|-------------------------|
| Proje | ect: | Par | ngiora Du | Diligenc | 20 | Locatio | on: Send Rd | South B | elt Bandic | ra | Hole p | osition: | n | | | N | o.: | |
| Job N | No.: | 742 | | Start Da | ate: 2 | -12-18 | Grour | nd Level | (m LINZ): | Co-Ordi | nates (NZT | M2000): | | | - | HÆ | \20 | |
| Clier | nt: | 1140 | , | | Jale. Z | -12-10 | | Hole De | pth: | E 1 | ,566,642.7 | N 5,203 | ,365. | 5 | She | et: | | |
| W | elhom | Dev | elopments | s Ltd | | | | 0.55 n | 1 | | 1 | | | | | | of 1 | |
| the control (m LINZ) | Depth (m) | Geological Uni | (refer Inf | Geologi to separate ormation sh | ical Des Geotech neet for fu | cription nical and Ge ther informa | ological ttion) | Legend | Soil Shea (kl | r Strength Pa) 150 200 | Scala Pe (blows) 3 6 | netrometer / 50 mm) 9 12 1 | сл Groundwater | Soil Moisture | Calling | Tes | ts | Instrument/ Backfill |
| +20.25 | - - - - - - - - - - - - - - - - - - - | (VALDHURST MEMBER, SPRINGSTON FORMATION) (TOPSOIL) | SILT, trac soft"; mois (TOPSOIL SILT, min and yellov plasticity; MEMBER 0.45m Gra EOH @ 0 | e clay, orga st; low plast) or to some c /ish-brown sand, fine t sand, fine t sand, fine t sand, fine t sand, fine t s55 m | nics; dark icity; orga | brown. "Ver nics, rootlets sand; grey Stiff"; moist (YALDHUR MATION) ard". | y soft to s. with orang ilow ST | $\begin{array}{c} 11 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$ | | | | 9 12 1 | | ESO. NOV | | >. 1 0, 1 1, 2 4, 3 13, | | |
| Exp V V Soil | lanatior Scala Pe blows/50 Permeab Schmidt Insitu Van V=Peak, Worsture | netro mm llity T Ham ne Sh R=Re | meter - rest ner near Strengti esidual, o penetrate | • ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | Small D Large D U100 U Water S Water F Rise Tin | isturbed Sar isturbed Sar ndisturbed S trike (1st, 2r tise (1st, 2nc ne (minutes) | nple nple ample nd) 1) and | GROUN X No Slov Rap HOLE T | IDWATER It Encounter w Seep (de bid Inflow (d ERMINATE | red pth) DDUE TO | : | Remark 1. Coordina and subjec 2. Strength Scala test | ates ar t to su terms results | nd eleva rvey cor for coh and inc | tions bas nfirmation esive soil licated in | ed on ha layers a quotation | nd hand GP re based on n marks. | 5 |
| D = satu All c | dry; M = rated dimensi | noisi | t; W = wet; S in metres | S = | actor: | | [| | Rig/Pl | ant Used: | | | | | Logg | ed by: | Checked | by: |

| 2 | RI CONS Engineers | ULT/ and Ge | ANTS rologists Rologists | ley Consulta Moorhouse Ave istchurch : +643 3794402 c: +643 3794403 | ants | | | | | | | | HAN | ١D | A | UG | SER L | OG |
|---------|--|----------------|--|--|---|---|--|---|---------------|-------------------------------|---|---------------------------|---|---|---------------------------------|---|---|---|
| Proje | ct: | Rar | ndiora Due | Diligence | | Locatio | n: end Rd/ | South F | Selt Rano | iora | | Hole p | osition: | lan | | | ١ | No.: |
| Job N | No.: 17(|)74.9 | | Start Date: | 21-* • 21-* | 12-18 | Groun | d Level | (m LINZ) | : Co-Or | dinate | es (NZ) | M2000): | 3 20- | 1 1 | | H | A21 |
| Clier | nt: | | I | | . 21 | 12 10 | | Hole De | epth: | | _ 1,50 | 0,720.3 | 9 11 3,20 | 3,39 | 1.1 | | Sheet: | |
| W F | | Deve | elopments | Ltd | | | | 0.55 n | n | | | | | - | n | | 1 | of 1 |
| (m LINZ | Depth (m | Geological U | (refer to Info | Geological separate Geo mation sheet f | Descr technic or furth | iption al and Geo er informa | ological tion) | Legend | Soil She (| ear Streng kPa) 150 200 | th | Scala Pe (blows 3 6 | enetrometer / 50 mm) 9 12 | Groundwate | Soil Moistur | Samples | Tes | Instrument/ Backfill |
| +21.50 | 0.20 | (TOP SOIL) | SILT, trace soft"; moist (TOPSOIL) | clay, organics; ; low plasticity; | dark br organio | own. "Ven cs, rootlets | y soft to 5. | | | | | | | | | ES0.1 NOV | No. 1 1, 0, 1, 1, 1, 2, 1, 2, 4, 3, 3, 5, 7, 5, 3, 3, 2, 2, 1, 2 | |
| | - | (FILL) | SILT, minou gravel; grey Firm to stiff organics, fi subangular | to some clay, with orange ar ; moist; low pla prous; gravel, fi . (FILL) | trace sa nd yello asticity; ine to m | and, organ wish-brow sand, fine nedium, su | iics and n mottling to mediur ibrounded | $\begin{array}{c c} x & x \\ x & x \\ x & x \\ n; \\ to \\ x & x \\ x \\ x \\ x \\ x \\ x \\ x \\ x \\ x$ | | | | | | | | | | |
| +21.15 | - 0.55 | | 0.45m Grad | les to gravelly; | wet to s | saturated | | | | | | | | | | ES0.5 | | |
| | - | | Gravel grad | es medium to o | coarse. | | | | | i i i i | | | i i I I | Í | | NOV | | |
| | - | | | | | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | | | |
| | - 1 | | | | | | | | | | | | 1.00r | n → | | | No. 2 2, 7, 3, 4, 7, 4, 3, 2, 3, 4 | |
| | - | | | | | | | | | | | | | | | | V | |
| | - | | | | | | | | | | | | | | | | | |
| Exp | lanation | IS: | meter - | • • | all Dist | urbed Som | nle | GROUN | IDWATEF | 2 | | | Rema | rks | | | | |
| | Explanations: Scala Penetrometer - Small Disturbed Sample GROUNDWATER Image: Disturbed Sample Large Disturbed Sample Not Encountered Image: Disturbed Sample U100 Undisturbed Sample Slow Seep (depth) Schmidt Hammer Image: Disturbed Sample Slow Seep (depth) Image: Note Strength (kPa) Image: Disturbed Sample Slow Seep (depth) V=Peak, R=Residual, Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample V100 Undisturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Disturbed Sample Image: Distreside Sample | | | | | | | | | | | | 1. Coordi and subj 2. Streng Scala tes | inates ect to s th term st resul | and surve ns fo lts ar | elevatio ey confir or cohes nd indic | ns based on ha mation. ive soil layers a ated in quotatic | and hand GPS are based on on marks. |
| All o | rated dimensi | ons | in metres | Contracto | or: | | | | Rig/l | Plant Used | d: | | | | | | Logged by: | Checked by: |

| 2 | RI CONS Engineers | ULT/ and Ge | EY 2 ANTS T Fologists F | Riley Consul 2 Moorhouse Ave hristchurch el: +643 3794402 ax: +643 379440 | ants | | | | | | | | | | HA | ND | Δ | UC | SER | LOG | |
|-------------------------------|---|--|--|--|--|--|---|---|-------------------------------|--|---------------------------------|--------------------------------|-----------------|-------------------------|--|--|---|--|---|---|----------------------------|
| Projec | t: nerset | Rar | ngiora Du | e Diliaence | | Locatio | n: end Rd/ | South | Belt | Ranc | liora | | ۲ ۱ | lole po Refer t | sition: o Site | Plan | | | | No.: | |
| Job N | 0.: 17(|)743 | . <u></u> | Start Date: | 21- - 21- | 12-18 12-18 | Groun | d Leve | l (m | LINZ) |): C | o-Ordi | nates | (NZT) | M2000 |): | 01 A | | ŀ | HA22 | |
| Client | : | | · | | 5. 21- | 12-10 | | Hole D | Depth | ו: | | E | 1,500, | 055.5 | N 3,4 | 203,32 | . 1.4 | | Sheet: | | |
| We Le co | | | elopments | Ltd | | | | 1.10 | m | | | | | | | | - 0 | | | 1 of 1 | |
| (m LINZ (m LINZ | Depth (m | Geological U | (refer Inf | Geologica to separate Ge ormation sheet | Desc otechnic for furth | ription cal and Ge ter informa | ological tion) | Leaend | S | oil She (<u>50 10</u> | ear St kPa) | rength | Sc (3 | ala Pen blows / 6 | etromet 50 mm) <u>9 12</u> | er 2 15 | Soil Moistur | Samples | - | Tests | Instrument/ Backfill |
| +19 20 | 0.30 | (TOPSOIL) | SILT, tract to firm"; m fine to me 0.25m Gra | e clay, organics oist, low plasti dium, subround dium, subround | and gra city; org ded, gre yellowis | avel; dark b anics, rootl ywacke (To sh-brown n | orown. "So lets; grave OPSOIL) nottling. | off $\underline{\vee}$ \vee | | | | | | | | | | ES0.1 NOV | No. 1 1, 0, 2, 1, 2, 1, 2, 1, 2, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1, 1 | | |
| +19.10 | 0.40 | | Gravelly S with orang moist; low to mediun MEMBER | ILT, minor to so and yellowis plasticity; san subrounded FORMATION). ft to very soft" | ome sar h-brown d, fine to o round | nd, trace gr mottling. ' medium; ed (YALDH | avel; grey 'Firm"; gravel, fin IURST | e x | | | | | | | | | | | | | |
| - | | TON FORMATION) | SILT, mind soft"; mois amorphou SPRINGS 0.60m Gra | or clay, trace or st; low plasticity s, weak odour. TON FORMAT ades to firm. | ganics; /; organi (YALDł ON) | dark grey. cs, fibrous HURST ME | "Soft to ve to EMBER, | J ⊧ry | ۵ | × | | | | | | | Ľ | ES0.5 NOV | //// | ∨ ^{V= 38} R= 10 | |
| - | | (YALDHURST MEMBER, SPRINGS | 0.75m 50r | nm lenses of d | ark brov | vn fibrous I | PEAT. | | | | | | | | | | | | | | |
| +18.40 | - 1 1.10 | | 1.00m Gra trace to m | ides to include inor fine gravel | minor to | o some sar | nd, and | | | | | | | | | 00m | | | No. 2 3, 9, 7, 6, 7, 8, 9, 10, | | |
| - | | | ЕОН @ 1. | 10 m | | | | | | | | | | | | <u></u> | | | | | |
| | | | | | | | | | | | | | | | | 50m | | | ♥ | | |
| Expla Solution Solution | anatior cala Pe lows/50 ermeab chmidt l situ Var =Peak, TPisture | netro mm ility T Hamr ne Sh R=Re able to | meter - est ner ear Strengtl esidual, o penetrate | ● Si □ La ■ U n (kPa) ♥ W ▼ R | nall Dis Irge Dis I00 Und ater Str ater Ris se Time | turbed San turbed San isturbed S ike (1st, 2n e (1st, 2nd e (minutes) | nple nple ample id) I) and | GROU X N SI X Ra HOLE | Jot Ei ow S apid TER | VATEF ncount Seep (Inflow MINAT epth | tered depth (dept (D D |) h 0.6 m UE TO fusal | 1) : Coll | lapse | Rem 1. Coc and su 2. Stre shear cohesi Scala | narks Ibject to Ingth ter vane tes ve soil s test res | s and surv ms fo st wh streno ults a | elevatic ey confi or cohes ere avai gth term nd indic | ons based or rmation. sive soil laye lable. Where s are based ated in quot | n hand hand (rs are based e no shear var on correlation ation marks. | GPS on ne, n with |
| D = d satura All di | ry; M = 1 ated mensi | ons | in metres | S = | or: | | [L | | | Rig/ | Plant | Used: | | | | | | | | y: Check | ed by: |

| 2 | RI CONS Engineers | ULT/ and Ge | EY 22 NTS T | Riley Con 2 Moorhouse christchurch el: +643 379 ax: +643 379 | sultant ^{Ave} 4402 | s | _ | _ | _ | _ | _ | | | _ | F | IAI | ١D | A | UC | SER | LO | G | _ |
|---|---|--|--|--|--|--|---|--------------------------|--|--|--|---------------------------------------|--------|---------------------|-------------------|--|--|--|---|--|---|--|-------------------------|
| Proje | ct: | Per | | o Diligor | ~ | Loc | ation: | 4/6~ | th D- | | nai | | | Hole | e posi | ition: | Dian | | | | No.: | | |
| Job N | lo.: | Rar | | Start Da | ate: 2 | 21-12-18 | Grou | nd Le | vel (| m LIN | angion IZ): | a Co-Orc | linate | es (N | ZTM2 | 2000): | | | | | HA2 | 3 | |
| Clien | 170 t: | 0743 | • | Finish L | Date: 2 | 21-12-18 | 3 | 2 Hole | 0.50 e Dei | pth: | | E | 1,56 | 6,746 | 5.4 | N 5,20 | 03,30 | 0.2 | | Sheet: | | | |
| W | elhom | Deve | elopment | s Ltd | | | | 0.8 | 30 m | | | | | | | | | | | | 1 of 7 | 1 | |
| 5 5 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 | Depth (m) | Geological Uni | (refer Inf | Geolog to separate formation sh | ical De Geotec neet for f | scriptior hnical and urther info |) Geological rmation) | | Legend | Soil S | Shear (kPa | Strengtl a) 150 200 | h | Scala (blov 3 | Peneti ws / 50 | romete) mm)) 12 | r Groundwater 12 | Soil Moisture | Samples | | Tests | | Instrument/ Backfill |
| | - | (TOPSOIL) | SILT, trac moist; low | e clay, orga / plasticity; / | nics; dar organics | k brown. ' , rootlets. | 'Very soft"; (TOPSOIL) | 2 1/ 1/ | <u>\</u> <u>\</u> <u>\</u> <u>\</u> <u>\</u> <u>\</u> <u>\</u> <u>\</u> | | | | | | | | | | ES0.1 | No. 1 0, 0, 1 0, 1, 2 1, 1, 2 1, 1, 1 1, 1, 1 1, 3, 4 5, 4 | 5 5 5 5 | | |
| +20.25 | - 0.25 | | 0.20m Gr | ades to 'sof | to very | soft'. | | 2 | | İ | Ì | i i i i | K | i I | i i I I | İ | İ | | | | | | |
| | - | (GSTON FORMATION) | SILT, min gravel; gra "Soft to fir organics, (YALDHU | or to some ey with oran m; moist; lo fibrous; gra RST MEME | clay, trac ge and y w plastivel, subr ER, SPF | e sand, o vellowish-t city; sand, ounded to RINGSTOI | rganics and prown mottlin fine to medi subangular. N FORMATIO | ng. × ium; × ON) × | | | | | | | | | | | | | | | |
| | - | (YALDHURST MEMBER, SPRIN | 0.60m Gra | ades to clay | ey. Very | stiff. | | | | | | | • | | | | | | ES0.5 NOV | | ∨V= R= | 112 36 | |
| +19.70 | 0.80 | | 0.75m Mi | nor orange | mottling. | | | * | `× | | | | | | | | | | | | | | |
| | - 1 | | EOH @ U | 80 m | | | | | | | | | | | | 1.00 1.00 1.10 1.15 1.15 1.15 1.15 1.15 | | | | No. 2 12, 14 14 | | | |
| Expl | anation | ns: | meter - | • | Small | Disturbed | Sample | GRO | OUNI | DWAT | rer | | | | | Rema | arks | | ole:: " | mo k ' | n h !' | and Of | |
| ▼ E ▼ F ∨ S II D = c | Permeab Schmidt Schmidt /=Peak, Moisture dry; M = rated | mm ility T Hamr ne Sh R=Re able to moist | est ner tear Strengt esidual, o penetrate ;; W = wet; ; | h (kPa) ↓ S = | Large I U100 U Water Water Rise T | Disturbed Jndisturbe Strike (1s Rise (1st, ime (minu | Sample d Sample t, 2nd) 2nd) and tes) | | Not Slow Rapi LE TE arge | Enco v Seep id Inflo ERMIN t deptl | o (dep o (dep ow (de NATEC hXI | d th) pth) DUE TC Refusal | D: | Collaps | se | . Coord and sub 2. Stren shear va sohesive Scala te | anates ject to gth terr ane tes e soil s e soil s est resu | and surve ms fo t whe treng ilts ar | elevationer ey confi for cohest ere avai th term and indic | ons based o rmation. sive soil laye lable. Wher is are based cated in quo | n hand h ers are ba e no she l on corre tation ma | and GF ased or ar vane elation v arks. | າຮ , with |
| All d | imensi Sca | ons le 1 [.] | in metres 10 | Contr | actor: | | | | | R | ig/Pla and A | nt Used uger | : | | | | | | | Logged I RBW | oy: Ch | ecked CFC | l by: C |

| 2 | RI CONS Engineers | ULT/ and Ge | | Riley Consul 22 Moorhouse Ave Christchurch Tel: +643 3794402 Fax: +643 3794402 | ltants | | | | | | | HAN | D | AU | G | ER LO | OG | _ |
|-----------------|---|--|--|--|---|---|--|----------------------------------|--|--|----------------------|---|---|---|--|---|--|------------------------|
| Proj | ect: nmersel | Rar | ndiora Du | e Diligence | | Locatio | n: end Rd | /South I | Belt Randi | ora | Hole p | osition: to Site Pla | n | | | N | lo.: | |
| Job | No.: 17(|)743 | . <u></u> | Start Date | : 18- te: 18- | 12-18 12-18 | Grour | nd Level | (m LINZ): | Co-Ordir | nates (NZT | M2000): | 464 | .7 | | HA- | BH1 | |
| Clie | nt: Velhom | Dev | | e td | | | | Hole D | epth: | | ,000,021.0 | 110,200 | , 101 | | | Sheet: | of 1 | |
| | | CPit | | | | | | | | | | | ter | er | ທູ | | | |
| (m LIN +23.7 | Depth (r | Geological | (refer In | Geologica to separate Ge formation shee | al Desci eotechnic t for furth | ription cal and Gener informa | ological tion) | Legenc | Soil She (ł | ar Strength Pa) | Scala Per (blows) | netrometer / 50 mm) <u>9 12 -</u> | Groundwa | Soil Moistu | Sample | Tes | ts | Instrument Backfill |
| +23.5 | 0 0.20 | (TOP SOIL) | SILT, trac moist; lov | e clay, organic v plasticity; org | s; dark b anics, ro | rown. "Firm otlets. (TOI | n to stiff"; PSOIL) | | | | | | | ES(NO' | 0.1 V | | | |
| | - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | SILT, min and yellov plasticity; MEMBEF | or to some clai wish-brown mo sand, fine to r R, SPRINGSTO | y, trace s titling. Ve nedium. (N FORM | iand; grey \ vry stiff; mo (YALDHUR ATION) | with orang ist; low ST | 99 | | | | | | ESS |).5 V | | | |
| +22.9 | - <u>0.75</u> - 1 | | EOH @ 0 | .75 m | | | | ^-× × | | | | | | ES(NO | 0.7 V | | | |
| | - | | | | | | | | | | | | | | | | | - |
| Ex | olanatio | าร: | | | | | | GROU | NDWATER | | | Remark | (S | <u> </u> | | l | | <u> </u> |
| | Scala Pe blows/50 Permeab Schmidt Insitu Va V=Peak, IMOISIUE dry; M = urated dimensi | netro mm ility T Hamr ne Sh R=Re able to moist moist | meter - est ner lear Strengt esidual, o penetrate ;; W = wet; in metres | $(kPa) = \frac{V}{2} R$ | mall Dist arge Dist 100 Und Vater Stri Vater Ris Rise Time tor: | turbed San turbed San isturbed Sa ike (1st, 2n e (1st, 2nd e (minutes) | nple nple ample id) I) and | X N Slo Ra HOLE Tarç | ot Encounte ow Seep (d pid Inflow TERMINAT get depth | ered epth) (depth) ED DUE TO: Refusal Plant Used: | : Collapse | 1. Coordin and subjec 2. Hole loc environme 3. No stren testing at n | ates a ct to s cated s ntal s ngth te nearby | and elev urvey co adjacen ampling esting; s y HA loc | vation onfirm t to B g. streng cation | s based on ha nation. BH1, undertake gth terms base is. | nd hand Gf en for d on streng Checkee | s th d by: |

| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS cologists | Riley Consult 2 Moorhouse Ave hristchurch el: +643 3794402 ax: +643 3794403 | ants | | | | | | | HAN | D | AU | GEF | R LO | DG | |
|------------------------------------|--|--|--|---|---|--|---|--|--|---------------------------------------|-----------------------|---|---|---|--|---|-------------------------------------|-------------------------|
| Proje | ct: | Por | naiora Du | Diligenco | | Locatio | n: and Pd | South D | olt Panaia | ra | Hole po | osition: | n | | | N | o.: | |
| Job N | lo.: 17(|)743 | 3 | Start Date: Finish Date | 18- : 18- | 12-18 12-18 | Grour | nd Level | (m LINZ): | Co-Ordin | ates (NZT | M2000): N 5.203 | .517. | .3 | | HA- | BH2 | |
| Clien We | t: elhom | Deve | elopments | s Ltd | | | | Hole De 0.90 n | epth: | | <u> </u> | | | | She | et: 1 (| of 1 | |
| Elevation (m LINZ) | Depth (m) | Geological Unit | (refer Inf | Geological to separate Geo ormation sheet | Descl otechnic for furth | r iption cal and Ge er informa | ological tion) | Legend | Soil Shea (kl | r Strength Pa) | Scala Per (blows / | netrometer 50 mm) | л Groundwater | Soil Moisture | Samples | Tes | ts | Instrument/ Backfill |
| +24.40 | - 0.20 | | SILT, trac moist; low SILT, min and yellov plasticity; | e clay, organics; plasticity; orga pr to some clay, vish-brown mott | ; dark b nics, ro trace s ling. Ve | rown. "Firr otlets. (TO and; grey ' ry stiff; mo YALDHUF | n to stiff"; PSOIL) with orang bist; low | <u> 10 </u> | | | | | | ES0 NOV | 1/// | | | |
| | - | ST MEMBER, SPRINGSTON FORMATION) | MEMBER | SPRINGSTON | FORM | ATION) | | <pre>x x x x x x x x x x x x x x x x x x x</pre> | | | | | | ES0 NOV | .5 | | | |
| +23.50 | - - 0.90 | (УАГДНИК | 0.70m Gra 0.80m Gra subrounde | ades to grey and ades to include r ad. | d orange minor g | e mottling. ravel, fine | to mediur | | | | | | | ES0 NO\ | .8 | | | |
| | - 1 - - - | | EOH @ 0 | 90 m | | | | | | | | | | | | | | |
| Expl Expl F Soil D = c | anation Scala Pe blows/50 Permeab Schmidt nsitu Va /=Peak, Moisture dry; M = ated | netro mm ility T Ham ne Sh R=Re able t | meter - rest mer sidual, o penetrate t; W = wet; : | ● Sr □ La ■ U1 n (kPa) ↓ Wa ↓ Wa ↓ Wa ↓ Wa ↓ Wa ↓ Wa ↓ Wa ↓ Sa | nall Disi rge Disi 00 Und ater Stri ater Ris se Time | turbed San turbed San isturbed S ike (1st, 2r e (1st, 2nc (minutes) | nple nple ample nd) t) and | GROUN X No Slo Rap HOLE T Targe | DWATER t Encounter w Seep (de pid Inflow (d ERMINATE et depth X | red epth) D DUE TO: Refusal | Collapse | Remark 1. Coordina and subjec 2. Hole loc environmer 3. No strem testing at n | S ates and t to su ated a ntal sa ight tes nearby | nd eleva irvey co idjacent impling sting; s HA loc | ations bas nfirmatior to BH1, to trength ter ations. | eed on ha n. Indertake ms base | nd hand GP n for d on strengt | S |
| All d | limensi | ons | in metres | Contracto | or: | | | | Rig/Pl | ant Used: Auger 70 m | m | | | | Logg | ed by: | Checked | by |

| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS Pologists | Ciley Consul 2 Moorhouse Ave hristchurch el: +643 3794402 | tants | | | | | | | | | ŀ | AN | ١D | A | UC | SER L | OG | |
|--|--|---|---|--|--|--|--|-------------------------------|--|------------------------------|---------------------------------------|-----------------|---------------|--------------------|--|--|--|---|---|--|--------------------------------------|
| Proje | ct: | Dor | | Diligonoo | | Locatio | n: | /South | | t Dong | ioro | | Hol | e pos | ition: | lon | | | | No.: | |
| Job N | lo.: 17 | 0743 | | Start Date: Finish Date | 20- e: 20- | 12-18 12-18 12-18 | Grour | nd Lev 24 | r De rel (n | n LINZ): | | o-Ordii E 1 | nates (N | JZTM 57.4 | 2000): N 5.20 | 3.588 | 3.3 | | HA | -BH3 | 6 |
| Clien W | t: elhom | Dev | elopments | Ltd | | | | Hole 1.05 | Dep 5 m | th: | | | ,,. | - | -, - | | | | Sheet: 1 | of 1 | |
| Elevation (m LINZ) | Depth (m) | Geological Unit | (refer Infe | Geologica to separate Ge prmation sheet | Desci otechnic for furth | r iption cal and Ge er informa | ological tion) | - | Legend | Soil She (I | ear Str kPa) | ength | Scala (blo | a Penel bws / 5 | trometer 0 mm) 9 12 | 51 Groundwater | Soil Moisture | Samples | Te | ests | Instrument/ Backfill |
| +24.20 | - 0.20 | (TOP SOIL) | SILT, trace soft"; mois (TOPSOIL | e clay, organics t; low plasticity) | ; dark b /; organi | rown. "Soft | t to very s. | | <u>''</u> <u>\\ /</u> <u>\\ /</u> <u>\\ /</u> <u>\\ /</u> <u>\</u> X | | <u> 0 30</u> | | | | 9 12 | | | ES0.1 NOV | No. 1 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 2, 2, 1, 2, 2, 2, 1, 2, 2, 5, 7 | | |
| | - | RMATION) | ol.35m Gra | ish-brown mod sand, fine to m SPRINGSTOF | , trace s tling. Ve edium. (N FORM stiff'. | ATION) | ist; Iow ST | ye × × × × × × | × × × × × × × | | | | | | | | | | | | |
| | - | (YALDHURST MEMBER, SPRINGSTON FO | 0.60m Gra Very stiff. | des to light gre | ey with n | ninor oranç | ge mottlin | rg. × × × × × × × × × | × × × × × × × × × × | | | | | | | | | ES0.5 NOV | | ✓ V= 163 ✓ R= 36 | |
| +23.35 | - 1 - - | | ЕОН @ 1. | 05 m | | | | ×× | ××× | | | | | | 1.007 1.007 1.007 1.0 | - ▶ n | | ES1.0 NOV | No. 2 8, 11, 13, 11 | | |
| Expl | - anatio Scala Pe blows/50 Permeat Schmidt nsitu Va /=Peak, | ns: metro mm Hamr ne Sh R=Re able t | meter - est ner eear Strength esidual, o penetrate | ● Si □ La U u (kPa) ↓ W ↓ W ↓ R | nall Dis arge Dist 100 Und ater Stri ater Ris se Time | turbed San urbed San isturbed Sa isturbed Sa ke (1st, 2nd (minutes) | nple nple ample id) t) and | | UND Not I Slow Rapic | WATER Encounte Seep (c | ered depth (depth |)) JE TO | | | Rema 1. Coord and subj 2. Streng shear var cohesive Scala tes 3. Locate sampling | rks inates ect to s th term ne test soil st resul ad adja | and of surve ms fo whe treng its ar cent | elevatic evy confi r cohese re avai th term nd indic to BH3 | ons based on h mation. sive soil layers lable. Where r s are based or vated in quotat s, undertaken f | nand hand (are based no shear van n correlation ion marks. or environm | GPS on ne, n with nental |
| D = 0 satu All d | dry; M = rated limens | moist | ; W = wet; S | S = Contract | or: | | [| X Ta | arget | Rig/F | Ref | Jsed: | | ose | | | | | Logged by | Check | ed by: |

| 2 | RI CONS Engineers | ULT/ and Ge | EY ANTS Fologists | Riley Consults 2 Moorhouse Av hristchurch el: +643 37944 ax: +643 37944 | lltants e 02 03 | | | | | | | HAN | D | AUC | GER L | OG |
|-------------------------|--|---|---|--|---|--|--|---|---|--|------------------------------|---|--|---|--|--|
| Proje | ct: merse | Rar | ndiora Du | e Diligence | | Locatio | n: end Rd | /South F | Belt Rangic | ra | Hole po | osition: to Site Play | n | | N | lo.: |
| Job N | lo.: 17 |)74.3 | | Start Date | e: 20- te: 20- | 12-18 12-18 | Grour | nd Level | (m LINZ): | Co-Ordin | ates (NZT | M2000): | 611 | 3 | HA | -BH4 |
| Clien | it: | | | | | 12 10 | | Hole De | epth: | | ,500,000.5 | N 3,203, | 011. | 5 | Sheet: | -5.4 |
| W F | | Deve | elopments | | | | | 0.95 r | n | | | | - | | | of 1 |
| multiple (m LINZ | Depth (m | Geological U | (refer Inf | Geologica to separate G ormation shee | al Desci eotechnic et for furth | r iption cal and Ge ner informa | ological tion) | Legend | Soil Shea (kl | r Strength Pa) 150 200 | Scala Per (blows / 3 6 | netrometer 50 mm) 9 12 1 | مه Groundwate | Soil Moistur Samples | - Tes | Instrument/ Backfill |
| +21.00 | - 0.20 | (TOP SOIL) | SILT, trac moist; low | e clay, organio plasticity; org | cs; dark b ganics, ro | rown. "Firm otlets. (TO | n to stiff"; PSOIL) | | | | | | | ES0.1 NOV | //// | |
| | - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | SILT, min and yellov plasticity; MEMBER | or to some cla vish-brown m sand, fine to r , SPRINGSTO | ny, trace s bttling. Ve nedium. I NN FORM | iand; grey i ry stiff; mc (YALDHUR ATION) | with orang ist; low ST | y x | | | | | | ES0.5 NOV | 7777 | |
| +20.25 | - 0.95 - 1 | | 0.90m Gri greywack EOH @ 0 | ades to includ e. 95 m | e some g | ravel, subr | ounded, | | | | | | | ES0.9 NOV | | |
| Exp V Soil D = | Scala Pe blows/50 Permeat Schmidt nsitu Va √=Peak, Moistuff dry; M = rated | netro mm ility T Hamr ne Sh R=Re able to moist | meter - est ner lear Strengt esidual, o penetrate ;; W = wet; ; | • (kPa) • (kPa | Small Dis Large Dis J100 Und Water Str Water Ris Rise Time | turbed San turbed San isturbed S ike (1st, 2n e (1st, 2nd e (minutes) | nple nple ample id) I) and | GROUN | IDWATER NDWATER ot Encounter w Seep (de pid Inflow (d ERMINATE et depth X | red pth) lepth) D UE TO: Refusal | Collapse | Remark: 1. Coordina and subject 2. Hole locz environmer 3. No streny testing at n | S ates art t to sur ated ac ntal sar gth tes earby | d elevati rvey conf djacent to mpling. ting; stre HA locat | ons based on ha irmation. o BH1, undertak ength terms base ions. | and hand GPS en for ed on strength |
| | limens Sca | ons le 1 [.] | in metres 10 | Contrac | ctor: | | | | Rig/Pl Hand | ant Used: Auger 70 m | m | | | | Logged by: AvD | Checked by: |

| Project: Summ Job No Client: Well +22.40 +22.40 - +22.40 - - +22.40 - - - | erset | Ran | | | | | | | | | | ΠΑΝ | וט | AU | GER L | UG |
|--|---|---|---|--|---|---|--------------------------------------|---|---|--|-----------------------|--|--|--|--|---|
| Job No Client: Well +22.40 +22.40 - +22.40 - - +22.40 - - - - - - - - | 0.: 17(| nai | aioro Du | Diligonoo | | Location | n: ond Pd/ | South B | olt Pangio | ro | Hole po | osition: | n | | | No.: |
| Client: Well +22.40 +22.40 - +22.20 - +22.20 - - - - | - 170 | 740 | | Start Date: | : 21-1 | 12-18 | Groun | d Level | (m LINZ): | Co-Ordin | ates (NZT | M2000): | | | HA | -BH5 |
| Well | | 1143 | | Finish Date | e: 21-1 | 12-18 | | 22.40 Hole De |) epth: | E1 | ,566,694.2 | N 5,203 | ,361. | 3 | Sheet: | |
| +22.20 +22.20 +22.40 - +22.20 - - - | hom | Deve | elopments | Ltd | | | | 0.60 n | <u>ו</u> | | | | | | 1 | of 1 |
| +22.20 | Depth (m) | Geological Uni | (refer Inf | Geological to separate Geo prmation sheet | l Descr eotechnic for furthe | iption al and Gec er informat | ological tion) | Legend | Soil Shea (kl | r Strength Pa) | Scala Per (blows / | netrometer 50 mm) 9 12 1 | u Groundwater | Soil Moisture | Te | Instrument/ Backfill |
| +21.80 | 0.20 | (TOP SOIL) | SILT, trace moist; low | e clay, organics plasticity; orga | s; dark br anics, roc | rown. "Firm otlets. (TOF | n to stiff"; PSOIL) | | | | | | | ES0. NOV | | |
| +21.80 | | YALDHURST MEMBER, SPRINGSTON FORMATION) | SILT, mind and yellow plasticity; MEMBER | or to some clay, rish-brown mot sand, fine to mu SPRINGSTON | v, trace sa ttling. Ver edium. (` N FORM/ | and; grey w ry stiff; moi YALDHUR: ATION) | vith orang ist; low ST | e × × × × × × × × × × × × × × × × × × × | | | | | | ES0. | | |
| - | 1 | | ЕОН @ 0. | 60 m | | | | | | | | | | | | |
| Explar Sci blo Pei Sci Ins V= Sci D = dry saturat | natior ala Pe bws/50 rmeab hmidt l situ Var Peak, <u>Pisture</u> y; M = F | netror mm ility To Hamn ne Sh R=Re able to moist | meter - est ner ear Strength esidual, o penetrate ;; W = wet; S | ● Sn □ La ■ U1 n (kPa) ♥ W ↓ W ↓ Ri: S = | mall Distu arge Distu 100 Undi / ater Strik / ater Rise ise Time | urbed Sam urbed Sam isturbed Sa ke (1st, 2nd e (1st, 2nd (minutes) | iple iple ample d)) and | GROUN X Nc Slo Rap HOLE T Targe | IDWATER t Encounter w Seep (de bid Inflow (d ERMINATE et depth X | ed pth) lepth) D DUE TO: Refusal | Collapse | Remark 1. Coordina and subjec 2. Hole loc: environmer 3. No stren testing at n | S ates ar t to su ated a ntal sa gth tes earby | nd eleva rvey cor djacent mpling. sting; st HA loca | tions based on h firmation. to BH1, undertal rength terms bas tions. | and hand GPS ten for ed on strength |

| 2 | RI CONS Engineers | ULTA and Ge | R 22 Ch Te ologists | Moorhouse A ristchurch I: +643 3794 x: +643 3794 | Ave 402 4403 | | | | | | | | | | ┣ | IA | ND |) / | ٩U | GE | ER LO | OG | |
|---------------------------------------|---------------------------------|--|---|---|--|--|-----------------------------|----------|---|------------|-------------------------|------------------------|-------|----------------|-------------------|------------------------------|------------------------------|--------------------------|-----------------------------|------------------------------|--------------------------------------|----------------------|-------------------------|
| Proje | ect: | Der | | | | Locatio | n: | | | | air | | | Hole | posi | tion: | | | | | Ν | lo.: | |
| Job I | | . rar | igiora Due | Start Da | e te: 18- | 12-18 | Groui | nd Le | evel (| m LINZ | | 1 Co-Or | dinat | tes (N | | 2000) | rian. | | | _ | HA | -BH6 | i |
| Clier | 170 nt: | J743 | | Finish D | ate: 18- | 12-18 | | 2 Hol | 23.70 e De | pth: | | E | E 1,5 | 66,308 | 3.8 | N 5,2 | 03,42 | 25.4 | | s | Sheet: | | |
| W | /elhom | Deve | elopments | Ltd | | | | 1. | 10 m | i | | | | | | | | | | | 1 | of 1 | |
| tevation (m LINZ) | Depth (m) | Geological Unit | (refer t Info | Geologi o separate rmation sh | cal Desci Geotechnic eet for furth | r iption cal and Geo ler informat | ological tion) | | Legend | Soil St | near : (kPa 100 1 | Streng a) 50 200 | th | Scala (blow | Peneti vs / 50 | romete) mm)) 12 | er | Groundwater | | samples | Tes | sts | Instrument/ Backfill |
| +23.50 | 0.20 | (TOP SOIL) | SILT, trace dry to mois (TOPSOIL) | clay, orgar t; low plast | nics; dark b iicity; organ | rown. "Firm ics, rootlets | n to stiff"; s. | , | | | | | | | | | | | ES0. NOV | 1/// | | | |
| | - | | SILT, mino and yellowi plasticity; s MEMBER, | r to some o ish-brown r and, fine to SPRINGST | clay, trace s mottling. Ve o medium. (TON FORM | and; grey v ry stiff; mo YALDHUR ATION) | vith oran ist; low ST | ge | × × × × × × × × | | | | | | | | | | | | | | |
| essona | - | (YALDHURST MEMBER, SPRINGSTON FORMATION) | 0.60m Grav subrounder | des to inclu d, greywacl | ide trace gr ke. | avel, fine to | o mediun | n, : | * | | | | | | | | | | ES0. NOV | .5 | | | |
| 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | - 1 | | 1.00m Red | uced orang | ge mottling. | | | : | ^ × × × × × × × × × | | | | | | | | | | | | | | |
| | - | | EOH @ 1.1 | 10 m | | | | | | | | | | | | | | | | | | | |
| וומיד וומילי סטראועטרא אדר דררכיני | - | | | | | | | | | | | | | | | | | | | | | | - |
| Exp | lanatio | ns: | moto- | | Small D: | hurbed 0- | anle | GR | OUN | DWATE | ĒR | | | | | Rem | arks | | | | | | |
| | ocaia Pe blows/50 Permeet | netro mm ility T | meter - est | | Large Dist | urbed Sam urbed Sam isturbed Sa | ipie iple ample | | | t Encoui | ntereo | d th N | | | | . Coor and sul 2. Hole | dinate oject to locate | s and surv d ad | d eleva vey co jacent | ations I nfirmat to BH | based on ha tion. 1, undertako | and hand G en for | SPS |
| ▼ ↓ > 3.6LB 1 | Schmidt Insitu Va | Hamr ne Sh | ner ear Strength | (kPa) | Water Stri | ike (1st, 2n | d) | |] Rap | id Inflov | v (depi | pth) | | | 6 | environ 3. No s | mental trength | l san i test rbv F | npling. ing; st | rength | terms base | ed on stren | gth |
| Soil | V=Peak, <u>WTP=</u> Un | R=Re able to | esidual, o penetrate | Į Ţ | Water Ris Rise Time | e (1st, 2nd (minutes) |) and | но | - LE TI | ERMINA | | DUE T | 0: | o | | ssung | acned | . Буг | | 200115. | | | |
| | dry; M = | moist | ; W = wet; S | = | actor: | | | | l'arge | t depth | | | (| Collaps | se | | | | | | aged by | Chooks | |
| | umens Sca | ons le 1: | 10 metres | Contra | | | Har | nd Au | uger 70 | а.) mm | 1 | | | | | | | RBW | Crecke | C | | | |

APPENDIX E Results Table

TABLE 1: CONTAMINANT CONCENTRATIONS IN SOILS (mg/kg)

104 Townsend Road & 141 South Belt, Rangiora

| | Background Soils Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|----------------------------------|------------------------------------|------------------|------------------|--------------|-------------|-------------|------------|---------------|-------------|-----------------|----------------|---------------|-----------------|-------------|---------------|----------|
| Sample ID | | | | | HA3 | HA3 | HA4 | HA4 | HA10 | HA10 | HA9 | HA9 | HA9 | HA2 | HA2 | |
| Job Number | Glev Earth | Burwood Resource | Residential (10% | High-Density | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 1101 05% |
| Date | Giey Laith | criteria | produce) | Residential | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | UCL 9578 |
| Depth (m) | | | | | 0.1 Soil | 0.5 Soil | 0.1 | 0.5 Soil | 0.1 Soil | 0.5 Soil | 0.1 Soil | 0.5 Soil | 0.9 Soil | 0.1 Soil | 0.5 Soil | |
| | | | I | | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | |
| Heavy Metals | | • | | | | - | | | | | | | | | | |
| Arsenic | 11 | 80 | 20 | 45 | 6.36 | 5.97 | 7.43 | 5.64 | 7.54 | 29.5 | 6.31 | 8.99 | 6.18 | 7.71 | 4.64 | |
| Cadmium | 0.28 | 2 700 | 3 | 230 | 0.086 | 20.3 | 0.053 | 0.006 20 9 | 0.11 | 0.057 23.6 | 0.11 | 0.023 20.6 | 0.021 21 | 0.13 | 0.029 25.4 | |
| | 16.4 | >10.000 | >10.000 | >10.000 | 8.06 | 5.59 | 6.82 | 10.7 | 8.01 | 10.3 | 9.65 | 6.6 | 12.1 | 17 | 11.3 | |
| Lead | 19.3 | 880 | 210 | 500 | 23.1 | 23.4 | 22.7 | 25.1 | 23.4 | 42.1 | 24.6 | 26.6 | 23.8 | 166 | 31.1 | |
| Nickel | 16.1 | 1,200 | - | - | 11.3 | 12.5 | 10.6 | 13.5 | 11.3 | 19.2 | 12.4 | 12.8 | 14.1 | 11 | 15.9 | |
| Zinc | 77.1 | 30,000 | - | - | 81.7 | 75.3 | 68.5 | 63.2 | 86.4 | 113 | 92.5 | 80.9 | 63.5 | 167 | 80.9 | |
| Qualitative Asbestos | | | | | | | | | | | | | | | | |
| Asbestos | | | | | ND | | | | ND | | | | | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | |
| Acenaphthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Acenaphthylene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Dibenz(a,h)anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Fluoranthene | | | | | <0.02 | < 0.02 | < 0.02 | < 0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | < 0.02 | <0.02 | |
| Fluorene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Indeno(1,2,3-cd)pyrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Naphthalene | | | | | <0.01 | <0.01 | < 0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | |
| Prenanthrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzfalanthracene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | < 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[a]pyrene (BAP) | | | | | 0.01 | <0.01 | 0.01 | <0.01 | 0.03 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[b]&[j] fluoranthene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | <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 | <0.024 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[k]fluoranthene | 0.922 | 40 | | 24 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | |
| Organochlorine Pesticides | 0.322 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.05 | 0.07 | 0.04 | 0.05 | 0.03 | 0.05 | 0.05 | 0.05 | L |
| Total DDT | | I | | 240 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| alpha-BHC | | | | 210 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | |
| Aldrin | | | | | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | |
| beta-BHC | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| cis-Chlordane | | | | | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | |
| delta-BHC | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Dieldrin | | | | 45 | < 0.05 | <0.005 | <0.005 | <0.005 | <0.005 | < 0.05 | <0.05 | <0.005 | < 0.005 | <0.005 | <0.005 | |
| Endosulfan I | | | | | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | |
| Endosulfan II | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Endosulfan sulphate | | | | | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | |
| Endrin Fadria aldahuda | | | | | < 0.05 | < 0.05 | < 0.05 | <0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | <0.05 | < 0.05 | |
| Endrin aldenyde | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 <0.005 | <0.01 | <0.01 | <0.01 <0.005 | <0.01 | <0.01 | |
| gamma-BHC | | | | | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | |
| Heptachlor | | | | | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | |
| Heptachlor epoxide | | | | - | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Hexachlorobenzene | | | | | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Methoxychlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| trans-Chlordane | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Chlordane (sum) | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| TCMX (Surrogate) % | | | | | 92.9 | 87.8 | 85.4 | 85.9 | 82.4 | 80.9 | 81.5 | 88.4 | 90.4 | 82.5 | 93.6 | |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These concentrations are proposed in the 2007 Ecan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded

NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

 55 - Bold where result exceeds background levels

 55 - Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.

 55 - Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.

 Benzo[a]pyrene (BAP) Toxic Equivalence Quotient (TEQ) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, 1

 1 Background Concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils Report No. R07/19, July 2007, compared to the mean concentration CCC.

| | Background Soils Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|-----------------------------|------------------------------------|--------------------------|------------------|--------------|------------|------------|------------------|------------|------------|---------------|----------------|------------|------------|------------|------------|---------|
| Sample ID | | | | | H-BH2 | H-BH2 | H-BH2 | H-BH1 | H-BH1 | H-BH1 | HA8 | HA8 | HA1 | HA1 | HA1 | |
| Job Number | | Burwood Resource | | | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | |
| Date | Gley Earth | Recovery Park acceptance | Residential (10% | High-Density | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | UCL 95% |
| Depth (m) | | criteria | produce) | Residential | 0.1 | 0.5 | 0.8 | 0.1 | 0.5 | 0.7 | 0.1 | 0.5 | 0.1 | 0.5 | 0.9 | |
| Geology | | | | | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | |
| Heavy Metals (mg/kg dry wt) | | 11 | I | | 0011 | 00 | 0011 | 0011 | | 0011 | 0011 | 0011 | 0011 | 00 | 00 | |
| | 11 | 80 | 20 | 45 | 8 5 1 | 4.63 | 3 5 8 | 5 29 | 3.08 | 4.67 | 6.46 | 3.06 | 5 1/ | 79 | 3 80 | |
| Cadmium | 0.28 | 400 | 3 | 230 | 0.059 | 0.019 | 0.01 | 0.069 | 0.014 | 0.008 | 0.40 | 0.013 | 0.074 | 0.069 | 0.046 | |
| Chromium | 19.3 | 2 700 | 460 | 1 500 | 19.3 | 21.5 | 20.2 | 18 | 23.2 | 17.3 | 18 | 22.4 | 15.1 | 22.7 | 25.9 | |
| Copper | 16.4 | >10.000 | >10.000 | >10.000 | 7 14 | 12 | 9.75 | 7 18 | 8 96 | 7.44 | 10 | 89 | 6.42 | 7 37 | 17.9 | |
| Lead | 19.3 | 880 | 210 | 500 | 25.4 | 29 | 22 | 22.7 | 28.8 | 19.7 | 32.6 | 25.7 | 20.8 | 34.9 | 40.2 | |
| Nickel | 16.1 | 1,200 | - | - | 12.5 | 13.8 | 11.7 | 13.6 | 12.6 | 9.05 | 13.9 | 10.4 | 10 | 14.9 | 18.1 | |
| Zinc | 77.1 | 30.000 | - | - | 90.1 | 66.5 | 49 | 86.8 | 62.1 | 40.7 | 119 | 46.7 | 69 | 96.7 | 96.6 | |
| | //.1 | 30,000 | I | | 5012 | 00.5 | -15 | 0010 | 02.1 | 10.7 | | 10.7 | 05 | 5017 | 5010 | |
| Ashostos | | | | | | | | 1 | 1 | 1 | ND | 1 | ND | | | |
| Asbestos | | <u> </u> | I | | 1 | | | I | I | 1 | ND | | ND | | | |
| Acenanhthene | | | - | | <0.01 | <0.01 | <u><</u> 0.01 | <0.01 | <0.01 | ~0.01 | <0.01 | <0.01 | <0.01 | <0 01 | <0 01 | |
| Acenaphthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Chrysene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Dibenz(a h)anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.03 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Eluoranthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Fluorene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.03 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Indeno(1,2,3-cd)pyrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Naphthalene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Pyrene | | | | | <0.02 | <0.02 | <0.02 | < 0.02 | < 0.02 | < 0.02 | 0.05 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benz[a]anthracene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[a]pyrene (BAP) | | | | | < 0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | <0.01 | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[b]&[j] fluoranthene | | | | | < 0.02 | <0.02 | <0.02 | <0.02 | < 0.02 | <0.02 | 0.05 | <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 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[k]fluoranthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[a]pyrene TEQ (LOR) | 0.922 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 | 0.03 | 0.03 | 0.03 | 0.03 | |
| Organochlorine Pesticides | | · | | | | | | | | • | | | • | | | |
| Total DDT | | | | 240 | < 0.02 | <0.02 | <0.02 | <0.02 | < 0.02 | <0.02 | < 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| alpha-BHC | | | | | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | |
| Aldrin | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | |
| beta-BHC | | | | | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | |
| cis-Chlordane | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | |
| cis-Nonachlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| delta-BHC | | | | | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Dieldrin | | | | 45 | <0.05 | <0.05 | <0.05 | <0.05 | < 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | |
| Endosulfan I | | | | | <0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Endosulfan II | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Endosulfan sulphate | | | | | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | |
| Endrin | | | | | <0.05 | <0.05 | <0.05 | <0.05 | < 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | |
| Endrin aldehyde | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Endrin ketone | | | [| | <0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| gamma-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | |
| Heptachlor | | | | | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Heptachlor epoxide | | | | | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | |
| Hexachlorobenzene | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Methoxychlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| trans-nonachior | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| trans-Chiordane | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| ICIVIA (Surrogate) % | | 1 | | | 82.1 | 92./ | 97.6 | 91.2 | 88.4 | ٥/.J | 93 | 96./ | 85 | /8./ | 80 | |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These concentrations are proposed in the 2007 Ecan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

Sto - Bold where result exceeds background levels
 Underline numeral (and highlighted yellow) where result exceeds Burwood Resource Recovery Park acceptance criteria.
 Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.
 Benzo[a]pyrene (BAP) Toxic Equivalence Quotient (TEQ) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, | Background Soils
Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|----------------------------------|------------------------------------|--------------------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|----------------|------------|--------------|--------------|------------|------------|
| Sample ID | | | | | H-BH6 | H-BH6 | H-BH6 | HA13 | HA7 | HA7 | H-BH3 | H-BH3 | HA11 | HA11 | HA5 | HA5 |
| Job Number | | Burwood Resource | | | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 |
| Date | Glev Earth | Recovery Park acceptance | Residential (10% | High-Density | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Depth (m) | | criteria | produce) | Residential | 01 | 0.5 | 1 | 0.1 | 01 | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 |
| Geology | | | | | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil |
| Heavy Metals (mg/kg dry wt) | | | I | | 301 | 3011 | 3011 | 301 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 501 | 501 |
| Arconic | 11 | <u>00</u> | 20 | 45 | 7.54 | 4.45 | 4.06 | 7 2 2 | 7.25 | 4.2 | E OG | 6.07 | 0.62 | 11.2 | E 21 | 0.25 |
| Cadmium | 0.29 | 00 400 | 20 | 45 | 7.54 | 4.45 | 4.00 | 7.52 | 7.25 | 4.2 | 0.024 | 0.07 | 9.05 | 0.025 | 0.12 | 9.25 |
| Chromium | 0.20 | 400 | 5 | 250 | 0.000 | 0.007 | 0.024 | 0.00 | 0.078 | 0.014 | 0.024 | 0.12 | 0.076 | 0.025 | 0.12 | 0.052 |
| Corpor | 19.3 | 2,700 | 400 | 1,500 | 19.7 | 19.8 6.27 | 7.42 | 19.5 | 20 | 10.0 | 19.4 | 25.0 | 19.0 | 22.2 | 10.2 | 14.2 |
| Copper | 10.4 | >10,000 | >10,000 | >10,000 | 9.95 | 0.57 | 7.45 | 10.5 | 20.0 | 4.79 | 8.57 | 33.5 | 0.55 | 9.04 | 10.5 | 14.5 |
| Nickol | 19.5 | 1 200 | 210 | 500 | 16.1 | 10.4 | 14.4 | 25.0 15.5 | 20.0 | 10.2 | 12.1 | 121 | 23.3 | 12 5 | 15.5 | 32.5 |
| Zinc | 77.1 | 1,200 | - | - | 10.1 93 E | 10.4 | 15.2 E1.1 | 15.5 | 14.4 03 E | 10.5 E 9 6 | 76.4 | 13.5 | 12.0 9E 4 | 15.5 93.6 | 102 | 10.2 |
| | //.1 | 50,000 | - | - | 03.3 | 40.9 | 51.1 | 01.4 | 03.5 | 56.0 | 70.4 | 145 | 05.4 | 82.0 | 102 | 03.2 |
| | | | | | | | | | 1 | | ND | | | | ND | |
| Asbestos | | | | | I | | | I | l | | ND | | | | ND | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | |
| Acenaphthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <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 | <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 | <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 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dibenz(a,h)anthracene | | | | | <0.01 | <0.01 | < 0.01 | <0.01 | <0.01 | <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 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Indeno(1,2,3-cd)pyrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 |
| Naphthalene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <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 | <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 | < 0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| BenzlaJanthracene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Benzo[a]pyrene (BAP) | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 |
| Benzo[b]&[j] fluoranthene | | | | | <0.02 | <0.02 | <0.02 | < 0.02 | < 0.02 | <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 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Benzo[k]fluoranthene | 0.000 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Benzo[a]pyrene TEQ (LOR) | 0.922 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Organochlorine Pesticides | | 1 | | | | | | | | | | | | | | |
| Total DDT | | | | 240 | <0.02 | <0.02 | <0.02 | <0.02 | < 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | < 0.02 |
| alpha-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Aldrin | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| beta-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| cis-Chlordane | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | | | | 45 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldenyde | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | | | | | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | < 0.005 |
| gamma-BHC | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | | | | | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Heptachlor epoxide | | | | | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Hexachlorobenzene | | | | | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 |
| | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachior | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chiordane | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| I CIVIX (Surrogate) % | | | | | 93.3 | 81.8 | /9.3 | 80.7 | 116.6 | 98.2 | 111.3 | 115.2 | 98 | 99.1 | 103.6 | 95.9 |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These concentrations are proposed in the 2007 Ecan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

55 - Bold where result exceeds background levels

 55 - Bold where result exceeds background levels

 55 - Underline numeral (and highlighted yellow) where result exceeds Burwood Resource Recovery Park acceptance criteria.

 55 - Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.

 Benzo[a]pyrene (BAP) Toxic Equivalence Quotient (TEQ) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, 1

 Background Concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils Report No. R07/19, July 2007, compared to the mean concentration CCC.

| | Background Soils Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|----------------------------------|------------------------------------|--------------------------|---------------------------------------|--------------|------------|------------|------------|------------|------------|---------------|----------------|------------|------------|------------|---------------|---------|
| Sample ID | | | | | HA6 | HA6 | H-BH4 | H-BH4 | HA12 | HA12 | FT1 | FT1 | HA14 | HA14 | HA18 | |
| Job Number | | Burwood Resource | | | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | |
| Date | Gley Earth | Recovery Park acceptance | Residential (10% | High-Density | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | UCL 95% |
| Depth (m) | | criteria | produce) | Residential | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | 0.3 | 0.1 | 0.5 | 0.1 | |
| Geology | | | | | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | |
| Heavy Metals (mg/kg dry wt) | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | |
| | 11 | 80 | 20 | 45 | 5.54 | 2.80 | 4.44 | 2.28 | 7.28 | 5 16 | 50 | 6.76 | 4.51 | 4.03 | 7.83 | |
| Cadmium | 0.29 | 400 | 20 | 220 | 0.10 | 2.83 | 0.12 | 0.017 | 0.001 | 0.020 | 0.26 | 0.061 | 4.51 | 4.03 | 7.85 | |
| Chromium | 10.20 | 2 700 | 3 | 1 500 | 10 | 0.027 | 10.12 | 20.2 | 20 | 20.02.9 | 0.50 | 20.001 | 10.000 | 27.2 | 0.000 22.1 | |
| Connor | 19.5 | >10.000 | 400 >10.000 | 1,300 | 19 | 12.0 | 6 77 | 0.59 | 6.60 | 20.9 | 42.2 | 7.65 | 10.7 | 14.2 | 23.1 | |
| Lood | 10.4 | >10,000 | >10,000 | >10,000 | 9.02 | 15.9 | 0.77 | 9.30 | 0.09 | 9.54 | 02.2 | 7.03 | 10.8 | 14.5 | 9.60 | |
| Leau | 19.5 | 1 200 | 210 | 500 | 27.1 | 16.1 | 12 | 24.7 | 10.7 | 11.0 | 14.4 | 37.2 | 21.2 | 29.9 | 20.0 | |
| | 10.1 | 1,200 | - | - | 14.1 | 10.1 | 15 | 72.0 | 12.7 | 11.9 | 14.4 | 15.4 | 14.4 | 11.0 | 10.0 | |
| | //.1 | 30,000 | - | - | 92.9 | 90 | /0.5 | /3.8 | /8.4 | 69.6 | 340 | 94.6 | 91.6 | 52.8 | 102 | |
| Qualitative Aspestos | | | | | | 1 | | | 1 | | | 1 | | | | |
| Asbestos | | | | | | | ND | | ND | | ND | ND | ND | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | |
| Acenaphthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Acenaphthylene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Chrysene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Dibenz(a,h)anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <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 | 0.1 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Fluorene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Indeno(1,2,3-cd)pyrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Naphthalene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Phenanthrene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | 0.01 | |
| Pyrene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.09 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benz[a]anthracene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[a]pyrene (BAP) | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.011 | <0.01 | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[b]&[j] fluoranthene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.07 | <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 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[k]fluoranthene | | | | | < 0.01 | < 0.01 | <0.01 | <0.01 | <0.011 | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[a]pyrene TEQ (LOR) | 0.922 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.09 | 0.03 | 0.03 | 0.03 | 0.03 | |
| Organochlorine Pesticides | | | | | | | | | | | | | | | | |
| Total DDT | | | | 240 | <0.02 | < 0.02 | <0.02 | <0.02 | < 0.02 | <0.02 | - | - | <0.02 | <0.02 | <0.02 | |
| alpha-BHC | | | | | <0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | <0.005 | <0.005 | <0.005 | |
| Aldrin | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | < 0.005 | |
| beta-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | <0.005 | |
| cis-Chlordane | | | | | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | <0.005 | |
| cis-Nonachlor | | | | | <0.01 | < 0.01 | < 0.01 | <0.01 | < 0.01 | <0.01 | - | - | <0.01 | <0.01 | <0.01 | |
| delta-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | <0.005 | < 0.005 | |
| Dieldrin | | | | 45 | < 0.05 | < 0.05 | < 0.05 | <0.05 | < 0.05 | < 0.05 | - | - | < 0.05 | <0.05 | < 0.05 | |
| Endosulfan I | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | < 0.005 | |
| Endosulfan II | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | < 0.01 | - | - | <0.01 | < 0.01 | <0.01 | |
| Endosulfan sulphate | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | < 0.005 | |
| Endrin | | | | | <0.05 | <0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | - | - | <0.05 | < 0.05 | <0.05 | |
| Endrin aldehyde | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | - | - | <0.01 | <0.01 | <0.01 | |
| Endrin ketone | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | <0.005 | < 0.005 | |
| gamma-BHC | | | | | <0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | <0.005 | <0.005 | <0.005 | |
| Heptachlor | | | | | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | <0.005 | |
| Heptachlor epoxide | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | <0.005 | < 0.005 | |
| Hexachlorobenzene | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | - | - | < 0.005 | < 0.005 | <0.005 | |
| Methoxychlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | - | - | <0.01 | < 0.01 | <0.01 | |
| trans-nonachlor | | | | | < 0.01 | < 0.01 | < 0.01 | <0.01 | < 0.01 | <0.01 | - | - | <0.01 | <0.01 | <0.01 | |
| trans-Chlordane | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | - | - | <0.01 | <0.01 | <0.01 | |
| Chlordane (sum) | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | - | - | <0.02 | <0.02 | <0.02 | |
| TCMX (Surrogate) % | | | | | 106.7 | 107.8 | 96.6 | 123.6 | 86.4 | 91 | - | - | 91.1 | 111.5 | 115.6 | |
| BTEX | | · | I | | | | | - | - | - | - | | · | | - | |
| Benzene | | | | | | | | | | | < 0.05 | < 0.05 | | | | |
| Ethylbenzene | | | | | | | | | | | < 0.05 | < 0.05 | | | | |
| Toluene | | | | | | | | | | | 0.08 | <0.05 | | | | |
| m,p-xylene | | | | | | | | | | | <0.05 | <0.05 | | | | |
| o-xylene | | | | | | | | | | | <0.05 | < 0.05 | | | | |
| | | | | | | | | | | | - | - | | | | |

NOTES: Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.
Background concentrations These concentrations are proposed in the 2007 Ecan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded
NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.
55- Bold where result exceeds background levels
55- Bold where result exceeds background levels
55- Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.
56- Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.
57- Benzo[a]pyrene (BAP) Toxic Equivalence Quotient (TEQ) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(k)fl

| | Background Soils Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|----------------------------------|------------------------------------|--------------------------|------------------|--------------|------------|------------|------------|----------------|-------------|---------------|----------------|----------------|------------|------------|--------------------------------|---------|
| Sample ID | | | | | HA18 | HA16 | HA16 | HA17 | HA17 | HA20 | HA23 | HA20 | HA21 | HA21 | HA15 | |
| Job Number | | Burwood Resource | | | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | |
| Date | Glev Farth | Recovery Park acceptance | Residential (10% | High-Density | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | UCL 95% |
| Denth (m) | 0.07 20.00 | criteria | produce) | Residential | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | |
| Goology | | citeria | | | Soil | Soil | 0.5 | Soil | 0.J Soil | Soil | Soil | Soil | Soil | Soil | Soil | |
| | | I | | | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | 3011 | |
| Heavy Metals (mg/kg dry wt) | | | | | | | | | | | | | | | | |
| Arsenic | 11 | 80 | 20 | 45 | 8.4 | 3.36 | 4.48 | 7.08 | 5.15 | 5.69 | 6.7 | 4.66 | 7.5 | 4.12 | 5.77 | |
| Cadmium | 0.28 | 400 | 3 | 230 | 0.019 | 0.015 | 0.1 | 0.12 | 0.012 | 0.089 | 0.11 | 0.008 | 0.068 | 0.044 | 0.071 | |
| Chromium | 19.3 | 2,700 | 460 | 1,500 | 25.8 | 23.4 | 18.5 | 21.5 | 23.2 | 21.1 | 20.4 | 19.5 | 22 | 17.3 | 18.9 | |
| Copper | 16.4 | >10,000 | >10,000 | >10,000 | 10.4 | 10.5 | 7.2 | 7.17 | 8.1 | 10.2 | 11.7 | 6.27 | 7.51 | 8.79 | 7.68 | |
| Lead | 19.3 | 880 | 210 | 500 | 25.3 | 25 | 22.5 | 24.3 | 26.5 | 24.2 | 24.3 | 18.9 | 25.3 | 16.8 | 23.3 | |
| Nickel | 16.1 | 1,200 | - | - | 14.4 | 12.3 | 13.3 | 14.7 | 13.5 | 17.5 | 14.9 | 12.1 | 14.1 | 12.6 | 12.7 | |
| Zinc | 77.1 | 30,000 | - | - | 60.3 | 58.8 | 91.7 | 97.3 | 72.2 | 87.3 | 79.7 | 49.8 | 93.1 | 59.6 | 92.7 | |
| Qualitative Asbestos | | | | | | | | | | | | | | | | |
| Asbestos | | | | | | ND | | | | | ND | | ND | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | - | | | | | | | | | | | |
| Acenaphthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | < 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 | <0.01 | <0.01 | < 0.01 | <0.01 | |
| Anthracene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Dibonz(a h)anthracono | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Eluoranthono | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Eluorono | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Indepo(1.2.2 cd)pyropo | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Naphthalene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Pyrene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzlajanthracene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| Benzo[a]pyrene (BAP) | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[b]&[j] fluoranthene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <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 | <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 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Benzo[a]pyrene TEQ (LOR) | 0.922 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | |
| Organochlorine Pesticides | | | | | | | | | | | | | | | | |
| Total DDT | | | | 240 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | |
| alpha-BHC | | | | | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Aldrin | | | | | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | |
| beta-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | |
| cis-Chlordane | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | |
| cis-Nonachlor | | | | | <0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| delta-BHC | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | |
| Dieldrin | | | | 45 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | <0.05 | < 0.05 | < 0.05 | < 0.05 | |
| Endosulfan I | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | |
| Endosulfan II | | | | | <0.01 | <0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Endosulfan sulphate | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | |
| Endrin | | | | | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | <0.05 | < 0.05 | < 0.05 | <0.05 | <0.05 | |
| Endrin aldehvde | | | | | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | <0.01 | < 0.01 | <0.01 | < 0.01 | <0.01 | |
| Endrin ketone | | | | | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| gamma-BHC | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Hentachlor | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| Hentachlor enovide | | | | | <0.005 | <0.005 | <0.005 | | | | | | | | | |
| Heyachlorobenzenc | | | | | | | | | | | | | | | | |
| Methovychlor | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.003 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | |
| trans popachlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| | | | | | <0.02 | <0.02 | <0.02 | <0.02 100 F | <0.02 | <0.02 | <0.02 | <0.02 100.0 | <0.02 | <0.02 | <u.uz< td=""><td></td></u.uz<> | |
| I CIVIX (SUITOgate) % | | 1 | | | 112 | 114.1 | 94.5 | 103.2 | 8.601 | 108.5 | 103./ | 100.6 | 103.9 | 101.0 | 112.8 | |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These concentrations are proposed in the 2007 Ecan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

55 - Bold where result exceeds background levels

 55 - Bold where result exceeds background levels

 55 - Underline numeral (and highlighted yellow) where result exceeds Burwood Resource Recovery Park acceptance criteria.

 55 - Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.

 Benzo[a]pyrene (BAP) Toxic Equivalence Quotient (TEQ) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, benzo(k)fluoranthene, 1

 Background Concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils Report No. R07/19, July 2007, compared to the mean concentration CCC.

| | Background Soils Concentrations | | NES-CS | | | | | | | Sample Refere | nce and Result | | | | | |
|--|------------------------------------|--------------------------|------------------|--------------|------------|------------|------------|--------------|--------------|---------------|----------------|---------------|----------|----------|----------|----------|
| Sample ID | | | | | HA15 | HA19 | HA19 | H-BH5 | H-BH5 | HA22 | HA22 | HA23 | | | | |
| lob Number | | Burwood Resource | | | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 | | | | |
| Date | Glev Farth | Recovery Park accentance | Residential (10% | High-Density | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | | | | UCI 95% |
| Depth (m) | | criteria | produce) | Residential | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | 0.5 | 0.5 | | | | |
| Geology | | criteria | | | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | | | | |
| Heavy Metals (mg/kg dry wt) | | | | | 3011 | 3011 | 3011 | 3011 | 3011 | 301 | 5011 | 3011 | | I | I | · |
| Arconic | 11 | 80 | 20 | 45 | 2.42 | 7.05 | 4.4 | 7 20 | 9.6 | 4.74 | 1 15 | 5.04 | | I | I | |
| Cadmium | 0.29 | 400 | 20 | 220 | 0.010 | 0.11 | 4.4 | 0.11 | 9.0 | 4.74 | 4.15 | 0.009 | | | | |
| Chromium | 10.28 | 2 700 | 460 | 1 500 | 24.6 | 21.0 | 24.6 | 22.2 | 0.023 | 17.2 | 16.9 | 0.008 22 F | | | | |
| Copper | 15.5 | >10.000 | ×10.000 | >10.000 | 0.03 | 12 | 0.0 | 8 / 8 | 25.5 8.67 | 9.52 | 8 70 | 0 11 | | | | |
| Lead | 10.4 | 880 | 210 | 500 | 26.9 | 31.8 | 25.8 | 23.7 | 25.2 | 20.4 | 21.4 | 25.8 | | | | |
| Nickel | 16.1 | 1 200 | - | - | 12.5 | 17.5 | 12.9 | 16.9 | 12.5 | 11.4 | 11.7 | 11.8 | | | | |
| Zinc | 77.1 | 30,000 | - | - | 65.7 | 89.7 | 64.1 | 109 | 81.4 | 64 | 47.7 | 69.5 | | | | |
| | //.1 | 30,000 | | | 03.7 | 05.7 | 04.1 | 105 | 01.4 | 04 | 47.7 | 05.5 | | <u> </u> | <u> </u> | <u> </u> |
| Ashastas | | | I | | | ND | | | | 1 | | | | | | |
| Asbestos Relycyclic Aromatic Hydrocarbons | | | | | | ND | | | | | | | | | | |
| | | | I | | <0.01 | (0.01 | (0.01 | 40.01 | (0.01 | -0.01 | <0.01 | <0.01 | <u> </u> | 1 | 1 | |
| | | | | | <0.01 | <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 | <0.01 | | | | |
| Chrysene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | | | | |
| Cillyselle Dihonz(a h)anthracono | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | | | | |
| Eluoranthono | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Fluorono | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | | | | |
| Indono(1,2,2,cd)pyrono | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Naphthalong | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Phopapthropo | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | | | | |
| Pyropo | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | | | | |
| Popz[a]anthracono | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.03 | <0.02 | | | | |
| | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 0.01 | <0.02 | | | | |
| Benzo[b]&[i] fluoranthene | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Benzo[g h i]pervlene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | | | |
| Benzo[k]fluoranthene | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | | | | |
| Benzo[a]pyrepe TEO (LOB) | 0 922 | 40 | | 24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | | | |
| Organochlorine Pesticides | 0.522 | 10 | I | 21 | 0.03 | 0.05 | 0.00 | 0.05 | 0.03 | 0.03 | 0.00 | 0.03 | | | | · |
| | | | I | 240 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | 1 | 1 | I |
| alpha-BHC | | | | 210 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.005 | <0.02 | | | | |
| Aldrin | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | | | | |
| beta-BHC | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | | | | |
| cis-Chlordane | | | | | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | | | | |
| cis-Nonachlor | | | | | < 0.01 | < 0.01 | <0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | | | |
| delta-BHC | | | | | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| Dieldrin | | | | 45 | <0.05 | < 0.05 | <0.05 | < 0.05 | < 0.05 | < 0.05 | <0.05 | <0.05 | | | | |
| Endosulfan I | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| Endosulfan II | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Endosulfan sulphate | | | | | < 0.005 | <0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| Endrin | | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | | | | |
| Endrin aldehyde | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Endrin ketone | | | | | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| gamma-BHC | | | | | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| Heptachlor | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | < 0.005 | | | | |
| Heptachlor epoxide | | | | | < 0.005 | <0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | <0.005 | <0.005 | | | | |
| Hexachlorobenzene | | | | | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | | | | |
| Methoxychlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| trans-nonachlor | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | | |
| trans-Chlordane | | | | | <0.01 | < 0.01 | <0.01 | <0.01 | < 0.01 | <0.01 | <0.01 | <0.01 | | | | |
| Chlordane (sum) | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | | | |
| TCMX (Surrogate) % | | | | | 129.9 | 98.3 | 111.9 | 114.9 | 98.6 | 101.9 | 94.2 | 135.4 | | | | |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These concentrations are proposed in the 2007 ECan report "Background concentrations of selected trace elements in Canterbury soils" - In this case "Level 2 Background" uses the maximum recorded NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

55 - Bold where result exceeds background levels

<u>55</u> - Underline numeral (and highlighted yellow) where result exceeds Burwood Resource Recovery Park acceptance criteria.
 <u>55</u> - Highlighted green where results exceed NES-CS residential 10% produce land use soil contaminant standards.
 1 Background Concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils Report No. R07/19, July 2007, compared to the mean concentration CCC.
 ND - Not Detected

| | Background Soils Concentrations | NES | -CS / BRANZ | | | | Sample Referer | nce and Result | | |
|----------------------|------------------------------------|---------------------------------|------------------|--------------|------------|------------|----------------|----------------|------------|------------|
| Sample ID | | | | | BP1 | BP1 | BP2 | BP2 | BP3 | BP3 |
| Job Number | | Burwood Resource | Posidontial (10% | High-Donsity | 170743 | 170743 | 170743 | 170743 | 170743 | 170743 |
| Date | Gley Earth | Recovery Park acceptance | | Posidential | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Depth (m) | | criteria | produce) | Residential | 0.1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.3 |
| Geology | | | | | Soil | Soil | Soil | Soil | Soil | Soil |
| Qualitative Asbestos | | | | | | | | | | |
| Asbestos | ND | ND | | | ND | ND | ND | ND | ND | ND |

NOTES:

Contaminant concentrations in soil have been compared against selected acceptance guidelines as discussed in the report.

Background concentrations These

NES-CS: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. BRANZ: New Zealand Guidelines for Assessing and Managing Asbestos in Soil, Nov 2017

ND - Not Detected

APPENDIX F

Laboratory Transcripts

Report Date: 21 Dec 2018

Certificate Number: P1812201041

Analytica Laboratories Ruakura Research Centre, 10 Bisley Road, Private Bag 3123

Client Reference: 18-38911

Dear Karla Chapman,

Re: Asbestos Soil Identification Analysis – 18-38911

8 sample(s) received on 20 Dec 2018 by Julie Saia.

The results of fibre analysis were performed by Georgina Jackson of Precise Consulting and Laboratory Ltd on 21 Dec 2018.

The sample(s) were stated to be from 18-38911.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in soil samples.

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Georgina Jackson.

Yours sincerely

Georgina Jackson

Georgina Jackson PRECISE LABORATORY IDENTIFIER





P1812201041 - **1** of 3

Sample Analysis Results

Certificate Number: P1812201041 Report Date: 21 Dec 2018 Site Location: 18-38911



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 (UMF), 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 samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

Georgina Jackson

Approved Identifier: Georgina Jackson

Reviewed by:

Georgina Jackson

Key Technical Person: Georgina Jackson

| Sample ID | Client Sample ID | Sample Location/Description/Dimensions | Analysis Results |
|-----------|---------------------|--|--|
| S001 | HA3 S0.1 | - Non-Homogeneous Soil 68.5g | No Asbestos Detected Organic Fibres |
| S002 | HA10 S0.1 | ۔ Non-Homogeneous Soil 68.0g | No Asbestos Detected Organic Fibres |
| S003 | HA8 S0.1 | ۔ Non-Homogeneous Soil 77.0g | No Asbestos Detected Organic Fibres |
| S004 | HA1 S0.1 | ۔ Non-Homogeneous Soil 64.0g | No Asbestos Detected Organic Fibres |
| S005 | BP1 S0.1 | - Non-Homogeneous Soil 52.0g | No Asbestos Detected Organic Fibres |
| S006 | BP1 S0.3 | ۔ Non-Homogeneous Soil 99.0g | No Asbestos Detected Organic Fibres |
| S007 | BP2 S0.1 | - Non-Homogeneous Soil 112.5g | No Asbestos Detected Organic Fibres |
| S008 | BP2 S0.3 | ۔ Non-Homogeneous Soil 44.5g | No Asbestos Detected Organic Fibres |

Issue Date: Jun 2017 | Version 10 Precise Consulting & Laboratory Limited Unit 1, 30 Greenpark Road, Penrose, Auckland 8023



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

P1812201041 - 2 of 3

Appendix 1: Soil Analysis Raw Data

Certificate Number: P1812201041 Report Date: 21 Dec 2018 Site Location: 18-38911



* The reporting limit for this standard is 0.1g/kg

** Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased

*** Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.





Analytica Laboratories Limited Ruakura Research Centre 10 Bisley Road Hamilton 3214, New Zealand Ph +64 (07) 974 4740 sales@analytica.co.nz www.analytica.co.nz

Certificate of Analysis

Riley Consultants Ltd 12 Moorhouse Ave Christchurch Attention: Leanne Sutherland Phone: 03 3794402 Email: ccameron@riley.co.nz

Sampling Site: 141 South Belt, Rangiora

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.

Lab Reference:

Date Received:

Order Number:

Reference:

Date Completed: 10/01/2019

Submitted by:

18-38911

AVD,Fy,RW

19/12/2018

170743

Heavy Metals in Soil

| | Client Sample ID | | | HA3 S0.5 0.5 | HA4 S0.1 0.1 | HA4 S0.5 0.5 | HA10 S0.1 0.1 |
|----------|------------------|--------------------|------------|-----------------|-----------------|-----------------|------------------|
| | Date Sampled | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-1 | 18-38911-2 | 18-38911-3 | 18-38911-4 | 18-38911-5 |
| Arsenic | mg/kg dry wt | 0.125 | 6.36 | 5.97 | 7.43 | 5.64 | 7.54 |
| Cadmium | mg/kg dry wt | 0.005 | 0.086 | 0.017 | 0.053 | 0.006 | 0.11 |
| Chromium | mg/kg dry wt | 0.125 | 16.5 | 20.3 | 15.7 | 20.9 | 17.1 |
| Copper | mg/kg dry wt | 0.075 | 8.06 | 5.59 | 6.82 | 10.7 | 8.01 |
| Lead | mg/kg dry wt | 0.05 | 23.1 | 23.4 | 22.7 | 25.1 | 23.4 |
| Nickel | mg/kg dry wt | 0.05 | 11.3 | 12.5 | 10.6 | 13.5 | 11.3 |
| Zinc | mg/kg dry wt | 0.05 | 81.7 | 75.3 | 68.5 | 63.2 | 86.4 |

Heavy Metals in Soil

| Client Sample ID | | | HA10 S0.5 0.5 | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|------------------|--------------|--------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| | Date Sampled | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-6 | 18-38911-7 | 18-38911-8 | 18-38911-9 | 18-38911-10 |
| Arsenic | mg/kg dry wt | 0.125 | 29.5 | 6.31 | 8.99 | 6.18 | 7.71 |
| Cadmium | mg/kg dry wt | 0.005 | 0.057 | 0.11 | 0.023 | 0.021 | 0.13 |
| Chromium | mg/kg dry wt | 0.125 | 23.6 | 16.9 | 20.6 | 21.0 | 17.0 |
| Copper | mg/kg dry wt | 0.075 | 10.3 | 9.65 | 6.60 | 12.1 | 15.0 |
| Lead | mg/kg dry wt | 0.05 | 42.1 | 24.6 | 26.6 | 23.8 | 166 |
| Nickel | mg/kg dry wt | 0.05 | 19.2 | 12.4 | 12.8 | 14.1 | 11.0 |
| Zinc | mg/kg dry wt | 0.05 | 113 | 92.5 | 80.9 | 63.5 | 167 |



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.

Heavy Metals in Soil

| | Client Sample ID | | | H-BH2 S0.1 0.1 | H-BH2 S0.5 0.5 | H-BH2 S0.8 0.8 | H-BH1 S0.1 0.1 |
|----------|------------------|--------------------|-------------|-------------------|-------------------|-------------------|-------------------|
| | Date Sampled | | 17/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-11 | 18-38911-12 | 18-38911-13 | 18-38911-14 | 18-38911-15 |
| Arsenic | mg/kg dry wt | 0.125 | 4.64 | 8.51 | 4.63 | 3.58 | 5.29 |
| Cadmium | mg/kg dry wt | 0.005 | 0.029 | 0.059 | 0.019 | 0.010 | 0.069 |
| Chromium | mg/kg dry wt | 0.125 | 25.4 | 19.3 | 21.5 | 20.2 | 18.0 |
| Copper | mg/kg dry wt | 0.075 | 11.3 | 7.14 | 12.0 | 9.75 | 7.18 |
| Lead | mg/kg dry wt | 0.05 | 31.1 | 25.4 | 29.0 | 22.0 | 22.7 |
| Nickel | mg/kg dry wt | 0.05 | 15.9 | 12.5 | 13.8 | 11.7 | 13.6 |
| Zinc | mg/kg dry wt | 0.05 | 80.9 | 90.1 | 66.5 | 49.0 | 86.8 |

Heavy Metals in Soil

| Client Sample ID | | | H-BH1 S0.5 0.5 | H-BH1 S0.7 0.7 | HA8 S0.1 0.1 | HA8 S0.5 0.5 | HA1 S0.1 0.1 |
|------------------|--------------|--------------------|-------------------|-------------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-16 | 18-38911-17 | 18-38911-18 | 18-38911-19 | 18-38911-20 |
| Arsenic | mg/kg dry wt | 0.125 | 3.98 | 4.67 | 6.46 | 3.06 | 5.14 |
| Cadmium | mg/kg dry wt | 0.005 | 0.014 | 0.008 | 0.088 | 0.013 | 0.074 |
| Chromium | mg/kg dry wt | 0.125 | 23.2 | 17.3 | 18.0 | 22.4 | 15.1 |
| Copper | mg/kg dry wt | 0.075 | 8.96 | 7.44 | 11.0 | 8.90 | 6.42 |
| Lead | mg/kg dry wt | 0.05 | 28.8 | 19.7 | 32.6 | 25.7 | 20.8 |
| Nickel | mg/kg dry wt | 0.05 | 12.6 | 9.05 | 13.9 | 10.4 | 10.0 |
| Zinc | mg/kg dry wt | 0.05 | 62.1 | 40.7 | 119 | 46.7 | 69.0 |

Heavy Metals in Soil

| Client Sample ID | | | HA1 S0.5 0.5 | HA1 S0.9 0.9 | H-BH6 S0.1 0.1 | H-BH6 S0.5 0.5 | H-BH6 S1.0 1.0 |
|------------------|--------------|--------------------|-----------------|-----------------|-------------------|-------------------|-------------------|
| | Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-21 | 18-38911-22 | 18-38911-23 | 18-38911-24 | 18-38911-25 |
| Arsenic | mg/kg dry wt | 0.125 | 7.90 | 3.89 | 7.54 | 4.45 | 4.06 |
| Cadmium | mg/kg dry wt | 0.005 | 0.069 | 0.046 | 0.066 | 0.007 | 0.024 |
| Chromium | mg/kg dry wt | 0.125 | 22.7 | 25.9 | 19.7 | 19.8 | 14.4 |
| Copper | mg/kg dry wt | 0.075 | 7.37 | 17.9 | 9.93 | 6.37 | 7.43 |
| Lead | mg/kg dry wt | 0.05 | 34.9 | 40.2 | 27.9 | 21.6 | 14.4 |
| Nickel | mg/kg dry wt | 0.05 | 14.9 | 18.1 | 16.1 | 10.4 | 15.2 |
| Zinc | mg/kg dry wt | 0.05 | 96.7 | 96.6 | 83.5 | 46.9 | 51.1 |

Heavy Metals in Soil

| | Clien | t Sample ID | HA14 S0.1 0.1 | HA7 S0.1 0.1 | HA7 S0.5 0.5 |
|----------|--------------|--------------------|------------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-30 | 18-38911-31 | 18-38911-32 |
| Arsenic | mg/kg dry wt | 0.125 | 7.32 | 7.25 | 4.20 |
| Cadmium | mg/kg dry wt | 0.005 | 0.060 | 0.078 | 0.014 |
| Chromium | mg/kg dry wt | 0.125 | 19.5 | 20.0 | 16.6 |
| Copper | mg/kg dry wt | 0.075 | 10.5 | 11.0 | 4.79 |
| Lead | mg/kg dry wt | 0.05 | 25.8 | 26.8 | 21.1 |
| Nickel | mg/kg dry wt | 0.05 | 15.5 | 14.4 | 10.3 |
| Zinc | mg/kg dry wt | 0.05 | 81.4 | 83.5 | 58.6 |

| | Client | t Sample ID | HA3 S0.1 0.1 | HA3 S0.5 0.5 | HA4 S0.1 0.1 | HA4 S0.5 0.5 | HA10 S0.1 0.1 |
|---------------------|--------------|--------------------|-----------------|-----------------|-----------------|-----------------|------------------|
| | Da | te Sampled | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-1 | 18-38911-2 | 18-38911-3 | 18-38911-4 | 18-38911-5 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | < 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | < 0.003 | <0.003 | < 0.003 | < 0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 92.9 | 87.8 | 85.4 | 85.9 | 82.4 |

Organochlorine Pesticides - Soil

| | Client Sample ID | | HA10 S0.5 0.5 | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|---------------|------------------|--------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-6 | 18-38911-7 | 18-38911-8 | 18-38911-9 | 18-38911-10 |
| 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 |

Report ID 18-38911-[R00]

Report Date 10/01/2019

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| | Client Sample ID | | | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|---------------------|------------------|------------|------------|-----------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 80.9 | 81.5 | 88.4 | 90.4 | 82.5 |

Organochlorine Pesticides - Soil

| | Client Sample ID | | HA2 S0.5 0.5 | H-BH2 S0.1 0.1 | H-BH2 S0.5 0.5 | H-BH2 S0.8 0.8 | H-BH1 S0.1 0.1 |
|---------------------|------------------|--------------------|-----------------|-------------------|-------------------|-------------------|-------------------|
| | Da | te Sampled | 17/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-11 | 18-38911-12 | 18-38911-13 | 18-38911-14 | 18-38911-15 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 93.6 | 82.1 | 92.7 | 97.6 | 91.2 |

Report Date 10/01/2019

| | Client | Sample ID | H-BH1 S0.5 0.5 | H-BH1 S0.7 0.7 | HA8 S0.1 0.1 | HA8 S0.5 0.5 | HA1 S0.1 0.1 |
|---------------------|--------------|--------------------|-------------------|-------------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-16 | 18-38911-17 | 18-38911-18 | 18-38911-19 | 18-38911-20 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | < 0.005 | <0.005 | < 0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | < 0.003 | <0.003 | < 0.003 | < 0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 88.4 | 87.3 | 93.0 | 96.7 | 85.0 |

Organochlorine Pesticides - Soil

| Client Sample ID | | | HA1 S0.5 0.5 | HA1 S0.9 0.9 | H-BH6 S0.1 0.1 | H-BH6 S0.5 0.5 | H-BH6 S1.0 1.0 |
|------------------|--------------|--------------------|-----------------|-----------------|-------------------|-------------------|-------------------|
| Date Sampled | | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-21 | 18-38911-22 | 18-38911-23 | 18-38911-24 | 18-38911-25 |
| 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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| | Client | Sample ID | HA1 S0.5 0.5 | HA1 S0.9 0.9 | H-BH6 S0.1 0.1 | H-BH6 S0.5 0.5 | H-BH6 S1.0 1.0 |
|---------------------|--------------|-----------|-----------------|-----------------|-------------------|-------------------|-------------------|
| | Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 78.7 | 80.0 | 93.3 | 81.8 | 79.3 |

Organochlorine Pesticides - Soil

| | Clien | t Sample ID | HA14 S0.1 0.1 | HA7 S0.1 0.1 | HA7 S0.5 0.5 |
|---------------------|--------------|--------------------|------------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-30 | 18-38911-31 | 18-38911-32 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | <0.003 | <0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 80.7 | 116.6 | 98.2 |

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Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | | HA3 S0.1 0.1 | HA3 S0.5 0.5 | HA4 S0.1 0.1 | HA4 S0.5 0.5 | HA10 S0.1 0.1 |
|-------------------------------|--------------|--------------------|-----------------|-----------------|-----------------|-----------------|------------------|
| Date Sampled | | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-1 | 18-38911-2 | 18-38911-3 | 18-38911-4 | 18-38911-5 |
| 1-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| 2-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Acenaphthene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Acenaphthylene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Anthracene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Benz[a]anthracene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.024 |
| Benzo[a]pyrene | mg/kg dry wt | 0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.03 |
| Benzo[b]&[j] fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 |
| Benzo[g,h,i]perylene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.024 |
| Benzo[k]fluoranthene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Chrysene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Dibenz(a,h)anthracene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 |
| Fluorene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Indeno(1,2,3-cd)pyrene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Naphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Phenanthrene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.024 |
| Pyrene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.04 |
| Anthracene-d10 (Surrogate) | % | 1 | 97.5 | 97.8 | 97.5 | 98.2 | 97.6 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | | HA10 S0.5 0.5 | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|------------------------------|--------------|--------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Date Sampled | | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-6 | 18-38911-7 | 18-38911-8 | 18-38911-9 | 18-38911-10 |
| 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 | 0.02 | <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 | 0.01 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 |

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| | Client Sample ID | | HA10 S0.5 0.5 | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|-------------------------------|------------------|------|------------------|-----------------|-----------------|-----------------|-----------------|
| | Date Sampled | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Anthracene-d10 (Surrogate) | % | 1 | 96.9 | 97.6 | 96.3 | 96.2 | 96.3 |

Polycyclic Aromatic Hydrocarbons - Soil

| | Clien | t Sample ID | HA2 S0.5 0.5 | H-BH2 S0.1 0.1 | H-BH2 S0.5 0.5 | H-BH2 S0.8 0.8 | H-BH1 S0.1 0.1 |
|-------------------------------|--------------|--------------------|-----------------|-------------------|-------------------|-------------------|-------------------|
| | Da | te Sampled | 17/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-11 | 18-38911-12 | 18-38911-13 | 18-38911-14 | 18-38911-15 |
| 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 | 0.01 | 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 | 96.7 | 95.6 | 91.4 | 90.9 | 92.9 |

Polycyclic Aromatic Hydrocarbons - Soil

| | Client Sample ID | | H-BH1 S0.5 0.5 | H-BH1 S0.7 0.7 | HA8 S0.1 0.1 | HA8 S0.5 0.5 | HA1 S0.1 0.1 |
|------------------------------|------------------|--------------------|-------------------|-------------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-16 | 18-38911-17 | 18-38911-18 | 18-38911-19 | 18-38911-20 |
| 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 | 0.03 | <0.02 | <0.02 |
| Benzo[a]pyrene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | 0.04 | <0.01 | <0.01 |
| Benzo[b]&[j] fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.05 | <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 | 0.02 | <0.01 | <0.01 |
| Chrysene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 |

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| | Client Sample ID | | H-BH1 S0.5 0.5 | H-BH1 S0.7 0.7 | HA8 S0.1 0.1 | HA8 S0.5 0.5 | HA1 S0.1 0.1 |
|-------------------------------|------------------|------------|-------------------|-------------------|-----------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| 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 | 0.05 | <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 | 0.03 | <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 | 0.05 | <0.02 | <0.02 |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 0.03 | 0.03 | 0.07 | 0.03 | 0.03 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | <0.01 | <0.01 | 0.06 | <0.01 | <0.01 |
| Anthracene-d10 (Surrogate) | % | 1 | 94.9 | 94.9 | 96.0 | 95.6 | 96.1 |

Polycyclic Aromatic Hydrocarbons - Soil

| | Clien | t Sample ID | HA1 S0.5 0.5 | HA1 S0.9 0.9 | H-BH6 S0.1 0.1 | H-BH6 S0.5 0.5 | H-BH6 S1.0 1.0 |
|-------------------------------|--------------|--------------------|-----------------|-----------------|-------------------|-------------------|-------------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-21 | 18-38911-22 | 18-38911-23 | 18-38911-24 | 18-38911-25 |
| 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 | 0.01 | 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 | 96.3 | 95.7 | 94.7 | 94.7 | 91.6 |

Polycyclic Aromatic Hydrocarbons - Soil

| | Client | Sample ID | HA14 S0.1 0.1 | HA7 S0.1 0.1 | HA7 S0.5 0.5 |
|---------------------|--------------|--------------------|------------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-30 | 18-38911-31 | 18-38911-32 |
| 1-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| 2-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Acenaphthene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |

Report ID 18-38911-[R00]

| | Client | Sample ID | HA14 S0.1 0.1 | HA7 S0.1 0.1 | HA7 S0.5 0.5 |
|-------------------------------|--------------|------------|------------------|-----------------|-----------------|
| | Da | te Sampled | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Acenaphthylene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Anthracene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Benz[a]anthracene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 |
| Benzo[a]pyrene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Benzo[b]&[j] fluoranthene | mg/kg dry wt | 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 |
| Benzo[k]fluoranthene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Chrysene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Dibenz(a,h)anthracene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 |
| Fluorene | mg/kg dry wt | 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 |
| Naphthalene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Phenanthrene | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Pyrene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 0.03 | 0.03 | 0.03 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 |
| Anthracene-d10 (Surrogate) | % | 1 | 95.0 | 98.6 | 97.6 |

Moisture Content

| CI | Client Sample ID | | HA3 S0.5 0.5 | HA4 S0.1 0.1 | HA4 S0.5 0.5 | HA10 S0.1 0.1 |
|------------------|------------------|------------|-----------------|-----------------|-----------------|------------------|
| | Date Sampled | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte U | it Reporting | 18-38911-1 | 18-38911-2 | 18-38911-3 | 18-38911-4 | 18-38911-5 |
| Moisture Content | % 1 | 24 | 19 | 22 | 19 | 71 |

Moisture Content

| C | Client Sample ID | | HA10 S0.5 0.5 | HA9 S0.1 0.1 | HA9 S0.5 0.5 | HA9 S0.9 0.9 | HA2 S0.1 0.1 |
|------------------|------------------|--------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| | Date Sampled | | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 | 17/12/2018 |
| Analyte L | Jnit | Reporting Limit | 18-38911-6 | 18-38911-7 | 18-38911-8 | 18-38911-9 | 18-38911-10 |
| Moisture Content | % | 1 | 23 | 25 | 20 | 20 | 19 |

Moisture Content

| Clier | Client Sample ID | | H-BH2 S0.1 0.1 | H-BH2 S0.5 0.5 | H-BH2 S0.8 0.8 | H-BH1 S0.1 0.1 |
|--------------------|--------------------|-------------|-------------------|-------------------|-------------------|-------------------|
| Da | Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte Unit | Reporting Limit | 18-38911-11 | 18-38911-12 | 18-38911-13 | 18-38911-14 | 18-38911-15 |
| Moisture Content % | 1 | 19 | 23 | 21 | 21 | 18 |

Moisture Content

| CI | Client Sample ID | | H-BH1 S0.7 0.7 | HA8 S0.1 0.1 | HA8 S0.5 0.5 | HA1 S0.1 0.1 |
|------------------|------------------|-------------|-------------------|-----------------|-----------------|-----------------|
| Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte U | it Reporting | 18-38911-16 | 18-38911-17 | 18-38911-18 | 18-38911-19 | 18-38911-20 |
| Moisture Content | 6 1 | 19 | 16 | 20 | 21 | 23 |

Moisture Content

| Clie | Client Sample ID | | HA1 S0.9 0.9 | H-BH6 S0.1 0.1 | H-BH6 S0.5 0.5 | H-BH6 S1.0 1.0 |
|--------------------|--------------------|-------------|-----------------|-------------------|-------------------|-------------------|
| Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte Uni | Reporting Limit | 18-38911-21 | 18-38911-22 | 18-38911-23 | 18-38911-24 | 18-38911-25 |
| Moisture Content % | 1 | 22 | 22 | 22 | 18 | 13 |

Moisture Content

| C | Client | Sample ID | HA14 S0.1 0.1 | HA7 S0.1 0.1 | HA7 S0.5 0.5 |
|------------------|--------------|--------------------|------------------|-----------------|-----------------|
| | Date Sampled | | 18/12/2018 | 18/12/2018 | 18/12/2018 |
| Analyte | Unit | Reporting Limit | 18-38911-30 | 18-38911-31 | 18-38911-32 |
| Moisture Content | % | 1 | 22 | 27 | 21 |

Method Summary

| 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) |
| 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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Elizabeth Fitzgerald, B.Sc. Inorganics Team Leader

J. Correy, Ph.D.

Signatory

Report Date: 07 Jan 2019

Certificate Number: P1901070830

CONSULTING & LABORATORY

Analytica Laboratories Ruakura Research Centre, 10 Bisley Road, Private Bag 3123

Client Reference: 18-39303

Dear Karla Chapman,

Re: Asbestos Soil Identification Analysis – 18-39303

13 sample(s) received on 07 Jan 2019 by Jesse Bryant.

The results of fibre analysis were performed by Alice Knowles of Precise Consulting and Laboratory Ltd on 07 Jan 2019.

The sample(s) were stated to be from 18-39303.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in soil samples.

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Alice Knowles.

Yours sincerely

houtes

Alice Knowles PRECISE LABORATORY IDENTIFIER



P1901070830 - **1** of 4



Sample Analysis Results

Certificate Number: P1901070830 Report Date: 07 Jan 2019 Site Location: 18-39303



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 (UMF), 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 samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

witch

Approved Identifier: Alice Knowles

Reviewed by:

outop

Key Technical Person: Alice Knowles

| Sample ID | Client Sample ID | Sample Location/Description/Dimensions | Analysis Results |
|-----------|---------------------|--|--|
| S001 | HABH3 SO.1 | - Non-Homogeneous Soil 86.00g | No Asbestos Detected Organic Fibres |
| S002 | HA5 S0.1 | - Non-Homogeneous Soil 74.02g | No Asbestos Detected Organic Fibres |
| S003 | HBH4 S0.1 | ۔ Non-Homogeneous Soil 65.57g | No Asbestos Detected Organic Fibres |
| S004 | HA12 S0.1 | ۔ Non-Homogeneous Soil 77.47g | No Asbestos Detected Organic Fibres |
| S005 | FT1 S0.1 | - Non-Homogeneous Soil 55.38g | No Asbestos Detected Organic Fibres |
| S006 | FT1 S0.3 | - Non-Homogeneous Soil 84.56g | No Asbestos Detected Organic Fibres |
| S007 | BP3 S0.1 | ۔ Non-Homogeneous Soil 89.46g | No Asbestos Detected Organic Fibres |
| S008 | BP3 S0.3 | - Non-Homogeneous Soil 94.59g | No Asbestos Detected Organic Fibres |



P1901070830 - 2 of 4



Sample Analysis Results

Certificate Number: P1901070830 Report Date: 07 Jan 2019 Site Location: 18-39303

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| Sample ID | Client Sample ID | Sample Location/Description/Dimensions | Analysis Results |
|-----------|---------------------|--|--|
| S009 | HA15 S0.1 | - Non-Homogeneous Soil 91.75g | No Asbestos Detected Organic Fibres |
| S010 | HA17 S0.1 | - Non-Homogeneous Soil 96.69g | No Asbestos Detected Organic Fibres |
| S011 | HA24 S0.1 | - Non-Homogeneous Soil 87.73g | No Asbestos Detected Organic Fibres |
| S012 | HA22 S0.1 | - Non-Homogeneous Soil 82.53g | No Asbestos Detected Organic Fibres |
| S013 | HA20 S0.1 | - Non-Homogeneous Soil 95.38g | No Asbestos Detected Organic Fibres |



P1901070830 - 3 of 4

Appendix 1: Soil Analysis Raw Data

Certificate Number: P1901070830 Report Date: 07 Jan 2019 Site Location: 18-39303

| Sample ID | Client Sample ID | Total Sample Weight (g) | ACM Approximate Dimensions (g)* | Form | Trace Asbestos Detected** |
|-----------|---------------------|-------------------------|---------------------------------|----------------------|---------------------------|
| S001 | HABH3 S0.1 | 86.00 | - | No Asbestos Detected | Ν |
| S002 | HA5 S0.1 | 74.02 | - | No Asbestos Detected | Ν |
| S003 | HBH4 S0.1 | 65.57 | - | No Asbestos Detected | Ν |
| S004 | HA12 S0.1 | 77.47 | - | No Asbestos Detected | Ν |
| S005 | FT1 S0.1 | 55.38 | - | No Asbestos Detected | N |
| S006 | FT1 S0.3 | 84.56 | - | No Asbestos Detected | N |
| S007 | BP3 S0.1 | 89.46 | - | No Asbestos Detected | N |
| S008 | BP3 S0.3 | 94.59 | - | No Asbestos Detected | N |
| S009 | HA15 S0.1 | 91.75 | - | No Asbestos Detected | Ν |
| S010 | HA17 S0.1 | 96.69 | - | No Asbestos Detected | N |
| S011 | HA24 S0.1 | 87.73 | - | No Asbestos Detected | N |
| S012 | HA22 S0.1 | 82.53 | - | No Asbestos Detected | Ν |
| S013 | HA20 S0.1 | 95.38 | - | No Asbestos Detected | Ν |

* The reporting limit for this standard is 0.1g/kg

** Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased

*** Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.





Analytica Laboratories Limited Ruakura Research Centre 10 Bisley Road Hamilton 3214, New Zealand Ph +64 (07) 974 4740 sales@analytica.co.nz www.analytica.co.nz

Certificate of Analysis

Riley Consultants Ltd 12 Moorhouse Ave Christchurch Attention: Leanne Sutherland Phone: 03 379 4402 Email: ccameron@riley.co.nz

Sampling Site: 141 South Belt, Rangiora

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.

Lab Reference:

Date Received:

Order Number:

Reference:

Date Completed: 9/01/2019

Submitted by:

18-39303

AvD, FY, RW

27/12/2018

170743

Heavy Metals in Soil

| Client Sample ID | | | HABH3 S0.1 0.1 | HABH3 S0.5 0.5 | HA11 S0.1 0.1 | HA11 S0.5 0.5 | HA5 S0.1 0.1 |
|------------------|--------------|--------------------|-------------------|-------------------|------------------|------------------|-----------------|
| | Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-1 | 18-39303-2 | 18-39303-4 | 18-39303-5 | 18-39303-7 |
| Arsenic | mg/kg dry wt | 0.125 | 5.06 | 6.07 | 9.63 | 11.2 | 5.21 |
| Cadmium | mg/kg dry wt | 0.005 | 0.024 | 0.12 | 0.076 | 0.025 | 0.12 |
| Chromium | mg/kg dry wt | 0.125 | 19.4 | 17.9 | 19.6 | 22.2 | 22.1 |
| Copper | mg/kg dry wt | 0.075 | 8.57 | 35.9 | 6.55 | 9.64 | 10.3 |
| Lead | mg/kg dry wt | 0.05 | 29.2 | 121 | 25.3 | 28.9 | 31.5 |
| Nickel | mg/kg dry wt | 0.05 | 12.1 | 13.3 | 12.6 | 13.5 | 15.6 |
| Zinc | mg/kg dry wt | 0.05 | 76.4 | 145 | 85.4 | 82.6 | 102 |

Heavy Metals in Soil

| Client Sample ID | | | HA5 S0.5 0.5 | HA6 S0.1 0.1 | HA6 S0.5 0.5 | HBH4 S0.1 0.1 | HBH4 S0.5 0.5 |
|------------------|--------------|--------------------|-----------------|-----------------|-----------------|------------------|------------------|
| | Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-8 | 18-39303-10 | 18-39303-11 | 18-39303-13 | 18-39303-14 |
| Arsenic | mg/kg dry wt | 0.125 | 9.25 | 5.54 | 2.89 | 4.44 | 3.38 |
| Cadmium | mg/kg dry wt | 0.005 | 0.032 | 0.19 | 0.027 | 0.12 | 0.017 |
| Chromium | mg/kg dry wt | 0.125 | 25.2 | 19.0 | 24.6 | 18.3 | 20.2 |
| Copper | mg/kg dry wt | 0.075 | 14.3 | 9.02 | 13.9 | 6.77 | 9.58 |
| Lead | mg/kg dry wt | 0.05 | 32.5 | 27.1 | 30.1 | 25.6 | 24.7 |
| Nickel | mg/kg dry wt | 0.05 | 16.2 | 14.1 | 16.1 | 13.0 | 11.7 |
| Zinc | mg/kg dry wt | 0.05 | 85.2 | 92.9 | 90.0 | 76.5 | 73.8 |



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.

Heavy Metals in Soil

| Client Sample ID | | | HA12 S0.1 0.1 | HA12 S0.5 0.5 | FT1 S0.1 0.1 | FT1 S0.3 0.3 | HA15 S0.1 0.1 |
|------------------|--------------|--------------------|------------------|------------------|-----------------|-----------------|------------------|
| Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | |
| Analyte | Unit | Reporting Limit | 18-39303-15 | 18-39303-16 | 18-39303-19 | 18-39303-20 | 18-39303-23 |
| Arsenic | mg/kg dry wt | 0.125 | 7.28 | 5.16 | 59.0 | 6.76 | 4.51 |
| Cadmium | mg/kg dry wt | 0.005 | 0.091 | 0.029 | 0.36 | 0.061 | 0.086 |
| Chromium | mg/kg dry wt | 0.125 | 20.0 | 20.9 | 42.2 | 20.8 | 18.7 |
| Copper | mg/kg dry wt | 0.075 | 6.69 | 9.54 | 62.2 | 7.65 | 10.8 |
| Lead | mg/kg dry wt | 0.05 | 25.9 | 22.8 | 223 | 37.2 | 21.2 |
| Nickel | mg/kg dry wt | 0.05 | 12.7 | 11.9 | 14.4 | 13.4 | 14.4 |
| Zinc | mg/kg dry wt | 0.05 | 78.4 | 69.6 | 340 | 94.6 | 91.6 |

Heavy Metals in Soil

| Client Sample ID | | | HA15 S0.5 0.5 | HA19 S0.1 0.1 | HA19 S0.5 0.5 | HA17 S0.1 0.1 | HA17 S0.5 0.5 |
|------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-24 | 18-39303-25 | 18-39303-26 | 18-39303-27 | 18-39303-28 |
| Arsenic | mg/kg dry wt | 0.125 | 4.03 | 7.83 | 8.40 | 3.36 | 4.48 |
| Cadmium | mg/kg dry wt | 0.005 | 0.016 | 0.088 | 0.019 | 0.015 | 0.10 |
| Chromium | mg/kg dry wt | 0.125 | 27.2 | 23.1 | 25.8 | 23.4 | 18.5 |
| Copper | mg/kg dry wt | 0.075 | 14.3 | 9.86 | 10.4 | 10.5 | 7.20 |
| Lead | mg/kg dry wt | 0.05 | 29.9 | 26.6 | 25.3 | 25.0 | 22.5 |
| Nickel | mg/kg dry wt | 0.05 | 11.6 | 18.6 | 14.4 | 12.3 | 13.3 |
| Zinc | mg/kg dry wt | 0.05 | 52.8 | 102 | 60.3 | 58.8 | 91.7 |

Heavy Metals in Soil

| Client Sample ID | | | HA18 S0.1 0.1 | HA18 S0.5 0.5 | HA21 S0.1 0.1 | HA24 S0.1 0.1 | HA21 S0.5 0.5 |
|------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | |
| Analyte | Unit | Reporting Limit | 18-39303-29 | 18-39303-30 | 18-39303-32 | 18-39303-33 | 18-39303-34 |
| Arsenic | mg/kg dry wt | 0.125 | 7.08 | 5.15 | 5.69 | 6.70 | 4.66 |
| Cadmium | mg/kg dry wt | 0.005 | 0.12 | 0.012 | 0.089 | 0.11 | 0.008 |
| Chromium | mg/kg dry wt | 0.125 | 21.5 | 23.2 | 21.1 | 20.4 | 19.5 |
| Copper | mg/kg dry wt | 0.075 | 7.17 | 8.10 | 10.2 | 11.7 | 6.27 |
| Lead | mg/kg dry wt | 0.05 | 24.3 | 26.5 | 24.2 | 24.3 | 18.9 |
| Nickel | mg/kg dry wt | 0.05 | 14.7 | 13.5 | 17.5 | 14.9 | 12.1 |
| Zinc | mg/kg dry wt | 0.05 | 97.3 | 72.2 | 87.3 | 79.7 | 49.8 |

Heavy Metals in Soil

| Client Sample ID | | | HA22 S0.1 0.1 | HA22 S0.5 0.5 | HA16 S0.1 0.1 | HA16 S0.5 0.5 | HA20 S0.1 0.1 |
|------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-35 | 18-39303-36 | 18-39303-37 | 18-39303-38 | 18-39303-39 |
| Arsenic | mg/kg dry wt | 0.125 | 7.50 | 4.12 | 5.77 | 2.43 | 7.05 |
| Cadmium | mg/kg dry wt | 0.005 | 0.068 | 0.044 | 0.071 | 0.019 | 0.11 |
| Chromium | mg/kg dry wt | 0.125 | 22.0 | 17.3 | 18.9 | 24.6 | 21.9 |
| Copper | mg/kg dry wt | 0.075 | 7.51 | 8.79 | 7.68 | 9.93 | 12.0 |
| Lead | mg/kg dry wt | 0.05 | 25.3 | 16.8 | 23.3 | 26.9 | 31.8 |
| Nickel | mg/kg dry wt | 0.05 | 14.1 | 12.6 | 12.7 | 12.5 | 17.5 |
| Zinc | mg/kg dry wt | 0.05 | 93.1 | 59.6 | 92.7 | 65.7 | 89.7 |

Heavy Metals in Soil

| | Client Sample ID | | | HBH5 S0.1 0.1 | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 |
|----------|------------------|--------------------|-------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-40 | 18-39303-41 | 18-39303-42 | 18-39303-43 | 18-39303-44 |
| Arsenic | mg/kg dry wt | 0.125 | 4.40 | 7.39 | 9.60 | 4.74 | 4.15 |
| Cadmium | mg/kg dry wt | 0.005 | 0.013 | 0.11 | 0.023 | 0.074 | 0.082 |
| Chromium | mg/kg dry wt | 0.125 | 24.6 | 22.3 | 23.5 | 17.2 | 16.8 |
| Copper | mg/kg dry wt | 0.075 | 9.90 | 8.48 | 8.67 | 9.52 | 8.79 |
| Lead | mg/kg dry wt | 0.05 | 25.8 | 23.7 | 25.2 | 20.4 | 21.4 |
| Nickel | mg/kg dry wt | 0.05 | 12.9 | 16.9 | 12.5 | 11.4 | 11.7 |
| Zinc | mg/kg dry wt | 0.05 | 64.1 | 109 | 81.4 | 64.0 | 47.7 |

Heavy Metals in Soil

| | Clien | t Sample ID | HA24 S0.5 0.5 |
|----------|--------------|--------------------|------------------|
| | Da | te Sampled | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-45 |
| Arsenic | mg/kg dry wt | 0.125 | 5.04 |
| Cadmium | mg/kg dry wt | 0.005 | 0.008 |
| Chromium | mg/kg dry wt | 0.125 | 22.5 |
| Copper | mg/kg dry wt | 0.075 | 9.11 |
| Lead | mg/kg dry wt | 0.05 | 25.8 |
| Nickel | mg/kg dry wt | 0.05 | 11.8 |
| Zinc | mg/kg dry wt | 0.05 | 69.5 |

Organochlorine Pesticides - Soil

| | Client Sample ID | | HABH3 S0.1 0.1 | HABH3 S0.5 0.5 | HA11 S0.1 0.1 | HA11 S0.5 0.5 | HA5 S0.1 0.1 |
|---------------------|------------------|--------------------|-------------------|-------------------|------------------|------------------|-----------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-1 | 18-39303-2 | 18-39303-4 | 18-39303-5 | 18-39303-7 |
| 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 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |

Report ID 18-39303-[R00]

Report Date 10/01/2019

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| | Client | t Sample ID | HABH3 S0.1 0.1 | HABH3 S0.5 0.5 | HA11 S0.1 0.1 | HA11 S0.5 0.5 | HA5 S0.1 0.1 |
|------------------|--------------|-------------|-------------------|-------------------|------------------|------------------|-----------------|
| | Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| 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 | 111.3 | 115.2 | 98.0 | 99.1 | 103.6 |

Organochlorine Pesticides - Soil

| | Client | t Sample ID | HA5 S0.5 0.5 | HA6 S0.1 0.1 | HA6 S0.5 0.5 | HBH4 S0.1 0.1 | HBH4 S0.5 0.5 |
|---------------------|--------------|--------------------|-----------------|-----------------|-----------------|------------------|------------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-8 | 18-39303-10 | 18-39303-11 | 18-39303-13 | 18-39303-14 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 95.9 | 106.7 | 107.8 | 96.6 | 123.6 |

Organochlorine Pesticides - Soil

| Client Sample ID | | | HA12 S0.1 0.1 | HA12 S0.5 0.5 | HA15 S0.1 0.1 | HA15 S0.5 0.5 | HA19 S0.1 0.1 |
|------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-15 | 18-39303-16 | 18-39303-23 | 18-39303-24 | 18-39303-25 |
| 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 |

| | Client Sample ID | | HA12 S0.1 0.1 | HA12 S0.5 0.5 | HA15 S0.1 0.1 | HA15 S0.5 0.5 | HA19 S0.1 0.1 |
|---------------------|------------------|------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 21/12/2018 | 21/12/2018 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 86.4 | 91.0 | 91.1 | 111.5 | 115.6 |

Organochlorine Pesticides - Soil

| | Client Sample ID | | HA19 S0.5 0.5 | HA17 S0.1 0.1 | HA17 S0.5 0.5 | HA18 S0.1 0.1 | HA18 S0.5 0.5 |
|---------------------|------------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-26 | 18-39303-27 | 18-39303-28 | 18-39303-29 | 18-39303-30 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |

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| Client Sample ID | | | HA19 S0.5 0.5 | HA17 S0.1 0.1 | HA17 S0.5 0.5 | HA18 S0.1 0.1 | HA18 S0.5 0.5 |
|-------------------|--------------|------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | |
| 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 | 112.0 | 114.1 | 94.5 | 109.5 | 103.8 |

Organochlorine Pesticides - Soil

| | Client | t Sample ID | HA21 S0.1 0.1 | HA24 S0.1 0.1 | HA21 S0.5 0.5 | HA22 S0.1 0.1 | HA22 S0.5 0.5 |
|---------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-32 | 18-39303-33 | 18-39303-34 | 18-39303-35 | 18-39303-36 |
| 2,4'-DDD | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDD | mg/kg dry wt | 0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 108.5 | 103.7 | 100.6 | 103.9 | 101.6 |

Organochlorine Pesticides - Soil

| Client Sample ID | | | HA16 S0.1 0.1 | HA16 S0.5 0.5 | HA20 S0.1 0.1 | HA20 S0.5 0.5 | HBH5 S0.1 0.1 |
|------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | |
| Analyte | Unit | Reporting Limit | 18-39303-37 | 18-39303-38 | 18-39303-39 | 18-39303-40 | 18-39303-41 |
| 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 |

| | Client Sample ID | | HA16 S0.1 0.1 | HA16 S0.5 0.5 | HA20 S0.1 0.1 | HA20 S0.5 0.5 | HBH5 S0.1 0.1 |
|---------------------|------------------|------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| 4,4'-DDE | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 4,4'-DDT | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Total DDT | mg/kg dry wt | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| alpha-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Aldrin | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| beta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Chlordane | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| cis-Nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| delta-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dieldrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endosulfan I | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endosulfan II | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Endrin | mg/kg dry wt | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Endrin aldehyde | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Endrin ketone | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| gamma-BHC | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Heptachlor epoxide | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | mg/kg dry wt | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methoxychlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-nonachlor | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| trans-Chlordane | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (sum) | mg/kg dry wt | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| TCMX (Surrogate) | % | 1 | 115.8 | 129.9 | 98.3 | 111.9 | 114.9 |

Organochlorine Pesticides - Soil

| Client Sample ID | | | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 | HA24 S0.5 0.5 |
|---------------------|--------------|--------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-42 | 18-39303-43 | 18-39303-44 | 18-39303-45 |
| 2,4'-DDD | mg/kg dry wt | 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 |
| 2,4'-DDT | mg/kg dry wt | 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 |
| 4,4'-DDE | mg/kg dry wt | 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 |
| Total DDT | mg/kg dry wt | 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 |
| Aldrin | mg/kg dry wt | 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 |
| cis-Chlordane | mg/kg dry wt | 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 |
| delta-BHC | mg/kg dry wt | 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 |
| Endosulfan I | mg/kg dry wt | 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 |
| Endosulfan sulphate | mg/kg dry wt | 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 |
| Endrin aldehyde | mg/kg dry wt | 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 |
| gamma-BHC | mg/kg dry wt | 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 |

| | Client | Sample ID | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 | HA24 S0.5 0.5 |
|--------------------|--------------|------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Heptachlor epoxide | mg/kg dry wt | 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 |
| Methoxychlor | mg/kg dry wt | 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 |
| trans-Chlordane | mg/kg dry wt | 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 |
| TCMX (Surrogate) | % | 1 | 98.6 | 101.9 | 94.2 | 135.4 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | HABH3 S0.1 0.1 | HABH3 S0.5 0.5 | HA11 S0.1 0.1 | HA11 S0.5 0.5 | HA5 S0.1 0.1 | |
|-------------------------------|--------------|--------------------|-------------------|------------------|------------------|-----------------|------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-1 | 18-39303-2 | 18-39303-4 | 18-39303-5 | 18-39303-7 |
| 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 | 0.01 | 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 | 98.6 | 97.9 | 99.1 | 98.2 | 97.0 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | | HA5 S0.5 0.5 | HA6 S0.1 0.1 | HA6 S0.5 0.5 | HBH4 S0.1 0.1 | HBH4 S0.5 0.5 |
|------------------------------|--------------|--------------------|-----------------|-----------------|-----------------|------------------|------------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-8 | 18-39303-10 | 18-39303-11 | 18-39303-13 | 18-39303-14 |
| 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 |

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| | Client Sample ID | | | HA6 S0.1 0.1 | HA6 S0.5 0.5 | HBH4 S0.1 0.1 | HBH4 S0.5 0.5 |
|-------------------------------|------------------|------------|------------|-----------------|-----------------|------------------|------------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| 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 | 0.01 | 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 | 98.6 | 98.0 | 98.5 | 98.6 | 98.7 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | HA12 S0.1 0.1 | HA12 S0.5 0.5 | FT1 S0.1 0.1 | FT1 S0.3 0.3 | HA15 S0.1 0.1 | |
|-------------------------------|--------------|--------------------|------------------|-----------------|-----------------|------------------|-------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-15 | 18-39303-16 | 18-39303-19 | 18-39303-20 | 18-39303-23 |
| 1-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| 2-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Acenaphthene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Acenaphthylene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Anthracene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Benz[a]anthracene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.04 | <0.02 | <0.02 |
| Benzo[a]pyrene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | 0.06 | <0.01 | <0.01 |
| Benzo[b]&[j] fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.07 | <0.02 | <0.02 |
| Benzo[g,h,i]perylene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.04 | <0.02 | <0.02 |
| Benzo[k]fluoranthene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | 0.03 | <0.01 | <0.01 |
| Chrysene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | 0.06 | <0.01 | <0.01 |
| Dibenz(a,h)anthracene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoranthene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.10 | <0.02 | <0.02 |
| Fluorene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Indeno(1,2,3-cd)pyrene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | 0.04 | <0.01 | <0.01 |
| Naphthalene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | <0.01 | <0.01 | <0.01 |
| Phenanthrene | mg/kg dry wt | 0.01 | <0.011 | <0.01 | 0.03 | <0.01 | <0.01 |
| Pyrene | mg/kg dry wt | 0.02 | <0.02 | <0.02 | 0.09 | <0.02 | <0.02 |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 0.03 | 0.03 | 0.09 | 0.03 | 0.03 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | <0.01 | <0.01 | 0.08 | <0.01 | <0.01 |
| Anthracene-d10 (Surrogate) | % | 1 | 100.3 | 99.1 | 100.0 | 99.8 | 100.0 |

| Client Sample ID | | HA15 S0.5 0.5 | HA19 S0.1 0.1 | HA19 S0.5 0.5 | HA17 S0.1 0.1 | HA17 S0.5 0.5 | |
|-------------------------------|--------------|--------------------|------------------|------------------|------------------|------------------|-------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-24 | 18-39303-25 | 18-39303-26 | 18-39303-27 | 18-39303-28 |
| 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 | 0.01 | 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 | 99.0 | 96.2 | 97.6 | 99.0 | 99.6 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | | HA18 S0.1 0.1 | HA18 S0.5 0.5 | HA21 S0.1 0.1 | HA24 S0.1 0.1 | HA21 S0.5 0.5 |
|------------------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-29 | 18-39303-30 | 18-39303-32 | 18-39303-33 | 18-39303-34 |
| 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 | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |

| | Client | Sample ID | HA18 S0.1 0.1 | HA18 S0.5 0.5 | HA21 S0.1 0.1 | HA24 S0.1 0.1 | HA21 S0.5 0.5 |
|-------------------------------|--------------|-----------|------------------|------------------|------------------|------------------|------------------|
| | Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Anthracene-d10 (Surrogate) | 110 % 1 | | 99.9 | 99.0 | 98.5 | 99.4 | 100.1 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | HA22 S0.1 0.1 | HA22 S0.5 0.5 | HA16 S0.1 0.1 | HA16 S0.5 0.5 | HA20 S0.1 0.1 | |
|-------------------------------|--------------|--------------------|------------------|------------------|------------------|------------------|-------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-35 | 18-39303-36 | 18-39303-37 | 18-39303-38 | 18-39303-39 |
| 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 | 0.01 | 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 | 99.0 | 100.3 | 96.7 | 98.0 | 96.6 |

Polycyclic Aromatic Hydrocarbons - Soil

| Client Sample ID | | | HA20 S0.5 0.5 | HBH5 S0.1 0.1 | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 |
|------------------------------|--------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-40 | 18-39303-41 | 18-39303-42 | 18-39303-43 | 18-39303-44 |
| 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 |

| | Client | Sample ID | HA20 S0.5 0.5 | HBH5 S0.1 0.1 | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 |
|-------------------------------|--------------|------------|------------------|------------------|------------------|------------------|------------------|
| | Da | te Sampled | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| 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 | 0.03 |
| 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 | 0.03 |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 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 | 97.7 | 98.3 | 95.6 | 97.8 | 99.8 |

Polycyclic Aromatic Hydrocarbons - Soil

| | Client Sample ID | | | | | | | |
|-------------------------------|------------------|--------------------|-------------|--|--|--|--|--|
| | Da | te Sampled | 21/12/2018 | | | | | |
| Analyte | Unit | Reporting Limit | 18-39303-45 | | | | | |
| 1-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| 2-Methylnaphthalene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Acenaphthene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Acenaphthylene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Anthracene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Benz[a]anthracene | mg/kg dry wt | 0.02 | <0.02 | | | | | |
| Benzo[a]pyrene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Benzo[b]&[j] fluoranthene | mg/kg dry wt | 0.02 | <0.02 | | | | | |
| Benzo[g,h,i]perylene | mg/kg dry wt | 0.02 | <0.02 | | | | | |
| Benzo[k]fluoranthene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Chrysene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Dibenz(a,h)anthracene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Fluoranthene | mg/kg dry wt | 0.02 | <0.02 | | | | | |
| Fluorene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Indeno(1,2,3-cd)pyrene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Naphthalene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Phenanthrene | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Pyrene | mg/kg dry wt | 0.02 | <0.02 | | | | | |
| Benzo[a]pyrene TEQ (LOR) | mg/kg dry wt | 0.01 | 0.03 | | | | | |
| Benzo[a]pyrene TEQ (Zero) | mg/kg dry wt | 0.01 | <0.01 | | | | | |
| Anthracene-d10 (Surrogate) | % | 1 | 100.0 | | | | | |

Moisture Content

| Clier | Client Sample ID | | HABH3 S0.5 0.5 | HA11 S0.1 0.1 | HA11 S0.5 0.5 | HA5 S0.1 0.1 |
|--------------------|--------------------|------------|-------------------|------------------|------------------|-----------------|
| Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte Unit | Reporting Limit | 18-39303-1 | 18-39303-2 | 18-39303-4 | 18-39303-5 | 18-39303-7 |
| Moisture Content % | 1 | 19 | 25 | 26 | 22 | 27 |

Moisture Content

| Clier | Client Sample ID | | HA6 S0.1 0.1 | HA6 S0.5 0.5 | HBH4 S0.1 0.1 | HBH4 S0.5 0.5 |
|--------------------|--------------------|------------|-----------------|-----------------|------------------|------------------|
| Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 |
| Analyte Unit | Reporting Limit | 18-39303-8 | 18-39303-10 | 18-39303-11 | 18-39303-13 | 18-39303-14 |
| Moisture Content % | 1 | 25 | 31 | 22 | 24 | 18 |

Moisture Content

| Client Sample ID | | HA12 S0.1 0.1 | HA12 S0.5 0.5 | FT1 S0.1 0.1 | FT1 S0.3 0.3 | HA15 S0.1 0.1 | |
|------------------|------|--------------------|------------------|-----------------|-----------------|------------------|-------------|
| Date Sampled | | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | 20/12/2018 | |
| Analyte | Unit | Reporting Limit | 18-39303-15 | 18-39303-16 | 18-39303-19 | 18-39303-20 | 18-39303-23 |
| Moisture Content | % | 1 | 30 | 24 | 38 | 26 | 25 |

Moisture Content

| Client Sample ID | | HA15 S0.5 0.5 | HA19 S0.1 0.1 | HA19 S0.5 0.5 | HA17 S0.1 0.1 | HA17 S0.5 0.5 | |
|------------------|-------|--------------------|------------------|------------------|------------------|------------------|-------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | |
| Analyte U | nit R | Reporting Limit | 18-39303-24 | 18-39303-25 | 18-39303-26 | 18-39303-27 | 18-39303-28 |
| Moisture Content | % | 1 | 23 | 23 | 22 | 21 | 27 |

Moisture Content

| Client Sample ID | | HA18 S0.1 0.1 | HA18 S0.5 0.5 | HA21 S0.1 0.1 | HA24 S0.1 0.1 | HA21 S0.5 0.5 |
|--------------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte Unit | Reporting Limit | 18-39303-29 | 18-39303-30 | 18-39303-32 | 18-39303-33 | 18-39303-34 |
| Moisture Content % | 1 | 25 | 20 | 26 | 31 | 16 |

Moisture Content

| (| Client Sample ID | | HA22 S0.1 0.1 | HA22 S0.5 0.5 | HA16 S0.1 0.1 | HA16 S0.5 0.5 | HA20 S0.1 0.1 |
|------------------|------------------|--------------------|------------------|------------------|------------------|------------------|------------------|
| Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 | |
| Analyte l | Unit | Reporting Limit | 18-39303-35 | 18-39303-36 | 18-39303-37 | 18-39303-38 | 18-39303-39 |
| Moisture Content | % | 1 | 24 | 16 | 24 | 21 | 24 |

Moisture Content

| Client Sample ID | | HA20 S0.5 0.5 | HBH5 S0.1 0.1 | HBH5 S0.5 0.5 | HA23 S0.1 0.1 | HA23 S0.5 0.5 |
|------------------|----------------------|------------------|------------------|------------------|------------------|------------------|
| | Date Sampled | | 21/12/2018 | 21/12/2018 | 21/12/2018 | 21/12/2018 |
| Analyte Ur | t Reporting Limit | 18-39303-40 | 18-39303-41 | 18-39303-42 | 18-39303-43 | 18-39303-44 |
| Moisture Content | 6 1 | 20 | 25 | 19 | 26 | 29 |

Moisture Content

| | Client | HA24 S0.5 0.5 | |
|------------------|--------|--------------------|-------------|
| | Da | te Sampled | 21/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-45 |
| Moisture Content | % | 1 | 23 |

Total Petroleum Hydrocarbons - Soil

| | Client | FT1 S0.1 0.1 | FT1 S0.3 0.3 | |
|----------------|--------------|--------------------|-----------------|-------------|
| | Da | 20/12/2018 | 20/12/2018 | |
| Analyte | Unit | Reporting Limit | 18-39303-19 | 18-39303-20 |
| C7-C9 | mg/kg dry wt | 10 | <10 | <10 |
| C10-C14 | mg/kg dry wt | 15 | <15 | <15 |
| C15-C36 | mg/kg dry wt | 25 | 149 | <25 |
| C7-C36 (Total) | mg/kg dry wt | 50 | 149 | <50 |

BTEX in Soil

| | Client | t Sample ID | FT1 S0.1 0.1 | FT1 S0.3 0.3 |
|------------------------|--------------|--------------------|-----------------|-----------------|
| | Da | te Sampled | 20/12/2018 | 20/12/2018 |
| Analyte | Unit | Reporting Limit | 18-39303-19 | 18-39303-20 |
| Benzene | mg/kg dry wt | 0.05 | <0.05 | <0.05 |
| Ethylbenzene | mg/kg dry wt | 0.05 | <0.05 | <0.05 |
| Toluene | mg/kg dry wt | 0.05 | 0.08 | <0.05 |
| m,p-xylene | mg/kg dry wt | 0.05 | <0.05 | <0.05 |
| o-xylene | mg/kg dry wt | 0.05 | <0.05 | <0.05 |
| Benzene-d6 (Surrogate) | % | 1 | 101.5 | 104.1 |

Method Summary

Elements in Soil Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).

| 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) |
| 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. |

TPH in Soil Solvent extraction, silica cleanup, followed by GC-FID analysis. (C7-C36)

BTEX in Soil Solvent extraction, followed by Headspace GC-MS analysis. US EPA method 5021A.

Franto

tatont

Sharelle Frank, B.Sc. (Tech) Technologist

Tom Featonby, M.Sc. Technologist

APPENDIX G

Drawing



| NGIORA) LIMITED |
|--------------------|
| ITH BELT, RANGIORA |
| GIORA |

| ADFILE | | | |
|------------|-------|-------|------|
| 70743-2 | | | |
| SCALE (A3) | ORIG. | SHEET | SIZE |
| :2000 | A3 | | |
| RAWING No. | REV. | | |
| 70743-2 | 2 | | |
| | | | |