REPORT

Tonkin+Taylor

Ground Contamination Assessment of Environmental Effects - 78 and 100 Park Terrace and 20 Dorset Street, Christchurch

Prepared for
Ryman Healthcare Limited
Prepared by
Tonkin & Taylor Ltd
Date
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1 Introduction

Ryman Healthcare Limited ("Ryman") engaged Tonkin & Taylor Ltd ("T+T") to undertake a ground contamination assessment for the construction and operation of a comprehensive care retirement village ("Proposed Village") at 78-80 Park Terrace ("Peterborough site"), and 100-104 Park Terrace, 20 Dorset Street and 19 Salisbury Street ("Bishopspark site") in Christchurch (collectively referred to herein as the "Site"). The location of the Site is presented on Figure 1.1 below.

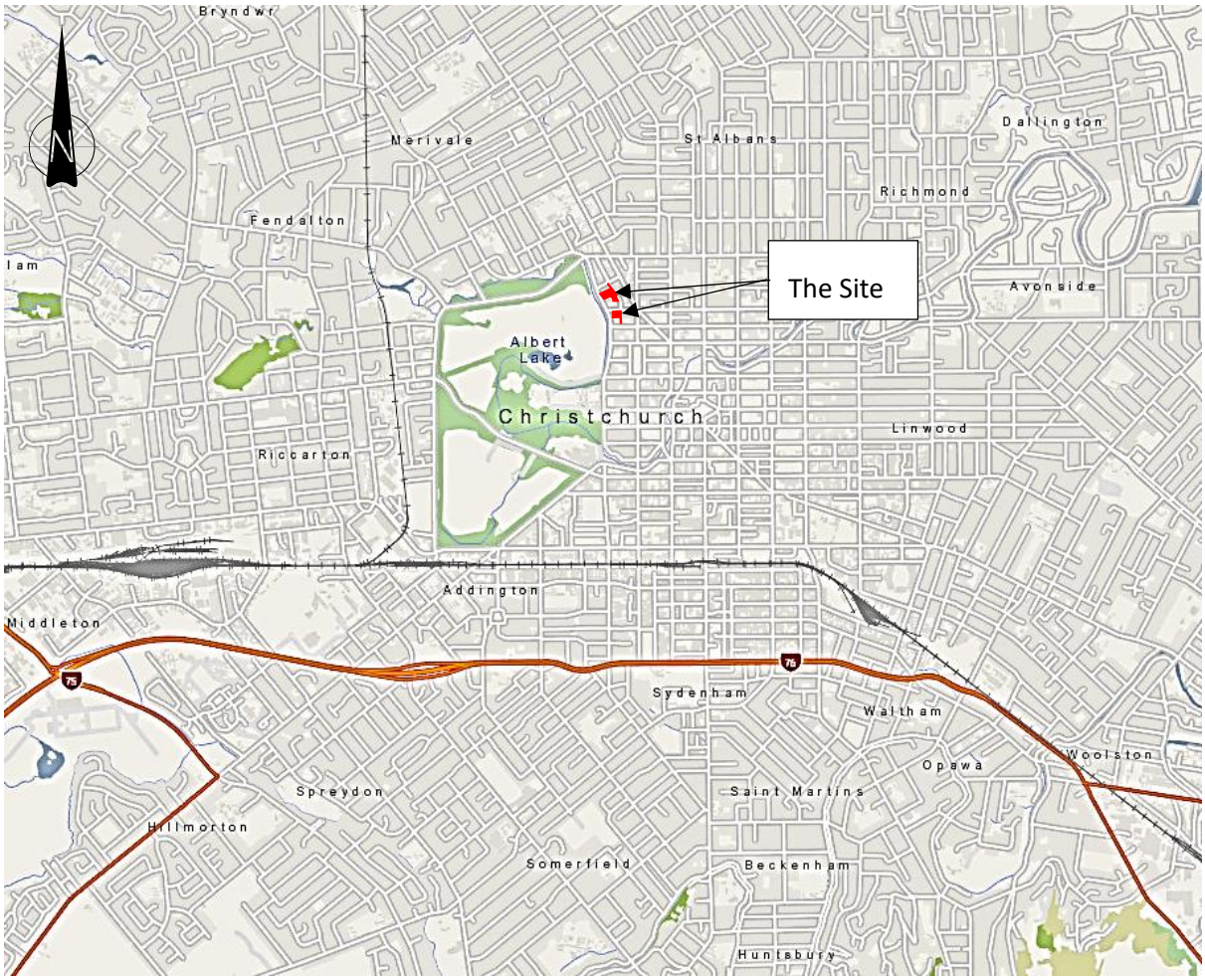


Figure 1.1: Site location plan. Source: LINZ.

T+T has undertaken this assessment to determine whether potentially contaminating activities have occurred at the Site, the potential for these activities to have resulted in ground contamination, and the actual ground contamination present. This report also assesses the potential environmental and human health effects of this contamination and hence what (if any) mitigation of ground contamination is required for the proposed use of the Site. This report provides additional detail in support of the Assessment of Environmental Effects (AEE) prepared for resource consent applications for the Proposed Village.

This report has been prepared in general accordance with the requirements for a Preliminary Site Investigation ("PSI") and Detailed Site Investigation ("DSI") referred to in the NES Soil Regulations ("NES Soil")[1], and as outlined in the Ministry for the Environment's (MfE) Contaminated Land

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

Management Guideline 1[2]. The persons undertaking, managing reviewing and certifying this investigation are suitably qualified and experienced practitioners, as defined in the NES Soil.

The contaminated land, geotechnical engineering, groundwater and civil engineering aspects of design are integrated. This report is to be read together with the Geotechnical Effects Assessment[3], Groundwater Bore Report[4] and Civil Design Report[5].

1.1 Proposed Village

A full description of the Proposed Village is included in the Assessment of Environmental Effects. The Proposed Village will be constructed and operated across the Bishopspark and Peterborough sites as follows:

- Bishopspark site:
  - Village Centre;
  - Care rooms;
  - Assisted living suites; and
  - Apartments.
- Peterborough site:
  - Apartments.

The Proposed Village layout is shown on the plans in Appendix A of this report.

The Proposed Village will include basements across the majority of the Bishopspark and Park Terrace sites, which will require substantial earthworks and the off-site disposal of excavated material. Additional earthworks will be required outside of the basement footprint for services. Stormwater from the operational village will be discharged to the Christchurch City Council reticulated stormwater network.

[2] Ministry for the Environment, updated 2011, Contaminated land management guidelines No. 1: *Reporting on Contaminated Sites in New Zealand*.
[3] Geotechnical Engineering Assessment of Environmental Effects. Ryman Village Park Terrace, Christchurch. Tonkin & Taylor Ltd, February 2020. Ref 30315.V1.
[4] Application to drill a bore. Bishops Park, Christchurch. Tonkin & Taylor Ltd, February 2020. Ref 30315.2000.
[5] Proposed Comprehensive Care Retirement Village, Park Terrace, Christchurch. Civil Engineering Design Report. BECA Limited. Ref NZ1-16471268.

2 Site Description

The Bishopspark site and Peterborough site which together comprise the Site are located to the east of Hagley Park in Central Christchurch, as shown in Figure 2.1. Details for each of these sites are provided in Table 2.1.

Figure 2.1: Approximate boundaries of Bishopspark and Peterborough sites. Image source: Environment Canterbury.

Table 2.1: Site Identification

	Bishopspark site	Peterborough site
Legal description	Lot 1 DP 46369 Lot 1 DP 46511 Pt Sec 23 TN RES Pt Sec 25 TN RES	Lot 1 DP77997
Site area	Approximately 12,000 m^2	Approximately 5,000 m^2
Zoning (Christchurch District Plan)	Residential Central City	Residential Central City

2.1 Site condition

The Bishopspark site is currently occupied by a number of disused single and two storey buildings that are currently being demolished and which are surrounded by hard and soft landscaping. The majority of the buildings currently on the Bishopspark site were constructed in the 1980's and were used as an aged care facility. Photographs 1-4 showing the Bishops park site at the time of T+T soil sampling in 2018 are included in Appendix B. A small chapel, located in the southern part of the site, was constructed in the 1920s and is currently listed as a heritage building. A number of buildings on the Bishopspark site were damaged during the February 2011 earthquake event and subsequently demolished in 2015. Access to the Bishopspark site is via Park Terrace.

The Peterborough site is flat, currently covered in gravel and used for parking vehicles (Photographs 5 and 6, Appendix B). The Peterborough site is fully fenced, with gated access from Peterborough Street. An electrical transformer is located immediately north (off-site) of the site boundary on Salisbury Street.

2.2 Surrounding land use

Land use surrounding the Site is summarised in Table 2.2.

Table 2.2: Surrounding land use

	Bishopspark site	Peterborough site
North	Residential housing.	Residential housing.
South	Residential housing.	George Hotel, offices residential.
East	Commercial buildings – predominantly small retail outlets and cafes.	Residential housing.
West	Avon River and Hagley Park.	Avon River and Hagley Park.

2.3 Geology

Published geological information for the Christchurch area[6,7] shows that the Site is underlain by alluvial sand and silt overbank deposits, underlain by greywacke gravels of the Springston Formation.

[6] Brown L.J. & Weeber J.H (1992). Geology of the Christchurch Urban Area. Institute of Geological and Nuclear Sciences Limited, geological map 1.
[7] Brown L.J. et al. (1995). Geology of Christchurch, New Zealand. Environmental and Engineering Geoscience 1 p.427-488.

Geotechnical investigations have been undertaken by T+T on both the Bishopspark[8] and Peterborough[9] sites. The generalised geological profiles for each site are presented in Table 2.3 and Table 2.4, based on the findings of the geotechnical investigations.

Table 2.3: Generalised geological profile beneath the Bishopspark site

Layer No.	Geological Unit	Typical lithology	Depth to top of layer (m)	Layer thickness (m)
0	Fill/Topsoil	Sandy GRAVEL with trace silt and cobbles. Silty TOPSOIL with trace rootlets	0.0	0.3 – 0.5
1	Yaldhurst Member of Springston Formation	Interbedded firm Sandy SILT and loose SAND/Silty SAND	0.5	2.7 – 3.5
2		Fibrous PEAT and PEAT within very soft SILT matrix	3.2 – 4.0	4.3 – 4.0
3		Loose Silty SAND/firm Sandy SILT	7.5 – 8.0	1.0 – 1.75
3a		Medium dense to dense sandy GRAVEL. Isolated 2.5 m thick area at location BH3; thins out towards the west (i.e. location of BH1).	8.5 – 9.75	0.7 – 1.2
4	Christchurch Formation	Medium dense to dense SAND	8.5 – 10.95	10.5 – 11.75
5		Stiff SILT/Sandy SILT	20.25	1.5
6	Riccarton Gravels	Medium dense to very dense Sandy GRAVEL	21.75	>4.0 (confirmed)

Table 2.4: Generalised geotechnical profile beneath the Peterborough site

Layer No.	Geological Unit	Typical lithology	Depth to top of layer (m)	Layer thickness (m)
0	Fill/Topsoil	Sandy GRAVEL with trace silt, cobbles and building waste comprising concrete, plastic, electrical wiring etc.).	0.0	0.3 – 6.0
1	Yaldhurst Member of Springston Formation	Interbedded firm Sandy SILT and loose SAND/Silty SAND	0.3	0.1 – 3.0
2		Fibrous PEAT and PEAT within very soft SILT matrix	2.7 - 5.5	0.5 – 2.6
3		Loose Silty SAND/firm Sandy SILT	6.3 – 8.0	1.0 – 2
3a		Medium dense to dense sandy GRAVEL and gravelly SAND	7.5 – 9.75	0.8 – 2.2
4	Christchurch Formation	Medium dense to dense SAND	10.9 – 13.7	7.7 - 10
5		Stiff SILT/Sandy SILT	18.9 - 20.1	1.0 - 2.4
6	Riccarton Gravels	Medium dense to very dense Sandy GRAVEL	21 – 21.2	>0.3 to 0.8 (confirmed)

[8] Geotechnical Investigation and Assessment. 100-104 Park Terrace, Christchurch. Tonkin & Taylor Ltd, December 2018. T+T Ref. 30315.

[9] Geotechnical Report, Proposed Retirement Village, 78 Park Terrace, Christchurch. Tonkin & Taylor Ltd. January 2015. T+T Ref 29759.

2.4 Hydrogeology and hydrology

T+T has completed groundwater monitoring using piezometers installed at both the Bishopspark and Peterborough sites during the respective geotechnical investigations.

At the Bishopspark site, groundwater was measured at depths of 1.1-1.3 m below ground level (mbgl). At the Peterborough site, groundwater was measured at depths between 1.3 and 2.2 mbgl. This shallow groundwater forms a water table (unconfined aquifer) in the shallow geology i.e. within 10 m of the surface. Groundwater flow in the shallow water table aquifer at the Site is assumed to be toward the Avon River. Groundwater movement through the shallow deposits (through flow) will be variable across the two sites, with preferential flow through the shallow sand and deeper gravel.

Depth to the water table is likely to be closely related to the water level in the Avon River. As such, groundwater depth is likely to be subject to fluctuations in the Avon River level. Variations in groundwater will also occur in response to rainfall, due to runoff, and yearly and seasonal variations. However, variation by more than ± 0.5 m either side of the median would generally not be expected except in very unusual circumstances.

Deeper groundwater (confined aquifer) exists in the Riccarton gravels at depths greater than 20 mbgl beneath a layer of stiff silt and sandy silt. The Riccarton aquifer has artesian water pressures, meaning the groundwater in this aquifer is pressurised, but is confined by the overlying layers.

A review of the local groundwater bores in the area shows that the closest bore with an active take to the Proposed Village is located approximately 230 northeast of the centre of the Bishopspark site. This bore is owned by Christchurch City Council (CCC) and is reported to be 31.7 m deep with a groundwater take for community supply (likely to be from the confined Riccarton aquifer).

The nearest, most shallow depth bore that is reported to have an active take is located within Hagley Park approximately 530 m southwest of the centre of the Peterborough site. This bore is reported to be 23 m deep and has a groundwater take for domestic supply. The use of this water is unknown. There are no domestic properties in the area and the bore is located beside a recreational boating pond.

2.5 Planning context

The planning context for the Site and the Proposed Village is addressed in the AEE. From a ground contamination perspective, the relevant planning matters to be considered are:

2.5.1 Christchurch District Plan

The Christchurch District Plan does not contain rules relating to the management of the potential effects of contaminated land. Instead it defers to the NES Soil. The relevant objectives and policies for the management of contaminated land, as described in Section 4.2.2 of the Christchurch District Plan, can be summarised as:

- Land containing elevated levels of contaminants is managed to protect human health and the environment;
- The best practice approach should be applied to the investigation and remediation of contaminated land; and
- Remediation should not pose a more significant risk to human health or the environment than if remediation had not occurred.

2.5.2 NES Soil

The NES Soil applies to soil disturbance and land development activities on a site where activities on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) have occurred or have more likely than not occurred. The likelihood of HAIL activities having occurred on the Site is assessed in Section 4. The applicability of the NES Soil to the construction and operation of the Proposed Village is discussed in Section 6.

Matters of control or discretion for consents sought under the NES Soil include the adequacy of site investigation, and the adequacy of the controls proposed to minimise risk to human health during the intended activity.

2.5.3 Canterbury Land and Water Regional Plan

The Canterbury Land and Water Regional Plan (LWRP) includes various rules relating to the discharge of contaminants to ground where they could enter surface water or groundwater.

The rules which specifically relate to the construction and operation of the Proposed Village and which contain contamination specific aspects are:

- Rule 5.120 – the taking and discharge of dewatering water as a restricted discretionary activity;
- Rule 5.93a – the discharge of stormwater or construction phase stormwater into a reticulated system; and
- Rule 5.94b – the discharge of construction-phase stormwater, other than from a reticulated stormwater system, onto or into land where contaminants may enter groundwater or surface water as a restricted discretionary activity;

The relevant objectives and policies for these activities include:

- The effects of discharges of contaminants into or into land where it may enter water (including groundwater) are minimised (policy 4.13);
- Cumulative adverse effects on water quality, existing uses, and values of water and public health from sewage, wastewater or stormwater discharges are avoided (policy 4.15);
- Reticulated stormwater systems within urban areas are managed in accordance with a stormwater management plan (policy 4.16); and
- The loss or discharge of sediment or sediment-laden water or other contaminants to surface water or groundwater from earthworks is avoided, and if not achievable, minimised (policy 4.18).

3 Site History

Historical information relating to the Site has been collected from a variety of sources, including the CCC property files, Environment Canterbury (ECan) Listed Land Use Register (LLUR), historic aerial photographs and current and historical certificates of title, which are included in Appendix C.

This history review focuses on on-site activities, except for the aerial photograph review where comments are also provided on readily observable surrounding land use. The information reviewed is summarised for each of the two site areas in the following sections.

3.1 Bishopspark

The majority of the Bishopspark site was (until acquired by Ryman) under the ownership of the Anglican Church for all of its documented history. The first residence was built at the Bishopspark site for the Anglican Bishop in the 1850s, followed by a new residence in the 1920s along with the small chapel which remains on the site. It is likely that ancillary buildings for the residence were also constructed around this time. The majority of the Bishopspark site comprised landscaped domestic gardens until construction of the Bishopspark retirement village in the mid-1980s.

The main use of the Bishopspark site since the 1980s has been for a retirement village operated by the Anglican Church. While most buildings have remained largely unchanged, some residences were demolished to construct the 'main building' in the early 2000s (eastern boundary) and the former Bishop's residence was demolished in 2015. There are no records on the property files of any storage of dangerous goods on the Bishopspark site.

In the south of the Bishopspark site, a series of small sheds/ buildings were demolished in the 1970s and the land remained largely vacant until a large building (possibly apartments) was constructed in the early 1980s (around the same time as the retirement village). This was replaced with a single-storey building in 2012.

CCC records suggest placement of up to 0.8 m of fill on the Bishopspark site. The filling was, according to CCC, carried out in an uncontrolled manner and comprised "mixed fill with rubbish". The reference to "rubbish" may refer to demolition material. CCC records do not identify the year the filling took place and the Bishopspark site is not recorded on ECan's LLUR.

Key site features are shown on Figure 3.1.

3.2 Peterborough

Titles for the Peterborough site were issued in 1914 and 1915 and from then until the late 1970s it was owned by private individuals and investment companies. In the 1980s, areas of the Peterborough site were owned by a printing company and a teacher training college. Ownership of the Peterborough site was transferred to Park Terrace Developments in 1997. Aerial photographs from 1940 to the late 1990s indicate that the Peterborough site contained residential-sized properties and landscaped gardens.

In the early 2000s, the Peterborough site was cleared and three adjoining apartment buildings were constructed, with associated basement car parking and ground-level hard-surfaced tennis court. These buildings are understood to have suffered significant damage during the 2010-2011 Christchurch earthquakes and were demolished by mid-late 2012. Demolition records indicate that the basement structure was largely removed and that crushed demolition materials were used to backfill the basement void. It is not known if imported fill was used to supplement the site-derived fill.

Key site features are shown on Figure 3.2.

3.3 Listed Land Use Register

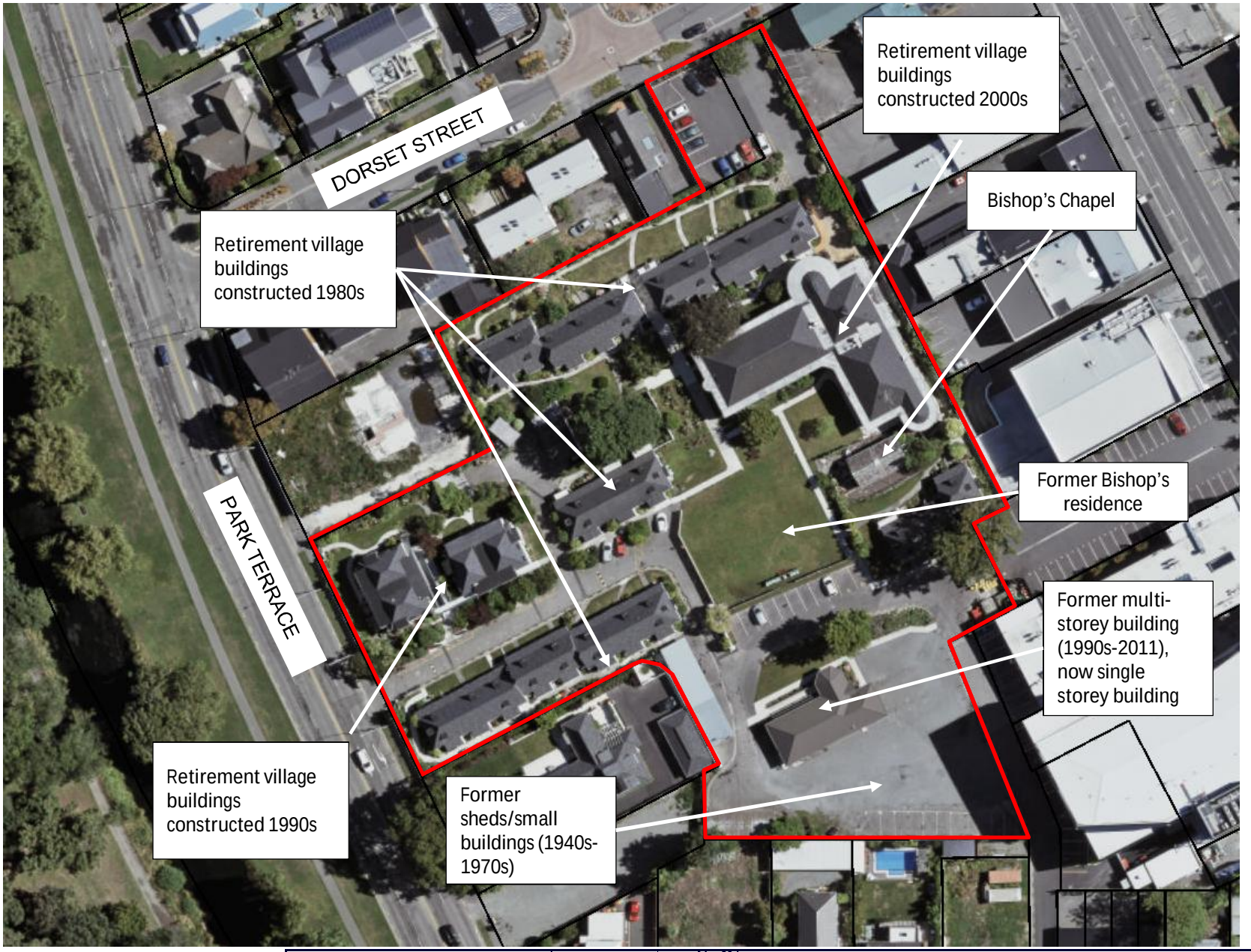
Neither the Bishopspark nor the Peterborough site are recorded on the ECan LLUR. However, a number of HAIL activities are recorded within 100m of the Site boundaries. Table 3.1 summarises the LLUR information for each of the HAIL sites recorded within 100 m of the Site boundaries.

Table 3.1: Summary of HAIL sites within 100 m of Site boundaries

LLUR ID	Details	Potential to impact Proposed Village
197645	Location of former electronics manufacturer.	Low – located nearly 100 m cross/down hydraulic gradient of the Site.
1482	Former Mobil service station. Multiple tanks removed c. 1999. Known soil and groundwater contamination at time of tank removal.	Low – HAIL site located in an anticipated down hydraulic gradient direction of the Site.
1481	Location of former underground diesel fuel tank which was removed in 1999.	Low to moderate – no soil or groundwater sampling data available from time of tank removal. Located immediately east of Site.
3522	Location of former clandestine drug laboratory.	Low - HAIL site surface reportedly fully sealed.
1480	Suspected location of underground diesel fuel tank.	Low – presence of tank not confirmed.
10546	Suspected location of underground diesel fuel tank.	Low – presence of tank not confirmed.
10607	Suspected location of underground diesel fuel tank.	Low – presence of tank not confirmed, located down gradient of Site.
1416	Petroleum hydrocarbon contamination associated with spillage of diesel fuel from underground storage tank.	Moderate – contamination confirmed at HAIL site and is located potentially up gradient of southern end of Peterborough site.
171526	North Hagley Park. Included on LLUR due to suspected historical use of persistent pesticides on sports fields.	Negligible – contaminants generally not environmentally mobile.

3.4 Previous Investigations

ECan and CCC records indicate that there have been no previous ground contamination investigations on either the Bishopspark or Peterborough sites.



LEGEND

Approximate site boundary

Approx Scale

0 10 20 30 40 50 60 70 80 (m)

Notes:
1. Aerial image sourced from Environment Canterbury

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RYMAN HEALTHCARE LIMITED

PROPOSED COMPREHENSIVE CARE RETIREMENT VILLAGE
PARK TERRACE, CHRISTCHURCH
Key Site Features – Bishopspark site

FIG. No. Figure 3.1

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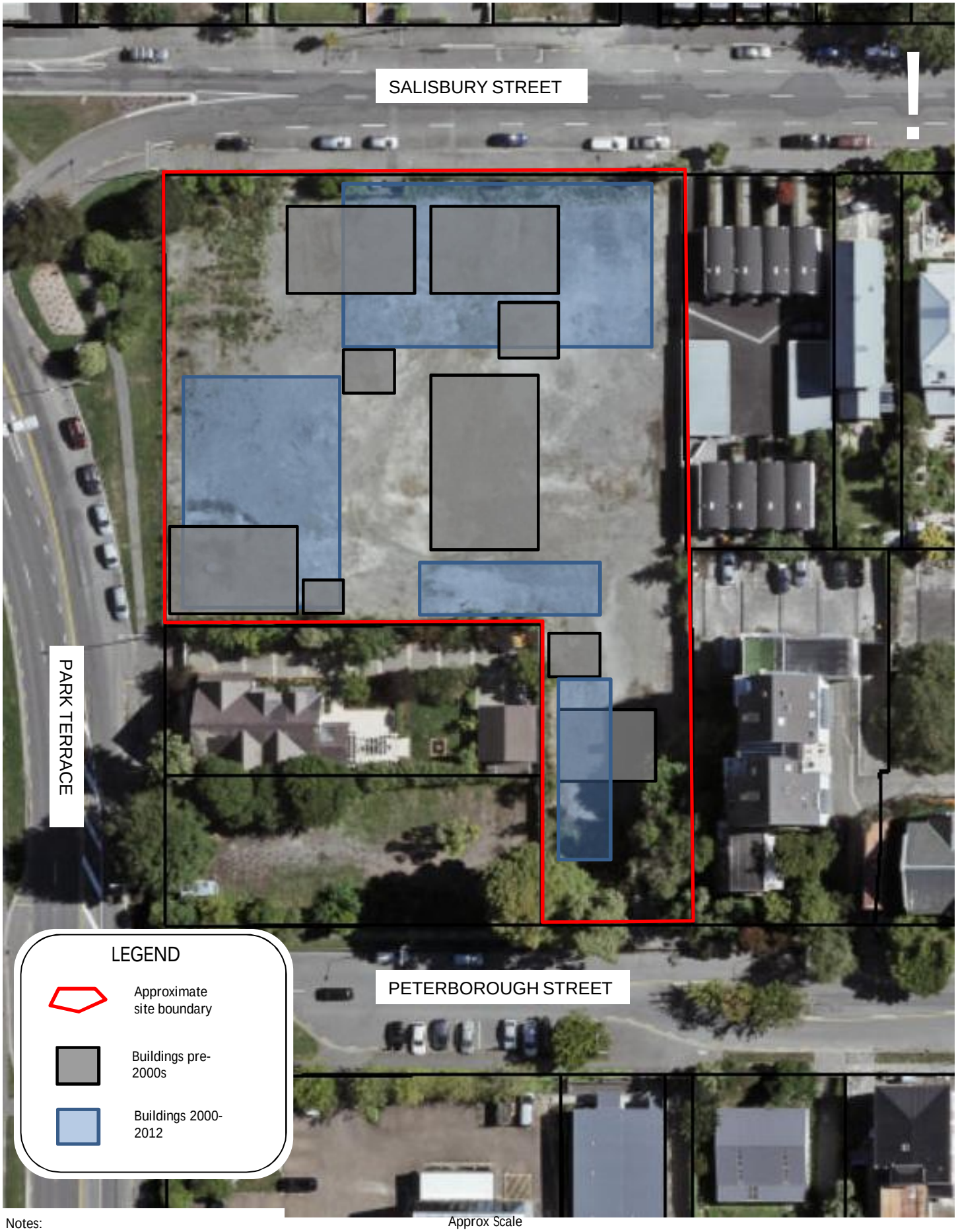

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PROPOSED RETIREMENT VILLAGE
PARK TERRACE, CHRISTCHURCH
Key Site Features – Peterborough Site

FIG. No. Figure 3.2

REV. 0

4 Site Characterisation

This section characterises the likely and potential contamination status of the Site based on the available information as presented in Section 3 of this report.

4.1 Potential for contamination

This investigation has identified that HAIL activities may have been undertaken at and in the vicinity of the Site. The activities, potential contaminants and an assessment of the likelihood, potential magnitude and possible extent of contamination are presented in Tables 4.1(Bishops Park) and 4.2 (Peterborough).

Table 4.1: Potential for contamination – Bishopspark

Land use/activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference
ON-SITE			
Suspected placement of fill on the site.	Wide variety depending on source of fill, potentially including metals, polycyclic aromatic hydrocarbons (PAH) and asbestos.	Up to 0.8 m of surficial fill which may contain demolition materials. There is a moderate to high likelihood of contamination in the fill, including asbestos contamination.	Potentially I – accidental or intentional release of a hazardous substance (if in sufficient quantity to present a risk to human health or the environment).
Demolition of former site buildings.	Lead and asbestos	Likely low potential for asbestos contamination from historic buildings and the demolition of the multi-story building. Potential for lead contamination low as the retirement village built after lead paint was banned in New Zealand.	Potentially I – accidental or intentional release of a hazardous substance (if in sufficient quantity to present a risk to human health or the environment).
Potential historic persistent pesticide use in landscaped areas on the Site.	Primarily copper, potentially organochlorine pesticides (OCPs).	Potential for low levels of copper contamination in topsoil in landscaped gardens. Potential for OCPs is low as most were phased out before the retirement village was built.	A10 – use of persistent pesticides.
OFF-SITE			
Multiple known or suspected fuel storage tanks.	Petroleum hydrocarbons	Low to moderate potential for on-Site soil contamination	Activity H – land that has been subject to the migration of

Land use/activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference
		dependent on proximity of off-site source. Potential for off-site contaminants to be mobilised onto site during construction dewatering.	hazardous substances from adjacent land (if in sufficient quantity to present a risk to human health or the environment).

Table 4.2: Potential for contamination – Peterborough

ON-SITE			
Demolition of former Site buildings (pre 2000)	Lead and asbestos.	The majority of soils were likely removed from the site to a depth of at least 4 mbgl during the excavation of the former basement in the early 2000s. It is therefore unlikely that pre-2000 surface soils remain on the site.	Not applicable.
Print/photography	Metals, solvents, hydrocarbons.		
Demolition of former site buildings and use of demolition fill.	Metals, polyaromatic hydrocarbons (PAHs), asbestos.	Likely low potential for asbestos contamination from demolition of post 2000 buildings as asbestos was unlikely to have been used in these buildings. Potential for metals and PAHs associated with demolition rubble, likely to be widespread based on anticipated depth of filling.	Potentially I – accidental or intentional release of a hazardous substance (if in sufficient quantity to present a risk to human health or the environment).
Potential imported fill.	Variable, depending on source. Cleanfill would not be expected to contain contamination above background levels. Fill derived from the demolition of off-site structures has the potential to contain Metals, PAHs and asbestos.	Variable, depending on source and extent of use.	Potentially I – accidental or intentional release of a hazardous substance (if in sufficient quantity to present a risk to human health or the environment).
OFF- SITE			

Electrical transformer.	It is anticipated that the electrical transformer was installed concurrently with the construction of apartment buildings on the site in the early 2000s and would therefore not be expected to contain PCBs.	Unlikely to be significant.	Not applicable.
Multiple known or suspected fuel storage tanks.	Petroleum hydrocarbons	Low to moderate potential for on-Site soil contamination dependent on proximity of off-site source. Increased potential for off-site contaminants to be mobilised onto site during construction dewatering.	Activity H – land that has been subject to the migration of hazardous substances from adjacent land (if in sufficient quantity to present a risk to human health or the environment).

4.2 Preliminary conceptual site model

A conceptual model as defined by the Ministry for the Environment in the contaminated land management guidelines[10], sets out known and potential sources of contamination, potential exposure pathways, and potential receptors. For there to be an effect from the proposed activity there has to be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

The construction of the Proposed Village at both the Bishopspark and Peterborough sites will include the excavation of the majority of the respective site areas for basements. It is therefore anticipated that little, if any, of the existing soil and fill within 4 m of the ground surface will be retained on site following the construction of the Proposed Village.

Table 4.3 below presents a preliminary conceptual site model and identifies potentially complete pollutant linkages which were subsequently assessed during site investigations (Section 5).

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

Table 4.3: Preliminary conceptual site model

Source	Pathway (s)	Receptor (s)	Potentially complete pollutant linkage?
Metals and asbestos in fill and surface soils from former buildings (including demolition). Pesticides from landscaped areas.	Inhalation, direct contact.	Future site users.	Possibly, if contaminated material retained on the Site and not appropriately managed.
		Construction workers/earthworks contractors.	Yes.
		Members of the public/adjacent residents.	Yes during earthworks.
	Incorrect disposal.	Ecological receptors, groundwater, receiving facility workers.	Yes if contaminated material not disposed to an appropriately licensed facility.
Petroleum hydrocarbons in soil and groundwater mobilised from off-site sources onto the Site during dewatering.	Inhalation, direct contact.	Future site users.	Unlikely given depth to groundwater and likelihood that Site will be predominantly sealed.
		Construction workers/earthworks contractors.	Possible.
	Incorrect disposal.	Ecological receptors, groundwater, receiving facility workers.	Yes if not disposed to an appropriately licensed facility (soil) or appropriately treated prior to discharge (groundwater).

5 Site Investigations

5.1 Investigation approach and scope

T+T has completed the following ground contamination investigations at the Site:

- Soil sampling in accessible areas of the then operational Bishopspark retirement village in November 2018; and
- Soil and groundwater sampling at the Peterborough site in December 2013, with additional soil sampling completed in June 2019.

For the Bishopspark site, the purpose of the 2018 investigation was to:

- Assess for the presence of fill materials, and contaminants within those fill materials;
- Assess for the presence of persistent pesticides within surface soils in landscaped/grassed areas; and
- Assess for the presence of contamination in areas formerly occupied by buildings.

For the Peterborough site, the purpose of the December 2013 investigation was to:

- Assess for the presence of contaminants within fill that had been used to backfill the site; and
- Assess for the presence of petroleum hydrocarbons in groundwater associated with the off-site loss of diesel fuel to ground at a property south of Peterborough Street.

Additional sampling for the presence of asbestos in soils was completed at the Peterborough site in June 2019 to increase the sampling density in line with guidance published in November 2017.

Table 5.1 summarises the scope of investigations completed by T+T at the Bishopspark and Peterborough sites. Investigation locations are shown in Figures 5.1 and 5.2 for Bishopspark and Peterborough, respectively.

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LEGEND

- Approximate site boundary
- BH1 Boreholes
- TR1 Shallow boreholes
- HA1 Hand auger

Approx Scale

0 10 20 30 40 50 60 70 80 (m)

Notes:
1. Aerial image sourced from Environment Canterbury

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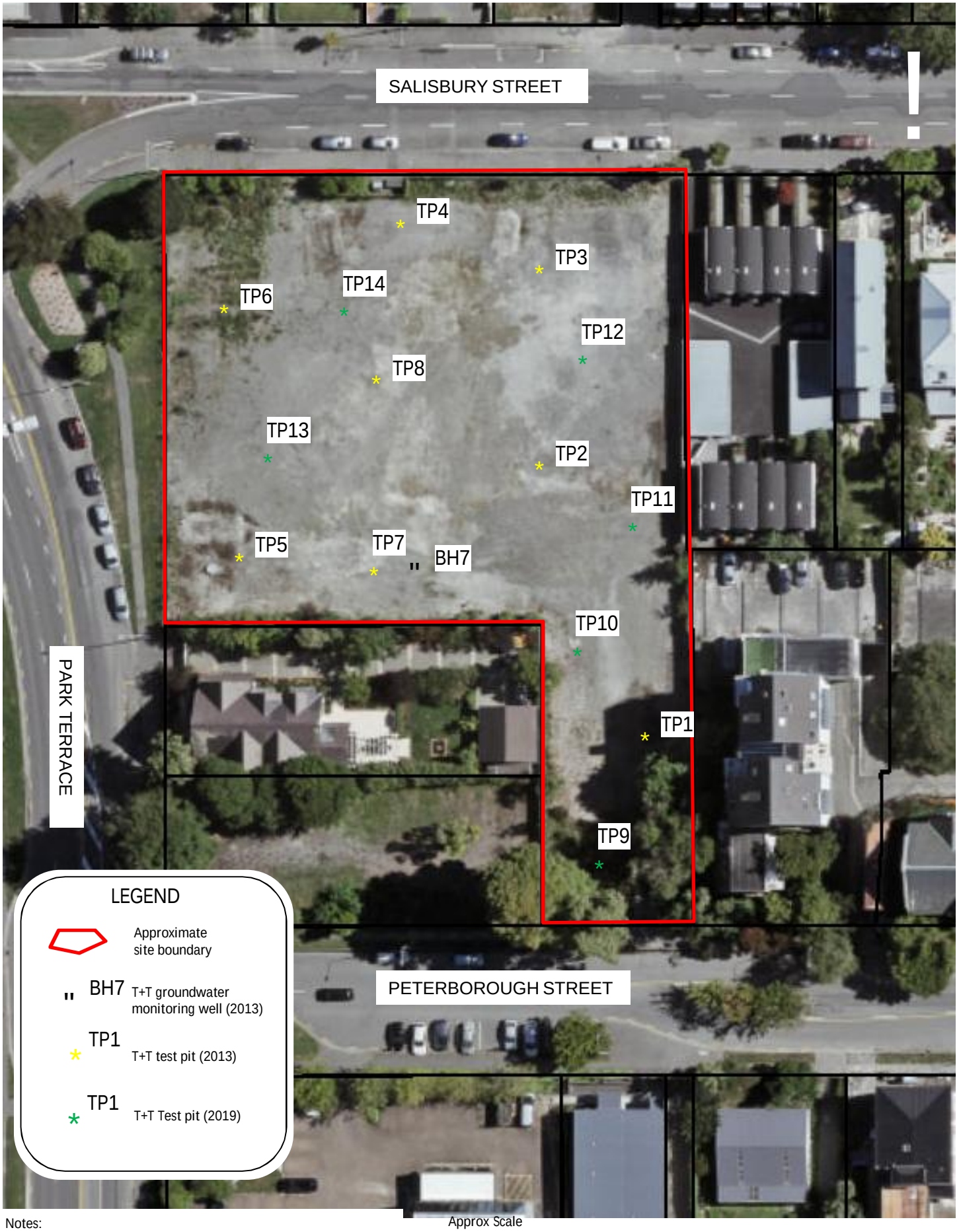
RYMAN HEALTHCARE LIMITED

PROPOSED COMPREHENSIVE CARE RETIREMENT VILLAGE
PARK TERRACE, CHRISTCHURCH
Site investigation locations- Bishopspark site

FIG. No. Figure 5.1

REV. 0



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RYMAN HEALTHCARE LIMITED
PROPOSED RETIREMENT VILLAGE
PARK TERRACE, CHRISTCHURCH
Site investigation locations– Peterborough Site

FIG. No. Figure 5.2

REV. 0

Table 5.1: Summary of site investigation scope

Contaminant source/area of interest	Investigation scope	T+T investigation location
Bishopspark		
Use of persistent pesticides in grassed and landscaped areas	Collection of surface (0-100 m depth) and subsurface soil samples with analysis for metals and organochlorine pesticides (OCPs).	Hand auger locations HA1-HA20.
Historic building demolition	Collection of surface and sub-surface samples with analysis for metals, asbestos (semi-quantitative) and PAHs.	Hand auger locations HA12-HA20 Shallow machine drilled borehole TR1-TR3.
Imported fill	Collection of surface and sub-surface samples with analysis for metals, asbestos (semi-quantitative) and PAHs.	Hand auger locations HA1-HA20 Shallow machine drilled borehole TR1-TR3.
Peterborough		
Fill placement from demolition of former buildings	2013: Soil sampling from eight machine excavated test pits positioned on an approximate grid across the site. Test pits excavated to a maximum depth of 4.0 mbgl. Analysis for metals, PAHs and asbestos (qualitative). 2019: Soil sampling form six test pits excavated to a maximum depth of 2.0 mbgl.	Test pits TP1—TP8. Test pits TP9-TP14.
Petroleum hydrocarbons in in on site soil and groundwater associated with off-site loss of diesel to ground to south of site.	2013: Collection of fill samples from at/near water table in all eight test pits with analysis of total petroleum hydrocarbons and PAHs. Installation of single groundwater monitoring well near southern boundary of site. Collection of groundwater sample from the single monitoring well with analysis for TPH.	TP1-TP8. BH7.

5.2 Methodology

5.2.1 Soil sampling (Bishopspark and Peterborough)

Soil samples were collected in general accordance with the MfE's *Contaminated Land Management Guidelines No.5* ("CLMG5"). Soil samples were collected according to the following procedure:

- The materials encountered were logged in accordance with the NZ Geotechnical Society "*Guideline for the classification and field description of soils and rocks for engineering purposes*";
- Freshly gloved hands were used to collect soil samples from the recovered auger/ borehole core. All samples were placed immediately into 300 ml glass jars;
- Any equipment used to collect the samples was decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent); and
- Samples were shipped in chilled containers to Hill Laboratories, Hamilton (Bishops Park 2018 and Peterborough 2013) and Analytica Laboratories, Hamilton (Peterborough 2019) under chain of custody documentation.

Samples collected for asbestos analysis from the Bishopspark site in 2018 and Peterborough site in 2019 were collected in accordance with the New Zealand Asbestos in Soils Guidelines[11].

5.2.2 Groundwater monitoring well installation and sampling (Peterborough site only)

To assess the potential impact of the historic diesel spill to the south of the Peterborough site (and also the potential impact of the underground storage tank recorded to the south-east of the Peterborough site), a shallow well was installed near the southern boundary of the Peterborough site (BH7)). The well was installed using a rotary coring rig (which was in use for a concurrent geotechnical investigation) on 18 December 2013. A 32 mm diameter PVC well was installed to 3 m depth (slotted to 0.5 m depth).

The well was developed using a Waterra inertial pump and left to settle prior to purging and sampling using a peristaltic pump. Recovered groundwater was placed directly into a laboratory supplied bottle and kept chilled during transport to Hill Laboratories in Hamilton under chain of custody documentation.

5.3 Assessment criteria

Analytical results for soil samples collected by T+T have been compared against the following assessment criteria:

- Published background concentrations in Christchurch urban soils[12];
- The NES Soil Contaminant Standards (SCS) for high-density residential use to assess potential risk to future Site occupants;
- The NES Soil SCS for commercial/ industrial land use for assessing risk to Site workers during earthworks; and
- New Zealand Guidelines for Asbestos in Soil 'all site uses' criteria of <0.001 % w/w asbestos fibres and fibrous asbestos (AF and FA respectively) and 0.04% w/w for Asbestos Containing Material to assess risks to future Site users based on high-density residential land use.

Analytical results for the groundwater sample collected from the Peterborough site in 2013 have been compared against tier 1 groundwater acceptance criteria as derived in the Guidelines for Assessing and Managing Petroleum Hydrocarbon Site in New Zealand (Ministry for the Environment, June 1999) for:

- Route-specific criteria for commercial/industrial land use via the inhalation pathway to assess risk to site workers during excavation and dewatering; and

[11] Guidelines for Assessing and Managing Asbestos in Soils in New Zealand. BRANZ, November 2017.
[12] T+T (2007) Background concentrations of selected trace elements in Canterbury soils. Addendum 1: Additional samples and Timaru specific background levels. Report R07/1/2. Prepared for ECan. Trace level 2 metals.

- Acceptance criteria for potable water use as a surrogate to assess risk to surface water (in the absence of specific ecological assessment criteria for TPH).

5.4 Data quality

A quality assurance and quality control (QA/QC) programme was implemented as part of field procedures, which included:

- Sampling equipment decontamination between sampling locations;
- Preservation of samples with ice during transport from the field to the laboratory;
- Transportation of samples with accompanying chain of custody documentation; and
- Compliance with laboratory sample holding times.

Soil sample analysis was undertaken by Hill Laboratories Ltd and Analytica Laboratories Ltd, which are accredited and audited annually by International Accreditation New Zealand (IANZ). The laboratory's quality control measures include testing of blanks with all batches of samples and frequent replicates and spikes, along with peer review of worksheets.

In addition, one duplicate soil sample was collected during the 2018 Bishopspark investigation and 2013 Peterborough investigation.

A quantitative measure of the overall variability or precision of the soil results was undertaken independently of the laboratory by calculating the relative percentage difference (RPD) for a pair of duplicate samples collected on site. It is typically considered acceptable (refer to MfE Guideline No. 5) if an RPD range of less than 50% is achieved for soil samples. As shown in Tables 5.2 and 5.3 below, all compounds detected within the duplicate samples reported RPD's within this range.

Table 5.2: RPD calculation – Peterborough (2013)

Sample	TP6/0.1	QC03	*RPD %*
Arsenic	3	3	0
Cadmium	<0.10	<0.10	0
Chromium	12	12	0
Copper	6	7	15
Lead	15.2	16	5
Nickel	10	10	0
Zinc	56	50	11

Table 5.3: RPD calculation – Bishops Park (2018)

Sample	TR2 (mg/kg)	DUP (mg/kg)	*RPD %*
Arsenic	6	6	0
Cadmium	< 0.10	< 0.10	0
Chromium	18	17	6
Copper	11	10	10
Lead	34	26	27
Nickel	13	12	8
Zinc	79	69	14

5.5 Investigation findings

5.5.1 Observations

Bishopspark site

Three main strata were observed during the 2018 T+T site investigations as summarised below.

- Topsoil;
  - A thin layer of topsoil (up to 0.1m) was encountered across the site.
- Fill material;
  - Fill material comprising of light brown sandy silt with minor gravels and with traces of demolition material was encountered across the site. Demolition material included small fragments of brick, concrete, asphalt, glass, shards of plastic, burnt wood and metal nails (Photograph 7, Appendix B);
  - With the exception of HA9 to HA11 and HA14, demolition material was observed at all hand auger location and shallow boreholes; and
  - One fragment of suspected ACM was observed at HA18 and collected for asbestos presence/absence (Photograph 8, Appendix B). The piece of suspected ACM was approximately 75 mm by 50 mm and weighed 35 g, and was subsequently confirmed through laboratory analysis as containing asbestos.
- Natural in situ material
  Hand augers in areas with no fill typically observed up to 0.1 m of topsoil overlying dark brown silt and natural clayey silt or yellow brown sand underlying this (HA9, HA10, HA11 and HA14).

No contaminant odours or staining were noted during the site investigation. Groundwater was not encountered during the ground contamination investigation.

Peterborough site

During the 2013 T+T investigation a variable thickness of fill was encountered across the site. The fill comprised crushed concrete and brick with gravel, and was generally observed to a depth of between 3-4 m, but was observed to a depth of 6m within the centre of the site, and less than 1 m in the north western corner of the site. The fill was typically underlain by alluvial and marine deposits comprising silt, sand and gravel. Groundwater was encountered to between 1.7 and 2.0 mbgl.

Evidence of contamination was noted as follows:

- An organic odour similar to gasworks waste was noted within the fill materials in all test pits except TP7;
- Minor hydrocarbon staining was observed on the ground surface adjacent to TP2; and
- Cobble-sized pieces of aged bitumen were identified in fill within TP3, TP7 and TP8.

No suspected asbestos containing material (ACM) was observed within any of the test pits excavated at the Peterborough site by T+T in 2013.

The ground conditions observed during the excavation of the 6 additional test pits in 2019 was consistent with that encountered during the 2013 T+T investigation. No evidence of ACM was noted during the 2019 investigation. Groundwater was encountered at approximately 1.4-1.5 mbgl. No contaminant odours or staining were noted. Test pit logs for the 2013 and 2019 T+T investigations are included in Appendix D.

5.5.2 Analytical results

Full results are presented in Tables E1 (Bishopspark) and E2 (Peterborough), which together with laboratory transcripts are included in Appendix E.

5.5.2.1 Overview

Bishopspark site

- None of the soil samples collected contained metals or PAH concentrations above the health-based criteria for construction worker protection or high-density residential land use scenarios with the exception of one isolated sample at HA4 exceeding PAH criterion within fill material;
- A number of samples contained metals and PAH concentrations exceeding background concentrations. Detected concentrations of PAH and metals in the natural material were below background concentrations;
- Topsoil and fill material across the site contained asbestos contamination:
  - 12 of 44 samples of topsoil and fill material tested reported low concentrations of asbestos below the residential site use 0.001% weight/weight AF+FA[13] criterion;
  - Three samples of topsoil and fill contained asbestos (recorded as AF+FA) at a concentration exceeding the residential land use criterion;
  - A single sample of fill contained asbestos (recorded as ACM (i.e. >10 mm sized fraction)) at a concentration exceeding the residential land use land use criterion; and
  - Suspected ACM, sampled at depth of 0.1-0.2 from HA18, was confirmed by laboratory testing to be asbestos.
- No elevated OCPs above background were detected in the surface samples analysed across the site. OCPs were detected above background within a sub-surface sample collected from the north-western corner of the site.

Peterborough site

The soil analytical results for soil samples collected by T+T from the site in 2013 can be summarised as:

- Asbestos was not detected within any of the 20 samples analysed;
- All detected metal and PAHs concentrations comply with the NES Soil SCS for high density residential land use; and
- Several individual metals and individual PAHs were detected above background concentrations along with minor concentrations of heavy-end petroleum hydrocarbons.

Twenty-one soil samples were collected during the 2019 T+T investigation. Asbestos was detected within two of those 21 samples:

- Asbestos (as AF/FA) was detected at a concentration of 0.0015 % w/w within fill collected from TP10 at 0.25m depth; and
- Asbestos (as ACM) was detected at a concentration of <0.001% within a sample collected from 0.25m depth within TP12.

During the 2013 investigation, a single groundwater sample, collected from BH7 was analysed for TPH. Mid-range hydrocarbons (C_{10}-C_{14}), consistent with diesel fuel, were detected at a concentration of 0.5 mg/l.

[13] Asbestos Fines (AF) and Fibrous Asbestos (FA)

5.5.2.2 Discussion

The contaminant conditions at the Bishopspark and Peterborough sites can be characterised as follows:

- Above background concentrations of metals and PAHs were detected in fill materials that are extensive across both sites. Metal and PAH concentrations were below NES Soil SCS for high density residential and commercial/industrial land use;
- Asbestos was detected in topsoil and subsurface fill on the Bishopspark site at up to 0.039 % w/w (as AF/FA), though detected concentrations of asbestos were generally below the residential AF/FA criteria of 0.001% w/w;
- The origin of fill and asbestos in soils at Bishopspark is unclear. CCC records suggest that up to 0.8m of fill was historically imported to the site, though the records do not indicate when this occurred, and therefore whether this fill is a plausible source of the asbestos detected on site. It is also unknown whether the fill (and asbestos) extends below the existing building footprints or is confined to the exterior areas of the site that were investigated by T+T;
- At the Peterborough site, asbestos was detected infrequently (two of 41 samples) in fill material, with one sample containing a concentration of AF/FA slightly above the 'all site uses' assessment criteria. However, the processing of demolition rubble for use as fill can result in the random distribution of asbestos, and so there is the potential (albeit low) for asbestos to be present anywhere in the fill material at Peterborough Street; and
- There is also evidence of low concentrations of diesel-range petroleum hydrocarbons in groundwater and in fill near the water table at the Peterborough site. This is likely to be associated with the historic diesel fuel loss to ground at an off-site property directly south of the Peterborough site, on the southern side of Peterborough Street.

5.5.2.3 Revised conceptual site model

Based on the site investigation data available, the following potentially complete pollutant linkages have been identified for the construction and operation of the Proposed Village:

- Risks to contractors (in particular earthworks contractors) from exposure to asbestos during earthworks and construction activities;
- Risks to future users and workers from exposure to asbestos if contaminated materials are retained on site (unlikely) and not managed appropriately (i.e. encapsulated);
- Risks to surface water if contaminated groundwater is not appropriately treated and/or disposed as part of dewatering activities; and
- Risks to groundwater, surface water and human health if contaminated materials excavated from the Site are not appropriately disposed.

6 Ground Contamination Assessment of Effects

6.1 Development context

The construction of the Proposed Village will require the excavation of almost the entire area of the Bishopspark and Peterborough sites to a depth of approximately 4 mbgl for the construction of basements. It is unlikely that any excavated material will be retained on Site for reuse.

For the Bishopspark site, excavation for the basement is expected to remove all topsoil and fill. For the Peterborough site, the majority of fill is likely to be removed with the exception of the central area of the Peterborough site where fill extends to approximately 6 mbgl. Dewatering will be required for both sites to enable basement excavation and construction.

6.2 Overview of contaminant conditions

Low levels of metals and PAHs have been detected in fill at both the Bishopspark and Peterborough sites, and while concentrations are generally above background levels they are below levels that would present a risk to future users of the Site or workers that may come into contact with handling fill/soil. Low concentrations of diesel-range petroleum hydrocarbons have been detected in fill near the water table and in groundwater at the Peterborough site, likely associated with an historic off-site diesel spill. The concentrations of petroleum hydrocarbons detected would not be expected to present a risk to human health.

Asbestos has been detected in topsoil and fill at the Bishopspark site, and to a lesser extent within fill on the Peterborough site. The extent of fill and asbestos in soils on the Bishopspark site cannot be fully defined until existing buildings are removed and additional investigation is completed in the building footprints.

Although asbestos has been detected within a small proportion of fill samples collected from the Peterborough site, it is assumed that there is a low probability of all of the filled area containing low levels of asbestos. This is because it is possible that the asbestos is derived from the crushing of asbestos containing building materials which can result in the random distribution of asbestos in demolition fill such as that present at the Peterborough site.

As the majority of (if not all) contaminated material will be removed from both sites for redevelopment, the risks presented to human health by the presence of ground contamination are predominantly to workers involved in construction earthworks.

6.3 NES Soil

The Christchurch District Plan defers to the NES Soil with respect to rules for the management of contaminated soil. The NES Soil manages the human health effects associated with various activities on a site where a HAIL activity has occurred, or has more likely than not occurred. For the Proposed Village, the NES Soil relates to soil disturbance during development.

Soil and groundwater sampling completed by T+T has identified the following HAIL activities at the Site:

- Activity I - accidental or intentional release of a hazardous substance (if in sufficient quantity to present a risk to human health or the environment) – due to the presence of asbestos in topsoil and/or fill at levels that exceed risk-based criteria for the protection of human health; and
- Activity H –– land that has been subject to the migration of hazardous substances from adjacent land (if in sufficient quantity to present a risk to human health or the environment) – due to the presence of petroleum hydrocarbons in groundwater in the south of the

Peterborough site which are likely associated with an historic off-site release of diesel fuel to ground. Although the NES Soil relates to soil contamination (and soil hydrocarbon levels are unlikely to present a risk to human health), it is relevant to consider groundwater contamination in the context of the Proposed Village as dewatering will be required to enable basement excavation.

Soil disturbance and off-site soil disposal required for the construction of the Proposed Village will exceed the Permitted Activity thresholds set out in Regulation 8(3), and therefore consent under the NES Soil will be required.

We note that under NES Soil Regulation 9, an application can be considered as a controlled activity if a detailed site investigation shows that the soil contamination does not exceed the applicable standard for the current or intended land use. While concentrations of asbestos at both the Bishopspark and Peterborough sites exceed the land use criteria for high density residential land use, it is likely that all contaminated material that is currently present on Site and which could present a risk to human health will be removed during development. Soils remaining on Site once the Proposed Village is constructed would be expected to meet the relevant standards for high density residential land use, and as such we consider that the activity (soil disturbance) can meet the requirements for a controlled activity.

As a precaution, we have assessed the activity against the matters over which CCC has discretion if it were a restricted discretionary activity, noting that in practice the matters for discretion cover the same issues as the matters of control for a controlled activity.

The matters of discretion are summarised in Table 6.1 below together with an assessment against these matters.

Table 6.1: NES Soil restricted matters of discretion

Matter of discretion	Assessment
Adequacy of the detailed site investigation.	The investigation documented in this report has been completed in accordance with CLMG5. Although additional investigation is likely to be undertaken to refine the understanding of the distribution of asbestos in soils at the Bishopspark site, this investigation adequately characterises soil contaminant conditions at the Site for the purposes of assessing risk to human health and options for the management of this risk.
The suitability of the piece of land for the proposed activity.	The Site is considered suitable for the construction and operation of the Proposed Village, subject to controls regarding the excavation, disposal and reuse of asbestos-containing soils.
The approach to the remediation or ongoing management of the piece of land.	Controls will be implemented to mitigate potential health effects on future residents, workers involved in soil disturbance and the general public from exposure to asbestos in soils. These controls will be consistent with industry good practice and will comply with the New Zealand Guidelines for Assessing and Managing Asbestos in Soils (2017) and Health and Safety (asbestos) Regulations 2016. Asbestos containing materials will be excavated and disposed off-Site. In the unlikely event that asbestos contaminated materials are retained on site they will be encapsulated under buildings or sealed areas, or a combination of disposal and encapsulation. During excavation and handling, dust suppression and earthworks controls will be employed to control the generation of airborne asbestos. In the unlikely event that contaminated materials are retained on Site, these will be placed beneath sealed areas or building footprints, and a Long Term

Matter of discretion	Assessment
	Management Plan will be prepared to document ongoing management controls.
The adequacy of the site management plan or the site validation report, or both, as applicable.	A Site Management Plan ("SMP") will be prepared in accordance with CLMG1 that will document the controls and procedures required in the event that asbestos contained on Site and/or removed and disposed off-Site. A framework SMP, which provides a summary of the anticipated SMP controls is include in Appendix F. A Site Validation Report ("SVR") will be prepared to document the completion of asbestos remediation or management works. This report will be prepared in accordance with CLMG1.
The transport, disposal and tracking of soil and other materials taken away in the course of the activity.	All materials removed from the Site will be disposed to a facility that is licensed to accept them. Material disposal and documentation procedures will be set out in the SMP. The SVR will report on the nature, volume and destination of materials disposed off-Site.

6.4 Land and Water Regional Plan

The key contamination-related matters of the LWRP that are most relevant to the construction of the Proposed Village are:

- Rule 5.120 – the taking and discharge of dewatering water as a restricted discretionary activity;
- Rule 5.94b – the discharge of construction-phase stormwater, other than from a reticulated stormwater system, onto or into land where contaminants may enter groundwater or surfacewater as a restricted discretionary activity; and
- Rule 5.93A – the discharge of operational phase stormwater to a reticulated system as a permitted activity.

The contamination-related matters over which ECan has discretion and an assessment against those matters is summarised in Table 6.2.

Table 6.2: LWRP matters of discretion

Matter of discretion	Assessment
Rule 5.120 - taking and discharge of dewatering water as a restricted discretionary activity	
The actual and potential environmental effects of not meeting the condition or conditions of Rule 5.119.	An assessment of potential effects associated with dewatering is provided in the Groundwater Bore Report[4].From a contamination perspective, the key effects of dewatering and subsequent discharge of water are: - The potential to modify the groundwater regime such that contaminants present in groundwater off-site are mobilised and drawn into the Site; and - The discharge of contaminated dewatering water into the CCC reticulated stormwater system and from there into the Avon River. The SMP for the Proposed Village will include procedures for the monitoring and treatment of dewatering water. As a minimum, dewatering water will be treated to reduce suspended sediment content to 50 mg/l before discharge. Additional treatment to reduce petroleum hydrocarbon concentrations may also be incorporated, if required and based on advice from a contaminated land specialist.

Matter of discretion	Assessment
Rule 5.94b the discharge of construction phase stormwater into potentially contaminated or contaminated land as a restricted discretionary activity	
The actual and potential effects of the discharge on the quality of surface water, aquatic ecosystems, Ngai Tahu cultural values.	With the exception of hydrocarbons encountered on the Peterborough site, the key contaminants either do not present a risk to groundwater (asbestos in soils) or have not been detected at concentrations likely to generate elevated concentrations in groundwater (metals, PAHs). Petroleum hydrocarbons may be present in groundwater and saturated soil at the Peterborough site. The discharge of construction phase stormwater to ground on the site is unlikely to significantly increase hydrocarbon concentrations in groundwater as there is no evidence indicating that there is a significant source of hydrocarbon exists in the unsaturated zone that is likely to be mobilised by infiltrating stormwater.
The actual and potential effects of the discharge on the quality and safety of human and animal drinking water.	With the exception of hydrocarbons encountered on the Peterborough site, the key contaminants either do not present a risk to groundwater (asbestos in soils) or have not been detected at concentrations likely to generate elevated concentrations in groundwater (metals, PAHs). Petroleum hydrocarbons may be present in groundwater and saturated soil at the Peterborough site. The discharge of construction phase stormwater to ground on the site is unlikely to significantly increase hydrocarbon concentrations in groundwater as there is no evidence indicating that there is a significant source of hydrocarbon exists in the unsaturated zone that is likely to be mobilised by infiltrating stormwater.
Rule 5.93A– the discharge of stormwater or construction-phase stormwater into a reticulated system as a permitted activity.	
Written permission has been obtained from the owner of the reticulated stormwater system that allows entry of the stormwater into the reticulated stormwater system.	It is understood that initial discussions have been held with CCC and approval in principal subject to the agreement of conditions regarding discharges during high rainfall events.

7 Recommendations and Conclusions

Based on the ground contamination investigations completed to date, we recommend and conclude the following:

- In terms of soil contamination, we consider the Site is suitable for the Proposed Village, subject to the implementation of controls to manage risks to human health associated with asbestos and to manage environmental risks associated with hydrocarbons.
- Additional investigations must be completed to assess the extent of asbestos in soils contamination on the Bishopspark site. These investigations should include the sampling of soil and fill within the current building footprints. Analysis should include asbestos, with sampling and analysis completed in accordance with the New Zealand Guidelines for Asbestos in Soils.
- Due to the presence of soil contamination above criteria for high-density residential land use and worker protection (asbestos) and background/ambient levels (metals, PAHs), controls will be required relating to the on-Site management and off-site disposal of contaminated soils during construction.
- During the disturbance of these materials to remove off Site standard earthworks controls supplemented with personnel and equipment decontamination, signage and segregation, dust controls, personal protective equipment can be implemented to manage the low potential for exposure to asbestos.
- It is considered that as a minimum, settlement and/or flocculation of dewatering discharge will be required to comply with discharge criteria for suspended solids. Additional treatment may be required to reduce petroleum hydrocarbon concentrations in groundwater discharge. The scope of groundwater treatment should be determined by a contaminated land specialist prior to discharge occurring on the basis of pre-discharge sampling and analysis.
- The controls, monitoring and pre-discharge testing required should be documented in an SMP, the provision of which should be condition of contamination-related resource consents sought for the construction of the Proposed Village.

Providing these recommendations are implemented, the human health and environmental contamination effects will be negligible. The Site is therefore considered suitable for the Proposed Village from a contamination perspective.

8 Applicability

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

We understand and agree that our client will submit this report in support of an application for resource consent and that Canterbury Regional Council and Christchurch City Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
	
.....	.....
Paul Walker	Pierre Malan
Technical Director	Project Director

PEW
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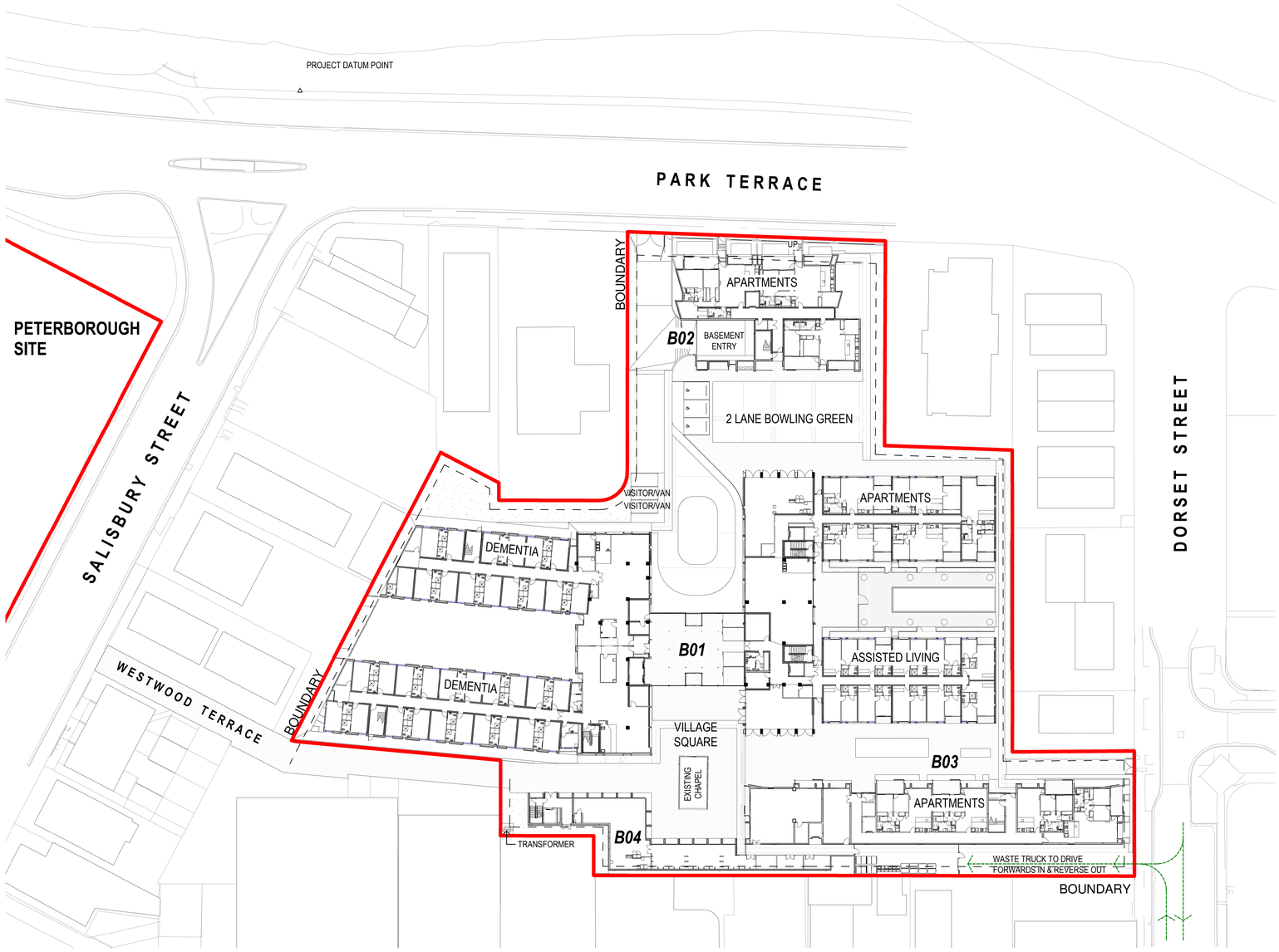
Appendix A: Proposed Village Plans



SITE INFORMATION

SITE ADDRESS: 100 PARK TERRACE, CHRISTCHURCH
SITE AREA: 12290m2

WASTE MANAGMENT STRATEGY

- All village centre waste is transferred to the waste room by the staff.
- Residents in Apartments can dispose of rubbish in the bin rooms located in each apartment building. All apartments have a nurse call facility for assistance if required. The bins are transferred to the waste room by staff.
- Assisted Living Suites and Care room are fully serviced by staff who will transfer waste to the waste room.

CCC waste management truck route

1. AREA FOOTPRINTS

Name	Count	Total Area
B01 FOOTPRINT	1	3952.27 m²
B02 FOOTPRINT	1	684.12 m²
B03 FOOTPRINT	1	858.69 m²
B04 FOOTPRINT	1	440.06 m²
Grand total: 4		5935.14 m²

3. CAR PARKS

Comments	Count
90 DEGREE	135
ACCESSIBLE	3
ON GRADE VAN	3
PARALLEL	3
Grand total: 144	

4. APARTMENT MIX

Building	Apartment Type	Count
BUILDING B01	APT - 1 BED	7
BUILDING B01	APT - 2 BED	35
BUILDING B01	APT - 3 BED	2
BUILDING B01: 44		
BUILDING B02	APT - 1 BED	1
BUILDING B02	APT - 2 BED	5
BUILDING B02	APT - 3 BED	13
BUILDING B02: 19		
BUILDING B03	APT - 1 BED	2
BUILDING B03	APT - 2 BED	20
BUILDING B03: 22		
Grand total: 85		

5. CARE UNIT MIX

Building	Care Unit Type	Count
BUILDING B01	ALS	54
BUILDING B01	DEM	6
BUILDING B01	DEMENTIA	29
BUILDING B01	HOSPITAL CARE	20
BUILDING B01	REST HOME CARE	15
BUILDING B01: 124		

Revisions

A 25/10/19 RESOURCE CONSENT DRAFT
B 13/12/19 RESOURCE CONSENT
C 09/03/20 FOR INFORMATION

Notes

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Project Title

PARK TERRACE
SITE ONE
BISHOPSPARK

Drawing Title

SITE .S01
PROPOSED SITE PLAN - GROUND

Drawing Issue

RESOURCE CONSENT

Drawing Details

Scale	As indicated @ A1
Date	09/03/20
Job No	8917
Drawn	WM Team
Checked	TDH

Drawing No .S01 .A0-030

Revision C

WARREN AND MAHONEY®

Revisions

—

A 25/10/19 RESOURCE CONSENT DRAFT
B 13/12/19 RESOURCE CONSENT
C 09/03/20 FOR INFORMATION

Notes

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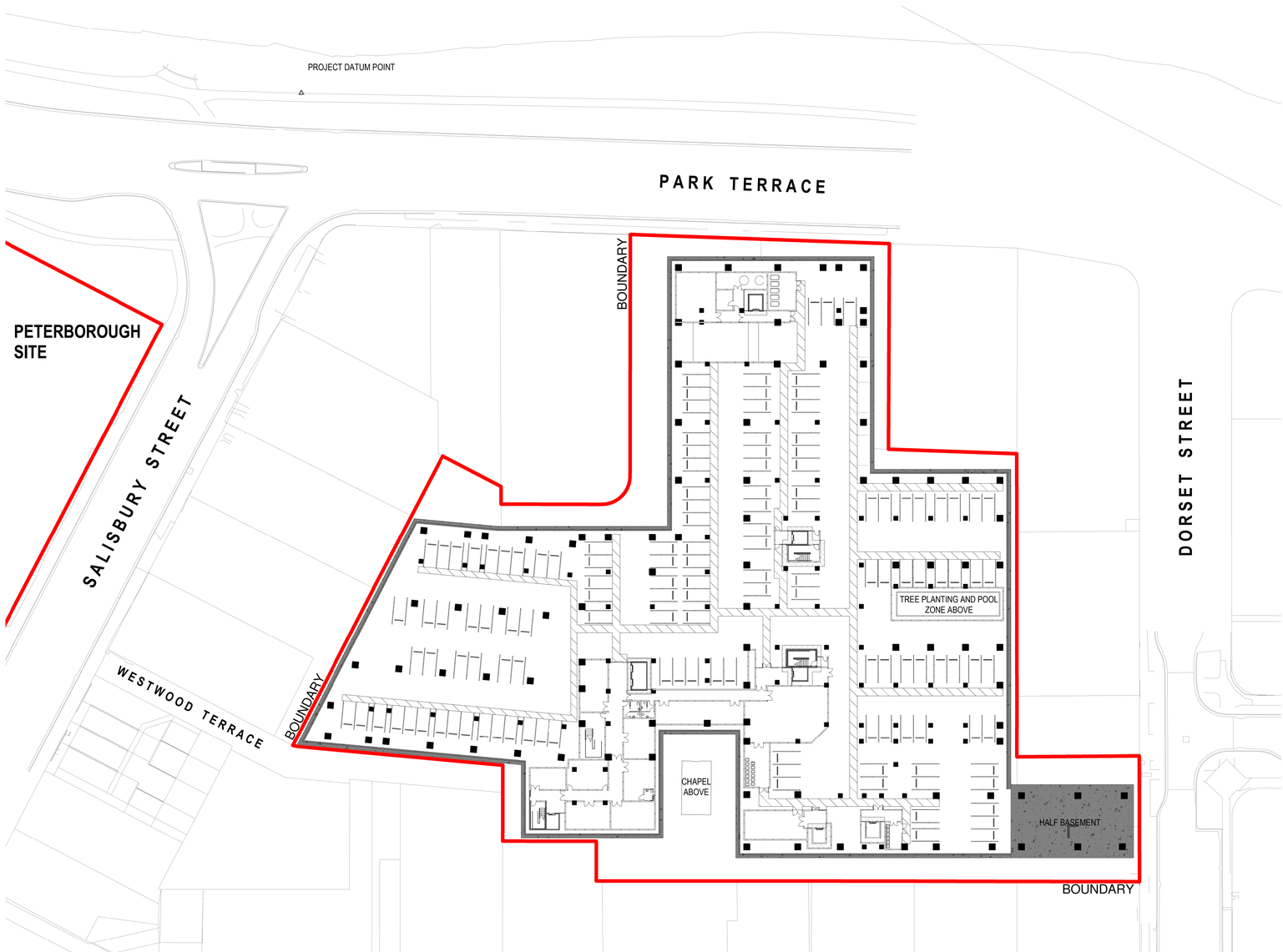

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Project Title

—

PARK TERRACE
SITE ONE
BISHOPSPARK

Drawing Title

—

SITE .S01
PROPOSED SITE PLAN
- BASEMENT

Drawing Issue

RESOURCE CONSENT

Drawing Details

—

Scale	1 : 500 @ A1
Date	09/03/20
Job No	8917
Drawn	WM Team
Checked	TDH

Drawing No **Revision**

—

.S01 .A0-040 C

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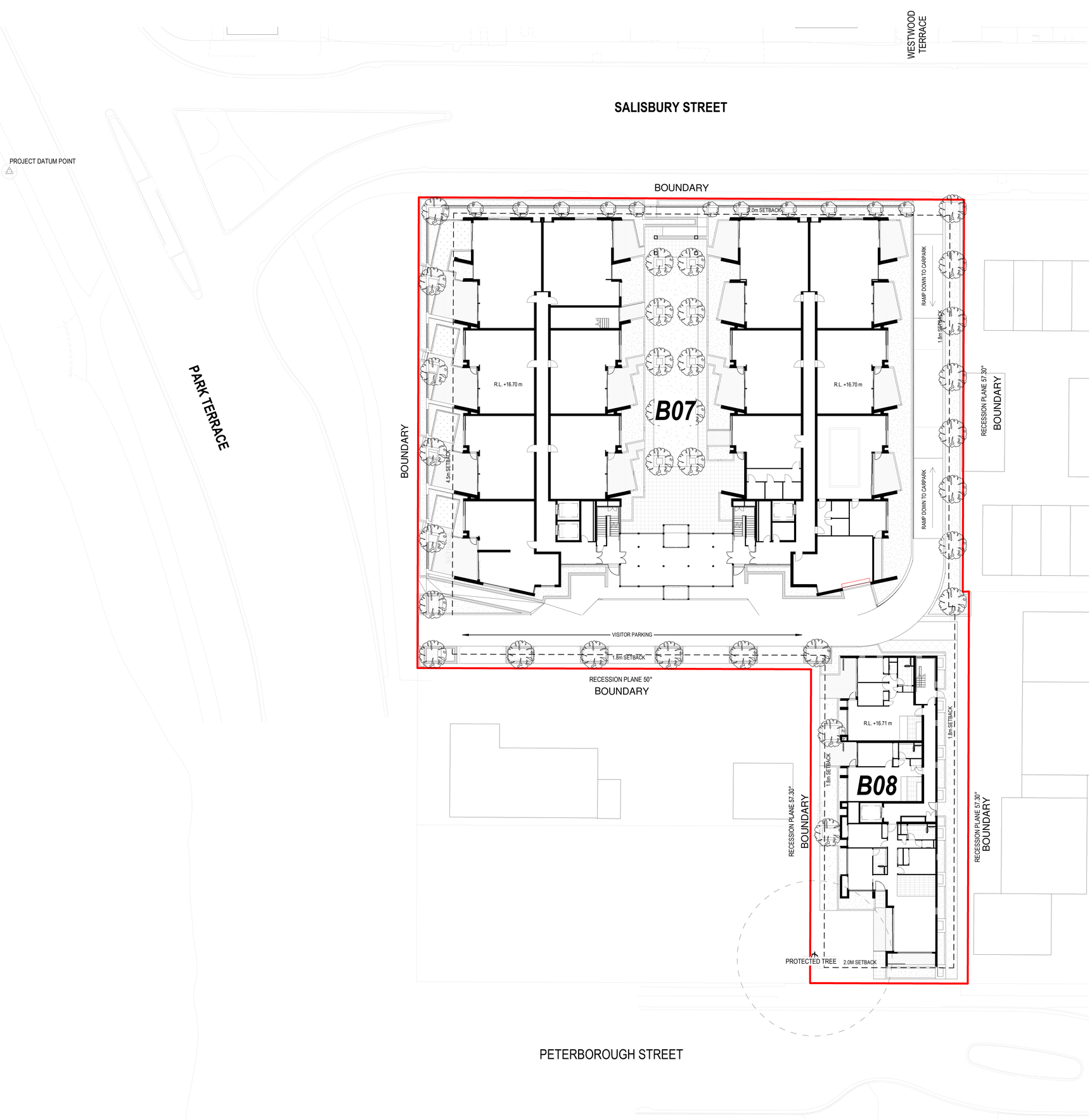

1. AREA FOOTPRINTS

Name	Count	Total Area
B07 FOOTPRINT	1	2047.44 m²
B08 FOOTPRINT	1	448.15 m²
Grand total: 2		2495.59 m²

3. CAR PARKS

Comments	Count
LEVEL 0	
90DEG PARKS	67
ACCESSIBLE PARKS	2
DOUBLE BANKED PARKS	8
PARALLEL PARKS	3
LEVEL 1	
PARALLEL PARKS	5
Grand total: 85	

4. APARTMENT MIX

Name	Count
APT - 1 BED	4
APT - 2 BED	53
APT - 3 BED	23
Grand total: 80	

Revisions

A	22/11/19	COORDINATION SET
B	18/12/19	DRAFT RESOURCE CONSENT
C	09/03/20	FOR INFORMATION

Notes

N
TRUE NORTH

Client

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Project Title

PARK TERRACE
SITE TWO
PETERBOROUGH

Drawing Title

SITE .S02
PROPOSED SITE PLAN
- GROUND

Drawing Issue

RESOURCE CONSENT

Drawing Details

Scale	1 : 250 @ A1
Date	09/03/20
Job No	8899
Drawn	WM Team
Checked	TDH

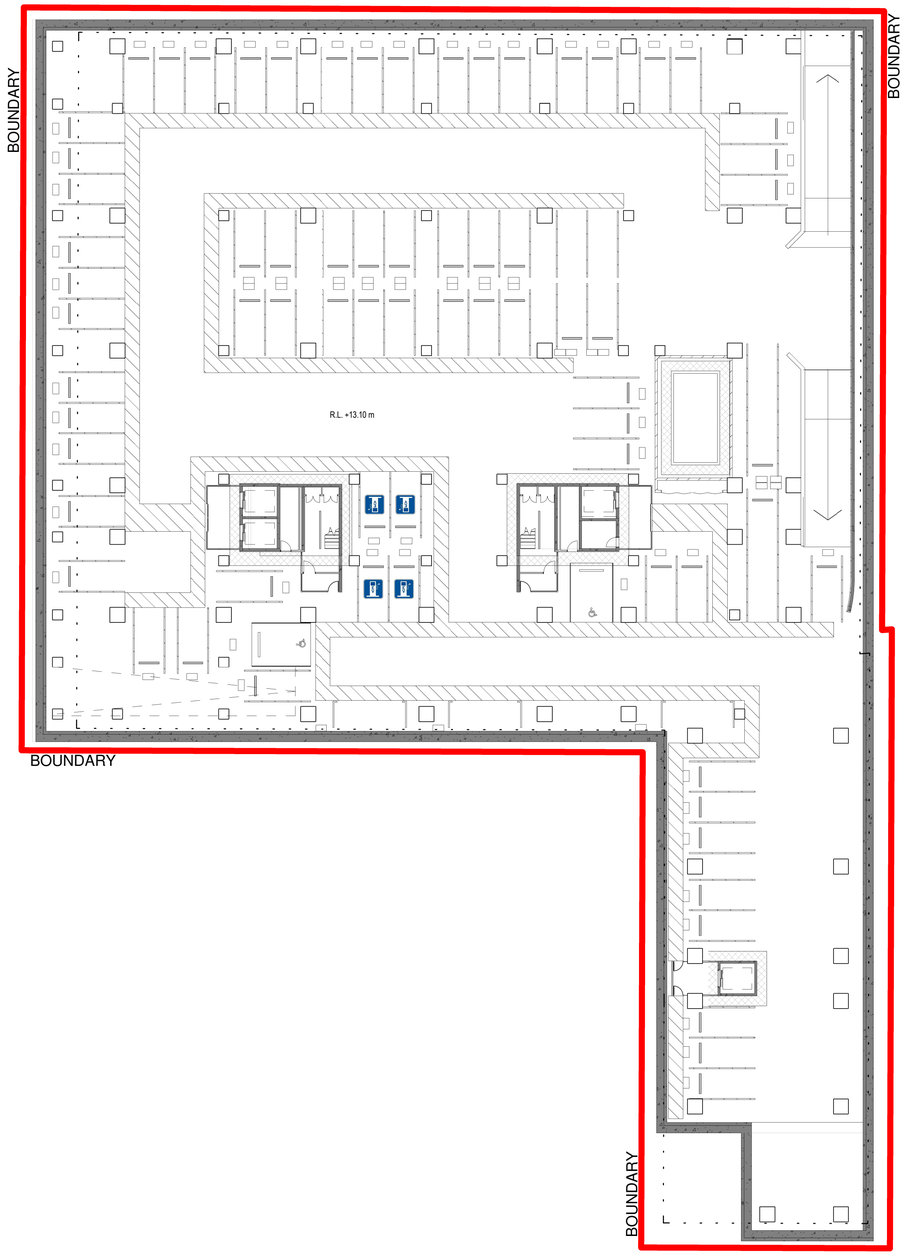
Drawing No .S02 .A0-030 **Revision** C

WARREN AND MAHONEY®

Revisions

A	22/11/19	COORDINATION SET
B	18/12/19	DRAFT RESOURCE CONSENT
C	09/03/20	FOR INFORMATION

Notes



1 A0-060 **PROPOSED SITE PLAN - BASEMENT**

A1 sheet scale = 1 : 250
A3 sheet scale is twice scale shown above

N
TRUE NORTH

Client

RYMAN HEALTHCARE

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Appendix B: Site Photographs

Photograph 1: BISHOPSPARK - Location of the former Bishops' residence (demolished 2015) and typical landscaped lawns across the site.

Photograph 2: BISHOPSPARK - Utility shed containing small quantities of agrichemicals (domestic weed-killers and copper-based pesticides). Another utility shed (dark structure at the left hand side of the picture) is used for laundry cleaning.

Photograph 3: BISHOPSPARK – Building located in the southern portion of the site with surrounding gravel car park (former location of the 7-storey structure).

Photograph 4: BISHOPSPARK – Typical layout of residences and ground conditions at the site. The fencing at the right of the image prevents access to the historic chapel which was damaged during the 2011 Canterbury earthquakes.

Photograph 5: PETERBOROUGH – Site layout looking south east from northern boundary.

Photograph 6: PETERBOROUGH – Site layout looking east from western boundary.

Photograph 7: BISHOPSPARK – Typical fill material encountered in hand augered soil bores.

Photograph 8: BISHOPSPARK – ACM observed at 0.1 m depth at hand auger location HA18...

Appendix C: Site History Information

Historical information relating to the site has been collected from a variety of sources. The information presented documents on-site activities, except for the aerial photograph review where comments are also provided on readily observable surrounding land use. The information that has been reviewed is summarised in this appendix.

C1 Certificates of title

Bishopspark

T+T conducted a review of current and historic certificates of titles. The review shows that all four properties are currently under a single title. Previous titles are summarised as follows:

- 104 Park Terrace was previously owned by the Church Property Trustees Ltd and prior to that, by a series of private owners;
- The larger portion of 100 Park Terrace, including the small part of the site bordering Dorset Street, was also previously owned by Church interests and prior to that by several private owners;
- The southern two lots of 100 Park Terrace have a similar history, although it is noted that the property titles originally extended south to Salisbury Street; and
- The oldest titles available date to 1901 and 1925 and were issued to private persons.

No HAIL activities are indicated by the property ownership records. We note that several covenants have been listed on recent titles. We have not undertaken a review of the covenants where they do not indicate potential contamination sources.

Peterborough Street

T+T conducted a review of current and historic certificates of titles. This information indicates the following with respect to ownership and use of the Site:

- The oldest titles reviewed were issued in 1914 and 1915 and identify that the site was occupied by residential sized lots;
- The titles were held by private individuals and investment companies until the late 1970s;
- The majority of the central area of the site was transferred to Colour Prints Limited in 1984, then to Prec Institute Company Limited in 1987, the remainder of the site was transferred to Prec Institute Company Limited in 1988, for the purposes of a teachers' training college; and
- The site was transferred to Hobson Properties Limited, and then to Park Terrace Developments in 1997.

C2 Historical aerial photographs

Historic aerial photographs were obtained from the Canterbury Maps online interactive map and Google Earth and reviewed. Relevant features of the Site and surrounds are summarised from each aerial photograph in the tables below.

Summary of aerial photograph review - Bishopspark

Aerial photograph (date and source)	Key points identified	Surrounding land features
1940-1944 Canterbury Maps	There is a large residential house in the centre of the property, surrounded by landscaped grounds that largely extend toward the north. A small church is visible on the central western boundary. There is a small residential house bordering Dorset Street. The southern portion of the site contains a series of small sheds/buildings. Two of these are located close to the large residential house (possible garden sheds). Large trees are present on the eastern boundary.	Surrounding land is predominantly low-density residential with Hagley Park present to the west.
1955-1959 Canterbury Maps	The large residential house and smaller one on Dorset Street remain. Landscaping has progressed with fences and large trees present. A house has been constructed at 104 Park Terrace. The sheds/ buildings in the south of the site remain but the photo clarity means it is not possible to tell if any have been added or removed.	Residential housing density has improved on surrounding sites.
1965-1969 Canterbury Maps	The site remains largely unchanged compared to the previous photograph. A domestic vegetable garden can be seen on the northwest boundary.	Development has continued on surrounding properties, with commercial buildings now visible to the east of the site (appear to be offices and potentially small industrial buildings)
1970-1974 Canterbury Maps	The majority of the site remains unchanged relative to the previous photograph. The southern two lots have had all sheds/ buildings and trees removed (except for the ones closely associated with the large residential house) and are now occupied by a car park (or possible storage yard. eastern two-thirds) and vacant land (western third).	Development of surrounding land has continued, with residential housing to the north and south of the site and commercial land to the east.
1975-1979 Canterbury Maps	The site is largely unchanged relative to the previous photograph. The house fronting Dorset Street has been demolished.	No significant changes relative to the previous photograph.

Aerial photograph (date and source)	Key points identified	Surrounding land features
1980-1984 Canterbury Maps	The existing retirement village has been constructed at the site. The property fronting Dorset Street remains vacant and both the large residential house, the church and the house at 104 Park Terrace remain, along with two small buildings associated with the large residential house (possible garden sheds). The majority of the site is occupied by a series of 11 large units, some of which are adjoining. There are landscaped gardens and paths leading between them. A square shed is visible on the western boundary between two units. There appears to be a large building in the southern two lots, with storage/ yard area surrounding it.	No significant changes relative to the previous photograph.
1990-1994 Canterbury Maps	The site remains largely unchanged compared to the previous photograph, although the photograph quality is not good enough to ascertain details.	No significant changes relative to the previous photograph.
2004 Google Earth	Some of the units on the western boundary have been removed and replaced by a large L-shaped 'main building'. Another building has been constructed at 104 Park Terrace. There are no other significant changes on site relative to previous photographs.	No significant changes relative to the previous photograph.
2007 Google Earth	No significant changes relative to the previous photograph.	No significant changes relative to the previous photograph.
2009 Google Earth	The quality of this photo allows more site features to be seen. Nine of the original 'units' remain on the site, along with the original large residential house, the two houses/ buildings at 104 Park Terrace and the church. The quality of the photo means that the building in the south can be identified as a multi-storey building, possibly an apartment block. A series of small buildings/ sheds are located in the northwest of the site near 104 Park Terrace.	Residential property has intensified in the north and the south of the site (including terrace housing and a small apartment building to the north). Commercial property remains to the east and Hagley Park to the west.

Aerial photograph (date and source)	Key points identified	Surrounding land features
2011 (15 Feb) Google Earth	No significant changes relative to the previous photograph.	No significant changes relative to the previous photograph.
2011 (26 Feb) Google Earth	A blue cover has been placed over the church (assumed earthquake damage). The street frontage with Dorset St is now occupied by a car park that extends to the west. No other significant changes relative to the previous photograph.	No significant changes relative to the previous photograph.
2012 (April) Google Earth	The large apartment style building in the south has been replaced with a smaller (single- or double-storey) house surrounded by sealed parking area. No other significant changes relative to the previous photograph.	Some surrounding buildings have been demolished (assumed earthquake damage) and are now vacant lots.
2012-2015 Google Earth	No significant changes relative to the previous photograph.	Some redevelopment occurring on surrounding properties.
2015 (November) Google Earth	The large residential house and one of the associated small buildings has been demolished and turned into a grassed area.	Some redevelopment occurring on surrounding properties.
2017 Google Earth	No significant changes relative to the previous photograph.	No significant changes relative to the previous photograph.

No specific HAIL activities have been identified in the aerial photograph review. There is potential for historic buildings in the south of the site to have been used for industrial/ commercial purposes, or as garden sheds, although given the domestic nature of the wider site, it is unlikely that any significant commercial use occurred. The retirement village units were constructed at a time when asbestos containing materials (ACM) were still being used in New Zealand, although were being phased out.

Summary of aerial photograph review – Peterborough Street

Aerial photograph (date and source)	Key points identified	Surrounding land features
1941 NZAM/ECan	Three residential dwellings and a shed are located across the site. The north western corner of the site is vegetated, with no structures present.	Avon River and Hagley Park are located across Park Terrace, immediately west of the site. The Peterborough Centre (former Christchurch Teachers' Training College) is present to the east of the site, on Peterborough Street. The remaining surrounding properties appear to be residential.

Aerial photograph (date and source)	Key points identified	Surrounding land features
1946 NZAM/ECan	Extensions have been made to the shed. No other significant changes to the layout and use of the site are evident since the previous photograph.	No significant difference between this and the previous photograph.
1955 NZAM/ECan	No significant changes to the layout and use of the site are evident since the previous photograph.	No significant differences are evident between this and the previous photograph.
1965 NZAM/ECan	The north-eastern corner of the site has been developed with a group of four or five buildings that appear to be an extension of the adjacent facility to the east. No other significant changes to the layout and use of the site are evident since the previous photograph.	No significant differences are evident between this and the previous photograph.
1973 NZAM/ECan	An additional building has been constructed in the north-eastern corner of the site. No other significant changes to the layout and use of the site are evident since the previous photograph.	A large building is now located immediately south west of the site. A commercial building is under construction to the south of Peterborough Street.
1984 NZAM/ECan	The group of buildings in the north-eastern corner of the site have been removed and this area is now being used as a car park. Another residential style building has been erected near the centre of the site. The dwelling in the north of the property has been extended.	No significant differences are evident between this and the previous photograph.
1994 NZAM/ECan	The majority of the site is obscured by trees, although no significant changes to the site appear to have occurred.	No significant differences are evident between this and the previous photograph.
2004 Google Earth	All former buildings have been demolished and three large apartment blocks are now present. A tennis court is located near the centre of the site and a landscaped area has been established in the north-western portion. Two smaller buildings are located in the southern portion of the site, and a sealed access way and car parking lot is located along the eastern boundary. The transformer is evident on the northern boundary.	No significant differences are evident between this and the previous photograph
2011 ECan	No significant changes to the layout and use of the site are evident since the previous photograph.	No significant differences are evident between this and the previous photograph

C3 Council property files

Bishopspark

Property files for the Bishopspark site date back to the 1970s, and provide information on the development of buildings and other structures on the site. Key information relating to site use and ground contamination are summarised below:

- Between the 1980s and early 2000s, council issued a number of approvals for new structures to be built around the property including new residences, extensions to carports, sheds, and alterations to existing buildings. Approvals for development of mid-rise buildings for the aged care facility were issued by the council in the early 1980s;
- There are no records indicating the construction of buildings that may be associated with hazardous substances, other than potential chemical storage (e.g. fuel, pesticides) in a shed. However, the timing of building construction in the 1980s suggests that asbestos-containing materials may have been used in the building construction. There are no records related to above-ground or under-ground fuel storage tanks on the site;
- A number of site reports refer to the presence of 'rubbish fill' in the top 0.8 m of ground across the site, related to historic uncontrolled filling activities, and soft ground/peat soil encountered below the fill. The year the filling occurred is unknown;
- Starting in the early 2000s, a number of historic buildings (including some that were built in the 1980s) were demolished and replaced by new structures;
- Historic buildings, including the heritage-listed Bishop's residence, were heavily damaged in the 2011 Canterbury earthquakes and subsequently demolished in 2015. Council records state that all demolition materials from the Bishop's residence were disposed to an accredited disposal facility; and
- The site is currently listed as an archaeological site on the New Zealand Heritage List/Rarangi Korero, and there are a number of protected trees on the property.

Peterborough Street

The bulk of the information related to planning issues surrounding the former apartment block, protected trees and internal fit outs. Relevant information obtained from the property files review is summarised as follows:

- A building consent application was submitted for a swimming pool/spa pool room in 1982. The location of the pool onsite was not clear;
- Three buildings were demolished in 1998;
- The apartment buildings were constructed in 1998. The development comprised 115 residential units, a full basement and pool; and
- An oil water separator was located in the northwest corner of the basement. This was shown in a site plan dated 1998.

Dangerous goods information was also requested from the Christchurch City Council on 10 December 2013. However, no dangerous goods information is held for the site.

C4 ECan contamination enquiry

A Listed Land Use Register (LLUR) report was obtained from ECan on 13 Mark 2020 and identifies all recorded HAIL sites located within 100m of the site boundary.

There are no HAIL sites identified within the Site itself, though 10 HAIL sites are located within 100 m of the Site.

The majority of the HAIL sites relate to the known or suspected storage of fuel in above ground or underground storage tanks. ECan holds records of contamination investigations for three of the 10 HAIL sites, and of the three, one is recorded as having significant adverse environmental effects. This site (#1416) relates to the loss of an estimated 3,000l of diesel in July 2002 from an underground storage tank located at the George Hotel, approximately 50 m south of the Peterborough Street site. The most recent file notes for this HAIL site indicates that as of January 2003, 0.114 m of hydrocarbon product was measured on groundwater within the tank pit.

Another HAIL site (#1482) relates to the former Mobil Victoria Street service station, located approximately 100 m east of the Bishopspark site. Monitoring of the HAIL site in 2001 indicated that petroleum hydrocarbons were present at concentrations above commercial/industrial land use criteria.

C5 Other documents

Bishopspark

The Christchurch District Plan includes a "Listed Place Heritage Assessment" for the Former Bishop's Chapel and Setting at the site (heritage item number 1305, report updated March 2017). The document contains the following key information with regard to the construction of the church and original Bishop's house (the demolished large residential building formerly located in the centre of the site):

- The original residence was constructed for use by the Bishops of Christchurch in 1858 and burnt down in 1927;
- The chapel was constructed in 1927 alongside the new Bishop's residence. Chapel construction includes a slate roof and black pine details on the interior;
- The residence was used as a family home as well as for church functions; and
- Several trees across the site are stated to be 'listed' and were part of the original gardens. This indicates that very little ground disturbance is likely to have occurred around those trees for the duration of their time at the site.

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

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.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

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

Date:	13 March 2020	
Land Parcels:	Lot 1 DP 46369	Valuation No(s): 2268014900
	Part Section 25 TN RES Christchurch	Valuation No(s): 2268015400
	Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
	Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,226

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200A

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268 035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,226

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200A

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,22680

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,22680352

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200A

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268 035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268 035200AC,2268035200AD,2268035200AE,22680

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,22680352

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,226

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200A

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,22680

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,22680352

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200A

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268 035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,226

	8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520 0BZ,2268035200C,2268035200CA,2268035200CB ,2268035200CC,2268035200CD,2268035200CE,2 268035200CF,2268035200CG,2268035200CH,226 8035200CI,2268035200CJ,2268035200CK,226803 5200CL,2268035200CM,2268035200CN,2268035 200CO,2268035200CP,2268035200CQ,226803520 0CR,2268035200CS,2268035200CT,2268035200C U,2268035200CV,2268035200CW,2268035200CY, 2268035200CZ,2268035200D,2268035200E,2268 035200F,2268035200G,2268035200H,226803520 0I,2268035200J,2268035200K,2268035200L,2268 035200M,2268035200N,2268035200O,22680352 00P,2268035200Q,2268035200R,2268035200S,22 68035200T,2268035200U,2268035200V,2268035 200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,226 8035200AC,2268035200AD,2268035200AE,22680 35200AF,2268035200AG,2268035200AH,2268035 200AI,2268035200AJ,2268035200AK,2268035200 AL,2268035200AM,2268035200AN,2268035200A O,2268035200AP,2268035200AQ,2268035200AR, 2268035200AS,2268035200AT,2268035200AU,22 68035200AV,2268035200AW,2268035200AX,226 8035200AY,2268035200AZ,2268035200B,226803 5200BA,2268035200BB,2268035200BC,22680352 00BD,2268035200BE,2268035200BF,2268035200 BG,2268035200BH,2268035200BI,2268035200BJ, 2268035200BK,2268035200BL,2268035200BM,22 68035200BN,2268035200BO,2268035200BP,2268 035200BQ,2268035200BR,2268035200BS,226803 5200BT,2268035200BU,2268035200BV,22680352 00BW,2268035200BX,2268035200BY,226803520

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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
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Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200

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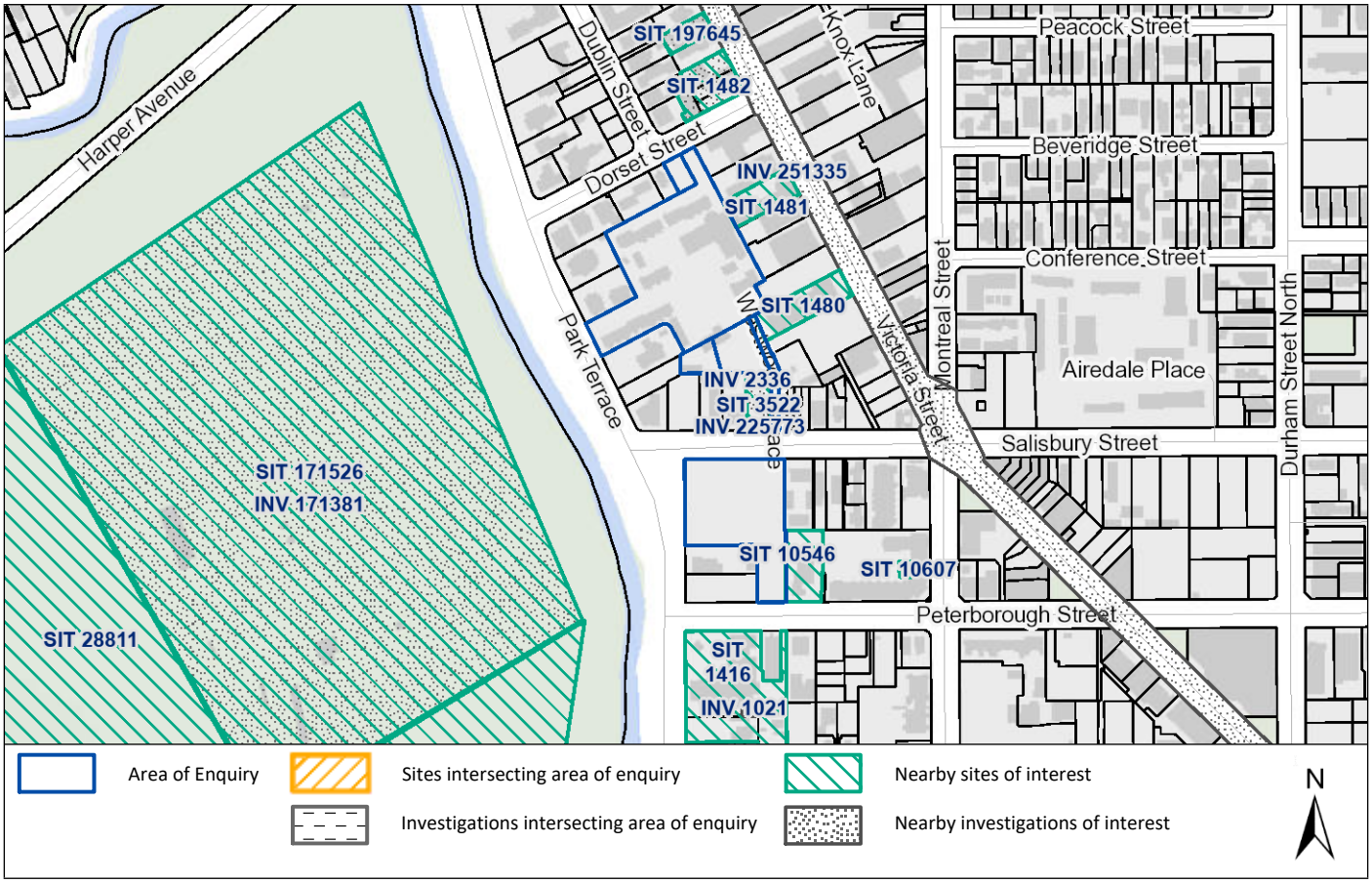
Lot 1 DP 77997	Valuation No(s): 2268035200A,2268035200AA,2268035200AB,2268035200AC,2268035200AD,2268035200AE,2268035200AF,2268035200AG,2268035200AH,2268035200AI,2268035200AJ,2268035200AK,2268035200AL,2268035200AM,2268035200AN,2268035200AO,2268035200AP,2268035200AQ,2268035200AR,2268035200AS,2268035200AT,2268035200AU,2268035200AV,2268035200AW,2268035200AX,2268035200AY,2268035200AZ,2268035200B,2268035200BA,2268035200BB,2268035200BC,2268035200BD,2268035200BE,2268035200BF,2268035200BG,2268035200BH,2268035200BI,2268035200BJ,2268035200BK,2268035200BL,2268035200BM,2268035200BN,2268035200BO,2268035200BP,2268035200BQ,2268035200BR,2268035200BS,2268035200BT,2268035200BU,2268035200BV,2268035200BW,2268035200BX,2268035200BY,2268035200BZ,2268035200C,2268035200CA,2268035200CB,2268035200CC,2268035200CD,2268035200CE,2268035200CF,2268035200CG,2268035200CH,2268035200CI,2268035200CJ,2268035200CK,2268035200CL,2268035200CM,2268035200CN,2268035200CO,2268035200CP,2268035200CQ,2268035200CR,2268035200CS,2268035200CT,2268035200CU,2268035200CV,2268035200CW,2268035200CY,2268035200CZ,2268035200D,2268035200E,2268035200F,2268035200G,2268035200H,2268035200I,2268035200J,2268035200K,2268035200L,2268035200M,2268035200N,2268035200O,2268035200P,2268035200Q,2268035200R,2268035200S,2268035200T,2268035200U,2268035200V,2268035200W,2268035200X,2268035200Y,2268035200Z
Part Section 23 TN RES Christchurch	Valuation No(s): 2268014900
Lot 1 DP 46511	Valuation No(s): 2268014900
Part Section 23 TN RES Christchurch	Valuation No(s): 2268014100



The information presented in this map is specific to the area within a 100m radius of property you have selected. Information on properties outside the serach radius 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
1416	The George Hotel	50 Park Terrace, Christchurch	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Significant Adverse Environmental Effects
1480	Formerly MAF, now Clinic of Natural Medicine etc.	131 Victoria Street, Christchurch	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Not Investigated
1481	Formerly HE Perry Ltd.	145 Victoria Street, Christchurch	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Not Investigated
1482	Mobil Victoria Street / Victoria Street Motors / Carlton Service Station	161 Victoria Street, Christchurch	F7 - Service stations;F3 - Engine reconditioning workshops;	Contaminated - Industrial/Commercial
3522	2/17 Salisbury Street	2/17 Salisbury Street, Christchurch Central, Christchurch	A14 - Pharmaceutical manufacture;	Not Investigated
10546	15 Peterborough Street	15 Peterborough Street, Central City, Christchurch	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Not Investigated
10607	22/25 Peterborough Street	22/25 Peterborough Street, Central City, Christchurch	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Not Investigated
28811	North Hagley Park	Hagley Park	A10 - Persistent pesticide bulk storage or use;	Not Investigated
171526	Carlton Mill Corner - North Hagley Park	Carlton Mill Corner - North Hagley Park	A10 - Persistent pesticide bulk storage or use;	Below guideline values - Recreation
197645	167 Victoria Street, Christchurch	167 Victoria Street, Christchurch	B3 - Electronics;	Not Investigated

Please note that the above table represents a summary of sites and HAILs intersecting the area of enquiry within a 100m buffer.

Information held about the sites on the Listed Land Use Register

Site 1416: The George Hotel (Within 100m of enquiry area.)

Site Address: 50 Park Terrace, Christchurch

Legal Description(s):	Lot 1 DP 37827,Lot 2 DP 12364,Lot 2 DP 1973

Site Category:	Significant Adverse Environmental Effects
Definition:	Site investigation demonstrates that sediment, groundwater or surface water is significantly contaminated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
?	Current	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

5 Jun 1999 1993: One 9000 L UST, 3(c) product. Information received on 18/6/99 suggests that the UST was removed in 1993 and that soil tests were taken. A DG inspector was present. Now on site is a 5000 L UST, 3(c) product. Installed in about 1996, double-skinned.

11 Jul 2002 3,000 L diesel leak reported to Enforcement (Ken Baxter). The leak occurred on 9 July 2002 when incorrect connections were made up and diesel was pumped down the tank pit monitoring well instead of into the heating system. Petrotec are involved in pumping the diesel out of the monitoring well. On 11 July 2002 the majority (over 2,800L) had been recovered. Daily withdrawal of diesel are to continue.

8 Feb 2005 Daily withdrawal of diesel was continued throughout July 2002, when frequency was reduced to weekly, and then three monthly.

The amount of product discharged into the monitoring bore was estimated at 3,000 litres. However, Petrotec recovered in excess of 3,000 from the well, indicating that the estimate was inaccurate, and the precentage recovery is unknown.

ECan engaged URS to monitor the well on 8 January 2003. The results of the measurements taken during the site visit indicate that there was at least 0.114m floating product on the groundwater table in the monitoring well located within the tank pit of the hotel's diesel UST.

Investigations:

27 Jan 2003 **INV 1021: George Hotel Diesel Spill - Site Visit 8 January 2003** (Detailed Site Investigation)
URS New Zealand Limited

Summary of investigation(s):

The site is currently used as a hotel and will continue to be used for this purpose in the future.

Approximately 3,000 L of diesel was accidentally discharged into a tank pit monitoring well at the site in July 2002. Product was recovered from the well during several events, however as the liquid was a mixture of diesel and water, it not clear how much of the diesel was successfully removed.

During the January 2003 investigation, URS measured a product thickness of 0.114 m. Subsequent product recovery was carried out by Petro-tec in May and July 2003, however no attempt has been made to determine the amount of remaining product or characterise the extent of contamination.

Petro-tec indicated at this time that they intended to undertake regular removal of product from the well, but no records of further monitoring or recovery have been forwarded to ECan.

Further work is required at the site to determine the nature and extent of contamination and assess the risk that it may pose to human health and the environment.

Based on the information held on file, it is proposed to categorise the site as 'Significant Adverse Environmental Effects'.

Site 1480: Formerly MAF, now Clinic of Natural Medicine etc. (Within 100m of enquiry area.)

Site Address:	131 Victoria Street, Christchurch
Legal Description(s):	Lot 1 DP 24313

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
?	?	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

17 May 1999 1993: One 2250 L UST, 3(c) product. Site info received on 27/5/99 which stated there were no tanks on site or hazardous substances as far as the owners know.

Investigations:

There are no investigations associated with this site.

Site 1481: Formerly HE Perry Ltd. (Within 100m of enquiry area.)

Site Address:	145 Victoria Street, Christchurch
Legal Description(s):	Lot 1 DP 4850

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
?	1993	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

17 May 1999 1993: One 4500 L UST, 3(c) product.

1 Feb 2005 CCC Webmap (2004) indicates that the tank was removed in 1999. Soil samples were taken at the time, results unknown.

Investigations:

There are no investigations associated with this site.

Site 1482: Mobil Victoria Street / Victoria Street Motors / Carlton Service Station (Within 100m of enquiry area.)

Site Address:	161 Victoria Street, Christchurch
Legal Description(s):	Lot 1 DP 19914,Lot 1 DP 7238,Part Section 25 TN RES Christchurch,Part Tn Res 25 CITY OF Christchurch

Site Category:	Contaminated - Industrial/Commercial
Definition:	The site has been investigated. Results show that the land has a hazardous substance in or on it that has, or is reasonably likely to have, significant adverse effects on human health and/or the environment.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
?	2001	Service stations including retail or commercial refuelling facilities
?	2001	Engine reconditioning workshops

Notes:

17 May 1999 Christchurch City Council information from 1993: Six UST tanks removed, replaced by three underground storage tanks (USTs), two containing 3(a) product with a total capacity of 100,000 L, and one 30,000 L containing 3(c) product.

Christchurch City Council comments were: "A number of tanks only 6 years old were removed." It was suspected that 30,000 L of fuel had been lost in the ground", missing between the tank and dispenser due to a leaking delivery line. "However after excavating the site no significant amounts of hydrocarbons have been found."

20 Jan 2003 Environment Canterbury information held in consent file CRC930615 indicates that 5 underground storage tanks were removed in 1993 and replaced with 3 new tanks with a total capacity of 130,000 litres.

Details: Tank 1: 50,000 litres, leaded petrol; Tank 2: 50,000 litres unleaded petrol; Tank 3: 50,000 litres diesel fuel. Note: This does not add up to 130,000 so there is an inaccuracy within these figures.

5 Mar 2003 Resource consent for 3 x 50,000L tanks surrendered on 30/10/02. The surrender is documented as being because the service station has been closed and underground storage tanks removed. The site is now used as commercial retail premises.

31 Mar 2005 In September 1992 a leaking fuel line was reported at this site. Canterbury Regional Council issued an abatement notice on 2nd February 1993 for remedial works to remove the hydrocarbon contaminated soils. Ongoing investigative, monitoring and remedial works have been occurring at the site since then, with a final round of sampling carried out and reported on in 1995.

Investigations:

1 Mar 1995 **INV 1196: Follow-up Sampling Assessment Report - Carlton Service Station, Christchurch** (Detailed Site Investigation)
Royds Consulting Ltd

Exceedences of environmental guideline values				
Document	**Contaminant**	**Pathway**	**Media**	**Land Use**
NZ DWS	Benzene	Maximum acceptable value (MAV) (health)	Water	Drinking water
NZ DWS	Toluene	Maximum acceptable value (MAV) (health)	Water	Drinking water
NZ DWS	Ethylbenzene	Maximum acceptable value (MAV) (health)	Water	Drinking water
NZ DWS	Xylenes	Maximum acceptable value (MAV) (health)	Water	Drinking water

23 Jul 2001 **INV 9170: Site Inspection for the removal of three underground storage tanks at Mobil Victoria Street, Christchurch** (Detailed Site Investigation)
Pattle Delamore Partners Ltd

Exceedences of environmental guideline values				
Document	**Contaminant**	**Pathway**	**Media**	**Land Use**
NZ PHCG	C7-C9	All pathways	Soil	Commercial/Industrial
NZ PHCG	Benzene		Soil	Maintenance/excavation
NZ PHCG	Benzene	All pathways	Soil	Commercial/Industrial
NZ PHCG	Toluene	All pathways	Soil	Commercial/Industrial
NZ PHCG	Xylenes	All pathways	Soil	Commercial/Industrial

Summary of investigation(s):

Royds Investigation (1993)

The Royds Consulting report describes the results of a groundwater monitoring round carried out at the former Mobil service station in February 1995. The service station and the joint motor workshop were closed in 2001. Since the closure of the service station and the workshop, the site has been redeveloped, and it now accommodates a food outlet. The surface of the site is sealed.
The groundwater sampling event described in the report is presented as a final round of the monitoring programme initiated in response to a release of petrol fuel at the site. According to the information provided to Environment Canterbury, the loss of product at the site started in 1991. Based on the quarterly inventory records, discrepancies above the industry accepted level were first observed in a quarter beginning March 1991. The unacceptable discrepancies occurred until September 1992, when Mobil detected and repaired a failure in the petrol suction line. The total volume of product not accounted for between March 1991 and September 1992 was in the order of 20,000 L.

The petrol systems were found faulty in April 1993, when an independent test and repair work was carried out; however, unexplained discrepancies in inventory records continued, and the underground petroleum storage system was finally replaced in August 1993. A product recovery operation began at the site in June 1993, ending some time before 1995, once two removal sumps were not longer collecting product. The final groundwater sampling round was undertaken after an onsite product recovery operation ceased, and after the underground petroleum storage system was completely replaced.

Environment Canterbury's record of environmental investigations undertaken prior to the final groundwater monitoring round is incomplete, consisting entirely of report excerpts and brief summaries. The initial investigations sought to assess the migration potential of the released product, reporting that the product spread from its source, migrating preferentially along the high porosity fill material, instead of infiltrating the fine textured natural soils. A total of fifteen groundwater monitoring bores were installed - both on and off the site - to monitor the product levels. Partial removal of spoil surrounding the leak source also occurred. The product was observed in the majority of the wells placed on site, but was absent from the offsite monitoring wells, the latter installed on opposite sides of Victoria Street and Dorset Road. High product levels (> 300 mm) were prevalently isolated to wells at the central, eastern, and southern areas of the site, installed in close proximity to the backfilled areas.

At the time of the final groundwater monitoring round in February 1995, only 5 of the monitoring wells were usable. Offsite bores south-east of the site (anticipated regional flow) no longer existed. Water samples collected from each of the five monitoring wells were analysed for BTEX and TPH. Product was observed in a single onsite well located on the eastern boundary of the site (thickness estimated at 45 mm). The product levels exhibited a significant reduction in comparison to the measurements from the previous round (September 1993), indicating either migration or biodegradation. Total petroleum hydrocarbons were detected in the groundwater from all five wells, ranging in concentration between 1 and 60 mg/l.

At two of the wells the concentrations of all BTEX components were recorded above their guideline values for potable use, with benzene levels at one well exceeding the guideline value for the indoor inhalation. The remaining BTEX components were not detected above the laboratory detection limits in the samples in two offsite wells.

The shallow non-artesian is not considered as a sensitive aquifer according to the MfE(1999) criteria. However, the local groundwater flow direction remains unknown, and neither the extent nor the temporal pattern of the non-aqueous and dissolved hydrocarbon phases has been confidently

established from the available dataset. The 1995 groundwater results also indicated that there was a potential for unacceptable exposure to site workers via the volatilisation pathway.

The reports documenting product recovery, groundwater monitoring, and soil validation exercises undertaken following the 1993 tank replacements and following the service station closure are yet to be submitted to Environment Canterbury.

PDP Investigation (2001)

In 2001, PDP documented the investigation of the removal of three fibreglass USTs from the site. The report was received by Environment Canterbury on 13 October 2011. Based on the report, no apparent discharges occurred from the petroleum storage system associated with the fibreglass tanks removed in 2001 but olfactory evidence of petroleum hydrocarbon impacts were noted in bores at the bowsers and excavations in the vicinity of the tank pit.

According to the report, 30 soil samples collected during the decommissioning of the USTs were lost in transit and 24 replacement samples were subsequently collected and submitted to the laboratory. The results were compared to MfE (1999) Tier 1 Soil Acceptance Criteria. One sample (BW1,most easterly bowser at the site) detected TPH C7-C9 and benzene, toluene and total xylenes above commercial/industrial guidelines. The residual contamination at BW1 was not delineated horizontally or vertically.

The available groundwater and soil investigations have not fully characterised conditions beneath the site. In addition, the motor vehicle workshop has not been investigated. Information about the current state of groundwater quality beneath the site would be valuable, especially in terms of the potential adverse effects to maintenance excavation workers (on and off-site) and downgradient land owners. The proposed category for the site is "Contaminated (for industrial/commercial land use)".

Site 3522: 2/17 Salisbury Street (Within 100m of enquiry area.)

Site Address:	2/17 Salisbury Street, Christchurch Central, Christchurch
Legal Description(s):	Pt Section 23 TN Res Christchurch

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
?	30/01/07	Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufactuing of illicit drugs with the potential for environmental discharges

Notes:

8 May 2010 Notification of hazardous chemicals contamination recieved 02/02/07 from NZ Police stating that 'Hazardous chemicals and contaminated equipment believed to be used in the manufacture of prohibited drugs have been removed from the site. Residue of hazardous substances and waste may still remain on this property'.

This property appears to be entirely sealed and therefore it is unlikely that the clandestine drug laboratory operating at this site has caused any associated ground contamination.

Investigations:

8 Nov 2018 **INV 225773: Preliminary Environmental Site Investigation - 17 Salisbury Street, Christchurch** (Preliminary Site Investigation)
ENGEO

Summary of investigation(s):

Environment Canterbury has received a Preliminary Site Investigation report that includes all or part of the property you have selected.

A Preliminary Site Investigation seeks to identify potential sources of contamination resulting from current and historical land uses.

The preliminary site investigation may not have found any potential sources of contamination on the property you have enquired about. Where potential sources of contamination have been identified, a site identification number (e.g. SIT 1234) and land uses from the Hazardous Activities and Industries List (HAIL) will be shown on your statement.

This investigation has not been summarised.

2 Feb 2007 **INV 2336: Notification of Hazardous Chemicals Contamination** (Preliminary Site Investigation)
Unknown

Summary of investigation(s):

Report(s) have not yet been audited.

Site 10546: 15 Peterborough Street (Within 100m of enquiry area.)

Site Address:	15 Peterborough Street, Central City, Christchurch
Legal Description(s):	Lot 1 DP 74079

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
unknown	1996	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

26 Mar 2012 Information obtained from CCC Webmap indicated that the site has previously contained an underground storage tank for diesel with a capacity of 2000 litres.

Investigations:

There are no investigations associated with this site.

Site 10607: 22/25 Peterborough Street (Within 100m of enquiry area.)

Site Address:	22/25 Peterborough Street, Central City, Christchurch
Legal Description(s):	Section 1 SO 15603

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
unknown	1998	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

28 Mar 2012 Information obtained from CCC Webmap indicated that an underground storage tank for diesel product previously existed within this property.

Investigations:

There are no investigations associated with this site.

Site 28811: North Hagley Park (Within 100m of enquiry area.)

Site Address:	Hagley Park
Legal Description(s):	Section 6 SO 467852

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
Pre 1941	2011	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

14 Nov 2013 Area defined from: 1941-2011 ECan Aerial Photographs.

North Hagley Park contains multiple sport turfs including; a golf course, cricket pitches, tennis courts, and bowling greens. These were all noted in the aerial photographs reviewed.

Investigations:

There are no investigations associated with this site.

Site 171526: Carlton Mill Corner - North Hagley Park (Within 100m of enquiry area.)

Site Address:	Carlton Mill Corner - North Hagley Park
Legal Description(s):	Section 6 SO 467852

Site Category:	Below guideline values - Recreation
Definition:	Parks/recreational: Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
Pre 1941	2011	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

Investigations:

15 Jan 2017 **INV 171381: Detailed Site Investigation - Carlton Mill Corner Park** (Detailed Site Investigation)
Tonkin and Taylor Ltd

Summary of investigation(s):

Site history: The site has been a portion of North Hagley park since pre-1941. Surrounding activities have included a golf course and residential and commercial properties.

INV171381 – Detailed Site Investigation – Carlton Mill Corner Park – Tonkin & Taylor 2017

Investigation objective: Tonkin & Taylor Ltd were engaged by Sports Surface Design and Management Ltd to complete a Detailed Site Investigation in preparation of playing surface and drainage upgrade works at the north-western corner of North Hagley Park. The purpose of the investigation was to assess ground contamination in the soils likely to be disturbed during upgrade works, assess what contamination-related health and safety controls may be required and assess disposal/management options for excess soil.

Eight soil sample locations were selected in a gridded pattern within the investigation area. Soil samples were collected from 0.1 metres below ground level from each of the sample locations and also from 0.3 metres below ground level at four of the sample locations. All samples were analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and organochlorine pesticides and four were also analysed for acid herbicides. Six additional soil samples were collected from around sample location HA3 at 0.1 and 0.3 metres below ground level to delineate the extent of the elevated mercury.

Results were compared with National Environmental Standard (NES) Soil Contaminant Standards for Recreational land use and applicable background concentrations. Burwood Landfill Waste Manifest slips were provided with the investigation report. However, the report does not refer to these documents or disposal of soil. The manifest slips do not state the soil volumes so it is unclear how much soil was disposed of or where it was excavated from.

Results: All soil sample results were below Soil Contaminant Standards for Recreational land use. However, soil samples collected from HA3 exceeded applicable background concentrations for arsenic, mercury and nickel. All acid herbicide results were below the laboratory limits of detection. DDT isomers were detected above laboratory detection limits in eleven of the twelve soil samples analysed. Two sample results were above adopted ambient concentrations but below Soil Contaminant Standards for total DDT.

Conclusions: The site has been categorised as “Below guideline values – recreational”

Justification for proposed category: Soil sample results were below applicable Soil Contaminant Standards for recreational land use, but above background concentrations. The investigation area has been adequately assessed and is suitable for recreational land use.

Site 197645: 167 Victoria Street, Christchurch (Within 100m of enquiry area.)

Site Address:	167 Victoria Street, Christchurch
Legal Description(s):	Lot 1 DP 51318

Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1940s	1980s	Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions, and other electronic devices

Notes:

Investigations:

2 Jul 2013 **INV 197623: Preliminary Site Investigation, 167 Victoria Street, Christchurch Central, Christchurch**
(Preliminary Site Investigation)
Geoscience Consulting Ltd

Summary of investigation(s):

INV197623 - Preliminary Site Investigation, 167 Victoria Street, Christchurch Central - Geoscience 2013

Geoscience were engaged to complete a Preliminary Site Investigation (PSI) of 167 Victoria Street, Christchurch Central (the site) to support the redevelopment of the site into a 4.5 storey building. The PSI included assessment of regional and district council records, historical aerial photographs and a site inspection. A number of potential HAIL activities were identified including B3 - Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices, and D5 - Engineering workshops with metal fabrication. The consultant recommended that a Detailed Site Investigation be completed prior to the redevelopment.

The site has been categorised as 'Not Investigated'.

Information held about other investigations on the Listed Land Use Register

28 Jun 2017 **INV 251335: Detailed Site Investigation Report - Victoria Street Renewal Project** (Detailed Site Investigation)
OPUS

Summary of investigation(s):

Environment Canterbury has received a Detailed Site Investigation report that includes all or part of the property you have selected.

A DSI seeks to identify the type, extent and level of contamination (if any) in an area. Soil, soil-gas or water samples will have been collected and analysed.

This investigation has not been summarised.

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ253119.

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.

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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)[1]. 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.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, 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.

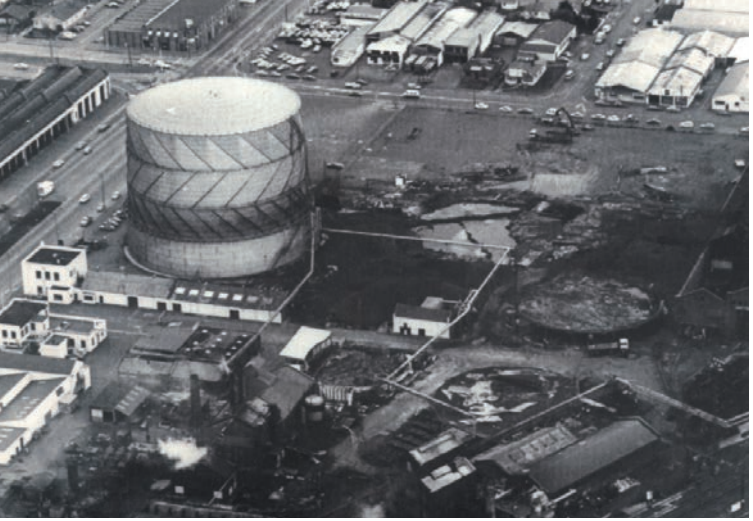
Please refer to the Site Categories and Definitions factsheet for further information.

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

The LLUR is available online at www.llur.ecan.govt.nz. 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.

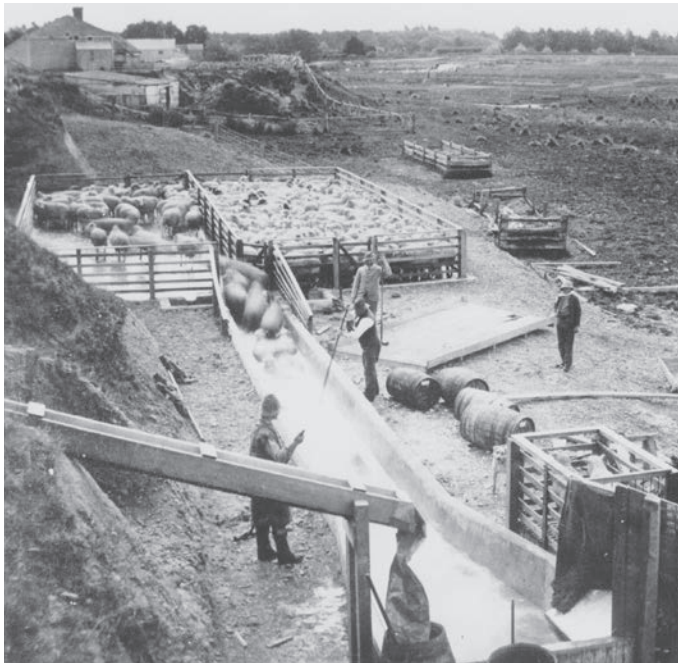
We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

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 www.ecan.govt.nz/HAIL.



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)

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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.

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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

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

E13/102

Appendix D: Test Pit and Bore Logs

D1 – Bishopspark

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH1**

Hole Location: Park Terrace Accessway

SHEET: 1 OF 3

PROJECT: 100 Park Terrace (Geotechnical) | LOCATION: Christchurch | JOB No.: 30315.0000

CO-ORDINATES: (NZTM2000) 5180964.89 mN, 1569908.77 mE | DRILL TYPE: Mobile Sonic 1000 | HOLE STARTED: 08/11/2018

DRILL METHOD: SNC | HOLE FINISHED: 09/11/2018

R.L.: 7.04m | DRILLED BY: ProDrill

DATUM: LYTTHT1937 | DRILL FLUID: WATER | LOGGED BY: OP | CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Box	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING / MOISTURE CONDITION	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Fill				73	SNC				6	1		D-M	MD				ASPHALT, 10mm.
																	Sandy, fine to coarse GRAVEL, with trace silt; greyish brown. Medium dense, dry to moist; sand, fine to medium.
												M-W	L				Silty, fine to coarse SAND, with trace gravel; brownish grey with orange mottling. Loose, moist to wet.
																	0.60m: no gravel
																	0.7m: fine sand only; greyish brown
																	1.1-1.5m: CORE LOSS.
				100	SPT		1/1 2/2 2/3 **N=9**		5	2		W					[CONT] Silty, fine to coarse SAND; brownish grey with orange mottling. Loose, moist to wet, no dilatancy.
				100	SNC												*1.50m:* becomes wet (SPT sample wet). *1.95m:* sand, fine to medium.
												M-W	F				2.6m: trace gravel; coarse, sub-rounded.
	Box 1, 0.0-3.5m			33	SPT		4/6 7/6 6/6 **N=25**		4	3		M	MD				Sandy SILT, with some gravel; grey. Firm, moist to wet, low plasticity, no dilatancy; sand, fine to coarse; gravel, medium to coarse, sub-rounded to sub-angular.
				100	SNC				3	4							Sandy, fine to coarse GRAVEL, with minor silt; grey. Medium dense, moist; gravel, sub-angular to sub-rounded; sand, fine to coarse.
													VS				3.75-3.85m: cobble within fibrous peat.
																	Fibrous PEAT; dark brown. Very soft, moist. Organic smell.
				100	SPT		0/1 0/1 1/1 **N=3**		2	5							SILT and PEAT; brownish grey. Very soft, moist, moderate plasticity; peat, fibrous, mixed in with silt.
Yaldhurst Member				100	SNC								S				*5.30 - 5.50m:* SILT lense; grey. Soft, moist, moderate plasticity. *5.50m:* large fibrous material throughout, eg, 2-10mm dia. tree roots.
	Box 2, 3.5-6.6m			71	SPT		0/0 0/0 1/1 **N=2**		1	6							
				100	SNC				0	7							SILT, with trace fibrous peat; grey and brown peat. Soft, moist, moderate plasticity.
													F				Sandy SILT; grey. Firm, moist, low plasticity; sand, fine.
				100	SPT		1/1 1/1 3/3 **N=8**		-1	8							
				100	SNC								MD				Fine to coarse SAND, with trace silt; grey. Medium dense, moist.
	Box 3, 6.6-9.6m			100	SPT		2/3 4/5 5/6 **N=20**		-2	9							*9.55 - 9.75m:* some silt present; grey, non-plastic.
				100	SNC												

COMMENTS:

Hole Depth 26.2m

Scale 1:50

Rev.: A

BoreLog - 6/12/2018 2:16:51 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH1**

Hole Location: Park Terrace Accessway

PROJECT: 100 Park Terrace (Geotechnical) | LOCATION: Christchurch | JOB No.: 30315.0000

CO-ORDINATES: (NZTM2000) 5180964.89 mN, 1569908.77 mE | DRILL TYPE: Mobile Sonic 1000 | HOLE STARTED: 08/11/2018

DRILL METHOD: SNC | HOLE FINISHED: 09/11/2018

R.L.: 7.04m | DRILLED BY: ProDrill

DATUM: LYTTHT1937 | DRILL FLUID: WATER | LOGGED BY: OP | CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation			100	SNC				-			M	MD				[CONT] Fine to coarse SAND, with trace silt; grey. Medium dense, moist. *10.15m:* grades to greyish brown.
			100	SPT		3/5 7/7 8/9 **N=31**		-4	11							
			91	SNC				-5	12							12.1-12.2m: CORE LOSS.
Box 4, 9.6-12.7m			100	SPT		2/3 4/5 6/3 **N=18**					W					Fine to coarse SAND, with minor silt; greyish brown. Medium dense, wet.
			100	SNC				-6	13		W-S					Silty, fine to medium SAND, with trace fibrous organics; grey. Medium dense, wet to saturated.
			100	SPT		2/3 3/4 4/8 **N=19**		-7	14		W					Fine to coarse SAND, with trace silt; brownish grey. Medium dense, wet. *13.65 - 13.75m:* minor silt.
			100	SNC				-8	15			D				Silty, fine to coarse SAND, with trace fibrous organics; grey. Dense, wet. *15.20 - 15.65m:* greyish brown. *15.35m:* minor silt.
Box 5, 12.7-15.7m			100	SPT		4/6 8/7 10/11 **N=36**										
			100	SNC				-9	16			MD-D				Fine to coarse SAND, with trace silt; light brown. Medium to very dense, wet. *16.50m:* some silt.
			100	SPT		3/7 12/13 14/11 for 45mm **N>=50**		-10	17							*17.15m:* trace silt.
			91	SNC				-11	18							18.2-18.3m: CORE LOSS.
Box 6, 15.7-18.8m			100	SPT		2/4 7/10 10/12 **N=39**						D				18.3m: becomes dense. 18.8-19.1m: minor shell present. *18.85m:* grades to grey.
			100	SNC				-12	19			MD				Silty, fine to coarse SAND; grey. Medium dense, wet.
			100	SPT												Coarse SAND, with trace silt; grey. Medium dense, wet.

COMMENTS:

Hole Depth 26.2m

Scale 1:50

Rev.: A

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH1**

Hole Location: Park Terrace Accessway

PROJECT: 100 Park Terrace (Geotechnical) | LOCATION: Christchurch | JOB No.: 30315.0000

CO-ORDINATES: (NZTM2000) 5180964.89 mN, 1569908.77 mE | DRILL TYPE: Mobile Sonic 1000 | HOLE STARTED: 08/11/2018

DRILL METHOD: SNC | HOLE FINISHED: 09/11/2018

R.L.: 7.04m | DRILLED BY: ProDrill

DATUM: LYTTHT1937 | DRILL FLUID: WATER | LOGGED BY: OP | CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Box	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation				100	SPT		1/1 2/1 4/5 **N=12**					W	St				Sandy SILT; grey. Stiff, wet, moderate plasticity; sand, fine.
												M					SILT, with trace sand; grey. Stiff, moist, moderate plasticity; sand, fine.
				100	SNC							W	MD				Sandy, fine to coarse GRAVEL, with some silt; greyish brown. Medium dense, wet; gravel, sub-angular to sub-rounded; sand, fine to coarse. *21.20m:* becomes silty.
	Box 7, 18.8-21.8m			66	SPT		12/10 7/10 8/5 **N=30**		-14	21			L-MD				
													MD				Fine to coarse SAND, with some silt; brownish grey. Loose to medium dense, wet, slow dilatancy.
				100	SNC				-15	22							Sandy, fine to coarse GRAVEL, with some silt; brownish grey. Medium dense, wet; gravel, sub-rounded; sand, fine to coarse.
Riccarton Gravels				100	SPT		4/6 7/5 6/6 **N=24**		-16	23							Fine to coarse SAND, with trace gravel; greyish brown. Medium dense, wet, non-dilatant; gravel, fine to medium, sub-rounded.
				100	SNC				-17	24							Sandy, fine to coarse GRAVEL; brown. Medium dense, wet; gravel, sub-rounded; sand, fine to coarse. *24.40m:* Low N value due to artesian pressure effects
	Box 8, 21.8-24.9m			100	SPT		5/4 3/2 4/6 **N=15**		-18	25							
				100	SNC												
	Box 9, 24.9-26.2m			100	SNC		14/16 18/32 for 75mm **N>=50**		-19	26			VD				*25.90m:* very dense.
									-20	27							26.2m: Target depth
									-21	28							
									-22	29							

COMMENTS:

Hole Depth 26.2m

Scale 1:50

Rev.: A

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH2**

SHEET: 1 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5180939.93 mN 1569966.19 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 12/11/2018 HOLE FINISHED: 12/11/2018
R.L.:	7.87m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL																ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Fill			46	SNC				7	1		M	MD				Asphalt Sandy GRAVEL; greyish brown. Medium dense, moist; gravel, fine to coarse, subangular; sand, fine to coarse. SAND, minor silt; greyish brown. Medium dense, moist; sand, fine to medium. Silty SAND; greyish brown. Very loose, moist, low plasticity; sand, fine to medium.
												VL				CORE LOSS: 0.7 - 1.5m
			100	SPT		0/0 0/0 1/1 **N=2**		6	2			VS				SILT, trace sand; light brown. Very soft, moist, high plasticity; sand, fine.
			100	SNC							M-W					Sandy SILT; grey. Very soft, moist to wet; silt, moderate plasticity, no dilatancy; sand, fine. *2.50m:* orange mottling present
			100	SPT		1/1 0/1 1/1 **N=3**		5	3							
			100	SNC				4	4		M	F VS				SILT and fibrous PEAT; grey with brown mottling. Firm, moist, moderate plasticity. Fibrous PEAT; dark brown. Very soft/loose; moist.
												St				Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine. *4.30 - 4.50m:* Peat and silt lense
Yaldhurst Member			100	DPT		BH2-PT1 @ 4.5m		3	5			VS				Silty fibrous PEAT with some sand; brown. Very soft, moist, low plasticity. *5.35 - 5.65m:* Fibrous peat lense
			100	SNC				2	6							
			44	SPT		0/0 0/0 0/0 **N=0**		1	7							*6.90 - 6.95m:* Silt with trace fibrous peat
			100	SNC				0	8							SILT, some peat (fibrous), trace sand; grey and brown mottling. Sand, fine. *8.30m:* grades to silt with some sand, trace fibrous peat
			100	SNC		0/0 0/0 1/1 **N=2**		-1	9			L				Silty SAND; grey. Loose, moist; sand, fine to medium.
			100	SPT		2/2 5/6 7/6 **N=24**		-2				MD				SAND, minor to trace silt; grey. Medium dense, moist; sand, fine to coarse. *9.95 - 10.25m:* Sand with some gravel, trace silt lense. Gravel, fine to coarse, subangluar to subrounded.

Box 1, 0.0-3.5m

Box 2, 3.5-6.7m

Box 3, 6.7-9.1m

COMMENTS:

Hole Depth 26.3m

Scale 1:50

Rev.: A

BOREHOLE LOG

BOREHOLE No.: **BH2**

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5180939.93 mN 1569966.19 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 12/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 12/11/2018
R.L.: 7.87m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
			100	SNC							M	MD				[CONT] SAND, minor to trace silt; grey. Medium dense, moist; sand, fine to coarse.
			81	SPT		2/3 6/6 5/5 **N=22**		-3	11							
			100	SNC				-4	12							*12.00m:* coarse sand
Box 4, 9.1-12.2m			100	SPT		1/2 4/6 5/4 **N=19**										
			100	SNC				-5	13							*13.40 - 13.90m:* fine to coarse sand, trace silt; colour grades to brownish grey
			100	SPT		2/3 4/5 5/9 **N=23**		-6	14							
Box 5, 12.2-15.2m			100	SNC				-7	15							
Christchurch Formation			100	SPT		3/3 1/3 4/8 **N=16**										
			100	SNC				-8	16							
			100	SPT		2/4 7/13 14/16 for 70mm **N>=50**		-9	17							
Box 6, 15.2-18.3m			100	SNC				-10	18							*18.30m:* becomes dense. Sand, predominantly fine to medium.
			100	SPT		2/4 8/11 15/13 **N=47**		-11	19							
			100	SNC												
			100	SPT				-12								

COMMENTS:

Hole Depth 26.3m

Scale 1:50

Rev.: A

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BOREHOLE LOG

BOREHOLE No.: **BH2**

SHEET: 3 OF 3

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5180939.93 mN 1569966.19 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 12/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 12/11/2018
R.L.: 7.87m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation (Box 7, 18.3-21.3m)			100	SPT		3/4 5/6 10/10 **N=31**		-13	21		M	MD				[CONT] SAND, minor silt; grey. Medium dense, moist; sand, fine to coarse.
											W	L-MD				Fine to coarse SAND, with some shells, minor silt; grey and white speckling. Loose to medium dense, wet.
			100	SNC							M-W	St				Sandy SILT; grey. Stiff, moist to wet, low plasticity; sand, fine to medium.
																21.0-21.3m: trace fibrous peat.
			100	SPT		7/11 7/9 12/11 **N=39**					W					SILT, with trace sand; greyish brown. Stiff, wet, low plasticity.
Riccarton Gravels								-14	22			D				Sandy, fine to coarse GRAVEL, with trace silt; brown. Dense, wet; gravel, sub-angular to sub-rounded; sand, fine to coarse.
			100	SNC												22.0m: trace cobbles.
			66	SPT		10/10 9/10 7/8 **N=34**		-15	23							22.8m: grades to GRAVEL, with some sand.
			78	SNC				-16	24							
																24.15-24.4m: CORE LOSS.
(Box 8, 21.3-25.1m)			77	SPT		7/7 6/7 9/7 **N=29**		-17	25			F				*24.40m:* becomes medium dense. 24.85m: becomes silty.
			100	SNC							S	MD				Sandy SILT; light brown. Firm, wet, low plasticity; sand, fine to coarse.
(Box 9, 25.1-26.3m)																Silty, sandy, fine to coarse GRAVEL; brown. Medium dense, saturated; gravel, sub-angular to sub-rounded; sand, fine to coarse.
			100	SPT		16/13 12/15 17/6 for 35mm **N>=50**		-18	26							25.45m: grades to sandy GRAVEL, with minor silt.
								-19	27							26.3m: Target depth
								-20	28							
								-21	29							
								-22								

COMMENTS:

Hole Depth 26.3m

Scale 1:50

Rev.: A

BoreLog - 6/12/2018 2:16:55 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH3**

Hole Location: Northern Carport

SHEET: 1 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5181008.75 mN 1569926.96 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 10/11/2018 HOLE FINISHED: 10/11/2018
R.L.:	7.51m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Fill			100	SNC		BH3-S1 @ 0.9m		7	1							ASPHALT, 10mm.
																Sandy, fine to coarse GRAVEL; greyish brown. Medium dense, moist; gravel, sub-angular to sub-rounded; sand, fine to coarse.
																0.25-0.3m: becomes silty.
			44	SPT		1/1 1/1 1/1 **N=4**		6	2							SILT, with trace sand and rootlets; grey with orange mottling. Stiff, moist, non-plastic; sand, fine.
																0.45m: trace fine gravel, becomes moist to wet.
																Sandy SILT; greyish brown. Firm, moist to wet, low plasticity; sand, fine.
			76	SNC				5	3							Silty, fine to medium SAND; greyish brown. Loose, moist to wet.
			100	SPT		BH3-S2 @ 3.0m 1/1 0/1 2/2 **N=5**		4	4							Sandy SILT, with trace fibrous peat; grey. Firm to stiff, moist, moderate plasticity; sand, fine.
																3.00m: grades to low plasticity.
			100	SNC				3	5							Fibrous PEAT; dark brown. Very soft/loose, moist.
Yaldhurst Member			0	PT		BH3-PT1 @ 4.5m		2	6							Fibrous PEAT and SILT; brown. Soft to firm, moist, low plasticity. Peat and silt mixed, homogeneous.
			100	SNC				1	7							SILT, with some fibrous peat and trace sand; grey with brown speckling/mottled. Firm to stiff, moist, moderate plasticity; sand, fine.
			0	PT		BH3-PT2 @ 6.1m		0	8							Sandy SILT, with trace fibrous organics; grey with brown speckling. Firm, moist, low plasticity; sand, fine to medium.
			100	SNC				-1	9							8.05m: no peat; becomes grey.
			100	SPT		0/1 3/2 3/2 **N=10**										Silty, fine to medium SAND; grey. Medium dense, moist to wet.
						BH3-S3 @ 8.1m										*8.90m:* sand, fine to coarse; some silt.
			100	SNC				-2								9.2m: fine to medium gravel present.
			66	SPT		6/8 7/6 7/7 **N=27**										Gravelly, fine to coarse SAND; brownish grey. Dense, wet; gravel, fine to coarse, sub-angular to sub-rounded.
			100	SNC												

Box 1, 0.0-3.0m
Box 2, 3.0-6.1m
Box 3, 6.1-9.6m

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

BOREHOLE LOG

BOREHOLE No.: **BH3**

Hole Location: Northern Carport

SHEET: 2 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5181008.75 mN 1569926.96 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 10/11/2018 HOLE FINISHED: 10/11/2018
R.L.:	7.51m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL															ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.		FLUID LOSS (%) 25 50 75	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (cm) 20 60 200 600 2000	Description and Additional Observations
Yaldhurst Member				100	SNC				-3	11							[CONT] Gravelly, fine to coarse SAND; brownish grey. Dense, wet; gravel, fine to coarse, sub-angular to sub-rounded.
				66	SPT		5/12 11/13 12/12 **N=48**										*10.80 - 10.90m:* fibrous peat present.
				91	SNC				-4	12							
	Box 4, 9.6-12.7m			88	SPT		1/3 5/7 8/9 **N=29**		-5								12.1-12.2m: CORE LOSS.
				100	SNC					13							Fine to coarse SAND, with minor silt; greyish brown. Medium dense, wet.
				100	SPT		1/2 3/4 5/7 **N=19**		-6								*12.75 - 12.85m:* Sandy SILT lense, stiff, non-plastic.
				100	SNC				-7	14							*13.60m:* trace silt.
	Box 5, 12.7-15.7m			100	SPT		2/3 4/5 6/6 **N=21**		-8								
Christchurch Formation				100	SNC					15							*15.65 - 16.05m:* saturated
				100	SPT		1/3 5/8 11/12 **N=36**		-9				D				*16.70m:* becomes dense.
				86	SNC				-10	16							*17.25m:* grades to fine to medium sand.
	Box 6, 15.7-18.7m			100	SPT		2/4 9/11 15/15 for 70mm **N>=50**		-11								
				100	SNC					17							*18.70m:* fine to coarse sand.
									-12	18							*18.85 - 19.20m:* Fine to medium SAND lense.
										19							*19.00m:* grades to grey.
				100	SPT												*19.80m:* becomes medium dense.

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH3**

Hole Location: Northern Carport

SHEET: 3 OF 3

PROJECT: 100 Park Terrace (Geotechnical) | LOCATION: Christchurch | JOB No.: 30315.0000

CO-ORDINATES: (NZTM2000) 5181008.75 mN, 1569926.96 mE

R.L.: 7.51m

DATUM: LYTTHT1937

DRILL TYPE: Mobile Sonic 1000

DRILL METHOD: SNC

DRILL FLUID: WATER

HOLE STARTED: 10/11/2018

HOLE FINISHED: 10/11/2018

DRILLED BY: ProDrill

LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation			100	SPT		2/5 6/6 6/12 **N=30**		-13	21							[CONT] Fine to coarse SAND, with minor silt; greyish brown. Medium dense, wet.
			100	SNC												Sandy SILT, with trace organics; grey. Stiff, moist, moderate plasticity; sand, fine to medium; organics, fibrous.
Box 7, 18.7-21.7m			100	SPT		9/12 13/13 12/12 for 50mm **N>=50**		-14								Fine to coarse SAND, with trace silt; light brown. Dense, moist. 21.5m: minor gravel, fine to coarse, sub-angular to sub-rounded. Very dense.
Riccarton Gravels			100	SNC				-15	22							Gravelly, fine to coarse SAND; greyish brown. Wet; gravel, fine to coarse, sub-angular to sub-rounded. Sandy, fine to coarse GRAVEL; greyish brown. Wet; gravel, sub-angular to sub-rounded; sand, coarse. *22.40m:* grades to some sand. *22.80m:* sandy GRAVEL, as above.
			33	SPT		6/8 7/6 5/2 **N=20**		-16	23							
			78	SNC					24							23.7m: minor silt.
Box 8, 21.7-25.1m			77	SPT		6/6 5/4 7/10 **N=26**		-17	25							
			85	SNC				-18								
Box 9, 25.1-26.4m			66	SPT		7/9 8/7 6/10 **N=31**			26							
								-19								26.35m: Target depth
									27							
								-20								
									28							
								-21								
									29							
								-22								

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

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Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH4**

SHEET: 1 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5181008.78 mN 1569987.44 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 19/11/2018 HOLE FINISHED: 19/11/2018
R.L.:	7.93m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL																	ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Topsoil			100	SNC				7	1	TS	D-M	St				TOPSOIL - Sandy SILT with trace rootlets; dark brown. Stiff, dry to moist.
											M	F-St				Sandy SILT; greyish brown. Firm to stiff, moist, low plasticity; sand, fine.
											W	VL				Silty SAND; greyish brown with orange mottling. Very loose, wet; sand, fine to coarse.
			100	SPT		0/0 1/1 0/1 **N=3**		6	2		M	F-St				Sandy SILT; greyish brown with orange mottling. Firm to stiff, moist; silt, low to moderate plasticity; sand, fine. *2.35m:* Colour change to grey
			100	SNC				5	3							
			88	SPT		1/1 1/2 1/2 **N=6**						St				Sandy SILT, minor peat (fibrous); grey and dark brown. Stiff, moist, low plasticity; sand, fine.
			100	SNC				4	4			F				PEAT (FIBROUS); dark brown. Firm, moist.
			100	PT		BH4-PT1 @ 4.5m		3	5			S				SILT and fibrous PEAT; grey and dark brown mottling. Soft, moist, moderate plasticity.
Yaldhurst Member			100	SNC							W	L				Silty SAND, trace peat (fibrous); grey with brown speckling. Loose, wet; sand, fine to medium, moderate dilatancy.
			100	PT		BH4-PT2 @ 6.1m		2	6		M	S				SILT and fibrous PEAT; grey and dark brown. Soft, moist, low plasticity.
			100	SNC				1	7			S-F				SILT, some sand, minor peat (fibrous); grey and dark brown mottling. Firm to soft, moist; sand, fine. *7.60m:* grades to sandy SILT; grey, no plasticity
			33	SPT		0/0 0/0 0/0 **N=0**		0	8							
			100	SNC		BH4-S1 @ 8.5m		-1	9			D				SAND, trace silt; grey. Dense, moist; sand, fine to coarse.
			77	SPT		0/2 7/9 10/8 **N=34**		-2								SAND, some gravel; grey. Dense, moist; sand, fine to coarse; gravel, medium, subrounded to subangular.

COMMENTS:

Hole Depth 26.3m

Scale 1:50

Rev.: A

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH4**

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5181008.78 mN 1569987.44 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 19/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 19/11/2018
R.L.: 7.93m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL / ENGINEERING DESCRIPTION

Column headings: GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION; FLUID LOSS (%) (25, 50, 75); WATER; CORE RECOVERY (%); METHOD; CASING; TESTS; SAMPLES; RL (m); DEPTH (m); GRAPHIC LOG; MOISTURE CONDITION / WEATHERING; STRENGTH/DENSITY CLASSIFICATION; SHEAR STRENGTH (kPa) (10, 25, 50, 100, 200); COMPRESSIVE STRENGTH (MPa) (1, 5, 20, 50, 100, 250); DEFECT SPACING (cm) (20, 60, 200, 600, 2000); Description and Additional Observations

Core Recovery (%)	Method	Tests
100	SNC	
66	SPT	2/3 4/5 6/8 **N=23**
91	SNC	
100	SPT	2/2 3/3 4/3 **N=13**
100	SNC	
100	SPT	1/3 3/5 7/8 **N=23**
100	SNC	
100	SPT	2/2 4/6 10/10 **N=30**
100	SNC	
100	SPT	2/5 6/11 12/15 **N=44**
91	SNC	
88	SPT	3/3 8/9 16/16 **N=49**
100	SNC	

Depth (m)	RL (m)
11	-3
12	-4
13	-5
14	-6
15	-7
16	-8
17	-9
18	-10
19	-11
	-12

Yaldhurst Member

Moisture: W; Density: D

Sandy GRAVEL; grey. Dense, wet; gravel, fine to coarse, subrounded to subangular; sand, fine to coarse.

Christchurch Formation

Density: MD

SAND, trace silt; grey. Medium dense, wet; sand, fine to coarse.

10.75 - 10.85m: sandy gravel lense

11.20 - 11.30m: silty sand lense

12.00 - 12.10m: silty fine sand lense

12.1-12.2m: CORE LOSS

SAND, trace silt; grey. Medium dense, wet; sand, fine to coarse.

14.55m: sand becomes fine to medium

15.65m: sand becomes fine to coarse

Density: D

16.70m: becomes dense

19.80 - 19.90m: trace crushed shells

COMMENTS:

Hole Depth 26.3m

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: **BH4**

SHEET: 3 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5181008.78 mN 1569987.44 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 19/11/2018 HOLE FINISHED: 19/11/2018
R.L.:	7.93m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL																ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation			100	SPT		3/3 4/5 4/4 **N=17**		-13	21		W	D				[CONT] SAND, trace silt; grey. Dense, wet; sand, fine to coarse.
			100	SNC							M	St				Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine. *20.60m:* trace fibrous organics
			100	SPT		3/2 3/3 3/3 **N=12**					W	MD				Silty SAND; grey. Medium dense, wet; sand, fine to coarse.
Riccarton Gravels			100	SNC				-14	22		S					Silty GRAVEL, some sand; grey and greyish brown. Medium dense, saturated; gravel, fine to coarse, subrounded to subangular; sand, fine to coarse.
											W	VD				22.0m: grades to sandy GRAVEL with minor silt. Sandy GRAVEL; brown. Very dense, wet; gravel, fine to coarse, subrounded to subangular; sand, fine to coarse.
			33	SPT		9/16 17/20 13 for 75mm **N>=50**		-15	23							
			91	SNC				-16	24							*24.10m:* trace cobbles
			77	SPT		7/8 8/11 11/13 **N=44**		-17	25			D				*24.40m:* becomes dense
			100	SNC												
			75	SPT		19/16 18/18 12/2 for 15mm **N>=50**		-18	26			VD				*25.90m:* becomes very dense.
								-19	27							26.3m: Target depth
								-20	28							
								-21	29							
								-22								

COMMENTS:

Hole Depth 26.3m

Scale 1:50

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: **BH5**

PROJECT: 100 Park Terrace (Geotechnical) | LOCATION: Christchurch | JOB No.: 30315.0000

CO-ORDINATES: (NZTM2000) 5180935.11 mN, 1570015.94 mE
R.L.: 7.91m
DATUM: LYTTHT1937

DRILL TYPE: Mobile Sonic 1000
DRILL METHOD: SNC
DRILL FLUID: WATER

HOLE STARTED: 13/11/2018
HOLE FINISHED: 13/11/2018
DRILLED BY: ProDrill
LOGGED BY: OP
CHECKED: KCC

GEOLOGICAL

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.

- Fill
- Yaldhurst Member

ENGINEERING DESCRIPTION

Core recovery (%)	Method	Tests
50	SNC	
77	SPT	BH5-S1 @ 1.5m 1/2 1/2 2/1 **N=6**
100	SNC	
100	SPT	BH5-S2 @ 3.0m 1/1 1/1 1/1 **N=4**
100	SNC	
100	PT	BH5-PT1 @ 4.5m
100	SNC	
100	SPT	0/0 0/0 0/1 **N=1**
100	SNC	
88	SPT	0/1 0/1 0/1 **N=2**
100	SNC	
66	SPT	2/4 8/9 9/9 **N=35**

Moisture condition	Strength/density classification	Description and additional observations
M		Asphalt
		Sandy GRAVEL; greyish brown. Moist; gravel, fine to coarse, subangular to subrounded; sand, fine to coarse.
	St	Sandy SILT; greyish brown. Stiff, moist, low plasticity; sand, fine.
		CORE LOSS: 0.75 - 1.5m
		Sandy SILT; brownish grey with orange mottling. Stiff, moist, low plasticity; sand, fine.
	L	Silty SAND; grey with orange mottling. Loose, moist; sand, fine to medium. *2.20m:* colour grades to grey
	St	Sandy SILT; grey. Stiff, moist, high plasticity; sand, fine.
	S	Silty PEAT (FIBROUS); dark greyish brown. Soft, moist, low plasticity. *4.30 - 4.40m:* Fibrous PEAT lense
W		Sandy SILT, trace peat (fibrous); brownish grey with dark brown mottling. Soft, wet; silt, moderate plasticity; sand, fine to medium. *5.95m:* some fibrous peat. *6.20 - 6.35m:* Silty fibrous PEAT lense. *6.65m:* Trace to minor fresh organics (roots, fibrous material). *7.40 - 7.60m:* Fine to coarse sand lense with minor silt
	L	Silty SAND; grey. Loose, wet; sand, fine to medium, non-dilatant.
		SAND, minor silt; grey. Loose, wet; sand, fine to coarse.
	MD	Gravelly SAND, trace silt; grey. Medium dense, wet; sand, fine to coarse; gravel, fine to coarse, subangular to subrounded.

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

BOREHOLE LOG

BOREHOLE No.: **BH5**

SHEET: 2 OF 3

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5180935.11 mN 1570015.94 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 13/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 13/11/2018
R.L.: 7.91m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Yaldhurst Member	[CONT] Gravelly SAND, trace silt; grey. Medium dense, wet; sand, fine to coarse; gravel, fine to coarse, subangular to subrounded.
	SAND, trace silt; grey. Medium dense, wet; sand, fine to coarse.
	12.20m: becomes dense
Christchurch Formation	*13.95 - 14.15m:* sand is fine to medium; minor silt
	15.20m: becomes very dense
	CORE LOSS: 18.2 - 18.3m
	SAND, trace silt; grey. Very dense to medium dense, wet; sand, fine to coarse. *18.75m:* brown mottling and white speckling (crushed up shells)

DEPTH (m)	RL (m)	SAMPLES	TESTS	CASING	METHOD	CORE RECOVERY (%)	WATER	FLUID LOSS (%)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)
11	-3	SPT	2/3 4/5 6/7 **N=22**		SNC	100				W	MD			
					SPT	77								
12	-4				SNC	100								
		SPT	3/6 7/9 11/15 **N=42**			100					D			
13	-5				SNC	100								
14	-6	SPT	2/3 6/8 9/9 **N=32**			100								
15	-7				SNC	100								
		SPT	3/7 12/11 12/15 **N>=50**			100					VD			
16	-8				SNC	100								
17	-9	SPT	4/10 12/14 19/5 for 15mm **N>=50**			100								
18	-10				SNC	91								
		SPT	3/6 9/14 17/10 for 30mm **N>=50**			100					MD-D			
19	-11				SNC	100								
	-12		2/3											

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

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BOREHOLE LOG

BOREHOLE No.: **BH5**

SHEET: 3 OF 3

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5180935.11 mN 1570015.94 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 13/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 13/11/2018
R.L.: 7.91m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Christchurch Formation			100	SPT		4/4 5/4 **N=17**		-13	21		M	F				[CONT] SAND, trace silt; grey. Very dense to medium dense, wet; sand, fine to coarse. Silty SAND; grey. Very dense to medium dense, wet; sand, fine to coarse. Sandy SILT, trace peat (fibrous); grey. Firm, moist, high plasticity; sand, fine. *21.20 - 21.30m:* silty sand lense
			100	SNC												
			100	SPT		4/7 10/14 14/12 for 45mm **N>=50**		-14	22		S	VSt VD				21.6m: colour grades to greyish brown SILT; grey. Very stiff, moist, low plasticity. Silty sandy GRAVEL; greyish brown. Very dense, saturated; gravel, fine to coarse, subangular to subrounded; sand, fine to coarse. *21.75m:* trace silt *22.40m:* trace cobbles
			85	SNC												
Riccarton Gravels			66	SPT		10/11 9/8 7/8 **N=32**		-15	23		W	D				CORE LOSS: 22.65-22.8m Sandy GRAVEL, trace silt; greyish brown. Dense, wet; gravel, fine to coarse, subrounded to subangular; sand, fine to coarse.
			100	SNC				-16	24							
			0	SPT		8/9 7/10 12/10 **N=39**		-17	25							
			85	SNC												
			66	SPT		5/4 6/8 8/12 **N=34**		-18	26							CORE LOSS: 25.75-25.9m Sandy GRAVEL, as above.
								-19	27							26.35m: Target depth
								-20	28							
								-21	29							
								-22								

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

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BOREHOLE LOG

BOREHOLE No.: **BH6**

SHEET: 1 OF 3

PROJECT: 100 Park Terrace (Geotechnical)		LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000)	5181068.29 mN 1569969.33 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 20/11/2018 HOLE FINISHED: 20/11/2018
R.L.:	7.51m	DRILL METHOD: SNC	DRILLED BY: ProDrill
DATUM:	LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	TESTS	RL (m)	DEPTH (m)	Description and Additional Observations
Fill				Asphalt Sandy GRAVEL, trace cobbles; brownish grey. Medium dense, dry; gravel, fine to coarse, subrounded to subangular; sand, fine to coarse.
Yaldhurst Member	BH6-S1 @ 1.2m 0/1 0/1 1/2 **N=4**	7	1	Sandy SILT; greyish brown. Soft, wet, low plasticity; sand, fine to medium. *0.85 - 1.25m:* silty sand lense; loose. *1.25m:* grey with orange mottling
		6	2	*2.00 - 2.15m:* silty sand lense; loose.
	1/0 1/1 1/1 **N=4**	5	3	Sandy SILT; grey. Stiff, moist, high plasticity; sand, fine; minor fibrous material (bark) and rootlets.
	BH6-PT1 @ 4.5m	4	4	PEAT (FIBROUS); dark brown. Soft, moist. SILT and fibrous PEAT; grey and dark brown. Soft, moist, low plasticity.
	BH6-PT2 @ 6.1m	3	5	5.2-5.4m: Silty SAND, with trace fibrous peat; grey, loose. *5.80 - 6.10m:* fresh organic material (bark, 2-5mm dia. roots).
	1/1 2/1 1/1 **N=5**	2	6	SILT, with trace sand, minor fibrous peat; grey with brown mottling. Firm, moist, moderate plasticity; sand, fine.
	BH6-S2 @ 8.1m	1	7	7.6m: grades to sandy SILT.
	4/8 9/7 8/8 **N=32**	0	8	Fine to coarse SAND, with minor silt; grey. Loose to medium dense, wet.
		-1	9	Sandy, fine to coarse GRAVEL, trace cobbles; grey. Dense, wet; gravel, sub-angular to sub-rounded; sand, fine to coarse. *9.95m:* grades to fine to medium gravel.
		-2		

GEOLOGICAL	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)
Fill			100	SNC			D	MD			
Yaldhurst Member			77	SPT			W	S			
			100	SNC			M	St			
			66	SPT							
			100	SNC				S			
			100	PT							
			100	SNC							
			100	PT				F			
			100	SNC							
			100	SPT							
			100	SNC			W	L-MD			
			100	SPT				D			

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

BOREHOLE LOG

BOREHOLE No.: **BH6**

SHEET: 2 OF 3

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5181068.29 mN 1569969.33 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 20/11/2018
	DRILL METHOD: SNC	HOLE FINISHED: 20/11/2018
R.L.: 7.51m		DRILLED BY: ProDrill
DATUM: LYTTHT1937	DRILL FLUID: WATER	LOGGED BY: OP CHECKED: KCC

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Yaldhurst Member	[CONT] Sandy, fine to coarse GRAVEL, trace cobbles; grey. Dense, wet; gravel, sub-angular to sub-rounded; sand, fine to coarse.
	Fine to coarse SAND; grey. Medium dense, wet. 10.3-10.4m: some fine to coarse gravel, sub-angular to sub-rounded.
	SILT, with minor sand; grey. Soft, wet, moderate plasticity; sand, fine to coarse. 11.05m: trace sand.
	Sandy SILT; grey. Stiff, wet, low plasticity, no dilatancy; sand, fine to coarse.
	Fine to coarse SAND; grey. Medium dense, wet.
	12.05-12.2m: CORE LOSS.
	Fine to coarse SAND; grey. Medium dense, wet.
Christchurch Formation	*16.70m:* becomes dense.
	18.2-18.3m: CORE LOSS.
	[CONT] Fine to coarse SAND; grey. Dense, wet.
	18.90 - 19.10m: minor crushed shells.

DEPTH (m)	RL (m)	SAMPLES	TESTS	CASING	METHOD	CORE RECOVERY (%)	WATER	FLUID LOSS (%)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION
11	-3		0/0 0/0 0/0 **N=0**		SNC	100				W	D
					SPT	22					MD
12	-4				SNC	86					S
			2/1 2/3 4/6 **N=15**		SPT	100					St
13	-5				SNC	100					MD
	-6		5/3 5/4 6/6 **N=21**		SPT	100					
14	-7				SNC	100					
15	-8		2/3 4/5 8/8 **N=25**		SPT	100					
16	-9				SNC	100					
17	-10		2/4 6/6 9/10 **N=31**		SPT	100					
18	-11				SNC	91					
			4/7 10/15 12/13 for 35mm **N>=50**		SPT	100					
19	-12				SNC	100					

SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)
10 25 50 100 200	1 5 20 50 100 250	20 60 200 600 2000

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

Tonkin+Taylor

BOREHOLE LOG

PROJECT: 100 Park Terrace (Geotechnical)	LOCATION: Christchurch	JOB No.: 30315.0000
CO-ORDINATES: (NZTM2000) 5181068.29 mN 1569969.33 mE	DRILL TYPE: Mobile Sonic 1000	HOLE STARTED: 20/11/2018
R.L.: 7.51m	DRILL METHOD: SNC	HOLE FINISHED: 20/11/2018
DATUM: LYTTHT1937	DRILL FLUID: WATER	DRILLED BY: ProDrill
		LOGGED BY: OP CHECKED: KCC

GEOLOGICAL UNIT	Core recovery (%)	Method	Tests	Moisture condition	Strength/Density	Description and Additional Observations
Christchurch Formation	100	SPT	4/3 4/3 3/5 **N=15**	W	D	[CONT] Fine to coarse SAND; grey. Dense, wet.
	100	SNC			St	Sandy SILT, with trace fibrous peat; grey with light brown speckling. Stiff, wet, moderate plasticity; sand, fine.
	100	SPT	0/3 4/5 5/3 **N=17**		MD	Silty, fine to medium SAND, with trace fresh organic material (bark, roots); grey. Medium dense, wet.
Riccarton Gravels	100	SNC			D-VD	Sandy, fine to coarse GRAVEL, with some silt; greyish brown. Medium to very dense, wet; sand, fine to coarse. 22.5m: no silt.
	66	SPT	9/11 10/13 15/12 for 65mm **N>=50**			
	86	SNC				
	66	SPT	14/17 17/16 17 for 75mm **N>=50**			
	90	SNC				
	66	SPT	7/9 11/14 14/11 **N>=50**			
						26.35m: Target depth

Depth (m): 21, 22, 23, 24, 25, 26, 27, 28, 29
RL (m): -13, -14, -15, -16, -17, -18, -19, -20, -21, -22

COMMENTS:

Hole Depth 26.35m

Scale 1:50

Rev.: A

HA1

Depth (mbgl)	Layer ID	Soil description
0.0-0.25	TOPSOIL	SILT with some sand, gravel and minor cobbles, trace brick fragments; brown. Dry. Gravel; fine to coarse.
0.25-0.35	FILL	SILT with some sand, gravel, cobbles and rare brick; yellow-brown. Sand; fine. Gravl; fine to coarse. One piece of rusted nail.
0.4		End of hole- cobble/obstruction refusal.

HA2

Depth (mbgl)	Layer ID	Soil description
0.0-0.25	TOPSOIL	Organic SILT with minor crushed brick fragments; brown. Moist, soft, moderate plasticity.
0.25-0.7	FILL	Clayey SILT with minor crushed brick fragments; brown. Soft, moist.
0.7	Natural	SAND; yellow-brown. Soft, moist.
0.7		End of hole; natural soils encountered.

HA3

Depth (mbgl)	Layer ID	Soil description
0.0-0.2	TOPSOIL	SILT with minor gravel; brown. Dry to moist. Gravel; fine to medium.
0.2-0.5	FILL	SILT with minoir-trace clay, gravel and rare brick and burnt wood; brown-yellow. Soft, dry-moist.
0.50		End of hole.

HA4

Depth (mbgl)	Layer ID	Soil description
0.0-0.05	TOPSOIL	Organic SILT; brown. Soft, moist.
0.05-0.5	FILL	SILT with some-minor clay, rare gravel and brick fragments; yellow-brown. Soft, moist. Gravel; fine.
0.5-0.6	Natural	SAND with minor silt and trace clay; yellow-brown. Sand; fine.
0.60		End of hole; natural soils encountered.

HA5

Depth (mbgl)	Layer ID	Soil description
0.0-0.05	TOPSOIL	Organic SILT; brown. Soft. Turf and rootlets throughout.
0.05-0.5	FILL	SILT with minor sand, rare gravel and trace wood chips; brown-yellow. Soft to very soft, moist. Gravel; fine.
0.50		End of hole.

HA6

Depth (mbgl)	Layer ID	Soil description
0.0-0.025	TOPSOIL	Organic SILT with trace rootlets throughout; brown. Soft, moist.
0.025-0.5	FILL	SILT with some sand, minor-trace clay and trace asphalt and brick fragments; brown. Soft, moist. Sand; fine.
0.5		End of hole; tree root refusal.

HA7

Depth (mbgl)	Layer ID	Soil description
0.0-0.005	TURF/ROOTLETS	Thin (<10 mm) thatched grass surface
0.0-0.4	FILL	SILT with some sand, minor gravel and trace brick and asphalt fragments; brown. Very soft-soft; dry. Gravel; fine to coarse.
0.40		End of hole.

HA8

Depth (mbgl)	Layer ID	Soil description
0.0-0.05	TURF/ROOTLETS	50 mm thatched turf and rootlets.
0.05-0.4	FILL	SILT with some sand, minor gravel and trace brick and asphalt; brown. Soft, dry. Gravel; fine to coarse.
0.4-0.5		Grades to darker brown.
0.50		End of hole.

HA9

Depth (mbgl)	Layer ID	Soil description
0.0-0.1	TOPSOIL	Organic SILT with minor gravel and trace rootlets; brown. Soft, moist. Gravel; fine to coarse.
0.1-0.3	FILL?	Silty GRAVEL; brown. Well graded and compacted. Gravel; fine to coarse. No man-made materials observed.
0.30		End of hole- gravel refusal.

HA10

Depth (mbgl)	Layer ID	Soil description
0.0-0.17	TOPSOIL	Organic SILT with minor gravel and trace rootlets; light brown. Soft, moist. Gravel; fine to medium.
0.17-0.5	Natural?	SILT with minor gravel and clay; dark brown. Soft, moist, moderate plasticity.
0.50		Grades to a yellow-brown SILT.
0.50		End of hole.

HA11

Depth (mbgl)	Layer ID	Soil description
0.0-0.1	TOPSOIL	Organic SILT; brown-light brown. Very soft-soft; dry.
0.1-0.5	Natural?	SILT with some-minor clay and trace gravel; yellow-brown. Soft-firm, moist. Gravel; coarse. No man-made materials observed.
0.50		Becoming stiff.
0.50		End of hole.

HA12

Depth (mbgl)	Layer ID	Soil description
0.0-0.01	TURF/ROOTLETS	10 mm thatched turf and rootlets.
0.01-0.45	FILL	SILT with minor sand and gravel, trace cobbles and brick fragments; brown. Soft, dry-moist. Gravel; fine to coarse.
0.45		End of hole.

HA13

Depth (mbgl)	Layer ID	Soil description
0.0-0.05	TOPSOIL	Organic SILT with thatched rootlets throughout; brown-light brown. Soft.
0.05-0.5	FILL	SILT with some gravel and minor sand and brick fragments; brown. Very soft, dry.
0.5-0.6	Natural	SILT with trace clay; yellow-brown. Soft, moist.
0.60		End of hole.

HA14

Depth (mbgl)	Layer ID	Soil description
0.0-0.5	TOPSOIL	Organic SILT; dark brown. Soft-firm, moist, moderate plasticity.
0.50	Natural	SAND with some silt; yellow-brown. Soft, moist. Sand; fine to medium.
0.50		End of hole.

HA15

Depth (mbgl)	Layer ID	Soil description
0.0-0.01	TURF/ROOTLETS	10 mm thatched turf and rootlets.
0.01-0.45	FILL	SILT with some sand and minor to trace gravel and clay, trace brick and asphalt fragments; brown. Soft, dry to moist.
0.45-0.65	Natural	SAND with some silt; yellow-brown. Sand; fine.
0.65		End of hole.

HA16

Depth (mbgl)	Layer ID	Soil description
0.0-0.01	TURF/ROOTLETS	10 mm thatched turf and rootlets.
0.01-0.35	FILL	SILT with some sand and gravel, trace cobbles and trace-minor brick; light brown. Dry. Rotted white painted wooden chips and one rusted nail observed.
0.35		End of hole- cobble refusal.

HA17

Depth (mbgl)	Layer ID	Soil description
0.0-0.005	TURF/ROOTLETS	5 mm thatched turf and rootlets.
0.005-0.3	FILL	SILT with some sand and minor gravel and brick and trace glass, asphalt, plastic fragments and one rusted nail; brown. Gravel; fine to coarse.
0.30		End of hole- gravel/brick refusal.

HA18

Depth (mbgl)	Layer ID	Soil description
0.0-0.5	FILL	SILT with some sand, gravel and rare cobbles, trace brick fragments and one piece of suspect asbestos containing board material (ACM) found at 0.1 m bgl.
0.50		End of hole- cobble refusal.

HA19

Depth (mbgl)	Layer ID	Soil description
0.0-0.3	FILL	SILT with some sand and gravel and minor-trace brick, concrete and plastic fragments; brown. Soft-firm, dry. Gravel; fine to coarse.
0.3-0.5	FILL	Clayey SILT with some sand and trace brick and wood chips; blue-grey. Firm, moist. Sand; fine.
0.5-0.6	Natural	SAND with some silt; yellow-brown. Soft, moist. Sand; fine.
0.60		End of hole.

HA20

Depth (mbgl)	Layer ID	Soil description
0.0-0.01	TURF/ROOTLETS	10 mm thatched turf and rootlets.
0.01-0.3	FILL	SILT with some sand and gravel, minor brick fragments and trace concrete fragments; brown. Soft to firm, dry to moist. Gravel; fine to coarse. Sand; fine.
0.30		End of hole- large cobble refusal.

D2 – Peterborough Street

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP1
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180810 mN 1570031 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		16/12/2013	TP1/0.1 + QC1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP1/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, electrical cables. Slight cement / gas works odour.	D-M				
			TP1/0.5	0.5								
			TP1/1.0	1.0								
			TP1/1.5	1.5				M				
								S				
			TP1/2.0	2.0								
				2.5			PEAT; dark brown. Fibrous, soft, saturated.		S		Springston Formation	
							Organic SILT with trace sand and clay; grey. Firm to stiff, saturated. Sand, fine. Organic odour.		F-St			
			TP1/3.0	3.0			**TP1 terminated @ 3.0 m**					
				3.5								
				4.0								

T+T_DATATEMPLATE.GDT lhs

Log Scale 1:22.5

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP2
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180840 mN 1570020 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP2/0.1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP2/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, timber. Slight cement / gas works odour.	D-M				
			TP2/0.5	0.5								
			TP2/1.0	1.0								
		16/12/2013	TP2/1.5	1.5				M				
			TP2/2.0	2.0				S				
				2.5			-concrete rubble common from 2.9 to 3.8 m					
			TP2/3.1	3.0								
				3.5								
			TP2/3.9	4.0			Sandy SILT, slightly organic; grey. Firm, saturated. Sand, fine. Organic odour. Some peat lenses; dark brown.		F		Springston Formation	
							TP2 terminated @ 4.0 m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP3
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180870 mN 1570011 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP3/0.1	0.0			FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP3/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, timber. Slight cement / gas works odour.	D-M				
			TP3/0.5 + QC2	0.5			-containing trace cobble sized black slag type material @ 0.5 m					
			TP3/1.0	1.0								
		16/12/2013						M				
			TP3/1.5	1.5								
								S				
			TP3/2.0	2.0								
				2.5			-concrete rubble common from 2.5 to 3.2 m					
				3.0								
			TP3/3.2				Silty fine SAND, slightly organic; grey. Saturated. Organic odour. Some peat lenses; dark brown.				Springston Formation	
							TP3 terminated @ 3.3 m					
				3.5								
				4.0								

T+T_DATATEMPLATE.GDT lhs

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP4
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180868 mN 1569986 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP4/0.1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP4/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, electrical cables. Slight cement / gas works odour.	D-M				
			TP4/0.5	0.5								
			TP4/1.0	1.0			FILL: sandy SILT, slightly organic; dark grey. Firm, moist. Sand, fine.		F			
							FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, electrical cables. Slight cement / gas works odour.		L			
			TP4/1.5	1.5				M				
		16/12/2013	TP4/2.0	2.0				S				
				2.5			Sandy SILT, with some gravel, slightly organic; grey. Firm, saturated. Sand, fine; gravel, fine to coarse, rounded, greywacke. Organic odour. Some peat lenses; dark brown.				Springston Formation	
			TP4/2.9	3.0			**TP4 terminated @ 3.0 m**					
				3.5								
				4.0								

T+T_DATATEMPLATE.GDT lhs

Log Scale 1:22.5

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP5
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180828 mN 1569971 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP5/0.1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP5/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, timber. Slight cement / gas works odour.	D-M				
			TP5/0.5	0.5								
			TP5/1.0	1.0								
		16/12/2013	TP5/1.5	1.5								
								S				
			TP5/2.0	2.0								
				2.5								
				3.0			-concrete rubble, steel, bricks, common from 3.0 to 4.2 m					
			TP5/3.2									
				3.5								
			TP5/4.0	4.0								
							TP5 terminated @ 4.2 m (effective refusal on demolition rubble)					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP6
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180856 mN 1569969 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		DRY ON COMPLETION	TP6/0.1 + QC3	0			FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, electrical cables.	D-M	L		FILL	
			TP6/0.25					M	St			
			TP6/0.5	0.5			FILL: sandy SILT, some gravels and cobbles slightly organic; dark brownish grey. Stiff, moist. Sand, fine; gravel, fine cobble sized, rounded greywacke.				Springston Formation	
							Silty SAND; light brownish grey, some orange brown mottling. Loose, moist, trace rootlets. Sand, fine.					
			TP6/1.0	1.0								
			TP6/1.5	1.5			**TP6 terminated @ 1.5 m**					
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								

T+T_DATATEMPLATE.GDT lhs

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP7
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180819 mN 1569989 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP7/0.1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D	L		FILL	
			TP7/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, timber. Slight cement / gas works odour.	D-M				
			TP7/0.5	0.5								
			TP7/1.0	1.0								
		16/12/2013	TP7/1.5	1.5				M				
								S				
			TP7/2.0	2.0								
				2.5								
			TP7/3.0	3.0			-concrete rubble, steel, bricks, rubbish and some bitumen fragments common from 3.0 to 4.2 m					
				3.5								
			TP7/4.0	4.0			FILL: SILT with some sand, slightly organic; Dark grey. Soft to firm, saturated. Sand, fine. Containing some plastic sheeting (disturbed natural material?)		S-F			
							TP7 terminated @ 4.2 m (effective refusal in disturbed natural material?)					

T+T_DATATEMPLATE.GDT lhs

Log Scale 1:22.5

EXCAVATION 29759.001_TP1-TP8.GPJ 16-Jan-2014

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TP8
Hole Location: Refer to Figure 2

SHEET 1 OF 1

PROJECT: RYMANS-ENV5		LOCATION: 78 Park Terrace, Christchurch	JOB No: 29759.001
CO-ORDINATES: 5180844 mN 1569995 mE	EXPOSURE TYPE: TP	EXCAV. STARTED: 16/12/13	
	EQUIPMENT: 13 tonne excavator	EXCAV FINISHED: 16/12/13	
R.L.	OPERATOR: Hunter Civil (Mike)	LOGGED BY: AJDC	
DATUM NZTM	DIMENSIONS: ~ 2.5m (l) X 1.5m (w)	CHECKED BY: WED	

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			TP8/0.1				FILL: fine to coarse GRAVEL; grey. Loose, dry, sub-angular to rounded, greywacke gravel.	D L			FILL	
			TP8/0.25				FILL: sandy, silty fine to coarse GRAVEL with some cobbles; brownish grey. Dry to moist, sub-angular, greywacke gravel; sand, fine to coarse. Containing some concrete rubble, reinforcing steel, and trace scrap metal, plastic, timber. Slight cement / gas works odour.	D-M				
			TP8/0.5	0.5								
			TP8/1.0	1.0								
		16/12/2013	TP8/1.5	1.5								
								S				
			TP8/2.0	2.0			-concrete rubble, steel, bricks, rubbish and some bitumen pieces common from 3.0 to 4.2 m					
				2.5								
			TP8/3.0	3.0								
				3.5			-becoming silty and sandy and containing plastic sheeting @ 3.4 m					
			TP8/4.0	4.0								
							TP8 terminated @ 4.3 m (effective refusal in FILL?)					

T+T_DATATEMPLATE.GDT lhs

Log Scale 1:22.5

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:BH07
Hole Location:

SHEET 1 OF 1

PROJECT: Ryman Geotech Investigation		LOCATION: 78 Park Terrace	JOB No: 29759
CO-ORDINATES:	5180816.36 mN 1570004.87 mE	DRILL TYPE: Mobile Sonic MS1000	HOLE STARTED: 19/12/13 HOLE FINISHED: 19/12/13
R.L.:	7.00 m	DRILL METHOD: RotoSonic	DRILLED BY: Pro-Drill
DATUM:	LYTTHT1937 (15/12/2013 - PostEQ)	DRILL FLUID: Water (Casing only)	LOGGED BY: CRG CHECKED: JKK

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 1000 2000	SOIL DESCRIPTION Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Engineered Fill		1.375 @ 19/12/2013 | 1.305 @ 13/01/2014						6.5 0.5 6.0 1.0 5.5 1.5 5.0 2.0 4.5 2.5 4.0 3.0 3.5 3.5 3.0 4.0 2.5 4.5 5								Sandy, fine to coarse GRAVEL, with minor silt, light grey, homogeneous. Tightly packed, dry grades to wet, well graded. Gravel, sub-rounded to angular, slightly weathered, greywacke; Sand, fine to coarse, well graded; various building waste throughout (concrete, plastic, electrical wiring etc). **EoH @ Target Depth - 3.0 m.**

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

T+T DATATEMPLATE.GDT amm

Log Scale 1:25

BORELOG 29759_CRG.GPJ 15-Jan-2014

EXCAVATION LOG

Tonkin+Taylor

Excavation Id.: **TP9**

SHEET: 1 OF 1

PROJECT: 100 Park Terrace	LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200

CO-ORDINATES: (WGS84)	172.629015 -43.525284	EXPOSURE METHOD:	TP	EXCAV. STARTED:	14/06/2019
		EQUIPMENT:	11T excavator	EXCAV. FINISHED:	14/06/2019
R.L.:	7.30m	OPERATOR:	Protranz Earthmoving	LOGGED BY:	LEBL
DATUM:	NZVD2016	DIMENSIONS:		CHECKED BY:	PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
		14/06/2019			7	0.0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subangular to rounded; sand, fine to coarse.	M				
								DEMOLITION FILL: Sandy silty GRAVEL, some crushed concrete >200 mm diameter, metal scraps and brick, minor to some cobbles, trace re-bar, metal scraps and large nails; light brown. Dry; gravel, fine to coarse, subangular to subrounded; sand, fine.	D			*0.1m:* PID 5.0 ppm *0.25m:* PID 5.3 ppm	
						0.5		0.5 - 0.55m: North side of pit - buried topsoil lense. SILT with fibrous organics; dark brown. Soft, moist.	M				
								0.7m: Electrical cable.				*0.7m:* PID 6.1 ppm	
						1.0						*1.0m:* PID 4.9 ppm	
								1.2m: Trace re-bar, electrical cables, crushed concrete; wet. Southern side of pit - large piece of re-bar protruding from pit wall.	W				
					6			1.4m: Groundwater encountered.					
						1.4		1.4m: END OF INVESTIGATION	S			*1.4m:* PID 6.1 ppm	
						1.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
1.4m

Scale 1:17

Rev.: A

EXCAVATION LOG

Tonkin+Taylor

Excavation Id.: **TP10**

SHEET: 1 OF 1

PROJECT: 100 Park Terrace | LOCATION: Peterborough St, Christchurch | JOB No.: 30315.0000.200

CO-ORDINATES: 172.628975 (WGS84) -43.525075
R.L.: 7.30m
DATUM: NZVD2016

EXPOSURE METHOD: TP
EQUIPMENT: 11T excavator
OPERATOR: Protranz Earthmoving
DIMENSIONS:

EXCAV. STARTED: 14/06/2019
EXCAV. FINISHED: 14/06/2019
LOGGED BY: LEBL
CHECKED BY: PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
		14/06/2019			7	0.0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subangular to rounded; sand, fine to coarse.	M				
								DEMOLITION FILL: Sandy silty GRAVEL, some crushed concrete >200 mm diameter and brick, minor cobbles, metal, re-bar, plastic pipe pieces, and ripped geotextile, trace asphalt; light brown. Dry to moist; gravel, fine to coarse, subangular to subrounded; sand, fine.	D-M			*0.1m:* PID 4.4 ppm *0.25m:* PID 5.8 ppm	
						0.5		0.2m: Southern end of pit - large piece of metal sheet and re-bar protruding from pit wall.				*0.6m:* PID 6.2 ppm	
					6	1.0		1.0m: Concrete pieces 300-400 mm diameter, large piece of re-bar.	M			*1.0m:* PID 5.6 ppm	
								1.3m: Large scraps of metal >200 mm.					
								1.4m: Groundwater encountered.	S			*1.4m:* PID 6.1 ppm	
						1.5		1.5m: END OF INVESTIGATION					

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.5m

Scale 1:17

Rev.: A

EXCAVATION LOG

Tonkin+Taylor

Excavation Id.: **TP11**

SHEET: 1 OF 1

PROJECT: 100 Park Terrace		LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200
CO-ORDINATES: (WGS84)	172.629098 -43.524937	EXPOSURE METHOD: TP	EXCAV. STARTED: 14/06/2019
		EQUIPMENT: 11T excavator	EXCAV. FINISHED: 14/06/2019
R.L.:	7.30m	OPERATOR: Protranz Earthmoving	LOGGED BY: LEBL
DATUM:	NZVD2016	DIMENSIONS:	CHECKED BY: PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
		14/06/2019			7	0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subrounded; sand, fine to coarse.	M				
						0.5		DEMOLITION FILL: Sandy silty GRAVEL, some crushed concrete >200 mm diameter, metal, re-bar, wire, and plastic, trace cobbles and asphalt; light brown. Dry to moist; gravel, fine to coarse, subangular to subrounded; sand, fine. 0.3m: West side of pit - piece of geotextile protruding from pit wall. 0.6m: Increased crushed concrete 50-150 mm diameter. 0.7m: East side of pit - electrical cables protruding from pit wall.	D-M			*0.1m:* PID 2.9 ppm *0.25m:* PID 4.0 ppm *0.6m:* PID 5.2 ppm	
					6	1.0		1.4m: Groundwater encountered.				*1.0m:* PID 3.9 ppm	
						1.5		1.4m: END OF INVESTIGATION	S			*1.4m:* PID 5.6 ppm	

SKETCH / PHOTO:

COMMENTS:

Hole Depth
1.4m

Scale 1:17

Rev.: A

EXCAVATION LOG

Tonkin+Taylor

Excavation Id.: **TP12**

SHEET: 1 OF 2

PROJECT: 100 Park Terrace	LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200

CO-ORDINATES: (WGS84)	172.629011 -43.524707	EXPOSURE METHOD:	TP	EXCAV. STARTED:	13/06/2019
		EQUIPMENT:	11T excavator	EXCAV. FINISHED:	13/06/2019
R.L.:	7.30m	OPERATOR:	Protranz Earthmoving	LOGGED BY:	LEBL
DATUM:	NZVD2016	DIMENSIONS:		CHECKED BY:	PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
		13/06/2019			7	0.0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subangular to rounded; sand, fine to coarse.	M			*0.01m:* PID 2.3 ppm	
						0.5		DEMOLITION FILL: Sandy silty GRAVEL, some crushed concrete >200 mm diameter, minor cobbles, scrap metal, large nails, brick, re-bar and asphalt; light brown. Dry to moist; gravel, fine to coarse, subangular to subrounded; sand, fine. 0.3m: Some cobbles, moist.	D-M M			*0.25m:* PID 3.1 ppm *0.6m:* PID 4.1 ppm	
					6	1.0		1.0 - 1.5m: Increased crushed concrete content, trace timber and nails.					
						1.5		1.5m: Groundwater encountered.	S			*1.5m:* PID 4.5 ppm	
						2.0		2m: END OF INVESTIGATION				*2.0m:* PID 4.0 ppm	

SKETCH / PHOTO:

COMMENTS:

Hole Depth
2m

Scale 1:18

Rev.: A

Tonkin+Taylor

EXCAVATION LOG

Excavation Id.: **TP12**

PROJECT: 100 Park Terrace	LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200

CO-ORDINATES: (WGS84)	172.629011 -43.524707	EXPOSURE METHOD:	TP	EXCAV. STARTED:	13/06/2019
		EQUIPMENT:	11T excavator	EXCAV. FINISHED:	13/06/2019
R.L.:	7.30m	OPERATOR:	Protranz Earthmoving	LOGGED BY:	LEBL
DATUM:	NZVD2016	DIMENSIONS:		CHECKED BY:	PEW

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION (-1, -2, -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10, 25, 50, 100, 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT

SKETCH / PHOTO:

COMMENTS:

Hole Depth 2m

Scale 1:18

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP13**

SHEET: 1 OF 1

PROJECT: 100 Park Terrace	LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200

CO-ORDINATES: (WGS84)	172.628479 -43.524858	EXPOSURE METHOD:	TP	EXCAV. STARTED:	14/06/2019
		EQUIPMENT:	11T excavator	EXCAV. FINISHED:	14/06/2019
R.L.:	7.30m	OPERATOR:	Protranz Earthmoving	LOGGED BY:	LEBL
DATUM:	NZVD2016	DIMENSIONS:		CHECKED BY:	PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
					7	0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subangular; sand, fine to coarse.	M				
								DEMOLITION FILL: Sandy silty GRAVEL, minor to some crushed concrete, trace scrap metal, large nails, brick, plastic, re-bar and asphalt; light brown. Dry to moist; gravel, fine to coarse, subangular to subrounded; sand, fine.	D-M			*0.1m:* PID 3.8 ppm *0.25m:* PID 4.0 ppm	
						0.5		0.6m: Very slight hydrocarbon odour; 100-200 mm thick layer of crushed concrete. 0.7m: Trace timber pieces 150-200 mm diameter.				*0.6m:* PID 4.9 ppm	
						1.0		1.0m: Slight bitumen-like odour, trace plasterboard pieces.				*1.0m:* PID 4.9 ppm	
		14/06/2019			6			1.4m: Groundwater encountered, rapid infiltration to pit.					
						1.5		1.4m: END OF INVESTIGATION	S			*1.4m:* PID 4.8 ppm	

SKETCH / PHOTO:

COMMENTS:

Hole Depth
1.4m

Scale 1:17

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP14**

SHEET: 1 OF 1

PROJECT: 100 Park Terrace	LOCATION: Peterborough St, Christchurch	JOB No.: 30315.0000.200

CO-ORDINATES: (WGS84)	172.628591 -43.52466	EXPOSURE METHOD:	TP	EXCAV. STARTED:	13/06/2019
		EQUIPMENT:	11T excavator	EXCAV. FINISHED:	13/06/2019
R.L.:	7.30m	OPERATOR:	Protranz Earthmoving	LOGGED BY:	LEBL
DATUM:	NZVD2016	DIMENSIONS:		CHECKED BY:	PEW

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
					7	0		RECENT FILL: Sandy GRAVEL; dark brown. Moist; gravel, fine to coarse, subangular; sand, fine to coarse.	M				
								DEMOLITION FILL: Sandy silty GRAVEL, minor to some crushed concrete, minor brick, pvc pipe, scrap metal, large nails, and re-bar, trace asphalt; light brown. Dry to moist; gravel, fine to coarse, subangular to subrounded; sand, fine.	D-M			*0.1m:* PID 1.4 ppm *0.25m:* PID 1.6 ppm	
						0.5		0.7m: Some crushed concrete. West side of pit - large piece of re-bar protruding from pit wall.				*0.6m:* PID 2.2 ppm	
					6	1.0		1.0 - 1.5m: Crushed concrete in a matrix of sandy silty gravel, majority of concrete pieces 100-200 mm diameter.				*1.0m:* PID 2.5 ppm	
		13/06/2019				1.5		1.5m: Groundwater encountered.	S			*1.5m:* PID 2.8 ppm	
								1.6m: One half of a football, trace timber pieces.					
								1.85m: One piece of black, sticky felt material.				*1.8m:* PID 2.5 ppm	
								1.9m: END OF INVESTIGATION					

SKETCH / PHOTO:

COMMENTS:

Hole Depth
1.9m

Scale 1:17

Rev.: A

Appendix E: Laboratory Transcripts

E1 – Bishopspark

Table E1: Bishopspark analytical results for surface soil samples.

Sample Name:	Background Soil Concentration [3]	Worker safety [4,5,6,7, 12]	Residential Use [8,9,10,12]	HA1	HA2	HA3	HA4	HA5	HA6	HA7	HA8	HA9	HA10
Depth				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample depth				6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018
Material				Fill	Fill	Topsoil	Fill	Organic fill	Fill	Fill	Fill	Topsoil	Topsoil
Asbestos in Soil													
Asbestos Presence / Absence	ND	-	-	Asbestos detected	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos detected	Asbestos detected	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos detected	Asbestos detected
Description of Asbestos Form	-	-	-	Loose fibres	-	-	Loose fibres	Loose fibres	-	-	-	Loose fibres	Loose fibres
Asbestos in ACM % of Total Sample	ND	0.05 [13]	0.04	<0.001	-	-	<0.001	<0.001	-	-	-	<0.001	<0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	ND	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	-	-	-	<0.001	<0.001
Heavy Metals													
Arsenic	16.3	70	45	8	5	8	28	9	10	8	8	8	10
Cadmium	0.2	1,300	230	0.34	0.14	0.13	0.27	0.19	0.21	0.17	0.14	0.13	0.16
Chromium	20.1	6,300	1,500	18	15	20	18	15	16	17	16	14	15
Copper	19.5	>10,000	>10,000	33	15	16	65	22	39	18	18	15	17
Lead	128.8	3,300	500	220	158	73	220	131	149	71	72	81	92
Nickel	18	6,000	1,200	13	12	12	15	13	14	12	12	11	13
Zinc	166.8	400,000	60,000	250	114	124	200	146	162	106	102	101	106
Organochlorine Pesticides (OCP) #													
4,4'-DDD	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	-	-	-	0.036	0.024	0.049	0.012	0.029	< 0.010	0.023	< 0.010	0.013	0.031
2,4'-DDT	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	-	-	-	0.024	0.018	0.039	< 0.010	0.024	< 0.010	< 0.010	< 0.010	0.01	0.033
Total DDT [2]	0.431	1,000	240	< 0.06	< 0.06	0.09	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	0.06
Dieldrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons (PAH)*													
1-Methylnaphthalene	-	-	-	0.022	< 0.012	< 0.012	< 0.014	< 0.013	0.015	< 0.012	< 0.012	< 0.012	< 0.011
2-Methylnaphthalene	-	-	-	0.02	< 0.012	< 0.012	< 0.014	< 0.013	0.012	< 0.012	< 0.012	< 0.012	< 0.011
Perylene	-	-	-	0.108	0.085	0.047	0.093	0.137	0.09	0.042	0.043	0.061	0.049
Benzo[a]pyrene Potency Equivalency Factor (PEF) N	-	-	-	0.66	0.54	0.27	0.61	0.85	0.56	0.35	0.35	0.35	0.32
Benzo[a]pyrene Toxic Equivalence (TEF) [1]	0.922	35	24	0.66	0.55	0.27	0.61	0.85	0.56	0.35	0.35	0.35	0.32
Acenaphthylene	-	-	-	0.044	0.04	0.021	0.046	0.069	0.05	0.031	0.029	0.028	0.025
Acenaphthene	-	-	-	< 0.012	< 0.012	< 0.012	< 0.014	< 0.013	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Anthracene	-	-	-	0.05	0.042	0.02	0.053	0.071	0.042	0.034	0.022	0.03	0.029
Benzo[a]anthracene	-	-	-	0.29	0.26	0.116	0.26	0.36	0.24	0.152	0.15	0.148	0.156
Benzo[a]pyrene (BAP)[1]	-	-	-	0.43	0.35	0.172	0.4	0.56	0.37	0.27	0.26	0.23	0.21
Benzo[b]fluoranthene + Benzo[j]fluoranthene	-	-	-	0.51	0.45	0.22	0.48	0.68	0.46	0.2	0.2	0.29	0.27
Benzo[e]pyrene	-	-	-	0.3	0.25	0.123	0.28	0.41	0.27	0.11	0.112	0.168	0.152
Benzo[g,h,i]perylene	-	-	-	0.32	0.27	0.143	0.31	0.47	0.31	0.127	0.131	0.196	0.173
Benzo[k]fluoranthene	-	-	-	0.21	0.168	0.084	0.199	0.25	0.176	0.079	0.076	0.106	0.1
Chrysene	-	-	-	0.37	0.31	0.159	0.35	0.45	0.32	0.14	0.137	0.181	0.186
Dibenzo[a,h]anthracene	-	-	-	0.081	0.068	0.038	0.072	0.094	0.06	0.023	0.024	0.04	0.038
Fluoranthene	-	-	-	0.69	0.54	0.27	0.68	0.84	0.55	0.4	0.34	0.32	0.33
Fluorene	-	-	-	0.018	< 0.012	0.013	0.014	0.025	0.02	< 0.012	< 0.012	< 0.012	0.012
Indeno(1,2,3-c,d)pyrene	-	-	-	0.32	0.27	0.143	0.32	0.49	0.31	0.142	0.146	0.2	0.171
Naphthalene	-	3,100	63	< 0.06	< 0.06	< 0.06	< 0.07	< 0.07	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Phenanthrene	-	-	-	0.23	0.189	0.094	0.24	0.32	0.2	0.172	0.094	0.106	0.12
Pyrene	-	NA	(1,600)	0.65	0.52	0.26	0.65	0.8	0.54	0.36	0.31	0.31	0.33

Notes

Results presented in mg/kg unless specified.

Values in underlined exceed the published background level.

Values in bold exceed the Residential Use criteria.

Values in *italic* exceed the Worker safety criteria.

ND – Not detected.

Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

OCP results included where above the laboratory limit of detection and assessment criteria available.

* PAH results included where above the laboratory limit of detection and assessment criteria available.

1 – BaP(eq) calculated as the weighted sum of nine carcinogenic PAHs.

2 – ∑DDT is the sum of six isomers of DDT and its metabolites.

3 - Environment Canterbury published background concentrations, sourced from Canterbury Maps: Trace Elements Level 2.

4 – Ministry for the Environment (April 2012) Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Appendix B: Soil contaminant standards (Commercial/industrial/outdoor worker).

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12 – BRANZ 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

13 - BRANZ 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil. Commercial/Industrial land use applied for worker safety.

Table E1 continued: Bishopspark analytical results for surface soil samples.

Sample Name:	Background Soil Concentration [3]	Worker safety [4,5,6,7, 12]	Residential Use [8,9,10,12]	HA11	HA12	HA13	HA14	HA15	HA16	HA17	HA18	HA19	HA20
Depth				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample depth				6/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018
Material				Topsoil	Fill	Fill	Topsoil	Fill	Fill	Fill	Fill	Fill	Fill
Asbestos in Soil													
Asbestos Presence / Absence	ND	-	-	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos detected	Asbestos detected	Asbestos detected	Asbestos detected	Asbestos detected	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-	-	-	Loose fibres	Loose fibres	Loose fibres	ACM sample	ACM debris and Loose fibres	-
Asbestos in ACM % of Total Sample	ND	0.05 [13]	0.04	-	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	ND	<0.001	<0.001	-	-	-	-	<0.001	<0.001	<0.001	-	*0.009*	-
Heavy Metals													
Arsenic	16.3	70	45	6	8	9	10	14	7	12	9	18	6
Cadmium	0.2	1,300	230	0.11	0.17	0.15	0.34	0.18	0.17	0.19	0.2	0.28	0.14
Chromium	20.1	6,300	1,500	14	17	17	15	16	16	17	16	27	14
Copper	19.5	>10,000	>10,000	12	19	19	35	31	19	27	27	38	16
Lead	128.8	3,300	500	44	139	158	113	87	130	220	169	81	69
Nickel	18	6,000	1,200	11	13	13	12	13	13	14	12	14	11
Zinc	166.8	400,000	60,000	84	140	141	250	112	210	173	198	210	111
Organochlorine Pesticides (OCP) [#]													
4,4'-DDD	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	-	-	-	0.019	0.013	0.043	0.014	0.014	< 0.010	0.017	< 0.010	0.02	0.01
2,4'-DDT	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	-	-	-	0.015	< 0.010	0.014	< 0.010	0.013	< 0.010	< 0.010	< 0.010	0.017	< 0.010
Total DDT [2]	0.431	1,000	240	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Dieldrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons (PAH)*													
1-Methylnaphthalene	-	-	-	< 0.013	< 0.012	< 0.012	0.054	< 0.012	< 0.012	< 0.012	0.025	< 0.013	< 0.012
2-Methylnaphthalene	-	-	-	< 0.013	< 0.012	< 0.012	0.036	< 0.012	< 0.012	< 0.012	0.019	< 0.013	< 0.012
Perylene	-	-	-	0.042	0.045	0.028	0.114	0.108	0.028	0.037	0.054	0.036	0.047
Benzo[a]pyrene Potency Equivalency Factor (PEF) NB	-	-	-	0.24	0.37	0.28	1.25	1.11	0.29	0.37	0.58	0.38	0.48
Benzo[a]pyrene Toxic Equivalence (TEF) [1]	0.922	35	24	0.24	0.37	0.28	1.26	1.12	0.29	0.37	0.58	0.38	0.48
Acenaphthylene	-	-	-	0.018	0.028	0.018	0.092	0.076	0.021	0.031	0.038	0.029	0.042
Acenaphthene	-	-	-	< 0.013	< 0.012	< 0.012	0.016	< 0.012	< 0.012	< 0.012	< 0.012	< 0.013	< 0.012
Anthracene	-	-	-	0.019	0.043	0.029	0.099	0.076	0.025	0.036	0.035	0.035	0.074
Benzo[a]anthracene	-	-	-	0.092	0.181	0.111	0.48	0.41	0.126	0.158	0.23	0.152	0.26
Benzo[a]pyrene (BAP)[1]	-	-	-	0.148	0.27	0.18	0.77	0.68	0.183	0.24	0.36	0.24	0.31
Benzo[b]fluoranthene + Benzo[j]fluoranthene	-	-	-	0.19	0.27	0.179	0.89	0.74	0.179	0.27	0.39	0.26	0.31
Benzo[e]pyrene	-	-	-	0.113	0.141	0.096	0.47	0.41	0.101	0.138	0.21	0.143	0.16
Benzo[g,h,i]perylene	-	-	-	0.156	0.134	0.178	0.96	0.84	0.194	0.26	0.42	0.29	0.28
Benzo[k]fluoranthene	-	-	-	0.086	0.099	0.065	0.32	0.26	0.07	0.1	0.142	0.089	0.122
Chrysene	-	-	-	0.123	0.2	0.131	0.57	0.45	0.125	0.165	0.25	0.171	0.24
Dibenzo[a,h]anthracene	-	-	-	0.035	0.023	0.037	0.191	0.179	0.04	0.049	0.089	0.057	0.061
Fluoranthene	-	-	-	0.196	0.44	0.28	1.24	0.9	0.25	0.34	0.47	0.33	0.55
Fluorene	-	-	-	< 0.013	< 0.012	< 0.012	0.031	0.019	< 0.012	< 0.012	< 0.012	< 0.013	0.022
Indeno(1,2,3-c,d)pyrene	-	-	-	0.148	0.157	0.191	1.02	0.94	0.21	0.25	0.47	0.31	0.31
Naphthalene	-	3,100	63	< 0.07	< 0.06	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.07	< 0.06
Phenanthrene	-	-	-	0.058	0.171	0.118	0.52	0.31	0.09	0.127	0.15	0.113	0.26
Pyrene	-	NA	(1,600)	0.183	0.46	0.32	1.31	1.04	0.28	0.35	0.49	0.37	0.55

Notes

Results presented in mg/kg unless specified.

Values in underlined exceed the published background level.

Values in bold exceed the Residential Use criteria.

Values in *italic* exceed the Worker safety criteria.

ND – Not detected.

Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

[#] OCP results included where above the laboratory limit of detection and assessment criteria available.

[*] PAH results included where above the laboratory limit of detection and assessment criteria available.

1 – BaP(eq) calculated as the weighted sum of nine carcinogenic PAHs.

2 – ∑DDT is the sum of six isomers of DDT and its metabolites.

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Table E1 continued : Bishopspark analytical results for fill material samples and deeper natural samples.

Sample Name:	Background Soil Concentration [3]	Worker safety [4,5,6,7, 12]	Residential Use [8,9,10,12]	HA1	HA2	HA3	HA4	HA5	HA6	HA7	HA8	HA9	HA10	HA11	HA12	HA13	HA14	HA15
Depth				0.35	0.45	0.45	0.4	0.4	0.45	0.4	0.45	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Sample depth				6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	6/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018
Material				Fill	Fill	Fill	Fill	Organic fill	Fill	Fill	Fill	Silty Gravel	Silt	Silt	Fill	Fill	Silt	Sand
Asbestos in Soil																		
Asbestos Presence / Absence	ND	-	-	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos detected	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos detected	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-	-	ACM debris and Loose fibres	-	-	-	-	Loose fibres	-	-	-	-	-	-
Asbestos in ACM % of Total Sample	ND	0.05 [13]	0.04	-	-	-	<0.001	-	-	-	-	<0.001	-	-	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	ND	<0.001	<0.001	-	-	-	*0.039*	-	-	-	-	<0.001	-	-	-	-	-	-
Heavy Metals																		
Arsenic	16.3	70	45	7	4	8	59	8	10	7	7	7	6	5	5	8	10	14
Cadmium	0.2	1,300	230	0.2	< 0.10	0.22	0.34	0.14	0.19	0.17	0.15	< 0.10	< 0.10	< 0.10	0.13	0.34	0.24	0.18
Chromium	20.1	6,300	1,500	16	15	18	19	15	16	16	16	13	16	16	18	17	14	15
Copper	19.5	>10,000	>10,000	24	10	31	120	22	27	21	19	12	12	10	32	24	24	65
Lead	128.8	3,300	500	147	99	125	370	111	130	99	95	55	42	21	50	230	94	101
Nickel	18	6,000	1,200	14	13	15	16	14	14	13	14	11	14	14	12	13	13	13
Zinc	166.8	400,000	60,000	144	79	157	250	128	147	123	117	75	67	59	30	240	181	124
Organochlorine Pesticides (OCP) [#]																		
4,4'-DDD	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.025	0.019	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	-	-	-	0.069	< 0.010	0.56	< 0.010	0.023	0.019	0.086	0.064	0.011	0.016	< 0.010	< 0.010	0.019	< 0.010	0.012
2,4'-DDT	-	-	-	< 0.010	< 0.010	0.089	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	-	-	-	0.043	< 0.010	0.56	< 0.010	0.016	0.015	0.03	0.019	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011
Total DDT [2]	0.431	1,000	240	0.11	< 0.06	1.21	< 0.06	< 0.06	< 0.06	0.14	0.1	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06		< 0.06
Dieldrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons (PAH)*																		
1-Methylnaphthalene	-	-	-	< 0.012	< 0.012	0.026	< 0.013	< 0.012	< 0.013	< 0.012	< 0.012	< 0.011	< 0.012	< 0.013	< 0.011	< 0.012	< 0.014	< 0.012
2-Methylnaphthalene	-	-	-	< 0.012	< 0.012	0.019	< 0.013	< 0.012	< 0.013	< 0.012	< 0.012	< 0.011	< 0.012	< 0.013	< 0.011	< 0.012	< 0.014	< 0.012
Perylene	-	-	-	0.127	0.027	0.51	0.089	0.123	0.083	0.061	0.098	0.031	0.029	< 0.013	0.036	0.05	0.086	0.105
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	-	-	-	0.8	0.17	3.4	0.6	0.81	0.49	0.51	0.65	0.18	0.19	< 0.03	0.3	0.46	0.98	1.09
Benzo[a]pyrene Toxic Equivalence (TEF) [1]	0.922	35	24	0.79	0.18	3.3	0.6	0.81	0.49	0.5	0.65	0.18	0.19	< 0.04	0.31	0.46	0.99	1.09
Acenaphthylene	-	-	-	0.064	< 0.012	0.186	0.048	0.078	0.046	0.049	0.055	0.02	0.018	< 0.013	0.025	0.032	0.066	0.073
Acenaphthene	-	-	-	< 0.012	< 0.012	0.076	< 0.013	0.014	< 0.013	< 0.012	< 0.012	< 0.011	< 0.012	< 0.013	< 0.011	< 0.012	< 0.014	< 0.012
Anthracene	-	-	-	0.074	0.019	0.52	0.05	0.084	0.052	0.04	0.054	0.018	0.023	< 0.013	0.034	0.052	0.067	0.076
Benzo[a]anthracene	-	-	-	0.38	0.097	1.85	0.28	0.38	0.21	0.21	0.31	0.088	0.103	0.013	0.142	0.23	0.37	0.42
Benzo[a]pyrene (BAP)	-	-	-	0.53	0.11	2.2	0.39	0.54	0.32	0.37	0.42	0.115	0.116	0.018	0.2	0.3	0.59	0.66
Benzo[b]fluoranthene + Benzo[j]fluoranthene	-	-	-	0.64	0.129	2.7	0.48	0.63	0.4	0.31	0.54	0.165	0.153	0.031	0.185	0.31	0.66	0.74
Benzo[e]pyrene	-	-	-	0.36	0.078	1.45	0.27	0.37	0.23	0.165	0.3	0.09	0.086	0.016	0.104	0.162	0.35	0.42
Benzo[g,h,i]perylene	-	-	-	0.39	0.085	1.58	0.31	0.45	0.29	0.195	0.34	0.106	0.111	0.027	0.177	0.27	0.71	0.79
Benzo[k]fluoranthene	-	-	-	0.25	0.054	1.02	0.192	0.25	0.143	0.121	0.21	0.059	0.076	< 0.013	0.075	0.12	0.24	0.3
Chrysene	-	-	-	0.46	0.104	2.1	0.35	0.47	0.27	0.199	0.38	0.103	0.122	0.014	0.147	0.25	0.43	0.46
Dibenzo[a,h]anthracene	-	-	-	0.082	0.025	0.33	0.066	0.094	0.057	0.038	0.077	0.022	0.021	< 0.013	0.039	0.058	0.162	0.171
Fluoranthene	-	-	-	0.91	0.175	5.2	0.68	0.91	0.51	0.5	0.71	0.2	0.24	0.026	0.31	0.54	0.91	0.95
Fluorene	-	-	-	0.023	< 0.012	0.118	0.02	0.024	0.014	0.015	0.02	< 0.011	0.014	< 0.013	< 0.011	< 0.012	0.017	0.017
Indeno(1,2,3-c,d)pyrene	-	-	-	0.4	0.087	1.64	0.31	0.44	0.29	0.22	0.34	0.109	0.108	0.029	0.193	0.29	0.83	0.9
Naphthalene	-	3,100	63	< 0.06	< 0.06	< 0.06	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06	< 0.07	< 0.06
Phenanthrene	-	-	-	0.29	0.062	2.9	0.26	0.39	0.2	0.177	0.27	0.081	0.093	< 0.013	0.113	0.21	0.32	0.31
Pyrene	-	NA	(1,600)	0.86	0.179	5.1	0.65	0.84	0.48	0.45	0.74	0.195	0.23	0.026	0.35	0.61	1	1.08

Notes

Results presented in mg/kg unless specified.

Values in underlined exceed the published background level.

Values in bold exceed the Residential Use criteria.

Values in *italic* exceed the Worker safety criteria.

ND – Not detected.

Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

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[#] OCP results included where above the laboratory limit of detection and assessment criteria avalible.

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Table E1 continued : Bishopspark analytical results for fill material samples and deeper natural samples.

Sample Name:	Background Soil Concentration [3]	Worker safety [4,5,6,7, 12]	Residential Use [8,9,10,12]	HA16	HA17	HA18	HA19	HA20	TR1	TR2	DUP	TR2	TR3	TR3	BH1	BH2	BH3	BH5
Depth				0.3	0.3	0.35	0.3	0.3	0-0.6	0-0.7		0.7-0.8	0-0.6	0.6-0.8	1.0-1.2	1.0-1.2	1.0-1.2	2.0-2.2
Sample depth				7/11/2018	7/11/2018	7/11/2018	7/11/2018	7/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018
Material				Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Natural	Natural	Natural	Natural	Natural
Asbestos in Soil																		
Asbestos Presence / Absence	ND	-	-	Asbestos detected	Asbestos detected	Asbestos NOT detected.	Asbestos detected	Asbestos detected	Asbestos NOT detected.	Asbestos NOT detected.	-	-	Asbestos detected	-	-	-	-	-
Description of Asbestos Form	-	-	-	Loose fibres	ACM debris and Loose fibres	-	ACM debris and Loose fibres	Loose fibres	-	-	-	-	ACM debris and fibre cement	-	-	-	-	-
Asbestos in ACM % of Total Sample	ND	0.05 [13]	0.04	<0.001	<0.001	-	<0.001	<0.001	-	-	-	-	*0.100*	-	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	ND	<0.001	<0.001	<0.001	<0.001	-	*0.019*	<0.001	-	-	-	-	0.001	-	-	-	-	-
Heavy Metals																		
Arsenic	16.3	70	45	8	10	9	8	7	8	6	6	7	6	3	4	6	6	4
Cadmium	0.2	1,300	230	0.16	0.19	0.15	0.25	0.13	0.14	< 0.10	< 0.10	< 0.10	0.31	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chromium	20.1	6,300	1,500	16	15	15	16	15	16	18	17	17	17	12	14	18	18	12
Copper	19.5	>10,000	>10,000	20	31	19	78	20	23	11	10	10	25	6	7	9	11	7
Lead	128.8	3,300	500	190	370	127	340	86	100	34	26	20	97	10.7	11	16.5	18.8	11.1
Nickel	18	6,000	1,200	13	13	13	14	12	12	13	12	15	14	11	12	14	15	11
Zinc	166.8	400,000	60,000	145	210	158	240	125	131	79	69	69	270	40	41	58	60	41
Organochlorine Pesticides (OCP) [#]																		
4,4'-DDD	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
4,4'-DDE	-	-	-	0.014	< 0.010	< 0.010	< 0.010	0.01	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
2,4'-DDT	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
4,4'-DDT	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
Total DDT [2]	0.431	1,000	240	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	-	< 0.06	-	-	-		-
Dieldrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
Endrin	-	160	45	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAH)*																		
1-Methylnaphthalene	-	-	-	< 0.012	0.013	< 0.011	< 0.013	0.012	0.014	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
2-Methylnaphthalene	-	-	-	< 0.012	0.014	< 0.011	< 0.013	< 0.012	0.013	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Perylene	-	-	-	0.111	0.065	0.054	0.088	0.044	0.075	< 0.011	< 0.011	< 0.013	0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	-	-	-	1.06	0.66	0.59	0.91	0.47	0.74	0.07	0.06	< 0.03	0.12	< 0.03	< 0.03	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF) [1]	0.922	35	24	1.06	0.66	0.59	0.91	0.47	0.74	0.07	0.06	< 0.04	0.12	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04
Acenaphthylene	-	-	-	0.094	0.063	0.04	0.071	0.036	0.054	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Acenaphthene	-	-	-	0.015	< 0.011	< 0.011	< 0.013	< 0.012	< 0.012	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Anthracene	-	-	-	0.18	0.118	0.036	0.07	0.051	0.41	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]anthracene	-	-	-	0.63	0.35	0.23	0.37	0.22	0.41	0.029	0.022	< 0.013	0.063	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]pyrene (BAP)	-	-	-	0.71	0.41	0.37	0.59	0.3	0.49	0.052	0.042	< 0.013	0.092	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[b]fluoranthene + Benzo[j]fluoranthene	-	-	-	0.68	0.45	0.4	0.63	0.31	0.52	0.041	0.037	< 0.013	0.079	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[e]pyrene	-	-	-	0.36	0.23	0.21	0.33	0.163	0.25	0.021	0.018	< 0.013	0.037	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[g,h,i]perylene	-	-	-	0.58	0.42	0.43	0.58	0.3	0.32	0.029	0.026	< 0.013	0.029	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[k]fluoranthene	-	-	-	0.27	0.162	0.141	0.24	0.117	0.187	0.016	0.016	< 0.013	0.028	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Chrysene	-	-	-	0.56	0.31	0.25	0.42	0.22	0.46	0.021	0.018	< 0.013	0.047	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Dibenzo[a,h]anthracene	-	-	-	0.118	0.096	0.09	0.121	0.063	0.075	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Fluoranthene	-	-	-	1.31	0.76	0.48	0.88	0.45	0.63	0.051	0.045	< 0.013	0.108	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Fluorene	-	-	-	0.026	0.031	< 0.011	0.014	0.012	< 0.012	< 0.011	< 0.011	< 0.013	< 0.012	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Indeno(1,2,3-c,d)pyrene	-	-	-	0.56	0.48	0.46	0.63	0.31	0.47	0.031	0.029	< 0.013	0.029	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Naphthalene	-	3,100	63	< 0.06	< 0.06	< 0.06	< 0.07	< 0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.06	< 0.07	< 0.07	< 0.07
Phenanthrene	-	-	-	0.6	0.41	0.146	0.28	0.179	0.185	0.018	0.017	< 0.013	0.033	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013
Pyrene	-	NA	(1,600)	1.35	0.81	0.55	0.89	0.46	0.58	0.04	0.036	< 0.013	0.089	< 0.013	< 0.012	< 0.014	< 0.013	< 0.013

Notes

Results presented in mg/kg unless specified.

Values in underlined exceed the published background level.

Values in bold exceed the Residential Use criteria.

Values in *italic* exceed the Worker safety criteria.

ND – Not detected.

Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

[#] OCP results included where above the laboratory limit of detection and assessment criteria avalible.

[*] PAH results included where above the laboratory limit of detection and assessment criteria avalible.

1 – BaP(eq) calculated as the weighted sum of nine carcinogenic PAHs.

2 – ∑DDT is the sum of six isomers of DDT and its metabolites.

3 - Environment Canterbury published background concentrations, sourced from Canterbury Maps: Trace Elements Level 2.

4 – Ministry for the Environment (April 2012) Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Appendix B: Soil contaminant standards (Commercial/industrial/outdoor worker).

5 – National Environment Protection (Assessment of Site Contamination) Measure 1999, updated 2013. Health investigation levels for beryllium, nickel and zinc Table 1A(1) (Commercial/industrial).

6 – BRANZ 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

7- Ministry for the Environment, 2011. Guideline for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 acceptance criteria for Maintenance/excavation workers. Table 4.19. Sandy Silt soil type.

8 - Ministry for the Environment (April 2012) Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Appendix B: Soil contaminant standards (High-density residential use).

9 – National Environment Protection (Assessment of Site Contamination) Measure 1999, updated 2013. Health investigation levels for beryllium, nickel and zinc Table 1A(1) (Residential B).

10 - Ministry for the Environment, 2011. Methodology for deriving standards for contaminants in soil to protect human health. High-density residential.

11 - M. Morley, CCC (email communication, 16 March 2011). Based on NES Soil soil contaminant standards (recreational use).

12 – BRANZ 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

13 - BRANZ 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil. Commercial/Industrial land use applied for worker safety.

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2076402	A2Pv1
Contact:	Jonathan Coakley	**Date Received:**	06-Nov-2018	
	C/- Tonkin & Taylor	**Date Reported:**	09-Nov-2018	
	PO Box 2083	**Quote No:**	80842	
	Wellington 6140	**Order No:**	30315.1000	
		Client Reference:	30315	
		Submitted By:	Lewis Black	

Sample Type: Soil

Sample Name:		HA1 0.1 06-Nov-2018	HA1 0.35 06-Nov-2018	HA2 0.1 06-Nov-2018	HA2 0.45 06-Nov-2018	HA3 0.1 06-Nov-2018
Lab Number:		2076402.1	2076402.2	2076402.3	2076402.4	2076402.5
Asbestos Presence / Absence		Amosite (Brown Asbestos) detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		Loose Fibres	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	708.3	844.0	653.2	753.3	632.2
Dry Weight	g	625.3	782.1	556.3	625.5	540.3
Ashed Weight	g	582.0	767.4	521.6	592.5	510.8
Moisture	%	12	7	15	17	15
Dry Sample Fraction >10mm	g ashed wt	116.0	320.6	13.7	< 0.1	7.6
Sample Fraction <10mm to >2mm	g ashed wt	93.1	127.6	36.2	3.9	26.1
Sample Fraction <2mm	g ashed wt	371.7	318.6	471.0	588.2	476.4
<2mm Subsample Weight	g ashed wt	55.5	57.5	57.6	58.0	54.7
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	0.00005	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA3 0.45 06-Nov-2018	HA4 0.1 06-Nov-2018	HA4 0.4 06-Nov-2018	HA5 0.1 06-Nov-2018	HA5 0.4 06-Nov-2018
Lab Number:		2076402.6	2076402.7	2076402.8	2076402.10	2076402.11
Asbestos Presence / Absence		Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.
Description of Asbestos Form		-	Loose Fibres	ACM Debris and Loose Fibres	Loose Fibres	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.039	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.039	< 0.001	< 0.001
As Received Weight	g	720.3	707.0	692.6	668.0	762.9
Dry Weight	g	610.2	587.9	562.4	586.9	657.9

Sample Type: Soil						
Sample Name:		HA3 0.45 06-Nov-2018	HA4 0.1 06-Nov-2018	HA4 0.4 06-Nov-2018	HA5 0.1 06-Nov-2018	HA5 0.4 06-Nov-2018
Lab Number:		2076402.6	2076402.7	2076402.8	2076402.10	2076402.11
Ashed Weight	g	586.8	515.3	519.6	514.6	602.8
Moisture	%	15	17	19	12	14
Dry Sample Fraction >10mm	g ashed wt	73.4	1.6	8.9	52.4	< 0.1
Sample Fraction <10mm to >2mm	g ashed wt	35.2	28.9	51.9	38.8	4.9
Sample Fraction <2mm	g ashed wt	477.5	484.2	458.1	423.1	597.3
<2mm Subsample Weight	g ashed wt	58.5	59.0	57.6	55.4	57.8
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	0.00005	0.2219	0.00031	< 0.00001

Sample Name:		HA6 0.1 06-Nov-2018	HA6 0.45 06-Nov-2018	HA7 0.1 06-Nov-2018	HA7 0.4 06-Nov-2018	HA8 0.1 06-Nov-2018
Lab Number:		2076402.12	2076402.13	2076402.14	2076402.15	2076402.16
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	699.1	772.9	780.3	806.6	719.7
Dry Weight	g	624.8	684.5	710.2	735.0	649.1
Ashed Weight	g	543.7	618.3	643.7	677.6	568.8
Moisture	%	11	11	9	9	10
Dry Sample Fraction >10mm	g ashed wt	10.2	3.6	34.7	19.8	2.0
Sample Fraction <10mm to >2mm	g ashed wt	60.0	56.8	55.6	92.1	25.3
Sample Fraction <2mm	g ashed wt	473.0	557.3	552.6	564.8	541.0
<2mm Subsample Weight	g ashed wt	57.6	59.8	56.6	57.4	58.2
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA8 0.45 06-Nov-2018	HA9 0.1 06-Nov-2018	HA9 0.3 06-Nov-2018	HA10 0.1 06-Nov-2018	HA10 0.4 (Nat) 06-Nov-2018
Lab Number:		2076402.17	2076402.18	2076402.19	2076402.20	2076402.21
Asbestos Presence / Absence		Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.
Description of Asbestos Form		-	Loose Fibres	Loose Fibres	Loose FIbres	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	828.6	729.6	1,099.2	679.5	772.2
Dry Weight	g	740.3	657.6	1,053.4	625.6	679.8
Ashed Weight	g	674.1	565.4	1,034.9	586.7	635.1
Moisture	%	11	10	4	8	12
Dry Sample Fraction >10mm	g ashed wt	78.6	51.6	597.4	1.6	37.6
Sample Fraction <10mm to >2mm	g ashed wt	35.5	63.3	237.0	8.7	32.2

Sample Type: Soil						
Sample Name:		HA8 0.45 06-Nov-2018	HA9 0.1 06-Nov-2018	HA9 0.3 06-Nov-2018	HA10 0.1 06-Nov-2018	HA10 0.4 (Nat) 06-Nov-2018
Lab Number:		2076402.17	2076402.18	2076402.19	2076402.20	2076402.21
Sample Fraction <2mm	g ashed wt	559.4	449.6	199.7	575.0	564.4
<2mm Subsample Weight	g ashed wt	56.7	56.6	52.3	51.3	52.3
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	0.00040	0.00005	0.00003	< 0.00001

Sample Name:		HA11 0.1 06-Nov-2018	HA11 0.4 06-Nov-2018			
Lab Number:		2076402.22	2076402.23			
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	-	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
As Received Weight	g	849.3	834.1	-	-	-
Dry Weight	g	763.1	716.7	-	-	-
Ashed Weight	g	699.1	667.6	-	-	-
Moisture	%	10	14	-	-	-
Dry Sample Fraction >10mm	g ashed wt	135.1	< 0.1	-	-	-
Sample Fraction <10mm to >2mm	g ashed wt	161.4	9.6	-	-	-
Sample Fraction <2mm	g ashed wt	401.7	657.0	-	-	-
<2mm Subsample Weight	g ashed wt	54.9	53.5	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	< 0.00001	-	-	-

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

The following assumptions have been made:

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

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

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-23
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-23
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-23

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1-8, 10-23
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-23
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-23
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-23
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-8, 10-23
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-8, 10-23
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-23
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-23
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-23
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-23
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-23
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-23
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-23

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

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

Rhodri Williams BSc (Hons)
Section Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2076418	SPv1
Contact:	Jonathan Coakley	**Date Received:**	06-Nov-2018	
	C/- Tonkin & Taylor	**Date Reported:**	12-Nov-2018	
	PO Box 2083	**Quote No:**	80842	
	Wellington 6140	**Order No:**	30315.1000	
		Client Reference:	30315	
		Submitted By:	Lewis Black	

Sample Type: Soil

Sample Name:		HA1 - 0.1 06-Nov-2018	HA1 - 0.35 06-Nov-2018	HA2 - 0.1 06-Nov-2018	HA2 - 0.45 06-Nov-2018	HA3 - 0.1 06-Nov-2018
Lab Number:		2076418.1	2076418.2	2076418.3	2076418.4	2076418.5
Individual Tests						
Dry Matter	g/100g as rcvd	86	89	83	82	82
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	7	5	4	8
Total Recoverable Cadmium	mg/kg dry wt	0.34	0.20	0.14	< 0.10	0.13
Total Recoverable Chromium	mg/kg dry wt	18	16	15	15	20
Total Recoverable Copper	mg/kg dry wt	33	24	15	10	16
Total Recoverable Lead	mg/kg dry wt	220	147	158	99	73
Total Recoverable Nickel	mg/kg dry wt	13	14	12	13	12
Total Recoverable Zinc	mg/kg dry wt	250	144	114	79	124
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.036	0.069	0.024	< 0.010	0.049
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	0.024	0.043	0.018	< 0.010	0.039
Total DDT Isomers	mg/kg dry wt	< 0.06	0.11	< 0.06	< 0.06	0.09
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Type: Soil						
Sample Name:		HA1 - 0.1 06-Nov-2018	HA1 - 0.35 06-Nov-2018	HA2 - 0.1 06-Nov-2018	HA2 - 0.45 06-Nov-2018	HA3 - 0.1 06-Nov-2018
Lab Number:		2076418.1	2076418.2	2076418.3	2076418.4	2076418.5
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	0.022	< 0.012	< 0.012	< 0.012	< 0.012
2-Methylnaphthalene	mg/kg dry wt	0.020	< 0.012	< 0.012	< 0.012	< 0.012
Perylene	mg/kg dry wt	0.108	0.127	0.085	0.027	0.047
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.66	0.80	0.54	0.17	0.27
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.66	0.79	0.55	0.18	0.27
Acenaphthylene	mg/kg dry wt	0.044	0.064	0.040	< 0.012	0.021
Acenaphthene	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
Anthracene	mg/kg dry wt	0.050	0.074	0.042	0.019	0.020
Benzo[a]anthracene	mg/kg dry wt	0.29	0.38	0.26	0.097	0.116
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.43	0.53	0.35	0.110	0.172
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.51	0.64	0.45	0.129	0.22
Benzo[e]pyrene	mg/kg dry wt	0.30	0.36	0.25	0.078	0.123
Benzo[g,h,i]perylene	mg/kg dry wt	0.32	0.39	0.27	0.085	0.143
Benzo[k]fluoranthene	mg/kg dry wt	0.21	0.25	0.168	0.054	0.084
Chrysene	mg/kg dry wt	0.37	0.46	0.31	0.104	0.159
Dibenzo[a,h]anthracene	mg/kg dry wt	0.081	0.082	0.068	0.025	0.038
Fluoranthene	mg/kg dry wt	0.69	0.91	0.54	0.175	0.27
Fluorene	mg/kg dry wt	0.018	0.023	< 0.012	< 0.012	0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.32	0.40	0.27	0.087	0.143
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Phenanthrene	mg/kg dry wt	0.23	0.29	0.189	0.062	0.094
Pyrene	mg/kg dry wt	0.65	0.86	0.52	0.179	0.26
Total of Reported PAHs in Soil*	mg/kg	4.7	5.9	3.8	1.3	1.9

Sample Name:		HA3 - 0.45 06-Nov-2018	HA4 - 0.1 06-Nov-2018	HA4 - 0.4 06-Nov-2018	HA5 - 0.1 06-Nov-2018	HA5 - 0.4 06-Nov-2018
Lab Number:		2076418.6	2076418.7	2076418.8	2076418.10	2076418.11
Individual Tests						
Dry Matter	g/100g as rcvd	83	76	77	80	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	28	59	9	8
Total Recoverable Cadmium	mg/kg dry wt	0.22	0.27	0.34	0.19	0.14
Total Recoverable Chromium	mg/kg dry wt	18	18	19	15	15
Total Recoverable Copper	mg/kg dry wt	31	65	120	22	22
Total Recoverable Lead	mg/kg dry wt	125	220	370	131	111
Total Recoverable Nickel	mg/kg dry wt	15	15	16	13	14
Total Recoverable Zinc	mg/kg dry wt	157	200	250	146	128
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.56	0.012	< 0.010	0.029	0.023
2,4'-DDT	mg/kg dry wt	0.089	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	0.56	< 0.010	< 0.010	0.024	0.016
Total DDT Isomers	mg/kg dry wt	1.21	< 0.06	< 0.06	< 0.06	< 0.06

Sample Type: Soil						
Sample Name:		HA3 - 0.45 06-Nov-2018	HA4 - 0.1 06-Nov-2018	HA4 - 0.4 06-Nov-2018	HA5 - 0.1 06-Nov-2018	HA5 - 0.4 06-Nov-2018
Lab Number:		2076418.6	2076418.7	2076418.8	2076418.10	2076418.11
Organochlorine Pesticides Screening in Soil						
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	0.026	< 0.014	< 0.013	< 0.013	< 0.012
2-Methylnaphthalene	mg/kg dry wt	0.019	< 0.014	< 0.013	< 0.013	< 0.012
Perylene	mg/kg dry wt	0.51	0.093	0.089	0.137	0.123
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	3.4	0.61	0.60	0.85	0.81
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	3.3	0.61	0.60	0.85	0.81
Acenaphthylene	mg/kg dry wt	0.186	0.046	0.048	0.069	0.078
Acenaphthene	mg/kg dry wt	0.076	< 0.014	< 0.013	< 0.013	0.014
Anthracene	mg/kg dry wt	0.52	0.053	0.050	0.071	0.084
Benzo[a]anthracene	mg/kg dry wt	1.85	0.26	0.28	0.36	0.38
Benzo[a]pyrene (BAP)	mg/kg dry wt	2.2	0.40	0.39	0.56	0.54
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	2.7	0.48	0.48	0.68	0.63
Benzo[e]pyrene	mg/kg dry wt	1.45	0.28	0.27	0.41	0.37
Benzo[g,h,i]perylene	mg/kg dry wt	1.58	0.31	0.31	0.47	0.45
Benzo[k]fluoranthene	mg/kg dry wt	1.02	0.199	0.192	0.25	0.25
Chrysene	mg/kg dry wt	2.1	0.35	0.35	0.45	0.47
Dibenzo[a,h]anthracene	mg/kg dry wt	0.33	0.072	0.066	0.094	0.094
Fluoranthene	mg/kg dry wt	5.2	0.68	0.68	0.84	0.91
Fluorene	mg/kg dry wt	0.118	0.014	0.020	0.025	0.024
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	1.64	0.32	0.31	0.49	0.44
Naphthalene	mg/kg dry wt	< 0.06	< 0.07	< 0.07	< 0.07	< 0.06
Phenanthrene	mg/kg dry wt	2.9	0.24	0.26	0.32	0.39
Pyrene	mg/kg dry wt	5.1	0.65	0.65	0.80	0.84
Total of Reported PAHs in Soil*	mg/kg	30	4.5	4.5	6.1	6.1

Sample Name:		HA6 - 0.1 06-Nov-2018	HA6 - 0.45 06-Nov-2018	HA7 - 0.1 06-Nov-2018	HA7 - 0.4 06-Nov-2018	HA8 - 0.1 06-Nov-2018
Lab Number:		2076418.12	2076418.13	2076418.14	2076418.15	2076418.16
Individual Tests						
Dry Matter	g/100g as rcvd	81	80	86	85	82
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	10	8	7	8
Total Recoverable Cadmium	mg/kg dry wt	0.21	0.19	0.17	0.17	0.14
Total Recoverable Chromium	mg/kg dry wt	16	16	17	16	16
Total Recoverable Copper	mg/kg dry wt	39	27	18	21	18
Total Recoverable Lead	mg/kg dry wt	149	130	71	99	72
Total Recoverable Nickel	mg/kg dry wt	14	14	12	13	12
Total Recoverable Zinc	mg/kg dry wt	162	147	106	123	102
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Type: Soil						
Sample Name:		HA6 - 0.1 06-Nov-2018	HA6 - 0.45 06-Nov-2018	HA7 - 0.1 06-Nov-2018	HA7 - 0.4 06-Nov-2018	HA8 - 0.1 06-Nov-2018
Lab Number:		2076418.12	2076418.13	2076418.14	2076418.15	2076418.16
Organochlorine Pesticides Screening in Soil						
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	0.025	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.019	0.023	0.086	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.015	< 0.010	0.030	< 0.010
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.06	0.14	< 0.06
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	0.015	< 0.013	< 0.012	< 0.012	< 0.012
2-Methylnaphthalene	mg/kg dry wt	0.012	< 0.013	< 0.012	< 0.012	< 0.012
Perylene	mg/kg dry wt	0.090	0.083	0.042	0.061	0.043
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.56	0.49	0.35	0.51	0.35
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.56	0.49	0.35	0.50	0.35
Acenaphthylene	mg/kg dry wt	0.050	0.046	0.031	0.049	0.029
Acenaphthene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.012	< 0.012
Anthracene	mg/kg dry wt	0.042	0.052	0.034	0.040	0.022
Benzo[a]anthracene	mg/kg dry wt	0.24	0.21	0.152	0.21	0.150
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.37	0.32	0.27	0.37	0.26
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.46	0.40	0.20	0.31	0.20
Benzo[e]pyrene	mg/kg dry wt	0.27	0.23	0.110	0.165	0.112
Benzo[g,h,i]perylene	mg/kg dry wt	0.31	0.29	0.127	0.195	0.131
Benzo[k]fluoranthene	mg/kg dry wt	0.176	0.143	0.079	0.121	0.076
Chrysene	mg/kg dry wt	0.32	0.27	0.140	0.199	0.137
Dibenzo[a,h]anthracene	mg/kg dry wt	0.060	0.057	0.023	0.038	0.024
Fluoranthene	mg/kg dry wt	0.55	0.51	0.40	0.50	0.34
Fluorene	mg/kg dry wt	0.020	0.014	< 0.012	0.015	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.31	0.29	0.142	0.22	0.146
Naphthalene	mg/kg dry wt	< 0.06	< 0.07	< 0.06	< 0.06	< 0.06
Phenanthrene	mg/kg dry wt	0.20	0.20	0.172	0.177	0.094
Pyrene	mg/kg dry wt	0.54	0.48	0.36	0.45	0.31
Total of Reported PAHs in Soil*	mg/kg	4.0	3.6	2.3	3.2	2.1

Sample Name:		HA8 - 0.45 06-Nov-2018	HA9 - 0.1 06-Nov-2018	HA9 - 0.3 06-Nov-2018	HA10 - 0.1 06-Nov-2018	HA10 - 0.4 (Nat) 06-Nov-2018
Lab Number:		2076418.17	2076418.18	2076418.19	2076418.20	2076418.21

Sample Type: Soil						
	Sample Name:	HA8 - 0.45 06-Nov-2018	HA9 - 0.1 06-Nov-2018	HA9 - 0.3 06-Nov-2018	HA10 - 0.1 06-Nov-2018	HA10 - 0.4 (Nat) 06-Nov-2018
	Lab Number:	2076418.17	2076418.18	2076418.19	2076418.20	2076418.21
Individual Tests						
Dry Matter	g/100g as rcvd	83	82	92	90	82
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	8	7	10	6
Total Recoverable Cadmium	mg/kg dry wt	0.15	0.13	< 0.10	0.16	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	14	13	15	16
Total Recoverable Copper	mg/kg dry wt	19	15	12	17	12
Total Recoverable Lead	mg/kg dry wt	95	81	55	92	42
Total Recoverable Nickel	mg/kg dry wt	14	11	11	13	14
Total Recoverable Zinc	mg/kg dry wt	117	101	75	106	67
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	0.019	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.064	0.013	0.011	0.031	0.016
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	0.019	0.010	< 0.010	0.033	< 0.010
Total DDT Isomers	mg/kg dry wt	0.10	< 0.06	< 0.06	0.06	< 0.06
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.012	< 0.011	< 0.011	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.012	< 0.011	< 0.011	< 0.012
Perylene	mg/kg dry wt	0.098	0.061	0.031	0.049	0.029
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.65	0.35	0.18	0.32	0.19
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.65	0.35	0.18	0.32	0.19
Acenaphthylene	mg/kg dry wt	0.055	0.028	0.020	0.025	0.018
Acenaphthene	mg/kg dry wt	< 0.012	< 0.012	< 0.011	< 0.011	< 0.012
Anthracene	mg/kg dry wt	0.054	0.030	0.018	0.029	0.023
Benzo[a]anthracene	mg/kg dry wt	0.31	0.148	0.088	0.156	0.103
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.42	0.23	0.115	0.21	0.116
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.54	0.29	0.165	0.27	0.153
Benzo[e]pyrene	mg/kg dry wt	0.30	0.168	0.090	0.152	0.086
Benzo[g,h,i]perylene	mg/kg dry wt	0.34	0.196	0.106	0.173	0.111
Benzo[k]fluoranthene	mg/kg dry wt	0.21	0.106	0.059	0.100	0.076
Chrysene	mg/kg dry wt	0.38	0.181	0.103	0.186	0.122

Sample Type: Soil						
Sample Name:		HA8 - 0.45 06-Nov-2018	HA9 - 0.1 06-Nov-2018	HA9 - 0.3 06-Nov-2018	HA10 - 0.1 06-Nov-2018	HA10 - 0.4 (Nat) 06-Nov-2018
Lab Number:		2076418.17	2076418.18	2076418.19	2076418.20	2076418.21
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Dibenzo[a,h]anthracene	mg/kg dry wt	0.077	0.040	0.022	0.038	0.021
Fluoranthene	mg/kg dry wt	0.71	0.32	0.20	0.33	0.24
Fluorene	mg/kg dry wt	0.020	< 0.012	< 0.011	0.012	0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.34	0.20	0.109	0.171	0.108
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Phenanthrene	mg/kg dry wt	0.27	0.106	0.081	0.120	0.093
Pyrene	mg/kg dry wt	0.74	0.31	0.195	0.33	0.23
Total of Reported PAHs in Soil*	mg/kg	4.9	2.4	1.4	2.4	1.5

Sample Name:		HA11 - 0.1 06-Nov-2018	HA11 - 0.4 06-Nov-2018			
Lab Number:		2076418.22	2076418.23			
Individual Tests						
Dry Matter	g/100g as rcvd	79	82	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	5	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	14	16	-	-	-
Total Recoverable Copper	mg/kg dry wt	12	10	-	-	-
Total Recoverable Lead	mg/kg dry wt	44	21	-	-	-
Total Recoverable Nickel	mg/kg dry wt	11	14	-	-	-
Total Recoverable Zinc	mg/kg dry wt	84	59	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	-	-	-
4,4'-DDE	mg/kg dry wt	0.019	< 0.010	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	-	-	-
4,4'-DDT	mg/kg dry wt	0.015	< 0.010	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Perylene	mg/kg dry wt	0.042	< 0.013	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.24	< 0.03	-	-	-

Sample Type: Soil						
Sample Name:		HA11 - 0.1 06-Nov-2018	HA11 - 0.4 06-Nov-2018			
Lab Number:		2076418.22	2076418.23			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.24	< 0.04	-	-	-
Acenaphthylene	mg/kg dry wt	0.018	< 0.013	-	-	-
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Anthracene	mg/kg dry wt	0.019	< 0.013	-	-	-
Benzo[a]anthracene	mg/kg dry wt	0.092	0.013	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.148	0.018	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.190	0.031	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.113	0.016	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.156	0.027	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.086	< 0.013	-	-	-
Chrysene	mg/kg dry wt	0.123	0.014	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.035	< 0.013	-	-	-
Fluoranthene	mg/kg dry wt	0.196	0.026	-	-	-
Fluorene	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.148	0.029	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	-	-	-
Phenanthrene	mg/kg dry wt	0.058	< 0.013	-	-	-
Pyrene	mg/kg dry wt	0.183	0.026	-	-	-
Total of Reported PAHs in Soil*	mg/kg	1.6	< 0.3	-	-	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8, 10-23
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8, 10-23
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1-8, 10-23
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	-	1-8, 10-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-8, 10-23
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-8, 10-23
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-8, 10-23
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	1-8, 10-23

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2076418	SUPv1
Contact:	Jonathan Coakley C/- Tonkin & Taylor PO Box 2083 Wellington 6140	**Date Received:**	06-Nov-2018	
		Date Reported:	12-Nov-2018	
		Quote No:	80842	
		Order No:	30315.1000	
		Client Reference:	30315	
		Submitted By:	Lewis Black	

Sample Type: Soil

		Sample Name:	HA1 - 0.1 06-Nov-2018	HA1 - 0.35 06-Nov-2018	HA2 - 0.1 06-Nov-2018	HA2 - 0.45 06-Nov-2018
		Lab Number:	2076418.1	2076418.2	2076418.3	2076418.4
Individual Tests						
Dry Matter	g/100g as rcvd		85.5 ± 5.0	88.7 ± 5.0	83.0 ± 5.0	81.7 ± 5.0
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt		7.5 ± 1.8	6.6 ± 1.7	5.0 ± 1.5	4.2 ± 1.5
Total Recoverable Cadmium	mg/kg dry wt		0.344 ± 0.081	0.195 ± 0.071	0.143 ± 0.069	< 0.10 ± 0.067
Total Recoverable Chromium	mg/kg dry wt		17.5 ± 3.1	16.1 ± 2.9	14.8 ± 2.7	15.2 ± 2.7
Total Recoverable Copper	mg/kg dry wt		33.0 ± 4.7	24.3 ± 3.6	14.9 ± 2.5	10.4 ± 2.0
Total Recoverable Lead	mg/kg dry wt		223 ± 34	147 ± 23	158 ± 24	99 ± 15
Total Recoverable Nickel	mg/kg dry wt		13.4 ± 2.2	13.6 ± 2.2	12.3 ± 2.1	12.5 ± 2.1
Total Recoverable Zinc	mg/kg dry wt		247 ± 18	144 ± 11	113.8 ± 8.5	79.1 ± 6.2
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt		< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
alpha-BHC	mg/kg dry wt		< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
beta-BHC	mg/kg dry wt		< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047
delta-BHC	mg/kg dry wt		< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
gamma-BHC (Lindane)	mg/kg dry wt		< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
cis-Chlordane	mg/kg dry wt		< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
trans-Chlordane	mg/kg dry wt		< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt		< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015
2,4'-DDD	mg/kg dry wt		< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
4,4'-DDD	mg/kg dry wt		< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
2,4'-DDE	mg/kg dry wt		< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
4,4'-DDE	mg/kg dry wt		0.0357 ± 0.0029	0.0687 ± 0.0041	0.0241 ± 0.0026	< 0.010 ± 0.0023
2,4'-DDT	mg/kg dry wt		< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057
4,4'-DDT	mg/kg dry wt		0.024 ± 0.014	0.043 ± 0.025	0.018 ± 0.011	< 0.010 ± 0.0061
Total DDT Isomers	mg/kg dry wt		< 0.06 ± 0.018	0.112 ± 0.028	< 0.06 ± 0.015	< 0.06 ± 0.012
Dieldrin	mg/kg dry wt		< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan I	mg/kg dry wt		< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
Endosulfan II	mg/kg dry wt		< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan sulphate	mg/kg dry wt		< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064
Endrin	mg/kg dry wt		< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Endrin aldehyde	mg/kg dry wt		< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059
Endrin ketone	mg/kg dry wt		< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
Heptachlor	mg/kg dry wt		< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Heptachlor epoxide	mg/kg dry wt		< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
Hexachlorobenzene	mg/kg dry wt		< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Methoxychlor	mg/kg dry wt		< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067

Sample Type: Soil					
Sample Name:		HA1 - 0.1 06-Nov-2018	HA1 - 0.35 06-Nov-2018	HA2 - 0.1 06-Nov-2018	HA2 - 0.45 06-Nov-2018
Lab Number:		2076418.1	2076418.2	2076418.3	2076418.4
Polycyclic Aromatic Hydrocarbons Screening in Soil					
1-Methylnaphthalene	mg/kg dry wt	0.022 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	0.020 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032
Perylene	mg/kg dry wt	0.108 ± 0.011	0.127 ± 0.012	0.0846 ± 0.0093	0.0266 ± 0.0070
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.657 ± 0.039	0.796 ± 0.047	0.544 ± 0.032	0.174 ± 0.014
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.659 ± 0.039	0.795 ± 0.047	0.546 ± 0.032	0.175 ± 0.014
Acenaphthylene	mg/kg dry wt	0.0443 ± 0.0078	0.0644 ± 0.0088	0.0403 ± 0.0076	< 0.012 ± 0.0067
Acenaphthene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.012 ± 0.0068	< 0.012 ± 0.0069	< 0.012 ± 0.0069
Anthracene	mg/kg dry wt	0.050 ± 0.017	0.074 ± 0.024	0.042 ± 0.014	0.0189 ± 0.0083
Benzo[a]anthracene	mg/kg dry wt	0.287 ± 0.075	0.38 ± 0.10	0.256 ± 0.067	0.097 ± 0.026
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.433 ± 0.034	0.533 ± 0.042	0.353 ± 0.028	0.110 ± 0.011
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.51 ± 0.11	0.64 ± 0.14	0.448 ± 0.092	0.129 ± 0.028
Benzo[e]pyrene	mg/kg dry wt	0.302 ± 0.024	0.362 ± 0.029	0.251 ± 0.021	0.0777 ± 0.0089
Benzo[g,h,i]perylene	mg/kg dry wt	0.316 ± 0.055	0.390 ± 0.068	0.272 ± 0.048	0.085 ± 0.016
Benzo[k]fluoranthene	mg/kg dry wt	0.212 ± 0.028	0.248 ± 0.032	0.168 ± 0.023	0.0545 ± 0.0096
Chrysene	mg/kg dry wt	0.367 ± 0.055	0.460 ± 0.069	0.312 ± 0.047	0.104 ± 0.017
Dibenzo[a,h]anthracene	mg/kg dry wt	0.081 ± 0.013	0.082 ± 0.013	0.068 ± 0.011	0.0247 ± 0.0074
Fluoranthene	mg/kg dry wt	0.688 ± 0.070	0.911 ± 0.092	0.539 ± 0.055	0.175 ± 0.019
Fluorene	mg/kg dry wt	0.0175 ± 0.0070	0.0226 ± 0.0072	< 0.012 ± 0.0068	< 0.012 ± 0.0068
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.317 ± 0.030	0.403 ± 0.038	0.272 ± 0.026	0.087 ± 0.011
Naphthalene	mg/kg dry wt	< 0.06 ± 0.034	< 0.06 ± 0.034	< 0.06 ± 0.035	< 0.06 ± 0.035
Phenanthrene	mg/kg dry wt	0.230 ± 0.033	0.286 ± 0.041	0.189 ± 0.028	0.062 ± 0.011
Pyrene	mg/kg dry wt	0.648 ± 0.084	0.86 ± 0.11	0.519 ± 0.067	0.179 ± 0.024
Total of Reported PAHs in Soil*	mg/kg	4.7	5.9	3.8	1.3

Sample Name:		HA3 - 0.1 06-Nov-2018	HA3 - 0.45 06-Nov-2018	HA4 - 0.1 06-Nov-2018	HA4 - 0.4 06-Nov-2018
Lab Number:		2076418.5	2076418.6	2076418.7	2076418.8
Individual Tests					
Dry Matter	g/100g as rcvd	81.6 ± 5.0	82.6 ± 5.0	75.9 ± 5.0	76.6 ± 5.0
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	8.2 ± 1.8	7.6 ± 1.8	27.5 ± 4.4	58.9 ± 8.9
Total Recoverable Cadmium	mg/kg dry wt	0.125 ± 0.068	0.217 ± 0.072	0.272 ± 0.076	0.341 ± 0.081
Total Recoverable Chromium	mg/kg dry wt	20.1 ± 3.4	18.2 ± 3.1	18.2 ± 3.2	19.2 ± 3.3
Total Recoverable Copper	mg/kg dry wt	16.5 ± 2.6	31.4 ± 4.5	64.9 ± 9.0	120 ± 17
Total Recoverable Lead	mg/kg dry wt	73 ± 11	125 ± 19	215 ± 33	367 ± 55
Total Recoverable Nickel	mg/kg dry wt	12.1 ± 2.1	14.9 ± 2.4	15.4 ± 2.4	15.7 ± 2.4
Total Recoverable Zinc	mg/kg dry wt	123.7 ± 9.1	157 ± 12	203 ± 15	249 ± 18
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
4,4'-DDE	mg/kg dry wt	0.0494 ± 0.0034	0.558 ± 0.028	0.0120 ± 0.0023	< 0.010 ± 0.0023
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0057	0.089 ± 0.047	< 0.010 ± 0.0057	< 0.010 ± 0.0057
4,4'-DDT	mg/kg dry wt	0.039 ± 0.023	0.56 ± 0.33	< 0.010 ± 0.0061	< 0.010 ± 0.0061
Total DDT Isomers	mg/kg dry wt	0.089 ± 0.026	1.21 ± 0.33	< 0.06 ± 0.012	< 0.06 ± 0.012

Sample Type: Soil					
Sample Name:		HA3 - 0.1 06-Nov-2018	HA3 - 0.45 06-Nov-2018	HA4 - 0.1 06-Nov-2018	HA4 - 0.4 06-Nov-2018
Lab Number:		2076418.5	2076418.6	2076418.7	2076418.8
Organochlorine Pesticides Screening in Soil					
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064
Endrin	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Polycyclic Aromatic Hydrocarbons Screening in Soil					
1-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	0.026 ± 0.032	< 0.014 ± 0.032	< 0.013 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	0.019 ± 0.032	< 0.014 ± 0.032	< 0.013 ± 0.032
Perylene	mg/kg dry wt	0.0469 ± 0.0075	0.514 ± 0.040	0.0928 ± 0.0097	0.0885 ± 0.0095
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.271 ± 0.018	3.35 ± 0.20	0.610 ± 0.036	0.595 ± 0.035
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.272 ± 0.018	3.33 ± 0.20	0.611 ± 0.036	0.595 ± 0.035
Acenaphthylene	mg/kg dry wt	0.0207 ± 0.0069	0.186 ± 0.018	0.0458 ± 0.0078	0.0485 ± 0.0080
Acenaphthene	mg/kg dry wt	< 0.012 ± 0.0069	0.076 ± 0.023	< 0.014 ± 0.0071	< 0.013 ± 0.0071
Anthracene	mg/kg dry wt	0.0196 ± 0.0085	0.52 ± 0.16	0.053 ± 0.018	0.050 ± 0.017
Benzo[a]anthracene	mg/kg dry wt	0.116 ± 0.031	1.85 ± 0.49	0.264 ± 0.069	0.283 ± 0.074
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.172 ± 0.015	2.22 ± 0.17	0.402 ± 0.032	0.393 ± 0.031
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.217 ± 0.045	2.72 ± 0.56	0.482 ± 0.099	0.478 ± 0.098
Benzo[e]pyrene	mg/kg dry wt	0.123 ± 0.012	1.45 ± 0.12	0.280 ± 0.023	0.269 ± 0.022
Benzo[g,h,i]perylene	mg/kg dry wt	0.143 ± 0.026	1.58 ± 0.28	0.313 ± 0.055	0.307 ± 0.054
Benzo[k]fluoranthene	mg/kg dry wt	0.084 ± 0.013	1.02 ± 0.13	0.199 ± 0.026	0.192 ± 0.026
Chrysene	mg/kg dry wt	0.159 ± 0.025	2.09 ± 0.31	0.354 ± 0.053	0.346 ± 0.052
Dibenzo[a,h]anthracene	mg/kg dry wt	0.0384 ± 0.0083	0.335 ± 0.044	0.072 ± 0.012	0.066 ± 0.011
Fluoranthene	mg/kg dry wt	0.273 ± 0.029	5.23 ± 0.53	0.682 ± 0.069	0.676 ± 0.068
Fluorene	mg/kg dry wt	0.0131 ± 0.0068	0.118 ± 0.016	0.0144 ± 0.0069	0.0203 ± 0.0071
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.143 ± 0.015	1.64 ± 0.16	0.318 ± 0.030	0.309 ± 0.030
Naphthalene	mg/kg dry wt	< 0.06 ± 0.035	< 0.06 ± 0.035	< 0.07 ± 0.035	< 0.07 ± 0.035
Phenanthrene	mg/kg dry wt	0.094 ± 0.015	2.93 ± 0.41	0.243 ± 0.035	0.264 ± 0.038
Pyrene	mg/kg dry wt	0.260 ± 0.034	5.08 ± 0.66	0.648 ± 0.084	0.648 ± 0.084
Total of Reported PAHs in Soil*	mg/kg	1.9	30	4.5	4.5

Sample Name:		HA5 - 0.1 06-Nov-2018	HA5 - 0.4 06-Nov-2018	HA6 - 0.1 06-Nov-2018	HA6 - 0.45 06-Nov-2018
Lab Number:		2076418.10	2076418.11	2076418.12	2076418.13
Individual Tests					
Dry Matter	g/100g as rcvd	79.5 ± 5.0	81.0 ± 5.0	81.1 ± 5.0	79.8 ± 5.0
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	9.2 ± 1.9	8.4 ± 1.9	9.7 ± 2.0	9.7 ± 2.0
Total Recoverable Cadmium	mg/kg dry wt	0.195 ± 0.071	0.137 ± 0.068	0.213 ± 0.072	0.189 ± 0.071
Total Recoverable Chromium	mg/kg dry wt	15.5 ± 2.8	15.5 ± 2.8	16.3 ± 2.9	16.0 ± 2.8
Total Recoverable Copper	mg/kg dry wt	22.0 ± 3.3	21.8 ± 3.3	38.6 ± 5.5	27.0 ± 4.0
Total Recoverable Lead	mg/kg dry wt	131 ± 20	111 ± 17	149 ± 23	130 ± 20
Total Recoverable Nickel	mg/kg dry wt	13.2 ± 2.2	13.8 ± 2.2	14.2 ± 2.3	13.9 ± 2.3
Total Recoverable Zinc	mg/kg dry wt	146 ± 11	128.3 ± 9.4	162 ± 12	147 ± 11
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047

Sample Type: Soil					
Sample Name:		HA5 - 0.1 06-Nov-2018	HA5 - 0.4 06-Nov-2018	HA6 - 0.1 06-Nov-2018	HA6 - 0.45 06-Nov-2018
Lab Number:		2076418.10	2076418.11	2076418.12	2076418.13
Organochlorine Pesticides Screening in Soil					
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
4,4'-DDE	mg/kg dry wt	0.0290 ± 0.0027	0.0225 ± 0.0025	< 0.010 ± 0.0023	0.0195 ± 0.0025
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057
4,4'-DDT	mg/kg dry wt	0.024 ± 0.014	0.0156 ± 0.0092	< 0.010 ± 0.0061	0.0145 ± 0.0086
Total DDT Isomers	mg/kg dry wt	< 0.06 ± 0.018	< 0.06 ± 0.014	< 0.06 ± 0.012	< 0.06 ± 0.014
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064
Endrin	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Polycyclic Aromatic Hydrocarbons Screening in Soil					
1-Methylnaphthalene	mg/kg dry wt	< 0.013 ± 0.032	< 0.012 ± 0.032	0.015 ± 0.032	< 0.013 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	< 0.013 ± 0.032	< 0.012 ± 0.032	0.012 ± 0.032	< 0.013 ± 0.032
Perylene	mg/kg dry wt	0.137 ± 0.013	0.123 ± 0.012	0.0902 ± 0.0096	0.0833 ± 0.0092
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.847 ± 0.049	0.814 ± 0.047	0.556 ± 0.033	0.490 ± 0.030
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.848 ± 0.049	0.814 ± 0.047	0.556 ± 0.033	0.491 ± 0.030
Acenaphthylene	mg/kg dry wt	0.0694 ± 0.0091	0.0777 ± 0.0097	0.0501 ± 0.0080	0.0458 ± 0.0078
Acenaphthene	mg/kg dry wt	< 0.013 ± 0.0070	0.0138 ± 0.0072	< 0.012 ± 0.0069	< 0.013 ± 0.0070
Anthracene	mg/kg dry wt	0.071 ± 0.023	0.084 ± 0.027	0.042 ± 0.014	0.052 ± 0.017
Benzo[a]anthracene	mg/kg dry wt	0.356 ± 0.093	0.376 ± 0.098	0.235 ± 0.062	0.210 ± 0.055
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.563 ± 0.044	0.535 ± 0.042	0.369 ± 0.029	0.321 ± 0.026
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.68 ± 0.14	0.63 ± 0.13	0.461 ± 0.095	0.396 ± 0.082
Benzo[e]pyrene	mg/kg dry wt	0.406 ± 0.032	0.374 ± 0.030	0.271 ± 0.022	0.233 ± 0.019
Benzo[g,h,i]perylene	mg/kg dry wt	0.467 ± 0.081	0.448 ± 0.078	0.308 ± 0.054	0.291 ± 0.051
Benzo[k]fluoranthene	mg/kg dry wt	0.247 ± 0.032	0.255 ± 0.033	0.176 ± 0.024	0.143 ± 0.020
Chrysene	mg/kg dry wt	0.446 ± 0.067	0.469 ± 0.070	0.320 ± 0.048	0.269 ± 0.041
Dibenzo[a,h]anthracene	mg/kg dry wt	0.094 ± 0.014	0.094 ± 0.014	0.060 ± 0.011	0.0574 ± 0.0099
Fluoranthene	mg/kg dry wt	0.839 ± 0.085	0.910 ± 0.092	0.545 ± 0.055	0.506 ± 0.052
Fluorene	mg/kg dry wt	0.0249 ± 0.0073	0.0242 ± 0.0072	0.0198 ± 0.0071	0.0142 ± 0.0069
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.490 ± 0.046	0.445 ± 0.042	0.309 ± 0.030	0.286 ± 0.028
Naphthalene	mg/kg dry wt	< 0.07 ± 0.035	< 0.06 ± 0.035	< 0.06 ± 0.035	< 0.07 ± 0.035
Phenanthrene	mg/kg dry wt	0.317 ± 0.045	0.385 ± 0.055	0.200 ± 0.029	0.205 ± 0.030
Pyrene	mg/kg dry wt	0.80 ± 0.11	0.84 ± 0.11	0.538 ± 0.070	0.484 ± 0.063
Total of Reported PAHs in Soil*	mg/kg	6.1	6.1	4.0	3.6

Sample Name:	HA7 - 0.1 06-Nov-2018	HA7 - 0.4 06-Nov-2018	HA8 - 0.1 06-Nov-2018	HA8 - 0.45 06-Nov-2018
Lab Number:	2076418.14	2076418.15	2076418.16	2076418.17

Sample Type: Soil					
Sample Name:		HA7 - 0.1 06-Nov-2018	HA7 - 0.4 06-Nov-2018	HA8 - 0.1 06-Nov-2018	HA8 - 0.45 06-Nov-2018
Lab Number:		2076418.14	2076418.15	2076418.16	2076418.17
Individual Tests					
Dry Matter	g/100g as rcvd	85.5 ± 5.0	84.7 ± 5.0	81.6 ± 5.0	83.1 ± 5.0
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	7.8 ± 1.8	7.3 ± 1.7	8.2 ± 1.8	6.7 ± 1.7
Total Recoverable Cadmium	mg/kg dry wt	0.169 ± 0.070	0.170 ± 0.070	0.140 ± 0.069	0.145 ± 0.069
Total Recoverable Chromium	mg/kg dry wt	16.7 ± 2.9	16.0 ± 2.9	16.2 ± 2.9	15.7 ± 2.8
Total Recoverable Copper	mg/kg dry wt	17.9 ± 2.8	20.6 ± 3.1	17.6 ± 2.8	18.6 ± 2.9
Total Recoverable Lead	mg/kg dry wt	71 ± 11	99 ± 15	72 ± 11	95 ± 15
Total Recoverable Nickel	mg/kg dry wt	12.5 ± 2.1	13.4 ± 2.2	11.9 ± 2.1	13.7 ± 2.2
Total Recoverable Zinc	mg/kg dry wt	105.9 ± 7.9	122.7 ± 9.1	102.4 ± 7.7	117.0 ± 8.7
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0054	0.025 ± 0.013	< 0.010 ± 0.0054	0.0188 ± 0.0094
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
4,4'-DDE	mg/kg dry wt	0.0228 ± 0.0025	0.0857 ± 0.0049	< 0.010 ± 0.0023	0.0638 ± 0.0039
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057
4,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0061	0.030 ± 0.018	< 0.010 ± 0.0061	0.019 ± 0.012
Total DDT Isomers	mg/kg dry wt	< 0.06 ± 0.012	0.141 ± 0.024	< 0.06 ± 0.012	0.102 ± 0.018
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064
Endrin	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Polycyclic Aromatic Hydrocarbons Screening in Soil					
1-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032	< 0.012 ± 0.032
Perylene	mg/kg dry wt	0.0420 ± 0.0074	0.0608 ± 0.0081	0.0425 ± 0.0074	0.098 ± 0.010
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.352 ± 0.024	0.505 ± 0.032	0.347 ± 0.023	0.646 ± 0.038
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.350 ± 0.024	0.504 ± 0.032	0.347 ± 0.023	0.646 ± 0.038
Acenaphthylene	mg/kg dry wt	0.0305 ± 0.0072	0.0488 ± 0.0080	0.0294 ± 0.0072	0.0552 ± 0.0083
Acenaphthene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.012 ± 0.0069	< 0.012 ± 0.0069	< 0.012 ± 0.0069
Anthracene	mg/kg dry wt	0.034 ± 0.012	0.040 ± 0.014	0.0220 ± 0.0090	0.054 ± 0.018
Benzo[a]anthracene	mg/kg dry wt	0.152 ± 0.041	0.207 ± 0.055	0.150 ± 0.040	0.307 ± 0.081
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.266 ± 0.022	0.374 ± 0.030	0.261 ± 0.021	0.418 ± 0.033
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.204 ± 0.043	0.306 ± 0.063	0.203 ± 0.042	0.54 ± 0.12
Benzo[e]pyrene	mg/kg dry wt	0.110 ± 0.011	0.165 ± 0.015	0.112 ± 0.011	0.300 ± 0.024
Benzo[g,h,i]perylene	mg/kg dry wt	0.127 ± 0.023	0.195 ± 0.035	0.131 ± 0.024	0.338 ± 0.059
Benzo[k]fluoranthene	mg/kg dry wt	0.079 ± 0.012	0.121 ± 0.017	0.076 ± 0.012	0.213 ± 0.028
Chrysene	mg/kg dry wt	0.140 ± 0.022	0.199 ± 0.031	0.137 ± 0.022	0.381 ± 0.057

Sample Type: Soil					
Sample Name:		HA7 - 0.1 06-Nov-2018	HA7 - 0.4 06-Nov-2018	HA8 - 0.1 06-Nov-2018	HA8 - 0.45 06-Nov-2018
Lab Number:		2076418.14	2076418.15	2076418.16	2076418.17
Polycyclic Aromatic Hydrocarbons Screening in Soil					
Dibenzo[a,h]anthracene	mg/kg dry wt	0.0229 ± 0.0073	0.0378 ± 0.0082	0.0242 ± 0.0073	0.077 ± 0.012
Fluoranthene	mg/kg dry wt	0.403 ± 0.041	0.505 ± 0.051	0.338 ± 0.035	0.712 ± 0.072
Fluorene	mg/kg dry wt	< 0.012 ± 0.0068	0.0147 ± 0.0069	< 0.012 ± 0.0068	0.0199 ± 0.0071
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.142 ± 0.015	0.224 ± 0.022	0.146 ± 0.015	0.337 ± 0.032
Naphthalene	mg/kg dry wt	< 0.06 ± 0.034	< 0.06 ± 0.035	< 0.06 ± 0.035	< 0.06 ± 0.035
Phenanthrene	mg/kg dry wt	0.172 ± 0.025	0.177 ± 0.026	0.094 ± 0.015	0.267 ± 0.038
Pyrene	mg/kg dry wt	0.360 ± 0.047	0.447 ± 0.058	0.313 ± 0.041	0.736 ± 0.095
Total of Reported PAHs in Soil*	mg/kg	2.3	3.2	2.1	4.9

Sample Name:		HA9 - 0.1 06-Nov-2018	HA9 - 0.3 06-Nov-2018	HA10 - 0.1 06-Nov-2018	HA10 - 0.4 (Nat) 06-Nov-2018
Lab Number:		2076418.18	2076418.19	2076418.20	2076418.21
Individual Tests					
Dry Matter	g/100g as rcvd	82.0 ± 5.0	91.9 ± 5.0	90.3 ± 5.0	82.4 ± 5.0
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	7.6 ± 1.8	6.8 ± 1.7	10.1 ± 2.0	6.4 ± 1.7
Total Recoverable Cadmium	mg/kg dry wt	0.129 ± 0.068	< 0.10 ± 0.067	0.155 ± 0.069	< 0.10 ± 0.067
Total Recoverable Chromium	mg/kg dry wt	14.4 ± 2.6	13.2 ± 2.5	15.2 ± 2.7	16.4 ± 2.9
Total Recoverable Copper	mg/kg dry wt	15.1 ± 2.5	12.1 ± 2.2	16.8 ± 2.7	12.1 ± 2.1
Total Recoverable Lead	mg/kg dry wt	81 ± 13	54.8 ± 8.2	92 ± 14	42.3 ± 6.4
Total Recoverable Nickel	mg/kg dry wt	11.5 ± 2.0	10.8 ± 2.0	12.7 ± 2.1	14.3 ± 2.3
Total Recoverable Zinc	mg/kg dry wt	100.8 ± 7.6	75.0 ± 5.9	105.8 ± 7.9	66.9 ± 5.5
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047	< 0.010 ± 0.0047
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043	< 0.010 ± 0.0043
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015	< 0.04 ± 0.015
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044	< 0.010 ± 0.0044
4,4'-DDE	mg/kg dry wt	0.0128 ± 0.0023	0.0111 ± 0.0023	0.0313 ± 0.0028	0.0159 ± 0.0024
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057	< 0.010 ± 0.0057
4,4'-DDT	mg/kg dry wt	0.0101 ± 0.0061	< 0.010 ± 0.0061	0.033 ± 0.020	< 0.010 ± 0.0061
Total DDT Isomers	mg/kg dry wt	< 0.06 ± 0.012	< 0.06 ± 0.012	0.064 ± 0.022	< 0.06 ± 0.012
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046	< 0.010 ± 0.0046
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051	< 0.010 ± 0.0051
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064	< 0.010 ± 0.0064
Endrin	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059	< 0.010 ± 0.0059
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054	< 0.010 ± 0.0054
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042	< 0.010 ± 0.0042
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045	< 0.010 ± 0.0045
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067	< 0.010 ± 0.0067
Polycyclic Aromatic Hydrocarbons Screening in Soil					
1-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.011 ± 0.032	< 0.011 ± 0.032	< 0.012 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.011 ± 0.032	< 0.011 ± 0.032	< 0.012 ± 0.032
Perylene	mg/kg dry wt	0.0608 ± 0.0081	0.0305 ± 0.0070	0.0493 ± 0.0076	0.0295 ± 0.0070
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.350 ± 0.022	0.183 ± 0.014	0.319 ± 0.021	0.186 ± 0.014

Sample Type: Soil					
Sample Name:		HA9 - 0.1 06-Nov-2018	HA9 - 0.3 06-Nov-2018	HA10 - 0.1 06-Nov-2018	HA10 - 0.4 (Nat) 06-Nov-2018
Lab Number:		2076418.18	2076418.19	2076418.20	2076418.21
Polycyclic Aromatic Hydrocarbons Screening in Soil					
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.351 ± 0.022	0.183 ± 0.014	0.319 ± 0.021	0.185 ± 0.014
Acenaphthylene	mg/kg dry wt	0.0284 ± 0.0071	0.0197 ± 0.0069	0.0254 ± 0.0070	0.0178 ± 0.0068
Acenaphthene	mg/kg dry wt	< 0.012 ± 0.0069	< 0.011 ± 0.0068	< 0.011 ± 0.0068	< 0.012 ± 0.0069
Anthracene	mg/kg dry wt	0.030 ± 0.011	0.0179 ± 0.0081	0.029 ± 0.011	0.0228 ± 0.0092
Benzo[a]anthracene	mg/kg dry wt	0.148 ± 0.039	0.088 ± 0.024	0.156 ± 0.041	0.103 ± 0.028
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.231 ± 0.019	0.115 ± 0.011	0.206 ± 0.017	0.116 ± 0.012
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.285 ± 0.059	0.165 ± 0.035	0.267 ± 0.055	0.153 ± 0.032
Benzo[e]pyrene	mg/kg dry wt	0.168 ± 0.015	0.0903 ± 0.0096	0.152 ± 0.014	0.0856 ± 0.0093
Benzo[g,h,i]perylene	mg/kg dry wt	0.196 ± 0.035	0.106 ± 0.020	0.173 ± 0.031	0.111 ± 0.021
Benzo[k]fluoranthene	mg/kg dry wt	0.106 ± 0.015	0.059 ± 0.010	0.100 ± 0.015	0.076 ± 0.012
Chrysene	mg/kg dry wt	0.181 ± 0.028	0.103 ± 0.017	0.186 ± 0.029	0.122 ± 0.020
Dibenzo[a,h]anthracene	mg/kg dry wt	0.0399 ± 0.0084	0.0221 ± 0.0072	0.0384 ± 0.0083	0.0215 ± 0.0072
Fluoranthene	mg/kg dry wt	0.315 ± 0.033	0.200 ± 0.022	0.332 ± 0.034	0.242 ± 0.026
Fluorene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.011 ± 0.0068	0.0118 ± 0.0068	0.0135 ± 0.0068
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.205 ± 0.020	0.109 ± 0.013	0.171 ± 0.018	0.108 ± 0.012
Naphthalene	mg/kg dry wt	< 0.06 ± 0.035	< 0.06 ± 0.034	< 0.06 ± 0.034	< 0.06 ± 0.035
Phenanthrene	mg/kg dry wt	0.106 ± 0.017	0.081 ± 0.014	0.120 ± 0.019	0.093 ± 0.015
Pyrene	mg/kg dry wt	0.305 ± 0.040	0.195 ± 0.026	0.331 ± 0.043	0.230 ± 0.031
Total of Reported PAHs in Soil*	mg/kg	2.4	1.4	2.4	1.5

Sample Name:		HA11 - 0.1 06-Nov-2018	HA11 - 0.4 06-Nov-2018		
Lab Number:		2076418.22	2076418.23		
Individual Tests					
Dry Matter	g/100g as rcvd	78.7 ± 5.0	82.3 ± 5.0	-	-
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	6.5 ± 1.7	5.4 ± 1.6	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.111 ± 0.068	< 0.10 ± 0.067	-	-
Total Recoverable Chromium	mg/kg dry wt	14.3 ± 2.6	15.6 ± 2.8	-	-
Total Recoverable Copper	mg/kg dry wt	12.4 ± 2.2	10.3 ± 2.0	-	-
Total Recoverable Lead	mg/kg dry wt	44.3 ± 6.7	20.6 ± 3.1	-	-
Total Recoverable Nickel	mg/kg dry wt	11.1 ± 2.0	13.7 ± 2.2	-	-
Total Recoverable Zinc	mg/kg dry wt	83.6 ± 6.5	59.4 ± 5.0	-	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	-	-
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	-	-
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0047	< 0.010 ± 0.0047	-	-
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	-	-
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	-	-
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0043	< 0.010 ± 0.0043	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04 ± 0.015	< 0.04 ± 0.015	-	-
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	-	-
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	-	-
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0044	< 0.010 ± 0.0044	-	-
4,4'-DDE	mg/kg dry wt	0.0192 ± 0.0025	< 0.010 ± 0.0023	-	-
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0057	< 0.010 ± 0.0057	-	-
4,4'-DDT	mg/kg dry wt	0.0151 ± 0.0089	< 0.010 ± 0.0061	-	-
Total DDT Isomers	mg/kg dry wt	< 0.06 ± 0.014	< 0.06 ± 0.012	-	-
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	-	-
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0046	< 0.010 ± 0.0046	-	-
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0051	< 0.010 ± 0.0051	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0064	< 0.010 ± 0.0064	-	-

Sample Type: Soil						
Sample Name:		HA11 - 0.1 06-Nov-2018	HA11 - 0.4 06-Nov-2018			
Lab Number:		2076418.22	2076418.23			
Organochlorine Pesticides Screening in Soil						
Endrin	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	-	-	
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0059	< 0.010 ± 0.0059	-	-	
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0054	< 0.010 ± 0.0054	-	-	
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	-	-	
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0042	< 0.010 ± 0.0042	-	-	
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0045	< 0.010 ± 0.0045	-	-	
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.0067	< 0.010 ± 0.0067	-	-	
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.013 ± 0.032	< 0.013 ± 0.032	-	-	
2-Methylnaphthalene	mg/kg dry wt	< 0.013 ± 0.032	< 0.013 ± 0.032	-	-	
Perylene	mg/kg dry wt	0.0418 ± 0.0074	< 0.013 ± 0.0067	-	-	
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.237 ± 0.017	< 0.03 ± 0.0097	-	-	
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.239 ± 0.017	< 0.04 ± 0.0097	-	-	
Acenaphthylene	mg/kg dry wt	0.0185 ± 0.0069	< 0.013 ± 0.0067	-	-	
Acenaphthene	mg/kg dry wt	< 0.013 ± 0.0070	< 0.013 ± 0.0070	-	-	
Anthracene	mg/kg dry wt	0.0192 ± 0.0084	< 0.013 ± 0.0071	-	-	
Benzo[a]anthracene	mg/kg dry wt	0.092 ± 0.025	0.0133 ± 0.0072	-	-	
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.148 ± 0.014	0.0175 ± 0.0068	-	-	
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	0.190 ± 0.040	0.0314 ± 0.0091	-	-	
Benzo[e]pyrene	mg/kg dry wt	0.113 ± 0.011	0.0163 ± 0.0068	-	-	
Benzo[g,h,i]perylene	mg/kg dry wt	0.156 ± 0.028	0.0267 ± 0.0079	-	-	
Benzo[k]fluoranthene	mg/kg dry wt	0.086 ± 0.013	< 0.013 ± 0.0068	-	-	
Chrysene	mg/kg dry wt	0.123 ± 0.020	0.0141 ± 0.0070	-	-	
Dibenzo[a,h]anthracene	mg/kg dry wt	0.0350 ± 0.0080	< 0.013 ± 0.0068	-	-	
Fluoranthene	mg/kg dry wt	0.196 ± 0.021	0.0264 ± 0.0072	-	-	
Fluorene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.013 ± 0.0068	-	-	
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.148 ± 0.016	0.0293 ± 0.0072	-	-	
Naphthalene	mg/kg dry wt	< 0.07 ± 0.035	< 0.07 ± 0.035	-	-	
Phenanthrene	mg/kg dry wt	0.058 ± 0.011	< 0.013 ± 0.0069	-	-	
Pyrene	mg/kg dry wt	0.183 ± 0.025	0.0265 ± 0.0075	-	-	
Total of Reported PAHs in Soil*	mg/kg	1.6	< 0.3	-	-	

The reported uncertainty is an expanded uncertainty with a level of confidence of approximately 95 percent (i.e. two standard deviations, calculated using a coverage factor of 2). Reported uncertainties are calculated from the performance of typical matrices, and do not include variation due to sampling.

For further information on uncertainty of measurement at Hill Laboratories, refer to the technical note on our website: www.hill-laboratories.com/files/Intro_To_UOM.pdf, or contact the laboratory.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8, 10-23
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8, 10-23
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1-8, 10-23

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	-	1-8, 10-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-8, 10-23
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-8, 10-23
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-8, 10-23
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	1-8, 10-23

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2077011 SPv2
Contact:	Jonathan Coakley C/- Tonkin & Taylor PO Box 2083 Wellington 6140	**Date Received:**	07-Nov-2018
		Date Reported:	14-Nov-2018
		Quote No:	80842
		Order No:	30315.1000
		Client Reference:	30315.1000
		Submitted By:	Lewis Black

Sample Type: Soil

Sample Name:		HA12 0.1 07-Nov-2018	HA12 0.4 07-Nov-2018	HA13 0.1 07-Nov-2018	HA13 0.4 07-Nov-2018	HA14 0.1 07-Nov-2018
Lab Number:		2077011.1	2077011.2	2077011.3	2077011.4	2077011.5
Individual Tests						
Dry Matter	g/100g as rcvd	87	88	84	83	66
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	5	9	8	10
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.13	0.15	0.34	0.34
Total Recoverable Chromium	mg/kg dry wt	17	18	17	17	15
Total Recoverable Copper	mg/kg dry wt	19	32	19	24	35
Total Recoverable Lead	mg/kg dry wt	139	50	158	230	113
Total Recoverable Nickel	mg/kg dry wt	13	12	13	13	12
Total Recoverable Zinc	mg/kg dry wt	140	30	141	240	250
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	833.6	919.0	895.1	738.5	610.1
Dry Weight	g	721.6	801.0	766.2	616.0	428.9
Ashed Weight	g	704.0	790.4	748.1	603.4	392.3
Moisture	%	13	13	14	17	30
Dry Sample Fraction >10mm	g ashed wt	128.8	117.3	152.7	40.2	12.4
Sample Fraction <10mm to >2mm	g ashed wt	159.6	115.4	160.4	144.9	96.3
Sample Fraction <2mm	g ashed wt	414.8	556.7	434.1	417.5	283.1
<2mm Subsample Weight	g ashed wt	58.1	56.4	58.3	58.4	57.5
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Type: Soil						
Sample Name:		HA12 0.1 07-Nov-2018	HA12 0.4 07-Nov-2018	HA13 0.1 07-Nov-2018	HA13 0.4 07-Nov-2018	HA14 0.1 07-Nov-2018
Lab Number:		2077011.1	2077011.2	2077011.3	2077011.4	2077011.5
Organochlorine Pesticides Screening in Soil						
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.013	< 0.010	0.043	0.019	0.014
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	0.014	< 0.010	< 0.010
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	< 0.012	0.054
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	< 0.012	0.036
Perylene	mg/kg dry wt	0.045	0.036	0.028	0.050	0.114
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.37	0.30	0.28	0.46	1.25
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.37	0.31	0.28	0.46	1.26
Acenaphthylene	mg/kg dry wt	0.028	0.025	0.018	0.032	0.092
Acenaphthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	< 0.012	0.016
Anthracene	mg/kg dry wt	0.043	0.034	0.029	0.052	0.099
Benzo[a]anthracene	mg/kg dry wt	0.181	0.142	0.111	0.23	0.48
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.27	0.20	0.180	0.30	0.77
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.27	0.185	0.179	0.31	0.89
Benzo[e]pyrene	mg/kg dry wt	0.141	0.104	0.096	0.162	0.47
Benzo[g,h,i]perylene	mg/kg dry wt	0.134	0.177	0.178	0.27	0.96
Benzo[k]fluoranthene	mg/kg dry wt	0.099	0.075	0.065	0.120	0.32
Chrysene	mg/kg dry wt	0.20	0.147	0.131	0.25	0.57
Dibenzo[a,h]anthracene	mg/kg dry wt	0.023	0.039	0.037	0.058	0.191
Fluoranthene	mg/kg dry wt	0.44	0.31	0.28	0.54	1.24
Fluorene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	< 0.012	0.031
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.157	0.193	0.191	0.29	1.02
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08
Phenanthrene	mg/kg dry wt	0.171	0.113	0.118	0.21	0.52
Pyrene	mg/kg dry wt	0.46	0.35	0.32	0.61	1.31
Total of Reported PAHs in Soil*	mg/kg	2.7	2.2	2.0	3.5	9.2

Sample Name:		HA14 0.4 07-Nov-2018	HA15 0.1 07-Nov-2018	HA15 0.4 07-Nov-2018	HA16 0.1 07-Nov-2018	HA16 0.3 07-Nov-2018
Lab Number:		2077011.6	2077011.7	2077011.8	2077011.10	2077011.11
Individual Tests						
Dry Matter	g/100g as rcvd	74	83	81	89	86

Sample Type: Soil						
Sample Name:		HA14 0.4 07-Nov-2018	HA15 0.1 07-Nov-2018	HA15 0.4 07-Nov-2018	HA16 0.1 07-Nov-2018	HA16 0.3 07-Nov-2018
Lab Number:		2077011.6	2077011.7	2077011.8	2077011.10	2077011.11
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	14	14	7	8
Total Recoverable Cadmium	mg/kg dry wt	0.24	0.18	0.18	0.17	0.16
Total Recoverable Chromium	mg/kg dry wt	14	16	15	16	16
Total Recoverable Copper	mg/kg dry wt	24	31	65	19	20
Total Recoverable Lead	mg/kg dry wt	94	87	101	130	190
Total Recoverable Nickel	mg/kg dry wt	13	13	13	13	13
Total Recoverable Zinc	mg/kg dry wt	181	112	124	210	145
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	781.8	824.9	671.6	927.3	764.9
Dry Weight	g	580.4	720.6	543.8	827.2	667.2
Ashed Weight	g	558.2	702.0	529.8	816.3	656.7
Moisture	%	26	13	19	11	13
Dry Sample Fraction >10mm	g ashed wt	< 0.1	192.9	18.9	242.2	103.1
Sample Fraction <10mm to >2mm	g ashed wt	55.5	83.8	58.5	189.3	148.2
Sample Fraction <2mm	g ashed wt	501.8	424.5	451.3	383.8	404.8
<2mm Subsample Weight	g ashed wt	58.0	54.6	57.1	59.9	55.7
Asbestos Presence / Absence		Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.
Description of Asbestos Form		-	Loose Fibres	-	ACM Debris	Loose Fibres
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	0.00003	< 0.00001	0.00392	0.00005
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.014	0.012	< 0.010	0.014
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.013	0.011	< 0.010	< 0.010
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Type: Soil						
Sample Name:		HA14 0.4 07-Nov-2018	HA15 0.1 07-Nov-2018	HA15 0.4 07-Nov-2018	HA16 0.1 07-Nov-2018	HA16 0.3 07-Nov-2018
Lab Number:		2077011.6	2077011.7	2077011.8	2077011.10	2077011.11
Organochlorine Pesticides Screening in Soil						
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.012	< 0.012	< 0.012	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.012	< 0.012	< 0.012	< 0.012
Perylene	mg/kg dry wt	0.086	0.108	0.105	0.028	0.111
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.98	1.11	1.09	0.29	1.06
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.99	1.12	1.09	0.29	1.06
Acenaphthylene	mg/kg dry wt	0.066	0.076	0.073	0.021	0.094
Acenaphthene	mg/kg dry wt	< 0.014	< 0.012	< 0.012	< 0.012	0.015
Anthracene	mg/kg dry wt	0.067	0.076	0.076	0.025	0.180
Benzo[a]anthracene	mg/kg dry wt	0.37	0.41	0.42	0.126	0.63
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.59	0.68	0.66	0.183	0.71
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.66	0.74	0.74	0.179	0.68
Benzo[e]pyrene	mg/kg dry wt	0.35	0.41	0.42	0.101	0.36
Benzo[g,h,i]perylene	mg/kg dry wt	0.71	0.84	0.79	0.194	0.58
Benzo[k]fluoranthene	mg/kg dry wt	0.24	0.26	0.30	0.070	0.27
Chrysene	mg/kg dry wt	0.43	0.45	0.46	0.125	0.56
Dibenzo[a,h]anthracene	mg/kg dry wt	0.162	0.179	0.171	0.040	0.118
Fluoranthene	mg/kg dry wt	0.91	0.90	0.95	0.25	1.31
Fluorene	mg/kg dry wt	0.017	0.019	0.017	< 0.012	0.026
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.83	0.94	0.90	0.21	0.56
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	< 0.06
Phenanthrene	mg/kg dry wt	0.32	0.31	0.31	0.090	0.60
Pyrene	mg/kg dry wt	1.00	1.04	1.08	0.28	1.35
Total of Reported PAHs in Soil*	mg/kg	6.9	7.5	7.5	2.0	8.2

Sample Name:		HA17 0.1 07-Nov-2018	HA17 0.3 07-Nov-2018	HA18 0.1 07-Nov-2018	HA18 0.35 07-Nov-2018	HA19 0.1 07-Nov-2018
Lab Number:		2077011.12	2077011.13	2077011.14	2077011.15	2077011.16
Individual Tests						
Dry Matter	g/100g as rcvd	89	91	88	89	80
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	10	9	9	18
Total Recoverable Cadmium	mg/kg dry wt	0.19	0.19	0.20	0.15	0.28
Total Recoverable Chromium	mg/kg dry wt	17	15	16	15	27
Total Recoverable Copper	mg/kg dry wt	27	31	27	19	38
Total Recoverable Lead	mg/kg dry wt	220	370	169	127	81
Total Recoverable Nickel	mg/kg dry wt	14	13	12	13	14
Total Recoverable Zinc	mg/kg dry wt	173	210	198	158	210
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	815.5	759.4	591.8	647.1	673.4
Dry Weight	g	754.5	706.3	519.0	582.1	548.2
Ashed Weight	g	737.8	694.9	495.6	569.3	522.9
Moisture	%	7	7	12	10	19
Dry Sample Fraction >10mm	g ashed wt	198.3	142.0	78.2	77.7	142.8
Sample Fraction <10mm to >2mm	g ashed wt	161.9	201.3	109.6	45.3	85.5
Sample Fraction <2mm	g ashed wt	376.5	350.5	307.0	445.1	293.8
<2mm Subsample Weight	g ashed wt	57.6	57.8	52.8	59.1	55.9

Sample Type: Soil						
Sample Name:		HA17 0.1 07-Nov-2018	HA17 0.3 07-Nov-2018	HA18 0.1 07-Nov-2018	HA18 0.35 07-Nov-2018	HA19 0.1 07-Nov-2018
Lab Number:		2077011.12	2077011.13	2077011.14	2077011.15	2077011.16
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
Asbestos Presence / Absence		Amosite (Brown Asbestos) detected.	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		Loose Fibres	ACM Debris and Loose Fibres	ACM Debris and Loose Fibres	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	0.00106	0.00571	0.04664	< 0.00001	< 0.00001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.009	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.009	< 0.001	< 0.001
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.017	< 0.010	< 0.010	< 0.010	0.020
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.017
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.012	0.013	0.025	< 0.011	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.012	0.014	0.019	< 0.011	< 0.013
Perylene	mg/kg dry wt	0.037	0.065	0.054	0.054	0.036
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.37	0.66	0.58	0.59	0.38
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.37	0.66	0.58	0.59	0.38
Acenaphthylene	mg/kg dry wt	0.031	0.063	0.038	0.040	0.029
Acenaphthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	< 0.011	< 0.013

Sample Type: Soil						
Sample Name:		HA17 0.1 07-Nov-2018	HA17 0.3 07-Nov-2018	HA18 0.1 07-Nov-2018	HA18 0.35 07-Nov-2018	HA19 0.1 07-Nov-2018
Lab Number:		2077011.12	2077011.13	2077011.14	2077011.15	2077011.16
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Anthracene	mg/kg dry wt	0.036	0.118	0.035	0.036	0.035
Benzo[a]anthracene	mg/kg dry wt	0.158	0.35	0.23	0.23	0.152
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.24	0.41	0.36	0.37	0.24
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.27	0.45	0.39	0.40	0.26
Benzo[e]pyrene	mg/kg dry wt	0.138	0.23	0.21	0.21	0.143
Benzo[g,h,i]perylene	mg/kg dry wt	0.26	0.42	0.42	0.43	0.29
Benzo[k]fluoranthene	mg/kg dry wt	0.100	0.162	0.142	0.141	0.089
Chrysene	mg/kg dry wt	0.165	0.31	0.25	0.25	0.171
Dibenzo[a,h]anthracene	mg/kg dry wt	0.049	0.096	0.089	0.090	0.057
Fluoranthene	mg/kg dry wt	0.34	0.76	0.47	0.48	0.33
Fluorene	mg/kg dry wt	< 0.012	0.031	< 0.012	< 0.011	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.25	0.48	0.47	0.46	0.31
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.07
Phenanthrene	mg/kg dry wt	0.127	0.41	0.150	0.146	0.113
Pyrene	mg/kg dry wt	0.35	0.81	0.49	0.55	0.37
Total of Reported PAHs in Soil*	mg/kg	2.6	5.2	3.9	3.9	2.7

Sample Name:		HA19 0.4 07-Nov-2018	HA20 0.1 07-Nov-2018	HA20 0.3 07-Nov-2018		
Lab Number:		2077011.17	2077011.18	2077011.19		
Individual Tests						
Dry Matter	g/100g as rcvd	79	82	85	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	6	7	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.25	0.14	0.13	-	-
Total Recoverable Chromium	mg/kg dry wt	16	14	15	-	-
Total Recoverable Copper	mg/kg dry wt	78	16	20	-	-
Total Recoverable Lead	mg/kg dry wt	340	69	86	-	-
Total Recoverable Nickel	mg/kg dry wt	14	11	12	-	-
Total Recoverable Zinc	mg/kg dry wt	240	111	125	-	-
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	736.1	694.2	783.0	-	-
Dry Weight	g	591.0	590.3	686.8	-	-
Ashed Weight	g	574.3	553.0	661.0	-	-
Moisture	%	20	15	12	-	-
Dry Sample Fraction >10mm	g ashed wt	23.1	189.6	184.3	-	-
Sample Fraction <10mm to >2mm	g ashed wt	99.6	79.7	151.0	-	-
Sample Fraction <2mm	g ashed wt	450.7	283.0	324.8	-	-
<2mm Subsample Weight	g ashed wt	55.3	57.4	52.8	-	-
Asbestos Presence / Absence		Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	-	-
Description of Asbestos Form		ACM Debris and Loose Fibres	-	Loose Fibres	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	0.11112	< 0.00001	0.00008	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	0.019	< 0.001	< 0.001	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	0.019	< 0.001	< 0.001	-	-

Sample Type: Soil						
Sample Name:		HA19 0.4 07-Nov-2018	HA20 0.1 07-Nov-2018	HA20 0.3 07-Nov-2018		
Lab Number:		2077011.17	2077011.18	2077011.19		
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
4,4'-DDE	mg/kg dry wt	< 0.010	0.010	0.010	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.06	-	-
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	0.012	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	-	-
Perylene	mg/kg dry wt	0.088	0.047	0.044	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.91	0.48	0.47	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.91	0.48	0.47	-	-
Acenaphthylene	mg/kg dry wt	0.071	0.042	0.036	-	-
Acenaphthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	-	-
Anthracene	mg/kg dry wt	0.070	0.074	0.051	-	-
Benzo[a]anthracene	mg/kg dry wt	0.37	0.26	0.22	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.59	0.31	0.30	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.63	0.31	0.31	-	-
Benzo[e]pyrene	mg/kg dry wt	0.33	0.160	0.163	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.58	0.28	0.30	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.24	0.122	0.117	-	-
Chrysene	mg/kg dry wt	0.42	0.24	0.22	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.121	0.061	0.063	-	-
Fluoranthene	mg/kg dry wt	0.88	0.55	0.45	-	-
Fluorene	mg/kg dry wt	0.014	0.022	0.012	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.63	0.31	0.31	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	-	-
Phenanthrene	mg/kg dry wt	0.28	0.26	0.179	-	-
Pyrene	mg/kg dry wt	0.89	0.55	0.46	-	-
Total of Reported PAHs in Soil*	mg/kg	6.3	3.6	3.3	-	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8, 10-19
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-8, 10-19
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-8, 10-19
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-8, 10-19
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	1-8, 10-19
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8, 10-19
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1-8, 10-19
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	-	1-8, 10-19
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-19
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-19
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8, 10-19
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1-8, 10-19
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-19
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-19
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-8, 10-19
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-8, 10-19
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-8, 10-19
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-19

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-19
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-19
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-19
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-8, 10-19
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-19
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8, 10-19

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

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

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

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2077058	A2Pv1
Contact:	Jonathan Coakley	**Date Received:**	07-Nov-2018	
	C/- Tonkin & Taylor	**Date Reported:**	09-Nov-2018	
	PO Box 2083	**Quote No:**	80842	
	Wellington 6140	**Order No:**	30315.1000	
		Client Reference:	30315.1000	
		Submitted By:	Lewis Black	

Sample Type: Building Material

Sample Name	Lab Number	Sample Category	Sample Weight on receipt (g)	Asbestos Presence / Absence
HA18 Suspect ACM 0.1	2077058.1	Fibre Cement	32.27	Chrysotile (White Asbestos) detected.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Building Material

Test	Method Description	Default Detection Limit	Sample No
Asbestos in Bulk Material			
Sample Category	Assessment of sample type. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	1
Sample Weight on receipt	Sample weight. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.01 g	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1

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

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

Rhodri Williams BSc (Hons)
Section Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2079842	A2Pv1
Contact:	Sami Hutchings C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	13-Nov-2018	
		Date Reported:	14-Nov-2018	
		Quote No:	92810	
		Order No:	30315.1000	
		Client Reference:	30315.1000	
		Submitted By:	Lewis Black	

Sample Type: Soil

Sample Name:		Terrier Rig 1 Fill 0-600 13-Nov-2018	Terrier Rig 2 Fill 0-700 13-Nov-2018	Terrier Rig 3 Fill 0-600 13-Nov-2018		
Lab Number:		2079842.1	2079842.2	2079842.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	-	-
Description of Asbestos Form		-	-	Fibre Cement and ACM Debris	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	0.100	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.001	-	-
As Received Weight	g	938.4	884.0	968.2	-	-
Dry Weight	g	840.8	819.9	868.0	-	-
Ashed Weight	g	832.5	814.9	860.3	-	-
Moisture	%	10	7	10	-	-
Dry Sample Fraction >10mm	g ashed wt	262.5	287.9	213.6	-	-
Sample Fraction <10mm to >2mm	g ashed wt	275.0	266.0	332.9	-	-
Sample Fraction <2mm	g ashed wt	294.3	260.6	313.1	-	-
<2mm Subsample Weight	g ashed wt	57.3	55.1	51.6	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	0.8678	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	< 0.00001	0.01011	-	-

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

The following assumptions have been made:

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

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

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1-3
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-3
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-3
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-3
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-3
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-3
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-3
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-3
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3

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

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

Rhodri Williams BSc (Hons)
Section Manager - Asbestos

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2079843 SPv1
Contact:	Sami Hutchings C/- Tonkin & Taylor PO Box 5271 Auckland 1141	**Date Received:**	13-Nov-2018
		Date Reported:	19-Nov-2018
		Quote No:	80842
		Order No:	30315.1000
		Client Reference:	30315.1000
		Submitted By:	Lewis Black

Sample Type: Soil

Sample Name:		Terrier Rig 1 Fill 0-600 13-Nov-2018	Terrier Rig 2 Fill 0-700 13-Nov-2018	Terrier Rig 2 Nat 700-800 13-Nov-2018	Terrier Rig 3 Fill 0-600 13-Nov-2018	Terrier Rig 3 Nat 600-800 13-Nov-2018
Lab Number:		2079843.1	2079843.2	2079843.3	2079843.4	2079843.5
Individual Tests						
Dry Matter	g/100g as rcvd	89	88	82	88	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	6	7	6	3
Total Recoverable Cadmium	mg/kg dry wt	0.14	< 0.10	< 0.10	0.31	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	18	17	17	12
Total Recoverable Copper	mg/kg dry wt	23	11	10	25	6
Total Recoverable Lead	mg/kg dry wt	100	34	20	97	10.7
Total Recoverable Nickel	mg/kg dry wt	12	13	15	14	11
Total Recoverable Zinc	mg/kg dry wt	131	79	69	270	40
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	-	< 0.04	-
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	-	< 0.06	-
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	-	< 0.010	-

Sample Type: Soil						
Sample Name:		Terrier Rig 1 Fill 0-600 13-Nov-2018	Terrier Rig 2 Fill 0-700 13-Nov-2018	Terrier Rig 2 Nat 700-800 13-Nov-2018	Terrier Rig 3 Fill 0-600 13-Nov-2018	Terrier Rig 3 Nat 600-800 13-Nov-2018
Lab Number:		2079843.1	2079843.2	2079843.3	2079843.4	2079843.5
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	0.014	< 0.011	< 0.013	< 0.012	< 0.013
2-Methylnaphthalene	mg/kg dry wt	0.013	< 0.011	< 0.013	< 0.012	< 0.013
Perylene	mg/kg dry wt	0.075	< 0.011	< 0.013	0.012	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.74	0.07	< 0.03	0.12	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.74	0.07	< 0.04	0.12	< 0.04
Acenaphthylene	mg/kg dry wt	0.054	< 0.011	< 0.013	< 0.012	< 0.013
Acenaphthene	mg/kg dry wt	< 0.012	< 0.011	< 0.013	< 0.012	< 0.013
Anthracene	mg/kg dry wt	0.41	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[a]anthracene	mg/kg dry wt	0.41	0.029	< 0.013	0.063	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.49	0.052	< 0.013	0.092	< 0.013
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.52	0.041	< 0.013	0.079	< 0.013
Benzo[e]pyrene	mg/kg dry wt	0.25	0.021	< 0.013	0.037	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	0.32	0.029	< 0.013	0.029	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	0.187	0.016	< 0.013	0.028	< 0.013
Chrysene	mg/kg dry wt	0.46	0.021	< 0.013	0.047	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	0.075	< 0.011	< 0.013	< 0.012	< 0.013
Fluoranthene	mg/kg dry wt	0.63	0.051	< 0.013	0.108	< 0.013
Fluorene	mg/kg dry wt	< 0.012	< 0.011	< 0.013	< 0.012	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.47	0.031	< 0.013	0.029	< 0.013
Naphthalene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg dry wt	0.185	0.018	< 0.013	0.033	< 0.013
Pyrene	mg/kg dry wt	0.58	0.040	< 0.013	0.089	< 0.013
Total of Reported PAHs in Soil*	mg/kg	5.2	0.4	< 0.3	0.7	< 0.3

Sample Name:		Terrier Rig Dup 13-Nov-2018	BH1 1.0 12-Nov-2018	BH2 1.0 13-Nov-2018	BH3 1.0 12-Nov-2018	BH5 2.0 13-Nov-2018
Lab Number:		2079843.6	2079843.7	2079843.9	2079843.11	2079843.14
Individual Tests						
Dry Matter	g/100g as rcvd	91	85	75	77	77
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	4	6	6	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	17	14	18	18	12
Total Recoverable Copper	mg/kg dry wt	10	7	9	11	7
Total Recoverable Lead	mg/kg dry wt	26	11.0	16.5	18.8	11.1
Total Recoverable Nickel	mg/kg dry wt	12	12	14	15	11
Total Recoverable Zinc	mg/kg dry wt	69	41	58	60	41
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-

Sample Type: Soil						
Sample Name:		Terrier Rig Dup 13-Nov-2018	BH1 1.0 12-Nov-2018	BH2 1.0 13-Nov-2018	BH3 1.0 12-Nov-2018	BH5 2.0 13-Nov-2018
Lab Number:		2079843.6	2079843.7	2079843.9	2079843.11	2079843.14
Organochlorine Pesticides Screening in Soil						
Total DDT Isomers	mg/kg dry wt	< 0.06	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	-	-	-	-
Endrin	mg/kg dry wt	< 0.010	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Perylene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.06	< 0.03	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.06	< 0.03	< 0.04	< 0.04	< 0.04
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Acenaphthene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Anthracene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]anthracene	mg/kg dry wt	0.022	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.042	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.037	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[e]pyrene	mg/kg dry wt	0.018	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	0.026	< 0.012	< 0.014	< 0.013	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	0.016	< 0.012	< 0.014	< 0.013	< 0.013
Chrysene	mg/kg dry wt	0.018	< 0.012	< 0.014	< 0.013	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Fluoranthene	mg/kg dry wt	0.045	< 0.012	< 0.014	< 0.013	< 0.013
Fluorene	mg/kg dry wt	< 0.011	< 0.012	< 0.014	< 0.013	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.029	< 0.012	< 0.014	< 0.013	< 0.013
Naphthalene	mg/kg dry wt	< 0.05	< 0.06	< 0.07	< 0.07	< 0.07
Phenanthrene	mg/kg dry wt	0.017	< 0.012	< 0.014	< 0.013	< 0.013
Pyrene	mg/kg dry wt	0.036	< 0.012	< 0.014	< 0.013	< 0.013
Total of Reported PAHs in Soil*	mg/kg	0.3	< 0.3	< 0.4	< 0.4	< 0.4

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-7, 9, 11, 14
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-7, 9, 11, 14
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1-2, 4, 6

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	-	1-7, 9, 11, 14
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-7, 9, 11, 14
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-7, 9, 11, 14
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-7, 9, 11, 14
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	1-7, 9, 11, 14

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

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

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

E2 – Peterborough Street

Table E2: Peterborough Street analytical results.

Sample Name:	Background Soil Concentration [2]	Worker safety [8]	High-density residential [4]	TP1 0.1	TP1 0.25	TP1 0.5	TP1 1.5	TP1 2.0	TP1 3.0	TP2 0.0	TP2 0.5	TP2 1.5	TP2 2.0	TP2 3.1	TP2 3.9	TP3 0.1	TP3 0.5	TP3 1.0
Depth (m bgl)				0.1	0.25	0.5	1.5	2.0	3.0	0.0	0.5	1.5	2.0	3.1	3.9	0.1	0.5	1.0
Date sampled				2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
Soil type				FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	Organic SILT	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	SILT	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)
Asbestos in Soil [1]																		
Presence/ absence	Asbestos NOT detected	-	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	-	-	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected
Asbestos in ACM % of Total Sample		Bonded: 0.05; Free fibre: 0.001 [5]	Bonded: 0.04; Free fibre: 0.001 [5]															
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample		0.001 [5]	0.001 [5]															
Metals and metalloids																		
Arsenic	16.3	70	45	-	5	-	5	-	4	-	5	5	-	4	2	-	4	-
Cadmium	0.2	1,300	230	-	< 0.10	-	< 0.10	-	< 0.10	-	0.12	< 0.10	-	< 0.10	< 0.10	-	< 0.10	-
Chromium	20.1	6,300	1,500	-	17	-	18	-	18	-	18	16	-	16	13	-	15	-
Copper	19.5	>10,000	>10,000	-	11	-	12	-	11	-	11	10	-	9	8	-	10	-
Lead	128.8	3,300	500	-	38	-	38	-	19.2	-	52	54	-	26	13.3	-	18.9	-
Mercury	0.1	4,200	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.10	-
Nickel	18	6,000 [6]	1,200 [6]	-	13	-	13	-	15	-	13	12	-	12	12	-	12	-
Zinc	166.8	400,000 [6]	60,000 [6]	-	132	-	122	-	63	-	121	105	-	106	49	-	117	-
Polycyclic Aromatic Hydrocarbons (PAH)*																		
Acenaphthene	0.055 [3]	-	-	-	0.26	-	0.67	-	< 0.03	-	0.03	0.06	-	0.18	< 0.03	-	< 0.03	-
Acenaphthylene	0.069 [3]	-	-	-	0.14	-	0.09	-	< 0.03	-	0.08	0.14	-	1.19	< 0.03	-	< 0.03	-
Anthracene	0.113 [3]	-	-	-	0.25	-	0.24	-	< 0.03	-	0.16	0.33	-	1.41	< 0.03	-	0.03	-
Benzo[a]anthracene	0.47 [3]	-	-	-	0.34	-	0.31	-	< 0.03	-	0.26	0.5	-	1.75	< 0.03	-		-
Benzo[a]pyrene (BAP)	0.595 [3]	-	-	-	0.3	-	0.22	-	< 0.03	-	0.22	0.34	-	1.24	< 0.03	-	0.05	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.947 [3]	-	-	-	0.41	-	0.27	-	0.03	-	0.26	0.39	-	1.39	< 0.03	-	0.07	-
Benzo[g,h,i]perylene	0.459 [3]	-	-	-	0.26	-	0.16	-	0.21	-	0.17	0.24	-	0.84	< 0.03	-	0.06	-
Benzo[k]fluoranthene	0.296 [3]	-	-	-	0.19	-	0.13	-	0.03	-	0.13	0.19	-	0.61	< 0.03	-	0.03	-
Chrysene	0.539 [3]	-	-	-	0.38	-	0.23	-	< 0.03	-	0.23	0.32	-	1.06	< 0.03	-	0.06	-
Dibenzo[a,h]anthracene	0.112 [3]	-	-	-	0.04	-	0.03	-	0.06	-	0.03	0.05	-	0.16	< 0.03	-	< 0.03	-
Fluoranthene	1.345 [3]	-	-	-	0.92	-	0.74	-	< 0.03	-	0.5	1	-	4.2	< 0.03	-	0.14	-
Fluorene	0.06 [3]	-	-	-	0.25	-	0.39	-	0.03	-	0.1	0.22	-	0.63	< 0.03	-	< 0.03	-
Indeno(1,2,3-c,d)pyrene	0.385 [3]	-	-	-	0.22	-	0.14	-	0.07	-	0.15	0.22	-	0.84	< 0.03	-	0.04	-
Naphthalene	0.029 [3]	Surface: 190 [v]; 1m-4m: 230 [v,7]	Surface: 58 [v]; 1m-4m: 70 [v,7]	-	< 0.12	-	< 0.12	-	< 0.15	-	0.12	0.18	-	0.31	< 0.14	-	< 0.13	-
Phenanthrene	0.703 [3]	-	-	-	1.23	-	1.39	-	0.03	-	0.56	1.45	-	7.1	< 0.03	-	0.14	-
Pyrene	1.362 [3]	Surface: NA ; 1m-4m: NA [7]	Surface: 1,600 [p]; 1m-4m: NA [7]	-	0.9	-	0.7	-	< 0.03	-	0.51	0.97	-	4.1	< 0.03	-	0.16	-
Bap Equivalent	0.922 [3]	35	24	-	0.46	-	0.34	-	0.09	-	0.33	0.52	-	1.86	NC	-	0.09	-
Total Petroleum Hydrocarbons (TPH)																		
C_7 - C_9	<LOR	Surface: 120 [m]; 1m-4m: 120 [m,7]	Surface: 120 [m]; 1m-4m: 120 [m,7]	-	-	-	< 8	< 8	-	-	-	< 8	< 8	-	-	-	-	-
C_{10} - C_{14}	<LOR	Surface: 1,500 [x]; 1m-4m: 1,900 [x,7]	Surface: 470 [x]; 1m-4m: 560 [x,7]	-	-	-	< 20	< 20	-	-	-	< 20	< 20	-	-	-	-	-
C_{15} - C_{36}	<LOR	NA [7]	NA [7]	-	-	-	260	80	-	-	-	155	100	-	-	-	-	-
Total (C_7 - C_{36})	<LOR	NGV	NGV	-	-	-	260	80	-	-	-	155	100	-	-	-	-	-

Notes

Results presented in mg/kg unless specified.

Values in underlined exceed the published background level.

Values in bold exceed the Residential Use criteria.

Values in *italic* exceed the Worker safety criteria.

ND – Not detected.

NGV- No Guideline Value.

NC indicates 'Not Calculated' as all carcinogenic PAHs are below the laboratory limit of detection.

NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.

1- 2013 Asbestos samples comprised qualitative identification only (presence/absence). 2019 samples comprised semi-quantitative asbestos analysis.

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8- Ministry for the Environment 2011, NES Users' Guide, Soil Contaminant Standard for commercial/industrial outdoor worker land use (unpaved

* PAH results included where above the laboratory limit of detection and assessment criteria available.

Table E2 continued: Peterborough Street analytical results.

Sample Name:	Background Soil Concentration [2]	Worker safety [8]	High-density residential [4]	TP3 1.5	TP3 3.2	TP4 0.1	TP4 0.5	TP4 1.0	TP4 2.9	TP5 0.1	TP5 0.3	TP5 0.5	TP5 1.0	TP5 2.0	TP6 0.1	TP6 0.3	TP7 1.0
Depth (m bgl)				1.5	3.2	0.1	0.5	1.0	2.9	0.1	0.3	0.5	1.0	2.0	0.1	0.3	1.0
Date sampled				2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
Soil type				FILL (Gravel)	SAND	FILL (Gravel)	FILL (Gravel)	FILL (Silt)	SILT	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Silt)	FILL (Gravel)
Asbestos in Soil [1]																	
Presence/ absence	Asbestos NOT detected	-	-	-	-	Asbestos NOT detected	Asbestos NOT detected	-	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	-	-	Asbestos NOT detected	-	Asbestos NOT detected
Asbestos in ACM % of Total Sample		Bonded: 0.05; Free fibre: 0.001 [5]	Bonded: 0.04; Free fibre: 0.001 [5]														
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample		0.001 [5]	0.001 [5]														
Metals and metalloids																	
Arsenic	16.3	70	45	4	2	-	6	5	3	-	4	-	9	5	3	5	5
Cadmium	0.2	1,300	230	< 0.10	< 0.10	-	< 0.10	< 0.10	0.33	-	< 0.10	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chromium	20.1	6,300	1,500	15	12	-	17	16	32	-	14	-	26	19	12	15	22
Copper	19.5	>10,000	>10,000	11	8	-	10	12	25	-	9	-	11	10	6	12	11
Lead	128.8	3,300	500	40	14.2	-	35	32	41	-	49	-	34	26	15.2	26	31
Mercury	0.1	4,200	1,000	< 0.10	-	-	< 0.10	< 0.10	-	-	-	-	< 0.10	< 0.10	-	-	-
Nickel	18	6,000 [6]	1,200 [6]	12	11	-	13	13	13	-	11	-	12	14	10	12	14
Zinc	166.8	400,000 [6]	60,000 [6]	143	53	-	320	152	80	-	144	-	90	108	56	72	89
Polycyclic Aromatic Hydrocarbons (PAH)*																	
Acenaphthene	0.055 [3]	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	-	0.02	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.069 [3]	-	-	< 0.03	< 0.03	-	0.03	< 0.03	< 0.03	-	0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	0.113 [3]	-	-	0.03	< 0.03	-	0.12	0.04	< 0.03	-	0.1	-	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Benzo[a]anthracene	0.47 [3]	-	-	0.07	< 0.03	-	0.25	0.08	0.04	-	0.16	-	0.05	0.06	< 0.03	0.15	
Benzo[a]pyrene (BAP)	0.595 [3]	-	-	0.06	< 0.03	-	0.2	0.07	0.04	-	0.12	-	0.03	0.04	< 0.03	0.14	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.947 [3]	-	-	0.08	< 0.03	-	0.25	0.09	0.06	-	0.15	-	0.05	0.06	< 0.03	0.18	0.02
Benzo[g,h,i]perylene	0.459 [3]	-	-	0.06	< 0.03	-	0.18	0.07	0.06	-	0.11	-	0.04	0.04	< 0.03	0.14	< 0.03
Benzo[k]fluoranthene	0.296 [3]	-	-	0.04	< 0.03	-	0.11	0.04	0.03	-	0.08	-	0.03	0.03	< 0.03	0.09	< 0.03
Chrysene	0.539 [3]	-	-	0.06	< 0.03	-	0.18	0.06	0.04	-	0.12	-	0.05	0.05	< 0.03	0.13	0.03
Dibenzo[a,h]anthracene	0.112 [3]	-	-	< 0.03	< 0.03	-	0.02	< 0.03	< 0.03	-	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	1.345 [3]	-	-	0.16	< 0.03	-	0.54	0.18	0.07	-	0.36	-	0.14	0.12	0.04	0.37	0.05
Fluorene	0.06 [3]	-	-	< 0.03	< 0.03	-	0.04	< 0.03	< 0.03	-	0.05	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	0.385 [3]	-	-	0.05	< 0.03	-	0.15	0.05	0.04	-	0.09	-	0.03	0.03	< 0.03	0.11	< 0.03
Naphthalene	0.029 [3]	Surface: 190 [v]; 1m-4m: 230 [v,7]	Surface: 58 [v]; 1m-4m: 70 [v,7]	< 0.12	< 0.14	-	< 0.12	< 0.12	< 0.14	-	< 0.12	-	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Phenanthrene	0.703 [3]	-	-	0.16	0.03	-	0.41	0.15	0.04	-	0.42	-	0.16	0.13	0.03	0.24	0.06
Pyrene	1.362 [3]	Surface: NA ; 1m-4m: NA [7]	Surface: 1,600 [p]; 1m-4m: NA [7]	0.17	0.03	-	0.55	0.19	0.08	-	0.37	-	0.15	0.14	0.05	0.4	0.06
Bap Equivalent	0.922 [3]	35	24	0.10	NC	-	0.30	0.11	0.07	-	0.18	-	0.10	0.07	NC	0.21	0.04
Total Petroleum Hydrocarbons (TPH)																	
C_7 - C_9	<LOR	Surface: 120 [m]; 1m-4m: 120 [m,7]	Surface: 120 [m]; 1m-4m: 120 [m,7]	-	-	-	-	-	-	-	-	-	-	< 8	-	-	-
C_{10} - C_{14}	<LOR	Surface: 1,500 [x]; 1m-4m: 1,900 [x,7]	Surface: 470 [x]; 1m-4m: 560 [x,7]	-	-	-	-	-	-	-	-	-	-	< 20	-	-	-
C_{15} - C_{36}	<LOR	NA [7]	NA [7]	-	-	-	-	-	-	-	-	-	-	67	-	-	-
Total (C_7 - C_{36})	<LOR	NGV	NGV	-	-	-	-	-	-	-	-	-	-	< 70	-	-	-

Notes
Results presented in mg/kg unless specified.
Values in underlined exceed the published background level.
Values in bold exceed the Residential Use criteria.
Values in *italic* exceed the Worker safety criteria.
ND – Not detected.
NGV- No Guideline Value.
NC indicates 'Not Calculated' as all carcinogenic PAHs are below the laboratory limit of detection.
NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
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8- Ministry for the Environment 2011, NES Users' Guide, Soil Contaminant Standard for commercial/industrial outdoor worker land use (unpaved
* PAH results included where above the laboratory limit of detection and assessment criteria available.

Table E2 continued: Peterborough Street analytical results.

Sample Name:	Background Soil Concentration [2]	Worker safety [8]	High-density residential [4]	TP7 1.5	TP7 2.0	TP7 4.0	TP8 0.1	TP8 0.5	TP8 2.0	TP8 3.0	TP8 4.0	TP9 0.1	TP9 0.25	TP9 1.0	TP9 1.4	TP10 0.1	TP10 0.25	TP10 1.0
Depth (m bgl)				1.5	2.0	4.0	0.1	0.5	2.0	3.0	4.0	0.1	0.25	1.0	1.4	0.1	0.25	1.0
Date sampled				2013	2013	2013	2013	2013	2013	2013	2013	2019	2019	2019	2019	2019	2019	2019
Soil type				FILL (Gravel)	FILL (Gravel)	SILT	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)
Asbestos in Soil [1]																		
Presence/ absence	Asbestos NOT detected	-	-	-	-	-	Asbestos NOT detected	-	Asbestos NOT detected	Asbestos NOT detected	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Chrysotile fibre cement	Asbestos NOT detected
Semi-quantitative as ACM		Bonded: 0.05; Free fibre: 0.001 [5]	Bonded: 0.04; Free fibre: 0.001 [5]														NAD	
Semi-quantitative as AF/FA		0.001 [5]	0.001 [5]														*0.0015*	
Metals and metalloids																		
Arsenic	16.3	70	45	-	6	2	-	5	4	-	2	-	-	-	-	-	-	-
Cadmium	0.2	1,300	230	-	< 0.10	< 0.10	-	< 0.10	0.11	-	< 0.10	-	-	-	-	-	-	-
Chromium	20.1	6,300	1,500	-	23	15	-	17	15	-	13	-	-	-	-	-	-	-
Copper	19.5	>10,000	>10,000	-	11	9	-	12	11	-	7	-	-	-	-	-	-	-
Lead	128.8	3,300	500	-	63	15.5	-	144	25	-	14.5	-	-	-	-	-	-	-
Mercury	0.1	4,200	1,000	-	-	-	-	< 0.10	< 0.10	-	-	-	-	-	-	-	-	-
Nickel	18	6,000 [6]	1,200 [6]	-	13	12	-	14	12	-	11	-	-	-	-	-	-	-
Zinc	166.8	400,000 [6]	60,000 [6]	-	99	53	-	149	144	-	46	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAH)																		
Acenaphthene	0.055 [3]	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.04	-	-	-	-	-	-	-
Acenaphthylene	0.069 [3]	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.04	-	-	-	-	-	-	-
Anthracene	0.113 [3]	-	-	-	< 0.03	< 0.03	-	0.03	0.04	-	< 0.04	-	-	-	-	-	-	-
Benzo[a]anthracene	0.47 [3]	-	-	-	0.03	< 0.03	-	0.07	0.08	-	< 0.04	-	-	-	-	-		-
Benzo[a]pyrene (BAP)	0.595 [3]	-	-	-	< 0.03	< 0.03	-	0.06	0.07	-	< 0.04	-	-	-	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.947 [3]	-	-	-	0.03	< 0.03	-	0.07	0.09	-	< 0.04	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	0.459 [3]	-	-	-	< 0.03	< 0.03	-	0.05	0.07	-	< 0.04	-	-	-	-	-	-	-
Benzo[k]fluoranthene	0.296 [3]	-	-	-	< 0.03	< 0.03	-	0.04	0.04	-	< 0.04	-	-	-	-	-	-	-
Chrysene	0.539 [3]	-	-	-	0.03	< 0.03	-	0.06	0.07	-	< 0.04	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	0.112 [3]	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.04	-	-	-	-	-	-	-
Fluoranthene	1.345 [3]	-	-	-	0.05	< 0.03	-	0.15	0.17	-	< 0.04	-	-	-	-	-	-	-
Fluorene	0.06 [3]	-	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	< 0.04	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	0.385 [3]	-	-	-	< 0.03	< 0.03	-	0.04	0.05	-	< 0.04	-	-	-	-	-	-	-
Naphthalene	0.029 [3]	Surface: 190 [v]; 1m-4m: 230 [v,7]	Surface: 58 [v]; 1m-4m: 70 [v,7]	-	< 0.13	< 0.14	-	< 0.12	< 0.12	-	< 0.19	-	-	-	-	-	-	-
Phenanthrene	0.703 [3]	-	-	-	0.06	< 0.03	-	0.13	0.17	-	< 0.04	-	-	-	-	-	-	-
Pyrene	1.362 [3]	Surface: NA ; 1m-4m: NA [7]	Surface: 1,600 [p]; 1m-4m: NA [7]	-	0.06	< 0.03	-	0.17	0.19	-	< 0.04	-	-	-	-	-	-	-
Bap Equivalent	0.922 [3]	35	24	-	0.04	NC	-	0.10	0.11	-	NC	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (TPH)																		
C_7 - C_9	<LOR	Surface: 120 [m]; 1m-4m: 120 [m,7]	Surface: 120 [m]; 1m-4m: 120 [m,7]	< 8	< 8	-	-	-	< 8	-	-	-	-	-	-	-	-	-
C_{10} - C_{14}	<LOR	Surface: 1,500 [x]; 1m-4m: 1,900 [x,7]	Surface: 470 [x]; 1m-4m: 560 [x,7]	< 20	< 20	-	-	-	< 20	-	-	-	-	-	-	-	-	-
C_{15} - C_{36}	<LOR	NA [7]	NA [7]	< 40	< 40	-	-	-	107	-	-	-	-	-	-	-	-	-
Total (C_7 - C_{36})	<LOR	NGV	NGV	< 70	< 70	-	-	-	107	-	-	-	-	-	-	-	-	-

Notes
Results presented in mg/kg unless specified.
Values in underlined exceed the published background level.
Values in bold exceed the Residential Use criteria.
Values in *italic* exceed the Worker safety criteria.
ND – Not detected.
NGV- No Guideline Value.
NC indicates 'Not Calculated' as all carcinogenic PAHs are below the laboratory limit of detection.
NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
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5- BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017, all site uses for asbestos containing material (ACM), Asbestos Fines (AF) and Fibrous Asbestos (FA). (w/w).
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7- Ministry for the Environment 1999, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Tier 1 soil acceptance criteria for TPH, Naphthalene and Non-carc. (Pyrene), residential and commercial/industrial land use, ALL pathways, sand soil type, surface (<1 m) and 1m- 4m depth of contamination. The following notes denotes the limiting pathway for each criterion: v- volatilisation, p- produce, m- maintenance/excavation, x- PAH surrogate.
8- Ministry for the Environment 2011, NES Users' Guide, Soil Contaminant Standard for commercial/industrial outdoor worker land use (unpaved
* PAH results included where above the laboratory limit of detection and assessment criteria available.

Table E2 continued: Peterborough Street analytical results.

Sample Name:	Background Soil Concentration [2]	Worker safety [8]	High-density residential [4]	TP11 0.1	TP11 0.25	TP11 1.0	TP11 1.4	TP 12 0.1	TP12 0.25	TP12 1.5	TP13 0.1	TP13 0.25	TP13 1.0	TP14 0.1	TP14 0.25	TP14 1.0	TP14 1.5
Depth (m bgl)				0.1	0.25	1.0	1.4	0.1	0.25	1.5	0.1	0.25	1.0	0.1	0.25	1.0	1.5
Date sampled				2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
Soil type				FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)	FILL (Gravel)
Asbestos in Soil [1]																	
Presence/ absence	Asbestos NOT detected	-	-	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Chrysotile free fibres	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected	Asbestos NOT detected
Semi-quantitative as ACM		Bonded: 0.05; Free fibre: 0.001 [5]	Bonded: 0.04; Free fibre: 0.001 [5]						<0.001								
Semi-quantitative as AF/FA		0.001 [5]	0.001 [5]						NAD								
Metals and metalloids																	
Arsenic	16.3	70	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.2	1,300	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	20.1	6,300	1,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	19.5	>10,000	>10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	128.8	3,300	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.1	4,200	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	18	6,000 [6]	1,200 [6]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	166.8	400,000 [6]	60,000 [6]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAH)																	
Acenaphthene	0.055 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	0.069 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	0.113 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]anthracene	0.47 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Benzo[a]pyrene (BAP)	0.595 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.947 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	0.459 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	0.296 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	0.539 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	0.112 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1.345 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	0.06 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	0.385 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	0.029 [3]	Surface: 190 [v]; 1m-4m: 230 [v,7]	Surface: 58 [v]; 1m-4m: 70 [v,7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	0.703 [3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	1.362 [3]	Surface: NA ; 1m-4m: NA [7]	Surface: 1,600 [p]; 1m-4m: NA [7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bap Equivalent	0.922 [3]	35	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (TPH)																	
C_7 - C_9	<LOR	Surface: 120 [m]; 1m-4m: 120 [m,7]	Surface: 120 [m]; 1m-4m: 120 [m,7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C_{10} - C_{14}	<LOR	Surface: 1,500 [x]; 1m-4m: 1,900 [x,7]	Surface: 470 [x]; 1m-4m: 560 [x,7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C_{15} - C_{36}	<LOR	NA [7]	NA [7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total (C_7 - C_{36})	<LOR	NGV	NGV	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes
Results presented in mg/kg unless specified.
Values in underlined exceed the published background level.
Values in bold exceed the Residential Use criteria.
Values in *italic* exceed the Worker safety criteria.
ND – Not detected.
NGV- No Guideline Value.
NC indicates 'Not Calculated' as all carcinogenic PAHs are below the laboratory limit of detection.
NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
1- 2013 Asbestos samples comprised qualitative identification only (presence/absence). 2019 samples comprised semi-quantitative asbestos analysis.
2- Environment Canterbury GIS, Trace elements Level 2 from "Background concentrations of selected trace elements in Canterbury soils" prepared for Environment Canterbury by Tonkin and Taylor Ltd, July 2006.
3- Environment Canterbury 2007, Background concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils.
4- Ministry for the Environment 2011, NES Users' Guide, Soil Contaminant Standard for high-density residential land use.
5- BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017, all site uses for asbestos containing material (ACM), Asbestos Fines (AF) and Fibrous Asbestos (FA). (w/w).
6- ASC NEPM Toolbox - Update Febrary 2014 - www.nepc.gov.au/nepms/assessment-site-contamination/toolbox.
7- Ministry for the Environment 1999, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand,
Tier 1 soil acceptance criteria for TPH, Naphthalene and Non-carc. (Pyrene), residential and commercial/industrial land use, ALL pathways,
sand soil type, surface (<1 m) and 1m- 4m depth of contamination. The following notes denotes the limiting pathway for each criterion: v-
8- Ministry for the Environment 2011, NES Users' Guide, Soil Contaminant Standard for commercial/industrial outdoor worker land use (unpaved
* PAH results included where above the laboratory limit of detection and assessment criteria available.

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ANALYSIS REPORT

Client:	Tonkin & Taylor	**Lab No:**	1216566	SPv2
Contact:	A Davies-Colley	**Date Registered:**	17-Dec-2013	
	C/- Tonkin & Taylor	**Date Reported:**	24-Dec-2013	
	PO Box 9544	**Quote No:**		
	HAMILTON 3240	**Order No:**	29759.001	
		Client Reference:	29759.001	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:		TP1/0.1 16-Dec-2013	TP1/0.25 16-Dec-2013	TP1/0.5 16-Dec-2013	TP1/1.5 16-Dec-2013	TP1/2.0 16-Dec-2013
Lab Number:		1216566.1	1216566.2	1216566.3	1216566.5	1216566.6
Individual Tests						
Dry Matter	g/100g as rcvd	-	89	-	90	90
Qualitative Identification of Asbestos		See attached report	See attached report	See attached report	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	5	-	5	-
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	-	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	17	-	18	-
Total Recoverable Copper	mg/kg dry wt	-	11	-	12	-
Total Recoverable Lead	mg/kg dry wt	-	38	-	38	-
Total Recoverable Nickel	mg/kg dry wt	-	13	-	13	-
Total Recoverable Zinc	mg/kg dry wt	-	132	-	122	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	0.26	-	0.67	-
Acenaphthylene	mg/kg dry wt	-	0.14	-	0.09	-
Anthracene	mg/kg dry wt	-	0.25	-	0.24	-
Benzo[a]anthracene	mg/kg dry wt	-	0.34	-	0.31	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.30	-	0.22	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.41	-	0.27	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.26	-	0.16	-
Benzo[k]fluoranthene	mg/kg dry wt	-	0.19	-	0.13	-
Chrysene	mg/kg dry wt	-	0.38	-	0.23	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.04	-	0.03	-
Fluoranthene	mg/kg dry wt	-	0.92	-	0.74	-
Fluorene	mg/kg dry wt	-	0.25	-	0.39	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.22	-	0.14	-
Naphthalene	mg/kg dry wt	-	< 0.12	-	< 0.12	-
Phenanthrene	mg/kg dry wt	-	1.23	-	1.39	-
Pyrene	mg/kg dry wt	-	0.90	-	0.70	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	< 8	< 8
C10 - C14	mg/kg dry wt	-	-	-	< 20	< 20
C15 - C36	mg/kg dry wt	-	-	-	260	80
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	260	80

Sample Name:	TP1/3.0 16-Dec-2013	TP2/0.0 16-Dec-2013	TP2/0.5 16-Dec-2013	TP2/1.5 16-Dec-2013	TP2/2.0 16-Dec-2013
Lab Number:	1216566.7	1216566.8	1216566.10	1216566.12	1216566.13
Individual Tests					

Sample Type: Soil						
Sample Name:		TP1/3.0 16-Dec-2013	TP2/0.0 16-Dec-2013	TP2/0.5 16-Dec-2013	TP2/1.5 16-Dec-2013	TP2/2.0 16-Dec-2013
Lab Number:		1216566.7	1216566.8	1216566.10	1216566.12	1216566.13
Individual Tests						
Dry Matter	g/100g as rcvd	75	-	92	94	90
Qualitative Identification of Asbestos		-	See attached report	See attached report	See attached report	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	-	5	5	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	0.12	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	18	-	18	16	-
Total Recoverable Copper	mg/kg dry wt	11	-	11	10	-
Total Recoverable Lead	mg/kg dry wt	19.2	-	52	54	-
Total Recoverable Nickel	mg/kg dry wt	15	-	13	12	-
Total Recoverable Zinc	mg/kg dry wt	63	-	121	105	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	0.03	0.06	-
Acenaphthylene	mg/kg dry wt	< 0.03	-	0.08	0.14	-
Anthracene	mg/kg dry wt	< 0.03	-	0.16	0.33	-
Benzo[a]anthracene	mg/kg dry wt	< 0.03	-	0.26	0.50	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	-	0.22	0.34	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.03	-	0.26	0.39	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.21	-	0.17	0.24	-
Benzo[k]fluoranthene	mg/kg dry wt	0.03	-	0.13	0.19	-
Chrysene	mg/kg dry wt	< 0.03	-	0.23	0.32	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.06	-	0.03	0.05	-
Fluoranthene	mg/kg dry wt	< 0.03	-	0.50	1.00	-
Fluorene	mg/kg dry wt	0.03	-	0.10	0.22	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.07	-	0.15	0.22	-
Naphthalene	mg/kg dry wt	< 0.15	-	0.12	0.18	-
Phenanthrene	mg/kg dry wt	0.03	-	0.56	1.45	-
Pyrene	mg/kg dry wt	< 0.03	-	0.51	0.97	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	< 8	< 8
C10 - C14	mg/kg dry wt	-	-	-	< 20	< 20
C15 - C36	mg/kg dry wt	-	-	-	155	100
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	155	100

Sample Name:		TP2/3.1 16-Dec-2013	TP2/3.9 16-Dec-2013	TP3/0.1 16-Dec-2013	TP3/0.5 16-Dec-2013	TP3/1.0 16-Dec-2013
Lab Number:		1216566.14	1216566.15	1216566.16	1216566.18	1216566.19
Individual Tests						
Dry Matter	g/100g as rcvd	88	77	-	91	-
Qualitative Identification of Asbestos		See attached report	-	See attached report	See attached report	See attached report
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	4	-
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	-	-	15	-
Total Recoverable Copper	mg/kg dry wt	-	-	-	10	-
Total Recoverable Lead	mg/kg dry wt	-	-	-	18.9	-
Total Recoverable Mercury	mg/kg dry wt	-	-	-	< 0.10	-
Total Recoverable Nickel	mg/kg dry wt	-	-	-	12	-
Total Recoverable Zinc	mg/kg dry wt	-	-	-	117	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	16	13	-	-	-
Total Recoverable Copper	mg/kg dry wt	9	8	-	-	-

Sample Type: Soil						
Sample Name:		TP2/3.1 16-Dec-2013	TP2/3.9 16-Dec-2013	TP3/0.1 16-Dec-2013	TP3/0.5 16-Dec-2013	TP3/1.0 16-Dec-2013
Lab Number:		1216566.14	1216566.15	1216566.16	1216566.18	1216566.19
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Lead	mg/kg dry wt	26	13.3	-	-	-
Total Recoverable Nickel	mg/kg dry wt	12	12	-	-	-
Total Recoverable Zinc	mg/kg dry wt	106	49	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	0.18	< 0.03	-	< 0.03	-
Acenaphthylene	mg/kg dry wt	1.19	< 0.03	-	< 0.03	-
Anthracene	mg/kg dry wt	1.41	< 0.03	-	0.03	-
Benzo[a]anthracene	mg/kg dry wt	1.75	< 0.03	-	0.06	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	1.24	< 0.03	-	0.05	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	1.39	< 0.03	-	0.07	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.84	< 0.03	-	0.06	-
Benzo[k]fluoranthene	mg/kg dry wt	0.61	< 0.03	-	0.03	-
Chrysene	mg/kg dry wt	1.06	< 0.03	-	0.06	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.16	< 0.03	-	< 0.03	-
Fluoranthene	mg/kg dry wt	4.2	< 0.03	-	0.14	-
Fluorene	mg/kg dry wt	0.63	< 0.03	-	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.84	< 0.03	-	0.04	-
Naphthalene	mg/kg dry wt	0.31	< 0.14	-	< 0.13	-
Phenanthrene	mg/kg dry wt	7.1	< 0.03	-	0.14	-
Pyrene	mg/kg dry wt	4.1	< 0.03	-	0.16	-

Sample Name:		TP3/1.5 16-Dec-2013	TP3/3.2 16-Dec-2013	TP4/0.1 16-Dec-2013	TP4/0.5 16-Dec-2013	TP4/1.0 16-Dec-2013
Lab Number:		1216566.20	1216566.22	1216566.23	1216566.25	1216566.26
Individual Tests						
Dry Matter	g/100g as rcvd	93	79	-	94	95
Qualitative Identification of Asbestos		-	-	See attached report	See attached report	-
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	4	-	-	6	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	-	-	17	16
Total Recoverable Copper	mg/kg dry wt	11	-	-	10	12
Total Recoverable Lead	mg/kg dry wt	40	-	-	35	32
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	12	-	-	13	13
Total Recoverable Zinc	mg/kg dry wt	143	-	-	320	152
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	-	12	-	-	-
Total Recoverable Copper	mg/kg dry wt	-	8	-	-	-
Total Recoverable Lead	mg/kg dry wt	-	14.2	-	-	-
Total Recoverable Nickel	mg/kg dry wt	-	11	-	-	-
Total Recoverable Zinc	mg/kg dry wt	-	53	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	-	0.03	< 0.03
Anthracene	mg/kg dry wt	0.03	< 0.03	-	0.12	0.04
Benzo[a]anthracene	mg/kg dry wt	0.07	< 0.03	-	0.25	0.08
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.06	< 0.03	-	0.20	0.07
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	0.08	< 0.03	-	0.25	0.09
Benzo[g,h,i]perylene	mg/kg dry wt	0.06	< 0.03	-	0.18	0.07
Benzo[k]fluoranthene	mg/kg dry wt	0.04	< 0.03	-	0.11	0.04

Sample Type: Soil						
Sample Name:		TP3/1.5 16-Dec-2013	TP3/3.2 16-Dec-2013	TP4/0.1 16-Dec-2013	TP4/0.5 16-Dec-2013	TP4/1.0 16-Dec-2013
Lab Number:		1216566.20	1216566.22	1216566.23	1216566.25	1216566.26
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Chrysene	mg/kg dry wt	0.06	< 0.03	-	0.18	0.06
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	-	0.02	< 0.03
Fluoranthene	mg/kg dry wt	0.16	< 0.03	-	0.54	0.18
Fluorene	mg/kg dry wt	< 0.03	< 0.03	-	0.04	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.05	< 0.03	-	0.15	0.05
Naphthalene	mg/kg dry wt	< 0.12	< 0.14	-	< 0.12	< 0.12
Phenanthrene	mg/kg dry wt	0.16	0.03	-	0.41	0.15
Pyrene	mg/kg dry wt	0.17	0.03	-	0.55	0.19

Sample Name:		TP4/2.9 16-Dec-2013	TP5/0.1 16-Dec-2013	TP5/0.25 16-Dec-2013	TP5/0.5 16-Dec-2013	TP5/1.0 16-Dec-2013
Lab Number:		1216566.29	1216566.30	1216566.31	1216566.32	1216566.33
Individual Tests						
Dry Matter	g/100g as rcvd	81	-	93	-	93
Qualitative Identification of Asbestos		-	See attached report	See attached report	See attached report	-
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	9
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	26
Total Recoverable Copper	mg/kg dry wt	-	-	-	-	11
Total Recoverable Lead	mg/kg dry wt	-	-	-	-	34
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	-	-	-	12
Total Recoverable Zinc	mg/kg dry wt	-	-	-	-	90
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	-	4	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.33	-	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	32	-	14	-	-
Total Recoverable Copper	mg/kg dry wt	25	-	9	-	-
Total Recoverable Lead	mg/kg dry wt	41	-	49	-	-
Total Recoverable Nickel	mg/kg dry wt	13	-	11	-	-
Total Recoverable Zinc	mg/kg dry wt	80	-	144	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	0.02	-	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	-	0.03	-	< 0.03
Anthracene	mg/kg dry wt	< 0.03	-	0.10	-	< 0.03
Benzo[a]anthracene	mg/kg dry wt	0.04	-	0.16	-	0.05
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.04	-	0.12	-	0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	0.06	-	0.15	-	0.05
Benzo[g,h,i]perylene	mg/kg dry wt	0.06	-	0.11	-	0.04
Benzo[k]fluoranthene	mg/kg dry wt	0.03	-	0.08	-	0.03
Chrysene	mg/kg dry wt	0.04	-	0.12	-	0.05
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	-	< 0.03	-	< 0.03
Fluoranthene	mg/kg dry wt	0.07	-	0.36	-	0.14
Fluorene	mg/kg dry wt	< 0.03	-	0.05	-	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.04	-	0.09	-	0.03
Naphthalene	mg/kg dry wt	< 0.14	-	< 0.12	-	< 0.12
Phenanthrene	mg/kg dry wt	0.04	-	0.42	-	0.16
Pyrene	mg/kg dry wt	0.08	-	0.37	-	0.15

Sample Name:		TP5/2.0 16-Dec-2013	TP6/0.1 16-Dec-2013	TP6/0.25 16-Dec-2013	TP7/1.0 16-Dec-2013	TP7/1.5 16-Dec-2013
Lab Number:		1216566.35	1216566.38	1216566.39	1216566.44	1216566.45
Individual Tests						
Dry Matter	g/100g as rcvd	92	99	91	90	94

Sample Type: Soil						
Sample Name:		TP5/2.0 16-Dec-2013	TP6/0.1 16-Dec-2013	TP6/0.25 16-Dec-2013	TP7/1.0 16-Dec-2013	TP7/1.5 16-Dec-2013
Lab Number:		1216566.35	1216566.38	1216566.39	1216566.44	1216566.45
Individual Tests						
Qualitative Identification of Asbestos		-	See attached report	-	See attached report	-
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	5	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	19	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	10	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	26	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	14	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	108	-	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	3	5	5	-
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	12	15	22	-
Total Recoverable Copper	mg/kg dry wt	-	6	12	11	-
Total Recoverable Lead	mg/kg dry wt	-	15.2	26	31	-
Total Recoverable Nickel	mg/kg dry wt	-	10	12	14	-
Total Recoverable Zinc	mg/kg dry wt	-	56	72	89	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Anthracene	mg/kg dry wt	< 0.03	< 0.03	0.03	< 0.03	-
Benzo[a]anthracene	mg/kg dry wt	0.06	< 0.03	0.15	0.03	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.04	< 0.03	0.14	< 0.03	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.06	< 0.03	0.18	0.02	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.04	< 0.03	0.14	< 0.03	-
Benzo[k]fluoranthene	mg/kg dry wt	0.03	< 0.03	0.09	< 0.03	-
Chrysene	mg/kg dry wt	0.05	< 0.03	0.13	0.03	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Fluoranthene	mg/kg dry wt	0.12	0.04	0.37	0.05	-
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.03	< 0.03	0.11	< 0.03	-
Naphthalene	mg/kg dry wt	< 0.12	< 0.12	< 0.12	< 0.12	-
Phenanthrene	mg/kg dry wt	0.13	0.03	0.24	0.06	-
Pyrene	mg/kg dry wt	0.14	0.05	0.40	0.06	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	-	-	-	< 8
C10 - C14	mg/kg dry wt	< 20	-	-	-	< 20
C15 - C36	mg/kg dry wt	67	-	-	-	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	< 70

Sample Name:		TP7/2.0 16-Dec-2013	TP7/4.0 16-Dec-2013	TP8/0.1 16-Dec-2013	TP8/0.5 16-Dec-2013	TP8/2.0 16-Dec-2013
Lab Number:		1216566.46	1216566.47	1216566.48	1216566.50	1216566.53
Individual Tests						
Dry Matter	g/100g as rcvd	85	80	-	92	90
Qualitative Identification of Asbestos		-	-	See attached report	-	See attached report
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	5	4
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	< 0.10	0.11
Total Recoverable Chromium	mg/kg dry wt	-	-	-	17	15
Total Recoverable Copper	mg/kg dry wt	-	-	-	12	11 #1
Total Recoverable Lead	mg/kg dry wt	-	-	-	144	25

Sample Type: Soil						
Sample Name:		TP7/2.0 16-Dec-2013	TP7/4.0 16-Dec-2013	TP8/0.1 16-Dec-2013	TP8/0.5 16-Dec-2013	TP8/2.0 16-Dec-2013
Lab Number:		1216566.46	1216566.47	1216566.48	1216566.50	1216566.53
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Mercury	mg/kg dry wt	-	-	-	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	-	-	14	12
Total Recoverable Zinc	mg/kg dry wt	-	-	-	149	144
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	6	2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	23	15	-	-	-
Total Recoverable Copper	mg/kg dry wt	11	9	-	-	-
Total Recoverable Lead	mg/kg dry wt	63	15.5	-	-	-
Total Recoverable Nickel	mg/kg dry wt	13	12	-	-	-
Total Recoverable Zinc	mg/kg dry wt	99	53	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	< 0.03	-	0.03	0.04
Benzo[a]anthracene	mg/kg dry wt	0.03	< 0.03	-	0.07	0.08
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	-	0.06	0.07
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	0.03	< 0.03	-	0.07	0.09
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	-	0.05	0.07
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	-	0.04	0.04
Chrysene	mg/kg dry wt	0.03	< 0.03	-	0.06	0.07
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	0.05	< 0.03	-	0.15	0.17
Fluorene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	-	0.04	0.05
Naphthalene	mg/kg dry wt	< 0.13	< 0.14	-	< 0.12	< 0.12
Phenanthrene	mg/kg dry wt	0.06	< 0.03	-	0.13	0.17
Pyrene	mg/kg dry wt	0.06	< 0.03	-	0.17	0.19
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	-	-	-	< 8
C10 - C14	mg/kg dry wt	< 20	-	-	-	< 20
C15 - C36	mg/kg dry wt	< 40	-	-	-	107
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	107

Sample Name:		TP8/3.0 16-Dec-2013	TP8/4.0 16-Dec-2013	QC01 16-Dec-2013	QC02 16-Dec-2013	QC03 16-Dec-2013
Lab Number:		1216566.54	1216566.55	1216566.56	1216566.57	1216566.58
Individual Tests						
Dry Matter	g/100g as rcvd	-	57	94	-	98
Qualitative Identification of Asbestos		See attached report	-	See attached report	See attached report	See attached report
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	2	5	-	3
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	0.16	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	13	17	-	12
Total Recoverable Copper	mg/kg dry wt	-	7	9	-	7
Total Recoverable Lead	mg/kg dry wt	-	14.5	34	-	16.0
Total Recoverable Nickel	mg/kg dry wt	-	11	12	-	10
Total Recoverable Zinc	mg/kg dry wt	-	46	320	-	50
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	< 0.04	0.04	-	< 0.03
Acenaphthylene	mg/kg dry wt	-	< 0.04	0.02	-	< 0.03
Anthracene	mg/kg dry wt	-	< 0.04	0.08	-	< 0.03
Benzo[a]anthracene	mg/kg dry wt	-	< 0.04	0.14	-	0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.04	0.11	-	0.03

Sample Type: Soil						
Sample Name:		TP8/3.0 16-Dec-2013	TP8/4.0 16-Dec-2013	QC01 16-Dec-2013	QC02 16-Dec-2013	QC03 16-Dec-2013
Lab Number:		1216566.54	1216566.55	1216566.56	1216566.57	1216566.58
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.04	0.13	-	0.03
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.04	0.09	-	0.03
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.04	0.07	-	< 0.03
Chrysene	mg/kg dry wt	-	< 0.04	0.12	-	0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.04	< 0.03	-	< 0.03
Fluoranthene	mg/kg dry wt	-	< 0.04	0.31	-	0.06
Fluorene	mg/kg dry wt	-	< 0.04	0.05	-	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.04	0.08	-	< 0.03
Naphthalene	mg/kg dry wt	-	< 0.19	< 0.12	-	< 0.12
Phenanthrene	mg/kg dry wt	-	< 0.04	0.36	-	0.05
Pyrene	mg/kg dry wt	-	< 0.04	0.33	-	0.07

Analyst's Comments

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample.

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms

Appendix No.2 - Total Petroleum Hydrocarbon Chromatograms

Appendix No.3 - Asbestos results

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2, 5, 7, 10, 12, 14-15, 18, 20, 22, 25-26, 29, 31, 33, 35, 38-39, 44, 46-47, 50, 53, 55-56, 58
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:5786,2805,10734;2695]	-	5, 12, 35, 46, 53
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	18, 20, 25-26, 33, 35, 50, 53
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	2, 5, 7, 10, 12, 14-15, 22, 29, 31, 38-39, 44, 46-47, 55-56, 58
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	-	2, 7, 10, 14-15, 18, 20, 22, 25-26, 29, 31, 33, 38-39, 44, 47, 50, 55-56, 58
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	-	6, 13, 45

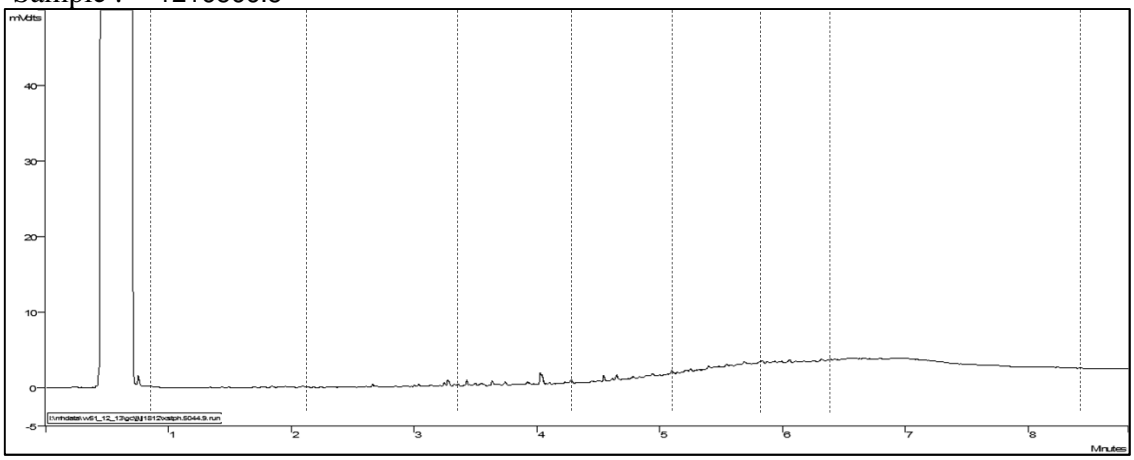
Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	2, 5-7, 10, 12-15, 18, 20, 22, 25-26, 29, 31, 33, 35, 38-39, 44-47, 50, 53, 55-56, 58
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2, 5, 7, 10, 12, 14-15, 18, 20, 22, 25-26, 29, 31, 33, 35, 38-39, 44, 46-47, 50, 53, 55-56, 58
Qualitative Identification of Asbestos	150-200g, sealed plastic bag. Polarised Light Microscopy and dispersion staining techniques. Subcontracted to Dowdell & Associates, 4 Cain Road, Penrose, Auckland. AS 4964 (2004) - Method for the Qualitative / Semi-Quantitative Identification of Asbestos in Bulk Samples.	-	1-3, 8, 10, 12, 14, 16, 18-19, 23, 25, 30-32, 38, 44, 48, 53-54, 56-58

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

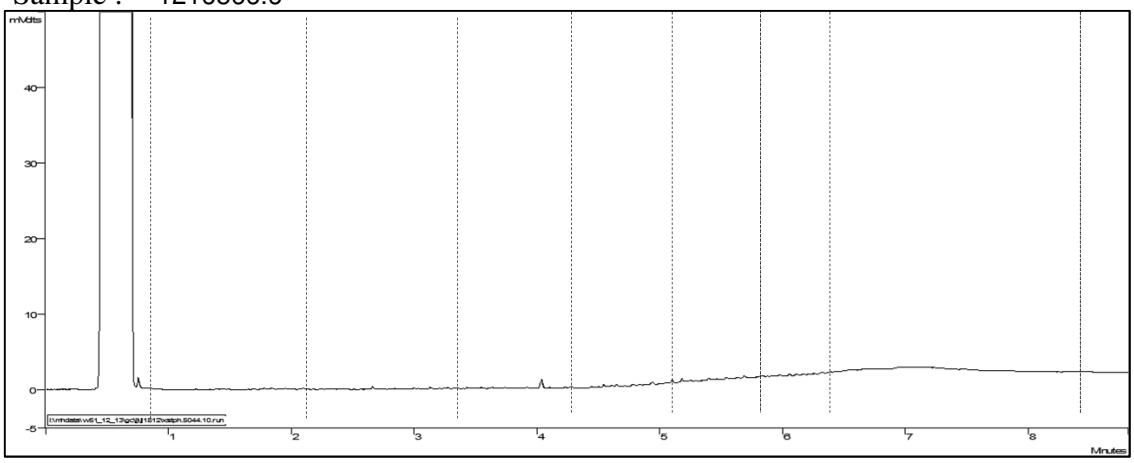
Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental Division

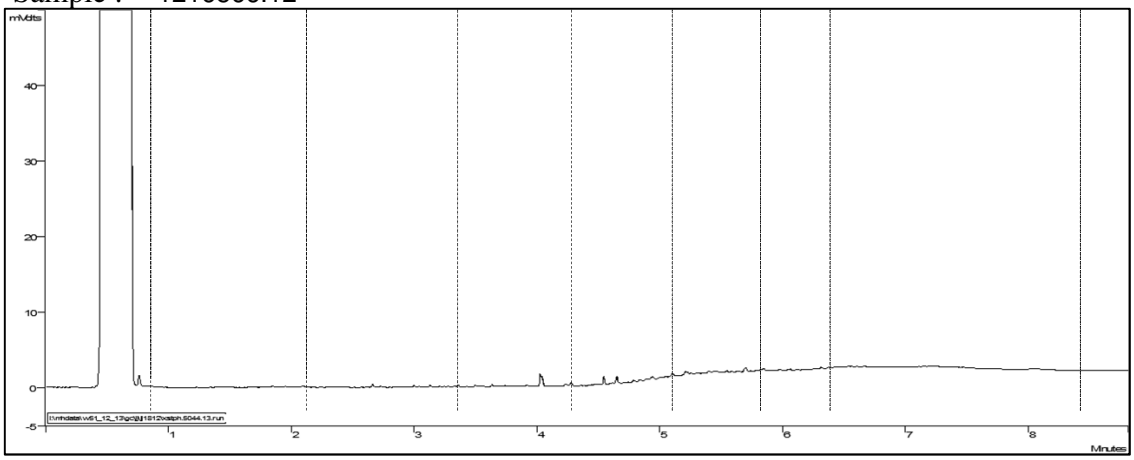
Sample : 1216566.5

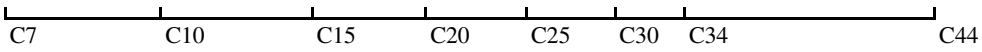


Sample : 1216566.6

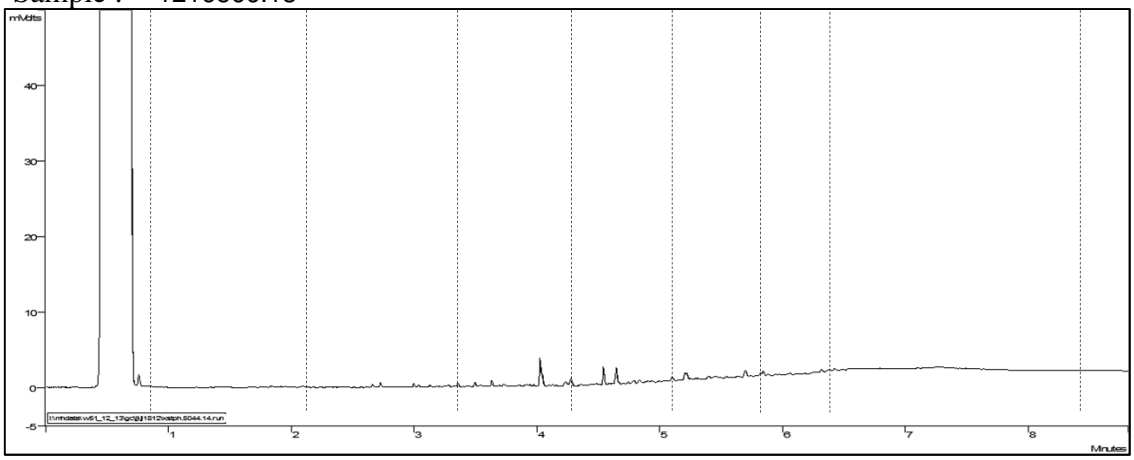


Sample : 1216566.12

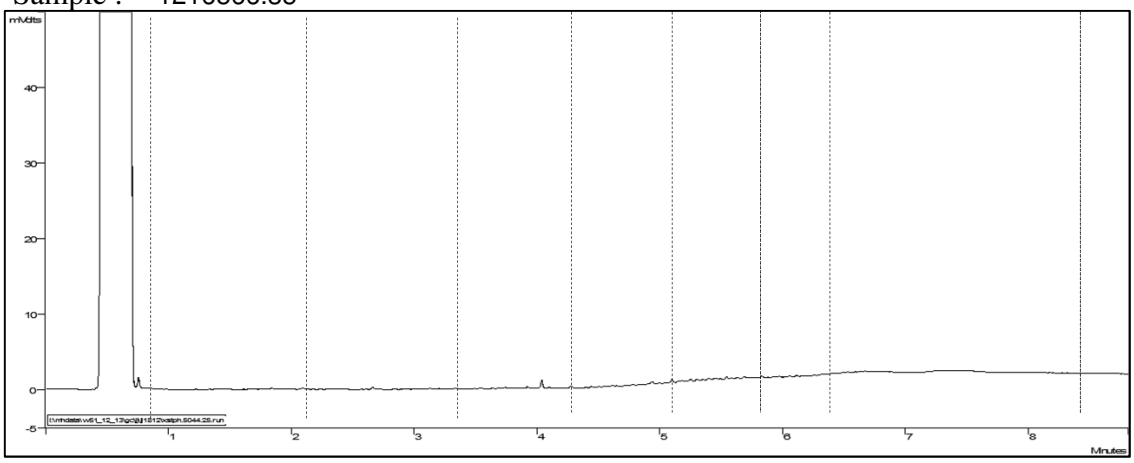




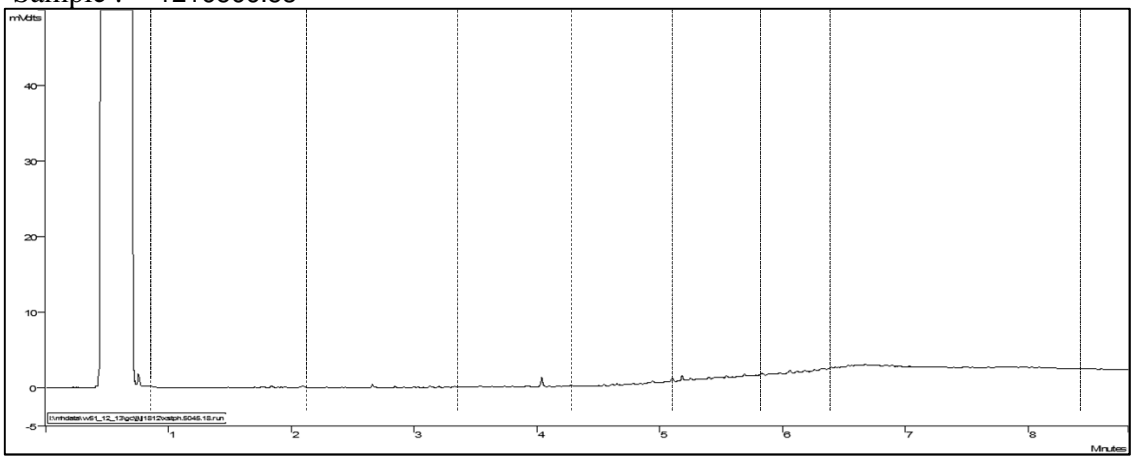
Sample : 1216566.13

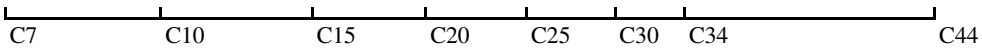


Sample : 1216566.35



Sample : 1216566.53





DOWDELL & ASSOCIATES LTD

OCCUPATIONAL HEALTH ANALYSTS & CONSULTANTS

4 Cain Rd, Penrose, PO Box 112-017 Auckland 1642, Phone (09) 5260-246. Fax (09) 5795-389.

20th December 2013

Hill Laboratories
Private Bag 3205
Waikato Mail Centre
Hamilton 3240

Dear Sir/Madam

Re: **Bulk Fibre Analysis**

Sampled by	: Client
Date received	: 20th December 2013
Laboratory no.	: 51462
Description	: 23 x soil sample(s)
Location	: -
Purchase order	: 136517
Method	: AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples

We examined the following sample(s) using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including Dispersion Staining Techniques. The following result(s) relate(s) to the sample(s) as received**:**

Reg no: F7130 **Labelled as:** 1216566/1
Sample size: 83.61 g wet / 82.55 g dry
Result: Asbestos **NOT** detected.

Reg no: F7131 **Labelled as:** 1216566/2
Sample size: 75.43 g wet / 73.42 g dry
Result: Asbestos **NOT** detected.

Reg no: F7132 **Labelled as:** 1216566/3
Sample size: 59.60 g wet / 41.95 g dry
Result: Asbestos **NOT** detected.

Reg no: F7133 **Labelled as:** 1216566/8
Sample size: 104.99 g wet / 103.26 g dry
Result: Asbestos **NOT** detected.

Reg no: F7134 **Labelled as:** 1216566/10
Sample size: 52.96 g wet / 46.89 g dry
Result: Asbestos **NOT** detected.

Reg no: F7135 **Labelled as:** 1216566/12
Sample size: 69.01 g wet / 84.09 g dry
Result: Asbestos **NOT** detected.

Reg no: F7136 **Labelled as:** 1216566/14
Sample size: 82.18 g wet / 66.57 g dry
Result: Asbestos **NOT** detected.

Reg no: F7137 **Labelled as:** 1216566/16
Sample size: 104.23 g wet / 97.86 g dry
Result: Asbestos **NOT** detected.

Reg no: F7138 **Labelled as:** 1216566/18
Sample size: 104.40 g wet / 93.30 g dry
Result: Asbestos **NOT** detected.

Reg no: F7139 **Labelled as:** 1216566/19
Sample size: 102.70 g wet / 93.79 g dry
Result: Asbestos **NOT** detected.

Reg no: F7140 **Labelled as:** 1216566/23
Sample size: 106.65 g wet / 99.94 g dry
Result: Asbestos **NOT** detected.

Reg no: F7141 **Labelled as:** 1216566/25
Sample size: 104.37 g wet / 93.55 g dry
Result: Asbestos **NOT** detected.

Reg no: F7142 **Labelled as:** 1216566/30
Sample size: 100.58 g wet / 93.48 g dry
Result: Asbestos **NOT** detected.

Reg no: F7143 **Labelled as:** 1216566/31
Sample size: 92.41 g wet / 82.14 g dry
Result: Asbestos **NOT** detected.

Reg no: F7144 **Labelled as:** 1216566/32
Sample size: 104.72 g wet / 93.48 g dry
Result: Asbestos **NOT** detected.

Reg no: F7145 **Labelled as:** 1216566/38
Sample size: 100.03 g wet / 83.27 g dry
Result: Asbestos **NOT** detected.

Reg no: F7146 **Labelled as:** 1216566/44
Sample size: 91.96 g wet / 82.22 g dry
Result: Asbestos **NOT** detected.

Reg no: F7147 **Labelled as:** 1216566/48
Sample size: 97.10 g wet / 94.27 g dry
Result: Asbestos **NOT** detected.

Reg no: F7148 **Labelled as:** 1216566/53
Sample size: 88.35 g wet / 77.72 g dry
Result: Asbestos **NOT** detected.

Reg no: F7149 **Labelled as:** 1216566/54
Sample size: 82.16 g wet / 71.65 g dry
Result: Asbestos **NOT** detected.

Reg no: F7150 **Labelled as:** 1216566/56
Sample size: 97.28 g wet / 91.30 g dry
Result: Asbestos **NOT** detected.

Reg no: F7151 **Labelled as:** 1216566/57
Sample size: 102.62 g wet / 90.77 g dry
Result: Asbestos **NOT** detected.

Reg no: F7152 **Labelled as:** 1216566/58
Sample size: 95.07 g wet / 93.46 g dry
Result: Asbestos **NOT** detected.

Yours faithfully
DOWDELL & ASSOCIATES LTD

Imtiaz Damani MSc
Analyst

E.Sheldon BSc (Hon)
Analyst

Laura Sands
Occupational Hygienist

NOTE: This report must not be altered, or reproduced except in full.

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BETTER TESTING BETTER RESULTS

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Hamilton 3240, New Zealand

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

ANALYSIS REPORT

Client:	Tonkin & Taylor	**Lab No:**	1218266	SPv1
Contact:	Wendy Whitley	**Date Registered:**	20-Dec-2013	
	C/- Tonkin & Taylor	**Date Reported:**	24-Dec-2013	
	PO Box 13055	**Quote No:**		
	CHRISTCHURCH 8141	**Order No:**	29759.001	
		Client Reference:	Park Tce	
		Submitted By:	Wendy Whitley	

Sample Type: Aqueous

Sample Name:		BH7 19-Dec-2013 3:00 pm				
Lab Number:		1218266.1				
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	-	-	-	-
C10 - C14	g/m³	0.5	-	-	-	-
C15 - C36	g/m³	< 0.4	-	-	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	-	-	-	-

SUMMARY OF METHODS

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

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	-	1

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

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

Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental Division

Report Date: 24 Jun 2019

Certificate Number: S1906191428

Tonkin + Taylor Ltd Christchurch
Level 3 PWC building, 60 Cashel Street (west end), Christchurch 8013

Client Reference: 30315.1000

Dear Lewis Black,

Re: Asbestos Soil Identification Analysis – Peterborough Street

21 sample(s) received on 19 Jun 2019 by Tamiko Watson.

The results of fibre analysis were performed by Jenny Nichols of Analytica Laboratories Limited on 24 Jun 2019.

The sample(s) were stated to be from Peterborough Street.

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 Jenny Nichols.

Yours sincerely

Jenny Nichols
LABORATORY IDENTIFIER

Sample Analysis Results

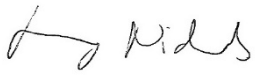
Certificate Number: S1906191428
Report Date: 24 Jun 2019
Site Location: Peterborough Street

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:



Approved Identifier: Jenny Nichols

Reviewed by:

Key Technical Person: Tamiko Watson

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	TP9 0.1	- Non-Homogeneous Soil 816.24g	No Asbestos Detected Organic Fibres
S002	TP9 0.25	- Non-Homogeneous Soil 835.10g	No Asbestos Detected Organic Fibres
S003	TP9 1.0	- Non-Homogeneous Soil 842.73g	No Asbestos Detected Organic Fibres
S004	TP9 1.4	- Non-Homogeneous Soil 927.95g	No Asbestos Detected Organic Fibres
S005	TP10 0.1	- Non-Homogeneous Soil 987.38g	No Asbestos Detected Organic Fibres
S006	TP10 0.25	- Non-Homogeneous Soil 854.30g	Chrysotile (white asbestos) Fibres Organic Fibres
S007	TP10 1.0	- Non-Homogeneous Soil 963.37g	No Asbestos Detected Organic Fibres
S008	TP11 0.1	- Non-Homogeneous Soil 925.26g	No Asbestos Detected Organic Fibres
S009	TP11 0.25	- Non-Homogeneous Soil 837.18g	No Asbestos Detected Organic Fibres

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Sample Analysis Results

Certificate Number: S1906191428
Report Date: 24 Jun 2019
Site Location: Peterborough Street

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S010	TP11 1.0	- Non-Homogeneous Soil 802.80g	No Asbestos Detected Organic Fibres
S011	TP11 1.4	- Non-Homogeneous Soil 912.45g	No Asbestos Detected Organic Fibres
S012	TP12 0.1	- Non-Homogeneous Soil 874.63g	No Asbestos Detected Organic Fibres
S013	TP12 0.25	- Non-Homogeneous Soil 858.39g	Chrysotile (white asbestos) Fibres Organic Fibres
S014	TP12 1.5	- Non-Homogeneous Soil 813.19g	No Asbestos Detected Organic Fibres
S015	TP13 0.1	- Non-Homogeneous Soil 989.18g	No Asbestos Detected Organic Fibres
S016	TP13 0.25	- Non-Homogeneous Soil 708.28g	No Asbestos Detected Organic Fibres
S017	TP13 1.0	- Non-Homogeneous Soil 844.24g	No Asbestos Detected Organic Fibres
S018	TP14 0.1	- Non-Homogeneous Soil 780.68g	No Asbestos Detected Organic Fibres
S019	TP14 0.25	- Non-Homogeneous Soil 859.52g	No Asbestos Detected Organic Fibres
S020	TP14 1.0	- Non-Homogeneous Soil 903.40g	No Asbestos Detected Organic Fibres
S021	TP14 1.5	- Non-Homogeneous Soil 753.25g	No Asbestos Detected Organic Fibres

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Appendix 1: Soil Analysis Raw Data

Certificate Number: S1906191428
Report Date: 24 Jun 2019
Site Location: Peterborough Street

Quantitative Results (non IANZ)																		
Sample ID	Client Sample ID	Total 500mL Sub-Sample (g)	ACM (>10mm)*				AF / FA (2-10mm) (100% ACM)*				AF / FA (<2mm) (100% ACM)*				<2mm Excess (g)	Trace Asbestos Detected **	W/W% Asbestos as ACM	W/W% Asbestos as AF / FA
			>10mm Weight (g)	>10mm ACM (g)	ACM Form	Form %***	2-10mm Weight (g)	2-10mm AF/FA (g)	ACM Form	Form %***	<2mm Weight (g)	<2mm AF/FA (g)	ACM Form	Form %***				
S001	TP9 0.1	816.24	462.47	0	N/A	0	204.84	0	N/A	0	100.48	0	N/A	0	48.45	No	<0.001	<0.001
S002	TP9 0.25	835.10	431.43	0	N/A	0	212.02	0	N/A	0	100.66	0	N/A	0	90.99	No	<0.001	<0.001
S003	TP9 1.0	842.73	414.91	0	N/A	0	175.52	0	N/A	0	101.67	0	N/A	0	150.63	No	<0.001	<0.001
S004	TP9 1.4	927.95	426.94	0	N/A	0	222.24	0	N/A	0	100.68	0	N/A	0	178.09	No	<0.001	<0.001
S005	TP10 0.1	987.38	377.48	0	N/A	0	322.42	0	N/A	0	101.25	0	N/A	0	186.23	No	<0.001	<0.001
S006	TP10 0.25	854.30	400.76	0	N/A	0	225.92	0.1321	Fibre cement	10	101.87	0	N/A	0	125.75	No	<0.001	0.0015
S007	TP10 1.0	963.37	617.02	0	N/A	0	194.97	0	N/A	0	101.11	0	N/A	0	50.27	No	<0.001	<0.001
S008	TP11 0.1	925.26	443.08	0	N/A	0	221.62	0	N/A	0	101.67	0	N/A	0	158.89	No	<0.001	<0.001
S009	TP11 0.25	837.18	477.22	0	N/A	0	174.79	0	N/A	0	100.21	0	N/A	0	84.96	No	<0.001	<0.001
S010	TP11 1.0	802.80	511.24	0	N/A	0	153.16	0	N/A	0	100.16	0	N/A	0	38.24	No	<0.001	<0.001
S011	TP11 1.4	912.45	423.21	0	N/A	0	236.15	0	N/A	0	100.99	0	N/A	0	152.10	No	<0.001	<0.001
S012	TP12 0.1	874.63	564.40	0	N/A	0	164.10	0	N/A	0	100.48	0	N/A	0	45.65	No	<0.001	<0.001
S013	TP12 0.25	858.39	523.09	0.0005	Free fibres	100	133.82	0	N/A	0	101.27	0	N/A	0	100.21	No	<0.001	<0.001
S014	TP12 1.5	813.19	513.79	0	N/A	0	156.17	0	N/A	0	100.87	0	N/A	0	42.36	No	<0.001	<0.001

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Sample ID	Client Sample ID	Total 500mL Sub-Sample (g)	ACM (>10mm)*				AF / FA (2-10mm) (100% ACM)*				AF / FA (<2mm) (100% ACM)*				<2mm Excess (g)	Trace Asbestos Detected **	W/W% Asbestos as ACM	W/W% Asbestos as AF / FA
			>10mm Weight (g)	>10mm ACM (g)	ACM Form	Form %***	2-10mm Weight (g)	2-10mm AF/FA (g)	ACM Form	Form %***	<2mm Weight (g)	<2mm AF/FA (g)	ACM Form	Form %***				
S015	TP13 0.1	989.18	323.85	0	N/A	0	361.17	0	N/A	0	102.75	0	N/A	0	201.41	No	<0.001	<0.001
S016	TP13 0.25	708.28	276.83	0	N/A	0	218.77	0	N/A	0	101.42	0	N/A	0	111.26	No	<0.001	<0.001
S017	TP13 1.0	844.24	512.88	0	N/A	0	175.50	0	N/A	0	101.66	0	N/A	0	54.20	No	<0.001	<0.001
S018	TP14 0.1	780.68	313.45	0	N/A	0	223.59	0	N/A	0	100.82	0	N/A	0	142.82	No	<0.001	<0.001
S019	TP14 0.25	859.52	520.44	0	N/A	0	136.75	0	N/A	0	101.46	0	N/A	0	100.87	No	<0.001	<0.001
S020	TP14 1.0	903.40	606.03	0	N/A	0	185.06	0	N/A	0	100.19	0	N/A	0	12.12	No	<0.001	<0.001
S021	TP14 1.5	753.25	514.16	0	N/A	0	136.68	0	N/A	0	102.41	0	N/A	0	0	No	<0.001	<0.001

* These results are raw weighed data presented as per the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos Soil and may be under the reporting limit for guidelines AS4964 of 0.1g/kg
** Trace asbestos detected is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present.
*** Asbestos percentage is determined using EPA-600-R-93-116: Method for the Determination of Asbestos in Bulk Building Materials and are outside of IANZ accreditation #1097 and is therefore not endorsed by IANZ.

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Appendix F: Framework SMP

Tonkin+Taylor

Job No: 30315.100
13 March 2020

Ryman Healthcare Ltd
c/- Mitchell Partnerships Ltd
Via email to Richard.Turner@mitchelldaysh.co.nz

Attention: Richard Turner

Dear Richard

Framework Site Management Plan for Ground Contamination.
Ryman Village, Park Terrace, Christchurch

Introduction

Ryman Healthcare Ltd (Ryman) is applying for resource consents to develop a comprehensive care retirement village (Proposed Village) on Park Terrace, in Christchurch (the Site). Tonkin & Taylor Ltd (T+T) has prepared a Ground Contamination Investigation Report[1] to support the consent applications.

This report sets out the basis for, and framework of, ground contamination-related procedures and controls to be implemented during construction earthworks at the Site. It is intended that a Site Management Plan (SMP) for ground contamination will be prepared in accordance with CLMG#1[2] prior to the commencement of earthworks. The procedures and controls set out within the SMP will be based on this framework plan, but will supersede them.

Basis for ground contamination management procedures

The Site comprises to separate land areas separated by Salisbury Street:

- The 'Bishopspark' site, located at 100-104 Park Terrace, 20 Dorset Street and 19 Salisbury Street and covering approximately 12,000 m^2. The Bishopspark site formerly contained the Bishopspark Retirement Village, which is currently undergoing deconstruction. Prior to this the site was the residence of the Bishop of Christchurch; and
- The 'Peterborough Street' site located at 78-80 Park Terrace and covering approximately 5,000 m^2. The Peterborough Street site is currently vacant having been cleared of two multi-storey apartment buildings in 2012. Prior to the construction of those buildings, the Peterborough site contained residential properties which were used for teaching and commercial purposes.

[1] Tonkin + Taylor, July 2019. Ground Contamination Assessment of Effects, 78 and 100 Park Terrace and 20 Dorset Street, Christchurch.30315. March 2020.
[2] Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand. Ministry for the Environment. April 2001 (revised 2011).

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The construction of the Proposed Village will require the excavation of almost the entire area of the Bishopspark and Peterborough sites to a depth of approximately 4 metres below ground level (m bgl) for the construction of basements. It is not currently anticipated that any excavated material will be retained on Site for reuse.

The T+T Ground Contamination Investigation identified that:

- At the Bishopspark site:
  - Contamination including asbestos, metals, polyaromatic hydrocarbons (PAHs) is present in surface soils and fill;
  - Asbestos (as asbestos fines/fibrous asbestos (AF/FA) has been detected at up to 0.039 % w/w;
  - Detected concentrations of metals and PAHs in topsoil and fill are generally above background but below contaminant standard derived to protect workers during earthworks and future residents;
  - Asbestos was not detected in samples collected from natural soils, and metals and PAH concentrations were below background levels; and
  - The presence/extent of contamination beneath current building footprints is not known and will be assessed through further investigation that will be undertaken before earthworks commence.
- At the Peterborough Street site:
  - The entire site contains fill material derived from the demolition of apartment buildings that were present on the site between 2000 and 2012. The fill contains a substantial proportion of crushed concrete and has been placed to a depth of up 6 m in the centre of the site, but more generally to 3-4 m, having been used to fill a former basement;
  - Metals and PAHs have been detected above background but below contaminant standard derived to protect workers during earthworks and future residents;
  - Asbestos (as asbestos fines/fibrous asbestos (AF/FA) has been detected in a small number of samples at up to 0.0015 % w/w; and
  - Low levels of diesel-range hydrocarbons have been detected in soil and groundwater at the site, and are thought to be associated with an historic release of diesel at a property located approximately 50 m south of the site.
- The presence of asbestos in soil/fill at both the Bishopspark and Peterborough Street sites means that specific health and safety controls and soil management procedures will be required to protect construction workers and the general public from exposure to asbestos during earthworks, and so that asbestos-contaminated soil is appropriately disposed or managed on site. The concentrations of chemical contaminants (e.g. metals) detected to date do not require specific health and safety controls, though procedures are required so that they are appropriately disposed or managed on site.

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

- The NES Soil regulations require an SMP be provided to show how contamination will be managed during and possibly after earthworks. A framework for the SMP is provided within this letter. It is proposed that a full SMP is prepared (and provided to Christchurch City Council) as a condition of consent following confirmation of the earthworks methodology, and prior to soil disturbance works commencing at the Site; and
- As contaminants (asbestos) have been detected above applicable land use standards, remediation and/or management of contaminated soils will be required so that future Site

users are not exposed to unacceptable concentrations of contamination in soil. In practice, excavation for basements on the Bishopspark and Peterborough Street sites will result in the removal of the majority of contaminated material. It is possible that some fill may be left beyond the extent of excavation within the Peterborough Street site.

The following provides a summary of the primary ground contamination controls to be put in place during the works, including asbestos and contingency procedures. These are based on industry good practice including CLMG#1 and New Zealand Asbestos in Soils Guidelines[3].

Pre-works testing

There is uncertainty regarding the extent of contamination at the Bishopspark site as investigations completed to date were unable to collect samples from beneath existing building footprints. Pre-works testing for a range of potential contaminants (including but not limited to asbestos in soils) will be completed in accordance with the CLMG No. 5[4] and New Zealand Asbestos in Soil Guidelines. The testing will be limited to the footprints of existing buildings and will be undertaken once building deconstruction at the Bishopspark site is complete.

Asbestos controls

Asbestos-specific health and safety controls will be implemented to protect site workers and the general public during earthworks to remove asbestos contaminated material from the Site. The controls implemented shall comply with the requirements of the Asbestos Regulations[5] and New Zealand Asbestos in Soils Guidelines. Based on the concentrations of asbestos detected during the investigations completed at the Site to date, the asbestos controls to be implemented are summarised below (which are additional to general earthworks procedures).

[3] New Zealand Guidelines for Assessing and Managing Asbestos in Soil – BRANZ – November 2017.
[4] Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils. Ministry for the Environment. February 2004 (revised 2011).
[5] Health and Safety at Work (Asbestos) Regulations 2016.

Site	Bishopspark	Peterborough Street
Asbestos in soils conditions	Generally less than 0.001% w/w, but maximum detected concentration of 0.039% w/w.	Generally not detected, but maximum detected concentration of 0.0015% w/w.
Level of control	Class B.	Asbestos related works.
Controls	• Notification to WorkSafe; • Work completed in accordance with an Asbestos Removal and Control Plan; • Air monitoring for duration of works; • Segregation of and restricted access to the *Class B Works* from other Site activities and use of signage to indicate that *Class B Works* are being undertaken; • Personal protective equipment (PPE) will need to include disposable coveralls (rated type 5, category 3), nitrile gloves, steel toe capped gumboots or safety footwear with disposable overshoes and a half-face P3 respirator; • Spoil for disposal will need to be wrapped with 200 µm heavy-gauge polythene and trucks covered; • Visual assessment of vehicle decontamination by independent Asbestos Assessor; and • Clearance inspection by Competent Person.	• Segregation of and restricted access to the *Asbestos Related Works* from other Site activities and use of signage to indicate that *Asbestos Related Works* are being undertaken; • Air monitoring for defined, representative period at commencement of works as a minimum; • PPE will need to include disposable coveralls (rated type 5, category 3), nitrile gloves, steel toe capped gumboots or safety footwear with disposable overshoes and a P2 dust mask; • Truck lining/wrapping dependent on landfill; and • Visual assessment of vehicle decontamination by Competent Person.
	• Basic disposable decontamination tent and foot wash; and • Water and/or asbestos-encapsulating polymer emulsion product will need to be applied for dust control before starting work and during as required;	

The proposed controls for Bishopspark will be reviewed in the light of the pre-works testing results.

Asbestos-specific health and safety controls and triggers for the downgrading of controls will be agreed with WorkSafe prior to the commencement of earthworks.

General earthworks procedures

Management of soil contamination related health effects

The potential for the exposure of workers and the public to contaminants in soil will be managed principally by controlling dust emissions, avoiding direct contact with soils and ensuring good personal hygiene and decontamination practices during the works.

Dust controls

The control of dust emissions is important for any earthworks project, though particularly where contaminants are present which could become airborne (for example asbestos). Dust controls will include maintaining damp conditions using water sprays in excavation areas, minimising the size and duration of stockpiles, covering or stabilising stockpiles and regular visual monitoring. Dust controls shall comply with the applicable Council guidelines, regulations and other applicable legislation.

Water discharges

Water management at the Site during earthworks and construction comprises two distinct phases:

- The discharge of stormwater to ground until excavation reaches the water table (approximately 1.5 m bgl); and
- The removal of accumulated stormwater and groundwater from excavations through dewatering once excavations extend below the water table.

It is proposed that dewatering discharge will be to the Christchurch City Council (CCC) reticulated stormwater network. Dewatering water will be treated prior to discharge to comply with discharge quality criteria and will include as a minimum settlement to remove suspended solids. Additional treatment (e.g. chemical flocculation) may be required to comply with the discharge quality criteria.

Dewatering (pump) tests are to be undertaken to confirm dewatering rates. Samples of groundwater will be collected during these tests to assess what treatment may be necessary to comply with the discharge quality criteria. Detailed treatment procedures (including a chemical treatment plan, if necessary) will be included within the SMP. Discharge monitoring and testing requirements and procedures will also be documented within the SMP.

Low concentrations of petroleum hydrocarbons have been detected in groundwater at the Peterborough Street site. Monitoring for signs of separate phase hydrocarbons in dewatering discharges from the Peterborough Street site, along with triggers for the implementation of hydrocarbon-specific treatment will be included in the SMP.

Sediment and erosion controls:

Erosion and sediment control shall be managed in accordance with Environment Canterbury's guidelines and other applicable legislation, and controls would be expected to include:

- Avoiding work in heavy rain;
- Avoiding stockpiles where possible, however where they are required they shall be covered, stabilised other otherwise kept damp if left overnight. Stockpiles will not be placed in an area where runoff cannot be controlled;
- Contractor to ensure that sediment is not tracked on and off the site by vehicle movements;
- The installation of silt fences and runoff diversion bunds where appropriate to capture sediment in surface water runoff;
- Cleaning of entry/exit points to remove sediment and prevent tracking onto roads; and
- Regular checking and maintenance of erosion and sediment controls to maintain good working condition.

Spoil management

The stockpiling of spoil shall be minimised with the preference to load spoil directly onto trucks. Stockpiling of contaminated material may be necessary for these works. Stockpiled material shall be covered to minimise dust generation.

Soil reuse and disposal

All soil/fill removed from the Site shall be disposed at an appropriately licensed facility.

Authority to dispose of material off Site will be obtained from the receiving facility prior to the works commencing. The details of each load (e.g. truck registration number) shall be recorded on Site to allow reconciliation against the disposal site weighbridge documentation.

Unexpected contamination and contingency procedures

Contingency measures will be prepared for implementation in the event of the unexpected discovery of contamination, or spills of potential contaminants.

The procedures will include:

- Indications of contamination;
- First response procedures;
- Notification procedures;
- Complaints procedures; and
- Actions following exposure to contaminated material.

Monitoring procedures

Monitoring will be undertaken to confirm that the controls being implemented are effective. Monitoring will include:

- Air monitoring for airborne asbestos fibres;
- Visual dust monitoring;
- Monitoring of dewatering discharges; and
- Monitoring of erosion and sediment controls.

Validation reporting:

A site validation report (SVR) will be prepared on completion of works. This will outline the works undertaken, any variation to the finalised SMP, and document soils removed from Site. The SVR will also specify requirements for ongoing monitoring and management (and associated consents), if required.

Applicability

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

We understand and agree that our client will submit this report in support of an application for resource consent and that Canterbury Regional Council and Christchurch City Council as the consenting authority will use this report for the purpose of assessing that application.

Recommendations and opinions contained in this report are based on our visual inspection and sampling of material within the site. The nature and continuity of the subsoil away from the test and sample locations is inferred and it must be appreciated that actual conditions may vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared and certified by a suitably qualified and experienced practitioner as prescribed under the NES Soil Users Guide (April 2012):

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Paul Walker

Technical Director – Contaminated Land

Authorised for Tonkin & Taylor Ltd by:

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Pierre Malan

Project Director

13-Mar-20
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