



22 March 2023

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Dear Allan

16A WICKHAM STREET, HAMILTON - PRELIMINARY AND DETAILED SITE INVESTIGATION

1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by Stride Property Limited ('Stride') via RCP Limited ('RCP') to undertake a combined Preliminary and Detailed Site Investigation (PSI/DSI) at an urban commercial property located at 16a Wickham Street, Frankton, Hamilton ('the site'; Figure 1). The PSI has been carried out to determine if any current or historic activities have occurred on the property that could potentially result in the presence of ground contamination; in particular, any potential uses or activities captured by the Hazardous Activities and Industries List (HAIL)¹. The DSI component has been carried out to determine if any of the current or historic activities that have been undertaken at the site have caused ground contamination, in particular any of the activities that have been found to have occurred on site that are listed as HAIL and as identified via the PSI. PDP understands that Stride are intending to redevelop a portion of the property for industrial purposes. This PSI/DSI forms part of the due diligence process. It should be noted that the PSI component of this report covers the whole of the 16a Wickham Street property, while the DSI component (at the request of Stride/RCP) only covers the western half of the property (defined as the 'investigation area'). The investigation area comprises two areas earmarked for redevelopment, the Watty Stage 1 development area and the Stage 2 development area.

This report summarises the actual and/or potential contaminated land issues identified, associated with the current and historical use(s) of the site/investigation area (based on available records) and has been prepared to satisfy the requirements of the local, regional and national contaminated land regulations:

- Section 19 from the Waipa District Plan (WDC, 2016).
- Chapter 5.3 from the Waikato Regional Plan (WRC, 2020).
- Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 ('the NESCS').

¹ The Hazardous Activities and Industries List (HAIL) is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal. The HAIL is intended to identify most situations in New Zealand where hazardous substances could cause, and in many cases have caused, land contamination.

This combined PSI/DSI has been overseen and reviewed by a Suitably Qualified and Experienced Practitioner (SQEP) with respect to contaminated land and has been undertaken in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No.1 – Reporting on Contaminated Sites in New Zealand* (MfE, 2021a), and the principles contained in *Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils* (MfE, 2021b). A certifying statement to this effect is provided in Appendix A. This letter report provides the findings of the investigation.

2.0 Objectives and Scope of Works

2.1 Objectives

The objectives of the investigation were to:

- ∴ Identify actual or potential contaminated land issues that could constitute as a HAIL activity or otherwise cause contamination of the ground from current and historical land-use within the site; and
- ∴ Determine if a risk to human health or environmental receptors may exist during (and post) potential redevelopment of the site based on the measured ground contamination (and if so, what actions may be required to mitigate this risk); and,
- ∴ Determine whether resource consent(s) may be required to facilitate the proposed site development in the context of the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (the NESCS) and/or Section 5.3 of the Waikato Regional Plan subject to the above findings.

2.2 Scope of Works

The scope of works undertaken by PDP, as agreed with RCP and Stride, and to meet the project objectives, included:

- ∴ Completing a desktop review of a selection of publicly available information including: historical aerial images, Waipa District Council (WDC) property files, a Waikato Regional Council (WRC) site contamination enquiry for the site, and an information request to WDC requesting additional information in regard to potential contamination of the site;
- ∴ Using the above information to identify actual or potential contamination sources/HAIL land uses/areas, and their location/s, at the site;
- ∴ Conducting a site walkover to inspect the current site conditions, particularly with the objective of identifying any visual evidence of potentially contaminating activities/sources which may have occurred at the site².
- ∴ Development of a Conceptual Site Model (CSM) to indicate the potentially complete source-pathway-receptor linkages which may be present at the site;
- ∴ The development of a Sampling and Analysis Plan (SAP) for the investigation area based upon the identified linkages to target areas of potential contamination;
- ∴ A site visit (of the investigation area) to carry out the soil sampling investigation as outlined in the SAP; and,

² Buildings containing asbestos products known to be in a deteriorated condition is a HAIL activity and would be reported on if identified. The scope of work did not include a building survey for ACM as defined by the *Health and Safety at Work (Asbestos) Regulations 2016*.

- ∴ Provision of this PSI/DSI letter report summarising the findings and discussing the requirements for consents for the proposed development in the context of contaminated land matters (if any) for the investigation area.

3.0 Site Description

3.1 Site Setting

The site is located at 16A Wickham Street, Frankton, Hamilton (refer to Figure 1). In the immediate surrounding area, the site is bordered by Hamilton Organic Green Waste Recycling Centre and a Waste Management Transfer Station to the north, and what appears to be a small quarry to the east and farmland to the east, south and west. The site is located within Waipa District Councils jurisdiction and based on WDC records reviewed is zoned for rural use. The legal description for the site is Lot 1 DP 396081 and Lot 1 DP 486522. The site is largely rectangular in shape and covers an area of approximately 4.2 hectares or 42,000 m².

The site topography is largely flat and the ground surface comprises a mixture of concrete, asphalt and gravel hardstand. With respect to the current use, the site consists of 15 separate yards, which are utilised as either storage facilities and/or as a primary location for various businesses. Further detail of the current site use is provided in Section 4.3.

3.2 Geology and Hydrology and Hydrogeology

The geological map of the Waikato Area (Edbrooke, 2005) indicates that the site is underlain by Holocene swamp deposits consisting of soft, dark brown to black, organic-rich mud, muddy peat, and woody peat. Mitchell Geocon Geotechnical (MGG, 2023) undertook a geotechnical investigation for the investigation area in late 2022. Bore logs from the investigation show that the property is underlain by either basecourse gravels or mixed fill (silt/clay/sand/gravel) to depths ranging from 0.3 to 0.9 m below ground level (bgl). Beneath the fill was soft fibrous peat. Test pits from PDP's investigation revealed basecourse gravels or mixed fill to depths ranging from 0.6 to 1.0 m bgl beneath which was soft fibrous peat.

The nearest surface water body is an unnamed open drain located along the northern boundary of the western half of the site. This drain runs to the west where it joins another open drain running north, which in turn connects to another open drain (at the northwest corner of 16 Wickham Street) that runs west. This drain connects to an unnamed stream which eventually discharges into the Waikato River approximately 4 km to the north/northeast of the site. Groundwater was encountered at depths ranging from 1.1 to 4.5 m bgl during the Mitchell Geocon Geotechnical investigation. Test pits from PDP's investigation revealed perched groundwater at ~0.5 and 0.6 m bgl in Yard 1 (refer to Figure 1). Groundwater beneath the site is generally expected to flow in an east / northeast direction towards the Waikato River, although it could be locally influenced by the drain located along the northern boundary of the site.

3.3 Proposed Development

RCP has provided PDP with a concept plan outlining the planned development for the 'investigation area' (Wattyl Stage 1 development area and the Stage 2 development area), including the locations of proposed buildings and operating areas. The concept plan and cut to fill plan from the latest Stiffe Hooker Engineering Infrastructure Report are both provided in Appendix B.

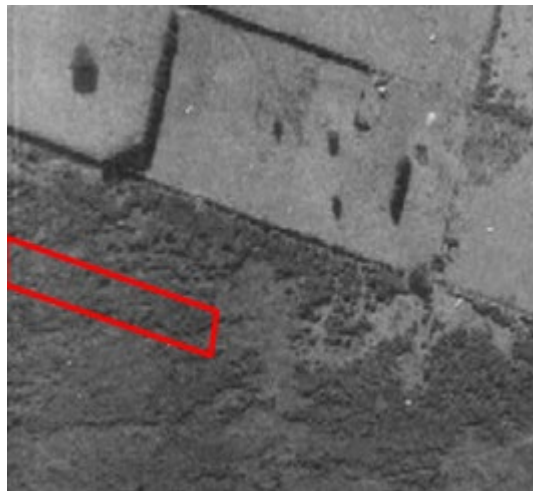
In summary, the development will include the construction of several large warehouses with most of the property completed with sealed surfaces. The cut to fill plans indicate the development will require a proposed cut volume of 2,230 m³ and a fill volume of approximately 1,130 m³.

4.0 Background Information

4.1 Aerial Photographs

Publicly available historical aerial photographs were obtained and reviewed in order to identify any land features or activities on the site that could indicate potential HAIL activity/use. Aerial photographs dating from 1943 to 1995 are available via the Retrolens website (<http://retrolens.nz/> accessed March 2023). These are summarised below in Table 1 with the site approximately outlined in red. Historical images from 2008 to 2019 were sourced from Google Earth Pro (accessed March 2023).

Table 1: Historical Aerial Review



1943 Aerial

The 1943 aerial is the oldest photograph obtained for the site. The site (approximately outlined in red) is towards the northern edge of a large area of bush/scrub. There is no evidence of buildings on the site. The site is bordered by pastureland (beyond the bush/scrub) to the north / northeast and by bush/scrub to the south.

Table 1: Historical Aerial Review



1953 Aerial

The site is as described previously. There appears to be development occurring to the north of the site with dwellings and associated roadways now present.



1971 Aerial

The site has been cleared of bush/scrub and now appears to be pastureland. The development to the north has grown with further buildings and roadways evident. The immediate surrounding area appears to be pastureland.

Table 1: Historical Aerial Review



1979 Aerial

The site appears to have been divided up into sections for pastoral purposes. Development to the north has progressed further with more buildings and roadways now present.



1990 Aerial

The site appears to still be pastureland. Development to the north has progressed further and appears to be largely commercial/industrial. A racecourse appears to have been developed to the west of the site. A new roadway / farm track is present to the west and south of the site. An area of disturbed land is present to the east of the site.

Table 1: Historical Aerial Review



1995 Aerial

The site and surrounds are largely as described previously. To the north of the eastern half of the site (current location of Hamilton Organic Green Waste Recycling Centre), some disturbed land and new buildings are present.



2008 Aerial

The central part of the site has started being developed with two buildings now present. The remainder of the site remains pastureland.

The yard at 16 Wickham Street to the north of the site has now been developed and appears to be used for storage and industrial purposes. The disturbed ground adjacent to the northeast border of the site noted in the 1995 aerial is still present and the property it is located on has been developed further. Pastureland is still present to the west, east and south of the site.

Table 1: Historical Aerial Review



2012 Aerial

The western half of the site has been developed and appears to consist of numerous yards largely used for storage. A number of small buildings are present. The eastern half of the site remains pastureland. The surrounding land use is as described previously.



2017 Aerial

A small portion of the eastern half of the site has started to be developed with what appears to be disturbed ground from earthworks present. The remainder of the site and surrounds are as described previously.

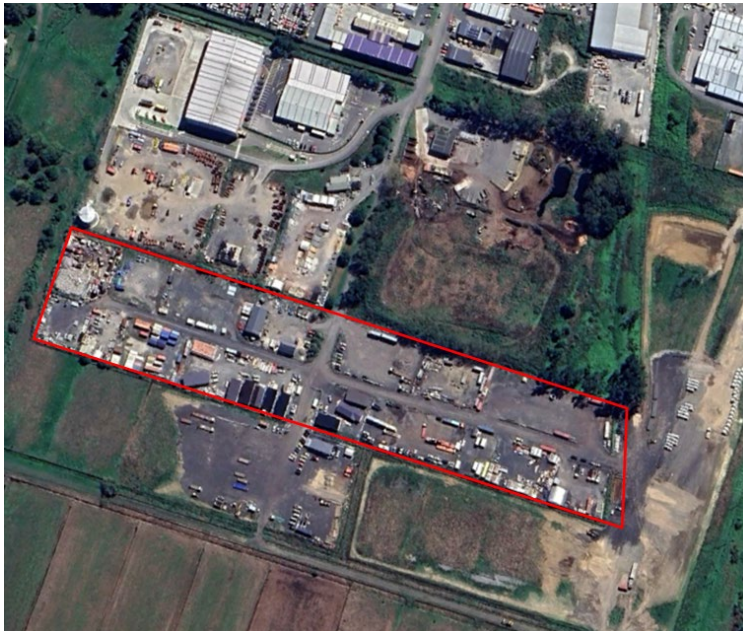
Table 1: Historical Aerial Review



2020 Aerial

The remainder of the site has been developed. It appears to be separated into numerous smaller yards which are largely being used for storage of containers and vehicles. A number of small buildings are present.

It appears that further development has begun adjacent to the central southern boundary of the site. The remainder of the surrounding land use is as described previously.



2022 Aerial

The site is largely as described previously.

Additional development has occurred to the south of the site. Further areas of disturbed ground are also now present immediately to the east of the site. Redevelopment of 16 Wickham Street (adjacent to northwest boundary of the site) to the new Waste Management transfer station has also occurred with a new large building now present in the north of that property.

4.2 Waikato Regional and Waipa District Council Information

The Property File and a Site Contamination Enquiry were sourced from Waipa District and Waikato Regional Councils (WRC and WDC) respectively for this investigation. A summary review of these files with respect to potential contamination matters is presented below.

4.2.1 Site Contamination Enquiry

A Site Contamination Enquiry (SCE) for the site was sourced from WRC. This enquiry was limited to the site itself and did not include the surrounding properties.

The SCE confirmed that part of the investigation area appears on the Land Use Information Register with a classification of 'Verified HAIL – No Sampling' for HAIL Activity 'A18 – Wood treatment or preservation or bulk storage of treated timber' associated with Kiwi Timber Supplies while the eastern half of the site (outside of the DSI investigation area) is classified as 'Verified HAIL – No Sampling' for HAIL Activity 'F8 – Transport depot or yards' associated with Auto Logistics/PTS Logistics Hamilton Depot.

Email correspondence with WDC also confirmed verified HAIL Activity 'A18 – Wood treatment or preservation or bulk storage of treated timber' for part of the investigation area and HAIL activity 'F8 – Transport yards' for the eastern half of the site.

Both the site contamination enquiry and email correspondence had no mention of any related dangerous goods or pollution incidents regarding spills/contamination at the site. The Site Contamination Enquiry from Waikato Regional Council and email correspondence from Waipa District Council is provided in Appendix C.

4.2.2 Property File

The WDC property file for the site was reviewed and comprised the following:

- ∴ Approximately 140 building consents for the construction of transportable/relocatable dwellings/structures;
- ∴ A Project Information Memorandum (PIM) for the construction of an implement shed; and
- ∴ Two land use consents to establish Shaw Asphalters Ltd and Kiwi Transportable Homes Ltd (LU007909).

The records suggest that activities classified as HAIL may have previously been undertaken on the site.

In 2007, a land use consent (LU/0046/07) was issued by WDC to Shaw Asphalters Ltd for the construction and operation of a site office and overnight storage of vehicles and asphalt material at 160 Higgins Road (now 16A Wickham Street). While the volume of stored asphalt is not known, this activity may potentially be subject to HAIL Category E2 'Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)'.

In 2009, a land use consent application (land use consent LU/0079/09) was submitted by Kiwi Transportable Homes Ltd to establish a transportable house depot and timber sales yard (potential HAIL Category A18 'Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside'.

Additionally, an annotated WDC plan included a land use consent LU007909 (as well as identified on the WDC online Environment map³) which indicated that the neighbouring property at 18 Wickham Street (Lot 1 DPS 59491) was formerly utilised as a Hamilton City landfill site. The period in which the landfill was active is not known at this time. Email correspondence with WDC confirmed that 18 Wickham Street is Hamilton City Councils green waste facility, which they do not have listed as a HAIL site. No further information was provided.

No other items relating to potential or known contamination issues were found. Relevant property files can be provided electronically on request.

4.3 Site Walkover and Interviews

A site walkover was conducted by a PDP representative on 2 December 2022. It should be noted that one yard located at the north-western corner of the site (identified as Yards 3 and 4) could not be accessed on this date and the walkover of that part of the property was undertaken in conjunction with site sampling on 21 February 2023. The walkover identified that fifteen separate yards (comprising of numerous businesses) use the site for storage purposes (refer to Figure 1 for location of yards within the site):

- ✧ Yard 1: Shaw's Asphalt (main premises)
- ✧ Yard 2: Cambridge Construction
- ✧ Yards 3 and 4: Pro Demolition
- ✧ Yard 5: Humes NZ
- ✧ Yard 6: JK Concrete
- ✧ Yard 7: Container Hire
- ✧ Yards 8 and 9: Kiwi Transportable Homes (main premises)
- ✧ Yard 10: PTS Logistics
- ✧ Yard 11: Portable Building Hire
- ✧ Yard 12: Livingstone Builders
- ✧ Yard 13: Yrear Contracting Limited
- ✧ Yard 14: Castle Portable Homes
- ✧ Yard 15: Strait NZ Logistics

Table 2 below notes features of interest and are illustrated (as noted below) on Figure 1. Where applicable, correspondence with site tenants is also shown. Site Photographs are provided in Appendix D.

³ WDC Environment map – Potential HAIL Sites <https://enterprise.mapimage.net/intramaps22A/?configId=6aa41407-1db8-44e1-8487-0b9a08965283&project=affd0934-6c16-44e6-90d4-b245ea9bdd6c&module=38bcad88-ae74-47bf-85bd-e9099c002b7f>

Table 2: 16A Wickham Street: Site Walkover and Correspondence with Site Tenants

Feature of Interest	Location and Photograph Log Reference	Description	Correspondence with Site Tenant
1	Yard 13 (Yrear Contracting Limited) <i>Photographs 1 and 2</i>	Empty IBC's, 20 L plastic containers (part filled with unknown black liquid (possible bitumen emulsion)) and empty 200 L steel drum stored on asphalt. Staining on asphalt next to locked container immediately adjacent to above mentioned container/drum storage.	No yard employee available for interview.
2	Yard 12 (Livingstone Builders) <i>Photographs 3 and 4</i>	Minor fuel, oil and chemical storage and general staining of ground.	Correspondence with an employee on site stated that Yard 13 is a storage yard for Livingstone Builders. The yard is used to store general construction material which is largely recycled quickly between jobs. The employee was not aware of any additional storage of fuels/chemicals or any other potentially contaminating activities within the yard.
3	Yard 8 (Kiwi Transportable Homes) <i>Photograph 5</i>	Storage of potentially treated timber.	Correspondence with a site employee stated that the yard is the main premises for Kiwi Transportable Homes where they construct portable houses on-site. Small amounts of treated timber are stored on site but only for short periods of time before they are used in the construction of the portable houses. The employee stated there was no bulk storage of any fuels/chemicals and was not aware of any other potentially contaminating activities within the yard.
4	Yard 7 (Container Hire) <i>Photograph 6</i>	Staining (approximately 2 m ²) on ground surface adjacent to an old Bitelli asphalt paver.	NA
5	Yard 7 (Container Hire) <i>Photograph 7</i>	Broken fibre cement sheets (approximately 50 m ² ; possibly asbestos containing material (ACM) on ground surface).	NA

Table 2: 16A Wickham Street: Site Walkover and Correspondence with Site Tenants

Feature of Interest	Location and Photograph Log Reference	Description	Correspondence with Site Tenant
6	Yard 6 (JK Concrete) <i>Photograph 8</i>	Rubbish / burn pile (approximately 9 m ²) containing timber, concrete, metal cans, bottles, spade head, pipes, cardboard and plastic sheets.	NA
7	Yard 6 (JK Concrete) <i>Photograph 9</i>	Stockpile (approximately 5 m ³) containing soil, gravel, concrete, timber (some burnt), plastic, cardboard, paint tin lid, food cans and glass bottles.	NA
8	Yard 6 (JK Concrete) <i>Photographs 10 to 12</i>	One sealed near empty IBC containing unknown black residue (possibly bitumen emulsion). Various sealed small plastic containers (mostly empty) containing mostly unknown contents (one container contained multi-purpose biodegradable cleaning gel). One sealed, near empty 200 L steel drum of hydraulic oil.	NA
9	Yard 4 (Pro Demolition) <i>Photograph 13</i>	Very large pile of timber covering approximately 1/3 of the yard.	Correspondence with a site employee stated that the yard was used as storage for Pro Demolition. The pile of timber is untreated and from when they used to mulch timber for biofuel production (this activity has now ceased – date was not known by the employee). Staining on the ground surface is likely from water blasting the excavators that they store on-site. The employee stated there was no bulk storage of any fuels/chemicals and was not aware of any other potentially contaminating activities within their yards.
10	Yard 4 (Pro Demolition) <i>Photograph 14</i>	Staining of ground surface (approximately 4 m ²) beneath excavator.	

Table 2: 16A Wickham Street: Site Walkover and Correspondence with Site Tenants

Feature of Interest	Location and Photograph Log Reference	Description	Correspondence with Site Tenant
11	Yard 2 (Cambridge Construction) <i>Photograph 15</i>	Small pile of uncovered timber	NA
12	Yard 1 (Shaw's Asphalt) <i>Photograph 16</i>	Unbunded diesel above-ground storage tank (AST) (~1,000 L in capacity) with minor staining observed on ground surface immediately beneath the dispenser which is attached to the AST.	Correspondence with a site employee stated that the yard is the main premises for Shaw Asphalters. The building along the western corner is used for storage purposes and is where minor maintenance on trucks and other machinery generally occurs. Other than the diesel AST, the employee stated there was no bulk storage of any fuels/chemicals and was not aware of any other potentially contaminating activities within their yard.
13	Yard 1 (Shaw's Asphalt) <i>Photograph 17</i>	Dangerous goods storage container on asphalt with no staining of surrounding ground surface noted.	
14	Yard 1 (Shaw's Asphalt) <i>Photographs 18 and 19</i>	Storage of seven sealed 200 L steel drums (half full to empty) containing kerosene and engine oil. Staining of the ground (approximately 3 m ²) observed in this area.	
15	Yard 1 (Shaw's Asphalt) <i>Photographs 20 to 23</i>	Open fronted building with two separate compartments used for vehicle, machinery and other (i.e., sealed, empty 20 L containers of engine/lube oil, tyres, carpet etc.) storage and as a 'workshop'. Some storage of 200 L steel drums containing kerosene and hydraulic fluid noted a long with numerous, minor (approximately 1 m ²) stains on ground surface.	
16	Yard 1 (Shaw's Asphalt) <i>Photograph 24</i>	Stockpile (approximately 25 m ³) of gravel, sand, concrete and bitumen.	

5.0 Information Summary

The information gathered during the PSI component of this investigation regarding the current and historical land-use at the site relating to potential ground contamination, particularly in relation to HAIL land-uses, with features of interest shown on Figure 1. The following information gathered is summarised below:

- ∴ Part of the western half of the site (Yard 8) appears on WRCs Land Use Information Register with a classification of 'Verified HAIL – No Sampling' for HAIL Activity '*A18 – Wood treatment or preservation or bulk storage of treated timber*' associated with Kiwi Timber Supplies. In addition to this, storage of potentially treated timber was observed in Yards 2, 4 and 8 during the site walkover.
- ∴ The eastern half of the site is classified as 'Verified HAIL – No Sampling' for HAIL Activity '*F8 – Transport depot or yards*' associated with Auto Logistics/PTS Logistics Hamilton Depot.
- ∴ Fill of unknown origin (described as uncontrolled filling⁴) was identified at depths ranging from 0.3 to 0.9 m bgl across the site during a geotechnical investigation by Mitchell Geocon Geotechnical.
- ∴ A small (~1,000 L) diesel AST was observed in Yard 1. Additional storage of fuels, oils and chemicals were observed in Yards 1 and 6.
- ∴ Staining of the ground surface was noted in Yards 4 and 7, and within the 'workshop' / storage building in Yard 1.
- ∴ Stockpiles of unknown origin were observed in Yards 1 and 6.
- ∴ A rubbish / burn pile was observed in Yard 6.
- ∴ A pile of broken, possibly ACM fibre cement sheets was observed in Yard 7.

6.0 Conceptual Site Model

A risk to human health can only exist if there is a hazard (i.e., a source, for example contaminated soil, dust, or water from a contaminant source), a receptor (i.e., people) and an exposure pathway linking the hazard and the receptor. An absence of any one of these components means no risk can exist. A conceptual site model (CSM) is designed to identify the hazards, receptors, and possible links between these. The conceptual site model developed for the site is provided in Table 3.

⁴ Described as comprising '*basecourse, brown rock, pit sand and silts and clays*'.

Table 3: Conceptual Site Model for Soil at 16a Wickham Street

Source	Pathway	Receptor	Pathway Linkage
Unbunded storage of fuel, oil, bitumen emulsion and chemical containers	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (and appropriate controls are not put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (and appropriate controls are not put in place to minimise exposure).
	Inhalation of vapours	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (and appropriate controls are not put in place to minimise exposure).
	Infiltration to groundwater	Groundwater users	Potentially incomplete – if leaking of containers occurs, this pathway is possibly complete as the underlying material is composed of gravels and medium grained sands overlying the peat layer near a shallow groundwater table. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.
	Runoff to surface water	Surface water users	Potentially complete – if leaking of containers occurs, stormwater could runoff into the open drain located along the northern boundary of the site.
Storage of treated timber (potential contaminants could include heavy metals (particularly copper, chromium, arsenic, and boron)	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (and appropriate controls are not put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (and appropriate controls are not put in place to minimise exposure).
	Infiltration to groundwater	Groundwater	Potentially incomplete – subject to further testing. Complete if contaminated soils are confirmed as present as the underlying material is composed of gravels and medium grained sands overlying the peat layer near a shallow groundwater table. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.
	Runoff to surface water	Surface water	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present and stormwater could runoff into shallow open drains located on site.

Table 3: Conceptual Site Model for Soil at 16a Wickham Street

Source	Pathway	Receptor	Pathway Linkage
Burning refuse (rubbish/burn pile in Yard 6) (potential contaminants could include heavy metals and polycyclic aromatic hydrocarbons (PAHs))	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present around the rubbish/burn pile (unless appropriate precautions are put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present around the rubbish/burn pile (unless appropriate precautions are put in place to minimise exposure).
	Infiltration to groundwater	Groundwater	Potentially incomplete – subject to further testing. Complete if contaminated soils are confirmed as present around the rubbish/burn pile as the underlying material is composed of gravels and medium grained sands overlying the peat layer near a shallow groundwater table. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.
	Runoff to surface water	Surface water	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present and stormwater could runoff into shallow open drains located on site.
Stockpiles of Unknown Origin	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present within and underneath the stockpiles (unless appropriate precautions are put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present within and underneath the stockpiles (unless appropriate precautions are put in place to minimise exposure).
	Infiltration to groundwater	Groundwater	Potentially incomplete – subject to further testing. Complete if contaminated soils are confirmed as present around the rubbish/burn pile as the underlying material is composed of gravels and medium grained sands overlying the peat layer near a shallow groundwater table. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.

Table 3: Conceptual Site Model for Soil at 16a Wickham Street

Source	Pathway	Receptor	Pathway Linkage
	Runoff to surface water	Surface water	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present and stormwater could runoff into shallow open drains located on site.
Bulk storage of petroleum hydrocarbons (diesel AST).	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (unless appropriate precautions are put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present (unless appropriate precautions are put in place to minimise exposure).
	Inhalation of vapours	Site users	Potentially complete if significant spills related to filling occur. Otherwise, incomplete/minimal as source is located outdoors.
	Infiltration to groundwater	Groundwater	Potentially incomplete – subject to further testing. Complete if contaminated soils are confirmed as present as the underlying material is composed of gravels and medium grained sands overlying the peat layer near a shallow groundwater table. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.
	Runoff to surface water	Surface water	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present and stormwater could runoff into shallow open drains located on site.
Fill of unknown origin	Ingestion of soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present in the fill (and appropriate controls are not put in place to minimise exposure).
	Dermal contact with soil	Site users	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present in the fill (and appropriate controls are not put in place to minimise exposure).
	Infiltration to groundwater	Groundwater	Potentially incomplete – subject to further testing. Complete if contaminated soils are confirmed as present in the fill. However, given the underlying soils comprise of organic peats it is considered unlikely that shallow groundwater would be used for municipal purposes.
	Runoff to Surface Water	Surface Water	Potentially complete – subject to further testing. Complete if contaminated soils are confirmed as present in the fill.

Table 3: Conceptual Site Model for Soil at 16a Wickham Street

Source	Pathway	Receptor	Pathway Linkage
Possible ACM Cement Sheets	Inhalation of asbestos fibres	Site users	Potentially complete - subject to further testing (only complete if ACM/asbestos is confirmed as present/or at concentrations in soil which exceed guideline values, and accessible/disturbed).

7.0 Site Investigation Methodology

Site investigation works were undertaken by a PDP site operative on 21 and 22 February 2023, to assess the HAIL areas identified during the PSI. The works comprised the completion of an underground utility location, subsequent mark-out of the test pit / sample locations, and collection of soil samples as described below via combination of test pits and hand tools. The sample locations are shown in Figure 2. It should be noted that, at the request of RCP, the DSI component of this investigation only comprises the western half of the site (approximately 20,000 m²; contains both the Wattyl Stage 1 development and Stage 2 development areas facility) and will hereafter be referred to as the ‘investigation area’.

7.1 Sampling and Analysis Plan

A Sampling and Analysis Plan (SAP) has been developed for the investigation area based on the key project objectives, known site history, the preliminary CSM and observations made during the site visit(s). The features of interest, location of potentially impacted soils, sample numbers and frequency, contaminants of concern and sampling methodology are described below in Table 4. In summary the investigation was conducted using a targeted sampling methodology, as outlined in *Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils*⁵.

Table 4: 16A Wickham Street: Sampling and Analysis Plan

Source Item / Feature of Interest	Sampling Locations	Number of Samples	Contaminants of Concern	Sampling Methodology Within Sampling Area
Stockpiles (Features of Interest 7 and 16)	2 targeted locations beneath stockpiles. 2 composite samples from stockpile materials	4 (2 samples from stockpile materials and 2 from ground beneath stockpiles)	Heavy metals, PAHs, and total petroleum hydrocarbons (TPHs). Visual assessment for ACM.	Composite samples of stockpile material will be collected by hand. Samples from beneath stockpiles will be collected from ~0.1 – 0.2 m bgl and collected via excavator.
Potentially treated timber storage (Features of Interest 3, 9 and 11)	4 targeted locations	8	Heavy metals (particularly copper, chromium and arsenic) and boron.	Samples will be collected from ~0.1 m bgl and ~0.5 m bgl. Test pits will be excavated with an excavator.

⁵ It is noted that soil duplicate samples were not collected/analysed, owing to the inherent difficulty in obtaining representative duplicate soil samples.

Table 4: 16A Wickham Street: Sampling and Analysis Plan

Source Item / Feature of Interest	Sampling Locations	Number of Samples	Contaminants of Concern	Sampling Methodology Within Sampling Area
Diesel AST (Feature of Interest 12)	1 targeted location	3	TPH and PAH	Three samples (one at ~0.1 m bgl, one at ~0.5 to 1.0 m bgl and one at groundwater table (where encountered, assumed to be ~2 m bgl)) Test pit will be excavated via hand auger to groundwater table.
'Workshop' (Feature of Interest 15)	1 targeted location within stained area to represent 'worst case' scenario.	2	Heavy metals, TPH and PAH	Samples will be collected from ~0.1 m bgl and ~0.5 m bgl. Test pits will be excavated with an excavator.
Storage of kerosene and engine oil steel drums (Feature of Interest 14)	1 targeted location	2	Heavy metals, TPH, PAH and BTEX.	Samples will be collected from ~0.1 m bgl and ~0.5 m bgl. Test pits will be excavated with an excavator.
Bitumen Emulsion / other fuel/chemical storage / stained ground. (Features of Interest 4, 8, 10, 13)	4 targeted locations to represent 'worst case scenarios'	7	Heavy metals, TPH, PAH and/or BTEX	Samples will be collected from ~0.1 m below ground level (bgl) and/or ~0.5 m bgl. Test pits will be excavated with an excavator.
Burn Pile (Feature of Interest 6)	1 targeted location	2	Heavy metals and PAH	Samples will be collected from ~0.1 m below ground level (bgl) and ~0.5 m bgl. Test pits will be excavated with an excavator.
Possible ACM Cement Sheets (Feature of Interest 5)	1 targeted location plus collection of bulk building material	1	Semi-quantitative asbestos (if result of bulk building material confirms asbestos)	Building material will be collected directly by hand and double bagged in laboratory provided plastic bags. Soil sample will be collected from ~0.1 m bgl via hand directly adjacent to possible ACM cement sheets
Fill of unknown origin	Subsurface samples across	7	Heavy metals and PAH.	Samples will be collected from ~0.5 m bgl.

Table 4: 16A Wickham Street: Sampling and Analysis Plan

Source Item / Feature of Interest	Sampling Locations	Number of Samples	Contaminants of Concern	Sampling Methodology Within Sampling Area
	the investigation area			Test pits will be collected via excavator.

7.2 Site Observations

During the soil sampling from the hand auger holes, site soils were observed and logged by the site operative. The geology observed was surface/near surface hardfill which comprised a mixture of fine to coarse gravels, silt, sand, clay, concrete and road millings (chunks of asphalt). This layer was observed to extend to depths ranging from 0.6 to 1 m bgl across the investigation area. Soft, moist, fibrous peat was observed beneath this surface / near surface fill layer at 0.9 m bgl (TP05), 1 m bgl (TP08) and 0.6 m bgl (TP09). Perched groundwater was encountered at two locations at ~0.6 m bgl (TP08) and ~0.5 m bgl (TP09). The near surface fill at TP08 was observed to be engineered, compacted layers of gravel and coarse-grained sand overlying a geotextile cloth, which was installed over the peat. This engineered fill was not observed at any other sampling locations and was likely due to previous construction of the 'workshop' / storage building beneath which the sample was taken.

In general, no construction or demolition waste was observed within the surface / near surface fill layer, with the exception of asphalt, which was observed in all sampling locations apart from TP08 and TP09, and concrete, which was observed at locations TP01, TP03 and TP04. No evidence of possible ACM or municipal refuse was observed at any soil sampling locations. Bitumen emulsion was observed on the ground surface within Yard 6 (sample location TP03).

Site photographs are provided in Appendix D.

7.3 Quality Control

At each new sample location, a fresh pair of nitrile gloves were worn, and the sample collection equipment (if used) was decontaminated using a Decon 90 solution. Samples were immediately placed into the appropriate laboratory supplied plastic/glass jars and chilled within cool storage bins during the site works and subsequent transport to the analysing laboratory. At the completion of the site works, sample bins were sent directly to an IANZ accredited laboratory (RJ Hill Laboratories Limited) in Hamilton, under standard PDP chain-of-custody procedures.

8.0 Applicable Guidelines and Criteria

8.1 Human Health Assessment Criteria

Applicable human health assessment criteria for soils on this site are the soil contaminant standards (SCSs) from the 'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health' (MfE, 2011b), which is incorporated by reference into the NES-CS Regulations.

Where the NES-CS does not provide a SCS, alternative guideline values were selected for use in accordance with the MfE CLMG No. 2 (MfE, 2011a). On this basis, guideline values for nickel and zinc were obtained from the National Environmental Protection Council (NEPC) National Environmental Protection Measure, Schedule B(1) of the 'Guideline on Investigation Levels for Soils and Groundwater' (NEPC, 2013) (the 'NEPM'). The guidelines utilised to assess the risk to human health from petroleum hydrocarbons and PAHs (excluding benzo(a)pyrene toxic equivalent (BaP TEQ) which is covered under the *Methodology*), were the 'Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New

Zealand' (MfE, 2011c) (the 'Oil Industry Guidelines' (OIG)). Soil results have been compared to the Tier 1 soil assessment criteria for 'All Pathways'. The Tier 1 soil acceptance criteria via All Pathways reflect the most stringent criteria associated with the protection of human health via several exposure routes. Comparison of analytical results to these criteria reveals whether a more in-depth review of the potential exposure pathways is required at the site (or not). A "sand" soil type of <1 m bgl has been applied for comparison with the relevant criteria for the soil samples, as it is considered to best typify the nature of the soils encountered at the site.

For all of the SCSs, NEPM and OIG soil guideline values (SGVs), commercial / industrial (or equivalent) guideline values have been selected as the most appropriate for the proposed future land (refer Section 3.3) use at the subject site.

8.2 Environmental Assessment Criteria

Reference has been made to the Landcare research draft Eco-SGVs (Landcare, 2019) in order to assess any potential environmental impacts from soils at the site. Commercial/industrial with 60% land use protection was selected as the most appropriate for the current and proposed future land use at the subject site.

It is understood that the NES-CS supersedes any contaminated land rules with respect to the Waipa District Council rules (Refer to Section 19.1.2 in the Waipa District Plan).

8.3 Additional Assessment Criteria

Given the NES-CS utilises natural background concentrations of contaminants in soils, as well as the SCSs, to determine consenting categories (i.e. compliance with regulation 5(9)), results have also been compared to the background concentrations of inorganic elements in soils for the Waikato region (WRC, 2019) (<https://www.waikatoregion.govt.nz/services/regional-services/waste-hazardous-substances-and-contaminated-sites/contaminated-sites/natural-background-concentrations>, accessed March 2023).

In addition to these background concentrations, PDP were provided with an internal Waikato Regional Document '*Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria- Document # 10581789*' (Caldwell, 2018). The document calculated the 95 percentile Waikato surface soil background levels of trace elements for natural background, forestry, horticultural and arable, pastoral and urban land uses. Previous correspondence with Mr Caldwell suggested that the comparison of soil sample results to the 95-percentile urban Waikato surface soil background levels was appropriate for this investigation.

Specific soil environmental guidelines (such as the Canadian Environmental Quality Guidelines from the Canadian Council of Ministers of the Environment (CCME)) have not been adopted for selected contaminants of concern on the basis that most of the reported results are relatively low, only marginally above the published natural background concentrations for metals and the published urban background levels adopted by the WRC. Furthermore, with respect to hydrocarbons, the underlying aquifer is not considered to be sensitive with regards to use and there are no sensitive water bodies within 100 m of the on-site petroleum hydrocarbon storage locations. As outlined in Section 8.2, Eco SGVs have been used to provide a Tier 1 assessment of environmental risk.

9.0 Results and Comparison to Applicable Criteria

The results of the soil sampling, and comparison to applicable assessment criteria, are provided in Table 5 (attached). The laboratory reports and relevant chromatograms are provided in Appendix E. See Figure 2 for sample locations. A summary of the analytical results are as follows:

Heavy Metals

- ∴ One soil sample (SP02) collected from the stockpiled material in Yard 6, reported concentrations of arsenic above the relevant SCS human health criteria and the Landcare Research eco-SGVs. SP02 also exceeded the Landcare Research draft eco-SGVs for copper and zinc. It should be noted that the sample collected from the ground surface beneath the stockpile (SS04) reported concentrations of arsenic, copper and zinc below both the 95% upper limit for background range of trace elements in Waikato soils or the calculated 95 percentile background range of trace elements in Waikato soils for urban land use (hereafter referred to as 'Waikato background range').
- ∴ Eight soil samples (TP01_0.1 – nickel, TP02_0.1 – lead, nickel and zinc, TP03_0.1 – zinc, TP05_0.6 – cadmium, TP07_0.3 – chromium, SS02 – nickel, SP01 – chromium and SP02 – arsenic, cadmium, chromium, copper, nickel and zinc) contained concentrations of heavy metals above the Waikato background range. These samples are variably located across the investigation area and are largely made up of surface and stockpiled soils (with the exception of TP05_0.6 and TP07_0.3).
- ∴ All other soil samples analysed for heavy metals reported concentrations below the Waikato background range and the relevant SCS's / SGVs applied as human health screening criteria for commercial/industrial use.

PAH Analysis

- ∴ Twelve out of 21 soil samples (TP01_0.1, TP01_0.6, TP02_0.1, TP04_0.1, TP04_0.5, TP05_0.1, TP08_0.5, TP09_0.1, SS02, SS03, SP01 and SP02) analysed for PAH reported low but detectable concentrations of various PAH compounds (i.e., above background). These samples are variably located across the investigation area and are largely made up of surface and stockpiled soils (with the exception of TP01_0.6, TP04_0.5 and TP08_0.5).
- ∴ All other samples analysed for selected PAH compounds reported concentrations that were below the laboratory limit of reporting (LOR).
- ∴ The concentrations of all PAH compounds reported by the laboratory were all below the relevant human health criteria for commercial/industrial use.

TPH Analysis

- ∴ All soil samples analysed for TPH reported concentrations that were below the Tier 1 Petroleum Guidelines All Pathways criteria for a commercial/industrial land use.
- ∴ Two samples (TP02_0.1 (Yard 4) and SS02 (Yard 1)) reported TPH (C₁₅-C₃₆) concentrations above the Landcare Research eco-SGVs. The deeper sample at TP02 (TP02_0.5) did not report petroleum concentrations above the laboratory LOR for the any carbon chain length hydrocarbons. A deeper sample beneath SS02 was not able to be collected due to underground services in the immediate vicinity.
- ∴ Two surface soil samples (TP09_0.1 and SS02 – both in Yard 1) reported TPH (C₁₀-C₁₄) concentrations above the laboratory LOR. TPH (C₁₀-C₁₄) concentrations were below the laboratory LOR for the deeper sample at TP09 (TP09_0.7-0.9). A deeper sample beneath SS02 was not able to be collected due to underground services in the immediate vicinity.

- ✦ Eleven soil samples (TP01_0.1, TP01_0.6, TP02_0.1, TP03_0.1, TP08_0.5, TP09_0.1, TP09_0.7-0.9, SS02, SS03, SP01 and SP02) reported TPH (C₁₅-C₃₆) concentrations above the laboratory LOR. These samples are variably located across the investigation area and are largely made up of surface and stockpiled soils (with the exception of TP01_0.6, TP08_0.5 and TP09_0.7-0.9).
- ✦ No soil samples reported petroleum concentrations above the laboratory LOR for the C₇-C₉ carbon chain length hydrocarbons.

BTEX Analysis

- ✦ BTEX concentrations were all reported at concentrations below the laboratory LOR and hence the relevant human health criteria for the one sample analysed (SS02).

Asbestos

- ✦ Asbestos was not detected in the one building material sample that was analysed (fibre cement sheets in Yard 7).

10.0 Risk Assessment

10.1 Human Health Risk Assessment

Soil from the stockpile located in Yard 6 (SP02) exceeds the applicable SCS criteria for arsenic. The stockpiled soils could pose a risk to excavation workers and site users if they are not appropriately managed in the interim and during proposed site works (e.g., through the adoption of appropriate PPE, handling and disposal procedures).

All other soil samples reported results that complied with the relevant SCSs and SGVs and therefore are considered unlikely to pose a risk to human health in the context of the current or proposed future site use.

10.2 Environmental Risk Assessment

The contaminants of concern which were analysed within the investigation area generally reported various exceedances of the Waikato region background range for trace elements (heavy metals), and petroleum hydrocarbons were reported above the laboratory LOR. Three surface and stockpile soil samples (TP02_0.1 (Yard 4), SS02 (Yard 1) and SP02 (Yard 6)) variously reported concentrations of arsenic, copper, zinc and/or petroleum hydrocarbons above the Landcare Research eco-SGVs that could potentially present a risk to the environment via discharges. However, they are considered to be low risk with respect to the underlying groundwater and/or surface water for the following reasons:

- ✦ The distance to the nearest surface water feature (a drain) is approximately 35 m from the TP02 location, 45 m from SS02 and 100 m from SP02 (Yard 6 stockpile). These distances, and site surface (i.e., largely gravel hardstand) means that stormwater would likely soak into the ground surface before reaching this surface water body.
- ✦ Concentrations of the above-mentioned contaminants (arsenic, copper, zinc and petroleum hydrocarbons) from sample SS04 (collected from 0.15 m bgl directly underneath the stockpile (SP02)) and TP02_0.5 (deeper sample at TP02) were all well below the Waikato region background range and the Landcare Research eco-SGVs. This indicates that contaminants from the surface soils / stockpile are not readily leaching deeper into the ground/groundwater.
- ✦ A deeper sample beneath SS02 was not able to be collected due to underground services in the immediate vicinity. However, the nearest soil samples TP09 collected from surface soils and between 0.7-0.9 m depth (and located approximately 10 m to the northeast) did not report petroleum hydrocarbon concentrations above the eco-SGVs which indicates that the contaminants

in surface soils are likely to be limited in lateral and vertical extent and contaminant discharges to the environment are not readily occurring.

Overall, it is considered that the surface/stockpile soils at the site are unlikely to represent a significant contamination source capable of generating ongoing discharges within the site, or beyond the site boundary.

11.0 Conceptual Site Model Pathway Assessment

After a review of all the available information, and analysis of the sample results, a review of the CSM provided in Section 6.0 indicates that the pathways identified as potentially complete are not likely to be a risk to human health or the environment in relation to the proposed soil disturbance within the investigation area, subject to the adoption of some handling controls being in put in place. However, soils within the stockpile in Yard 6 exceed the SCS for arsenic and are considered to pose a risk to both current site users and excavation workers if not managed appropriately during any proposed soil disturbance / excavation as part of site redevelopment. An updated CSM is provided below in Table 6:

Table 6: Updated Conceptual Site Model

Source	Pathway	Receptor	Pathway Linkage
Soils in stockpile within Yard 6	Ingestion of soil	Site users / maintenance/ excavation workers	<p>Potentially complete for site users due to accessibility of Yard 6 stockpile soils if appropriate handling controls are not put in place (and they are inadvertently disturbed during day-to-day operations and appropriate controls are not in place to be protective of human health).</p> <p>Complete for Yard 6 stockpile soils for maintenance/excavation workers during proposed site works if appropriate handling controls are not put in place during the disturbance works.</p>
	Dermal contact with soil	Site users / maintenance/ excavation workers	<p>Potentially complete for site users due to accessibility of Yard 6 stockpile soils if appropriate handling controls are not put in place and personnel disturb the soils.</p> <p>Potentially complete for Yard 6 stockpile soils for maintenance/excavation workers during proposed site works if appropriate handling controls are not put in place during the disturbance works.</p>
	Infiltration to groundwater	Groundwater	Incomplete/minimal – due to underlying sample (SS04) containing concentrations of arsenic, chromium, copper and zinc below Waikato region background ranges and the relevant SCSs / SGVs.

Table 6: Updated Conceptual Site Model

Source	Pathway	Receptor	Pathway Linkage
	Runoff to surface water	Surface water	Incomplete/minimal – due to distance from nearest surface water body (~100 m).

12.0 Consenting Considerations

12.1 National Environmental Standards

The NESCS seeks to control activities on contaminated land so as to protect human health. The NESCS regulations apply to any “*piece of land*” on which an activity or industry described in the HAIL has been undertaken in the past (or is more likely than not to have been undertaken) or is currently present. As HAIL activities/uses were identified during the PSI component of this investigation and further confirmed to be present during the DSI component (via results that were reported above the SCSs /SGVs and given that there is the potential for soil disturbance (and removal) to take place when the site is developed), the NESCS regulations (8(3)) are considered to apply to the investigation area.

Based on the results reported, any soil disturbance works undertaken within the “*piece of land*” may fall within the permitted or controlled rules depending upon the scale of the redevelopment works.

Regulation 8 of the NESCS states that “*Disturbing the piece of land is a permitted activity while the following requirements are met:*

- a. *Controls to minimise the exposure of humans to mobilised contaminants must-*
 - i. *Be in place when the activity begins:*
 - ii. *Be effective while the activity is done:*
 - iii. *Be effective until the soil is reinstated to an erosion-resistant state:*
- b. *The soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:*
- c. *The volume of the disturbance of the soil of the piece of land must be no more than 25 m³ per 500 m²:*
- d. *Soil must not be taken away in the course of the activity, except that,-*
 - i. *For the purpose of laboratory analysis, any amount of soil may be taken away as samples:*
 - ii. *For all other purposes combined, a maximum of 5 m³ per 500 m² of soil may be taken away per year:*
- e. *Soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:*
- f. *The duration of the activity must be no longer than 2 months:*
- g. *The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.”*

With respect to this DSI, the “piece of land” is conservatively defined as the whole investigation area (~20,000 m²) owing to the presence of multiple discrete ‘features of interest’ and the underlying fill (origin unknown). Within the site investigation area, it is estimated that up to approximately 1,000 m³ of soil could be disturbed and up to 200 m³ of soil could be removed as a permitted activity under Regulation 8. As per the Stiffe Hooker cut to fill plan (Appendix B), it is estimated that ~2,230 m³ will be cut as part of the proposed site development works. Should this be the case or should any of the other permitted rules not be able to be met, then a Controlled Activity consent for soil disturbance under Regulation 9 of the NES-CS would be required.

Although, the stockpile soils located in Yard 6 (SP02) exceed the applicable SCS for arsenic (i.e., a concentration that could trigger the need for a Restricted Discretionary consent under the NES-CS). The stockpiled soils are not considered to represent the general in-situ soils within the investigation area (as proven by the reported arsenic concentrations elsewhere being below Waikato region background concentrations beneath the stockpile) and can be removed as a permitted activity (under Regulation 8 (3) of the NES-CS), provided the stockpile volume does not exceed the allowable soil disturbance/removal volumes under the NES-CS regulations and the other permitted activity rules can be adhered to. Therefore providing that the stockpile soils are appropriately managed (i.e. health and safety plan or similar, as outlined in Regulation 8(3)a) excavated and disposed of (to a facility consented to receive such material) before the controlled activity works occur, the exceedance of arsenic in the Yard 6 stockpile should not affect the NES-CS consent status of the investigation area.

12.2 Waikato Regional Council Contaminated Land Rules

Section 5.3 of the Waikato Regional Plan details the issues, policies, objectives and rules that relate to contaminated land discharges. Specifically, Section 5.3.4.6 outlines the permitted activity rules that apply to ‘Discharges from Remediation of Contaminated Land’:

- a. Any discharge to air arising from the activity shall comply with the conditions and standards and terms in Section 6.1.8 except where the matters addressed in Section 6.1.8 are already addressed by conditions on resource consents for the site.
- b. No contaminants from the remediation of the contaminated land shall be discharged into water or onto land unless discharged to a landfill authorised in Section 5.2.7.
- c. The Waikato Regional Council shall be provided with the following reports prepared in compliance with Contaminated Land Management Guideline No.1: Reporting on Contaminated Sites in New Zealand (Ministry for the Environment, Wellington, NZ, updated October 2003) prior to commencement of land remediation:
 - i. detailed site investigation report
 - ii. site remedial action plan
- d. After remediation is completed, copies of the following reports prepared in compliance with Contaminated Land Management Guideline No.1: Reporting on Contaminated Sites in New Zealand (Ministry for the Environment, Wellington, NZ, updated October 2003) must be provided to the Waikato Regional Council:
 - i. site validation report
 - ii. ongoing monitoring and management plan.
- e. Any updates of these reports shall be provided to the Waikato Regional Council if a change in investigation, remediation and monitoring strategy occurs.

Given the lack of a complete source to receptor pathway at the site in those areas tested, adverse effects to the environment are not anticipated based on the results received. As such the above rules are not considered to be applicable should small-scale earthworks be undertaken as a result of the redevelopment, which may involve the disturbance/removal of soils with detectable petroleum hydrocarbons and heavy metals above Waikato region background ranges, as this is not considered to represent “remediation”.

13.0 Conclusions and Recommendations

A Preliminary Site Investigation has been undertaken for the site and a subsequent Detailed Site Investigation has been undertaken for the investigation area (western half of the site) at 16A Wickham Street, Frankton, Hamilton to assess the potential for contamination to be present as a result of the current and historic activities occurring within the investigation area. In summary, the key points of the PSI component are noted below:

- ∴ Part of the western half of the site appears on the WRC Land Use Information Register with a classification of ‘Verified HAIL – No Sampling’ for HAIL Activity ‘A18 – Wood treatment or preservation or bulk storage of treated timber’ while the eastern half of the site is classified as ‘Verified HAIL – No Sampling’ for HAIL Activity ‘F8 – Transport depot or yards’. These HAIL classifications were further confirmed by WDC;
- ∴ Fill of unknown origin was identified at depths ranging from 0.3 to 0.9 m bgl across the site during a geotechnical investigation by Mitchell Geocon Geotechnical;
- ∴ An unbunded diesel AST (~1,000 L) was observed in Yard 1;
- ∴ Unbunded storage of old fuel, oil and chemical containers (sealed containers comprising of small quantities), as well as potentially treated timber were observed in various locations around the site. Minor staining on the ground surface was also observed with Yards 1, 4 and 7; and,
- ∴ A small stockpile was observed in Yard 1, while a small stockpile and a small rubbish/burn pile were observed in Yard 6.

The DSI component of the investigation targeted the above-mentioned features of interest for the western half of the site (i.e., the ‘investigation area’). The results of the DSI sampling confirmed:

- ∴ One soil sample (SP02) collected from within a stockpile in Yard 6 reported concentrations of arsenic above the relevant SCS human health criteria (commercial/industrial use);
- ∴ All remaining soil sample results comply with SCSs and other SGVs for commercial / industrial land-uses;
- ∴ Heavy metals exceeded Waikato region background ranges variously across the investigation area;
- ∴ Petroleum hydrocarbons (TPH and PAHs) were identified at concentrations greater than background (i.e., above the laboratory LOR) variously across the investigation area but below the adopted SCSs and SGVs;
- ∴ No ACM was observed during the test pitting investigation and the building material sample collected from Yard 7 came back negative for asbestos; and
- ∴ Soils at the investigation area were observed to comprise of basecourse gravels, underlain by mixed fill and organic peat soils. Perched groundwater was encountered at a depth of ~0.5 m bgl in two locations within Yard 1. No evidence of refuse, construction and/or demolition waste (other than concrete and asphalt), or ACM was encountered in the underlying fill/soils at any of the locations investigated.

In relation to the presence of soils above the relevant human health criteria for arsenic within the stockpile in Yard 6, it is considered that the stockpile soils (< 5 m³) can be removed as a permitted activity under the NESCS as the volumes are within the allowable removal/disturbance volumes. In the interim (prior to removal), due to the elevated concentration of arsenic, this stockpile should not be disturbed and ideally covered with an impermeable layer until disposal to an approved facility (consented to accept the material) can be arranged. As outlined in Regulation 8(3)a, appropriate controls will need to be put in place to minimise the potential exposure of humans to mobilised contaminants.

Due to the investigation area soils reporting contaminant concentrations above background soil concentrations for heavy metals and laboratory LOR with respect to hydrocarbons, it is likely a consent will be required under the NESCS should the permitted soil disturbance regulations not be able to be complied with for the proposed site development. If the permitted activity regulations cannot be complied with then a Controlled Activity consent would need to be sought under the NESCS regulations. It is not anticipated that the WRC Contaminated Land Rules for remediation are triggered for the site, on the basis that no adverse effects to the environment have been identified from the DSI.

A Contaminated Site Management Plan (CSMP) would likely be required under a Controlled Activity consent (as outlined in Regulation 9(2)b, to provide procedures and controls for disturbing/removing soils that contain contaminants above published background concentrations.

Overall, the contaminant concentrations detected within the investigation area are considered to be low or limited in extent such that the potential risk to human health or for discharges to environmental receptors to occur are considered to be low.

14.0 References

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15.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Stride Property Limited and others (not directly contracted by PDP for the work), including RCP Limited, Waikato Regional Council, Waipa District Council and Mitchell Geocon Geotechnical. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared based on: visual observations of the site vicinity, PID results from field headspace analysis, analysis of 27 soil samples and one building material sample from 17 locations. All soil samples were analysed by an analytical laboratory variously for heavy metals, PAH, TPH and individual BTEX compound concentrations and the building material sample was analysed for asbestos. The site conditions as described in this report have been interpreted from, and are subject to, this information and its limitations and accordingly PDP does not represent that its interpretation accurately represents the full site conditions.

This assessment is limited to collection and analysis of soil samples from sampling locations that have been selected based on underground and above ground infrastructure constraints, and the comparison of laboratory test results with environmental and health guidelines. Subsurface conditions, including contaminant concentrations, can vary in time and distance so that conditions found at any specific point of sampling might not be representative of subsurface conditions that could occur away from the specific point of sampling.

PDP has sampled and tested only for those chemicals that are described in this report. The presence or absence of other chemicals at the site is not considered in this report.

The information contained within this report applies to sampling soil and water undertaken on the dates stated in this report, or if none is stated, the date of this report. With time, the site conditions and environmental standards could change so that the reported assessment and conclusions are no longer valid. Accordingly, the report should not be used to refer to site conditions and environmental standards applying at a later date without first confirming the validity of the report's information at that time.

This report has been prepared by PDP on the specific instructions of Stride Property Limited for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

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Yours faithfully

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Technical Director – Contaminated Land



KEY :

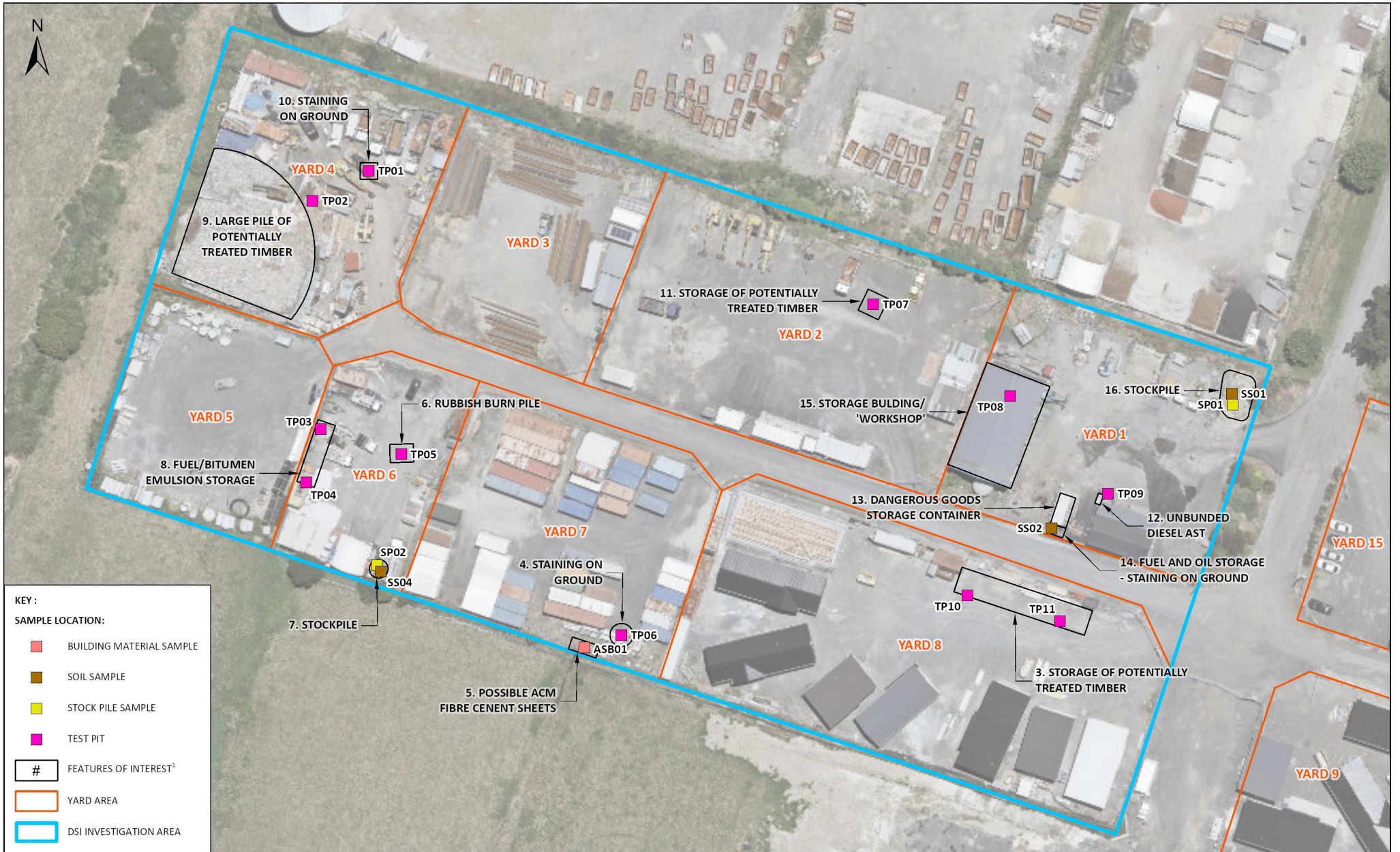
- # FEATURES OF INTEREST¹
- YARD AREA
- DSI INVESTIGATION AREA (SEE FIGURE 2 FOR DETAILS)

SOURCE:
 1. AERIAL IMAGERY (FLOWN 2020-2021) SOURCED FROM THE LINZ DATA SERVICE (HTTPS://BASEMAPS.LINZ.GOVT.NZ) AND LICENCED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE.
 2. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA.
 3. SITE FEATURES ARE INDICATIVE ONLY (MAY NOT BE SPATIALLY ACCURATE).

NOTE:
 1. REFER TO SECTION 4.3 IN REPORT

FIGURE 1: SITE LOCATION PLAN

SCALE: 1:2,000 (A4)
 0 50 100
 METRES



SOURCE:
 1. AERIAL IMAGERY (FLOWN 2020-2021) SOURCED FROM THE LINZ DATA SERVICE (HTTPS://BASEMAPS.LINZ.GOVT.NZ) AND LICENCED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE.
 2. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA.
 3. SITE FEATURES ARE INDICATIVE ONLY (MAY NOT BE SPATIALLY ACCURATE).

NOTE:
 1. REFER TO SECTION 4.3 IN REPORT

FIGURE 2: SAMPLE LOCATION PLAN

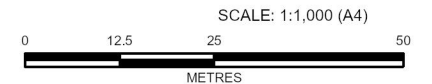


Table 5: Soil Sample Results - Commercial / Industrial Land Use - Heavy Metals, Polycyclic Aromatic Hydrocarbons and Total Petroleum Hydrocarbons¹.

Soil Sample ID	TP01_0.1	TP01_0.6	TP02_0.1	TP02_0.5	TP03_0.1	TP03_0.5	TP04_0.1	TP04_0.5	TP05_0.1	Background Range of Trace Elements in Waikato Soils		NES SCS & SGV ⁵	Landcare Eco-SGVs ⁸
	Lab Identification Number	3180542.1	3180542.2	3180542.3	3180542.4	3180542.5	3180542.6	3180542.7	3180542.8	3180542.9	95th Percentile Urban ²		
Sample Date	22/02/2023												
Sample Depth (mbgl)	0.1	0.6	0.1	0.5	0.1	0.5	0.1	0.5	0.1				
Soil Type	Sand and gravel	Silt/Sand	Sand and gravel	Clay and Gravel	Gravel	Sand	Gravel	Sand	Gravel			Commercial/industrial	Commercial/industrial
Heavy Metals													
Arsenic	7	7	27	4	22	5	10	3	8	27.21	6.8	70	150
Cadmium	0.10	0.19	0.17	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.6	0.22	1,300	33
Chromium (total)	18	7	29	14	24	10	12	5	11	17.18	30	6,300 ⁶	650
Copper	21	9	43	47	30	38	23	6	13	49	25	>10,000	420
Lead	32	23	193	23	20	16.6	21	11	22	150	20	3,300	2,500
Nickel	20	2	13	7	10	5	9	3	7	11.9	7.6	6,000 ⁷	-
Zinc	111	49	230	47	210	50	160	29	56	162.7	53	400,000 ⁷	480
Polycyclic Aromatic Hydrocarbons													
												<1 m Sand	<1 m Peat
Pyrene	0.60	0.067	0.50	< 0.015	< 0.012	< 0.013	0.025	0.118	0.034	-	-	NA ^{10,11}	NA ^{10,11}
Naphthalene	< 0.06	< 0.07	< 0.06	< 0.08	< 0.06	< 0.07	< 0.06	< 0.07	< 0.06	-	-	(190) ^{10,12v,13}	(8,000) ^{10,12v,13}
Benzo[a]pyrene Toxic Equivalence (NES) ⁹	0.59	0.072	0.49	ND	ND	ND	ND	0.152	0.059	-	-	(11) ^{10,12d,13}	(11) ^{10,12d,13}
Total Petroleum Hydrocarbons													
												<1 m Sand	<1 m Peat
C7 - C9	< 20	< 20	< 20	< 30	< 20	< 20	< 20	< 20	< 20	-	-	120 ^{10,12m}	(6,700) ^{10,12m,13}
C10 - C14	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	-	(1,500) ^{10,12v,13}	NA ^{10,11}
C15 - C36	950	45	2,500	< 40	86	< 40	< 40	< 40	< 40	-	-	NA ^{10,11}	NA ^{10,11}
Total Hydrocarbons (C7 - C36)	950	< 80	2,500	< 90	92	< 80	< 80	< 80	< 80	-	-	-	-

85	Concentration exceeds the higher of the 95% upper limit or the 95th percentile urban background range for soils in the Waikato region
75	Concentration exceeds the MWLR 2019 Landcare Research Eco-SGVs
ND	All individual PAH compounds making up the BAPeq are below the laboratory limit of detection
-	No guideline value available / parameter not tested

Notes:

- All results in mg/kg.
- Criteria from Appendices (Waikato Surface Soils Background Data), Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789.
- Criteria from Waikato Regional Council 'Natural background concentrations in the Waikato region' - 95% upper limit background concentrations for selected elements in soil of the Waikato region - <https://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations>, Accessed 20/03/2023.
- Criteria from Table 5, Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789.
- Criteria from Table B2 and B3, Appendix B of the 'Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations' (NESCS, 2011) - Commercial/industrial outdoor worker (unpaved).
- Guideline value (from NESCS, 2011) is for Chromium VI.
- Criteria from 'Schedule B(1) Guideline on Investigation Levels for Soils and Groundwater National Environment Protection Measure' (NEPM, 2013). Table 1A(1) Health investigation levels for soil contaminants (mg/kg) - Commercial/industrial use.
- Criteria from Tables 53-55 of Manaaki Whenua Landcare Research 'UPDATED Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document' (MWLR, 2019) - Commercial/industrial (80%). Values for typical, aged soil have been conservatively adopted for copper and zinc.
- BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.
- Values from 'Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand' (MFE, 2011) for sand and peat at < 1m depth, for all pathways. Values for commercial/industrial land use.
- 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.
- The following notes indicate the limiting pathway for each criterion : v - volatilisation, m - Maintenance/excavation, x - PAH surrogate, d - dermal.
- Brackets denote value exceeds threshold likely to correspond to formation of residual separate phase hydrocarbons.
- Criteria for coarse grained soils (those which contain greater than 50% by mass of particles great than 75 µm mean diameter) have been adopted.

Table 5 Continued: Soil Sample Results - Commercial / Industrial Land Use - Heavy Metals, Polycyclic Aromatic Hydrocarbons and Total Petroleum Hydrocarbons¹

Soil Sample ID	TP05_0.6	TP06_0.1	TP06_0.5	TP07_0.1	TP07_0.3	TP08_0.1	TP08_0.5	TP09_0.1	TP09_0.7-0.9	Background Range of Trace Elements in Waikato Soils		NES SCS & SGV ⁵	Landcare Eco-SGVs ⁸
Lab Identification Number	3180542.10	3180542.11	3180542.12	3180542.13	3180542.14	3180542.15	3180542.16	3180542.18	3180542.19				
Sample Date	22/02/2023												
Sample Depth (mbgl)	0.6	0.1	0.5	0.1	0.3	0.1	0.5	0.1	0.7-0.9	95th Percentile Urban ²	95% Upper Limit ³	Commercial/Industrial	Commercial/Industrial
Soil Type	Gravel	Gravel	Clay	Gravel	Gravel	Gravel	Gravel	Gravel	Peat				
Heavy Metals													
Arsenic	12	27	5	13	5	9	11	-	-	27.21	6.8	70	150
Cadmium	0.72	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	-	-	0.6	0.22	1,300	33
Chromium (total)	8	18	11	17	44	12	6	-	-	17.18	30	6,300 ⁶	650
Copper	27	29	34	23	16	23	13	-	-	49	25	>10,000	420
Lead	12.7	16.3	35	20	19	14.5	46	-	-	150	20	3,300	2,500
Nickel	4	11	6	9	9	11	5	-	-	11.9	7.6	6,000 ⁷	-
Zinc	91	79	57	74	58	69	67	-	-	162.7	53	400,000 ⁷	480
Boron	-	-	-	< 20	< 20	-	-	-	-	9.52	6.7	>10,000	15
Polycyclic Aromatic Hydrocarbons													
											<1 m Sand	<1 m Peat	
Pyrene	< 0.016	< 0.012	< 0.016	-	-	< 0.011	2.2	0.185	< 0.03	-	-	NA ^{10,11}	NA ^{10,11}
Naphthalene	< 0.08	< 0.06	< 0.08	-	-	< 0.06	< 0.07	< 0.06	< 0.11	-	-	(190) ^{10,12v,13}	(8,000) ^{10,12v,13}
Benzo[a]pyrene Toxic Equivalence (NES) ⁹	ND	ND	ND	-	-	ND	3.3	ND	ND	-	-	(11) ^{10,12d,13}	(11) ^{10,12d,13}
Total Petroleum Hydrocarbons													
											<1 m Sand	<1 m Peat	
C7 - C9	-	< 20	< 30	-	-	< 20	< 20	< 20	< 30	-	-	120 ^{10,12m}	(6,700) ^{10,12m,13}
C10 - C14	-	< 20	< 20	-	-	< 20	< 20	26	< 30	-	-	(1,500) ^{10,12v,13}	NA ^{10,11}
C15 - C36	-	< 40	< 40	-	-	< 40	193	610	260	-	-	NA ^{10,11}	NA ^{10,11}
Total Hydrocarbons (C7 - C36)	-	< 80	< 90	-	-	< 80	196	640	270	-	-	-	-

85	Concentration exceeds the higher of the 95% upper limit or the 95th percentile urban background ranges for soils in the Waikato region
75	Concentration exceeds the MWLR 2019 Landcare Research Eco-SGVs
ND	All individual PAH compounds making up the BAPEq are below the laboratory limit of detection
-	No guideline value available / parameter not tested

Notes:

- All results in mg/kg.
- Criteria from Appendices (Waikato Surface Soils Background Data), Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789.
- Criteria from Waikato Regional Council 'Natural background concentrations in the Waikato region' - 95% upper limit background concentrations for selected elements in soil of the Waikato region - <https://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations>, Accessed 20/03/2023.
- Criteria from Table 5, Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789
- Criteria from Table B2 and B3, Appendix B of the 'Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations' (NESCS, 2011): Commercial/industrial outdoor worker (unpaved).
- Guideline value (from NESCS, 2011) is for Chromium VI.
- Criteria from 'Schedule B(1) Guideline on Investigation Levels for Soils and Groundwater National Environment Protection Measure' (NEPM, 2013). Table 1A(1) Health investigation levels for soil contaminants (mg/kg) - Commercial/industrial use.
- Criteria from Tables 53-55 of Manaaki Whenua Landcare Research 'UPDATED Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document' (MWLR, 2019) - Commercial/industrial (80%). Values for typical, aged soil have been conservatively adopted for copper and zinc.
- BAPEq Potency Equivalence calculated from: Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.
- Values from 'Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand' (MFE, 2011) for sand and peat at < 1m depth, for all pathways. Values for commercial/industrial land use.
- 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.
- The following notes indicate the limiting pathway for each criterion : v - volatilisation, m - Maintenance/excavation, x - PAH surrogate, d - dermal.
- Brackets denote value exceeds threshold likely to correspond to formation of residual separate phase hydrocarbons.
- Criteria for coarse grained soils (those which contain greater than 50% by mass of particles great than 75 µm mean diameter) have been adopted.

Table 5 Continued: Soil Sample Results - Commercial / Industrial Land Use - Heavy Metals, Polycyclic Aromatic Hydrocarbons and Total Petroleum Hydrocarbons¹.

Soil Sample ID	TP10_0.1	TP10_0.6	TP11_0.1	TP11_0.5	SS02	SS03	SS04	SP01	SP02	Background Range of Trace Elements in Waikato Soils		NES SCS & SGV ⁵	Landcare Eco-SGVs ⁸
Lab Identification Number	3180542.20	3180542.21	3180542.22	3180542.23	3180542.24	3180542.25	3180542.26	3180542.27	3180542.28				
Sample Date	22/02/2023				21/02/2023		22/02/2023		21/02/2023				
Sample Depth (mbgl)	0.1	0.6	0.1	0.5	0.15	0.15	0.15	-	-	95th Percentile Urban ²	95% Upper Limit ³	Commercial/Industrial	Commercial/Industrial
Soil Type	Gravel	Sand	Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Sand and gravel				
Heavy Metals													
Arsenic	16	9	9	8	10	7	8	5	1,050	27.21	6.8	70	150
Cadmium	< 0.10	0.15	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.68	0.6	0.22	1,300	33
Chromium (total)	17	11	9	10	16	10	10	34	340	17.18	30	6,300 ⁶	650
Copper	20	17	10	17	28	16	18	31	480	49	25	>10,000	420
Lead	13.7	29	15.4	29	17.4	19.3	23	17.3	16.7	150	20	3,300	2,500
Nickel	9	6	5	5	12	10	3	55	21	11.9	7.6	6,000 ⁷	-
Zinc	89	94	50	92	152	71	36	76	1,580	162.7	53	400,000 ⁷	480
Boron	< 20	< 20	< 20	< 20	-	-	-	-	-	9.52	6.7	>10,000	15
Polycyclic Aromatic Hydrocarbons													
											<1 m Sand	<1 m Peat	
Pyrene	-	-	-	-	0.33	5.8	< 0.013	0.022	0.035	-	-	NA ^{10,11}	NA ^{10,11}
Naphthalene	-	-	-	-	< 0.10	< 0.06	< 0.07	< 0.06	< 0.06	-	-	(190) ^{10,12v,13}	(8,000) ^{10,12v,13}
Benzo[a]pyrene Toxic Equivalence (NES) ⁹	-	-	-	-	0.039	3.8	ND	0.027	ND	-	-	(11) ^{10,12d,13}	(11) ^{10,12d,13}
Total Petroleum Hydrocarbons													
											<1 m Sand	<1 m Peat	
C7 - C9	-	-	-	-	< 20	< 20	< 20	< 20	< 20	-	-	120 ^{10,12m}	(6,700) ^{10,12m,13}
C10 - C14	-	-	-	-	320	< 20	< 20	< 20	< 20	-	-	(1,500) ^{10,12v,13}	NA ^{10,11}
C15 - C36	-	-	-	-	8,400	290	< 40	720	147	-	-	NA ^{10,11}	NA ^{10,11}
Total Hydrocarbons (C7 - C36)	-	-	-	-	8,800	300	< 80	720	163	-	-	-	-
Monocyclic Aromatic Hydrocarbons													
Benzene	-	-	-	-	< 0.05	-	-	-	-	-	-	3.0 ^{10,12m}	28 ^{10,12v}
Toluene	-	-	-	-	< 0.05	-	-	-	-	-	-	(94) ^{10,12m,13}	(7,500) ^{10,12m,13}
Ethylbenzene	-	-	-	-	< 0.05	-	-	-	-	-	-	(180) ^{10,12v,13}	(7,200) ^{10,12v,13}
m&p-Xylene	-	-	-	-	< 0.10	-	-	-	-	-	-	-	-
o-Xylene	-	-	-	-	< 0.05	-	-	-	-	-	-	-	-
Total Xylenes ¹³	-	-	-	-	<0.15	-	-	-	-	-	-	(150) ^{10,12m,13}	(5,700) ^{10,12v,13}

85	Concentration exceeds the higher of the 95% upper limit or the 95 percentile urban background ranges for soils in the Waikato region
75	Concentration exceeds the MWLR 2019 Landcare Research Eco-SGVs
540	Concentration exceeds the NES Soil Guideline Values
ND	All individual PAH compounds making up the BAPEq are below the laboratory limit of detection
-	No guideline value available / parameter not tested

- Notes:**
- All results in mg/kg.
 - Criteria from Appendices (Waikato Surface Soils Background Data), Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789.
 - Criteria from Waikato Regional Council 'Natural background concentrations in the Waikato region' - 95% upper limit background concentrations for selected elements in soil of the Waikato region - <https://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations>, Accessed 20/03/2023.
 - Criteria from Table 5, Internal Document: Caldwell, J. 2017. Waikato Regional Council Standard Operating Policies for Defining Cleanfill Acceptance Criteria. Document # 10581789.
 - Criteria from Table B2 and B3, Appendix B of the 'Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations' (NESCS, 2011): Commercial/industrial outdoor worker (unpaved).
 - Guideline value (from NESCS, 2011) is for Chromium VI.
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 - Values from 'Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand' (MFE, 2011) for sand and peat at < 1m depth, for all pathways. Values for commercial/industrial land use.
 - 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.
 - The following notes indicate the limiting pathway for each criterion : v - volatilisation, m - Maintenance/excavation, x - PAH surrogate, d - dermal.
 - Brackets denote value exceeds threshold likely to correspond to formation of residual separate phase
 - Criteria for coarse grained soils (those which contain greater than 50% by mass of particles great than 75 µm mean diameter) have been adopted.

Appendix A: Certifying Statement

I, Erin Richards of Pattle Delamore Partners certify that:

1. This combined preliminary and detailed site investigation meets the requirements of the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (the NES-CS) because it has been:
 - a. done by a suitably qualified and experienced practitioner, and
 - b. done in accordance with the current edition of *Contaminated land management guidelines No 5 – Site investigation and analysis of soils*, and
 - c. reported on in accordance with the current edition of *Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand*, and
 - d. the report is certified by a suitably qualified and experienced practitioner.
2. This combined preliminary and detailed site investigation concludes that the activities that will occur under regulation 5(2) to (6) are controlled activities under regulation 9 of the NES-CS because contaminant concentrations exceed the applicable standard in regulation 7 of NES-CS.

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner(s) who have done this investigation and certified this report is provided below.

This certification applies to the date of this report.

Signed



Erin Richards

Technical Director – Contaminated Land

Erin Richards – Project Director

Erin is a geologist with over 20 years of experience in geological and contaminated land assessments. She has a MSc in Geology (1st class hon) from the University of Auckland. Erin has extensive experience in contaminated land assessments and has undertaken as a consultant (either directly herself or as a project manager/director) hundreds of assessments across a variety of contaminated sites, which have ranged from greenfield sites (identified for development) through to complex brownfield assessments, including assessment/decommissioning of bulk storage fuel depots/terminals and large-scale commercial/industrial properties. Assessments have been widespread and have involved soil, groundwater and soil-gas investigations, resource consenting (NES-CS through to long term discharge consenting under regional rules), spill response works, remediation (including development of remedial options assessments), dewatering assessments, development of management plans, Tier 2 risk assessments and ongoing compliance monitoring works. Erin was a primary author of the 2021 Contaminated Land Management Guidelines: CLMG1 and CLMG5. As such, she has a good familiarity with and understanding of the current contaminated land regulations and practice in New Zealand including assessments against the NES-CS.

Leena Khong – Project Manager / Report Reviewer

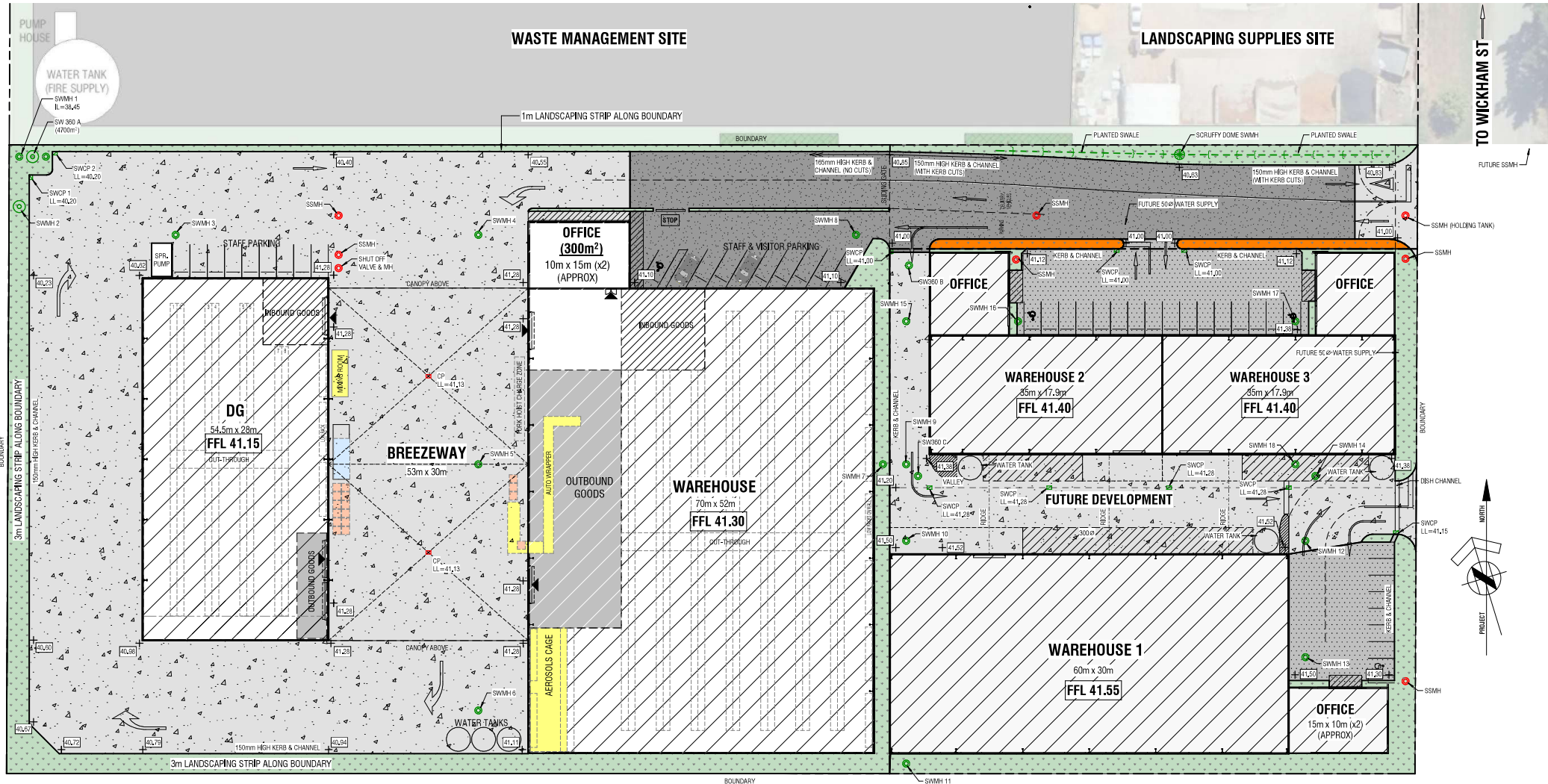
Leena Khong is an environmental geologist with over 10 years of experience in environmental and contaminated land assessments. Leena has a BSc and MSc in Geology from Auckland University. Leena has been involved in a wide range of environmental and contaminated land projects in Australia and New Zealand. Her involvement in the various projects has included project management, design and implementation of field programmes, technical input, risk assessment, site investigation, remediation works, liaison with stakeholders, peer reviews, and resource consent reviews (NES-CS), and compliance monitoring.

Tom Harvey - Author

Tom is an environmental geologist with over 4 years of experience, specialising in contaminated land investigations. As an environmental Geologist, Tom has been involved in numerous contaminated sites investigations. He has practical experience in a wide variety of contaminated land assessment techniques, including general contaminated site sampling (soil, water, gas, sediment), baseline sampling, delineation sampling and site validation sampling. This sampling experience has involved rigorous Health and Safety planning. During his time at PDP, Tom has undertaken, overseen and reported on both Preliminary Site Investigations and Detailed Site Investigations. He has experience and familiarity with the current contaminated land regulations and practice in New Zealand including assessments against the NES-CS, and in the consenting of contaminated sites.



Appendix B: Stiffe Hooker Site and Cut to Fill Plans



SITE FINISHES LEGEND

LANDSCAPED / GRASSED AREA	
150 THK. REINFORCED CONCRETE SLAB ON GAP-40 BASECOURSE	
50mm THK. AC14 ON GAP-40 BASECOURSE	
25mm THK. AC10 ON GAP-40 BASECOURSE	

PROPOSED SITE PLAN
SCALE @ A1 1:300

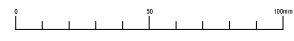
SITE AREAS SCHEDULE - POST-DEVELOPMENT (m²)

FINISHES / SITES	WATTYL DEVELOPMENT	FUTURE DEVELOPMENT	TOTAL
PERMEABLE AREAS:			
LANDSCAPING	1331	512	1843
SEMI-IMPERMEABLE AREAS:			
COMPACTED METAL	0	0	0
IMPERMEABLE AREAS:			
PERMANENT BUILDINGS	6824	3679	10503
IMPERMEABLE AREAS:			
PAVEMENT / HARDESTAND	5505	2054	7559
TOTAL	13760	6245	20005

REV DATE DESCRIPTION
stiffe hooker
 architects + engineers + interior
 PROJECT
 PROPOSED DEVELOPMENT AT 16A WICKHAM STREET
 FOR
 STRIDE PROPERTY
 DRAWING
 PROPOSED SITE & FINISHED LEVELS PLAN

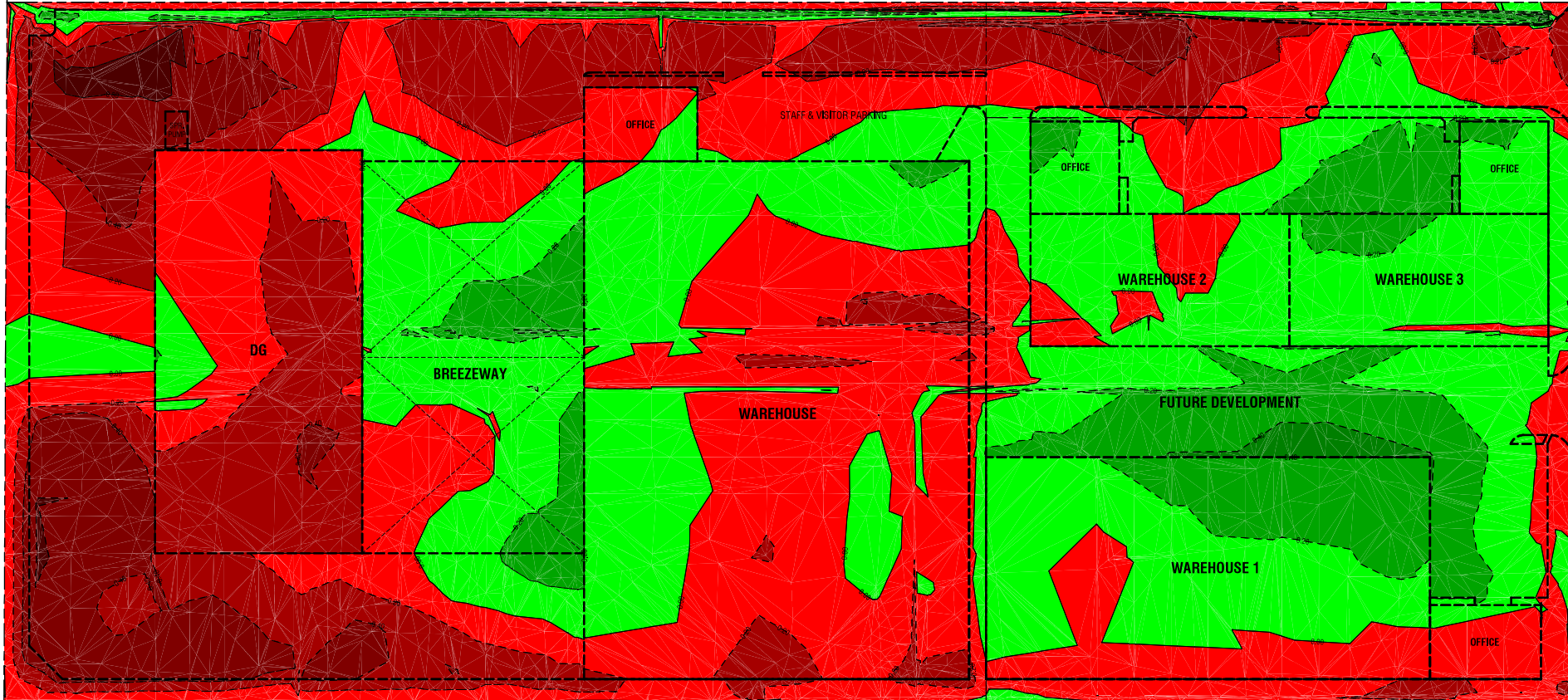
CAD FILE JOB NO
 10368
 SCALE AT A1 As indicated REV
 SCALE AT A3 **SD-RC02**

PRELIMINARY 20.02.2023



CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK
 FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALE
 THE FINISHES AND THE DEPOSIT COVERS ARE CO-ORDINATE





PLATFORM VOLUMES	
1. VOLUMES ARE SOLID VOLUMES. NO BULKING FACTORS HAVE BEEN APPLIED.	
2. -VE VALUES = CUT DEPTH	
3. +VE VALUES = FILL DEPTH	
APPROX. BULK CUT / FILL VOLUMES FOR PLATFORM	
CUT VOLUME = 2230m ³	
FILL VOLUME = 1130m ³	
WORKS AREA = 20005m ²	

BULK EARTHWORKS CUT / FILL DEPTHS				
RANGE NO.	MIN. DEPTH (m)	MAX. DEPTH (m)	AREA (m ²)	COLOUR
1	-0,80	-0,60	102,75	Dark Red
2	-0,60	-0,40	1310,42	Red
3	-0,40	-0,20	3236,80	Light Red
4	-0,20	0,00	8545,43	Orange
5	0,00	0,20	6647,38	Yellow
6	0,20	0,40	2050,25	Light Green
7	0,40	0,60	109,85	Green
8	0,60	0,80	1,63	Dark Green

REV	DATE	DESCRIPTION
		3d melrose street newmarket aso/landsc ph +64 9 520 4400 www.stiffehooker.co.nz

PROJECT
 PROPOSED DEVELOPMENT AT 16A WICKHAM STREET

FOR
 STRIDE PROPERTY

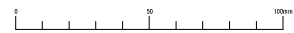
DRAWING
 PROPOSED BUILDING PLATFORM CUT & FILL PLAN

CAD FILE: C:\Users\stiff\OneDrive - Melrose Street\Documents\16a\16a.dwg
 JOB NO: 10368

SCALE AT A1: As indicated
 SCALE AT A3: As indicated

SHEET: SD-RC10
 REV: 1

PRELIMINARY 20.02.2023



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 FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALE
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Appendix C: Council Information

Tom Harvey

From: Karl Tutty <Karl.Tutty@waipadc.govt.nz>
Sent: Thursday, 2 March 2023 3:08 pm
To: Tom Harvey
Subject: RE: External Sender: 16a Wickham Street, Hamilton Contamination Information

Hi Tom,

Similar map. The sub-part of 16A confirmed HAIL timber storage. The bit opposite transport depot. There is a large volume of documents on 16A, looks like it was in use by a builder of mobile homes or similar so lots of building consents applications. I cannot see anything dangerous goods related or similar. Database notes below.



LUI11099	Current Record	Kiwi Timber Supplies	0 Wickham Street, Hamilton	Verified HAIL - No Sampling	#####
----------	----------------	----------------------	----------------------------	-----------------------------	-------

LUI12419	Current Record	AUTO logistics / PTS logistics Hamilton depot		Verified HAIL - No Sampling	#####
----------	----------------	-----------------------------------------------	--	-----------------------------	-------

From: Tom Harvey <Tom.Harvey@pdp.co.nz>
Sent: Thursday, 2 March 2023 1:06 pm
To: Karl Tutty <Karl.Tutty@waipadc.govt.nz>
Subject: External Sender: 16a Wickham Street, Hamilton Contamination Information

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cybersecurity Policy and report suspicious emails to Servicedesk

Hi Karl,

I am in the process of completing a PSI/DSI update for 16a Wickham Street, Hamilton (see below snip). We have the Site Contamination Enquiry from WRC but just wanted to check what WDC has on record for the site in terms of contamination.



Thanks,

Tom Harvey – BSc, MSc (Hons) | Environmental Geologist
PATTLE DELAMORE PARTNERS LTD
Level 4, PDP House, 235 Broadway, Newmarket, Auckland
PO Box 9528, Newmarket, Auckland 1149
NEW ZEALAND

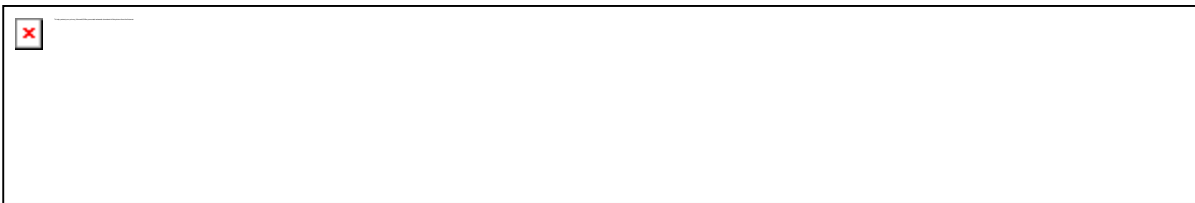
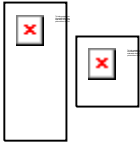
DDI - +64 9 529 5879 | Mob - +64 22 314 4248
Map - [Auckland Office](#) | Web - www.pdp.co.nz

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Te Kaunihera ā Rohe o Waipa



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Ella van den Berg

From: Guy Sowry <Guy.Sowry@waikatoregion.govt.nz>
Sent: Tuesday, 13 December 2022 12:31 pm
To: Ella van den Berg
Subject: Land Use Information Register enquiry 16A Wickham Street, Hamilton (REQ193302)
LUI11099 and LUI124912

Dear Ella

Thank you for your enquiry regarding information the Waikato Regional Council may hold relating to potential contamination at the property indicated below:

16A Wickham Street, Hamilton: LOT 1 DP 396081 LOT 1 DP 486522 (VRN 04570/003/08)



Background: The Waikato Regional Council maintains a register of properties known to be contaminated on the basis of chemical measurements, or potentially contaminated on the basis of past land use. This register (called the Land Use Information Register) is still under development and should not be regarded as comprehensive. The 'potentially contaminated' category is gradually being compiled with reference to past or present land uses that have a greater than average chance of causing contamination, as outlined in the Ministry for the Environment's Hazardous Activities and Industries List (HAIL): <http://www.mfe.govt.nz/sites/default/files/hazards/contaminated-land/is-land-contaminated/hazardous-activities-industries-list.pdf>

This property: I can confirm that this property **does** appear on the Land Use Information Register, as indicated by the area shaded blue on the maps below.



The area shaded blue above appears on the Land Use Information Register as **LUI11099** with a classification of 'Verified HAIL – No Sampling' due to (past OR past and current) land use for HAIL activity 'A18. Wood treatment or preservation or bulk storage of treated timber' (approximate dates 2010 – 2015) associated with Kiwi Timbers Supplies. This site is included on the register for land use information only; we do not hold soil investigation reports regarding the presence or otherwise of hazardous substances in the soil.



The area shaded blue above appears on the Land Use Information Register as **LUI12419** with a classification of 'Verified HAIL – No Sampling' due to current land use for HAIL activity 'F8. Transport depot and yards' associated with Auto Logistics/PTS Logistics Hamilton Depot. This site is included on the register for land use information only; we do not hold soil investigation reports regarding the presence or otherwise of hazardous substances in the soil.

District Councils: Our records are not integrated with those of territorial authorities, so it would also be worth contacting the Waipa District Council to complete your audit of Council records if you have not already done so. In general, information about known contaminated land will be included on a property LIM produced by the territorial authority.

Rural Land Considerations: Examples of sites that are "more likely than not" to have soil contamination (HAIL sites) include timber treatment activities, service stations and/or petroleum storage, panel beaters, spray painters, etc. Whilst pastoral farming is not included on this list, typical farming activities of horticulture, sheep dipping, chemical

storage, petroleum storage and workshops are; but are more difficult to identify and may not be as well represented on the Land Use Information Register. Therefore, individuals interested in pastoral land may be interested in completing further investigations in accordance with Ministry for the Environment Guidelines prior to land purchase and/or development.

Additional Information: Please note that:

- Significant use of lead-based paint on buildings can, in some cases, pose a contamination risk; the use of lead-based paint is not recorded on the Land Use Information Register.
- Buildings in deteriorated or derelict condition which contain asbestos can result in asbestos fibres in soil; the use of asbestos in building materials is not recorded on the Land Use Information Register.
- The long term, frequent use of superphosphate fertilisers can potentially result in elevated levels of cadmium in soil; the use of superphosphate fertiliser is not recorded on the Land Use Information Register.
- We are not currently resourced to fully incorporate historic aerial photographs in our region-wide assessment of HAIL activities. A significant proportion of the Crown historical aerial image archive for the Waikato region is available to view free of charge at <http://retrolens.nz/>. We recommend this resource is consulted for any HAIL assessment.
- Due to the large volume of enquiries being received, we may not be able to respond to your enquiry as quickly as previously. We are resourced to meet **20 day** response times as per LGOIMA, but endeavour to respond more quickly when workload permits. If your enquiry is urgent, please note this first in your enquiry and we will do our best to assist.

Please feel free to contact me if you have any further queries on this matter. For any new enquiries or requests for information please continue to use the [Request for Service form](#) for 'Contaminated Land/HAIL.'

Kind regards

Guy

Guy Sowry | CONTRACTOR | Land and Soil, Science and Strategy
 WAIKATO REGIONAL COUNCIL | Te Kaunihera ā Rohe o Waikato
 P: +6478592839
 F: facebook.com/waikatoregion
 Private Bag 3038, Waikato Mail Centre, Hamilton, 3240

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Appendix D: Site Photographs



Photograph 1: Empty IBCs, 20L plastic containers (part filled with unknown black liquid (possibly bitumen emulsion)) and empty 200 L steel drum in far southeast yard of the site (Feature of interest 1).



Photograph 2: Staining on asphalt next to locked container in far southeast yard of the site (Feature of interest 1).



Photograph 3: Minor fuel, oil and chemical storage and general staining of ground in Livingstons Construction yard (southeast of the site) (Feature of interest 2).



Photograph 4: Staining on ground next to minor fuel, oil and chemical storage in Livingstons Construction yard (southeast of the site) (Feature of interest 2).



Photograph 5: Storage of potentially treated timber along northern boundary of the Kiwi Transportable Home's yard (Feature of interest 3).



Photograph 6: Staining on ground in front of old Bitelli asphalt paver. Within an unknown yard largely containing shipping containers in the southwest of the site (Feature of interest 4).



Photograph 7: Broken fibre cement sheets on ground within the unknown yard largely containing shipping containers in the southwest of the site (Feature of interest 5).



Photograph 8: Rubbish / burn pile in centre of JK Concrete storage yard in the southwest of the site. Timber, concrete, metal cans, bottles, spade head, pipes, cardboard and plastic sheets observed (Feature of interest 6).



Photograph 9: Small stockpile of soil and refuse in southeast corner of JK Concrete storage yard in southwest of the site. Soil, gravel, concrete, timber (some burnt), plastic, cardboard, paint tin lid, food cans, glass bottles observed (Feature of interest 7).



Photograph 10: Near empty IBC with unknown black residue inside on the western boundary of JK Concrete storage yard (Feature of interest 8).



Photograph 11: Various small plastic containers (mostly empty) with mostly unknown contents (one container contained multipurpose biodegradable cleaning gel) in JK Concrete storage yard (Feature of interest 8).



Photograph 12: Near empty 200 L steel drum of hydraulic oil on the western boundary of JK Concrete storage yard (Feature of interest 8).



Photograph 13: Very large pile of timber (reportedly untreated) covering approximately 1/3 of the Pro Demolition yard (Feature of interest 9).



Photograph 14: Staining of ground surface beneath excavator in Pro Demolition yard (Feature of interest 10).



Photograph 15: Small pile of uncovered timber in the Cambridge Construction yard (Feature of interest 11).



Photograph 16: Un-bunded diesel AST in Shaw Asphalters yard (central north of the site) (Feature of interest 12).



Photograph 17: Dangerous goods storage container in central south part of Shaw Asphalters yard (Feature of Interest 13).



Photograph 18: 200L Steel drums (empty to half full - containing kerosene and engine oil) behind dangerous goods storage container. 5 within a wooden 'bund' and 2 outside of bund on asphalt (Feature of interest 14).



Photograph 19: Stained ground within the 'bund' containing 200L steel drums of kerosene and engine oil behind dangerous goods storage container (Feature of interest 14).



Photograph 20: 'Workshop' / storage shed on western boundary of Shaw Asphalters yard. Numerous black stains on ground. 2 x 200 L steel drums of kerosene and 1 x 200 L steel drum of hydraulic fluid (Feature of interest 15).



Photograph 21: Example of staining on ground in the 'Workshop'/storage shed (Feature of interest 15).



Photograph 22: 'Workshop' / Storage shed containing trucks, loader, digger and a Bitelli asphalt paver. Numerous stains on ground and general storage (i.e. empty 20L containers of engine/lube oil, tyres, carpet etc) (Feature of interest 15).



Photograph 23: Example of staining on ground in the 'workshop' / storage shed (Feature of interest 15).



Photograph 24: Stockpile of gravel, sand, concrete and bitumen in the northeast corner of Shaw's Asphalters yard (Feature of interest 16).



Photograph 25: Compacted layers of gravel and coarse-grained sand as observed at TP08.



Photograph 26: Typical mixed fill encountered across the investigation area. Note the black peat at the bottom of the test pit.



Photograph 27: Bitumen emulsion on ground surface at sample location TP03.



Appendix E: Laboratory Reports



Certificate of Analysis

Page 1 of 11

Client:	Pattle Delamore Partners Limited	Lab No:	3180542	SPV1
Contact:	Erin Richards	Date Received:	22-Feb-2023	
	C/- Pattle Delamore Partners Limited	Date Reported:	01-Mar-2023	
	PO Box 9528	Quote No:	81087	
	Newmarket	Order No:		
	Auckland 1149	Client Reference:	A03478103	
		Submitted By:	Tom Harvey	

Sample Type: Soil						
Sample Name:		TP01_0.1 22-Feb-2023	TP01_0.6 22-Feb-2023	TP02_0.1 22-Feb-2023	TP02_0.5 22-Feb-2023	TP03_0.1 22-Feb-2023
Lab Number:		3180542.1	3180542.2	3180542.3	3180542.4	3180542.5
Individual Tests						
Dry Matter	g/100g as rcvd	94	78	91	66	84
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	7	27	4	22
Total Recoverable Cadmium	mg/kg dry wt	0.10	0.19	0.17	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	18	7	29	14	24
Total Recoverable Copper	mg/kg dry wt	21	9	43	47	30
Total Recoverable Lead	mg/kg dry wt	32	23	193	23	20
Total Recoverable Nickel	mg/kg dry wt	20	2	13	7	10
Total Recoverable Zinc	mg/kg dry wt	111	49	230	47	210
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	3.9	0.4	3.3	< 0.4	< 0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.013	< 0.011	< 0.015	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.019	< 0.016	< 0.03	< 0.018
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.013	0.012	< 0.015	< 0.012
Acenaphthene	mg/kg dry wt	< 0.011	< 0.013	< 0.011	< 0.015	< 0.012
Anthracene	mg/kg dry wt	0.054	< 0.013	0.072	< 0.015	< 0.012
Benzo[a]anthracene	mg/kg dry wt	0.24	0.030	0.21	< 0.015	< 0.012
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.41	0.050	0.34	< 0.015	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.59	0.072	0.49	< 0.037	< 0.029
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.59	0.072	0.48	< 0.037	< 0.029
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.41	0.058	0.35	< 0.015	< 0.012
Benzo[e]pyrene	mg/kg dry wt	0.27	0.029	0.23	< 0.015	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt	0.39	0.036	0.29	< 0.015	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt	0.150	0.020	0.128	< 0.015	< 0.012
Chrysene	mg/kg dry wt	0.23	0.030	0.22	< 0.015	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt	0.060	< 0.013	0.048	< 0.015	< 0.012
Fluoranthene	mg/kg dry wt	0.50	0.055	0.41	< 0.015	< 0.012
Fluorene	mg/kg dry wt	< 0.011	< 0.013	< 0.011	< 0.015	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.32	0.040	0.25	< 0.015	< 0.012
Naphthalene	mg/kg dry wt	< 0.06	< 0.07	< 0.06	< 0.08	< 0.06
Perylene	mg/kg dry wt	0.126	< 0.013	0.099	< 0.015	< 0.012
Phenanthrene	mg/kg dry wt	0.149	< 0.013	0.152	< 0.015	< 0.012
Pyrene	mg/kg dry wt	0.60	0.067	0.50	< 0.015	< 0.012



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

Sample Type: Soil						
Sample Name:		TP01_0.1 22-Feb-2023	TP01_0.6 22-Feb-2023	TP02_0.1 22-Feb-2023	TP02_0.5 22-Feb-2023	TP03_0.1 22-Feb-2023
Lab Number:		3180542.1	3180542.2	3180542.3	3180542.4	3180542.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 30	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	950	45	2,500	< 40	86
Total hydrocarbons (C7 - C36)	mg/kg dry wt	950	< 80	2,500	< 90	92
Sample Name:		TP03_0.5 22-Feb-2023	TP04_0.1 22-Feb-2023	TP04_0.5 22-Feb-2023	TP05_0.1 22-Feb-2023	TP05_0.6 22-Feb-2023
Lab Number:		3180542.6	3180542.7	3180542.8	3180542.9	3180542.10
Individual Tests						
Dry Matter	g/100g as rcvd	78	86	79	90	61
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	10	3	8	12
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.72
Total Recoverable Chromium	mg/kg dry wt	10	12	5	11	8
Total Recoverable Copper	mg/kg dry wt	38	23	6	13	27
Total Recoverable Lead	mg/kg dry wt	16.6	21	11.0	22	12.7
Total Recoverable Nickel	mg/kg dry wt	5	9	3	7	4
Total Recoverable Zinc	mg/kg dry wt	50	160	29	56	91
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.3	0.9	0.3	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
2-Methylnaphthalene	mg/kg dry wt	< 0.019	< 0.017	< 0.019	< 0.017	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Acenaphthene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.012	0.069	0.021	< 0.016
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	0.017	0.108	0.042	< 0.016
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.031	< 0.027	0.152	0.059	< 0.039
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.031	< 0.027	0.151	0.059	< 0.039
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.013	0.021	0.116	0.045	< 0.016
Benzo[e]pyrene	mg/kg dry wt	< 0.013	0.013	0.061	0.027	< 0.016
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	0.013	0.066	0.028	< 0.016
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.012	0.049	0.018	< 0.016
Chrysene	mg/kg dry wt	< 0.013	0.013	0.069	0.022	< 0.016
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Fluoranthene	mg/kg dry wt	< 0.013	0.023	0.106	0.024	< 0.016
Fluorene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	0.012	0.066	0.028	< 0.016
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.08
Perylene	mg/kg dry wt	< 0.013	< 0.012	0.026	< 0.011	< 0.016
Phenanthrene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.011	< 0.016
Pyrene	mg/kg dry wt	< 0.013	0.025	0.118	0.034	< 0.016
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 80	< 80	-	-
Sample Name:		TP06_0.1 22-Feb-2023	TP06_0.5 22-Feb-2023	TP07_0.1 22-Feb-2023	TP07_0.3 22-Feb-2023	TP08_0.1 22-Feb-2023
Lab Number:		3180542.11	3180542.12	3180542.13	3180542.14	3180542.15
Individual Tests						
Dry Matter	g/100g as rcvd	89	63	-	-	94

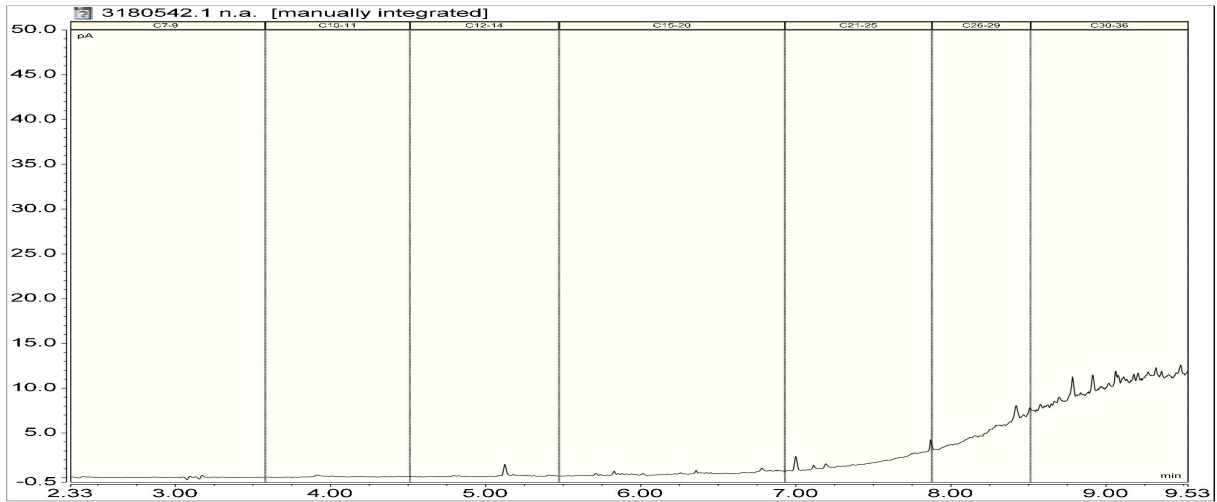
Sample Type: Soil						
Sample Name:	TP06_0.1 22-Feb-2023	TP06_0.5 22-Feb-2023	TP07_0.1 22-Feb-2023	TP07_0.3 22-Feb-2023	TP08_0.1 22-Feb-2023	
Lab Number:	3180542.11	3180542.12	3180542.13	3180542.14	3180542.15	
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	27	5	-	-	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	18	11	-	-	12
Total Recoverable Copper	mg/kg dry wt	29	34	-	-	23
Total Recoverable Lead	mg/kg dry wt	16.3	35	-	-	14.5
Total Recoverable Nickel	mg/kg dry wt	11	6	-	-	11
Total Recoverable Zinc	mg/kg dry wt	79	57	-	-	69
7 Heavy metals plus Boron						
Total Recoverable Arsenic	mg/kg dry wt	-	-	13	5	-
Total Recoverable Boron	mg/kg dry wt	-	-	< 20	< 20	-
Total Recoverable Cadmium	mg/kg dry wt	-	-	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	-	17	44	-
Total Recoverable Copper	mg/kg dry wt	-	-	23	16	-
Total Recoverable Lead	mg/kg dry wt	-	-	20	19.0	-
Total Recoverable Nickel	mg/kg dry wt	-	-	9	9	-
Total Recoverable Zinc	mg/kg dry wt	-	-	74	58	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	-	-	< 0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
2-Methylnaphthalene	mg/kg dry wt	< 0.017	< 0.03	-	-	< 0.016
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Acenaphthene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Anthracene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Benzo[a]anthracene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.027	< 0.038	-	-	< 0.026
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.027	< 0.038	-	-	< 0.025
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.012	< 0.016	-	-	< 0.011
Benzo[e]pyrene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Benzo[k]fluoranthene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Chrysene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Fluoranthene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Fluorene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Naphthalene	mg/kg dry wt	< 0.06	< 0.08	-	-	< 0.06
Perylene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Phenanthrene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Pyrene	mg/kg dry wt	< 0.012	< 0.016	-	-	< 0.011
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 30	-	-	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	-	-	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 90	-	-	< 80
Sample Name:	TP08_0.5 22-Feb-2023	TP09_0.1 22-Feb-2023	TP09_0.7-0.9 22-Feb-2023	TP10_0.1 22-Feb-2023	TP10_0.6 22-Feb-2023	
Lab Number:	3180542.16	3180542.18	3180542.19	3180542.20	3180542.21	
Individual Tests						
Dry Matter	g/100g as rcvd	79	92	48	-	-

Sample Type: Soil						
Sample Name:	TP08_0.5 22-Feb-2023	TP09_0.1 22-Feb-2023	TP09_0.7-0.9 22-Feb-2023	TP10_0.1 22-Feb-2023	TP10_0.6 22-Feb-2023	
Lab Number:	3180542.16	3180542.18	3180542.19	3180542.20	3180542.21	
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.11	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	6	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	13	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	46	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	5	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	67	-	-	-	-
7 Heavy metals plus Boron						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	16	9
Total Recoverable Boron	mg/kg dry wt	-	-	-	< 20	< 20
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	< 0.10	0.15
Total Recoverable Chromium	mg/kg dry wt	-	-	-	17	11
Total Recoverable Copper	mg/kg dry wt	-	-	-	20	17
Total Recoverable Lead	mg/kg dry wt	-	-	-	13.7	29
Total Recoverable Nickel	mg/kg dry wt	-	-	-	9	6
Total Recoverable Zinc	mg/kg dry wt	-	-	-	89	94
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	19.0	< 0.3	< 0.5	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.011	< 0.03	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.019	< 0.017	< 0.04	-	-
Acenaphthylene	mg/kg dry wt	0.081	< 0.011	< 0.03	-	-
Acenaphthene	mg/kg dry wt	0.035	< 0.011	< 0.03	-	-
Anthracene	mg/kg dry wt	0.22	< 0.011	< 0.03	-	-
Benzo[a]anthracene	mg/kg dry wt	1.13	< 0.011	< 0.03	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	2.2	< 0.011	< 0.03	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	3.3	< 0.026	< 0.049	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	3.3	< 0.026	< 0.049	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	2.5	< 0.011	< 0.03	-	-
Benzo[e]pyrene	mg/kg dry wt	1.21	< 0.011	< 0.03	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	1.91	< 0.011	< 0.03	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.88	< 0.011	< 0.03	-	-
Chrysene	mg/kg dry wt	1.10	< 0.011	< 0.03	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.35	< 0.011	< 0.03	-	-
Fluoranthene	mg/kg dry wt	1.92	< 0.011	< 0.03	-	-
Fluorene	mg/kg dry wt	0.020	< 0.02 #1	< 0.03	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	2.0	< 0.011	< 0.03	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.11	-	-
Perylene	mg/kg dry wt	0.73	< 0.011	0.02	-	-
Phenanthrene	mg/kg dry wt	0.40	< 0.011	< 0.03	-	-
Pyrene	mg/kg dry wt	2.2	0.185	< 0.03	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 30	-	-
C10 - C14	mg/kg dry wt	< 20	26	< 30	-	-
C15 - C36	mg/kg dry wt	193	610	260	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	196	640	270	-	-
Sample Name:	TP11_0.1 22-Feb-2023	TP11_0.5 22-Feb-2023	SS02 21-Feb-2023	SS03 21-Feb-2023	SS04 21-Feb-2023	
Lab Number:	3180542.22	3180542.23	3180542.24	3180542.25	3180542.26	
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	93	87	76

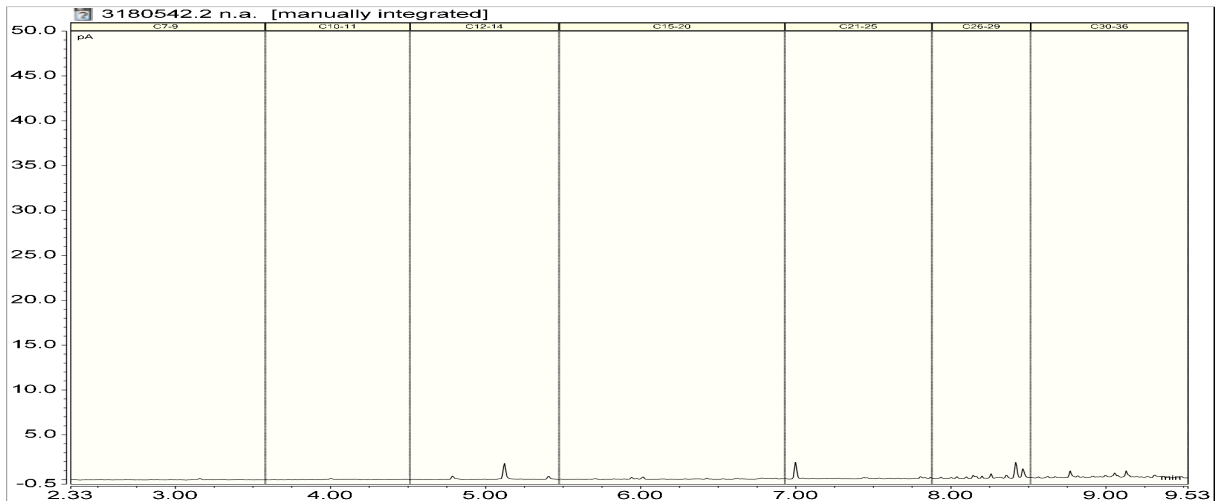
Sample Type: Soil						
Sample Name:	TP11_0.1 22-Feb-2023	TP11_0.5 22-Feb-2023	SS02 21-Feb-2023	SS03 21-Feb-2023	SS04 21-Feb-2023	
Lab Number:	3180542.22	3180542.23	3180542.24	3180542.25	3180542.26	
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	10	7	8
Total Recoverable Cadmium	mg/kg dry wt	-	-	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	-	16	10	10
Total Recoverable Copper	mg/kg dry wt	-	-	28	16	18
Total Recoverable Lead	mg/kg dry wt	-	-	17.4	19.3	23
Total Recoverable Nickel	mg/kg dry wt	-	-	12	10	3
Total Recoverable Zinc	mg/kg dry wt	-	-	152	71	36
7 Heavy metals plus Boron						
Total Recoverable Arsenic	mg/kg dry wt	9	8	-	-	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.12	-	-	-
Total Recoverable Chromium	mg/kg dry wt	9	10	-	-	-
Total Recoverable Copper	mg/kg dry wt	10	17	-	-	-
Total Recoverable Lead	mg/kg dry wt	15.4	29	-	-	-
Total Recoverable Nickel	mg/kg dry wt	5	5	-	-	-
Total Recoverable Zinc	mg/kg dry wt	50	92	-	-	-
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	-	< 0.05	-	-
Toluene	mg/kg dry wt	-	-	< 0.05	-	-
Ethylbenzene	mg/kg dry wt	-	-	< 0.05	-	-
m&p-Xylene	mg/kg dry wt	-	-	< 0.10	-	-
o-Xylene	mg/kg dry wt	-	-	< 0.05	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	0.9	33	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	0.168	0.017	< 0.013
2-Methylnaphthalene	mg/kg dry wt	-	-	0.109	< 0.017	< 0.019
Acenaphthylene	mg/kg dry wt	-	-	< 0.011	0.034	< 0.013
Acenaphthene	mg/kg dry wt	-	-	< 0.011	0.24	< 0.013
Anthracene	mg/kg dry wt	-	-	< 0.011	0.92	< 0.013
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.011	2.5	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	0.030	2.6	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	0.039	3.8	< 0.031
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	0.038	3.8	< 0.031
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	0.032	3.1	< 0.013
Benzo[e]pyrene	mg/kg dry wt	-	-	0.047	1.44	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	0.064	1.42	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.011	1.16	< 0.013
Chrysene	mg/kg dry wt	-	-	< 0.011	2.3	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.011	0.35	< 0.013
Fluoranthene	mg/kg dry wt	-	-	0.021	5.9	< 0.013
Fluorene	mg/kg dry wt	-	-	< 0.011	0.179	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	0.043	1.60	< 0.013
Naphthalene	mg/kg dry wt	-	-	< 0.10 #1	< 0.06	< 0.07
Perylene	mg/kg dry wt	-	-	< 0.011	0.62	< 0.013
Phenanthrene	mg/kg dry wt	-	-	< 0.011	2.5	< 0.013
Pyrene	mg/kg dry wt	-	-	0.33	5.8	< 0.013
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	-	-	320	< 20	< 20
C15 - C36	mg/kg dry wt	-	-	8,400	290	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	8,800	300	< 80

Sample Type: Soil			
Sample Name:		SP01 21-Feb-2023	SP02 21-Feb-2023
Lab Number:		3180542.27	3180542.28
Individual Tests			
Dry Matter	g/100g as rcvd	96	85
Heavy Metals, Screen Level			
Total Recoverable Arsenic	mg/kg dry wt	5	1,050
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.68
Total Recoverable Chromium	mg/kg dry wt	34	340
Total Recoverable Copper	mg/kg dry wt	31	480
Total Recoverable Lead	mg/kg dry wt	17.3	16.7
Total Recoverable Nickel	mg/kg dry wt	55	21
Total Recoverable Zinc	mg/kg dry wt	76	1,580
Polycyclic Aromatic Hydrocarbons Screening in Soil*			
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	0.014
2-Methylnaphthalene	mg/kg dry wt	0.011	0.019
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.012
Acenaphthene	mg/kg dry wt	< 0.011	< 0.012
Anthracene	mg/kg dry wt	< 0.011	< 0.012
Benzo[a]anthracene	mg/kg dry wt	< 0.02 #1	< 0.012
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.014	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.027	< 0.028
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.027	< 0.028
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.017	0.021
Benzo[e]pyrene	mg/kg dry wt	0.029	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt	0.023	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.012
Chrysene	mg/kg dry wt	0.024	0.012
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.012
Fluoranthene	mg/kg dry wt	< 0.011	0.028
Fluorene	mg/kg dry wt	< 0.011	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.012
Naphthalene	mg/kg dry wt	< 0.06	< 0.06
Perylene	mg/kg dry wt	0.013	< 0.012
Phenanthrene	mg/kg dry wt	0.029	0.045
Pyrene	mg/kg dry wt	0.022	0.035
Total Petroleum Hydrocarbons in Soil			
C7 - C9	mg/kg dry wt	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20
C15 - C36	mg/kg dry wt	720	147
Total hydrocarbons (C7 - C36)	mg/kg dry wt	720	163

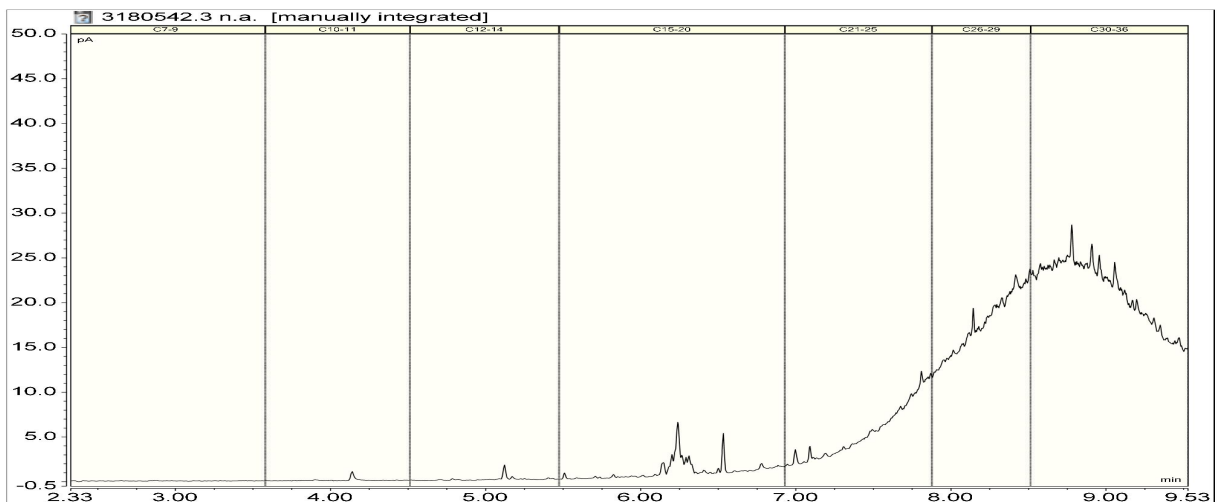
3180542.1
TP01_0.1 22-Feb-2023
Client Chromatogram for TPH by FID



3180542.2
TP01_0.6 22-Feb-2023
Client Chromatogram for TPH by FID



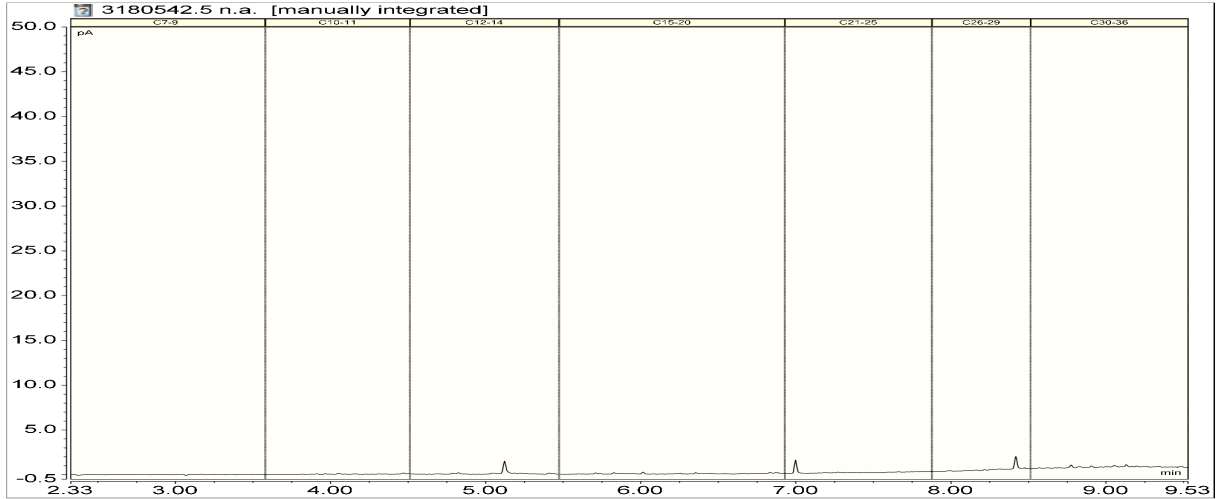
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TP02_0.1 22-Feb-2023
Client Chromatogram for TPH by FID



3180542.5

TP03_0.1 22-Feb-2023

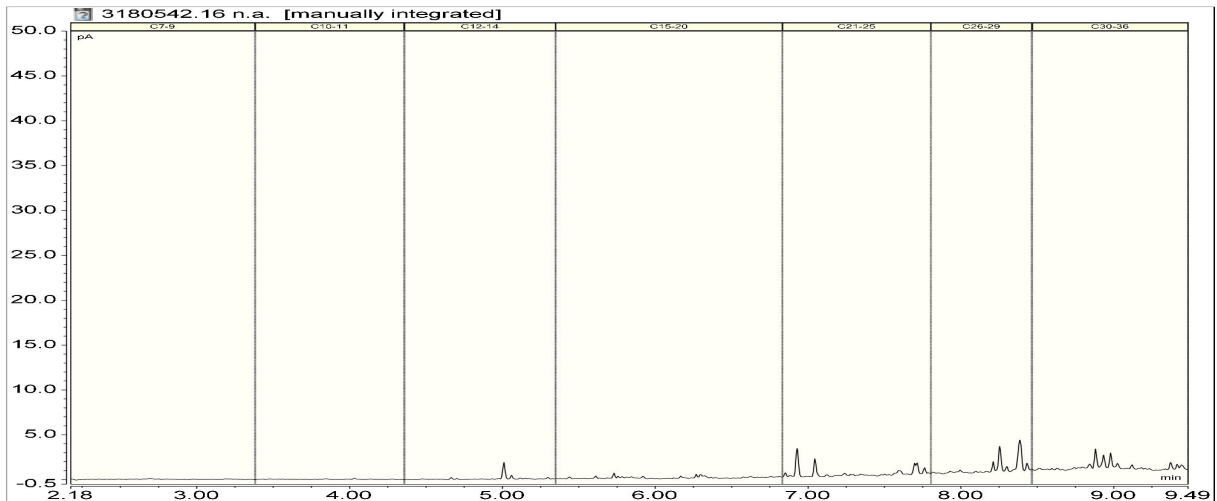
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3180542.16

TP08_0.5 22-Feb-2023

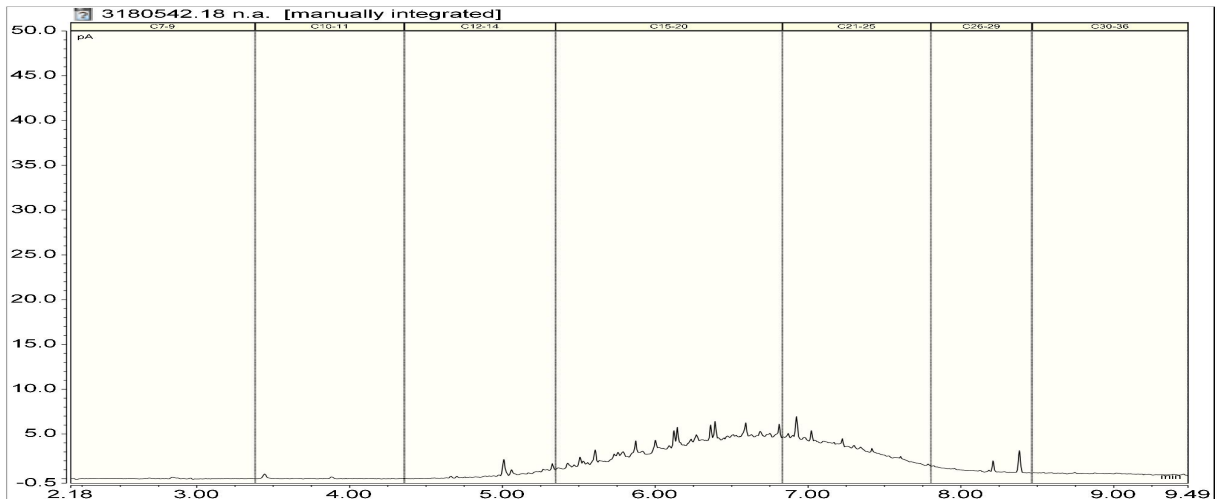
Client Chromatogram for TPH by FID



3180542.18

TP09_0.1 22-Feb-2023

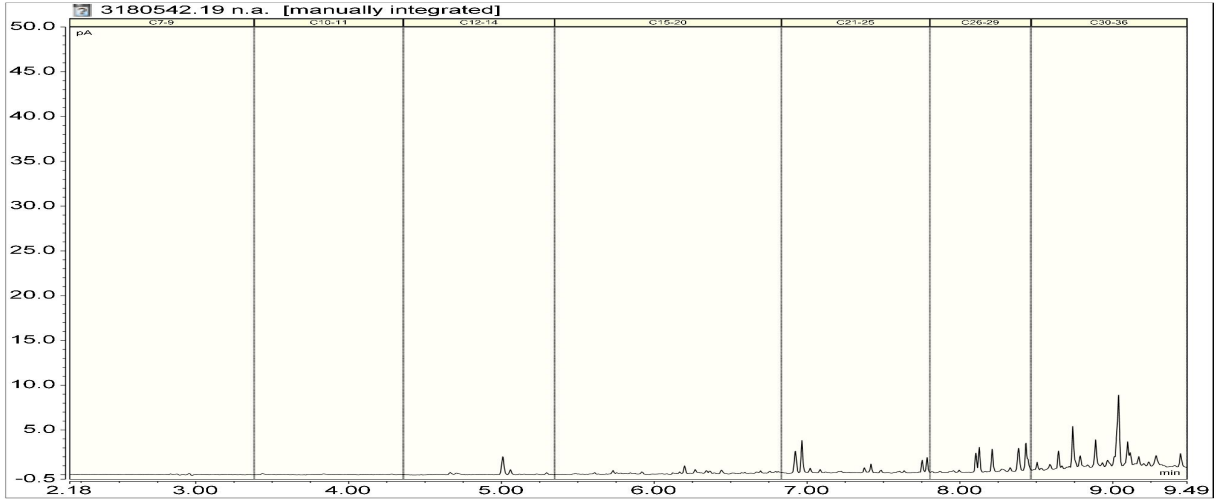
Client Chromatogram for TPH by FID



3180542.19

TP09_0.7-0.9 22-Feb-2023

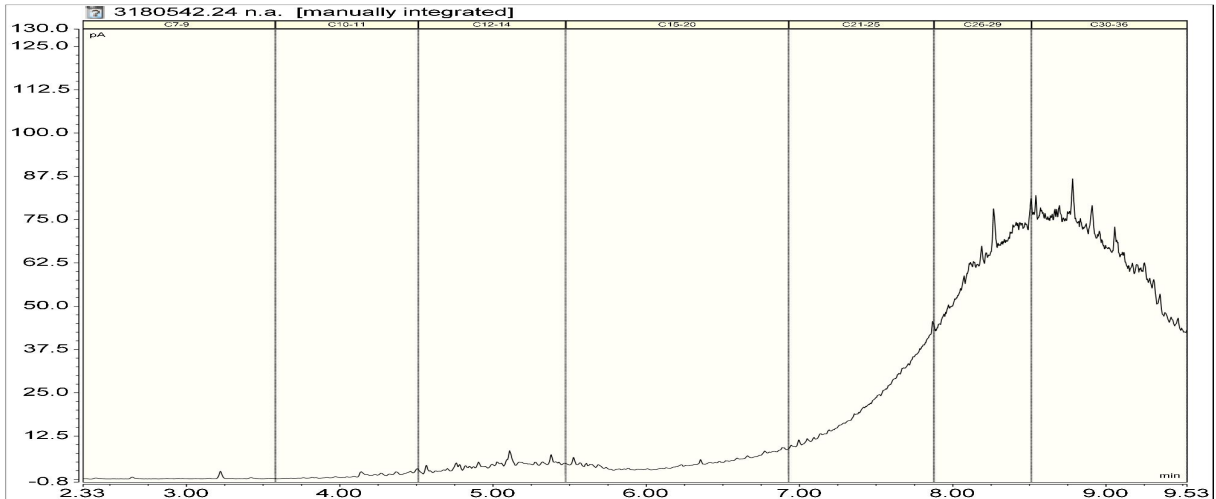
Client Chromatogram for TPH by FID



3180542.24

SS02 21-Feb-2023

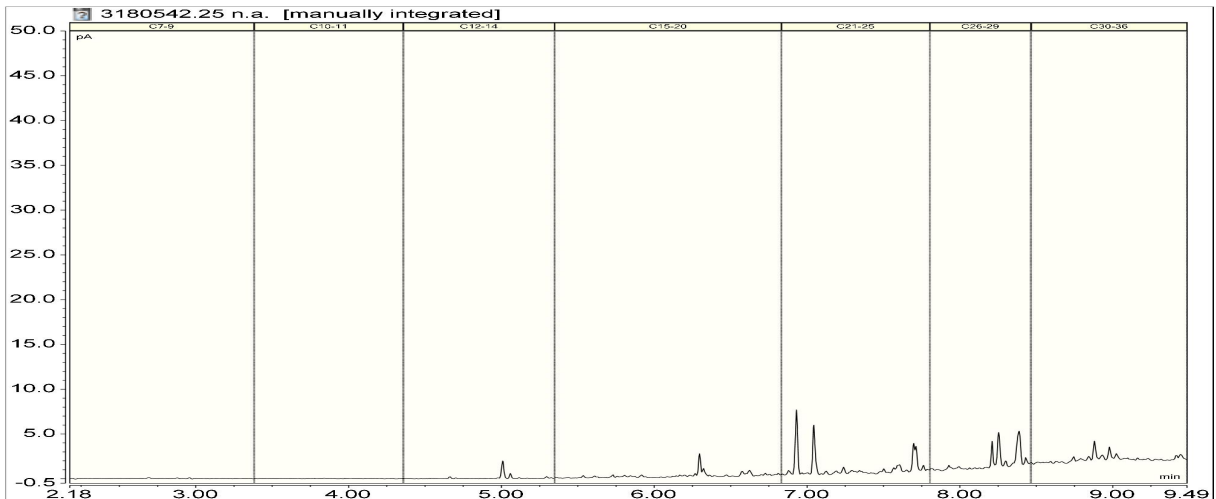
Client Chromatogram for TPH by FID



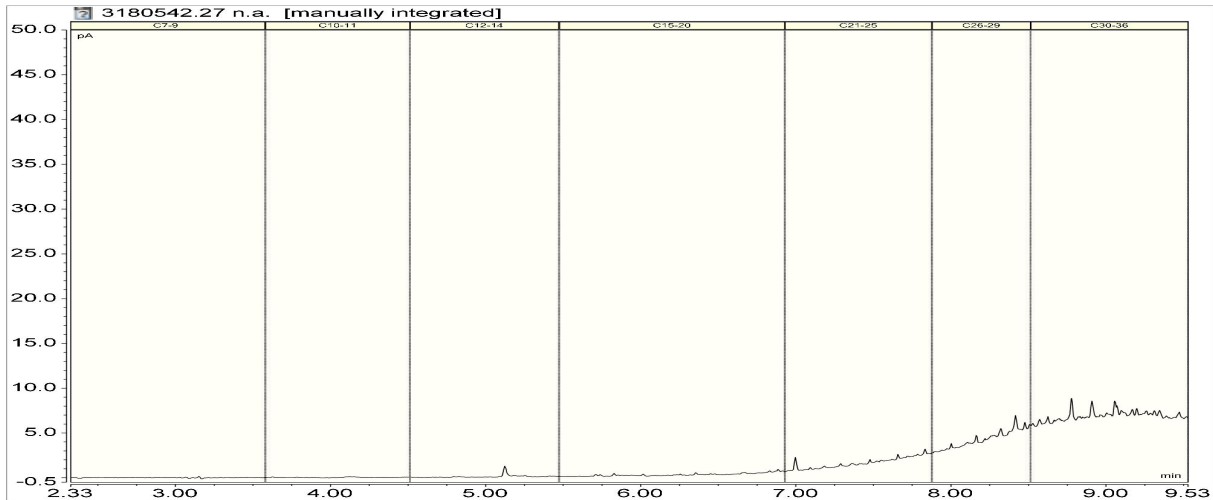
3180542.25

SS03 21-Feb-2023

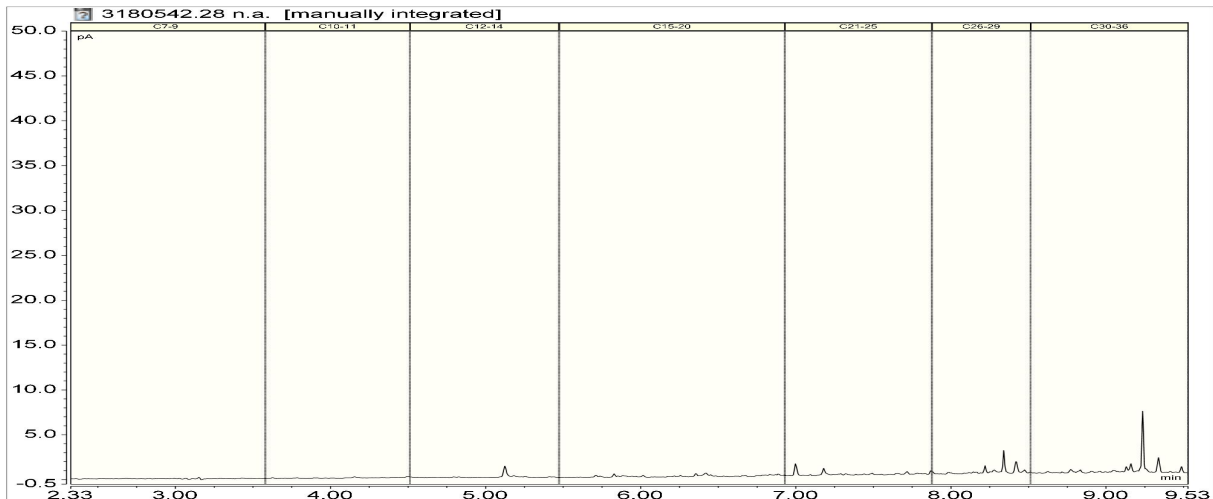
Client Chromatogram for TPH by FID



3180542.27
 SP01 21-Feb-2023
 Client Chromatogram for TPH by FID



3180542.28
 SP02 21-Feb-2023
 Client Chromatogram for TPH by FID



Analyst's Comments

#1 Due to some interference found in the chromatography, the detection limit was raised. Hence the higher detection limit reported.

Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-16, 20-28
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-12, 15-16, 18-19, 24-28
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	1-12, 15-16, 18-19, 24-28

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-12, 15-16, 18-19, 24-28
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-12, 15-16, 18-19, 24-28
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	1-8, 11-12, 15-16, 18-19, 25-28
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	1-12, 15-16, 24-28
7 Heavy metals plus Boron	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 - 20 mg/kg dry wt	13-14, 20-23
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	24
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	9-10, 24
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1-3, 5, 16, 18-19, 24-25, 27-28
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1-8, 11-12, 15-16, 18-19, 24-28
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-8, 11-12, 15-16, 18-19, 24-28
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-8, 11-12, 15-16, 18-19, 24-28
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-8, 11-12, 15-16, 18-19, 24-28

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

Testing was completed between 23-Feb-2023 and 01-Mar-2023. For completion dates of individual analyses please contact the laboratory.

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

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

Kim Harrison MSc
Client Services Manager - Environmental



Certificate of Analysis

Page 1 of 2

Client:	Pattle Delamore Partners Limited	Lab No:	3180545	A2Pv1
Contact:	Erin Richards	Date Received:	22-Feb-2023	
	C/- Pattle Delamore Partners Limited	Date Reported:	24-Feb-2023	
	PO Box 9528	Quote No:	81087	
	Newmarket	Order No:		
	Auckland 1149	Client Reference:	A03478103	
		Add. Client Ref:	Sampled: 22/02/23	
		Submitted By:	Tom Harvey	

Sample Type: Building Material

Sample Name	Lab Number	Sample Category	Sample Weight on receipt (g)	Asbestos Presence / Absence	Description of Asbestos in Non Homogeneous Samples
ASB01	3180545.1	Fibre Cement	58.83	Asbestos NOT detected. Organic fibres detected.	N/A

Glossary of Terms

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

For further details, please contact the Asbestos Team.

Summary of Methods

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

Sample Type: 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; 28 Heather Street, Auckland.	-	1
Sample Weight on receipt	Sample weight. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	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; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos in Non Homogeneous Samples	Form, dimensions and/or weight of asbestos fibres present. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1



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

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

Testing was completed on 24-Feb-2023. For completion dates of individual analyses please contact the laboratory.

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

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



Mahaleel (May) Alfante BSc, PGDipSci
Laboratory Technician - Asbestos



PATTLE DELAMORE PARTNERS LTD

Request for Analyses

NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.

From: Pattle Delamore Partners Ltd

To: Hills Hamilton

Office: Auckland Hamilton Tauranga Wellington Christchurch Invercargill

Quote No.:

Submitted by: Tom Harvey Ph No.: 0223164248

PDP Job No.: A03478103

Chain of Custody Record

Additional

Job No: Date Recv: 22-Feb-23 15:58

Sent:

Name: Tom Harvey
Signature: [Signature]
Date and time: 22.2.23

Received: Room temp. Chilled Temp.: 11.8°C
 Frozen

Name: _____
Signature: _____
Date and time: _____

318 0543

Received by: Arneka Phillips



3131805432

Results to: lab.samples@pdp.co.nz
 Email submitter: tom.harvey @pdp.co.nz
 Email other: ern.richards @pdp.co.nz

Priority: Normal High Urgent

Results required by: ___ / ___ / ___

Invoice to: PDP Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
TP01_0.1	22.2.23		S	AM7, TPH, PAH	
TP01_0.6					
TP02_0.1					
TP02_0.5					
TP03_0.1					
TP03_0.5					
TP04_0.1					
TP04_0.5					
TP05_0.1				AM7 + PAH	
TP05_0.6				AM7 + PAH	
TP06_0.1				AM7, TPH + PAH	
TP06_0.5				AM7, TPH + PAH	
TP07_0.1				AM7 + Barren	
TP07_0.3				AM7 + Barren	
TP08_0.1				AM7, TPH + PAH	
TP08_0.5				AM7, TPH + PAH	
TP08_1.1				Hold Cold	
TP09_0.1				TPH + PAH	
TP09_0.7-0.9				TPH + PAH	
TP10_0.1				AM7 + Barren	
TP10_0.5					
TP11_0.1					

Sample type: S Soil GW Groundwater SAL Saline FW Freshwater GEO Geothermal SW Stormwater
 SED Sediment BIO Biota WW Wastewater P Potable O Other: _____

For physical address see www.pdp.co.nz

Note: Samples may contain dangerous or hazardous substances

Page 1 of 1

PDP Auckland
Tel: +64 9 523 6900

PDP Hamilton
Tel: +64 7 949 7880

PDP Tauranga
Tel: +64 7 985 6440

PDP Wellington
Tel: +64 4 471 4130

PDP Christchurch
Tel: +64 3 345 7100

PDP Invercargill
Tel: +64 3 422 16



Job Information Summary

Page 1 of 1

Client:	Pattle Delamore Partners Limited	Lab No:	3180543
Contact:	Erin Richards	Date Registered:	23-Feb-2023 11:23 am
	C/- Pattle Delamore Partners Limited	Priority:	High
	PO Box 9528	Quote No:	81087
	Newmarket	Order No:	
	Auckland 1149	Client Reference:	A03478103
		Add. Client Ref:	
		Submitted By:	Tom Harvey
		Charge To:	Pattle Delamore Partners Limited
		Target Date:	24-Feb-2023 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS01 21-Feb-2023	Soil	PSoil500Asb	Hold Cold



Request for Analyses

NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.

PATTLE DELAMORE PARTNERS LTD

From: Pattle Delamore Partners Ltd

To: H. Ms Hamilton

Office: Auckland Hamilton Tauranga Wellington Christchurch Invercargill

Quote No.: _____

Submitted by: Tom Harvey Ph No.: 0223164248

PDP Job No.: A03478103

Chain of Custody Record

Job No: _____ Date Recv: 22-Feb-23 15:58

Sent:
Name: Tom Harvey
Signature: [Signature]
Date and time: 22.2.23

Received: Room temp. Chilled Temp.: 11°C
 Frozen
Name: _____
Signature: _____
Date and time: _____

318 0545

Received by: Arneka Phillips



313 1805457

Results to: lab.samples@pdp.co.nz
 Email submitter: tom.harvey @pdp.co.nz
 Email other: ern.richards @pdp.co.nz

Priority: Normal High Urgent

Results required by: ___ / ___ / ___

Invoice to: PDP Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
TP01_0.1	22.2.23		S	AM7, TPH, PAH	
TP01_0.6					
TP02_0.1					
TP02_0.5					
TP03_0.1					
TP03_0.5					
TP04_0.1					
TP04_0.5					
TP05_0.1				AM7 + PAH	
TP05_0.6				HM7 + PAH	
TP06_0.1				AM7, TPH + PAH	
TP06_0.5				AM7, TPH + PAH	
TP07_0.1				HM7 + Buren	
TP07_0.3				HM7 + Buren	
TP08_0.1				AM7, TPH + PAH	
TP08_0.5				HM7, TPH + PAH	
TP08_1.1				Hold Cold	
TP09_0.1				TPH + PAH	
TP09_0.7-0.9				TPH + PAH	
TP10_0.1				HM7 + Buren	
TP10_0.5					
TP11_0.1					

Sample type: S Soil GW Groundwater SAL Saline FW Freshwater GEO Geothermal SW Stormwater
 SED Sediment BIO Biota WW Wastewater P Potable O Other: _____



Job Information Summary

Page 1 of 1

Client:	Pattle Delamore Partners Limited	Lab No:	3180545
Contact:	Erin Richards	Date Registered:	24-Feb-2023 4:04 pm
	C/- Pattle Delamore Partners Limited	Priority:	High
	PO Box 9528	Quote No:	81087
	Newmarket	Order No:	
	Auckland 1149	Client Reference:	A03478103
		Add. Client Ref:	Sampled: 22/2/23
		Submitted By:	Tom Harvey
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	27-Feb-2023 4:30 pm

* As the samples require analysis at a Hill Laboratories location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	ASB01	Building Material	cpzBag2	Asbestos in Bulk Material

Summary of Methods

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