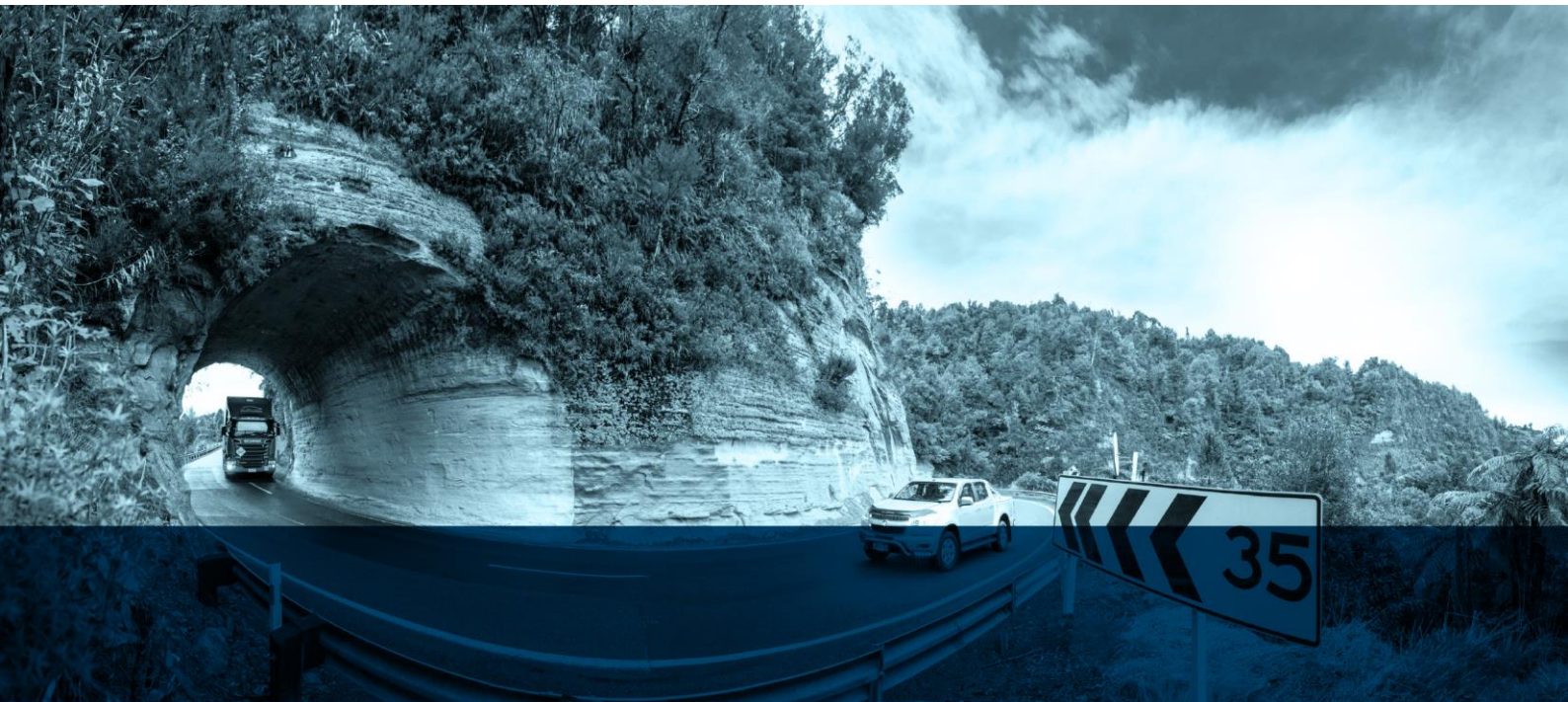





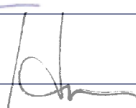
Ground Contamination – Detailed Site Investigation

July 2018

Mt Messenger Alliance

MMA-PLA-CON-RPT-2878



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Glossary

Abbreviation	Definition
ACM	Asbestos-containing material
DSI	Detailed Site Investigation as referred to in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, and as outlined in the Ministry for the Environment Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand (updated 2011).
HAIL	Ministry for the Environment Hazardous Activities Industrial List
MfE	Ministry for the Environment
MMA	Mount Messenger Alliance
NES Soil	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NPDC	New Plymouth District Council
The Project	The Mt Messenger Bypass project
PSI	Preliminary Site Investigation as referred to in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, and as outlined in the Ministry for the Environment Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand (updated 2011).
CLMP	Contaminated Land Management Plan. Fulfils the requirements of a Site Management Plan as referred to in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.
SH3	State Highway 3
SQEP	Suitably qualified and experienced practitioner
TRC	Taranaki Regional Council

1 Introduction

1.1 Purpose & scope

The NZ Transport Agency (Transport Agency) is proposing to construct and operate a new section of State Highway 3 (SH3), generally between Uruti and Ahititi to the north of New Plymouth. The Transport Agency lodged applications for resource consents and a Notice of Requirement on 15 December 2017 to alter the existing SH3 designation, to enable the Mt Messenger Bypass project (the Project) to proceed. A full description of the Project including its design, construction and operation is provided in the Assessment of Effects on the Environment Report, contained in Volume 1: AEE, and is shown on the Drawings in Volume 2: Drawing Set. This application included a Ground Contamination – Preliminary Site Investigation (PSI)¹ and a Draft Contaminated Land Management Plan (Draft CLMP)². The PSI and Draft CLMP provide specialist input relating to the potential for adverse effects relating to the disturbance of potentially contaminated land and management of disturbance of contaminated land (if present) for the Project alignment.

The PSI and Draft CLMP detailed the requirement for soil sampling and testing, commensurate with the requirements of a detailed site investigations (DSI), to be undertaken prior to the commencement of any ground disturbance. Property access to enable this investigation was permitted in late December 2017 and the information from the soil sampling and testing are detailed in this report.

This investigation has been completed to assess whether the potentially contaminating activities as described by MfE Hazardous Activities Industrial List (HAIL) identified in the PSI have resulted in contaminants present in soil along the proposed alignment, and implications for the associated works.

The scope of work for this investigation comprised:

- Review of the PSI;
- Excavation of 14 test pits and 6 hand augers to a maximum depth of 2.2m or refusal (whichever first encountered) along the proposed alignment as informed by the PSI;
- Logging the soils encounter;
- Collection of soil samples from various depths at each location for analytical testing;
- Laboratory analysis of soil samples for a range of potential contaminants; and
- Preparation of this report to document the work undertaken and the findings of these investigations.

This report has been prepared in general accordance with the requirements for a DSI referred to in the Resource Management (National Environmental Standard for Assessing and

¹ Mt Messenger Alliance, December 2017. Ground Contamination – Preliminary Site Investigation, Technical Report 12. ISBN: 978-1-98-851273-0

² Mt Messenger Alliance, December 2017. Draft Contaminated Land Management Plan, MMA-ENV-RMA-RPT-1482. ISBN: 978-1-98-851277-8.

Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soil), and as outlined in the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand (updated 2011). The persons undertaking, managing, reviewing, and certifying this investigation are suitably qualified and experienced practitioners as defined in the NES Soil³.

³ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

2 Project setting

2.1 Project location and description

The alignment is situated to the east of existing SH3 through the Mount Messenger area. The alignment ties-in to the existing SH3 at topographical flats to the north and south of Mount Messenger approximately 1km south of Ahititi and 6.4km north of Uruti, respectively.

The proposed alignment intersects a number of rural zoned properties. The details of these properties and the proposed alignment are provided in Table 2.1 below and shown on Figure 1 (Appendix A:).

Table 2.1 – Property identification

Street address	Legal description	Area (hectare)	CT	Current site owner
3133 Mokau Rd, SH3 North Taranaki	Sec 38 and Sec 50 Blk VIII Mimi Survey District	41.32	G3/168	Gordon Andrew Thomas Keighley, Joy Keighley and Keighley Nominees Limited
N/A	Sec 51, Sec 57 and Pt Sec 52 Blk VIII Mimi Survey District	Total 99.92 ha made up of 22.14 ha (Sec 51) 0.0466 ha (Sec 57) and 77.78 ha (Pt Sec 52)	H1/1387	Debbie Ann Pascoe and Tony James Sofus Pascoe
3140 Mokau Rd, SH3 North Taranaki	Sec 55 Blk VIII Mimi Survey District	38.21	J1/249	Rodney John Barlow
3072 Mokau Rd, SH3 North Taranaki	Sec 9 SO 457513	155.66	627642	Debbie Ann Pascoe and Tony James Sofus Pascoe
N/A	Sec 1 SO 313242	182.74	149437	Ngati Tama Custodian Trustees Limited
2750 Mokau Road, SH3 North Taranaki	Lot 1 DP 5816	23.97	145/198	Kevin George Beard
N/A	Sec 1 SO 313243	44.267	149437	Ngati Tama Custodian Trustees Limited

Street address	Legal description	Area (hectare)	CT	Current site owner
2528 Mokau Road, SH3 North Taranaki	Sec 16–19 and Pt Sec 13 Blk XII Mimi Survey District	81.16 (total combined area)	G2/1020 G2/1393–5 G3/57	Allan George Robin Thomson
2397 Mokau Road, SH3 North Taranaki	Sec 35 Blk VIII Mimi Survey District	52.63	G1/238	Russell Alister Gordon
2454 Mokau Road, SH3 North Taranaki	Sec 20 Blk XII Mimi Survey District	60.1	G2/1181	Janice Robyn Bonita Anglesey and William Arthur Anglesey
2048 Mokau Road, SH3 North Taranaki	Lot 1 DP 16494	82.88	H4/333	Timothy Charles Scott and Carol Joyce Scott

As stated in Table 11.1 of the Assessment of Effects on the Environment (December 2017), there are no consented water takes downstream of the Project construction water takes. While the site is generally very remote and sparsely populated, it is possible that there are permitted activity water takes related to agricultural use in the vicinity of the Project site.

2.2 Published geology

The published geology beneath the alignment is described by Edbrooke⁴ as interbedded fine to very fine-grained sandstone and mudstone or siltstone of the Mount Messenger Formation.

2.3 Hydrology and groundwater

The alignment traverses two surface water catchments. These are the Tongaporutu Catchment in the north and the Mimi Catchment to the south. The boundaries of these catchments are defined by the high points of the proposed alignment adjacent to the summit of Mount Messenger.

Tributaries in the Tongaporutu Catchment feed north into a valley which forms into the defined water course of the Mangapepeke Stream. Tributaries of the Mimi Catchment flow south to a low marsh/ wetland and form into the defined water course of the Mimi River.

Groundwater on site is generally shallow. In the parts of the Project site which intersect valley floors, groundwater is likely to be near or at the ground surface level. In parts of the

⁴ Edbrooke, S.W. (compiler) 2005. Geology of the Waikato area. Institute of Geological and Nuclear Sciences 1:250 000 geological map 4. 1 sheet + 68 p. Lower Hutt, New Zealand: Institute of Geological and Nuclear Sciences Limited. Lower Hutt, New Zealand.

Project site raised above valleys or on ridgelines, groundwater is likely to be approximately 2–3m in depth. Groundwater flow is expected to follow topography into two main stream valleys through which the Project area runs.

2.4 Potential contamination sources

Potentially contaminating (or HAIL) activities have been identified to have and/or more likely than not to have occurred along the Project alignment as documented in the PSI. The HAIL activities, including the potential contaminants associated with each of the activities and an assessment of the likely extent of contamination, are summarised in Table 2.2.

Locations of the soil sampling locations which have been undertaken as part of this investigation to evaluate the areas of potential contamination are also outlined in Table 2.2 and shown on Figures 3a and 3b (Appendix A).

Table 2.2 – Potential for contamination

Land use/ activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference	Sample Locations
<p>Fly tipping along existing SH3 and farm dumps at the dry stock farms at the northern and southern ends of the proposed alignment</p>	<p>Various depending on type of waste. May include (but not limited to) gross refuse, biological hazards, heavy metals, hydrocarbons and agrichemicals</p>	<p>Review of environmental incidents held by TRC indicate that the eastern banks of the existing SH3 have been subject to fly tipping and offall disposal. This is typically concentrated at pullover bays and in particular the public rest areas adjacent to the summit of Mount Messenger. A number of incidents are also recorded of dead stock being dumped and found in waterways of the area.</p> <p>Therefore the areas of the proposed earthworks associated with the proposed alignment adjacent to the existing SH3 may encounter refuse and/ or contaminated soils impacted by dumped material.</p> <p>Furthermore, two incidents are recorded of associated waste disposal to land within the southern property along the proposed alignment. One of the incidents included the disposal of stripped cars into a drained water course following a landslip onto the property from the bank of existing SH3. The property owner was prosecuted by TRC. Details of remediation, if undertaken, are not on file.</p> <p>The second incident relates to rubbish observed in a waterway on a farm below Mount Messenger. Inspection found only inert rubbish had been dumped and the land owner was instructed to remove the rubbish. Re-inspection found that the rubbish had been removed but the specific location of the rubbish dump and/ or the location of approved disposal are not documented.</p> <p>The proposed alignment transects the area of the filled water course and other open areas of the farm which may have been subject to waste disposal.</p>	<p>G5 – Waste disposal to land</p>	<p>All locations.</p>

Land use/ activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference	Sample Locations
		Therefore, there is the potential for refuse and/or near surface soils impacted by the dumped material to be encountered where the proposed alignment intersects open area of farms and in the vicinity of public rest areas adjacent to the existing SH3.		
Traffic incidents along existing SH3 leading to spills of various products	Various depending on the products spilt. May include (but not limited to) hydrocarbons, biological hazards, chemicals.	<p>Review of environmental incidents held by TRC indicated a number of reported incidents between 1999 and 2015 associated with spills along the existing SH3 in the area where the proposed alignment runs adjacent to the existing SH3.</p> <p>This included spills of various volumes of various products. All incidents were responded to and mitigated with spills contained and removed offsite as much as practical.</p> <p>There is a possible albeit low potential for contamination associated with such spills (or other unreported spills) to be encountered in the areas of the proposed earthworks associated with the proposed alignment that run adjacent to the existing SH3.</p>	Assessed as not a HAIL, as concentration of the migration of hazardous substances from these incidents to the areas of the earthworks associated with the proposed alignment are unlikely to be in sufficient quantity that it could be a risk to human health or the environment.	Not applicable
Bulk storage of fuel, chemicals and wastes associated with dry farming operation	Various depending on the products stored. May include (but not limited to) hydrocarbons and agrichemicals such as heavy metals,	<p>The alignment transects at or near the boundary of farming activities at the northern and southern end of the alignment.</p> <p>The current and historical aerial photograph review indicates that structures or storage are unlikely to have been located along the proposed alignment in these areas.</p>	Assessed as not a HAIL, as areas of the earthworks associated with the proposed alignment are unlikely to have been impacted by	Not applicable

Land use/ activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference	Sample Locations
	organochlorine pesticides, organo-phosphates.		bulk storage activities.	
Structures containing asbestos-containing materials (ACM)	Asbestos	<p>The property files and building plans review indicates that ACM are or have been present within buildings located at the properties at 3140 Mokau Road and 2528 Mokau Road. However, the buildings at these properties do not need to be removed or relocated for the proposed construction works.</p> <p>The current and historical aerial photo review indicates that it is unlikely that there were any dwellings and other buildings located along the alignment.</p>	Assessed as not a HAIL as no current or historical dwellings located along the alignment.	Not applicable

3 Site investigation

3.1 Data quality objectives

As described Section 1.2, the objective of this ground contamination investigation has been to evaluate soil conditions to establish the presence of contamination, if any, associated with the HAIL activities identified at the site.

The results of the available investigations have been used to establish implications for the Project and to establish procedures required during soil disturbance works.

3.2 Investigation methodology

A soil sampling plan that targeted areas along the Project alignment where HAIL activities have been identified and where construction works will result in soil disturbances was devised. Actual sample locations were limited by physical access constraints and located to minimise disruption of occupied areas of the active farm areas. The proposed sample locations were adjusted at the time of collection accordingly in coordination with the current property owners/occupiers.

Soil samples were collected from a total of 20 investigation locations, and varied between 25m and 400m spacing along the Project alignment. The sample locations are shown on Figures 3a and 3b (Appendix A).

Intrusive investigations were carried out at the site between 11th and 15th December 2017. Soil samples were collected using either a hand-auger or with a 2-tonne excavator from a test pit. Hand auger depths ranged between 1.5m and 2m below ground surface, while test pit depths ranged between 1.2m and 2.2m below ground surface. A small excavator was required due to limited access up the valleys. Test pits were able to be dug at 14 locations, and soil samples were collected from hand augers at the remaining 6 locations. The sampling location plans are included as Figures 3a and 3b (Appendix A).

Materials encountered during the investigation were logged in accordance with the NZ Geotechnical Society "Guideline for the classification and field description of soils and rocks for engineering purposes".

Samples were collected at regular depths (0.5m intervals) from the test pits or hand auger holes. The sampling procedure was as follows:

- Confirmation of the sampling location relative to local features,
- Grass scraped away using the digger bucket or a shovel, and a surface soil sample collected using a clean trowel,
- Excavation of the test pit in half meter stages with samples collected every half meter from the centre of the digger bucket using a clean trowel or by hand with fresh nitrile gloves,
- Samples were collected from clean hand auger at half meter stages using fresh gloved hands

Hand sampling equipment was cleaned between each sample with Decon90 and water. New nitrile gloves were worn for collection of each sample. For each sample, soil was placed into a clean glass jar (provided by Hills Laboratory). Samples were couriered chilled from New Plymouth to Hills Laboratory, Hamilton under chain of custody documentation.

A total of 36 samples and 3 duplicates were analysed at Hills Laboratories for concentrations of heavy metals, semi-volatile organic compounds (SVOCs) – including polycyclic aromatic hydrocarbons (PAH) and organochlorine pesticides (OCP), and total petroleum hydrocarbons (TPH).

3.3 Observations

Soil logs were made at each hand auger and test pit location, and are included in Appendix B.

Natural soils were encountered at most locations along the alignment. Top soil was present at some locations in the top 50mm to 100mm overlying silt with varying degrees of clay and sand. In most locations, the silt graded down into clay with varying degrees of organic material. Peat was encountered at 0.85m depth in CLTP12.

At the southern end of the alignment, gravels were encountered between 0.2m and 1.8m below ground in all three test pits. No foreign material was encountered in the gravels. Gravels were sub-rounded to rounded, except for angular to sub-angular gravels encountered in CLTP14 (likely fill). Gravels could be related to outflow from the Mimi catchment, or there is a possibility that at a few locations gravels from the existing SH3 road could be re-worked with local materials.

3.4 Quality assurance/quality control

Quality assurance and quality control (QA/QC) programs were implemented as part of field procedures to confirm that the soil analytical data were fit for purpose. The program included:

- Sampling equipment decontamination between sampling locations.
- Preservation of samples with ice during transport from the field to the laboratory.
- Transportation of samples with accompanying Chain of Custody documentation (Appendix D).
- Collection of laboratory replicate samples and review of calculated relative percent differences (RPDs).
- Comparison of field and analytical data.
- Compliance with sample holding times.

Standard laboratory QA/QC reports were not examined as part of this project, but are available from the laboratory on request.

A quantitative measure of the precision of the results was undertaken independently of the laboratory for a number of the sites by calculating the RPD values for replicate pairs. The RPD values were calculated using the following equation:

$$RPD := \frac{(C_0 - C_s) \cdot 100\%}{\frac{(C_0 + C_s)}{2}}$$

where C_0 = concentration obtained from the original sample

C_s = concentration obtained from the split or duplicate sample

Three duplicate soil samples were collected during the investigation. Analyses of the duplicate samples were in addition to standard laboratory QA/QC. Table 3.1 presents the QA/QC analytical results.

Table 3.1 - Results from duplicate samples for quality control check

Location and depth	CLTP16 1.0m	CLTP16 Duplicate	RPD %	CLTP12 0.5m	CLTP12 Duplicate	RPD %	CLTP04 0.5m	CLTP04 Duplicate	RPD %
Arsenic	5	6	18	< 2	< 2	n/c	13	7	60
Cadmium	< 0.10	< 0.10	n/c	< 0.10	< 0.10	n/c	< 0.10	< 0.10	n/c
Chromium	24	24	0	15	14	7	19	20	5
Copper	16	16	0	6	6	0	10	9	11
Lead	14.7	15	1	7.9	8	1	12.5	12	7
Nickel	23	23	0	13	12	8	13	15	14
Zinc	69	72	4	45	41	9	52	59	13

RPDs calculated for the duplicate samples were typically less than 20 %. RPD values for duplicate sample pairs that are less than 50% are generally considered good.

The duplicate sample for CLTP04 varied by less than 20% for all metals with the exception of arsenic. This sample was collected from 0.5m depth in clayey silt with some reddish brown staining. The material description indicates there may be some variability within the soil layer which may account for the 60% difference in the arsenic concentrations.

Based on the above, the sampling and analytical program is considered acceptable and the results obtained are of reliable quality and suitable for interpretation taking into consideration the potential for variability in arsenic concentrations as indicated in CLTP04.

3.5 Evaluation criteria

Results have been compared to the following criteria:

- NES Soil contaminant standard and associated hierarchy documents as referred to in MfE Contaminated Land Management Guideline No. 2, directed in the NES Soil Users Guide to assess human health risks. Based on the proposed use, the standard for commercial/ industrial land use has been adopted. The commercial/industrial worker land use standard has also been adopted for assessing risks to construction workers for metal contaminants. For hydrocarbons, the maintenance worker soil acceptance criteria from the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand; and

- An environmental discharge criteria is not specified by the New Plymouth District Council (NPDC) or Taranaki Regional Council (TRC). As per common practice for regions in New Zealand without guidelines, we have adopted the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (CCME) for the Protection of Environmental values for commercial/industrial use to assess potential environmental impacts.

3.6 Investigation findings

Analytical soil results from testing of 36 soil samples are presented in summary Table C.1 and Table C.2 attached as Appendix C. Full laboratory transcripts reports are included in Appendix D.

All results were below both the adopted NES Soil and CCME Environmental guidelines for commercial/industrial use being the criteria for the assessment of effects on human health and the environment. Other key findings of the results compared are as follows:

- All heavy metal concentrations were generally consistent and likely indicative of local background concentrations.
- All OCP results were below laboratory detection level.
- All PAH results were below laboratory detection levels, with the exception of trace levels concentration at CLHA02 in the surface sample. This hand auger was located near the rest area at the summit of the SH3 road. The trace PAH concentration indicates exceedance of expected background concentrations but is below the adopted human health and environmental criteria.
- All TPH results were below laboratory detection, with the exception of trace concentrations C₁₅–C₃₀ at CLTP04 in the surface sample. CLTP04 is located within the northern farm area approximately 100 m to the east of the buildings on this property. The trace TPH concentration indicates exceedance of expected background concentrations but is below the adopted human health and environmental criteria.

3.7 Conceptual site model and assessment of environmental effects

A conceptual model as defined by the MfE Contaminated Land Management Guidelines No 5: Site Investigation and Analysis of Soils (updated 2011), sets out known and potential sources of contamination, potential exposure pathways, and potential receptors. For there to be an effect from the proposed activity there has to be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

A conceptual site model has been developed for the works associated with the proposed alignment, which takes into account the available information about the site, geological, hydrological and hydrogeological site conditions and our understanding of the potential effects on human health and the environment. The model is presented in Figure 3.1 overleaf.

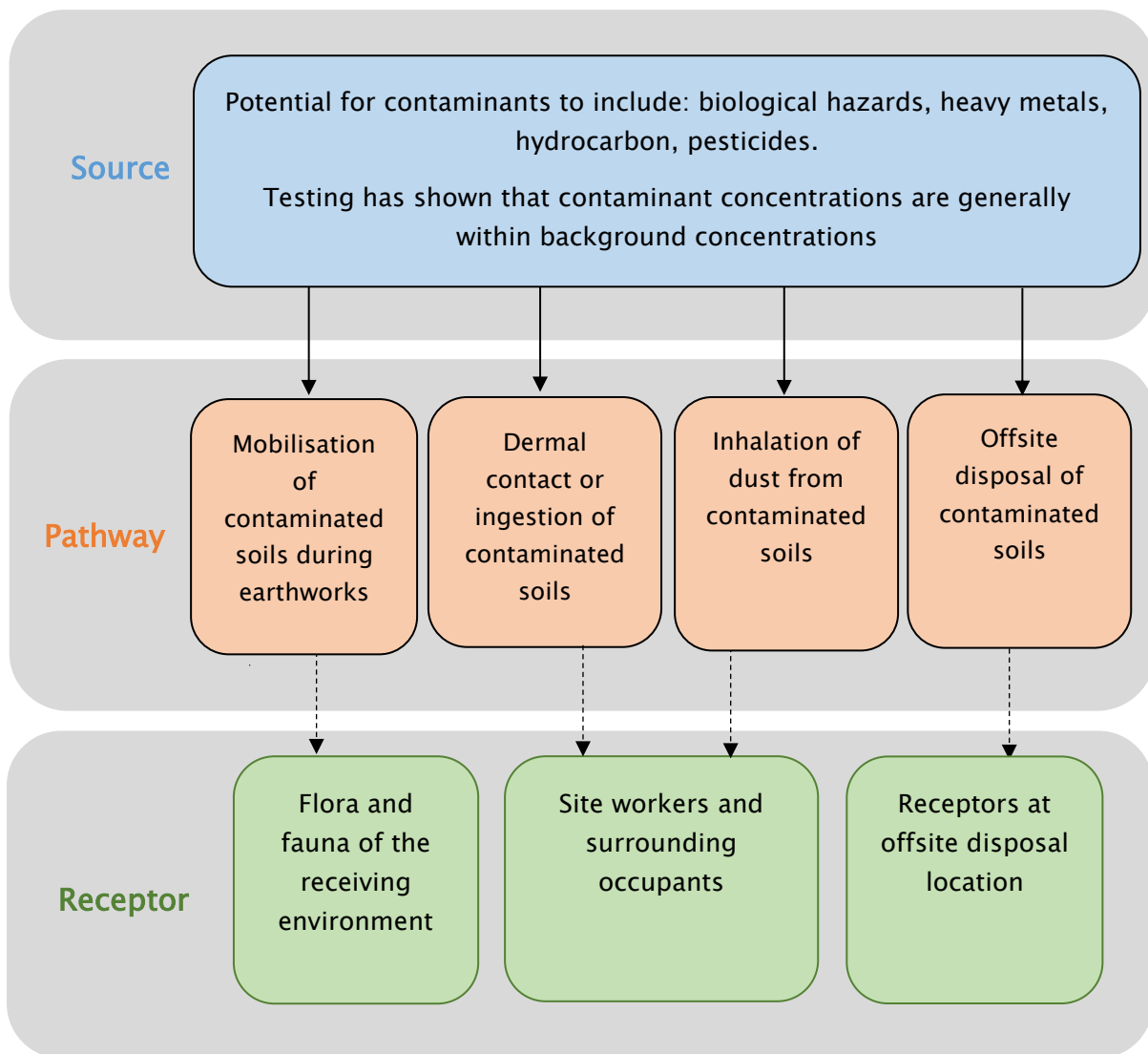


Figure 3.1 – Conceptual site model. Dash lines indicate incomplete pathways.

The conceptual site model, based on existing data, shows that there is no pathway for contaminants to pose a risk to human or environmental receptors during or at completion of the works, as they are not present in concentrations that exceed the relevant human health or environmental guidelines.

4 Implications and conclusions

A large portion of the Project area has not been subject to potential contaminating (or HAIL) activities. Potential contaminating activities (waste disposal to land) has been identified in the northern and southern extents of the Project alignment. The areas identified as potentially impacted by HAIL activities (waste disposal to land) that will be disturbed as part of the Project works have been subject to targeted soil sampling as part of this investigation. The results of this sampling indicate that the soils do not contain contaminants at a level that would present a risk to human health or the environment during or at the completion of works. Based on these results:

- No contaminated-land specific earthworks or health and safety controls therefore apply during the works.
- Soils disturbed during the Project are suitable for reuse on-site or disposal at on-site disposal locations located within the Project designation boundary, or disposed off-site at a location authorised to accept materials.

There remains the potential to encounter unexpected contamination during the proposed works. In such cases, the potential risks to human health and the environment are expected to be able to be managed during works through the implementation of appropriate controls so that the effects from contaminated land will be less than minor. Controls to identify and manage unexpected contaminated soil (if encountered) are specified in the CLMP. The CLMP details management, monitoring and reporting requirements with respect to contaminated land for the Project.

Appendices

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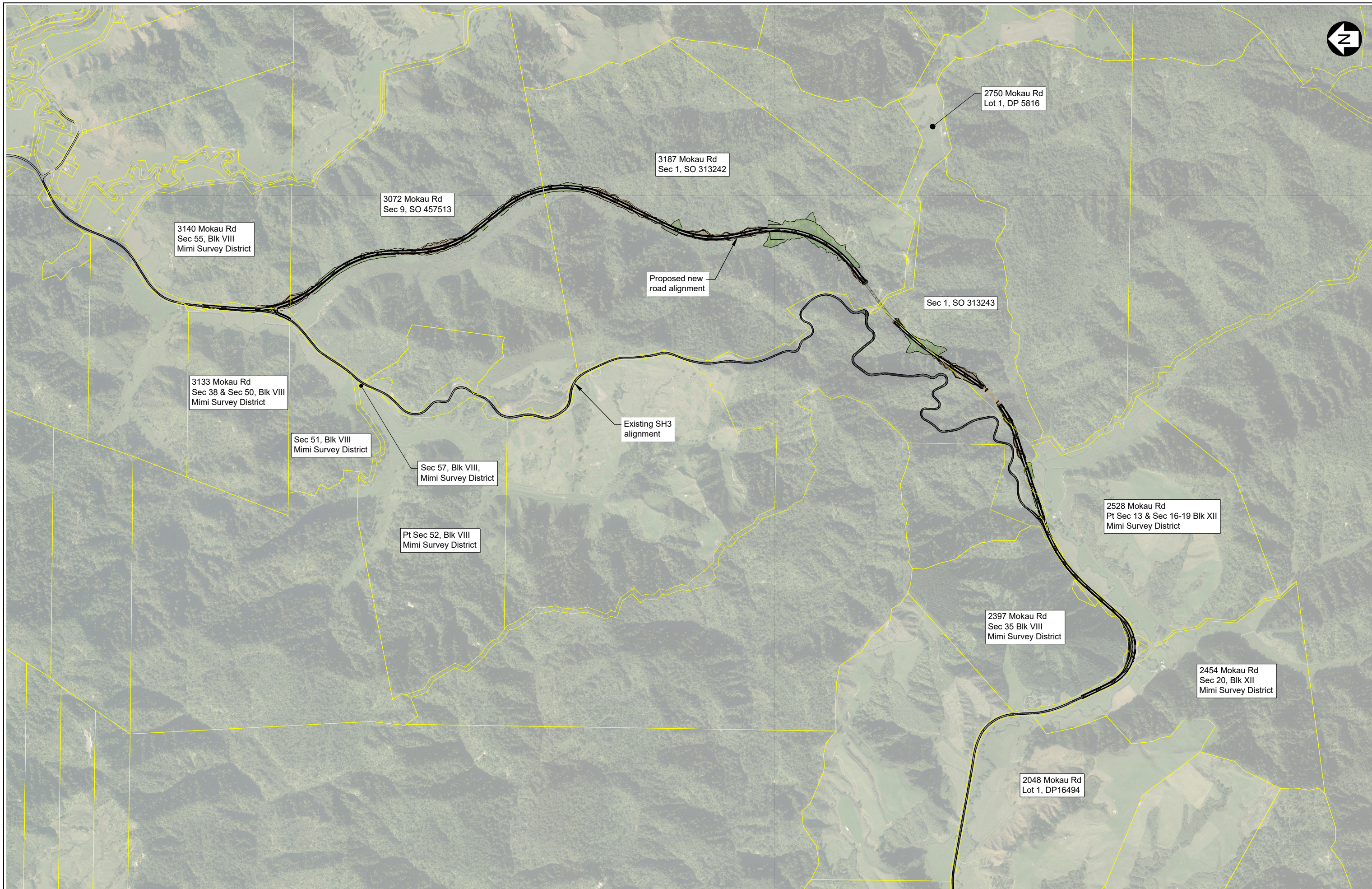
Appendix A: Figures

Figure 1 – Overview Site Plan

Figure 2 – Locations of Potential Contamination

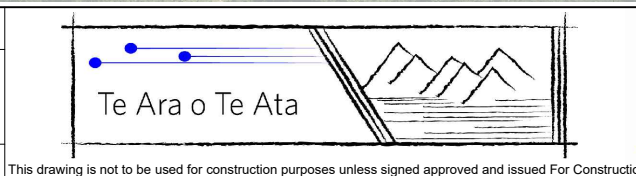
Figure 3a – Investigation Sample Locations – Mangapepeke Valley

Figure 3b – Investigation Sample Locations – Mimi Valley



Rev	Revision Description	Drawn	Checked	Designed	Design Checked	Approved	Date
A	FOR INFORMATION	WHE	QDO'S	-	-	-	01/11/2017

Tab	MMA-DES-ENV-E1-FIG-0001
Scales	NOT TO SCALE
Original Size	A1



MT MESSENGER SH3 REALIGNMENT

**ENVIRONMENTAL
GROUND CONTAMINATION PSI
OVERVIEW SITE PLAN**

Approved	NOT FOR CONSTRUCTION
Status	FOR INFORMATION
Drawing Number	MMA-DES-ENV-E1-FIG-0001
Revision	A



3072 Mokau Rd
Potential contamination should waste disposal to land have occurred in open farm areas the proposed alignment crosses

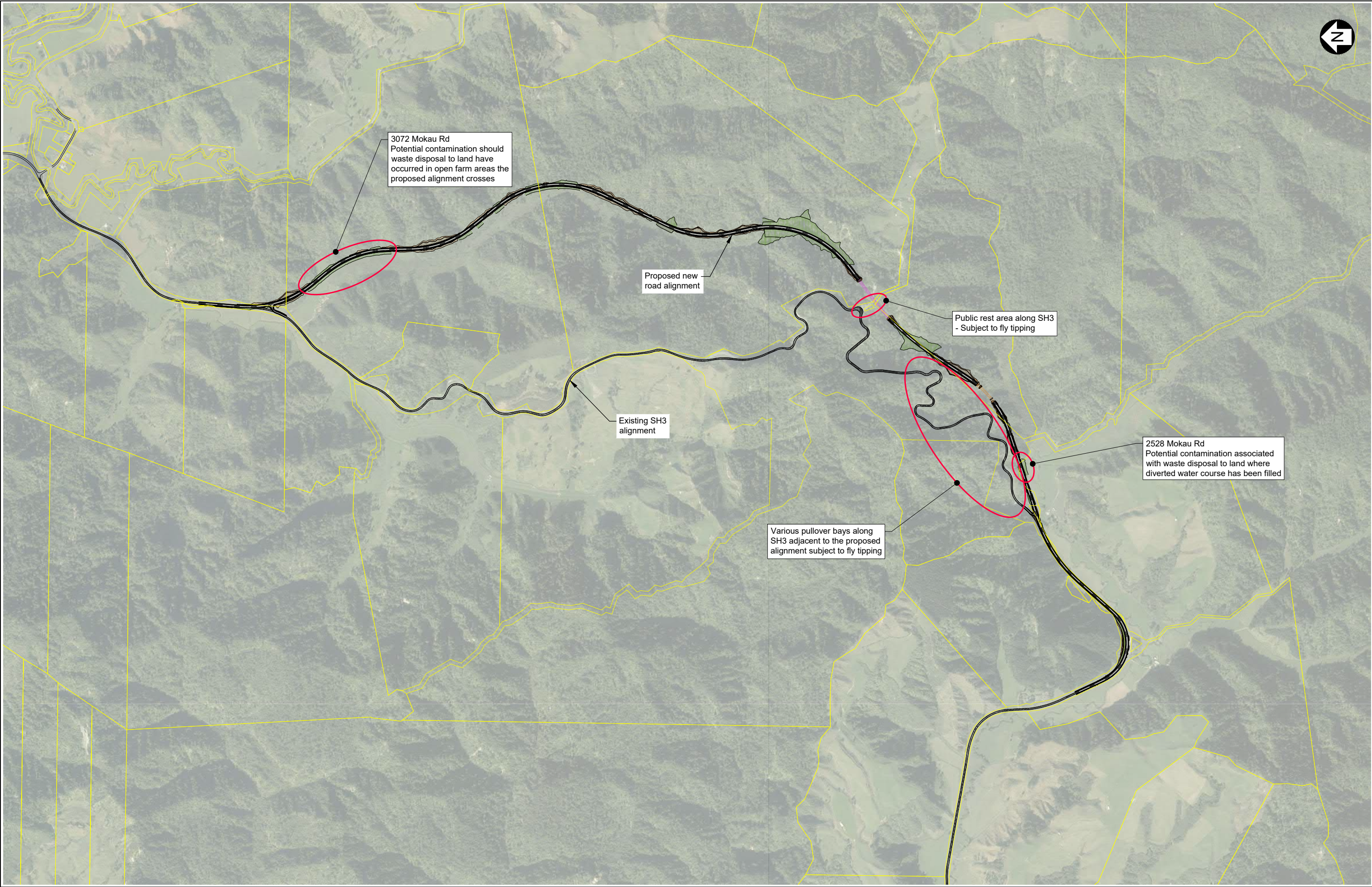
Proposed new road alignment

Public rest area along SH3
- Subject to fly tipping

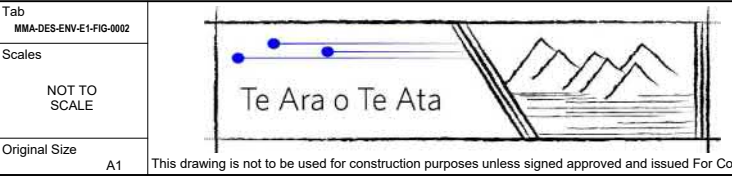
Existing SH3 alignment

2528 Mokau Rd
Potential contamination associated with waste disposal to land where diverted water course has been filled

Various pullover bays along SH3 adjacent to the proposed alignment subject to fly tipping



Tab	MMA-DES-ENV-E1-FIG-0002						
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Original Size	A1						
Rev	Revision Description	Drawn	Checked	Designed	Design Checked	Approved	Date
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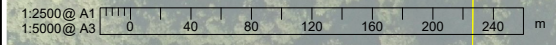
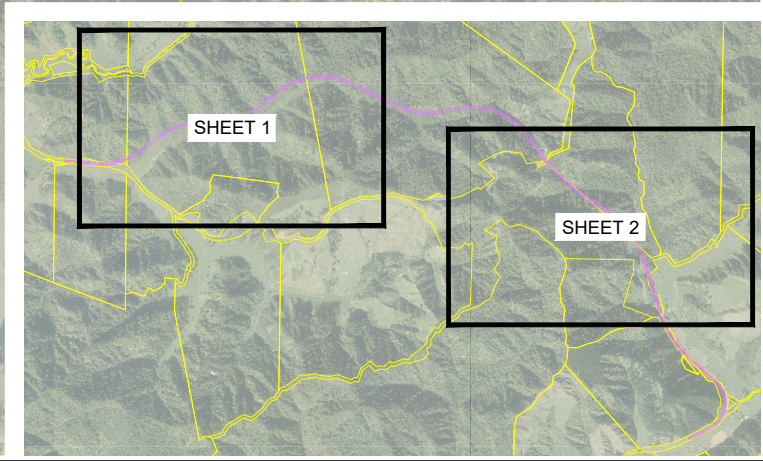
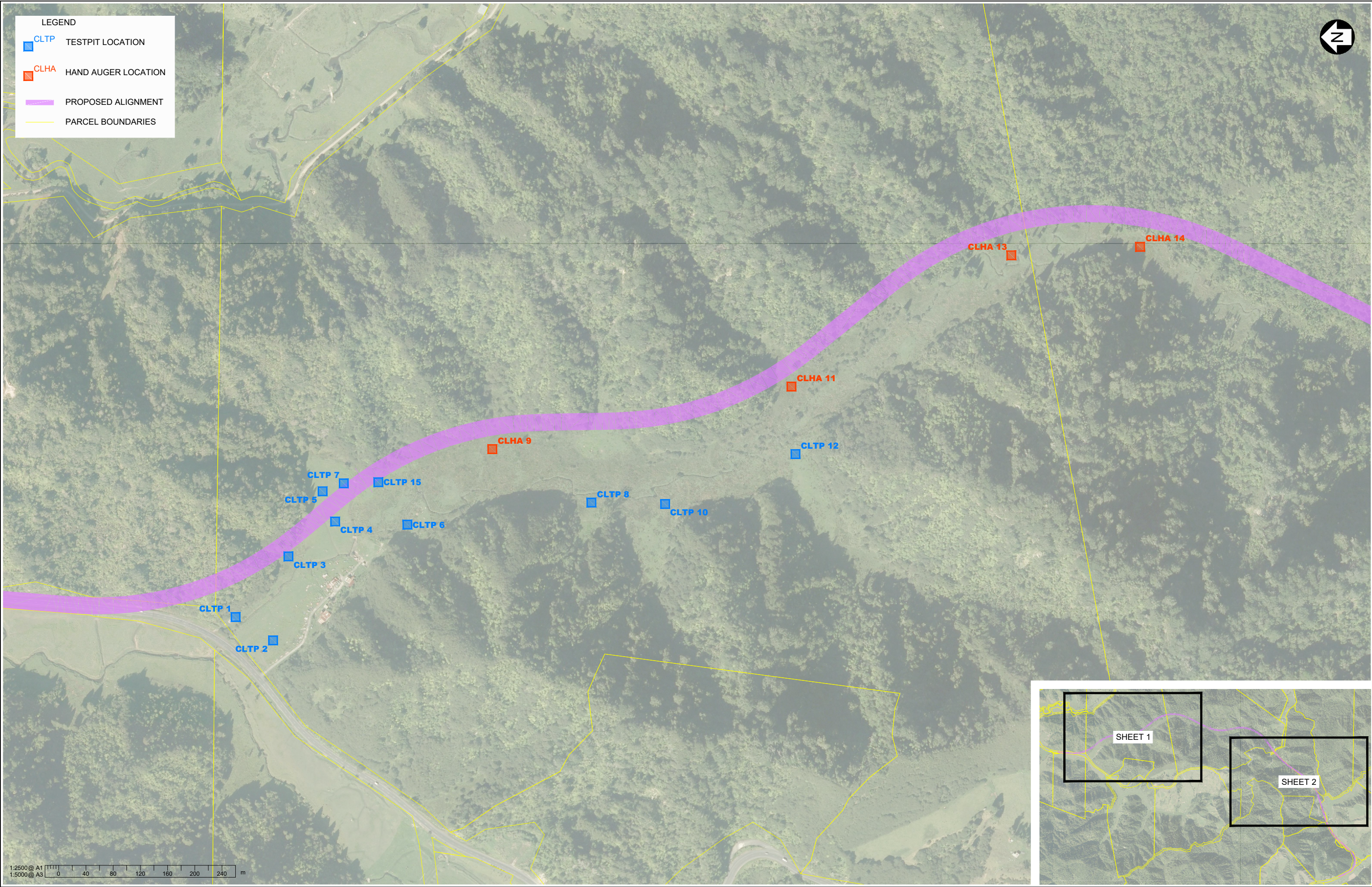


MT MESSENGER SH3 REALIGNMENT
ENVIRONMENTAL
GROUND CONTAMINATION PSI
LOCATIONS OF POTENTIAL CONTAMINATION

Approved	NOT FOR CONSTRUCTION
Status	FOR INFORMATION
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Revision	A

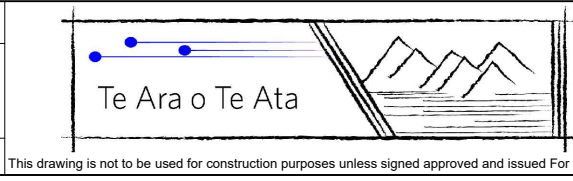
LEGEND

- CLTP TESTPIT LOCATION
- CLHA HAND AUGER LOCATION
- PROPOSED ALIGNMENT
- PARCEL BOUNDARIES



Rev	Revision Description	Drawn	Checked	Designed	Design Checked	Approved	Date
A	FOR INFORMATION	WHE	QDO'S	-	-	-	27/07/2018

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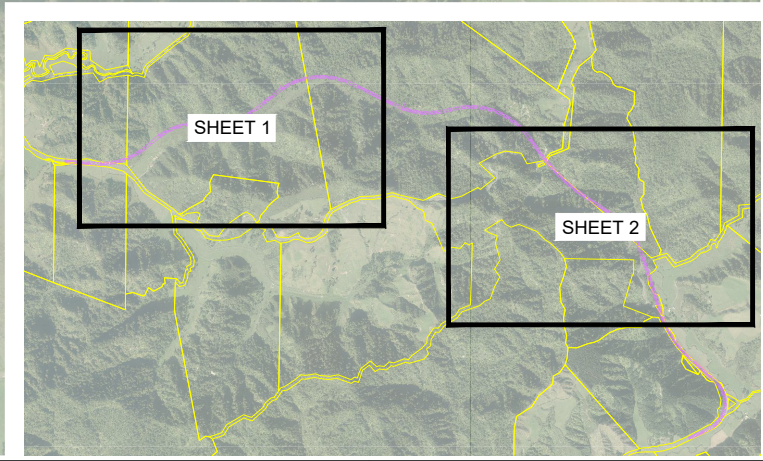
MT MESSENGER SH3 REALIGNMENT

**ENVIRONMENTAL
GROUND CONTAMINATION DSI
INVESTIGATION SAMPLE LOCATIONS - SHEET 1**

Approved	NOT FOR CONSTRUCTION
Status	FOR INFORMATION
Drawing Number	MMA-DES-ENV-E1-FIG-0012
Revision	A

LEGEND

- CLTP TESTPIT LOCATION
- CLHA HAND AUGER LOCATION
- PROPOSED ALIGNMENT
- PARCEL BOUNDARIES



1:2500 @ A1	1:5000 @ A3	0	40	80	120	160	200	240	m
A FOR INFORMATION		WHE	QDO'S	-	-	-	-	27/07/2018	
Rev	Revision Description	Drawn	Drawing Checked	Designed	Design Checked	Approved	Date	Original Size	A1

Tab	MMA-DES-ENV-E1-FIG-0013
Scales	1:5000 (A3) 1:2500 (A1)
Original Size	A1

Te Ara o Te Ata

NZ TRANSPORT AGENCY
WAKA KOTAHĪ
Mt Messenger Bypass

MT MESSENGER SH3 REALIGNMENT

ENVIRONMENTAL GROUND CONTAMINATION DSI INVESTIGATION SAMPLE LOCATIONS - SHEET 2

Approved	NOT FOR CONSTRUCTION
Status	FOR INFORMATION
Drawing Number	MMA-DES-ENV-E1-FIG-0013
Revision	A

Appendix B: Investigation Logs



EXCAVATION LOG

Excavation Id.: **CLHA01**

SHEET: 1 OF 1

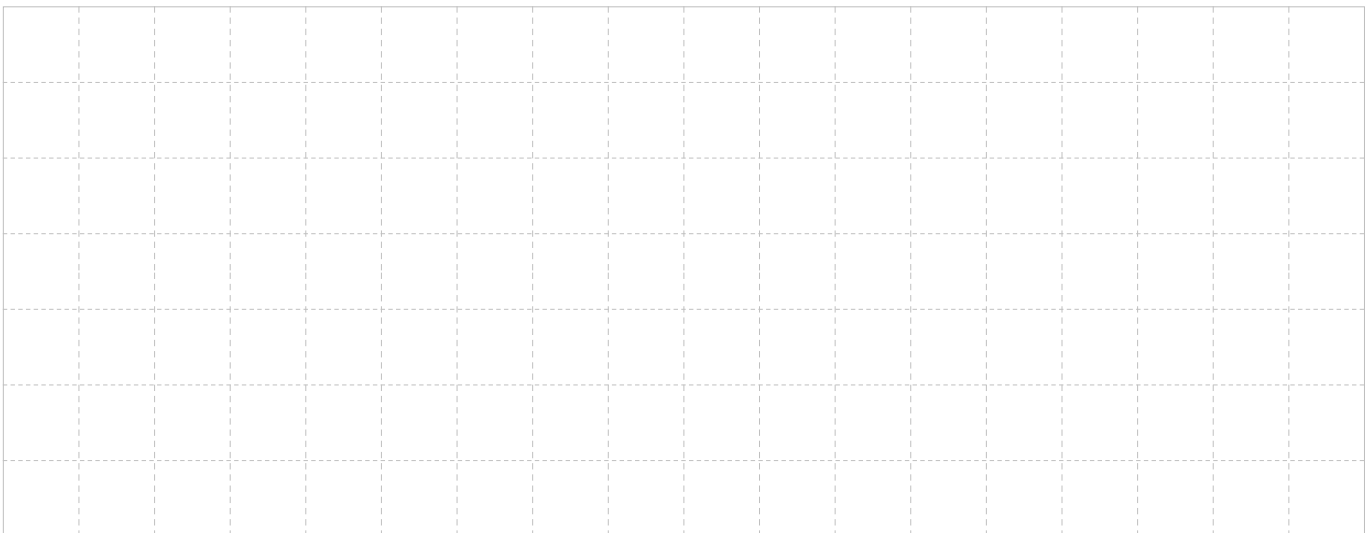
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5693518.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 12/12/2017
 (NZTM2000) 1738699.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 12/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.0m				SILT with some sand and minor clay; light yellowish brown. Very stiff, dry to moist, non-plastic.	D-M	VSI				Mount Messenger Formation
			Sample 2 @ 0.5m		0.5								
			Sample 3 @ 1.0m		1.0		Silty fine SAND; light yellowish brown. Loose, moist to wet, poorly graded. 1.2m reddish brown mottling	M-W	L				
		DRY 12/12/2017	Sample 4 @ 1.5m		1.5		Completely weathered, light yellowish brown SILTSTONE, very weak.		MD				
					2.0		End of investigation at 1.6 mbgl No standing groundwater encountered Hand auger aborted due to dense stratum						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.6m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLHA02**

SHEET: 1 OF 1

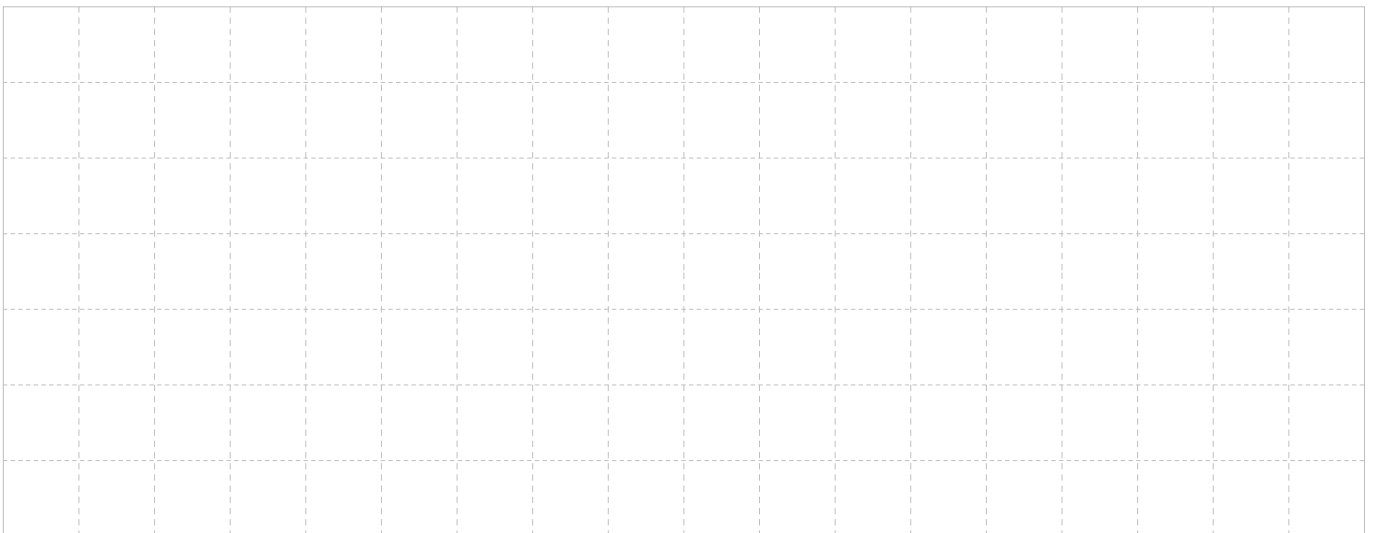
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5693517.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 12/12/2017
 (NZTM2000) 1738704.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 12/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.0m				SILT with trace sand and clay; light yellowish brown. Very stiff, dry to moist, non-plastic; sand, fine.	D-M		VSI			Mount Messenger Formation
			Sample 2 @ 0.5m		0.5		SILT with some clay and trace sand; light yellowish brown with some orange brown and grey mottling. Very stiff, moist, slightly plastic; sand, fine.			M			
			Sample 3 @ 1.0m		1.0								
			Sample 4 @ 1.5m		1.5		Highly weathered grey SILTSTONE, very weak, with some siltstone bedding.			MD-D			
					2.0		End of investigation at 1.6 mbgl No standing groundwater encountered Hand auger aborted due to dense stratum						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.6m



EXCAVATION LOG

Excavation Id.: **CLHA09**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

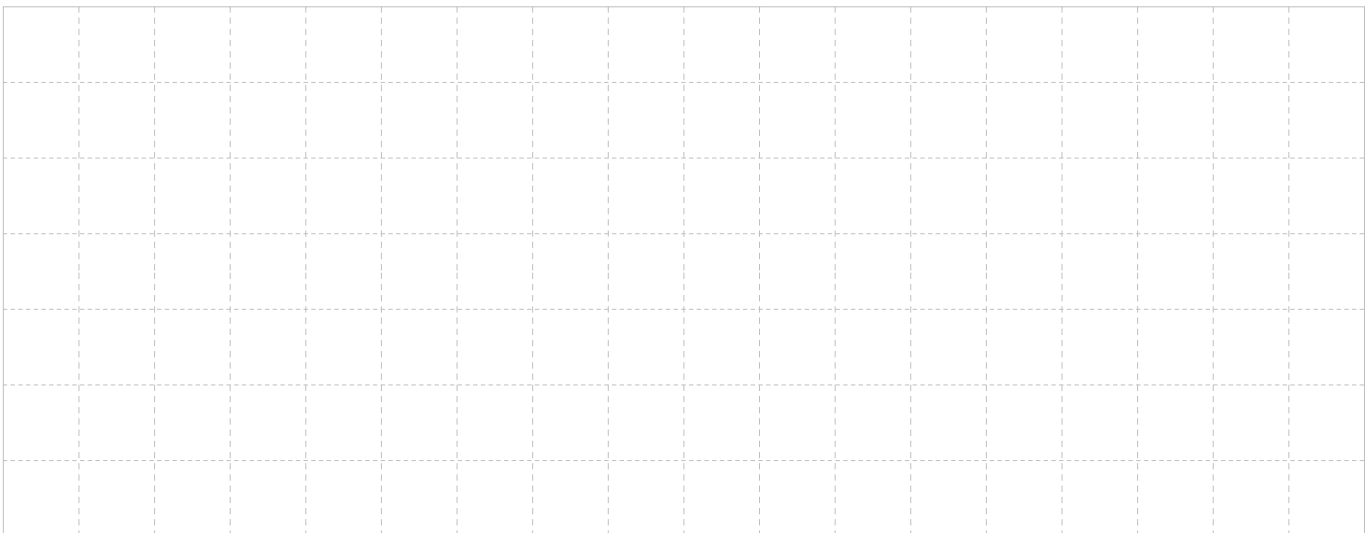
CO-ORDINATES: 5695853.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 13/12/2017
 (NZTM2000) 1738933.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 13/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.0m					SILT with some clay and rootlets; light brownish grey with some reddish brown most mottling. Stiff, moist, non-plastic; sand, fine.	M					
			Sample 2 @ 0.5m			0.5		SILT minor clay and trace sand and siltstone gravel; brownish grey. Firm, moist to wet, low plasticity; sand, fine; gravel; fine to medium, angular to subangular, highly to completely weathered.	M-W					
			Sample 3 @ 1.0m			1.0		SILT with some clay and minor sand; grey with some orange brown mottling. Firm, wet, low plasticity; sand, fine.	W					
			Sample 4 @ 1.5m			1.5		Organic SILT with some sand; dark bluish grey. Soft to firm, wet, low plasticity; sand, fine; organics, fibrous (decomposed wood).						
			Sample 5 @ 2.0m			2.0		End of investigation at 2.0 mbgl No standing groundwater encountered						

Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth 2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLHA11**

SHEET: 1 OF 1

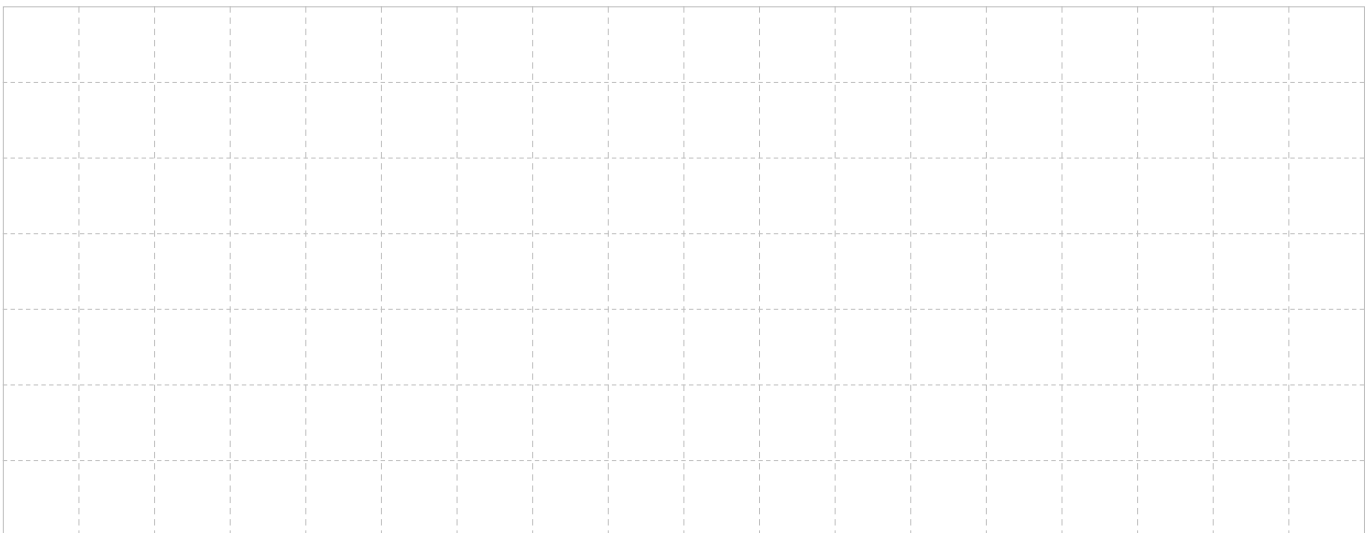
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5695412.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 15/12/2017
 (NZTM2000) 1738986.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 15/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.0m				SILT with some sand and minor clay; light brown with orange brown mottling. Very stiff, dry to moist, non-plastic.	D-M		VSI			Holocene Alluvial Deposits
			Sample 2 @ 0.5m		0.5		SILT with some sand and clay; light brownish grey with orange brown and reddish brown mottling. Stiff, moist, low plasticity; sand, fine.	M		St			
			Sample 3 @ 1.0m		1.0								
			Sample 4 @ 1.5m		1.5								
			Sample 5 @ 2.0m		2.0		Silty CLAY with trace sand; dark bluish grey. Firm, wet to saturated, high plasticity; sand, fine.	W-S		F			
							End of investigation at 2.0 mbgl No standing groundwater encountered						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLHA13**

SHEET: 1 OF 1

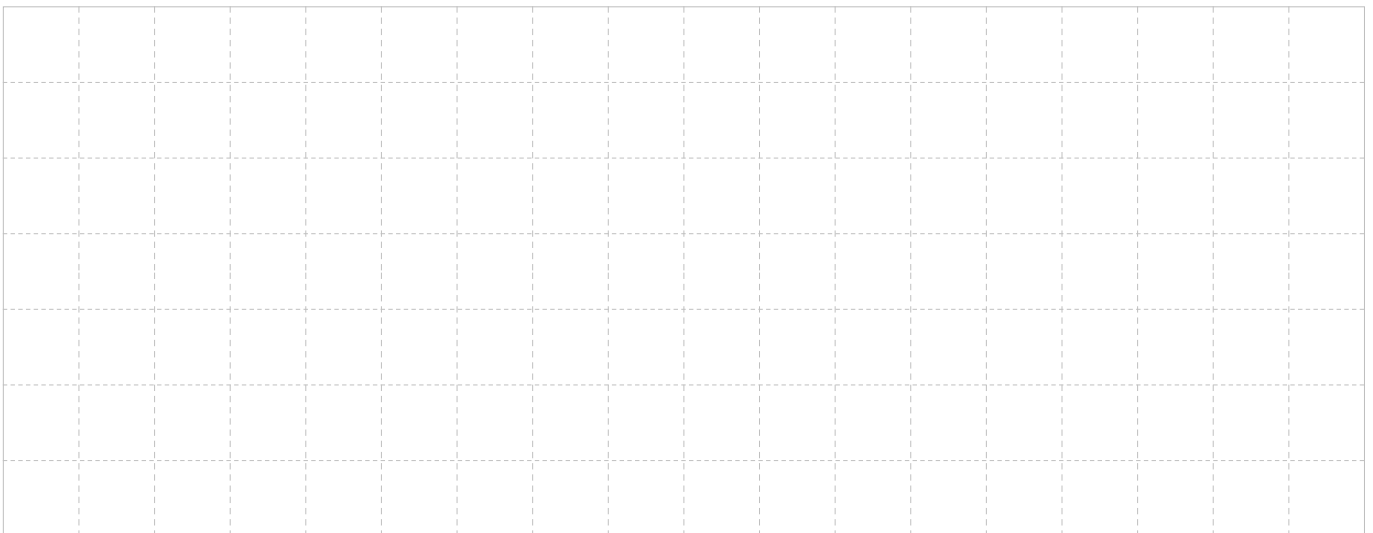
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5695117.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 15/12/2017
 (NZTM2000) 1739246.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 15/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.0m					SILT with some sand and trace clay; light grey with reddish brown mottling. Stiff, moist, low plasticity; sand, fine.	M		St			
			Sample 2 @ 0.5m			0.5		SILT with some sand, minor gravel and trace clay; light brown with reddish brown mottling. Stiff, moist, low plasticity; sand, fine; gravel, fine to coarse, angular to subrounded, fine to coarse, rock fragments (siltstone).						
			Sample 3 @ 1.0m			1.0		Clayey SILT with some gravel and trace sand; dark bluish grey. Firm to stiff, wet, low plasticity; gravel, fine to coarse, subangular to subrounded, moderately to completely weathered, rock fragments (siltstone).	W		F-St			
			Sample 4 @ 1.5m			1.5		1.5m: saturated						
								No Recovery	S					
									W					
								End of investigation at 1.80 mbgl						
						2.0		No standing groundwater encountered						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.8m



EXCAVATION LOG

Excavation Id.: **CLHA14**

SHEET: 1 OF 1

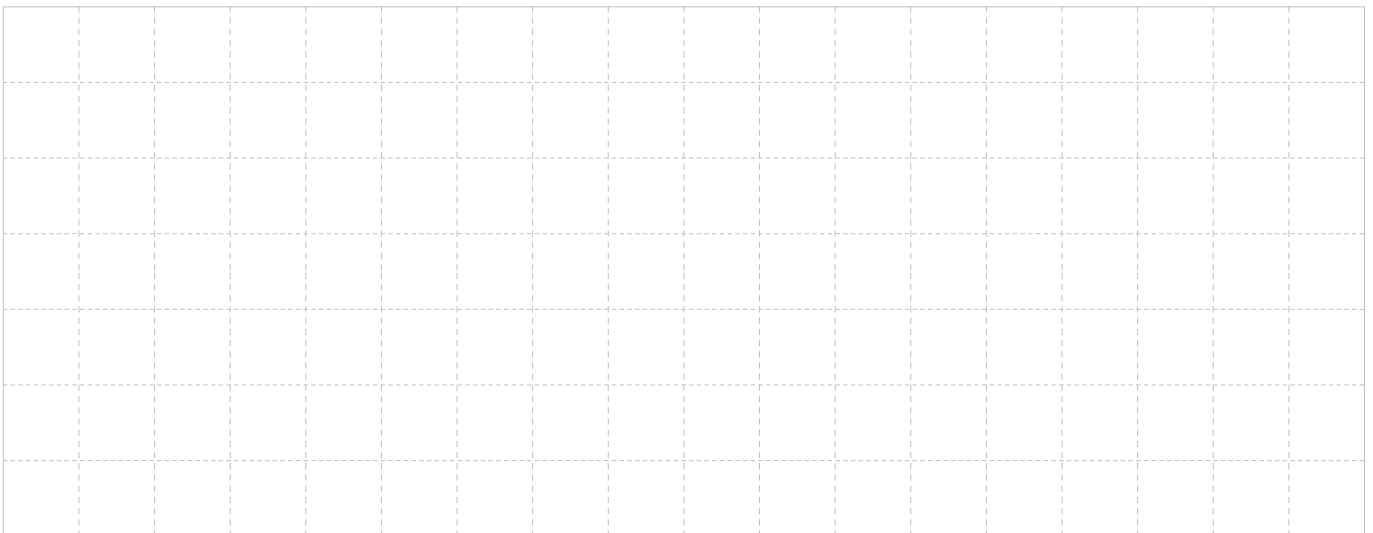
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5694924.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 15/12/2017
 (NZTM2000) 1739182.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 15/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL						
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.2m					SILT with some minor clay; light brown with some reddish brown mottling. Firm to stiff, moist, low plasticity.	M		F-St			
			Sample 2 @ 0.5m		0.5			Silty, fine SAND; dark bluish grey. Very loose, wet, poorly graded.	W		VL			
			Sample 3 @ 1.0m		1.0			Sandy SILT with trace clay; dark bluish grey. Soft, wet, low plasticity; sand, fine.			S			
			Sample 4 @ 1.5m		1.5			1.1m: becomes saturated	S					
								End of investigation at 1.50 mbgl No standing groundwater encountered HA aborted due to collapse						
						2.0								

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.5m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP01**

SHEET: 1 OF 1

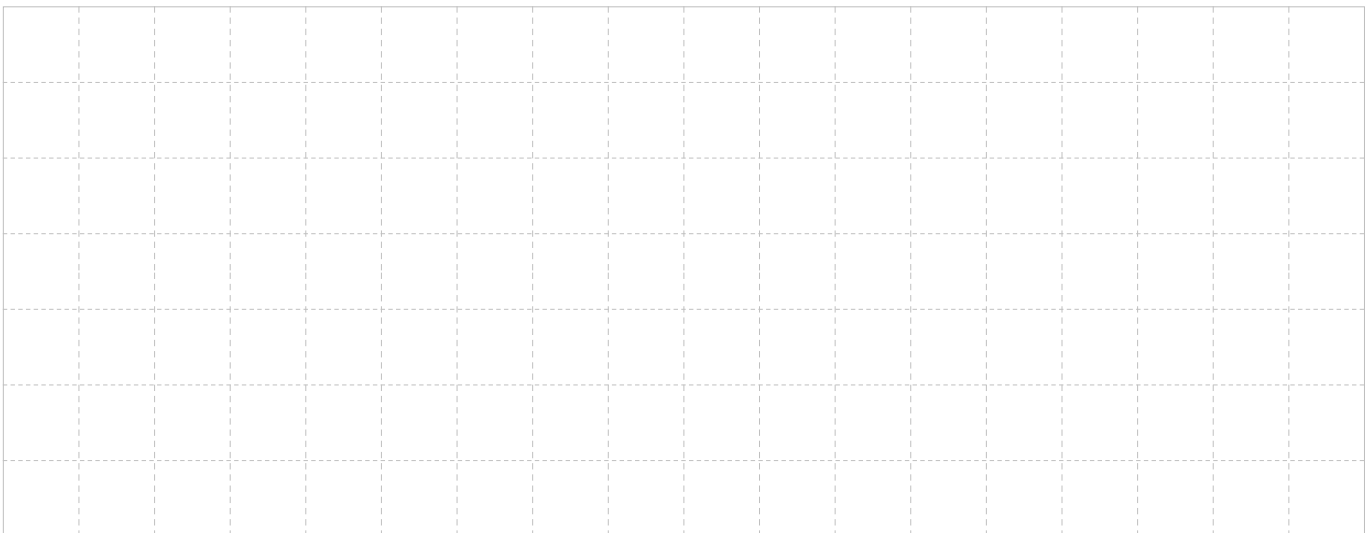
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5696233.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 12/12/2017
 (NZTM2000) 1738654.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 12/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3			● 52/18 kPa Sample 1 @ 0.0m					TOPSOIL, brown, dry.	D		St			
			● 68/9 kPa Sample 2 @ 0.5m			0.5		SILT with some sand and trace clay and gravel; orange brown with some dark brown and orange brown mottling. Very stiff, moist, low plasticity; sand, fine; gravel, fine to medium. subrounded to rounded, moderately weathered, rock fragments (siltstone) 0.3m: becomes stiff	M		VSt St			Fill
		12/12/2017	● 44/6 kPa Sample 3 @ 1.0m			1.0		SILT with some sand and trace rootlets; light greyish brown with reddish brown mottling. Firm, wet, low plasticity; sand, fine. SILT with some clay and sand, trace organics; light grey with some orange brown mottling. Firm, wet, low plasticity; organics, fibrous (decomposed wood). Sandy SILT with trace organics; light grey with orange brown mottling. Soft, saturated, low plasticity; organics, fibrous.	W		F			Holocene Alluvial Deposits
			● 26/4 kPa Sample 4 @ 1.5m			1.5		Clayey SILT, with trace sand and siltstone boulders; light grey. Soft, saturated, low plasticity; sand, fine. 1.2m: dominated by burnt organics (wood). Organic SILT with minor sand; dark blackish brown. Firm, saturated, low plasticity; sand, fine; organics, fibrous (decomposing wood). Clayey SILT with some sand and some rootlets; bluish grey. Soft, saturated, low plasticity; sand, fine; organics, fibrous.	S		S			
			● 18/1 kPa Sample 5 @ 2.0m			2.0		Organic SILT; dark brown. Soft, saturated, low plasticity; organics, fibrous (tree roots and decomposing wood - strong organic smell).						
								End of investigation at 2.2 mbgl Standing groundwater encountered at 0.90 mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2.2m



EXCAVATION LOG

Excavation Id.: **CLTP02**

SHEET: 1 OF 1

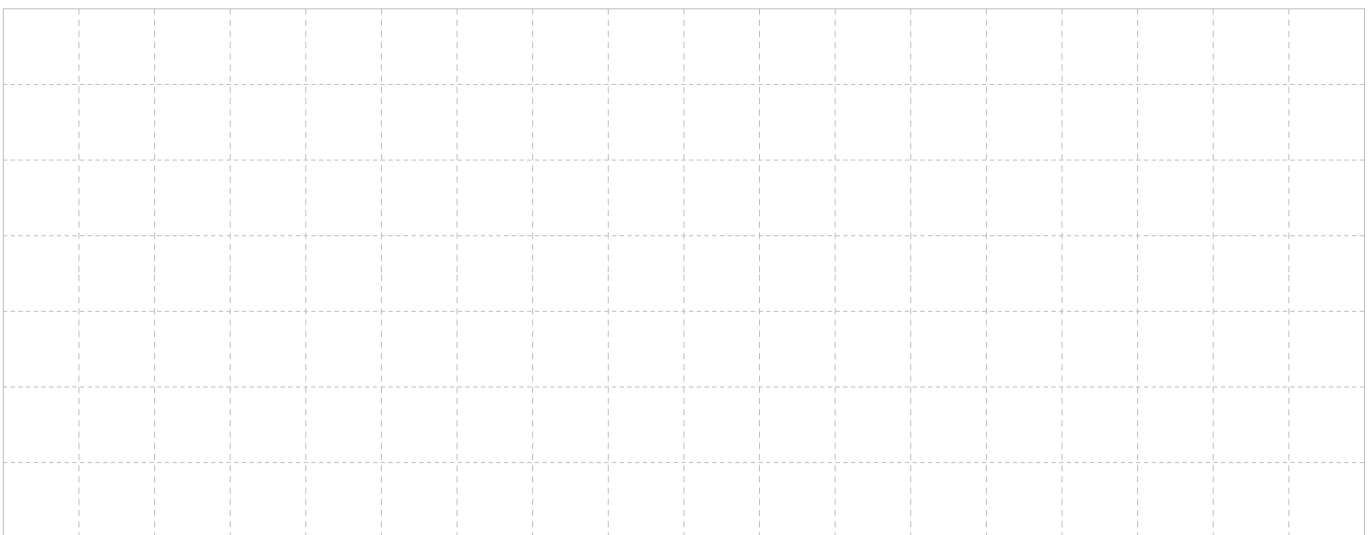
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5696199.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 14/12/2017
 (NZTM2000) 1738610.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 14/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m					SILT; light brown with some orange brown mottling. Very stiff, dry, non-plastic.	D		VS			Holocene Alluvial Deposits
			Sample 2 @ 0.5m			0.5		SILT with some clay and minor sand; brown. Stiff, moist, low plasticity; sand, fine. 0.45m: dark grey mottling	M		St			
			Sample 3 @ 1.0m			1.0		Changes to Clayey SILT; light brown some grey inclusions. Firm to stiff, wet, high plasticity.	W		F-St			
		14/12/2017	Sample 4 @ 1.5m			1.5		1.4m: slow groundwater inflow 1.75m: becomes saturated 1.8m: becomes light grey with some orange brown mottling						
			Sample 5 @ 2.0m			2.0		End of investigation at 2.0 mbgl	S					

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP03**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

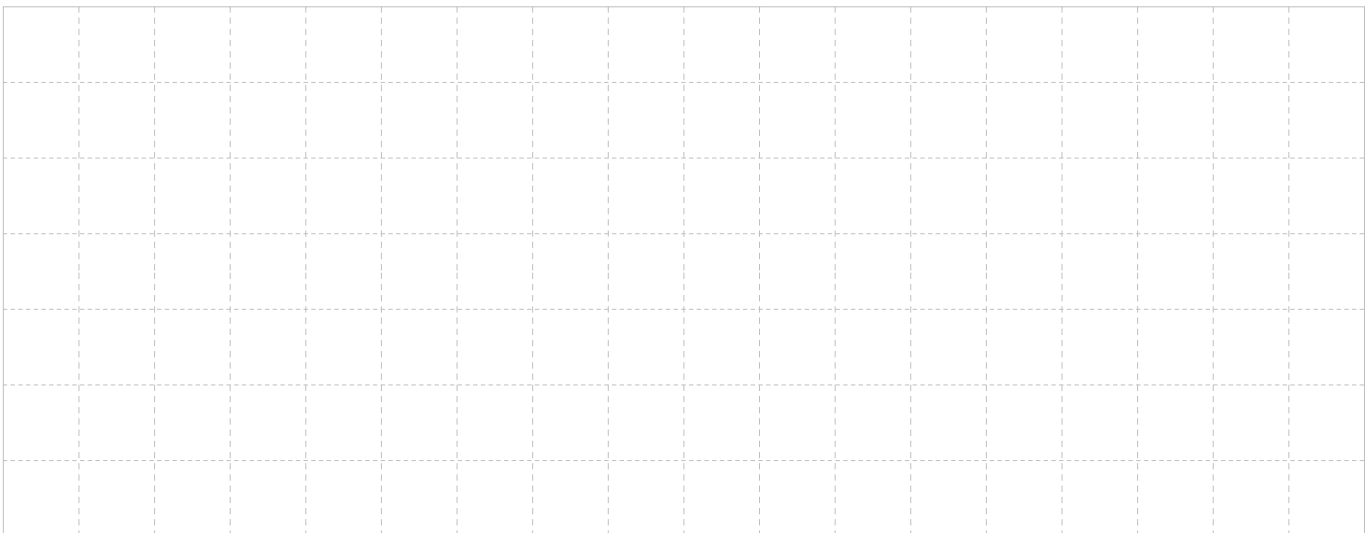
CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 13/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 13/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL						
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m					Light brown, silty topsoil with some black organics.	M		S			
			Sample 2 @ 0.5m			0.5		Clayey SILT with some organics; light grey with some brown mottling. Soft, moist, low plasticity; organics, burnt wood.						
			Sample 3 @ 1.0m			1.0		Silty CLAY; light grey with some brown mottling.			W			
			Sample 4 @ 1.5m			1.5		CLAY with trace silt; light grey. Very soft, high plasticity.			VS			
		13/12/2017	Sample 5 @ 2.0m			2.0		End of investigation at 2.0 mbgl Groundwater seeping in at 2 mbgl						

Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP04**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

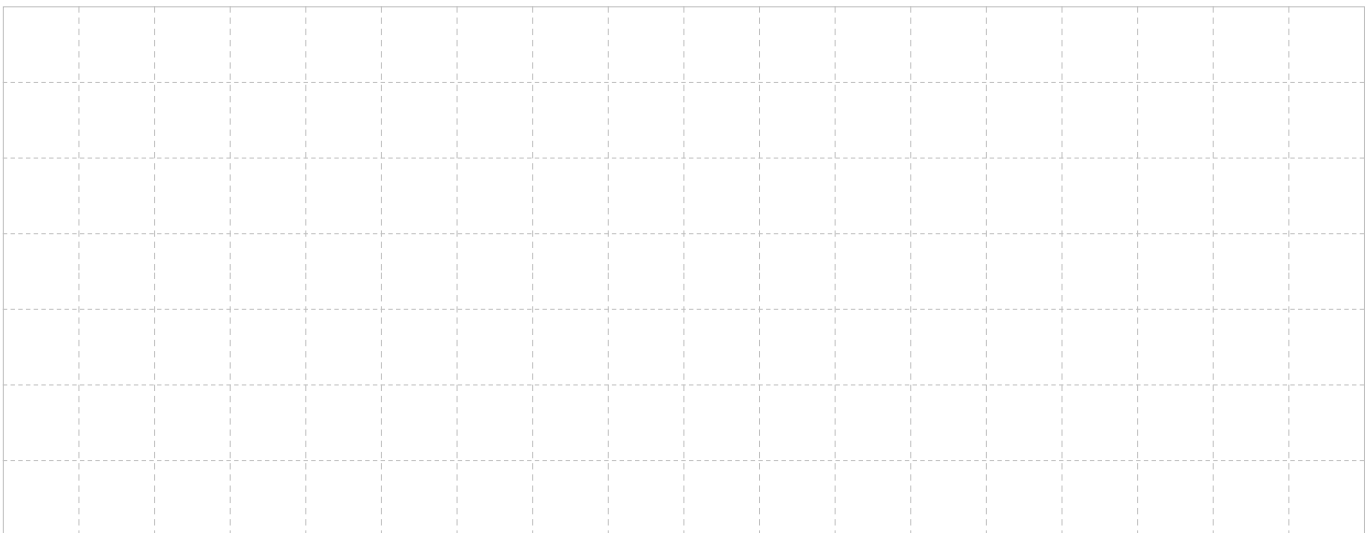
CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 13/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 13/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	DEPTH (m)	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3										10 25 50 100 200		
			Sample 1 @ 0.0m		0.0	Silty light brown TOPSOIL Clayey SILT; light brown. Firm, moist, moderately plastic.	D		H			
			● 39/- kPa Sample 2 @ 0.5m		0.5	0.5m: stained dark reddish brown	M					
		12/12/2017	● 31/7 kPa Sample 3 @ 1.0m		1.0	1.0m: becomes bluish grey, streaked brown, high plasticity Silty CLAY; light brownish grey. Firm, moist to wet, moderate to high plasticity.	M-W		St			
			● 26/7 kPa Sample 4 @ 1.5m		1.5	1.5m: large log and branches						
			● 24/4 kPa		2.0	End of investigation at 2.0 mbgl Standing groundwater encountered at 1.2 mbgl						

Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m
Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP05**

SHEET: 1 OF 1

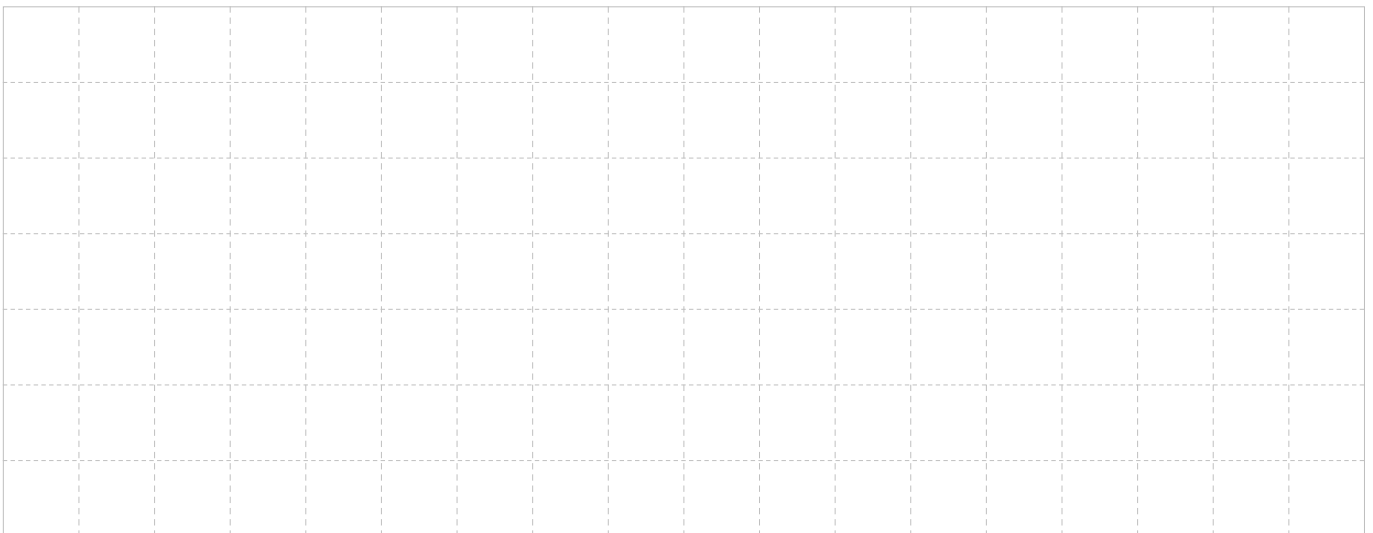
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5696121.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 13/12/2017
 (NZTM2000) 1738825.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 13/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL						
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m					Silty brown TOPSOIL SILT with minor sand; light brown. Firm, dry, low plasticity; sand, fine.	D		SI F			
			● 39/- kPa Sample 2 @ 0.5m			0.5		0.5m: logs with decomposing organics Clayey SILT; light brown. Firm, moist, moderately plastic.			M			
			● 35/8 kPa Sample 3 @ 1.0m			1.0		Clayey SILT with some organics; bluish grey streaked brown. Firm, moist, moderately plastic.						
		13/12/2017	● 34/8 kPa Sample 4 @ 1.5m			1.5		Becomes CLAY with some silt and minor organics. Firm, wet, high plasticity.			W			
			Sample 5 @ 2.0m			2.0		End of investigation at 2.0 mbgl Slow groundwater inflow at 1.2 mbgl						
			● 38/8 kPa											Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP06**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

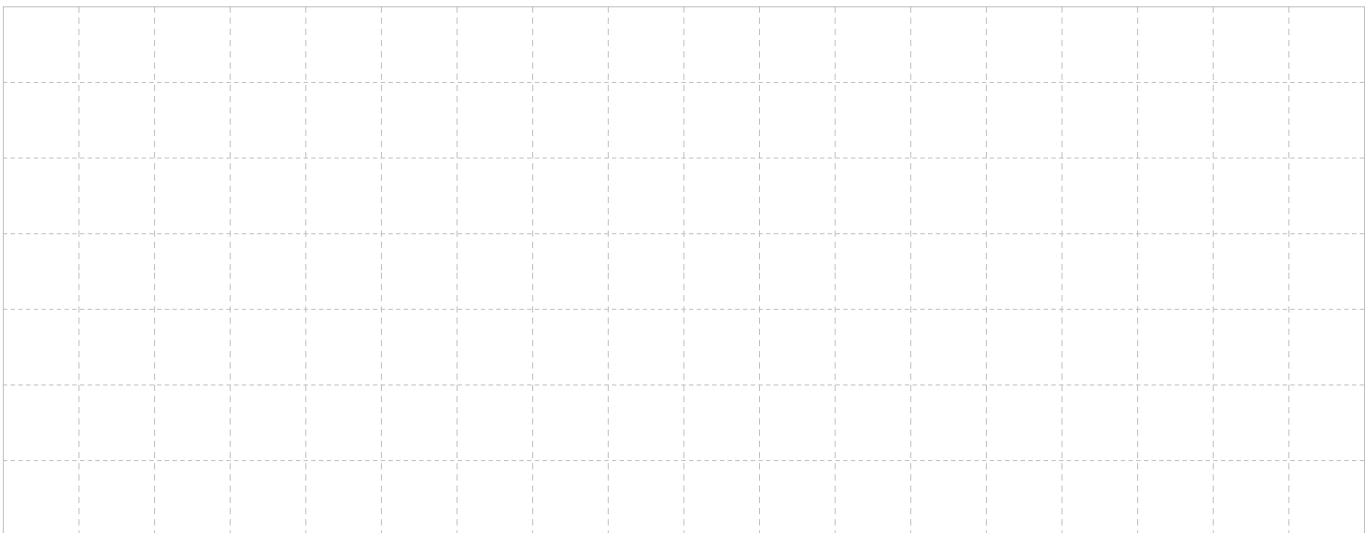
CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 14/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 14/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL						
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m			0.1		Silty brown TOPSOIL SILT with minor clay and trace fine sand; light brownish grey. Stiff, moist, low plasticity.	M		St			
			Sample 2 @ 0.5m			0.5		SILT with minor clay and trace sand; light brownish grey. Firm, moist, low plasticity; sand, fine. 0.94m: becomes with siltstone gravels (dark grey)			F			
			Sample 3 @ 1.0m			1.0		Clayey SILT; dark grey with brown mottling. Firm, moist to wet, moderate to high plasticity.			M-W			
			Sample 4 @ 1.5m			1.5		1.5m: 100mm thick terracoata brown layer						
			Sample 5 @ 2.0m			2.0		Silty CLAY; dark bluish grey. Firm, wet, moderate to high plasticity. 1.8m: groundwater inflow			W			
								End of investigation at 2.1 mbgl Standing groundwater encountered at 1.8 mbgl						

Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2.1m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP07**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5696103.00 N (NZTM2000) 1738874.00 E EXPOSURE METHOD: TP EXCAV. STARTED: 13/12/2017

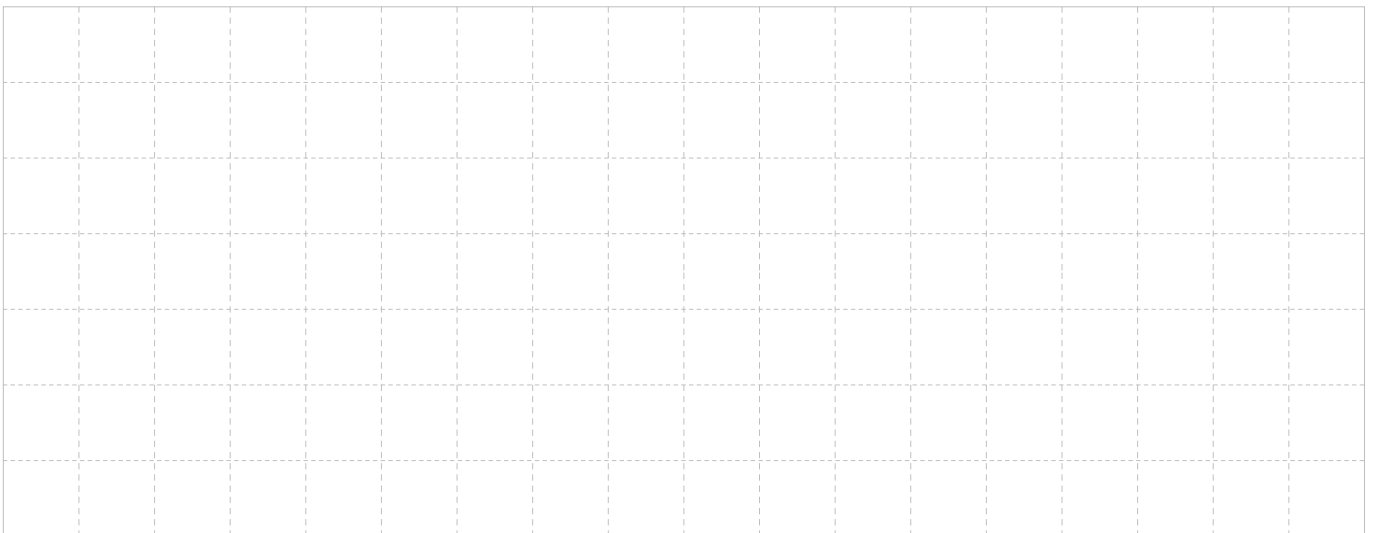
R.L.: EQUIPMENT: 2T Excavator EXCAV. FINISHED: 13/12/2017

DATUM: OPERATOR: Downers LOGGED BY: THOV

 DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.1m ● 39/- kPa				Sandy SILT, brown TOPSOIL SILT with some fine sand and minor clay; light brown. Firm, dry, low to moderate plasticity.	D		SI F			Holocene Alluvial Deposits
			Sample 2 @ 0.5m ● 39/- kPa		0.5		Clayey SILT; light brown with grey mottling. Firm, moist, moderate plasticity.			M			
			Sample 3 @ 1.0m ● 39/- kPa		1.0		Silty CLAY, with fine sand; bluish grey. Firm, wet, high plasticity.			W			
		13/12/2017	● 19/1 kPa				1.2m: becomes soft 1.3m: becomes saturated			S			
			● 19/4 kPa Sample 4 @ 1.5m		1.5		1.5m: becomes wet with some organics			S			
			● 32/6 kPa				1.7m: logs and branches						
			Sample 5 @ 2.0m		2.0		End of investigation at 2.0 mbgl Standing groundwater encountered at 1.3mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP08**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

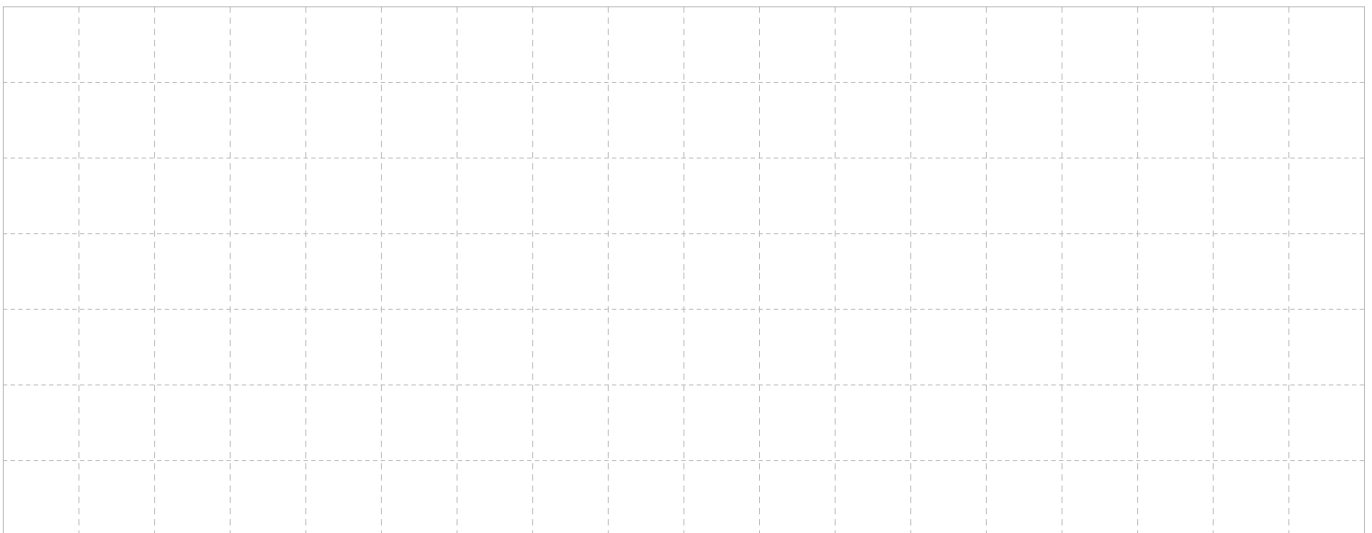
CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 14/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 14/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV

DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.1m				Silty brown TOPSTOIL, dry.	D		VSt			Holocene Alluvial Deposits
			● 47/9 kPa Sample 2 @ 0.5m		0.5		SILT with minor sand and trace clay; light brown. Hard, dry, low plasticity 0.5m: becomes with siltstone gravels (brown) 0.52m: becomes moist			H			
			● 39/- kPa Sample 3 @ 1.0m		1.0		SILT with some clay, gravel and trace sand; light grey. Very stiff, moist low to moderate plasticity; gravel, fine to coarse, subangular to subrounded, moderately weathered, rock fragments (siltstone); sand, fine. 1.2m: becomes with siltstone boulders and orange brown streaking 1.3m: 100mm thick layer of terracotta brown			VSt			
			● 23/2 kPa Sample 4 @ 1.5m		1.5		Clayey SILT with some sand; dark bluish grey. Firm, wet, moderate to high plasticity. 1.8m: becomes with organics, fibrous (wood) 2.0m: becomes with some siltstone gravel (dark grey)	W		F			
			● 22/3 kPa Sample 5 @ 2.0m		2.0		End of investigation at 2.0 mbgl No standing groundwater encountered						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP10**

SHEET: 1 OF 1

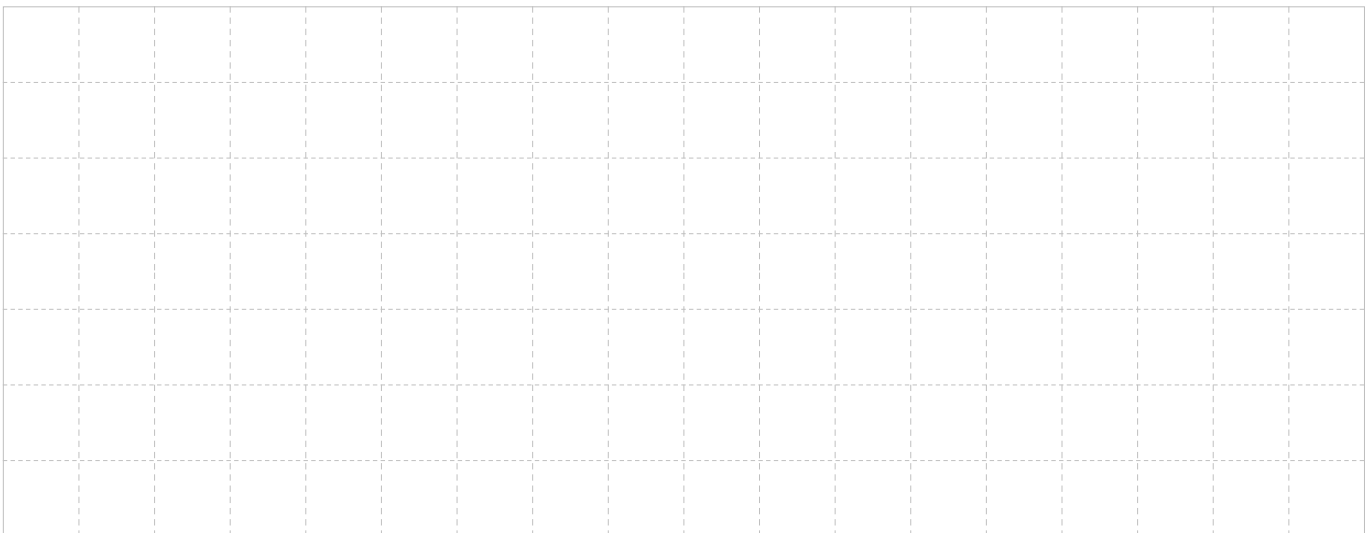
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 14/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 14/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.0m					Silty brown TOPSOIL, dry.	D		St			
			Sample 2 @ 0.5m			0.5		SILT with some sand and trace clay and cobbles; light brown. Very stiff, dry to moist, low plasticity; sand, fine, cobbles, siltstone. 0.5m: 100mm layer of siltstone cobbles	D-M		vSt			
			Sample 3 @ 1.0m			1.0		Sandy SILT; dark bluish grey with orange brown mottling. Firm, wet, low plasticity. 1.1m: becomes with siltstone gravel (dark grey)	W		F			
			Sample 4 @ 1.5m			1.5		Clayey SILT with some sand; dark bluish grey with orange brown mottling. Stiff, moist, moderate to high plasticity; sand, fine. 1.7m: 100mm thick layer terracotta brown	M		St			
			Sample 5 @ 2.0m			2.0		Sandy SILT with some clay and organics; dark bluish grey. Firm, saturated, high plasticity; organics (giant log).	S		F			
								End of investigation at 2.0 mbgl Standing groundwater encountered at 1.8 mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m
Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP12**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

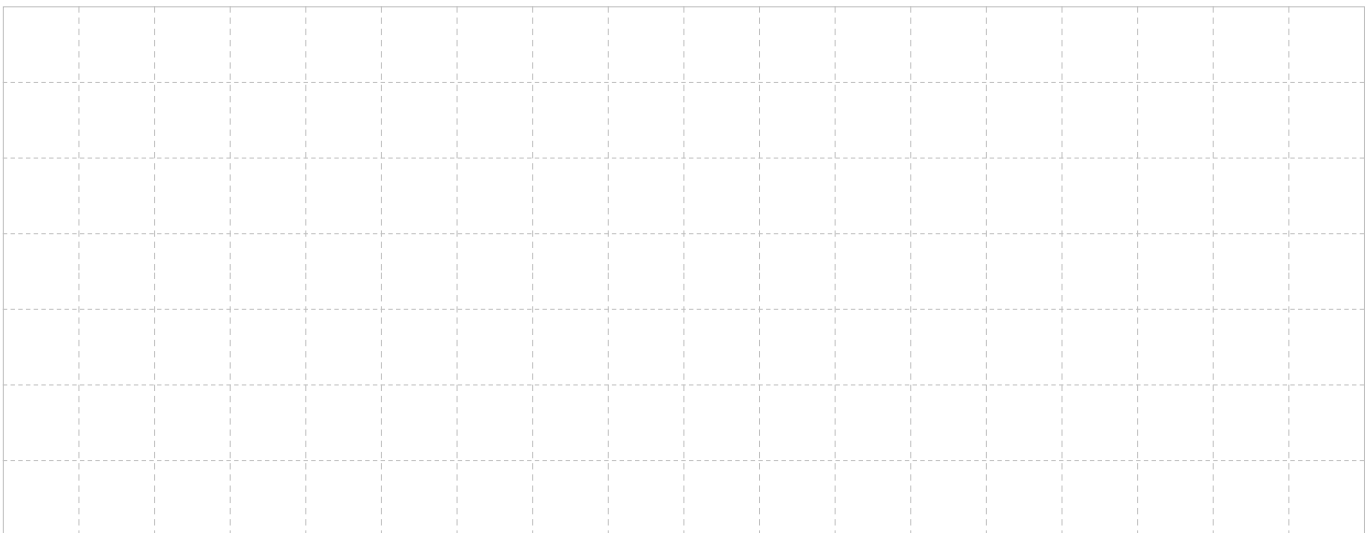
CO-ORDINATES: (NZTM2000) EXPOSURE METHOD: TP EXCAV. STARTED: 14/12/2017
 EQUIPMENT: 2T Excavator EXCAV. FINISHED: 14/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m					TOPSOIL, brown, dry.	D		SI			
			Sample 2 @ 0.5m			0.5		SILT with some sand and trace clay; light brown with orange brown mottling. Hard, dry to moist, non-plastic.	D-M		H			
			Sample 3 @ 1.0m			1.0		Silty fine SAND; dark bluish grey. Very loose, wet, poorly graded.	W		VL			
			Sample 3 @ 1.0m			1.0		Organic SILT; dark bluish grey. Soft to firm, wet, low plasticity; organics, amorphous and fibrous (tree rootlets)			S-F			
			Sample 3 @ 1.0m			1.0		changes into PEAT; black. Soft, wet, low plasticity, fibrous.			F			
			Sample 4 @ 1.5m			1.5		Clayey SILT with some sand; dark bluish grey. Firm, wet to saturated, low plasticity.	W-S		S			
			Sample 4 @ 1.5m			1.5		Changes into Sandy SILT, with some organics and minor clay; dark bluish grey. Soft, saturated, low plasticity; organics, fibrous (decomposed wood).	S		S			
			Sample 4 @ 1.5m			1.5		Silty CLAY, with trace sand and organics; bluish grey. Soft, wet, high plasticity; sand, fine.	W					
			Sample 5 @ 2.0m			2.0		End of investigation at 2.0 mbgl No standing groundwater encountered						

Holocene Alluvial Deposits

SKETCH / PHOTO:



COMMENTS:

Hole Depth 2m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP14**

SHEET: 1 OF 1

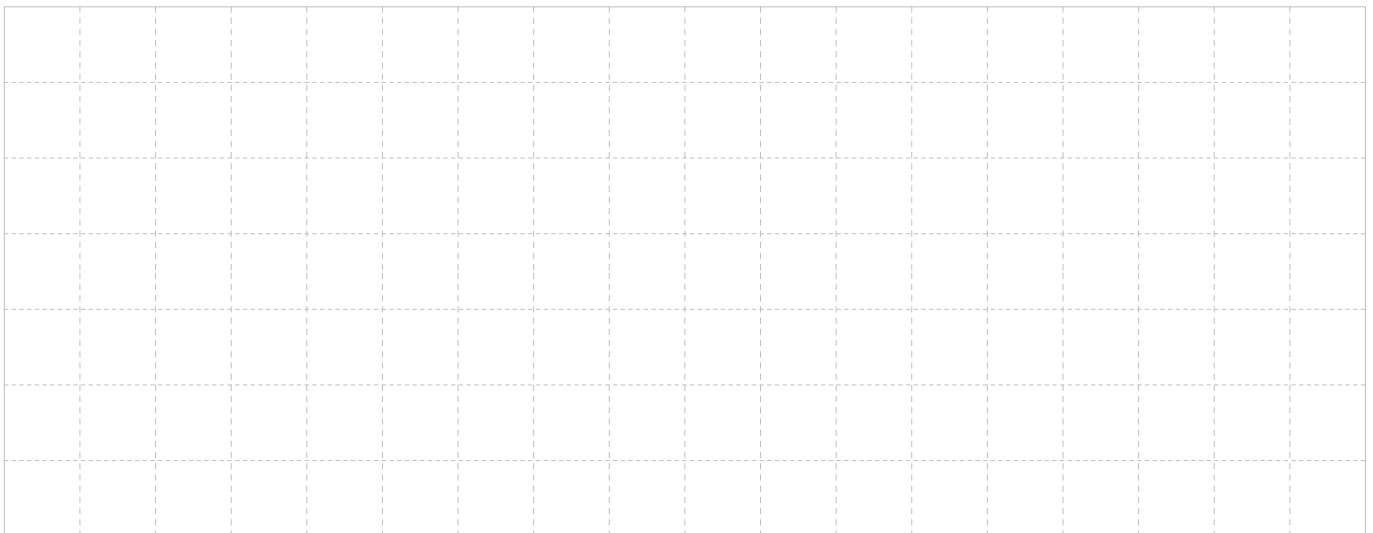
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5692836.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 11/12/2017
 (NZTM2000) 1737914.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 11/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	DEPTH (m)	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3										10 25 50 100 200		
			Sample 1 @ 0.2m		0.2	SILT with some rootlets; brownish grey with orange brown mottling. Very stiff, dry, low plasticity.	D		VS			
			Sample 2 @ 0.5m		0.5	Silty sandy GRAVEL with cobbles and boulders; grey. Dense, dry, fine to coarse, angular to subangular, moderately to highly weathered, rock fragments; boulders, rock fragments. 0.4m: becomes moist			D			
		11/12/2017	Sample 3 @ 1.0m		1.0	Gravelly cobbly SILT with some clay and sand. Medium dense to dense, wet, low plasticity; gravel, fine to coarse, rock fragments (siltstone); cobbles, rock fragments (siltstone). 0.98m: moderately weathered grey SILTSTONE (boulder) 1.3m: moderate groundwater inflow	W		MD-D			Fill
			Sample 4 @ 1.5m		1.5	Silty gravelly COBBLES; grey. Very dense, saturated, rock fragments (siltstone); gravel, fine to coarse, angular to subangular, slightly to moderately weathered.	S		VD			
					2.0	End of investigation at 1.7 mbgl Sanding groundwater encountered 1.3 mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.7m

Scale 1:21



EXCAVATION LOG

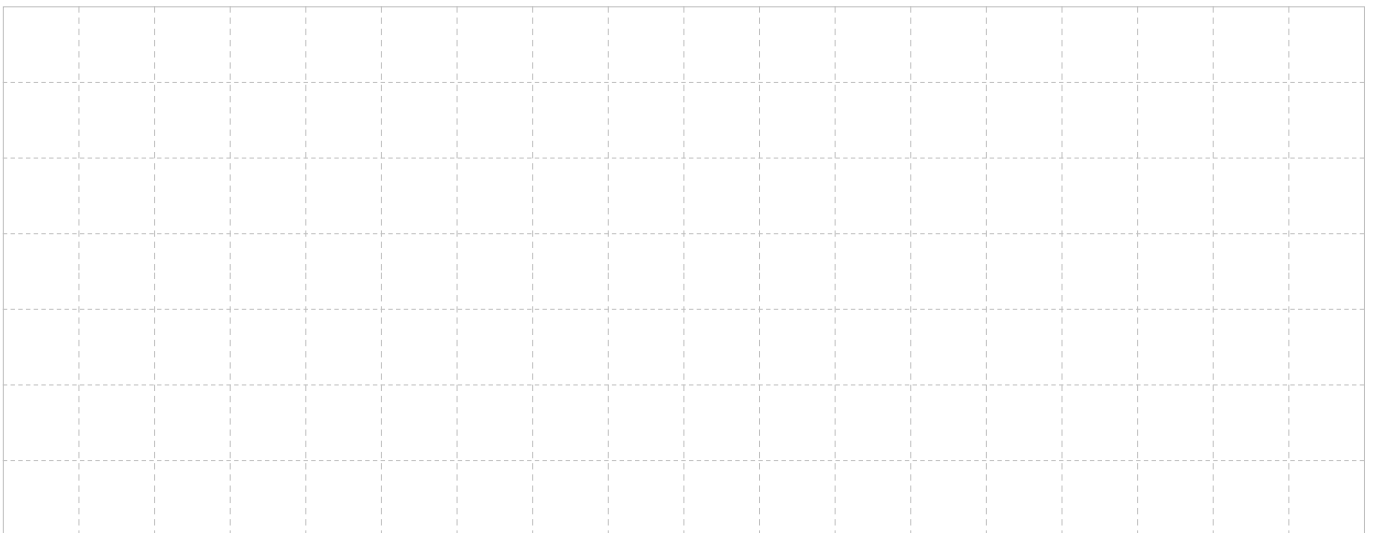
Excavation Id.: **CLTP15**

SHEET: 1 OF 1

PROJECT: Mt Messenger SI	LOCATION: Mt Messenger, SH3	JOB No.: 1001181.1000
CO-ORDINATES: (NZTM2000)	EXPOSURE METHOD: TP	EXCAV. STARTED: 14/12/2017
R.L.:	EQUIPMENT: 2T Excavator	EXCAV. FINISHED: 14/12/2017
DATUM:	OPERATOR: Downers	LOGGED BY: THOV
	DIMENSIONS:	CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.1m					Silty, brown TOPSOIL	D		VSI			Holocene Alluvial Deposits
			Sample 2 @ 0.5m		0.5			Clayey SILT; light grey with brown mottling. Hard, dry, moderately plastic			H			
			Sample 3 @ 1.0m		1.0			Grading into Silty CLAY; light grey with brown mottling. Soft, moist, high plasticity.	M		S			
			Sample 4 @ 1.5m		1.5			Clay; light grey. Very soft, saturated, high plasticity.	S		VS			
						2.0		End of investigation at 1.6 mbgl Groundwater seeping in at 1.6 mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
1.6m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP16**

SHEET: 1 OF 1

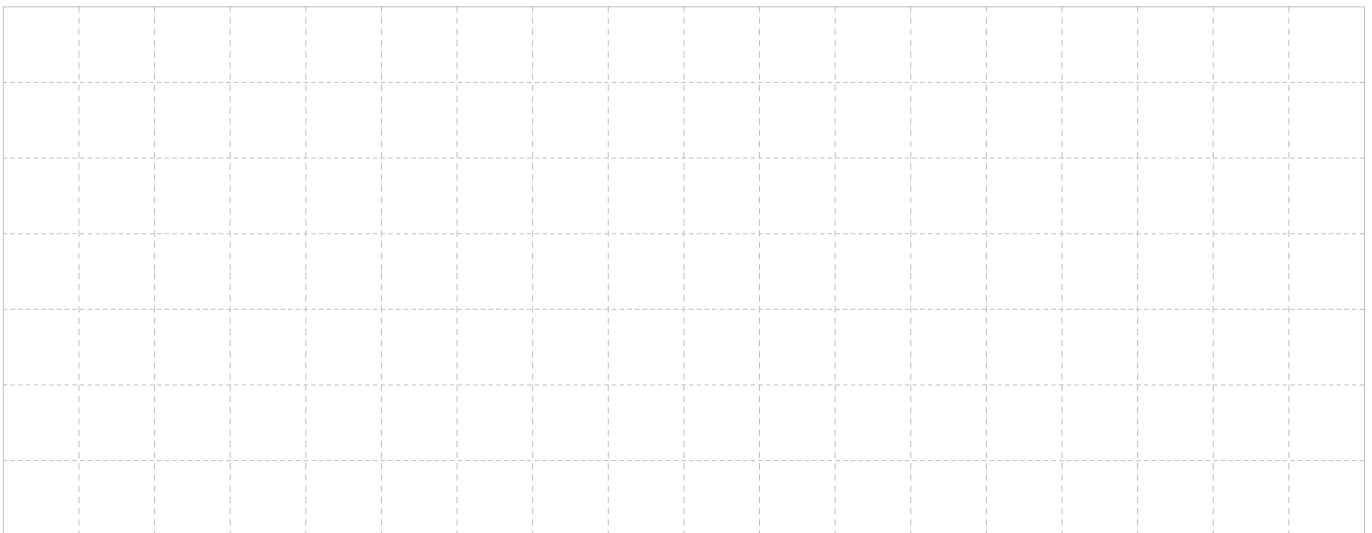
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5692818.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 11/12/2017
 (NZTM2000) 1737899.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 11/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3											10 25 50 100 200		
			Sample 1 @ 0.0m				Silty brown TOPSOIL	D	VSI				
							Silty cobbly GRAVEL with siltstone boulders; grey. Very dense, dry, highly weathered, siltstone.		VD				
			Sample 2 @ 0.5m		0.5		Gravelly SILT with some sand; grey. Hard, dry to moist, non-plastic; gravel, fine to coarse, subrounded to rounded, highly weathered, siltstone.	D-M	H				
			Sample 3 @ 1.0m		1.0		Gravelly sandy SILT with siltstone cobbles and boulders. Very dense, wet, non plastic.	W	VL				
							Gravelly SILT, with some sand; grey. Stiff, saturated, low plasticity; gravel, fine, siltstone; sand, fine.	S	St				
			Sample 4 @ 1.5m		1.5		Silty GRAVEL with some sand and siltstone cobbles. Dense, saturated, fine to medium moderately weathered, siltstone.		D				
							Gravelly SILT with trace clay, sand and siltstone cobbles; grey. Very dense, saturated, low plasticity; gravel, subangular to subrounded, moderately to completely weathered; sand, fine.		VL				
			Sample 5 @ 1.8m		2.0		End of investigation at 1.8 mbgl Standing groundwater encountered 1.75 mbgl						

SKETCH / PHOTO:



COMMENTS:

Hole Depth 1.8m

Scale 1:21



EXCAVATION LOG

Excavation Id.: **CLTP17**

SHEET: 1 OF 1

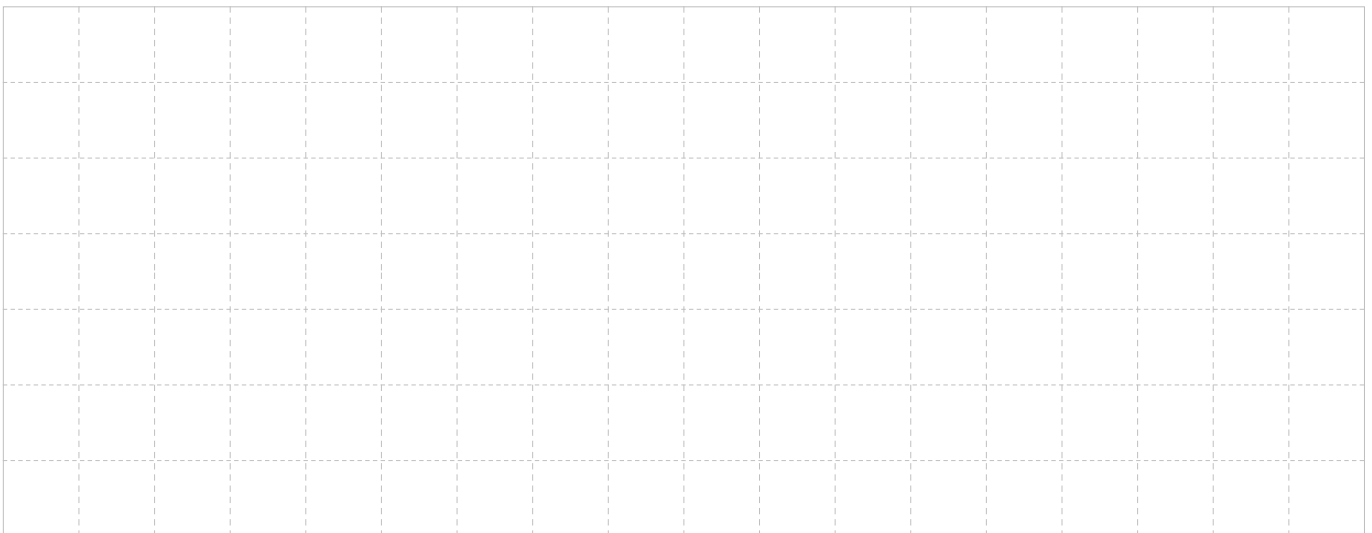
PROJECT: Mt Messenger SI LOCATION: Mt Messenger, SH3 JOB No.: 1001181.1000

CO-ORDINATES: 5692782.00 N EXPOSURE METHOD: TP EXCAV. STARTED: 11/12/2017
 (NZTM2000) 1737806.00 E EQUIPMENT: 2T Excavator EXCAV. FINISHED: 11/12/2017

R.L.: OPERATOR: Downers LOGGED BY: THOV
 DATUM: DIMENSIONS: CHECKED BY:

EXCAVATION TESTS			ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
1 2 3												10 25 50 100 200		
			Sample 1 @ 0.0m					Cobbly SILT with some gravel, gravel, boulders and minor sand; grey. Hard, dry, non plastic; gravel, fine to coarse, subrounded to rounded, moderately to completely weathered, rock fragments (siltstone).	D		H			
			Sample 2 @ 0.5m ● 194/24 kPa			0.5								
			● 193/12 kPa Sample 3 @ 1.0m ● 206/- kPa			1.0		Sandy SILT, with some gravel and trace clay; grey with some orange brown mottling. Hard, moist, non-plastic; sand, fine; gravel, fine to medium, rounded, completely weathered, rock fragments (siltstone).		M				
			● UTP Sample 4 @ 1.5m ● 144/18 kPa			1.5								
	DRY	11/12/2017	● 144/18 kPa Sample 5 @ 2.0m			2.0		Sandy SILT, with some gravel and some clay; grey with some orange brown streaks. Very stiff, moist, low plasticity; sand, fine.			VS			
								End of investigation at 2.0 mbgl No standing groundwater encountered						

SKETCH / PHOTO:



COMMENTS:

Hole Depth
2m

Scale 1:21

Appendix C: Results Summary Tables

Table C.1 – Summary of analytical results of soil testing – Testpit Locations

Table C.2 – Summary of analytical results of soil testing – Hand Auger Locations

Table C2: Summary of analytical results of soil testing - Hand Auger Locations

Sample ID/Guidelines	Human Health	Discharge / Environmental	CLHA 01	CLHA 01	CLHA 02	CLHA 02	CLHA 09	CLHA 09	CLHA11	CLHA13	CLHA14	CLHA14
Depth (m)	NES Soil (Commercial / Industrial) ¹	CCME Environmental (Commercial/ Industrial) ²	0.0	1.5	0.0	0.5	0.0	0.5	0.1	0.2	0.1	0.5
Soil Type			SILT	Weathered SILTSTONE	SILT	SILT	Topsoil	SILT	SILT	SILT	SILT	Silty SAND
Date			12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	14/12/2017	14/12/2017	14/12/2017	14/12/2017
Metals												
Arsenic	70	12	4	3	5	3	3	4	3	3	4	< 2
Cadmium	1,300	0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chromium	6,300	87	22	22	21	23	17	17	20	16	18	13
Copper	NL	91	15	11	19	14	10	10	12	9	10	6
Lead	3,300	260/ 600	13.3	13.4	19.7	14.6	10.9	12	12.4	10.4	11.3	7
Nickel	6,000 ³	50	22	17	16	17	13	15	15	13	15	11
Zinc	NL ³	360	67	61	71	56	54	50	66	51	60	42
Organochlorine Pesticides (OCP)												
Aldrin	45 ³	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	1,000	12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	160	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
<i>All other OCP are reported as less than laboratory detection.</i>												
Polycyclic Aromatic Hydrocarbons (PAH)												
Acenaphthene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	-	0.7	< 0.10	< 0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene + Benzo[j]fluoranthene	-	-	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	-	-	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	NL ⁴	22	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	-	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	NL ⁴	1.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
BaP equivalent	25 ⁴	-	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
<i>All other Semivolatile Organic Compounds (SVOC) reported as less than laboratory detection.</i>												
Total Petroleum Hydrocarbons												
TPH C7-C9	20,000 ⁴	710 ⁵	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 10	< 9
TPH C10-C14	NL ⁴	1,500 ⁵	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TPH C15-C30	NL ⁴	NL ⁵	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons C7-C36	-	-	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70

Notes:

Bold values indicate results exceed the NES Soil standard for commercial/industrial use

Underlined values indicate results exceed CCME Tier 1 environmental guideline values for commercial / industrial use

All values are reported in mg/kg (ppm) unless otherwise stated.

NL = Not limiting (i.e >10,000mg/kg)

1 - Ministry for the Environment (MfE, April 2012). Users Guide: National Environmental Standard for assessing and managing contaminants in soil to protect Human Health: commercial/industrial use (unless otherwise stated).

2 - CCME, 1991 (updated 2002). Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health (unless otherwise stated).

3 - NEPM 2013. Guideline on the Investigation Levels for Soil and Groundwater: commercial/industrial D.

4 - MfE, 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 Soil acceptance criteria: commercial/industrial use, silty clay, <1 m.

5 - MfE, 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand - Groundwater Protection, silty clay, contamination at < 1 m, groundwater at 2 m depth.

Appendix D: Laboratory Transcripts



ANALYSIS REPORT

Client:	Tonkin & Taylor	Lab No:	1897353	SPV1
Contact:	Elyse Laface C/- Tonkin & Taylor PO Box 5271 Auckland 1141	Date Received:	16-Dec-2017	
		Date Reported:	05-Jan-2018	
		Quote No:	80842	
		Order No:	1001181.1000	
		Client Reference:	1001181.1000	
		Submitted By:	Elyse Laface	

Sample Type: Soil

Sample Name:	CLTP07 1.5m 13-Dec-2017 9:27 am	CLTP05 0.0m 13-Dec-2017 10:18 am	CLTP05 0.5m 13-Dec-2017 10:25 am	CLTP04 0.0m 13-Dec-2017 11:27 am	CLTP04 0.5m 13-Dec-2017 11:36 am
Lab Number:	1897353.4	1897353.6	1897353.7	1897353.12	1897353.13

Individual Tests

Dry Matter	g/100g as rcvd	73	80	70	71	73
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Heavy Metals, Screen Level

Test	Unit	CLTP07 1.5m	CLTP05 0.0m	CLTP05 0.5m	CLTP04 0.0m	CLTP04 0.5m
Total Recoverable Arsenic	mg/kg dry wt	2	4	5	5	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.18	< 0.10	0.19	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	19	22	22	20
Total Recoverable Copper	mg/kg dry wt	9	13	13	10	9
Total Recoverable Lead	mg/kg dry wt	10.4	11.5	14.6	12.0	11.6
Total Recoverable Nickel	mg/kg dry wt	12	15	18	15	15
Total Recoverable Zinc	mg/kg dry wt	49	72	64	65	59

Haloethers Trace in SVOC Soil Samples by GC-MS

Test	Unit	CLTP07 1.5m	CLTP05 0.0m	CLTP05 0.5m	CLTP04 0.0m	CLTP04 0.5m
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS

Test	Unit	CLTP07 1.5m	CLTP05 0.0m	CLTP05 0.5m	CLTP04 0.0m	CLTP04 0.5m
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15

Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS

Test	Unit	CLTP07 1.5m	CLTP05 0.0m	CLTP05 0.5m	CLTP04 0.0m	CLTP04 0.5m
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endrin	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2





ANALYSIS REPORT

Client:	Tonkin & Taylor	Lab No:	1897351	SPV1
Contact:	Elyse Laface C/- Tonkin & Taylor PO Box 5271 Auckland 1141	Date Received:	16-Dec-2017	
		Date Reported:	05-Jan-2018	
		Quote No:	80842	
		Order No:	1001181.1000	
		Client Reference:	1001181.1000	
		Submitted By:	Elyse Laface	

Sample Type: Soil

Sample Name:	CLTP10 0.10m 14-Dec-2017 1:21 pm	CLTP10 1.0m 14-Dec-2017 1:40 pm	CLTP12 0.5m 14-Dec-2017	CLHA14 0.10m 14-Dec-2017 3:35 pm	CLHA14 0.5m 14-Dec-2017 3:40 pm
Lab Number:	1897351.1	1897351.3	1897351.7	1897351.11	1897351.12

Individual Tests

Dry Matter	g/100g as rcvd	89	78	75	63	72
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Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	4	3	< 2	4	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.14	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	16	15	18	13
Total Recoverable Copper	mg/kg dry wt	9	10	6	10	6
Total Recoverable Lead	mg/kg dry wt	23	10.2	7.9	11.3	7.0
Total Recoverable Nickel	mg/kg dry wt	11	14	13	15	11
Total Recoverable Zinc	mg/kg dry wt	74	52	45	60	42

Haloethers Trace in SVOC Soil Samples by GC-MS

Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS

N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15

Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS

Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endrin	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2





ANALYSIS REPORT

Client:	Tonkin & Taylor	Lab No:	1896489	SPV1
Contact:	Elyse Laface C/- Tonkin & Taylor PO Box 5271 Auckland 1141	Date Received:	15-Dec-2017	
		Date Reported:	29-Dec-2017	
		Quote No:	80842	
		Order No:	1001181.1000	
		Client Reference:	1001181.1000	
		Submitted By:	Elyse Laface	

Sample Type: Soil

Sample Name:	CLTP17 2.0m 11-Dec-2017 1:03 pm	CLTP16 0.0m 11-Dec-2017 1:35 pm	CLTP16 1.0m 11-Dec-2017 2:00 pm	CLTP 14 0.0m 11-Dec-2017 3:21 pm	CLTP 14 1.5m 11-Dec-2017 3:48 pm
Lab Number:	1896489.4	1896489.5	1896489.7	1896489.10	1896489.14

Individual Tests

Dry Matter	g/100g as rcvd	79	86	83	82	75
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Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	4	5	5	6	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	22	25	24	25	24
Total Recoverable Copper	mg/kg dry wt	14	22	16	24	22
Total Recoverable Lead	mg/kg dry wt	14.6	17.7	14.7	18.3	16.1
Total Recoverable Nickel	mg/kg dry wt	20	25	23	22	23
Total Recoverable Zinc	mg/kg dry wt	65	81	69	83	80

Haloethers Trace in SVOC Soil Samples by GC-MS

Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS

N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15

Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS

Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endrin	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2



Sample Type: Soil						
Sample Name:	CLTP17 2.0m 11-Dec-2017 1:03 pm	CLTP16 0.0m 11-Dec-2017 1:35 pm	CLTP16 1.0m 11-Dec-2017 2:00 pm	CLTP 14 0.0m 11-Dec-2017 3:21 pm	CLTP 14 1.5m 11-Dec-2017 3:48 pm	
Lab Number:	1896489.4	1896489.5	1896489.7	1896489.10	1896489.14	
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
1,3-Dichlorobenzene	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
1,4-Dichlorobenzene	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
Hexachlorobutadiene	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
Hexachloroethane	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.13	< 0.15
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
Sample Name:	CLTP17 2.0m 11-Dec-2017 1:03 pm	CLTP16 0.0m 11-Dec-2017 1:35 pm	CLTP16 1.0m 11-Dec-2017 2:00 pm	CLTP 14 0.0m 11-Dec-2017 3:21 pm	CLTP 14 1.5m 11-Dec-2017 3:48 pm	
Lab Number:	1896489.4	1896489.5	1896489.7	1896489.10	1896489.14	
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70
Sample Name:	CLTP 01 0.0m 12-Dec-2017 9:30 am	CLTP 01 1.0m 12-Dec-2017 10:10 am	CLHA 01 0.0m 12-Dec-2017 12:30 pm	CLHA 01 1.5m 12-Dec-2017 1:00 pm	CLHA 02 0.0m 12-Dec-2017 1:30 pm	
Lab Number:	1896489.15	1896489.18	1896489.23	1896489.26	1896489.27	
Individual Tests						
Dry Matter	g/100g as rcvd	74	73	81	79	82
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	2	4	3	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	19	15	22	22	21
Total Recoverable Copper	mg/kg dry wt	12	7	15	11	19
Total Recoverable Lead	mg/kg dry wt	17.4	10.1	13.3	13.4	19.7
Total Recoverable Nickel	mg/kg dry wt	14	11	22	17	16
Total Recoverable Zinc	mg/kg dry wt	61	44	67	61	71
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endrin	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
Sample Name:	CLTP 01 0.0m 12-Dec-2017 9:30 am	CLTP 01 1.0m 12-Dec-2017 10:10 am	CLHA 01 0.0m 12-Dec-2017 12:30 pm	CLHA 01 1.5m 12-Dec-2017 1:00 pm	CLHA 02 0.0n 12-Dec-2017 1:30 pm	
Lab Number:	1896489.15	1896489.18	1896489.23	1896489.26	1896489.27	
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.13
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.11
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.11
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.15	< 0.14	< 0.14	< 0.13
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
Sample Name:	CLTP 01 0.0m 12-Dec-2017 9:30 am	CLTP 01 1.0m 12-Dec-2017 10:10 am	CLHA 01 0.0m 12-Dec-2017 12:30 pm	CLHA 01 1.5m 12-Dec-2017 1:00 pm	CLHA 02 0.0n 12-Dec-2017 1:30 pm	
Lab Number:	1896489.15	1896489.18	1896489.23	1896489.26	1896489.27	
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70
Sample Name:	CLHA 02 0.5m 12-Dec-2017 1:32 pm	CLHA 09 0.0m 12-Dec-2017 3:05 pm	CLHA 09 0.5m 12-Dec-2017 3:10 pm	CLTP 17 0.5m 11-Dec-2017 11:42 am	CLTP16 1.0m [Duplicate]	
Lab Number:	1896489.28	1896489.31	1896489.32	1896489.35	1896489.36	
Individual Tests						
Dry Matter	g/100g as rcvd	76	78	78	83	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	4	4	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	23	17	17	23	24
Total Recoverable Copper	mg/kg dry wt	14	10	10	32	16
Total Recoverable Lead	mg/kg dry wt	14.6	10.9	12.0	15.0	14.9
Total Recoverable Nickel	mg/kg dry wt	17	13	15	24	23
Total Recoverable Zinc	mg/kg dry wt	56	54	50	79	72
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Endrin	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-

Sample Type: Soil						
Sample Name:	CLHA 02 0.5m 12-Dec-2017 1:32 pm	CLHA 09 0.0m 12-Dec-2017 3:05 pm	CLHA 09 0.5m 12-Dec-2017 3:10 pm	CLTP 17 0.5m 11-Dec-2017 11:42 am	CLTP16 1.0m [Duplicate]	
Lab Number:	1896489.28	1896489.31	1896489.32	1896489.35	1896489.36	
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	-
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.14	< 0.14	< 0.13	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-

Sample Type: Soil					
Sample Name:	CLHA 02 0.5m 12-Dec-2017 1:32 pm	CLHA 09 0.0m 12-Dec-2017 3:05 pm	CLHA 09 0.5m 12-Dec-2017 3:10 pm	CLTP 17 0.5m 11-Dec-2017 11:42 am	CLTP16 1.0m [Duplicate]
Lab Number:	1896489.28	1896489.31	1896489.32	1896489.35	1896489.36
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-

Analyst's Comments

It has been noted that the spikes for SVOC on sample 1896489.35, were run as part of our in-house QC procedure, had lower than expected recoveries for Pentachlorophenol at 21% and 18%. Therefore the result maybe underestimated.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
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	4-5, 7, 10, 14-15, 18, 23, 26-28, 31-32, 35-36
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	0.002 - 6 mg/kg dry wt	4-5, 7, 10, 14-15, 18, 23, 26-28, 31-32, 35
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	4-5, 7, 10, 14-15, 18, 23, 26-28, 31-32, 35
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	4-5, 7, 10, 14-15, 18, 23, 26-28, 31-32, 35

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

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

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Kim Harrison MSc
Client Services Manager - Environmental

Sample Type: Soil						
Sample Name:	CLTP10 0.10m 14-Dec-2017 1:21 pm	CLTP10 1.0m 14-Dec-2017 1:40 pm	CLTP12 0.5m 14-Dec-2017	CLHA14 0.10m 14-Dec-2017 3:35 pm	CLHA14 0.5m 14-Dec-2017 3:40 pm	
Lab Number:	1897351.1	1897351.3	1897351.7	1897351.11	1897351.12	
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
1,3-Dichlorobenzene	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
1,4-Dichlorobenzene	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
Hexachlorobutadiene	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
Hexachloroethane	mg/kg dry wt	< 0.12	< 0.14	< 0.15	< 0.17	< 0.15
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
Sample Name:	CLTP10 0.10m 14-Dec-2017 1:21 pm	CLTP10 1.0m 14-Dec-2017 1:40 pm	CLTP12 0.5m 14-Dec-2017	CLHA14 0.10m 14-Dec-2017 3:35 pm	CLHA14 0.5m 14-Dec-2017 3:40 pm	
Lab Number:	1897351.1	1897351.3	1897351.7	1897351.11	1897351.12	
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 10	< 9
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70
Sample Name:	CLHA13 0.2m 14-Dec-2017	CLHA11 0.10m 14-Dec-2017 5:20 pm	CLTP02 0.0m 14-Dec-2017 10:13 am	CLTP02 0.5m 14-Dec-2017 10:20 am	CLTP06 0.0m 14-Dec-2017 11:30 am	
Lab Number:	1897351.15	1897351.19	1897351.24	1897351.25	1897351.29	
Individual Tests						
Dry Matter	g/100g as rcvd	77	77	76	70	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	4	3	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.17	< 0.10	0.12
Total Recoverable Chromium	mg/kg dry wt	16	20	21	20	18
Total Recoverable Copper	mg/kg dry wt	9	12	11	11	10
Total Recoverable Lead	mg/kg dry wt	10.4	12.4	14.3	11.7	12.5
Total Recoverable Nickel	mg/kg dry wt	13	15	16	14	14
Total Recoverable Zinc	mg/kg dry wt	51	66	68	52	67
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Endrin	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil

Sample Name:	CLHA13 0.2m 14-Dec-2017	CLHA11 0.10m 14-Dec-2017 5:20 pm	CLTP02 0.0m 14-Dec-2017 10:13 am	CLTP02 0.5m 14-Dec-2017 10:20 am	CLTP06 0.0m 14-Dec-2017 11:30 am
Lab Number:	1897351.15	1897351.19	1897351.24	1897351.25	1897351.29

Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples

Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Phenols Trace in SVOC Soil Samples by GC-MS

4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Plasticisers Trace in SVOC Soil Samples by GC-MS

Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS

1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.16	< 0.14
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Other SVOC Trace in SVOC Soil Samples by GC-MS

Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
Sample Name:	CLHA13 0.2m 14-Dec-2017	CLHA11 0.10m 14-Dec-2017 5:20 pm	CLTP02 0.0m 14-Dec-2017 10:13 am	CLTP02 0.5m 14-Dec-2017 10:20 am	CLTP06 0.0m 14-Dec-2017 11:30 am	
Lab Number:	1897351.15	1897351.19	1897351.24	1897351.25	1897351.29	
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 9	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70
Sample Name:	CLTP06 1.0m 14-Dec-2017 11:44 am	CLTP08 0.0m 14-Dec-2017 12:15 pm	CLTP08 0.5m 14-Dec-2017 12:24 pm	CLTP12 0.5m [Duplicate]		
Lab Number:	1897351.31	1897351.34	1897351.35	1897351.40		
Individual Tests						
Dry Matter	g/100g as rcvd	75	79	76	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	3	4	< 2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.16	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	17	18	19	14	-
Total Recoverable Copper	mg/kg dry wt	10	9	12	6	-
Total Recoverable Lead	mg/kg dry wt	12.0	12.7	14.1	7.8	-
Total Recoverable Nickel	mg/kg dry wt	14	12	15	12	-
Total Recoverable Zinc	mg/kg dry wt	57	100	62	41	-
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Endrin	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-

Sample Type: Soil						
Sample Name:	CLTP06 1.0m 14-Dec-2017 11:44 am	CLTP08 0.0m 14-Dec-2017 12:15 pm	CLTP08 0.5m 14-Dec-2017 12:24 pm	CLTP12 0.5m [Duplicate]		
Lab Number:	1897351.31	1897351.34	1897351.35	1897351.40		
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	-	-
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	-	-
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.14	< 0.15	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	-	-
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-

Sample Type: Soil						
Sample Name:	CLTP06 1.0m 14-Dec-2017 11:44 am	CLTP08 0.0m 14-Dec-2017 12:15 pm	CLTP08 0.5m 14-Dec-2017 12:24 pm	CLTP12 0.5m [Duplicate]		
Lab Number:	1897351.31	1897351.34	1897351.35	1897351.40		
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	-	-

Analyst's Comments

It was observed that the container for sample 1897351.7 was not completely filled. Volatile loss may have occurred due to the headspace created in the container.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
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, 3, 7, 11-12, 15, 19, 24-25, 29, 31, 34-35, 40
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	0.002 - 6 mg/kg dry wt	1, 3, 7, 11-12, 15, 19, 24-25, 29, 31, 34-35
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	1, 3, 7, 11-12, 15, 19, 24-25, 29, 31, 34-35
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 3, 7, 11-12, 15, 19, 24-25, 29, 31, 34-35

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

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

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Kim Harrison MSc
Client Services Manager - Environmental

Sample Type: Soil						
Sample Name:	CLTP07 1.5m 13-Dec-2017 9:27 am	CLTP05 0.0m 13-Dec-2017 10:18 am	CLTP05 0.5m 13-Dec-2017 10:25 am	CLTP04 0.0m 13-Dec-2017 11:27 am	CLTP04 0.5m 13-Dec-2017 11:36 am	
Lab Number:	1897353.4	1897353.6	1897353.7	1897353.12	1897353.13	
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.14	< 0.16	< 0.16	< 0.15
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

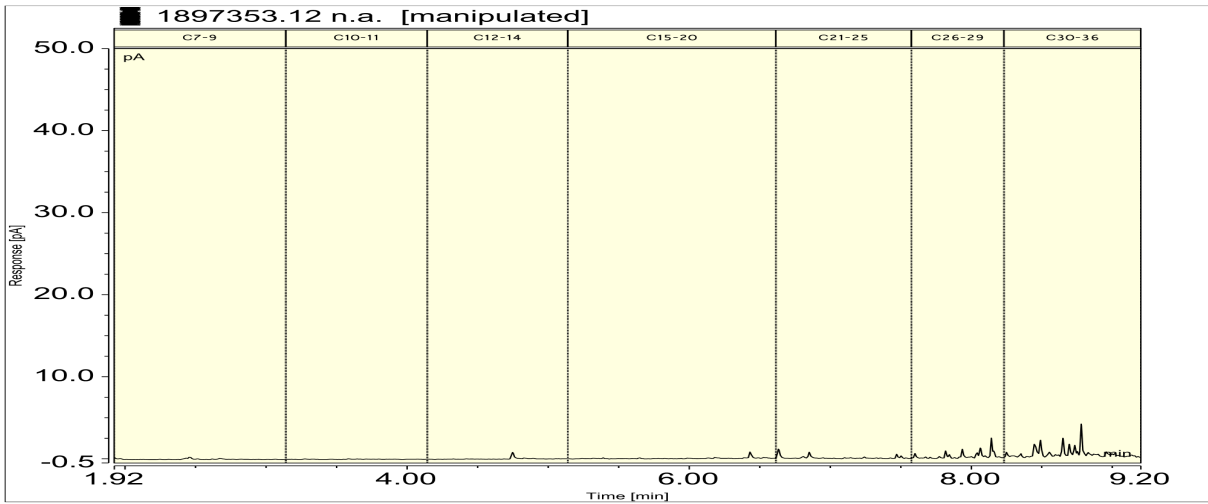
Sample Type: Soil						
Sample Name:	CLTP07 1.5m 13-Dec-2017 9:27 am	CLTP05 0.0m 13-Dec-2017 10:18 am	CLTP05 0.5m 13-Dec-2017 10:25 am	CLTP04 0.0m 13-Dec-2017 11:27 am	CLTP04 0.5m 13-Dec-2017 11:36 am	
Lab Number:	1897353.4	1897353.6	1897353.7	1897353.12	1897353.13	
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 9	< 9	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	94	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	94	< 70
Sample Name:	CLTP03 0.1m 13-Dec-2017	CLTP03 1.0m 13-Dec-2017	CLTP15 0.1m 13-Dec-2017	CLTP15 1.0m 13-Dec-2017	CLTP04 0.5m [Duplicate]	
Lab Number:	1897353.16	1897353.18	1897353.21	1897353.23	1897353.25	
Individual Tests						
Dry Matter	g/100g as rcvd	74	70	82	70	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	4	4	3	13
Total Recoverable Cadmium	mg/kg dry wt	0.13	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	23	21	18	17	19
Total Recoverable Copper	mg/kg dry wt	13	10	11	9	10
Total Recoverable Lead	mg/kg dry wt	17.6	12.5	11.6	10.5	12.5
Total Recoverable Nickel	mg/kg dry wt	18	16	13	14	13
Total Recoverable Zinc	mg/kg dry wt	70	61	61	50	52
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
2,4-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,6-Dinitrotoluene	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Nitrobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
alpha-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
beta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
delta-BHC	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDD	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDE	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
4,4'-DDT	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Dieldrin	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Endosulfan I	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan sulphate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Endrin	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
Endrin ketone	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Heptachlor	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Heptachlor epoxide	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Hexachlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-

Sample Type: Soil						
Sample Name:	CLTP03 0.1m 13-Dec-2017	CLTP03 1.0m 13-Dec-2017	CLTP15 0.1m 13-Dec-2017	CLTP15 1.0m 13-Dec-2017	CLTP04 0.5m [Duplicate]	1897353.25
Lab Number:	1897353.16	1897353.18	1897353.21	1897353.23	1897353.25	1897353.25
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dimethylphenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	-
Phenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Butylbenzylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Diethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Dimethylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di-n-butylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Di-n-octylphthalate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
Hexachlorobutadiene	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
Hexachloroethane	mg/kg dry wt	< 0.15	< 0.16	< 0.14	< 0.16	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Carbazole	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Dibenzofuran	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Isophorone	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-

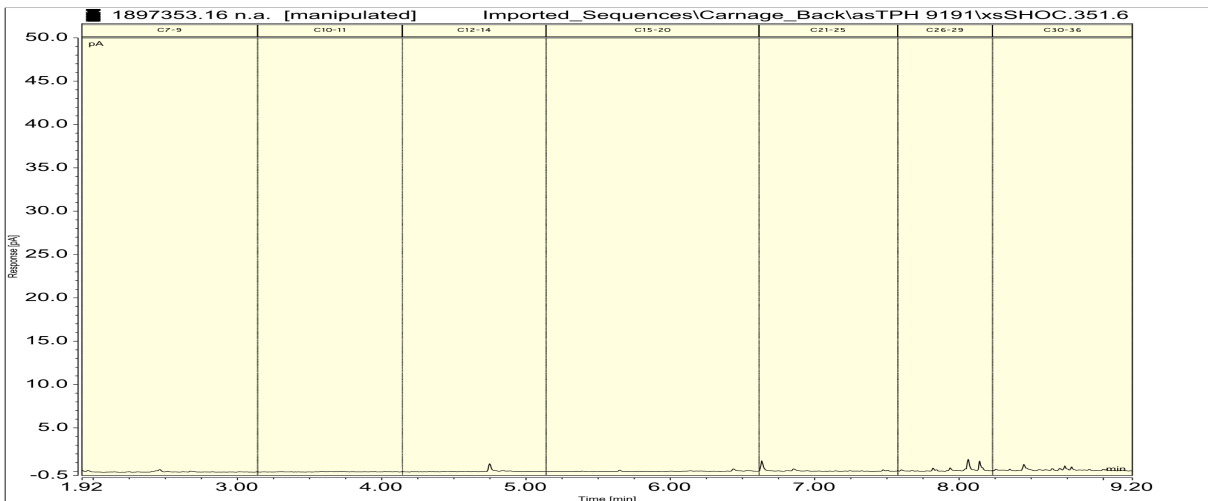
Sample Type: Soil

		CLTP03 0.1m	CLTP03 1.0m	CLTP15 0.1m	CLTP15 1.0m	CLTP04 0.5m
Sample Name:		13-Dec-2017	13-Dec-2017	13-Dec-2017	13-Dec-2017	[Duplicate]
Lab Number:		1897353.16	1897353.18	1897353.21	1897353.23	1897353.25
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 9	< 8	< 9	-
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	-
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	-

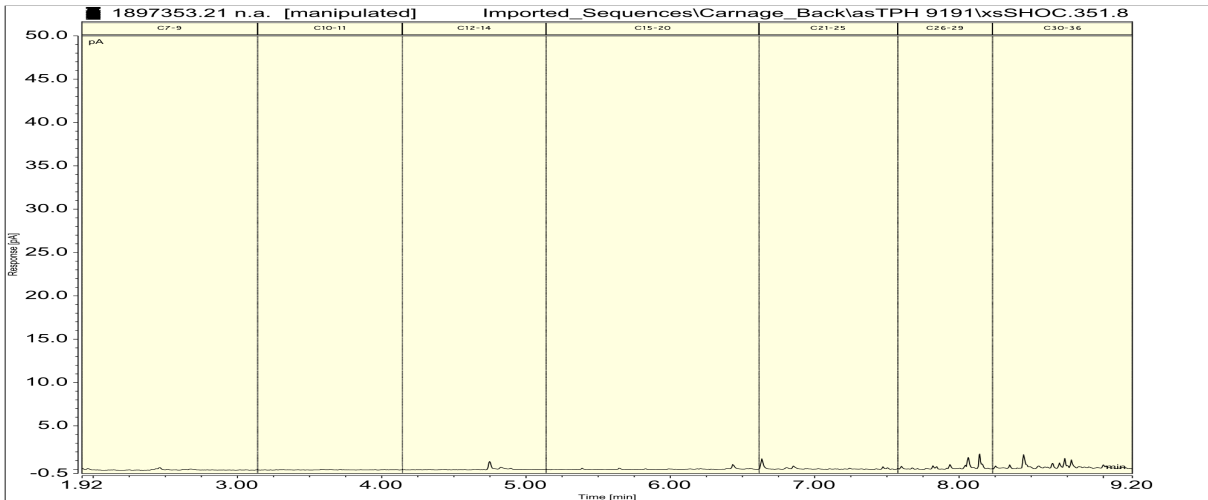
1897353.12
 CLTP04 0.0m 13-Dec-2017 11:27 am
 Client Chromatogram for TPH by FID



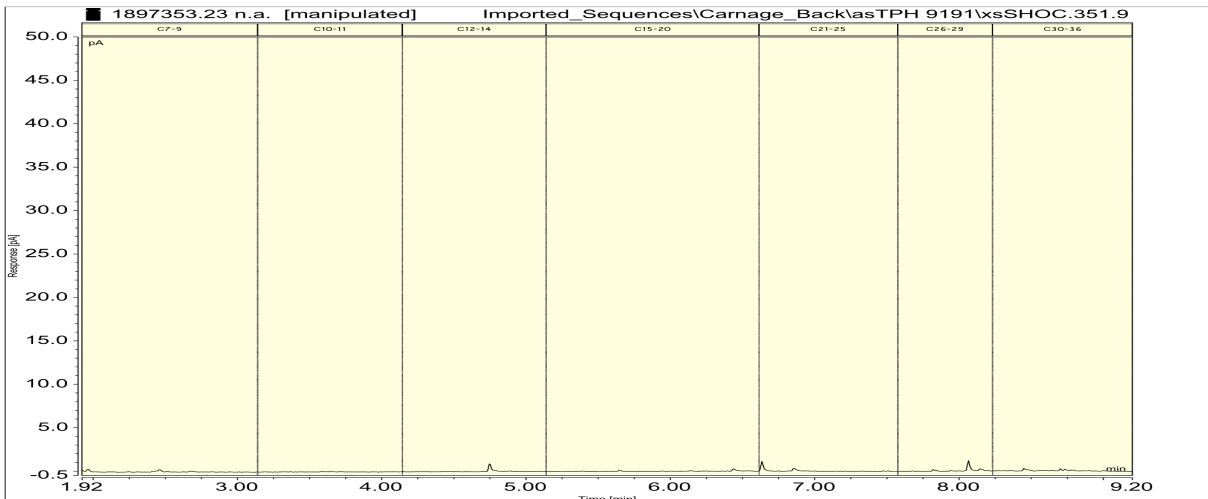
1897353.16
 CLTP03 0.1m 13-Dec-2017
 Client Chromatogram for TPH by FID



1897353.21
 CLTP15 0.1m 13-Dec-2017
 Client Chromatogram for TPH by FID



1897353.23
 CLTP15 1.0m 13-Dec-2017
 Client Chromatogram for TPH by FID



SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
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	4, 6-7, 12-13, 16, 18, 21, 23, 25
Semivolatle Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	0.002 - 6 mg/kg dry wt	4, 6-7, 12-13, 16, 18, 21, 23
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	4, 6-7, 12-13, 16, 18, 21, 23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	4, 6-7, 12-13, 16, 18, 21, 23

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

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

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

A handwritten signature in purple ink, consisting of a large capital 'K' followed by the name 'Harrison' in a cursive script.

Kim Harrison MSc
Client Services Manager - Environmental