



Intrusive Ground Contamination Investigation

Former Sawmill, Tauhara, Taupo

Prepared for
Waikato Regional Council

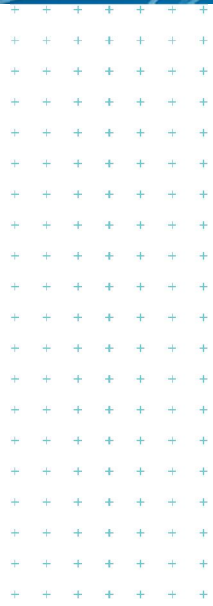
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1 Introduction

Tonkin & Taylor Ltd (T+T) has been commissioned by Waikato Regional Council ('WRC') to undertake an intrusive ground contamination investigation of a site formerly used for sawmilling and timber treatment purposes, located around Simkin, Leslie, and Rangatira Streets, Taupo ('the site'). The site location is shown in Figure 1, Appendix A.

This work has been undertaken in accordance with the *Contract for Services Long form agreement* between WRC and T+T, contract No: SA2016/2017-1740, dated 18 November 2016 and the *Addendum(s) to Contract for Services*, dated 13 February and 24 April 2017.

This report has been prepared in general accordance with the requirements in the MfE's Contaminated Land Management Guidelines. The persons undertaking, managing, reviewing, and certifying this investigation are suitably qualified and experienced practitioners as defined in the NES Soil¹.

1.1 Background

As part of an ongoing programme of work to improve the information held on their Land Use Information Register, WRC has identified through a review of historic aerial photographs that the site (and land to the north) was formerly used for sawmilling and timber treatment purposes. Timber treatment, including the storage of treated timber, is an activity which has the potential to cause land contamination, (HAIL activity), as defined by the MfE in the Hazardous Activities and Industries List.

In 2016, WRC engaged Opus International Consultants Ltd (Opus) to carry out a preliminary site investigation (PSI)² ('the PSI') of the site (referred to by Opus as 'Area 1'), and two similarly sized areas to the north and north-west ('Areas 2 and 3'). The PSI confirmed that the site has been used for several HAIL activities associated with historic timber processing (refer to Section 3).

The PSI also identified that the site was developed from the late 1960s. The northern portion of the site (north of Rangatira Street) was developed for residential use, while the southern portion of the site (south of Rangatira Street) was developed as a primary school (Mountview School). No details on the development works (e.g. earthworks and/or cut and fill plans) are held by Waikato Regional Council or the Taupo District Council.

This investigation has been undertaken to supplement the PSI undertaken by Opus.

1.2 Objective and scope of works

The objective of this assessment is to investigate the presence of, and potential risks to human health associated with, contamination that may have resulted from the HAIL activities identified at the site by Opus.

The scope of work for this investigation comprised:

- Review of the Opus PSI report
- Soil sampling across Mountview School involving:
 - Collection of soil samples from 10 hand auger boreholes and analysis of selected samples for copper, chromium, arsenic, and boron (CCAB) and pentachlorophenol (PCP)

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

² Opus International Consultants Ltd, June 2016, *Tauhara Sawmilling and Timber Treatment Processes – Preliminary Site Investigation*. Opus Reference 2-32660.

- Collection of soil samples from two raised vegetable gardens and analysis for CCAB and PCP
- Soil sampling across the northern portion of the site involving:
 - Soil sampling at 32 residential properties including collection of samples from two (2) hand auger boreholes from each property and analysis of selected samples for CCAB, PCP, and polycyclic aromatic hydrocarbons (PAH)
 - Additional sampling to assess the extent of arsenic impacted soils at four (4) properties
 - Collection of five (5) soil samples from raised vegetable gardens at three of the residential properties and analysis for CCAB and PCP
 - Collection of soil samples from nine (9) hand auger boreholes located on public land³, located immediately adjacent to properties where owner's permission for sampling was not granted, and analysis of 18 samples for CCAB and PCP
- Preparation of a letter report summarising the results of soil sampling at Mountview School (refer to Appendix F)
- Preparation of individual sampling letters summarising the results of soil sampling at each of the residential properties (refer to Appendix G)
- Preparation of this report

This report documents our findings and comments on the nature and extent of ground contamination found at the site.

³ Note 5 of these samples were positioned in a public reserve, approximately 1 m outside of the northern site boundary.

2 Site description

2.1 Site identification

The site is located within a residential area, in the north-eastern area of Taupo. Industrial land is located immediately to the north of the site.

The site details are summarised in Table 2.1. For the purpose of the investigation (and this report), the site has been treated as two distinct areas, described in the subsections below, and shown in Figures 1 to 3, Appendix A.

2.1.1 Mountview School

Mountview School is located at No. 31, Rangatira Street and forms the southern portion of the site. Mountview School is legally described as Lot 42 DPS 13555 and comprises 1.946 hectares.

Broadly speaking, the western portion of Mountview School comprises grassed playing fields (refer to Figure 1, Appendix A and Photograph 1, Appendix B) while the eastern portion is occupied by school buildings, and sealed areas (netball courts, carparks, walkways, etc.) with small areas of ornamental gardens and well covered lawn (refer to Figure 1, Appendix A and Photograph 2, Appendix B).

2.1.2 Residential area

The residential area comprises a roughly triangular shaped piece of land, located on the northern side of Rangatira Street, and around Leslie and Simkin Streets. The area includes a total of 38 residential dwellings, comprising some 3.7 hectares. A public reserve/easement area is located immediately adjacent to the north/ north-eastern site boundary. This area comprises a vacant grassed strip with some mature trees and separates the residential area of the site from the neighbouring industrial land (refer Figure 3 in Appendix A and Photographs 6 and 7, Appendix B).

Table 2.1: Site identification

Area	Mountview School	Residential area
Street address	No. 31 Rangatira Street	Nos. 30, 32, 36, 38, 40, 42, 44, 48 Rangatira Street Nos. 1, 2, 4, 5, 6, 8, 10, 12, 14, 16, 20A, 20B Leslie Street Nos. 1, 3, 5, 7, 9, 11 to 18 Simkin Street
Legal description	Lot 42 DPS 13555	Lots 1 to 14 and 16 to 38 DPS 13555
Site owner	Tuwharetoa Property Investment Ltd Partnership, Her Majesty The Queen	Various private individuals, Housing New Zealand Ltd – 11 Leslie Street
Site area	1.946 ha	3.7 ha (approx.)
Certificates of title	635800, 642443	Various
Zoning	Review of TDC planning maps indicate that the entire site is zoned 'standard residential' under the TDC operative district plan (October 2007). Mountview School is designated 'School'. The site is not subject to any other overlays or designations.	

Further details of the location and description of the site are provided in the PSI report.

2.2 Environmental setting

Environmental setting information (including topographical, geological, hydrogeological, ecological, and neighbouring land use information) for the site is presented in the PSI report. This information has been reviewed by T+T as part of this investigation and has not been replicated in this report. Site specific environmental setting information (i.e. geological and hydrogeological information), gathered during the intrusive investigation is described in Section 5 of this report.

3 Site history and potential sources of contamination

3.1 Review of PSI report

The PSI identifies that HAIL activities have occurred at the site. The activities and potential contaminants are presented in Table 3.1 below.

The PSI report includes a figure showing the approximate locations of all identified HAIL activities. In addition, WRC has georeferenced a historic aerial photograph showing the former timber treatment operations, and has overlain the aerial image with the current property boundaries. These figures are provided in Appendix C.

Table 3.1: Summary of HAIL activities and potential contaminants (identified by Opus)

Hail category	Description and location	Potential contaminants
<i>A18 – Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside</i>	<ul style="list-style-type: none"> Storage of treated timber across majority of site. PCP dip in the northern portion of the site, around 14 and 16 Leslie Street and potentially 9 and 11 Leslie Street. Boric dip on the beneath Rangatira Street, adjacent to No. 36 Rangatira Street and No. 1 Leslie Street 	CCAB, PCP and potentially associated dioxins
<i>A17 – Storage tanks or drums for fuel, chemicals or liquid waste</i>	<ul style="list-style-type: none"> Storage of diesel in drums associated with generators in the vicinity of 20 Leslie Street and 12 and 14 Simkin Street. Storage of PCP and CCAB adjacent to the dips. 	PCP, CCAB, hydrocarbons
<i>G8 – Landfill sites⁴</i>	<ul style="list-style-type: none"> Fire pit probably offsite, but near 16 Simkin Street. General filling/levelling likely to include gravel, and sawdust materials 	CCAB, hydrocarbons, (Note 1)

Note 1 – May include dioxins as identified by Opus.

3.2 Interviews with long term Taupo residents

A discussion with former Mountview School Principal (1990 to 2009), Mr John Barnes, revealed that the southern portion of the school playing field (south of the line of oak trees) and land beneath the existing school hall (refer to Figure 2) was boggy and often showed evidence of subsidence. These areas were excavated in early 1997 to approximately 8 to 10 m below the existing ground level. The excavation extended up to 10 m from the western boundary of the playing field. The excavated material comprised 1 to 2 m of topsoil above sawdust and pine trees, which were thought to have been dumped in the mid-1950s. The excavation was then backfilled with pumice sand.

A discussion with a retired Taupo builder, Mr Geoff Chizmar, confirmed Mr John Barnes recollection. Sawdust was present in a former gully at the school and this was excavated to build the school hall.

⁴ T+T consider that HAIL category I is more appropriate for fire pits and filling associated with land development.

4 Intrusive investigations

4.1 Investigation rationale and scope

Soil investigations were conducted primarily to assess the potential for the previous uses of the site (in particular the HAIL activities identified by Opus), to have resulted in ground contamination.

The investigation was undertaken primarily to assess potential contamination risks to human health. On this basis, and based on the potential contamination sources identified in the PSI, the investigation was designed to target near surface materials. Some of the proposed sample locations were constrained by paved surfaces or the presence of underground services. All hand augers were positioned within readily accessible areas (grassed/garden areas, away from underground services).

4.1.1 Mountview School

At Mountview School, the hand augers were positioned to provide coverage across the school, at locations shown in Figure 2, Appendix A. The hand augers were positioned on the following basis:

- HA1 to HA6 were positioned across the school playing field, on a grid basis, at approximately 30 m centres⁵.
- HA7 was positioned in an area of bare soil located east of the school hall, near the southern boundary of the site.
- HA8 was positioned in a small grassed area adjacent to Rangatira Street.
- HA9 was positioned in a grass strip adjacent to Rangatira Street in the north-eastern portion of the school.
- HA10 was positioned in a grassed area, adjacent to a small playground in the eastern-most corner of the school.

4.1.2 Residential properties

4.1.2.1 Initial sampling

Soil sampling was carried out at the residential properties where the owners/occupiers provided permission to WRC. A total of 32 of the 38 individual properties were sampled. Two hand augers (borehole numbers 1-1, 1-2 to 32-1, 32-2) were drilled at each of the residential properties, at opposite ends of the property (where possible). Sample locations were often positioned close to children's play areas (e.g. trampolines, swing sets, playhouses). Refer to Figure 3 for borehole number and locations within each residential property.

Soil samples were collected at nine (9) locations (boreholes 33 to 41) on public land, located immediately adjacent to properties where owner's permission for sampling was not granted as follows:

- Boreholes 33 to 36 were positioned within the public reserve/easement area, approximately 1 m from the site boundary (offsite).
- Boreholes 37 to 41 were positioned within the grassed road verge.

4.1.2.2 Additional delineation sampling

Following receipt of the initial sampling results, additional (delineation) sampling was undertaken at the following four sample locations and residential properties:

⁵ HA3 to HA6 were preferentially located to target the original ground surface rather than imported material.

- Sample 19-2 at 9 Leslie Street
- Sample 20-1 at 15 Leslie Street
- Sample 24-2 at 20B at Leslie Street
- Sample 28-2 at 17 Simkin Street.

The following scope of works was undertaken:

- Collect surface samples (0 to 0.1 m depth) from four directions (north, south, east, and west), at a distance of 0.5 m from sample 19-2 location.
- Collect 0.3 m deep samples from all directions (north, south, east, and west), at distances of between 0.5 and 3.0 m, from sample locations 20-1 and 28-2.
- Collect 0.3 m deep samples in accessible⁶ areas, between 1.0 and 3.5 m from the location of sample 24-2.

The delineation sample locations are presented in Figures 4 to 7 in Appendix A.

4.1.3 Vegetable gardens

Soil samples were also collected from vegetable gardens present at the site. A total of two (2) samples were collected from two vegetable gardens at the school and 18 samples collected from 12 vegetable gardens across the residential area (but not all of these samples were analysed). The construction of the vegetable gardens was recorded (e.g. treated timber, raised beds).

4.2 Sampling methodology

Soil sampling was conducted as follows:

- Soil samples were collected from hand augers drilled to depths of up to 1.2 m below ground level (bgl).
- All samples were collected directly from the auger head or directly from the ground with freshly-gloved hands, and placed into laboratory-prepared sample containers and/or new plastic snap lock bags. The samples were stored under chilled conditions prior to shipping to the laboratory. The auger head was cleaned and decontaminated between sampling locations.
- Soil samples were generally collected from the surface (0.1 m) and at depths of 0.3, 0.5 and 1.0 m bgl. Boreholes within the public areas (boreholes 33 to 41) were terminated at a depth of 0.3 m to minimise the risk of striking underground services.
- The materials encountered were logged in general accordance with the NZ Geotechnical Society guidance⁷.
- Additional samples were held at the laboratory for further analysis, if required.
- On completion of the sampling, reinstatement comprised backfilling with the soil cuttings and reinstating grass surface.

⁶ Note delineation sample locations around 24-2 were restricted by the location of a new shed and garden established on site since the initial sampling event.

⁷ New Zealand Geotechnical Society, December 2005, *Guideline for the field classification and description of soil and rock or engineering purposes*.

5 Field observations

A detailed site walkover inspection was not carried out during the investigation. However, relevant observations made on site during the field investigation are summarised by area below. Key site features are shown on Figure 1, Appendix A and selected photographs are included as Photographs 1 to 9 in Appendix B.

5.1 Mountview School

The land is generally flat to slightly undulating. The playing field and netball court is around 0.5 to 1.0 m below the level of Rangatira Street while the eastern portion of the school sits approximately level with, and up to 1.0 m above, the level of Rangatira Street.

Several ornamental garden areas and occasional grassed areas are present across the eastern portion of the school. The eastern-most corner of the school comprises a small playground located within a small grassed area. Two raised vegetable gardens are present in this location (Photograph 3).

A caretakers shed is located in the eastern portion of the site, adjacent to the vegetable gardens.

All sample locations encountered dark brown SILT with some sand (imported topsoil) to a depth of approximately 0.1 m bgl. The topsoil was underlain by FILL which comprised:

- Brown to yellowish brown silt with some sand, pumice gravel and organic material encountered to the base of the 1.0m deep boreholes at samples locations HA1 and HA2.
- Greyish brown sandy silt with some sand and gravel encountered in HA8 to a depth of 0.55 m.
- Light brownish grey silty sand with some pumice gravel encountered to the base of the 1.0 m deep boreholes at samples location HA7.
- Dark brown silt encountered to a depth of 0.4m in HA9, and HA10. This material was underlain by additional layers of fill comprising grey to brown silts and sands.

The topsoil at sample locations HA3 to HA6, and the fill at location HA8, was underlain by yellowish brown to grey silty SAND with pumice gravels to at least the base of the boreholes. This material may represent the natural ground (or disturbed natural ground).

Soils recovered from the boreholes also included:

- Woodchips from 0.7 to 1.0 m in HA1 and HA2;
- A small piece of plastic at 0.3m in HA8; and
- Organic material (including what appeared to be topsoil inclusions) between 0.6 and 1.2m in HA9.

Other potential evidence of contamination (visual or olfactory) was not identified in any material from the sample locations.

5.2 Residential area

The land is generally flat to slightly undulating. Thirty seven (37) of the thirty eight (38) lots included a residential dwelling and auxiliary buildings (sheds, garages, etc.) which are typical of the 1960s or 1970s construction style (Photograph 5 in Appendix B) with raised timber floors, expected to be founded on square concrete piles. Broadly speaking, the residential dwellings are surrounded by lawn, gardens, and sealed driveway areas. Vegetable gardens were observed at approximately 38% of the properties.

The property at No. 17 Simkin Street was being used for general storage of timber crates and other materials including both treated and un-treated timber (refer Photograph 4 in Appendix B).

All sample locations encountered a dark brown SILT with or without minor sand (imported topsoil) at the surface to a depth of typically up to 0.1 m bgl. The imported topsoil (described as 'Unit A') was underlain by:

- Natural/disturbed natural soils ('Unit B') comprising one of the following soil types:
 - B1: Silty SAND or Sandy SILT sometimes containing minor fine gravel (pumiceous); light yellowish brown to light brown.
 - B2: Silty SAND or Sandy SILT sometimes containing minor fine gravel (pumiceous); light greyish brown to light grey.
 - B3: Reworked or disturbed materials consisting of B1 and/or B2.

There is typically a defined contact between Units B1 and B2, however, sometimes B1 was observed to grade into B2 with respect to colour and lithology.

- Mixed FILL ('Unit C') – Variable fill layer distinct in composition from reworked/disturbed natural. Predominantly SILT or SAND with or without fine to coarse gravels (pumiceous or non pumiceous). Contains woodchip and/or bark at four locations.
- Buried topsoil ('Unit D') – SILT with or without minor sand; dark brown.

The soil types described above are summarised in Table 5.1 below, together with details on unit depth/thickness.

Table 5.1: Generalised soil profile

Depth below ground level to top of layer (m)	Unit thickness (m)	Geological unit	Description
0.0	0.05 – 0.3	Unit A – imported topsoil	Dark brown SILT with or without minor sand
0.15 – 0.9	0.1 – 0.8	Unit B – natural or disturbed natural soils	Brown, grey, or yellow, silty SAND or Sandy SILT sometimes containing minor fine gravel
0.05 – 0.2	0.1 – 0.95	Unit C – mixed FILL	Predominantly SILT or SAND with or without fine to coarse gravels.
0.3 – 0.8	0.1 – 0.25	Unit D – buried topsoil	Dark brown SILT with or without minor sand

Mixed FILL or 'Unit C' was encountered in about a quarter of the boreholes (particularly in the northern and western residential properties) as follows:

- 8-1 at a depth of 0.05-1.0 m bgl (included wood chip and/or bark).
- 8-2 at a depth of 0.05-0.7 m bgl.
- 10-1 at a depth of 0.05-0.7 m bgl.
- 10-2 at a depth of 0.05-0.4 m bgl.
- 11-2 at a depth of 0.2-0.3 m bgl (included wood chip and/or bark, and glass).
- 12-2 at a depth of 0.05-0.35 m bgl (included a small piece of plastic).
- 13-2 at a depth of 0.1-0.4 m bgl.
- 21-1 at a depth of 0.1-1.0 m bgl.
- 21-2 at a depth of 0.05-1.0 m bgl (included charcoal pieces at 0.8 m bgl).
- 25-2 at a depth of 0.2-0.5 m bgl (included wood chip and/or bark and charcoal pieces).

- 28-1 at a depth of 0.1-0.4 m bgl.
- 29-1 at a depth of 0.2-0.4 m bgl.
- 29-2 at a depth of 0.1-0.3 m bgl.
- 30-1 at a depth of 0.2-0.35 m bgl.

In addition, charcoal pieces and a piece of rusted steel (old machinery part) were encountered during delineation sampling around borehole 20-1 at depths of between 0.05 and 0.3 and 0.1 m bgl respectively (Unit C).

5.3 Additional potential sources of contamination outside the project scope

This investigation addresses a specific suite of contaminants as a result of the former use of the site for timber processing. Where there is evidence of other activities and land uses that may cause contamination to individual properties these are noted. However, there are substances that are routinely used by domestic, commercial and/or industrial activities (e.g. asbestos sheeting and fuel storage) that do not form part of this investigation and are not specifically addressed in this report.

A number of potential contamination sources additional to those listed in the PSI (refer to Section 3) were identified during the site works. These are summarised as follows:

- Timber structures (e.g. decks, retaining walls, fences, timber house foundations) which provide a potential source of CCAB.
- Several houses, sheds, and fences across the residential area were constructed of fibreboard building materials, suspected of being asbestos containing material (ACM). No suspected ACM was identified at the school, however given the age of the buildings, it is likely that ACM is present at the school in some form. Asbestos was not included in the analytical programme for this project.
- Several oil drums and fuel containers, numerous car tyres, and numerous pieces of machinery (including old lawn mowers and a hydraulic log splitter that was reported by the occupant as 'leaking oil on to the ground') were present across the backyard of No. 11 Simkin Street (Photograph 5).
- A steel incinerator was present at 17 Simkin Street. The incinerator was full of green waste during the site visit. However, given the volume of building timber (some treated) observed at this property, it is possible that the incinerator has been used to dispose of waste timber in the past.
- The school caretakers shed was not inspected, however it is likely that it contains minor quantities of hazardous substances (fuel, oil, cleaning products, herbicides, pesticides etc.).
- The presence of fill or disturbed natural soils was identified in the majority of the hand augers (Sections 5.2 above). No details are available regarding how the site was developed in the late 1960s, however, it is likely that fill was imported to the site as part of re-contouring/levelling works. In addition, topsoil would have been imported to the site to create lawn, gardens, playing fields etc. The source of the fill and topsoil is unknown.
- Ash and charcoal was identified in several of the vegetable gardens.
- Given the age of the subdivision, it is likely that the buildings at the site have been painted with lead based paint at some stage in their lifetime. There is potential for paint flakes to have been deposited on the surrounding ground during weathering or maintenance activities. Contamination is likely to be limited to shallow soils immediately adjacent to the buildings. Lead was not included in the analytical programme for this project.

We understand that WRC consider that the use of lead based paints and ACM (in a non-deteriorated condition) do not constitute HAIL activities.

6 Analytical testing and results

Soil samples were submitted to an IANZ accredited laboratory for analysis based on the HAIL identified by the PSI (refer to Section 3) and/or field observations (refer Section 5) as follows:

- 168 surface and 0.3 m deep samples for CCAB and PCP.
- 12 samples for PAH from Nos. 14 and 16 Simkin Street and 20A Leslie Street, where the PSI identified hydrocarbon storage had occurred. Samples collected from 20B Leslie Street and 12 Simkin Street (other properties which the PSI suggested may have been subject to hydrocarbon storage) were not analysed for PAH based on field observations and the results of PAH analysis of neighbouring properties. Dioxin analysis was not considered necessary based on the low PCP concentrations. Previous research⁸ shows a clear relationship between PCP and dioxin concentrations at New Zealand sawmill sites, with dioxins consistently recorded at lower concentrations than PCP.
- The two vegetable garden samples from the school (S1 and S2) and four (4)⁹ samples (9-V1, 9-V2, 22-V1, 22-V2) from the residential properties where the most significant vegetable gardening occurred were analysed for CCAB and PCP. One vegetable garden sample (20-V) was analysed for arsenic following the identification of elevated arsenic concentrations in the backyard of this property. The locations of the five (5) vegetable garden samples that were analysed are shown on Figure 3, Appendix A.
- Submission of seven (7) quality control samples for CCAB analysis.

Full laboratory transcripts and chain of custody documentation are provided in Appendix D.

6.1 Data quality

6.1.1 Sample handling and holding times

The chain of custody records, attached in Appendix D, show that the samples were submitted to Hill Laboratories within the generally accepted holding times for these analytes¹⁰.

6.2 Laboratory quality control

Hill Laboratories are accredited by IANZ and as such are expected to comply with the accreditation requirements that include the confirmation of validity and suitability of results. Any breaches in laboratory control would be expected to be notified at the time of release of the analytical results. No breaches were reported.

6.3 Duplicate samples

A quantitative measure of the variability in the results was undertaken independently of the laboratory by calculating the Relative Percentage Difference (RPD) values for the duplicate pair of samples. The RPD value was calculated as follows:

⁸ Tonkin & Taylor Ltd and SPHERE, 2008, Assessment of Dioxin Contamination at Sawmill Sites. A Report to the Ministry for the Environment.

⁹ Samples from properties where significant vegetable gardening was occurring or where arsenic concentrations in the backyards of the properties were more than double the SCSs(health).

¹⁰ Ministry for the Environment, updated 2011, Contaminated land management guidelines No. 5, *Site Investigation and Analysis of Soils*.

$$RPD := \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} \cdot 100$$

Where Co = concentration of the original sample

Cs = concentration of the duplicate sample

Table 6.1 presents a summary of the QA/QC duplicate results.

Table 6.1: Summary of QA/QC data

Sample	Arsenic	Boron	Chromium	Copper
HA10/0.1	13	< 20	7	11
QC2	13	< 20	6	11
RPD%	0	NC	15	0
10-1 /0.1	5	<20	3	9
Dup1	4	<20	3	8
RPD%	22	NC	0	12
11-1 /0.1	7	<20	6	11
Dup2	7	<20	5	11
RPD%	0	NC	18	0
13-1 /0.3	3	<20	2	3
Dup3	<2	<20	2	3
RPD%	NA	NC	0	0
15-1 /0.1	13	<20	9	10
Dup4	14	<20	11	13
RPD%	-7	NC	-20	-26
24-1 /0.1	17	<20	10	9
Dup5	14	<20	8	7
RPD%	19	NC	22	25
26-1 /0.1	9	<20	6	6
Dup6	10	<20	6	7
RPD%	-11	NC	0	-15

NC – not calculated as at least one value of the duplicate pair were recorded below the laboratory limit of reporting
All values in mg/kg except for the RPD values (%)

It is typically considered acceptable (refer to MfE's Contaminated Land Management Guidelines¹¹) if an RPD range of less than 50% is achieved for soil samples. As shown in Table 6.1, the metal concentrations in the duplicate samples reported RPDs within this range (maximum of 26%) indicating that variability in sample collection, handling and analysis is acceptable.

¹¹ Ministry for the Environment, updated 2011, Contaminated land management guidelines No. 5, *Site Investigation and Analysis of Soils*.

6.4 Assessment criteria

Assessment criteria are outlined in the following subsections and tabulated together with the analytical results in Table E1, Appendix E.

6.4.1 Background concentrations

Metal concentrations have been compared against published background data provided in the following documents:

- Landcare Research, 2016, *Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document*.
- Waikato Regional Council. *Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data*.

The Landcare Research document provides *national* background metal ranges and is considered to be most applicable for the Taupo area. Background concentrations for arsenic, chromium, and copper have been selected from this document, however, it does not include a national background concentration for boron. Boron concentrations have therefore been compared against the published background concentration provided by WRC.

6.4.2 Criteria for protection of human health

The NES Soil regulations provide a set of chemical-specific soil contaminant thresholds that define an adequate level of protection for human health for a range of differing land-uses in New Zealand (referred to as soil contaminant standards or SCSs_(health)). Standards were derived for 12 contaminants, called "priority contaminants", which must be used if the land use fits within the particular exposure scenario.

For contaminants that are not priority contaminants, and/or for land uses that fall outside the five standard land-use exposure scenarios, the NES mandates that either a site-specific soil guideline value can be derived (in accordance with the prescribed methodology¹²), or a guideline value can be selected from national and international literature in accordance with the *Contaminated Land Management Guideline No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values*¹³ (herein referred to as MfE Guideline No. 2).

SCSs_(health) exist for the majority of contaminants of concern identified in Section 3. For this Tier 1 screening assessment the SCSs_(health) for:

- Residential land use (10% produce consumption) has been selected for comparison of data from the residential properties.
- In the absence of specific SCSs_(health) for a primary school, recreational land use and residential land use (no produce consumption) have been selected for comparison of data from Mountview School.

¹² Ministry for the Environment, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health.

¹³ Ministry for the Environment. Contaminated Land Management Guidelines No 2: *Hierarchy and Application in New Zealand of Environmental Guideline Values*. Published 2003, Revised 2011.

In the absence of SCSs_(health) for individual PAH compounds, guideline values published by MfE¹⁴ and USEPA¹⁵ have been adopted.

6.4.3 Criteria for protection of the environment

The Canadian soil quality guidelines¹⁶ have been adopted to assess risks to the environment (environmental protection criteria).

National environmental based criteria have recently been published in New Zealand¹⁷. Although these criteria have not been subject to international review they have been considered as part of this assessment, and have specifically been used to assess results of metals for which the published background concentration range exceeds the Canadian soil quality guidelines (i.e. copper and chromium).

6.5 Analytical results

A summary of analytical results from samples analysed during this investigation, alongside the relevant acceptance criteria, is presented in Tables E1 to E3 provided in Appendix E. Key findings are summarised below.

6.5.1 Mountview School

Results of laboratory analysis for 18 samples (including two vegetable garden samples) tested for PCP and CCAB show the following:

- Boron and PCP (and TCP¹⁸) in all 18 samples recorded concentrations below the laboratory limit of reporting.
- All metals concentrations were below the SCSs_(health) for a recreational land use.
- All surface samples (0 to 0.1m depth), contained concentrations within published background concentrations and below the SCSs_(health) for residential land use (no produce consumption).
- Two samples collected from 0.3m depth from the eastern portion of the site (sample locations HA9 and HA10) contained arsenic concentrations (27 and 78 mg/kg) above the published background concentrations, environmental protection criteria and the no produce SCSs_(health) for residential land use (24 mg/kg).

6.5.2 Residential area

6.5.2.1 Initial residential sampling

Results of twelve (12) samples analysed for PAH showed all individual PAH compounds below or near the laboratory limit of reporting (up to 0.05 mg/kg). The PAH concentrations were orders of magnitude lower than the SCSs_(health) and environmental based criteria.

Results of laboratory analysis for 146 samples from the residential properties (including 18 samples from the adjacent public areas) for PCP and CCAB showed the following:

¹⁴ MfE, 1999 (updated 2011). *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*.

¹⁵ USEPA Regional Screening Levels - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Residential Land Use. Carcinogens adjusted for incremental excess cancer risk of 1 in 100,000

¹⁶ Canadian Council of Ministers of the Environment, 1999 (updated 2007), Canadian soil quality guidelines for the protection of environment.

¹⁷ Landcare Research, 2016, User Guide: Background soil concentrations and soil guidelines for the protection of ecological receptors (Eco-SGVs) – Consultation draft).

¹⁸ TCP (2,3,4,6 – Tetrachlorophenol) was included as part of the laboratory PCP analysis.

Protection of human health:

- All measured concentrations were below the $SCSs_{(health)}$ for a residential land use (10% produce consumption), with the exception of arsenic which exceeded the residential criteria in approximately 14% of the samples analysed.
- A total of 12 of the 32 residential properties and 5 of the 9 reserve locations contained arsenic concentrations above the residential land use $SCSs_{(health)}$ (Refer Figure 3 in Appendix A).
- 13 of the 15 samples that contained elevated arsenic concentrations of between the $SCSs_{(health)}$ and double the $SCSs_{(health)}$ (i.e. 20 to 40 mg/kg) were surface samples (0 to 0.1 m depth).
- Six samples, typically from 0.3 m depth, contained elevated arsenic concentrations, more than double the residential criteria including:
 - 49 mg/kg in sample 19-2/0.1 (9 Leslie Street).
 - 137 mg/kg in sample 20-1/0.3 (15 Leslie Street).
 - 92 mg/kg in sample 24-2/0.3 (20B Leslie Street).
 - 74 mg/kg in sample 28-2/0.3 (17 Simkin Street)
 - 169 mg/kg in sample 39/0.1 (road verge immediately south of 18 Leslie Street).
 - 41 mg/kg in sample 39/0.3 (road verge immediately south of 18 Leslie Street).

Additional (delineation) sampling/analysis was carried out to assess the extent of the arsenic impacted soils identified in the above results. Details of the delineation sampling are documented in Section 6.5.2.3 below. No delineation sampling was carried out around borehole 39 as this borehole was located in the road verge, and adjacent to a treated timber fence (a likely source of the contamination).

Published background and environmental protection criteria:

- Approximately 19% of the samples analysed exceeded the environmental based criteria and background upper confidence limit for arsenic (both 17 mg/kg).
- Boron, copper and chromium were all recorded in low concentrations (below the laboratory limit of reporting or within background concentrations) with the following exceptions:
 - Sample 5-2/0.1 contained a boron concentration of 21 mg/kg, above the published background concentration (6.7 mg/kg).
 - Two samples contained elevated copper (up to 710 mg/kg), at concentrations above the background concentration and above the national environmental based criteria of 140 mg/kg.
- Low levels of PCP (up to 0.1 mg/kg) were recorded in three of the samples at concentrations below the environmental protection criteria of 11 mg/kg. All of the other PCP (and TCP) concentrations were recorded below the laboratory limit of reporting (<0.05 mg/kg).

6.5.2.2 Vegetable garden sampling

Laboratory analysis was conducted on four samples collected from vegetable gardens which appeared to be used extensively for growing vegetables (14 and 16 Simkin Street). These samples were analysed for CCAB and PCP. A vegetable garden sample from 15 Leslie Street was also analysed for arsenic after arsenic impacted soils were identified in the backyard of this property. Results of laboratory analysis show that:

- All concentrations were below the $SCSs_{(health)}$ for a residential land use (10% produce consumption), with the exception of arsenic. Arsenic concentrations slightly exceeded the residential criteria of 20 mg/kg in two of the samples analysed, 9V-1 and 9V-2, reporting concentrations of 28 and 25 mg/kg respectively. These samples were collected from

vegetable gardens constructed of corrugated iron sheeting with a treated timber frame (a possible source of the elevated arsenic).

- Four of the five vegetable garden samples exceeded the environmental based criteria and background upper limit for arsenic (both 17 mg/kg).
- Boron, chromium, and copper were low and all typically below laboratory limits of reporting or within background levels.

6.5.2.3 Delineation sampling/analysis

A total of 43 additional soil samples collected in the vicinity of sample locations 19-2, 20-1, 24-2, and 28-2, were analysed for arsenic. The results of laboratory analysis indicate that:

- Around sample location 19-2 (9 Leslie Street) arsenic impacted soils are limited to near surface soils less than 0.3 m below ground. The lateral extent of arsenic impacted soils is localised in an area of less than 1 m by 1 m with a maximum concentration of 49 mg/kg (refer to Figure 4).
- Around sample location 20-2 (15 Leslie Street) arsenic impacted soils are limited to depths of between 0.1 m and 0.5 m below ground. The lateral extent of arsenic impacted soils is estimated to comprise an area of approximately 2.5 m by at least 5 m, with a maximum concentration of 141 mg/kg recorded (refer to Figure 5). As testing showed that contamination was generally not located at surface (and therefore not expected to present a immediate exposure risk), further testing to delineate the deeper contamination to the south has not been undertaken at this time.
- Around sample location 24-2 (20B Leslie Street) arsenic impacted soils are limited to depths of between 0.1 m and 0.5 m below ground. The lateral extent of arsenic impacted soils comprises an area of approximately 2.5 m by at least 4 m, with a maximum concentration of 92 mg/kg recorded (refer to Figure 6). The lateral extent of arsenic contamination, to the north and south, has not been fully assessed at this location due to the presence of a new shed and paved area to the south and because the contamination was not at surface and therefore does not present an immediate exposure risk.
- Around sample location 28-2 (17 Simkin Street) arsenic impacted soils are limited vertically to depths of between >0.1 m and <0.5 m. The lateral extent of arsenic impacted soils comprises an area of approximately 1.5 m by at least 3.5 m, with a maximum concentration of 92 mg/kg recorded (refer to Figure 7). The lateral extent of arsenic contamination, to the north, has not been fully assessed at this location, primarily because the contamination was not at surface and therefore does not present an immediate exposure risk..

7 Site condition

7.1 Nature and extent of contamination

In general, low contaminant concentrations were encountered across the site with the exception of elevated arsenic (above the SCSs_(health) and environmental based criteria) identified at discrete locations within near surface soils (<0.5 m deep).

The soils in some areas contain concentrations of other contaminants (PCP, PAH, boron, copper, and chromium) above background levels and/or environmental based criteria, but well below the SCSs_(health).

7.1.1 Mountview School

As discussed in Section 6.4.2, in the absence of specific SCSs_(health) for a primary school, recreational land use and residential land use (no produce consumption) have been selected for comparison of data from Mountview School.

The arsenic concentrations above the SCSs_(health) were recorded in samples collected from a grassed areas in the eastern portion of the school. These samples were collected at depths of 0.3 m. The soils from the remainder of the site (including the school playing fields) contained concentrations of contaminants at background levels.

7.1.2 Residential areas

Twelve of the 32 residential properties sampled contained arsenic concentrations that may present a risk to human health. However, arsenic concentrations in the surface samples (0 to 0.1m depth) generally only slightly exceeded the SCS_(health) of 20 mg/kg (concentrations typically less than 30 mg/kg and only ever exceeded the SCSs_(health) in one of the two bore holes at each property. This suggests that the elevated arsenic concentrations in surface soils are isolated and limited in nature.

As discussed in Section 6.5.2.3, the highest arsenic concentrations (more than double the SCSs_(health)) were recorded at four residential properties (Nos. 9, 15, and 20B Leslie Street, and 17 Simkin Street) and at one sample location collected from the road verge¹⁹ (immediately south of 18 Leslie Street).

Delineation sampling indicates that arsenic concentrations of more than double the SCS_(health) are isolated to specific areas, ranging in length from approximately 1 m to more than 5 m (refer to Figures 4 to 7). Elevated arsenic at 9 Leslie Street was confined to the surface samples (<0.1 m depth). Elevated arsenic at 15 and 20B Leslie Street, and 17 Simkin Street was recorded in the 0.3 m deep samples (all within Unit B soils) but not the 0.1 (Unit A) or 0.5 m deep samples (based on the initial testing results).

The highest arsenic concentration (169 mg/kg) was identified in a surface sample (0 to 0.1 m depth) from the road verge immediately south of 18 Leslie Street (sample 39). The 0.3 m deep sample from this location contained a concentration of 41 mg/kg, which is still more than double the SCSs_(health). However, the SCSs_(health) for a recreational land use scenario (80 mg/kg for arsenic) is considered to be more appropriated in this instance. Sample 39 was collected approximately 0.3 m from a treated timber boundary fence. Given the proximity to the fence, and reduction in concentration with depth, the elevated arsenic concentrations may be associated with leaching of treatment chemicals from the fence or incorporation of sawdust or waste construction material. No delineation sampling was carried out at sample 39 as access was not granted to the residential property beyond the verge where this sample was collected.

7.2 Investigation uncertainty and limitations

This investigation has been designed to target HAIL activities identified as part of the Opus PSI only. It does not include the investigation of other potential HAIL activities identified during the site works (refer to Section 5.3).

Other points of uncertainty or limitations of this investigation are discussed below:

- The investigation was primarily to assess human health risks and therefore sampling was limited to the upper 1 m of soils. It is possible that contamination associated with historic land uses is present at depths greater than 1 m and was not encountered during the investigation (e.g. if the site was filled with more than 1 m of fill during subdivision development). Regardless, exposure to contaminants in soils at more than 1 m depth is unlikely.
- Delineation sampling did not fully assess arsenic contamination below 100 mm depth below ground surface at three of the four residential properties. The extent of arsenic impacted soils at these properties is uncertain in at least one direction away from the original sample location. This was due to the presence of a structure and paved area and because the contamination was not at surface and therefore does not present an immediate exposure risk.
- Samples from public areas were collected at maximum depths of 0.3 m to avoid risk of striking underground services.
- No delineation sampling was carried out around borehole 39 which recorded the highest arsenic concentration as this was impractical given its location in the road verge.
- Results of analysis of duplicate samples indicates that arsenic concentrations could be as much as 22% higher or lower than the reported values. Several arsenic concentrations at the residential properties were reported within 22% of the $SCS_{(health)}$.

7.3 Conceptual site model

A conceptual site model (CSM), as defined by the MfE in the contaminated land management guidelines¹⁴, 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). Table 7.1 summarises the source-pathway-receptor analysis completed to assess possible environmental and human health risks associated with the site conditions identified by the Opus PSI and intrusive investigations. The CSM is based on a Tier 1 assessment and current land use.

In summary, the CSM analysis presented below shows that there is potential for onsite human health risks to site users if they are exposed to near surface soils which contain arsenic at concentrations above $SCS_{(health)}$. The CSM also shows that there is potential for the near surface soils to pose a risk to the surrounding environment, particularly during any soil disturbance works.

Excavated soils requiring off-site disposal may also pose an environmental effect to the receiving fill site, if the material is not disposed in an appropriate and controlled manner.

Table 7.1: Conceptual site model and effects assessment

Source	Pathway	Receptors	Pathway assessment	
Surface soils containing arsenic above SCS(health).	Dermal contact, inhalation and ingestion of contaminated soil	Current/future residential occupants and employees/students of Mountview School.	Pathway has been investigated and found to be: <ul style="list-style-type: none"> • Complete at 12 residential properties. • Incomplete at School and other locations 	Human health
Vegetable garden soils containing arsenic above SCS(health).	Produce consumption	Current/future site users	Pathway has been investigated and found to be: <ul style="list-style-type: none"> • Complete at the current vegetable gardens at 16 Simkin Street. • Incomplete at School and other locations 	
Shallow soils containing metals above environmental based criteria and/or SCS(health).	Leaching of contaminants / mobilisation during rainfall events or via dust during land disturbance work	On site – Underlying groundwater ^a Off site – Flora and fauna in nearby receiving environments	Pathway has been investigated and found to be complete at several properties including Mountview School where metal concentrations exceed environmental based criteria	Environmental health
	Direct effects on soil biota	Biota living in soil on site		
	Excavated materials disposed offsite	Off site – receiving environments in vicinity of the disposal site ^b		

Note: Conceptual site model based on Tier 1 screening and current land use

a – Contamination is expected to be confined to within shallow soils beneath the site and is unlikely to have impacted on underlying groundwater which is expected to be at least 20 m bgl (based on Opus PSI).

b - Negligible if materials are disposed to an appropriate receiving facility (i.e. licensed landfill or managed fill subject to approval from the facility operator).

8 Discussion and implications

8.1 Mountview School

The results of soil sampling in the playing fields, around the school grounds including vegetable gardens show that surface soils are not at levels that would pose a risk to school users. Arsenic concentrations above the residential (no produce consumption) SCSs_(health) were identified in the eastern portion of the school, at a depth of 0.3 m bgl and therefore do not present an immediate risk to human health based on current land use and layout. Disturbance of soils in the eastern portion of the site would likely need to be carried out with appropriate controls in place to manage potential human health and environmental effects (unless additional soil testing proves otherwise). Disturbance of soils is also likely to require resource consent, as discussed in Section 8.2.

8.2 Residential areas

The results of soil sampling indicate that elevated arsenic concentrations in surface soils across the subject site (including 9 Leslie Street) are isolated and limited in nature and do not present a significant risk to human health under the current land use. Higher concentrations of arsenic (more than double the SCSs_(health)) were identified in isolated locations, typically only at a depth of 0.3 m bgl and therefore do not present an immediate risk to human health based on current land use and layout. We understand that the residents have been provided with a copy of results for their properties (refer to Appendix F).

Disturbance of soils in the residential properties around the locations which contain arsenic concentrations above the SCSs_(health) would likely need to be carried out with appropriate controls in place to manage potential human health and environmental effects. Disturbance of soils is also likely to require resource consent, as discussed in Section 8.4.

The highest arsenic concentration (169 mg/kg) was recorded in a road verge sample at the surface. This contamination is likely to be associated with the immediately adjacent treated timber fence, however, we suggest that this inference is confirmed. Without further delineation, this result should be recorded on council files to ensure that soil disturbed by maintenance/excavation workers is disposed of appropriately.

8.3 Vegetable gardens

Vegetable garden samples generally contained contaminant concentrations which do not present a risk to human health. However, two samples (9V-1 and 9V-2) contained arsenic levels slightly above the SCSs_(health). These elevated arsenic concentrations may be related to the construction of the raised garden beds (treated timber frame) or from addition of ash as a fertiliser. Additional bioavailability analysis could be undertaken at a later date to confirm the Tier 1 risk assessment. In the interim, vegetables from these gardens should be thoroughly washed of soil prior to consumption. Hands should also be thoroughly washed following gardening activities at this property. Adding clean soil (such as potting mix or imported topsoil) would likely reduce arsenic concentrations in the vegetable gardens through dilution. Alternatively, the existing soil could be entirely replaced with clean imported topsoil. We understand that the residents have been provided with health advice to this effect.

Only two of the nine properties which had vegetable gardens that were not sampled as part of the investigation contained arsenic in the backyards at concentration above the SCSs_(health) of 20 mg/kg (with concentrations up to 27 mg/kg).

8.4 Regulatory implications

The key legislation and planning controls around contaminated sites in Taupo are discussed in the following subsections. TDC is charged with managing contaminants from a human health perspective while WRC manages issues that affect the environment.

8.4.1 NES Soil regulations

The NES Soil regulations came into effect on 1 January 2012. This legislation sets out nationally consistent planning controls appropriate to district and city councils for assessing contaminants in soil with regard to human health. As a result, the NES Soil regulations prevail over the rules in the District Plan, except where the rules permit or restrict effects that are not dealt with in the NES Soil regulations.

The NES Soil regulations apply to specific activities on land where a HAIL activity has, or is more likely than not to have occurred. Activities covered under the NES Soil regulations include soil disturbance, soil sampling, fuel systems removal, subdivision and land use change. Because HAIL activities have occurred on the site (refer to Section 3), the NES Soil regulations may apply to future land development activities occurring at the site.

Broadly speaking, based on the results of the investigation, development of:

- Properties where arsenic concentrations exceed the SCSs_(health) (including the School) are likely to require consent from TDC under the NES as restricted discretionary activity.
- Properties where contaminant concentrations exceed background concentrations may require consent from TDC under the NES as controlled activity (unless permitted activity criteria can be met with regards to soil disturbance volumes etc.).
- Properties where contaminant concentrations are within background levels may not require consent under the NES Soil. It is likely that further testing will be required within the individual properties to confirm this.

8.4.2 Taupo District Plan

The NES Soil regulations prevail over the rules in the District Plan, except where the rules permit or restrict effects that are not dealt with in the NES Soil regulations. We consider that the NES Soil regulations supersede these rules in their entirety. Hence, any future development at the site will not require contaminated land related consents under the District Plan.

8.4.3 Waikato Regional Plan

The policies, objectives, and implementation methods relating to the control of contaminated sites in the Waikato region are specified in the Waikato Regional Plan (WRP).

WRC's definition of contaminated land includes land of one of the following kinds:

- a) if there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or
- b) if there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that-
 - i. *has significant adverse effects on the environment; or*
 - ii. *is reasonably likely to have significant adverse effects on the environment.*

Section 5.3 of the WRP, which relates to contaminated sites, states:

"Discharges of contaminants from contaminated land shall be managed so that they:

- a do not present significant risk of chronic or acute toxic effects on human health, flora or fauna due to the contamination of soil and ground or surface water*
- b do not have adverse effects on water quality or aquatic ecosystems that are inconsistent with the water management objectives in Section 3.1.2*
- c there are no adverse effects on air quality that are inconsistent with air quality objectives in Section 6.1.2*
- d avoid significant adverse effects on the relationship that tangata whenua as Kaitiaki have with their identified taonga such as ancestral lands, water and waahi tapu*
- e remedy or mitigate cumulative adverse effects on the relationship that tangata whenua as Kaitiaki have with their identified taonga such as ancestral lands, water and waahi tapu."*

The methods proposed to manage contaminated sites in the region relate principally to investigation, assessment and registration of contaminated sites, the application of conditions on consents where sought for any contaminated site and education by the Council.

The WRP includes rules regarding discharges from the remediation of contaminated land.

The current testing shows that contaminant concentrations exceed human health and environmental based criteria. On this basis, several isolated areas of the subject site are considered to meet WRC's definition of 'contaminated land' under the Regional Plan. If remediation (e.g. to remove arsenic impacted soils) is required, then the rules regarding discharges from the remediation of contaminated land will apply to the site. Provided that any remediation and management of the site is undertaken in accordance with the MfE guidelines for the management of contaminated land, and the relevant reports are provided to WRC, remediation at the site is likely to comply with WRC's permitted activity rule, and no resource consent will be required.

9 Summary

T+T has been commissioned by WRC to undertake an intrusive ground contamination investigation of the site which has formerly been used for sawmilling and timber treatment purposes.

The objective of the assessment was to investigate the presence of, and potential risks to human health associated with, contamination that may have resulted from several HAIL activities associated with historic timber processing at the site.

This investigation has involved soil sampling across the site including collection of soil samples from:

- 10 borehole locations across Mountview School;
- 32 residential properties;
- 9 hand auger boreholes located on public land; and
- Raised vegetable gardens.

Selected soil samples have been analysed for copper, chromium, arsenic and boron (CCAB), pentachlorophenol (PCP), and in some cases polycyclic aromatic hydrocarbons (PAH).

In general, low contaminant concentrations were encountered across the site with the exception of elevated arsenic (above the $SCS_{(health)}$ and environmental based criteria) identified at discrete locations within near surface soils (<0.5 m deep).

At Mountview School, arsenic concentrations above the $SCS_{(health)}$ were recorded in two of the 10 sample locations. These samples collected were both collected from a grassed area in the eastern portion of the school at depths of 0.3 m. The soils from the remainder of the site (including the school playing fields) contained concentrations of contaminants at background levels.

Twelve of the 32 residential properties sampled contained arsenic concentrations that may present a risk to human health. However, arsenic concentrations in the surface samples (0 to 0.1m depth) generally only slightly exceeded the $SCS_{(health)}$ of 20 mg/kg (concentrations typically less than 30 mg/kg and only ever exceeded the $SCS_{(health)}$ in one of the two bore holes at each property. This suggests that the elevated arsenic concentrations in surface soils are isolated and limited in nature.

Higher concentrations of arsenic (more than double the $SCS_{(health)}$) were recorded at four residential properties (Nos. 9, 15, and 20B Leslie Street, and 17 Simkin Street) and at one sample location collected from the road verge (immediately south of 18 Leslie Street). The higher arsenic concentrations were typically only recorded at a depth of 0.3 m bgl and therefore do not present an immediate risk to human health based on current land use and layout.

The vegetable garden samples generally contained contaminant concentrations which do not present a risk to human health. However, two samples contained arsenic levels slightly above the $SCS_{(health)}$. These elevated arsenic concentrations may be related to the construction of the raised garden beds (treated timber frame) or from addition of ash as a fertiliser.

10 Applicability

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

Recommendations and opinions in this report are based on exploratory data from discrete investigation locations. The nature and continuity of subsoil away from the exploratory holes are inferred and it must be appreciated that actual conditions could vary from the assumed model.

The persons undertaking, managing reviewing and certifying this assessment are suitably qualified and experienced practitioners as defined in the NES Soil regulations.

Tonkin & Taylor Ltd

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



.....
Alex Davies-Colley

.....
Glen Nicholson

Environmental Scientist

Project Director

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



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Lean Phuah

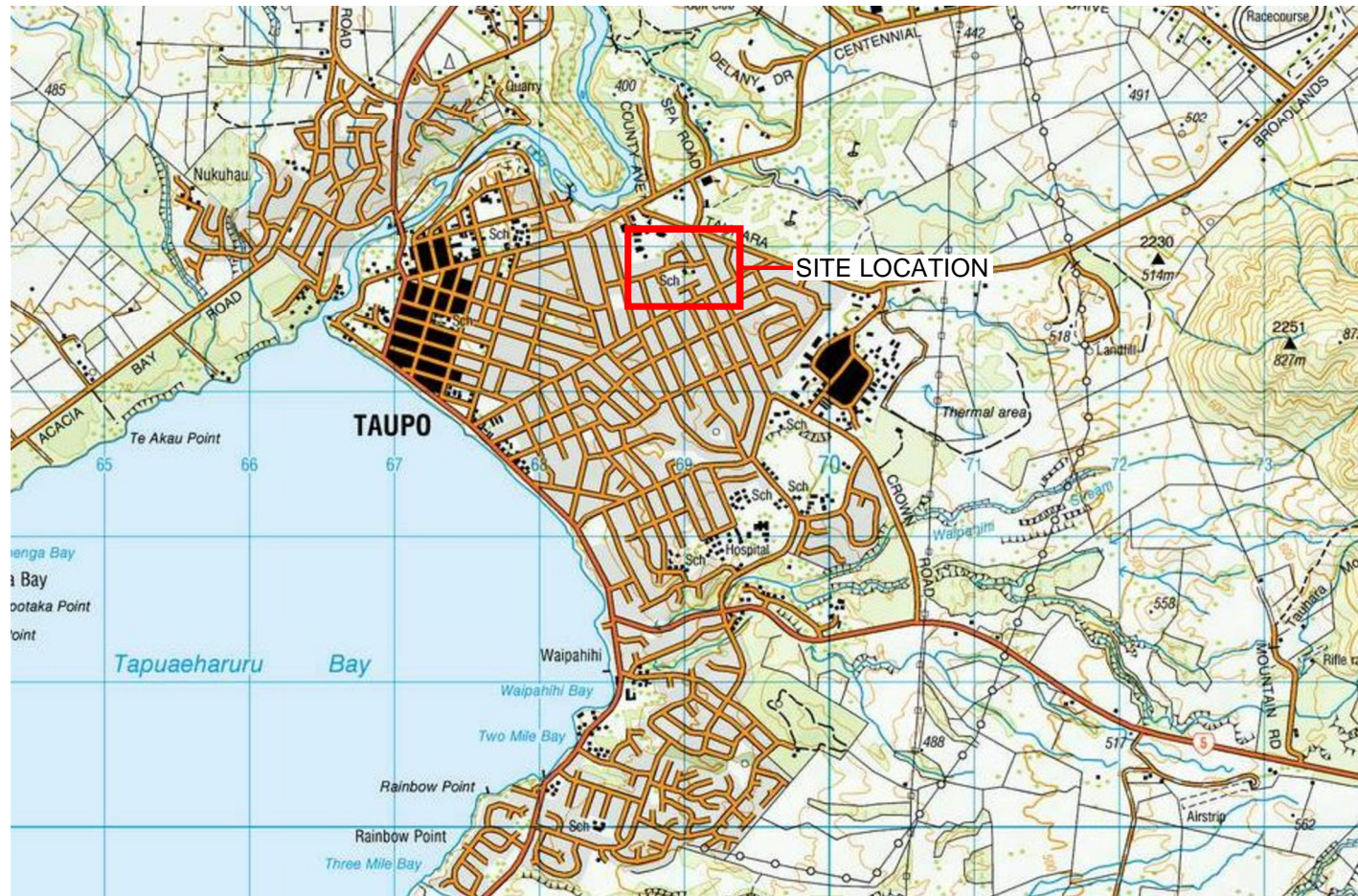
Principal Contaminated Land Specialist

AJDC

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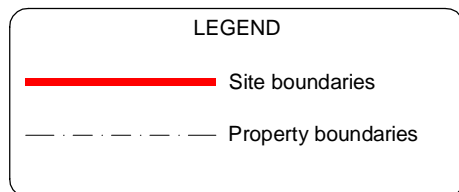
Appendix A: Figures

- Figure 1 – Site location plan
- Figure 2 – Sample Location plan (Mountview School)
- Figure 3 – Sample location plan (Residential area)
- Figure 4 – Delineation sampling plan – 9 Leslie Street
- Figure 5 – Delineation sampling plan – 15 Leslie Street
- Figure 6 – Delineation sampling plan – 20B Leslie Street
- Figure 7 – Delineation sampling plan – 17 Simkin Street

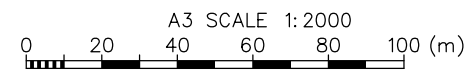


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SITE LOCATION MAP



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APPROVED	AJDC	Jun. 17
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WAIKATO REGIONAL COUNCIL
GROUND CONTAMINATION INVESTIGATION
FORMER SAWMILL – TAUHARA, TAUPO
Site Location and Site Layout Plan

FIG. No. Figure 1

REV. 0



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LEGEND

- Site boundaries
- Property boundaries
- ⊕ HA Hand auger locations
- S Vegetable garden sample locations



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WAIKATO REGIONAL COUNCIL
 GROUND CONTAMINATION INVESTIGATION
 FORMER SAWMILL – TAUHARA, TAUPO
 Sample Location Plan

FIG. No. Figure 2

REV. 0

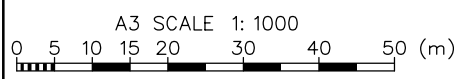
LEGEND

- Site boundaries
- - - Property boundaries
-  Soil sample locations
- V Vegetable garden sample locations
- 11 Street numbers



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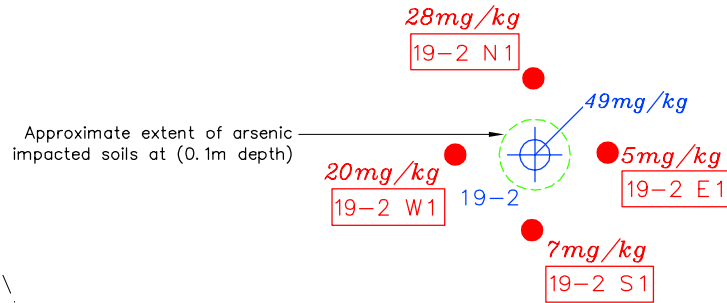
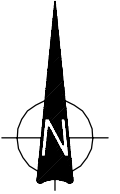

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DRAWN	DWM	May. 17
DRAFTING CHECKED	AJDC	Jun. 17
APPROVED	AJDC	Jun. 17
CADFILE : \\1000997-F03.dwg		
SCALES (AT A3 SIZE)		
1: 1000		
PROJECT No.	1000997	

WAIKATO REGIONAL COUNCIL
 GROUND CONTAMINATION INVESTIGATION
 FORMER SAWMILL – TAUHARA, TAUPO
 Sample Location Plan

FIG. No. Figure 3

REV. 0



LEGEND

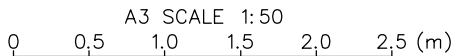
----- Property boundary

Denotes original sample location (19-2)

19-2 N1 ● Denotes delineation sample location

28 mg/kg Denotes arsenic concentration @ 0.1m depth

Note: Refer to figure 3 for original sample locations within residential properties.



ORIGINAL IN COLOUR

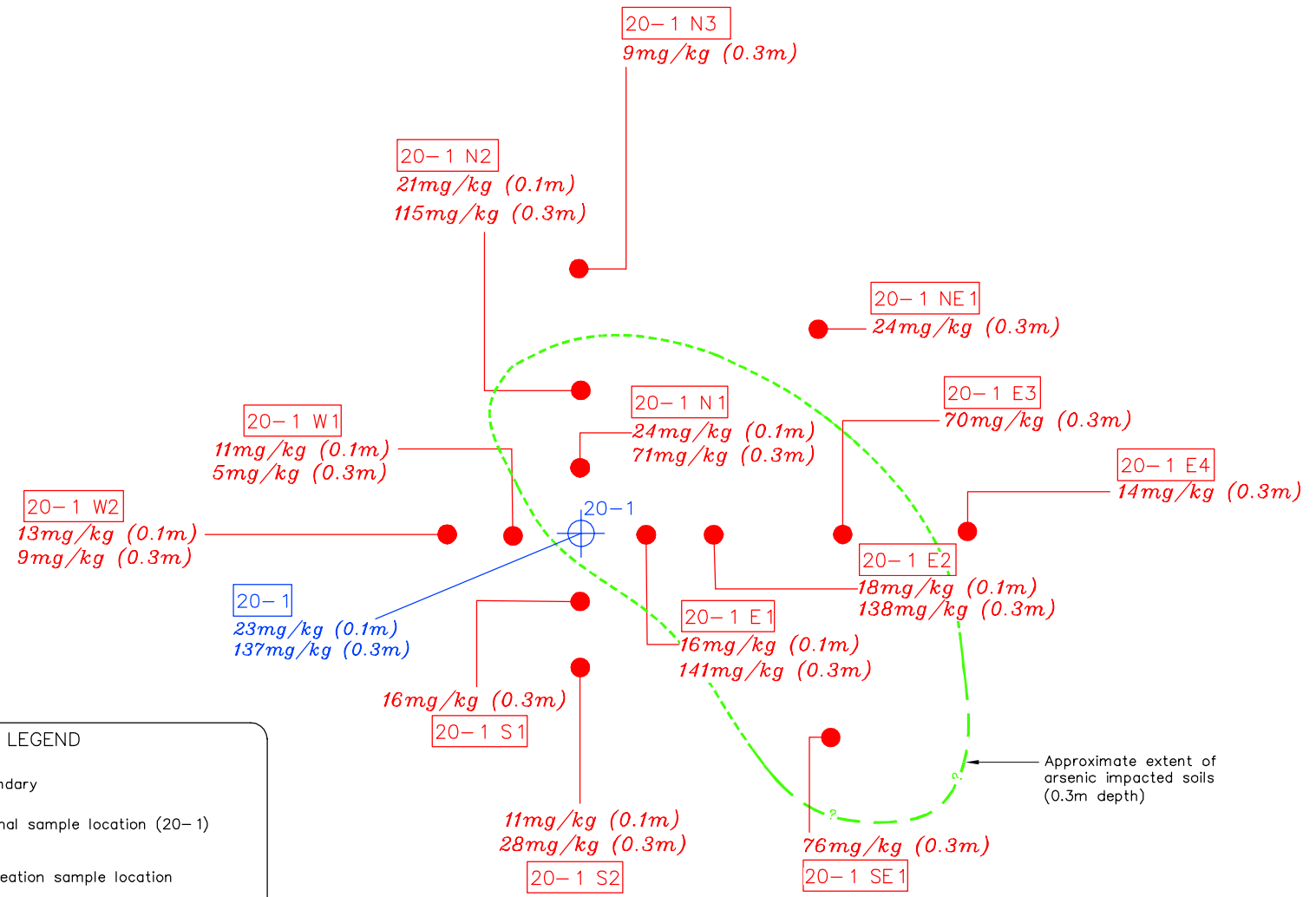
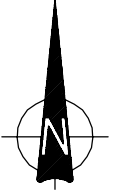
Tonkin+Taylor
Level 5, 711 Victoria Street, Hamilton
www.tonkintaylor.co.nz

DRAWN	MMOJ	May.17
DRAFTING CHECKED	AJDC	Jun.17
APPROVED	AJDC	Jun.17
CADFILE : 1000997-F04_F07.dwg		
SCALES (AT A4 SIZE) 1:50		
PROJECT No.	1000997	

WAIKATO REGIONAL COUNCIL
GROUND CONTAMINATION INVESTIGATION
FORMER SAWMILL- TAUHARA, TAUPO
Delineation sampling plan- 9 Leslie Street

FIG. No.	Figure 4	REV.	0
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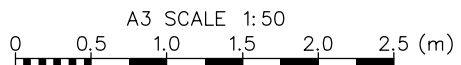
P:\1000997\WorkingMaterial\CAD\FIG\1000997-F04_F07.dwg F04 19/05/2017 3:21:38 PM



LEGEND

- Property boundary
- Denotes original sample location (20-1)
- Denotes delineation sample location
- 13mg/kg (0.1m)* *9mg/kg (0.3m)* Denotes arsenic concentration at depths of 0.1m and 0.3m

Note: Refer to figure 3 for original sample locations within residential properties.



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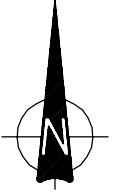
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DRAFTING CHECKED	AJDC	Jun.17
APPROVED	AJDC	Jun.17
CADFILE : \\1000997-F04_F07.dwg		
SCALES (AT A4 SIZE)		
1:50		
PROJECT No.	1000997	

WAIKATO REGIONAL COUNCIL
GROUND CONTAMINATION INVESTIGATION
FORMER SAWMILL- TAUHARA, TAUPO
Delineation sampling plan- 15 Leslie Street

FIG. No. **Figure 5**

REV. **0**

P:\1000997\WorkingMaterial\CAD\FIG\1000997-F04_F07.dwg F06 19/05/2017 3:21:04 PM



Approximate extent of arsenic impacted soils (0.3m depth)

Extent of new garden

Lawn

New shed

Existing dwelling at 20B Leslie Street

Fence with gate

56 mg/kg 24-2 3

26 mg/kg 24-2 4

38 mg/kg 24-2 6

53 mg/kg 24-2 7

92 mg/kg 24-2

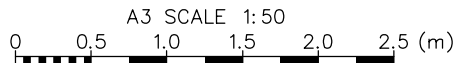
12 mg/kg 24-2 5

14 mg/kg 24-2 1

LEGEND

- Property boundary
- Denotes original sample location (24-2)
- Denotes delineation sample location
- Denotes arsenic concentration @ 0.3m depth

Note: Refer to figure 3 for original sample locations within residential properties.



ORIGINAL IN COLOUR



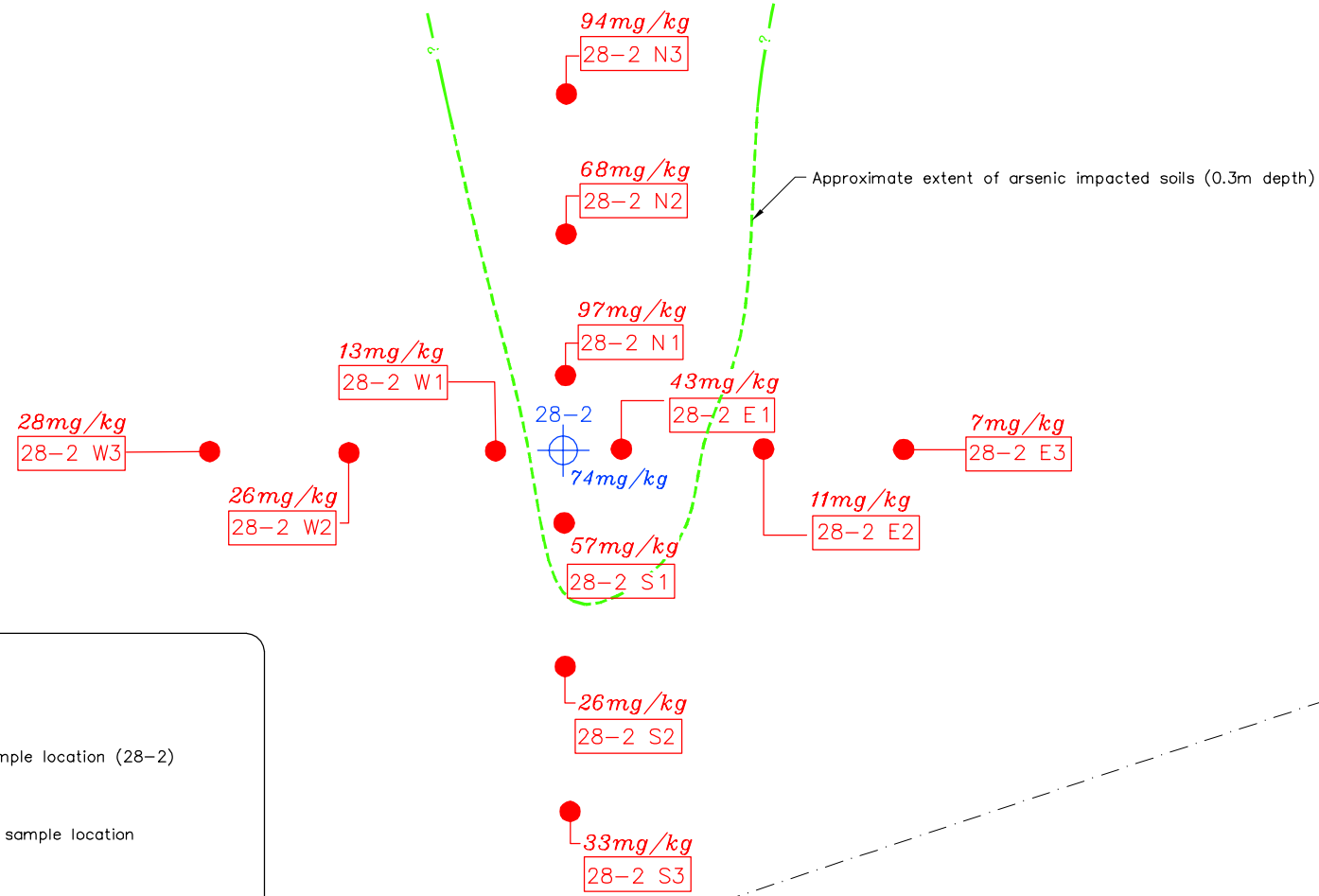
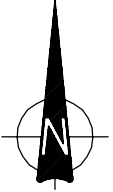
Tonkin+Taylor

Level 5, 711 Victoria Street, Hamilton
www.tonkintaylor.co.nz

DRAWN	MMOJ	May.17
DRAFTING CHECKED	AJDC	Jun.17
APPROVED	AJDC	Jun.17
CADFILE :	1000997-F04_F07.dwg	
SCALES (AT A4 SIZE)	1:50	
PROJECT No.	1000997	

WAIKATO REGIONAL COUNCIL
GROUND CONTAMINATION INVESTIGATION
FORMER SAWMILL- TAUHARA, TAUPO
Delineation Sampling Plan- 20B Leslie Street

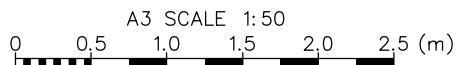
FIG. No.	Figure 6	REV.	0
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LEGEND

- Property boundary
- Denotes original sample location (28-2)
- Denotes delineation sample location
- Denotes arsenic concentration @ 0.3m depth

Note: Refer to figure 3 for original sample locations within residential properties.



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DRAWN	MMOJ	May.17
DRAFTING CHECKED	AJDC	Jun.17
APPROVED	AJDC	Jun.17
CADFILE : 1000997-F04_F07.dwg		
SCALES (AT A4 SIZE) 1:50		
PROJECT No.	1000997	

WAIKATO REGIONAL COUNCIL
GROUND CONTAMINATION INVESTIGATION
FORMER SAWMILL- TAUHARA, TAUPO
Delineation sampling plan- 17 Simkin Street

FIG. No.	Figure 7	REV.	0
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P:\1000997\WorkingMaterial\CAD\FIG\1000997-F04_F07.dwg F07 19/05/2017 3:18:49 PM

Appendix B: Site photographs

Photograph 1

Date: 21/11/2016

*Mountview School;
looking east across
playing field.*



Photograph 2

Date: 21/11/2016

*Mountview School;
looking south-west
towards classrooms.*



Photograph 3

Date: 21/11/2016

*Eastern corner of
Mountview School,
looking west.
Showing small
playground and
raised vegetable
gardens (left).*



Photograph 4

Date: 02/03/2017

*Northern portion of
17 Simkin Street,
looking north.
Showing a steel
incinerator and
storage of timber
crates and other
materials.*



Photograph 5

Date: 08/12/2016

*11 Simkin Street
looking, north.
Showing various
scrap, small engines,
oil/fuel containers,
and the hydraulic log
splitter.*



Photograph 6

Date: 06/04/2017

*Public reserve/
easement area
located between
Leslie Street (to the
south) and industrial
land (to the north),
looking west.*



Photograph 7

Date: 06/04/2017

Soil sampling on public land immediately outside 9 Simkin Street.



Photograph XX

Date: 16/01/2017

Typical soil profile encountered on site. Unit A, Unit B1, and Unit B2 (from left to right).



Photograph XX

Date: 16/01/2017

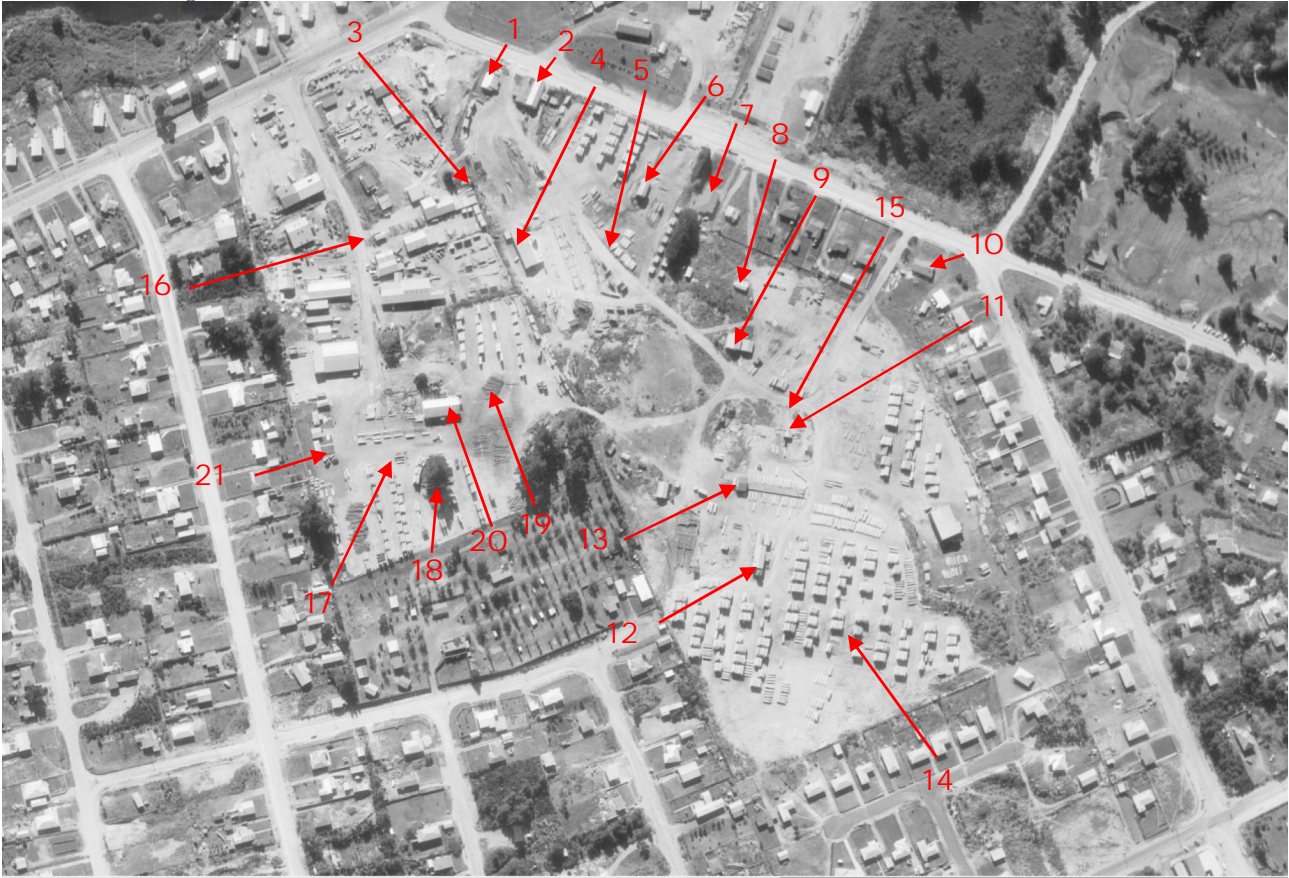
Exceedance location at 20-1, 15 Leslie Street. Showing typical delineation sampling pattern.



Appendix C: Figures showing locations of historic HAIL activities

- Opus figure (from PSI report)
- WRC georeferenced figure

Figure 23 – Overview of site activities based on discussion with Mr Tuck (1963)



1. Office Building
2. Tuck Bros Engineering Workshop (also used for motor maintenance and motor vehicle workshop)
3. Planner shed and Joinery factory with diesel generator (burnt down in 1961 therefore not visible in 1963 aerial)
4. Pre-cut Homes Factory
5. Retail timber yard
6. 'Tanilith' timber treatment plant (also known as Hickson treatment), established in 1952 and used chromated copper arsenate as a treatment agent
7. Cookhouse (built by Stanley Tuck in 1951)
8. Stanley Tuck family bach
9. Taupo Borough Council's diesel generators for Taupo's electricity (ceased operation in 1952 once geothermal power was available in the area)
10. Tuck Bros staff housing
11. Radiata pine sawmill (operated from 1951 until 1961, when it burnt down)
12. Boric timber treatment
13. PCP timber treatment (with diesel generator)
14. Storage of PCP treated timber (may also include storage of boracic and 'Tanilith' treated timber)
15. Fire pit (all residue such as sawdust and slabs) were burnt in this beyond a protective fire wall
16. Mount Tauhara Timber Company (not operated by Tuck Bros)
17. Chemical storage shed (MWH)
18. Boric dip (MWH)
19. Export dip (sumicidin) (MWH)
20. Dip bath (Haipen and Busan) (MWH)
21. Workshop (storage of oils and greases) (MWH)



Commercial/ industrial area

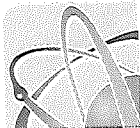
Residential properties

School

Tauhara Timber, 1963 with current property boundaries

Appendix D: Laboratory transcripts and chain of custody documentation

4:30



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS Job No: **168 3426** Date Recv: 21-Nov-16 16:48
 R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND
 Received by: Darryl Brown
 Office use Job N
 3118834268

Client
 Name Waikato Regional Council 94
 Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240
 Phone 07 856 7184 Fax 07 856 0551
 Client Reference
 Quote No 81926 Order No W1601-23
 Primary Contact Michelle Begbie 132177
 Submitted By Michelle Begbie 132177
 Charge To Waikato Regional Council 94
 Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results spratt@geotechnics.co.nz
adawes-colleg@waikato.govt.nz

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
 Date & Time: 21/11/16 4:45
 Name: Steven Pratt
 Signature: [Signature]
 Please tick if you require COC to be emailed back

Received at Hill Laboratories
 Date & Time:
 Name: [Signature]
 Signature: [Signature]

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature:

ADDITIONAL INFORMATION

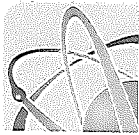
Pg 1 of 5
 Bag + Jar for every sample
 except QC1 & QC2

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 3 working days following the day of receipt of the samples at the laboratory.
 For urgent priority analyses the laboratory requires at least one day's advance warning prior to receiving the samples. Please contact the author of this quote with the expected sample delivery dates and to confirm the estimated turnaround time.
 Requested Reporting Date: _____

Quoted Sample Types

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	HAI 0.1m	21/11/16	Soil	CCAB, PCP
2	HAI 0.3m			HOLD COLD
3	HAI 0.5m			HOLD COLD
4	HAI 1.0m			HOLD COLD
5	HAZ 0.1m			CCAB, PCP
6	HAZ 0.3m			CCAB, PCP
7	HAZ 0.5m			HOLD COLD
8	HAZ 1.0m			HOLD COLD
9	HAB 0.1m			CCAB, PCP
10	HAB 0.3m			CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81926 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 21/11/16
Name: Steven Pratt
Signature: [Signature]
 Please tick if you require COC to be emailed back

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)
NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 3 working days following the day of receipt of the samples at the laboratory.

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Requested Reporting Date:

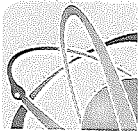
ADDITIONAL INFORMATION

Pg 2 of 5

Quoted Sample Types

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	HA3 0.5m	21/11/16	Soil	HOLD COLD
2	HA3 1.0m			HOLD COLD
3	HA4 0.1m			CCAB, PCP
4	HA4 0.3m			HOLD COLD
5	HA4 0.5m			HOLD COLD
6	HA4 0.85m			HOLD COLD
7	HA5 0.1m			CCAB, PCP
8	HA5 0.3m			HOLD COLD
9	HA5 0.5m			HOLD COLD
10	HA5 0.85m			HOLD COLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81926 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 21/11/16
Name: Steven Pratt
Signature: [Signature]
 Please tick if you require COC to be emailed back

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)
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Requested Reporting Date:

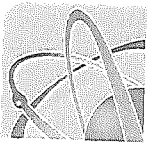
ADDITIONAL INFORMATION

Pg 3 of 5

Quoted Sample Types

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
21	HAB 0.1m	21/11/16	Soil	CCAB, PCP
22	HAB 0.3m	↓	↓	CCAB, PCP
23	HAB 0.5m			HOLD COLD
24	HAB 1.0m			HOLD COLD
25	HAF 0.1m			CCAB, PCP
26	HAF 0.3m			HOLD COLD
27	HAF 0.5m			HOLD COLD
28	HAF 0.8m			HOLD COLD
29	HAS 0.1m			CCAB, PCP
30	HAS 0.3m			CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81926 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results _____

ADDITIONAL INFORMATION

pg 4 of 5

Quoted Sample Types

Soil (Soil)

No. Sample Name Sample Date/Time Sample Type Tests Required

31	HAS	0.5m	21/11/16	Soil	HOLD COLD
32	HAS	0.85m			HOLD COLD
33	HAS	0.1m			CCAB, PCP
34	HAS	0.3m			HOLD COLD
35	HAS	0.5m			HOLD COLD
36	HAS	0.9m			HOLD COLD
37	HA10	0.1m			CCAB, PCP
38	HA10	0.3m			CCAB, PCP
39	HA10	0.5m			HOLD COLD
40	HA10 QC1				HOLD COLD
41	QC2				CCAB

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 21/11/16
 Please tick if you require COC to be emailed back Name: Steven Platt
Signature: _____

Received at Hill Laboratories Date & Time: _____
Name: _____
Signature: _____

Condition Temp:
 Room Temp Chilled Frozen

Sample & Analysis details checked
Signature: _____

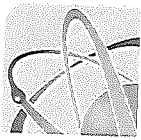
Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 3 working days following the day of receipt of the samples at the laboratory.

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Requested Reporting Date: _____



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81926 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results _____

Office use _____ Job No: _____

CHAIN OF CUSTODY RECORD

Sent to **Hill Laboratories** Date & Time: 21/11/16
 Please tick if you require COC to be emailed back Name: Steven Peatt
 Signature: _____

Received at **Hill Laboratories** Date & Time: _____
 Name: _____
 Signature: _____

Condition _____ Temp: _____
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 3 working days following the day of receipt of the samples at the laboratory.

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Requested Reporting Date: _____

ADDITIONAL INFORMATION

Pg 5 of 5

Quoted Sample Types

Soil (Soil) _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
42	S1	21/11/16	Soil	HOLD COLD
43	S2	↓	↓	↓
44	S3			
45	S4			
46	S5			
47	S6			
48	S7			
49	S8			
9				
10				



Job Information Summary Page 1 of 3

Client:	Waikato Regional Council	Lab No:	1683426
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	21-Nov-2016 5:25 pm
		Priority:	Urgent
		Quote No:	81926
		Order No:	W1601-23
		Client Reference:	Taupo
		Add. Client Ref:	
		Submitted By:	A Davies-Colley
		Charge To:	Waikato Regional Council
		Target Date:	30-Nov-2016 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	HA1 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
2	HA1 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
3	HA1 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
4	HA1 1.0m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
5	HA2 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
6	HA2 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
7	HA2 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
8	HA2 1.0m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
9	HA3 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
10	HA3 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
11	HA3 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
12	HA3 1.0m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
13	HA4 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
14	HA4 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
15	HA4 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
16	HA4 0.85m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
17	HA5 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
18	HA5 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
19	HA5 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
20	HA5 0.85m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
21	HA6 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
22	HA6 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
23	HA6 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
24	HA6 1.0m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
25	HA7 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
26	HA7 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
27	HA7 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
28	HA7 0.8m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
29	HA8 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
30	HA9 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
31	HA8 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
32	HA8 0.85m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
33	HA9 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
34	HA8 0.3m [Red mark on lid] 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
35	HA9 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
36	HA9 0.9m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
37	HA10 0.1m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
38	HA10 0.3m 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
39	HA10 0.5m 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
40	QC1 21-Nov-2016	Soil	cpBag	Hold Cold
41	QC2 21-Nov-2016	Soil	cpBag	CCAB, screen level
42	S1 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
43	S2 21-Nov-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
44	S3 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
45	S4 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
46	S5 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
47	S6 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
48	S7 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold
49	S8 21-Nov-2016	Soil	GSoil300, cpBag	Hold Cold

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 42-43
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 42-43

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1683426	SPv2
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	21-Nov-2016	
		Date Reported:	30-Nov-2016	
		Quote No:	81926	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Amended Report

This report replaces an earlier report issued on the 23 Nov 2016 at 11:34 am
 At the client's request, testing has been added to samples S1 & S2.

Sample Type: Soil						
Sample Name:	HA1 0.1m 21-Nov-2016	HA2 0.1m 21-Nov-2016	HA2 0.3m 21-Nov-2016	HA3 0.1m 21-Nov-2016	HA3 0.3m 21-Nov-2016	
Lab Number:	1683426.1	1683426.5	1683426.6	1683426.9	1683426.10	
Individual Tests						
Dry Matter	g/100g as rcvd	63	63	72	71	76
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	2	2	< 2	3	< 2
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	2	3	3	3	< 2
Total Recoverable Copper	mg/kg dry wt	7	10	3	6	< 2
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	HA4 0.1m 21-Nov-2016	HA5 0.1m 21-Nov-2016	HA6 0.1m 21-Nov-2016	HA6 0.3m 21-Nov-2016	HA7 0.1m 21-Nov-2016	
Lab Number:	1683426.13	1683426.17	1683426.21	1683426.22	1683426.25	
Individual Tests						
Dry Matter	g/100g as rcvd	66	73	71	77	71
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	3	2	3	< 2	3
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	5	5	< 2	3
Total Recoverable Copper	mg/kg dry wt	5	5	6	< 2	9
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	HA8 0.1m 21-Nov-2016	HA9 0.3m 21-Nov-2016	HA9 0.1m 21-Nov-2016	HA8 0.3m [Red mark on lid] 21-Nov-2016	HA10 0.1m 21-Nov-2016	
Lab Number:	1683426.29	1683426.30	1683426.33	1683426.34	1683426.37	
Individual Tests						
Dry Matter	g/100g as rcvd	65	86	75	79	75
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	4	78	4	4	13
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	6	5	7	4	7
Total Recoverable Copper	mg/kg dry wt	11	42	17	4	11



Sample Type: Soil					
Sample Name:	HA8 0.1m 21-Nov-2016	HA9 0.3m 21-Nov-2016	HA9 0.1m 21-Nov-2016	HA8 0.3m [Red mark on lid] 21-Nov-2016	HA10 0.1m 21-Nov-2016
Lab Number:	1683426.29	1683426.30	1683426.33	1683426.34	1683426.37
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	HA10 0.3m 21-Nov-2016	QC2 21-Nov-2016	S1 21-Nov-2016	S2 21-Nov-2016	
Lab Number:	1683426.38	1683426.41	1683426.42	1683426.43	
Individual Tests					
Dry Matter	g/100g as rcvd	74	-	59	66
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	27	13	6	5
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	11	6	6	6
Total Recoverable Copper	mg/kg dry wt	25	11	18	18
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	< 0.05	< 0.05

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 42-43
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 42-43
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 5-6, 9-10, 13, 17, 21-22, 25, 29-30, 33-34, 37-38, 41-43

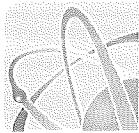
These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

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 blue ink, consisting of several overlapping, fluid strokes that form a stylized, somewhat abstract shape.

Ara Heron BSc (Tech)
Client Services Manager - Environmental



Hill Laboratories

BETTER TESTING BETTER RESULTS

Job No: Date Recv: 06-Dec-16 05:31

ANALYSIS

169 1731

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Received by: Lisa Bailey

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results *adavies-Colleg @ for Kintygar Co. NZ*

ADDITIONAL INFORMATION

*Pg 1 of 9
* Samples in 2x chilly bins
* Bag + Jar for each sample
except Dup 1 + Dup 2*

Quoted Sample Types

Soil (Soil)

Office use Job No. 3116917315

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 5.12.16 7:30 pm
Name: Steve Pratt
 Please tick if you require COC to be emailed back
Signature: *[Signature]*

Received at Hill Laboratories Date & Time: 6.12.16 9.41
Name: Lisa B
Signature: *[Signature]*

Condition Room Temp Chilled Frozen Temp: 6.7

Sample & Analysis details checked
Signature:

Priority Low Normal High

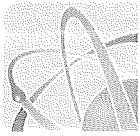
Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

No. Sample Name Sample Date/Time Sample Type Tests Required

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	1-1/0.1	5.12.16	Soil	CCAB, PCP
2	1-1/0.3			CCAB, PCP
3	1-1/0.5			HOLD
4	1-1/1.0			HOLD
5	1-2/0.1			CCAB, PCP
6	1-2/0.3			CCAB, PCP
7	1-2/0.5			HOLD
8	2-1/0.1			CCAB, PCP
9	2-1/0.3			CCAB, PCP
10	2-1/0.5			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

pg 2 of 9

Quoted Sample Types

Requested Reporting Date:

Soil (soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required	
11	2-1/1.0	5.12.16	Soil	HOLD	
12	2-2/0.1	↓	↓	CCAB, PCP	
13	2-2/0.3			CCAB, PCP	
14	2-2/0.5			HOLD	
15	2-2/0.7			HOLD	
16	3-1/0.1			CCAB, PCP	
17	3-1/0.3			CCAB, PCP	
18	3-1/0.5			HOLD	
19	3-1/1.0			HOLD	
20	3-2/0.1				CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

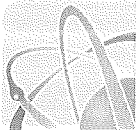
Pg 3 of 9

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
21	3-2 3-2 / 0.3	5.12.16	SOIL	CCAB, PCP
22	3-2 / 0.6	↓	↓	HOLD
23	4-1 / 0.1			CCAB, PCP PCP
24	4-1 / 0.3			CCAB, PCP
25	4-1 / 0.5			HOLD
26	4-1 / 1.0			HOLD
27	4-2 / 0.1			CCAB, PCP
28	4-2 / 0.3			CCAB, PCP
29	4-2 / 0.5			HOLD
30	5-1 / 0.1			CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

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Name Waikato Regional Council 94

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Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

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Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd Phone: +64 7 858 2000
1 Clyde Street, Fax: +64 7 858 2001
Private Bag 3205, Email: mail@hill-labs.co.nz
Hamilton 3240, NEW ZEALAND Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:

Please tick if you require COC to be emailed back Name:

Signature:

Received at Hill Laboratories Date & Time:

Name:

Signature:

Condition Temp:

Room Temp Chilled Frozen

Sample & Analysis details checked

Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

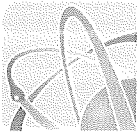
Py 4 of 9

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
31	5-1/0.3	5.12.16	SOIL	CCAB, PCP
32	5-1/0.5	↓	↓	HOLD
33	5-1/1.0			HOLD
34	5-2/0.1			CCAB, PCP
35	5-2/0.3			CCAB, PCP
36	5-2/0.5			HOLD
37	6-1/0.1			CCAB, PCP
38	6-1/0.3			CCAB, PCP
39	6-1/0.5			HOLD
40	6-1/1.0			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
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Phone: +64 7 858 2000
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Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:

Please tick if you require COC to be emailed back Name:

Signature:

Received at Hill Laboratories Date & Time:

Name:

Signature:

Condition Temp:

Room Temp Chilled Frozen

Sample & Analysis details checked

Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

Pg 5 of 9

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
41	6-2/0.1	5.12.16	Soil	CCAB, PCP
42	6-2/0.3			CCAB, PCP
43	6-2/0.5			HOLD
44	7-1/0.1			CCAB, PCP
45	7-1/0.3			CCAB, PCP
46	7-1/0.5			HOLD
47	7-1/1.0			HOLD
48	7-2/0.1			CCAB, PCP
49	7-2/0.3			CCAB, PCP
50	7-2/0.5			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W/601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ADDITIONAL INFORMATION

Pg 6 of 9

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
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Phone: +64 7 858 2000
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Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
Name:
 Please tick if you require COC to be emailed back Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Room Temp Chilled Frozen Temp:

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
51	8-1/0.1	5.12.16	SOIL	CCAB, PCP
52	8-1/0.3	↓	↓	CCAB, PCP
53	8-1/0.5			HOLD
54	8-2/0.1			CCAB, PCP
55	8-2/0.3			CCAB, PCP
56	8-2/0.5			HOLD
57	8-2/1.0			HOLD
58	9-1/0.1			CCAB, PCP
59	9-1/0.3			CCAB, PCP
60	9-1/0.5			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

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Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

Pg 8 of 9

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
71	10-2/0.5	5.12.16	SOIL	HOLD
72	11-1/0.1	↓	↓	CCAB, PCP
73	11-1/0.3			CCAB, PCP
74	11-1/0.5			HOLD
75	11-1/1.0			HOLD
76	11-2/0.1			CCAB, PCP
77	11-2/0.3			CCAB, PCP
78	11-2/0.5			HOLD
79	Dup1			CCAB
80	Dup2			CCAB



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W/601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ADDITIONAL INFORMATION

Pg 7 of 9

ANALYSIS REQUEST

R J Hill Laboratories Ltd Phone: +64 7 858 2000
1 Clyde Street, Fax: +64 7 858 2001
Private Bag 3205, Email: mail@hill-labs.co.nz
Hamilton 3240, NEW ZEALAND Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
61	9-2/0.1	5.12.16	SOIL	CCAB, PCP
62	9-2/0.3			CCAB, PCP
63	9-2/0.5			HOLD
64	9-2/1.0			HOLD
65	10-1/0.1			CCAB, PCP
66	10-1/0.3			CCAB, PCP
67	10-1/0.5			HOLD
68	10-1/1.0			HOLD
69	10-2/0.1			CCAB, PCP
70	10-2/0.3			CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ADDITIONAL INFORMATION

pg 9 of 9

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
81	1-V	5.12.16	Soil	HOLD
82	3-V	↓	↓	HOLD
83	9-V1			HOLD
84	9-V2			HOLD
85	10-V			HOLD
6				
7				
8				
9				
10				



Job Information Summary Page 1 of 5

Client:	Waikato Regional Council	Lab No:	1691731
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	06-Dec-2016 9:50 am
		Priority:	High
		Quote No:	81927
		Order No:	W1601-23
		Client Reference:	Taupo
		Add. Client Ref:	
		Submitted By:	S Pratt
		Charge To:	Waikato Regional Council
		Target Date:	13-Dec-2016 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	1-1/0.1m 05-Dec-2016	Soil	cGSoil, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
2	1-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
3	1-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
4	1-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
5	1-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
6	1-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
7	1-2/0.5m 05-Dec-2016	Soil	cGSoil, cpBag	Hold Cold
8	2-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
9	2-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
10	2-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
11	2-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
12	2-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
13	2-2/0.3m 05-Dec-2016	Soil	cGSoil, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
14	2-2/0.5m 05-Dec-2016	Soil	cGSoil, cpBag	Hold Cold
15	2-2/0.7m 05-Dec-2016	Soil	cGSoil, cpBag	Hold Cold
16	3-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
17	3-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
18	3-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
19	3-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
20	3-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
21	3-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
22	3-2/0.6m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
23	4-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
24	4-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
25	4-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
26	4-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
27	4-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
28	4-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
29	4-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
30	5-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
31	5-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
32	5-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
33	5-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
34	5-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
35	5-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
36	5-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
37	6-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
38	6-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
39	6-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
40	6-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
41	6-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
42	6-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
43	6-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
44	7-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
45	7-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
46	7-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
47	7-1/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
48	7-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
49	7-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
50	7-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
51	8-1/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
52	8-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
53	8-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
54	8-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
55	8-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
56	8-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
57	8-2/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
58	9-1/0.1m 05-Dec-2016	Soil	cGSoil, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
59	9-1/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
60	9-1/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
61	9-2/0.1m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
62	9-2/0.3m 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
63	9-2/0.5m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
64	9-2/1.0m 05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
65	10-1/0.1m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
66	10-1/0.3m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
67	10-1/0.5m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
68	10-1/1.0m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
69	10-2/0.1m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
70	10-2/0.3m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
71	10-2/0.5m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
72	11-1/0.1m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
73	11-1/0.3m05-Dec-2016	Soil	cGSoil, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
74	11-1/0.5m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
75	11-1/1.0m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
76	11-2/0.1m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
77	11-2/0.3m05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
78	11-2/0.5m05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
79	Dup1 05-Dec-2016	Soil	cpBag	CCAB, screen level
80	Dup2 05-Dec-2016	Soil	GSoil300	CCAB, screen level
81	1-V05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
82	3-V05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
83	9-V1 05-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
84	9-V2 05-Dec-2016	Soil	cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
85	10-V05-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
86	9-V3 05-Dec-2016	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	58-59, 61-62
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 83-84
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 83-84

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPV1
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil

Sample Name:	1-1/0.1m	1-1/0.3m	1-2/0.1m	1-2/0.3m	2-1/0.1m
	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:	1691731.1	1691731.2	1691731.5	1691731.6	1691731.8

Individual Tests						
Dry Matter	g/100g as rcvd	82	80	90	82	85
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	12	3	5	< 2	11
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	10	< 2	4	< 2	9
Total Recoverable Copper	mg/kg dry wt	14	2	5	< 2	8
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	2-1/0.3m	2-2/0.1m	2-2/0.3m	3-1/0.1m	3-1/0.3m
	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:	1691731.9	1691731.12	1691731.13	1691731.16	1691731.17

Individual Tests						
Dry Matter	g/100g as rcvd	77	83	80	90	83
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	3	21	< 2	10	4
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	2	12	< 2	8	3
Total Recoverable Copper	mg/kg dry wt	3	17	2	12	7
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	3-2/0.1m	3-2/0.3m	4-1/0.1m	4-1/0.3m	4-2/0.1m
	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:	1691731.20	1691731.21	1691731.23	1691731.24	1691731.27

Individual Tests						
Dry Matter	g/100g as rcvd	82	80	90	81	76
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	27	3	8	2	18
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	21	< 2	6	< 2	32
Total Recoverable Copper	mg/kg dry wt	54	13	11	6	26
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05



Sample Type: Soil						
Sample Name:		4-2/0.3m	5-1/0.1m	5-1/0.3m	5-2/0.1m	5-2/0.3m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.28	1691731.30	1691731.31	1691731.34	1691731.35
Individual Tests						
Dry Matter	g/100g as rcvd	80	82	80	74	80
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	12	2	21	6
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	21	< 20
Total Recoverable Chromium	mg/kg dry wt	< 2	8	< 2	11	2
Total Recoverable Copper	mg/kg dry wt	3	24	8	24	2
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		6-1/0.1m	6-1/0.3m	6-2/0.1m	6-2/0.3m	7-1/0.1m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.37	1691731.38	1691731.41	1691731.42	1691731.44
Individual Tests						
Dry Matter	g/100g as rcvd	92	84	91	83	85
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	3	8	< 2	14
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	9	3	6	< 2	8
Total Recoverable Copper	mg/kg dry wt	12	4	6	3	11
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		7-1/0.3m	7-2/0.1m	7-2/0.3m	8-1/0.1m	8-1/0.3m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.45	1691731.48	1691731.49	1691731.51	1691731.52
Individual Tests						
Dry Matter	g/100g as rcvd	80	92	81	75	69
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	17	2	25	6
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	< 2	20	3	13	5
Total Recoverable Copper	mg/kg dry wt	< 2	26	3	13	8
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		8-2/0.1m	8-2/0.3m	9-1/0.1m	9-1/0.3m	9-2/0.1m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.54	1691731.55	1691731.58	1691731.59	1691731.61
Individual Tests						
Dry Matter	g/100g as rcvd	81	79	65	77	75
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	18	6	20	5	32
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	10	5	9	< 2	20
Total Recoverable Copper	mg/kg dry wt	17	7	45	10	36
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Anthracene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03

Sample Type: Soil						
Sample Name:		8-2/0.1m	8-2/0.3m	9-1/0.1m	9-1/0.3m	9-2/0.1m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.54	1691731.55	1691731.58	1691731.59	1691731.61
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Chrysene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Fluorene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Naphthalene	mg/kg dry wt	-	-	< 0.16	< 0.15	< 0.15
Phenanthrene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Pyrene	mg/kg dry wt	-	-	< 0.04	< 0.03	< 0.03
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		9-2/0.3m	10-1/0.1m	10-1/0.3m	10-2/0.1m	10-2/0.3m
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.62	1691731.65	1691731.66	1691731.69	1691731.70
Individual Tests						
Dry Matter	g/100g as rcvd	74	88	78	90	80
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	3	5	6	10	7
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	3	3	5	6	9
Total Recoverable Copper	mg/kg dry wt	4	9	6	7	7
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.04	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.04	-	-	-	-
Anthracene	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.04	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.04	-	-	-	-
Chrysene	mg/kg dry wt	< 0.04	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.04	-	-	-	-
Fluorene	mg/kg dry wt	< 0.04	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.04	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.16	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.04	-	-	-	-
Pyrene	mg/kg dry wt	< 0.04	-	-	-	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		11-1/0.1m	11-1/0.3m	11-2/0.1m	11-2/0.3m	Dup1
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016
Lab Number:		1691731.72	1691731.73	1691731.76	1691731.77	1691731.79
Individual Tests						
Dry Matter	g/100g as rcvd	89	84	90	83	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	7	< 2	9	3	4
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	6	< 2	7	< 2	3
Total Recoverable Copper	mg/kg dry wt	11	3	18	4	8

Sample Type: Soil					
Sample Name:	11-1/0.1m 05-Dec-2016	11-1/0.3m 05-Dec-2016	11-2/0.1m 05-Dec-2016	11-2/0.3m 05-Dec-2016	Dup1 05-Dec-2016
Lab Number:	1691731.72	1691731.73	1691731.76	1691731.77	1691731.79
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	Dup2 05-Dec-2016	9-V1 05-Dec-2016	9-V2 05-Dec-2016		
Lab Number:	1691731.80	1691731.83	1691731.84		
Individual Tests					
Dry Matter	g/100g as rcvd	-	75	67	-
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	7	28	25	-
Total Recoverable Boron	mg/kg dry wt	< 20	23	< 20	-
Total Recoverable Chromium	mg/kg dry wt	5	34	38	-
Total Recoverable Copper	mg/kg dry wt	11	91	83	-
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	-	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	-	< 0.05	< 0.05	-

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	58-59, 61-62
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 83-84
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 83-84
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8-9, 12-13, 16-17, 20-21, 23-24, 27-28, 30-31, 34-35, 37-38, 41-42, 44-45, 48-49, 51-52, 54-55, 58-59, 61-62, 65-66, 69-70, 72-73, 76-77, 79-80, 83-84

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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results adavies.colley@fonkintaylor.co.nz

Job No: _____ Date Recv: 09-Dec-16 05:35

ANALYSIS

169 4127

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Received by: Lisa Bailey



3116941277

Office use Job No: _____

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 8.12.16
Name: Steven Pratt
 Please tick if you require COC to be emailed back
Signature: _____

Received at Hill Laboratories Date & Time: 9.12.16 1130
Name: Kate Henderson
Signature: _____

Condition Temp: 10.8
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

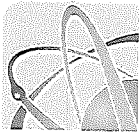
1 chilly bin and 1 box of samples

Pg 1 of 9

Quoted Sample Types

Soil (Soil) Requested Reporting Date: _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	<u>12-1/0.1</u>	<u>8.12.16</u>	<u>SOIL</u>	<u>CCAB, PCP</u>
2	<u>12-1/0.3</u>	↓	↓	<u>CCAB, PCP</u>
3	<u>12-1/0.5</u>			<u>HOLD</u>
4	<u>12-1/1.0</u>			<u>HOLD</u>
5	<u>12-2/0.1</u>			<u>CCAB, PCP</u>
6	<u>12-2/0.3</u>			<u>CCAB, PCP</u>
7	<u>12-2/0.5</u>			<u>HOLD</u>
8	<u>13-1/0.1</u>			<u>CCAB, PCP</u>
9	<u>13-1/0.3</u>			<u>CCAB, PCP</u>
10	<u>13-1/0.5</u>			<u>HOLD</u>



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference W1601-23

Quote No 81927 Order No

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)
NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

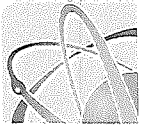
pg 2 of 9

Quoted Sample Types

Soil (Soil)

Requested Reporting Date:

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
11	13-1/1.0	8.12.16	SOIL	CCAB, PCP HOLD
12	13-2/0.1	↓	↓	CCAB, PCP
13	13-2/0.3			CCAB, PCP
14	13-2/0.5			HOLD
15	14-1/0.1			CCAB, PCP
16	14-1/0.3			CCAB, PCP
17	14-1/0.5			HOLD
18	14-1/1.0			HOLD
19	14-2/0.1			CCAB, PCP
20	14-2/0.3			CCAB, PCP



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 **Fax** 07 856 0551

Client Reference

Quote No 81927 **Order No**

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ADDITIONAL INFORMATION

Pg 3 of 9

Quoted Sample Types

Soil (Soil) Requested Reporting Date: _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
21	14-2/0.5	8.12.16	Soil	HOLD
22	15-1/0.1	↓	↓	CCAB, PCP
23	15-1/0.3			CCAB, PCP
24	15-1/0.5			HOLD
25	15-1/1.0			HOLD
26	15-2/0.1			CCAB, PCP
27	15-2/0.3			CCAB, PCP
28	15-2/0.5			HOLD
29	16-1/0.1			CCAB, PCP
30	16-1/0.3			CCAB, PCP

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:

Please tick if you require COC to be emailed back Name:

Signature:

Received at Hill Laboratories Date & Time:

Name:

Signature:

Condition Temp:

Room Temp Chilled Frozen

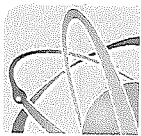
Sample & Analysis details checked

Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client Name **Waikato Regional Council** 94

Address **Private Bag 3038, Waikato Mail Centre**
Hamilton 3240

Phone **07 856 7184** Fax **07 856 0551**

Client Reference

Quote No **81927** Order No

Primary Contact **Michelle Begbie** 132177

Submitted By **Michelle Begbie** 132177

Charge To **Waikato Regional Council** 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ADDITIONAL INFORMATION
Pg 4 of 9

Quoted Sample Types

Soil (Soil) Requested Reporting Date: _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required		
31	16-1/0.5	8.12.16	SOIL	HOLD		
32	16-1/1.0			HOLD		
33	16-2/0.1			CCAB, PCP		
34	16-2/0.3			CCAB, PCP		
35	16-2/0.5			HOLD		
36	16-2/1.0			HOLD		
37	17-1/0.1			CCAB, PCP		
38	17-1/0.3			CCAB, PCP		
39	17-1/0.5			HOLD		
40	17-1/1.0			✓	✓	HOLD

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: _____
 Please tick if you require COC to be emailed back Name: _____
 Signature: _____

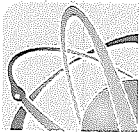
Received at Hill Laboratories Date & Time: _____
 Name: _____
 Signature: _____

Condition Temp: _____
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

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Signature:

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Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)
NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

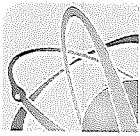
ADDITIONAL INFORMATION

Pg 5 of 9

Quoted Sample Types

Soil (soil) Requested Reporting Date:

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
41	17-2/0.1	8.12.16	Soil	CCAB, PCP
42	17-2/0.3			CCAB, PCP
43	17-2/0.5			HOLD
44	18-1/0.1			CCAB, PCP
45	18-1/0.3			CCAB, PCP
46	18-1/0.5			HOLD
47	18-1/0.0			HOLD
48	18-2/0.1			CCAB, PCP
49	18-2/0.3			CCAB, PCP
50	18-2/0.5			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

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ANALYSIS REQUEST

R J Hill Laboratories Ltd Phone: +64 7 858 2000
1 Clyde Street, Fax: +64 7 858 2001
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Hamilton 3240, NEW ZEALAND Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
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Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

6 of 9

Requested Reporting Date:

Quoted Sample Types

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
51	19-1/0.1	8.12.16	Soil	CCAB, PCP
52	19-1/0.3			CCAB, PCP
53	19-1/0.5			HOLD
54	19-1/1.0			HOLD
55	19-2/0.1			CCAB, PCP
56	19-2/0.3			CCAB, PCP
57	19-2/0.5			HOLD
58	20-1/0.1			CCAB, PCP
59	20-1/0.3			CCAB, PCP PCP
60	20-1/0.5			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd Phone: +64 7 858 2000
1 Clyde Street, Fax: +64 7 858 2001
Private Bag 3205, Email: mail@hill-labs.co.nz
Hamilton 3240, NEW ZEALAND Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:

Please tick if you require COC to be emailed back Name:

Signature:

Received at Hill Laboratories Date & Time:

Name:

Signature:

Condition Temp:

Room Temp Chilled Frozen

Sample & Analysis details checked

Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

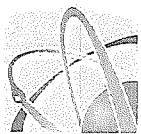
ADDITIONAL INFORMATION

Pg 7 of 9

Quoted Sample Types

Soil (soil) Requested Reporting Date:

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
61	20-1/1.0	8.12.16	Soil	HOLD
62	20-2/0.1	↓	↓	CCAB, PCP
63	20-2/0.3			CCAB, PCP
64	20-2/0.5			HOLD
65	20-2/0.8			HOLD
66	21-1/0.1			CCAB, PCP, PAHs
67	21-1/0.3			CCAB, PCP, PAHs
68	21-1/0.5			HOLD
69	21-1/1.0			HOLD
70	21-2/0.1			CCAB, PCP, PAHs



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
Signature:

Received at Hill Laboratories Date & Time:
Name:
Signature:

Condition Temp:
 Room Temp Chilled Frozen

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

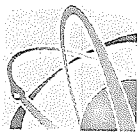
Pg 8 of 9

Requested Reporting Date:

Quoted Sample Types

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
71	21-2/0.3	8.12.16	Soil	CCAB, PCP, PAHs
72	21-2/0.5	↓	↓	HOLD
73	22-1/0.1			CCAB, PCP
74	22-1/0.3			CCAB, PCP
75	22-1/0.5			HOLD
76	22-1/1.0			CCAB HOLD
77	22-2/0.1			CCAB, PCP
78	22-2/0.3			CCAB, PCP
79	22-2/0.5			HOLD
80	12-V			HOLD



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client

Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81927 Order No _____

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results _____

ADDITIONAL INFORMATION

Pg. 9 of 9

Quoted Sample Types

Soil (Soil) _____

Requested Reporting Date: _____

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use _____ Job No: _____

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: _____

Please tick if you require COC to be emailed back Name: _____
Signature: _____

Received at Hill Laboratories Date & Time: _____

Name: _____
Signature: _____

Condition _____ Temp: _____

Room Temp Chilled Frozen

Sample & Analysis details checked

Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
81	14-V	8.12.16	Soil	HOLD
82	16-V1	↓	↓	↓
83	16-V2			
84	17-V			
85	18-V1			
86	18-V2			
87	20-V			
88	22-V1			
89	22-V2			
90	22-V3			
91	Dup 3			
92	Dup 4			CCAB, PCP



Job Information Summary Page 1 of 5

Client:	Waikato Regional Council	Lab No:	1694127
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	09-Dec-2016 11:29 am
		Priority:	High
		Quote No:	81927
		Order No:	W1601 - 23
		Client Reference:	Taupo
		Add. Client Ref:	
		Submitted By:	Steven Pratt
		Charge To:	Waikato Regional Council
		Target Date:	16-Dec-2016 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	12-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
2	12-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
3	12-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
4	12-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
5	12-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
6	12-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
7	12-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
8	13-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
9	13-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
10	13-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
11	13-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
12	13-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
13	13-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
14	13-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
15	14-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
16	14-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
17	14-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
18	14-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
19	14-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
20	14-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
21	14-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
22	15-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
23	15-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
24	15-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
25	15-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
26	15-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
27	15-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
28	15-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
29	16-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
30	16-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
31	16-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
32	16-1/1.0m 08-Dec-2016	Soil	GSoil300	Hold Cold
33	16-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
34	16-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
35	16-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
36	16-2/1.0m 08-Dec-2016	Soil	cpBag	Hold Cold
37	17-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
38	17-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
39	17-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
40	17-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
41	17-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
42	17-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
43	17-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
44	18-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
45	18-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
46	18-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
47	18-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
48	18-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
49	18-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
50	18-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
51	19-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
52	19-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
53	19-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
54	19-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
55	19-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
56	19-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
57	19-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
58	20-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
59	20-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
60	20-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
61	20-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
62	20-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
63	20-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
64	20-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
65	20-2/0.8m 08-Dec-2016	Soil	GSoil300	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
66	21-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
67	21-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
68	21-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
69	21-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
70	21-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
71	21-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS; Polycyclic Aromatic Hydrocarbons Screening in Soil
72	21-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
73	22-1/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
74	22-1/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
75	22-1/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
76	22-1/1.0m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
77	22-2/0.1m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
78	22-2/0.3m 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
79	22-2/0.5m 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
80	12-V 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
81	14-V 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
82	16-V1 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
83	16-V2 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
84	17-V 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
85	18-V1 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
86	18-V2 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
87	20-V 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
88	22-V1 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
89	22-V2 08-Dec-2016	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
90	22-V3 08-Dec-2016	Soil	GSoil300, cpBag	Hold Cold
91	Dup 3 08-Dec-2016	Soil	cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
92	Dup 4 08-Dec-2016	Soil	cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
93	W1601 - 23 08-Dec-2016	Soil	cpBag	Hold Cold

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	66-67, 70-71
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv19
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	23-Dec-2016	(Amended)
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil

Sample Name:	12-1/0.1m 08-Dec-2016	12-1/0.3m 08-Dec-2016	12-2/0.1m 08-Dec-2016	12-2/0.3m 08-Dec-2016	13-1/0.1m 08-Dec-2016
Lab Number:	1694127.1	1694127.2	1694127.5	1694127.6	1694127.8

Individual Tests						
Dry Matter	g/100g as rcvld	81	76	80	73	79
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	17	7	10	6	10
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	8	5	7	3	8
Total Recoverable Copper	mg/kg dry wt	9	11	10	8	17
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	13-1/0.3m 08-Dec-2016	13-2/0.1m 08-Dec-2016	13-2/0.3m 08-Dec-2016	14-1/0.1m 08-Dec-2016	14-1/0.3m 08-Dec-2016
Lab Number:	1694127.9	1694127.12	1694127.13	1694127.15	1694127.16

Individual Tests						
Dry Matter	g/100g as rcvld	80	83	80	90	85
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	3	5	< 2	8	7
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	2	4	2	4	4
Total Recoverable Copper	mg/kg dry wt	3	7	5	7	5
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	14-2/0.1m 08-Dec-2016	14-2/0.3m 08-Dec-2016	15-1/0.1m 08-Dec-2016	15-1/0.3m 08-Dec-2016	15-2/0.1m 08-Dec-2016
Lab Number:	1694127.19	1694127.20	1694127.22	1694127.23	1694127.26

Individual Tests						
Dry Matter	g/100g as rcvld	77	82	81	79	81
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	6	< 2	13	5	4
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	3	< 2	9	5	2
Total Recoverable Copper	mg/kg dry wt	8	< 2	10	6	3
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05



Sample Type: Soil						
Sample Name:		15-2/0.3m	16-1/0.1m	16-1/0.3m	16-2/0.1m	16-2/0.3m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.27	1694127.29	1694127.30	1694127.33	1694127.34
Individual Tests						
Dry Matter	g/100g as rcvd	81	62	71	69	81
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	16	2	23	3
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	< 2	8	4	12	3
Total Recoverable Copper	mg/kg dry wt	< 2	10	6	10	5
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		17-1/0.1m	17-1/0.3m	17-2/0.1m	17-2/0.3m	18-1/0.1m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.37	1694127.38	1694127.41	1694127.42	1694127.44
Individual Tests						
Dry Matter	g/100g as rcvd	73	80	73	70	81
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	< 2	15	3	18
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	11	< 2	10	5	19
Total Recoverable Copper	mg/kg dry wt	13	< 2	12	15	21
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		18-1/0.3m	18-2/0.1m	18-2/0.3m	19-1/0.1m	19-1/0.3m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.45	1694127.48	1694127.49	1694127.51	1694127.52
Individual Tests						
Dry Matter	g/100g as rcvd	74	76	80	75	81
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	3	16	5	11	< 2
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	15	4	6	< 2
Total Recoverable Copper	mg/kg dry wt	6	36	8	10	< 2
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:		19-2/0.1m	19-2/0.3m	20-1/0.1m	20-1/0.3m	20-1/0.5m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.55	1694127.56	1694127.58	1694127.59	1694127.60
Individual Tests						
Dry Matter	g/100g as rcvd	78	77	79	81	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	4
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	49	< 2	23	137	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	43	3	12	97	-
Total Recoverable Copper	mg/kg dry wt	40	5	12	37	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
Sample Name:		20-2/0.1m	20-2/0.3m	21-1/0.1m	21-1/0.3m	21-2/0.1m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.62	1694127.63	1694127.66	1694127.67	1694127.70

Sample Type: Soil

Sample Name:		20-2/0.1m	20-2/0.3m	21-1/0.1m	21-1/0.3m	21-2/0.1m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.62	1694127.63	1694127.66	1694127.67	1694127.70
Individual Tests						
Dry Matter	g/100g as rcvd	86	74	73	79	79
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	10	4	7	3	28
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	10	5	6	3	13
Total Recoverable Copper	mg/kg dry wt	7	10	7	4	44
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Acenaphthylene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Anthracene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Chrysene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Fluoranthene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Fluorene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Naphthalene	mg/kg dry wt	-	-	< 0.4	< 0.14	< 0.3
Phenanthrene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Pyrene	mg/kg dry wt	-	-	< 0.07	< 0.03	< 0.06
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	0.07	< 0.05	0.07	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:		21-2/0.3m	22-1/0.1m	22-1/0.3m	22-2/0.1m	22-2/0.3m
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:		1694127.71	1694127.73	1694127.74	1694127.77	1694127.78
Individual Tests						
Dry Matter	g/100g as rcvd	81	78	81	82	79
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	5	11	3	12	9
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	3	6	< 2	7	7
Total Recoverable Copper	mg/kg dry wt	6	8	2	13	36
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Anthracene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	0.04
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Chrysene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Fluoranthene	mg/kg dry wt	0.04	< 0.06	< 0.03	< 0.06	0.05
Fluorene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Naphthalene	mg/kg dry wt	< 0.14	< 0.3	< 0.14	< 0.3	< 0.15
Phenanthrene	mg/kg dry wt	< 0.03	< 0.06	< 0.03	< 0.06	< 0.03
Pyrene	mg/kg dry wt	0.03	< 0.06	< 0.03	< 0.06	0.05

Sample Type: Soil					
Sample Name:	21-2/0.3m 08-Dec-2016	22-1/0.1m 08-Dec-2016	22-1/0.3m 08-Dec-2016	22-2/0.1m 08-Dec-2016	22-2/0.3m 08-Dec-2016
Lab Number:	1694127.71	1694127.73	1694127.74	1694127.77	1694127.78
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	20-V 08-Dec-2016	22-V1 08-Dec-2016	22-V2 08-Dec-2016	Dup 3 08-Dec-2016	Dup 4 08-Dec-2016
Lab Number:	1694127.87	1694127.88	1694127.89	1694127.91	1694127.92
Individual Tests					
Dry Matter	g/100g as rcvd	-	55	55	80
Total Recoverable Arsenic	mg/kg dry wt	15	-	-	-
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	-	18	20	< 2
Total Recoverable Boron	mg/kg dry wt	-	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	-	22	22	2
Total Recoverable Copper	mg/kg dry wt	-	57	58	3
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	-	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	-	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

Amended Report: This report replaces an earlier report issued on 19 Dec 2016 at 2:32 pm
Reason for amendment: Arsenic results have been added to samples 1694127.60 (20-1/0.5m) and 1694127.87 (20-V), and PAH screen results have been added to samples 1694127.73 (22-1/0.1m), 1694127.74 (22-1/0.3m), 1694127.77 (22-2/0.1m) and 1694127.78 (22-2/0.3m) at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-60, 62-63, 66-67, 70-71, 73-74, 77-78, 87-89, 91-92

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	66-67, 70-71, 73-74, 77-78
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-59, 62-63, 66-67, 70-71, 73-74, 77-78, 88-89, 91-92

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 37-38, 41-42, 44-45, 48-49, 51-52, 55-56, 58-60, 62-63, 66-67, 70-71, 73-74, 77-78, 87-89, 91-92
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	60, 87

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.

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



ANALYSIS 170 9117

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEAL

Received by: Gareth Davies



Client
Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results *adavies-colley@fer.kintaylor.co.nz*

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 17.01.17 9:05 am
Name: Alex Davies-Colley
 Please tick if you require COC to be emailed back
Signature: *[Signature]*

Received at Hill Laboratories Date & Time: 17/01/17 15:33
Name: Ben M
Signature: *[Signature]*

Condition Room Temp Chilled Frozen Temp: 12.3

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

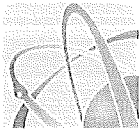
page 1 of 4
Bag + Jar for samples 1-7
Jar only for samples 8-

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	23-1/0.1	16.01.17	Soil	CCAB, PCP
2	23-1/0.3		↓	CCAB, PCP
3	23-1/0.5			HOLD
4	23-1/1.0			HOLD
5	23-2/0.1			CCAB, PCP
6	23-2/0.3			CCAB, PCP
7	23-2/0.5			HOLD
8	19-2 N1/0.1			Arsenic (screen)
9	19-2 N2/0.1			HOLD
10	19-2 S1/0.1			As (screen)



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 **Fax** 07 856 0551

Client Reference W1601-23

Quote No 81927 **Order No**

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results

Office use **Job No:**

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories **Date & Time:**
 Please tick if you require COC to be emailed back **Name:**
Signature:

Received at Hill Laboratories **Date & Time:**
Name:
Signature:

Condition **Temp:**
 Room Temp Chilled Frozen

Sample & Analysis details checked
Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

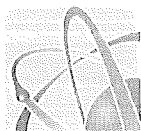
ADDITIONAL INFORMATION
Page 2 of 4

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
11	19-2 S2/0.1	16.01.17	SOIL	HOLD
12	19-2 E1/0.1			AS (screen)
13	19-2 E2/0.1			HOLD
14	19-2 W1/0.1			AS (screen)
15	19-2 W2/0.1			HOLD
16	19-2 R/0.1			HOLD
17	20-1 N1/0.1			AS (screen)
18	20-1 N1/0.3			AS (screen)
19	20-1 N2/0.1			
20	20-1 N2/0.3			



Hill Laboratories

BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results _____

Office use _____ Job No: _____

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: _____
 Please tick if you require COC to be emailed back Name: _____
 Signature: _____

Received at Hill Laboratories Date & Time: _____
 Name: _____
 Signature: _____

Condition _____ Temp: _____
 Room Temp Chilled Frozen

Sample & Analysis details checked
 Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

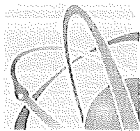
ADDITIONAL INFORMATION

Page 3 of 4

Quoted Sample Types _____ Requested Reporting Date: _____

Soil (Soil) _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
21	20-1 N3/0.1	16.01.17	SOIL	HOLD
22	20-1 N3/0.3			HOLD
23	20-1 S1/0.1			As (screen)
24	20-1 S1/0.3			
25	20-1 S2/0.1			
26	20-1 S2/0.3			
27	20-1 S3/0.1			HOLD
28	20-1 S3/0.3			HOLD
29	20-1 E1/0.1			As (screen)
30	20-1 E1/0.3			As (screen)



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client
 Name Waikato Regional Council 94
 Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240
 Phone 07 856 7184 Fax 07 856 0551
 Client Reference
 Quote No 81927 OrderNo W1601-23
 Primary Contact Michelle Begbie 132177
 Submitted By Michelle Begbie 132177
 Charge To Waikato Regional Council 94
 Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results

ANALYSIS REQUEST

R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND
 Phone: +64 7 858 2000
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 Email: mail@hill-labs.co.nz
 Web: www.hill-labs.co.nz

Office use Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time:
 Please tick if you require COC to be emailed back Name:
 Signature:
Received at Hill Laboratories Date & Time:
 Name:
 Signature:
Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature:

ADDITIONAL INFORMATION

page 4 of 4

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
31	20-1 E2/0.1	8/16.017	SOIL	As (screen)
32	20-1 E2/0.3			As (screen)
33	20-1 E3/0.1			HOLD
34	20-1 E3/0.3			HOLD
35	20-1 W1/0.1			As (screen)
36	20-1 W1/0.3			
37	20-1 W2/0.1			
38	20-1 W2/0.3			
39	20-1 W3/0.1			HOLD
40	20-1 W3/0.3			HOLD

Alex Davies-Colley

To: Michelle Begbie
Subject: RE: Tauhara properties to be sampled

From: Michelle Begbie [mailto:Michelle.Begbie@waikatoregion.govt.nz]
Sent: Thursday, 12 January 2017 12:23 p.m.
To: Alex Davies-Colley <ADavies-Colley@tonkintaylor.co.nz>
Subject: Tauhara properties to be sampled

Hi Alex,

As discussed yesterday, there is only one more new property at Tauhara to be sampled, but also the two already sampled that returned elevations which will require targeted sampling.

The first new property details are:

3 Simkin Street

Roy & Erina Kapoor (Owner/occupier) 020 4012 8826 020 4013 0788 erinakapoor@yahoo.co.nz
Please ring Erina to check a suitable day/time for her so that she can secure her dog secure for your visit.

Surface only
x

And although you probably already have the contact details for the other two properties for resampling they are:

9 Leslie Street

Trudi McHale (Tenant) 07 378 2828 021 137 2076 taupo@shedboss.co.nz
Ross Donald (Absent landowner) 027 411 9914

Handwritten notes:
1.0 0.5 1972
x x x
← 1.0 0.5 x
y

For this property it was the surface sample collected on the southern side of the house that indicated an elevation. My thoughts are that we could surface sample for arsenic only in four directions from the original point at 0.5m and 1m (but keep the 1m in cold hold). When I spoke to Trudi last year she advised that her agreement over the phone at that time served as permission, but if we could let her know when the sampling was to take place then she could let her son know so that he won't be alarmed when people arrive.

Handwritten notes:
Sample 0.1 + 0.3
x x y x
20-1

15 Leslie Street

Jim and Rangi Treloar (Owner/occupiers) 07 378 5712 027 243 7162 rangi.jim@kinect.co.nz

For this property it was the sample collected from the north side of the house, at a depth of 0.3m that returned the highest result. The additional results for this property (r'd 23th Dec) show that the vegetable garden and soil at a depth of 0.5m on the north side of the house were well within the NES guideline value; and so my thoughts are that we need to sample to 0.1 and 0.3m perhaps at 0.5m, 1m and 2m radius in four directions from the original sampling point; analyzing only for arsenic but holding the 2m samples in the cold hold.

What do you think about these sampling ideas? They are just ideas at this point, would love to hear what you would recommend as well.

Contract:

In addition to a letter report being required for 3 Simkin, we will also need to amend the letter reports for 9 and 15 Leslie Street once these results are available and reissue. We will also need to account for further field sampling, and the completion of the DSI. How much money do you think we need to vary the consent by? I propose that we extend the completion date for the contract until the end of May. I would like to have the contract amended by around the 10th of Feb so that it can be signed in plenty of time before the expiry.

Thanks for all your hard work on this project. Sorry I can't come with you to Taupo now. FYI I will be taking leave on the 16-17th and from the 20th-31st January.

Thanks,
Michelle.

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Visit our website at <http://www.waikatoregion.govt.nz>

~~23-1~~
~~23-2~~

- 23-1 / 0.1 0.3 0.5 1.0 (7)
- 23-2 0.1 0.3 0.5

- 19-2	N1 / 0.1	N2 / 0.1	(8)	- surface only
	S1 / 0.1	S2 / 0.7		x N2
	E1 / 0.1	E2 / 0.1		v N1
	W1 / 0.1	W2 / 0.7	x	x
	(0.5m)	(1.0m)	W2 W1	x 19-2 x
				x E1 E2
				x S1
				T S2

- 20-1	0.5m		1.0m	⊙ 1 to 0.3
	N1 / 0.1, 0.3	N2 / 0.1, 0.3	N2 / 0.1, 0.3	
	S1 / 0.1, 0.3	S2 / 0.1, 0.3	S2 / 0.1, 0.3	2.0m
	E1 / 0.1, 0.3	E2 / 0.1, 0.3	E2 / 0.1, 0.3	N3 / 0.1, 0.3
	W1 / 0.1, 0.3	W2 / 0.1, 0.3	W2 / 0.1, 0.3	S3 / 0.1, 0.3
	x			E3 / 0.1, 0.3
	x			W3 / 0.1, 0.3
	x			
x	x	x	⊙ 20-1	(24)
	x			
	x			



Job Information Summary

Page 1 of 2

Client:	Waikato Regional Council	Lab No:	1709117
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	17-Jan-2017 3:32 pm
		Priority:	High
		Quote No:	81927
		Order No:	W1601-23
		Client Reference:	
		Add. Client Ref:	
		Submitted By:	A Davies-Colley
		Charge To:	Waikato Regional Council
		Target Date:	24-Jan-2017 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	23-1/0.1 16-Jan-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
2	23-1/0.3 16-Jan-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
3	23-1/0.5 16-Jan-2017	Soil	GSoil300, cpBag	Hold Cold
4	23-1/1.0 16-Jan-2017	Soil	GSoil300, cpBag	Hold Cold
5	23-2/0.1 16-Jan-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
6	23-2/0.3 16-Jan-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
7	23-2/0.5 16-Jan-2017	Soil	GSoil300, cpBag	Hold Cold
8	19-2N1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
9	19-2N2/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
10	19-2S1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
11	19-2S2/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
12	19-2E1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
13	19-2E2/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
14	19-2W1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
15	19-2W2/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
16	19-2R/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
17	20-1N1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
18	20-1N1/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
19	20-1N2/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
20	20-1N2/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
21	20-1N3/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
22	20-1N3/0.3 16-Jan-2017	Soil	GSoil300	Hold Cold
23	20-1S1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
24	20-1S1/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
25	20-1S2/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
26	20-1S2/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
27	20-1S3/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
28	20-1S3/0.3 16-Jan-2017	Soil	GSoil300	Hold Cold
29	20-1E1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
30	20-1E1/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
31	20-1E2/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
32	20-1E2/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
33	20-1E3/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
34	20-1E3/0.3 16-Jan-2017	Soil	GSoil300	Hold Cold
35	20-1W1/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
36	20-1 W1/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
37	20-1 W2/0.1 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
38	20-1 W2/0.3 16-Jan-2017	Soil	GSoil300	Total Recoverable Arsenic
39	20-1 W3/0.1 16-Jan-2017	Soil	GSoil300	Hold Cold
40	20-1 W3/0.3 16-Jan-2017	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8, 10, 12, 14, 17-20, 23-26, 29-32, 35-38
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8, 10, 12, 14, 17-20, 23-26, 29-32, 35-38
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	8, 10, 12, 14, 17-20, 23-26, 29-32, 35-38



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1709117	SPv2
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	17-Jan-2017	
		Date Reported:	01-Feb-2017	(Amended)
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	23-1/0.1 16-Jan-2017	23-1/0.3 16-Jan-2017	23-2/0.1 16-Jan-2017	23-2/0.3 16-Jan-2017	19-2 N1/0.1 16-Jan-2017
Lab Number:	1709117.1	1709117.2	1709117.5	1709117.6	1709117.8

Individual Tests

Dry Matter	g/100g as rcvd	83	86	90	80	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	28

CCAB, screen level

Total Recoverable Arsenic	mg/kg dry wt	6	< 2	10	10	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	5	< 2	5	7	-
Total Recoverable Copper	mg/kg dry wt	12	2	6	7	-

Pentachlorophenol Screening in Soil by LCMSMS

Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Sample Name:	19-2 S1/0.1 16-Jan-2017	19-2 E1/0.1 16-Jan-2017	19-2 W1/0.1 16-Jan-2017	20-1 N1/0.1 16-Jan-2017	20-1 N1/0.3 16-Jan-2017
Lab Number:	1709117.10	1709117.12	1709117.14	1709117.17	1709117.18

Individual Tests

Total Recoverable Arsenic	mg/kg dry wt	7	5	20	24	71
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Sample Name:	20-1 N2/0.1 16-Jan-2017	20-1 N2/0.3 16-Jan-2017	20-1 N3/0.3 16-Jan-2017	20-1 S1/0.1 16-Jan-2017	20-1 S1/0.3 16-Jan-2017
Lab Number:	1709117.19	1709117.20	1709117.22	1709117.23	1709117.24

Individual Tests

Total Recoverable Arsenic	mg/kg dry wt	21	115	9	33	16
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Sample Name:	20-1 S2/0.1 16-Jan-2017	20-1 S2/0.3 16-Jan-2017	20-1 E1/0.1 16-Jan-2017	20-1 E1/0.3 16-Jan-2017	20-1 E2/0.1 16-Jan-2017
Lab Number:	1709117.25	1709117.26	1709117.29	1709117.30	1709117.31

Individual Tests

Total Recoverable Arsenic	mg/kg dry wt	11	28	16	141	18
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Sample Name:	20-1 E2/0.3 16-Jan-2017	20-1 E3/0.3 16-Jan-2017	20-1 W1/0.1 16-Jan-2017	20-1 W1/0.3 16-Jan-2017	20-1 W2/0.1 16-Jan-2017
Lab Number:	1709117.32	1709117.34	1709117.35	1709117.36	1709117.37

Individual Tests

Total Recoverable Arsenic	mg/kg dry wt	138	70	11	5	13
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Sample Name:	20-1 W2/0.3 16-Jan-2017				
Lab Number:	1709117.38				



Sample Type: Soil						
Sample Name:		20-1 W2/0.3				
		16-Jan-2017				
Lab Number:		1709117.38				
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	9	-	-	-	-

Analyst's Comments

Amended Report: This report replaces an earlier report issued on 24 Jan 2017 at 4:13 pm
Reason for amendment: At the client's request, testing has been added to two samples.

SUMMARY OF METHODS

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

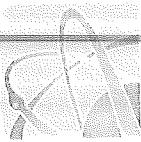
Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6, 8, 10, 12, 14, 17-20, 22-26, 29-32, 34-38
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6, 8, 10, 12, 14, 17-20, 22-26, 29-32, 34-38
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	8, 10, 12, 14, 17-20, 22-26, 29-32, 34-38

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.

Ara Heron BSc (Tech)
Client Services Manager - Environmental



Hill Laboratories

BETTER TESTING BETTER RESULTS

Client Name Waikato Regional Council 94
Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240
Phone 07 856 7184 **Fax** 07 856 0551
Client Reference
Quote No 81927 **Order No** W1601-23
Primary Contact Michelle Begbie 132177
Submitted By Michelle Begbie 132177
Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results adavies-colley@for.kintaylor.com

ADDITIONAL INFORMATION
 Pg 1 of 6
 * Bag + Jar for each sample
 except Dup 5 + Dup 6

ANALYSIS REPORT
 Job No: _____ Date Recv: 02-Mar-17 17:31
173 3665
 Received by: Gareth Davies
 Office use Job No: _____

CHAIN OF CUSTODY RECORD
 3117336655
Sent to Hill Laboratories Date & Time: 2/3/17
 Name: Steran Pratt
 Please tick if you require COC to be emailed back
 Signature: [Signature]
Received at Hill Laboratories Date & Time: 3/3/17 3.43
 Name: Kim Harrison
 Signature: [Signature]
Condition Temp:
 Room Temp Chilled Frozen 9.0 °C
 Sample & Analysis details checked
 Signature: _____

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date: _____

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	24-1/0.1	2/3/17	Soil	CCAB, PCP
2	24-1/0.3			CCAB, PCP
3	24-1/0.5			HOLD
4	24-1/1.0			EA HOLD
5	24-2/0.1			CCAB, PCP
6	24-2/0.3			CCAB, PCP
7	24-2/0.5			HOLD
8	25-1/0.1			CCAB, PCP
9	25-1/0.3			CCAB, PCP
10	25-1/0.5			HOLD



ANALYSIS REQUEST

R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
 Fax: +64 7 858 2001
 Email: mail@hill-labs.co.nz
 Web: www.hill-labs.co.nz

Client
 Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W/1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results adavies-colley@fan.kin.taylor.co.nz

Office use Job No:

CHAIN OF CUSTODY/RECORD

Sent to Hill Laboratories Date & Time: 2/3/17
 Name: Steven Pratt
 Please tick if you require COC to be emailed back
 Signature: *[Signature]*

Received at Hill Laboratories Date & Time:
 Name:
 Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature:

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION
 Pg 2 of 6
 * Bag + Jar for each sample
 except Dip 5 + Dip 6

Quoted Sample Types

Requested Reporting Date:

Soil (soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
11	25-1/1.0	2/3/17	Soil	CCAB, PCP Hold
12	25-2/0.1			CCAB, PCP
13	25-2/0.3			CCAB, PCP
14	25-2/0.5			Hold
15	26-1/0.1			CCAB, PCP
16	26-1/0.3			CCAB, PCP
17	26-1/0.5			Hold
18	26-1/1.0			CCAB, PCP Hold
19	26-2/0.1			CCAB, PCP
20	26-2/0.3			CCAB, PCP



ANALYSIS REQUEST

R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
 Fax: +64 7 858 2001
 Email: mail@hill-labs.co.nz
 Web: www.hill-labs.co.nz

Client
 Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference

Quote No 81927 Order No W/601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results

Email Results adavies-colley@fmh.kor.taylor.co.nz

Office use Job No:

CHAIN OF CUSTODY/RECORD

Sent to Hill Laboratories Date & Time: 2/3/17
 Please tick if you require COC to be emailed back Name: Steven Pratt
 Signature: *[Signature]*

Received at Hill Laboratories Date & Time:
 Name:
 Signature:

Condition Temp:
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature:

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION
 pg 3 of 6
 * Bag + Jar for each sample
 except Dup 5 + Dup 6

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
21	26-2/0.5	2/3/17	Soil	CCAB, PCP Hold
22	27-1/0.1			CCAB, PCP
23	27-1/0.3			CCAB, PCP
24	27-1/0.5			Hold
25	27-1/1.0			Hold
26	27-2/0.1			CCAB, PCP
27	27-2/0.3			CCAB, PCP
28	27-2/0.5			Hold
29	28-1/0.1			CCAB, PCP
30	28-1/0.3			CCAB, PCP

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter

Fax Results _____

Email Results adavies.colley@far.kin.taylor.co.nz

ADDITIONAL INFORMATION

pg 4 of 6

* Bag + Jar for each sample

except MP 5

Quoted Sample Types

Soil (Soil) _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
31	28-1/0.5	2/3/17	Soil	CCAB, PCP Hold
32	28-1/1.0			Hold
33	28-2/0.1			CCAB, PCP
34	28-2/0.3			CCAB, PCP
35	28-2/0.5			Hold
36	29-1/0.1			CCAB, PCP
37	29-1/0.3			CCAB, PCP
38	29-1/0.5			Hold
39	29-1/1.0			Hold
40	29-2/0.1			CCAB, PCP

ANALYSIS REQUEST

R J Hill Laboratories Ltd
1 Clyde Street,
Private Bag 3205,
Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
Fax: +64 7 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Office use _____ Job No: _____

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 2/3/17
 Please tick if you require COC to be emailed back Name: Steven Pratt
 Signature: [Signature]

Received at Hill Laboratories Date & Time: _____
 Name: _____
 Signature: _____

Condition _____ Temp: _____
 Room Temp Chilled Frozen
 Sample & Analysis details checked
 Signature: _____

Priority Low Normal High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date: _____

ANALYSIS REQUEST

R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
 Fax: +64 7 858 2001
 Email: mail@hill-labs.co.nz
 Web: www.hill-labs.co.nz

Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
Hamilton 3240

Phone 07 856 7184 Fax 07 856 0551

Client Reference _____

Quote No 81927 Order No W1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results adavies-colley@fan.kirilaylor.com

Office use Job No: _____

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 2/3/17
 Please tick if you require COC to be emailed back
 Name: Steven Platt
 Signature: [Signature]

Received at Hill Laboratories Date & Time: _____
 Name: _____
 Signature: _____

Condition Room Temp Chilled Frozen Temp: _____
 Sample & Analysis details checked
 Signature: _____

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

pg 5 of 6
* Bag + Jov for each sample
except Dip 5 + Dip 6

Quoted Sample Types Requested Reporting Date: _____

Soil (Soil) _____

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
41	29-2/0.3	2/3/17	Soil	CCAB, PCP
42	29-2/0.5			HOLD
43	30-1/0.1			CCAB, PCP
44	30-1/0.3			CCAB, PCP
45	30-1/0.5			HOLD
46	30-1/1.0			HOLD
47	30-2/0.1			CCAB, PCP
48	30-2/0.3			CCAB, PCP
49	30-2/0.5			HOLD
50	29-VI			HOLD



ANALYSIS REQUEST

R J Hill Laboratories Ltd
 1 Clyde Street,
 Private Bag 3205,
 Hamilton 3240, NEW ZEALAND

Phone: +64 7 858 2000
 Fax: +64 7 858 2001
 Email: mail@hill-labs.co.nz
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Client Name Waikato Regional Council 94

Address Private Bag 3038, Waikato Mail Centre
 Hamilton 3240

Phone 07 856 7184 **Fax** 07 856 0551

Client Reference

Quote No 81927 **Order No** W/1601-23

Primary Contact Michelle Begbie 132177

Submitted By Michelle Begbie 132177

Charge To Waikato Regional Council 94

Results To Mail Primary Contact Mail Submitter
 Fax Results
 Email Results *adavies-colley@far.kirbylaw.co.nz*

Office use **Job No:**

CHAIN OF CUSTODY/RECORD

Sent to Hill Laboratories **Date & Time:** 2/3/17
 Please tick if you require COC to be emailed back
Name: Steven Pratt
Signature: *[Signature]*

Received at Hill Laboratories **Date & Time:**
Name:
Signature:

Condition **Temp:**
 Room Temp Chilled Frozen
 Sample & Analysis details checked
Signature:

Priority Low Normal High
 Urgent (ASAP, extra charge applies, please contact lab first)
 NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

ADDITIONAL INFORMATION

Py 6 of 6
 * Bag + Jar for each sample
 except Dup 5 + Dup 6

Quoted Sample Types **Requested Reporting Date:** _____

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
51	29-V2	2/3/17	Soil	CCAB, PCR HOLD
52	20-1 E4 /0.3			Arsenic ASSENIC
53	20-1 ES /0.3			HOLD
54	20-1 NE 1 /0.3			Arsenic HOLD
55	20-1 SE 1 /0.3			Arsenic HOLD
56	Dup 5			CCAB
57	Dup 6			CCAB
58				
9				
10				



Job Information Summary

Page 1 of 3

Client:	Waikato Regional Council	Lab No:	1733665
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	03-Mar-2017 3:43 pm
		Priority:	High
		Quote No:	81927
		Order No:	W1601-23
		Client Reference:	Taupo
		Add. Client Ref:	
		Submitted By:	A Davies-Colley
		Charge To:	Waikato Regional Council
		Target Date:	24-Mar-2017 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	24-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
2	24-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
3	24-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
4	24-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
5	24-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
6	24-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
7	24-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Total Recoverable Arsenic
8	25-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
9	25-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
10	25-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
11	25-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
12	25-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
13	25-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
14	25-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
15	26-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
16	26-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
17	26-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
18	26-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
19	26-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
20	26-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
21	26-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
22	27-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
23	27-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
24	27-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
25	27-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
26	27-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
27	27-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
28	27-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
29	28-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
30	28-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
31	28-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
32	28-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
33	28-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
34	28-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
35	28-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Total Recoverable Arsenic
36	29-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
37	29-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
38	29-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
39	29-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
40	29-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
41	29-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
42	29-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
43	30-1/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
44	30-1/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
45	30-1/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
46	30-1/1.002-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
47	30-2/0.102-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
48	30-2/0.302-Mar-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
49	30-2/0.502-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
50	29-V1 02-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
51	29-V2 02-Mar-2017	Soil	GSoil300, cpBag	Hold Cold
52	20-1 E4/0.3 02-Mar-2017	Soil	cpBag	Total Recoverable Arsenic
53	20-1 E5/0.3 02-Mar-2017	Soil	cpBag	Hold Cold
54	20-1 NE1/0.3 02-Mar-2017	Soil	cpBag	Total Recoverable Arsenic
55	20-1 SE1/0.3 02-Mar-2017	Soil	cpBag	Total Recoverable Arsenic
56	Dup 5 02-Mar-2017	Soil	cpBag	CCAB, screen level
57	Dup 6 02-Mar-2017	Soil	cpBag	CCAB, screen level

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-37, 40-41, 43-44, 47-48, 52, 54-57

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48, 56-57
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-37, 40-41, 43-44, 47-48, 52, 54-57
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1, 7, 35, 52, 54-55
Total Recoverable Chromium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv2
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	23-Mar-2017	(Amended)
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	24-1/0.1 02-Mar-2017	24-1/0.3 02-Mar-2017	24-2/0.1 02-Mar-2017	24-2/0.3 02-Mar-2017	24-2/0.5 02-Mar-2017
Lab Number:	1733665.1	1733665.2	1733665.5	1733665.6	1733665.7

Individual Tests

Dry Matter	g/100g as rcvd	83	79	85	70	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	4

CCAB, screen level

Total Recoverable Arsenic	mg/kg dry wt	17 #2	3	12	92	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	10 #1	3	8	22	-
Total Recoverable Copper	mg/kg dry wt	9	4	14	25	-

Pentachlorophenol Screening in Soil by LCMSMS

Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Sample Name:	25-1/0.1 02-Mar-2017	25-1/0.3 02-Mar-2017	25-2/0.1 02-Mar-2017	25-2/0.3 02-Mar-2017	26-1/0.1 02-Mar-2017
Lab Number:	1733665.8	1733665.9	1733665.12	1733665.13	1733665.15

Individual Tests

Dry Matter	g/100g as rcvd	89	81	69	80	88
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CCAB, screen level

Total Recoverable Arsenic	mg/kg dry wt	5	4	19	9	9
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	3	16	8	6
Total Recoverable Copper	mg/kg dry wt	7	4	46	95	6

Pentachlorophenol Screening in Soil by LCMSMS

Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	26-1/0.3 02-Mar-2017	26-2/0.1 02-Mar-2017	26-2/0.3 02-Mar-2017	27-1/0.1 02-Mar-2017	27-1/0.3 02-Mar-2017
Lab Number:	1733665.16	1733665.19	1733665.20	1733665.22	1733665.23

Individual Tests

Dry Matter	g/100g as rcvd	74	75	78	91	79
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CCAB, screen level

Total Recoverable Arsenic	mg/kg dry wt	3	19	3	11	7
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	19	< 2	7	6
Total Recoverable Copper	mg/kg dry wt	6	30	3	7	6



Sample Type: Soil						
Sample Name:	26-1/0.3 02-Mar-2017	26-2/0.1 02-Mar-2017	26-2/0.3 02-Mar-2017	27-1/0.1 02-Mar-2017	27-1/0.3 02-Mar-2017	
Lab Number:	1733665.16	1733665.19	1733665.20	1733665.22	1733665.23	
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	27-2/0.1 02-Mar-2017	27-2/0.3 02-Mar-2017	28-1/0.1 02-Mar-2017	28-1/0.3 02-Mar-2017	28-2/0.1 02-Mar-2017	
Lab Number:	1733665.26	1733665.27	1733665.29	1733665.30	1733665.33	
Individual Tests						
Dry Matter	g/100g as rcvd	85	79	85	77	81
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	5	< 2	11	3	7
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	2	7	3	5
Total Recoverable Copper	mg/kg dry wt	10	2	730	9	5
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	28-2/0.3 02-Mar-2017	28-2/0.5 02-Mar-2017	29-1/0.1 02-Mar-2017	29-1/0.3 02-Mar-2017	29-2/0.1 02-Mar-2017	
Lab Number:	1733665.34	1733665.35	1733665.36	1733665.37	1733665.40	
Individual Tests						
Dry Matter	g/100g as rcvd	78	-	79	73	82
Total Recoverable Arsenic	mg/kg dry wt	-	3	-	-	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	74	-	14	7	11
Total Recoverable Boron	mg/kg dry wt	< 20	-	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	7	-	8	5	7
Total Recoverable Copper	mg/kg dry wt	4	-	14	7	21
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	< 0.05	< 0.05	< 0.05
Sample Name:	29-2/0.3 02-Mar-2017	30-1/0.1 02-Mar-2017	30-1/0.3 02-Mar-2017	30-2/0.1 02-Mar-2017	30-2/0.3 02-Mar-2017	
Lab Number:	1733665.41	1733665.43	1733665.44	1733665.47	1733665.48	
Individual Tests						
Dry Matter	g/100g as rcvd	79	81	76	77	78
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	16	5	9	9
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	2	8	5	7	3
Total Recoverable Copper	mg/kg dry wt	3	8	8	16	4
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	20-1 E4/0.3 02-Mar-2017	20-1 NE1/0.3 02-Mar-2017	20-1 SE1/0.3 02-Mar-2017	Dup 5 02-Mar-2017	Dup 6 02-Mar-2017	
Lab Number:	1733665.52	1733665.54	1733665.55	1733665.56	1733665.57	
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	14	24	76	-	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	14	10
Total Recoverable Boron	mg/kg dry wt	-	-	-	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	-	-	-	8	6
Total Recoverable Copper	mg/kg dry wt	-	-	-	7	7

Analyst's Comments

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. The average of the results of the replicate analyses has been reported. Replicate 1: 11 mg/kg; Replicate 2: 10 mg/kg.

#2 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. The average of the results of the replicate analyses has been reported. Replicate 1: 17 mg/kg; Replicate 2: 17 mg/kg.

Amended Report: This report replaces an earlier report issued on 20 Mar 2017 at 10:08 am
Reason for amendment: Arsenic analysis added to samples 1733665.7 and 1733665.35, as per clients request.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-37, 40-41, 43-44, 47-48, 52, 54-57
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48, 56-57
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6, 8-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-34, 36-37, 40-41, 43-44, 47-48

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-9, 12-13, 15-16, 19-20, 22-23, 26-27, 29-30, 33-37, 40-41, 43-44, 47-48, 52, 54-57
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	7, 35, 52, 54-55

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.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

175 4689

Received by: Greg Brittan



CLIENT NAME: WAIKATO REGIONAL COUNCIL
 ADDRESS: PRIVATE BAG 3038
 WAIKATO MAIL CENTRE
 HAMILTON 3240

PHONE: 078567184

CLIENT REFERENCE:

QUOTE NO. 81927
 ORDER NO. W1601-23

PRIMARY CONTACT: MICHELLE BEGBIE

CHARGE TO: WAIKATO REGIONAL COUNCIL

ANALYSIS
 RS HILL LABOR
 1 CLYDE ST
 HAMILTON

CHAIN OF CUSTODY

SENT TO HILL LABORATORIES

DATE & TIME: 6/4/17 4.15

NAME: Steven Pratt

SIGNATURE: *[Signature]*

RECEIVED AT HILL LABORATORIES

DATE & TIME: 07/04/17 16:36

NAME: GARETH DAVIES

SIGNATURE: *[Signature]*

CONDITION: TEMP: 19.5

PRIORITY: HIGH

RESULTS TO: MAIL PRIMARY CONTACT MAIL SUBMITTER
 EMAIL RESULTS adavies-colley@tonkintaylor.com

ADDITIONAL INFORMATION

Pg 1 of 3
 Bag + Jar for all samples
 2x chilly bins

No.	Sample Name	Sample Date	Sample Type	TESTS REQUIRED
1	24-2 1 / 0.3	6/4/2017	SOIL	Arsenic
2	24-2 2 / 0.3			HOLD
3	24-2 3 / 0.3			HOLD
4	24-2 4 / 0.3			HOLD
5	24-2 5 / 0.3			Arsenic
6	24-2 6 / 0.3			Arsenic
7	24-2 7 / 0.3			Arsenic
8	28-2 N1 / 0.3			Arsenic
9	28-2 N2 / 0.3			Arsenic HOLD
10	28-2 N3 / 0.3			HOLD

ORDER NO. W1601-23
 QUOTE NO. 81927

Pg 2 of 3

No.	Sample Name	Sample Date	Sample Type	TESTS REQUIRED
11	28-2 S1 / 0.3	6/4/2017	SOIL	ARSENIC
12	28-2 S2 / 0.3			
13	28-2 S3 / 0.3			
14	28-2 E1 / 0.3			
15	28-2 E2 / 0.3			
16	28-2 E3 / 0.3			
17	28-2 W1 / 0.3			
18	28-2 W2 / 0.3			
19	28-2 W3 / 0.3			
20	31-1 / 0.1			CCAB, PCP
21	31-1 / 0.3			CCAB, PCP
22	31-1 / 0.5			HOLD
23	31-1 / 1.0			HOLD
24	31-2 / 0.1			CCAB, PCP
25	31-2 / 0.3			CCAB, PCP
26	31-2 / 0.5			HOLD
27	32-1 / 0.1			CCAB, PCP
28	32-1 / 0.3			CCAB, PCP
29	32-1 / 0.5			HOLD
30	32-1 / 1.0			CCAB, PCP HOLD
31	32-2 / 0.1			CCAB, PCP
32	32-2 / 0.3			CCAB, PCP
33	32-2 / 0.5			HOLD
34	33 / 0.1			CCAB, PCP
35	33 / 0.3			
36	34 / 0.1			
37	34 / 0.3			
38	35 / 0.1			
39	35 / 0.3			
40	36 / 0.1			
41	36 / 0.3			
42	37 / 0.1			
43	37 / 0.3			
44	38 / 0.1			
45	38 / 0.3			
46	39 / 0.1			
47	39 / 0.3			

ORDER NO. W1601-23

QUOTE NO. 81927

Pg 3 of 3

No.	Sample Name	Sample Date	Sample Type	TESTS REQUIRED
48	40/0.1	6/4/2017	SOIL	CCAB, PCP
49	40/0.3	↓	↓	↓
50	41/0.1			
51	41/0.3			
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Job Information Summary

Client:	Waikato Regional Council	Lab No:	1754689
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Registered:	07-Apr-2017 4:36 pm
		Priority:	High
		Quote No:	81927
		Order No:	W1601-23
		Client Reference:	
		Add. Client Ref:	
		Submitted By:	A Davies-Colley
		Charge To:	Waikato Regional Council
		Target Date:	27-Apr-2017 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	24-21/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
2	24-22/0.306-Apr-2017	Soil	cpBag	Hold Cold
3	24-23/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
4	24-24/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
5	24-25/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
6	24-26/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
7	24-27/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
8	28-2 N1/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
9	28-2 N2/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
10	28-2 N3/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
11	28-2 S1/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
12	28-2 S2/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
13	28-2 S3/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
14	28-2 E1/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
15	28-2 E2/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
16	28-2 E3/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
17	28-2 W1/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
18	28-2 W2/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
19	28-2 W3/0.306-Apr-2017	Soil	cpBag	Total Recoverable Arsenic
20	31-1/0.106-Apr-2017	Soil	cpBag, GSoil300	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
21	31-1/0.306-Apr-2017	Soil	cpBag, GSoil300	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
22	31-1/0.506-Apr-2017	Soil	cpBag, GSoil300	Hold Cold
23	31-1/1.006-Apr-2017	Soil	cpBag, GSoil300	Hold Cold
24	31-2/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
25	31-2/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
26	31-2/0.506-Apr-2017	Soil	GSoil300, cpBag	Hold Cold
27	32-1/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
28	32-1/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
29	32-1/0.506-Apr-2017	Soil	GSoil300, cpBag	Hold Cold
30	32-1/1.006-Apr-2017	Soil	GSoil300, cpBag	Hold Cold
31	32-2/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
32	32-2/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
33	32-2/0.506-Apr-2017	Soil	GSoil300, cpBag	Hold Cold

Samples				
No	Sample Name	Sample Type	Containers	Tests Requested
34	33/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
35	33/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
36	34/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
37	34/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
38	35/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
39	35/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
40	36/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
41	36/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
42	37/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
43	37/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
44	38/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
45	38/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
46	39/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
47	39/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
48	40/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
49	40/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
50	41/0.106-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS
51	41/0.306-Apr-2017	Soil	GSoil300, cpBag	CCAB, screen level; Pentachlorophenol Screening in Soil by LCMSMS

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3-21, 24-25, 27-28, 31-32, 34-51
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	20-21, 24-25, 27-28, 31-32, 34-51
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	20-21, 24-25, 27-28, 31-32, 34-51
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	20-21, 24-25, 27-28, 31-32, 34-51

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3-21, 24-25, 27-28, 31-32, 34-51
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1, 3-19



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1754689	SPv2
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Apr-2017	
		Date Reported:	26-Apr-2017	(Amended)
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil						
Sample Name:	24-2 1/0.3	24-2 3/0.3	24-2 4/0.3	24-2 5/0.3	24-2 6/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.1	1754689.3	1754689.4	1754689.5	1754689.6	
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	14	56	26	12	38
Sample Name:	24-2 7/0.3	28-2 N1/0.3	28-2 N2/0.3	28-2 N3/0.3	28-2 S1/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.7	1754689.8	1754689.9	1754689.10	1754689.11	
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	53	97	68	94	57
Sample Name:	28-2 S2/0.3	28-2 S3/0.3	28-2 E1/0.3	28-2 E2/0.3	28-2 E3/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.12	1754689.13	1754689.14	1754689.15	1754689.16	
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	26	33	43	11	7
Sample Name:	28-2 W1/0.3	28-2 W2/0.3	28-2 W3/0.3	31-1/0.1	31-1/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.17	1754689.18	1754689.19	1754689.20	1754689.21	
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	68	70
Total Recoverable Arsenic	mg/kg dry wt	13	26	28	-	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	5	< 2
Total Recoverable Boron	mg/kg dry wt	-	-	-	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	-	-	-	4	< 2
Total Recoverable Copper	mg/kg dry wt	-	-	-	19	< 2
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05
Sample Name:	31-2/0.1	31-2/0.3	32-1/0.1	32-1/0.3	32-2/0.1	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.24	1754689.25	1754689.27	1754689.28	1754689.31	
Individual Tests						
Dry Matter	g/100g as rcvd	68	68	51	73	68
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	12	9	6	< 2	24
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	8	9	5	< 2	14
Total Recoverable Copper	mg/kg dry wt	32	41	15	4	39



Sample Type: Soil						
Sample Name:	31-2/0.1 06-Apr-2017	31-2/0.3 06-Apr-2017	32-1/0.1 06-Apr-2017	32-1/0.3 06-Apr-2017	32-2/0.1 06-Apr-2017	
Lab Number:	1754689.24	1754689.25	1754689.27	1754689.28	1754689.31	
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	32-2/0.3 06-Apr-2017	33/0.1 06-Apr-2017	33/0.3 06-Apr-2017	34/0.1 06-Apr-2017	34/0.3 06-Apr-2017	
Lab Number:	1754689.32	1754689.34	1754689.35	1754689.36	1754689.37	
Individual Tests						
Dry Matter	g/100g as rcvd	70	61	69	60	66
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	4	8	9	14	8
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	2	12	5	21	8
Total Recoverable Copper	mg/kg dry wt	4	14	11	25	21
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	35/0.1 06-Apr-2017	35/0.3 06-Apr-2017	36/0.1 06-Apr-2017	36/0.3 06-Apr-2017	37/0.1 06-Apr-2017	
Lab Number:	1754689.38	1754689.39	1754689.40	1754689.41	1754689.42	
Individual Tests						
Dry Matter	g/100g as rcvd	80	84	71	69	69
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	25	26	< 2	7	30
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	10	9	< 2	5	18
Total Recoverable Copper	mg/kg dry wt	23	24	3	9	17
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	37/0.3 06-Apr-2017	38/0.1 06-Apr-2017	38/0.3 06-Apr-2017	39/0.1 06-Apr-2017	39/0.3 06-Apr-2017	
Lab Number:	1754689.43	1754689.44	1754689.45	1754689.46	1754689.47	
Individual Tests						
Dry Matter	g/100g as rcvd	75	67	70	66	73
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	18	27	5	169	41
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	11	13	3	69	12
Total Recoverable Copper	mg/kg dry wt	11	27	8	310	28
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	0.10	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sample Name:	40/0.1 06-Apr-2017	40/0.3 06-Apr-2017	41/0.1 06-Apr-2017	41/0.3 06-Apr-2017		
Lab Number:	1754689.48	1754689.49	1754689.50	1754689.51		
Individual Tests						
Dry Matter	g/100g as rcvd	70	72	75	72	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	2	23	29	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	9	3	13	16	-
Total Recoverable Copper	mg/kg dry wt	12	3	16	14	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Amended Report: This report replaces an earlier report issued on 18 Apr 2017 at 12:12 pm
Reason for amendment: Arsenic added to samples 1754689.3, 4, 9 and 10, as per clients request.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3-21, 24-25, 27-28, 31-32, 34-51
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	20-21, 24-25, 27-28, 31-32, 34-51
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	20-21, 24-25, 27-28, 31-32, 34-51
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	20-21, 24-25, 27-28, 31-32, 34-51
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3-21, 24-25, 27-28, 31-32, 34-51
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1, 3-19

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

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

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

Appendix E: Tabulated analytical results

- Table E1 – Tabulated analytical results (Mount View School)
- Table E2 – Tabulated analytical results (initial residential sampling)
- Table E3 – Tabulated analytical results (additional residential sampling/analysis)

Table E1: Tabulated analytical results (Mount View School)

Area	Human health criteria ¹	Environmental based criteria ²	Background concentrations ³	School playing fields										Around school buildings						Vegetable gardens			
				HA1	HA2	HA2	HA3	HA3	HA4	HA5	HA6	HA6	HA7	HA8	HA8	HA9	HA9	HA10	HA10	S1	S2		
Sample location/ID																							
Depth (m)				0.1	0.1	0.3	0.1	0.3	0.1	0.1	0.1	0.3	0.1	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	Surface	Surface
Laboratory number				1683426.1	1683426.5	1683426.6	1683426.9	1683426.10	1683426.13	1683426.17	1683426.21	1683426.22	1683426.25	1683426.29	1683426.34	1683426.33	1683426.30	1683426.37	1683426.38	1683426.42	1683426.43		
Sample date				21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16	21-Nov-16
Soil type ^(see note 6)				Topsoil	Topsoil	Fill	Topsoil	Fill	Topsoil	Topsoil	Topsoil	Fill	Topsoil	Topsoil	Fill	Topsoil	Topsoil	Topsoil	Topsoil/Fill	Topsoil	Topsoil		
Metals																							
Arsenic	24/80	17	60 ⁷	8.9-17	2	2	< 2	3	< 2	3	2	3	< 2	3	4	4	4	<u>78</u>	13	<u>27</u>	6	5	
Boron	>10,000 / >10,000	-	20 ⁷	6.7 ⁴	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	
Chromium*	>10,000 / >10,000	64	390 ⁷	41-129	2	3	3	3	< 2	4	5	5	< 2	3	6	4	7	5	7	11	6	6	
Copper	>10,000 / >10,000	63	140 ⁷	29-108	7	10	3	6	< 2	5	5	6	< 2	9	11	4	17	42	11	25	18	18	
Pentachlorophenol																							
Pentachlorophenol (PCP)	56/150	11	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
2,3,4,6 - Tetrachlorophenol (TCP)	1,900 ⁵	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	

Notes:

All values in mg/kg

< indicates value less than laboratory limit of reporting

* guideline value for chromium III / total chromium

Italicised values indicate that results exceed published background concentrations

Underlined values indicate that results exceed environmental criteria (CCME for As and B, Landcare Research for Cu and Cr). Refer to report Section 6.4.3 for further detail.

Yellow shaded values indicate that results exceed human health criteria for residential use (no produce)

1 - MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health. Values for residential use (no produce)/recreational use.

2 - CCME, 1991 (updated 2002). Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health (unless otherwise stated). Residential/parkland scenario. Environmental guidelines only have been referenced.

3 - Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document

4 - Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data. <http://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations/>

5 - USEPA Regional Screening Levels - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Residential Land Use. Carcinogens adjusted for incremental excess cancer risk of 1 in 100,000

6 - Soil types: silty SAND or sandy SILT denote natural or disturbed natural material

7 - Landcare Research, 2016, User Guide: Background soil concentrations and soil guidelines for the protection of ecological receptors (Eco-SGVs) – Consultation draft. Land use - Residential/recreational area.

Copper value assumes typical, fresh soil as a conservative approach.

Table E2: Tabulated analytical results (initial residential sampling)

Street address	Sample location/ID	Depth (m)	Laboratory number	Sample date	Soil type ^(see note 7)	38 Rangatira Street				30 Rangatira Street				6 Leslie Street				5 Leslie Street				12 Leslie Street					
						1-1	1-1	1-2	1-2	2-1	2-1	2-2	2-2	3-1	3-1	3-2	3-2	4-1	4-1	4-2	4-2	5-1	5-1	5-2	5-2		
						0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3
						1691731.1	1691731.2	1691731.5	1691731.6	1691731.8	1691731.9	1691731.12	1691731.13	1691731.16	1691731.17	1691731.20	1691731.21	1691731.23	1691731.24	1691731.27	1691731.28	1691731.30	1691731.31	1691731.34	1691731.35		
						5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16	5-Dec-16		
						Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B		
Metals																											
Arsenic	20	17	60 ⁸	8.9-17	12	3	5	<2	11	3	21	<2	10	4	27	3	8	2	18	<2	12	2	21	6			
Boron	>10,000	-	20 ⁸	6.7 ⁴	< 20	< 20	< 20	< 20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20		
Chromium*	>10,000	64	390 ⁸	41-129	10	<2	4	<2	9	2	12	<2	8	3	21	<2	6	<2	32	<2	8	<2	11	2			
Copper	> 10,000	63	140 ⁸	29-108	14	2	5	<2	8	3	17	2	12	7	54	13	11	6	26	3	24	8	24	2			
Pentachlorophenol																											
Pentachlorophenol (PCP)	55	11	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
2,3,4,6 - Tetrachlorophenol (TCP)	1,900 ⁵	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Polycyclic Aromatic Hydrocarbons Screening in Soil																											
Acenaphthene	3,600 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Anthracene	18,000 ⁵	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Benzo[a]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Benzo[a]pyrene (BAP)	Refer to BaP TEQ	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Benzo[b]fluoranthene +	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Benzo[k]fluoranthene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chrysene	Refer to BaP TEQ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Dibenzo[a,h]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Fluoranthene	Refer to BaP TEQ	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Fluorene	2,400 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Indeno[1,2,3-c,d]pyrene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Naphthalene	58 ⁸	22 / 0.013 ⁸	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Phenanthrene	-	50 / 0.046 ⁸	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Pyrene	1,600 ⁵	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BaP equivalent (TEQ)	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Notes:
 All values in mg/kg
 < indicates value less than laboratory limit of reporting
 * guideline value for chromium III / total chromium
Italicised values indicate that results exceed published background concentrations
 Underlined values indicate that results exceed environmental criteria (CCME for As and B, Landcare Research for Cu and Cr). Refer to report Section 6.4.3 for further detail.
 Yellow shaded values indicate that results exceed human health criteria for residential use (10 % produce consumption)

- 1 - MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health. Values for residential use (10% produce consumption)
- 2 - CCME, 1991 (updated 2002). Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health (unless otherwise stated). Residential/parkland scenario. Environmental guidelines only have been referenced.
 a - guideline value if impact to surface water is a concern
- 3 - Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
- 4 - Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data. <http://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations/>
- 5 - USEPA Regional Screening Levels - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Residential Land Use. Carcinogens adjusted for incremental excess cancer risk of 1 in 100,000
- 6 - MfE, 1999 (updated 2011). Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Sand soil type (most conservative of soil types encountered on site). Contamination <1m
- 7 - Soil types: For full 'Unit' descriptions refer to report section 4.1.1.2
- 8 - Landcare Research, 2016, User Guide: Background soil concentrations and soil guidelines for the protection of ecological receptors (Eco-SGVs) – Consultation draft. Land use - Residential/recreational area.

Table E2: Tabulated analytical results (initial residential sampling)

Street address	Sample location/ID	Depth (m)	Laboratory number	Sample date	Soil type <small>(see note 7)</small>	11 Leslie Street				13 Leslie Street				12 Simkin Street				16 Simkin Street				15 Simkin Street			
						6-1	6-1	6-2	6-2	7-1	7-1	7-2	7-2	8-1	8-1	8-2	8-2	9-1	9-1	9-2	9-2	10-1	10-1	10-2	10-2
						1691731.37	1691731.38	1691731.41	1691731.42	1691731.44	1691731.45	1691731.48	1691731.49	1691731.51	1691731.52	1691731.54	1691731.55	1691731.58	1691731.59	1691731.61	1691731.62	1691731.65	1691731.66	1691731.69	1691731.70
Human health criteria ¹		Environmental based criteria ²		Background concentrations ³		Unit A		Unit B		Unit A		Unit B		Unit A		Unit B		Unit A		Unit B		Unit A		Unit B	
Metals																									
Arsenic	20	17	60 ⁸	8.9-17	14	3	8	<2	14	<2	17	2	25	6	18	6	20	5	32	3	5	6	10	7	
Boron	>10,000	-	20 ⁸	6.7 ⁵	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Chromium*	>10,000	64	390 ⁸	41-129	9	3	6	<2	8	<2	20	3	13	5	10	5	9	<2	20	3	3	5	6	9	
Copper	>10,000	63	140 ⁸	29-108	12	4	6	3	11	<2	26	3	13	8	17	7	45	10	36	4	9	6	7	7	
Pentachlorophenol																									
Pentachlorophenol (PCP)	55	11	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
2,3,4,6 - Tetrachlorophenol (TCP)	1,900 ⁵	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Polycyclic Aromatic Hydrocarbons Screening in Soil																									
Acenaphthene	3,600 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Anthracene	18,000 ⁵	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Benzo[a]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Benzo[a]pyrene (BAP)	Refer to BaP TEQ	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Benzo[b]fluoranthene + Benzo[j]fluoranthene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Benzo[k]fluoranthene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Chrysene	Refer to BaP TEQ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Dibenzo[a,h]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Fluoranthene	Refer to BaP TEQ	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Fluorene	2,400 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Indeno[1,2,3-c,d]pyrene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Naphthalene	58 ⁶	22 / 0.013 ⁸	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.016	<0.15	<0.15	<0.016	-	-	-	-	
Phenanthrene	-	50 / 0.046 ⁸	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
Pyrene	1,600 ⁶	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	<0.03	<0.03	<0.04	-	-	-	-	
BaP equivalent (TEQ)	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	-	-	-	-	

Table E2: Tabulated analytical results (initial residential sampling)

Street address	Sample location/ID	Depth (m)	Laboratory number	Sample date	Soil type ^(see note 7)	Human health criteria ¹	Environmental based criteria ²	Background concentrations ³	ADJACENT TO 8 Leslie Street		ADJACENT TO 9 Simkin Street		ADJACENT TO 8 Simkin Street	
									36	36	40	40	41	41
									0.1	0.3	0.1	0.3	0.1	0.3
									1754689.40	1754689.41	1754689.48	1754689.49	1754689.50	1754689.51
									6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17
									Unit A	SILT	Unit A	Sandy SILT	Unit A	Sandy SILT
Metals														
Arsenic	20	17	60 ⁸	8.9-17	<2	7	14	2	23	29				
Boron	>10,000	-	20 ⁸	6.7 ⁴	<20	<20	<20	<20	<20	<20				
Chromium*	>10,000	64	390 ⁸	41-129	<2	5	9	3	13	16				
Copper	> 10,000	63	140 ⁸	29-108	3	9	12	3	16	14				
Pentachlorophenol														
Pentachlorophenol (PCP)	55	11	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
2,3,4,6 - Tetrachlorophenol (TCP)	1,900 ⁵	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Polycyclic Aromatic Hydrocarbons Screening in Soil														
Acenaphthene	3,600 ⁵	-	-	-	-	-	-	-	-	-				
Acenaphthylene	-	-	-	-	-	-	-	-	-	-				
Anthracene	18,000 ⁵	2.5	-	-	-	-	-	-	-	-				
Benzo[a]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-				
Benzo[a]pyrene (BaP)	Refer to BaP TEQ	20	-	-	-	-	-	-	-	-				
Benzo[b]fluoranthene +	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-				
Benzo[j]fluoranthene	-	-	-	-	-	-	-	-	-	-				
Benzo[k]fluoranthene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-				
Chrysene	Refer to BaP TEQ	-	-	-	-	-	-	-	-	-				
Dibenzo[a,h]anthracene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-				
Fluoranthene	Refer to BaP TEQ	50	-	-	-	-	-	-	-	-				
Fluorene	2,400 ⁵	-	-	-	-	-	-	-	-	-				
Indeno[1,2,3-c,d]pyrene	Refer to BaP TEQ	1	-	-	-	-	-	-	-	-				
Naphthalene	58 ⁶	22 / 0.013 ⁸	-	-	-	-	-	-	-	-				
Phenanthrene	-	50 / 0.046 ⁸	-	-	-	-	-	-	-	-				
Pyrene	1,600 ⁶	10	-	-	-	-	-	-	-	-				
BaP equivalent (TEQ)	10	-	-	-	-	-	-	-	-	-				

Table E3: Tabulated analytical results (additional residential sampling/analysis)

Street address	Sample location/ID	Human health criteria ¹	Environmental based criteria ²	Background concentrations ³	Vegetable garden samples					Delineation samples														
					16 Simkin Street		15 Leslie Street	14 Leslie Street		9 Leslie Street				20B Leslie Street										
					9-V1	9-V2	20-V	22-V1	22-V2	19-2 N1	19-2 S1	19-2 E1	19-2 W1	24-2	24-2 1	24-2 3	24-2 4	24-2 5	24-2 6	24-2 7				
					Surface	Surface	Surface	Surface	Surface	0.1	0.1	0.1	0.1	0.5	0.3	0.3	0.3	0.3	0.3	0.3				
					1691731.83	1691731.84	1694127.87	1694127.88	1694127.89	1709117.8	1709117.10	1709117.12	1709117.14	1733665.7	1754689.1	1754689.3	1754689.4	1754689.5	1754689.6	1754689.7				
					5-Dec-16	5-Dec-16	8-Dec-16	8-Dec-16	8-Dec-16	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	2-Mar-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17			
					Topsoil/potting mix	Topsoil/potting mix	Topsoil/potting mix	Topsoil/potting mix	Topsoil/potting mix	Unit A	Unit A	Unit A	Unit A	Unit C	Unit D	Unit D	Unit D	Unit D	Unit D	Unit D	Unit D			
Metals																								
					20	17	60 ⁷	8.9-17	<u>28</u>	<u>25</u>	15	<u>18</u>	<u>20</u>	<u>28</u>	7	5	<u>20</u>	4	14	<u>56</u>	<u>26</u>	12	<u>38</u>	<u>53</u>
					>10,000	-	20 ⁷	6.7 ⁴	23	<20	-	< 20	< 20	-	-	-	-	-	-	-	-	-	-	-
					>10,000	64	390 ⁷	41-129	34	38	-	22	22	-	-	-	-	-	-	-	-	-	-	-
					> 10,000	63	140 ⁷	29-108	91	83	-	57	58	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol																								
					55	11	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	-	-	-	-	-	-	-	-	-	-
					1,900 ⁵	-	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	-	-	-	-	-	-	-	-	-	-

Street address	Sample location/ID	Human health criteria ¹	Environmental based criteria ²	Background concentrations ³	Delineation samples																		
					17 Simkin Street																		
					28-2	28-2 N1	28-2 N2	28-2 N3	28-2 S1	28-2 S2	28-2 S3	28-2 E1	28-2 E2	28-2 E3	28-2 W1	28-2 W2	28-2 W3						
					0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
					1733665.35	1754689.8	1754689.9	1754689.10	1754689.11	1754689.12	1754689.13	1754689.14	1754689.15	1754689.16	1754689.17	1754689.18	1754689.19	1754689.20	1754689.21	1754689.22	1754689.23	1754689.24	
					2-Mar-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17	6-Apr-17
					Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B	Unit B
Metals																							
					20	17	60 ⁷	8.9-17	3	<u>97</u>	<u>68</u>	<u>94</u>	<u>57</u>	<u>26</u>	<u>33</u>	<u>43</u>	11	7	13	<u>26</u>	<u>28</u>		
					>10,000	-	20 ⁷	6.7 ⁴	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					>10,000	64	390 ⁷	41-129	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					> 10,000	63	140 ⁷	29-108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol																							
					55	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					1,900 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Street address	Sample location/ID	Human health criteria ¹	Environmental based criteria ²	Background concentrations ³	Delineation samples																									
					15 Leslie Street																									
					20-1	20-1 N1	20-1 N1	20-1 N2	20-1 N2	20-1 N3	20-1 S1	20-1 S1	20-1 S2	20-1 S2	20-1 E1	20-1 E1	20-1 E2	20-1 E2	20-1 E3	20-1 E4	20-1 W1	20-1 W1	20-1 W2	20-1 W2	20-1 NE1	20-1 SE				
					0.5	0.1	0.3	0.1	0.3	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.3	0.3	0.3	0.3	0.1	0.3	0.1	0.3	0.3					
					1694127.60	1709117.17	1709117.18	1709117.19	1709117.20	1709117.22	1709117.23	1709117.24	1709117.25	1709117.26	1709117.29	1709117.30	1709117.31	1709117.32	1709117.34	1733665.52	1709117.35	1709117.35	1709117.37	1709117.38	1733665.54	1733665.55				
					16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	2-Mar-17	16-Jan-17	16-Jan-17	16-Jan-17	16-Jan-17	2-Mar-17	2-Mar-17				
					Unit C	Unit A	Unit C	Unit A	Unit C	Unit C	Unit A	Unit C	Unit A	Unit C	Unit A	Unit C	Unit A	Unit C	Unit C	Unit C	Unit A	Unit C	Unit A	Unit C	Unit C	Unit C				
Metals																														
					20	17	60 ⁷	8.9-17	4	<u>24</u>	<u>71</u>	<u>21</u>	<u>115</u>	9	<u>33</u>	16	11	<u>28</u>	16	<u>141</u>	<u>18</u>	<u>138</u>	<u>70</u>	14	11	5	13	9	<u>24</u>	<u>76</u>
					>10,000	-	20 ⁷	6.7 ⁴	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					>10,000	64	390 ⁷	41-129	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					> 10,000	63	140 ⁷	29-108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol																														
					55	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
					1,900 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Notes:

All values in mg/kg

< indicates value less than laboratory limit of reporting

* guideline value for chromium III / total chromium

Italicised values indicate that results exceed published background concentrations

Underlined values indicate that results exceed environmental criteria (CCME for As and B, Landcare Research for Cu and Cr). Refer to report Section 6.4.3 for further detail.

Yellow shaded values indicate that results exceed human health criteria for residential use

1 - MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health. Values for residential use (no produce consumption).

2 - CCME, 1991 (updated 2002). Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health (unless otherwise stated). Residential/parkland scenario. Environmental guidelines only have been referenced.

3 - Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data. <http://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Contaminated-sites/Natural-background-concentrations/>

4 - NEPM 2013. Guideline on the Investigation Levels for Soil and Groundwater. Residential A (most conservative landuse in the absence of a rural residential criteria)

5 - USEPA Regional Screening Levels - http://www.epa.gov/reg3hwm/risk/human/rb-concentration_table/index.htm. Carcinogens adjusted for incremental excess cancer risk of 1 in 100,000.

6 - Soil types: For full 'Unit' descriptions refer to report section 4.1.1.2

7 - Landcare Research, 2016, User Guide: Background soil concentrations and soil guidelines for the protection of ecological receptors (Eco-SGVs) – Consultation draft. Land use - Residential/recreational area.

Copper value assumes typical, fresh soil as a conservative approach.

Appendix F: Private property sampling letters

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 38 Rangatira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 38 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
1-1/0.1	0.05-0.1	S of house	12	< 20	10	14	< 0.05	< 0.05
1-1/0.3	0.3		3	< 20	<2	2	< 0.05	< 0.05
1-2/0.1	0.05-0.1	N of house	5	< 20	4	5	< 0.05	< 0.05
1-2/0.3	0.3		<2	< 20	<2	<2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv2
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		1-1/0.1m	1-1/0.3m	1-2/0.1m	1-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.1	1691731.2	1691731.5	1691731.6	
Individual Tests						
Dry Matter	g/100g as rcvd	82	80	90	82	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	12	3	5	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	10	< 2	4	< 2	-
Total Recoverable Copper	mg/kg dry wt	14	2	5	< 2	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v1, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 30 Rangatira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 30 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
2-1/0.1	0.05-0.1	SW of house	11	<20	9	8	< 0.05	< 0.05
2-1/0.3	0.3		3	<20	2	3	< 0.05	< 0.05
2-2/0.1	0.05-0.1	N of house	<u>21</u>	<20	12	17	< 0.05	< 0.05
2-2/0.3	0.3		<2	<20	<2	2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (2-2/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPV3
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		2-1/0.1m	2-1/0.3m	2-2/0.1m	2-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.8	1691731.9	1691731.12	1691731.13	
Individual Tests						
Dry Matter	g/100g as rcvd	85	77	83	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	11	3	21	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	9	2	12	< 2	-
Total Recoverable Copper	mg/kg dry wt	8	3	17	2	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1691731v2, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-9, 12-13
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	8-9, 12-13
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	8-9, 12-13
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	8-9, 12-13
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	8-9, 12-13



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', written in a cursive style.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

**Preliminary soil sampling results -
6 Leslie Street, Taupo**

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 6 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
3-1/0.1	0.05-0.1	W of garage	10	<20	8	12	< 0.05	< 0.05
3-1/0.3	0.3		4	<20	3	7	< 0.05	< 0.05
3-2/0.1	0.05-0.1	W of house	<u>27</u>	<20	21	54	< 0.05	< 0.05
3-2/0.3	0.3		3	<20	<2	13	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (3-2/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv4
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		3-1/0.1m	3-1/0.3m	3-2/0.1m	3-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.16	1691731.17	1691731.20	1691731.21	
Individual Tests						
Dry Matter	g/100g as rcvd	90	83	82	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	10	4	27	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	3	21	< 2	-
Total Recoverable Copper	mg/kg dry wt	12	7	54	13	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v3, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	16-17, 20-21
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	16-17, 20-21
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	16-17, 20-21
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	16-17, 20-21
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	16-17, 20-21



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 5 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 5 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
4-1/0.1	0.05-0.1	NW of house	8	<20	6	11	< 0.05	< 0.05
4-1/0.3	0.3		2	<20	<2	6	< 0.05	< 0.05
4-2/0.1	0.05-0.1	SE of house	18	<20	32	26	< 0.05	< 0.05
4-2/0.3	0.3		<2	<20	<2	3	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv5
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		4-1/0.1m	4-1/0.3m	4-2/0.1m	4-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.23	1691731.24	1691731.27	1691731.28	
Individual Tests						
Dry Matter	g/100g as rcvd	90	81	76	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	8	2	18	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	6	< 2	32	< 2	-
Total Recoverable Copper	mg/kg dry wt	11	6	26	3	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v4, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	23-24, 27-28
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	23-24, 27-28
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	23-24, 27-28
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	23-24, 27-28
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	23-24, 27-28



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 12 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 12 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
5-1/0.1	0.05-0.1	N of house	12	<20	8	24	< 0.05	< 0.05
5-1/0.3	0.3		2	<20	<2	8	< 0.05	< 0.05
5-2/0.1	0.05-0.1	NW of house	<u>21</u>	21	11	24	< 0.05	< 0.05
5-2/0.3	0.3		6	<20	2	2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (5-2/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability


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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



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Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv6
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		5-1/0.1m	5-1/0.3m	5-2/0.1m	5-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.30	1691731.31	1691731.34	1691731.35	
Individual Tests						
Dry Matter	g/100g as rcvd	82	80	74	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	12	2	21	6	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	21	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	< 2	11	2	-
Total Recoverable Copper	mg/kg dry wt	24	8	24	2	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v5, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	30-31, 34-35
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	30-31, 34-35
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	30-31, 34-35
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	30-31, 34-35
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	30-31, 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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 11 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 11 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples, for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
6-1/0.1	0.05-0.1	E of garage	14	<20	9	12	< 0.05	< 0.05
6-1/0.3	0.3		3	<20	3	4	< 0.05	< 0.05
6-2/0.1	0.05-0.1	S of house	8	<20	6	6	< 0.05	< 0.05
6-2/0.3	0.3		<2	<20	<2	3	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability


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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv7
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		6-1/0.1m	6-1/0.3m	6-2/0.1m	6-2/0.3m	
Lab Number:		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
		1691731.37	1691731.38	1691731.41	1691731.42	
Individual Tests						
Dry Matter	g/100g as rcvd	92	84	91	83	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	3	8	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	9	3	6	< 2	-
Total Recoverable Copper	mg/kg dry wt	12	4	6	3	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1691731v6, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	37-38, 41-42
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	37-38, 41-42
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	37-38, 41-42
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	37-38, 41-42
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	37-38, 41-42



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

**Preliminary soil sampling results -
13 Leslie Street, Taupo**

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 13 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
7-1/0.1	0.05-0.1	N of house	14	<20	8	11	< 0.05	< 0.05
7-1/0.3	0.3		<2	<20	<2	<2	< 0.05	< 0.05
7-2/0.1	0.05-0.1	S of house	17	<20	20	26	< 0.05	< 0.05
7-2/0.3	0.3		2	<20	3	3	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv8
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		7-1/0.1m	7-1/0.3m	7-2/0.1m	7-2/0.3m	
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
Lab Number:		1691731.44	1691731.45	1691731.48	1691731.49	
Individual Tests						
Dry Matter	g/100g as rcvd	85	80	92	81	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	< 2	17	2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	< 2	20	3	-
Total Recoverable Copper	mg/kg dry wt	11	< 2	26	3	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v7, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	44-45, 48-49
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	44-45, 48-49
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	44-45, 48-49
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	44-45, 48-49
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	44-45, 48-49



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 12 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 12 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
8-1/0.1	0.05-0.1	S of house	<u>25</u>	<20	13	13	< 0.05	< 0.05
8-1/0.3	0.3		6	<20	5	8	< 0.05	< 0.05
8-2/0.1	0.05-0.1	N of house	18	<20	10	17	< 0.05	< 0.05
8-2/0.3	0.3		6	<20	5	7	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (8-1/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv9
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		8-1/0.1m	8-1/0.3m	8-2/0.1m	8-2/0.3m	
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
Lab Number:		1691731.51	1691731.52	1691731.54	1691731.55	
Individual Tests						
Dry Matter	g/100g as rcvd	75	69	81	79	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	25	6	18	6	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	13	5	10	5	-
Total Recoverable Copper	mg/kg dry wt	13	8	17	7	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v8, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	51-52, 54-55
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	51-52, 54-55
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	51-52, 54-55
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	51-52, 54-55
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	51-52, 54-55



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 16 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 16 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples, including two samples from raised vegetable gardens, for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB);
- Test four soil samples for chemicals associated with burning waste including polycyclic aromatic hydrocarbons (PAH) which is thought to have occurred in the vicinity of this property as part the timber processing operations; and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*	PAH
9-1/0.1	0.05-0.1	N of house	20	<20	9	45	< 0.05	< 0.05	<LOR
9-1/0.3	0.3		5	<20	<2	10	< 0.05	< 0.05	<LOR
9-2/0.1	0.05-0.1	E of house	<u>32</u>	<20	20	36	< 0.05	< 0.05	<LOR
9-2/0.3	0.3		3	<20	3	4	< 0.05	< 0.05	<LOR
9-V1	0.1	Vege garden	<u>28</u>	23	34	91	< 0.05	< 0.05	-
9-V2	0.1	Vege garden	<u>25</u>	<20	38	83	< 0.05	< 0.05	-
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-	10 ⁵
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

<LOR – all individual PAH compounds are below the laboratory limit of reporting

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

Results of laboratory analysis show that:

- The concentration of arsenic in three samples (9-2/0.1, 9-V1, 9-V2) exceed the SCS for standard residential land use.
- Concentrations of all other measured parameters were at/below the criteria for standard residential land use.

4 Applicability

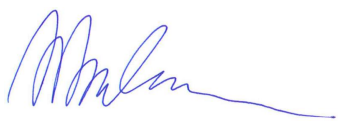
This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv10
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		9-1/0.1m	9-1/0.3m	9-2/0.1m	9-2/0.3m	
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
Lab Number:		1691731.58	1691731.59	1691731.61	1691731.62	
Individual Tests						
Dry Matter	g/100g as rcvd	65	77	75	74	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	20	5	32	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	9	< 2	20	3	-
Total Recoverable Copper	mg/kg dry wt	45	10	36	4	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Acenaphthylene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Anthracene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[a]anthracene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Chrysene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Fluoranthene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Fluorene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Naphthalene	mg/kg dry wt	< 0.16	< 0.15	< 0.15	< 0.16	-
Phenanthrene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Pyrene	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.04	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v9, issued 12-Dec-2016. Only selected sample results have been shown.

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



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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	58-59, 61-62
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	58-59, 61-62
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	58-59, 61-62
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	58-59, 61-62
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	58-59, 61-62
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	58-59, 61-62

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 15 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 15 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
10-1/0.1	0.05-0.1	E of house	5	<20	3	9	< 0.05	< 0.05
10-1/0.3	0.3		6	<20	5	6	< 0.05	< 0.05
10-2/0.1	0.05-0.1	N of garage	10	<20	6	7	< 0.05	< 0.05
10-2/0.3	0.3		7	<20	9	7	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv11
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		10-1/0.1m	10-1/0.3m	10-2/0.1m	10-2/0.3m	
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
Lab Number:		1691731.65	1691731.66	1691731.69	1691731.70	
Individual Tests						
Dry Matter	g/100g as rcvd	88	78	90	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	5	6	10	7	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	3	5	6	9	-
Total Recoverable Copper	mg/kg dry wt	9	6	7	7	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v10, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	65-66, 69-70
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	65-66, 69-70
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	65-66, 69-70
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	65-66, 69-70
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	65-66, 69-70



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 13 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 13 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples, for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
11-1/0.1	0.05-0.1	NE of house	7	<20	6	11	< 0.05	< 0.05
11-1/0.3	0.3		<2	<20	<2	3	< 0.05	< 0.05
11-2/0.1	0.05-0.1	S of house	9	<20	7	18	< 0.05	< 0.05
11-2/0.3	0.3		3	<20	<2	4	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1691731	SPv12
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Dec-2016	
		Date Reported:	12-Dec-2016	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	S Pratt	

Sample Type: Soil						
Sample Name:		11-1/0.1m	11-1/0.3m	11-2/0.1m	11-2/0.3m	
		05-Dec-2016	05-Dec-2016	05-Dec-2016	05-Dec-2016	
Lab Number:		1691731.72	1691731.73	1691731.76	1691731.77	
Individual Tests						
Dry Matter	g/100g as rcvd	89	84	90	83	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	7	< 2	9	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	6	< 2	7	< 2	-
Total Recoverable Copper	mg/kg dry wt	11	3	18	4	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments
 Supplement to test report 1691731v11, issued 12-Dec-2016. Only selected sample results have been shown.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	72-73, 76-77
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	72-73, 76-77
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	72-73, 76-77
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	72-73, 76-77
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	72-73, 76-77



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 18 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 18 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
12-1/0.1	0.05-0.1	SW of house	17	<20	8	9	< 0.05	< 0.05
12-1/0.3	0.3		7	<20	5	11	< 0.05	< 0.05
12-2/0.1	0.05-0.1	N of house	10	<20	7	10	< 0.05	< 0.05
12-2/0.3	0.3		6	<20	3	8	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

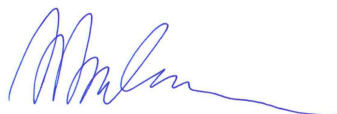
This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPV8
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		12-1/0.1m	12-1/0.3m	12-2/0.1m	12-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.1	1694127.2	1694127.5	1694127.6	
Individual Tests						
Dry Matter	g/100g as rcvd	81	76	80	73	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	17	7	10	6	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	5	7	3	-
Total Recoverable Copper	mg/kg dry wt	9	11	10	8	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 11 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 11 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
13-1/0.1	0.05-0.1	E of house	10	<20	8	17	< 0.05	< 0.05
13-1/0.3	0.3		3	<20	2	3	< 0.05	< 0.05
13-2/0.1	0.05-0.1	S of house	5	<20	4	7	< 0.05	< 0.05
13-2/0.3	0.3		<2	<20	2	5	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPV9
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		13-1/0.1m	13-1/0.3m	13-2/0.1m	13-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.8	1694127.9	1694127.12	1694127.13	
Individual Tests						
Dry Matter	g/100g as rcvd	79	80	83	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	10	3	5	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	2	4	2	-
Total Recoverable Copper	mg/kg dry wt	17	3	7	5	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-9, 12-13
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	8-9, 12-13
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	8-9, 12-13
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	8-9, 12-13
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	8-9, 12-13



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 7 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 7 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
14-1/0.1	0.05-0.1	S of house	8	<20	4	7	< 0.05	< 0.05
14-1/0.3	0.3		7	<20	4	5	< 0.05	< 0.05
14-2/0.1	0.05-0.1	E of house	6	<20	3	8	< 0.05	< 0.05
14-2/0.3	0.3		<2	<20	<2	<2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability


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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv10
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		14-1/0.1m	14-1/0.3m	14-2/0.1m	14-2/0.3m	
Lab Number:		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
		1694127.15	1694127.16	1694127.19	1694127.20	
Individual Tests						
Dry Matter	g/100g as rcvd	90	85	77	82	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	8	7	6	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	4	4	3	< 2	-
Total Recoverable Copper	mg/kg dry wt	7	5	8	< 2	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	15-16, 19-20
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	15-16, 19-20
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	15-16, 19-20
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	15-16, 19-20
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	15-16, 19-20



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 6 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 6 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
15-1/0.1	0.05-0.1	W of house	13	<20	9	10	< 0.05	< 0.05
15-1/0.3	0.3		5	<20	5	6	< 0.05	< 0.05
15-2/0.1	0.05-0.1	N of garage	4	<20	2	3	< 0.05	< 0.05
15-2/0.3	0.3		<2	<20	<2	<2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

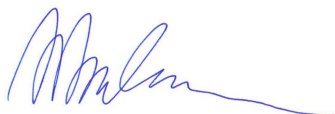
This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv11
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		15-1/0.1m	15-1/0.3m	15-2/0.1m	15-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.22	1694127.23	1694127.26	1694127.27	
Individual Tests						
Dry Matter	g/100g as rcvd	81	79	81	81	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	13	5	4	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	9	5	2	< 2	-
Total Recoverable Copper	mg/kg dry wt	10	6	3	< 2	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	22-23, 26-27
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	22-23, 26-27
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	22-23, 26-27
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	22-23, 26-27
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	22-23, 26-27



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

**Preliminary soil sampling results -
44 Rangatira Street, Taupo**

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 44 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
16-1/0.1	0.05-0.1	NE of house	16	<20	8	10	< 0.05	< 0.05
16-1/0.3	0.3		2	<20	4	6	< 0.05	< 0.05
16-2/0.1	0.05-0.1	E of house	<u>23</u>	<20	12	10	< 0.05	< 0.05
16-2/0.3	0.3		3	<20	3	5	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (16-2/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv12
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		16-1/0.1m	16-1/0.3m	16-2/0.1m	16-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.29	1694127.30	1694127.33	1694127.34	
Individual Tests						
Dry Matter	g/100g as rcvd	62	71	69	81	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	16	2	23	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	4	12	3	-
Total Recoverable Copper	mg/kg dry wt	10	6	10	5	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	29-30, 33-34
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	29-30, 33-34
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	29-30, 33-34
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	29-30, 33-34
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	29-30, 33-34



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 40 Rangitira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangitira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 40 Rangitira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
17-1/0.1	0.05-0.1	NE of house	14	<20	11	13	< 0.05	< 0.05
17-1/0.3	0.3		<2	<20	<2	<2	< 0.05	< 0.05
17-2/0.1	0.05-0.1	W of house	15	<20	10	12	< 0.05	< 0.05
17-2/0.3	0.3		3	<20	5	15	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv13
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		17-1/0.1m	17-1/0.3m	17-2/0.1m	17-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.37	1694127.38	1694127.41	1694127.42	
Individual Tests						
Dry Matter	g/100g as rcvd	73	80	73	70	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	< 2	15	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	11	< 2	10	5	-
Total Recoverable Copper	mg/kg dry wt	13	< 2	12	15	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	37-38, 41-42
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	37-38, 41-42
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	37-38, 41-42
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	37-38, 41-42
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	37-38, 41-42



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 1 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 1 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
18-1/0.1	0.05-0.1	NW of house	18	<20	19	21	< 0.05	< 0.05
18-1/0.3	0.3		3	<20	4	6	< 0.05	< 0.05
18-2/0.1	0.05-0.1	SE of house	16	<20	15	36	< 0.05	< 0.05
18-2/0.3	0.3		5	<20	4	8	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv14
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		18-1/0.1m	18-1/0.3m	18-2/0.1m	18-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.44	1694127.45	1694127.48	1694127.49	
Individual Tests						
Dry Matter	g/100g as rcvd	81	74	76	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	18	3	16	5	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	19	4	15	4	-
Total Recoverable Copper	mg/kg dry wt	21	6	36	8	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	44-45, 48-49
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	44-45, 48-49
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	44-45, 48-49
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	44-45, 48-49
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	44-45, 48-49



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 20A Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 20A Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB);
- Test four soil samples for chemicals associated with burning waste including polycyclic aromatic hydrocarbons (PAH) which is thought to have occurred in the vicinity of this property as part the timber processing operations; and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*	PAH
21-1/0.1	0.05-0.1	W of unit	7	<20	6	7	< 0.05	< 0.05	<LOR
21-1/0.3	0.3		3	<20	3	4	0.07	< 0.05	<LOR
21-2/0.1	0.05-0.1	S of unit	<u>28</u>	<20	13	44	< 0.05	< 0.05	<LOR
21-2/0.3	0.3		5	<20	3	6	< 0.05	< 0.05	0.07 ⁵
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-	10 ⁵
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (21-2/0.1) marginally exceeds the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability


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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv17
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		21-1/0.1m	21-1/0.3m	21-2/0.1m	21-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.66	1694127.67	1694127.70	1694127.71	
Individual Tests						
Dry Matter	g/100g as rcvd	73	79	79	81	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	7	3	28	5	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	6	3	13	3	-
Total Recoverable Copper	mg/kg dry wt	7	4	44	6	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Acenaphthylene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Anthracene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Benzo[a]anthracene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Chrysene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Fluoranthene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	0.04	-
Fluorene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Naphthalene	mg/kg dry wt	< 0.4	< 0.14	< 0.3	< 0.14	-
Phenanthrene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	< 0.03	-
Pyrene	mg/kg dry wt	< 0.07	< 0.03	< 0.06	0.03	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	0.07	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

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



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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	66-67, 70-71
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	66-67, 70-71
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	66-67, 70-71
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	66-67, 70-71
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	66-67, 70-71
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	66-67, 70-71

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.



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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 14 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 14 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples, including two samples from raised vegetable gardens, for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
22-1/0.1	0.05-0.1	NE of house	11	<20	6	8	< 0.05	< 0.05
22-1/0.3	0.3		3	<20	<2	2	< 0.05	< 0.05
22-2/0.1	0.05-0.1	S of house	12	<20	7	13	< 0.05	< 0.05
22-2/0.3	0.3		9	<20	7	36	< 0.05	< 0.05
22-V1	0.1	Vege garden	18	<20	22	57	< 0.05	< 0.05
22-V2	0.1	Vege garden	20	<20	22	58	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were at/below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv18
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil

Sample Name:	22-1/0.1m	22-1/0.3m	22-2/0.1m	22-2/0.3m	22-V1
	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016
Lab Number:	1694127.73	1694127.74	1694127.77	1694127.78	1694127.88

Individual Tests						
Dry Matter	g/100g as rcvd	78	81	82	79	55
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	11	3	12	9	18
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	6	< 2	7	7	22
Total Recoverable Copper	mg/kg dry wt	8	2	13	36	57
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Sample Name:	22-V2				
	08-Dec-2016				
Lab Number:	1694127.89				

Individual Tests						
Dry Matter	g/100g as rcvd	55	-	-	-	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	20	-	-	-	-
Total Recoverable Boron	mg/kg dry wt	< 20	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	22	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	58	-	-	-	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	-	-	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	-	-	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	73-74, 77-78, 88-89
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	73-74, 77-78, 88-89



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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	73-74, 77-78, 88-89
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	73-74, 77-78, 88-89
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	73-74, 77-78, 88-89

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Soil sampling results - 9 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 9 Leslie Street. This letter includes the results of additional sampling carried out in January 2017 and supersedes our previous letter dated 19 December 2016.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

Initial soil sampling (December 2016)

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples (collected at the 0.1 and 0.3m depth below ground level at the two hand auger boreholes) for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving underground services.

Additional soil sampling (January 2017)

One of the surface samples collected in December 2016, sample 19-2 at 0.1 m depth, encountered arsenic concentrations exceeding the standard for residential land use. In response to this result, the following scope of works was undertaken to assess the extent of arsenic impacted soils:

- Collect surface samples from four directions (north, south, east, and west), at distances of 0.5 and 1.0 m, from sample 19-2 location.
- Test the four soil samples collected at 0.5 m distance away from sample 19-2 location for arsenic, at the 0.1m depth; and
- Compare testing results against relevant human health standards and published background levels.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
19-1/0.1	0.05-0.1	N of house	11	<20	6	10	< 0.05	< 0.05
19-1/0.3	0.3		<2	<20	<2	<2	< 0.05	< 0.05
19-2/0.1	0.05-0.1	S of house	<u>49</u>	<20	43	40	< 0.05	< 0.05
19-2/0.3	0.3		<2	<20	3	5	< 0.05	< 0.05
19-2 N1/0.1	0.1	0.5 m N of 19-2	<u>28</u>	-	-	-	-	-
19-2 S1/0.1	0.1	0.5 m S of 19-2	7	-	-	-	-	-
19-2 E1/0.1	0.1	0.5 m E of 19-2	5	-	-	-	-	-
19-2 W1/0.1	0.1	0.5 m W of 19-2	20	-	-	-	-	-
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

All concentrations in mg/kg
Underlined values exceed SCS for residential land use
 * 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of initial laboratory analysis show that:

- The concentration of arsenic in one sample (19-2/0.1) exceeded the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

Results of the additional laboratory analysis show that:

- The concentration of arsenic in one sample (19-2 N1/0.1 at 28 mg/kg) *marginally* exceeded the SCS for standard residential land use (20 mg/kg).
- Concentrations of all other measured parameters were below the criteria for standard residential land use.
- The area of the site which contains arsenic above the criteria for standard residential land use appears to be localised and limited in nature.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



Glen Nicholson

Project Director

ajdc/nxg

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv15
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil						
Sample Name:		19-1/0.1m	19-1/0.3m	19-2/0.1m	19-2/0.3m	
		08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:		1694127.51	1694127.52	1694127.55	1694127.56	
Individual Tests						
Dry Matter	g/100g as rcvd	75	81	78	77	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	11	< 2	49	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	6	< 2	43	3	-
Total Recoverable Copper	mg/kg dry wt	10	< 2	40	5	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	51-52, 55-56
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	51-52, 55-56
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	51-52, 55-56
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	51-52, 55-56
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	51-52, 55-56



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 blue ink, appearing to read 'Graham Corban', written in a cursive style.

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



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1709117	SPv4
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	17-Jan-2017	
		Date Reported:	02-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil					
Sample Name:	19-2 N1/0.1 16-Jan-2017	19-2 S1/0.1 16-Jan-2017	19-2 E1/0.1 16-Jan-2017	19-2 W1/0.1 16-Jan-2017	
Lab Number:	1709117.8	1709117.10	1709117.12	1709117.14	
Total Recoverable Arsenic	mg/kg dry wt	28	7	5	20
					-

Analyst's Comments

Supplement to test report 1709117v2. Selected samples have been reported at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8, 10, 12, 14
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	8, 10, 12, 14
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	8, 10, 12, 14

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

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

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



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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 3 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 3 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
23-1/0.1	0.05-0.1	S of garage	6	<20	5	12	< 0.05	< 0.05
23-1/0.3	0.3		<2	<20	<2	2	< 0.05	< 0.05
23-2/0.1	0.05-0.1	S of house	10	<20	5	6	< 0.05	< 0.05
23-2/0.3	0.3		10	<20	7	7	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1709117	SPV3
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	17-Jan-2017	
		Date Reported:	14-Feb-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	23-1/0.1 16-Jan-2017	23-1/0.3 16-Jan-2017	23-2/0.1 16-Jan-2017	23-2/0.3 16-Jan-2017		
Lab Number:	1709117.1	1709117.2	1709117.5	1709117.6		
Individual Tests						
Dry Matter	g/100g as rcvd	83	86	90	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	6	< 2	10	10	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	5	< 2	5	7	-
Total Recoverable Copper	mg/kg dry wt	12	2	6	7	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1709117v2. Selected samples have been reported at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-6
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-6



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Soil sampling results -
15 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 15 Leslie Street. This letter includes the results of additional sampling carried out in January and March 2017, and supersedes our previous letters dated 19 December 2016 and 4 April 2017.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

Initial soil sampling (December 2016)

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples (collected at the 0.1 and 0.3m depth below ground level at the two hand auger boreholes) for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB);
- Test one sample from a raised vegetable garden for PCP and CCAB; and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving underground services.

Additional soil sampling (January 2017)

Two of the samples collected in December 2016, samples 22-2 at 0.1 m and 0.3 depth, contained arsenic levels above the standard for residential land use. In response to these results, the following scope of works was undertaken to assess the extent of arsenic impacted soils:

- Collect samples from the surface and 0.3 m depth from four directions (north, south, east, and west), at distances of 0.5, 1.0 m, and 2.0 from sample location 20-1.
- Test 18 soil samples for arsenic; and
- Compare testing results against relevant human health standards and published background levels.

Additional soil sampling (March 2017)

The January 2017 sampling results showed elevated arsenic concentrations (above the standard for residential land use) extending to the north and east of sample location 20-1. The 0.3 m deep sample collected 2.0 m east of 20-1 still recorded an arsenic concentration above the standard for residential land use. In response to this result, the following scope of works was undertaken to further assess the extent of arsenic impacted soils:

- Collect samples from 0.3 m depth at distances of 3.0 m (east), 2.5 m (north-east), and 2.5 (south-east) from the original sample location, where elevated arsenic was recorded.
- Test three soil samples for arsenic; and
- Compare testing results against relevant human health standards and published background levels.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use, referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
<i>December 2016 sampling</i>								
20-1/0.1	0.05-0.1	N of house	<u>23</u>	<20	12	12	< 0.05	< 0.05

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
20-1/0.3	0.3		<u>137</u>	<20	97	37	< 0.05	< 0.05
20-1/0.5	0.5		4	-	-	-	-	-
20-2/0.1	0.05-0.1	SE of house	10	<20	10	7	< 0.05	< 0.05
20-2/0.3	0.3		4	<20	5	10	< 0.05	< 0.05
V1	0.1	Vege garden	15	-	-	-	-	-
<i>January 2017 sampling</i>								
20-1 N1/0.1	0.1	0.5m N of 20-1	<u>24</u>					
20-1 N1/0.3	0.3		<u>71</u>	-	-	-	-	-
20-1 N2/0.1	0.1	1m N of 20-1	<u>21</u>	-	-	-	-	-
20-1 N2/0.3	0.3		<u>115</u>	-	-	-	-	-
20-1 N3/0.3	0.3	2m N of 20-1	9					
20-1 S1/0.1	0.1	0.5m S of 20-1	<u>33</u>	-	-	-	-	-
20-1 S1/0.3	0.3		16	-	-	-	-	-
20-1 S2/0.1	0.1	1m S of 20-1	11	-	-	-	-	-
20-1 S2/0.3	0.3		<u>28</u>	-	-	-	-	-
20-1 E1/0.1	0.1	0.5m E of 20-1	16	-	-	-	-	-
20-1 E1/0.3	0.3		<u>141</u>	-	-	-	-	-
20-1 E2/0.1	0.1	1m E of 20-1	18	-	-	-	-	-
20-1 E2/0.3	0.3		<u>138</u>	-	-	-	-	-
20-1 E3/0.3	0.3	2m E of 20-1	<u>70</u>					
20-1 W1/0.1	0.1	0.5m W of 20-1	11	-	-	-	-	-
20-1 W1/0.3	0.3		5	-	-	-	-	-
20-1 W2/0.1	0.1	1m W of 20-1	13	-	-	-	-	-
20-1 W2/0.3	0.3		9	-	-	-	-	-
<i>March 2017 sampling</i>								
20-1 E4/0.3	0.3	3m E of 20-1	14	-	-	-	-	-
20-1 NE1/0.3	0.3	2.5m NE of 20-1	<u>24</u>	-	-	-	-	-
20-1 SE1/0.3	0.3	2.5m SE of 20-1	<u>76</u>	-	-	-	-	-
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of initial laboratory analysis show that:

- The concentration of arsenic in two samples (20-1/0.1 and 20-1/0.3) exceeded the SCS for standard residential land use.
- Concentrations of all other measured parameters were below the criteria for standard residential land use.

Results of the additional laboratory analysis show that:

- An area of arsenic impacted soil (approximately 2.5 m by 5 m) is present in the backyard at a depth of 0.3 m, with a maximum measured arsenic concentration of 141 mg/kg.
- The surface soils in this area also contain arsenic above the SCS for standard residential land use (20 mg/kg), with measured concentrations of up to 33 mg/kg.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:




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Alex Davies-Colley

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Glen Nicholson

Environmental Scientist

Project Director

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1694127	SPv16
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	09-Dec-2016	
		Date Reported:	19-Dec-2016	
		Quote No:	81927	
		Order No:	W1601 - 23	
		Client Reference:	Taupo	
		Submitted By:	Steven Pratt	

Sample Type: Soil					
Sample Name:	20-1/0.1m	20-1/0.3m	20-2/0.1m	20-2/0.3m	
	08-Dec-2016	08-Dec-2016	08-Dec-2016	08-Dec-2016	
Lab Number:	1694127.58	1694127.59	1694127.62	1694127.63	
Individual Tests					
Dry Matter	g/100g as rcvd	79	81	86	74
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	23	137	10	4
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	12	97	10	5
Total Recoverable Copper	mg/kg dry wt	12	37	7	10
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	0.07
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplement to test report 1694127v1, issued 16-Dec-2016. Only selected sample results have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	58-59, 62-63
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	58-59, 62-63
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	58-59, 62-63
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	58-59, 62-63
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	58-59, 62-63



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is written over a faint dotted line.

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



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1709117	SPv5
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	17-Jan-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil					
Sample Name:	20-1 N1/0.1	20-1 N1/0.3	20-1 N2/0.1	20-1 N2/0.3	20-1 N3/0.3
	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017
Lab Number:	1709117.17	1709117.18	1709117.19	1709117.20	1709117.22
Total Recoverable Arsenic	mg/kg dry wt	24	71	21	115
					9
Sample Name:	20-1 S1/0.1	20-1 S1/0.3	20-1 S2/0.1	20-1 S2/0.3	20-1 E1/0.1
	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017
Lab Number:	1709117.23	1709117.24	1709117.25	1709117.26	1709117.29
Total Recoverable Arsenic	mg/kg dry wt	33	16	11	28
					16
Sample Name:	20-1 E1/0.3	20-1 E2/0.1	20-1 E2/0.3	20-1 E3/0.3	20-1 W1/0.1
	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017	16-Jan-2017
Lab Number:	1709117.30	1709117.31	1709117.32	1709117.34	1709117.35
Total Recoverable Arsenic	mg/kg dry wt	141	18	138	70
					11
Sample Name:	20-1 W1/0.3	20-1 W2/0.1	20-1 W2/0.3		
	16-Jan-2017	16-Jan-2017	16-Jan-2017		
Lab Number:	1709117.36	1709117.37	1709117.38		
Total Recoverable Arsenic	mg/kg dry wt	5	13	9	-
					-

Analyst's Comments

Supplement to test report 1709117v2. Selected samples have been reported at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	17-20, 22-26, 29-32, 34-38
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	17-20, 22-26, 29-32, 34-38
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	17-20, 22-26, 29-32, 34-38



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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



ANALYSIS REPORT

Page 1 of 1

Client:	Waikato Regional Council	Lab No:	1733665	SPv10
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	20-1 E4/0.3	20-1 NE1/0.3	20-1 SE1/0.3		
	02-Mar-2017	02-Mar-2017	02-Mar-2017		
Lab Number:	1733665.52	1733665.54	1733665.55		
Total Recoverable Arsenic	mg/kg dry wt	14	24	76	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	52, 54-55
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	52, 54-55
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	52, 54-55

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

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



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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
1 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 1 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
25-1/0.1	0.05-0.1	NE of house	5	<20	4	7	< 0.05	< 0.05
25-1/0.3	0.3		4	<20	3	4	< 0.05	< 0.05
25-2/0.1	0.05-0.1	SW of house	19	<20	16	46	< 0.05	< 0.05
25-2/0.3	0.3		9	<20	8	95	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for residential land use with 10% produce consumption.

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Alex Davies

Environmental Scientist



Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv4
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:		25-1/0.1 02-Mar-2017	25-1/0.3 02-Mar-2017	25-2/0.1 02-Mar-2017	25-2/0.3 02-Mar-2017	
Lab Number:		1733665.8	1733665.9	1733665.12	1733665.13	
Individual Tests						
Dry Matter	g/100g as rcvd	89	81	69	80	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	5	4	19	9	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	4	3	16	8	-
Total Recoverable Copper	mg/kg dry wt	7	4	46	95	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-9, 12-13
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	8-9, 12-13
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	8-9, 12-13
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	8-9, 12-13
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	8-9, 12-13



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
36 Rangatira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 36 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
26-1/0.1	0.05-0.1	N of house	9	<20	6	6	< 0.05	< 0.05
26-1/0.3	0.3		3	<20	4	6	< 0.05	< 0.05
26-2/0.1	0.05-0.1	S of house	19	<20	19	30	< 0.05	< 0.05
26-2/0.3	0.3		3	<20	<2	3	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

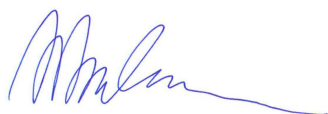
This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....
Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv5
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:		26-1/0.1	26-1/0.3	26-2/0.1	26-2/0.3	
Lab Number:		02-Mar-2017	02-Mar-2017	02-Mar-2017	02-Mar-2017	
		1733665.15	1733665.16	1733665.19	1733665.20	
Individual Tests						
Dry Matter	g/100g as rcvd	88	74	75	78	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	9	3	19	3	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	6	4	19	< 2	-
Total Recoverable Copper	mg/kg dry wt	6	6	30	3	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	15-16, 19-20
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	15-16, 19-20
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	15-16, 19-20
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	15-16, 19-20
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	15-16, 19-20



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is written over a faint dotted line.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
42 Rangatira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 42 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
27-1/0.1	0.05-0.1	W of house	11	<20	7	7	< 0.05	< 0.05
27-1/0.3	0.3		7	<20	6	6	< 0.05	< 0.05
27-2/0.1	0.05-0.1	W of garage	5	<20	4	10	< 0.05	< 0.05
27-2/0.3	0.3		<2	<20	2	2	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



Glen Nicholson

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv6
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	27-1/0.1 02-Mar-2017	27-1/0.3 02-Mar-2017	27-2/0.1 02-Mar-2017	27-2/0.3 02-Mar-2017	
Lab Number:	1733665.22	1733665.23	1733665.26	1733665.27	
Individual Tests					
Dry Matter	g/100g as rcvd	91	79	85	79
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	11	7	5	< 2
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	7	6	4	2
Total Recoverable Copper	mg/kg dry wt	7	6	10	2
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	22-23, 26-27
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	22-23, 26-27
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	22-23, 26-27
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	22-23, 26-27
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	22-23, 26-27



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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A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Soil sampling results -
17 Simkin Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 17 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

Initial soil sampling (March 2017)

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples (collected at the 0.1 and 0.3m depth below ground level at the two hand auger boreholes) for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving underground services.

Additional soil sampling (April 2017)

One of the samples collected in March 2017, sample 28-2 at 0.3 m depth, contained arsenic levels above the standard for residential land use. In response to this result, the following scope of works was undertaken to assess the extent of arsenic impacted soils:

- Test the 0.5 m deep sample from sample location 24-2.
- Collect 0.3 m deep samples from four directions (north, south, east, and west), at distances of 0.5, 1.0 m and 2.0 m, from sample 28-2 location.
- Test the twelve soil samples collected at 0.5 m, 1.0 m, and 2.0 m distance away from sample 28-2 location for arsenic, at the 0.3m depth; and
- Compare testing results against relevant human health standards and published background levels.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
28-1/0.1	0.05-0.1	Mid N portion of property	11	<20	7	730	< 0.05	< 0.05
28-1/0.3	0.3		3	<20	3	9	< 0.05	< 0.05
28-2/0.1	0.05-0.1	Mid S portion of property	7	<20	5	5	< 0.05	< 0.05
28-2/0.3	0.3		<u>74</u>	<20	7	4	< 0.05	< 0.05
28-2/0.5	0.5		3	-	-	-	-	-
28-2 N1/0.3	0.3	0.5 m N of 28-2	<u>97</u>	-	-	-	-	-
28-2 N2/0.3	0.3	1.0 m N of 28-2	<u>68</u>	-	-	-	-	-
28-2 N3/0.3	0.3	2.0 m N of 28-2	<u>94</u>	-	-	-	-	-
28-2 S1/0.3	0.3	0.5 m S of 28-2	<u>57</u>	-	-	-	-	-
28-2 S2/0.3	0.3	1.0 m S of 28-2	<u>26</u>	-	-	-	-	-
28-2 S3/0.3	0.3	2.0 m S of 28-2	<u>33</u>	-	-	-	-	-
28-2 E1/0.3	0.3	0.5 m E of 28-2	<u>43</u>	-	-	-	-	-
28-2 E2/0.3	0.3	1.0 m E of 28-2	11	-	-	-	-	-

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
28-2 E3/0.3	0.3	2.0 m E of 28-2	7	-	-	-	-	-
28-2 W1/0.3	0.3	0.5 m W of 28-2	13	-	-	-	-	-
28-2 W2/0.3	0.3	1.0 m W of 28-2	<u>26</u>	-	-	-	-	-
28-2 W3/0.3	0.3	2.0 m W of 28-2	<u>28</u>	-	-	-	-	-
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of initial laboratory analysis show that:

- The concentration of arsenic in one sample (28-2/0.3) exceeded the criteria for residential land use (10% produce consumption).
- Concentrations of all other measured parameters were below the criteria for residential land use (10% produce consumption).

Results of the additional laboratory analysis show that:

- An area of arsenic impacted soil is present in the southern portion of the property at a depth of 0.3 m, with a maximum measured arsenic concentration of 97 mg/kg.
- The surface soils (0.05 to 0.1m) in this area contain arsenic below the criteria for residential land use (10% produce consumption) of 20 mg/kg.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Alex Davies

Glen Nicholson

Environmental Scientist

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv7
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil						
Sample Name:		28-1/0.1 02-Mar-2017	28-1/0.3 02-Mar-2017	28-2/0.1 02-Mar-2017	28-2/0.3 02-Mar-2017	28-2/0.5 02-Mar-2017
Lab Number:		1733665.29	1733665.30	1733665.33	1733665.34	1733665.35
Individual Tests						
Dry Matter	g/100g as rcvd	85	77	81	78	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	3
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	11	3	7	74	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	7	3	5	7	-
Total Recoverable Copper	mg/kg dry wt	730	9	5	4	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	29-30, 33-35
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	29-30, 33-34
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	29-30, 33-34
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	29-30, 33-34
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	29-30, 33-35
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	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.

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

A handwritten signature in blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1754689	SPv4
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Apr-2017	
		Date Reported:	02-May-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil					
Sample Name:	28-2 N1/0.3 06-Apr-2017	28-2 N2/0.3 06-Apr-2017	28-2 N3/0.3 06-Apr-2017	28-2 S1/0.3 06-Apr-2017	28-2 S2/0.3 06-Apr-2017
Lab Number:	1754689.8	1754689.9	1754689.10	1754689.11	1754689.12
Total Recoverable Arsenic	mg/kg dry wt	97	68	94	57
Sample Name:	28-2 S3/0.3 06-Apr-2017	28-2 E1/0.3 06-Apr-2017	28-2 E2/0.3 06-Apr-2017	28-2 E3/0.3 06-Apr-2017	28-2 W1/0.3 06-Apr-2017
Lab Number:	1754689.13	1754689.14	1754689.15	1754689.16	1754689.17
Total Recoverable Arsenic	mg/kg dry wt	33	43	11	7
Sample Name:	28-2 W2/0.3 06-Apr-2017	28-2 W3/0.3 06-Apr-2017			
Lab Number:	1754689.18	1754689.19			
Total Recoverable Arsenic	mg/kg dry wt	26	28	-	-

Analyst's Comments

Supplementary Report: This report is a supplement to an earlier report issued on the 26-04-17.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	8-19
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	8-19
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	8-19

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

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental



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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
48 Rangatira Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 48 Rangatira Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for standard residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
29-1/0.1	0.05-0.1	SW of house	14	<20	8	14	< 0.05	< 0.05
29-1/0.3	0.3		7	<20	5	7	< 0.05	< 0.05
29-2/0.1	0.05-0.1	N of house	11	<20	7	21	< 0.05	< 0.05
29-2/0.3	0.3		<2	<20	2	3	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv8
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil						
Sample Name:		29-1/0.1 02-Mar-2017	29-1/0.3 02-Mar-2017	29-2/0.1 02-Mar-2017	29-2/0.3 02-Mar-2017	
Lab Number:		1733665.36	1733665.37	1733665.40	1733665.41	
Individual Tests						
Dry Matter	g/100g as rcvd	79	73	82	79	-
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	14	7	11	< 2	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	8	5	7	2	-
Total Recoverable Copper	mg/kg dry wt	14	7	21	3	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	36-37, 40-41
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	36-37, 40-41
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	36-37, 40-41
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	36-37, 40-41
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	36-37, 40-41



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results - 5 Simkin, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 5 Simkin Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
30-1/0.1	0.05-0.1	W of house	16	<20	8	8	< 0.05	< 0.05
30-1/0.3	0.3		5	<20	5	8	< 0.05	< 0.05
30-2/0.1	0.05-0.1	E of house	9	<20	7	16	< 0.05	< 0.05
30-2/0.3	0.3		9	<20	3	4	< 0.05	< 0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability


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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....
Glen Nicholson

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPv9
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	30-1/0.1 02-Mar-2017	30-1/0.3 02-Mar-2017	30-2/0.1 02-Mar-2017	30-2/0.3 02-Mar-2017	
Lab Number:	1733665.43	1733665.44	1733665.47	1733665.48	
Individual Tests					
Dry Matter	g/100g as rcvd	81	76	77	78
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	16	5	9	9
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	8	5	7	3
Total Recoverable Copper	mg/kg dry wt	8	8	16	4
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	43-44, 47-48
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	43-44, 47-48
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	43-44, 47-48
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	43-44, 47-48
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	43-44, 47-48



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
14 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 14 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
31-1/0.1	0.05-0.1	E of house	5	<20	4	19	<0.05	<0.05
31-1/0.3	0.3		<2	<20	<2	<2	<0.05	<0.05
31-2/0.1	0.05-0.1	N of garage	12	<20	8	32	<0.05	<0.05
31-2/0.3	0.3		9	<20	9	41	<0.05	<0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- Concentrations of all measured parameters were below the criteria for standard residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

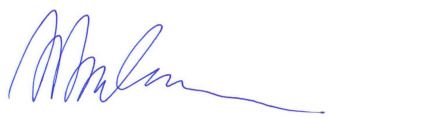
This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



Glen Nicholson

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1754689	SPv5
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Apr-2017	
		Date Reported:	02-May-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	31-1/0.1 06-Apr-2017	31-1/0.3 06-Apr-2017	31-2/0.1 06-Apr-2017	31-2/0.3 06-Apr-2017	
Lab Number:	1754689.20	1754689.21	1754689.24	1754689.25	
Individual Tests					
Dry Matter	g/100g as rcvd	68	70	68	68
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	5	< 2	12	9
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	4	< 2	8	9
Total Recoverable Copper	mg/kg dry wt	19	< 2	32	41
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplementary Report: This report is a supplement to an earlier report issued on the 26-04-17.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	20-21, 24-25
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	20-21, 24-25
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	20-21, 24-25
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	20-21, 24-25
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	20-21, 24-25



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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A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Preliminary soil sampling results -
2 Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 2 Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area) and at what concentrations.

The following scope of work was undertaken to meet the above objective:

- Investigate near surface soil quality by collecting samples from 0.1 and 0.3 m depth below surface at two hand auger boreholes located within accessible areas at the property¹;
- Test the four soil samples for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving and underground services.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
32-1/0.1	0.05-0.1	N of house, near boundary	6	<20	5	15	<0.05	<0.05
32-1/0.3	0.3		<2	<20	<2	4	<0.05	<0.05
32-2/0.1	0.05-0.1	W of house	<u>24</u>	<20	14	39	<0.05	<0.05
32-2/0.3	0.3		4	<20	2	4	<0.05	<0.05
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

All concentrations in mg/kg

Underlined values exceed SCS for residential land use

* 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of laboratory analysis show that:

- The concentration of arsenic in one sample (32-2/0.1) marginally exceeds the criteria for residential land use (10% produce consumption).
- Concentrations of all other measured parameters were below the criteria for residential land use (10% produce consumption).

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Alex Davies

Glen Nicholson

Environmental Scientist

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1754689	SPv6
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Apr-2017	
		Date Reported:	03-May-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	32-1/0.1	32-1/0.3	32-2/0.1	32-2/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.27	1754689.28	1754689.31	1754689.32	
Individual Tests					
Dry Matter	g/100g as rcvd	51	73	68	70
CCAB, screen level					
Total Recoverable Arsenic	mg/kg dry wt	6	< 2	24	4
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20
Total Recoverable Chromium	mg/kg dry wt	5	< 2	14	2
Total Recoverable Copper	mg/kg dry wt	15	4	39	4
Pentachlorophenol Screening in Soil by LCMSMS					
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05

Analyst's Comments

Supplementary Report: This report is a supplement to an earlier report issued on the 26-04-17.

SUMMARY OF METHODS

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	27-28, 31-32
CCAB, screen level	Total recoverable digestion, ICP-MS. screen level	2 - 20 mg/kg dry wt	27-28, 31-32
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	27-28, 31-32
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	27-28, 31-32
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	27-28, 31-32



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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A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

Attention: Michelle Begbie

Dear Michelle

Soil sampling results -
20B Leslie Street, Taupo

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Waikato Regional Council (WRC) to assess whether historic land use practices may have resulted in ground contamination of residential properties located on Rangatira Street, Leslie Street, and Simkin Street, in Taupo.

This letter provides the results of soil sampling carried out at 20B Leslie Street.

2 Objective and scope of work

The objective of the investigation was to characterise the near surface soils with particular emphasis on potential human health effects from chemicals associated with historic timber processing activities (known to have occurred in the area).

The following scope of work was undertaken to meet the above objective:

Initial soil sampling (March 2017)

- Investigate near surface soil quality by collecting samples from two hand auger boreholes located within accessible areas at the property¹;
- Test four soil samples (collected at the 0.1 and 0.3m depth below ground level at the two hand auger boreholes) for typical chemicals associated with timber treatment including pentachlorophenol (PCP) and copper, chromium, arsenic, and boron (CCAB); and
- Compare testing results against relevant human health standards and published background levels.

¹ The positioning of borehole locations was limited by the presence of surface paving underground services.

Additional soil sampling (April 2017)

One of the samples collected in March 2017, sample 24-2 at 0.3 m depth, contained an arsenic level above the standard for residential land use. In response to this result, the following scope of works was undertaken to assess the extent of arsenic impacted soils:

- Test the 0.5 m deep sample from sample location 24-2.
- Collect 0.3 m deep samples at accessible locations in the proximity (1 to 3 m) from sample 24-2 location.
- Test the four soil samples collected at 0.5 m distance away from sample 24-2 location for arsenic, at the 0.3m depth; and
- Compare testing results against relevant human health standards and published background levels.

3 Analytical results

3.1 Evaluation criteria

Soil testing results have been evaluated against soil contaminant standards (SCS) for residential land use (10% produce consumption), referred to in the 'National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health'² and provided for in the 'Methodology for deriving standards for contaminants in soil to protect human health'³.

Published background metals concentrations have been provided for comparison.

3.2 Results

The soil testing results are tabulated with SCS and background concentrations in Table 3.1 below. The full laboratory transcript is provided in Appendix A.

Table 3.1: Soil analytical results

Sample ID	Depth (m)	Sample location	Arsenic	Boron	Chromium	Copper	PCP	TCP*
24-1/0.1	0.05-0.1	N of house	17	<20	10	9	< 0.05	< 0.05
24-1/0.3	0.3		3	<20	3	4	< 0.05	< 0.05
24-2/0.1	0.05-0.1	NW of house	12	<20	8	14	< 0.05	< 0.05
24-2/0.3	0.3		<u>92</u>	<20	22	25	< 0.05	< 0.05
24-2/0.5	0.5		4	-	-	-	-	-
24-2 1/0.3	0.3	2.0 m SE of 24-2	14	-	-	-	-	-
24-2 3/0.3	0.3	2.5 m N of 24-2	<u>56</u>	-	-	-	-	-
24-2 4/0.3	0.3	3.0 m NW of 24-2	<u>26</u>	-	-	-	-	-
24-2 5/0.3	0.3	1.0 m E of 24-2	12	-	-	-	-	-
24-2 6/0.3	0.3	1.0 m N of 24-2	<u>38</u>					
24-2 7/0.3	0.3	1.0 m W of 24-2	<u>53</u>					
SCS for residential land use (10% produce consumption) ¹			20	>10,000	>10,000 ⁴	>10,000	55	-
Published background (95 th percentile range) ²			8.9 - 17	6.7 ³	41 - 129	29 - 108	-	-

² Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

³ MfE, 2011, Methodology for deriving standards for contaminants in soil to protect human health.

All concentrations in mg/kg
Underlined values exceed SCS for residential land use
 * 2,3,4,6-Tetrachlorophenol

1. NES Soil Contaminant Standards, MfE 2011
2. Landcare Research, 2016, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document
3. Waikato Regional Council. Natural background concentrations in the Waikato region, upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data.
4. Guideline for chromium (III)
5. Benzo[a]pyrene equivalent value

Results of initial laboratory analysis show that:

- The concentration of arsenic in one sample (24-2/0.3) exceeded the SCS for residential land use (10% produce consumption).
- Concentrations of all other measured parameters were below the criteria for residential land use (10% produce consumption).

Results of the additional laboratory analysis show that:

- An area of arsenic impacted soil is present in the north-western portion of the site at a depth of 0.3 m, with a maximum measured arsenic concentration of 92 mg/kg.
- The surface soils (0.05 to 0.1m) in this area contain arsenic below the criteria for residential land use (10% produce consumption) of 20 mg/kg.

4 Applicability

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

Recommendations and opinions in this report are based on observations and the results of discrete soil sampling and analysis. The nature and continuity of subsoil away from the discrete soil sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....

Alex Davies

Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



.....

Glen Nicholson

Project Director

ajdc/elp

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Appendix A: Laboratory transcript



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1733665	SPV3
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	02-Mar-2017	
		Date Reported:	27-Mar-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:	Taupo	
		Submitted By:	A Davies-Colley	

Sample Type: Soil

Sample Name:	24-1/0.1 02-Mar-2017	24-1/0.3 02-Mar-2017	24-2/0.1 02-Mar-2017	24-2/0.3 02-Mar-2017	24-2/0.5 02-Mar-2017	
Lab Number:	1733665.1	1733665.2	1733665.5	1733665.6	1733665.7	
Individual Tests						
Dry Matter	g/100g as rcvd	83	79	85	70	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	4
CCAB, screen level						
Total Recoverable Arsenic	mg/kg dry wt	17 #2	3	12	92	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Total Recoverable Chromium	mg/kg dry wt	10 #1	3	8	22	-
Total Recoverable Copper	mg/kg dry wt	9	4	14	25	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	-

Analyst's Comments

Supplement to test report 1733665v2, issued 23-Mar-2017. Only selected samples have been shown at the request of the client.

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. The average of the results of the replicate analyses has been reported. Replicate 1: 11 mg/kg; Replicate 2: 10 mg/kg.

#2 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. The average of the results of the replicate analyses has been reported. Replicate 1: 17 mg/kg; Replicate 2: 17 mg/kg.

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.

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 5-7
CCAB, screen level	Total recoverable digestion, ICP-MS, screen level	2 - 20 mg/kg dry wt	1-2, 5-6
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	1-2, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 5-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 5-7
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	7



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 blue ink, appearing to read 'Graham Corban', is positioned above the printed name.

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



ANALYSIS REPORT

Client:	Waikato Regional Council	Lab No:	1754689	SPv3
Contact:	Michelle Begbie C/- Waikato Regional Council Private Bag 3038 Waikato Mail Centre Hamilton 3240	Date Received:	06-Apr-2017	
		Date Reported:	01-May-2017	
		Quote No:	81927	
		Order No:	W1601-23	
		Client Reference:		
		Submitted By:	A Davies-Colley	

Sample Type: Soil						
Sample Name:	24-2 1/0.3	24-2 3/0.3	24-2 4/0.3	24-2 5/0.3	24-2 6/0.3	
	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	
Lab Number:	1754689.1	1754689.3	1754689.4	1754689.5	1754689.6	
Total Recoverable Arsenic	mg/kg dry wt	14	56	26	12	38
Sample Name:	24-2 7/0.3					
	06-Apr-2017					
Lab Number:	1754689.7					
Total Recoverable Arsenic	mg/kg dry wt	53	-	-	-	-

Analyst's Comments

Supplementary Report: This report is a supplement to an earlier report issued on the 26-04-17.

SUMMARY OF METHODS

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3-7
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3-7
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1, 3-7

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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