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Ref: 000300

23 June 2023

CCKV Maitai Dev Co LP
7 Ralphine Way,
Nelson

Attn: Neil Donaldson

Dear Neil,

Addendum Contamination Assessment – Maitahi Subdivision – V4

Introduction

Envirolink Ltd has been engaged by CCKV Maitai Dev Co LP to undertake additional investigation and assessment of ground conditions around the former sheep treatment area and former homestead at 7 Ralphine Way, Nelson (the site). The objective of the assessment is to provide additional detail to further inform a remediation methodology, including possible dewatering requirements.

This report should be read in conjunction with the detailed site investigation (DSI) report prepared by Envirolink Ltd dated December 2021, (Ref: 211209.MaitahiDSI_v2).

The current design plan includes a watercourse to be constructed through the former sheep treatment area. Envirolink has not been provided with a design for this watercourse, as such the construction methodology is unknown.

Additional Investigation – Sheep Treatment Area

Sample Methodology

During the DSI phase, a shallow soil investigation was undertaken around the woolshed and former sheep treatment area. The former sheep treatment area shows significant impact from arsenic and dieldrin with several samples reporting concentrations above human health standards for a recreation land use and ecological screening levels. Exceedances of recreation soil contaminant standards (SCS)[1] were recorded in the deepest samples collected from adjacent to a sump associated with the dip/spray area (600-700 mm below ground level

1 Ministry for the Environment, 2012 The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

(bgl)) and runout areas (300-375 mm bgl). In some areas, arsenic appears to have migrated through a shallow hardfill layer into the upper river deposits where concentrations have been recorded in excess of surface concentrations. In contrast to arsenic, dieldrin's affinity for organic matter seems to have reduced its downward migration with all depth samples showing reduced concentrations relative to those at the surface.

As recommended in the initial DSI, additional investigation was undertaken to further define the depth of impact and groundwater quality within the surrounding area. The following additional investigation was completed:

- Seven test pits were excavated across the treatment and runout areas on 19 April 2023 using an 8-ton excavator and was supervised by a Suitably Qualified and Experienced Practitioner (SQEP) from Envirolink. The target depth for test pits was the shallow or perched water table.
- The installation of 4 monitoring wells to determine the groundwater quality within the sheep dip/spray area. Boreholes were drilled by CW Drilling between 13 and 18 April using a rotax concentric casing advancement and compressed air. The introduction of water was limited. The drilling and piezometer installation was supervised by Tonkin and Taylor, who logged the ground conditions that were intercepted. The target depth for boreholes was 1-2 m below shallow or perched groundwater to enable the installation of a piezometer for groundwater monitoring purposes.

The positioning of the additional investigation locations was based on a judgmental sampling approach. Justification of the investigation locations is presented in Table 1 below. Reference is made to investigation locations advanced as part of the DSI.

Table 1: Investigation Location Methodology

Test Pit/Bore ID	Depth (m)	Location Justification
TP01	1.7	To provide coverage of the eastern part of the sheep treatment infrastructure (between former sample locations KV6 and KV10).
TP02	1.5	To provide coverage of the central part of sheep treatment infrastructure (downgradient of KV11 and KV12).
TP04	1.6	Downgradient of treatment sump, to provide coverage of the western part of sheep treatment infrastructure (close to KV29 -highest surficial arsenic detected, and KV16, KV15, KV14 – highest surficial dieldrin detected).
TP05	1.5	In the location of the proposed watercourse, downgradient of the sheep treatment area – in the runout zone (close to KV31 and KV21)
TP06	1.6	Downgradient of the footbath (close to KV24 - KV26)
TP07	1.5	Further down gradient of runout zone (downgradient of KV20 and KV32).
TP08	1.4	Downgradient of KV42.

Test Pit/Bore ID	Depth (m)	Location Justification
KVBH01	3.40	Upgradient of sheep treatment infrastructure – control location.
KVBH02	3.75	Downgradient of treatment sump
KVBH03	3.50	Downgradient of treatment infrastructure, in the location of proposed watercourse.
KVBH04	3.55	Downgradient of treatment infrastructure in location of proposed watercourse.
KVBH04A	2.10	Downgradient of treatment infrastructure in location of proposed watercourse, targeting shallow groundwater seepage.

* TP03 was not completed as sufficient coverage was gained from other test pits.

The Investigation Location Plan is presented below as Figure 1.

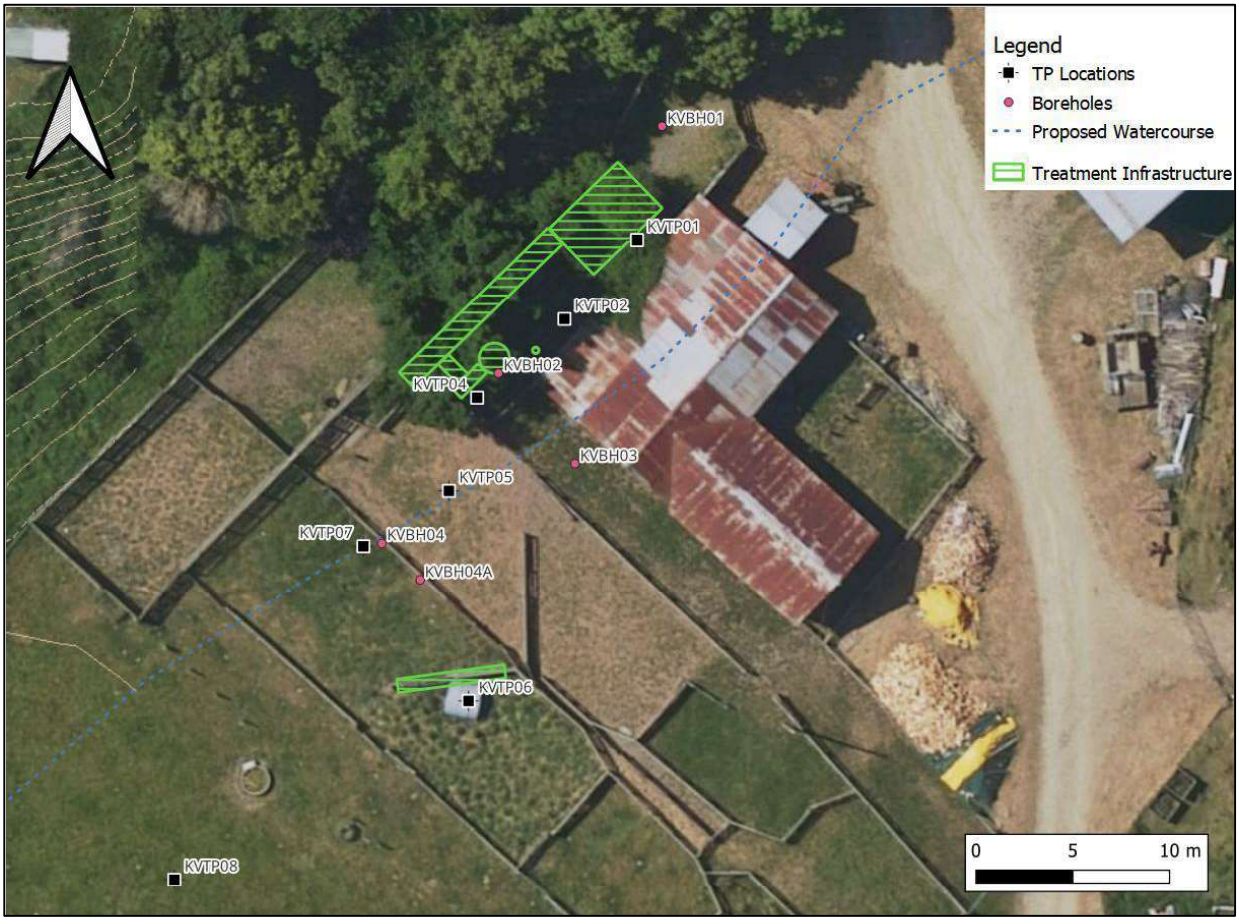


Figure 1: Additional Investigation Location Plan

Soil samples were collected from test pits only, approximately 3 to 4 samples were collected from each pit; 26 samples were collected in total. Given that assessment of surficial soil had been completed in the DSI, samples were typically collected from subsoil (0.3 - 0.5 m), and then at changes in ground conditions or approximately every 0.5 m until the water table was

encountered (~1.5 m bgl). All quality assurance protocols were adhered to when collecting the samples.

Groundwater piezometers were developed by the drillers on installation using a foot valve. Groundwater samples were collected from the piezometers on 20th April 2023 by Envirolink. Prior to sampling, the piezometers were purged of at least five well volumes using a small submersible pump. Groundwater recharge was fast. Water samples were collected using a dedicated bailer. The water was observed to be silty when recovered. All quality assurance protocols were adhered to when collecting the samples.

All samples collected were delivered to Hill Laboratories. All water samples were scheduled for heavy metal analysis (field filtered), as well as for organochlorine pesticides (OCP) and pH. A representative selection of soil samples was scheduled for heavy metals and OCP. The remaining samples are being held cold by the laboratory. A list of samples collected is included within the test pit logs in Appendix C.

Observations

The observations detailed below are based on the test pits only. Borehole installation was supervised by Tonkin and Taylor, their logs are provided in Appendix A. Test pit logs are provided in Appendix B. Photographs taken during the investigation are presented in Appendix C. The soil observed was typically free of anthropogenic material, although occasional wire and glass containers (bottles) were noted in TP01, TP02 and TP04 around the sheep treatment area. TP01 was located beneath a concrete pad, which was removed prior to excavation. Brown bottles were encountered at 1 m bgl within TP02, indicating the presence of fill from surface to approximately 1 m depth; the material was observed as reworked natural sands and gravels. Typical ground conditions encountered are detailed in Table 2 below.

Table 2: Ground Conditions Encountered during Envirolink led investigations.

Unit		**Typical Depth (mm bgl)**	**Typical Description**	**Notes**
Topsoil		0-300	Dark brown organic sandy gravelly SILT	Encountered around treatment area and in paddocks
Fill/Hardfill		0-1,000	Orangish brown slightly silty SAND and GRAVEL with cobbles. Occasional anthropogenic material.	Likely imported river gravels. Encountered in sheep pens.
River Deposits	Granular deposits	200-800	Orangish brown (slightly) silty SAND and GRAVEL with cobbles.	River deposit depth and composition likely to be variable across the woolshed and paddock areas. Cohesive deposits sometimes absent (e.g., TP05) or sometimes dominant (TP08).
	Cohesive deposits	800–1,100	Soft orangish brown sandy (slightly) gravelly CLAY/SILT	
	Granular deposits	1,100-1,900+	Orangish brown (slightly) silty SAND and/or GRAVEL with cobbles.	

Within the test pits, groundwater was encountered between 1.4 and 1.9 m bgl; typically deeper in the west of the investigation area. Within the boreholes, groundwater was encountered between 1.5 and 2.4 m bgl. A shallow cohesive layer was encountered in KVBH4, therefore two piezometers were installed; one with a screen above the cohesive layer (BH04a) and one below (BH04). This cohesive layer was inconsistent across the site and therefore is unlikely to act as a confining layer. Perched water was noted in this layer in the T&T logs. Ground conditions were typically damp from surface.

Soil Results

The trigger values used to compare the results are detailed in the DSI. A summary of the additional analytical results is presented in Table 3 below.

TP01 - TP04 are located within the area of the treatment infrastructure. Elevated arsenic (above the NES[2] recreational SCS) has been reported in soil samples collected from surface to the water table (1.5 m bgl). The exception is TP01 where concentrations have reduced at 0.8 m bgl to below the recreation guideline values but still above the residential SCS. Shallow concentrations reported in TP01 are an order of magnitude above NES recreational SCS. Elevated dieldrin (above the NES residential SCS by an order of magnitude) has been reported in shallow soils in TP02, but its affinity for organic matter has resulted in much reduced concentrations at depth. Elevated lead has been reported in TP02 at 0.5 m, exceeding NES recreational SCS.

[2] Ministry for the Environment, 2012 The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

Table 3: Soil Results - Additional Analysis (mg/kg)

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Total HCH	Total DDT Isomers	Total drins
KV TP01 0.2m	1,190	< 0.10	67	80	20	35	92	< 0.012	< 0.07	0.08
KV TP01 0.5m	1,020	0.31	111	74	59	60	280	< 0.014	< 0.08	0.18
KV TP01 0.8m	40	-	-	-	-	-	-	-	-	0.00
KV TP02 0.2m	360	6.9	125	76	250	93	1050	0.073	0.16	41.31
KV TP02 0.5m	470	0.46	159	121	1,750	115	430	< 0.016	< 0.10	0.25
KV TP02 1m	128	0.27	130	52	15	49	63	-	-	0.00
KV TP02 1.5m	240	0.45	132	59	32	55	111	-	-	0.00
KV TP04 0.8m	112	0.15	150	54	3.7	60	86	< 0.013	< 0.08	0.30
KV TP04 1.6m	110	0.29	122	54	4.9	52	147	< 0.012	< 0.08	0.39
KV TP05 0.5m	133	0.17	113	71	24	79	140	< 0.012	< 0.07	2.83
KV TP05 0.9m	55	-	-	-	-	-	-	< 0.012	< 0.07	0.37
TP06 0.5m	30	0.21	151	90	31	200	410	< 0.012	< 0.07	0.22
TP07 0.5m	172	0.32	128	740	72	153	210	< 0.013	< 0.08	5.73
TP07 1.2m	57	-	-	50	-	-	-	< 0.012	< 0.08	1.00
TP08 0.3m	18	-	-	-	-	-	-		-	
Background	11	0.9	183	41.5	33	274.4	141.5	0	0.48	0
NCC Cleanfill	12	0.75	183	83	86	274.4	300	-	0.7~	-
York Valley Landfill Screening Criteria	100	10	100#	200	100	200	200	8		0.4
Ecological Guideline Value	55	17	390	240	1,300	52*	300	7*	4.8	1.4*
NESCS – Residential	20	3	460#	>10,000	210	400	7,400	140	70	2.6
NESCS – Residential (High-density)	45	230	1,500	>10,000	500	1,200	60,000	700	240	45
NESCS – Recreational	80	400	2,700#	>10,000	880	1,200	30,000	1,400	400	70

#Screening value for chromium (VI)
*ANZECC SQG-H value used in absence of ECO-SGV.

TP05 and TP07 were located downgradient of the treatment infrastructure, in the run-out zone. At these locations, elevated concentrations of arsenic and dieldrin above NES recreational SCS were reported to 0.5 m bgl. Elevated arsenic concentrations, when compared to residential SCS, were still being reported at 0.9 m and 1.2 m depth but are much reduced compared to shallower samples.

TP06 was located downgradient of the footbath. At 0.5 m bgl concentrations of arsenic were above the residential SCS, but below recreational SCS. Copper was also reported above the Eco-SGV.

Based on the arsenic concentrations, the depth of impact around the treatment infrastructure (TP01 - TP04), reaches the water table (~ 1.5 m bgl) with concentrations exceeding the recreational SCS. In the run-out zone, downgradient of the treatment infrastructure (TP05 - TP07), impact at depth is still apparent with concentrations above residential SCS for arsenic within a meter from the existing surface. At TP08, 30 m from the infrastructure, minimal impact was observed, although arsenic was reported above current clean fill acceptance guideline values.

The most elevated concentrations of dieldrin have been reported in the shallow soils (<700 mm) around the sump in the western part of the treatment area (see previous DSI) but is also present 10 m downgradient (TP05 - TP07) at depths of 0.5 m at concentrations above residential SCS. The most elevated concentrations of arsenic have been reported within the

shallowest 0.5 m around the treatment infrastructure.

Impacted soils are not suitable for (shallow) re-use in a recreational or residential context. Remediation and management methods still need to be established, but it is likely that a combined remediation approach will be required. The most heavily impacted soil (e.g. within 0.5 m of surface in the treatment area) may need to be disposed of off-site[3]. If the balance of the impacted soil was to be retained on site, it would need to be managed in a way that minimises risk to human health and the environment.

Toxicity Characteristic Leachate Procedure (TCLP) testing (undertaken as part of the DSI) indicates that most soil is suitable for disposal at York Valley Landfill. Two samples (KV10 and KV14) reported exceedances above the York Valley acceptance limits therefore soil from these areas may need pre-treatment prior to disposal. Following the additional investigation results, three additional samples which reported the most elevated concentrations of zinc, lead and arsenic were scheduled for TCLP. The results are presented in Table 4 below. No additional exceedances were reported.

Table 4: TCLP - Additional Analysis

Sample ID	Depth (mm)	Arsenic		Lead		Zinc		Aldrin	
		Soil (mg/kg)	TCLP (g/m³)	Soil (mg/kg)	TCLP (g/m³)	Soil (mg/kg)	TCLP (g/m³)	Soil (mg/kg)	TCLP (g/m³)
TP01	200	1,190	0.28	-	-	-	-	-	-
TP02	200	360	2.8	-	-	1,050	0.153	-	-
TP02	500	-	-	1,750	0.0082	-	-	-	-
KV10*	75	-	-	-	-	5,500	14.3	-	-
KV14*	75	-	-	-	-	-	-	633.8	0.00036
York Valley Landfill Acceptance		100	5	100	5	200	10	-	0.00008**

* Only results from DSI that reported exceedances of York Valley Landfill Acceptance Limits

** Class A landfill limits (MfE 2004).

As exceedances have only been reported in two samples, blending of the soil may be sufficient to reduce contaminant concentrations detected in the TCLP analysis.

[3] We understand that on-site containment options are being considered however these will not be discussed further as part of this investigation.

Groundwater Results

The results of the groundwater sampling are presented in Table 5.

Table 5: Groundwater Laboratory Results

	pH	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Lindane	Total DDT	Aldrin	Dieldrin	Endrin
KVBH01	6.8	<1	<0.05	0.7	2.2	<0.1	2	7.1	<0.2	<0.2	<0.1	<0.1	<0.1
KVBH02	6.8	2.2	<0.05	1.1	1.7	<0.1	1.3	10.2	<0.2	<0.2	<0.1	1.06	<0.1
KVBH03	6.9	<1	<0.05	0.6	2.9	<0.1	1.3	4	<0.2	<0.2	0.15	0.2	<0.1
KVBH04	6.9	4.6	<0.05	1.4	3.3	<0.1	2	6.3	<0.2	<0.2	<0.1	0.21	<0.1
KVBH04A	6.8	1.6	<0.05	1.3	10.5	<0.1	3.1	40	<0.2	<0.2	<0.1	0.1	<0.1
ANZECC Guideline Value 80%	-	140	0.8	40	2.5	9.4	17	31	1	0.04	0.001	0.01	0.06
ANZECC Guideline Value 95%		13	0.2	1	1.4	3.4	11	8	0.2	0.01	0.001	0.01	0.02

All concentrations expressed as µg/L.
Guideline values are the Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Concentrations of copper, zinc, aldrin and dieldrin exceed applicable Australian and New Zealand Guidelines for Fresh and Marine Water Quality (80%) in KVBH02 - KVBH04A. Concentrations of chromium also exceed the 95% guideline value[4]. Dieldrin concentrations exceed the guideline values most significantly, with the highest concentrations reported in KVBH02 immediately downgradient of the sump. The control sample collected upgradient of the treatment area does not show any impact. Given the results, if dewatering is required during the construction and realignment of the stream, shallow water will require treatment prior to disposal or discharge.

The piezometers have been monitored to confirm water flow direction. A summary of the monitoring data is presented in Appendix E. The data was collected by Tonkin and Taylor. Given the topography, and water sampling results from the control location, it is considered likely that flow direction is towards the south-southeast. Groundwater contours have been provided and indicate shallow water moves in a southerly/south easterly direction. Groundwater contours are presented in Appendix E.

Investigation – Former Homestead

Sample Methodology

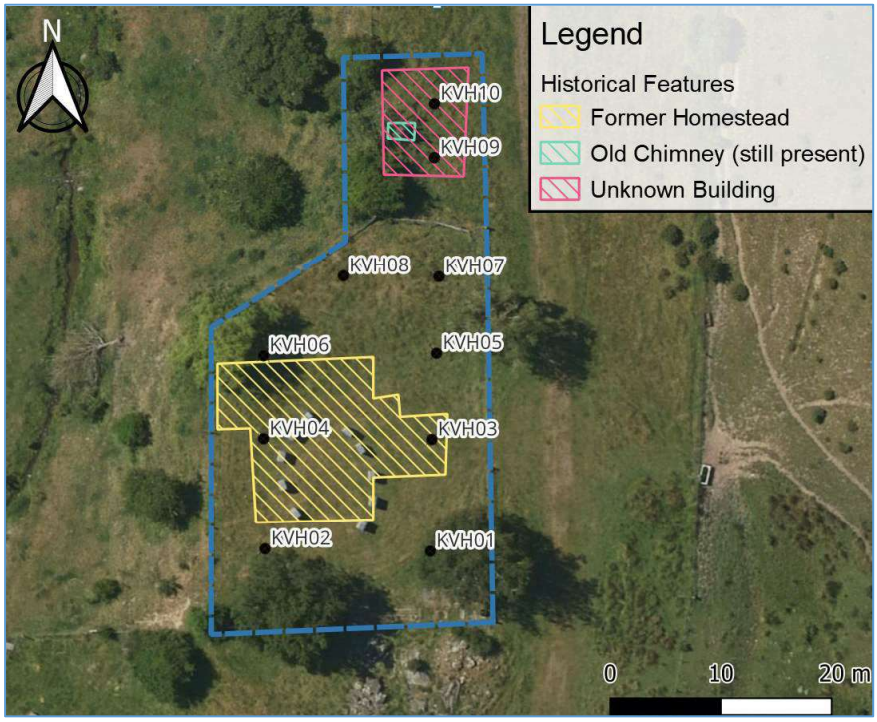
The former homestead was constructed circa. 1842 and burnt down in 1991. The DSI provides further detail, and recommended soil investigation of this area. A smaller unknown building was also identified in this area during historical aerial review.

Ground investigation was undertaken on 16th May 2023. Investigation locations are

[4] Please note that copper and chromium soil/groundwater concentrations may be influenced from naturally generated elements originating from the Richmond Ranges.

presented in Figure 2 below. Ten shallow soil samples were collected on a grid-based pattern across the 1,000 m^2 area. Based on the site history, all ten shallow soil samples were analysed for heavy metals. Six representative samples were also analysed for asbestos in soil (semi-quantitative). Although the cottage was built in 1840s it may have been renovated in the period when asbestos and / or lead paint was used. All quality assurance protocols were adhered to when collecting the samples. Soil was encountered as topsoil; no anthropogenic material was encountered.

Figure 2: Site Layout and Investigation Locations – Former Homestead



Soil Results

The analytical results are presented in Table 6. The laboratory certificates are included in Appendix D. According to the most recent Site Structure Plan, this part of the site will be included within a neighborhood reserve. The Site Structure Plan is included in Appendix F.

Based on a proposed recreational end use[5], no elevated concentrations of heavy metals have been reported when compared to the relevant human health guideline values. Concentrations of lead have been reported above NCC cleanfill criteria across the site, and concentrations of zinc and arsenic are above cleanfill criteria in the location of the former homestead. The contaminants that have been detected would be expected to be present following the burning of a residential dwelling.

As a precautionary measure, if a children's play area is to be established within the proposed

[5] Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.

neighborhood reserve, it should be located away from the location of the former homestead.

Asbestos was not detected in any of the six samples analysed and have therefore not been included in the results table.

Table 6: Soil Contaminant Results – Former Homestead

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
KVH - 01	9	0.51	136	63	270	102	410
KVH - 02	8	0.53	134	65	310	134	540
KVH - 03	12	0.61	135	60	310	110	420
KVH - 04	10	0.5	131	65	370	103	510
KVH - 05	9	0.53	113	66	210	76	320
KVH - 06	8	0.53	145	70	210	114	450
KVH - 07	9	0.43	118	52	161	61	260
KVH - 08	16	0.45	119	67	510	57	350
KVH - 09	7	0.35	132	40	96	55	300
KVH - 10	5	0.26	141	42	107	57	200
Background	11	0.9	183	41.5	33	274.4	141.5
Cleanfill	12	0.75	183	83	86	274.4	300
NES CS - Recreational	80	400	6300	10000	880	400	7400
NES CS - Resi 10%	20	3	460	10000	210	400	7400

Conceptual Site Model

The conceptual site model (CSM) has been developed from an assessment of sources of contaminants, potential exposure pathways, and feasible receptors (Table 7 & 8). A risk is present if a complete pathway is present between the source of contamination and the receptors.

Future site users are the primary on-site receptors from a human health perspective. The woolshed area and the homestead area are intended for recreational usage. Should the development plan change, the potential risk should be reassessed.

Table 7 - Conceptual Site Model - Linkage Assessment – Homestead Area

Source (HAIL Category)	Associated Contaminants	Pathway	Receptor	Risk Assessment
Former Dwelling /Homestead	• Heavy metals	• Ingestion • Dermal Contact • Inhalation (dust) • Consumption of	• Future site users	**Minimal risk posed** Contaminants of concern do not SCS for recreational use. If a children's play area is proposed in this reserve area it should be located away from the footprint of the former dwelling.

Source (HAIL Category)	Associated Contaminants	Pathway	Receptor	Risk Assessment
		homegrown produce		
		• Leaching of contaminants into water if soil disposed of improperly	• Environmental receptors	**Potential risk posed** Contaminant concentrations exceed cleanfill limits. Soil removed from site would require management to minimise risk.

The depth of impact around the sheep treatment infrastructure (TP01 - TP04), for arsenic specifically, reaches the water table and at concentrations exceeding the recreational SCS. In the run-out zone, and downgradient of the treatment infrastructure (TP05 - TP07), impact at depth is still apparent with concentrations above residential SCS for arsenic within a meter of existing ground level.

Elevated concentrations of copper, zinc, aldrin and dieldrin have been reported in shallow groundwater/perched water. This presents a potential risk to surface water courses/ ecology and has implications if groundwater is required to be discharged during the construction of the proposed waterway.

Table 8 - Conceptual Site Model - Linkage Assessment – Sheep Pen Area

Source (HAIL Category)	Primary Contaminants of concern	Pathway	Receptor	Linkage Active?
Sheep Treatment – A8	• Arsenic • Zinc • Dieldrin	• Inhalation • Ingestion • Dermal Contact	• Future site users	**Potential risk posed** Concentrations of arsenic and dieldrin exceed human health standards for recreational usage.
		• Leaching of contaminants into water if soil disposed of improperly	• Surface water	**Potential risk posed.** Cleanfill criteria widely exceeded. Excavated soil will require appropriate management to mitigate potential risks.
		• Dissolution and migration of soluble contaminants from in-situ soil	• Surface water	**Potential risk posed.** Yes, shallow groundwater results indicate environmental /ecological standards are exceeded. Water will need to be treated as part of dewatering exercise prior to offsite disposal.

*As detailed in the DSI, risk to human health via groundwater ingestion has been discounted as there appears to be no abstraction of downgradient groundwater for human consumption. Groundwater is, thus, only considered as a contaminant pathway to surface water receptors.

Conclusions and Recommendations

Former Homestead Area

- Concentrations of heavy metals do not exceed relevant human health standards (NES recreational SCS) for a recreation land use. Shallow soil is therefore suitable for re-use in a recreational or reserve context. Should a children's play area be proposed for the neighborhood reserve in this area, as a precautionary measure, it should be located away from the former homestead area. Concentrations of lead, zinc and arsenic reported are above NCC cleanfill criteria and therefore if the soil is to be disposed of off-site, it will need to go to a facility authorised to accept it.

Woolshed and Runout Area

- Concentrations of arsenic and dieldrin exceeding human health standards (NES recreational SCS) have been reported to depths of 1.5 m bgl and 0.7 m respectively within the investigation area. Elevated concentrations (above NES residential SCS) are reported to at least 1 m depth in the run-out zone (i.e. within 20 m downgradient of the treatment infrastructure). Remediation or management is required to address the risk to human health and will likely comprise a combined approach of off-site disposal, soil sorting and on-site retention. The remedial options are dependent on the proposed development plan;

- Shallow water encountered has reported concentrations of heavy metals and dieldrin that exceed applicable ecological standards. Shallow water was typically encountered from 1.4 m bgl. Dewatering is likely to be required during any trenching / excavation exceeding this depth. The shallow water is moving in a south/southeasterly direction, the most elevated concentrations reported were immediately downgradient of the treatment sump. Where dewatering is required, wastewater will require treatment prior to disposal. A combination of coagulation/flocculation and filtration through a reactive media (activated carbon) will need to be considered;
- Remediation measures taken to minimise human health risk will appropriately address potential ecological risk, in particular the most heavily contaminated soil around the treatment area. Given this, retention or capping of contaminated soil would not be appropriate adjacent to watercourses unless further ecological risk assessment was undertaken;
- TCLP results indicate some shallow soil from the treatment area is not suitable for disposal at York Valley Landfill without pre-treatment. Soil blending or mixing may be an option;
- The only area that has not been addressed as part of the current investigations is the land under the existing woolshed. It is likely that land underneath the shed is at low risk of being impacted by the surrounding hazardous activities. However, once the shed is removed or, alternatively the floor removed in appropriate places, the material beneath the shed can be assessed. This may also be carried out during the remediation of the wider area.

If you have any further questions, please do not hesitate to contact me.

Yours faithfully

MARTYN O'CAIN
MSc (hons) Environmental Science
PG Dip Business Management
Certified Environmental Practitioner (Contaminated Land)

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Limitations

This letter/report has not followed the Ministry for the Environment guidelines for reporting on contaminated sites. It is a summary of the methods and results of the work that has been undertaken at the site.

This letter/report has been prepared based on site conditions as they exist at the time of writing. If subsequent investigations or remedial actions are undertaken from the date of this report then certain aspects of this report may no longer be relevant or require amendment. In addition, if HAIL activities occur on the site after the date of this report then the conclusions and recommendations presented in this report may no longer be relied on.

Discussion on the sampling methods and results in this report are based on current recognised guidelines and trigger values. These methods and assessment criteria may change and concentrations of a contaminant, which are currently deemed acceptable, may in the future become subject to new or updated standards. This may cause the contaminant concentrations to become unacceptable and require further management or remediation to enable the site to be deemed suitable for existing or proposed land use activities.

It is not practicable for any investigation to be so complete that it can accurately detect all contaminants and establish a detailed record of their concentrations throughout a site. However, the current investigation has been carried out to provide a level of characterisation commensurate with an acceptable assessment of site conditions.

Contaminant concentrations beneath the existing woolshed have not yet been determined.

The full extent of the lead contamination at the original dwelling site as not been determined.

Appendix A – T&T Borehole Logs

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No. BH01

SHEET: 1 OF 1

PROJECT: Kaka Subdivision Maitai Valley, Nelson | LOCATION: Kaka Valley | JOB No.: 1012397.1000

CO-ORDINATES: 5431392.841, 1625946.014 (NZ Transverse Mercator Projection)

R.L.: 20.46 (NZVD 2016)

DRILL TYPE:

DRILL METHOD: Concentric

DRILL FLUID: Air

HOLE STARTED: 13/04/2023

HOLE FINISHED: 13/04/2023

DRILLED BY: Dylan, CW Drilling

LOGGED BY: DJA CHECKED: MRF

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Fill	NA		Cuttings retrieved at surface	Concentrics		Unslotted piezo tube; Conc.	Nil.		0.5		Damp					SILT, LP, dark brown, some organics, occasional medium sub-rounded gravel. Cobbles noted on surrounding sheep pen surface
Alluvium		▽ 2.4				Bentonite			1.0							SILT, LP, brown, some organics, some gravel, subangular, platey, grey/white.
									1.2							Silty GRAVEL, fine-medium, platey, light brown with grey & white gravel
									1.4							SILT, LP, light brown
						Gvl			1.5							Silty GRAVEL, fine, platey, light brown with grey & whitish gravels
						Piezo screen			1.6		Dry					GRAVEL, medium-coarse, light grey, minor silt, brown.
						Sand			2.0							
									2.2		Wet Damp					Silty GRAVEL, fine, sub-rounded, light brown
									2.5							GRAVEL, fine-medium, sub-rounded, grey/ blue/minor silt.
						Gravel			3.0							
						Bentonite			3.5							
									3.6							EOH - Target depth
									4.0							

COMMENTS:

Hole Depth

Scale 1:25

Rev.: A

BoreLog - 15/05/2019 2:52:03 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.
BH02
SHEET: 1 OF 1

PROJECT: Kaka Subdivisionn Maitai Valley, Nelson
LOCATION: Kaka Valley
JOB No.: 1012397.1000

CO-ORDINATES: 5431379.366, 1625938.353
(NZ Transverse Mercator Projection)
R.L.: 20.346
(NZVD 2016)

DRILL TYPE:
DRILL METHOD: Concentric
DRILL FLUID: Air

HOLE STARTED: 17/04/2023
HOLE FINISHED: 17/04/2023
DRILLED BY: Dylan, CW Drilling
LOGGED BY: FEOH CHECKED: MRF

GEOLOGICAL										ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	FLUID LOSS (%) 25 75	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (cm) 20 60 200 600 2000	Description and Additional Observations
Topsoil	NA		Cuttings retrieved at surface	Concentrics		Conc.	Nil.		0.4		Moist - wet					SILT, LP, dark brown, organics
Alluvium		∇ 2.5				Unslotted piezo tube / Bentonite / Gvl / Piezo screen / Sand / Gravel			0.5							Gravelly SILT, LP, light brown, medium sub-rounded gravel
									1.0		Dry					GRAVEL, fine-coarse, sub-angular-sub-rounded, light brown-gray. Minor silt
									1.5							Silty, sandy GRAVEL, fine - medium, sub-angular -sub-rounded, light brown - grey. Sand is fine.
									2.0							@1.9 Gravel and sand become coarse
									2.5		Wet					@2.4 becomes grey Silty GRAVEL, fine - coarse, sub-angular - sub-rounded, gray, trace sand, trace clay, with organics (rootlets)
									2.9							GRAVEL, fine-coarse, sub-angular - sub-rounded, gray, trace silt, trace sand, trace clay
									3.0							
									3.5							EOH - Target depth
									4.0							

COMMENTS:
Hole Depth

Scale 1:25

Rev.: A

BoreLog - 15/05/2019 2:52:03 PM - Produced with Core-GS by GeFoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.
BH03
SHEET: 1 OF 1

PROJECT: Kaka Subdivisionn Maitai Valley, Nelson
LOCATION: Kaka Valley
JOB No.: 1012397.1000

CO-ORDINATES: 5431374.076, 1625943.562
(NZ Transverse Mercator Projection)
R.L.: 19.836
(NZVD 2016)

DRILL TYPE:
DRILL METHOD: Concentric
DRILL FLUID: Air

HOLE STARTED: 17/04/2023
HOLE FINISHED: 17/04/2023
DRILLED BY: Dylan, CW Drilling
LOGGED BY: SIMV CHECKED: XXX

GEOLOGICAL										ENGINEERING DESCRIPTION						
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%) 100 50 15	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 15 30 60 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 25 50 100 200	DEFECT SPACING (cm) 20 60 200 600 2000	Description and Additional Observations
Alluvium	NA	▽ 18/04/2023	Cuttings retrieved at surface	Concentrics		Unslotted piezo tube Bentonite Conc. Gvl Piezo screen Sand Gravel	Nil.		0.5 0.9 1.0 1.5 1.8 2.0 2.3 2.5 3.0 3.5 4.0		Moist Moist-Wet					Silty GRAVEL, fine - medium, sub-rounded - sub-angular, dark brown, with some sand. SILT, NP, brown, minor gravel and trace sand, medium - coarse, sub-rounded - sub-angular @1.0 some gravel content @1.2 minor gravel content GRAVEL, fine, sub-rounded - sub-angular, grey, some sand @2.1 Gravel becomes fine-medium, some silt. GRAVEL, fine-coarse, sub-rounded - sub-angular, grey, minor sand. @2.6 becomes silty, brown EOH - Target Depth

COMMENTS:
Hole Depth

Scale 1:25

Rev.: A

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Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No. BH04

SHEET: 1 OF 1

PROJECT: Kaka Subdivisionn Maitai Valley, Nelson | LOCATION: Kaka Valley | JOB No.: 1012397.1000

CO-ORDINATES: 5431369.954, 1625931.747 (NZ Transverse Mercator Projection)

R.L.: 19.426 (NZVD 2016)

DRILL TYPE:

DRILL METHOD: Concentric

DRILL FLUID: Air

HOLE STARTED: 17/04/2023

HOLE FINISHED: 17/04/2023

DRILLED BY: Dylan, CW Drilling

LOGGED BY: FEOH CHECKED: MRF

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (mm)	Description and Additional Observations
Alluvium	NA		Cuttings retrieved at surface	Concentrics		Unslotted piezo tube; Bentonite; Conc.	Nil.		0.3		Dry-Moist					Silty SAND, brown, minor gravel, fine-medium, sub-rounded
Water perched in silt layer									0.5							SILT, LP, dark brown, trace gravel, fine - medium, sub-rounded. @0.6 becomes light brown
									0.9							
									1.0		Moist					Gravelly SILT, LP, light brown, gravel is fine - medium, rounded - sub-rounded, grey-brown Becomes silty GRAVEL Becomes SILT with minor gravel
Water encountered in gravel									1.5		Wet					GRAVEL, fine, sub-rounded - sub-angular, orange brown, with some/minor silt @1.6 m, medium sub-rounded gravels
						Gvl			2.0							Silty GRAVEL, fine - coarse, sub-rounded, grey - brown, trace clay
						Piezo screen; Sand			2.5							
									3.0							
						Gravel			3.5							
						Bentonite			4.0							EOH - Target depth

COMMENTS:

Hole Depth

Scale 1:25

Rev.: A

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Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No. BH04A

SHEET: 1 OF 1

PROJECT: Kaka Subdivisionn Maitai Valley, Nelson | LOCATION: Kaka Valley | JOB No.: 1012397.1000

CO-ORDINATES: 5431367.365, 1625934.523 (NZ Transverse Mercator Projection)

R.L.: 19.426 (NZVD 2016)

DRILL TYPE:

DRILL METHOD: Concentric

DRILL FLUID: Air

HOLE STARTED: 17/04/2023

HOLE FINISHED: 17/04/2023

DRILLED BY: Dylan, CW Drilling

LOGGED BY: FEOH CHECKED: MRF

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	FLUID LOSS (%)	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	RL (m) / DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	COMPRESSIVE STRENGTH (MPa)	DEFECT SPACING (cm)	Description and Additional Observations
Alluvium	NA		Cuttings retrieved at surface	Concentrics		Unslotted piezo tube: Conc. / Bentonite; Piezo screen: Gvl / Sand; Gravel; Bentonite	Nil.	0.3 / 0.5 / 0.9 / 1.0 / 1.2 / 1.3 / 1.5 / 1.9 / 2.0 / 2.5 / 3.0 / 3.5 / 4.0		Dry-Moist / Moist / Wet					Silty SAND, brown, minor gravel, fine-medium, sub-rounded SILT, LP, dark brown, trace gravel, fine - medium, sub-rounded. @0.6 becomes light brown Gravelly SILT, LP, light brown, gravel is fine - medium, rounded - sub-rounded, grey-brown Becomes silty GRAVEL Becomes SILT with minor gravel GRAVEL, fine, sub-rounded - sub-angular, orange brown, with some/minor silt @1.6 m, medium sub-rounded gravels EOH - Target depth

Water perched in silt layer

Water encountered in gravel

COMMENTS:

Hole Depth

Scale 1:25

Rev.: A

BoreLog - 15/05/2019 2:52:03 PM - Produced with Core-GS by GeRoc

Appendix B – Test Pit Logs

TP01	Concrete was present at surface.		
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth (m)**
0	0.15	Silty SAND; grey black, soft, organic. Sand is fine. Topsoil.	
0.15	0.4	Sandy SILT with gravel and cobbles; dark grey, damp, soft. Gravel is fine to coarse, subangular to subrounded.	ES at 0.2
0.4	1	Sandy SILT with gravel and cobbles; orange brown, damp, soft. Gravel is fine to coarse, subangular to subrounded.	ES at 0.5
1	1.7	Silty SAND and GRAVEL with cobbles; orange brown, slightly damp. Sand is fine to coarse.	ES at 0.8
Notes	Water strike at 1.7m.		ES at 1.7
TP02			
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth**
0	0.2	Silty SAND; grey brown, soft, organic. Sand is fine. Topsoil. FILL.	ES at 0.2
0.2	1	Sandy SILT with gravel and cobbles; orange brown, damp, soft. Gravel is fine to coarse, subangular to subrounded. FILL.	ES at 0.5
1	1.5	Silty SAND with cobbles; orange brown, slightly damp. Sand is fine to coarse.	ES 1 and 1.5
Notes	Water strike at 1.5m. Bottles encountered at depth at 1m.		
TP04			
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth**
0	0.2	Sandy gravelly SILT; dark brown, low plasticity. Sand, fine. Topsoil	
0.2	0.4	Silty SAND and GRAVEL with cobbles; grey, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles.	ES at 0.3
0.4	0.8	Silty SAND and GRAVEL with cobbles; orange brown, slightly damp. Sand is coarse. Gravel is fine to coarse, subangular to subrounded with cobbles.	ES at 0.8
0.8	1	Silty CLAY; dark grey brown, mottled orange, soft, low plasticity.	ES at 1.2
1	1.6	Silty SAND and GRAVEL with cobbles and bands of silt; grey brown, wet. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded.	ES at 1.6
Notes	1.5 Water strike - becoming wet at 1.5m		

TP05			
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth**
0	0.4	Sandy gravelly SILT; dark brown, low plasticity. Sand, fine. Topsoil	ES at 0.2
0.4	1	Silty SAND and GRAVEL with cobbles; orange brown, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles.	ES at 0.5
1	1.5	Silty SAND and GRAVEL with cobbles; orange brown, slightly damp. Sand is coarse. Gravel is fine to coarse, subangular to subrounded with cobbles.	ES at 0.9
Notes	Water strike at 1.5m		ES at 1.5
TP06			
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth**
0	0.1	Sandy gravelly SILT; dark brown, low plasticity. Sand, fine.	
0.1	0.4	Silty SAND and GRAVEL; dark brown, grey, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles. FILL.	ES at 0.5
0.5	0.8	Silty SAND and GRAVEL with cobbles; orange brown, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles. Fill.	
0.8	1	Sandy SILT with gravel and cobbles; orange brown, damp, soft. Gravel is fine to coarse, subangular to subrounded.	ES at 0.8
1	1.9	Silty SAND and GRAVEL with cobbles; orange brown, wet. Gravel is fine to coarse, subangular to subrounded.	ES at 1.2
Notes	Water strike at 1.9m		ES at 1.9
TP07			
Top Depth (m)	**Base Depth (m)**	**Description**	**Sample Depth**
0	0.1	Sandy gravelly SILT; dark brown, low plasticity. Sand, fine.	
0.1	0.3	Silty SAND and GRAVEL; dark brown, grey, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles. FILL.	
0.3	0.8	Silty SAND and GRAVEL; dark brown, slightly damp. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded with cobbles.	ES at 0.5
0.8	1.1	Silty CLAY; dark grey brown, mottled orange, soft, low plasticity.	ES at 0.8
1.1	1.25	Sandy SILT with gravel and cobbles; orange brown, damp, soft. Gravel is fine to coarse, subangular to subrounded.	ES at 1.2

1.25	1.5	Silty SAND and GRAVEL with cobbles; grey brown, wet. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded.	
Notes	Water strike at 1.5m.		
TP08			
Top Depth (m)	Bottom Depth (m)	Description	Sample Depth
0	0.35	Slightly silty SAND; grey brown. Topsoil.	ES at 0.3
0.35	1.4	Sandy SILT with gravel and cobbles; orange brown, damp, soft. Gravel is fine to coarse, subangular to subrounded.	ES at 0.6
Notes	Water strike at 1.4		ES at 1.4

Appendix C – Additional Investigation Photographs

Photograph 1 – Test Pit 1

Photograph 2 – Test Pit 1

Photograph 3 – Test Pit 2

Photograph 4 – Test Pit 4 location.

Photograph 5 – Test Pit 4

Photograph 6 – TP 5

Photograph 7: TP6

Photograph 8 – TP7

Photograph 9: TP8

Photograph 10 – Paddock of former homestead.

Photograph 11 – Example sample location

Appendix D – Laboratory Certificates

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Envirolink Limited	**Lab No:**	3250436	SPv4
Contact:	Rebecca Colvin	**Date Received:**	20-Apr-2023	
	C/- Envirolink Limited	**Date Reported:**	25-May-2023	**(Amended)**
	20 Stafford Drive	**Quote No:**	123433	
	Ruby Bay	**Order No:**		
	Mapua 7005	**Client Reference:**	Kaka Valley 300	
		Submitted By:	Rebecca Colvin	

Sample Type: Soil

Sample Name:		TP04 0.8m 19-Apr-2023	TP04 1.6m 19-Apr-2023	TP02 0.2m 19-Apr-2023	TP02 0.5m 19-Apr-2023	TP02 1m 19-Apr-2023
Lab Number:		3250436.3	3250436.5	3250436.6	3250436.7	3250436.8
Individual Tests						
Dry Matter	g/100g as rcvd	80	83	70	64	-
TCLP Weight of Sample Taken	g	-	-	50	50	-
TCLP Initial Sample pH	pH Units	-	-	6.9	8.4	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.7	4.7	-
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	4.9	4.9	-
TCLP Post Extraction Sample pH	pH Units	-	-	5.0	5.3	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	112	110	360	470	128
Total Recoverable Cadmium	mg/kg dry wt	0.15	0.29	6.9	0.46	0.27
Total Recoverable Chromium	mg/kg dry wt	150	122	125	159	130
Total Recoverable Copper	mg/kg dry wt	54	54	76	121	52
Total Recoverable Lead	mg/kg dry wt	3.7	4.9	250	1,750	15.0
Total Recoverable Nickel	mg/kg dry wt	60	52	93	115	49
Total Recoverable Zinc	mg/kg dry wt	86	147	1,050	430	63
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.012	0.044	< 0.016	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.012	0.018	< 0.016	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.012	0.027	< 0.016	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.012	0.045	< 0.016	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.012	0.109	< 0.016	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.08	0.16	< 0.10	-
Dieldrin	mg/kg dry wt	0.27	0.37	41	0.22	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Endrin	mg/kg dry wt	< 0.013	< 0.012	0.27	< 0.016	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.012	0.118	< 0.016	-

Sample Type: Soil						
Sample Name:		TP04 0.8m 19-Apr-2023	TP04 1.6m 19-Apr-2023	TP02 0.2m 19-Apr-2023	TP02 0.5m 19-Apr-2023	TP02 1m 19-Apr-2023
Lab Number:		3250436.3	3250436.5	3250436.6	3250436.7	3250436.8
Organochlorine Pesticides Screening in Soil						
Heptachlor	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.012	< 0.014	< 0.016	-

Sample Name:		TP02 1.5m 19-Apr-2023	TP01 0.2m 19-Apr-2023	TP01 0.8m 19-Apr-2023	TP08 0.3m 19-Apr-2023	TP07 0.5m 19-Apr-2023
Lab Number:		3250436.9	3250436.10	3250436.11	3250436.12	3250436.15
Individual Tests						
Dry Matter	g/100g as rcvd	-	85	-	-	82
TCLP Weight of Sample Taken	g	-	50	-	-	-
TCLP Initial Sample pH	pH Units	-	9.1	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	1.7	-	-	-
TCLP Extractant Type*		-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-	-
TCLP Extraction Fluid pH	pH Units	-	4.9	-	-	-
TCLP Post Extraction Sample pH	pH Units	-	5.1	-	-	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	40	18	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	240	1,190	-	-	172
Total Recoverable Cadmium	mg/kg dry wt	0.45	< 0.10	-	-	0.32
Total Recoverable Chromium	mg/kg dry wt	132	67	-	-	128
Total Recoverable Copper	mg/kg dry wt	59	80	-	-	740
Total Recoverable Lead	mg/kg dry wt	32	20	-	-	72
Total Recoverable Nickel	mg/kg dry wt	55	35	-	-	153
Total Recoverable Zinc	mg/kg dry wt	111	92	-	-	210
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.012	-	-	< 0.013
alpha-BHC	mg/kg dry wt	-	< 0.012	-	-	< 0.013
beta-BHC	mg/kg dry wt	-	< 0.012	-	-	< 0.013
delta-BHC	mg/kg dry wt	-	< 0.012	-	-	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.012	-	-	< 0.013
cis-Chlordane	mg/kg dry wt	-	< 0.012	-	-	< 0.013
trans-Chlordane	mg/kg dry wt	-	< 0.012	-	-	< 0.013
2,4'-DDD	mg/kg dry wt	-	< 0.012	-	-	< 0.013
4,4'-DDD	mg/kg dry wt	-	< 0.012	-	-	< 0.013
2,4'-DDE	mg/kg dry wt	-	< 0.012	-	-	< 0.013
4,4'-DDE	mg/kg dry wt	-	< 0.012	-	-	< 0.013
2,4'-DDT	mg/kg dry wt	-	< 0.012	-	-	< 0.013
4,4'-DDT	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Total DDT Isomers	mg/kg dry wt	-	< 0.07	-	-	< 0.08
Dieldrin	mg/kg dry wt	-	0.051	-	-	5.7
Endosulfan I	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Endosulfan II	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Endosulfan sulphate	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Endrin	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Endrin aldehyde	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Endrin ketone	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Heptachlor	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Methoxychlor	mg/kg dry wt	-	< 0.012	-	-	< 0.013

Sample Type: Soil						
Sample Name:		TP07 1.2m 19-Apr-2023	TP06 0.5m 19-Apr-2023	TP05 0.5m 19-Apr-2023	TP05 0.9m 19-Apr-2023	TP01 0.5m 19-Apr-2023
Lab Number:		3250436.17	3250436.19	3250436.24	3250436.25	3250436.26
Individual Tests						
Dry Matter	g/100g as rcvd	83	88	88	87	75
Total Recoverable Arsenic	mg/kg dry wt	57	-	-	55	-
Total Recoverable Copper	mg/kg dry wt	50	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	30	133	-	1,020
Total Recoverable Cadmium	mg/kg dry wt	-	0.21	0.17	-	0.31
Total Recoverable Chromium	mg/kg dry wt	-	151	113	-	111
Total Recoverable Copper	mg/kg dry wt	-	90	71	-	74
Total Recoverable Lead	mg/kg dry wt	-	31	24	-	59
Total Recoverable Nickel	mg/kg dry wt	-	200	79	-	60
Total Recoverable Zinc	mg/kg dry wt	-	410	140	-	280
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
alpha-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
beta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
delta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.07	< 0.07	< 0.07	< 0.08
Dieldrin	mg/kg dry wt	0.98	0.191	2.8	0.35	0.153
Endosulfan I	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Endosulfan II	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Endrin	mg/kg dry wt	< 0.012	< 0.012	0.022	< 0.012	< 0.014
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Endrin ketone	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Heptachlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014
Methoxychlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.014

Sample Name:		TP01 1.7m 19-Apr-2023
Lab Number:		3250436.27
Individual Tests		
Total Recoverable Arsenic	mg/kg dry wt	97

Sample Type: Aqueous				
Sample Name:		TP01 0.2m [TCLP extract]	TP02 0.2m [TCLP extract]	TP02 0.5m [TCLP extract]
Lab Number:		3250436.30	3250436.31	3250436.32
Individual Tests				
Total Arsenic	g/m^3	0.28	2.8	-
Total Lead	g/m^3	-	-	0.0082
Total Zinc	g/m^3	-	0.153	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '3250436-SPv3' issued on 04-May-2023 at 12:09 pm.
Reason for amendment: At the client's request, TCLP testing has been added to three 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 simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	3, 5-12, 15, 17, 19, 24-27
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%.	-	11-12, 17, 25, 27
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	3, 5-7, 10, 15, 17, 19, 24-26
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	11-12, 17, 25, 27
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	11-12, 17, 25, 27
Total Recoverable Copper	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
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	3, 5-10, 15, 19, 24, 26
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	3, 5-7, 10, 15, 17, 19, 24-26
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	6-7, 10
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	6-7, 10
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6-7, 10
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6-7, 10
TCLP Extractant Type*	US EPA 1311.	-	6-7, 10
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	6-7, 10
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6-7, 10

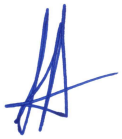
Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) 23rd ed. 2017.	-	30-32
Total Arsenic	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 23rd ed. 2017.	0.021 g/m^3	30-31
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 23rd ed. 2017.	0.0021 g/m^3	32
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 23rd ed. 2017.	0.021 g/m^3	31

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

Testing was completed between 21-Apr-2023 and 25-May-2023. For completion dates of individual analyses please contact the laboratory.

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



Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Envirolink Limited	**Lab No:**	3250437	SPv2
Contact:	Rebecca Colvin	**Date Received:**	20-Apr-2023	
	C/- Envirolink Limited	**Date Reported:**	28-Apr-2023	
	20 Stafford Drive	**Quote No:**	123433	
	Ruby Bay	**Order No:**		
	Mapua 7005	**Client Reference:**	Kaka Valley 300	
		Submitted By:	Rebecca Colvin	

Sample Type: Aqueous

Sample Name:		KVBH01 19-Apr-2023	KVBH02 19-Apr-2023	KVBH03 19-Apr-2023	KVBH04 19-Apr-2023	KVBH04A 19-Apr-2023
Lab Number:		3250437.1	3250437.2	3250437.3	3250437.4	3250437.5
Individual Tests						
pH	pH Units	6.8	6.8	6.9	6.9	6.8
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	< 0.0010	0.0022	< 0.0010	0.0046	0.0016
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	0.0007	0.0011	0.0006	0.0014	0.0013
Dissolved Copper	g/m³	0.0022	0.0017	0.0029	0.0033	0.0105
Dissolved Lead	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Nickel	g/m³	0.0020	0.0013	0.0013	0.0020	0.0031
Dissolved Zinc	g/m³	0.0071	0.0102	0.0040	0.0063	0.040
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Aldrin	g/m³	< 0.00010	0.00015	< 0.00010	< 0.00010	< 0.00010
alpha-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
beta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
delta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
gamma-BHC (Lindane)	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
cis-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
trans-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
2,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
2,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
2,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	g/m³	< 0.00010	0.00106	0.00020	0.00021	0.00010
Endosulfan I	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Endrin aldehyde	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Endrin ketone	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Heptachlor epoxide	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Hexachlorobenzene	g/m³	< 0.0008	< 0.0008	< 0.0008	< 0.0008	< 0.0008
Methoxychlor	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010

Summary of Methods

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

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B 23rd ed. 2017.	0.00005 - 0.0010 g/m^3	1-5
Organochlorine Pesticides Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-ECD analysis. In-house based on US EPA 8081.	0.00010 - 0.0008 g/m^3	1-5
pH	pH meter. APHA 4500-H$^+$ B 23rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1-5

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

Testing was completed between 22-Apr-2023 and 28-Apr-2023. For completion dates of individual analyses please contact the laboratory.

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

Kim Harrison MSc
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Envirolink Limited	**Lab No:**	3279920 SPv1
Contact:	Rebecca Colvin	**Date Received:**	18-May-2023
	C/- Envirolink Limited	**Date Reported:**	24-May-2023
	20 Stafford Drive	**Quote No:**	100741
	Ruby Bay	**Order No:**	Kaka Valley - 300
	Mapua 7005	**Client Reference:**	Kaka Valley - 300
		Submitted By:	Rebecca Colvin

Sample Type: Soil

Sample Name:		KVH - 01 16-May-2023	KVH - 02 16-May-2023	KVH - 03 16-May-2023	KVH - 04 16-May-2023	KVH - 05 16-May-2023
Lab Number:		3279920.1	3279920.2	3279920.3	3279920.4	3279920.5
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	9	8	12	10	9
Total Recoverable Cadmium	mg/kg dry wt	0.51	0.53	0.61	0.50	0.53
Total Recoverable Chromium	mg/kg dry wt	136	134	135	131	113
Total Recoverable Copper	mg/kg dry wt	63	65	60	65	66
Total Recoverable Lead	mg/kg dry wt	270	310	310	370	210
Total Recoverable Nickel	mg/kg dry wt	102	134	110	103	76
Total Recoverable Zinc	mg/kg dry wt	410	540	420	510	320

Sample Name:		KVH - 06 16-May-2023	KVH - 07 16-May-2023	KVH - 08 16-May-2023	KVH - 09 16-May-2023	KVH - 10 16-May-2023
Lab Number:		3279920.6	3279920.7	3279920.8	3279920.9	3279920.10
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	9	16	7	5
Total Recoverable Cadmium	mg/kg dry wt	0.53	0.43	0.45	0.35	0.26
Total Recoverable Chromium	mg/kg dry wt	145	118	119	132	141
Total Recoverable Copper	mg/kg dry wt	70	52	67	40	42
Total Recoverable Lead	mg/kg dry wt	210	161	510	96	107
Total Recoverable Nickel	mg/kg dry wt	114	61	57	55	57
Total Recoverable Zinc	mg/kg dry wt	450	260	350	300	200

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-10
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-10

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

Testing was completed between 19-May-2023 and 24-May-2023. For completion dates of individual analyses please contact the laboratory.

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

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

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

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Certificate of Analysis

Client:	Envirolink Limited	**Lab No:**	3281476 A2Pv1
Contact:	Rebecca Colvin C/- Envirolink Limited 20 Stafford Drive Ruby Bay Mapua 7005	**Date Received:**	19-May-2023
		Date Reported:	24-May-2023
		Quote No:	100741
		Order No:	Kaka Valley - 300
		Client Reference:	Kaka Valley - 300
		Submitted By:	Rebecca Colvin

Sample Type: Soil

Sample Name:		KVH - 01A 16-May-2023	KVH - 04A 16-May-2023	KVH - 05A 16-May-2023	KVH - 06A 16-May-2023	KVH - 08A 16-May-2023
Lab Number:		3281476.1	3281476.2	3281476.3	3281476.4	3281476.5
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	723.4	705.8	720.0	711.7	706.7
Dry Weight	g	552.2	508.0	542.9	527.4	505.0
Moisture*	%	24	28	25	26	29
Sample Fraction >10mm	g dry wt	77.2	50.7	88.9	24.7	26.5
Sample Fraction <10mm to >2mm	g dry wt	138.6	149.3	180.3	179.8	155.0
Sample Fraction <2mm	g dry wt	334.4	306.5	272.1	319.7	316.4
<2mm Subsample Weight	g dry wt	52.8	54.0	51.4	57.4	52.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		KVH - 09A 16-May-2023
Lab Number:		3281476.6
Asbestos Presence / Absence		Asbestos NOT detected.
Description of Asbestos Form		-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001
As Received Weight	g	783.4
Dry Weight	g	590.5
Moisture*	%	25
Sample Fraction >10mm	g dry wt	63.1

Sample Type: Soil		
Sample Name:		KVH - 09A 16-May-2023
Lab Number:		3281476.6
Sample Fraction <10mm to >2mm	g dry wt	210.9
Sample Fraction <2mm	g dry wt	314.6
<2mm Subsample Weight	g dry wt	54.8
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001

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

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

The following assumptions have been made:

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

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

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Weight of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-6
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-6
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-6
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-6
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-6
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-6

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6

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

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

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

Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

Appendix E – Groundwater Monitoring Data

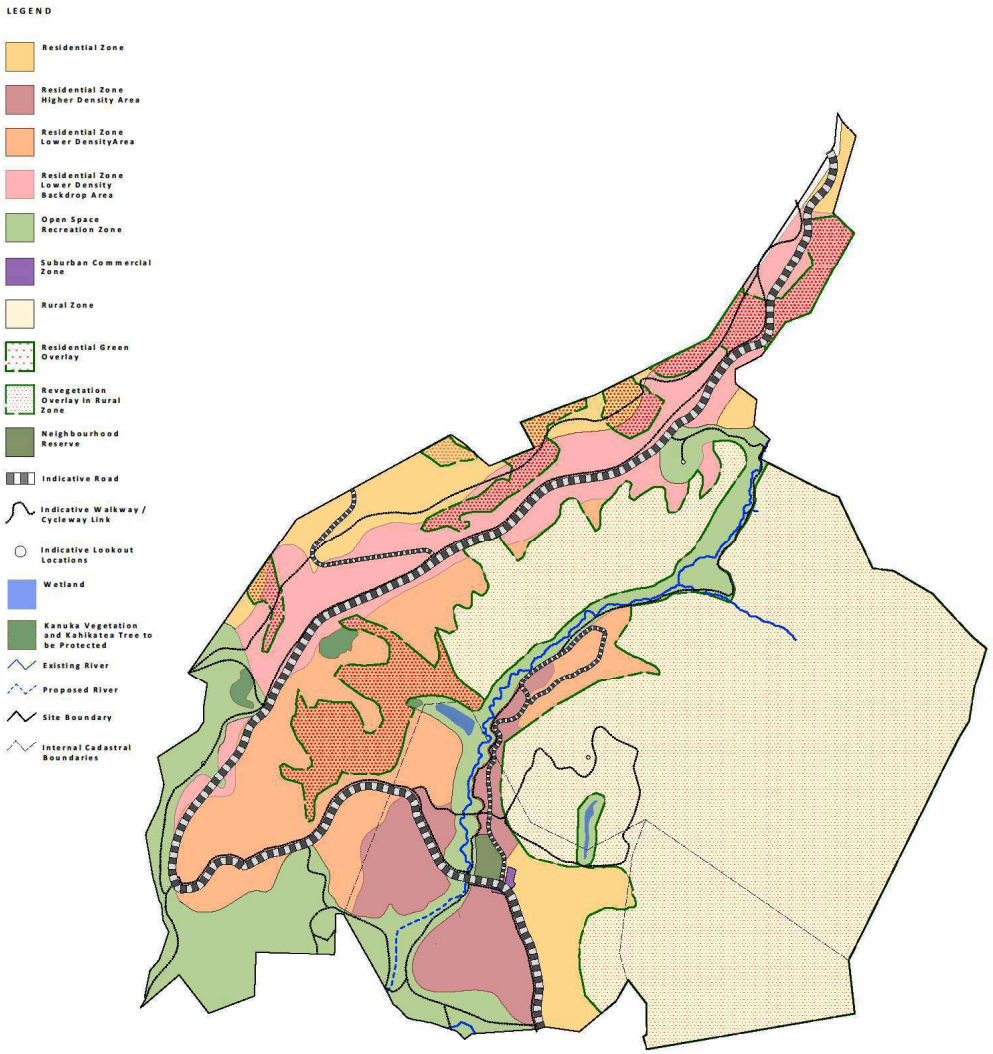

Legend
Boreholes
Boreholes GW Contour R1
Proposed Watercourse
Treatment Infrastructure
KVBH01
KVTP01
KVTP02
KVBH02
KVTP04
18698
18540
18461
18382
KVBH03
KVTP05
18303
18224
KVTP07
KVBH04
KVBH04A
KVTP06
KVTP08
0
5
10 m


Legend
Boreholes
Boreholes GW Contour R3
Proposed Watercourse
Treatment Infrastructure
KVBH01
KVTP01
KVTP02
KVBH02
KVTP04
19726
19566
19486
19406
KVBH03
KVTP05
19326
19246
KVTP07
KVBH04
KVBH04A
KVTP06
KVTP08
0
5
10 m

	BH1		BH2		BH3		BH4		BH4A	
RL (ground level, m)		N/A		20.346		19.836		19.426		19.426
Northing/Easting			5431379.366	1625938.353	5431374.076	1625943.562	5431369.954	1625931.747	5431367.365	1625934.523
Date	Water Level	Real depth	Water Level	Depth to Base	Water Level	Depth to Base	Water Level	Depth to Base	Water Level	Depth to Base
25/04/2023	#VALUE!	#VALUE!	18.856	17.026	18.386	16.336	18.206	16.276	18.066	17.726
10/05/2023			20.256	17.046	19.836	16.386	19.546	16.276	19.406	17.716
15/05/2023			19.886	17.046	19.436	16.336	19.216	16.256	19.086	17.726

Appendix F – Site Structure Plan

Appendix C – Structure Plan



RMM

Attachment B1.1:

Maitahi Bayview Structure Plan - Part of Schedule X

Scale 1:10,000 @ A3