Geo & Hydro – K8 Ltd

: PO Box 1295 Hastings 4156
New Zealand : 021 1171148
: www.benkeet.com : ben@benkeet.com

South Wairarapa District Council (SWDC)
[redacted]

Project:	GRPS-4 R&V Memo
Location:	4 Pierce Street, Greytown
Legal Description:	Sec 123 Maroa District / Pt Lot 4 DP 1187
Area:	300 of 5.500 m^2
Date:	28 November 2023

Memo: Remediation and Validation of 4 Pierce Street, Greytown

The DSI report by Geo & Hydro - K8 Ltd (GHK8) dated 22 September 2023 determined one contaminant of concern, lead (Pb), to be at concentrations above recreational soil contaminant standard (SCS) set by the NESCS. Contamination was limited to a strip of land along the SE boundary of the site.

With only two targeted samples exceeding the applicable standard, the DSI recommended a more pragmatic and cost-effective alternative to a Remedial Action Plan by appending the DSI with a memo upon completion of remediation. The memo to certify that the site meets recreational NES SCS.

The combined volume of contaminated and non-contaminated soil was lower than the maximum volume of the permitted activity threshold of 25 m^3 / 500 m^2; therefore, no resource consent was required to carry out remediation. The onsite soil blending was chosen as the most suitable remedial strategy.

The remedial process included the following steps:

1. blend the contaminated soil with the underlaying un-contaminated soil until the concentration of lead is well below the recreational NES SCS
2. test the surface soil surrounding the contaminated area as well as the blended soil in-situ during the blending process to ensure all contaminated material has been removed and blended
3. collect final validation samples for the corroborative analysis

Remediation was carried out on 27 October 2023. It was supervised by a Suitably Qualified and Experienced Practitioner (SQEP). The strip of land where remediation was carried out is shown in Figure 1. The validation sampling grid is also shown in the same Figure.

Figure 1 Remediated area and validation sampling grid

Remediation

Remediation started by setting out a 5-meter minimum earthwork exclusion zone around the contaminated and blending areas to avoid any cross-contamination. The surface was scraped back starting at the southern end of the strip of land. The on-site analyses were performed to ensure all contaminated soil had been properly blended with clean soil. Once blending was complete, the soil was tested again. The process was repeated until the whole strip was remediated to meet the applicable NES SCS.

Validation

After all soil had been compacted, 14 samples were taken on a grid as shown in Figure 1. All samples were analysed three times by an XRF analyser. Six samples were sent to an accredited laboratory for the corroborative analysis. The laboratory reports are appended top this memo. The correlation between the laboratory and XRF test results is shown in Figure 2

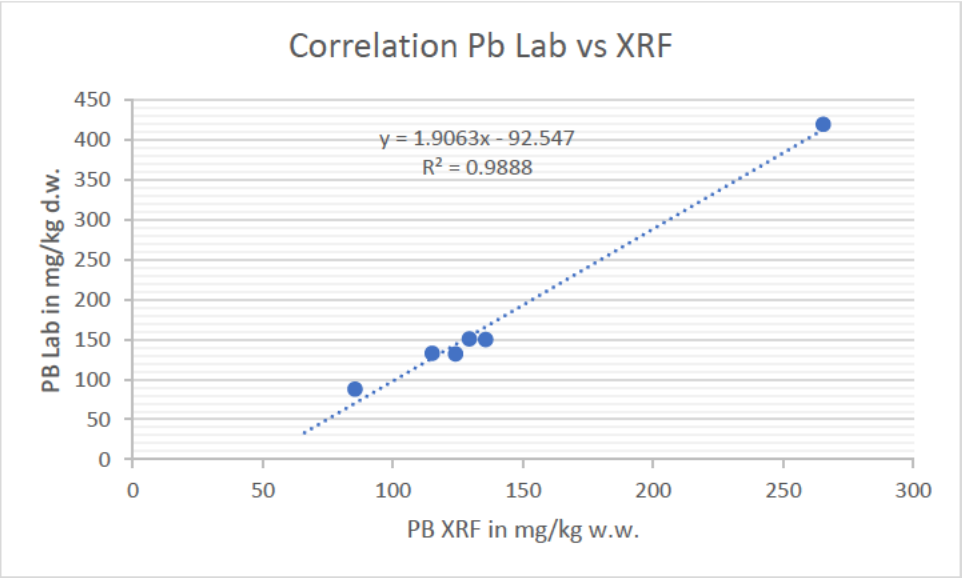


Figure 2 Correlation for lead (Pb): lab vs XRF results

The XRF test results below were adjusted using the above correlation.

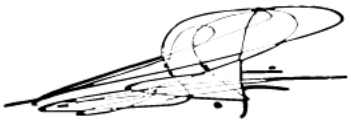
Sample No.	As Adj	Pb Adj
	mg/kg d.w. adjusted for s.m.& lab results	
A0	6	70
B0	9	335
C0	9	412
A10	5	83
B10	4	179
B10	3	141
C10	6	154
C10	5	33
A20	7	167
B20	5	144
B20	5	127
C20	6	44
C20	6	61
A30	9	159
B30	4	166
C30	6	133
C30	8	123
A40	4	70
B40	8	141
B40	6	77
NES SCS Recr	80	880

Conclusion

All XRF and laboratory test results for lead and arsenic are well below recreational NES SCS. Therefore, it is highly unlikely for the soil to pose a risk to human health. Consequently, the site can be considered remediated.

Remediation was carried out under the supervision of and certified by:

Drs. Ben Keet, MBA, SQEP, FRSC, MRSNZ, MinstD
CEnvP - Certified General Practitioner and CENVP SC - Certified Site Contamination Specialist
Senior Contaminated Land Auditor



Geo & Hydro – K8 Ltd

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Website: www.benkeet.com

DISCLAIMER/LIMITATIONS

This memo describes the remediation process, data collection and interpretation of the results. Conclusions of this investigation are specific to this property only and are valid for the purpose it was requested. The memo is valid only in its original form and must be reproduced in its entirety. While the memo has been prepared very carefully, no responsibility or liability is accepted for the consequences arising from 1) erroneous and/or omitted data, 2) property areas not analysed, 3) factors and/or data intentionally or unintentionally made unavailable to Geo & Hydro – K8 Ltd., 4) factors and/or data Geo & Hydro – K8 Ltd could not ascertain by reasonable inquiry in the ordinary course of investigation. Anyone who relies on this report other than SWDC does so at his/her own risk.

References

- Ministry for the Environment. 2011a. Contaminated Land Management Guidelines (CLMG) No.1: *Reporting on Contaminated Sites in New Zealand*, MfE, 2021 Revised.
- Ministry for the Environment. 2011a. CLMG No. 5: Site Investigation and Analysis of Soils, MfE, 2021 Revised.

Attached:

Remediation Photographs

Lab reports

Chain of Custody

Remediation photographs

	The blending process was guided by the on-site analyses
	The edges were tested to ensure the full extent of the contaminated area was remediated.
	Final validation samples were taken after the soil had been compacted.

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Certificate of Analysis

Client:	K8 Limited	**Lab No:**	3397088	SPv1
Contact:	Dr B Keet	**Date Received:**	01-Nov-2023	
	C/- Geo & Hydro Limited	**Date Reported:**	03-Nov-2023	
	621 Marine Parade	**Quote No:**	72158	
	Napier South	**Order No:**		
	Napier 4110	**Client Reference:**	GRPS-4VAL	
		Submitted By:	Dr B Keet	

Sample Type: Soil

	Sample Name:	GRPS-4VAL-B0	GRPS-4VAL-C0	GRPS-4VAL-C10	GRPS-4VAL-B20	GRPS-4VAL-C20
	Lab Number:	3397088.1	3397088.2	3397088.3	3397088.4	3397088.5
Total Recoverable Arsenic	mg/kg dry wt	5	9	5	5	6
Total Recoverable Lead	mg/kg dry wt	88	420	151	132	133

	Sample Name:	GRPS-4VAL-B30
	Lab Number:	3397088.6
Total Recoverable Arsenic	mg/kg dry wt	5
Total Recoverable Lead	mg/kg dry wt	150

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 Labs, 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%.	-	1-6
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%.	-	1-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-6
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	1-6
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-6

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

Testing was completed between 01-Nov-2023 and 03-Nov-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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	C/- Geo & Hydro Limited	**Date Reported:**	03-Nov-2023	
	621 Marine Parade	**Quote No:**	72158	
	Napier South	**Order No:**		
	Napier 4110	**Client Reference:**	GRPS-4VAL	
		Submitted By:	Dr B Keet	

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	Lab Number:	3397088.1	3397088.2	3397088.3	3397088.4
Total Recoverable Arsenic	mg/kg dry wt	4.9 ± 1.5	8.5 ± 1.9	4.8 ± 1.5	4.8 ± 1.5
Total Recoverable Lead	mg/kg dry wt	88 ± 14	423 ± 64	151 ± 23	132 ± 20

	Sample Name:	GRPS-4VAL-C20	GRPS-4VAL-B30
	Lab Number:	3397088.5	3397088.6
Total Recoverable Arsenic	mg/kg dry wt	5.8 ± 1.6	5.1 ± 1.6
Total Recoverable Lead	mg/kg dry wt	133 ± 20	150 ± 23

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

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

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Private Bag 3205
Hamilton 3240, New Zealand

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E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: **339 7088**

Date Recv: **01-Nov-23 13:12**

Received by: David Manson

3133970887

Quote No

Primary Contact Drs. Ben Keet

Submitted By Drs Ben Keet

Client Name Geo & Hydro - K8 Ltd

Address 621 Marine Parade

Napier *Postcode* 4110

Phone 021 117 1148 *Mobile* 021 117 1148

Email ben@benkeet.com

Charge To K8 Ltd

Client Reference GRPS-4VAL

Order No

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*

☑ *Email Primary Contact* ☐ *Email Submitter* ☐ *Email Client*

☐ *Email Other*

☐ *Other*

ADDITIONAL INFORMATION

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 31-10-23 - 13.55

Name: B Keet

☑ *Tick if you require COC to be emailed back*

Signature:

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* Temp: 20.7

☐ *Sample and Analysis details checked*

Signature:

Priority ☐ **Low** ☐ **Normal** ☑ **High**

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

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	GRPS-4VAL-B0			ES	As and Pb
2	GRPS-4VAL-C0			ES	As and Pb
3	GRPS-4VAL-C10			ES	As and Pb
4	GRPS-4VAL-B20			ES	As and Pb
5	GRPS-4VAL-C20			ES	As and Pb
6	GRPS-4VAL-B30			ES	As and Pb
7					
8					
9					
10					
11					
12					

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Job Information Summary

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	Napier 4110	**Client Reference:**	GRPS-4VAL
		Add. Client Ref:	
		Submitted By:	Dr B Keet
		Charge To:	K8 Limited
		Target Date:	03-Nov-2023 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	GRPS 4VAL B0	Soil	PSoil250	Total Recoverable Arsenic; Total Recoverable Lead
2	GRPS-4VAL-C0	Soil	PSoil250	Total Recoverable Arsenic; Total Recoverable Lead
3	GRPS 4VAL C10	Soil	PSoil250	Total Recoverable Arsenic; Total Recoverable Lead
4	GRPS-4VAL-B20	Soil	cPSoil250	Total Recoverable Arsenic; Total Recoverable Lead
5	GRPS 4VAL C20	Soil	cPSoil250	Total Recoverable Arsenic; Total Recoverable Lead
6	GRPS-4VAL-B30	Soil	cPSoil250	Total Recoverable Arsenic; Total Recoverable Lead

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