DAVIS OGILVIE
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SITE VALIDATION REPORT

34300 / OAKBRIDGE STAGE 1 / SOVEREIGN PALMS LTD

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Davis Ogilvie & Partners Ltd

QUALITY ASSURANCE

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Reviewed By **Warren Sharp**
Technical Director
CEnvP - SCS

Signature:

DISCLAIMER

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Should anyone wish to discuss the content of this report with Davis Ogilvie & Partners Ltd, they are welcome to contact us on (03) 366 1653.

TABLE OF CONTENTS

1.0 INTRODUCTION

Davis Ogilvie & Partners Limited (Davis Ogilvie) was commissioned by Sovereign Palms Ltd to prepare this Site Validation Report (SVR) documenting contaminated soil remediation works undertaken over Oakbridge Stage 1, Prestons Road, Christchurch. The site extent is indicated on Site Plan A01 attached. Details of the site are provided in the below table.

Site details	
Owner:	Sovereign Palms Ltd
Site Address (current):	20 Mills Road, Marshland
Legal Description (current):	Lot 3 DP 24826, Lot 1 DP 512479
Total Area:	7.5 ha (approx.)
Topography:	Flat lying
Adjoining Site Uses:	Rural / Rural residential to north, east and south. Retirement village under construction to west.

2.0 BACKGROUND

Detailed background information on Oakbridge Stage 1 (the site) has been provided in the following reports:

- Davis Ogilvie report dated 26 May 2017: *Detailed Site Investigation Report, Oakbridge,* Reference 34300.
- Davis Ogilvie report dated 8 August 2017: *Remediation Action Plan – Oakbridge Stage 1, Christchurch*. Reference 34300.

As described in the above reports, arsenic contamination in excess of Soil Contaminant Standards (SCS) for residential land use and related to a former sheep dip was present in shallow soils over the central northern portion of the site. Arsenic concentrations in excess of background were detected in shallow soils around and particularly to the west of the primary area of arsenic contamination. Cadmium concentrations in excess of background, also related to a former sheep dip, were present in shallow soils over the eastern portion of the site.

Resource Consent RMA/2017/2059/A was granted by Christchurch City Council (CCC) for subdivision of the site, including a requirement to remediate the site to meet SCS for residential land use. This SVR has been prepared in order to comply with consent conditions 12.2 to 12.7 of RMA/2017/209/A and documents the remedial works and soil validation sampling undertaken.

3.0 SUMMARY OF WORKS

3.1 Excavation Works

The entire site extent was excavated to an average depth of 0.4 m for geotechnical reasons, with the contamination remedial excavation works program being conducted as part of the wider site geotechnical excavation program.

The extent of excavation for the primary (arsenic impacted) remedial area is indicated on Site Plan A02 attached. Excavation works over this area was a staged process driven by geotechnical requirements and was undertaken over the period late 2019 to mid-2020, with the majority of the remedial excavation occurring during May and June 2020. Soils within the remediation area were excavated to at least 0.4 m depth. Photos of the completed excavation are provided in Figure 1. Excavation areal and depth extent was verified via validation sampling (Section 3.4).

The excavation of all topsoil's across the site, with resultant mixing on excavation, was considered an appropriate remedial solution for areas where arsenic and cadmium concentrations in excess of background (below SCS) were detected.

There was no significant deviation to the RAP during the remedial works program.

3.2 Soil Disposal

A number of facilities were utilised for disposal of surplus soils from the site as follows:

- Approximately 540 tonnes of shallow topsoil / turf (top 0.10 to 0.15 m) from the main arsenic remediation area was disposed of to Burwood Landfill. Evidence of disposal, in the form of a spreadsheet supplied by the landfill, is included as Appendix A.
- Shallow topsoil / turf stripped from areas around the arsenic remediation which contained arsenic concentrations in excess of background was disposed of to the reserve area on the eastern side of the site. Note that, as set out in the DSI, no contaminant concentrations in excess of SCS for recreational land use were detected at the site. As such, deposition of contaminated materials to the reserve was considered an appropriate disposal option. While not finished at the time of writing of this SVR, the reserve is to be completed with 0.3 m of topsoil.
- A total of 2,960 m^3 of soils from the site including arsenic contaminated soils from the main remediation cut, and surplus stockpiled topsoils and silts, were disposed of as fill to the Southern Motorway project (CSM2). Detailed disposal receipts were not available for this facility. Correspondence with the CSM2 team regarding materials acceptance can be provided if required.

- Surplus soils from areas where original investigation results indicated no contamination in excess of background was present, or from stockpiles of mixed soils where validation sampling indicated residual concentrations less than background, were disposed of offsite as cleanfill. Contractor records indicate on the order of 5,230 m^3 of soils were disposed of as cleanfill.

Figure 1: Selected remedial works photographs.

3.3 Fill Materials

As discussed above, the entire site was excavated to a depth of at least 0.4m for geotechnical purposes, deeper in some areas, with these areas of the site requiring engineered fill and topsoiling. Sources of fill materials utilised at the site were as follows:

- Quarry sourced gravels for roadways, service trenches, and engineered fill in some areas.
- Site sourced silts for Lot areas. The site sourced silt was derived from excavations in the reserve area (excavated to a depth of 1.2 m below finished ground level) and the stormwater ponds (excavated to depths in the range 1.2 to 2.2 m below finished ground level).
- A small volume (< 500 m^3) of silt was imported from the neighbouring site to the west for use on the northern most lots. This silt was validated post use (refer Section 3.4).
- Topsoils re spread over all Stage 1 Lots were sourced from Stage 1 excavations. Validation of topsoil is discussed in Section 3.4.
- A small volume of contaminated topsoils derived from initial earthworks on Oakbridge Stage 2 east of the site were used as fill within street scape gardens in the centre of Oakbridge Boulevard (Refer Figure 2). Sampling of these soils (available on request, will be detailed in reporting for Stage 2) indicates arsenic concentrations in the range 16 to 25 mg/kg, in excess of background and also SCS for residential land use in some samples. The gardens were finished with at least 0.05 m of imported clean topsoil (in the form of instant lawn).

Figure 2: Street scape gardens, Oakbridge Boulevard.

3.4 Soil Validation Sampling

3.4.1 Methodology

As set out in the RAP the remediation criteria for the site was to meet SCS for residential land use, namely 20 mg/kg for arsenic. In addition, to avoid further contamination related encumbrance on finished lots, results were also compared to background / criteria for cleanfill disposal (being the range of values for Christchurch derived soils).

Validation sampling was carried out as follows:

- Of the remedial excavation base and sides. Samples VSB1-B8, VSC1-C8, VS1-VS54.
- Of fill materials used on northern lots (sourced from the neighbouring property to the west). Samples VS50 Fill – VS54 Fill.
- Of topsoiled lots (as further verification of residual contamination levels in re-used topsoils). Samples VS79-VS93, VS120–VS152.
- Of stockpiled soils (topsoils and silts that were either re-used onsite or disposed of offsite) resulting from excavations in areas where the DSI indicated results above cleanfill criteria. Samples ST12-ST31 (2019), C1-C12, ST24-ST33 (2020), ST50-ST74.

The soil validation samples were collected on a random grid basis from the base and sides of the remedial excavation and some surrounding areas (where DSI results exceeded cleanfill criteria) at the locations indicated on the attached Site Plan A02. Final topsoil validation samples were collected on a random grid basis at the locations indicated on the attached Site Plan A03. All sampled stockpiles were considered well mixed via the excavation and stockpiling process, with stockpile validation samples collected on a systematic basis from the surface of each stockpile. The soil validation samples were collected by Davis Ogilvie staff in general accordance with Ministry for the Environment Contaminated Land Management Guidelines.

All soil validation samples were analysed for heavy metals using an X-Ray Fluorescence Analyser (XRF). In excess of 70 selected samples were submitted to Analytica Laboratories Ltd and analysed for heavy metals as QA/QC on XRF results.

3.4.2 Results

Soil validation sample analytical results are summarised in Tables 1 (remedial excavation base and sides, imported fill), 2 (topsoil on finished lots) and 3 (stockpile cleanfill assessment) attached. Laboratory reports are included as Appendix B. Soil validation sample results were compared to SCS for residential land use and to adopted background / cleanfill disposal criteria. Relevant SCS and cleanfill criteria are included in Tables 1 to 3. Results can be summarised as follows:

Remedial excavation base and side

With the exception of arsenic in one side wall sample, VS8, no analysed heavy metals were detected at concentrations above SCS for residential land use. The small volume of soils represented by sample VS8 were stripped to stockpile before the exceedance was picked up; it is considered highly likely that dilution that would have occurred on further excavation of soils in the area will have reduced concentrations to less than SCS for residential land use, this verified by validation of stockpiled soils.

Two soil samples detected arsenic at a concentration in excess of adopted cleanfill criteria. Statistical analysis of arsenic (conservatively, of laboratory results only) indicates a 95% UCL for arsenic in these soils of 12.18 mg/kg, less than adopted cleanfill criteria.

Imported fill used on northern lots

Arsenic at a concentration in excess of SCS for residential land use was detected in one fill sample, VS50-Fill. Removal of fill materials in the area of VS50 was undertaken with further validation samples collected. All results were less than SCS for residential land use and adopted cleanfill criteria.

Final Lots topsoil

No analysed heavy metals were detected at concentrations in excess of SCS for residential land use. With the exception of copper in one sample, no analysed heavy metals were detected at concentrations in excess of adopted criteria for cleanfill disposal.

Statistical analysis of copper results (conservatively, of laboratory results only) indicates a 95% UCL of 15.42 mg/kg, less than the adopted cleanfill criteria. As such soils across the site as a whole requiring disposal as a result of further excavation (e.g. for dwelling foundations) are considered to be suitable for disposal as cleanfill.

Stockpiled soils

No analysed heavy metals were detected at concentrations in excess of SCS for residential land use. With the exception of arsenic in two samples and zinc in one sample, no analysed heavy metals were detected at concentrations in excess of adopted criteria for cleanfill disposal.

Statistical analysis of results (conservatively, of laboratory results only) indicates a 95% UCL of 13.53 mg/kg for arsenic and 100.9 mg/kg for zinc, less than adopted cleanfill criteria. As such the stockpiled soils as a whole were considered suitable for re-use or offsite disposal as cleanfill.

3.5 QA/QC

All fieldwork has been managed by a Suitably Qualified and Experienced Practitioner (SQEP) and this report was reviewed by a SQEP, as required by the National Environmental Standard for Soil Contamination (NESCS).

The primary heavy metal analysis methodology for this project was via the use of field portable XRF. The XRF used was an Olympus Vanta C-Series VCW Model. The manufacturer's instructions were followed in the use of the device. Manufacturer supplied calibration samples were tested frequently in the field. USEPA Method 6200, *Field Portable X-ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment* (2007), was used as guidance for the use of the XRF and quality assurance measures. Over 70 soil samples were laboratory analysed as verification samples. A linear regression analysis of XRF readings and laboratory results was performed on the analytical results for the analytes arsenic, copper, lead and zinc. On a validation sample group basis (excavation base, topsoil, stockpiled soils) regression values ranged from 0.79 to 0.93, exceeding the acceptable value of 0.70 set out in Method 6200. Regression analysis for all data as a whole indicated values in the range 0.87 (copper) to 0.92 (lead) with the regression value for arsenic being 0.88. The analysis indicated the XRF typically read on the order of 10 to 15% lower than the laboratory for arsenic, copper and lead, and on average 20% lower than the laboratory for zinc. A review of XRF readings indicated adjusting XRF results would not significantly change report conclusions and as such, has not been undertaken in the results table.

One instrument precision analysis was also undertaken, with a single sample analysed 7 times. The precision results returned Relative Percentage Differences in the range 2.82 % to 11.07%, within the maximum of 20% set out in Method 6200.

With regards to laboratory analysis, soil samples were submitted to Analytica Laboratories Ltd, a recognised laboratory endorsed by International Accreditation New Zealand (IANZ). The laboratory analysis was performed in accordance with the terms of accreditation. No issues were noted.

On the basis of the QA/QC work undertaken the XRF and laboratory results were considered suitable for interpretation.

4.0 SUMMARY

Soil remedial and general excavation works have been completed at the site. 540 tonnes of arsenic contaminated soils were disposed of offsite to Burwood Landfill. 2,960m^3 of soils, including arsenic and cadmium contaminated soils, were disposed of offsite to the southern motorway. Selected contaminated soils were relocated onsite to the reserve area.

All contaminated soils have been successfully removed from the residential Lots within the site area, with residual contaminant concentrations on the Lots below SCS for residential land use and adopted cleanfill criteria.

Residual contamination in excess of adopted cleanfill criteria and SCS for Residential land use, but less than SCS for recreational land use, remains on site within the reserve, and in street scape gardens on Oakbridge Boulevard. Contaminated soils within the street scape gardens have been covered with at least 0.05m of cleanfill in the form of instant lawn. The reserve area has yet to be completed at the time of writing of this SVR; Davis Ogilvie understand the reserve will be finished with at least 0.3 m of topsoil.

In summary, on the basis of the remedial works and associated soil validation sampling conducted, it is considered that the site is suitable for residential and recreational land use. Future surplus soils that will be generated during further development of residential lots within the site are considered to be suitable for disposal as cleanfill (subject to facility acceptance).

contractor to locate all existing services & verify all dimensions before commencing work

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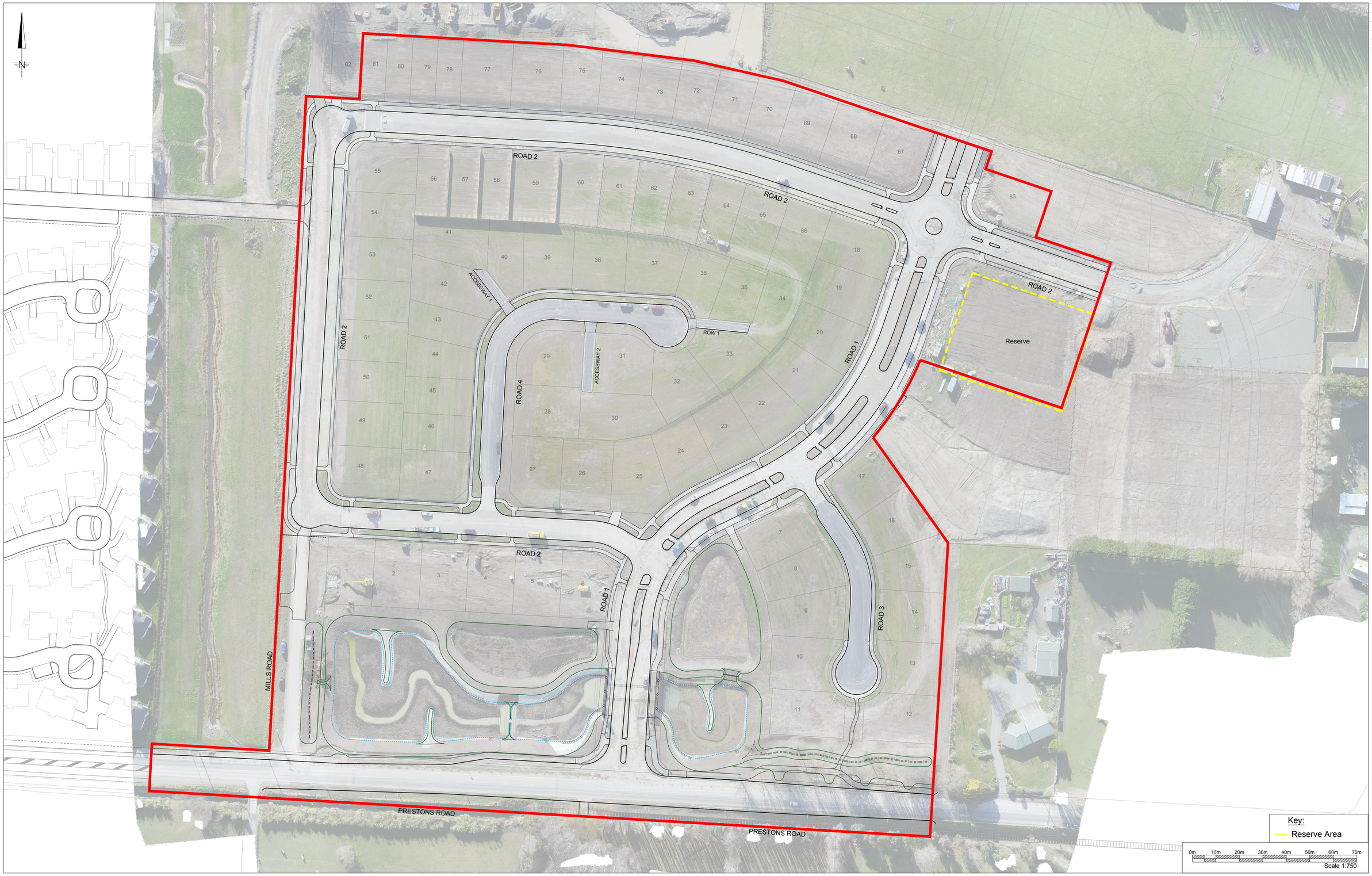

OAKBRIDGE - STAGE 1

SCALE 1:750

CAD ref: 34300.Stage1.Envirovalidationreport.dwg

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OAKBRIDGE

OAKBRIDGE - PRESTONS ROAD, REDWOOD
SITE LAYOUT
STAGE 1 VALIDATION REPORT

ENVIRONMENTAL SCIENCE
AERIAL PHOTO 02/08/21

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contractor to locate all existing services & verify all dimensions before commencing work

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OAKBRIDGE - STAGE 1

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OAKBRIDGE

OAKBRIDGE - PRESTONS ROAD, REDWOOD
REMEDIATION VALIDATION SAMPLES - BASE
STAGE 1 VALIDATION REPORT

ENVIRONMENTAL SCIENCE
AERIAL PHOTO 02/08/21

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contractor to locate all existing services & verify all dimensions before commencing work

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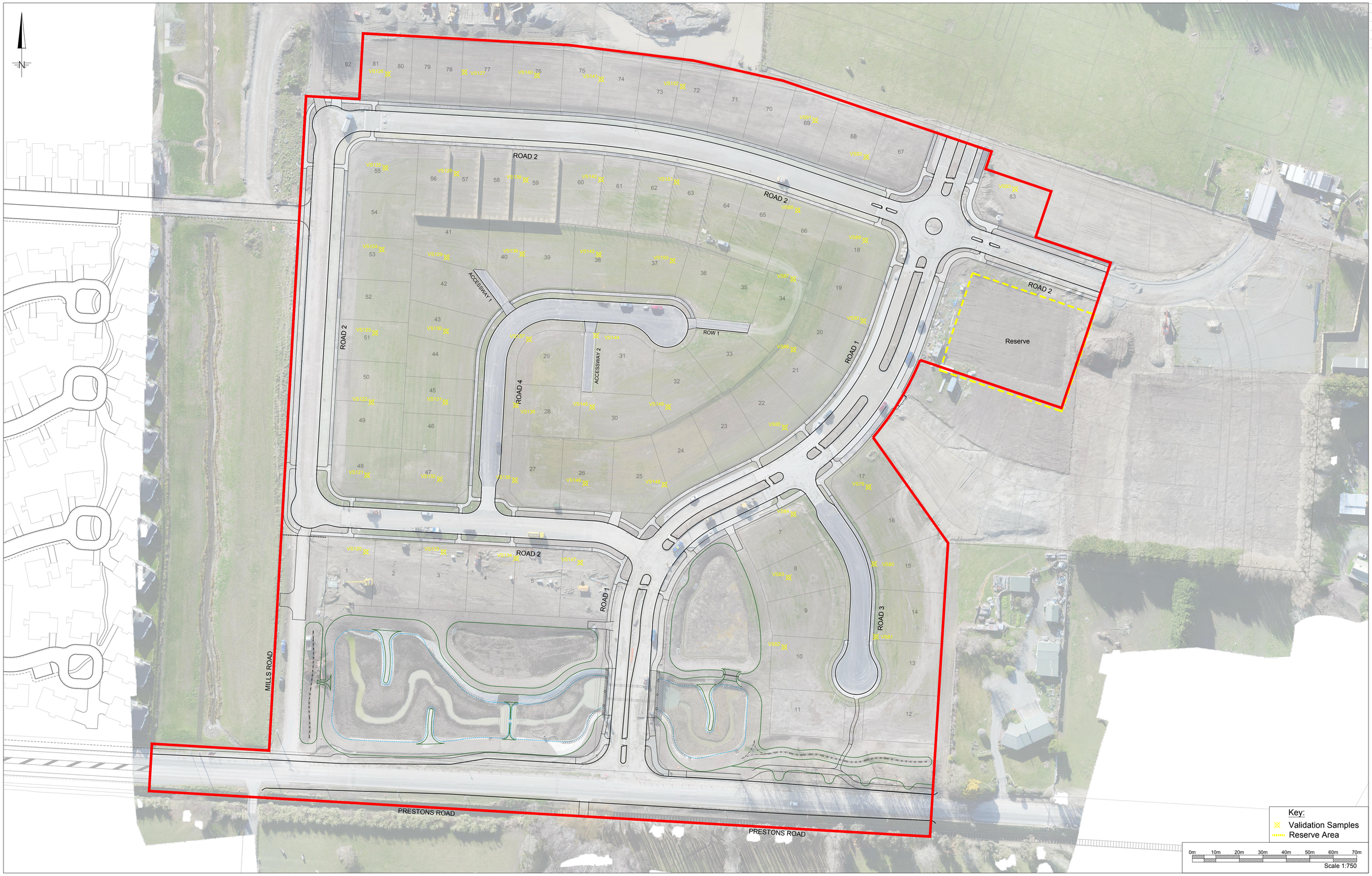

OAKBRIDGE - STAGE 1

SCALE 1:750

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OAKBRIDGE

OAKBRIDGE - PRESTONS ROAD, REDWOOD
REMEDIATION VALIDATION SAMPLES - TOPSOIL
STAGE 1 VALIDATION REPORT

ENVIRONMENTAL SCIENCE
AERIAL PHOTO 02/08/21

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Table 1: Soil Validation Analytical Results - Excavation

				Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
SCS Residential Land Use [1]				20	3	460 [2]	>10,000	210	400 [3]	7,400 [3]
Background [4]				16.3	0.36	25.9	25	128.8	20.7	166.8
Sample ID	Depth (m)	Date	Method							
VSB1	0.5 - 0.8	20/08/2019	XRF	11	-	<11	21	51	29	94
VSB2	0.5 - 0.8	20/08/2019	XRF	5	-	<13	11	25	30	79
VSB3	0.5 - 0.8	20/08/2019	XRF	6	-	<11	9	17	23	80
VSB4	0.5 - 0.8	20/08/2019	XRF	3	-	<12	10	20	27	63
VSB5	0.5 - 0.8	20/08/2019	XRF	9	-	<15	18	35	29	88
VSB6	0.5 - 0.8	20/08/2019	XRF	8	-	<14	10	35	25	79
VSB7	0.5 - 0.8	20/08/2019	XRF	6	-	21	10	16	15	57
VSB8	0.5 - 0.8	20/08/2019	XRF	4	-	<17	7	26	21	68
VSC1	0.45	17/01/2020	XRF	5	-	<14	10	20	<10	58
VSC2	0.45	17/01/2020	XRF	7	-	<18	8	20	12	63
			20-01862-6	6.5	0.06	21.3	8.88	24.4	16.2	91.6
VSC3	0.45	17/01/2020	XRF	10	-	<12	10	21	19	66
VSC4	0.45	17/01/2020	XRF	7	-	<12	13	23	17	70
VSC5	0.45	17/01/2020	XRF	4	-	<13	<5	18	15	78
VSC6	0.45	17/01/2020	XRF	13	-	<13	12	30	32	83
VSC7	0.45	17/01/2020	XRF	6	-	<12	7	21	10	69
			20-01862-7	4.5	0.059	20.3	7.67	24.4	16.3	87.3
VSC8	0.45	17/01/2020	XRF	4	-	<13	10	24	14	80
VSC9	0.45	17/01/2020	XRF	6	-	<54	7.4	27	20	84
VS1	0.4-0.6	17/03/2020	XRF	6		<17	11	24	22	78
			20-12566-1	5.5	0.075	21.8	8.69	27.6	17.1	89.8
VS2	0.4-0.6	17/03/2020	XRF	5		<17	7	27	28	75
			20-12566-2	6.3	0.085	21.6	8.39	26.4	16.9	99.9
VS3	0.4-0.6	17/03/2020	XRF	4		<17	8	23	26	68
			20-12566-3	4.9	0.074	21.3	7.51	25.1	17	84.1
VS4	0.4-0.6	17/03/2020	XRF	3		<18	7	19	21	55
			20-12566-4	4.5	0.068	21.7	11	26.6	17.7	85.7
VS5	0.4-0.6	17/03/2020	XRF	3		<16	10	20	25	62
			20-12566-5	3.8	0.08	21.8	12.7	25	18.3	80
VS6	0.4-0.6	17/03/2020	XRF	5		<17	6	23	18	56
			20-12566-6	5.7	0.068	21.7	9.53	24.3	17.3	79.5
VS7	0.4-0.6	17/03/2020	XRF	12		<17	11	25	30	72
			20-12566-7	**17.4**	0.097	21.7	11.8	27.1	17.4	84
VS8	0.1	15/06/2020	XRF	**17**		<18	18	21	24	65
			20-22045-1	**29.9**	0.078	23.6	14.3	30.6	20.3	89.9
VS9	0.4	15/06/2020	XRF	7		<17	13	23	31	66
			20-22045-2	8.8	0.1	23.8	14.1	29	19.2	85.2
VS10	0.4	15/06/2020	XRF	5		<16	5	19	28	50
VS11	0.1	15/06/2020	XRF	6		<17	12	27	23	58
VS12	0.1	15/06/2020	XRF	16		<17	14	23	27	67
VS13	0.4	15/06/2020	XRF	8		<16	12	22	26	65
VS14	0.4	15/06/2020	XRF	11		<16	10	25	23	61
			20-22045-3	14.3	0.085	22.2	14.2	30.1	17.4	86
VS15	0.1	15/06/2020	XRF	11		<17	10	25	25	67
			20-22045-4	14.7	0.16	24.3	16.3	32.6	19.2	87.9
VS16	0.1	15/06/2020	XRF	12		<17	20	23	29	68
VS17	0.4	15/06/2020	XRF	8		<15	11	17	24	53
VS18	0.4	15/06/2020	XRF	9		<16	11	23	29	59
VS19	0.1	15/06/2020	XRF	9		<17	12	26	26	66
VS20	0.1	15/06/2020	XRF	13		<17	10	21	30	59
			20-22045-5	12.9	0.075	22.5	13.1	27.3	19.7	83.8
VS21	0.4	15/06/2020	XRF	7		<13	11	23	28	65
VS22	0.4	15/06/2020	XRF	12		<15	10	23	31	62
			20-22045-6	13.7	0.09	23.7	14.7	28.7	18.5	86.6
VS23	0.1	15/06/2020	XRF	10		<15	13	23	26	65
VS24	0.2	15/06/2020	XRF	11		<17	13	24	31	68
VS25	0.4	15/06/2020	XRF	10		<15	11	21	23	62
VS26	0.2	15/06/2020	XRF	13		<16	14	22	31	84
VS27	0.4	20/08/2019	XRF	6		<15	8	19	20	57
VS28	0.4	20/08/2019	XRF	5		<16	7	19	24	48
VS29	0.4	15/06/2020	XRF	9		<16	7	19	25	61
VS30	0.4	15/06/2020	XRF	6		<14	9	22	25	63
VS31	0.1	15/06/2020	XRF	9		<16	14	24	26	65
VS32	0.4	15/06/2020	XRF	6		<15	15	22	31	63
			20-22045-7	8.8	0.1	22.3	15.6	30.3	17.9	98.6
VS33	0.4	15/06/2020	XRF	9		<16	7	23	30	52
VS34	0.4	15/06/2020	XRF	4		<16	7	22	25	59
VS35	0.1	15/06/2020	XRF	4		<16	4	16	30	57
VS36	0.1	15/06/2020	XRF	9		<LOD	11	26	25	67
VS37	0.1	15/06/2020	XRF	13		<17	10	25	32	68
			20-22045-8	**16.6**	0.14	23.9	16.5	32.3	19.5	89.6
VS38	0.1	15/06/2020	XRF	14		<16	14	25	27	70
VS39	0.4	15/06/2020	XRF	9		<16	25	29	29	78
VS40	0.4	15/06/2020	XRF	3		<14	8	17	24	60
VS41	0.4	15/06/2020	XRF	7		<15	13	22	29	64
VS42	0.4	9/03/2021	XRF	6		<14	6	19	17	48
			21-12060-1	4	0.028	17.4	6.4	17.2	11.8	53
VS43	0.4	9/03/2021	XRF	4		<14	7	16	25	46
VS44	0.4	9/03/2021	XRF	5		<14	8	14	24	40
			21-12060-2	5.5	0.025	17.4	9.56	15.8	13	50.9
VS45	0.4	9/03/2021	XRF	4		<14	10	20	37	45
VS46	0.4	9/03/2021	XRF	2		<13	10	16	22	40
			21-12060-3	3.9	0.026	14.9	6.9	14.5	12.1	48
VS47	0.4	9/03/2021	XRF	4		<13	7	12	27	37
VS48	0.4	9/03/2021	XRF	3		<13	8	14	22	47
			21-12060-4	3.2	0.02	18	8.78	15.8	14	50.2
VS49	0.4	9/03/2021	XRF	7		<14	5	13	24	34
VS50	0.4	23/03/2021	XRF	7		<14	7	11	21	33
			21-12060-5	6	0.023	15.9	6.4	12.1	12.4	38.4
VS50 - Fill	*0.2*	*9/03/2021*	*XRF*	*13*		*<15*	*7*	*19*	*26*	*45*
			21-12060-6	*24.5*	*0.044*	*18.5*	*7.2*	*18*	*14.1*	*59.8*
VS50 Fill A	0.2	23/03/2021	21-13413-1	8	0.057	18.1	10.7	19.2	15.5	61.9
VS50 Fill B	0.2	23/03/2021	21-13413-2	7.7	0.06	19.1	11.5	19	16.2	63.2
VS50 Fill C	0.2	23/03/2021	21-13413-3	9.6	0.047	17.1	9.27	17.8	14.1	59.9
VS50 Fill D	0.2	23/03/2021	21-13413-4	8.5	0.06	18.5	10.3	19.7	15.2	66.7
VS51	0.2 - fill	9/03/2021	XRF	4		<14	5	14	22	43
			21-12060-7	4.5	0.021	16.7	5.4	14.3	12.1	47.3
	0.4	9/03/2021	XRF	7		<13	6	12	14	29
VS52	0.2-fill	9/03/2021	XRF	5		<15	9	19	20	52
	0.4	9/03/2021	XRF	4		<14	7	13	21	36
VS53	0.2-fill	9/03/2021	XRF	6		<15	11	18	11	51
	0.4	9/03/2021	XRF	3		<13	8	15	20	37
			21-12060-8	2.3	0.023	17	8.85	14.8	13.7	47.9
VS54	0.2-fill	9/03/2021	XRF	4		<15	10	21	17	48
			21-12060-9	5.6	0.054	15.9	8.74	17	14.3	59.4
	0.4	9/03/2021	XRF	4		<15	7	15	18	45

Notes:
All results in mg/kg
Bold - indicates exceeds adopted background criteria
Italic - indicates soils represented by this sample removed.
Highlight - indicates exceeds SCS for residential land use.

1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS).
2. NES SCS criteria presented are for Chromium (VI)
3. National Environment Protection Council (NEPC) (2013). National Environmental Protection (Assessment of Site Contamination) Measure 2013 Schedule C.
4. Environment Canterbury (Ecan 2007). Background Concentrations of selected trace elements in Canterbury Soils. Urban Recent / Regional Recent / Urban Gley / Regional Gley / Regional Organic

Table 2: Soil Validation Sample Analytical Results - Topsoil

				Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
SCS Residential Land Use [1]				20	3	460 [2]	>10,000	210	400 [3]	7,400 [3]
Background [4]				16.3	0.36	25.9	25	128.8	20.7	166.8
Sample ID	Depth (m)	Date	Method							
VS79	0.0-0.15	30/04/2021	XRF	8	-	<15	12	21	25	53
			21-19831-12	8.4	0.17	20.7	12.8	23.5	14.2	66.2
VS80	0.0-0.15	30/04/2021	XRF	8	-	<15	11	19	20	52
			21-19831-13	8.3	0.13	17.8	10.8	21.7	12.2	62.2
VS81	0.0-0.15	30/04/2021	XRF	7	-	<15	8	22	21	50
			21-19831-14	7.9	0.17	17.7	10.9	22	11.9	58.7
VS82	0.0-0.15	30/04/2021	XRF	11	-	<13	13	23	18	53
			21-19831-15	11	0.18	20.1	13.2	24.6	14.6	61.9
VS83	0.0-0.15	30/04/2021	XRF	11	-	<15	13	20	17	50
			21-19831-16	11	0.16	18.5	13.3	24.5	13.5	58.6
VS84	0.0-0.15	30/04/2021	XRF	8	-	<16	9	20	19	52
			21-19831-17	9.1	0.11	16	7.59	18.4	11.2	51
VS85	0.0-0.15	30/04/2021	XRF	11	-	<17	14	26	23	66
			21-19831-18	9.9	0.11	20.2	13.8	25.7	15.5	70.2
VS86	0.0-0.15	30/04/2021	XRF	6	-	<16	14	19	24	47
			21-19831-19	8.2	0.11	18.7	9.42	23.7	13.1	62.6
VS87	0.0-0.15	30/04/2021	XRF	10	-	<17	18	23	31	63
			21-19831-20	15.7	0.13	20.7	21.4	27.5	17.1	85
VS88	0.0-0.15	30/04/2021	XRF	9	-	<15	12	22	19	65
			21-19831-21	10	0.14	20.7	14	25	16.2	73.5
VS89	0.0-0.15	30/04/2021	XRF	8	-	<15	10	20	25	51
			21-19831-22	8.4	0.11	18.7	10.5	23.3	13.6	65.4
VS90	0.0-0.15	30/04/2021	XRF	10	-	<17	13	21	22	60
			21-19831-23	10	0.12	20	15.2	24.7	15.6	72.6
VS91	0.0-0.15	30/04/2021	XRF	3	-	<17	4	15	21	45
			21-19831-24	4.1	0.028	14.8	4.3	15.5	10.3	50
VS92	0.0-0.15	30/04/2021	XRF	3	-	<16	5	16	20	43
			21-19831-25	3.3	0.033	13.9	3.7	15.3	10.1	52.1
VS93	0.0-0.15	30/04/2021	XRF	5	-	<16	7	18	22	47
			21-19831-26	4.9	0.037	16.7	5.5	18.3	11.3	57.2
VS120	0.0-0.15	28/07/2021	XRF	9	-	<15	14	26	24	63
			21-34409-1	11	0.1	21.1	13.9	29.8	16.6	79.6
VS121	0.0-0.15	28/07/2021	XRF	6	-	<12	7	23	10	86
VS122	0.0-0.15	28/07/2021	XRF	7	-	<14	18	29	15	72
VS123	0.0-0.15	28/07/2021	XRF	13	-	<14	16	28	16	77
			21-34409-2	16.3	0.11	23.4	18	36.6	20	106
VS124	0.0-0.15	28/07/2021	XRF	11	-	<15	13	26	16	76
			21-34409-3	13.4	0.12	22.7	18.4	33.1	20	94.2
VS125	0.0-0.15	28/07/2021	XRF	8	-	<12	16	21	20	62
VS126	0.0-0.15	28/07/2021	XRF	9	-	<15	19	24	13	75
VS127	0.0-0.15	28/07/2021	XRF	11	-	<14	24	20	16	73
			21-34409-4	15.3	0.13	22	**35.1**	29.8	19.1	96.8
VS128	0.0-0.15	28/07/2021	XRF	6	-	<13	10	23	12	55
VS129	0.0-0.15	28/07/2021	XRF	12	-	<14	14	22	18	74
VS130	0.0-0.15	28/07/2021	XRF	8	-	<13	12	24	20	66
VS131	0.0-0.15	28/07/2021	XRF	8	-	<14	11	23	20	64
			21-34409-5	12	0.13	22.6	17.2	31.4	20.1	88.8
VS132	0.0-0.15	28/07/2021	XRF	7	-	<12	11	20	9	55
VS133	0.0-0.15	28/07/2021	XRF	11	-	<14	16	26	21	73
			21-34409-6	13.7	0.13	23	18.1	33.2	20	89.6
VS134	0.0-0.15	28/07/2021	XRF	8	-	<12	12	23	25	62
VS135	0.0-0.15	28/07/2021	XRF	8	-	<13	12	27	19	66
VS136	0.0-0.15	28/07/2021	XRF	10	-	24	13	27	15	66
VS137	0.0-0.15	28/07/2021	XRF	9	-	<13	13	23	16	61
			21-34409-7	13.1	0.15	22.5	16.5	30.4	17.6	82.7
VS138	0.0-0.15	28/07/2021	XRF	7	-	<16	13	19	<9	56
VS139	0.0-0.15	28/07/2021	XRF	9	-	<14	12	21	22	62
VS140	0.0-0.15	28/07/2021	XRF	9	-	<15	21	20	15	69
VS141	0.0-0.15	28/07/2021	XRF	11	-	<14	21	23	22	75
VS142	0.0-0.15	28/07/2021	XRF	9	-	<15	14	17	<9	51
VS143	0.0-0.15	28/07/2021	XRF	10	-	<14	12	23	15	67
			21-34409-8	12	0.12	20.4	15.8	28.3	18	85.6
VS144	0.0-0.15	28/07/2021	XRF	11	-	<12	11	24	13	59
VS145	0.0-0.15	28/07/2021	XRF	10	-	<12	12	23	21	60
VS146	0.0-0.15	28/07/2021	XRF	7	-	<13	8	17	<8	52
VS147	0.0-0.15	28/07/2021	XRF	6	-	<17	8	24	21	63
VS148	0.0-0.15	28/07/2021	XRF	6	-	<14	10	19	18	48
			21-34409-9	7.2	0.14	21.1	11.4	26.2	14	67.9
VS149	0.0-0.15	28/07/2021	XRF	10	-	<12	11	20	23	61
VS150	0.0-0.15	28/07/2021	XRF	9	-	<13	12	16	21	62
VS151	0.0-0.15	28/07/2021	XRF	10	-	<14	17	9	22	64
VS152	0.0-0.15	28/07/2021	XRF	12	-	<14	15	20	21	59
			21-34409-10	15.7	0.13	22.2	23.2	30.3	19.1	89.1

Notes:
All results in mg/kg
Bold - indicates exceeds adopted background criteria

1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS).
2. NES SCS criteria presented are for Chromium (VI)
3. National Environment Protection Council (NEPC) (2013). National Environmental Protection (Assessment of Site Contamination) Measure 2013 Schedule C.
4. Environment Canterbury (Ecan 2007). Background Concentrations of selected trace elements in Canterbury Soils. Urban Recent / Regional Recent / Urban Gley / Regional Gley / Regional Organic

Table 3: Soil Validation Analytical Results - Cleanfill Characterisation									
			Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Background[1]			16.3	0.36	25.9	25	128.8	20.7	166.8
Sample ID	Date	Method							
ST12	7/11/2019	XRF	7	-	<15	11	29	18	79
ST13	7/11/2019	XRF	10	-	<12	16	31	23	90
ST14	7/11/2019	XRF	11	-	<4	12	29	22	82
ST15	7/11/2019	XRF	9	-	<14	11	24	22	64
ST16	7/11/2019	XRF	7	-	<15	8	23	19	63
ST17	7/11/2019	XRF	8	-	<14	16	30	22	81
ST18	7/11/2019	XRF	12	-	<13	16	37	27	98
ST19	7/11/2019	XRF	14	-	<14	15	29	23	82
		19-41213-12	**16.9**	0.16	23.9	19.5	38.9	21.3	116
ST20	7/11/2019	XRF	9	-	<14	11	30	21	91
ST21	7/11/2019	XRF	8	-	<13	15	40	18	99
ST22	7/11/2019	XRF	11	-	<14	12	35	24	90
ST23	7/11/2019	XRF	10	-	<14	15	27	27	70
ST24	7/11/2019	XRF	16	-	<14	13	33	23	77
		19-41213-13	12.8	0.13	25.2	20.2	37.8	21.2	108
ST25	7/11/2019	XRF	7	-	<14	21	42	26	96
ST26	7/11/2019	XRF	12	-	<12	14	42	26	95
		19-41213-14	12	0.14	23.7	23.5	60.8	20.1	126
ST27	7/11/2019	XRF	5	-	<14	10	28	20	83
ST28	7/11/2019	XRF	9	-	<13	13	32	23	77
ST29	7/11/2019	XRF	7	-	<13	13	26	33	71
ST30	7/11/2019	XRF	14	-	<13	23	73	22	122
		19-41213-15	**18.8**	0.23	24.4	31.5	85.4	21.2	**185**
ST31	7/11/2019	XRF	10	-	<14	18	44	23	97
C1	28/01/2020	XRF	11	-	<17	13	26	26	66
		20-03526-1	12.8	0.13	**27.1**	15.5	30.9	19.4	85.9
C2	28/01/2020	XRF	10	-	<18	13	24	22	66
		20-03526-2	11	0.13	**26.2**	13.9	29.5	18.8	83.9
C3	28/01/2020	XRF	9	-	<18	13	26	29	68
		20-03526-3	11	0.11	23.3	14.2	28.8	16.8	82.8
C4	28/01/2020	XRF	9	-	<16	14	27	26	69
		20-03526-4	12	0.11	22.3	13.1	29.6	16.3	79.8
C5	28/01/2020	XRF	13	-	<16	13	27	24	71
		20-03526-5	14.8	0.12	23.6	14.7	29.5	17.5	82.9
C6	28/01/2020	XRF	10	-	<15	13	26	33	72
		20-03526-6	12.7	0.12	23.3	14.2	29	16.6	80.5
C7	28/01/2020	XRF	9	-	<16	12	25	25	72
		20-03526-7	11	0.11	21.9	13	26.4	15	72.7
C8	28/01/2020	XRF	10	-	<14	10	24	23	65
		20-03526-8	9.6	0.097	24.2	12.4	28.4	17	80.4
C9	28/01/2020	XRF	10	-	<13	13	23	29	64
		20-03526-9	10	0.12	21.6	12.5	28.1	15.9	75.6
C10	28/01/2020	XRF	9	-	<15	12	24	26	68
		20-03526-10	12.6	0.12	24.2	15.1	30.2	17.6	85.9
C11	28/01/2020	XRF	9	-	<13	12	26	27	71
		20-03526-11	13.1	0.13	23.7	14.8	31.4	17.5	82.4
C12	28/01/2020	XRF	10	-	<13	13	27	23	66
		20-03526-12	15.1	0.13	23.5	15.9	29.7	17.9	82.6
ST24	5/02/2020	XRF	9	-	<17	10	27	20	69
		20-04795-1	8.6	0.1	19.6	12.7	25.1	15.4	72.4
ST25	5/02/2020	XRF	7	-	<17	13	25	23	63
ST26	5/02/2020	XRF	9	-	<11	14	25	22	65
		20-04795-2	13.4	0.11	21.4	13.8	28.6	16.1	76.9
ST27	5/02/2020	XRF	11	-	<17	14	25	22	63
		20-04795-3	11	0.11	20.8	16.1	27.4	16.1	74.5
ST28	5/02/2020	XRF	9	-	<16	13	24	21	62
ST29	5/02/2020	XRF	8	-	<16	13	27	23	64
ST30	5/02/2020	XRF	12	-	<17	14	29	22	71
		20-04795-4	11	0.1	21	14.6	27.5	16.4	76.3
ST31	5/02/2020	XRF	11	-	<17	15	32	32	86
		20-04795-5	10	0.099	22	14.6	28.7	17.3	79
ST32	5/02/2020	XRF	8	-	<14	13	27	22	69
ST33	5/02/2020	XRF	8	-	<16	13	28	32	70
		20-04795-6	11	0.1	21.2	13.4	27.3	16.6	79.8
ST50	17/03/2020	XRF	11	-	<19	17	32	27	77
		20-12566-8	12	0.11	24.3	17.7	32.6	20	91.9
ST51	17/03/2020	XRF	8	-	<17	12	24	27	68
ST52	17/03/2020	XRF	10	-	<17	14	27	26	71
ST53	17/03/2020	XRF	8	-	<18	14	32	26	68
ST54	17/03/2020	XRF	11	-	<15	16	24	29	69
		20-12566-9	13.7	0.13	23.5	17.6	35.4	19.2	95.6
ST55	17/03/2020	XRF	7	-	<17	18	31	26	76
ST56	17/03/2020	XRF	10	-	<17	14	29	25	73
ST57	17/03/2020	XRF	9	-	<18	13	29	31	70
ST58	17/03/2020	XRF	13	-	<18	15	31	27	74
		20-12566-10	16	0.13	25.8	19.2	36.3	21.6	98.8
ST59	17/03/2020	XRF	11	-	<17	13	28	29	74
ST60	17/03/2020	XRF	9	-	<17	13	27	32	73
ST61	17/03/2020	XRF	12	-	<18	14	23	27	71
		20-12566-11	13	0.11	25.2	19.8	33.9	21.3	95.5
ST62	17/03/2020	XRF	8	-	<18	15	24	28	65
ST63	17/03/2020	XRF	11	-	<18	16	28	26	89
ST64	17/03/2020	XRF	10	-	<17	14	28	27	93
ST65	17/03/2020	XRF	11	-	<16	17	27	24	85
		20-12566-12	14.4	0.17	24.4	20.7	36.5	20.5	134
ST66	17/03/2020	XRF	9	-	<18	16	31	24	79
ST67	17/03/2020	XRF	8	-	<17	19	28	24	75
ST68	17/03/2020	XRF	10	-	<18	14	26	31	67
ST69	17/03/2020	XRF	9	-	<17	14	30	37	77
		20-12566-13	12	0.11	23.5	18.1	33.9	19.4	98.3
ST70	17/03/2020	XRF	10	-	<18	15	24	35	67
ST71	17/03/2020	XRF	13	-	<18	16	31	21	75
		20-12566-14	15.1	0.13	24.1	19.4	35.8	19.9	101
ST72	17/03/2020	XRF	7	-	<18	14	34	17	77
ST73	17/03/2020	XRF	11	-	<17	16	38	26	101
ST74	17/03/2020	XRF	14	-	<18	20	33	26	93
		20-12566-15	16.6	0.15	22.5	20.7	41	19.5	121

Notes:
All results in mg/kg
Bold - indicates exceeds adopted background criteria

1. Environment Canterbury (Ecan 2007). Background Concentrations of selected trace elements in Canterbury Soils.

APPENDIX A

Burwood Landfill Disposal Record

Tran Docket	Date Time In	Manifest Number	Vehicle Id	Transporter	Product	Gross Weight	Tare Weight	Net Weight
440878	18/12/2019 10:30	656689	JBH526	K B Contracting	CCC Special Soil Class A	17.18	10.68	6.50
440879	18/12/2019 10:31	656689	JBH526T	K B Contracting	CCC Special Soil Class A	16.74	6.44	10.30
440881	18/12/2019 10:42	656689	HTC598	K B Contracting	CCC Special Soil Class A	16.62	10.80	5.82
440885	18/12/2019 10:47	656689	GQN65	K B Contracting	CCC Special Soil Class A	28.10	15.10	13.00
440888	18/12/2019 10:50	656689	MKJ149	K B Contracting	CCC Special Soil Class A	17.32	11.10	6.22
440889	18/12/2019 10:52	656689	MKJ149T	K B Contracting	CCC Special Soil Class A	17.08	6.40	10.68
440892	18/12/2019 11:00	656689	HTC598T	K B Contracting	CCC Special Soil Class A	20.10	7.18	12.92
440901	18/12/2019 11:36	656689	HTC579	Pullen Haulage Ltd	CCC Special Soil Class A	17.18	11.10	6.08
440902	18/12/2019 11:36	656689	HTC579T	Pullen Haulage Ltd	CCC Special Soil Class A	17.70	6.55	11.15
440903	18/12/2019 11:37	656689	JBH526	K B Contracting	CCC Special Soil Class A	18.02	10.68	7.34
440904	18/12/2019 11:37	656689	JBH526T	K B Contracting	CCC Special Soil Class A	19.34	6.44	12.90
440905	18/12/2019 11:38	656689	GQN65	K B Contracting	CCC Special Soil Class A	28.38	15.10	13.28
440908	18/12/2019 11:41	656689	MKJ149	K B Contracting	CCC Special Soil Class A	17.18	11.10	6.08
440909	18/12/2019 11:42	656689	MKJ149T	K B Contracting	CCC Special Soil Class A	17.62	6.40	11.22
440912	18/12/2019 11:44	656689	GHY181	K B Contracting	CCC Special Soil Class A	17.40	11.04	6.36
440913	18/12/2019 11:45	656689	GHY181T	K B Contracting	CCC Special Soil Class A	17.64	6.66	10.98
440921	18/12/2019 11:55	656689	HJC419	K B Contracting	CCC Special Soil Class A	17.06	11.00	6.06
440922	18/12/2019 11:57	656689	HJC419T	K B Contracting	CCC Special Soil Class A	18.94	7.08	11.86
440928	18/12/2019 12:20	656689	HJC419T	K B Contracting	CCC Special Soil Class A	17.64	7.08	10.56
440930	18/12/2019 12:23	656689	HTC598	K B Contracting	CCC Special Soil Class A	17.30	10.80	6.50
440931	18/12/2019 12:24	656689	HTC598T	K B Contracting	CCC Special Soil Class A	19.28	7.18	12.10
440937	18/12/2019 12:32	656689	GHY181	K B Contracting	CCC Special Soil Class A	17.74	11.04	6.70
440939	18/12/2019 12:33	656689	GHY181T	K B Contracting	CCC Special Soil Class A	19.38	6.66	12.72
440950	18/12/2019 13:12	656689	JBH526	K B Contracting	CCC Special Soil Class A	17.18	10.68	6.50
440951	18/12/2019 13:13	656689	JBH526T	K B Contracting	CCC Special Soil Class A	19.28	6.44	12.84
440952	18/12/2019 13:14	656689	MKJ149	K B Contracting	CCC Special Soil Class A	17.66	11.10	6.56
440953	18/12/2019 13:14	656689	MKJ149T	K B Contracting	CCC Special Soil Class A	18.80	6.40	12.40
440954	18/12/2019 13:15	656689	GQN65	K B Contracting	CCC Special Soil Class A	30.54	15.10	15.44
440955	18/12/2019 13:20	656689	HJC419	K B Contracting	CCC Special Soil Class A	18.20	11.00	7.20
440957	18/12/2019 13:22	656689	HJC419T	K B Contracting	CCC Special Soil Class A	19.58	7.08	12.50
440959	18/12/2019 13:28	656689	JSK785	K B Contracting	CCC Special Soil Class A	18.40	10.92	7.48
440960	18/12/2019 13:30	656689	JSK785T	K B Contracting	CCC Special Soil Class A	19.66	6.88	12.78
440964	18/12/2019 13:36	656689	HTC598	K B Contracting	CCC Special Soil Class A	17.72	10.80	6.92
440965	18/12/2019 13:38	656689	HTC598T	K B Contracting	CCC Special Soil Class A	19.50	7.18	12.32
440969	18/12/2019 13:43	656689	GHY181	K B Contracting	CCC Special Soil Class A	19.20	11.04	8.16
440970	18/12/2019 13:43	656689	GHY181T	K B Contracting	CCC Special Soil Class A	20.28	6.66	13.62
440972	18/12/2019 13:49	656689	JBH526	K B Contracting	CCC Special Soil Class A	16.72	10.68	6.04
440973	18/12/2019 13:49	656689	JBH526T	K B Contracting	CCC Special Soil Class A	15.70	6.44	9.26
440975	18/12/2019 13:54	656689	MKJ149	K B Contracting	CCC Special Soil Class A	16.68	11.10	5.58
440976	18/12/2019 13:54	656689	MKJ149T	K B Contracting	CCC Special Soil Class A	16.84	6.40	10.44
440977	18/12/2019 14:03	656689	HJC419	K B Contracting	CCC Special Soil Class A	17.00	11.00	6.00
440978	18/12/2019 14:03	656689	HJC419T	K B Contracting	CCC Special Soil Class A	17.26	7.08	10.18
440979	18/12/2019 14:05	656689	GQN65	K B Contracting	CCC Special Soil Class A	28.28	15.10	13.18
440983	18/12/2019 14:11	656689	JSK785	K B Contracting	CCC Special Soil Class A	17.32	10.92	6.40
440984	18/12/2019 14:12	656689	JSK785T	K B Contracting	CCC Special Soil Class A	17.54	6.88	10.66
440987	18/12/2019 14:25	656689	HTC598	K B Contracting	CCC Special Soil Class A	18.08	11.80	6.28
440988	18/12/2019 14:26	656689	HTC598T	K B Contracting	CCC Special Soil Class A	17.76	7.18	10.58
440989	18/12/2019 14:29	656689	GHY181	K B Contracting	CCC Special Soil Class A	17.52	11.04	6.48
440990	18/12/2019 14:29	656689	GHY181T	K B Contracting	CCC Special Soil Class A	18.20	6.66	11.54
440997	18/12/2019 15:03	656689	JBH526	K B Contracting	CCC Special Soil Class A	16.50	10.68	5.82
440998	18/12/2019 15:04	656689	JBH526T	K B Contracting	CCC Special Soil Class A	16.90	6.44	10.46
440999	18/12/2019 15:05	656689	MKJ149	K B Contracting	CCC Special Soil Class A	17.26	11.10	6.16
441000	18/12/2019 15:05	656689	MKJ149T	K B Contracting	CCC Special Soil Class A	17.06	6.40	10.66
441003	18/12/2019 15:12	656689	HJC419	K B Contracting	CCC Special Soil Class A	16.98	11.00	5.98
441004	18/12/2019 15:13	656689	HJC419T	K B Contracting	CCC Special Soil Class A	17.56	7.08	10.48
441007	18/12/2019 15:22	656689	JSK785	K B Contracting	CCC Special Soil Class A	17.80	10.92	6.88
441008	18/12/2019 15:24	656689	JSK785T	K B Contracting	CCC Special Soil Class A	15.90	6.88	9.02
441011	18/12/2019 15:29	656689	HTC598	K B Contracting	CCC Special Soil Class A	13.32	10.80	2.52
441012	18/12/2019 15:30	656689	HTC598T	K B Contracting	CCC Special Soil Class A	13.30	7.18	6.12
							545.65	538.77

APPENDIX B

Laboratory Reports

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Certificate of Analysis

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Attention: Warren Sharp
Phone: 027 7007603
Email: warren@do.nz

Lab Reference: 19-41213
Submitted by: WJS
Date Received: 23/11/2019
Date Completed: 27/11/2019
Order Number:
Reference: 39630

Sampling Site: Oakbridge

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

Heavy Metals in Soil

	Client Sample ID		ST1	ST2	ST3	ST4	ST5
	Date Sampled		5/11/2019	5/11/2019	5/11/2019	5/11/2019	5/11/2019
Analyte	Unit	*Reporting Limit*	19-41213-1	19-41213-2	19-41213-3	19-41213-4	19-41213-5
Arsenic	mg/kg dry wt	*0.125*	21.6	15.2	19.4	16.8	17.6
Cadmium	mg/kg dry wt	*0.005*	0.16	0.19	0.17	0.19	0.19
Chromium	mg/kg dry wt	*0.125*	24.0	22.5	23.6	22.8	23.7
Copper	mg/kg dry wt	*0.075*	16.6	16.4	17.1	44.6	21.7
Lead	mg/kg dry wt	*0.05*	32.8	30.9	30.8	53.4	56.3
Nickel	mg/kg dry wt	*0.05*	20.4	18.8	19.9	20.0	21.2
Zinc	mg/kg dry wt	*0.05*	93.1	93.7	95.4	156	156

Heavy Metals in Soil

	Client Sample ID		ST6	ST7	ST8	ST9	ST10
	Date Sampled		5/11/2019	5/11/2019	5/11/2019	5/11/2019	5/11/2019
Analyte	Unit	*Reporting Limit*	19-41213-6	19-41213-7	19-41213-8	19-41213-9	19-41213-10
Arsenic	mg/kg dry wt	*0.125*	16.2	16.2	17.5	19.1	18.7
Cadmium	mg/kg dry wt	*0.005*	0.22	0.29	0.24	0.23	0.22
Chromium	mg/kg dry wt	*0.125*	23.9	23.0	23.8	24.0	24.9
Copper	mg/kg dry wt	*0.075*	21.7	24.9	21.8	20.1	22.1
Lead	mg/kg dry wt	*0.05*	37.2	53.8	35.5	33.9	34.4
Nickel	mg/kg dry wt	*0.05*	20.3	20.2	20.2	20.0	21.4
Zinc	mg/kg dry wt	*0.05*	105	183	102	95.9	97.0

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Heavy Metals in Soil

Client Sample ID			ST11	ST19	ST24	ST26	ST30
Date Sampled			5/11/2019	7/11/2019	7/11/2019	7/11/2019	7/11/2019
Analyte	Unit	*Reporting Limit*	19-41213-11	19-41213-12	19-41213-13	19-41213-14	19-41213-15
Arsenic	mg/kg dry wt	*0.125*	13.6	16.9	12.8	12	18.8
Cadmium	mg/kg dry wt	*0.005*	0.21	0.16	0.13	0.14	0.23
Chromium	mg/kg dry wt	*0.125*	22.8	23.9	25.2	23.7	24.4
Copper	mg/kg dry wt	*0.075*	17.6	19.5	20.2	23.5	31.5
Lead	mg/kg dry wt	*0.05*	33.4	38.9	37.8	60.8	85.4
Nickel	mg/kg dry wt	*0.05*	18.8	21.3	21.2	20.1	21.2
Zinc	mg/kg dry wt	*0.05*	101	116	108	126	185

Heavy Metals in Soil

Client Sample ID			USA	USB
Date Sampled			5/11/2019	5/11/2019
Analyte	Unit	*Reporting Limit*	19-41213-16	19-41213-17
Arsenic	mg/kg dry wt	*0.125*	19.6	16.7
Cadmium	mg/kg dry wt	*0.005*	0.23	0.15
Chromium	mg/kg dry wt	*0.125*	24.6	22.7
Copper	mg/kg dry wt	*0.075*	20.1	17.3
Lead	mg/kg dry wt	*0.05*	34.9	31.5
Nickel	mg/kg dry wt	*0.05*	20.7	18.9
Zinc	mg/kg dry wt	*0.05*	93.8	89.4

Method Summary

Elements in Soil Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Elizabeth Fitzgerald, B.Sc.
Senior Technician

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Phone: 027 7007603
Email: warren@do.nz

Lab Reference: 20-03526
Submitted by: WB
Date Received: 30/01/2020
Date Completed: 3/02/2020
Order Number:
Reference: 34300

Sampling Site: Oakbridge

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

Heavy Metals in Soil

	Client Sample ID		C1	C2	C3	C4	C5
	Date Sampled		28/01/2020	28/01/2020	28/01/2020	28/01/2020	28/01/2020
Analyte	Unit	*Reporting Limit*	20-03526-1	20-03526-2	20-03526-3	20-03526-4	20-03526-5
Arsenic	mg/kg dry wt	*0.125*	12.8	11	11	12	14.8
Cadmium	mg/kg dry wt	*0.005*	0.13	0.13	0.11	0.11	0.12
Chromium	mg/kg dry wt	*0.125*	27.1	26.2	23.3	22.3	23.6
Copper	mg/kg dry wt	*0.075*	15.5	13.9	14.2	13.1	14.7
Lead	mg/kg dry wt	*0.25*	30.9	29.5	28.8	29.6	29.5
Nickel	mg/kg dry wt	*0.05*	19.4	18.8	16.8	16.3	17.5
Zinc	mg/kg dry wt	*0.05*	85.9	83.9	82.8	79.8	82.9

Heavy Metals in Soil

	Client Sample ID		C6	C7	C8	C9	C10
	Date Sampled		28/01/2020	28/01/2020	28/01/2020	28/01/2020	28/01/2020
Analyte	Unit	*Reporting Limit*	20-03526-6	20-03526-7	20-03526-8	20-03526-9	20-03526-10
Arsenic	mg/kg dry wt	*0.125*	12.7	11	9.6	10	12.6
Cadmium	mg/kg dry wt	*0.005*	0.12	0.11	0.097	0.12	0.12
Chromium	mg/kg dry wt	*0.125*	23.3	21.9	24.2	21.6	24.2
Copper	mg/kg dry wt	*0.075*	14.2	13.0	12.4	12.5	15.1
Lead	mg/kg dry wt	*0.25*	29.0	26.4	28.4	28.1	30.2
Nickel	mg/kg dry wt	*0.05*	16.6	15.0	17.0	15.9	17.6
Zinc	mg/kg dry wt	*0.05*	80.5	72.7	80.4	75.6	85.9

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Heavy Metals in Soil

			Client Sample ID	C11	C12
			Date Sampled	28/01/2020	28/01/2020
Analyte	Unit	*Reporting Limit*		20-03526-11	20-03526-12
Arsenic	mg/kg dry wt	*0.125*		13.1	15.1
Cadmium	mg/kg dry wt	*0.005*		0.13	0.13
Chromium	mg/kg dry wt	*0.125*		23.7	23.5
Copper	mg/kg dry wt	*0.075*		14.8	15.9
Lead	mg/kg dry wt	*0.25*		31.4	29.7
Nickel	mg/kg dry wt	*0.05*		17.5	17.9
Zinc	mg/kg dry wt	*0.05*		82.4	82.6

Method Summary

Elements in Soil Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader

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Attention: Warren Sharp
Phone: 027 7007603
Email: warren@do.nz

Lab Reference: 20-04795
Submitted by: WS
Date Received: 6/02/2020
Date Completed: 12/02/2020
Order Number:
Reference: 34300

Sampling Site: Oakbridge

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

Heavy Metals in Soil

			ST24	ST26	ST27	ST30	ST31
		Date Sampled	5/02/2020	5/02/2020	5/02/2020	5/02/2020	5/02/2020
Analyte	Unit	*Reporting Limit*	20-04795-1	20-04795-2	20-04795-3	20-04795-4	20-04795-5
Arsenic	mg/kg dry wt	*0.125*	8.6	13.4	11	11	10
Cadmium	mg/kg dry wt	*0.005*	0.10	0.11	0.11	0.10	0.099
Chromium	mg/kg dry wt	*0.125*	19.6	21.4	20.8	21.0	22.0
Copper	mg/kg dry wt	*0.075*	12.7	13.8	16.1	14.6	14.6
Lead	mg/kg dry wt	*0.25*	25.1	28.6	27.4	27.5	28.7
Nickel	mg/kg dry wt	*0.05*	15.4	16.1	16.1	16.4	17.3
Zinc	mg/kg dry wt	*0.05*	72.4	76.9	74.5	76.3	79.0

Heavy Metals in Soil

			ST33	ST34	ST36
		Date Sampled	5/02/2020	5/02/2020	5/02/2020
Analyte	Unit	*Reporting Limit*	20-04795-6	20-04795-7	20-04795-8
Arsenic	mg/kg dry wt	*0.125*	11	14.2	22.3
Cadmium	mg/kg dry wt	*0.005*	0.10	0.12	0.15
Chromium	mg/kg dry wt	*0.125*	21.2	22.8	22.1
Copper	mg/kg dry wt	*0.075*	13.4	22.7	24.1
Lead	mg/kg dry wt	*0.25*	27.3	37.5	44.3
Nickel	mg/kg dry wt	*0.05*	16.6	19.8	19.4
Zinc	mg/kg dry wt	*0.05*	79.8	109	139

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

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Sampling Site: Oakbridge

Lab Reference: 20-12566
Submitted by: WJS
Date Received: 24/03/2020
Testing Initiated: 24/03/2020
Date Completed: 26/03/2020
Order Number: N/A
Reference: 36300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

	Client Sample ID		US1	US2	US3	US4	US5
	Date Sampled		17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Analyte	Unit	*Reporting Limit*	20-12566-1	20-12566-2	20-12566-3	20-12566-4	20-12566-5
Arsenic	mg/kg dry wt	*0.125*	5.5	6.3	4.9	4.5	3.8
Cadmium	mg/kg dry wt	*0.005*	0.075	0.085	0.074	0.068	0.080
Chromium	mg/kg dry wt	*0.125*	21.8	21.6	21.3	21.7	21.8
Copper	mg/kg dry wt	*0.075*	8.69	8.39	7.51	11.0	12.7
Lead	mg/kg dry wt	*0.25*	27.6	26.4	25.1	26.6	25.0
Nickel	mg/kg dry wt	*0.05*	17.1	16.9	17.0	17.7	18.3
Zinc	mg/kg dry wt	*0.05*	89.8	99.9	84.1	85.7	80.0

Heavy Metals in Soil

	Client Sample ID		US6	US7	ST50	ST54	ST58
	Date Sampled		17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Analyte	Unit	*Reporting Limit*	20-12566-6	20-12566-7	20-12566-8	20-12566-9	20-12566-10
Arsenic	mg/kg dry wt	*0.125*	5.7	17.4	12	13.7	16.0
Cadmium	mg/kg dry wt	*0.005*	0.068	0.097	0.11	0.13	0.13
Chromium	mg/kg dry wt	*0.125*	21.7	21.7	24.3	23.5	25.8
Copper	mg/kg dry wt	*0.075*	9.53	11.8	17.7	17.6	19.2
Lead	mg/kg dry wt	*0.25*	24.3	27.1	32.6	35.4	36.3
Nickel	mg/kg dry wt	*0.05*	17.3	17.4	20.0	19.2	21.6
Zinc	mg/kg dry wt	*0.05*	79.5	84.0	91.9	95.6	98.8

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Heavy Metals in Soil

			ST61	ST65	ST69	ST71	ST74
Client Sample ID							
Date Sampled			17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Analyte	Unit	*Reporting Limit*	20-12566-11	20-12566-12	20-12566-13	20-12566-14	20-12566-15
Arsenic	mg/kg dry wt	*0.125*	13.0	14.4	12	15.1	16.6
Cadmium	mg/kg dry wt	*0.005*	0.11	0.17	0.11	0.13	0.15
Chromium	mg/kg dry wt	*0.125*	25.2	24.4	23.5	24.1	22.5
Copper	mg/kg dry wt	*0.075*	19.8	20.7	18.1	19.4	20.7
Lead	mg/kg dry wt	*0.25*	33.9	36.5	33.9	35.8	41.0
Nickel	mg/kg dry wt	*0.05*	21.3	20.5	19.4	19.9	19.5
Zinc	mg/kg dry wt	*0.05*	95.5	134	98.3	101	121

Method Summary

Elements in Soil Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader

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Sampling Site: Oakbridge

Lab Reference: 20-22045
Submitted by: W.J.S.
Date Received: 18/06/2020
Testing Initiated: 18/06/2020
Date Completed: 23/06/2020
Order Number: N/A
Reference: 34300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

	Client Sample ID		VS8	VS9	VS14	VS15	VS20
	Date Sampled		15/06/2020	15/06/2020	15/06/2020	15/06/2020	15/06/2020
Analyte	Unit	*Reporting Limit*	20-22045-1	20-22045-2	20-22045-3	20-22045-4	20-22045-5
Arsenic	mg/kg dry wt	*0.125*	29.9	8.8	14.3	14.7	12.9
Cadmium	mg/kg dry wt	*0.005*	0.078	0.10	0.085	0.16	0.075
Chromium	mg/kg dry wt	*0.125*	23.6	23.8	22.2	24.3	22.5
Copper	mg/kg dry wt	*0.075*	14.3	14.1	14.2	16.3	13.1
Lead	mg/kg dry wt	*0.25*	30.6	29.0	30.1	32.6	27.3
Nickel	mg/kg dry wt	*0.05*	20.3	19.2	17.4	19.2	19.7
Zinc	mg/kg dry wt	*0.05*	89.9	85.2	86.0	87.9	83.8

Heavy Metals in Soil

	Client Sample ID		VS22	VS32	VS37
	Date Sampled		15/06/2020	15/06/2020	15/06/2020
Analyte	Unit	*Reporting Limit*	20-22045-6	20-22045-7	20-22045-8
Arsenic	mg/kg dry wt	*0.125*	13.7	8.8	16.6
Cadmium	mg/kg dry wt	*0.005*	0.090	0.10	0.14
Chromium	mg/kg dry wt	*0.125*	23.7	22.3	23.9
Copper	mg/kg dry wt	*0.075*	14.7	15.6	16.5
Lead	mg/kg dry wt	*0.25*	28.7	30.3	32.3
Nickel	mg/kg dry wt	*0.05*	18.5	17.9	19.5
Zinc	mg/kg dry wt	*0.05*	86.6	98.6	89.6

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader

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Attention: Warren Sharp
Phone: 027 7007603
Email: warren@do.nz

Sampling Site: Oakbridge

Lab Reference: 21-12060
Submitted by: Warren Sharp
Date Received: 17/03/2021
Testing Initiated: 17/03/2021
Date Completed: 19/03/2021
Order Number:
Reference: 34300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

			Client Sample ID	VS42	VS44	VS46	VS48	VS50
			Date Sampled	9/03/2021	9/03/2021	9/03/2021	9/03/2021	9/03/2021
Analyte	Unit	*Reporting Limit*		21-12060-1	21-12060-2	21-12060-3	21-12060-4	21-12060-5
Arsenic	mg/kg dry wt	*0.125*		4.0	5.5	3.9	3.2	6.0
Cadmium	mg/kg dry wt	*0.005*		0.028	0.025	0.026	0.020	0.023
Chromium	mg/kg dry wt	*0.125*		17.4	17.4	14.9	18.0	15.9
Copper	mg/kg dry wt	*0.075*		6.4	9.56	6.9	8.78	6.4
Lead	mg/kg dry wt	*0.25*		17.2	15.8	14.5	15.8	12.1
Nickel	mg/kg dry wt	*0.05*		11.8	13.0	12.1	14.0	12.4
Zinc	mg/kg dry wt	*0.05*		53.0	50.9	48.0	50.2	38.4

Heavy Metals in Soil

			Client Sample ID	VS50-Fill	VS51-Fill	VS53	VS54-Fill
			Date Sampled	9/03/2021	9/03/2021	9/03/2021	9/03/2021
Analyte	Unit	*Reporting Limit*		21-12060-6	21-12060-7	21-12060-8	21-12060-9
Arsenic	mg/kg dry wt	*0.125*		24.5	4.5	2.3	5.6
Cadmium	mg/kg dry wt	*0.005*		0.044	0.021	0.023	0.054
Chromium	mg/kg dry wt	*0.125*		18.5	16.7	17.0	15.9
Copper	mg/kg dry wt	*0.075*		7.2	5.4	8.85	8.74
Lead	mg/kg dry wt	*0.25*		18.0	14.3	14.8	17.0
Nickel	mg/kg dry wt	*0.05*		14.1	12.1	13.7	14.3
Zinc	mg/kg dry wt	*0.05*		59.8	47.3	47.9	59.4

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader

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Certificate of Analysis

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Level 1 The Ricoh Building, 24 Moorhouse Ave
Christchurch 8011

Attention: Warren Sharp
Phone: 027 7007603
Email: warren@do.nz

Sampling Site: Oakbridge

Lab Reference: 21-13413
Submitted by: W. Sharp
Date Received: 24/03/2021
Testing Initiated: 24/03/2021
Date Completed: 26/03/2021
Order Number:
Reference: 34300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

			Client Sample ID	US50-A	US50-B	US50-C	US50-D
			Date Sampled	23/03/2021	23/03/2021	23/03/2021	23/03/2021
Analyte		Unit	*Reporting Limit*	21-13413-1	21-13413-2	21-13413-3	21-13413-4
Arsenic		mg/kg dry wt	*0.125*	8.0	7.7	9.6	8.5
Cadmium		mg/kg dry wt	*0.005*	0.057	0.060	0.047	0.060
Chromium		mg/kg dry wt	*0.125*	18.1	19.1	17.1	18.5
Copper		mg/kg dry wt	*0.075*	10.7	11.5	9.27	10.3
Lead		mg/kg dry wt	*0.25*	19.2	19.0	17.8	19.7
Nickel		mg/kg dry wt	*0.05*	15.5	16.2	14.1	15.2
Zinc		mg/kg dry wt	*0.05*	61.9	63.2	59.9	66.7

Method Summary

Elements in Soil Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Sharelle Frank, B.Sc. (Tech)
Technologist

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Certificate of Analysis

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Christchurch 8011

Attention: Warren Sharp
Phone: 027 7007603
Email: warren@do.nz

Sampling Site: Oakbridge

Lab Reference: 21-19831
Submitted by: W Sharp
Date Received: 03/05/2021
Testing Initiated: 3/05/2021
Date Completed: 6/05/2021
Order Number:
Reference: 34300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

		Client Sample ID	US69	US70	US71	US72	US73
		Date Sampled	30/04/2021	30/04/2021	30/04/2021	30/04/2021	30/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-2	21-19831-3	21-19831-4	21-19831-5	21-19831-6
Arsenic	mg/kg dry wt	*0.125*	7.8	4.3	3.4	2.2	6.3
Cadmium	mg/kg dry wt	*0.005*	0.069	0.049	0.045	0.031	0.056
Chromium	mg/kg dry wt	*0.125*	16.9	13.2	13.3	10	12.9
Copper	mg/kg dry wt	*0.075*	9.12	5.4	6.0	4.8	5.2
Lead	mg/kg dry wt	*0.25*	18.2	13.3	10.9	9.79	13.8
Nickel	mg/kg dry wt	*0.05*	12.5	8.55	9.78	8.34	7.65
Zinc	mg/kg dry wt	*0.05*	73.9	46.7	45.2	37.9	43.6

Heavy Metals in Soil

		Client Sample ID	US74	US75	US76	US77	US78
		Date Sampled	30/04/2021	30/04/2021	30/04/2021	30/04/2021	30/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-7	21-19831-8	21-19831-9	21-19831-10	21-19831-11
Arsenic	mg/kg dry wt	*0.125*	12	5.8	7.8	3.7	2.8
Cadmium	mg/kg dry wt	*0.005*	0.13	0.065	0.062	0.038	0.033
Chromium	mg/kg dry wt	*0.125*	17.8	14.7	17.9	16.2	17.2
Copper	mg/kg dry wt	*0.075*	9.74	7.70	6.7	4.8	5.8
Lead	mg/kg dry wt	*0.25*	22.6	17.0	20.0	16.3	20.2
Nickel	mg/kg dry wt	*0.05*	12.6	8.35	11.7	11.6	12.5
Zinc	mg/kg dry wt	*0.05*	64.9	45.1	62.9	65.2	60.5

Heavy Metals in Soil

Client Sample ID			US79	US80	US81	US82	US83
Date Sampled			30/04/2021	30/04/2021	30/04/2021	30/04/2021	30/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-12	21-19831-13	21-19831-14	21-19831-15	21-19831-16
Arsenic	mg/kg dry wt	*0.125*	8.4	8.3	7.9	11	11
Cadmium	mg/kg dry wt	*0.005*	0.17	0.13	0.17	0.18	0.16
Chromium	mg/kg dry wt	*0.125*	20.7	17.8	17.7	20.1	18.5
Copper	mg/kg dry wt	*0.075*	12.8	10.8	10.9	13.2	13.3
Lead	mg/kg dry wt	*0.25*	23.5	21.7	22.0	24.6	24.5
Nickel	mg/kg dry wt	*0.05*	14.2	12.2	11.9	14.6	13.5
Zinc	mg/kg dry wt	*0.05*	66.2	62.2	58.7	61.9	58.6

Heavy Metals in Soil

Client Sample ID			US84	US85	US86	US87	US88
Date Sampled			30/04/2021	30/04/2021	30/04/2021	30/04/2021	30/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-17	21-19831-18	21-19831-19	21-19831-20	21-19831-21
Arsenic	mg/kg dry wt	*0.125*	9.1	9.9	8.2	15.7	10
Cadmium	mg/kg dry wt	*0.005*	0.11	0.11	0.11	0.13	0.14
Chromium	mg/kg dry wt	*0.125*	16.0	20.2	18.7	20.7	20.7
Copper	mg/kg dry wt	*0.075*	7.59	13.8	9.42	21.4	14.0
Lead	mg/kg dry wt	*0.25*	18.4	25.7	23.7	27.5	25.0
Nickel	mg/kg dry wt	*0.05*	11.2	15.5	13.1	17.1	16.2
Zinc	mg/kg dry wt	*0.05*	51.0	70.2	62.6	85.0	73.5

Heavy Metals in Soil

Client Sample ID			US89	US90	US91	US92	US93
Date Sampled			30/04/2021	30/04/2021	30/04/2021	30/04/2021	30/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-22	21-19831-23	21-19831-24	21-19831-25	21-19831-26
Arsenic	mg/kg dry wt	*0.125*	8.4	10	4.1	3.3	4.9
Cadmium	mg/kg dry wt	*0.005*	0.11	0.12	0.028	0.033	0.037
Chromium	mg/kg dry wt	*0.125*	18.7	20.0	14.8	13.9	16.7
Copper	mg/kg dry wt	*0.075*	10.5	15.2	4.3	3.7	5.5
Lead	mg/kg dry wt	*0.25*	23.3	24.7	15.5	15.3	18.3
Nickel	mg/kg dry wt	*0.05*	13.6	15.6	10.3	10.1	11.3
Zinc	mg/kg dry wt	*0.05*	65.4	72.6	50.0	52.1	57.2

Heavy Metals in Soil

Client Sample ID			US94	US60	US62	US64	US66
Date Sampled			30/04/2021	09/04/2021	09/04/2021	09/04/2021	09/04/2021
Analyte	Unit	*Reporting Limit*	21-19831-27	21-19831-28	21-19831-29	21-19831-30	21-19831-31
Arsenic	mg/kg dry wt	*0.125*	2.4	1.2	12	8.6	4.8
Cadmium	mg/kg dry wt	*0.005*	0.019	0.033	0.046	0.032	0.027
Chromium	mg/kg dry wt	*0.125*	13.9	11	14.4	19.2	15.3
Copper	mg/kg dry wt	*0.075*	4.1	8.78	6.5	8.40	7.5
Lead	mg/kg dry wt	*0.25*	11.7	8.95	15.4	21.8	15.5
Nickel	mg/kg dry wt	*0.05*	10.6	10.6	9.55	14.9	12.0
Zinc	mg/kg dry wt	*0.05*	39.1	41.0	50.9	59.8	49.4

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader

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Certificate of Analysis

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Attention: Warren Sharp
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Sampling Site: Oakbridge Stg 1

Lab Reference: 21-34409
Submitted by: Warren Sharp
Date Received: 05/08/2021
Testing Initiated: 5/08/2021
Date Completed: 9/08/2021
Order Number:
Reference: 34300

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

Client Sample ID			US120	US123	US124	US127	US131
Date Sampled							
Analyte	Unit	*Reporting Limit*	21-34409-1	21-34409-2	21-34409-3	21-34409-4	21-34409-5
Arsenic	mg/kg dry wt	*0.125*	11	16.3	13.4	15.3	12
Cadmium	mg/kg dry wt	*0.005*	0.10	0.11	0.12	0.13	0.13
Chromium	mg/kg dry wt	*0.125*	21.1	23.4	22.7	22.0	22.6
Copper	mg/kg dry wt	*0.075*	13.9	18.0	18.4	35.1	17.2
Lead	mg/kg dry wt	*0.25*	29.8	36.6	33.1	29.8	31.4
Nickel	mg/kg dry wt	*0.05*	16.6	20.0	20.0	19.1	20.1
Zinc	mg/kg dry wt	*0.05*	79.6	106	94.2	96.8	88.8

Heavy Metals in Soil

Client Sample ID			US133	US137	US143	US148	US152
Date Sampled							
Analyte	Unit	*Reporting Limit*	21-34409-6	21-34409-7	21-34409-8	21-34409-9	21-34409-10
Arsenic	mg/kg dry wt	*0.125*	13.7	13.1	12	7.2	15.7
Cadmium	mg/kg dry wt	*0.005*	0.13	0.15	0.12	0.14	0.13
Chromium	mg/kg dry wt	*0.125*	23.0	22.5	20.4	21.1	22.2
Copper	mg/kg dry wt	*0.075*	18.1	16.5	15.8	11.4	23.2
Lead	mg/kg dry wt	*0.25*	33.2	30.4	28.3	26.2	30.3
Nickel	mg/kg dry wt	*0.05*	20.0	17.6	18.0	14.0	19.1
Zinc	mg/kg dry wt	*0.05*	89.6	82.7	85.6	67.9	89.1

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

Emily Hanna, B.Sc.
Trace Elements Team Leader