11/04/2023 Our Ref: 50097 - Rev 0

Attn: Suburban Estates Limited
CC: Chris Prebble
26 Peterborough Street, Christchurch Central, 8013
E: prebble@suburbanestates.co.nz

Dear Chris

RE: 48 QUAIFES ROAD, HALSWELL, CHRISTCHURCH
SOIL VALIDATION REPORT

1.0 INTRODUCTION

1.1 Terms of Reference

Engineering Design Consultants Ltd (EDC) was commissioned by Suburban Estates Limited to prepare a Soil Validation Report (SVR) following on-site remedial works (removal of topsoil and any remaining ash relating to two previous bonfires). This report follows a Preliminary Site Investigation (REV 1), written by EDC and issued May, 2022.

This report has been prepared by and under the supervision of Suitably Qualified and Experienced Practitioners (SQEP's), in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No 1 '*CLMG No. 1*' (Ministry for the Environment, 2001 (Revised 2021)).

1.2 Proposed Works

This SVR is limited to overseeing the removal of ash contaminated topsoil and subsequent validation testing of the remaining soil around the two bonfires identified during the site walkover over of the PSI. The location of two burn areas can be found in Figure 1.

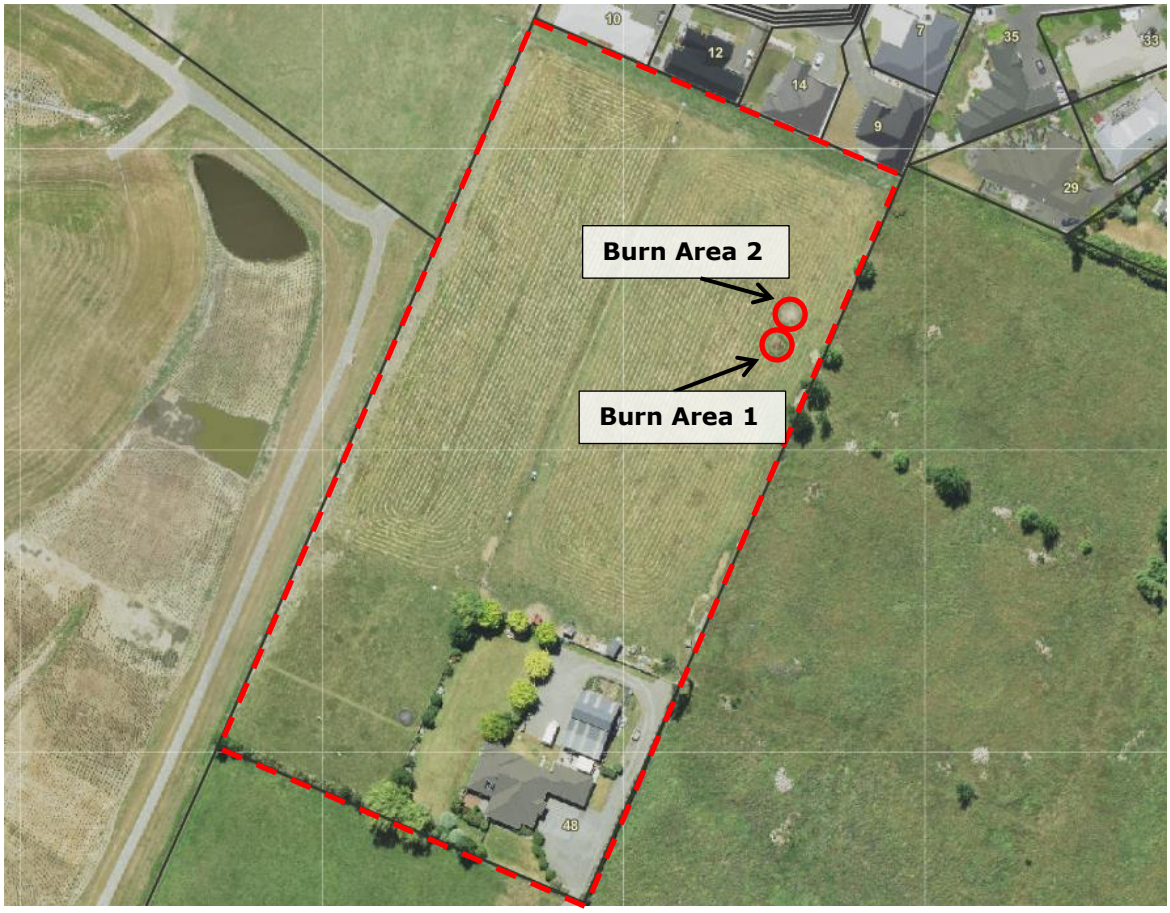

Figure 1: Areas of soil removal circled in red, the sites boundary is an outlined in dashed red

1.3 Scope of Works

The following work has been undertaken as part of this Soil Validation Report (SVR):

- Summary of remediation works.
- Confirmation of appropriate disposal of topsoil
- Validation testing of the remaining soil
- Provision of conclusions and recommendations

1.4 Site Location

The site is rectangle, orientated northeast / southwest and is accessed from a right of way off Quaifes Road, and covers an approximate area of 2.04 Ha. The Google Earth coordinates of the approximate centre of the remediated area are: 43°35'9.66"S, 172°33'39.25"E.

2.0 SUMMARY OF EXISTING REPORTS

Below is a summary of EDC's Preliminary Site Investigation:

Based on the site visit and a review of the available information, EDC considers that it is more likely than not, that no HAIL activity has occurred on site, with the exception of the burn piles, which present a very localised source of soil contamination and are considered HAIL Activity I.

Therefore, with the exception of the burn area in the north portion of the site. It is highly unlikely that there will be a risk to human health from compounds within the site soil if the proposed subdivision is done.

In view of the above, a Detailed Site Investigation (DSI) is considered not warranted though a surface scrape of the burn area should be undertaken under the supervision of a SQEP and a validation statement (including a nominal number of soil tests) provided to confirm adequate removal of potentially ashy soils. The ashy soils should be disposed of to an appropriate waste facility. Two samples should be taken from each burn pile and analysed for metals and PAH's in order to classify the waste. It is anticipated that the volume requiring removal will be approximately $3m^2$ and therefore can be undertaken as a Permitted Activity.

3.0 REMEDIAL ACTION

3.1 Remediation Goals

The goal of the remediation exercise was to mitigate the risk of contaminated soil contact with the residential end-user by removing the ash contaminated soils from the burnt areas (Figure 1). This was achieved by overseeing the removal of ash contaminated topsoil, validation laboratory testing of the remining topsoil and confirmation of the disposal of removed soils.

Validation testing of the soil was undertaken to confirm the remaining soil is not a health risk and below $SCS_{(health)}$ 10% produce guidelines.

This would result in the site being designated as "*Suitable for Residential Land Use*" and subsequently testing the surface of the soil that is to remain on site.

4.0 REMOVAL AND DISPOSAL OF CONTAMINATED SOIL

The two burn areas were removed separately and consequently EDC inspected the remediated areas on two dates, 09/11/2022 and 22/02/2023, post the removal of ash-contaminated topsoil. On both occasions the remaining soil (generally topsoil) was free from visual or olfactory indicators of contamination.

EDC has overseen the removal of the surficial layer of ash from the two burn pit areas. During the removal of the ash-contaminated topsoil, care was taken to ensure contaminated and clean topsoil was not mixed, with all removed ash contaminated topsoil stored in a covered skip, before being disposed of at Protranz Earthmoving Land Fill, a suitable facility.

A total of approximately 11 tonne of contaminated topsoil, transported by WASTECO, was sent for disposal at Protranz Earthmoving, Leggett Road on 01 March 2023. Each burn area was approximately 6m x 6m, with ashy material generally contained within the upper 0.2m – 0.3m, with burn area 1 being over-excavated (5m x 3m, and an additional 0.3m deep).

A copy of the receipts from Protranz Earthmoving for this material is included in Appendix A.

Photos of the finished surface and soil which has been over excavated can be found in Figure 2 to 4.

EDC's site note detailing the removal of contaminated topsoil forms Appendix B.

Figure 2: View of Burn Area 1, post stripping of ashy soil. The area marked out in pink has been over-excavated. Photo taken 09/11/2022

Figure 3: View of Burn Area 1 post over excavation to natural soil, taken 22/02/2023

Figure 4: View of Burn Area 2 post stripping of ashy soil, taken 22/02/2023

5.0 SOIL SAMPLING AND QUALITY ASSURANCE

5.1 Sampling & Analysis Plan

Two samples have been taken within the topsoil/natural soils from within each burn area, post the removal of any ash contaminated soil. Two samples have also been obtained from within the disposal bins to confirm the waste classification for disposal. The sample descriptions are contained in Appendix C.

5.2 Sampling Methodology

Soil sampling for laboratory testing was carried out in general accordance with the MfE "*CLMG No.5*" Document (Ministry for the Environment, 2004 (Revised 2021)), with samples being collected on 9 November 2022 and 22 February 2023. All samples were collected by EDC staff with experience of soil sampling, in suitable containment vessels provided by Analytica Laboratories Ltd, and stored in cooled chilly-bins for transport to the Analytica Laboratories facility.

Samples were extracted using a stainless-steel trowel or scooped directly into the sample jars. De-contamination procedures were carried out between each grab sample using a nylon bristle brush, Decon90 and finally de-ionised water to remove all soil particles.

5.3 Field Work Quality Assurance

Procedures put in place to minimise bias in field sampling include:

- Qualified and experienced staff to carry out the work, particularly the field staff. At least one of the two field staff has more than five years' experience with contaminated soil sampling.
- Preparation prior to site work including review of the sampling plan.
- Decontamination of sampling equipment undertaken between samples, using a stiff-bristle brush, deionised water, Decon90 solution and a final rinse in deionised water.
- All samples collected and sealed immediately for storage in an insulated storage container.
- The Sample Inventory/Chain of Custody document is signed by laboratory on acceptance of sample delivery and returned to EDC Ltd. These documents are included as Appendix C.

5.4 Laboratory Work Quality Assurance

- Using a qualified, accredited and experienced laboratory. Analytica Laboratories are IANZ accredited for laboratory soil sampling analysis, with experienced staff and strong quality control checks.
- Chain of custody procedures and suitable sample storage (reduced temperature, secure, insulated containers).

- Reviews and audits of the work being carried out, including data reporting and interpretation.

6.0 SAMPLING PLAN AND LABORATORY TEST RESULTS

6.1 Validation Sampling

A total of four soil samples, with two from within each burn area, have been used to validate the concentrations of heavy metals and Polycyclic Aromatic Hydrocarbons within the remediated surface (SA101, SA102, SA201 and SA202). This surface was generally 0.2m – 0.3m below the surrounding ground level, with localised areas having been over-excavated an additional 0.3 where any ashy soil in Burn Area 1. The finished level was free from visual or olfactory indicators of contamination. The sample locations are shown on Figure 5.

Two additional samples, one from within the skip (SA103) and one from within the material that has been over-excavated (and SA104) have been analysed for disposal purposes, while these samples are included within the results and chain of custody appendices, they but are not included in the results of this report as they have been disposed of at a suitable facility, as discussed in section 4.

Figure 5: Location of samples

6.2 Laboratory Testing Results and QA

Samples were submitted for analysis at Analytica Laboratories. A full copy of the laboratory Chain of Custody and results reports are attached in Appendix C and Appendix D respectfully.

Blind replicate tests were undertaken on several samples and indicated an acceptable margin of error.

6.2.1 NES Suite testing

A results summary table for the 4 heavy metal laboratory results from within the burn area foot print is provided below (units are mg/kg). A copy of the results can be in Appendix D.

Compound	No. Samples	Min.	Max.	Ave.	SCSs (health) Residential 10%	Background Levels[b]
Arsenic	4	3.3	8.2	5.9	20	12.58
Boron	4	3.2	6.8	4.9	10,000	-
Cadmium	4	0.03	0.09	0.06	3	0.19
Chromium[c]	4	13.5	18.7	16.3	460	22.7
Copper	4	6.4	8.7	7.7	10,000	20.3
Lead	4	13.4	18.3	16.2	210	40.96
Mercury	4	0.06	0.07	0.06	310	0.11
BaP (TEQ)	4	0.03			10	-

Notes:

Bracketed numbers show No. samples above the respective assessment criteria.

[a] Soil Contaminant Standard (10% produce).

[b] Soil trace elements 2 – Trace elements level 2

[c] It is assumed that total chromium is 100% Chromium VI.

Table 1: Laboratory Results Summary

All four samples (SA101, SA102, SA201 and SA202) across the burn areas returned concentrations of elements of concern below that of the Trace 2 background values. All four samples have also been individually been tested for Polycyclic Aromatic Hydrocarbons, which returned results at or below the reporting limit and well below the $SCS_{(health)}$.

6.3 Health and Safety Comment

No health and safety incidents or near misses occurred during EDC's validation works. Nor is EDC aware of any other incidents occurring during the remedial works, beyond EDC's supervision.

6.4 Long-Term Site Management

Given the ash soil has been removed and disposed of, with the remediation complete, the risk of any contaminants identified on site has been reduced to an acceptable level for the proposed residential use. Therefore, no long-term management is considered necessary.

We recommend that all Contamination Reports, including this SVR, are lodged with Christchurch City Council (and ECan) to be added to each new property file, so that future development can be properly advised of the site history.

7.0 CONCLUSION

7.1 Human Health and Environmental Receptors

EDC has overseen the removal of ash-contaminated soil from within the burn areas, which has been disposed of at Protranz Earthmoving Landfill, a suitable disposal facility. The soil to remain on site within the footprint of the burn area have been tested for heavy metals, which were found to be below $SCSs_{(Health)}$ Residential 10% produce guidelines and background levels.

The remaining soil within the burn area footprint was also tested for Polycyclic Aromatic Hydrocarbons (PAH), which were found to be at or below the reporting limit and well below the $SCS_{(Health)}$ Residential 10% produce guidelines. Therefore, considering the above, it is considered that the risk to the end user and environmental receptors has been reduced to a negligible level, with no further remedial action required with the objective of the remedial works met.

The PSI did not indicate any further sources of HAIL activities, therefore the remaining soil and topsoil remaining on site can be considered 'Cleanfill'.

REPORT PREPARED BY:

Dan Pickering
BAppSci (Envi), BSc(Hons) (Geology)
Geotechnical Engineer

REPORT REVIEWED BY:

Giles Learman
BSc (Hons) CGeol FGS
Geotechnical Manager

8.0 LIMITATIONS

Except where required by law, the findings presented as part of this report are for the sole use of our client, as noted above. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. No third party (excluding the local authority) may use or rely upon this report unless authorised by EDC in writing.

To the extent permitted by law, EDC expressly disclaims and excludes liability for any loss, damage, cost or expense suffered by any third party relating to or resulting from the use of, or reliance upon any information contained in this report. It is the responsibility of third parties to independently make enquiries or seek advice in relation to their particular requirements.

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report, in regard to its accuracy or completeness.

Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

This report includes Appendices. These appendices should be read in conjunction with the main part of the report and this report should not be considered complete without them.

Appendix A - Disposal Dockets

Appendix B - EDC Site Inspection Note

Appendix B - Chain of Custody

Appendix D - Analytica Lab Results

9.0 REFERENCES

Ministry for the Environment. (2001 (Revised 2021)). *Contaminated Land Management Guidelines (CLMG) No.1 - Reporting on Contaminated Sites in New Zealand.* Wellington: Ministry for the Environment.

Ministry for the Environment. (2004 (Revised 2021)). *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils.* Wellington: Ministry for the Environment.

Ministry for the Environment. (2011). *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations.* Wellington: Parliamentary Counsel Office.

APPENDIX A

PROTRANZ EARTHMOVING DISPOSAL DOCKETS

Date	Customer Name	Site Name	Address	City	Serv. Type	Qty. Serviced	Cont. Type	Waste Type	Status-Booking	Weight	UOM
9/08/2022	Suburban Estates Limited		48 Quaifes Road	Christchurch	REM	1	GA3.5	REF	I	740	Kg
1/03/2023	Suburban Estates Limited		48 Quaifes Road	Christchurch	REM	1	GA7.5	ASBESTOS	C	5550	Kg
1/03/2023	Suburban Estates Limited		48 Quaifes Road	Christchurch	REM	1	GA7.5	ASBESTOS	C	5040	Kg

APPENDIX B

EDC SITE INSPECTION NOTE

ENGINEERING DESIGN CONSULTANTS

SITE REPORT

EDC File No: 50097 Date: 09/11/2022

BC/EPA No: -

Time: 2:00PM Weather: Sunny.

Inspected by: DP Site Manager: Chris Preble 021 146 3720

HEALTH & SAFETY

Are you entering site alone? Yes/No
(If 'yes' call/text the office to advise when entering and leaving, ensure that you speak to someone or receive a response to your text.)

Induction completed? Yes/No
(If 'no' please give reason.....)

Signed in? Yes/No Signed out? Yes/No

Carry out 5 x 5 check? Yes/No
(Please refer overleaf for instructions. Identify potential hazards and note below.)

Site Address: 48 Quaifes Road / Environmental inspection 001

OBJECTIVE: Sampling of two burn pits & spoil. All ash needs to be removed to topsoil.

OUTCOME:

- BURNPIT 1 excavated 0.2 - 0.3m below ground level, was 6m x 6m in size & the remaining soil is topsoil.
  - One area, 1m x 1m has been marked out & noted on site plan to be excavated to topsoil (approx 0.2m)
  - Photos of the removal is acceptable.
  - Two samples with the old burn pit have been taken & the spoil.
- Burnpit 2: At the time of inspection this area was not ready being covered by soil stockpile.
  - This area will need to be inspected & sampled, all stockpiled soil north of burnpit 1 must be moved without disturbing the ash below. The ash should then be removed to the topsoil & covered.
  - No spoil can be disposed before instruction from EDC, post lab testing.

H & S Comments:

See Over For Limitations and 5 x 5 Instructions

Daniel Pickering
021 539 780

Photos:

LIMITATIONS

UNDER THE CHARTERED ENGINEERS ACT (2002), PROFESSIONAL ENGINEERS CAN ONLY REVIEW WORK WITHIN THEIR AREAS OF EXPERTISE.

1. This observation is carried out for our client only and for the purpose stated.
   It should not be relied upon by any third party without our specific written agreement.

2. All weather-tightness and durability issues are excluded. Refer to Architect for all details specifically relating to B2 and E2 of the NZBC.

3. Engineering Design Consultants Ltd will be held blameless to all third parties.

4. All temporary works are the sole responsibility of the Builder / Contractor.

5. Report any discrepancies immediately to the Engineer.

6. Certification of registered building work is based on the understanding that this work is completed by licenced building practitioners holding a current practicing licence.

7. Engineering Design Consultants Ltd does not check set-out or levels. We recommend a licenced Professional Surveyor is engaged to provide this service.

8. By checking any work, Engineering Design Consultants Ltd does not verify that the work does not require a variation from Council. We recommend that this is confirmed in writing from Council Inspector/Engineer.

9. If in doubt, ASK the Engineer.

5 x 5 CHECK

1. STOP - engage brain before you act.
2. LOOK - identify any hazards.
3. ASSESS - what damage could those hazards cause.
4. MANAGE - implement controls, tell others.
5. SAFELY - complete the task.

canterbury maps

Canterbury Maps

N

0 0 0 0 0.01 Kilometres

Scale: 1:150 @A4

Map Created by Canterbury Maps on 15/09/2022 at 2:07 PM

ENGINEERING DESIGN CONSULTANTS

SITE REPORT

EDC File No: Date: 22/02/23

BC/EPA No:

Time: 10:00am Weather: Light rain

Inspected by: DP Site Manager: Chris Prebble

HEALTH & SAFETY

Are you entering site alone? Yes/No
(If 'yes' call/text the office to advise when entering and leaving, ensure that you speak to someone or receive a response to your text.)

Induction completed? Yes/No
(If 'no' please give reason Simple paddock)

Signed in? Yes/No Signed out? Yes/No

Carry out 5 x 5 check? Yes/No
(Please refer overleaf for instructions. Identify potential hazards and note below.)

Site Address: 48 Quaifes Road / Environmental inspection 002

OBSECTIVE Inspection & Sampling of burn pit 2.

All ash to be removed to the topsoil or below.
- Burn pit 1 previously inspected & sampled.

OUTCOME

- Burn Pit 1 : Area identified as needing additional digout has been completed with an area of 2m x 5m removed to natural soil
  - no outstanding issues with this area.
- Burn Pit 2:- 5.5m x 6.0m, excavated 0.3m to the natural light orange grey silty sand. No ash remains at base or in side walls.
  - Two surface samples have been taken within the burn area. (SA201, SA202).

OUTCOME

- Ash has been removed from both pits. Pits can not be covered or modified untill environmental sampling results have been returned.
  - Sampling & location map attached.

D.P

Daniel Pickering
021 539 780

H & S Comments: See Over For Limitations and 5 x 5 Instructions

Photos: ✓

LIMITATIONS

UNDER THE CHARTERED ENGINEERS ACT (2002), PROFESSIONAL ENGINEERS CAN ONLY REVIEW WORK WITHIN THEIR AREAS OF EXPERTISE.

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5. Report any discrepancies immediately to the Engineer.

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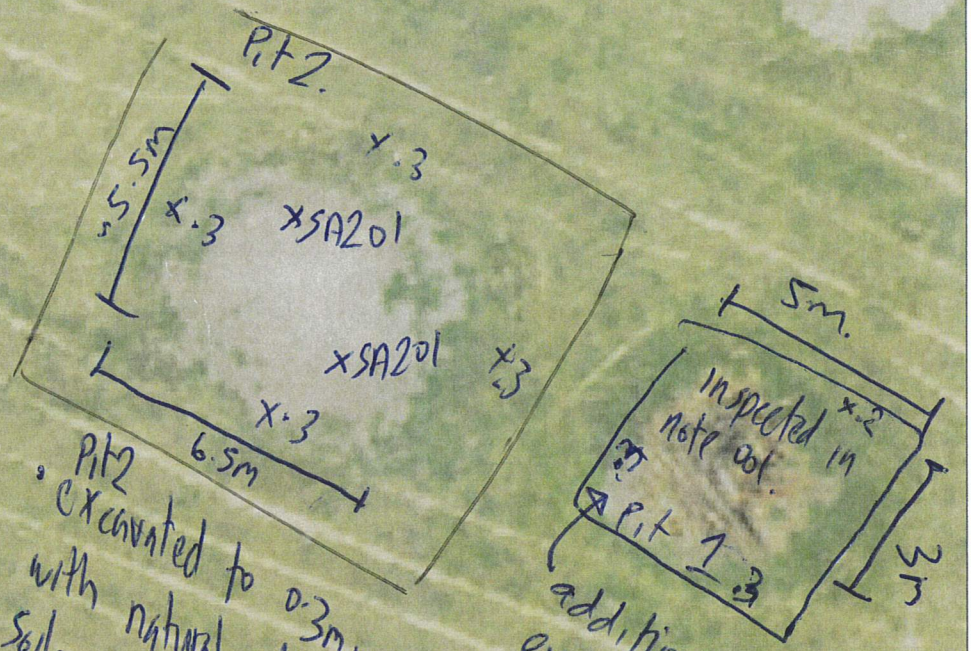
9. If in doubt, ASK the Engineer.

5 x 5 CHECK

1. STOP - engage brain before you act.
2. LOOK - identify any hazards.
3. ASSESS - what damage could those hazards cause.
4. MANAGE - implement controls, tell others.
5. SAFELY - complete the task.

Inspection 002, DP, 22/02/23.
48 Quaides Road
- OBJECTIVE: Visual assessment of Pit 2 & two surface samples on excavated surface.



Pit 2
- Excavated to 0.3m, with natural silty sand soil.
- No evidence of Burn material in bag or walls.
- 2 Samples taken in predominantly natural soil. at new surface.

additional excavation to natural soil. ✓
- No remaining ash.

Canterbury Maps

canterbury maps

Information has been derived from various organisations, including Environment Canterbury and the Canterbury Maps partners. Boundary information is derived under licence from LINZ Digital Cadastral Database (Crown Copyright Reserved). Environment Canterbury and the Canterbury Maps partners do not make any warranty and disclaim any warranty as to the accuracy or completeness of the information or its fitness for any purpose.

Information from this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it.

N

0 0 0 0 0 Kilometres
Scale: 1:100 @A3

Map Created by Canterbury Maps on 22/02/2023 at 8:57 AM

APPENDIX C

CHAIN OF CUSTODY

Analytica Laboratories Limited
Ruakura Research Centre
10 Bisley Road
Hamilton 3214, New Zealand
Ph +64 (07) 974 4740
sales@analytica.co.nz
www.analytica.co.nz

Sample Receipt Report

EDC
15B Leslie Hills Drive, Riccarton
Christchurch 8011
Attention: Daniel Pickering
Phone: 021539780
Email: danielP@edc.co.nz

Lab Reference: 22-41975
Submitted by: DP
Date Registered: 17/11/2022
Date Due: 22/11/2022
Order Number:
Reference: 50097

Sampling Site: 48 Quaifes Road, Halswell

Summary of Samples

Laboratory ID	Client Sample Reference	Date Sampled	Depth	Sample Type	Condition On Arrival
22-41975-1	SA101	09/11/2022	0.3	Soil	Acceptable
22-41975-2	SA102	09/11/2022	0.3	Soil	Acceptable
22-41975-3	SA103	09/11/2022	SKIP	Soil	Acceptable
22-41975-4	SA104 - Extra	09/11/2022	0.3	Soil	Acceptable

Summary of Testing

		NES metal in Soil	PAH in Soil	Dry Sieve	Moisture Content
22-41975-1	SA101	✓	✓	✓	✓
22-41975-2	SA102	✓	✓	✓	✓
22-41975-3	SA103	✓	✓	✓	✓
22-41975-4	SA104 - Extra	✓	✓	✓	✓

NES Metals Suite

Testing Breakdown

		Arsenic	Boron	Cadmium	Chromium	Copper	Lead	Mercury
22-41975-1	SA101	✓	✓	✓	✓	✓	✓	✓
22-41975-2	SA102	✓	✓	✓	✓	✓	✓	✓
22-41975-3	SA103	✓	✓	✓	✓	✓	✓	✓
22-41975-4	SA104 - Extra	✓	✓	✓	✓	✓	✓	✓

If you have any queries please email us at enviro.reception@analytica.co.nz or telephone 07 444 5574.

Our full terms and conditions can be found on our website: https://www.analytica.co.nz/about-us/terms-and-conditions/

The published due date is that of tests done internally, subcontracted tests are subject to the subcontractor's turnaround time and may be reported on or following the due date indicated.

If you have any queries please email us at sample.reception@analytica.co.nz or telephone 07 974 4740.

Analytica Laboratories Limited
Ruakura Research Centre
10 Bisley Road
Hamilton 3214, New Zealand
Ph +64 (07) 974 4740
sales@analytica.co.nz
www.analytica.co.nz

Sample Receipt Report

EDC
15B Leslie Hills Drive, Riccarton
Christchurch 8011
Attention: Daniel Pickering
Phone: 021539780
Email: danielP@edc.co.nz

Lab Reference: 23-05473
Submitted by: DP
Date Registered: 24/02/2023
Date Due: 1/03/2023
Order Number:
Reference: 50097

Sampling Site: 48 Quaifes Road, Halswell

Summary of Samples

Laboratory ID	Client Sample Reference	Date Sampled	Depth	Sample Type	Condition On Arrival
23-05473-1	SA201	22/02/2023	0.00	Soil	Acceptable
23-05473-2	SA202	22/02/2023	0.00	Soil	Acceptable

Summary of Testing

		NES metal in Soil	Dry Sieve	PAH in Soil	Moisture Content
23-05473-1	SA201	✓	✓	✓	✓
23-05473-2	SA202	✓	✓	✓	✓

NES Metals Suite

Testing Breakdown

		Arsenic	Boron	Cadmium	Chromium	Copper	Lead	Mercury
23-05473-1	SA201	✓	✓	✓	✓	✓	✓	✓
23-05473-2	SA202	✓	✓	✓	✓	✓	✓	✓

If you have any queries please email us at sample.receipt@analytica.co.nz or telephone 07 974 4740.

Our full terms and conditions can be found on our website: https://www.analytica.co.nz/about-us/terms-and-conditions/

The published due date is that of tests done internally, subcontracted tests are subject to the subcontractor's turnaround time and may be reported on or following the due date indicated.

Sample Storage

Soil: Samples will be held onsite for 3 months from the registered date and then disposed of. Please contact our Customer Service team on 07 974 4740 if you wish to extend the samples holding period. Samples are held in a chiller for 1 month, and in ambient storage for 2 months. Please note that the laboratory recommends testing volatile compounds within 2 weeks of sampling, testing for such compounds beyond the recommended period will be noted on the final report.

Water: Samples will be held in a chiller onsite for 1 month from the registered date and then disposed of.

APPENDIX D

ANALYTICA – LAB TEST RESULTS

Analytica Laboratories Limited
Ruakura Research Centre
10 Bisley Road
Hamilton
sales@analytica.co.nz
www.analytica.co.nz

Certificate of Analysis

EDC
15B Leslie Hills Drive, Riccarton
Christchurch 8011

Attention: Daniel Pickering
Phone: 021539780
Email: danielP@edc.co.nz

Lab Reference: 22-41975
Submitted by: DP
Date Received: 17/11/2022
Testing Initiated: 17/11/2022
Date Completed: 24/11/2022
Order Number:
Reference: 50097

Sampling Site: 48 Quaifes Road, Halswell

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.

NES Metals Suite

			Client Sample ID	SA101 0.3	SA102 0.3	SA103 SKIP	SA104 - Extra 0.3
			Date Sampled	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Analyte	Unit	*Reporting Limit*		22-41975-1	22-41975-2	22-41975-3	22-41975-4
Arsenic	mg/kg dry wt	*0.125*		7.2	8.2	35.5	408
Boron	mg/kg dry wt	*1.25*		5.5	6.8	16	120
Cadmium	mg/kg dry wt	*0.005*		0.084	0.092	0.14	0.512
Chromium	mg/kg dry wt	*0.125*		17.4	18.7	46.9	252
Copper	mg/kg dry wt	*0.075*		8.56	8.73	27.7	449
Lead	mg/kg dry wt	*0.25*		17.9	18.3	18.2	69.9
Mercury	mg/kg dry wt	*0.025*		0.056	0.057	0.056	0.026

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	SA101 0.3	SA102 0.3	SA103 SKIP	SA104 - Extra 0.3
			Date Sampled	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Analyte	Unit	*Reporting Limit*		22-41975-1	22-41975-2	22-41975-3	22-41975-4
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	0.011
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		0.012	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	SA101 0.3	SA102 0.3	SA103 SKIP	SA104 - Extra 0.3
			Date Sampled	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*		0.011	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	0.040
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	0.019
Pyrene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		0.010	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		100	99	98	99

Moisture Content

			Client Sample ID	SA101 0.3	SA102 0.3	SA103 SKIP	SA104 - Extra 0.3
			Date Sampled	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Analyte	Unit	*Reporting Limit*		22-41975-1	22-41975-2	22-41975-3	22-41975-4
Moisture Content	%	*1*		17	15	20	20

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.

PAH in Soil

Solvent extraction, silica cleanup, followed by GC-MS analysis.
Benzo[a]pyrene TEQ (LOR): The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH.
Benzo[a]pyrene TEQ (Zero): The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation.
Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to *'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'*. Ministry for the Environment. 2011. (In accordance with in-house procedure).

Moisture

Moisture content is determined gravimetrically by drying at 103 °C.

Jarred Wilson, DipSci
Trace Elements Team Leader

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Technologist

Astra Southwood
Lab Technician

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Certificate of Analysis

EDC
15B Leslie Hills Drive, Riccarton
Christchurch 8011

Attention: Daniel Pickering
Phone: 021539780
Email: danielP@edc.co.nz

Lab Reference: 23-05473
Submitted by: DP
Date Received: 24/02/2023
Testing Initiated: 24/02/2023
Date Completed: 1/03/2023
Order Number:
Reference: 50097

Sampling Site: 48 Quaifes Road, Halswell

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.

NES Metals Suite

			Client Sample ID	SA201 0.00	SA202 0.00
			Date Sampled	22/02/2023	22/02/2023
Analyte	Unit	*Reporting Limit*	23-05473-1	23-05473-2	
Arsenic	mg/kg dry wt	*0.125*	3.3	5.0	
Boron	mg/kg dry wt	*1.25*	3.2	4.0	
Cadmium	mg/kg dry wt	*0.005*	0.025	0.038	
Chromium	mg/kg dry wt	*0.125*	13.5	15.4	
Copper	mg/kg dry wt	*0.075*	6.4	7.0	
Lead	mg/kg dry wt	*0.25*	13.4	15.3	
Mercury	mg/kg dry wt	*0.025*	0.064	0.069	

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	SA201 0.00	SA202 0.00
			Date Sampled	22/02/2023	22/02/2023
Analyte	Unit	*Reporting Limit*	23-05473-1	23-05473-2	
1-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	
2-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	
Acenaphthene	mg/kg dry wt	*0.01*	<0.010	<0.010	
Acenaphthylene	mg/kg dry wt	*0.01*	<0.010	<0.010	
Anthracene	mg/kg dry wt	*0.01*	<0.010	<0.010	
Benz[a]anthracene	mg/kg dry wt	*0.02*	<0.020	<0.020	
Benzo[a]pyrene	mg/kg dry wt	*0.01*	<0.010	<0.010	
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*	<0.020	<0.020	

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	SA201 0.00	SA202 0.00
			Date Sampled	22/02/2023	22/02/2023
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*		<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*		<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		120	120

Moisture Content

		Client Sample ID	SA201 0.00	SA202 0.00
		Date Sampled	22/02/2023	22/02/2023
Analyte	Unit	*Reporting Limit*	23-05473-1	23-05473-2
Moisture Content	%	*1*	17	22

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.

PAH in Soil

Solvent extraction, silica cleanup, followed by GC-MS analysis.
Benzo[a]pyrene TEQ (LOR): The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH.
Benzo[a]pyrene TEQ (Zero): The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation.
Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to *'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'*. Ministry for the Environment. 2011. (In accordance with in-house procedure).

Moisture

Moisture content is determined gravimetrically by drying at 103 °C.

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Technologist

Astra Southerwood,
Sample Preparation Team Leader

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Technologist