



Soil Contamination Risk Site Validation Report

39 Branthwaite Drive, Rolleston

June 2023



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Specialist soil contamination experts, keeping your project moving.

QUALITY CONTROL AND CERTIFICATION SHEET

Client: Your Section Ltd

Date of issue: 13 June 2023

Report written by:

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CONTENTS

1	Executive Summary.....	4
2	Objectives of the Investigation.....	5
3	Scope of Work Undertaken.....	5
4	Site Identification	6
5	Proposed Site Use.....	7
6	Site Description	7
6.1	Environmental Setting	7
6.2	Site Layout and Current Site Uses	7
6.3	Surrounding Land Uses.....	7
6.4	Geotechnical Investigation	7
7	Summary of Previous Investigations.....	7
7.1	Preliminary Site Investigation	7
7.2	Preliminary/Detailed Site Investigation and Remediation Action Plan	7
8	Summary of Remedial Works and Site Validation Investigation	8
8.1	Soil Guideline Values	8
8.2	Quality Assurance and Quality Control.....	8
8.3	Summary of Remedial Works.....	9
8.4	Summary of Site Validation Investigation	9
9	Site Validation Investigation Results.....	9
9.1	Evaluation of Results.....	9
9.2	Results of Field & Laboratory Quality Assurance and Quality Control.....	9
10	Summary of Resource Consent.....	10
11	Conclusion.....	10
12	Limitations	10

APPENDICES

A	Validation Sample Location Plan
B	Table of Laboratory Validation Results
C	Table of XRF Validation Results
D	Laboratory Reports
E	Disposal Documentation

1 Executive Summary

The subject of this report is located at 39 Branthwaite Drive in Rolleston, Canterbury, from herein referred to as 'the site'. It is proposed to subdivide the site for residential use. This will involve the subdivision of the site, change of use of the land, soil disturbance and off-site disposal of soils. As such, an assessment under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Health) Regulations 2011 (NESCS) has been undertaken. It is noted also that Momentum Environmental Ltd (MEL) is obligated to consider the requirements of Section 10(4) of the Health and Safety at Work (Asbestos) Regulations 2016.

A Preliminary Site Investigation (PSI) was undertaken for the site, when it was part of a larger underlying block, in October 2016 by Malloch Environmental Ltd (now Momentum Environmental Ltd, MEL). There were no Hazardous Activities or Industries (HAIL) activities identified for the site at that time of reporting.

Due to the long-time delay between the original PSI and the current subdivision proposal, a review of the site to assess for any changes over time was required. A site inspection undertaken as part of the updated PSI confirmed the presence of a burn pile. A soil sample collected from the centre of the burn area returned an arsenic concentration of 72mg/kg, exceeding the 'residential 10% produce' soil guideline value (SGV) of 20mg/kg. There were no other exceedances of the human health guidelines.

The Remediation Action Plan (RAP) recommended that soils from the burn area were remediated via excavation and off-site disposal to an authorised disposal facility. The soil disturbance and disposal associated with the remediation activities complied with permitted activity thresholds and are classified as a 'permitted activity' under the NESCS.

Remediation of contaminated soils within the burn area was completed on 25 May 2023. MEL attended site on 29 May 2023 to complete XRF testing and validation sampling of the remediated area. The XRF test readings showed concentrations of arsenic and lead below the device limit of detection. A total of five validation samples were collected from the walls and base of the excavated area. The results showed heavy metal concentrations below the 'residential 10% produce' SGVs and also below expected background concentrations for the area.

A total of 28.22 tonnes of soils were excavated from the site and disposed of at Burwood Landfill under manifest number 660659.

The remediation actions have successfully remediated the contaminated soils at the site. Heavy metal concentrations in soils remaining within the remediated area are below expected background levels.

2 Objectives of the Investigation

This report has been prepared in general accordance with the Ministry for the Environment's (MfE) "Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand, revised 2021" (CLMG). This report includes all requirements for a Site Validation Report.

The objectives of this investigation are to:

- Describe project information and any physical and environmental features of the site.
- Summarise any relevant resource consent information, specifically consent condition requirements.
- Summarise previous contaminated land investigations, specifically remedial strategy and objectives of the remediation.
- Describe remediation/management works undertaken including testing, sampling and inspections.
- Analyse all results and provide an assessment of the effectiveness of the remediation against the remediation objectives.
- Describe and attach any documentary evidence, such as waste disposal documentation.

3 Scope of Work Undertaken

The scope of the work undertaken has included:

- Review of previous investigations undertaken at the site.
- Design and implement a Site Validation Investigation based on the remediation strategy and objectives and the remedial works undertaken.
- On site soil validation sampling and laboratory analysis.
- Analysis of results against applicable soil guidelines values (SGV).
- Preparation of report in accordance with MfE guidelines.

4 Site Identification

The site is located at 39 Branthwaite Drive in Rolleston, Canterbury. The site is legally described as Lot 15 DP 509805 and has an approximate area of 2.33ha.



Figure 1 – Location Plan

5 Proposed Site Use

It is proposed to subdivide the site for residential use. This will involve the subdivision of the site, change of use of the land, soil disturbance and off-site disposal of soils.

6 Site Description

6.1 Environmental Setting

Table 1 – Environmental Setting

Topography	The site is generally flat land.
Geology	The ECan GIS database describes the majority of soils at the site as the Templeton moderately deep silt. Wells in the area indicate that topsoils are underlain by silty and claybound gravels.
Soil Trace Elements	According to the ECan GIS database, natural concentrations of trace elements for the site are those of the 'Regional, Recent' soil group.
Groundwater	The site lies over the unconfined and semiconfined gravel aquifer system. Groundwater levels recorded on nearby bore logs are between 11 and 14m deep. The direction of groundwater flow is generally in a south-easterly direction.
Surface Water	According to the ECan GIS database there are no surface water receptors within a 100m radius of the site.

6.2 Site Layout and Current Site Uses

The site is currently vacant of structures and in the process of being developed for residential use. The site previously contained a dwelling and sheds used for rural residential purposes.

6.3 Surrounding Land Uses

The surrounding land is used for residential purposes.

6.4 Geotechnical Investigation

There were no geotechnical investigations made available to Momentum Environmental Ltd (MEL).

7 Summary of Previous Investigations

7.1 Preliminary Site Investigation

A Preliminary Site Investigation (PSI) was undertaken for the site when it was part of a larger underlying block in October 2016 by Malloch Environmental Ltd (now Momentum Environmental Ltd, MEL). The PSI included a review of seven aerial photographs from 1942 to 2014. The aerials showed that the site had been used for pastoral farming until the early 2000's when a dwelling was constructed. There were no Hazardous Activities or Industries (HAIL) activities identified for the site at that time of reporting.

7.2 Preliminary/Detailed Site Investigation and Remediation Action Plan

Due to the long-time delay between the original PSI and the current subdivision proposal, a review of the site to assess for any changes over time was required. Additional aerial photographs showed a small burn pile to the south of the dwelling. A site inspection undertaken as part of the updated PSI confirmed the presence of a burn pile. The owners daughter thought it was likely that the burn pile had been used only for burning of green waste but could not confirm this. There was no evidence of burning of rubbish items with no anthropogenic items present. The ash affected soils were fine and visibly darker than nearby topsoils.

A soil sample collected from the centre of the burn area returned an arsenic concentration of 72mg/kg, exceeding the 'residential 10% produce' soil guideline value (SGV) of 20mg/kg. There were no other exceedances of the human health guidelines. Cadmium, chromium, copper and zinc all exceeded the expected background concentrations for the soils.

The Remediation Action Plan (RAP) recommended that soils from the burn area were remediated via excavation and off-site disposal to an authorised disposal facility. The soil disturbance and disposal associated with the remediation activities complied with permitted activity thresholds and are classified as a 'permitted activity' under the NESCS.

8 Summary of Remedial Works and Site Validation Investigation

8.1 Soil Guideline Values

Human health soil contaminant standards for a group of 12 priority contaminants were derived under a set of five land-use scenarios and are legally binding under The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Health) Regulations 2011 (NES). These standards have been applied where applicable. The regulations describe these as Soil Contaminant Standards. For contaminants other than the 12 priority contaminants, the hierarchy as set out in the Ministry for the Environment Contaminated Land Management Guidelines No 2 has been followed. These are generally described as Soil Guideline Values. For simplicity, this report uses the terminology Soil Guideline Values (SGV) when referring to the appropriate soil contaminant standard or other derived value from the hierarchy. For soil, guideline values are predominantly risk based, in that they are typically derived using designated exposure scenarios that relate to different land uses. For each exposure scenario, selected pathways of exposure are used to derive guideline values. These pathways typically include soil ingestion, inhalation and dermal adsorption. The guideline values for the appropriate land use scenario relate to the most critical pathway.

The land-use scenarios applicable for the site is 'residential 10% produce'. The 'commercial/industrial' land use scenario is used as a proxy for workers involved in disturbing soils.

The adopted trigger value used to determine need for assessment of ecological receptors (including stormwater disposal areas) also referred to as Ecological Guideline Values (EGVs) is the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (online) – Sediment GV-high (ANZWQ).

For comparison of site concentrations against expected background levels, heavy metal concentrations will be assessed against the expected background levels for soils as published in *Background Concentrations in Canterbury soils*, Tonkin and Taylor, July 2007.

8.2 Quality Assurance and Quality Control

Field quality assurance measures as described in Section 4.3.1 of the "Contaminated Land Management Guidelines No 5: Site Investigation and Analysis of Soils, revised 2021" (CLMG) are to be followed. These include using trained staff, choosing appropriate sample containers, accurate and individual labelling and recording of locations, completing appropriate laboratory chain of custody forms, chilling of samples as appropriate and timely delivery to laboratories. All non-disposable sampling equipment should be decontaminated between samples using Decon 90 and rinsed with tap water. All samples are to be submitted to IANZ accredited laboratories. Quality control to ensure freedom from sample cross-contamination is to be measured by the appropriate use of duplicate and rinsate blank samples.

8.3 Summary of Remedial Works

The client advised that they wanted to remediate to achieve results of below expected background. Accordingly, the contractors were instructed to undertake an excavation with extra depth and lateral extent beyond visually affected soils. Remediation of the site was completed on 25 May 2023. MEL attended site on 29 May 2023 following the excavation of the burn area to approximately 0.15m. The soils at the base of the excavated area were brown silty topsoils with no evidence of ashy material. XRF testing completed on the walls and the base of the excavated area showed concentrations of arsenic and lead below the device limit of detection. A total of five soil samples were collected from the walls and base of the excavated area.

XRF test locations marked with an 'O' indicate soils with contaminant concentrations below the 'residential 10% produce' SGVs.



Photo 1 & 2 – Remediated burn area

8.4 Summary of Site Validation Investigation

The site validation investigation was carried out on 29 May 2023. A total of 29 XRF test readings were taken, followed by collection of five soil samples from the walls and base of the excavated area.

The Validation Sample Location Plan is attached in **Appendix A**.

9 Site Validation Investigation Results

9.1 Evaluation of Results

The laboratory validation sample results showed heavy metal concentrations below the 'residential 10% produce' SGVs. Heavy metal concentrations were also below expected background concentrations for the area.

A total of 28.22 tonnes of soils were excavated from the site and disposed of at Burwood Landfill.

The Table of Laboratory Validation Results is attached in **Appendix B**, the Table of XRF Validation Results is attached in **Appendix C** and Laboratory Reports are attached in **Appendix D**. Disposal documentation is attached in **Appendix E**.

9.2 Results of Field & Laboratory Quality Assurance and Quality Control

No quality control issues were identified during sampling.

All laboratory tested samples were submitted to Hill Laboratories for analysis. Hill Laboratories holds IANZ accreditation. As part of holding accreditation the laboratory follows appropriate testing and quality control procedures. No quality control issues were identified.

10 Summary of Resource Consent

Remediation of the burn area was undertaken as a permitted activity, therefore NESCS consent was not required.

11 Conclusion

Remediation of contaminated soils within the burn area was completed on 25 May 2023. MEL attended site on 29 May 2023 to complete XRF testing and validation sampling of the remediated area. The XRF test readings showed concentrations of arsenic and lead below the device limit of detection. A total of five validation samples were collected from the walls and base of the excavated area. The results showed heavy metal concentrations below the 'residential 10% produce' SGVs and also below expected background concentrations for the area.

A total of 28.22 tonnes of soils were excavated from the site and disposed of at Burwood Landfill under manifest number 660659.

The remediation actions have successfully remediated the contaminated soils at the site. Heavy metal concentrations in soils remaining within the remediated area are below expected background levels.

12 Limitations

Momentum Environmental Limited has performed services for this project in accordance with current professional standards for environmental site assessments, and in terms of the client's financial and technical brief for the work. Any reliance on this report by other parties shall be at such party's own risk. It does not purport to completely describe all the site characteristics and properties. Where data is supplied by the client or any third party, it has been assumed that the information is correct, unless otherwise stated. Momentum Environmental Limited accepts no responsibility for errors or omissions in the information provided. Should further information become available regarding the conditions at the site, Momentum Environmental Limited reserves the right to review the report in the context of the additional information.

Opinions and judgments expressed in this report are based on an understanding and interpretation of regulatory standards at the time of writing and should not be construed as legal opinions. As regulatory standards are constantly changing, conclusions and recommendations considered to be acceptable at the time of writing, may in the future become subject to different regulatory standards which cause them to become unacceptable. This may require further assessment and/or remediation of the site to be suitable for the existing or proposed land use activities. There is no investigation that is thorough enough to preclude the presence of materials at the site that presently or in the future may be considered hazardous.

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Appendix A – Validation Sample Location Plan



Specialist soil contamination experts,
keeping your project moving.

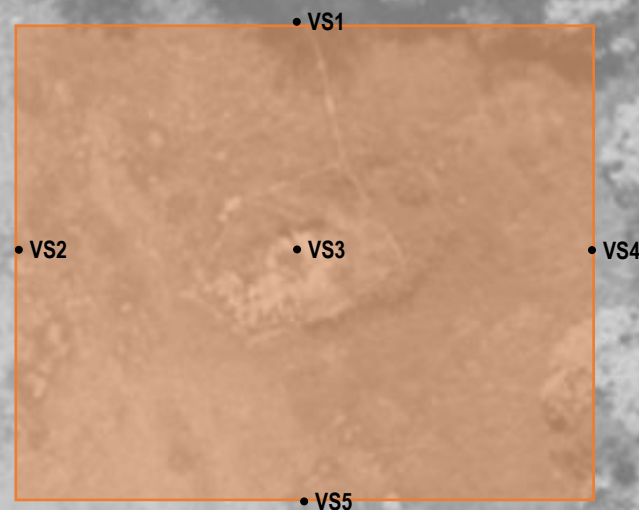
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LEGEND

- VS1 Validation sample location
-  Approximate extent of
remediated area, excavated
to 0.15-0.2m deep

PLAN MUST BE PRINTED IN COLOUR

Approx. extent of site shown on plan



Graphic scale is approximate only



Date: 09 June 2023

Drawing No: 743/1

39 Branthwaite Drive, Rolleston Validation Sample Location Plan

Notes:

- 1 This plan has been prepared for soil contamination risk assessment purposes only. No liability is accepted if the plan is used for any other purposes.
- 2 Any measurements taken from this plan which are not dimensioned on the electronic copy are at the risk of the user.
- 3 Soil sample locations are approximate only

Appendix B – Table of Laboratory Validation Results

Table of Laboratory Validation Results - 39 Branthwaite Drive, Rolleston

Date of sampling: 29 May 2023



Analyte	Sample Name:	VS1	VS2	VS3	VS4	VS5	Soil Guideline Values					
Soil Results	Lab Number:	3289337.1	3289337.2	3289337.3	3289337.4	3289337.5	Residential	Commercial/	Reference	Ecological	Reference	Background ₁
	Location	Wall	Wall	Base	Wall	Wall	10% Produce	Industrial		Receptors		
Heavy Metals												
Arsenic	mg/kg dry wt	5	4	4	4	4	20	70	NES	70	ANZWQ	12.58
Cadmium	mg/kg dry wt	< 0.10	0.13	0.11	0.11	< 0.10	3	1,300	NES	10	ANZWQ	0.19
Chromium	mg/kg dry wt	14	13	15	13	13	460	6,300	NES	370	ANZWQ	22.70
Copper	mg/kg dry wt	4	4	4	4	4	>10,000	>10,000	NES	270	ANZWQ	20.30
Lead	mg/kg dry wt	15.7	15.5	16	16.3	15.5	210	3,300	NES	220	ANZWQ	40.96
Nickel	mg/kg dry wt	10	9	10	10	10	400	6,000	NEPM	52	ANZWQ	20.70
Zinc	mg/kg dry wt	53	52	59	54	55	7,400	400,000	NEPM	410	ANZWQ	93.94

Indicates result exceeds 'residential 10% produce' guideline value
Indicates result exceeds ecological guideline value
Indicates result exceeds background value for soil type

NES - National Environmental Standard for Assessing and Managing Contaminants in Soils, MfE
NEPM - National Environmental Protection Measures 2013, Formerly NEPC, Australia
ANZWQ - Australian and New Zealand - Guidelines for Fresh and Marine Water Quality (online)- Sediment GV-high
₁ Concentrations for "Regional, Yellow Brown Sandy" soil group from Background concentrations in Canterbury soils, Tonkin and Taylor, July 2007

Appendix C – Table of XRF Validation Results

Table of XRF Validation Results - 39 Branthwaite Drive, Rolleston

Units: ppm



XRF Reading #	Time	Type/Comment	Test Duration	Total Recoverable Arsenic		Total Recoverable Lead	
				Result	Error	Result	Error
708	29/05/2023 9:13	System Check	58.35	-	-	-	-
709	29/05/2023 9:14	System Check	58.79	-	-	-	-
710	29/05/2023 9:16	Calibration	30.39	405.2	24.52	471.7	27.84
711	29/05/2023 9:17	Blank	30.07	<LOD	4.84	<LOD	7.12
712	29/05/2023 9:18	Soil suitable to remain on site	12.92	<LOD	9.59	<LOD	13.57
713	29/05/2023 9:18	Soil suitable to remain on site	13.72	<LOD	9.79	<LOD	13.13
714	29/05/2023 9:19	Soil suitable to remain on site	13.71	<LOD	9.39	<LOD	13.01
715	29/05/2023 9:19	Soil suitable to remain on site	12.53	<LOD	9.59	<LOD	13.63
716	29/05/2023 9:20	Soil suitable to remain on site	17.71	<LOD	8.2	<LOD	11.46
717	29/05/2023 9:20	Soil suitable to remain on site	12.11	<LOD	10.1	<LOD	14.92
718	29/05/2023 9:21	Soil suitable to remain on site	13.32	<LOD	10.11	<LOD	13.45
719	29/05/2023 9:21	Soil suitable to remain on site	13.71	<LOD	10.46	<LOD	14.61
720	29/05/2023 9:21	Soil suitable to remain on site	11.33	<LOD	9.56	<LOD	13.69
721	29/05/2023 9:22	Soil suitable to remain on site	15.31	<LOD	9.78	<LOD	13.53
722	29/05/2023 9:22	Soil suitable to remain on site	13.72	<LOD	9.97	<LOD	14.33
723	29/05/2023 9:28	Soil suitable to remain on site	16.12	<LOD	8.43	<LOD	12
724	29/05/2023 9:29	Soil suitable to remain on site	18.9	<LOD	8.88	<LOD	12.21
725	29/05/2023 9:29	Soil suitable to remain on site	17.7	<LOD	8.42	<LOD	11.64
726	29/05/2023 9:30	Soil suitable to remain on site	21.29	<LOD	7.23	<LOD	10.07
727	29/05/2023 9:30	Soil suitable to remain on site	12.52	<LOD	9.3	<LOD	13.54
728	29/05/2023 9:31	Soil suitable to remain on site	10.93	<LOD	10.12	<LOD	14.27
729	29/05/2023 9:31	Soil suitable to remain on site	13.32	<LOD	9.95	<LOD	13.98
730	29/05/2023 9:31	Soil suitable to remain on site	13.32	<LOD	10.27	<LOD	15.1
731	29/05/2023 9:37	Soil suitable to remain on site	14.52	<LOD	9.66	<LOD	13.65
732	29/05/2023 9:38	Soil suitable to remain on site	13.72	<LOD	10.14	<LOD	14.03
733	29/05/2023 9:39	Soil suitable to remain on site	13.31	<LOD	9.13	<LOD	12.81
734	29/05/2023 9:40	Soil suitable to remain on site	11.32	<LOD	10.54	<LOD	14.87
735	29/05/2023 9:41	Soil suitable to remain on site	14.91	<LOD	9.17	<LOD	13.44
736	29/05/2023 9:46	Blank	30.08	<LOD	5.18	<LOD	7.45

Appendix D – Laboratory Reports

Certificate of Analysis

Page 1 of 1

Client:	Momentum Environmental Limited	Lab No:	3289337	SPV1
Contact:	Hollie Griffith	Date Received:	29-May-2023	
	C/- Momentum Environmental Limited	Date Reported:	01-Jun-2023	
	19 Robertsons Road	Quote No:	72157	
	Kirwee 7671	Order No:		
		Client Reference:	39 Branthwaite Drive, Rolleston	
		Submitted By:	Hollie Griffith	

Sample Type: Soil

Sample Name:	VS1 29-May-2023 9:35 am	VS2 29-May-2023 9:37 am	VS3 29-May-2023 9:40 am	VS4 29-May-2023 9:42 am	VS5 29-May-2023 9:45 am
Lab Number:	3289337.1	3289337.2	3289337.3	3289337.4	3289337.5
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	5	4	4	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.13	0.11	0.11
Total Recoverable Chromium	mg/kg dry wt	14	13	15	13
Total Recoverable Copper	mg/kg dry wt	4	4	4	4
Total Recoverable Lead	mg/kg dry wt	15.7	15.5	16.0	16.3
Total Recoverable Nickel	mg/kg dry wt	10	9	10	10
Total Recoverable Zinc	mg/kg dry wt	53	52	59	54

Summary of Methods

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

Sample Type: Soil

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

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

Testing was completed between 30-May-2023 and 01-Jun-2023. For completion dates of individual analyses please contact the laboratory.

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

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



Kim Harrison MSc
Client Services Manager - Environmental

Appendix E – Disposal Documentation

33898



33898

This is a Tax Invoice

GST Number : 106-854-270

Docket Number : 473968
Date In : 25/05/2023 01:12:19 pr
Transporter : Frews Contracting Ltd
Vehicle : DYA936
Product : CCC Special Soil Clas:
First Weight : 10,880 Kg
Second Weight : 17,680 Kg
Net Weight : 6,800 Kg

Job Number: CCC
Job Address: Misc
Billing Customer: CCC Landfill Customer
Manifest Number: 660659

Thankyou.
For all account enquiries,
please phone 03 941 8999

This is a Tax Invoice

GST Number : 106-854-270

Docket Number : 473966
Date In : 25/05/2023 01:10:00 pr
Transporter : Frews Contracting Ltd
Vehicle : GZU415
Product : CCC Special Soil Clas:
First Weight : 15,900 Kg
Second Weight : 37,320 Kg
Net Weight : 21,420 Kg

Job Number: CCC
Job Address: Misc
Billing Customer: CCC Landfill Customer
Manifest Number: 660659

Thankyou.
For all account enquiries,
please phone 03 941 8999