DETAILED SITE INVESTIGATION
55 COSGRAVE ROAD &
55A COSGRAVE ROAD
ARDMORE
AUCKLAND

For the Attention of:

Winton Land Limited

Reference: FES 1443.008 December 2023 (R4)

Company Information

Focus Environmental Services Limited

PO Box 11455

Ellerslie

Auckland 1542

Telephone: +64 9 579 4155

Email: mail@focusenvironmental.co.nz

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Author

Megan Thomas
Environmental Scientist

Reviewed

Claire Johnson
Environmental Scientist

Authorised

David O'Reilly
Principal Environmental Consultant

Distribution List

Parties	Copies
Winton Land Limited	1
Focus Environmental Services Limited	1

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Executive Summary

This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

Focus Environmental Services Limited was contracted by Winton Land Limited to carry out a Detailed Site Investigation (DSI) at 55 & 55A Cosgrave Road, Ardmore, Auckland. The legal description of the site is Sect 3 SO 495342, Sect 4 SO 495342 & SECT 1 SO 495342, SECT 2 SO495342 with an area of 9.24 and 1.81 ha respectively.

It should be noted that this report has been revised following the request of the client.

The Sunfield Urban Development Area (UDA) consists of nineteen properties located across Cosgrave Road, Old Wairoa Road, Hamlin Road and Airfield Road, Papakura, Auckland.

The scope of this report is limited to the properties of 55 Cosgrave Road and the western portion of 55A Cosgrave Road, Ardmore and should be read in conjunction with the cover letter summarising the findings of the PSIs and DSIs completed for the Sunfield UDA.

This DSI has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No. 5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, Ardmore Block Plan Change Area, 55 Cosgrave, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the former site building, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the site contamination enquiry stated that the site had potentially been used for horticultural purposes. An interview with the property owner stated this area of the site was only used for growing maize for cattle feed, and that the paddocks had been subject to a Thrip infestation and therefore pesticide sprays were used to eliminate this.

Following a review of the available historical photographs, no horticultural activities other than the maize growing described by the property owner was identified and the only sprays used were modern post 2000's used to control the Thrip infestation.

In order to confirm this, as a conservative approach, indicative representative sampling of the site soils in these areas was recommended to determine if any organo-chlorine pesticides had been used on the site.

Due to the potential sources of contamination identified it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the desk top assessment, the intrusive site investigation was carried out by Focus Environmental Services Limited personnel on 24th March 2021.

As part of the investigation, three discrete surface soil samples were taken from the areas of the historical buildings identified at the site, and twenty discrete samples were composited (4:1) at the laboratory to form 5 composite samples from the area where organo-chlorine pesticide sprays were potentially used.

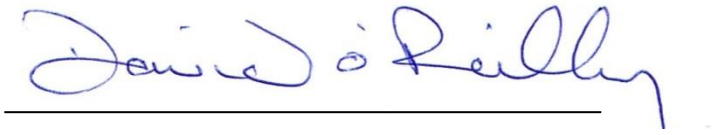
The results of the sample analysis have shown the concentrations of all contaminants of concern detected were below the maximum Auckland background concentrations for non-volcanic soils and therefore the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) and the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part (AUP: OP).

At the request of the client, 55A Cosgrave Road has been included in the report. Given the site is in use for the same purposes as the neighbouring sites on which the sample analysis was carried out it is reasonable to assume the concentrations of contaminants would also be below the maximum Auckland background concentrations for non-volcanic soils.

As the concentrations of contaminants detected were below the background concentrations for the site, in accordance with Regulation 5(9), the regulations of the NES do not apply to site.

In addition, as there were no contaminants detected above the levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP, the contaminated land rules of the AUP: OP will unlikely be triggered by the current proposal.

Submitted By,



Principal Environmental Consultant
Focus Environmental Services Limited

1.0 Scope

1.1 This report has been prepared at the request of Winton Land Limited ("the Client") in terms of the Focus Environmental Services Limited Agreement ("Agreement").

1.2 The following report is based on:

- *Information provided by the Client*
- *The report titled 'Preliminary Site Investigation, Ardmore Block Plan Change Area, 55 Cosgrave Road, Ardmore Auckland' dated December 2020 and prepared by Focus Environmental Services;*
- *A site walkover and inspection; and*
- *Site investigation and soil sampling.*

1.3 We have not independently verified the information provided to us by the Client or its completeness. We do not express an opinion on the accuracy or the reliability of such information.

1.4 No warranties are given, intended or implied.

1.5 Opinion, inferences, assumptions and interpretations made in this report should not be construed as legal opinion.

1.6 Where an assessment is given in this report, the Client must also rely upon their own judgement, knowledge and assessment of the subject of this report before undertaking any action.

1.7 This report must not be used in any other context or for any other purpose other than that for which it has been prepared without the prior written consent of Focus Environmental Services Limited.

1.8 This report is strictly confidential and intended for the sole use of the Client and shall not be disclosed without the prior written consent of Focus Environmental Services Limited.

1.9 This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

2.0 Site Identification

The property is located at 55 Cosgrave Road and the western area of 55A Cosgrave Road, Ardmore, Auckland as shown in Figure 1 attached. The legal description of the site is Sect 3 SO 495342, Sect 4 SO 495342 & SECT 1 SO 495342, SECT 2 SO495342 (henceforth referred to as the site) with an area of 9.24 and 1.81 ha respectively. The site is located at national grid reference 1774124mE and 5897887mN.

The site is rectangular in shape and is zoned 'Future Urban Zone' under the Auckland Unitary Plan – Operative in Part (AUP: OP).

The site location plan is presented as Figure 1.

3.0 Proposed Site Redevelopment Activity

It is proposed that the site will be redeveloped for residential purposes. As part of the redevelopment, the site will undergo subdivision, a change of land use and disturbance of soils.

The illustrative masterplan is attached as Appendix A.

4.0 Geology and Hydrology

Published geological maps[1] indicate the subject sites are typically underlain by alluvial deposits of the Puketoka Formation. A description of the underlying geology is presented in Table 1 below.

Table 1: Geology: 55 & 55A Cosgrave Road, Ardmore

Key name	Late Pliocene to Middle Pleistocene pumiceous river deposits
Simple name	Neogene sedimentary rocks
Main rock name	Sand
Description	Pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvia
Subsidiary rocks	Mud gravel peat lignite tephra pumice
Key group	Late Pliocene to Middle Pleistocene sediments
Stratigraphic lexicon name	Puketoka Formation
Absolute age (min)	0.071 million years
Absolute age (max)	3.6 million years
Rock group	Sandstone
Rock class	Clastic sediment

No groundwater investigation was carried out as part of this investigation.

The nearest surface water body to the site, as identified in the ecological report titled '*Cosgrave Road Plan Change: Baseline Ecology*' and dated April 2023, is an artificial drainage channel which runs through the western boundary of the site.

[1] Geology of the Auckland Area (Institute of Geological &Nuclear Sciences 1:250,000 geological map 3, 2011)

5.0 Regulatory Framework

5.1 The National Environmental Standard

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES) came into effect on the 1st of January 2012 and supersedes any District Plan rules that related to contaminated land. Any Regional Plan rules relating to contaminated land are still applicable.

In brief, the objective of the NES is to ensure that land affected by contaminants is identified and assessed and, if necessary, remediated or managed to protect human health. The NES only applies to the activities: removing or replacing all, or part of, a fuel storage system; sampling the soil; disturbing the soil; subdividing the land; and changing the land use, and where an activity or industry described in the Hazardous Activities and Industries List (HAIL) is being, has been, or is more likely than not to have been undertaken on the piece of land.

The NES also contains reference to the soil contaminant standards for human health ($SCS_{(health)}$), for a variety of land use scenarios along with reference to best practice reporting documents.

The environmental HAIL is attached as Appendix B.

5.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules of the AUP: OP must be considered.

In brief, the objective of the AUP: OP is to manage land containing elevated levels of contaminants to protect human health and the environment and to enable the effective use of the land.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

6.0 Background

The history of the site has been described in the report titled *'Preliminary Site Investigation, Ardmore Block Plan Change Area, 55 Cosgrave Road, Ardmore, Auckland'* dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the former site buildings, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the site contamination enquiry stated that the site had potentially been used for horticultural purposes. An interview with the property owner stated this area of the site was only used for growing maize for cattle feed, and that the paddocks had been subject to a Thrip infestation and therefore pesticide sprays were used to eliminate this. Following a review of the available historical photographs, no horticultural activities other than the maize growing described by the property owner was identified and the only sprays used were modern post 2000's used to control the Thrip infestation.

This document is intended to confirm the contamination status of the site at 55 Cosgrave Road, Ardmore.

In addition, at the time of writing this report, the results of a detailed geotechnical investigation covering the site was not available.

7.0 Potentially Contaminating Activities or Land Uses

Three potentially contaminating activities were identified at the site, these are outlined in Table 2 below.

Table 2: Potentially Contaminating Activities and/or Land Uses: 55 & 55A Cosgrave Road, Ardmore

Activity Description	HAIL Category
Historical Horticulture/Persistent Pesticide Use	A10
Maintenance and Use of Lead Based Paint	I
Demolition of Historic Structures Potentially Containing Asbestos, Products Potentially Containing Asbestos in a Degraded Condition, and Potentially Asbestos Containing Material intermixed with the Site Soils	E1

It should be noted that following a review of the available historical photographs, no horticultural activities other than the maize growing described by the property owner was identified and the only sprays used were modern post 2000's used to control the Thrip infestation. In order to confirm this, as a conservative approach, indicative representative sampling of the site soils in these areas was recommended to determine if any organo-chlorine pesticides had been used on the site

8.0 Conceptual Model of Exposure Pathways

The preliminary conceptual site model provided in Table 3 below expands on the potential sources of contamination (as identified above) and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 3: Preliminary Conceptual Site Model: 55 & 55A Cosgrave Road, Ardmore

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Surface Water Run-off	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Migration of Groundwater	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.

9.0 Sampling and Analysis Plan and Sampling Method

Environmental Sampling was carried out in accordance with the Contaminated Land Management Guidelines No. 5 (MfE, Revised 2021).

Twenty discrete soil samples were collected from across the site and composited at the laboratory (4:1) to form five composite samples which are indicative and representative of the areas of the site potentially subject to historical horticultural and organo-chlorine pesticide spray use onsite.

Furthermore, three discrete surface soil samples were collected from the area of the historical buildings on site. All samples were sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 4 below.

Table 4: Sample Analysis Information: 55 & 55A Cosgrave Road, Ardmore

Sample Name	Sample Depth	Number of Samples	HAIL Activity	Analysis Suite
COMP01 - COMP05	0 - 0.15m	5	Historical Horticulture/Pesticide Use	• Total recoverable Arsenic, Copper & Lead; and • Organo-chlorine Pesticides.
HB01 – HB03	0 - 0.15m	3	Potential ACM Demolition Debris	• Semi-quantitative Asbestos in Soil (NZ Guidelines).
			Application of Lead Based Paint	• Total recoverable Lead.

It should be noted that no visual evidence of asbestos containing materials was observed within the vicinity of the historical building.

The sample location plan is presented as Figure 2.

10.0 Field Sampling Quality Assurance

All sampling implements were triple washed between samples using clean tap water, followed by a solution of laboratory grade phosphate free detergent (Decon 90), and a final rinse with clean water.

Clean, nitrile gloves were worn when handling each sample. Samples were stored in laboratory cleaned glass jars or laboratory supplied 500ml plastic containers and immediately placed in an iced cooler. The samples were transported under chain of custody documentation to an IANZ accredited laboratory for analysis.

11.0 Laboratory Quality Assurance

Routine laboratory quality assurance procedures include analysis of laboratory blanks and spiked samples. All analyses were carried out using industry standard methods as follows:

- Total Recoverable Metals – Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICPMS. In accordance with in-house procedure based on US EPA method 200.8.
- Organo-chlorine Pesticides – sonication extraction – OCP Screen method, air dry, grind, sonication extraction GC-ECD.
- Semi–quantitative Asbestos in Soil - Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in soil samples.

12.0 Basis for Guideline Values

It is proposed that the site will be developed for residential land use, therefore the guideline values of the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use (10% produce consumption), as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES), and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP) are considered relevant and have been adopted as the site assessment criteria.

In addition, as the NES does not contain a reference value for asbestos in soil, in accordance with the hierarchy described in the Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011), the soil guideline value for asbestos in New Zealand for residential land use, taken from the New Zealand Guidelines for Assessing and Manging Asbestos in Soil (BRANZ Limited, 2017) of 0.001% combined fibrous asbestos and asbestos fines (FA/AF) and/or 0.01% asbestos containing material (ACM) has been adopted as the site assessment criteria.

Furthermore, the concentrations of heavy metals detected will be compared to the maximum background levels for non-volcanic soils in Auckland[2] (TP153).

The relevant values of the above guidelines have been reproduced in Table 5 below:

[2] Background Concentrations of Inorganic Elements in Soils from the Auckland Region, Technical Publication No.153, Auckland Regional Council, 2001.

Table 5: Site Assessment Criteria: 55 Cosgrave Road, Ardmore (mg/kg)

Parameter	NES ($SCSs_{(health)}$)	AUP: OP	TP153 (Non-Volcanic)
Arsenic	20	100	12
Copper	NL	325	45
Lead	210	250	65
Total DDT	70	12	-
Dieldrin	2.6	-	-
Asbestos (AF/FA)	0.001%[1]/0.01%[2]	-	-
Visual ACM	No Visual Evidence of ACM[3]	-	-

Note: NL = Not Limited. This is where the derived values exceed 10,000mg/kg; 1 = Soil guideline values for asbestos in Soil of 0.001% combined fibrous asbestos and asbestos fines (FA/AF), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 2 = Soil guideline values for asbestos in Soil of 0.01% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 3 = No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

It is considered that the natural background levels of organo-chlorine pesticides and asbestos in soils are to be below the analytical levels of detection and hence the detection of asbestos in any form (visual evidence, AF & FA) would restrict material from being classified as cleanfill.

13.0 Soil Sampling Results

Tabulated soil sampling results are presented in Tables 6 - 8 below and laboratory transcripts are provided in Appendix C.

13.1 Heavy Metals

Table 6: Heavy Metals Results: 55 Cosgrave Road, Ardmore (mg/kg)

Sample	As	Cu	Pb
COMP01	<8	26	17.7
COMP02	4	29	18.8
COMP03	3	31	18.6
COMP04	<5	25	17
COMP05	7	23	22
HB01	-	-	25
HB02	-	-	16.8
HB03	-	-	20

Note: Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the AUP: OP. Results in *Italics* exceed the maximum Auckland background concentrations for non-volcanic soils outlined in the Auckland Regional Council Technical Publication No.153, Oct 2001.

The concentrations of arsenic, copper and lead detected in all samples analysed were below the maximum Auckland background concentrations for non-volcanic soils and therefore below the $SCSs_{(health)}$ for residential land use and the discharge criteria as outlined in the AUP: OP.

13.2 Organo-chlorine Pesticides

Table 7: Organo-chlorine Pesticide Results: 55 Cosgrave Road, Ardmore (mg/kg)

Sample	Total DDT	Dieldrin
COMP01	<0.02	<0.05
COMP02	<0.02	<0.05
COMP03	<0.02	<0.05
COMP04	<0.02	<0.05
COMP05	<0.02	<0.05

Note: * = Residual levels of contaminants detected. Results in red exceed the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

The concentrations of organo-chlorine pesticides in all samples analysed were below the analytical levels of detection, therefore below the cleanfill criteria, the $SCS_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

13.3 Asbestos

Table 8: Asbestos in Soil Results: 55 Cosgrave Road, Ardmore (Semi-quantitative, %)

Sample	Asbestos Type	Asbestos (FA/AF %)	Asbestos (% ACM)
HB01	Asbestos Not Detected	<0.001	<0.001
HB02	Asbestos Not Detected	<0.001	<0.001
HB03	Asbestos Not Detected	<0.001	<0.001

Note: * - denotes residual concentrations detected. Results in red exceed the adopted human health criteria. Results in *Italics* exceed the cleanfill criteria.

The concentration of asbestos fibres detected in the all samples collected were below the analytical levels of detection, therefore below the cleanfill criteria, and the adopted human health criteria.

14.0 Revised Conceptual Model of Exposure Pathways

The revised conceptual site model provided in Table 9 below expands on the potential sources of contamination (as identified above), following sampling and analysis, and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 9: Revised Conceptual Site Model: 55 Cosgrave Road, Ardmore

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Incomplete: No concentrations of contaminants detected in exceedance of the SCS Residential land use.
		Human Health – Commercial/Industrial Outdoor Worker	Incomplete: No concentrations of contaminants detected in exceedance of the SCS Commercial/industrial worker
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Incomplete: No concentrations of contaminants detected in exceedance of the SCS Residential land use.
		Human Health – Commercial/Industrial Outdoor Worker	Incomplete: No concentrations of contaminants detected in exceedance of the SCS Commercial/industrial worker
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Incomplete: No evidence of potential vapours or fibres identified at the site.
		Human Health – Commercial/Industrial Outdoor Worker	Incomplete: No evidence of potential vapours or fibres identified at the site.
	Surface Water Run-off	Ecological Receptors - Artificial Drainage Channel	Incomplete: No concentrations of contaminants detected in exceedance of the AUP: OP
	Migration of Groundwater	Ecological Receptors - Artificial Drainage Channel	Incomplete: No concentrations of contaminants detected in exceedance of the AUP: OP

15.0 Regulatory Requirements

15.1 The National Environmental Standard

Due to the potentially contaminating land uses identified above, it is considered that an activity described in the HAIL is being, has been, or is more likely than not to have been undertaken at the site.

Resource Consent will therefore likely be required for the site under the District Plan, following the introduction of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

In reference to the NES the following assessment was made in determining the activity status of the proposed works:

- The land is covered by the NES under regulation 5.7(b) 'an activity or industry described in the HAIL has been undertaken on it'.
- The activity is disturbing soil under regulation 5(4)(a) 'means disturbing the soil of the piece of land for a particular purpose'.
- The activity will unlikely comply with regulation 8(3)(c) 'the volume of the disturbance of the soil of the piece of land must be no more than 25m^3 per 500m^2' and '…a maximum of 5 m^3 per 500 m^2 of soil may be taken away'.
- A detailed site investigation for the piece of land does exist.

As the concentrations of contaminants detected were below the background concentrations for the site, in accordance with Regulation 5(9), the regulations of the NES do not apply to site.

15.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules must be considered.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

As there were no contaminants detected above the levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP, the contaminated land rules of the AUP: OP will unlikely be triggered by the current proposal.

16.0 Conclusions and Recommendations

This DSI has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No. 5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, Ardmore Block Plan Change Area, 55 Cosgrave, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the former site building, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the site contamination enquiry stated that the site had potentially been used for horticultural purposes. An interview with the property owner stated this area of the site was only used for growing maize for cattle feed, and that the paddocks had been subject to a Thrip infestation and therefore pesticide sprays were used to eliminate this.

Following a review of the available historical photographs, no horticultural activities other than the maize growing described by the property owner was identified and the only sprays used were modern post 2000's used to control the Thrip infestation.

In order to confirm this, as a conservative approach, indicative representative sampling of the site soils in these areas was recommended to determine if any organo-chlorine pesticides had been used on the site.

Due to the potential sources of contamination identified it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the desk top assessment, the intrusive site investigation was carried out by Focus Environmental Services Limited personnel on 24th March 2021.

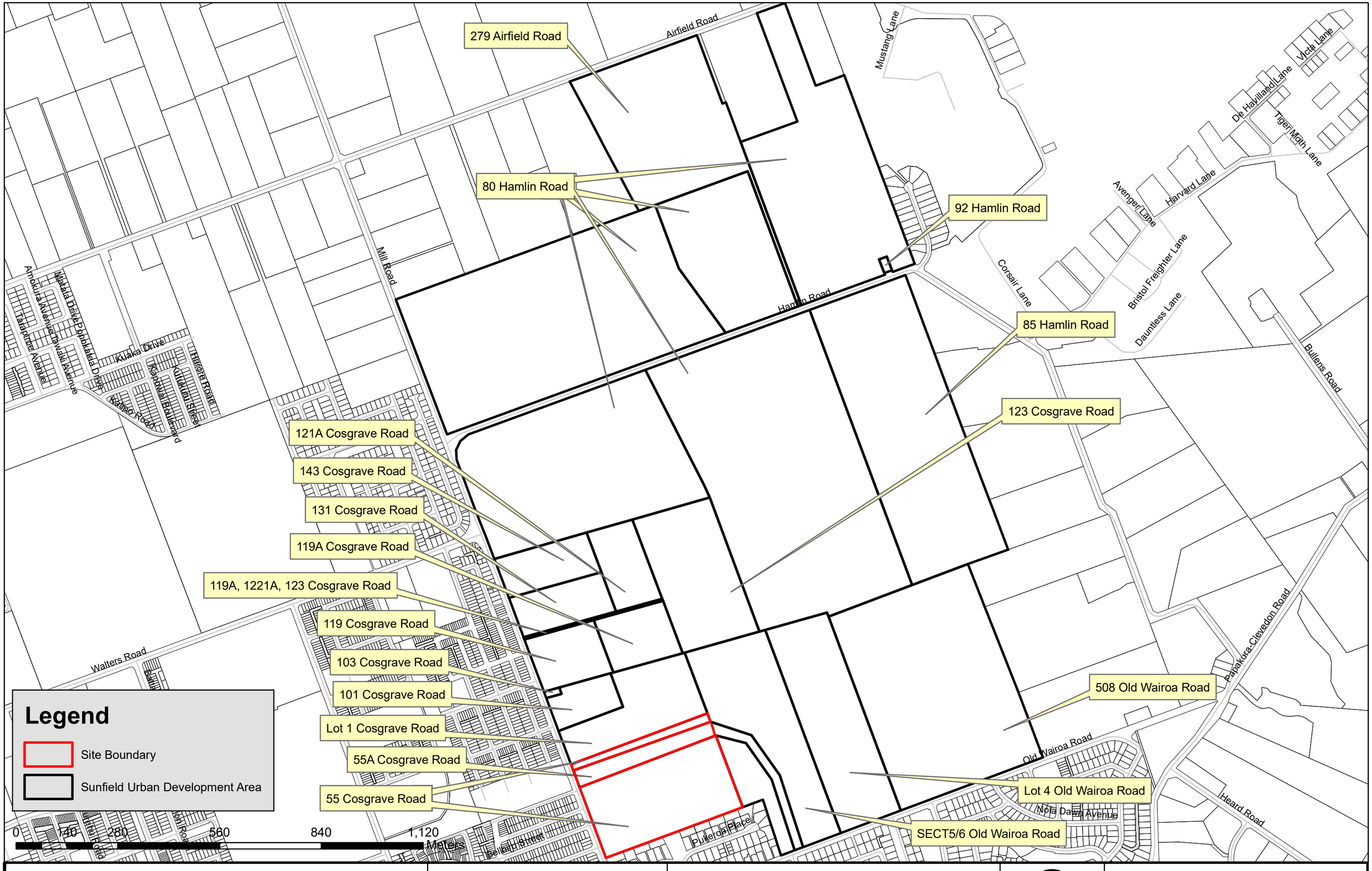
As part of the investigation, three discrete surface soil samples were taken from the areas of the historical buildings identified at the site, and twenty discrete samples were composited (4:1) at the laboratory to form 5 composite samples from the area where organo-chlorine pesticide sprays were potentially used.
The results of the sample analysis have shown the concentrations of all contaminants of concern detected were below the maximum Auckland background concentrations for non-volcanic soils and therefore the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) and the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part (AUP: OP).

At the request of the client, 55A Cosgrave Road has been included in the report. Given the site is in use for the same purposes as the neighbouring sites on which the sample analysis was carried out it is reasonable to assume the concentrations of contaminants would also be below the maximum Auckland background concentrations for non-volcanic soils.

As the concentrations of contaminants detected were below the background concentrations for the site, in accordance with Regulation 5(9), the regulations of the NES do not apply to site.

In addition, as there were no contaminants detected above the levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP, the contaminated land rules of the AUP: OP will unlikely be triggered by the current proposal.

Figures



Focus Environmental Services Limited
PO Box 11455
Ellerslie
Auckland 1542

Ph: +64 9 579 4155
www.focusenvironmental.co.nz

Winton Land Limited
55 & 55A Cosgrave Road
Sunfield Urban Development Area
Papakura
Auckland

Figure 1: Site Location Plan

Detailed Site Investigation

1443.008

Drawing Number: 1443.008.01
Drawn By: MT
Checked By: DO'R
Date: 19/12/2023

Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 55 & 55A Cosgrave Road Sunfield Urban Development Area Papakura Auckland	**Figure 2: Sample Location Plan** Detailed Site Investigation	1443.008 R5	Drawing Number: 1443.008.02 Drawn By: MT Checked By: DO'R Date: 19/12/2023

Appendices

Appendix A – Illustrative Masterplan

Appendix B – Environmental HAIL

Ministry for the Environment
Manatū Mō Te Taiao

Hazardous Activities and Industries List (HAIL)

October 2011

A Chemical manufacture, application and bulk storage

1. Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application
2. Chemical manufacture, formulation or bulk storage
3. Commercial analytical laboratory sites
4. Corrosives including formulation or bulk storage
5. Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents
6. Fertiliser manufacture or bulk storage
7. Gasworks including the manufacture of gas from coal or oil feedstocks
8. Livestock dip or spray race operations
9. Paint manufacture or formulation (excluding retail paint stores)
10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
11. Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application
12. Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides
13. Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground
14. Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges
15. Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)
16. Skin or wool processing including a tannery or fellmongery, or any other commercial facility for hide curing, drying, scouring or finishing or storing wool or leather products
17. Storage tanks or drums for fuel, chemicals or liquid waste
18. Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside

B Electrical and electronic works, power generation and transmission

1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)

2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment
3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices
4. Power stations, substations or switchyards

C Explosives and ordinances production, storage and use

1. Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging
2. Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors
3. Training areas set aside exclusively or primarily for the detonation of explosive ammunition

D Metal extraction, refining and reprocessing, storage and use

1. Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material
2. Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds
3. Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds
4. Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals
5. Engineering workshops with metal fabrication

E Mineral extraction, refining and reprocessing, storage and use

1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
2. Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)
3. Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process
4. Commercial concrete manufacture or commercial cement storage
5. Coal or coke yards
6. Hydrocarbon exploration or production including well sites or flare pits
7. Mining industries (excluding gravel extraction) including exposure of faces or release of groundwater containing hazardous contaminants, or the storage of hazardous wastes including waste dumps or dam tailings

F Vehicle refuelling, service and repair

1. Airports including fuel storage, workshops, washdown areas, or fire practice areas
2. Brake lining manufacturers, repairers or recyclers
3. Engine reconditioning workshops
4. Motor vehicle workshops
5. Port activities including dry docks or marine vessel maintenance facilities

6. Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas
7. Service stations including retail or commercial refuelling facilities
8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances

G Cemeteries and waste recycling, treatment and disposal

1. Cemeteries
2. Drum or tank reconditioning or recycling
3. Landfill sites
4. Scrap yards including automotive dismantling, wrecking or scrap metal yards
5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)
6. Waste recycling or waste or wastewater treatment

H Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

I Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment

Appendix C – Laboratory Transcripts

Hill Laboratories
TRIED, TESTED AND TRUSTED

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

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2566816 SPv2
Contact:	Elliot Dillon-Herzog	**Date Received:**	25-Mar-2021
	C/- Focus Environmental Services Limited	**Date Reported:**	30-Mar-2021
	PO Box 11455	**Quote No:**	80876
	Ellerslie	**Order No:**	
	Auckland 1542	**Client Reference:**	1443.008
		Submitted By:	Elliot Dillon-Herzog

Sample Type: Soil

Sample Name:		HB01 24-Mar-2021	HB02 24-Mar-2021	HB03 24-Mar-2021	Composite of COMP01 A, COMP01 B, COMP01 C and COMP01 D	Composite of COMP02 A, COMP02 B, COMP02 C and COMP02 D
Lab Number:		2566816.21	2566816.22	2566816.23	2566816.24	2566816.25
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	71	72
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	< 8	4
Total Recoverable Copper	mg/kg dry wt	-	-	-	26	29
Total Recoverable Lead	mg/kg dry wt	25	16.8	20	17.7	18.8
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	< 0.015	< 0.014
alpha-BHC	mg/kg dry wt	-	-	-	< 0.015	< 0.014
beta-BHC	mg/kg dry wt	-	-	-	< 0.015	< 0.014
delta-BHC	mg/kg dry wt	-	-	-	< 0.015	< 0.014
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.015	< 0.014
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.015	< 0.014
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.015	< 0.014
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.015	< 0.014
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.015	< 0.014
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.015	< 0.014
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.015	< 0.014
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.015	< 0.014
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Total DDT Isomers	mg/kg dry wt	-	-	-	< 0.09	< 0.09
Dieldrin	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endosulfan I	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endosulfan II	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endrin	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Endrin ketone	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Heptachlor	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.015	< 0.014
Methoxychlor	mg/kg dry wt	-	-	-	< 0.015	< 0.014

Sample Type: Soil						
Sample Name:		Composite of COMP03 A, COMP03 B, COMP03 C and COMP03 D	Composite of COMP04 A, COMP04 B, COMP04 C and COMP04 D	Composite of COMP05 A, COMP05 B, COMP05 C and COMP05 D		
Lab Number:		2566816.26	2566816.27	2566816.28		
Individual Tests						
Dry Matter	g/100g as rcvd	71	69	71	-	-
Total Recoverable Arsenic	mg/kg dry wt	3	< 5	7	-	-
Total Recoverable Copper	mg/kg dry wt	31	25	23	-	-
Total Recoverable Lead	mg/kg dry wt	18.6	17.0	22	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
alpha-BHC	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
beta-BHC	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
delta-BHC	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
4,4'-DDD	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
4,4'-DDE	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
2,4'-DDT	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
4,4'-DDT	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Total DDT Isomers	mg/kg dry wt	< 0.09	< 0.09	< 0.09	-	-
Dieldrin	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endosulfan I	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endosulfan II	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endrin	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Endrin ketone	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Heptachlor	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-
Methoxychlor	mg/kg dry wt	< 0.014	< 0.014	< 0.014	-	-

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	21-28
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	21-28
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	24-28
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	24-28
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	21-28
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	24-28
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	24-28

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	21-28

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

Testing was completed between 29-Mar-2021 and 30-Mar-2021. For completion dates of individual analyses please contact the laboratory.

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2567182	A2Pv1
Contact:	Elliot Dillon-Herzog	**Date Received:**	25-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	26-Mar-2021	
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.008	
		Submitted By:	Elliot Dillon-Herzog	

Sample Type: Soil

Sample Name:		HB01 24-Mar-2021	HB02 24-Mar-2021	HB03 24-Mar-2021		
Lab Number:		2567182.1	2567182.2	2567182.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
As Received Weight	g	322.2	361.5	297.8	-	-
Dry Weight	g	219.2	287.6	216.9	-	-
Moisture	%	32	20	27	-	-
Sample Fraction >10mm	g dry wt	10.7	< 0.1	0.2	-	-
Sample Fraction <10mm to >2mm	g dry wt	44.0	29.6	38.5	-	-
Sample Fraction <2mm	g dry wt	164.0	256.9	177.3	-	-
<2mm Subsample Weight	g dry wt	57.6	52.5	57.7	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

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

For further details, please contact the Asbestos Team.

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

The following assumptions have been made:

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

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

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-3
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3

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

Testing was completed on 26-Mar-2021. 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.

John Keneth Paglingayen
Bachelor of Applied Science
Laboratory Technician - Asbestos

DETAILED SITE INVESTIGATION,
REMEDIATION ACTION PLAN
&
ASSESSMENT OF ENVIRONMENTAL EFFECTS
80 HAMLIN ROAD,
ARDMORE
AUCKLAND

For the Attention of:

Winton Land Limited

Reference: FES 1443.009 December 2023

Company Information

Focus Environmental Services Limited

PO Box 11455

Ellerslie

Auckland 1542

Telephone: +64 9 579 4155

Email: mail@focusenvironmental.co.nz

Quality Information

Project Name	DSI, RAP & AEE 80 Hamlin Road, Ardmore
Project Number	1443.009 (R1)
File Reference	M:\2023 Jobs\Winton\Sunfield Development\Completed Reports\80 Hamlin Road, Ardmore - 1443.009\01 Report\R1\1443.009_DSI_RAP_AEE_MT (R1).docx
Date Issued	April 2021
Date Revised	December 2023

Author

Megan Thomas
Environmental Scientist

Reviewed

Claire Johnson
Environmental Scientist

Authorised

David O'Reilly
Principal Environmental Consultant

Distribution List

Parties	Copies
Winton Land Limited	1
Focus Environmental Services Limited	1

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Appendices

Executive Summary

This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

Focus Environmental Services Limited was contracted by Winton Land Limited to carry out a Detailed Site Investigation, Remediation Action Plan and Assessment of Environmental Effects (henceforth referred to as the DSI, RAP & AEE) at 80 Hamlin Road, Ardmore, Auckland. The legal description of the site is Pt Lot 2 DP 22141, Lot 2 DP 21397, Lot 1 DP21397, Lot 5 DP 12961, Pt Lot 4 DP 12961 with an area of 117.50 ha.

It should be noted that this report has been revised following the request of the client.

The Sunfield Urban Development Area (UDA) consists of nineteen properties located across Cosgrave Road, Old Wairoa Road, Hamlin Road and Airfield Road, Papakura, Auckland.

The scope of this report is limited to the property of at 80 Hamlin Road, Ardmore and should be read in conjunction with the cover letter summarising the findings of the PSIs and DSIs completed for the Sunfield UDA.

This DSI, RAP & AEE has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No.5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, Ardmore Block Plan Change Area, 80 Hamlin Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

During the review of the available information, it was noted that the southern and western portion of the site had been utilised for horticultural purposes. In addition, due to the age of the site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the storage of fuel and chemicals, bulk storage of tyres, potential spray race activities and treating of timber posts onsite were also noted.

During the site walkover and inspection, visible broken fragments of potentially asbestos containing material was observed on top of the soil profile at three locations across the site.

This document is intended to confirm the contamination status of the site at 80 Hamlin Road.

Due to the potential sources of contamination identified it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

An intrusive investigation was carried out by Focus Environmental Services Limited personnel where a total of fifty-five discrete soil samples were collected from the site.

The results of the sample analysis and visual inspection indicate that the site soils in central area of the site and the central northern area of the site are contaminated above the $SCSs_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, PCP and asbestos fibres (AF/FA, w/w bonded ACM and visual evidence). Furthermore, concentrations of heavy metals were detected in exceedance of the NES (SCS) for commercial/industrial worker and therefore may pose a short-term risk to site workers.

Due to the elevated levels of contaminants detected, the site at 80 Hamlin Road, Ardmore will require remediation of the affected soils prior to being redeveloped. The estimated volume of soil requiring remediation is $492m^3$. It should be noted that this volume may change during the remedial process.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being $405m^3$ which is above 200 m^3 it is considered that the proposed remediation will likely not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP may be required.

The objective of this Remediation Action Plan is to ensure that the soils contaminated above the adopted site assessment criteria are handled, removed in a controlled manner and disposed of to a suitable disposal location. All earthworks required as part of the remedial works should be carried out in accordance with this Remediation Action Plan.

An assessment of the effects which may occur as a result of the proposed works has been made in order to mitigate any potential adverse environmental and/or human health effects. If the controls outlined in this Remediation Action Plan are implemented during the development works it is considered that the effects on the environment and human health are likely to be effectively mitigated.

Submitted By,

Principal Environmental Consultant
Focus Environmental Services Limited

1.0 Scope

1.1 This report has been prepared at the request of Winton Land Limited ("the client") in terms of the Focus Environmental Services Limited Agreement ("Agreement").

1.2 The following report is based on:

- *Information provided by the client;*
- *'Preliminary Site Investigation, Ardmore Block Plan Change Area, 80 Hamlin Road, Ardmore, Auckland' dated December 2020 and prepared by Focus Environmental Services Limited;*
- *A site walkover and inspection; and*
- *Site investigation and soil sampling.*

1.3 We have not independently verified the information provided to us by the client or its completeness. We do not express an opinion on the accuracy or the reliability of such information.

1.4 No warranties are given, intended or implied.

1.5 Opinion, inferences, assumptions and interpretations made in this report should not be construed as legal opinion.

1.6 Where an assessment is given in this report, the client must also rely upon their own judgement, knowledge and assessment of the subject of this report before undertaking any action.

1.7 This report must not be used in any other context or for any other purpose other than that for which it has been prepared without the prior written consent of Focus Environmental Services Limited.

1.8 This report is strictly confidential and intended for the sole use of the client and shall not be disclosed without the prior written consent of Focus Environmental Services Limited.

1.9 This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

2.0 Site Identification

The property is located at 80 Hamlin Road, Ardmore as shown in Figure 1 attached. The legal description of the site is Pt Lot 2 DP 22141, Lot 2 DP 21397, Lot 1 DP21397, Lot 5 DP 12961, Pt Lot 4 DP 12961 with an area of 117.50 ha. The site is located at national grid reference 1774332mE and 5899147mN.

The site is rectangular in shape and is zoned 'Rural – Mixed Rural Zone' under the Auckland Unitary Plan – Operative in Part (AUP: OP).

The site location plan is presented as Figure 1.

3.0 Proposed Site Redevelopment Activity

It is proposed that the site will be redeveloped for residential purposes. As part of the redevelopment, the site will undergo subdivision, a change of land use and disturbance of soils.

The illustrative masterplan is attached as Appendix A.

4.0 Geology and Hydrology

Published geological maps[1] indicate that the site at 80 Hamlin Road, Ardmore is underlain with non-volcanic deposits of the Puketoka Formation & Tauranga Group.

A description of the underlying geologies is presented in Tables 1 - 2 below.

Table 1: Geology of 80 Hamlin Road, Ardmore

Key name	Late Pliocene to Middle Pleistocene pumiceous river deposits
Simple name	Neogene sedimentary rocks
Main rock name	Sand
Description	Pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvia
Subsidiary rocks	Mud gravel peat lignite tephra pumice
Key group	Late Pliocene to Middle Pleistocene sediments
Stratigraphic lexicon name	Puketoka Formation
Absolute age (min)	0.071 million years
Absolute age (max)	3.6 million years
Rock group	sandstone
Rock class	Clastic sediment

Table 2: Geology of 80 Hamlin Road, Ardmore

Key name	OIS1 (Holocene) river deposits
Simple name	Holocene river deposits
Main rock name	Mud
Description	Sand, silt mud and clay with local gravel and peat beds
Subsidiary rocks	Sand silt clay peat
Key group	Holocene sediments
Stratigraphic lexicon name	Tauranga Group
Absolute age (min)	0.0 million years
Absolute age (max)	0.014 million years
Rock group	mudstone
Rock class	Clastic sediment

[1] Geology of the Auckland Area (Institute of Geological &Nuclear Sciences 1:250,000 geological map 3, 2011)

No groundwater investigation was completed as part of this investigation.

The nearest surface water body to the site is an unnamed tributary of the Papakura Stream which runs through the centre of the site.

5.0 Regulatory Framework

5.1 The National Environmental Standard

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES) came into effect on the 1st of January 2012 and supersedes any District Plan rules that related to contaminated land. Any Regional Plan rules relating to contaminated land are still applicable.

In brief, the objective of the NES is to ensure that land affected by contaminants is identified and assessed and, if necessary, remediated or managed to protect human health. The NES only applies to the activities: removing or replacing all, or part of, a fuel storage system; sampling the soil; disturbing the soil; subdividing the land; and changing the land use, and where an activity or industry described in the Hazardous Activities and Industries List (HAIL) is being, has been, or is more likely than not to have been undertaken on the piece of land.

The NES also contains reference to the soil contaminant standards for human health ($SCS_{(health)}$), for a variety of land use scenarios along with reference to best practice reporting documents.

The environmental HAIL is attached as Appendix B.

5.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules of the AUP: OP must be considered.

In brief, the objective of the AUP: OP is to manage land containing elevated levels of contaminants to protect human health and the environment and to enable the effective use of the land.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

6.0 Background

The history of the site has been described in the report titled '*Preliminary Site Investigation, Ardmore Block Plan Change Area, 80 Hamlin Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

During the review of the available information, it was noted that the southern and western portion of the site had been utilised for horticultural purposes. In addition, due to the age of the site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the storage of fuel and chemicals, bulk storage of tyres, potential spray race activities and treating of timber posts onsite were also noted.

During the site walkover and inspection, visible broken fragments of potentially asbestos containing material was observed on top of the soil profile at three locations across the site.

It should be noted that the potential sources of contamination (as identified above) were limited to a historical review, and therefore, prior to the commencement of any development at the property, it was recommended that a site walkover and inspection be completed in order to confirm the potentially contaminating land uses and/or activities carried out at the site. This was completed and no significant changes were observed.

This document is intended to confirm the contamination status of the site at 80 Hamlin Road.

In addition, at the time of writing the results of a detailed geotechnical investigation covering the site was not available.

7.0 Potentially Contaminating Activities or Land Uses

Following a review of the desktop assessment presented in the PSI and the subsequent site walkover and inspection at the site, five potentially contaminating activities were identified and are outlined in Table 3 below.

Table 3: Potentially Contaminating Activities: 80 Hamlin Road, Ardmore

Activity Description	HAIL Category
Livestock Dip of Spray Race Operations	A8
Bulk Tyre Storage	I
Maintenance and Use of Lead Based Paint	I
Demolition of Historic Structures Potentially Containing Asbestos	E1
Horticultural Activities	A10
Bulk Storage of Petroleum	A13
Bulk Storage of Chemicals	A2
Wood Treatment	A18

8.0 Conceptual Model of Exposure Pathways

The preliminary conceptual site model provided in Table 4 below expands on the potential sources of contamination (as identified above) and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 4: Preliminary Conceptual Site Model: 80 Hamlin Road, Ardmore

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Surface Water Run-off	Ecological Receptors - Unnamed Tributary Papakura Stream	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Migration of Groundwater	Ecological Receptors - Unnamed Tributary Papakura Stream	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.

9.0 Sampling and Analysis Plan and Sampling Method

Environmental Sampling was carried out in accordance with the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021).

A total of fifty-five discrete surface soil samples were collected from across the site and, with eight of these composited at the laboratory 4:1 to form two composite samples, and were sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 5 & 6 below.

Table 5: Discrete Sample Analysis Information: 80 Hamlin Road, Ardmore

Sample Name	Sample Depth	Number of Samples	HAIL Activity	Analysis Suite
SR01 – SR02	0-0.15m	2	Potential Spray Race Activities	• Total recoverable Arsenic, Copper & Lead; and • Organochlorine Pesticides.
CSP SUR	0-0.15m	1	Treating of Timber (Cresote Pit)	• Total recoverable Arsenic, Copper and Chromium; • Organochlorine Pesticides; • Semi-Volatile Organic Compounds (SVOC's).
CSP 0.4m	0.5m	1		
HB01 – HB06, HB08 – HB22	0-0.15m	21	• Historic maintenance and use of lead-based paint • Demolition of historic structures potentially containing asbestos	• Total Recoverable Lead; • Semi-quantitative asbestos in soil (NZ Guidelines).
TT01	0-0.15m	1	• Treated Timber Storage	• Total recoverable Arsenic, Copper and Chromium; • Organochlorine Pesticides.
FS01 – FS03	0-0.15m	3	• Bulk Storage of Petroleum	• Total Petroleum Hydrocarbons; and • Polycyclic Aromatic Hydrocarbons.
Pb01 – Pb17	0-0.15m	17	• Historic maintenance and use of lead-based paint	• Total Recoverable Lead.
ASB02	0-0.15m	1	Potentially asbestos containing materials intermixed with the site soils	• Semi-quantitative asbestos in soil (NZ Guidelines).

Table 6: Composite Sample Analysis Information: 80 Hamlin Road, Ardmore

Sample Name	Sample Depth	Number of Samples	HAIL Activity	Analysis Suite
COMP01 A	0.15m	4:1	Historic Horticultural Land Use	• Total recoverable Arsenic, Copper & Lead; and • Organochlorine Pesticides.
COMP01 B				
COMP01 C				
COMP01 D				
COMP02 A	0.15m	4:1		
COMP02 B				
COMP02 C				
COMP02 D				

One bulk material sample were collected from PACM building materials identified in contact with the site soils, this sample were sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 7 below.

Table 7: Bulk Material Sample Analysis Information: 80 Hamlin Road, Ardmore

Sample Name	Number of Samples	HAIL Activity	Analysis Suite
PACM02	1	Potentially asbestos containing materials intermixed with the site soils	• Asbestos in Bulk Materials (Presence/Absence).

The sample location plan is presented as Figure 2, 2-1, 2-2, 2-3, 2-4, 2-5 & 2-6.

10.0 Field Sampling Quality Assurance

All sampling implements were triple washed between samples using clean tap water, followed by a solution of laboratory grade phosphate free detergent (Decon 90), and a final rinse with clean water.

Clean, latex gloves were worn when handling each sample. Samples were stored in laboratory cleaned glass jars or laboratory supplied 500ml plastic tubs and immediately placed in an iced cooler. The samples were transported under chain of custody documentation to an IANZ accredited laboratory for analysis.

11.0 Laboratory Quality Assurance

Routine laboratory quality assurance procedures include analysis of laboratory blanks and spiked samples. All analyses were carried out using industry standard methods as follows:

- Total Recoverable Metals – Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICPMS screen level, interference removal by Kinetic Energy Discrimination if required.
- Organo-chlorine pesticides – Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.
- Polycyclic Aromatic Hydrocarbons – Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.
- Total Petroleum Hydrocarbons - Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.
- Semi-Volatile Organic Compounds (SVOC's) - Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.
- Asbestos in bulk materials - Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.
- Semi – quantitative asbestos in soil – Calculated from weight of fibrous asbestos plus asbestos fines (AF/FA) and the weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.

12.0 Basis for Guideline Values

If developed, it is proposed that the site will be developed for residential land use, therefore the guideline values of the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use (10% produce consumption), as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES), and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP) are considered relevant and have been adopted as the site assessment criteria.

In addition, as the NES does not contain a reference value for asbestos in soil, in accordance with the hierarchy described in the Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, Revised 2021), the soil guideline value for asbestos in New Zealand for residential land use, taken from the New Zealand Guidelines for Assessing and Manging Asbestos in Soil (BRANZ Limited, 2017) of 0.001% combined fibrous asbestos and asbestos fines (FA/AF) and/or 0.01% asbestos containing material (ACM) has been adopted as the site assessment criteria.

Furthermore, the concentrations of heavy metals detected will be compared to the maximum background levels for non-volcanic soils in Auckland[2] (TP153). The relevant values of the above guidelines have been reproduced in Table 8 below.

[2] Background Concentrations of Inorganic Elements in Soils from the Auckland Region, Technical Publication No.153, Auckland Regional Council, 2001.

Table 8: Site Assessment Criteria: 80 Hamlin Road, Ardmore (mg/kg)

Parameter	NES Commercial/Industrial Worker ($SCSs_{(health)}$)	NES Residential ($SCSs_{(health)}$)	AUP: OP	TP153 (Non-Volcanic)
Arsenic	70	20	100	12
Chromium	6,300	460	400	55
Copper	NL		325	45
Lead	3,300	210	250	65
Total DDT	1,000	70	12	-
Dieldrin	160	2.6	0.5[1]	-
Pentachlorophenol (PCP)	360	55	30[7]	-
Asbestos (AF/FA)	0.001%[2]/0.05%[8]	0.001%[2]/0.01%[3]	-	-
Visual ACM	No Visual Evidence of ACM[4]		-	-
BaP eq.	35	10	20	-
TPH (C_7-C_9)	8,800[9]	2,700[5]	710[6]	-
TPH (C_{10}-C_{14})	1,900[9]	560[5]	1,500[6]	-
TPH (C_{15}-C_{36})	NA[9]	NA[5]	NA[6]	-

Note: NL = Not Limited. This is where the derived values exceed 10,000mg/kg;, 1= Soil Guideline Values to protect on-site ecological receptors taken from Ministry for the Environment Guidelines for Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites, November 2006.; 2 = Soil guideline values for asbestos in Soil of 0.001% combined fibrous asbestos and asbestos fines (FA/AF), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 3= Soil guideline values for asbestos in Soil of 0.01% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017) 4= No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017). 5 = Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand – Tier 1 Soil Acceptance Criteria, Module 4, August 1999 for Residential use (silty clay) all pathways with contamination at the surface (<1.0m); 6 = Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand – Tier 1 Soil Acceptance Criteria, Module 4, August 1999 for the Protection of Groundwater Quality for silty clay soils with contamination at the surface (<1.0m) with shallow groundwater. 7= Ecological Soil Screening Level for Pentachlorophenol for ecological receptors (US EPA, 2007; 8= Soil guideline values for asbestos in Soil of 0.05% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017)9 = Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand – Tier 1 Soil Acceptance Criteria, Module 4, August 1999 for Commercial/Industrial use (silty clay) all pathways with contamination at the surface (<1.0m);

Furthermore, the natural background levels of organo-chlorine pesticides, polycyclic aromatic hydrocarbons, SVOC's, total petroleum hydrocarbons and asbestos (visual evidence, AF & FA) are considered to be below the analytical levels of detection and hence the detection of these analytes would restrict material from being classified as cleanfill material.

13.0 Quality Control

13.1 Laboratory Verification

Four samples (SR02, CSP SUR, HB02 & HB20) was selected at random for duplicate analysis and Relative Percentage Difference (RPD) calculations. In accordance with the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021) an RPD value of less than 30-50% is generally considered acceptable. If the results were below the laboratory detection limits the RPD was not calculated. The results of the RPD analysis are presented in Table 9 below.

Table 9: RPD Summary: 80 Hamlin Road, Ardmore

Parameter	SR02	CSP SUR	HB02	HB20
Arsenic	0.00	*55.74*	-	-
Chromium	-	*58.82*	-	-
Copper	11.11	37.50	-	-
Lead	2.28	-	1.71	5.44

Note: Results in *Italics* exceed 30% RPD. Results in red exceed 50% RPD.

Excluding the concentrations of arsenic and chromium detected in sample CSP SUR, the RPD values calculated for all the analytes were less than or within the acceptable range. The minor exceedances of 50% RPD for arsenic and chromium are likely due to the relativity low concentrations of these elements in the samples detected and the potentially heterogenous nature of the contamination in relation to the creosote pit. Therefore, based on the results of the RPD analysis, with the exception of arsenic and chromium in the vicinity of the creosote pit, the sample results are likely to be relatively consistent and repeatable.

The RPD calculations are presented as Appendix C.

14.0 Soil Sampling Results

Tabulated soil sampling results are presented in Tables 10-16 below, with the tabulated lead results are presented as Appendix D and laboratory transcripts are provided in Appendix E.

14.1 Heavy Metals

Table 10: Heavy Metals Results: 80 Hamlin Road, Ardmore (mg/kg).

Sample	As	Cr	Cu	Pb
TT01	8	21	30	-
CSP SUR	*22*	18	39	-
CSP 0.4m	*34*	53	*50*	-
SR01	***130***	-	*144*	40
SR02	*15*	-	17	13.0
COMP01 A-D	6	-	18	39
COMP02 A-D	6	-	33	34

Note: Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in blue also exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for commercial/industrial worker. Results in **Bold** exceed the discharge criteria as outlined in the AUP: OP. Results in *Italics* exceed the maximum Auckland background concentrations for non-volcanic soils outlined in the Auckland Regional Council Technical Publication No.153, Oct 2001.

Excluding samples TT01, COMP01 A-D and COMP02 A-D, the concentrations of arsenic detected in all of the samples analysed were elevated above the maximum Auckland background concentrations for non-volcanic soils. The concentrations of arsenic detected in samples CSP SUR, CSP 0.4m were elevated above the ($SCSs_{(health)}$) for residential land use but below the discharge criteria as outlined in the AUP: OP. The concentrations of arsenic detected in samples SR01 were elevated above the ($SCSs_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP. Furthermore, the concentrations of arsenic detected in sample SR01 were elevated above the SCS ($_{(health)}$) for a commercial/industrial worker as outlined in the NES.

The concentrations of chromium detected in all of the samples analysed were below the maximum Auckland background concentrations for non-volcanic soils and therefore below the ($SCSs_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP.

Excluding sample SR01 & SR02, the concentrations of copper detected in all of the samples analysed were below the maximum Auckland background concentrations for non-volcanic soils and therefore below the ($SCSs_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP. The concentrations of copper detected in samples SR01 & SR02 were below the ($SCSs_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP.

Excluding samples Pb03, Pb04, Pb05, Pb07, Pb08, Pb09, Pb10, Pb11, Pb15, Pb16, Pb17, HB01, HB05, HB06, HB08, HB10 & HB11, the concentrations of lead detected in all of the samples analysed were below the maximum Auckland background concentrations for non-volcanic soils and therefore below the (SCSs$_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP. Excluding samples Pb07, Pb11, Pb15, Pb16, Pb17, HB01, HB05, HB06 and HB10, the concentrations of lead detected were elevated above the maximum Auckland background concentrations for non-volcanic soils but below the (SCSs$_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP. The concentrations of lead detected in samples Pb03, Pb04, Pb05, Pb08, Pb09, Pb10, HB08 and HB11 were elevated above the (SCSs$_{(health)}$) for residential land use and the discharge criteria as outlined in the AUP: OP. Furthermore, the concentrations of lead detected in sample Pb09 were elevated above the SCS ($_{(health)}$) for a commercial/industrial worker as outlined in the NES.

14.2 Organochlorine Pesticides

Table 11: Organochlorine Pesticide Results: 80 Hamlin Road, Ardmore (mg/kg).

Sample	Total DDT	Dieldrin
SR01	<0.08	<0.013
SR02	<0.08	<0.013
TT01	<0.07	<0.011
CSP SUR	<0.09	<0.014
CSP 0.4m	<0.08	<0.012
COMP01 A-D	<0.08	<0.013
COMP02 A-D	<0.08	<0.013

Note: * = Residual levels of contaminants detected. Results in red exceed the Soil Contaminant Standards for health (SCSs$_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

The concentrations of organo-chlorine pesticides detected were below the analytical limit of detection and therefore below the cleanfill criteria.

The concentrations of organo-chlorine pesticides in all samples analysed were below the SCSs$_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

14.3 Pentachlorophenol (PCP)

Table 12: Pentachlorophenol (PCP) Results: 80 Hamlin Road, Ardmore (mg/kg).

Sample	PCP
CSP SUR	*76*
CSP 0.4m	<30

Note: Results in red exceed the Soil Contaminant Standards for health (SCSs$_{(health)}$) for residential land use. Results in **bold** exceed the adopted environmental criteria. Results in *Italics* exceed the cleanfill criteria.

Excluding sample CSP SUR, the concentrations of Pentachlorophenol (PCP) detected in the samples analysed were below the analytical limit of detection and therefore below the cleanfill criteria.

Concentrations of PCP were detected in sample CSP SUR in exceedance of the ($SCSs_{(health)}$) for residential land use and the adopted environmental criteria.

14.1 Polycyclic Aromatic Hydrocarbons

Table 13: Polycyclic Aromatic Hydrocarbon Results: 80 Hamlin Road, Ardmore (mg/kg).

Sample	BaP eq.
CSP SUR	*<1.3**
CSP 0.4m	*1.4*
FS01	*<0.01**
FS02	*<0.03**
FS03	*0.26*

Note: Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

There were low level or residual concentrations of polycyclic-aromatic hydrocarbons detected in all of the soil samples sent for analysis, therefore exceeding the cleanfill criteria.

The concentrations of polycyclic-aromatic hydrocarbons in sample all samples analysed were below the $SCSs_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

14.2 Total Petroleum Hydrocarbons

Table 14: TPH Results: 80 Hamlin Road, Ardmore (mg/kg).

Sample	TPH (C_7-C_9)	TPH (C_{10}-C_{14})	TPH (C_{15}-C_{36})
FS01	<8	*28*	*173*
FS02	<8	*300*	*8,700*
FS03	<8	*24*	*630*

Note: Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in **Bold** exceed the adopted site assessment criteria. Results in *Italics* exceed the analytical limit of detection.

There were low level concentrations of total petroleum hydrocarbons detected in all of the soil samples sent for analysis, therefore exceeding the cleanfill criteria.

The concentrations of total petroleum hydrocarbons in sample all samples analysed were below the $SCS_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

14.3 Asbestos

Table 15: Asbestos in Soil Results (Semi-Quantitative, %)

Sample	Asbestos Type	Asbestos (FA/AF %)	Asbestos (% ACM)
HB01	Asbestos NOT Detected	<0.001	<0.001
HB02	Asbestos NOT Detected	<0.001	<0.001
HB03	Asbestos NOT Detected	<0.001	<0.001
HB04	Asbestos NOT Detected	<0.001	<0.001
HB05	Asbestos NOT Detected	<0.001	<0.001
HB06	Asbestos NOT Detected	<0.001	<0.001
HB08	Asbestos NOT Detected	<0.001	<0.001
HB09	Asbestos NOT Detected	<0.001	<0.001
HB10	Asbestos NOT Detected	<0.001	<0.001
HB11	Asbestos NOT Detected	<0.001	<0.001
HB12	Asbestos NOT Detected	<0.001	<0.001
HB13	*Chrysotile (White Asbestos) Detected*	*<0.001**	*<0.001**
HB14	Asbestos NOT Detected	<0.001	<0.001
HB15	Asbestos NOT Detected	<0.001	<0.001
HB16	Asbestos NOT Detected	<0.001	<0.001
HB17	Asbestos NOT Detected	<0.001	<0.001
HB18	Asbestos NOT Detected	<0.001	<0.001
HB19	Asbestos NOT Detected	<0.001	<0.001
HB21	Asbestos NOT Detected	<0.001	<0.001
HB22	*Amosite (Brown Asbestos) & Chrysotile (White Asbestos) Detected*	0.026	0.047
ASB02	Asbestos NOT Detected	<0.001	<0.001

Note: * - denotes residual concentrations detected. Results in red exceed the adopted human health criteria. Results in *Italics* exceed the cleanfill criteria.

Excluding samples HB13 & HB22, the concentrations of asbestos detected in all of the samples analysed were below the analytical limit of detection and therefore below the clean fill criteria and the adopted human health criteria.

Residual concentrations of asbestos were detected in sample HB13. The concentrations of asbestos detected in sample HB22 were elevated above the adopted human health criteria.

Table 16: Asbestos in Bulk Materials Results, 80 Hamlin Road, Ardmore

Sample	Asbestos Type
PACM02	*Amosite (Brown Asbestos) & Chrysotile (White Asbestos) Detected*

Results in red exceed the adopted human health criteria.

Asbestos was detected in the material sample (PACM02) sent for analysis, therefore exceeding the adopted human health criteria.

Furthermore, visual evidence of asbestos was identified in the vicinity of HB12 and HB22.

14.4 Semi Volatile Organic Compounds (SVOC'S)

Excluding the concentrations of polycyclic aromatic hydrocarbons, phenols and carbazole in samples CSP SUR and CSP 0.4m, the concentrations of SVOC's were below the analytical limit of detection, therefore below the cleanfill criteria and therefore below the $SCS_{(health)}$ for residential land use as outlined in the NES.

15.0 Additional Investigation

Following the removal of the concrete lining within the area of tire storage, it is recommended that the soils in the footprint of this areas should be visually inspected in order to confirm the presence of any visual or olfactory evidence of contamination by a suitably qualified and experienced environmental practitioner (SQEP).

Additionally, if visual or olfactory evidence is identified sampling will be undertaken in accordance with the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021). With the samples analysed, at a minimum, for the following parameters;

- Polycyclic-Aromatic Hydrocarbons; and
- Total Recoverable Zinc.

The results of which will be reported as part of the Site Validation Report.

The area of additional investigation is shown in Figure 3 attached.

16.0 Extent of Contamination

The results of the sample analysis and visual inspection indicate that the site soils in central area of the site and the central northern area of the site are contaminated above the $SCSs_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, PCP and asbestos (AF/FA, w/w bonded ACM and visual evidence) fibres. Furthermore, concentrations of heavy metals were detected in exceedance of the NES (SCS) for commercial/industrial worker and therefore may pose a short-term risk to site workers.

Visual evidence of asbestos containing material was identified in to the south of one of the sheds onsite and in the vicinity of the historical building HB12, therefore exceeding the human health criteria (Area 1).

The surface sample HB22, taken from taken from the vicinity of the historical building onsite contained concentrations of asbestos elevated above the adopted human health criteria for the site in addition to visual evidence of asbestos being identified in the vicinity of the sample location (Area 2).

The surface sample SR01, taken from the footprint of the potential historical spray race onsite, contained concentrations of arsenic elevated above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 3). It should be noted that concentrations of arsenic were detected in this area elevated above the NES $SCSs_{(health)}$ for a commercial/industrial worker.

The surface samples Pb03, Pb04, Pb05 & HB11, taken from a dwelling, historical building and accessory structures onsite, contained concentrations of lead elevated above the above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 4).

The surface sample Pb08, taken from the site soils surrounding a shed onsite contained concentration of lead elevated above the above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 5).

The surface samples Pb09, Pb10 & HB08, taken from the historical building HB08 and from surrounding the dwelling onsite contained concentrations of lead elevated above the above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 6). It should be noted that concentrations of lead were detected in this area elevated above the NES $SCSs_{(health)}$ for a commercial/industrial worker.

The samples CSP SUR and CSP 0.4m contain concentrations of arsenic elevated above the $SCSs_{(health)}$ for residential land use, but below the discharge criteria as outlined in the AUP: OP. Furthermore, sample CSP SUR, contained concentrations of PCP elevated above the $SCSs_{(health)}$ for residential land use and the adopted environmental criteria (Area 7).

The bulk material sample, PACM02, taken from the board fragments surrounding a shed onsite were identified to contain asbestos, therefore exceeding the adopted human health criteria (Area 8).

The estimated volume required to remove the contaminated soils from the site is presented in Table 17 below.

Table 17: Extent of Contamination: 80 Hamlin Road, Ardmore.

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Area 1	99	-	Visual ACM	-
Area 2	290	0.3	Asbestos	87
Area 3	287	0.3	As	86.1
Area 4	482	0.3	Pb	144.6
Area 5	208	0.3	Pb	62.4
Area 6	322	0.3	Pb	96.6
Area 7	30	0.5	As & PCP	15
Area 8	76	-	Visual ACM	-
Total Volume				492
Total Tonnes (m^3 x 1.5)				738

The inferred extent of the contaminated soil at the site is presented in Figure 4, 4-1 & 4-2. This estimate is based on the sampling and results available following the site investigation and it should be noted that the volume may increase or decrease following inspection and validation sampling.

All contaminated materials will require disposal at a suitably licensed landfill facility. In addition, due to the concentrations of heavy metals detected, the selected disposal facility may require TCLP analysis prior to acceptance, if the results exceed the TCLP waste criteria, then disposal at a special waste facility may be required.

In addition, due to the low-level contamination identified at the site, the site soils in these areas are not suitable for classification as cleanfill and any topsoil removed from these areas of the site will required disposal to a suitably licensed managed fill facility, unless further sampling and analysis demonstrate otherwise.

17.0 Revised Conceptual Model of Exposure Pathways

The revised conceptual site model provided in Table 18 below expands on the potential sources of contamination (as identified above), following sampling and analysis, and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 18: Revised Conceptual Site Model: 80 Hamlin Road, Ardmore.

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Management required during remediation
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Management required during remediation
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Management required during remediation
	Surface Water Run-off	Ecological Receptors - Unnamed tributary of the Papakura Stream	Potentially Complete: Remediation or management of the contaminated area required.
	Migration of Groundwater	Ecological Receptors - Unnamed tributary of the Papakura Stream	Potentially Complete: Remediation or management of the contaminated area required.

18.0 Regulatory Requirements

18.1 The National Environmental Standard

Due to the potentially contaminating land uses identified above, it is considered that an activity described in the HAIL is being, has been, or is more likely than not to have been undertaken at the site.

Resource Consent will therefore likely be required for the site under the District Plan, following the introduction of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

In reference to the NES the following assessment was made in determining the activity status of the proposed works:

- The land is covered by the NES under regulation 5.7(b) 'an activity or industry described in the HAIL has been undertaken on it'.
- The activity is changing the use of a piece of land under regulation 5(6) 'means changing it to a use that, because the land is described in subclause (7), is reasonably likely to harm human health'.
- The activity is subdividing land under regulation 5(5)(c) 'means subdividing land that has part if the piece of land within its boundaries'.
- The activity of changing use and subdivision does not comply with regulation 8(4).
- The activity is disturbing soil under regulation 5(4)(a) 'means disturbing the soil of the piece of land for a particular purpose'.
- The activity is unlikely to comply with regulation 8(3)(c) 'the volume of the disturbance of the soil of the piece of land must be no more than 25m^3 per 500m^2' and '…a maximum of 5 m^3 per 500 m^2 of soil may be taken away'.
- A detailed site investigation for the piece of land does exist.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

18.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules must be considered.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being 404.7m^3 which is above 200 m^3 it is considered that the proposed remediation will likely not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP may be required.

19.0 Remediation Action Plan

Due to the concentration of asbestos fibres identified in the site soils, in accordance with the New Zealand Guidelines for Assessing and Manging Asbestos in Soil (BRANZ Limited, 2017), the soils within Areas 2 and the visual evidence of asbestos within Area 1 & 8 will require removal by a Class B licensed asbestos removalist.

This Remediation Action Plan & Assessment of Environmental Effects (RAP & AEE) provides the soil specific management controls to be implemented at the site to ensure that any adverse effects on human health, as a result of the removal of asbestos and the heavy metal contaminated soils identified at the site, will be effectively mitigated.

It is therefore considered that this RAP & AEE meets the requirements of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

In order to meet the requirements of the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016), it is recommended that the selected contractor incorporates the procedures set out in this RAP & AEE into site-specific asbestos removal control plan (ARCP) and that the works are carried out in accordance with the Approved Code of Practice for the Management, Removal of Asbestos (WorkSafe New Zealand, 2016).

Following the removal of any asbestos contaminated soils or ACM, a certificate of clearance is to be produced by a suitably licensed asbestos assessor or competent person.

Should any ACM be discovered during any future works, its removal from the site shall be conducted in accordance with the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016) and the Approved Code of Practice for the Management and Removal of Asbestos (WorkSafe New Zealand, 2016).

19.1 Remediation Criteria

The objectives for the remediation of the site are to remediate the affected soils to levels below the applicable guideline values (as specified in Table 8) to address the immediate human health and environmental concerns at the site. Remediation of the site in the areas shown in Figure 4, 4-1 & 4-2 will be necessary to achieve compliance with the above guidelines.

The remediation strategy for the site will involve the machine excavation and loading of the affected site soils prior to transport and disposal. The site will then be subject to a process of validation whereby the remaining soils will be sampled to confirm that the objectives of the remediation for the site have been achieved.

The remediation criteria for the site are presented in Tables 19- 23 below:

Table 19: Remediation criteria for Area 1 & 8 – 80 Hamlin Road, Ardmore (mg/kg).

Parameter	Value
Asbestos	No visible evidence of asbestos on surface soil[1]

1= No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

Table 20: Remediation criteria for Area 2 – 80 Hamlin Road, Ardmore (mg/kg).

Parameter	Value
Asbestos	<0.001%[1]/0.01%[2]
	No visible evidence of asbestos on surface soil[3]

1 = Soil guideline values for asbestos in Soil of 0.001% combined fibrous asbestos and asbestos fines (FA/AF), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 2 = Soil guideline values for asbestos in Soil of 0.01% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017). 3= No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

Table 21: Remediation criteria for Area 3 – 80 Hamlin Road, Ardmore (mg/kg).

Parameter	Value
Arsenic	20

Table 22: Remediation criteria for Area 4, 5 & 6 – 508 Old Wairoa Road, Ardmore (mg/kg).

Parameter	Value
Lead	210

Table 23: Remediation criteria for Area 7– 80 Hamlin Road, Ardmore (mg/kg).

Parameter	Value
Arsenic	20
PCP	55

As stated above, the remediation of the asbestos contaminated soils in Area 2 and the asbestos contaminated material in Areas 1 & 8 is required to be undertaken under the supervision of a Class B licensed asbestos removalist. It is recommended that a licensed asbestos removalist is present for the duration of the removal works to ensure that the procedures outlined in this plan and the ARCP are adhered to in order to mitigate the potential effects on human health.

Following the removal of the asbestos containing soils (Area 2) and the visual evidence of asbestos within Area 1 & 8, a clearance certificate will be obtained by a licensed asbestos assessor or competent person.

19.2 Management Areas

Low level contamination was detected in twelve areas of the site. Concentrations of heavy metals were detected in eight locations in exceedance of the clean fill criteria, residual concentrations of asbestos in one location and low-level concentrations of polycyclic aromatic hydrocarbons in three locations, all exceeding the clean fill criteria. Due to the concentrations of contaminants detected, the site soils require management during development.

The approximate areas of management are shown in Table 24 below.

Table 24: Management Areas: 80 Hamlin Road, Ardmore (mg/kg).

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
Management Area 6	13	0.3	PAH & TPH	3.9
Management Area 7	198	0.3	Pb	59.4
Management Area 8	65	0.3	Pb	19.5
Management Area 9	86	0.3	Pb	25.8
Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				386.4
Total Tonnes (m^3 x 1.5)				430t

The inferred area and depth requiring management are shown in Figure 5, 5-1, 5-2, 5-3, 5-4 & 5-5.

19.3 Work Programme

It is considered that the health & safety and environmental controls, as detailed below, will be sufficient to ensure that any adverse human health and/or environmental effects, as a result of the contaminated soils identified at the site, will be effectively mitigated.

A contractor experienced in remediation of contaminated sites will undertake the earthworks, excavation & disposal of contaminated soils at the site.

The contractor will:

- Prior to works occurring, install a 3.0m barrier buffer zone where possible surrounding each inferred area of contamination.
- Prepare a site-specific Asbestos Removal Control Plan and notify WorkSafe of the remediation of the asbestos contaminated soils and asbestos containing materials (Areas 1, 2 & 8)
- Provide adequate Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE) to all staff involved in the removal works.
- Install facilities on site which include a clean area for staff, a decontamination unit and washing facilities.
- Connect a water source and/or misting system to control any dusts that may be generated as a result of the works. This misting system must be capable of reaching all areas of the site during the ground-breaking works.
- Engage a third-party asbestos assessor and complete representative asbestos fibre monitoring during the remedial works in remediation Area 2.
- Install sediment and erosion controls for the development works in accordance with industry best practice (Auckland Council's Erosion and Sediment Control Guide for Land Disturbing Activities [3].
- Ensure that the soils within Areas 2 and management Area 1 are sufficiently wet prior to starting works.
- Remove all visual evidence of asbestos containing material from Areas 1 & 8.
- Machine excavate the contaminated soils from the site and load the materials onto waiting trucks.
- Asbestos contaminated soils in areas…..will be loaded into trucks lined with 200µm heavy-gauge polythene and wrapped.
- Ensure that the trucks leaving the site have their contents wrapped, are fitted with close fitting tarpaulins and have sealed tailgates.
- Once the trucks have been inspected to ensure that the tarpaulins are properly fitted and the tires are free from any soil materials, transport contaminated soils to a suitable disposal location and retain any weighbridge dockets obtained.
- Obtain certificate of clearance by a suitably licensed asbestos assessor or a competent person for the areas of asbestos contaminated soils.

[3] Auckland Council, Erosion & Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Guideline Document 2016/005.

- Carry out the validation process and undertake any further remedial works required to achieve the remediation goals.
- Once all contaminated soil has been removed and the remediation goals achieved then the site will be reinstated with clean fill materials if required and the site stabilized.
- Prior to plant being removed from the asbestos removal area, a visual assessment for the presence of asbestos, visible debris and soil shall be carried out by a qualified asbestos assessor and a clearance certificate issued.
- Once all contaminated soil has been removed, clearance certificate obtained and the remediation goals achieved then the site will be reinstated with clean fill materials if required and the site stabilized.

19.4 Establishment and Site Preparation

Prior to works commencing the contractor should be familiar with this remediation action plan (RAP) which outlines all environmental and health & safety controls to be implemented when dealing with the contaminated soils

No unauthorised access to the remedial area will be allowed during the removal of the contaminated soils. Access to the site and the contaminated materials will be restricted during the project.

In addition, the asbestos contaminated area of the site will be fenced off to enclose the work areas. No unauthorised access to the asbestos works areas (Area 1, 2, 8 & management area 1), will be allowed during the entirety of the works. Access to the site and the contaminated materials will be restricted during the project.

Appropriate warning signage shall be posted in visible locations during the works and surrounding the stockpile material. All visitors and contractors will sign in and out of the site each day during the removal of the asbestos containing soils.

19.5 Asbestos Fibre Monitoring

In order to confirm that the mitigation controls are sufficient in the areas of asbestos remediation (Area 2), asbestos fiber monitoring is recommended to confirm that asbestos in air is below trace level (0.01 f/ml).

Representative asbestos fiber monitoring shall be completed by a third-party asbestos assessor for at least one day during the works.

In the event that trace levels are exceeded, cease works, dampen, cover and fence off (barrier tape) the area of works and contact the Contaminated Land Specialist.

19.6 Excavation, Haulage and Disposal of Materials

Excavation works will not commence at the site until all the environmental controls have been put in place. The exposed excavated areas will be kept to a minimum to minimise the risk of erosion due to storm water runoff. Where possible, the excavated materials will be loaded directly onto the removal trucks.

All trucks carting asbestos contaminated soils elevated above the remediation criteria should be lined with 200µm heavy-gauge polythene. All trucks with asbestos contaminated soils (Area 2) will have their contents wrapped. The remaining soils containing residual asbestos may need to be wrapped depending on the receiving disposal facility.

All trucks will be fitted with close fitting tarpaulins and have sealed tailgates. All trucks will be inspected prior to leaving the loading area, to ensure that no loose contaminated materials leave the site. During loading wheel covers will be used where possible and any loose materials will be collected for later disposal.

All materials leaving the site will be disposed of to a suitably licensed disposal facility and will be tracked by way of weighbridge dockets which include the disposal location and the weight of the load.

19.7 Validation Sampling

Following the removal of the asbestos contaminated materials (Areas 1, 2 & 8) a clearance certificate will be produced by a suitably licensed asbestos assessor or a competent person. Following receipt of the clearance certificate, the base and side walls of the excavated area will be sampled by a suitably qualified and experienced practitioner and the soils analysed by an accredited laboratory to determine if the remediation works have been successful.

Site validation sampling for all remediation areas will be completed at a frequency sufficient to meet the requirements of the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021) by a suitably qualified and experienced contaminated land professional.

The clearance certificate and the results of all validation sampling will be included in the site validation report.

19.8 Clean Fill Validation (If Required)

Any materials imported onto the site if required to reinstate the ground will have to be tested to ensure their suitability as clean fill materials. Imported materials are to be sampled at a rate of at least 1 sample per 500m^3 for heavy metals, polycyclic aromatic hydrocarbons, organochlorine pesticides and asbestos. Alternatively, dockets confirming that imported hardfill has been sourced from a commercial quarry may also be provided to Auckland Council in lieu of sampling. Any soil material imported to the site shall comply with the definition of 'cleanfill material', as per the Auckland Unitary Plan: Operative in Part.

All imported materials shall be sourced from a site which has been determined by a Suitably Qualified Contaminated Land Professional to have had no known history of potentially contaminating activities, as detailed on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL); or adequately investigated by a

Suitably Qualified Contaminated Land Professional, in accordance with Contaminated Land Management Guidelines (Ministry for the Environment, Revised 2021) to meet the 'Cleanfill material' definition as prescribed in the AUP: OP.

20.0 Assessment of Environmental Effects

The following sections deal with the potential adverse effects which could have a negative impact on the environment and or human health as a result of the remediation project. If the controls outlined in this RAP are implemented during the development works the effects on the environment are likely to be effectively mitigated.

The required site management controls are detailed below and include, but should not be limited to, the following: dust control, health and safety measures, stormwater, erosion and sediment control, odour control and contingency measures.

20.1 Dust Control

During the disturbance process, the areas of asbestos contaminated soils (Areas 2 & management area 1) should be adequately wet. Soil should have water applied at the point of contact. The excavator or other excavation equipment should handle the material wet.

A continuous water supply should be available at all times. The water source and/or misting system should be capable of applying water or a water mist directly to the materials to minimize dust and prevent fibre emissions. This misting system must be capable of reaching all areas of the remediation area during the ground-breaking works.

For the areas of chemical contamination, if conditions are dry during the remedial works dust deposition could occur. Dust will be controlled in accordance with the Good Practice Guidelines for Assessing and Managing the Environmental Effects of Dust Emissions, Ministry for the Environment (2016). In order to mitigate against the effects of dust regular damping down of soil with a misting system may be required.

20.2 Health and Safety Measures

The level of asbestos specific PPE and RPE shall be determined by the asbestos removalist, however, in order to minimise the potential effects or the likelihood of cumulative effects, all personnel likely to come into contact with asbestos contaminated soils and materials (Areas 1, 2 & 8) and prior to the provision of the air monitoring results from management area 1, all personal shall be provided with and wear the following PPE at all times when working in the asbestos contaminated areas of the site:

- Disposable coveralls (Type 5);
- Half-face P3 respirator with particulate filter;
- Steel toe capped gumboots or safety footwear with disposable overshoes;
- Nitrile gloves (if handling any contaminated soils is required);
- Hard Hat (if working around plant and excavators);
- Hearing protection (if required);
- Safety Glasses (to be worn in particularly dry weather conditions); and
- Safety Visibility Vest

All meal breaks are to be taken in designated clean areas following appropriate decontamination.

For the areas (Areas 4, 5 & 7, management areas 2-12) of chemical contamination, the level of soil contamination is unlikely to present a short-term risk to site workers. However, in order to minimise the potential effects or the likelihood of cumulative effects, all personnel likely to come into contact with contaminated soils during development works shall be provided with and it is recommended that they wear the following PPE at all times when working in these areas of the site:

- Coveralls (to be changed immediately if these become highly soiled);
- Dust masks (to be worn in particularly dry weather conditions);
- Approved safety footwear (rubber boots, work boots with toe protection);
- Gloves (if handling any contaminated soils is required);
- Hard Hat (if working around plant and excavators);
- Hearing protection (if required);
- Safety Glasses (to be worn in particularly dry weather conditions); and
- Safety Visibility Vest

Due to the concentrations of lead in Area 6 and arsenic detected in Area 3, the concentrations may pose a short-term risk to site workers, therefore, it is recommended that all personnel likely to come into contact with contaminated soils during development works shall be provided with and wear the following PPE at all times when working in this area of the site:

- Disposable coveralls (to be changed immediately if these become highly soiled);
- P2 Dust masks (or equivalent);
- Approved safety footwear (rubber boots, work boots with toe protection);
- Gloves (if handling any contaminated soils is required);

- Hard Hat (if working around plant and excavators);
- Hearing protection (if required);
- Safety Glasses (to be worn in particularly dry weather conditions); and
- Safety Visibility Vest.

All meal breaks are to be taken in designated clean areas or off site, with all personnel washing their hands and mouth area prior to eating, drinking or smoking. Used PPE is to be doffed by all personnel before leaving the site.

20.3 Stormwater, Erosion & Sediment Control

Install sediment and erosion controls for the development works in accordance with the Auckland Council's Erosion and Sediment Control Guide for Land Disturbing Activities[4].

Earthworks are not to be carried out during periods of significant rainfall. Excavation will be carried out a rate that matches the rate at which soil can be carted off the site. Any contaminated water generated by rainfall impacting on contaminated soils will be retained within the excavation.

It is not anticipated that stockpiling of soils will be required. If required, soil stockpiles will be covered by tarpaulins if left overnight, and when rain is anticipated during the working day. Tarpaulins will be anchored at the edges. As a general management strategy, the size of stockpiles will be kept to a minimum by ensuring that as far as possible, excavation is carried out a rate that matches the rate at which soil is carted off the site.

20.4 Odour Control

It is considered unlikely that nuisance odour will be an issue on site. However, in the event that there may be odorous materials encountered, where possible these will be loaded as soon as possible onto the removal trucks. If this is not possible the odorous material will be covered with non-odorous material prior to being loaded.

20.5 Contingency Measures

The following contingency measures have been developed to support the contractor should the underlying contamination conditions vary significantly from the conditions outlined following the site investigation.

If any unexpected materials are identified during the excavation process, which differ from previous observations, and the site soil assessment (i.e. odorous, unusually coloured), the contractor shall immediately contact the environmental specialist to inspect the material and provide advice for the safe handling and disposal of the material.

Visual and olfactory indicators of contamination include the following:

- Asbestos containing materials (ACM) (board, pipe, free fibres or fragments)
- Demolition debris (polystyrene, steel and timber)
- Refuse materials (other than concrete or brick)

[4] Auckland Council, Erosion & Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Guideline Document 2016/005.

- Odour (petroleum, oil, creosote, solvent, sulphur, landfill gas)
- Discoloured soil (black/green staining is most common)
- Incinerator ash (black coarse sand)
- Gasworks wastes (clinker – black gravel, blue billy, black tar)
- Harmful non Cleanfill materials

If any potential ACM or unexpected materials are identified during site works, the area shall immediately be fenced off (barrier tape) with a 2.0m buffer zone, photographs taken and the Contaminated Land Specialist contacted. The Contaminated Land Specialist will then inspect the material and provide advice for the sampling and analysis, safe handling and disposal of the material.

Following the discovery of any unexpected materials any environmental investigation is to be carried out in general accordance with the Contaminated Land Management Guidelines No. 1 and No.5 (MfE, Revised 2021).

In the event that soils are found to contain concentrations of contaminants elevated above the relevant site acceptance criteria, the site soils will require remediation and subsequent validation.

All contaminated materials removed from site will require disposal at a suitably licensed disposal facility and site validation sampling is to be completed at a frequency sufficient to meet the requirements of the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021).

In the event that asbestos containing materials are identified at the site, its removal from the site shall be conducted in accordance with the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016) and the Approved Code of Practice for the Management and Removal of Asbestos (WorkSafe New Zealand, 2016).

Following the removal of any ACM, a certificate of clearance is to be produced by a suitably licensed asbestos assessor.

If ground water or surface water collects within the excavation during the works, this water shall be allowed to soak into the ground. Any perched groundwater, groundwater, or surface run-off encountered within the excavation area requiring removal shall be considered as potentially contaminated, and shall either be disposed of by a licensed liquid waste contractor, pumped to sewer, provided relevant permits have been obtained, or discharged to the stormwater system or surface waters provided testing demonstrates compliance with the Australian and New Zealand Environment Conservation Council (ANZECC) Guidelines for Fresh and Marine Water Quality (2000) for the protection of 95 percent of species.

In the event that unexpected materials are encountered at the site, Auckland Council are to be notified of the nature and extent of the contamination along and provided with details of the management procedures undertaken at the site.

20.6 Equipment Decontamination & Clearance

Following remediation of the asbestos contaminated soils and materials (Areas 1, 2 & 8), remove visible debris and soil from all plant, paying attention to the tracks and bucket of excavators.

Prior to plant being removed from the site, a visual assessment for the presence of asbestos, visible debris and soil shall be carried out by an independent assessor or competent person.

Cleaning procedures should be conducted in such a manner as to ensure that all residual soil and contaminants are safely removed and disposed of.

20.7 Site Validation Report

Following the proposed works, it is recommended that a site validation report is prepared. The site validation report should contain sufficient detail to address the following matters:

- A summary of the works undertaken including volume of soil removed from site;
- A summary of the air fibre and gas monitoring, along with any validation testing undertaken, including tabulated analytical results;
- Copies of the disposal dockets for the material removed from the site;
- Records of any unexpected contamination encountered during the works, if applicable; and
- A summary of any additional soil sampling undertaken, tabulated analytical results, and interpretation of the results in the context of the current contaminated land regulatory requirements.

21.0 Conclusions and Recommendations

This DSI, RAP & AEE has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No.5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, Ardmore Block Plan Change Area, 80 Hamlin Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

During the review of the available information, it was noted that the southern and western portion of the site had been utilised for horticultural purposes. In addition, due to the age of the site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, the storage of fuel and chemicals, bulk storage of tyres, potential spray race activities and treating of timber posts onsite were also noted.

During the site walkover and inspection, visible broken fragments of potentially asbestos containing material was observed on top of the soil profile at three locations across the site.

This document is intended to confirm the contamination status of the site at 80 Hamlin Road.

Due to the potential sources of contamination identified it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

An intrusive investigation was carried out by Focus Environmental Services Limited personnel where a total of fifty-five discrete soil samples were collected from the site.

The results of the sample analysis and visual inspection indicate that the site soils in central area of the site and the central northern area of the site are contaminated above the $SCS_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, PCP and asbestos fibres (AF/FA, w/w bonded ACM and visual evidence). Furthermore, concentrations of heavy metals were detected in exceedance of the NES (SCS) for commercial/industrial worker and therefore may pose a short-term risk to site workers.

Due to the elevated levels of contaminants detected, the site at 80 Hamlin Road, Ardmore will require remediation of the affected soils prior to being redeveloped. The estimated volume of soil requiring remediation is 492m^3. It should be noted that this volume may change during the remedial process.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being 405m^3 which is above 200 m^3 it is considered that the proposed remediation will likely not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP may be required.

The objective of this Remediation Action Plan is to ensure that the soils contaminated above the adopted site assessment criteria are handled, removed in a controlled manner and disposed of to a suitable disposal location. All earthworks required as part of the remedial works should be carried out in accordance with this Remediation Action Plan.

An assessment of the effects which may occur as a result of the proposed works has been made in order to mitigate any potential adverse environmental and/or human health effects. If the controls outlined in this Remediation Action Plan are implemented during the development works it is considered that the effects on the environment and human health are likely to be effectively mitigated.

Figures

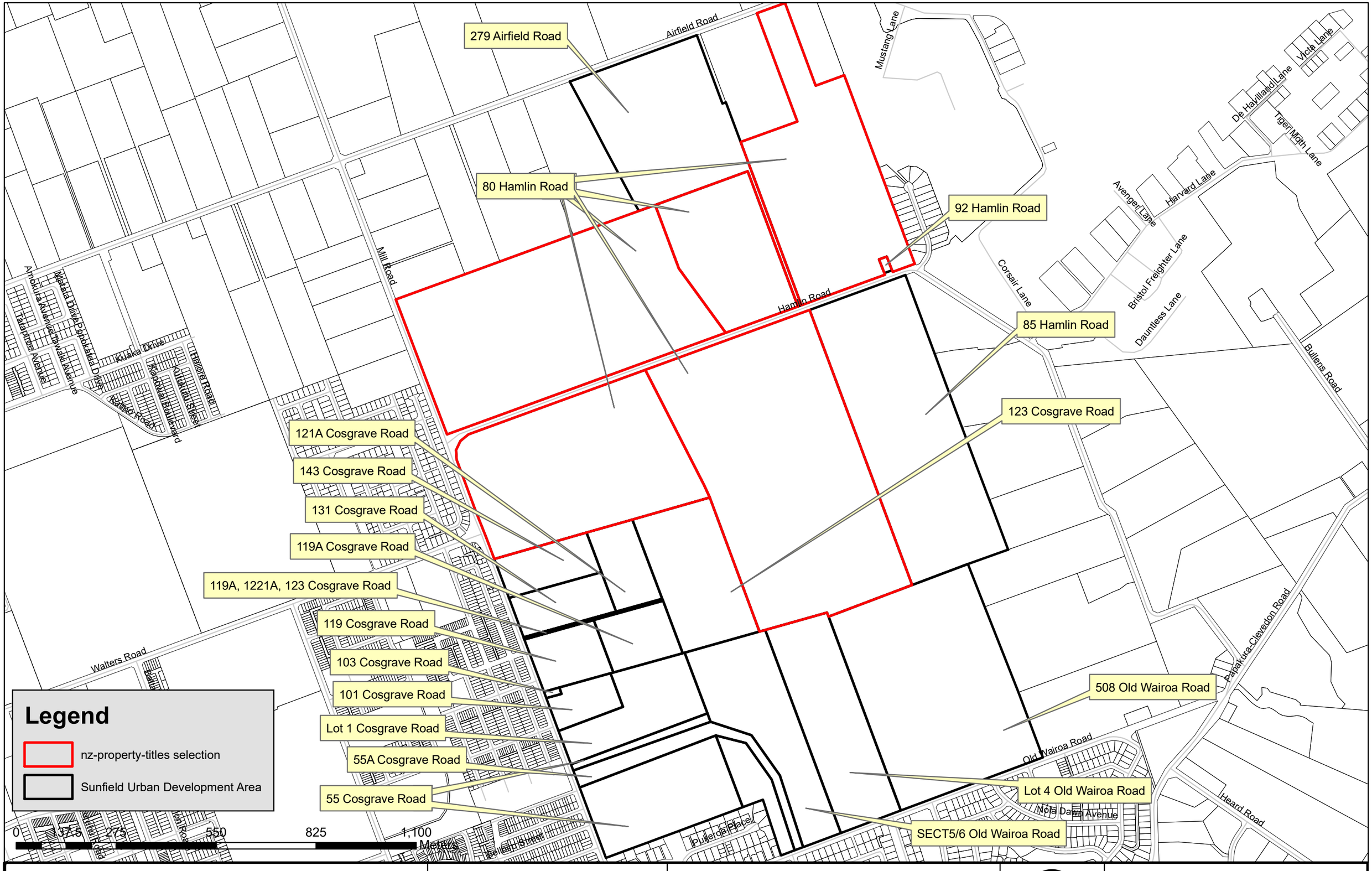

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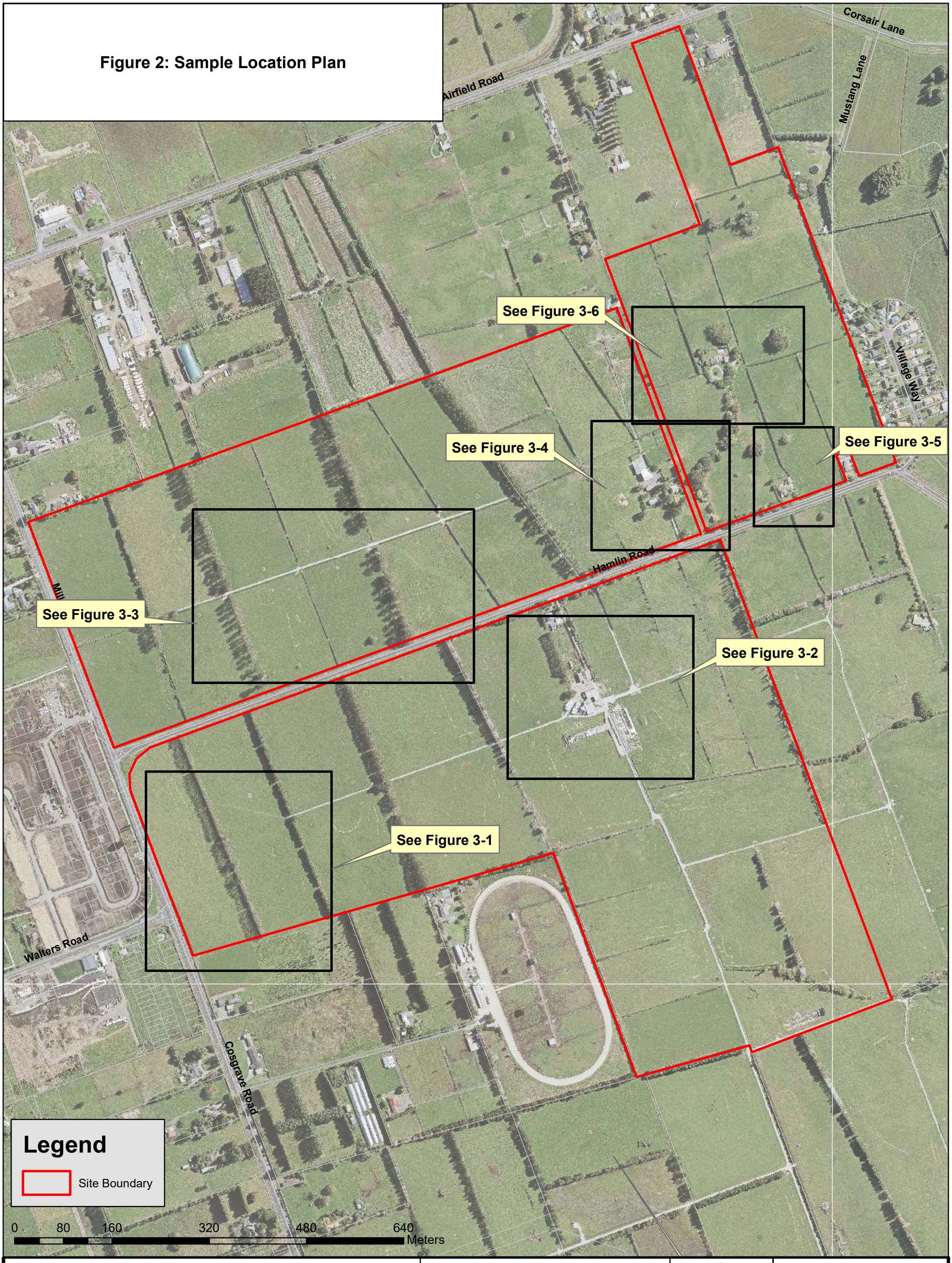
Figure 1: Site Location Plan
DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.01
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Figure 2: Sample Location Plan



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1443.009 (R1)

Drawing Number: 1443.009.02
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

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Figure 2-1: Sample Location Plan

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.02-1
Drawn By: MT
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Date: 20/12/2023

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Figure 2-2: Sample Location Plan

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.02-2
Drawn By: MT
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Date: 20/12/2023

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Figure 2-3: Sample Location Plan

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.02-3
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

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Figure 2-4: Sample Location Plan

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.02-4
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

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Figure 2-5: Sample Location Plan

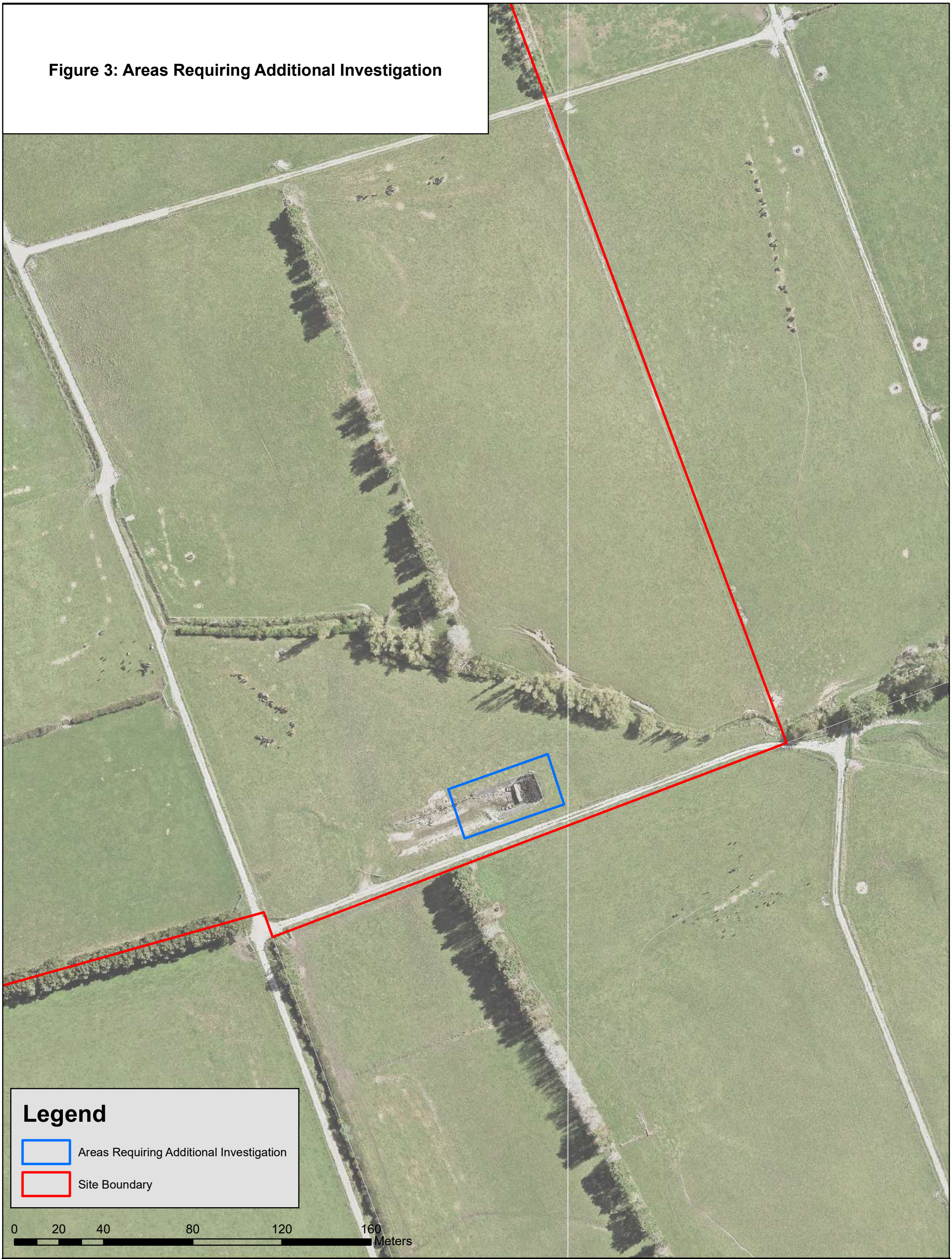
DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.02-5
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

FOCUS ENVIRONMENTAL SERVICES LTD Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 80 Hamlin Road Sunfield Urban Development Area Papakura Auckland	**Figure 2-6: Sample Location Plan** DSI, RAP & AEE	N 1443.009	Drawing Number: 1443.009.02-6 Drawn By: MT Checked By: DO'R Date: 20/12/2023

Figure 3: Areas Requiring Additional Investigation



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1443.009 (R1)	Drawing Number: 1443.009.03
	Drawn By: MT
	Checked By: DO'R
	Date: 20/12/2023

Figure 4: Inferred Extent of Contamination

FOCUS ENVIRONMENTAL SERVICES LTD	Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 80 Hamlin Road Sunfield Urban Development Area Papakura Auckland	N 1443.009 (R1)	Drawing Number: 1443.009.04 Drawn By: MT Checked By: DO'R Date: 20/12/2023

Legend

- Inferred Extent of Contamination
- Site Boundary

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Area 1	99	-	Visual ACM	-
Area 2	290	0.3	Asbestos	87
Area 3	287	0.3	As	86.1
Area 4	482	0.3	Pb	144.6
Area 5	208	0.3	Pb	62.4
Area 6	322	0.3	Pb	96.6
Area 7	30	0.5	As & PCP	15
Area 8	76	-	Visual ACM	-
Total Volume				492
Total Tonnes (m^3 x 1.5)				738

0 10 20 40 60 80 Meters

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Figure 4-1: Inferred Extent of Contamination

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.04-1
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Legend

- Inferred Extent of Contamination
- Site Boundary

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Area 1	99	-	Visual ACM	-
Area 2	290	0.3	Asbestos	87
Area 3	287	0.3	As	86.1
Area 4	482	0.3	Pb	144.6
Area 5	208	0.3	Pb	62.4
Area 6	322	0.3	Pb	96.6
Area 7	30	0.5	As & PCP	15
Area 8	76	-	Visual ACM	-
Total Volume				492
Total Tonnes (m^3 x 1.5)				738

0 5 10 20 30 40 Meters

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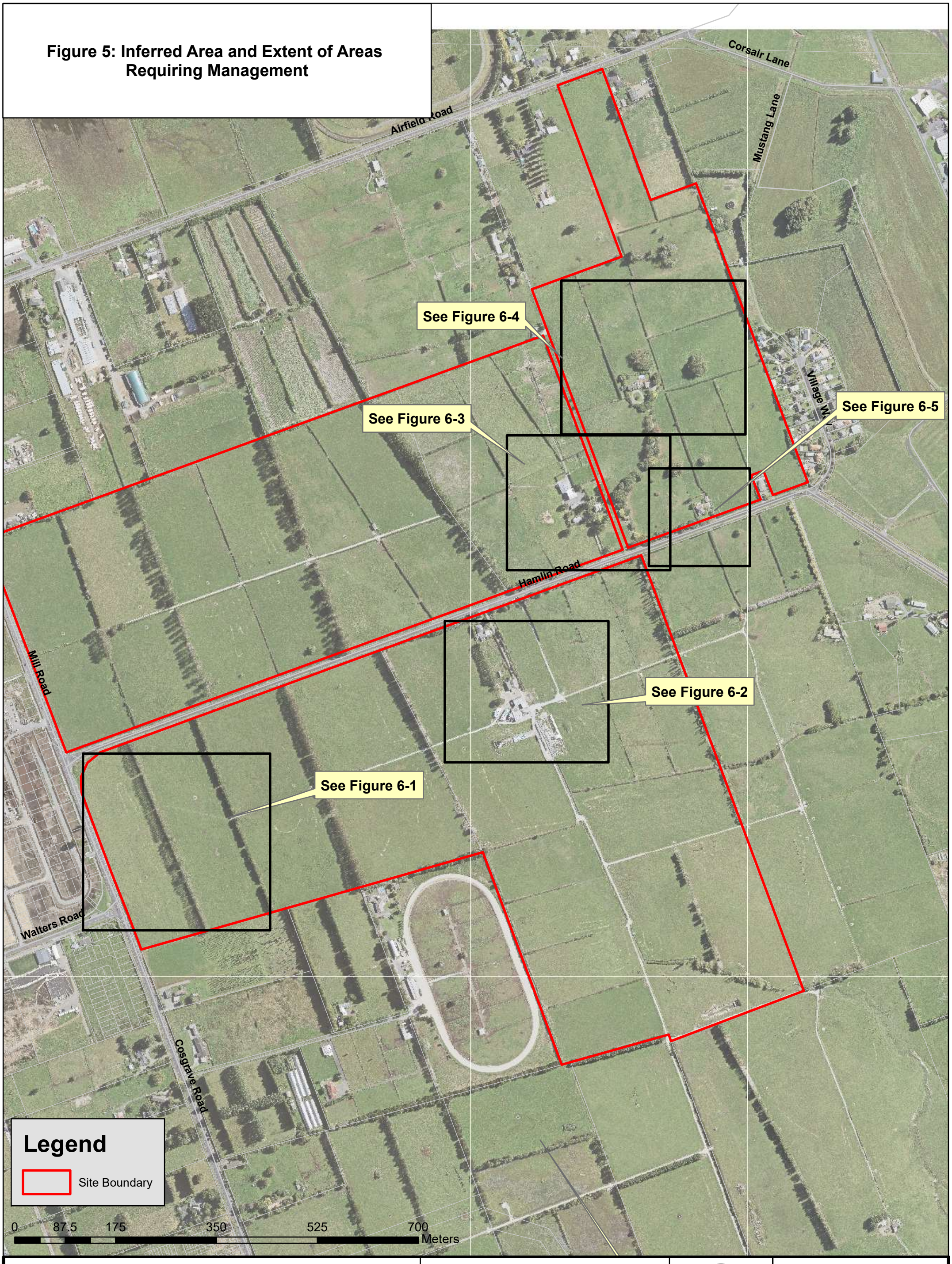
Figure 4-2: Inferred Extent of Contamination

DSI, RAP & AEE

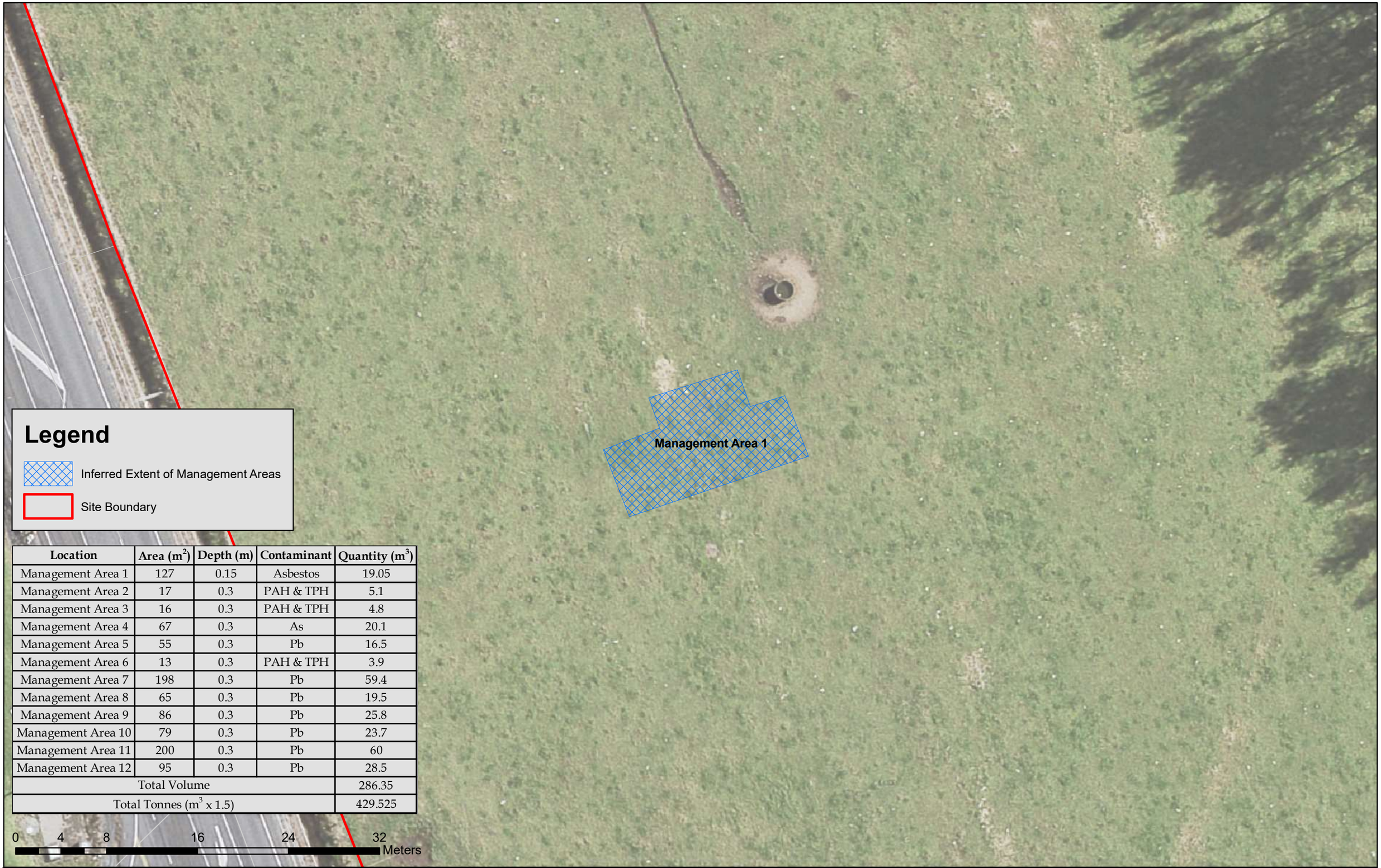
1443.009 (R1)

Drawing Number: 1443.009.04-2
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Figure 5: Inferred Area and Extent of Areas Requiring Management



FOCUS ENVIRONMENTAL SERVICES LTD	Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 80 Hamlin Road Sunfield Urban Development Area Papakura Auckland	N 1443.009 (R1)	Drawing Number: 1443.009.05 Drawn By: MT Checked By: DO'R Date: 20/12/2023



Legend

- Inferred Extent of Management Areas
- Site Boundary

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
Management Area 6	13	0.3	PAH & TPH	3.9
Management Area 7	198	0.3	Pb	59.4
Management Area 8	65	0.3	Pb	19.5
Management Area 9	86	0.3	Pb	25.8
Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				286.35
Total Tonnes (m^3 x 1.5)				429.525

0 4 8 16 24 32 Meters

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Figure 5-1: Inferred Area and Extent of Areas Requiring Management

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.05-1
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Legend

Inferred Extent of Management Areas

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
Management Area 6	13	0.3	PAH & TPH	3.9
Management Area 7	198	0.3	Pb	59.4
Management Area 8	65	0.3	Pb	19.5
Management Area 9	86	0.3	Pb	25.8
Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				286.35
Total Tonnes (m^3 x 1.5)				429.525

0 5 10 20 30 40 Meters

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Figure 5-2: Inferred Area and Extent of Areas Requiring Management

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.05-2
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
Management Area 6	13	0.3	PAH & TPH	3.9
Management Area 7	198	0.3	Pb	59.4
Management Area 8	65	0.3	Pb	19.5
Management Area 9	86	0.3	Pb	25.8
Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				286.35
Total Tonnes (m^3 x 1.5)				429.525

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Figure 5-3: Inferred Area and Extent of Areas Requiring Management

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.05-3
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
Management Area 6	13	0.3	PAH & TPH	3.9
Management Area 7	198	0.3	Pb	59.4
Management Area 8	65	0.3	Pb	19.5
Management Area 9	86	0.3	Pb	25.8
Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				286.35
Total Tonnes (m^3 x 1.5)				429.525

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Figure 5-4: Inferred Area and Extent of Areas Requiring Management

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.05-4
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	127	0.15	Asbestos	19.05
Management Area 2	17	0.3	PAH & TPH	5.1
Management Area 3	16	0.3	PAH & TPH	4.8
Management Area 4	67	0.3	As	20.1
Management Area 5	55	0.3	Pb	16.5
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Management Area 10	79	0.3	Pb	23.7
Management Area 11	200	0.3	Pb	60
Management Area 12	95	0.3	Pb	28.5
Total Volume				286.35
Total Tonnes (m^3 x 1.5)				429.525

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PO Box 11455
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Auckland 1542

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Figure 5-5: Inferred Area and Extent of Areas Requiring Management

DSI, RAP & AEE

1443.009 (R1)

Drawing Number: 1443.009.05-5
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Appendices

Appendix A – Illustrative Masterplan

Appendix B – Environmental HAIL

Ministry for the Environment
Manatū Mō Te Taiao

Hazardous Activities and Industries List (HAIL)

October 2011

A Chemical manufacture, application and bulk storage

1. Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application
2. Chemical manufacture, formulation or bulk storage
3. Commercial analytical laboratory sites
4. Corrosives including formulation or bulk storage
5. Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents
6. Fertiliser manufacture or bulk storage
7. Gasworks including the manufacture of gas from coal or oil feedstocks
8. Livestock dip or spray race operations
9. Paint manufacture or formulation (excluding retail paint stores)
10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
11. Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application
12. Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides
13. Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground
14. Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges
15. Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)
16. Skin or wool processing including a tannery or fellmongery, or any other commercial facility for hide curing, drying, scouring or finishing or storing wool or leather products
17. Storage tanks or drums for fuel, chemicals or liquid waste
18. Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside

B Electrical and electronic works, power generation and transmission

1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)

2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment
3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices
4. Power stations, substations or switchyards

C Explosives and ordinances production, storage and use

1. Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging
2. Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors
3. Training areas set aside exclusively or primarily for the detonation of explosive ammunition

D Metal extraction, refining and reprocessing, storage and use

1. Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material
2. Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds
3. Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds
4. Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals
5. Engineering workshops with metal fabrication

E Mineral extraction, refining and reprocessing, storage and use

1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
2. Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)
3. Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process
4. Commercial concrete manufacture or commercial cement storage
5. Coal or coke yards
6. Hydrocarbon exploration or production including well sites or flare pits
7. Mining industries (excluding gravel extraction) including exposure of faces or release of groundwater containing hazardous contaminants, or the storage of hazardous wastes including waste dumps or dam tailings

F Vehicle refuelling, service and repair

1. Airports including fuel storage, workshops, washdown areas, or fire practice areas
2. Brake lining manufacturers, repairers or recyclers
3. Engine reconditioning workshops
4. Motor vehicle workshops
5. Port activities including dry docks or marine vessel maintenance facilities

6. Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas
7. Service stations including retail or commercial refuelling facilities
8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances

G Cemeteries and waste recycling, treatment and disposal

1. Cemeteries
2. Drum or tank reconditioning or recycling
3. Landfill sites
4. Scrap yards including automotive dismantling, wrecking or scrap metal yards
5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)
6. Waste recycling or waste or wastewater treatment

H Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

I Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment

Appendix C – RPD Calculations

RPD Calculations: 80 Hamlin Road, Ardmore

Parameter	SR02	SR02 (DUP)	RPD (%)	CSP SUR	CSP SUR (DUP)	RPD (%)	HB02	HB02 (DUP)	RPD (%)	HB20	HB20 (DUP)	RPD (%)
Total Recoverable Arsenic	15	15	0.00	22	39	*55.74*	-	-	-	-	-	-
Total Recoverable Cadmium	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Chromium	-	-	-	18	33	*58.82*	-	-	-	-	-	-
Total Recoverable Copper	17	19	11.11	39	57	37.50	-	-	-	-	-	-
Total Recoverable Lead	13	13.3	2.28	-	-	-	59	58	1.71	17	16.1	5.44
Total Recoverable Nickel	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Zinc	-	-	-	-	-	-	-	-	-	-	-	-

Note: Results in *I talics* exceed 30% RPD. Results in red exceed 50% RPD

Appendix D – Tabulated Lead Results

Sample	Pb
Pb01	55
Pb02	34
Pb03	***280***
Pb04	***640***
Pb05	***1060***
Pb06	14.4
Pb07	*142*
Pb08	***500***
Pb09	***4300***
Pb10	***800***
Pb11	*91*
Pb12	52
Pb13	48
Pb14	59
Pb15	*143*
Pb16	*93*
Pb17	*158*
HB01	*83*
HB02	59
HB03	27
HB04	39
HB05	*186*
HB06	*104*
HB08	***300***
HB09	50
HB10	*70*
HB11	***340***
HB12	52
HB13	65
HB14	20
HB15	63
HB16	45
HB17	28
HB18	49
HB19	53
HB20	17
HB21	37
HB22	26

Note: All results in mg/kg. Results in Red exceed the SCS(health) for residential land use. Results in blue also exceed the Soil Contaminant Standards for health (SCSs(health)) for commercial/industrial worker Results in **Bold** exceed the discharge criteria of the AUP: OP. Results in *Italics* exceed the maximum Auckland background concentrations for non-volcanic soils outlined in the Auckland Regional Council Technical Publication No.153, Oct 2001.

Appendix E – Laboratory Transcripts

Hill Laboratories
TRIED, TESTED AND TRUSTED

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

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2569586	SPv4
Contact:	Joseph McLay	**Date Received:**	27-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	09-Apr-2021	
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.009	
		Submitted By:	Joseph McLay	

Sample Type: Soil

Sample Name:		SR01 25-Mar-2021	SR02 25-Mar-2021	Pb01 25-Mar-2021	Pb02 25-Mar-2021	Pb03 25-Mar-2021
Lab Number:		2569586.1	2569586.2	2569586.3	2569586.4	2569586.5
Individual Tests						
Dry Matter	g/100g as rcvd	76	77	-	-	-
Total Recoverable Arsenic	mg/kg dry wt	130	15	-	-	-
Total Recoverable Copper	mg/kg dry wt	144	17	-	-	-
Total Recoverable Lead	mg/kg dry wt	40	13.0	55	34	280
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.013	-	-	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.013	-	-	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	-	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.013	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.013	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.013	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.013	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.08	-	-	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endrin	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.013	-	-	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.013	-	-	-

Sample Name:	Pb04 25-Mar-2021	Pb05 25-Mar-2021	Pb06 25-Mar-2021	Pb07 25-Mar-2021	Pb08 25-Mar-2021
Lab Number:	2569586.6	2569586.7	2569586.8	2569586.9	2569586.10

Sample Type: Soil						
Sample Name:		Pb04 25-Mar-2021	Pb05 25-Mar-2021	Pb06 25-Mar-2021	Pb07 25-Mar-2021	Pb08 25-Mar-2021
Lab Number:		2569586.6	2569586.7	2569586.8	2569586.9	2569586.10
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	640	1,060	14.4	142	500

Sample Name:		Pb09 25-Mar-2021	Pb10 25-Mar-2021	Pb11 25-Mar-2021	Pb12 25-Mar-2021	Pb13 25-Mar-2021
Lab Number:		2569586.11	2569586.12	2569586.13	2569586.14	2569586.15
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	4,300	800	91	52	48

Sample Name:		Pb14 25-Mar-2021	Pb15 25-Mar-2021	Pb16 25-Mar-2021	Pb17 25-Mar-2021	HB01 25-Mar-2021
Lab Number:		2569586.16	2569586.17	2569586.18	2569586.19	2569586.20
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	59	143	93	158	83

Sample Name:		HB02 25-Mar-2021	HB03 25-Mar-2021	HB04 25-Mar-2021	HB05 25-Mar-2021	HB06 25-Mar-2021
Lab Number:		2569586.21	2569586.22	2569586.23	2569586.24	2569586.25
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	59	27	39	186	104

Sample Name:		HB08 25-Mar-2021	HB11 25-Mar-2021	HB13 25-Mar-2021	HB14 25-Mar-2021	HB15 25-Mar-2021
Lab Number:		2569586.26	2569586.27	2569586.28	2569586.29	2569586.30
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	300	340	65	20	63

Sample Name:		HB16 25-Mar-2021	HB17 25-Mar-2021	HB18 25-Mar-2021	HB19 25-Mar-2021	HB20 25-Mar-2021
Lab Number:		2569586.31	2569586.32	2569586.33	2569586.34	2569586.35
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	45	28	49	53	17.0

Sample Name:		HB21 25-Mar-2021	HB22 25-Mar-2021	TT01 25-Mar-2021	CSP SUR 25-Mar-2021	CSP 0.4m 25-Mar-2021
Lab Number:		2569586.36	2569586.37	2569586.46	2569586.47	2569586.48
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	91	73	83
Total Recoverable Lead	mg/kg dry wt	37	26	-	-	-
CCA by ICP-MS						
Total Recoverable Arsenic	mg/kg dry wt	-	-	8	22	34
Total Recoverable Chromium	mg/kg dry wt	-	-	21	18	53
Total Recoverable Copper	mg/kg dry wt	-	-	30	39	50
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
alpha-BHC	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
beta-BHC	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
delta-BHC	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
cis-Chlordane	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
trans-Chlordane	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
2,4'-DDD	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
4,4'-DDD	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
2,4'-DDE	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
4,4'-DDE	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
2,4'-DDT	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
4,4'-DDT	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Total DDT Isomers	mg/kg dry wt	-	-	< 0.07	< 0.09	< 0.08
Dieldrin	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Endosulfan I	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Endosulfan II	mg/kg dry wt	-	-	< 0.011	< 0.06 #1	< 0.06 #1
Endosulfan sulphate	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012

Sample Type: Soil						
Sample Name:		HB21 25-Mar-2021	HB22 25-Mar-2021	TT01 25-Mar-2021	CSP SUR 25-Mar-2021	CSP 0.4m 25-Mar-2021
Lab Number:		2569586.36	2569586.37	2569586.46	2569586.47	2569586.48
Organochlorine Pesticides Screening in Soil						
Endrin	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Endrin aldehyde	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Endrin ketone	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Heptachlor	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Methoxychlor	mg/kg dry wt	-	-	< 0.011	< 0.014	< 0.012
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	-	-	-	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	-	-	-	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Endrin	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Endrin ketone	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	-	-	-	0.8	1.7
Anthracene	mg/kg dry wt	-	-	-	3.1	2.7
Benzo[a]anthracene	mg/kg dry wt	-	-	-	0.6	1.3
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	0.6	1.0
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	0.5	1.3
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	0.6	0.7
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Chrysene	mg/kg dry wt	-	-	-	0.6	1.3
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	-	-	-	1.8	7.0
Fluorene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	0.5	0.6
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		HB21 25-Mar-2021	HB22 25-Mar-2021	TT01 25-Mar-2021	CSP SUR 25-Mar-2021	CSP 0.4m 25-Mar-2021
Lab Number:		2569586.36	2569586.37	2569586.46	2569586.47	2569586.48
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Naphthalene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	-	-	-	0.5	1.1
Pyrene	mg/kg dry wt	-	-	-	4.0	6.2
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	< 1.3	1.4
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	< 1.3	1.4
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	-	< 5	< 5
2-Chlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	-	-	-	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	-	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	-	-	-	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	76	< 30
Phenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	-	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	-	-	-	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.8	< 0.8
Hexachloroethane	mg/kg dry wt	-	-	-	< 0.8	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	-	< 10	< 10
Carbazole	mg/kg dry wt	-	-	-	< 0.5	0.7
Dibenzofuran	mg/kg dry wt	-	-	-	< 0.5	< 0.5
Isophorone	mg/kg dry wt	-	-	-	< 0.5	< 0.5

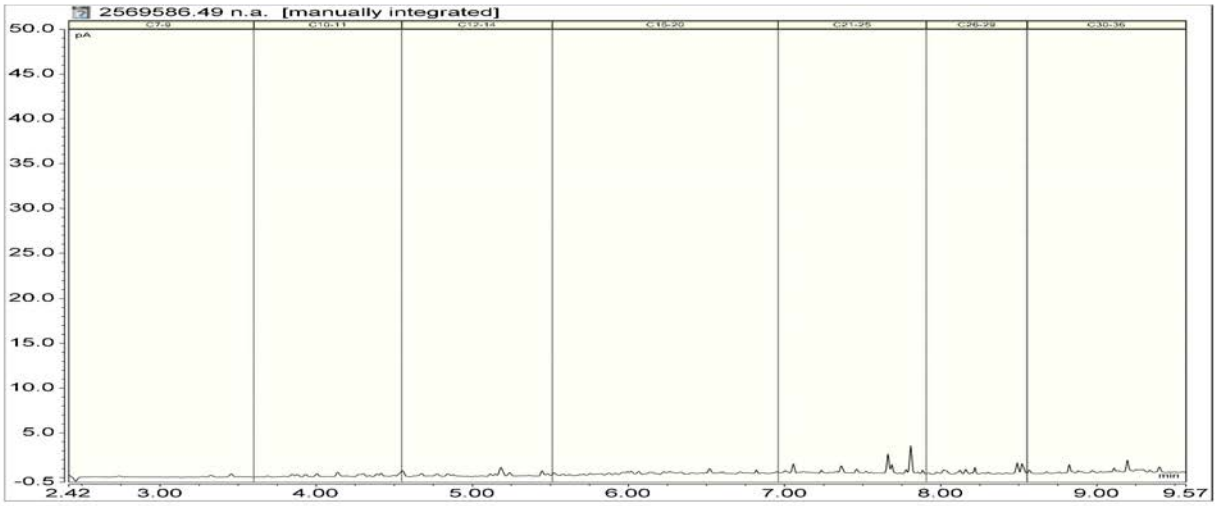
Sample Name:		FS01 25-Mar-2021	FS02 25-Mar-2021	FS03 25-Mar-2021	SR02 [Duplicate] 25-Mar-2021	CSP SUR [Duplicate] 25-Mar-2021
Lab Number:		2569586.49	2569586.50	2569586.51	2569586.52	2569586.53
Individual Tests						
Dry Matter	g/100g as rcvd	98	89	96	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	15	39
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	33 #3
Total Recoverable Copper	mg/kg dry wt	-	-	-	19	57
Total Recoverable Lead	mg/kg dry wt	-	-	-	13.3	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	2.1	2.6	2.4	-	-
1-Methylnaphthalene	mg/kg dry wt	0.68	< 0.011	0.050	-	-
2-Methylnaphthalene	mg/kg dry wt	0.42	< 0.011	0.040	-	-

Sample Type: Soil						
Sample Name:		FS01 25-Mar-2021	FS02 25-Mar-2021	FS03 25-Mar-2021	SR02 [Duplicate] 25-Mar-2021	CSP SUR [Duplicate] 25-Mar-2021
Lab Number:		2569586.49	2569586.50	2569586.51	2569586.52	2569586.53
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Acenaphthylene	mg/kg dry wt	< 0.010	< 0.011	< 0.010	-	-
Acenaphthene	mg/kg dry wt	< 0.010	< 0.011	< 0.010	-	-
Anthracene	mg/kg dry wt	0.072	< 0.011	0.053	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10 #2	< 0.011	0.091	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.016	< 0.011	0.164	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.03	0.26	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.03	0.26	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.011	< 0.011	0.20	-	-
Benzo[e]pyrene	mg/kg dry wt	0.012	0.012	0.51	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.011	< 0.011	0.54	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.010	< 0.011	0.033	-	-
Chrysene	mg/kg dry wt	0.015	< 0.011	< 0.10 #2	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.010	< 0.011	0.036	-	-
Fluoranthene	mg/kg dry wt	0.046	< 0.011	0.045	-	-
Fluorene	mg/kg dry wt	0.103	< 0.011	< 0.010	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.011	< 0.011	0.26	-	-
Naphthalene	mg/kg dry wt	0.54	< 0.06	0.07	-	-
Perylene	mg/kg dry wt	< 0.010	< 0.011	0.020	-	-
Phenanthrene	mg/kg dry wt	0.114	< 0.011	0.012	-	-
Pyrene	mg/kg dry wt	0.046	2.6	0.21	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	-	-
C10 - C14	mg/kg dry wt	28	300	24	-	-
C15 - C36	mg/kg dry wt	173	8,700	630	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	200	9,000	650	-	-

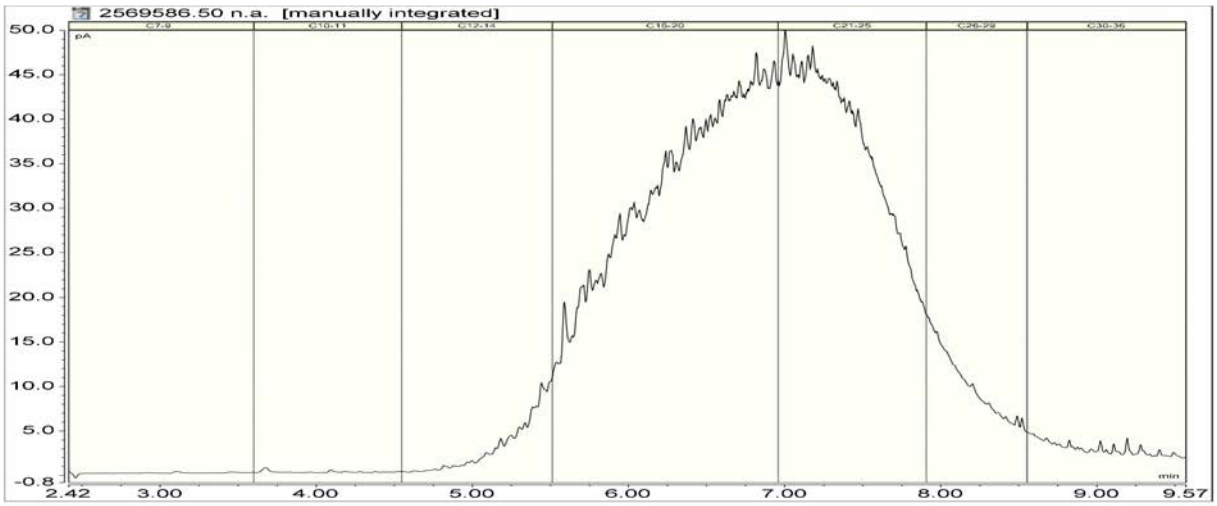
Sample Name:		HB02 [Duplicate] 25-Mar-2021	HB20 [Duplicate] 25-Mar-2021	Composite of Comp01 A, Comp01 B, Comp01 C and Comp01 D	Composite of Comp02 A, Comp02 B, Comp02 C and Comp02 D	
Lab Number:		2569586.54	2569586.55	2569586.56	2569586.57	
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	78	77	-
Total Recoverable Arsenic	mg/kg dry wt	-	-	6	6	-
Total Recoverable Copper	mg/kg dry wt	-	-	28	33	-
Total Recoverable Lead	mg/kg dry wt	58	16.1	39	34	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	< 0.013	< 0.013	-
alpha-BHC	mg/kg dry wt	-	-	< 0.013	< 0.013	-
beta-BHC	mg/kg dry wt	-	-	< 0.013	< 0.013	-
delta-BHC	mg/kg dry wt	-	-	< 0.013	< 0.013	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.013	< 0.013	-
cis-Chlordane	mg/kg dry wt	-	-	< 0.013	< 0.013	-
trans-Chlordane	mg/kg dry wt	-	-	< 0.013	< 0.013	-
2,4'-DDD	mg/kg dry wt	-	-	< 0.013	< 0.013	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.013	< 0.013	-
2,4'-DDE	mg/kg dry wt	-	-	< 0.013	< 0.013	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.013	< 0.013	-
2,4'-DDT	mg/kg dry wt	-	-	< 0.013	< 0.013	-
4,4'-DDT	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Total DDT Isomers	mg/kg dry wt	-	-	< 0.08	< 0.08	-
Dieldrin	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Endosulfan I	mg/kg dry wt	-	-	< 0.013	< 0.013	-

Sample Type: Soil						
Sample Name:		HB02 [Duplicate] 25-Mar-2021	HB20 [Duplicate] 25-Mar-2021	Composite of Comp01 A, Comp01 B, Comp01 C and Comp01 D	Composite of Comp02 A, Comp02 B, Comp02 C and Comp02 D	
Lab Number:		2569586.54	2569586.55	2569586.56	2569586.57	
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Endrin	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Endrin aldehyde	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Endrin ketone	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Heptachlor	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Methoxychlor	mg/kg dry wt	-	-	< 0.013	< 0.013	-

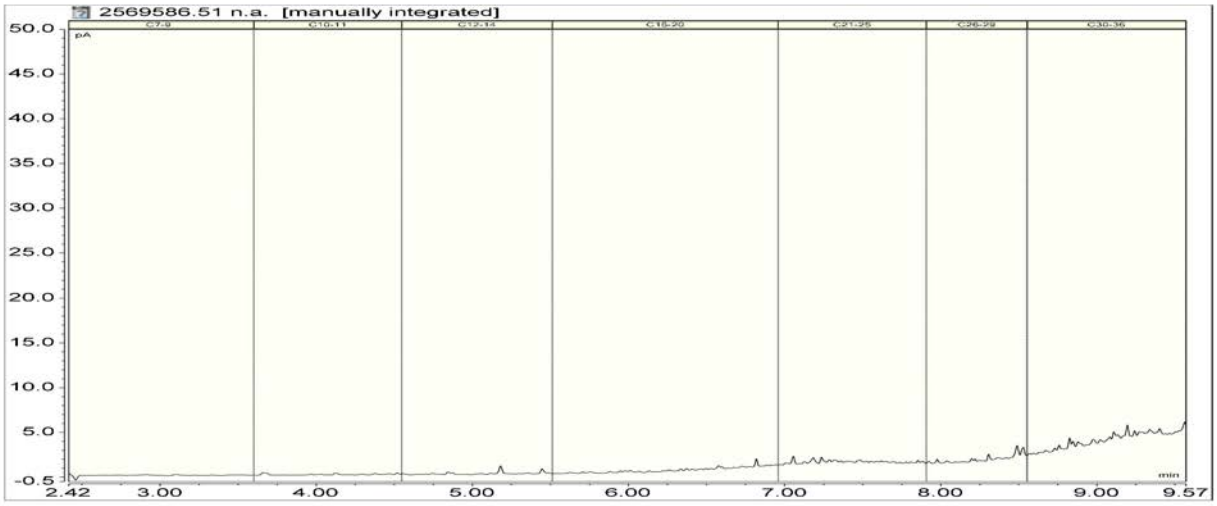
2569586.49
FS01 25-Mar-2021
Client Chromatogram for TPH by FID



2569586.50
FS02 25-Mar-2021
Client Chromatogram for TPH by FID



2569586.51
FS03 25-Mar-2021
Client Chromatogram for TPH by FID



Analyst's Comments

#1 Due to some interference found in the chromatography, the detection limit was raised. Hence the higher detection limit reported.

#2 Due to some interference found in the chromatography, the detection limit was raised. Hence the higher detection limit reported.

#3 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. Replicate 1 = 33mg/kg, replicate 2 = 26mg/kg.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-37, 46-48, 52-57
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-37, 46-48, 54-57
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	49-51
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-2, 46-51, 56-57
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-37, 46-48, 54-57
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2, 56-57
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2, 56-57
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-37, 54-57

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	49-51
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	49-51
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	49-51
CCA by ICP-MS	Total recoverable digestion, ICP-MS, screen level.	2 mg/kg dry wt	46-48
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.	0.4 - 2 mg/kg dry wt	52
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.	2 mg/kg dry wt	53
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-2, 46-48, 56-57
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	47-48
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	49-51
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	49-51
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	49-51
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	49-51
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	49-51

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

Testing was completed between 30-Mar-2021 and 06-Apr-2021. For completion dates of individual analyses please contact the laboratory.

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

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2570278	A2Pv2
Contact:	Joseph McLay	**Date Received:**	29-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	06-Apr-2021	**(Amended)**
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.009	
		Submitted By:	Joseph McLay	

Sample Type: Soil

Sample Name:		HB01 25-Mar-2021	HB02 25-Mar-2021	HB03 25-Mar-2021	HB04 25-Mar-2021	HB05 25-Mar-2021
Lab Number:		2570278.1	2570278.2	2570278.3	2570278.4	2570278.5
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	614.7	558.0	582.0	539.9	634.0
Dry Weight	g	506.1	448.1	425.4	360.4	574.0
Moisture	%	18	20	27	33	9
Sample Fraction >10mm	g dry wt	6.9	42.7	0.5	12.8	7.8
Sample Fraction <10mm to >2mm	g dry wt	19.3	65.7	0.7	8.9	66.2
Sample Fraction <2mm	g dry wt	478.5	338.8	423.0	337.9	499.2
<2mm Subsample Weight	g dry wt	57.8	58.7	57.6	58.6	54.6
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HB06 25-Mar-2021	HB08 25-Mar-2021	HB11 25-Mar-2021	HB13 25-Mar-2021	HB14 25-Mar-2021
Lab Number:		2570278.6	2570278.8	2570278.9	2570278.10	2570278.11
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	Loose fibres	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	538.7	285.6	460.6	422.1	535.1
Dry Weight	g	373.8	239.3	393.3	361.3	344.0
Moisture	%	31	16	15	14	36

Sample Type: Soil						
Sample Name:		HB06 25-Mar-2021	HB08 25-Mar-2021	HB11 25-Mar-2021	HB13 25-Mar-2021	HB14 25-Mar-2021
Lab Number:		2570278.6	2570278.8	2570278.9	2570278.10	2570278.11
Sample Fraction >10mm	g dry wt	3.8	1.5	0.6	72.4	4.8
Sample Fraction <10mm to >2mm	g dry wt	30.3	3.5	14.4	52.5	10.2
Sample Fraction <2mm	g dry wt	338.3	232.8	376.8	235.0	327.8
<2mm Subsample Weight	g dry wt	51.2	55.1	54.9	54.1	58.2
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	0.00099	< 0.00001

Sample Name:		HB15 25-Mar-2021	HB16 25-Mar-2021	HB17 25-Mar-2021	HB18 25-Mar-2021	HB19 25-Mar-2021
Lab Number:		2570278.12	2570278.13	2570278.14	2570278.15	2570278.16
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	457.6	411.7	500.5	564.6	365.8
Dry Weight	g	270.2	270.5	314.2	334.0	258.7
Moisture	%	41	34	37	41	29
Sample Fraction >10mm	g dry wt	3.4	30.5	< 0.1	< 0.1	3.1
Sample Fraction <10mm to >2mm	g dry wt	12.7	12.1	6.7	13.6	45.2
Sample Fraction <2mm	g dry wt	253.8	226.6	305.8	318.3	209.3
<2mm Subsample Weight	g dry wt	52.7	51.6	55.5	53.0	56.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HB20 25-Mar-2021	HB21 25-Mar-2021	HB22 25-Mar-2021	ASB02 25-Mar-2021	
Lab Number:		2570278.17	2570278.18	2570278.19	2570278.20	
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	-
Description of Asbestos Form		-	-	Fibre cement and ACM debris	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	0.047	< 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.026	< 0.001	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.026	< 0.001	-
As Received Weight	g	412.0	516.1	872.8	977.4	-
Dry Weight	g	294.5	382.8	839.3	935.1	-
Moisture	%	29	26	4	4	-
Sample Fraction >10mm	g dry wt	13.5	2.1	297.9	156.7	-

Sample Type: Soil						
Sample Name:		HB20 25-Mar-2021	HB21 25-Mar-2021	HB22 25-Mar-2021	ASB02 25-Mar-2021	
Lab Number:		2570278.17	2570278.18	2570278.19	2570278.20	
Sample Fraction <10mm to >2mm	g dry wt	81.9	69.6	281.4	344.1	-
Sample Fraction <2mm	g dry wt	198.3	310.2	259.2	433.3	-
<2mm Subsample Weight	g dry wt	52.3	50.4	59.3	54.2	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	0.3985	< 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	0.2196	< 0.00001	-

Glossary of Terms

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

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

The following assumptions have been made:

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

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

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2570278-A2Pv1' issued on 31-Mar-2021 at 4:25 pm.
Reason for amendment: Updated client reference as per request.

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-6, 8-20
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-6, 8-20
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-6, 8-20
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-6, 8-20
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6, 8-20
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6, 8-20
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-6, 8-20
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-6, 8-20

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-6, 8-20
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6, 8-20
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6, 8-20
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6, 8-20
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6, 8-20
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-6, 8-20
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6, 8-20
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6, 8-20

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

Testing was completed on 31-Mar-2021. For completion dates of individual analyses please contact the laboratory.

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

Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2578950	A2Pv1
Contact:	Joseph McLay	**Date Received:**	08-Apr-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	12-Apr-2021	
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.009	
		Submitted By:	Joseph McLay	

Sample Type: Soil

Sample Name:		HB09 29-Mar-2021	HB10 29-Mar-2021	HB12 29-Mar-2021		
Lab Number:		2578950.1	2578950.2	2578950.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	-	-
As Received Weight	g	444.8	493.0	908.9	-	-
Dry Weight	g	325.7	362.1	768.0	-	-
Moisture	%	27	27	15	-	-
Sample Fraction >10mm	g dry wt	0.3	< 0.1	140.2	-	-
Sample Fraction <10mm to >2mm	g dry wt	93.3	34.5	347.0	-	-
Sample Fraction <2mm	g dry wt	231.6	327.1	280.8	-	-
<2mm Subsample Weight	g dry wt	57.5	53.2	57.6	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-

Glossary of Terms

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

For further details, please contact the Asbestos Team.

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

The following assumptions have been made:

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

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

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	1-3
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-3
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-3
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-3
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-3
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-3
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-3
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-3

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

Testing was completed on 12-Apr-2021. 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.

Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

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

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2572044	SPv2
Contact:	Joseph McLay	**Date Received:**	30-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	06-Apr-2021	**(Amended)**
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.009	
		Submitted By:	Joseph McLay	

Sample Type: Soil

	Sample Name:	HB09 29-Mar-2021	HB10 29-Mar-2021	HB12 29-Mar-2021		
	Lab Number:	2572044.1	2572044.2	2572044.3		
Total Recoverable Lead	mg/kg dry wt	50	70	52	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2572044-SPv1' issued on 01-Apr-2021 at 2:25 pm.
Reason for amendment: Updated client reference as per request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3

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

Testing was completed on 01-Apr-2021. For completion dates of individual analyses please contact the laboratory.

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

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2570524	A2Pv2
Contact:	Joseph McLay	**Date Received:**	29-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	06-Apr-2021	**(Amended)**
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.009	
		Submitted By:	Joseph McLay	

Sample Type: Building Material

Sample Name	Lab Number	Sample Category	Sample Weight on receipt (g)	Asbestos Presence / Absence	Description of Asbestos in Non Homogeneous Samples
PACM02	2570524.1	Fibre Cement	33.98	Amosite (Brown Asbestos) detected. Chrysotile (White Asbestos) detected.	-

Glossary of Terms

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

For further details, please contact the Asbestos Team.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2570524-A2Pv1' issued on 30-Mar-2021 at 11:36 am.
Reason for amendment: Updated client reference as per request.

Summary of Methods

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

Sample Type: Building Material

Test	Method Description	Default Detection Limit	Sample No
Asbestos in Bulk Material			
Sample Category	Assessment of sample type. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	1
Sample Weight on receipt	Sample weight. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.01 g	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos in Non Homogenous Samples	Form, dimensions and/or weight of asbestos fibres present. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1

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

Dates of testing are available on request. 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.

Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

DETAILED SITE INVESTIGATION
REMEDIATION ACTION PLAN
&
ASSESSMENT OF ENVIRONMENTAL EFFECTS
508 OLD WAIROA ROAD
ARDMORE
AUCKLAND

For the Attention of:

Winton Land Limited

Reference: FES 1443.010 December 2023 (R5)

Company Information

Focus Environmental Services Limited

PO Box 11455

Ellerslie

Auckland 1542

Telephone: +64 9 579 4155

Email: mail@focusenvironmental.co.nz

Quality Information

Project Name	DSI, RAP & AEE 508 Old Wairoa Road, Ardmore
Project Number	1443.010 (R5)
File Reference	M:\2023 Jobs\Winton\Sunfield Development\Completed Reports\508 Old Wairoa Road (R3)\01 Report\R5\1443.010_DSI_RAP_AEE_MT_R5.docx
Date Issued	April 2021
Date Revised	December 2023

Author

Megan Thomas
Environmental Scientist

Reviewed

Claire Johnson
Environmental Scientist

Authorised

David O'Reilly
Principal Environmental Consultant

Distribution List

Parties	Copies
Winton Land Limited	1
Focus Environmental Services Limited	1

Contents

Executive Summary

This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

Focus Environmental Services Limited was contracted by Winton Land Limited to carry out a Detailed Site Investigation, Remediation Action Plan and Assessment of Environmental Effects (DSI, RAP & AEE) at 508 Old Wairoa Road, Ardmore, Auckland. The legal description of the site is DP 10383 with an area of 23.63ha.

It should be noted that this report has been revised following the request of the client.

The Sunfield Urban Development Area (UDA) consists of nineteen properties located across Cosgrave Road, Old Wairoa Road, Hamlin Road and Airfield Road, Papakura, Auckland.

The scope of this report is limited to the property at 508 Old Wairoa Road, Ardmore, and should be read in conjunction with the cover letter summarising the findings of the PSIs and DSIs completed for the Sunfield UDA.

This DSI, RAP & AEE is for the site located at 508 Old Wairoa Road, Ardmore. At the request of the client, this report has been revised following subdivision of the parent property in which the site formerly included what is now 85 Hamlin Road. The legal description of the site is DP 10383 with an area of 23.63ha.

This DSI, RAP & AEE has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No. 5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, 508 Old Wairoa Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the current site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, potentially uncertified filling and spray race activities were also identified across the site.

In addition, dumping and the potential burning of refuse was observed.

An additional site inspection and walkover was undertaken to supplement the information provided in the PSI on the 25th of March 2021.

During the site inspection and walkover, visual evidence of PACM was observed intermixed with the site soils at what is now 85 Hamlin Road, and a structure was observed with extensive fire damage at the site. The soils in the areas of potential refuse burning identified as part of the PSI were inspected, however no evidence of burning was identified.

Due to the potential sources of contamination identified, it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the site inspection and walkover, the intrusive investigation was carried out by Focus Environmental Services Limited personnel where a total of nine discrete soil samples were collected from the areas of potentially contaminating activities across the site. In addition, six test pits and four hand augers were extended to a maximum depth of 2.3m and 1.0m below ground level (bgl) respectively, with representative samples obtained at varying depths.

The results of the sample analysis and investigation indicate that the site soils across the site are contaminated above the $SCS_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, zinc and asbestos fibres. Furthermore, concentrations of heavy metals were detected in exceedance of the NES (SCS) for commercial/industrial worker, and therefore may pose a short-term risk to site workers.

Due to the elevated levels of contaminants detected, the site at 508 Old Wairoa Road, Ardmore will require remediation of the affected soils prior to being redeveloped. The estimated volume of soil requiring remediation is 7,206.7m^3. It should be noted that this volume may change during the remedial process.

Due to the volume of soil requiring remediation, a combination of offsite disposal and/or onsite management may be adopted as the remedial approach for the site.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

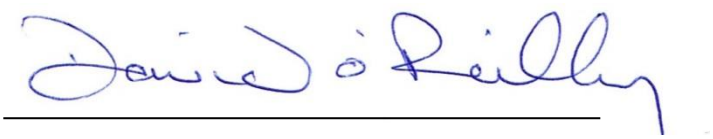
Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being 7,134.7m^3, which is above 200 m^3, it is considered that the proposed remediation will likely not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP will be required.

In addition, in the event that following the proposed development, concentrations of contaminants at levels elevated above the discharge criteria as outlined in the AUP: OP are to be encapsulated onsite, a long-term site monitoring and management plan and long-term discharge consent under rule E30.6.2.1 of the AUP: OP will likely be required.

The objective of this Remediation Action Plan is to ensure that the soils contaminated above the adopted site assessment criteria are handled, removed in a controlled manner, and disposed of to a suitable disposal location. All earthworks required as part of the remedial works should be carried out in accordance with this Remediation Action Plan.

An assessment of the effects which may occur as a result of the proposed works has been made in order to mitigate any potential adverse environmental and/or human health effects. If the controls outlined in this Remediation Action Plan are implemented during the works it is considered that the effects on the environment and human health are likely to be effectively mitigated.

This report is certified by David O'Reilly, Suitability Qualified and Experienced Practitioner (SQEP):



Principal Environmental Consultant
Focus Environmental Services Limited

1.0 Scope

1.1 This report has been prepared at the request of Winton Land Limited ("the client") in terms of the Focus Environmental Services Limited Agreement ("Agreement").

1.2 The following report is based on:

- *Information provided by "the Client";*
- *'Preliminary Site Investigation, 508 Old Wairoa Road, Ardmore, Auckland' dated December 2020 and prepared by Focus Environmental Services Limited;*
- *A site walkover and inspection; and*
- *Site investigation and soil sampling.*

1.3 We have not independently verified the information provided to us by the client or its completeness. We do not express an opinion on the accuracy or the reliability of such information.

1.4 No warranties are given, intended or implied.

1.5 Opinion, inferences, assumptions and interpretations made in this report should not be construed as legal opinion.

1.6 Where an assessment is given in this report, the client must also rely upon their own judgement, knowledge and assessment of the subject of this report before undertaking any action.

1.7 This report must not be used in any other context or for any other purpose other than that for which it has been prepared without the prior written consent of Focus Environmental Services Limited.

1.8 This report is strictly confidential and intended for the sole use of the client and shall not be disclosed without the prior written consent of Focus Environmental Services Limited.

1.9 This Focus Environmental Services Limited report is produced under a management system certified as complying with ISO 45001:2018 by SGS New Zealand.

2.0 Site Identification

The property is located at 508 Old Wairoa Road, Ardmore, Auckland as shown in Figure 1 attached. The legal description of the site is DP 10383 with an area of 23.63ha. The site is located at national grid reference 1774879mE and 5898176mN.

The site is rectangular in shape and is zoned 'Future Urban Zone' and 'Rural – Mixed Rural Zone' under the Auckland Unitary Plan – Operative in Part (AUP: OP).

The site location plan is presented as Figure 1.

3.0 Proposed Site Redevelopment Activity

It is proposed that the site will be redeveloped for residential purposes. As part of the redevelopment, the site will undergo subdivision, a change of land use and disturbance of soils.

The illustrative masterplan is attached as Appendix A.

4.0 Geology and Hydrology

Published geological maps[1] indicate that the site at 508 Old Wairoa Road, Ardmore is underlain with non-volcanic deposits of the Tauranga Group and the East Coast Bays Formation.

A description of the underlying geologies is presented in Tables 1 & 2 below.

Table 1: Geology of 508 Old Wairoa Road, Ardmore

Key name	OIS1 (Holocene) river deposits
Simple name	Holocene river deposits
Main rock name	Mud
Description	Sand, silt mud and clay with local gravel and peat beds
Subsidiary rocks	Sand silt clay peat
Key group	Holocene sediments
Stratigraphic lexicon name	Tauranga Group
Absolute age (min)	0.0 million years
Absolute age (max)	0.014 million years
Rock group	mudstone
Rock class	Clastic sediment

Table 2: Geology of 508 Old Wairoa Road, Ardmore

Key name	East Coast Bays Formation of Warkworth Subgroup (Waitemata Group)
Simple name	Neogene sedimentary rocks
Main rock name	turbidite
Description	Alternating sandstone and mudstone with variable volcanic content and interbedded volcaniclastic grits
Subsidiary rocks	Sandstone mudstone grit
Key group	Waitemata Group
Stratigraphic lexicon name	East Coast Bays Formation
Absolute age (min)	16.4 million years
Absolute age (max)	23.8 million years
Rock group	Alternating sandstone/siltstone
Rock class	Clastic sediment

[1] Geology of the Auckland Area (Institute of Geological &Nuclear Sciences 1:250,000 geological map 3, 2011)

No groundwater investigation was completed as part of this investigation.

The nearest surface water body to the site, as identified in the ecological report titled *'Cosgrave Road Plan Change: Baseline Ecology'* and dated April 2023, is an artificial drainage channel which runs through the centre of the site.

5.0 Regulatory Framework

5.1 The National Environmental Standard

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES) came into effect on the 1st of January 2012 and supersedes any District Plan rules that related to contaminated land. Any Regional Plan rules relating to contaminated land are still applicable.

In brief, the objective of the NES is to ensure that land affected by contaminants is identified and assessed and, if necessary, remediated or managed to protect human health. The NES only applies to the activities: removing or replacing all, or part of, a fuel storage system; sampling the soil; disturbing the soil; subdividing the land; and changing the land use, and where an activity or industry described in the Hazardous Activities and Industries List (HAIL) is being, has been, or is more likely than not to have been undertaken on the piece of land.

The NES also contains reference to the soil contaminant standards for human health ($SCS_{(health)}$), for a variety of land use scenarios along with reference to best practice reporting documents.

The environmental HAIL is attached as Appendix B.

5.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules of the AUP: OP must be considered.

In brief, the objective of the AUP: OP is to manage land containing elevated levels of contaminants to protect human health and the environment and to enable the effective use of the land.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

6.0 Background

The history of the site has been described in the report titled '*Preliminary Site Investigation, 508 Old Wairoa Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the current site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, potentially uncertified filling and spray race activities were also identified across the site.

In addition, dumping and potential burning of refuse was observed.

It should be noted that the potential sources of contamination (as identified above) were limited to a historical review, and therefore, prior to the commencement of any works at the property, it was recommended that a site walkover and inspection be completed in order to confirm the potentially contaminating land uses and/or activities carried out at the site.

In addition, at the time of writing the report, the results of a detailed geotechnical investigation covering the site was not available.

7.0 Additional Site Walkover

An additional site inspection and walkover was undertaken to supplement the information provided in the PSI on the 25th of March 2021. The site inspection and walkover were undertaken during a period of fine weather.

During the site inspection and walkover, the following was noted; fire damage to the shed (shed 6) was observed, and significant potentially asbestos containing material (PACM) along with scorched earth and ash were observed surrounding the structure.

Furthermore, the areas of potential refuse burning, including a minor amount of fence posts, were inspected and no evidence of burning was identified. This material was observed to be stockpiled and intermixed with onsite vegetation, potentially with the intention to be burnt. The extent of this is shown in Figure 2 attached.

The additional site features are presented as Figure 2 and additional site inspection photographs as Appendix C.

8.0 Potentially Contaminating Activities or Land Uses

Following a review of the desktop assessment presented in the PSI and the subsequent site walkover and inspection at the site, five potentially contaminating activities were identified and are outlined in Table 3 below.

Table 3: Potentially Contaminating Activities: 508 Old Wairoa Road, Ardmore

Activity Description	HAIL Category
Livestock Dip of Spray Race Operations	A8
Demolition/Burning of Historic or Current Structures Potentially Containing Asbestos & Potentially Asbestos Containing Materials Intermixed with the Site Soils	E1
Maintenance and Use of Lead-based Paint	I
Potentially Uncertified Filling	I
Burning of Building	I

It should be noted that the burning of refuse, as outlined in the PSI, was omitted as no evidence of burning was identified during the additional site walkover and inspection.

9.0 Conceptual Model of Exposure Pathways

The preliminary conceptual site model provided in Table 4 below expands on the potential sources of contamination (as identified above) and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 4: Preliminary Conceptual Site Model: 508 Old Wairoa Road, Ardmore

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Surface Water Run-off	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Migration of Groundwater	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.

10.0 Sampling and Analysis Plan and Sampling Method

Environmental Sampling was carried out in accordance with the Contaminated Land Management Guidelines No. 5 (MfE, revised 2021).

Nine discrete surface soil samples were collected from across the site and were sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 5 below.

Table 5: Discrete Sample Analysis Information: 508 Old Wairoa Road, Ardmore

Sample ID	Sample Depth	No. of Samples	HAIL Activity	Analysis Suite
SR01 – SR02	0.0-0.15m	2	Spray Race Operations	• Total recoverable As, Cu, Pb; and • Organochlorine Pesticides
HB05	0.0-0.15m	1	Demolition/Burning of Historic or Current Structures Potentially Containing Asbestos & Potentially Asbestos Containing Materials Intermixed with the Site Soils Maintenance and Use of Lead-based Paint	• Total recoverable Pb • Semi-quantitative Asbestos in Soil (NZ Guidelines).
Pb01-Pb02& Pb10 - Pb11	0.0-0.15m	4	Maintenance and Use of Lead-based Paint	• Total recoverable Pb
Pb05	0.0-0.15m	1	Maintenance and Use of Lead-based Paint Burning of Building	• Total recoverable As, Cd, Cr, Cu, Pb, Ni, Zn; and • Polycyclic–Aromatic Hydrocarbons
ASB03	0.0-0.15m	1	Demolition/Burning of Historic or Current Structures Potentially Containing Asbestos & Potentially Asbestos Containing Materials Intermixed with the Site Soils	• Semi-quantitative Asbestos in Soil (NZ Guidelines).

In addition, six test pits (TP01-TP06) were completed to a maximum depth of 2.3m below ground level (bgl). The test pits were inspected for visual and olfactory evidence of contamination and were photographed and logged in accordance with NZ Geotechnical Society Guidelines.

One representative sample was collected from four test locations at varying depths, and was sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 6 below.

Table 6: Test Pit Sample Analysis Information: 508 Old Wairoa Road, Ardmore

Sample ID	Sample Depth	HAIL Activity	Analysis Suite
TP01 0.0-0.5m	0.0-0.5m	Potentially Uncertified Filling	• Total recoverable As, Cd, Cr, Cu, Pb, Ni & Zn; • Organochlorine Pesticides; • Polycyclic-Aromatic Hydrocarbons; and • Semi-quantitative Asbestos in Soil (NZ Guidelines).
TP02 0.5-1.0m	0.5-1.0m		
TP03 1.5-2.0m	1.5-2.0m		
TP05 1.0-1.5m	1.0-1.5m		

Furthermore, four hand augers (HA01-HA04) were completed to a maximum depth of 1.0m below ground level (bgl). The hand auger location was inspected for visual and olfactory evidence of contamination and were photographed and logged in accordance with NZ Geotechnical Society Guidelines.

One representative sample was collected from each hand auger location, and was sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 7 below.

Table 7: Hand Auger Sample Analysis Information: 508 Old Wairoa Road, Ardmore

Sample ID	Sample Depth	HAIL Activity	Analysis Suite
HA01 0.5m	0.5m	Potentially Uncertified Filling	• Total recoverable As, Cd, Cr, Cu, Pb, Ni & Zn; • Organochlorine Pesticides; • Polycyclic-Aromatic Hydrocarbons; and • Semi-quantitative Asbestos in Soil (NZ Guidelines).
HA02 SUR	SUR		
HA03 0.5m	0.5m		
HA04 0.2m	0.2m		

One bulk material sample was collected from PACM building materials identified in contact with the site soils. The sample was sent under full chain of custody documentation to an IANZ accredited laboratory. Sampling and Analysis information is provided in Table 8 below.

Table 8: Bulk Material Sample Analysis Information: 508 Old Wairoa Road, Ardmore

Sample ID	No. of Samples	HAIL Activity	Analysis Suite
PACM03	1	Demolition/Burning of Historic or Current Structures Potentially Containing Asbestos & Potentially Asbestos Containing Materials Intermixed with the Site Soils	• Asbestos in Bulk Materials (Presence/Absence)

Furthermore, a visual inspection for ACM was undertaken at each test pit and hand auger location. The visual inspection was undertaken in accordance with the 'New Zealand Guidelines for Assessing and Manging Asbestos in Soil' (BRANZ Limited, 2017).

The hand auger logs and photographs are attached as Appendix D.

The sample location plan is presented as Figure 3.

11.0 Field Sampling Quality Assurance

All sampling implements were triple washed between samples using clean tap water, followed by a solution of laboratory grade phosphate free detergent (Decon 90), and a final rinse with clean water.

Clean, nitrile gloves were worn when handling each sample. Samples were stored in laboratory cleaned glass jars or laboratory supplied 500ml plastic containers and immediately placed in an iced cooler. The samples were transported under chain of custody documentation to an IANZ accredited laboratory for analysis.

12.0 Laboratory Quality Assurance

Routine laboratory quality assurance procedures include analysis of laboratory blanks and spiked samples. All analyses were carried out using industry standard methods as follows:

- Total Recoverable Metals – Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICPMS screen level, interference removal by Kinetic Energy Discrimination if required.
- Organo-chlorine Pesticides – Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.
- Polycyclic Aromatic Hydrocarbons – Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.
- Asbestos in Bulk Materials - Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.
- Semi–quantitative Asbestos in Soil – Calculated from weight of fibrous asbestos plus asbestos fines (AF/FA) and the weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.

13.0 Basis for Guideline Values

If developed, it is proposed that the site will be developed for residential land use, therefore the guideline values of the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use (10% produce consumption), as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES), and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP) are considered relevant and have been adopted as the site assessment criteria.

In addition, as the NES does not contain a reference value for asbestos in soil, in accordance with the hierarchy described in the Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011), the soil guideline value for asbestos in New Zealand for residential land use, taken from the New Zealand Guidelines for Assessing and Manging Asbestos in Soil (BRANZ Limited, 2017) of 0.001% combined fibrous asbestos and asbestos fines (FA/AF) and/or 0.01% asbestos containing material (ACM) has been adopted as the site assessment criteria.

Furthermore, due to the underlying geology at the site, the concentrations of heavy metals detected will be compared to the maximum background levels for non-volcanic soils in Auckland[2] (TP153). The relevant values of the above guidelines have been reproduced in Table 9 below.

Table 9: Site Assessment Criteria: 508 Old Wairoa Road, Ardmore (mg/kg)

Parameter	NES ($SCSs_{(health)}$)	AUP: OP	TP153 (Non-Volcanic)
Arsenic	20	100	12
Cadmium	3	7.5	0.65
Chromium	460	400	55
Copper	NL	325	45
Lead	210	250	65
Nickel	400[1]	105	35
Zinc	7400[1]	400	180
BaP eq.	10	20	-
Total DDT	70	12	-
Dieldrin	2.6	0.5[2]	-
Asbestos (AF/FA)	0.001%[3]/0.01%[4]	-	-
Visual ACM	No Visual Evidence of ACM[5]	-	-

Note: NL = Not Limited. This is where the derived values exceed 10,000mg/kg; 1. = No Soil Contaminant Standards for health ($SCSs_{(health)}$) given, guideline values derived in accordance with the Contaminated Land Management Guidelines number 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011), and taken from the National Environment Protection (Assessment of Site Contamination)

[2] Background Concentrations of Inorganic Elements in Soils from the Auckland Region, Technical Publication No.153, Auckland Regional Council, 2001.

Measure 1999 for Low Density Residential land use, 2 = Soil Guideline Values to protect on-site ecological receptors taken from Ministry for the Environment Guidelines for Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites, November 2006.; 3 = Soil guideline values for asbestos in Soil of 0.001% combined fibrous asbestos and asbestos fines (FA/AF), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 4 = Soil guideline values for asbestos in Soil of 0.01% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 5= No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

Furthermore, the natural background levels of organo-chlorine pesticides, polycyclic aromatic hydrocarbons and asbestos (visual evidence, AF & FA) are considered to be below the analytical levels of detection and hence the detection of these analytes would restrict material from being classified as cleanfill material.

14.0 Quality Control

14.1 Laboratory Verification

One sample (HA01 0.5m) was selected at random for duplicate analysis and Relative Percentage Difference (RPD) calculations. In accordance with the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021) an RPD value of less than 30-50% is generally considered acceptable. If the results were below the laboratory detection limits the RPD was not calculated. The results of the RPD analysis are presented in Table 10 below.

Table 10: RPD Summary: 508 Old Wairoa Road, Ardmore

Parameter	HA01 0.5m
Arsenic	0.00
Cadmium	5.00
Chromium	6.45
Copper	12.24
Lead	3.77
Nickel	0.00
Zinc	5.8

Note: Results in *Italics* exceed 30% RPD. Results in red exceed 50% RPD.

The RPD values calculated for all the analytes were less than the acceptable range. Therefore, based on the results of the RPD analysis, the sample results are likely to be relatively consistent and repeatable.

The RPD calculations are presented as Appendix E.

15.0 Soil Sampling Results

Tabulated soil sampling results are presented in Tables 11 - 15 below and laboratory transcripts are provided in Appendix F.

15.1 Heavy Metals

Table 11: Heavy Metals Results: 508 Old Wairoa Road, Ardmore (mg/kg).

Sample	As	Cd	Cr	Cu	Pb	Ni	Zn
Pb01	-	-	-	-	*124*	-	-
Pb02	-	-	-	-	***510***	-	-
Pb05	*43*	*0.67*	*56*	*98*	***10,400***	10	***1,740***
Pb10	-	-	-	-	***1,430***	-	-
Pb11	-	-	-	-	***360***	-	-
HB05	-	-	-	-	***300***	-	-
SR01	*54*	-	-	45	46	-	-
SR02	6	-	-	32	29	-	-
HA01 0.5m	*13*	0.39	16	23	26	6	134
HA02 SUR	8	0.37	14	25	40	9	*250*
HA03 0.5m	2	0.21	8	5	9.5	3	43
HA04 0.2m	<2	<0.10	4	<2	5.0	<2	6
TP01 0.0-0.5m	***107***	*1.33*	*99*	*200*	*163*	*41*	***550***
TP02 0.5-1.0m	*14*	*1.41*	*96*	*118*	*160*	*74*	***2,400***
TP03 1.5-2.0m	*26*	0.19	21	36	32	33	94
TP05 1.0-1.5m	*13*	0.41	18	39	45	14	*250*

Note: Results in red exceed the Soil Contaminant Standards for health ($SCS_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the AUP: OP. Results in *Italics* exceed the maximum Auckland background concentrations for non-volcanic soils outlined in the Auckland Regional Council Technical Publication No.153, Oct 2001.

Concentrations of arsenic detected in samples Pb05, SR01, HA01 0.5m, TP01 0.0-0.5m, TP02 0.5-1.0m, TP03 1.5-2.0m and TP05 1.0-1.5m exceeded the maximum Auckland background concentrations for non-volcanic soils. In addition, the concentrations of arsenic detected in samples Pb05, SR01, TP01 0.0-0.5m and TP03 1.5-2.0m the $SCS_{(health)}$ for residential land use. The concentrations of arsenic detected in TP01 0.0-0.5m exceeded the discharge criteria as outlined in the AUP: OP.

With the exception of Pb05, TP01 0.0-0.5m and TP02 0.5-1.0m, the concentrations of cadmium, chromium and copper detected in all samples analysed were below the maximum Auckland background concentrations for non-volcanic soils.

Concentrations of lead detected in samples Pb01, Pb02, Pb05, Pb10, Pb11, HB05, TP01 0.0-0.5m and TP02 0.5-1.0m exceeded the maximum Auckland background concentrations for non-volcanic soils. In addition, the concentrations of lead detected in samples Pb02,

Pb05, Pb10 & HB05 were elevated above the $SCSs_{(health)}$ for residential land use and the discharge criteria as outlined in the AUP: OP. It should be noted that the concentrations of lead detected in sample Pb10 also exceeded the $SCSs_{(health)}$ for commercial/industrial worker.

With the exception of TP01 0.0-0.5m and TP02 0.5-1.0m, the concentration of nickel detected in all samples were below the maximum Auckland background concentrations for non-volcanic soils.

Concentrations of zinc detected in samples Pb05, HA02 SUR, TP01 0.0-0.5m, TP02 0.5-1.0m and TP05 1.0-1.5m exceeded the maximum Auckland background concentrations for non-volcanic soils. In addition, the concentrations of zinc detected in samples Pb05 and TP02 0.5-1.0m were elevated above the discharge criteria as outlined in the AUP: OP.

15.2 Organochlorine Pesticides

Table 12: Organochlorine Pesticide Results: 508 Old Wairoa Road, Ardmore (mg/kg).

Sample	Total DDT	Dieldrin
SR01	<0.07	<0.011
SR02	<0.08	<0.013
HA01 0.5m	<0.07	<0.012
HA02 SUR	<0.07	<0.012
HA03 0.5m	<0.07	<0.012
HA04 0.2m	<0.07	<0.011
TP01 0.0-0.5m	<0.08	<0.013
TP02 0.5-1.0m	<0.09	<0.014
TP03 1.5-2.0m	<0.08	*0.064*
TP05 1.0-1.5m	<0.08	<0.014

Note: * = Residual levels of contaminants detected. Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

With the exception of soil sample TP03 1.5-2.0, the concentrations of organo-chlorine pesticides detected were below the analytical limit of detection and therefore below the cleanfill criteria.

The concentrations of organo-chlorine pesticides in all samples analysed were below the $SCSs_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

15.3 Polycyclic Aromatic Hydrocarbons

Table 13: Polycyclic Aromatic Hydrocarbon Results: 508 Old Wairoa Road, Ardmore (mg/kg).

Sample	BaP eq.
HA01 0.5m	*0.03*
HA02 SUR	*0.04*
HA03 0.5m	<0.03
HA04 0.2m	<0.03
TP01 0.0-0.5m	*0.09*
TP02 0.5-1.0m	*0.22*
TP03 1.5-2.0m	*0.04*
TP05 1.0-1.5m	*2.1*

Note: * = Residual levels of contaminants detected. Results in red exceed the Soil Contaminant Standards for health ($SCSs_{(health)}$) for residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

With the exception of soil samples HA03 0.5m and HA04 0.2m, low-level concentrations of polycyclic-aromatic hydrocarbons were detected in all soil samples analysed, therefore exceeding the cleanfill criteria.

The concentrations of polycyclic-aromatic hydrocarbons detected in all samples analysed were below the $SCSs_{(health)}$ for residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

15.4 Asbestos

Table 14: Asbestos in Soil Results: 508 Old Wairoa Road, Ardmore (Semi-Quantitative, %)

Sample	Asbestos Type	Asbestos (FA/AF %)	Asbestos (% ACM)
ASB03	Asbestos NOT Detected	<0.001	<0.001
HB05	Asbestos NOT Detected	<0.001	<0.001
HA01 0.5m	Asbestos NOT Detected	<0.001	<0.001
HA02 SUR	Asbestos NOT Detected	<0.001	<0.001
HA03 0.5m	Asbestos NOT Detected	<0.001	<0.001
HA04 0.2m	Asbestos NOT Detected	<0.001	<0.001
TP01 0.0-0.5m	Asbestos NOT Detected	<0.001	<0.001
TP02 0.5-1.0m	*Chrysotile (White Asbestos) Detected*	<0.001	*0.033*
TP03 1.5-2.0m	*Chrysotile (White Asbestos) Detected*	*0.038*	<0.001
TP05 1.0-1.5m	*Amosite (Brown Asbestos) and Chrysotile (White Asbestos) Detected*	*0.031*	<0.001

Note: * - denotes residual concentrations detected. Results in red exceed the adopted human health criteria. Results in *Italics* exceed the cleanfill criteria.

Excluding samples TP02 0.5-1.0m, TP03 1.5-2.0m & TP05 1.0-1.5m, the concentrations of asbestos detected in all of the samples analysed were below the analytical limit of detection and therefore below the clean fill criteria and the adopted human health criteria.

The concentration of asbestos fibres detected in soil samples TP02 0.5-1.0m, TP03 1.5-2.0m & TP05 1.0-1.5m were elevated above the adopted human health criteria.

Table 15: Asbestos in Bulk Materials Results: 508 Old Wairoa Road, Ardmore

Sample	Asbestos Type
PACM03	*Chrysotile (White Asbestos) Detected*

Results in red exceed the adopted human health criteria.

Asbestos was detected in the material sample (PACM03) sent for analysis.

In addition, visual evidence of asbestos was identified surrounding the burnt shed.

16.0 Extent of Contamination

The results of the sample analysis indicate that the site soils in localised areas of the site contain concentrations of contaminants above the $SCSs_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, zinc and asbestos (AF/FA, w/w bonded ACM and visual evidence) fibres above the adopted human health criteria. Furthermore, concentrations of heavy metals were detected in exceedance of the $SCSs_{(health)}$ for commercial/industrial outdoor worker and therefore may pose a short-term risk to site workers.

Surface samples Pb10 and Pb11, taken from the soils surrounding the dwelling in the southern portion of the site contain concentrations of lead elevated above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 1).

Surface sample Pb02, taken from the vicinity of the shed in the southern portion of the site contained concentrations of lead elevated above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 2).

Surface sample HB05, taken from the vicinity of the historic building in the southern portion of the site contained concentrations of lead elevated above the above the $SCSs_{(health)}$ for residential land use, and the discharge criteria as outlined in the AUP: OP (Area 3).

Surface sample SR01, taken from the vicinity of the potential spray race operations at the site contained concentrations of arsenic elevated above the $SCSs_{(health)}$ for residential land use (Area 4).

Surface sample Pb05, taken from the vicinity of the burnt shed onsite contained concentrations of lead and arsenic elevated above the $SCSs_{(health)}$ for residential land use, and concentrations of lead and zinc elevated above the discharge criteria as outlined in the AUP: OP. Furthermore, the material sample PACM03, taken from this area was identified to contain asbestos (Area 5). It should be noted that concentrations of lead were also detected in this area elevated above the $SCSs_{(health)}$ for a commercial/industrial outdoor worker.

Test pit samples TP01 0.0-0.5, TP02 0.5-1.0m and TP03 1.5-2.0m, taken from the area of uncertified filling contained concentrations of arsenic elevated above the $SCSs_{(health)}$ for residential land use, concentrations of arsenic and zinc elevated above the discharge criteria as outlined in the AUP: OP, and concentrations of asbestos fibres above the adopted human health criteria (Area 6). It should be noted that concentrations of arsenic were also detected in the area of samples location TP01 0.0-0.5 elevated above the $SCSs_{(health)}$ for a commercial/industrial outdoor worker.

The estimated volume required to remove the contaminated soils from the site is presented in Table 16 below.

Table 16: Extent of Contamination: 508 Old Wairoa Road, Ardmore.

Location	Area (m2)	Depth (m)	Contaminant	Quantity (m^3)
Area 1	254	0.3	Pb	76.2
Area 2	96	0.3	Pb	28.8
Area 3	52	0.3	Pb	15.6
Area 4	240	0.3	As	72
Area 5	227	0.3	As, Pb, Zn & Visual ACM	68.1
Area 6	3,020	2.3	As, Zn & Asbestos	6,946
Total Volume				7,206.7
Total Tonnes (m^3 x 1.5)				**10,810.1 T**

The inferred extent of the contaminated soil at the site is presented in Figure 4. This estimate is based on the sampling and results available following the site investigation and it should be noted that the volume may increase or decrease following inspection and validation sampling.

The estimated area requiring a hand pick to remove the ACM from Area 5 is based on the visual observations made during the site investigation and it should be noted that this area may increase or decrease during the removal process.

Due to the elevated concentrations of contaminants outlined above (Areas 1 – 6), these areas of the site are unsuitable for development for residential land use without suitable remediation works, which may include onsite management.

All contaminated materials, including the stockpiled refuse materials removed from site will require disposal at a suitably licensed landfill facility. In addition, due to the concentrations of heavy metals detected, the selected disposal facility may require TCLP analysis prior to acceptance. if the results exceed the TCLP waste criteria, then disposal at a special waste facility may be required.

In addition, due to the low-level contamination identified within localised areas outside of the remediation areas of the site, these soils are not suitable for classification as cleanfill. It is considered that these soils with low-level contamination are suitable for retention and re-use onsite, however, if removed from site then these will require disposal to a suitably licensed managed fill facility, unless further sampling and analysis demonstrate otherwise.

17.0 Revised Conceptual Model of Exposure Pathways

The revised conceptual site model provided in Table 17 below expands on the potential sources of contamination (as identified above), following sampling and analysis, and exposure pathways and was based on the potential effects of the proposed subdivision, change of use and soil disturbance activities on human health and the environment.

Table 17: Revised Conceptual Site Model: 508 Old Wairoa Road, Ardmore.

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Management required during remediation
	Ingestion of Contaminated Soils	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Management required during remediation
	Inhalation of Vapours/Fibres	Human Health – Residential Land Use	Potentially Complete: Remediation or management of the contaminated area required.
		Human Health – Commercial/Industrial Outdoor Worker	Potentially Complete: Remediation or management of the contaminated area required.
	Surface Water Run-off	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Remediation or management of the contaminated area required.
	Migration of Groundwater	Ecological Receptors - Artificial Drainage Channel	Potentially Complete: Remediation or management of the contaminated area required.

18.0 Regulatory Requirements

18.1 The National Environmental Standard

Due to the potentially contaminating land uses identified above, it is considered that an activity described in the HAIL is being, has been, or is more likely than not to have been undertaken at the site.

Resource Consent will therefore likely be required for the site under the District Plan, following the introduction of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

In reference to the NES the following assessment was made in determining the activity status of the proposed works:

- The land is covered by the NES under regulation 5.7(b) 'an activity or industry described in the HAIL has been undertaken on it'.
- The activity is changing the use of a piece of land under regulation 5(6) 'means changing it to a use that, because the land is described in subclause (7), is reasonably likely to harm human health'.
- The activity is subdividing land under regulation 5(5)(c) 'means subdividing land that has part if the piece of land within its boundaries'.
- The activity of changing use and subdivision does not comply with regulation 8(4).
- The activity is disturbing soil under regulation 5(4)(a) 'means disturbing the soil of the piece of land for a particular purpose'.
- The activity is unlikely to comply with regulation 8(3)(c) 'the volume of the disturbance of the soil of the piece of land must be no more than 25m^3 per 500m^2' and '…a maximum of 5 m^3 per 500 m^2 of soil may be taken away'.
- A detailed site investigation for the piece of land does exist.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

18.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules must be considered.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being 7,134.7m^3, which is above 200 m^3, it is considered that the proposed remediation will not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP will be required.

It should be noted that a potential remedial strategy for the site is to encapsulate the contaminated materials identified onsite within a purpose-built encapsulation cell. In the

event that onsite encapsulation is the preferred remedial option, Auckland Council will likely require a long-term discharge consent and an appropriate long-term site monitoring and management plan, outlining details of those measures proposed to mitigate the potential ongoing effects associated with the contamination identified at the site.

19.0 Remediation Action Plan

Following consultation with the client, the preferred remedial and/or onsite management approach will be adopted. The advantages and disadvantages of the remediation options will be considered, including: costs, feasibility, engineering requirements, extent of contamination, proven effectiveness, project timeframe and future land use.

The goal of remediation and/or site management is to reduce to an acceptable level the potential risk associated with the presence of asbestos, and elevated arsenic, lead and zinc concentrations to human health and the environment, as well as to assist with controlling disposal costs within the project.

A summary of the remedial options is detailed in Section 19 below.

Due to the concentration of asbestos fibres identified in the site soils, in accordance with the New Zealand Guidelines for Assessing and Manging Asbestos in Soil (BRANZ Limited, 2017), the soils within Area 6 and the visual evidence of asbestos within Area 5 will require removal by a Class B licensed asbestos removalist.

This Remediation Action Plan & Assessment of Environmental Effects (RAP & AEE) provides the soil specific management controls to be implemented at the site to ensure that any adverse effects on human health, as a result of the removal of asbestos and the heavy metal contaminated soils identified at the site, will be effectively mitigated.

It is therefore considered that this RAP & AEE meets the requirements of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

In order to meet the requirements of the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016), it is recommended that the selected contractor incorporates the procedures set out in this RAP & AEE into site-specific asbestos removal control plan (ARCP) and that the works are carried out in accordance with the Approved Code of Practice for the Management, Removal of Asbestos (WorkSafe New Zealand, 2016).

Following the removal of any asbestos contaminated soils or ACM, a certificate of clearance is to be produced by a suitably licensed asbestos assessor or competent person.

Should any ACM be discovered during any future works, its removal from the site shall be conducted in accordance with the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016) and the Approved Code of Practice for the Management and Removal of Asbestos (WorkSafe New Zealand, 2016).

19.1 Remediation Criteria

The objectives for the remediation of the site are to remediate the affected soils to levels below the applicable guideline values (as specified in Table 10) to address the immediate human health and environmental concerns at the site. Remediation of the site in the areas shown in Figure 4 will be necessary to achieve compliance with the below guidelines.

The remediation strategy for the site will involve the machine excavation and loading of the affected site soils prior to transport and disposal, or on-site management/encapsulation. The site will then be subject to a process of validation whereby the remaining soils will be sampled to confirm that the objectives of the remediation for the site have been achieved.

The remediation criteria for the site are presented in Tables 18 - 21 below.

Table 18: Remediation criterion for Area 1, 2 & 3 – 508 Old Wairoa Road, Ardmore (mg/kg).

Parameter	Value
Lead	210

Table 19: Remediation criterion for Area 4 – 508 Old Wairoa Road, Ardmore (mg/kg).

Parameter	Value
Arsenic	20

Table 20: Remediation criteria for Area 5 – 508 Old Wairoa Road, Ardmore (mg/kg).

Parameter	Value
Arsenic	20
Lead	210
Zinc	400
Asbestos	No visible evidence of asbestos on surface soil[1]

1 = No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

Table 21: Remediation criteria for Area 6 – 508 Old Wairoa Road, Ardmore (mg/kg).

Parameter	Value
Arsenic	20
Zinc	400
Asbestos	<0.001%[1]/0.01%[2]
	No visible evidence of asbestos on surface soil[3]

1 = Soil guideline values for asbestos in Soil of 0.001% combined fibrous asbestos and asbestos fines (FA/AF), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited,

2017); 2 = Soil guideline values for asbestos in Soil of 0.01% asbestos containing material (ACM), taken from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017); 3 = No visual evidence of asbestos containing material in the upper 0.1m of soil in accordance with New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ Limited, 2017).

As stated above, the remediation of the asbestos contaminated soils in Areas 5 & 6 is required to be undertaken under the supervision of a Class B licensed asbestos removalist. It is recommended that a licensed asbestos removalist is present for the duration of the removal works to ensure that the procedures outlined in this plan and the ARCP are adhered to in order to mitigate the potential effects on human health.

In addition, given that fragments of ACM were observed in contact with the site soils within Area 5, it is recommended that a hand pick of these fragments is completed by a suitably licensed asbestos removalist, followed by inspection and visual clearance by a third party licensed asbestos assessor or competent person.

Following the removal of the asbestos containing soils (Area 6) and the visual evidence of asbestos within Area 5, a clearance certificate will be obtained by a licensed asbestos assessor or competent person.

19.2 Management Areas

Low-level contamination was detected in two areas of the site. Concentrations of heavy metals were detected in both areas in exceedance of natural background concentrations, along with concentrations of polycyclic aromatic hydrocarbons also in exceedance of natural background concentrations were detected in one location.

The approximate areas requiring management during development works are shown in Table 22 below.

Table 22: Management Areas – 508 Old Wairoa Road, Ardmore (mg/kg).

Location	Area (m^2)	Depth (m)	Contaminant	Quantity (m^3)
Management Area 1	2,121	0.5	As, Zn & PAH's	1,060.5
Management Area 2	60	0.3	Pb	18
Total Volume				1,078.5
Total Tonnes (m^3 x 1.5)				1,617.8

The inferred extent of the areas requiring management is shown in Figure 5.

20.0 Remedial Options

20.1 Onsite Encapsulation

Encapsulation of contaminated material is considered an appropriate remedial methodology to break complete pathways between contamination and receptors.

Cover systems can comprise hard standing, landscaping or soils. Where landscaping or soft soils are used as a capping system, a capillary break layer is required which should be overlain by various depths/types of fill material. These layers work in unison to form the cover system.

The main function of an engineered cover system should be to provide a safe and permanent barrier between any significant levels of buried contamination and site users.

In order to allow for the development of the site, with the onsite encapsulation of contaminated soils, the site will require an impermeable cap and will require engineering to prevent on-going discharges from the site. It is recommended that the designated encapsulation area is constructed outside of the residential development areas and preferably within an onsite recreational or commercial land use setting.

The minimum capping requirements for the encapsulated material is presented in Section 19.6 below.

In addition, the cap needs to be formed at a grade that sheds water effectively, with any planting being restricted to shallow rooting species and require minimal maintenance, and to help prevent erosion.

Where shrubs and trees are planned, the depth of the cover should extend to 900mm. For further information refer to '*CIRIA 1996: Remedial Methods for Contaminated Land. Volume V1 Containment and Hydraulic Measures Special Publication 106'*

20.2 Offsite Disposal

In the event that encapsulation is not the selected remedial option, and in order to allow for the development of the site to not be restricted by contamination issues and any associated ongoing consenting requirements, the site soils (Area 1 – 6) may require excavation and offsite disposal, with the underlying soils being subject to a process of validation.

The inferred extent of the contaminated soil potentially requiring off-site disposal is 7,206.7 m^3.

It should be noted that this estimate is based on the information available at the time of writing and may increase or decrease following any further investigation and/or the validation process.

21.0 Remediation Processes

21.1 Work Programme

It is considered that the health & safety and environmental controls, as detailed below, will be sufficient to ensure that any adverse human health and/or environmental effects, as a result of the contaminated soils identified at the site, will be effectively mitigated.

A contractor experienced in remediation of contaminated sites will undertake the earthworks, excavation & disposal of contaminated soils at the site.

The contractor will:

- Prior to works occurring, install a fenced buffer where possible surrounding each inferred area of contamination.
- Prepare a site-specific Asbestos Removal Control Plan and notify WorkSafe of the remediation of the asbestos contaminated soils and asbestos containing materials (Areas 5 & 6)
- Provide adequate Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE) to all staff involved in the removal works.
- Install facilities on site which include a clean area for staff, a decontamination unit and washing facilities.
- Connect a water source and/or misting system to control any dusts that may be generated as a result of the works. This misting system must be capable of reaching all areas of the site during the ground-breaking works.
- Engage a third-party asbestos assessor and complete representative asbestos fibre monitoring during the remedial works in remediation Area 6.
- Install sediment and erosion controls for the works in accordance with industry best practice (Auckland Council's Erosion and Sediment Control Guide for Land Disturbing Activities[3].
- Ensure that the soils within Area 6 are sufficiently wet prior to starting works.
- Remove all visual evidence of ACM from Area 5.
- Machine excavate the contaminated soils from the site and load the materials onto waiting trucks.
- If removed off-site, asbestos contaminated soils will be loaded into trucks lined with 200µm heavy-gauge polythene and wrapped.
- Ensure that the trucks leaving the site have their contents wrapped, are fitted with close fitting tarpaulins and have sealed tailgates.
- Once the trucks have been inspected to ensure that the tarpaulins are properly fitted and the tires are free from any soil materials, transport contaminated soils to a suitable disposal location and retain any weighbridge dockets obtained.
- Obtain certificate of clearance by a suitably licensed asbestos assessor or a competent person for the areas of asbestos contaminated soils.

[3] Auckland Council, Erosion & Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Guideline Document 2016/005.

- Carry out the validation process and undertake any further remedial works required to achieve the remediation goals.
- Prior to plant being removed from the asbestos removal area, a visual assessment for the presence of asbestos, visible debris and soil shall be carried out by a qualified asbestos assessor and a clearance certificate issued.
- Once all contaminated soils have been removed and/or encapsulated onsite, clearance certificate obtained and the remediation goals achieved, then the site will be reinstated with clean fill materials if required and the site stabilized.

21.2 Establishment and Site Preparation

Prior to works commencing, the contractor should be familiar with this remediation action plan (RAP) which outlines all environmental and health & safety controls to be implemented when dealing with the contaminated soils.

No unauthorised access to the remedial areas will be allowed during removal of the contaminated soils. Access to the site and the contaminated materials will be restricted during the project.

In addition, the asbestos contaminated area of the site will be fenced off to enclose the work areas. No unauthorised access to the asbestos works areas (Area 5 & 6), will be allowed during the entirety of the works.

Appropriate warning signage shall be posted in visible locations during the works and surrounding the stockpile material. All visitors and contractors will sign in and out of the site each day during the removal of the asbestos containing soils.

21.3 Asbestos Fibre Monitoring

In order to confirm that the mitigation controls are sufficient in the areas of asbestos remediation (Area 6), asbestos fibre monitoring is recommended to confirm that asbestos in air is below trace level (0.01 f/ml).

Representative asbestos fibre monitoring shall be completed by a third-party asbestos assessor for at least one day during the works.

In the event that trace levels are exceeded, cease works, dampen, cover and fence off (barrier tape) the area of works and contact the Contaminated Land Specialist.

21.4 Excavation, Haulage & Disposal/Encapsulation of Materials

Excavation works will not commence at the site until all the environmental controls have been put in place. The exposed excavated areas will be kept to a minimum to minimise the risk of erosion due to storm water runoff. If required, misting systems will be used at the point of excavation and will be installed on the boundaries of the removal works area.

Excavation of asbestos contaminated soils will not over reach the bounds of wetting. Excavation will be conducted in lifts small enough to ensure that disturbed soil remains adequately wet and will be carried out a rate that matches the rate at which soil can be moved.

Where possible, the excavated materials requiring onsite encapsulation will be transported to the designated encapsulation area (preferable a recreational park or similar) and covered with heavy duty geotextile cloth.

The geotextile cloth will then be covered with the required hard cap material (concrete, tar seal, or similar), or minimum 500 mm of soft cap material (compacted clay or similar).

Following the completion of the encapsulation process, the encapsulation area will be surveyed and as-built drawings provided for inclusion in the site validation report.

Where possible, the excavated materials requiring off-site disposal will be loaded directly onto the removal trucks.

All trucks carting asbestos contaminated soils should be lined with 200µm heavy-gauge polythene. All trucks with asbestos contaminated soils (Area 6) will have their contents wrapped. The remaining soils containing residual asbestos may need to be wrapped depending on the receiving disposal facility.

All trucks will be fitted with close fitting tarpaulins and have sealed tailgates. All trucks will be inspected prior to leaving the loading area, to ensure that no loose contaminated materials leave the site. During loading wheel covers will be used where possible and any loose materials will be collected for later disposal.

All materials leaving the site will be disposed of to a suitably licensed disposal facility and will be tracked by way of weighbridge dockets which include the disposal location and the weight of the load.

21.5 Validation Sampling

Following the removal of the asbestos contaminated materials (Area 5 & 6), a clearance certificate will be produced by a suitably licensed asbestos assessor or a competent person. Following receipt of the clearance certificate, the base and sidewalls of the excavated area will be sampled by a suitably qualified and experienced practitioner and the soils analysed by an accredited laboratory to determine if the remediation works have been successful.

Site validation sampling for all remediation areas will be completed at a frequency sufficient to meet the requirements of the Contaminated Land Management Guidelines No. 5 (MfE, Revised 2021) by a suitably qualified and experienced contaminated land professional.

The proposed validation sampling plan is shown in Figure 6 attached.

The clearance certificate and the results of all validation sampling will be included in the site validation report.

21.6 Clean Fill Validation (If required)

Any materials imported onto the site if required to reinstate the ground will have to be tested to ensure their suitability as clean fill materials. Imported materials are to be sampled at a rate of at least 1 sample per 500m^3 for heavy metals, polycyclic aromatic hydrocarbons, organochlorine pesticides and asbestos. Alternatively, dockets confirming that imported hardfill has been sourced from a commercial quarry may also be provided to Auckland Council in lieu of sampling. Any soil material imported to the site shall comply with the definition of 'cleanfill material', as per the AUP: OP.

All imported materials shall be sourced from a site which has been determined by a Suitably Qualified Contaminated Land Professional to have had no known history of potentially contaminating activities, as detailed on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL); or adequately investigated by a Suitably Qualified Contaminated Land Professional, in accordance with Contaminated Land Management Guidelines (Ministry for the Environment, 2011) to meet the 'Cleanfill material' definition as prescribed in the AUP: OP.

22.0 Assessment of Environmental Effects

The following sections deal with the potential adverse effects which could have a negative impact on the environment and/or human health as a result of the remediation project. If the controls outlined in this RAP are implemented during the works the effects on the environment are likely to be effectively mitigated.

The required site management controls are detailed below and include, but should not be limited to, the following: dust control, health and safety measures, stormwater, erosion and sediment control, odour control and contingency measures.

22.1 Dust Control

During the disturbance process, the area of asbestos contaminated soils (Area 6) should be adequately wet. Soil should have water applied at the point of contact. The excavator or other excavation equipment should handle the material wet.

A continuous water supply should be available at all times. The water source and/or misting system should be capable of applying water or a water mist directly to the materials to minimize dust and prevent fibre emissions. This misting system must be capable of reaching all areas of the remediation area during the ground-breaking works.

For areas of chemical contamination, if conditions are dry during the remedial works dust deposition could occur. Dust will be controlled in accordance with the Good Practice Guidelines for Assessing and Managing the Environmental Effects of Dust Emissions, Ministry for the Environment (2016). In order to mitigate against the effects of dust regular damping down of soil with a misting system may be required.

22.2 Health and Safety Measures

The level of asbestos specific PPE and RPE shall be determined by the asbestos removalist, however, in order to minimise the potential effects or the likelihood of cumulative effects, all personnel likely to come into contact with asbestos contaminated soils and materials (Area 5 & 6), shall be provided with and wear the following PPE at all times when working in the asbestos contaminated areas of the site:

- Disposable coveralls (Type 5);
- Half-face P3 respirator with particulate filter;
- Steel toe capped gumboots or safety footwear with disposable overshoes;
- Nitrile gloves (if handling any contaminated soils is required);
- Hard hat (if working around plant and excavators);
- Hearing protection (if required);
- Safety glasses (to be worn in particularly dry weather conditions); and
- Safety visibility vest

All meal breaks are to be taken in designated clean areas following appropriate decontamination.

For the areas of chemical contamination, in particular the areas where exceedance of the commercial/industrial outdoor worker were identified (Areas 5 & 6), it is considered that the level of soil contamination may present a short-term risk to site workers. However, in order to minimise the potential effects or the likelihood of cumulative effects, all personnel likely to come into contact with contaminated soils during works shall be provided with and it is recommended that they wear the following PPE at all times when working in these areas of the site:

- Coveralls (to be changed immediately if these become highly soiled);
- Dust masks (to be worn in particularly dry weather conditions);
- Approved safety footwear (rubber boots, work boots with toe protection);
- Gloves (if handling any contaminated soils is required);
- Hard hat (if working around plant and excavators);
- Hearing protection (if required);
- Safety glasses (to be worn in particularly dry weather conditions); and
- Safety visibility vest.

All meal breaks are to be taken in designated clean areas or off site, with all personnel washing their hands and mouth area prior to eating, drinking or smoking. Used PPE is to be doffed by all personnel before leaving the site.

22.3 Stormwater, Erosion & Sediment Control

Install sediment and erosion controls for the works in accordance with the Auckland Council's Erosion and Sediment Control Guide for Land Disturbing Activities[4].

Earthworks are not to be carried out during periods of significant rainfall. Excavation will be carried out a rate that matches the rate at which soil can be carted off the site. Any contaminated water generated by rainfall impacting on contaminated soils will be retained within the excavation.

It is not anticipated that stockpiling of soils will be required. If required, soil stockpiles will be covered by tarpaulins if left overnight, and when rain is anticipated during the working day. Tarpaulins will be anchored at the edges. As a general management strategy, the size of stockpiles will be kept to a minimum by ensuring that as far as possible, excavation is carried out a rate that matches the rate at which soil is carted off the site.

22.4 Odour Control

It is considered unlikely that nuisance odour will be an issue on site. However, in the event that there may be odorous materials encountered, where possible these will be loaded as soon as possible onto the removal trucks. If this is not possible the odorous material will be covered with non-odorous material prior to being loaded.

22.5 Contingency Measures

The following contingency measures have been developed to support the contractor should the underlying contamination conditions vary significantly from the conditions outlined following the site investigation.

If any unexpected materials are identified during the excavation process, which differ from previous observations, and the site soil assessment (i.e. odorous, unusually coloured), the contractor shall immediately contact the environmental specialist to inspect the material and provide advice for the safe handling and disposal of the material.

Visual and olfactory indicators of contamination include the following:

- Asbestos containing materials (ACM) (board, pipe, free fibres or fragments)
- Demolition debris (polystyrene, steel and timber)
- Refuse materials (other than concrete or brick)
- Odour (petroleum, oil, creosote, solvent, sulphur, landfill gas)
- Discoloured soil (black/green staining is most common)
- Incinerator ash (black coarse sand)
- Gasworks wastes (clinker – black gravel, blue billy, black tar)
- Harmful non Cleanfill materials

If any potential ACM or unexpected materials (other than what has already been noted) are identified during site works, the area shall immediately be fenced off (barrier tape) with a 2.0m buffer zone, photographs taken and the Contaminated Land Specialist

[4] Auckland Council, Erosion & Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Guideline Document 2016/005.

contacted. The Contaminated Land Specialist will then inspect the material and provide advice for the sampling and analysis, safe handling and disposal of the material.

Following the discovery of any unexpected materials, an environmental investigation is to be carried out in general accordance with the Contaminated Land Management Guidelines No. 1 and No. 5 (MfE, Revised 2021).

In the event that soils are found to contain concentrations of contaminants elevated above the relevant site acceptance criteria, the site soils will require remediation and subsequent validation.

All contaminated materials removed from site will require disposal at a suitably licensed disposal facility and site validation sampling is to be completed at a frequency sufficient to meet the requirements of the Contaminated Land Management Guidelines No.5 (MfE, Revised 2021).

In the event that asbestos containing materials (other than what has already been noted) are identified at the site, its removal from the site shall be conducted in accordance with the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016) and the Approved Code of Practice for the Management and Removal of Asbestos (WorkSafe New Zealand, 2016).

Following the removal of any ACM, a certificate of clearance is to be produced by a suitably licensed asbestos assessor.

If groundwater or surface water collects within the excavation during the works, this water shall be allowed to soak into the ground. Any perched groundwater, groundwater, or surface run-off encountered within the excavation area requiring removal shall be considered as potentially contaminated, and shall either be disposed of by a licensed liquid waste contractor, pumped to sewer, provided relevant permits have been obtained, or discharged to the stormwater system or surface waters provided testing demonstrates compliance with the Australian and New Zealand Environment Conservation Council (ANZECC) Guidelines for Fresh and Marine Water Quality (2000) for the protection of 95 percent of species.

In the event that unexpected materials are encountered at the site, Auckland Council are to be notified of the nature and extent of the contamination along and provided with details of the management procedures undertaken at the site.

22.6 Equipment Decontamination & Clearance

Following remediation of the asbestos contaminated soils and materials (Area 5 & 6), remove visible debris and soil from all plant, paying attention to the tracks and bucket of excavators.

Prior to plant being removed from the site, a visual assessment for the presence of asbestos, visible debris and soil shall be carried out by an independent assessor or competent person.

Cleaning procedures should be conducted in such a manner as to ensure that all residual soil and contaminants are safely removed and disposed of.

22.7 Site Validation Report

Following the proposed works, it is recommended that a site validation report is prepared. The site validation report should contain sufficient detail to address the following matters:

- A summary of the works undertaken including volume of soil removed from site;
- A summary of the air fibre and gas monitoring, along with any visual clearances, validation testing undertaken, including tabulated analytical results;
- Copies of the disposal dockets for the material removed from the site;
- Records of any unexpected contamination encountered during the works, if applicable; and
- A summary of any additional soil sampling undertaken, tabulated analytical results, and interpretation of the results in the context of the current contaminated land regulatory requirements.
- Details of any further management or monitoring requirements for the site.

23.0 Conclusions and Recommendations

This DSI, RAP & AEE has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No. 1 and No. 5 (Ministry for the Environment, Revised 2021).

The history of the site has been described in the report titled '*Preliminary Site Investigation, 508 Old Wairoa Road, Ardmore, Auckland*' dated December 2020 and prepared by Focus Environmental Services Limited (henceforth referred to as the "PSI").

In brief, due to the age of the current site buildings and demolished historical structures, the potential for ground contamination from the historic use of lead-based paints and asbestos containing materials was identified. Furthermore, potentially uncertified filling and spray race activities were also identified across the site.

In addition, dumping and the potential burning of refuse was observed.

An additional site inspection and walkover was undertaken to supplement the information provided in the PSI on the 25th of March 2021.

During the site inspection and walkover, visual evidence of PACM was observed intermixed with the site soils at what is now 85 Hamlin Road, and a structure was observed with extensive fire damage at the site. The soils in the areas of potential refuse burning identified as part of the PSI were inspected, however no evidence of burning was identified.

Due to the potential sources of contamination identified, it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the site inspection and walkover, the intrusive investigation was carried out by Focus Environmental Services Limited personnel where a total of nine discrete soil samples were collected from the areas of potentially contaminating activities across the site. In addition, six test pits and four hand augers were extended to a maximum depth of 2.3m and 1.0m below ground level (bgl) respectively, with representative samples obtained at varying depths.

The results of the sample analysis and investigation indicate that the site soils across the site are contaminated above the $SCS_{(health)}$ for residential land use as outlined in the NES and/or the discharge criteria of the AUP: OP for arsenic, lead, zinc and asbestos fibres. Furthermore, concentrations of heavy metals were detected in exceedance of the NES (SCS) for commercial/industrial worker, and therefore may pose a short-term risk to site workers.

Due to the elevated levels of contaminants detected, the site at 508 Old Wairoa Road, Ardmore will require remediation of the affected soils prior to being redeveloped. The estimated volume of soil requiring remediation is 7,206.7m^3. It should be noted that this volume may change during the remedial process.

Due to the volume of soil requiring remediation, a combination of offsite disposal and/or onsite management may be adopted as the remedial approach for the site.

A restricted discretionary consent is required under Regulation 10 of the NES as the proposed subdivision, change of use and soil disturbance are unlikely to meet the requirements of a permitted activity under Regulation 8 of the NES, and as this detailed site investigation for the piece of land has shown that the soil contamination does exceed the applicable standard for residential land use.

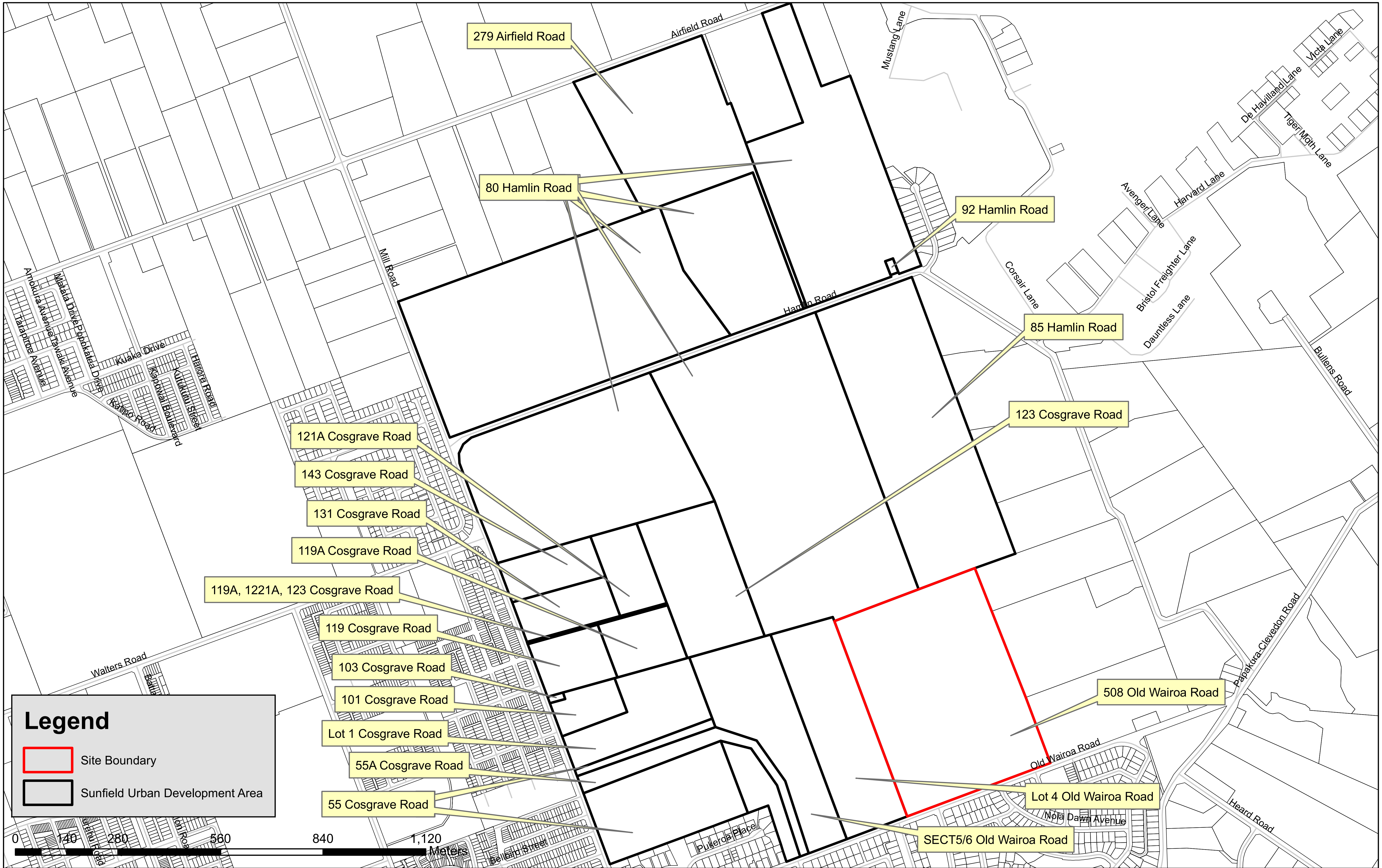
Due to the estimated volume of material containing concentrations of contaminants elevated above those values specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP being 7,134.7m^3, which is above 200 m^3, it is considered that the proposed remediation will likely not meet the permitted activity requirements under rule E30.6.1.2 of the AUP: OP and therefore resource consent under the AUP: OP will be required.

In addition, in the event that following the proposed development, concentrations of contaminants at levels elevated above the discharge criteria as outlined in the AUP: OP are to be encapsulated onsite, a long-term site monitoring and management plan and long-term discharge consent under rule E30.6.2.1 of the AUP: OP will likely be required.

The objective of this Remediation Action Plan is to ensure that the soils contaminated above the adopted site assessment criteria are handled, removed in a controlled manner, and disposed of to a suitable disposal location. All earthworks required as part of the remedial works should be carried out in accordance with this Remediation Action Plan.

An assessment of the effects which may occur as a result of the proposed works has been made in order to mitigate any potential adverse environmental and/or human health effects. If the controls outlined in this Remediation Action Plan are implemented during the works it is considered that the effects on the environment and human health are likely to be effectively mitigated.

Figures


279 Airfield Road
Airfield Road
Mustang Lane
Victa Lane
De Havilland Lane
Tiger Moth Lane
Harvard Lane
Avenger Lane
80 Hamlin Road
92 Hamlin Road
Corsair Lane
Bristol Freighter Lane
Dauntless Lane
Hamlin Road
Mill Road
85 Hamlin Road
Bullens Road
123 Cosgrave Road
Kuaka Drive
Amokura Avenue
Matata Drive
Popokatea Drive
Tataphrope Avenue
Tawaki Avenue
Kapuwai Boulevard
Kuluku Street
Karoro Road
Harore Road
Kaipo Road
121A Cosgrave Road
143 Cosgrave Road
131 Cosgrave Road
119A Cosgrave Road
119A, 1221A, 123 Cosgrave Road
119 Cosgrave Road
103 Cosgrave Road
101 Cosgrave Road
Lot 1 Cosgrave Road
55A Cosgrave Road
55 Cosgrave Road
Walters Road
Papakura-Clevedon Road
508 Old Wairoa Road
Old Wairoa Road
Lot 4 Old Wairoa Road
Nola Dawn Avenue
Heard Road
SECT5/6 Old Wairoa Road
Pukeroa Place
Bellbird Street
Legend
Site Boundary
Sunfield Urban Development Area
0
140
280
560
840
1,120
Meters

Focus Environmental Services Limited
PO Box 11455
Ellerslie
Auckland 1542

Ph: +64 9 579 4155
www.focusenvironmental.co.nz

Winton Land Limited
508 Old Wairoa Road
Sunfield Urban Development Area
Papakura
Auckland

Figure 1: Site Location Plan

DSI, RAP & AEE

N

1443.010 (R5)

Drawing Number: 1443.010.01

Drawn By: MT

Checked By: DO'R

Date: 20/12/2023

FOCUS ENVIRONMENTAL SERVICES LTD	Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 508 Old Wairoa Road Sunfield Urban Development Area Papakura Auckland	**Figure 2: Site Feature Plan** DSI, RAP & AEE	1443.010 (R5)	Drawing Number: 1443.010.02 Drawn By: MT Checked By: DO'R Date: 20/12/2023

Focus Environmental Services Limited
PO Box 11455
Ellerslie
Auckland 1542

Ph: +64 9 579 4155
www.focusenvironmental.co.nz

Winton Land Limited
508 Old Wairoa Road
Sunfield Urban Development Area
Papakura
Auckland

Figure 3: Sample Location Plan

DSI, RAP & AEE

	Drawing Number: 1443.010.03
	Drawn By: MT
1443.010 (R5)	Checked By: DO'R
	Date: 20/12/2023

Location	Area	Depth (m^2)	Contaminant	Quantity (m^3)
Area 1	254	0.3	Pb	76.2
Area 2	96	0.3	Pb	28.8
Area 3	52	0.3	Pb	15.6
Area 4	240	0.3	As	72
Area 5	227	0.3	As, Pb, Zn & Visual ACM	68.1
Area 6	3,020	2.3	As, Zn, Asbestos	6946
Total Volume (m^3)				7206.7
Total Tonnes (m^3 x 1.5)				**10810.1 t**

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Ellerslie
Auckland 1542

Ph: +64 9 579 4155
www.focusenvironmental.co.nz

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508 Old Wairoa Road
Sunfield Urban Development Area
Papakura
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Figure 4: Inferred Extent of Contamination

DSI, RAP & AEE

1443.010 (R5)

Drawing Number: 1443.010.04
Drawn By: MT
Checked By: DO'R
Date: 20/12/2023

Management Area 2

Management Area 1

Old Wairoa Road

Pakaraka Drive

Legend

Inferred Extent of Material Requiring Management

Site Boundary

Location	Area	Depth (m^2)	Contaminant	Quantity (m^3)
Management Area 1	2,121	0.5	As, Zn & PAH's	1060.5
Management Area 2	60	0.3	Pb	18
Total Volume (m^3)				1078.5
Total Tonnes (m^3 x 1.5)				**1617.8 t**

0 12.5 25 50 75 100 Meters

FOCUS ENVIRONMENTAL SERVICES LTD

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Ellerslie
Auckland 1542

Ph: +64 9 579 4155
www.focusenvironmental.co.nz

Winton Land Limited
508 Old Wairoa Road
Sunfield Urban Development Area
Papakura
Auckland

Figure 5: Inferred Extent of Material Requirng Management

DSI, RAP & AEE

1443.010 (R5)

Drawing Number: 1443.010.05

Drawn By: MT

Checked By: DO'R

Date: 20/12/2023

FOCUS ENVIRONMENTAL SERVICES LTD Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz	**Winton Land Limited** 508 Old Wairoa Road Sunfield Urban Development Area Papakura Auckland	**Figure 6: Inferred Extent of Contamination** DSI, RAP & AEE	N	Drawing Number: 1443.010.06 Drawn By: MT Checked By: DO'R Date: 20/12/2023
			1443.010 (R5)	

Appendices

Appendix A – Illustrative Masterplan

Appendix B – Environmental HAIL

Ministry for the Environment
Manatū Mō Te Taiao

Hazardous Activities and Industries List (HAIL)

October 2011

A Chemical manufacture, application and bulk storage

1. Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application
2. Chemical manufacture, formulation or bulk storage
3. Commercial analytical laboratory sites
4. Corrosives including formulation or bulk storage
5. Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents
6. Fertiliser manufacture or bulk storage
7. Gasworks including the manufacture of gas from coal or oil feedstocks
8. Livestock dip or spray race operations
9. Paint manufacture or formulation (excluding retail paint stores)
10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
11. Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application
12. Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides
13. Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground
14. Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges
15. Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)
16. Skin or wool processing including a tannery or fellmongery, or any other commercial facility for hide curing, drying, scouring or finishing or storing wool or leather products
17. Storage tanks or drums for fuel, chemicals or liquid waste
18. Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside

B Electrical and electronic works, power generation and transmission

1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)

2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment
3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices
4. Power stations, substations or switchyards

C Explosives and ordinances production, storage and use

1. Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging
2. Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors
3. Training areas set aside exclusively or primarily for the detonation of explosive ammunition

D Metal extraction, refining and reprocessing, storage and use

1. Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material
2. Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds
3. Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds
4. Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals
5. Engineering workshops with metal fabrication

E Mineral extraction, refining and reprocessing, storage and use

1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
2. Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)
3. Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process
4. Commercial concrete manufacture or commercial cement storage
5. Coal or coke yards
6. Hydrocarbon exploration or production including well sites or flare pits
7. Mining industries (excluding gravel extraction) including exposure of faces or release of groundwater containing hazardous contaminants, or the storage of hazardous wastes including waste dumps or dam tailings

F Vehicle refuelling, service and repair

1. Airports including fuel storage, workshops, washdown areas, or fire practice areas
2. Brake lining manufacturers, repairers or recyclers
3. Engine reconditioning workshops
4. Motor vehicle workshops
5. Port activities including dry docks or marine vessel maintenance facilities

6. Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas
7. Service stations including retail or commercial refuelling facilities
8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances

G Cemeteries and waste recycling, treatment and disposal

1. Cemeteries
2. Drum or tank reconditioning or recycling
3. Landfill sites
4. Scrap yards including automotive dismantling, wrecking or scrap metal yards
5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)
6. Waste recycling or waste or wastewater treatment

H Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

I Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment

Appendix C – Site Inspection Photographs

Site Inspection Photographs

508 Old Wairoa Road, Ardmore

by Focus Environmental Services Limited

Burnt Shed

Interior of Burnt Shed

Appendix D – Hand Auger Logs and Photographs

ENVIRONMENTAL BORELOG HA01 HA01

PROJECT NUMBER 1443.001.010	**DRILLING DATE** 25/03/2021	**COORDINATES** -
PROJECT NAME DSI, RAP & AEE	**DRILLING COMPANY** FES	**COORD SYS** NZTM
CLIENT Ardmore Developments Limited	**DRILLER** EDH	**SURFACE ELEVATION** -
ADDRESS 508 Old Wairoa Road, Ardmore	**DRILLING METHOD** Hand Auger	**LOGGED BY** JM
	TOTAL DEPTH 0.5 m	**CHECKED BY** DO'R

COMMENTS Refusal at 0.5m

Depth (m)	Graphic Log	Samples	Material Description	Additional Observations
		SUR	Brown SILT, intermixed coarse angular gravel, plastic inclusions	
		0.5m		
0.5			Termination Depth at: 0.5 m	

HA01

ENVIRONMENTAL BORELOG HA01 HA02

PROJECT NUMBER 1443.001.010	**DRILLING DATE** 25/03/2021	**COORDINATES** -
PROJECT NAME DSI, RAP & AEE	**DRILLING COMPANY** FES	**COORD SYS** NZTM
CLIENT Ardmore Developments Limited	**DRILLER** EDH	**SURFACE ELEVATION** -
ADDRESS 508 Old Wairoa Road, Ardmore	**DRILLING METHOD** Hand Auger	**LOGGED BY** JM
	TOTAL DEPTH 0.5 m	**CHECKED BY** DO'R

COMMENTS Refusal at 0.5m

Depth (m)	Graphic Log	Samples	Material Description	Additional Observations
		SUR	Brown SILT, intermixed coarse angular gravel, plastic inclusions	
		0.5m		
0.5			Termination Depth: 0.5m	

HA02

ENVIRONMENTAL BORELOG HA01 HA03

PROJECT NUMBER 1443.001.010	**DRILLING DATE** 25/03/2021	**COORDINATES** -
PROJECT NAME DSI, RAP & AEE	**DRILLING COMPANY** FES	**COORD SYS** NZTM
CLIENT Ardmore Developments Limited	**DRILLER** EDH	**SURFACE ELEVATION** -
ADDRESS 508 Old Wairoa Road, Ardmore	**DRILLING METHOD** Hand Auger	**LOGGED BY** JM
	TOTAL DEPTH 1.0 m	**CHECKED BY** DO'R

COMMENTS

Depth (m)	Graphic Log	Samples	Material Description	Additional Observations
		SUR	Brown SILT, intermixed fine gravel	
		0.5m		
0.5				
		0.75m	Orange/brown CLAY	
1			Termination Depth: 1.0m	

HA03

ENVIRONMENTAL BORELOG HA01 HA04

PROJECT NUMBER 1443.001.010	**DRILLING DATE** 25/03/2021	**COORDINATES** -
PROJECT NAME DSI, RAP & AEE	**DRILLING COMPANY** FES	**COORD SYS** NZTM
CLIENT Ardmore Developments Limited	**DRILLER** EDH	**SURFACE ELEVATION** -
ADDRESS 508 Old Wairoa Road, Ardmore	**DRILLING METHOD** Hand Auger	**LOGGED BY** JM
	TOTAL DEPTH 0.5 m	**CHECKED BY** DO'R

COMMENTS

Depth (m)	Graphic Log	Samples	Material Description	Additional Observations
		SUR	Brown TOPSOIL	
		0.2m	White fine SAND	
		0.4m	White Silty CLAY	
0.5			Termination Depth: 0.5m	

produced by ESlog.ESdat.net on 06 Apr 2021

HA04

Appendix E – RPD Calculations

RPD Calculations: 508 Old Wairoa Road, Ardmore

Parameter	HA01 0.5m	HA01 0.5m (DUP)	RPD (%)
Total Recoverable Arsenic	13	13	0.00
Total Recoverable Cadmium	0.39	0.41	5.00
Total Recoverable Chromium	16	15	6.45
Total Recoverable Copper	23	26	12.24
Total Recoverable Lead	26	27	3.77
Total Recoverable Nickel	6	6	0.00
Total Recoverable Zinc	134	142	5.80

Note: Results in *I talics* exceed 30% RPD. Results in red exceed 50% RPD

Appendix F – Laboratory Transcripts

Hill Laboratories
TRIED, TESTED AND TRUSTED

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

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2569615	SPv2.1
Contact:	Joseph McLay	**Date Received:**	27-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	27-Feb-2023	
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.010	
		Submitted By:	Joseph McLay	

Sample Type: Soil

Sample Name:		SR01 25-Mar-2021	SR02 25-Mar-2021	HB05 25-Mar-2021	Pb01 25-Mar-2021	Pb02 25-Mar-2021
Lab Number:		2569615.1	2569615.2	2569615.7	2569615.8	2569615.9
Individual Tests						
Dry Matter	g/100g as rcvd	89	77	-	-	-
Total Recoverable Arsenic	mg/kg dry wt	54	6	-	-	-
Total Recoverable Copper	mg/kg dry wt	45	32	-	-	-
Total Recoverable Lead	mg/kg dry wt	46	29	300	124	510
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
alpha-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
beta-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
delta-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.013	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.013	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	-	-	-
Dieldrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan I	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan II	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin ketone	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Heptachlor	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Methoxychlor	mg/kg dry wt	< 0.011	< 0.013	-	-	-

Sample Name:	~~Pb03~~ 25-Mar-2021	~~Pb09~~ 25-Mar-2021	Pb05 25-Mar-2021	HA01 0.5m 25-Mar-2021	HA02 SUR 25-Mar-2021
Lab Number:	2569615.10	2569615.15	2569615.16	2569615.17	2569615.18

Sample Type: Soil						
Sample Name:		~~Pb03~~ 25-Mar-2021	~~Pb09~~ 25-Mar-2021	Pb05 25-Mar-2021	HA01 0.5m 25-Mar-2021	HA02 SUR 25-Mar-2021
Lab Number:		2569615.10	2569615.15	2569615.16	2569615.17	2569615.18
Individual Tests						
Dry Matter	g/100g as rcvd	Sample not on site		86	87	86
Total Recoverable Lead	mg/kg dry wt			-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	43	13	8
Total Recoverable Cadmium	mg/kg dry wt	-	-	0.67	0.39	0.37
Total Recoverable Chromium	mg/kg dry wt	-	-	56	16	14
Total Recoverable Copper	mg/kg dry wt	-	-	98	23	25
Total Recoverable Lead	mg/kg dry wt	-	-	10,400	26	40
Total Recoverable Nickel	mg/kg dry wt	-	-	10	6	9
Total Recoverable Zinc	mg/kg dry wt	-	-	1,740	134	250
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	< 0.012	< 0.012
alpha-BHC	mg/kg dry wt	-	-	-	< 0.012	< 0.012
beta-BHC	mg/kg dry wt	-	-	-	< 0.012	< 0.012
delta-BHC	mg/kg dry wt	-	-	-	< 0.012	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.012	< 0.012
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.012	< 0.012
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.012	< 0.012
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.012	< 0.012
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.012	< 0.012
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.012	< 0.012
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.012	< 0.012
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.012	< 0.012
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Total DDT Isomers	mg/kg dry wt	-	-	-	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endosulfan I	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endosulfan II	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endrin	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Endrin ketone	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Heptachlor	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Methoxychlor	mg/kg dry wt	-	-	-	< 0.012	< 0.012
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	0.4	< 0.3	0.3
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Acenaphthylene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Acenaphthene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Anthracene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Benzo[a]anthracene	mg/kg dry wt	-	-	0.026	0.017	0.020
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	0.041	0.023	0.028
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	0.060	0.031	0.038
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	0.060	0.031	0.037
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	0.049	0.027	0.034
Benzo[e]pyrene	mg/kg dry wt	-	-	0.033	0.018	0.021
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	0.035	0.019	0.022
Benzo[k]fluoranthene	mg/kg dry wt	-	-	0.018	< 0.012	0.012
Chrysene	mg/kg dry wt	-	-	0.026	0.016	0.017

Sample Type: Soil						
Sample Name:		~~Pb03~~ 25-Mar-2021	~~Pb09~~ 25-Mar-2021	Pb05 25-Mar-2021	HA01 0.5m 25-Mar-2021	HA02 SUR 25-Mar-2021
Lab Number:		2569615.10	2569615.15	2569615.16	2569615.17	2569615.18
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Fluoranthene	mg/kg dry wt	-	-	0.045	0.036	0.047
Fluorene	mg/kg dry wt	-	-	< 0.012	< 0.012	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	0.033	0.020	0.022
Naphthalene	mg/kg dry wt	-	-	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt	-	-	< 0.012	0.012	< 0.012
Phenanthrene	mg/kg dry wt	-	-	< 0.012	0.015	0.022
Pyrene	mg/kg dry wt	-	-	0.051	0.038	0.045

Sample Name:		HA03 0.5m 25-Mar-2021	HA04 0.2m 25-Mar-2021	HA01 0.5m [Duplicate] 25-Mar-2021
Lab Number:		2569615.19	2569615.20	2569615.21
Individual Tests				
Dry Matter	g/100g as rcvd	86	90	-
Heavy Metals, Screen Level				
Total Recoverable Arsenic	mg/kg dry wt	2	< 2	13
Total Recoverable Cadmium	mg/kg dry wt	0.21	< 0.10	0.41
Total Recoverable Chromium	mg/kg dry wt	8	4	15
Total Recoverable Copper	mg/kg dry wt	5	< 2	26
Total Recoverable Lead	mg/kg dry wt	9.5	5.0	27
Total Recoverable Nickel	mg/kg dry wt	3	< 2	6
Total Recoverable Zinc	mg/kg dry wt	43	6	142
Organochlorine Pesticides Screening in Soil				
Aldrin	mg/kg dry wt	< 0.012	< 0.011	-
alpha-BHC	mg/kg dry wt	< 0.012	< 0.011	-
beta-BHC	mg/kg dry wt	< 0.012	< 0.011	-
delta-BHC	mg/kg dry wt	< 0.012	< 0.011	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.011	-
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.011	-
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.011	-
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.011	-
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.011	-
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.011	-
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.011	-
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.011	-
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.011	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	-
Dieldrin	mg/kg dry wt	< 0.012	< 0.011	-
Endosulfan I	mg/kg dry wt	< 0.012	< 0.011	-
Endosulfan II	mg/kg dry wt	< 0.012	< 0.011	-
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.011	-
Endrin	mg/kg dry wt	< 0.012	< 0.011	-
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.011	-
Endrin ketone	mg/kg dry wt	< 0.012	< 0.011	-
Heptachlor	mg/kg dry wt	< 0.012	< 0.011	-
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.011	-
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.011	-
Methoxychlor	mg/kg dry wt	< 0.012	< 0.011	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*				
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	-
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	-
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	-
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.011	-
Acenaphthene	mg/kg dry wt	< 0.012	< 0.011	-
Anthracene	mg/kg dry wt	< 0.012	< 0.011	-

Sample Type: Soil				
Sample Name:		HA03 0.5m 25-Mar-2021	HA04 0.2m 25-Mar-2021	HA01 0.5m [Duplicate] 25-Mar-2021
Lab Number:		2569615.19	2569615.20	2569615.21
Polycyclic Aromatic Hydrocarbons Screening in Soil*				
Benzo[a]anthracene	mg/kg dry wt	< 0.012	< 0.011	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.012	< 0.011	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.028	< 0.026	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.028	< 0.026	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.012	< 0.011	-
Benzo[e]pyrene	mg/kg dry wt	< 0.012	< 0.011	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.012	< 0.011	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.012	< 0.011	-
Chrysene	mg/kg dry wt	< 0.012	< 0.011	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.011	-
Fluoranthene	mg/kg dry wt	< 0.012	< 0.011	-
Fluorene	mg/kg dry wt	< 0.012	< 0.011	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.012	< 0.011	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	-
Perylene	mg/kg dry wt	< 0.012	< 0.011	-
Phenanthrene	mg/kg dry wt	< 0.012	< 0.011	-
Pyrene	mg/kg dry wt	< 0.012	< 0.011	-

Analyst's Comments

This certificate of analysis contains information extracted from 2569615-SPv2 issued on 06-Apr-2021 at 9:27 am.

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 7-10, 15-21
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-2, 7-10, 15
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	16-20
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	16-21
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-2, 17-20
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	16-20
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-2, 16-20
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 7-10, 15
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-2, 7-10, 15

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	16-20
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	16-20

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

Testing was completed between 29-Mar-2021 and 31-Mar-2021. For completion dates of individual analyses please contact the laboratory.

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2570280	A2Pv3.1
Contact:	Joseph McLay	**Date Received:**	29-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	28-Feb-2023	
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.010	
		Submitted By:	Joseph McLay	

Sample Type: Soil

Sample Name:		ASB03 25-Mar-2021	HB05 25-Mar-2021	HA01 0.5m 25-Mar-2021	HA02 SUR 25-Mar-2021	HA03 0.5m 25-Mar-2021
Lab Number:		2570280.2	2570280.7	2570280.8	2570280.9	2570280.10
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	551.6	627.4	658.6	627.2	742.4
Dry Weight	g	478.1	501.9	576.6	539.5	631.5
Moisture	%	13	20	12	14	15
Sample Fraction >10mm	g dry wt	8.3	21.1	45.7	79.2	9.6
Sample Fraction <10mm to >2mm	g dry wt	157.8	100.6	173.2	167.9	167.9
Sample Fraction <2mm	g dry wt	311.6	379.7	357.3	291.8	453.2
<2mm Subsample Weight	g dry wt	55.4	58.2	55.2	59.6	56.1
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA04 0.2m 25-Mar-2021
Lab Number:		2570280.11
Asbestos Presence / Absence		Asbestos NOT detected.
Description of Asbestos Form		-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001
As Received Weight	g	753.7
Dry Weight	g	676.9
Moisture	%	10
Sample Fraction >10mm	g dry wt	< 0.1

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil		
Sample Name:		HA04 0.2m 25-Mar-2021
Lab Number:		2570280.11
Sample Fraction <10mm to >2mm	g dry wt	37.6
Sample Fraction <2mm	g dry wt	638.4
<2mm Subsample Weight	g dry wt	58.2
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001

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

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

The following assumptions have been made:

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

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

Analyst's Comments

This certificate of analysis contains information extracted from 2570280-A2Pv3 issued on 06-Apr-2021 at 9:37 am.

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 7-11
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 7-11
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	2, 7-11
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 7-11
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 7-11
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 7-11
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	2, 7-11
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2, 7-11
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 7-11

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 7-11
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 7-11
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 7-11
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 7-11
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 7-11
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 7-11

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

Testing was completed between 30-Mar-2021 and 01-Apr-2021. 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.

Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED
R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand
T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2570281	A2Pv2
Contact:	Joseph McLay	**Date Received:**	29-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	06-Apr-2021	**(Amended)**
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.010	
		Submitted By:	Joseph McLay	

Sample Type: Building Material

Sample Name	Lab Number	Sample Category	Sample Weight on receipt (g)	Asbestos Presence / Absence	Description of Asbestos in Non Homogeneous Samples
~~PACM01~~	2570281.1	Fibre Cement	32.22	Sample not on site	-
PACM03	2570281.2	Fibre Cement	27.14	Chrysotile (White Asbestos) detected.	-

Glossary of Terms

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

For further details, please contact the Asbestos Team.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2570281-A2Pv1' issued on 30-Mar-2021 at 11:35 am.
Reason for amendment: Reference and sample ID updated as per request.

Summary of Methods

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

Sample Type: Building Material

Test	Method Description	Default Detection Limit	Sample No
Asbestos in Bulk Material			
Sample Category	Assessment of sample type. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	1-2
Sample Weight on receipt	Sample weight. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.01 g	1-2
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2
Description of Asbestos in Non Homogenous Samples	Form, dimensions and/or weight of asbestos fibres present. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-2

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

Dates of testing are available on request. For completion dates of individual analyses please contact the laboratory.

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

Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

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

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

Certificate of Analysis

Client:	Focus Environmental Services Limited	**Lab No:**	2572043 SPv2	
Contact:	Joseph McLay	**Date Received:**	30-Mar-2021	
	C/- Focus Environmental Services Limited	**Date Reported:**	06-Apr-2021	**(Amended)**
	PO Box 11455	**Quote No:**	80876	
	Ellerslie	**Order No:**		
	Auckland 1542	**Client Reference:**	1443.010	
		Submitted By:	Joseph McLay	

Sample Type: Soil

	Sample Name:	Pb10 29-Mar-2021	Pb11 29-Mar-2021			
	Lab Number:	2572043.1	2572043.2			
Total Recoverable Lead	mg/kg dry wt	1,430	360	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2572043-SPv1' issued on 01-Apr-2021 at 1:22 pm.
Reason for amendment: Reference update as per request.

Summary of Methods

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

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-2
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-2

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

Testing was completed on 01-Apr-2021. For completion dates of individual analyses please contact the laboratory.

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

Kim Harrison MSc
Client Services Manager - Environmental