

69 Inland Kaikōura Road. Contaminated Site Management Plan

Drones at Work

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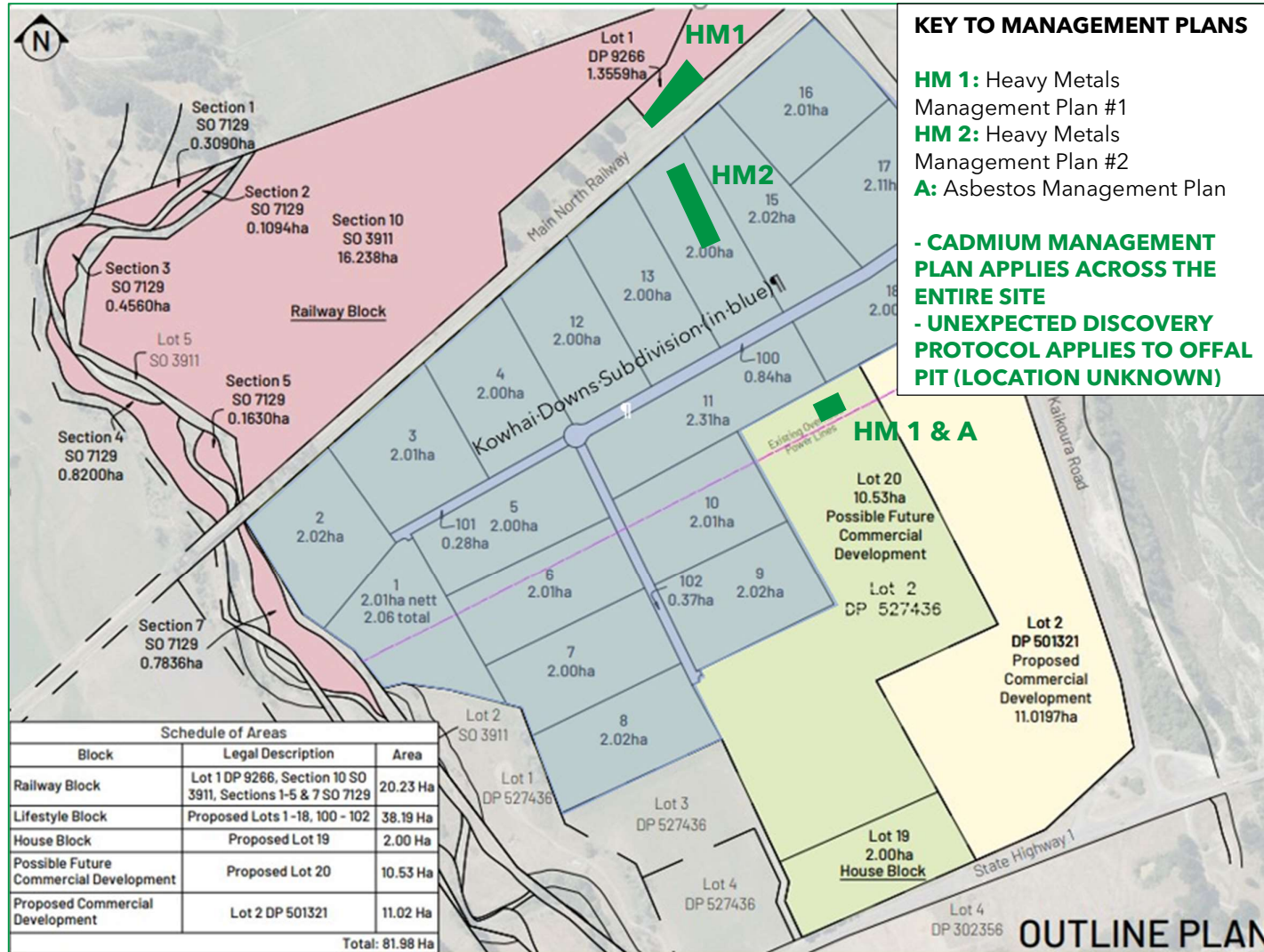
Certification

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List of Abbreviations

Abbreviation	Detail
ACM	Asbestos Containing Material
AF/FA	Asbestos fines and/or fibrous asbestos
Asbestos Removalist	Person with a WorkSafe licence allowing removal of asbestos
CLS	Contaminated Land Solutions Ltd
CSMP	Contaminated Site Management Plan (this report)
DSI	Detailed Site Investigation
HAIL	Hazardous Activities and Industries List
IANZ	International Accreditation New Zealand
MfE	Ministry for the Environment
NES	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
SCS	Soil Contaminant Standard
SQEP	Suitably Qualified and Experienced Practitioner (as defined in MfE 2012)
SVR	Site Validation Report

Remediation Figure



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1. Introduction

1.1 Background

Drones at Work Ltd, on behalf of Kaikoura Business Park Limited, engaged Contaminated Land Solutions Ltd (CLS) to prepare this Contaminated Site Management Plan (CSMP). The CSMP is required to address contamination identified at 69 Inland Kaikōura Road (the site). The CSMP defines methods to be used during disturbance and removal of soil across the site.

The site location is shown in **Figure 1**. The proposed site development is split into five parts as follows:

1. The Kowhai Downs subdivision, which is entirely large residential lots
2. The 'Railway Block' of unknown future use
3. 'Lot 20' which is described as 'possible future commercial development'
4. 'Lot 2 DP 501321' which is a proposed commercial development.
5. 'House Block' which currently accommodates a dwelling that will be retained for residential purposes along with some of the surrounding farmland to make up a total area of 2 hectares (20,000m²).

This report has been prepared with reference to the Ministry for the Environment's *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021)* (MfE, 2021). An explanatory statement 'About Your Report' is included in **Appendix 1**.

The proposed site layout is shown in **Appendix 2** and **Figure 2**.

1.2 Site Identification

Site identification details are presented in **Table 1**, the site location in **Figure 1** and the five proposed development areas of the site are shown in **Figure 2**.

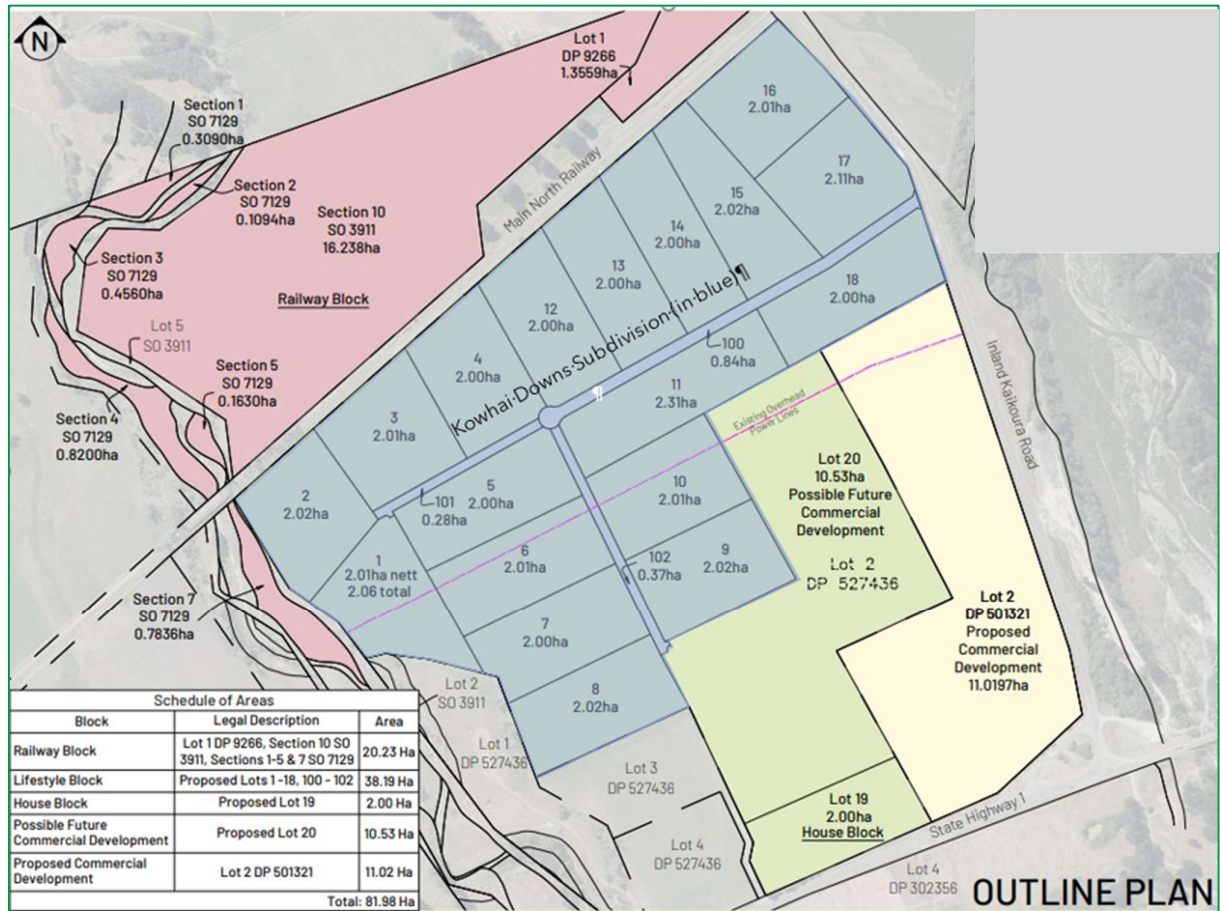
Table 1 Site Identification

Site Name	Kowhai Downs Subdivision
Site Location	69 Inland Kaikōura Road, Peketā, Kaikōura
Legal Description/s	LOT 2 DP 527436 LOT 1 DP 9266 SEC 10 SO 3911 SECS 1-5 7 SO 7129 LOT 2 DP 501321
Site Area	36.59ha rural residential, 1.49ha roading
Site Coordinates	S 42°24.45.46" E 173°37.44.78"
Site Zoning	Rural
Current Site Use	Farming
Proposed Site Use	Low density residential

Figure 1 Site Location. Source: Canterbury Maps. NZ LINZ Topographic Layer



Figure 2. Five Development Areas of the Site. Source: Baseline Group Drawing '7572 - Inland Kaikōura Block'



1.3 Summary of Identified Contamination

Contamination was identified in a site investigation conducted by CLS (CLS, 2022) and is summarised below.

Thirty-nine soil samples and four samples of bulk material were collected and analysed in a phase 1 investigation conducted by CLS on 4 and 5 January 2022. Based on the phase 1 investigation results, solid waste was removed from the 'piggery/offal pit' area (Lot 14, Kowhai Downs subdivision) by Mr Watherston (the occupier), an asbestos removal programme was conducted at the site by Agon Solutions Ltd, and a phase 2 investigation was undertaken by CLS on 24 February 2022.

The phase 2 investigation included the collection of samples from eleven locations in the 'incinerator' area (Lot 20) and eleven locations in the 'piggery/offal pit' area (Lot 14, Kowhai Downs subdivision).

Table 2 summarises the contamination identified through this work, and proposed management methods.

1.4 Objectives of this Report

The primary purpose of this CSMP is to provide a plan that can be followed to successfully manage contaminated soil at the site such that the proposed developments can proceed.

The specific objectives of the CSMP are as follows:

- 1 To set a remediation methods and goals for the soil contaminated with asbestos to achieve an acceptable level of risk to human health and the environment (including investigation of areas currently inaccessible due to shipping containers and solid waste)
- 2 To document management protocols for all other areas of the site
- 3 To document an unexpected contamination discovery protocol that can be used in the event the offal pit, landfill or other unexpected contamination are identified during earthworks.

Table 2. Contamination Identified and Proposed Management Methods at 69 Inland Kaikōura Road

Area	Proposed Future Use	HAIL Activities	Issues	Health contamination? significant	Management Methods
1. Kowhai Downs subdivision	Rural Residential	<ul style="list-style-type: none"> G5: Waste disposal to land and A6: Fertiliser bulk storage 	<ul style="list-style-type: none"> Lot 14: Possible offall pit Lot 14: Heavy metals in surface soil samples are above background levels and some are above SCSs 	<ul style="list-style-type: none"> Offal pit could be health significant Health significant 	<ul style="list-style-type: none"> Unexpected discovery protocol (Section 6) Heavy Metals Management Plan #1 (Section 5)
		<ul style="list-style-type: none"> I: Any other activity (lead-based paint) 	<ul style="list-style-type: none"> Lot 18: The existing house is likely to have a halo of lead in surface soil due to historical use of leaded paint 	<ul style="list-style-type: none"> Probably (not investigated) 	<ul style="list-style-type: none"> If the house is demolished and a new house built in its place, investigation and management will be required
		N/A	<ul style="list-style-type: none"> Cadmium above background levels 	<ul style="list-style-type: none"> Not health significant 	<ul style="list-style-type: none"> Cadmium Management Plan (Section 4)
2. Railway Block	Unknown	<ul style="list-style-type: none"> G5: Waste disposal to land 	<ul style="list-style-type: none"> Cadmium, lead and zinc above background levels 	<ul style="list-style-type: none"> Not health significant, but sample coverage is poor. 	<ul style="list-style-type: none"> Cadmium Management Plan (Section 4) Heavy Metals Management Plan #2 (Section 5) Depending on the future use of the site, further sampling may be warranted to delineate the elevated concentrations of heavy metals
		NA	<ul style="list-style-type: none"> Possible landfill next to river (Section 3 SO 3911 and Section 7 SO 7129), identified by ECan and included on the LLUR 	<ul style="list-style-type: none"> Landfill not identified and insufficient evidence that it exists 	<ul style="list-style-type: none"> The landfill does not meet the NES 'more likely than not' (to be present) threshold and its possible presence can therefore be managed using the unexpected discovery protocol (Section 6)
3. Lot 20	Possible Future Commercial Development	<ul style="list-style-type: none"> G5: Waste disposal to land and A6: Fertiliser bulk storage 	<ul style="list-style-type: none"> 'Incinerator area' has heavy metals in surface soil at concentrations above background Cadmium above background levels across this area 	<ul style="list-style-type: none"> Not health significant 	<ul style="list-style-type: none"> Heavy Metals Management Plan #2 (Section 5) Cadmium Management Plan (Section 4)
		<ul style="list-style-type: none"> E1: Asbestos in deteriorated condition 	<ul style="list-style-type: none"> 'Incinerator area' has health significant ACM 	<ul style="list-style-type: none"> Health significant 	<ul style="list-style-type: none"> Asbestos Management Plan (Section 3)

Area	Proposed Future Use	HAIL Activities	Issues	Health contamination? significant	Management Methods
4. Lot 2 DP 501321	Proposed Commercial Development	NA	<ul style="list-style-type: none"> ▪ Cadmium above background levels 	<ul style="list-style-type: none"> ▪ Not health significant 	<ul style="list-style-type: none"> ▪ Cadmium Management Plan (Section 4)
5. House Block	Rural Residential	A1: Agrichemicals	<ul style="list-style-type: none"> ▪ Hazardous substances in hazardous goods store 	<ul style="list-style-type: none"> ▪ This area has not been investigated 	<ul style="list-style-type: none"> ▪ Depending on the future use of the site, this store and surrounding land may need investigating
		NA	<ul style="list-style-type: none"> ▪ Cadmium above background levels 	<ul style="list-style-type: none"> ▪ Not health significant 	<ul style="list-style-type: none"> ▪ Cadmium Management Plan (Section 4)

2. Approach and Context

This CSMP has been produced following the completion of a Detailed Site Investigation (DSI) (CLS, 2022), which identified the issues outlined in **Table 2**.

The management strategy for the entire site comprises plans as follows

1. **Asbestos Plan:** To define processes for removal from site of soil with asbestos above the commercial Soil Contaminant Standard (SCS).
2. **Cadmium Management Plan:** To define processes for managing soil with elevated (not health significant) cadmium.
3. **Heavy Metals Management Plans:** Processes for managing soil with health significant heavy metals (Plan #1) and with elevated (not health significant) heavy metals (Plan #2).
4. **Unexpected Contamination Discovery Protocol:** Processes for managing unexpected, contaminated soil and water identified during ground disturbance, for example, if the offal pit is identified.

As well as the above, general provisions for the management of soil containing contaminants is provided. Successful implementation of this CSMP will result in successful breakage of complete exposure pathways between identified contamination (asbestos and heavy metals) and receptors as identified in the Conceptual Site Model (CSM) for the site. The Conceptual Site Model is included in **Appendix 3**.

As well as a description of the proposed processes, this plan identifies methods to demonstrate effectiveness of remediation works.

3. Asbestos Management Plan

3.1 Background

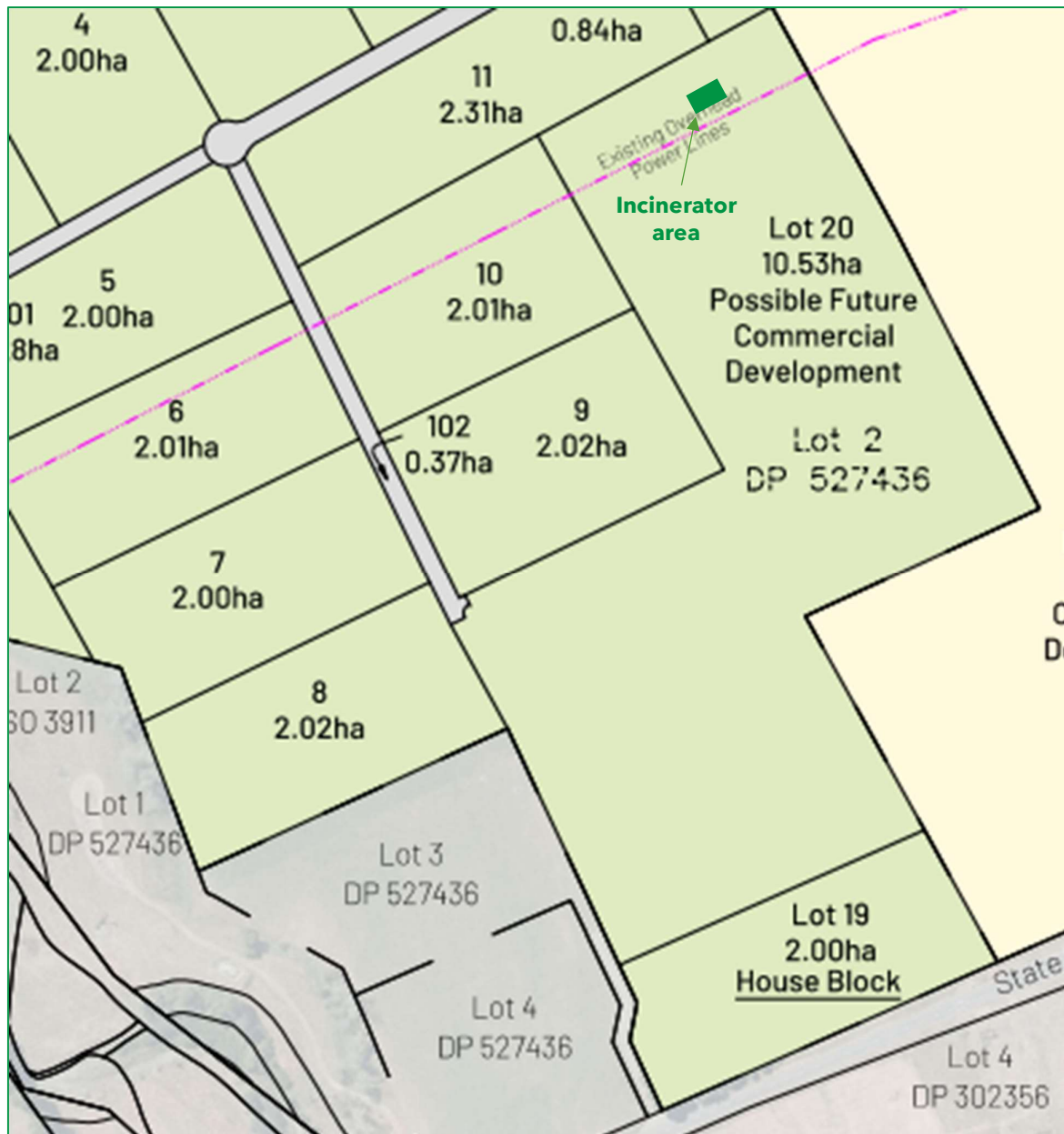
Lot 20 of the proposed development contains an area termed the 'incinerator area' in the CLS 2022 DSI report. This area has been identified to have health significant asbestos present as visible ACM fragments noted to be still present following two rounds of asbestos removal, and ACM on and in soil at levels above the commercial guideline (BRANZ 2017). Laboratory results available for the 'incinerator area' include one semi-quantitative result below the laboratory limit of reporting, and eleven presence absence results (asbestos detected in four samples, not detected in seven samples).

Of the four positive results the description of the asbestos form is detailed as: (1) Loose fibres (major), (2) ACM debris (major), (3) Fibre cement (2 x 1cm), ACM debris (major) and Loose fibres (major), (4) Loose fibres (minor). The laboratory report attached in **Appendix 4**, and sampling locations and other details are within CLS 2022. The results suggest that removal of the remaining asbestos, which is comingled with soil would be classified using the BRANZ 20017 decision flowchart as either 'asbestos-related work' or Class B removal work. CLS considers that Class B removal status would address the information shortfall (lack of semi-quantitative results) and recognise the higher risk of asbestos fibre release associated with the sandy soil conditions without a significant change in the removal requirements. CLS therefore recommends removal by a Licenced Asbestos Removalist per the requirements of Class B.

The location of this area within Lot 20 is shown in **Figure 3**.

Due to the presence of significant above ground structures in the area at the time of the phase 1 and 2 investigations, it is not considered to have been completely characterised.

Figure 3. Incinerator Area (Lot 20)



3.2 Approximate Soil Volumes

The volume of soil requiring remediation by removal from site are presented in **Table 3**. These volumes are approximate and are provided for the purpose of assisting with planning arrangements.

Table 3. Soil Disturbance and Removal Volumes - Incinerator Area (Lot 20)

Area	Length (m)	Width (m)	Depth (m)	Volume (m ³)
Asbestos Remediation Areas	10	5	0.15	7.5
	10	5	0.15	7.5
Poorly Characterised Area 1	25	6	0.15	22.5
Poorly Characterised Area 2 (area calculated as 100m ² using Canterbury Maps Drawing tool)	-	-	0.15	15
			Total	52.5

Figure 4. Draft Remediation Drawing #1 including Area Requiring Further Investigation - Incinerator Area (Lot 20)



3.3 Remediation Process

Draft Remediation Drawing #1 (**Figure 4**), shows the two known areas requiring remediation due to the presence of health significant asbestos, and two areas that require investigation because above ground structures and equipment have prevented access to ground at the time of the DSI (CLS 2022).

A complete exposure pathway currently exists in the remediation area of Lot 20 associated with inhalation of asbestos fibres. The remediation goal is to break the identified complete exposure pathway to the extent that the risk to human health and the environment is acceptable. The asbestos remediation goals are defined in **Table 4**.

The following process must be followed:

1. All above ground solid material to be removed, e.g., shipping containers, farm equipment, waste.
2. All visible ACM in the poorly characterised areas shown in purple in **Figure 4** removed by a competent person and validation sampling undertaken by a Suitably Qualified and Experienced Practitioner (SQEP).
3. Draft Remediation Drawing #1 (**Figure 4**) updated using the results of the removal and sampling.
4. The area defined in the revised Remediation Drawing #1 is to be excavated using processes defined by an Asbestos Removalist licensed by WorkSafe in their site-specific Asbestos Removal

Control Plan. The excavation will extend to a minimum depth of 150mm below ground level, or to a depth where the Asbestos Removalist confirms no visible ACM following completion of their clearance inspection. All excavated soil is to be placed in truck bins lined with 200 µm heavy-gauge polythene. The soil is to be transferred to a licenced disposal facility such as Kate Valley Regional Landfill.

5. Following excavation, the area is to be validated by soil sampling using a systematic sampling pattern such as a grid or herringbone pattern with a minimum of fifteen sampling points from the base of the area and a minimum of six sample points from the sidewalls.
6. Each sample is to be submitted to an IANZ accredited laboratory for analysis for asbestos (presence/absence).
7. The results of the analysis must be all negative. Where positive results are obtained, further excavation will be undertaken OR semi-quantitative analysis and comparison with the guideline values associated with the proposed future use within the New Zealand Guidelines for Assessment and Management of Asbestos in Soil (BRANZ 2017, **Table 4**) will be conducted. This table provides the remediation goals.
8. All waste material removed from the site must be tracked to its final destination, with disposal dockets retained for inclusion in the Site Validation Report.
9. On completion of the work, a Site Validation Report must be produced - see **Section 12**.

Table 4. Asbestos Remediation Goals. Source: BRANZ 2017

Form of asbestos	Soil guideline values for asbestos (w/w)			
	Residential ¹	High-density residential ²	Recreational ³	Commercial and industrial ⁴
ACM (bonded)	0.01%	0.04%	0.02%	0.05%
FA and/or AF ⁵	0.001%			
All forms of asbestos – surface	No visible asbestos on surface soil ⁶			
Capping requirements for residual contamination above selected soil guideline value				
Depth ⁷	Hard cap	No depth limitation, no controls – except for long-term management		
	Soft cap	≥0.5 m		≥0.2 m

Notes:

- 1. Residential:** Single dwelling site with garden and/or accessible soil. Also includes daycare centres, preschools, primary and secondary schools and rural residential.
- 2. High-density residential:** Urban residential site with limited exposed soil/soil contact, including small gardens. Applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens but not high-rise apartments (with very low opportunity for soil contact).
- 3. Recreational:** Public and private green areas and sports and recreation reserves. Includes playing fields, suburban reserves where children play frequently and school playing fields.
- 4. Commercial and industrial:** Includes accessible soils within retail, office, factory and industrial sites. Many commercial and industrial properties are well paved with concrete pavement and buildings that will adequately cover/cap any contaminated soils.
- 5. FA and/or AF:** Where free fibre is present at concentrations at or below 0.001% w/w, a proportion of these samples should be analysed using the laboratory analysis method described in section 5.4.4 (≈10% of samples). This is due to limitations in the AS 4964-2004 and WA Guidelines 500 ml sample method for free fibre (see section 5.4 for more information).
- 6. Surface:** Effective options include raking/tilling the top 100 mm of asbestos-contaminated soil (or to clean soil/fill if shallower to avoid contaminating clean material at depth) and hand picking to remove visible asbestos and ACM fragments or covering with a soft cap of virgin natural material (VNM) 100 mm thick delineated by a permeable geotextile marker layer or hard cap. Near-surface fragments of ACM can become exposed in soft soils such as sandy pumiceous soils after periods of rain.
- 7. Depth:** Capping is used where contamination levels exceed soil guideline values. Considerations of depth need to incorporate the type and likelihood of future disturbance activities at the site and site capping requirements (see section 6.1). Ideally, any capping layer should be delineated by a permeable geotextile marker layer between the cap and underlying asbestos/contaminated material. Institutional controls must be used to manage long-term risks, particularly where the cap may be disturbed (see section 7). Two forms of capping are typically used:
 - a. Hard cap comprises surfaces that are difficult to penetrate and isolate the asbestos contamination, such as tar seal or concrete driveway cover. This would typically not include pavers or decking due to maintenance and coverage factors.
 - b. Soft cap consists of a layer(s) of material which either comprise virgin natural material or soils that meet the asbestos residential soil guideline value from an on-site source. Use of on-site soils may require resource consent.

3.4 Health and Safety Measures

3.4.1 Background

As required by the Health and Safety at Work Act 2015, a health and safety plan addressing all site risks will be developed by the nominated contractor prior to commencement of works, and all sub-contractors will review this prior to commencing works at the site.

In the context of this health and safety plan ‘the site’ is the incinerator area shown in **Figure 4**.

All personnel at the site must be inducted to the health and safety requirements (including hazards) at the site, and each person is then required to confirm that they have understood these requirements. The health and safety plan and inductions should discuss actions that need to be taken for handling contaminated soil as described in this plan.

Access to the site shall be restricted when the remediation is in progress using security fencing. Only personnel involved in the remediation will be allowed into the site. Personnel shall be authorised to enter following completion of appropriate site induction procedures and following donning of required personal protective equipment (PPE).

3.4.2 Site Control Procedures

The health and safety plan will define the site ingress and egress arrangements, haulage routes within the site, and location of site support/rest/decontamination facilities. In particular, the following is required:

- Establishment of the asbestos work area as determined by the Licensed Asbestos Removalist by fencing and appropriate signage, including dust barriers where necessary. The controls should be sufficient to prevent accidental access to this area
- Establishment of an access way to and from the asbestos work area
- Establishment of a truck loading area and machinery decontamination area adjacent to the asbestos work area, to minimise the spread of asbestos contamination via machinery
- Notification to WorkSafe of the intent to commence works

3.4.3 Personal Protective Equipment (PPE)

Works will need to be completed in accordance with WorkSafe Approved Code of Practice for Management and Removal of Asbestos (November 2016), Health and Safety at Work (Asbestos) Regulations 2016, and BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil (2017).

During site induction, potential hazards associated with exposure to contaminants will be communicated to all site workers. Prior to entering the site all site workers must don the required PPE:

- Chemical-resistant gloves;
- Steel toe capped boots without laces
- Full length coveralls
- Appropriately fitted respirator (P2 minimum)

Appropriate stocks of disposable PPE must be available at the entry point into the site. An on-site decontamination unit with disposal bins lined using asbestos waste bags for used PPE will be installed at the entry/exit point prior to works commencing. The unit shall be positioned so that it cannot be accidentally by-passed, and asbestos waste bags will be replaced daily (or when full), being goose neck tied and disposed of to a facility licensed to accept asbestos waste. A rest area must be provided close to the site.

3.4.4 Air Quality Monitoring

Air monitoring requirements for asbestos shall be determined by the Licensed Asbestos Removalist, to provide assurance that the trace level and airborne contamination standard for asbestos in the Health and Safety at Work (Asbestos) Regulations 2016 are not exceeded.

The air monitoring must be carried out:

- (a) immediately before the licensed asbestos removal work commences, if the assessor determines that it is likely that the air contains respirable asbestos fibres in a concentration greater than trace level; and
- (b) while the licensed asbestos removal work is carried out.

4. Cadmium Management Plan

The DSI (CLS 2022) identified elevated cadmium in surface soil samples taken across the entire site, most likely to be attributed to the application of superphosphate fertiliser to the land.

The human health SCS based on a future rural residential use is 0.8mg/kg with 25% home grown produce consumption, and is 1,300mg/kg based on future commercial use.

The concentrations of cadmium reported in CLS 2022 were generally not health significant. Cadmium results from a limited number of samples taken below ground level reported concentrations below background suggesting that the elevated concentrations are restricted to surface soil.

Three of thirteen samples in the Kowhai Downs subdivision, Lot 14 'piggery/offal pit' area (SS215-0.0m, 3.3mg/kg, SS217-0.0m, 0.97mg/kg, SS221-0.0m, 0.84mg/kg) returned health significant cadmium concentrations. Management of these health significant results within the 'piggery/offal pit area' is covered in the Heavy Metal Management Plan #1 (Section 5), and not in this section which is restricted to low-level cadmium that is not health significant.

Management of the low level (not health significant) cadmium identified across the site will be as follows:

- Stormwater and wastewater disposal to ground should occur into ground deeper than 0.2m.
- If any shallow soil is to be disposed of off-site, it may not be accepted at a cleanfill due to the elevated cadmium results (however, it is considered that there are options for on-site retention of excess soil, and off-site removal should be avoided)

5. Heavy Metals Management Plans

5.1 Heavy Metals Management Plan #1 – Area with Health Significant Results

The DSI (CLS 2022) identified six health significant results from samples taken in the Kowhai Downs Subdivision, Lot 14: 'Piggery/Offal Pit' area. No other investigated areas returned health significant results for heavy metals.

The health significant results are shown in **Table 5** using the standard SCS for rural residential use based on 25% home grown produce consumption. Revised SCSs based on no home grown produce consumption are also displayed for comparative purposes.

Table 5. Heavy Metals Results Exceeding the SCS for the Proposed Future Use (out of all Investigation Results).

Sample ID	Contaminant	Result (mg/kg)	SCS rural residential 25% produce (mg/kg)	SCS no produce consumption (mg/kg) ¹
P04 - 0.0-0.1m	Arsenic	25	17	21
P04 - 0.0-0.1m	Lead	179	160	250
SS215-0.0m	Cadmium	3.3	0.8	110
SS217-0.0m	Cadmium	0.97	0.8	110
SS221-0.0m	Cadmium	0.84	0.8	110
SS224-0.0	Lead	166	160	250

1: SCS with no produce consumption sourced from MfE 2011

Assessment against the SCSs calculated for rural residential use with no home grown produce consumption (rather than the usual 25% home grown produce consumption) generally returned compliant results (one non-compliant arsenic in sample P04-0.0-0.1 is less than 20% over the SCS).

Further analysis of samples held cold is currently underway to provide greater assurance that contamination is limited to surface soil.

Three options are available for managing contamination in this area, which is approximately 100m x 30m, and assumed to be limited to the top 0.10m (total volume of impacted soil estimated to be 300m³). The area is shown in Management Drawing #1 (Figure 5). These options comprise the Heavy Metals Management Plan #1, which is as follows:

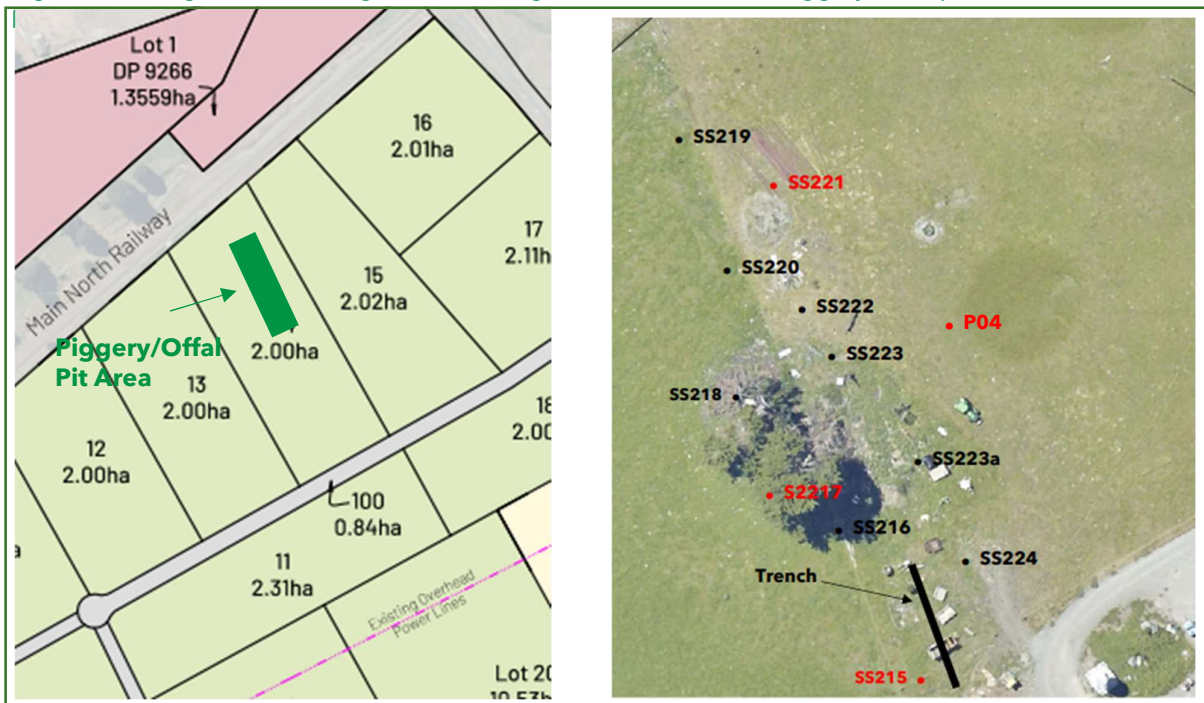
1. Preventing produce from being grown in impacted soil. This measure would need to be documented on the property title and in an on-going management plan and planter boxes with clean soils could be used for home grown produce.
2. Excavation of the impacted surface soil and relocation into an on-site encapsulation bund/cell with a geotextile layer and a minimum of 500mm uncontaminated low permeability soil, contoured and grassed to provide an erosion resistant surface. The encapsulation area (below ground or an above ground bund) will be documented in an ongoing management plan with maintenance requirements specified to ensure the on-going integrity of the encapsulation. If a below ground encapsulation is used, the area chosen must not be contaminated above health guidelines and soil excavated to form the encapsulation structure could be used to return the excavated area to ground level, i.e., soil swap. The process to be documented in the Site Validation Report (Section 12).
3. Excavation and removal of impacted soil from site. All waste material removed from the site must be tracked to its final destination, with disposal dockets retained for inclusion in the Site Validation Report (see section 12).

If options 2 or 3 are selected, the excavated area is to be validated by soil sampling using a systematic sampling pattern such as a grid or herringbone pattern with a minimum of twenty sampling points, plus a minimum of six samples from the sidewalls of the excavation. Each sample is to be submitted to an IANZ accredited laboratory for analysis for arsenic, cadmium, and lead. The 95% UCL of the mean result for each metal must not exceed the remediation goals detailed in Table 6.

Table 6. Remediation Goals for Heavy Metals (based on SCS rural residential 25% produce)

	Arsenic	Cadmium	Lead
Total recoverable concentration (mg/kg)	17	0.8	160

Figure 5. Management Drawing #1. Health Significant Cadmium in Piggery/Offal pit area of Kowhai



5.2 Heavy Metals Management Plan #2 - Areas With Low Concentrations of Heavy Metals

The DSI (CLS 2022) identified concentrations of cadmium, arsenic, copper, lead and zinc above background but below the relevant SCSs in surface soil samples taken from the following areas:

- Lot 20: Incinerator
- Kowhai Downs Subdivision, Lot 14: Milking shed
- Railway Block: Stockyards

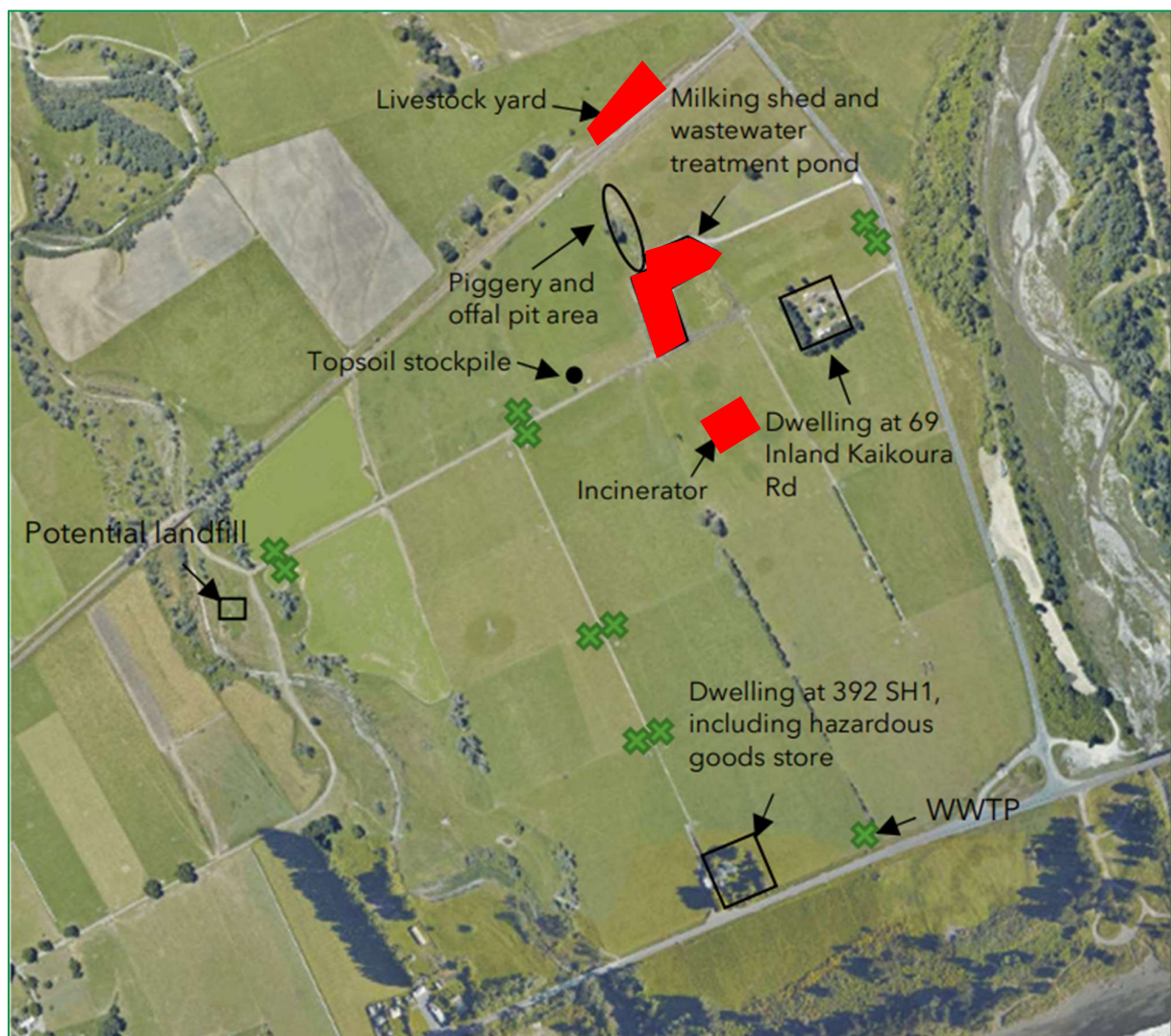
A limited number of samples taken from below surface returned results consistent with background suggesting that the elevated concentrations are limited to surface soil.

The impacted areas will be managed using the Heavy Metals Management Plan #2, which is as follows:

- Stormwater and wastewater disposal to ground should occur into ground deeper than 0.2m
- If any shallow soil is to be disposed of off-site, it may not be accepted at a cleanfill due to the elevated heavy metals results (it is considered that there are options for on-site retention of excess soil, and off-site removal should not be required)

The areas are shown in Management Drawing #2 (**Figure 6**).

Figure 6. Management Drawing #2. Areas (in Red) Subject to the Heavy Metals Management Plan #2



6. Unexpected Contamination Discovery Protocol

6.1 Overview

This procedure shall be followed in the event of the discovery of any unexpected contamination including the offal pit or the potential landfill site Environment Canterbury has identified located adjacent to Stoney Creek on the western boundary of the site. The procedures outlined below provide protocols to address unforeseen contamination and take appropriate action to avoid the dispersion of potential contaminants into the surrounding environment.

Archaeological discoveries are not covered in this protocol.

6.2 Contact Information

Table 7 Emergency Response Contact Information

	Contact Details
Kaikōura District Council Environmental Health	03 365 1667, after hours: 027 224 6572
Environment Canterbury Pollution Hotline	0800 765 588
WorkSafe New Zealand	info@worksafe.govt.nz ; 0800 030 040
National Poisons Centre	https://poisons.co.nz/ ; 0800 764 766

6.3 Contamination Indicators

Contamination discoveries include the presence of discoloured surface water (including sheens or slicks), unusual odours, gas bubbles in pooled surface water, oily substances, intact or broken drums/containers, or fibrous materials such as fibre cement which may contain asbestos. These discoveries will differ significantly from the expected ground conditions such that additional management, as described in this section, is required.

6.4 Process

During earthworks on the site, ground conditions will be actively monitored for the conditions/materials specified above.

If newly discovered contaminated material is encountered, earthworks must stop in the area. The material must remain *in situ* until a SQEP has had the opportunity to assess and test the material, and to provide advice on how to proceed. If the material is generating significant odour, for example if the offal pit is identified, it should be appropriately cordoned off and covered with sheeting.

The SQEP shall:

- Notify the regulatory authority/authorities, if required
- Characterise the contaminated material by collecting samples for laboratory analysis (by a SQEP, and if required)
- If appropriate, advise the contractor to excavate the suspected contaminated material into a covered and contained receptacle to allow works to continue with minimum delay
- When the material or water characteristics have been established by a SQEP, they will advise the site supervisor as to whether the:
 - Materials may remain on site or be directly loaded into trucks for disposal at an appropriately licensed waste facility

- Water may be discharged with or without additional treatment, or whether any site dewatering from the excavation should be collected for disposal at a wastewater facility licensed to receive the water
- Disposal of material must be to a facility licensed to accept such material and approval shall be obtained by Kaikoura Business Park Limited prior to transportation. The landfill operator may require further testing before accepting materials, in accordance with the landfill's resource consent

The nominated contractor shall:

- Ensure trucks have their loads covered with tarpaulins before leaving the site.
- Ensure all appropriate information such as location and quantity of material and off-site weighbridge dockets are recorded. All weighbridge documents for any material removed shall be retained for inclusion in the Site Validation Report.
- Record all details of unexpected contamination and hazardous materials discovery on an incident form, including GPS of location.
- If unsuitable for discharge, disposal of contaminated water must be to a wastewater facility licensed to accept such water and approval shall be obtained by Kaikoura Business Park Limited prior to transportation. The wastewater operator may require further testing before accepting wastewater, in accordance with the wastewater facilities resource consent.
- Should suspected bulk asbestos be observed during the earthworks (beyond the asbestos expected in the incinerator area), all work shall cease, pending inspection and confirmatory analysis by the SQEP. If asbestos is proven to be present, this will be managed in accordance with an addendum to this plan.

7. General Requirements - Roles and Contact Information

All employees engaged in the remediation or management of soil as defined in this CSMP and under the direct control of the Principal (Kaikoura Business Park Limited) shall comply with all of the defined requirements.

Roles assigned to key project personnel are identified in **Table 8**.

Table 8 Project Roles and Contact Information

Tasks	Responsible Organisation
Distribution of this plan to Drones at Work Ltd	CLS
<ul style="list-style-type: none"> ■ Updating this plan, if required ■ Providing guidance on the content of this plan ■ Providing guidance for unexpected discoveries ■ Monitoring the remedial works and providing guidance, as required ■ Validation sampling ■ Site Validation Report 	CLS
Implementation of this plan	Nominated Contactor (TBC)
Production of site-specific erosion and sediment control plan and health and safety plan	Nominated Contactor (TBC)

It is the responsibility of Kaikoura Business Park Limited to ensure that the work is conducted in accordance with this plan and that all consent conditions are complied with.

8. General Requirements - Site Management Procedures

8.1 Excavation Management

Prior to commencing the remediation earthworks the following should be conducted:

- Confirm that all necessary authorisations and consents have been obtained.
- Preparation of a works management plan of a complexity appropriate to the small-scale nature of the work. This plan will include:
 - This CSMP
 - Erosion and sediment control plan
 - Health and safety plan
 - Confirmation of acceptance of the material at the chosen disposal location, including waste tracking dockets

8.2 Site Record Keeping and Monitoring Requirements

Records to be kept on site during the remediation associated with the Asbestos Plan (section 3) include the following:

- Weather conditions each day and whether any actions are required to address weather conditions
- Effectiveness of erosion and sediment control measures
- Progress / problems associated with the site work
- Monitoring data including any stockpiling of soil within the site
- Photographs as appropriate
- Safety, health and environmental discussions and safety non-compliance issues
- Third party complaints lodged regarding the works, as well as all corrective measures implemented to limit such complaints from reoccurring
- Waste disposal dockets of all material transported off site
- All incidents and near misses, and
- Any other relevant information.

These records will be used for preparation of the Site Validation Report once work at the site is complete.

9. General Requirements - Environmental Management Procedures

9.1 Introduction

This section provides guidance on the measures required to protect the environment during the earthworks activities on the site. A site-specific sediment and erosion control plan will also be required to be developed by the contractor once the specific arrangements on site layout have been determined.

The contractor shall ensure that the works are carried out in such a manner to minimise any adverse effects on the environment. The contractor shall ensure that all materials and equipment removed from the site are either stored; or disposed of legally and responsibly. This section describes at a high level, what needs to be covered in an Environmental Management Plan.

9.2 Erosion and Sediment Controls

All earthworks will be completed in accordance with guidelines in Environment Canterbury's [Erosion and Sediment Control Toolbox - Environment Canterbury \(esc.canterbury.co.nz\)](http://esc.canterbury.govt.nz).

A site-specific erosion and sediment control plan will be prepared by the contractor. This will detail the location(s) and nature of the erosion and sediment control device(s), having regard to the anticipated extent and quantity of earthworks, along with the site layout. The site-specific plan is to be always available on site during the earthworks and is to be reviewed and amended if required upon the commencement of, and during, the works.

Earthworks areas are to be stabilised as soon as is practical to minimise erosion potential on site.

The primary mechanisms for sediment dispersing on the site is spillage during excavation and tracking by machinery. Any soils tracked beyond the site boundary should be swept up promptly and appropriately disposed of.

9.3 Stockpiling

Stockpiling of contaminated / odorous soil should be minimised / not undertaken during the course of works.

Where soils are to be temporarily stockpiled for staging prior to relocation within the site or off-site disposal, the location of temporary stockpiling must be defined in an erosion and sediment control plan.

If temporary stockpiling is required, the following controls should be implemented:

- Asbestos contaminated soil must not be stockpiled
- Soil stockpiles will be kept clean and tidy, no more than 4 m in height and with a compacted stable slope
- Vehicular movement over stockpiled soil will not be allowed
- Bunds or sediment fences will be constructed or installed around the edges of the stockpile management area to prevent storm water run-off from carrying contaminated or potentially contaminated soil away from the stockpile management area.

Imported fill required for backfilling excavations may be temporarily stockpiled in a designated area on site. All imported fill is required to be free of contaminants.

9.4 Dust and Odour Management

Excavation, stockpiling, movement of plant and transport of soils may generate dust and/or release odours. The generation of dust and odour will be minimised by the following:

- Suspending or limiting excavation, stockpiling and transport of soils during periods of high wind
- Limiting speed of travel on site
- Limiting transport routes across site to designated haulage routes
- Using a water spray on exposed soils to dampen soil
- Covering areas of exposed soil with sheeting / tarpaulins, and
- Ensuring trucks transporting material from the site are covered and that vehicles are adequately cleaned of dirt before leaving site.

10. General Requirements – Soil Testing

10.1 Off-Site Disposal of Soil

It is anticipated that all soil requiring off-site disposal would be accepted without additional testing. Asbestos contaminated soil will require disposal at a landfill licensed to accept it, for example Kate Valley Regional Landfill. Other material is likely to be acceptable at other regional facilities. Acceptance must be obtained prior to transport off-site.

If additional soil sampling is required, selection of analytes and assessment of results should be conducted by a SQEP. Analysis of samples shall be undertaken at an International Accreditation New Zealand (IANZ) accredited laboratory.

Transport of waste from the site must be documented using waste tracking forms. The accepting landfill operator should provide this paperwork prior to the earthworks commencing.

10.2 Sampling and Classification of Imported Fill to Site

Soil imported directly from quarries (virgin excavated natural material) does not require testing. Any imported fill material acquired from an alternative source should be assessed by a SQEP to determine its appropriateness for use on the site and to identify any potential discharge consent requirements.

Where no analytical data exists, the SQEP is likely to require sampling and testing at a minimum rate of one sample for every 500 m³ with not less than three samples tested per source, testing shall as a minimum include:

- Total organic content
- Heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)
- Semi-volatile organic compounds suite (SVOC)
- Asbestos presence/ absence, and
- Total petroleum hydrocarbons (TPH).

Testing on materials with a major component (i.e., 50% or more by mass) with a particle size greater than 2 mm may differ from that prescribed above and will be determined by the SQEP.

Analysis of samples shall be undertaken at an International Accreditation New Zealand (IANZ) accredited laboratory.

11. Site Validation Report (SVR)

On completion of the remedial work, a SVR will be prepared. The SVR will be written in general accordance with the requirements of the MfE 2021 *Contaminated Land Management Guidelines No 1. Reporting on Contaminated Sites in New Zealand (Revised 2021)*. A copy of the SVR will be provided to Kaikōura District Council to document details of:

- The risk posed by the contaminants and chosen remediation method
- A summary of the remediation action undertaken at the site including the asbestos removalist's report and clearance certificate
- Any further testing undertaken of soils/fill during the works
- Details of any unexpected contamination discovered at the site and a summary of actions undertaken to manage it
- Details of the SQEP monitoring undertaken during the works
- Air monitoring results
- Validation sampling, including results and assessment of results against the remediation goals (**Table 4** and **Table 6**)
- Proof of disposal of any contaminated soils/fill to a facility authorised to receive the material by way of waste manifests and/or weigh bridge receipts
- The timing of the works.
- Confirmation from the SQEP that the site is suitable for its proposed future uses
- Details of any required ongoing management, for example the area where no produce is to be grown, or the encapsulation cell (refer to **Section 5.2**).

12. Reference List

CLS 2022: *69 Inland Kaikōura Road. Preliminary & Detailed Site Investigation*, Contaminated Land Solutions.

Ministry for the Environment 2011, *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, Ministry for the Environment

Ministry for the Environment 2012, *Users' Guide. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*), Ministry for the Environment.

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

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

Appendix 1

About Your Report

Important Information About Your Report



Contaminated Land Solutions (CLS) is an independent, New Zealand owned company (NZBN: 9429049086843).

1 Limitations

1.1 Use of this Report

- CLS has prepared this report for Drones at Work Limited, exclusively for its use. It has been prepared in accordance with our scope of services and the instructions given by or on behalf of Drones at Work Limited. Data or opinions contained within the report may not be used in other contexts or for any other purposes without CLS's prior review and agreement.
- CLS accepts no responsibility or liability to any third party for the use of, or reliance on, the report by any third party and the use of, or reliance on, the report by any third party is at the risk of that party.

1.2 Project Specific Limitations

- In preparing the report, CLS has relied upon plans and other information ('Client Data') provided by or on behalf of the Client. Except as otherwise stated in the report, CLS has not verified the accuracy, currency or completeness of the Client Data.
- This report has not specifically promoted the involvement of tangata whenua. The involvement of Māori stakeholders in the issues raised by the report should be considered by the client. Likewise, mātauranga Māori may be relevant when considering the findings of the report and this knowledge has not been sought during the production of this report. The southern third (approximate) of the site is within a Rūnanga Sensitive Area: Wāhi Tapu.

1.3 Limits on Investigation and Information

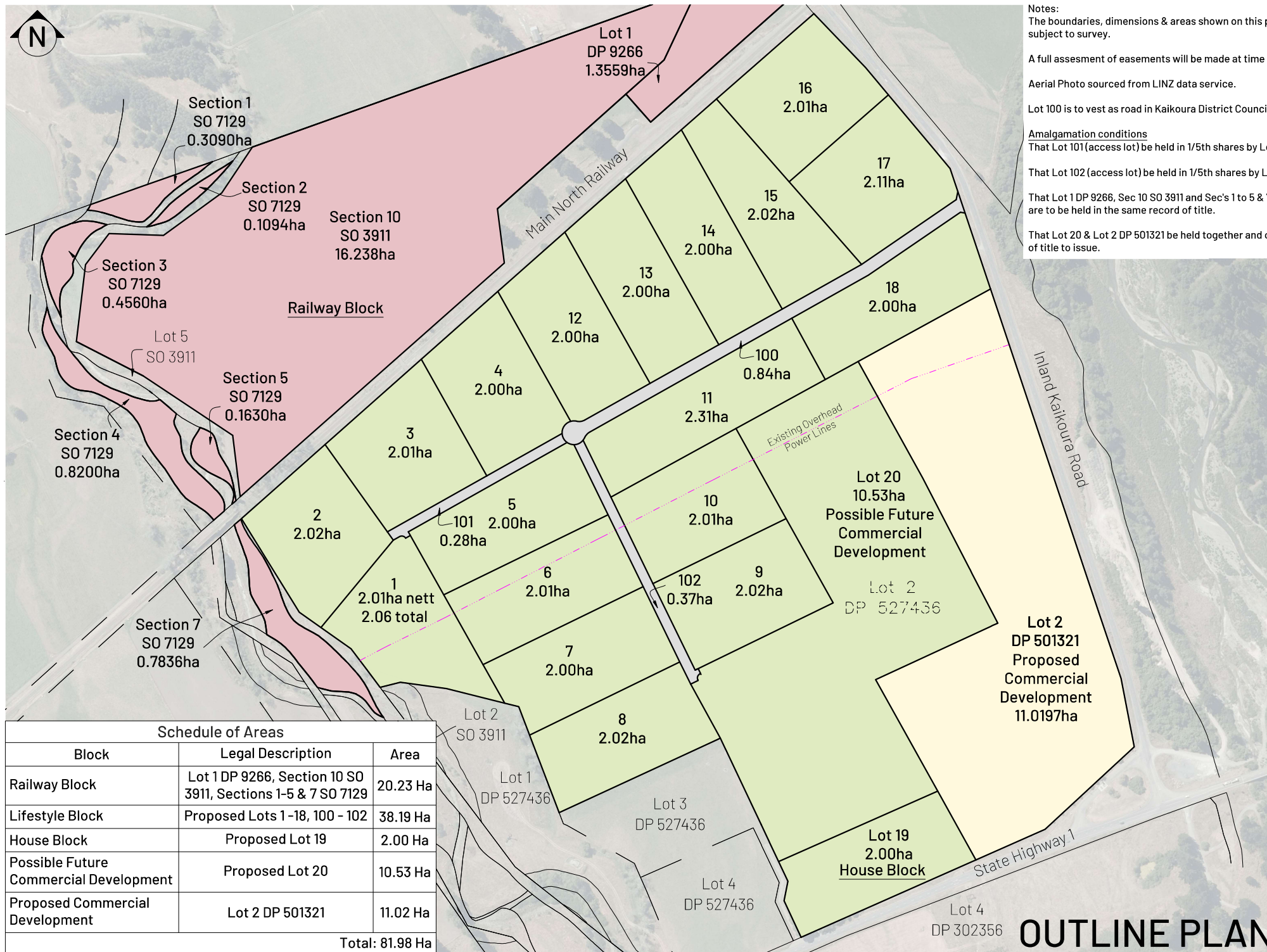
- This investigation is based on information collected at the times indicated in the report. This information will become outdated with time.
- Soil and rock formations are often variable, and this along with use, storage or disposal of hazardous substances on a site can result in heterogeneous distribution of contaminants. Contaminant concentrations may be evaluated at chosen sample locations - however, conditions between sample sites can only be inferred based on geological and hydrological conditions and the nature and the extent of identified contamination. Boundaries between zones of contamination are often indistinct, and therefore interpretation is based on available information and the application of professional judgement.
- Only a finite amount of information has been collected to meet the specific technical requirements of Drones at Work Limited's brief and this report does not purport to completely describe all the site's characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it must be appreciated that actual conditions could vary from the assumed model.
- This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should further information become available regarding the conditions at the site, including previously unknown likely sources of contamination, CLS reserves the right to review the report in the context of the additional information.
- This report has been prepared for Drones at Work Limited for its own use and is based on information provided. CLS takes no responsibility and disclaims all liability whatsoever for any loss or damage that Drones at Work Limited may suffer as a result of using or relying on any such information or recommendations contained in this report, except to the extent CLS expressly indicates in this report that it has verified the information to its satisfaction. This report is not to be reproduced either wholly or in part without our prior written permission.

1.4 Reporting Standard

This report meets the requirements of the Ministry for the Environment *Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand (Revised 2021)* (MfE 2021) and is certified by a practitioner meeting the requirements to be classified as a Suitably Qualified and Experienced Practitioner (SQEP).

Appendix 2

Outline Plan



Notes:
 The boundaries, dimensions & areas shown on this plan are subject to survey.

A full assesment of easements will be made at time of survey.

Aerial Photo sourced from LINZ data service.

Lot 100 is to vest as road in Kaikoura District Council.

Amalgamation conditions
 That Lot 101 (access lot) be held in 1/5th shares by Lots 1-5.
 That Lot 102 (access lot) be held in 1/5th shares by Lots 6-10.
 That Lot 1 DP 9266, Sec 10 SO 3911 and Sec's 1 to 5 & 7 SO 7129 are to be held in the same record of title.
 That Lot 20 & Lot 2 DP 501321 be held together and one record of title to issue.

Schedule of Areas

Block	Legal Description	Area
Railway Block	Lot 1 DP 9266, Section 10 SO 3911, Sections 1-5 & 7 SO 7129	20.23 Ha
Lifestyle Block	Proposed Lots 1-18, 100 - 102	38.19 Ha
House Block	Proposed Lot 19	2.00 Ha
Possible Future Commercial Development	Proposed Lot 20	10.53 Ha
Proposed Commercial Development	Lot 2 DP 501321	11.02 Ha
Total:		81.98 Ha

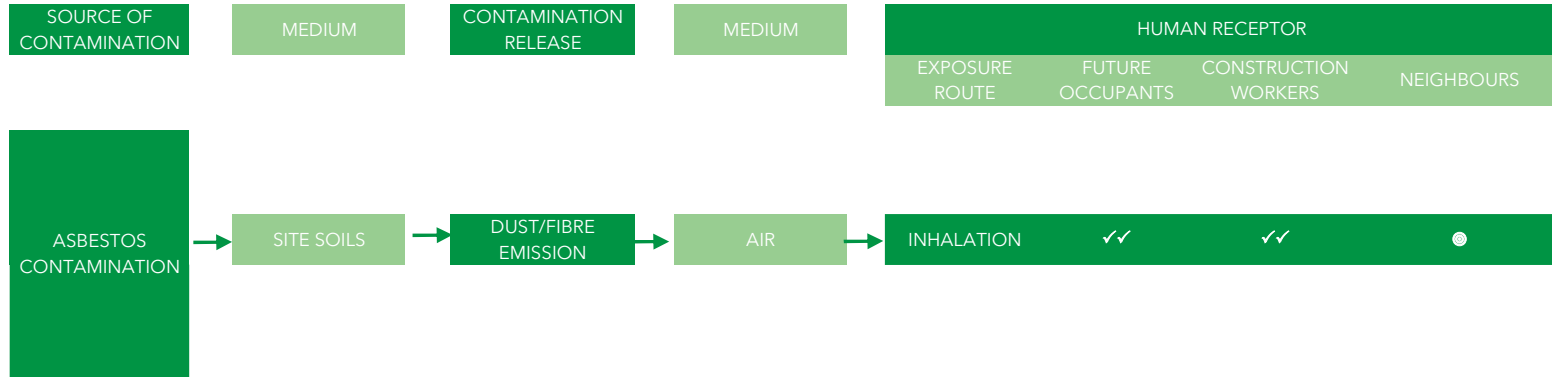
Schedule of Block Areas

Scale	1:4000 at A3	
Date	6/5/2021	
Client	Kaikoura Business Park 2021 Ltd	
Drawn	AM	
Review	CT	
Rev.	Date	Amendment
A	20/5/21	client issue
B	24/5/21	title block text size changed
C	24/5/21	commercial block areas separated schedule of areas table amended
Revision	C	
Sheet	1 of 1	

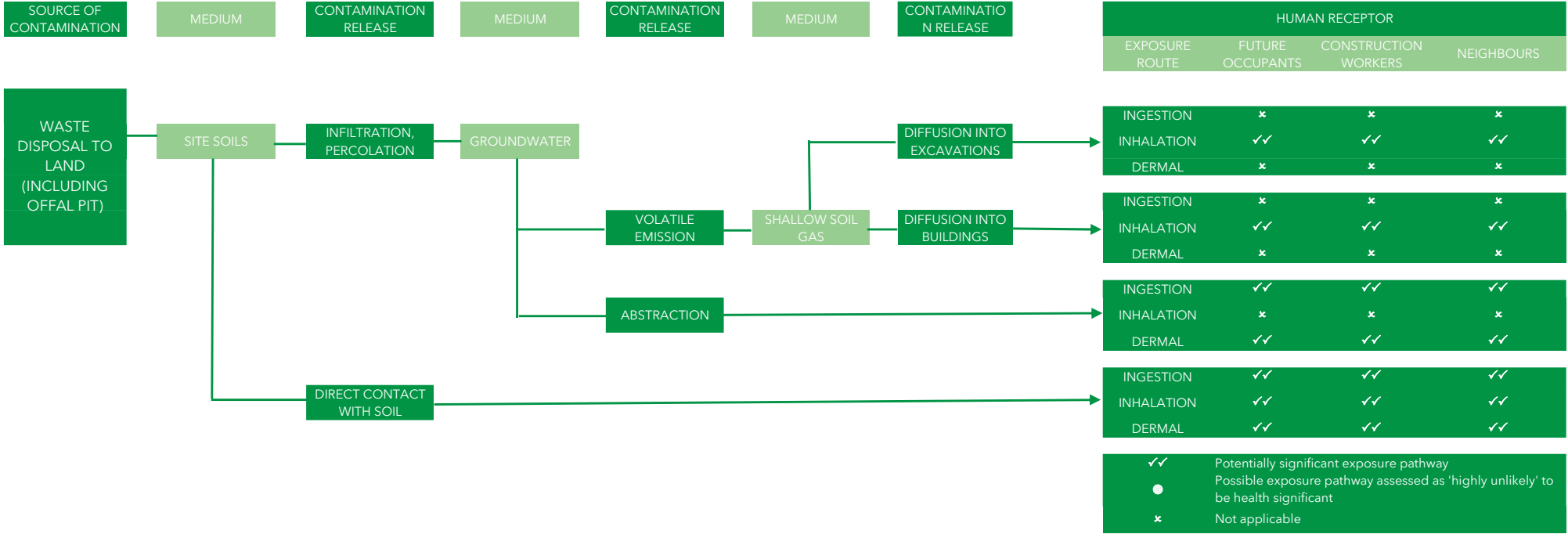
OUTLINE PLAN

Appendix 3

Conceptual Site Model



✓✓ Potentially significant exposure pathway
 ● Possible exposure pathway assessed as 'highly unlikely' to be health significant
 ✕ Not applicable



Appendix 4

Asbestos analysis
laboratory reports



Certificate of Analysis

Client:	Contaminated Land Solutions Limited	Lab No:	2819089	A2Pv1
Contact:	Helen Davies	Date Received:	06-Jan-2022	
	C/- Contaminated Land Solutions Limited	Date Reported:	07-Jan-2022	
	8a Huntsbury Avenue	Quote No:	115654	
	Huntsbury	Order No:		
	Christchurch 8022	Client Reference:	P2021031	
		Submitted By:	Helen Davies	

Sample Type: Soil

	Sample Name:	PO1 04-Jan-2022	PO2 04-Jan-2022	I01 05-Jan-2022		
	Lab Number:	2819089.1	2819089.2	2819089.3		
Asbestos Presence / Absence		Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.	-	-
Description of Asbestos Form		-	Fibre cement, ACM debris and Loose fibres	ACM debris	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	0.119	< 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	934.7	822.0	491.3	-	-
Dry Weight	g	917.6	804.0	433.5	-	-
Moisture	%	2	2	12	-	-
Sample Fraction >10mm	g dry wt	448.6	347.4	76.2	-	-
Sample Fraction <10mm to >2mm	g dry wt	285.6	269.0	84.0	-	-
Sample Fraction <2mm	g dry wt	182.6	187.1	272.8	-	-
<2mm Subsample Weight	g dry wt	56.7	56.0	55.8	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	0.9602	< 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	0.00574	0.00026	-	-



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.

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			
Weight 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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
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 07-Jan-2022. 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



Certificate of Analysis

Page 1 of 2

Client:	Contaminated Land Solutions Limited	Lab No:	2896765	A2Pv2
Contact:	Helen Davies	Date Received:	25-Feb-2022	
	C/- Contaminated Land Solutions Limited	Date Reported:	09-Mar-2022	(Amended)
	8a Huntsbury Avenue	Quote No:	110877	
	Huntsbury	Order No:		
	Christchurch 8022	Client Reference:	69 Inland Kaikoura Road	
		Submitted By:	Helen Davies	

Sample Type: Soil

Sample Name	Lab Number	As Received Weight (g)	Dry Weight (g)	<2mm Subsample Weight (g dry wt)	Asbestos Presence / Absence	Description of Asbestos Form
SS201 0.0m	2896765.1	709.0	627.7	53.9	Asbestos NOT detected.	-
SS202 0.1m	2896765.4	843.5	771.8	51.5	Chrysotile (White Asbestos) detected.	Loose fibres (major)
SS203 0.0m	2896765.5	517.0	342.1	51.6	Asbestos NOT detected.	-
SS204 0.0m	2896765.6	674.3	588.4	53.1	Asbestos NOT detected.	-
SS205 0.0m	2896765.7	582.6	485.0	51.2	Asbestos NOT detected.	-
SS206 0.0m	2896765.8	830.7	771.6	50.9	Asbestos NOT detected.	-
SS207 0.0m	2896765.9	729.1	604.2	54.5	Asbestos NOT detected.	-
SS208 0.0m	2896765.10	948.4	892.9	56.6	Amosite (Brown Asbestos), Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	ACM debris (major)
SS209 0.0m	2896765.11	577.9	461.3	56.0	Asbestos NOT detected.	-
SS210 0.0m	2896765.12	897.3	876.2	50.6	Asbestos NOT detected.	-
SS211 0.0m	2896765.13	709.6	626.4	54.7	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Fibre cement (2 x1 cm), ACM debris (major) and Loose fibres (major)
SS215 0.0m	2896765.14	622.4	566.5	59.5	Asbestos NOT detected.	-
SS216 0.0m	2896765.15	499.8	368.9	55.7	Asbestos NOT detected.	-
SS217 0.0m	2896765.16	510.5	392.0	51.3	Asbestos NOT detected.	-
SS218 0.0m	2896765.17	461.5	342.7	51.3	Asbestos NOT detected.	-
SS220 0.0m	2896765.19	702.2	626.5	57.7	Asbestos NOT detected.	-
SS221 0.0m	2896765.20	555.6	487.8	55.8	Asbestos NOT detected.	-
SS222 0.0m	2896765.21	637.1	585.2	55.8	Asbestos NOT detected.	-
SS223 0.0m	2896765.22	513.1	439.0	57.2	Asbestos NOT detected.	-
SS223a 0.0m	2896765.23	727.8	657.4	55.2	Asbestos NOT detected.	-
SS224 0.0m	2896765.24	499.4	402.4	50.6	Asbestos NOT detected.	-
SS208 0.15m	2896765.27	317.7	270.9	50.6	Chrysotile (White Asbestos) detected.	Loose fibres (minor)
SS211 0.15m	2896765.28	370.5	318.1	53.0	Asbestos NOT 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 '2896765-A2Pv1' issued on 02-Mar-2022 at 1:05 pm.
Reason for amendment: Additional analysis added.



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.

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
Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1, 4-17, 19-24, 27-28
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, 4-17, 19-24, 27-28
<2mm Subsample Weight	Sample dried at 100 to 105°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	1, 4-17, 19-24, 27-28
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, 4-17, 19-24, 27-28
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1, 4-17, 19-24, 27-28

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

Testing was completed between 01-Mar-2022 and 09-Mar-2022. 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 BApSc
Laboratory Technician - Asbestos

CLS contaminated land solutions

RONGOĀ WHENUA POKE