DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS

REMEDIATION ACTION PLAN

42542 / STAGE 3 – 6 THE CLEARING - AMBERLEY / UWC LIMITED

0800 999 333
hello@do.nz

Level 1, 24 Moorhouse Avenue, Addington
PO Box 589, Christchurch 8140
www.do.nz

Davis Ogilvie & Partners Ltd

QUALITY ASSURANCE

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Prepared and Approved By:	**Gareth Oddy** Technical Director - Environmental Scientist CEnvP, IP402, IP405	**Signature:**
Reviewed By:	**Andy Bunce** Engineering Geologist MSci (Hons)	**Signature:**

DISCLAIMER

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Davis Ogilvie did not complete an assessment of all possible conditions or circumstances that may exist at the site. Davis Ogilvie has provided an opinion based on information reviewed, site observations and investigations, and analysis methodologies current at the time of reporting. Variations in conditions may occur, and there may be conditions onsite which have not been revealed by the investigation, which have not been taken into account in the report. No warranty is included — either expressed or implied—that the actual conditions will conform to the assessments contained in this report. If any unexpected contamination is discovered during any soil disturbance works at the site, Davis Ogilvie should be notified to assess contamination conditions and possible management requirements.

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

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1.0 INTRODUCTION BACKGROUND

1.1 Background

Davis Ogilvie & Partners Ltd. (Davis Ogilvie) has been engaged by UWC Limited (the client) to complete a Remedial Action Plan (RAP) and resource consent applications for proposed earthworks at 187 & 193 Carters Road, Amberley. This RAP excludes 52 & 64 Amberley Beach Road as no contamination requiring remediation was identified at that address. This work was undertaken in accordance with Davis Ogilvie's agreement dated 9 July 2021.

The site currently comprises a farm located approximately 350 m south of the centre of Amberley, on the eastern side of State Highway 1 (Carters Road), as seen in Figure 1. The combined area of the existing properties (the site) is 32.73 ha.

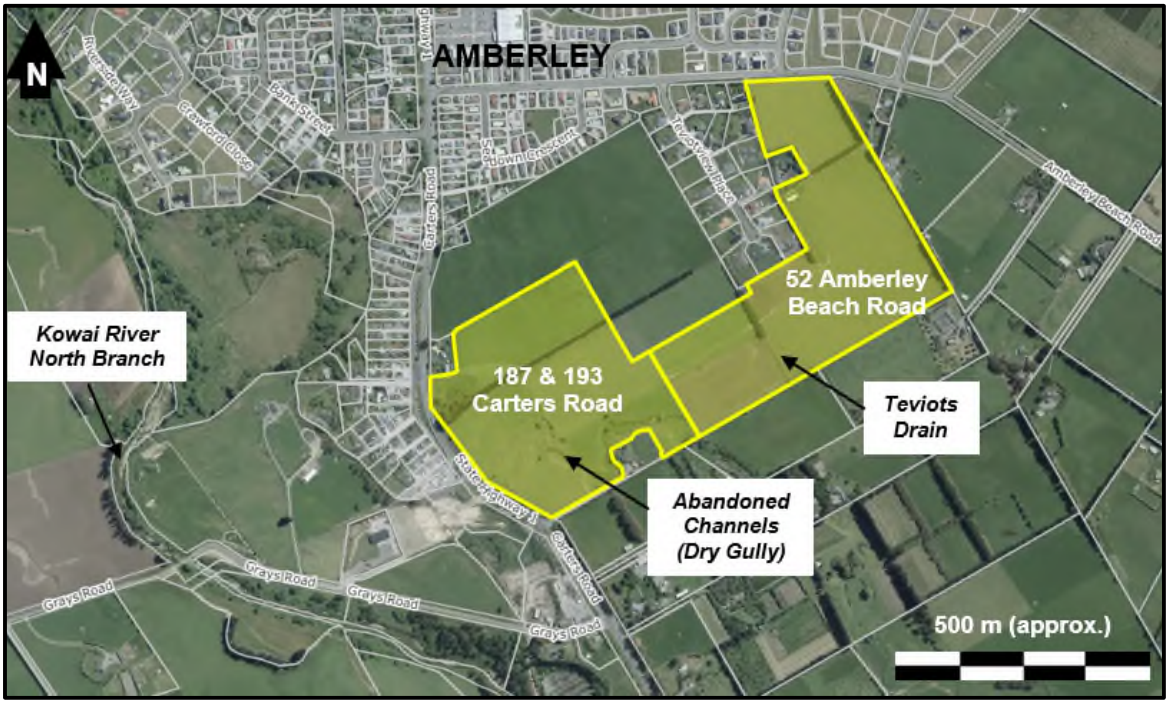

Figure 1: Site location in relation to Amberley township.
Source: Grip Online Cadastral Mapping https://map.grip.co.nz/map/

The proposed subdivision plans for the site (DWG 300F and 301B, Figure 2) include the development of new residential lots to be undertaken in multiple stages. The development will include stormwater disposal areas in the eastern corner and future stages include similar disposal areas in Dry Gully.

The Ministry for the Environment (MfE)'s 2011 Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS[1]) applies to activities on sites that have, have had, or are more likely than not to have had an activity on the Hazardous Activities and Industries List (HAIL) carried out.

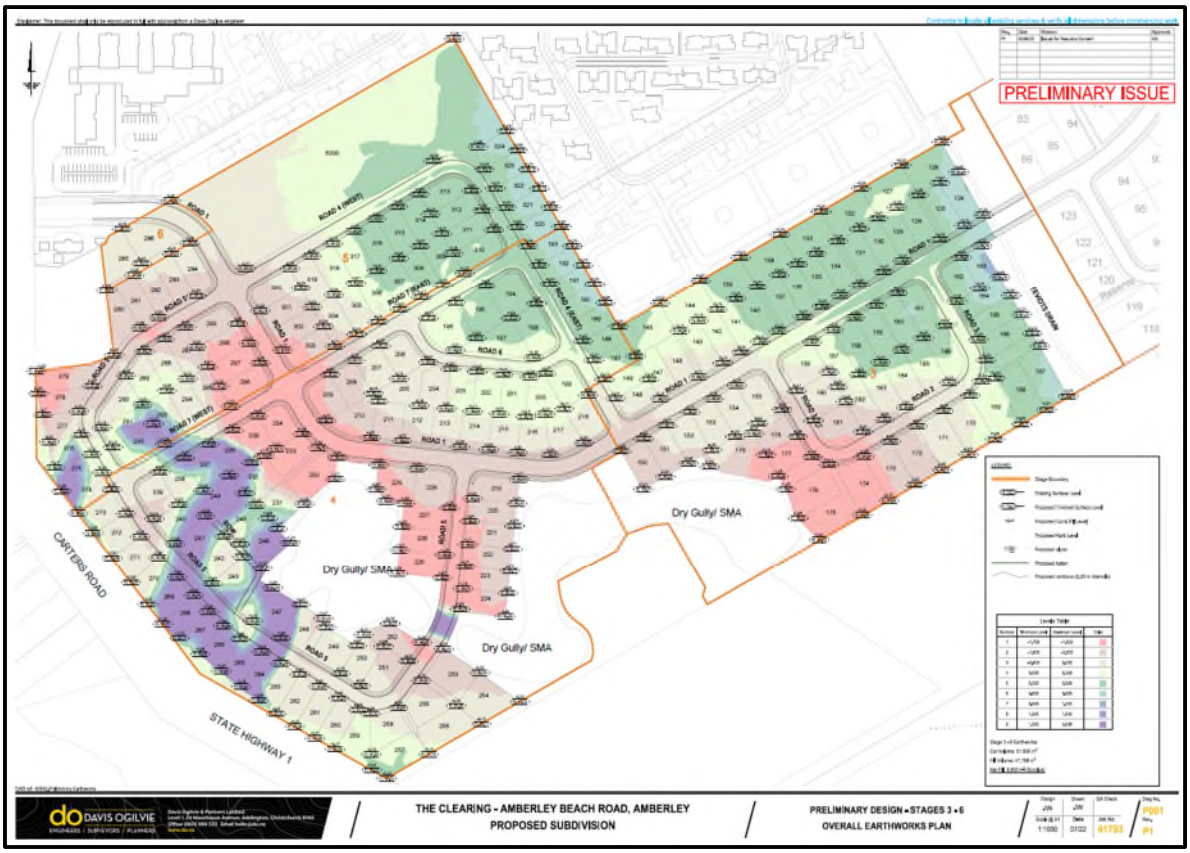

Figure 2: Proposed Preliminary Design and Subdivision Plan for Stages 3 – 6, P001, P1, July 2022.

187 & 193 Carters Road is not identified on ECan's LLUR, however a preliminary review of historical aerial photographs indicated buildings were present on the western portion of the site prior to the 1960s, and contamination of soils associated with lead paint can be associated with such buildings.

[1] Ministry for the Environment (MfE) (2012). Users' Guide. National Environmental Standard for Assessing and Managing Contaminants in Soils to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.

Subdivision, soil disturbance and change of land use are activities listed under the NESCS, and HAIL and / or potential HAIL activities have been identified. As such, a Detailed Site Investigation of the site was required. Davis Ogilvie have previously completed a Detailed Site Investigation (DSI)[2] and Supplementary DSI[3] at the site to evaluate the presence of HAIL activities and the presence of soil contaminants.

Concentrations exceeding Soil Contaminant Standards (SCS) have been identified in soil within areas of the site and require remediation prior to earthworks and change of land use. A summary of the contaminant concentrations and distribution are presented in this RAP, however the previous DSI Reports should be read in conjunction with this Report.

1.2 Statutory Provisions

As contaminant concentrations in excess of background were detected, the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS, 2011) are considered to apply and application for NESCS consent for subdivision, change of land use and soil disturbance is required for the proposed development.

The objective of this RAP is to detail proposed remedial works for the detected contamination within the site, and to set out management and monitoring requirements to be implemented during disturbance of soils at the site in order to mitigate potential adverse effects to human health and / or the environment.

Note that this RAP is intended to support application for consent under the NESCS Regulations. Other resource consent requirements will be addressed under separate Building and / or Land Use consent applications.

1.3 RAP Scope

This RAP has been produced together with an assessment of environmental effects to support resource consent applications being obtained. In addition, this RAP has been designed to assist UWC Limited and their nominated subcontractors in meeting their duties under the Health and Safety at Work Act 2015 in relation to the identified land contaminants. Additional health and safety considerations related to earthworks and construction sites will need to be considered by the principal contractor and controls applied where applicable.

[2] Davis Ogilvie & Partners (2022). Detailed Site Investigation: 187 & 193 Carters Road and 52 Amberley Beach Road, Amberley. 41793. May 2022.
[3] Davis Ogilvie & Partners (2022). Supplementary Detailed Site Investigation: 187 & 193 Carters Road, Amberley. 42542. February 2023.

Due to the contaminants of concern identified, remediation of the impacted soils is required prior to site redevelopment. The proposed soil disturbance volumes mean that the site works are likely to be considered by Hurunui District Council (HDC) as a restricted discretionary activity under Regulation 10 of the NES.

This RAP has been completed in order to provide suitable mitigation controls related to the identified contaminants, so that UWC Limited and it's appointed contractors can minimise the potential for significant adverse environmental and / or human health effects to arise during the earthworks, and to provide a methodology to enable the remediation of contaminants.

To address the presence of heavy metals at the site, this RAP includes:

- Details recommended for the remedial methodology and procedures for contaminated soil removal.
- Details of the controls to be implemented during redevelopment works to protect site workers and the surrounding residential receptors.
- Monitoring requirements during remedial earthworks.
- Details the means of transport and disposal locations for the various waste streams from the site.
- Provides soil validation criteria to be completed during and post remediation to confirm the remedial goals have been met.

This RAP has been produced under the supervision of a suitably qualified and experienced practitioner (SQEP) and has been reported in accordance with the MfE 2001, Guidelines for Reporting on Contaminated Sites in New Zealand (CLMG No.1).

2.0 PLAN MANAGEMENT AND CONTROLS

Excavation works, soil handling and soil disturbance activities at the site shall be controlled in accordance with the guidance provided in this RAP. These activities include, but are not limited to:

- *Bulk earthworks, including cutting, filling, and compacting.*
- *Loading and transport of material around the site.*
- *Equipment decontamination.*

If contamination is found that varies from what has been assumed in preparing this RAP, the RAP will be updated to account for the changed site understanding. If a revised RAP is prepared, it will be re-distributed to Council and the project team. All personnel assigned to this project must sign the Agreement and Acknowledgement Sheet to confirm that they understand and agree to abide by the provisions of this RAP (see **Appendix A**).

2.1 Distribution

The following parties shall be provided with a copy of this RAP:

- UWC Limited and / or its representatives.
- Hurunui District Council.
- Any subcontractors that are required to complete the remedial site works.

A copy of this RAP must be kept on-site at all times. It is the responsibility of UWC Limited to distribute the RAP to all contractors and subcontractors carrying out any land disturbance activities on the site.

2.2 Roles and Responsibilities

The implementation of this RAP is the responsibility of the Primary Contractor engaged by UWC Limited. The Primary Contractor may at times delegate responsibility for individual items to its sub-contractors. However, the Primary Contractor retains overall responsibility for implementation of this RAP and any changes required should the understanding of site conditions change.

Compliance with the guidance within this RAP must be followed by all persons involved in any works at the site that may result in the disturbance and / or excavation of soil. It is the primary contractor's responsibility to ensure that all site workers have been trained on the RAP and understand its requirements.

This RAP is not intended to relieve the Primary Contractor or the controller of the place of work of their responsibility for the health and safety of their workers and contractors under the Health and Safety at Work Act 2015.

The responsibilities of each party are summarised in Table 1.

Table 1: Assigned Responsibilities for Site Work	
Role	**Responsibility**
Site Owner	To distribute this RAP and be responsible for ensuring that the site works are undertaken in accordance with this document and any revisions to this document. This also includes ensuring that all site staff and subcontractors are aware of and comply with the procedures and health and safety requirements contained within this document.
Site Contractor	To distribute the RAP including updated versions, and to ensure that the correct copy of the RAP is on site at all times. To provide control and validation of the redevelopment works. It is recommended that a designated, suitably trained Site Supervisor is present to oversee the works. The Site Supervisor would address changes to site procedures, as necessary, should unanticipated conditions arise. Should an incident occur on-site which may result in discharges, the supervisor will take control of the situation and coordinate the efforts of all on site to minimise the impact. Health and Safety concerns will take precedence over environmental discharges and should it be unsafe to employ controls or emergency measures immediately, worker and public health and safety take priority.
Contaminated Land Specialist (SQEP) **Davis Ogilvie**	Liaise with the contractor during the course of the works, and to ensure works are conducted in accordance with the RAP and provide environmental support (if required) and to undertake soil validation sampling.

2.3 Review and Update

This document should be seen as a "*live*" document and modified to address any specific health, safety and environmental issues that arise during the redevelopment works. Any changes of note to this document should be confirmed in writing to Hurunui District Council.

It is the responsibility of the Contractor to distribute any changes to the RAP to site workers (including subcontractors) and to keep a copy of the updated RAP on-site at all times.

3.0 SITE INFORMATION

3.1 Site Identification

Details of the property are provided below in Table 2[4].

Table 2: Site Details	
Item	**Description**
Address	187 & 193 Carters Road
Legal Description	Lot 2 DP 559093
Property Owner	Hurunui Developments Limited
Site Area	15.0166 ha
Territorial Authority	Hurunui District Council
Site Location (GRIP)	 **Figure 3: Lot 2 DP 559093, highlighted in yellow.**

[4] Information sourced from GRIP Online Cadastral Mapping, accessed June 2022.

3.2 Site Description

The site is currently used for pastoral farming. Existing structures include cattle pens in the southern corner of 187 & 193 Carters Road. The nearest waterway is the Kowai River North Branch, the main channel of which is 500 m west of the site. Abandoned river meander bends known as Dry Gully form incised channels through the southern half of the site. The site is otherwise generally flat lying, with an overall gradient toward the east. A drainage channel (Teviots Drain) passes through the centre of the site.

An approximately 0.2 ha area of dense bush (eucalyptus and thorn bushes) covers a hummocky area of ground on the western side of the site near the entrance off Carters Road. Within this area a former borrow pit is located but is largely obscured from view by the vegetation.

Figure 4: View of western corner of site showing site entrance and area of dense bush. Approximate site boundary indicated. Photograph taken by drone on 13 August 2021, view southwest.

Commercial properties on the far side of Carters Road to the west of the site include the former Amberley sawmill and timber treatment site and a Hynds pipe supply yard. The former timber treatment site is located on land below the terrace that the State Highway is located and therefore unlikely to have affected soil at the subject site. Residential properties are also located on the opposite side of Carters Road facing the site.

4.0 PREVIOUS INVESTIGATION FINDINGS

A Detailed Site Investigation was issued for the subject site by Davis Ogilvie in May 2022. The desktop study of the DSI identified several potential HAIL sources including the following areas:

- Former borrow pit potentially backfilled with waste of unknown quantity, type and origin located in dense vegetation in west of site. Considered to fall within the definition of HAIL G3 'Landfill Sites'.
- Former yard area and sheep dip site in the west of the site to the south of the borrow pit. HAIL A8 'Livestock dip or spray race operations'.
- Burn pit and former farm buildings in the west of the site near site entrance. HAIL I 'Hazardous substance in sufficient quantity that it could be a risk to human health and the environment'.

A former area of fruit trees located in the east of the site at 52 Amberley Beach Road, described by ECan on the LLUR as a potential HAIL, was assessed by the DSI and confirmed to not contain contaminants above relevant criteria.

The potential HAIL areas were investigated by Davis Ogilvie between August to October 2021 via the excavation of test pits and hand augers. Numerous soil samples were collected from each area of potential concern and analysed for potential contaminants of concern. During the initial DSI, due to the overgrown dense vegetation of the borrow pit and tall established trees, access to the pit was restricted. Davis Ogilvie returned to site in October 2022 to complete a supplementary DSI to further refine understanding of the extent of soil contamination previously identified and to evaluate where possible the potential for waste within the borrow pit.

A summary of the HAIL areas and potential contaminants of concern are presented in Table 3.

Table 3: HAIL Activities Onsite		
HAIL Activity	**Details**	**Potential contaminants of concern**
A8 'Livestock dip or spray race operations'	The former sheep dip and footbath located 187 & 193 Carters Road.	Heavy metals and Organochlorine Pesticides (OCPs).
G3 'Landfill sites'	The historic borrow pit is considered likely to have been backfilled following excavation and may therefore contain uncontrolled fill of unknown origin. This may include farm waste or municipal refuse.	Waste dependent but potentially heavy metals and polycyclic aromatic hydrocarbons.
I 'Hazardous substance in sufficient quantity that it could be a risk to human health and the environment'	Lead-based paint was widely used on buildings of the age of the former farm buildings identified in historic aerial photographs of the site.	Studies (Ashrafzadeh et al, 2018 & Schwarz, 2012) of similarly aged buildings have shown that soil surrounding buildings and structures which have had lead-based paint products applied are frequently found to contain elevated concentrations of heavy metals, particularly lead, arsenic and zinc. Potential contaminants (primarily heavy metals) are commonly detected in ash resulting from burn areas.

A summary of the soil contamination results from both investigations is provided below:

- Some samples analysed from targeted locations at 187 & 193 Carters Road exceeded background concentrations for one or more heavy metals.
- Exceedances of arsenic SCS for residential land use were identified in six soil samples collected from the former sheep dip location.
- Elevated lead, copper, arsenic, and zinc concentrations were identified around the former buildings near the site entrance; however, these did not exceed residential SCS apart from in two locations.
- The location of the topsoil samples which exceeded residential SCS and background concentrations are displayed in Figure 5.

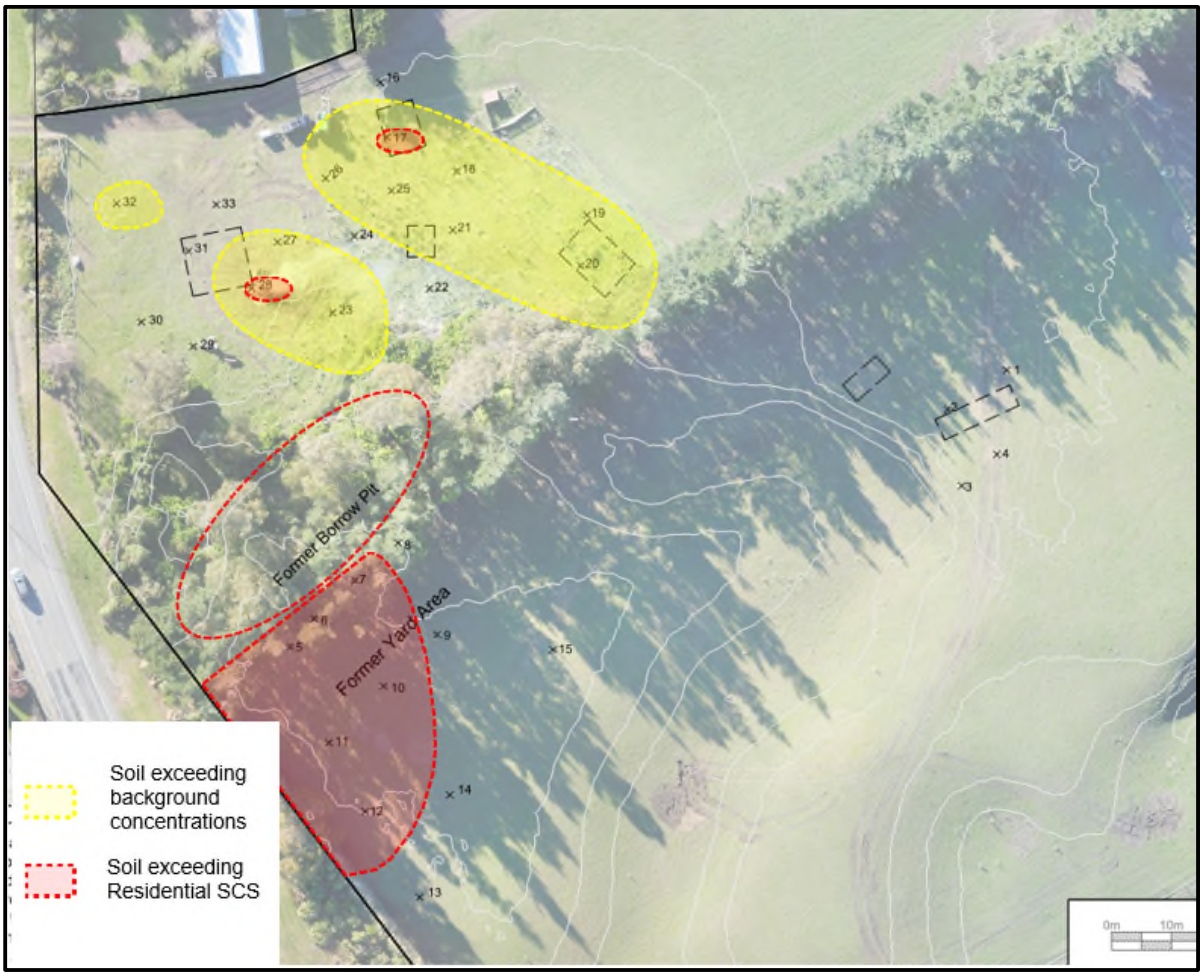

Figure 5: May 2022 DSI Findings showing likely extent of soil exceeding residential SCS. Samples exceeding residential SCS highlighted in red, and those exceeding background concentrations highlighted yellow.

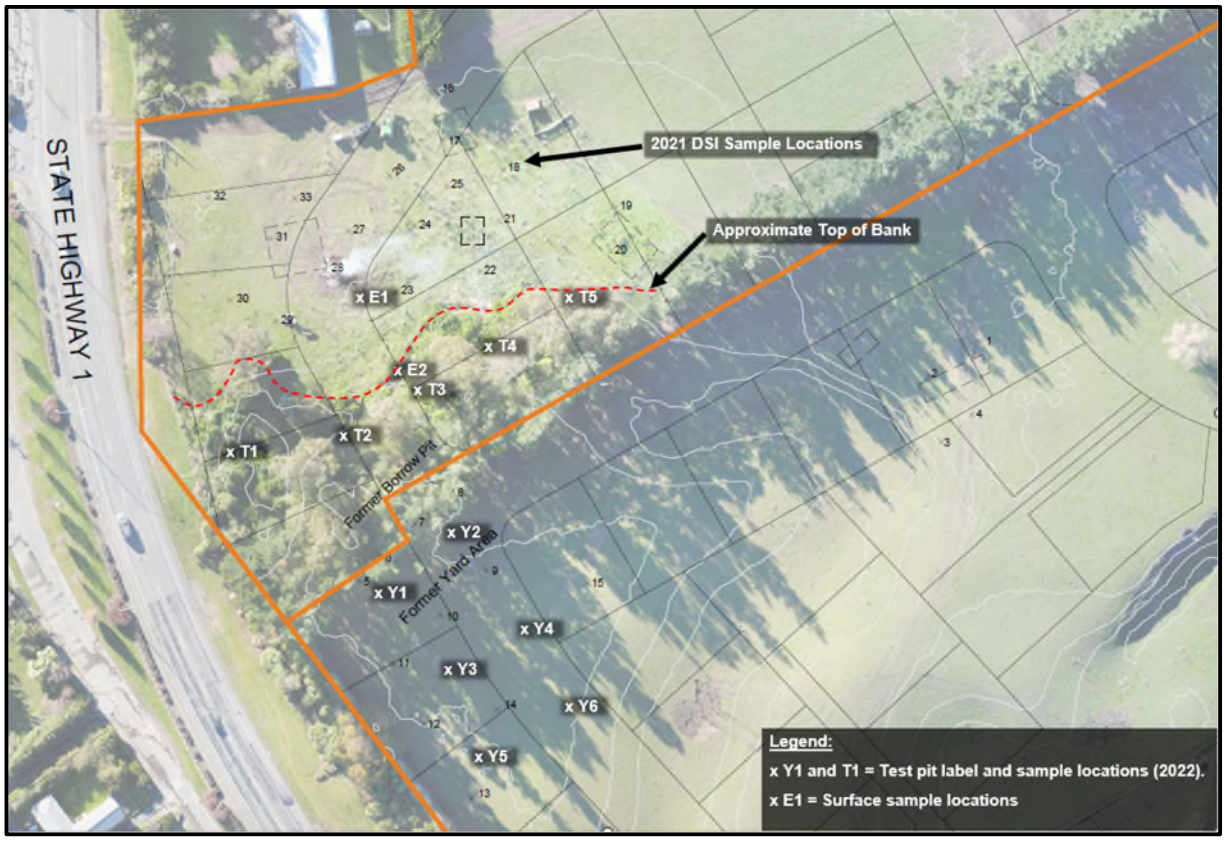

Figure 6: Sample locations depicted on a recent ariel overlain by the proposed scheme plan.

A summary of the results and proposed remedial areas is provided in Table 4.

Table 4: Summary of Soil Contamination

Contaminant of Concern and Location	No. of exceedances / sample locations in area	Location and depth of peak concentration	Peak concentration (mg/kg)	SCS or Guideline level (mg/kg)	Acceptance Criteria reference
Remedial Area A Former outbuildings; Lead	1/10	17 (XRF)	619 mg/kg	210 mg/kg	NES SCS
Remedial Area B Former residence and burn pit; Lead	2/8	28 (sample 21-43719-9) E1 (sample T008837.1.18)	650 mg/kg	210 mg/kg	NES SCS
Remedial Area C Western side of borrow pit; Arsenic	3/9	T1 (0.1 m bgl & 1.4 m bgl)	32 mg/kg	20 mg/kg	NES SCS
Remedial Area D Former Yard and Dip area; Arsenic	7/17	5 and Y1 (both 0.1 m bgl)	107 mg/kg	20 mg/kg	NES SCS

Four areas of soil contamination above adopted human health acceptance criteria (SCS – residential land use, 10% produce) have been identified and will require remediation or management during the proposed development. The four remedial areas are presented in Figure 7.

In addition to these four remedial areas, several areas have been identified that contain contaminants of concern above background soil concentrations but below proposed land use criteria. Although remediation of these areas is not necessary, management of the soil during redevelopment will be required to ensure it is handled, stored, and re-used or disposed of appropriately. Should this soil be re-used on a proposed residential lot the new owner will need to be made aware of the status of this soil. If the soil is disposed of then the soil is not considered to meet the current definition of cleanfill and is unlikely to be accepted as waste at cleanfill disposal sites.

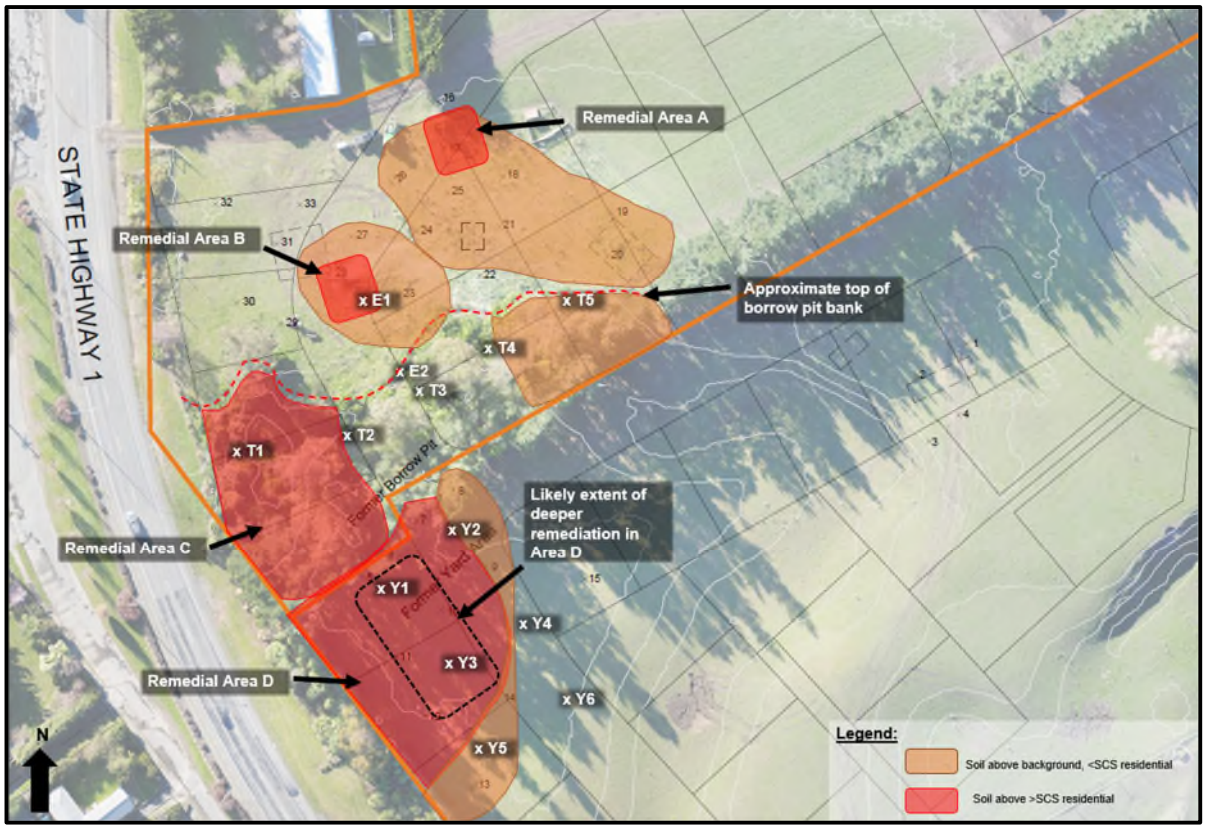

Figure 7: Proposed Remedial Areas A – D. The remedial areas are approximate only and are not for set out purposes.

5.0 REMEDIAL OPTIONS APPRAISAL

The DSI identified four areas of soil contamination that present a potential significant risk to human health for proposed residential land use receptors.

Remediation of these areas will therefore be required to mitigate the exposure risk to human health. Four primary remedial options have been evaluated to resolve the identified contamination on the site:

1. Removal of impacted soil off-site to a licenced landfill (Kate Valley Landfill).
2. Excavation and encapsulation of the contamination on the site in a purpose-built remedial cell.
3. Excavation and capping of the contamination in a purpose-built bund within a recreational reserve.
4. Change design and not develop impacted areas.

The preferred remedial option is to excavate the soil containing contaminants of concern over the residential (10% produce consumption) standards and disposal of this soil to Kate Valley Landfill or another appropriate managed fill site.

The transportation and disposal of surplus soil can have significant sustainability and climate change impacts. Best practice and guidance on the sustainable use of topsoil on construction sites (DEFRA, 2009) provides advice that off-site disposal should be a last resort. Unfortunately given the limited options for on-site encapsulation or re-use, off-site disposal for the contaminated soil has been identified as an option for remediated soils.

Re-use of soil or encapsulation of soil within recreational reserve areas is not possible due to the limited reserve area within the development. A change of design is at this stage not considered to be the best practical option for the redevelopment and would also retain the contamination at the site.

This RAP is for the removal of contaminated soil within the areas confirmed to be contaminated above residential land use criteria. It should be noted that during these works, more contaminated material may be exposed and would also require remediation. This is particularly true of the borrow pit which could only be partially investigated during the October 2022 DSI due to the presence of established trees and thick vegetation.

6.0 PROPOSED REMEDIATION ACTIVITY

Due to the need to remediate the land to make it suitable for residential land use, a NES land use consent is required from HDC and additional land use consents also required from ECan.

The proposed activity is to excavate to the required depth within each remedial area in order to remove soil which contains contaminants of concern above residential SCS. Soil will be either loaded directly into trucks in order to transport to an off-site landfill or will be temporarily stockpiled under controlled conditions to allow further assessment of contaminant properties.

6.1 Proposed Remedial Earthworks

The volume of in-situ contaminated material underlying the site estimated to be contaminated at concentrations above residential standards and require removal is approximately 2,200 m^3. This volume assumes a 0.3 m dig out in Remedial Areas A & B, a dig out to a maximum depth of 0.15 and 1.0 m bgl in Areas C & D respectively. The initial volume does not include a bulking factor nor a contingency volume. This initial volume is below the NES permitted disturbance volume but above the removal volumes and therefore an NES consent may be required, however this should be confirmed with HDC. A summary of the soil disturbance volumes anticipated for the earthworks is provided in Table 5.

Table 5: Comparison of Proposed Earthwork Volumes to NES

NES Regulation			Site Area	Permitted Site Disturbance / Removal Volumes	Proposed Earthwork / Disposal Volumes
Clause	Description	Permitted Volume			
8.3c	Soil Disturbance	25 m^3 per 500 m^2	150,000 m^2	7,500 m^3	**2,300 m^3**
8.3d	Soil Removal	5 m^3 per 500 m^2 (per year)	150,000 m^2	1,500 m^3	**2,300 m^3**

7.0 STATUTORY CONSIDERATIONS

This document supports an application for discharge consent to undertake remediation works of a contaminated site in accordance with the requirements of the RMA. The RMA, and associated planning documents, identify the circumstances where resource consents are required for an activity, as well as establishing the 'thresholds' that must not be contravened by an activity. This section of the document therefore assesses the statutory matters that arise from the RMA and the relevant planning documents in relation to the proposed remediation.

The regulatory frameworks and rules relating to the management and control of contaminated sites in the Canterbury region are specified in two documents; the Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (NES) (2012) and Environmental Canterbury (ECan) Regional rules as defined in the Land and Water Regional Plan (LWRP). A summary of each and its implications for the site are provided in the following sections.

7.1 Resource Management Regulations (NES)

The NES came into effect on 1 January 2012 (MfE, 2011). The NES introduced soil contaminant standards (SCSs) for 12 priority contaminants for the protection of human health under a variety of land use scenarios.

The NES requires that the Contaminated Land Management Guideline No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values be used where an NES SCS is not available. The NES do not consider environmental receptors; accordingly, the application of guidelines relevant to environmental receptors shall be implemented according to the MfE Contaminated Land Management Guideline No.2 and relevant rules in Regional Plans.

According to the NES regulations (8.3), disturbing the soil of the piece of land is a permitted activity while the following requirements are met:

a) Controls to minimise the exposure of humans to mobilised contaminants must:
- *i. Be in place when the activity begins.*
- *ii. Be effective while the activity is done.*
- *iii. Be effective until the soil is reinstated to an erosion-resistant state.*

b) The soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

c) The volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2:

d) Soil must not be taken away in the course of the activity, except that:
- *i. For the purpose of laboratory analysis, any amount of soil may be taken away as samples.*
- *ii. For all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year.*

e) Soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind.

f) The duration of the activity must be no longer than 2 months:

g) The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Based on the soil volume to be excavated and require disposal off-site, a resource consent under the NES is required.

7.2 ECan Land and Water Regional Plan (LWRP)

The Canterbury Land and Water Regional Plan (LWRP) identifies the resource management objectives for managing land and water resources in Canterbury to achieve the purpose of the Resource Management Act 1991 (RMA). Within the LWRP there are a number of applicable rules to this proposed activity.

Table 6: LWRP Rule Review

Rule	Control	Description	Comment
5.94A The discharge of construction-phase stormwater, other than into or from a reticulated stormwater system, to a surface waterbody, or onto or into land in circumstances where a contaminant may enter groundwater or surface water	permitted activity	1. The area of disturbed land from which the discharge is generated is less than: a) 1000 m^2 for any construction-phase stormwater generated as a result of work carried out in an area shown as High Soil Erosion Risk on the Planning Maps; or b) two hectares in any other location; and 2. The concentration of total suspended solids in the discharge shall not exceed: a) 50 g/m^3 where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or; or b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100 g/m^3 in which case Schedule 5 visual clarity standards shall apply; and 3. The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and 4. The discharge is not from, into or onto contaminated or potentially contaminated land; and 5. The discharge does not contain any hazardous substance; and 6. The discharge does not occur within a Community Drinking-water Protection Zone as set out in Schedule 1.	**The discharge of construction phase stormwater during remediation will be from a contaminated site. While the earthworks are unlikely to result in a significant discharge to groundwater, some contaminants may be exposed to rainfall during the earthworks and infiltration is a potential. It is therefore not considered to be a permitted activity. Activity meets all other conditions.**
5.175	The use of land to excavate material	1. Over the Coastal Confined Gravel Aquifer System, as shown on the Planning Maps: a) there is more than 1 m of undisturbed material between the deepest part of the excavation and Aquifer 1; and	**The site is not located over the coastal confined gravel aquifer and groundwater is located at a depth of approximately 2.6 - 3.1 m bgl of the ground surface.**

		b) if more than 100 m^3 of material is excavated, the excavation does not occur within 50 m of any surface waterbody; or	**Remedial excavations are anticipated to be up to 1.2 m bgl and therefore not within 1 m of the groundwater table.** **Based on this the activity would be considered as permitted.**
5.176	The use of land to excavate material that does not comply with one or more of the conditions of Rule 5.175 is a restricted discretionary activity.	The exercise of discretion is restricted to the following matters: **1.** The actual and potential adverse environmental effects on the quality of water in aquifers, rivers, lakes, wetlands; and **2.** Any need for remediation or long-term treatment of the excavation; and **3.** The protection of the confining layer and maintaining levels and groundwater pressures in any confined aquifer, including any alternative methods or locations for the excavation; and **4.** The management of any exposed groundwater.	Refer to AEE for effects and controls related to this. Affect of proposed activity will result in a net positive beneficial effect on the environment as shallow contamination will be removed from the site. Groundwater is unlikely to be exposed during the earthworks but if it is then controls will be put in place to manage quality.
5.187 Contaminated Land	Permitted activity. The passive discharge of contaminants from contaminated land onto or into land in circumstances where those contaminants may enter water is a permitted activity, provided the following conditions are met:	1. There has been a site investigation report provided to the CRC in accordance with Rule 5.185; and 2. Either the site investigation report or water quality sampling demonstrates that the discharge does not result in the concentration of contaminants in groundwater: a) at the property boundary; b) at any existing groundwater bore (excluding any monitoring bore located on the property); c) within a Community Drinking-water Protection Zone; exceeding the limits applicable to groundwater set out in Schedule 8; and 3. Either the site investigation report or water quality sampling demonstrates that the discharge does not result in the concentration of contaminants in groundwater at any point where groundwater exits to surface water, exceeding the receiving water quality standards in Schedule 5 for 90% of species; and 4. At any point where the groundwater exits to surface water the discharge does not produce any: a) conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or b) conspicuous change in the colour or visual clarity.	**Site Investigation report provided to CRC.** **Small localised, thin layer of contamination.** **Contaminants not particularly mobile.** **Unlikely to reach groundwater and leave site boundary.** **Site not within a groundwater drinking protection zone.** **Nearest surface water receptor is the Kowai River North Branch, located approximately 330m west.** **Considered a Permitted Activity.**

8.0 REMEDIATION METHODOLOGY

This RAP is designed to manage the risks related to disturbing contaminated soil during the remedial works and has been prepared in accordance with the MfE guidance document Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand.

8.1 Project Timing

The remedial earthworks are anticipated to take several weeks to complete, with sufficient trucks available for carting contaminated soil to landfill or for re-use on-site. Following completion of the remedial earthworks, soil validation and geotechnical inspection / testing should be completed. Soil validation will comprise visual inspection of the area by a SQEP and the collection of a number of representative soil samples for screening and laboratory analysis. Soil samples will be screened in the field with an XRF to assess heavy metal concentrations and to inform remedial works. Once remedial goals have been met with the XRF, soil samples will be collected from the walls and base of the excavation and submitted to an IANZ accredited laboratory for analysis. Laboratory analysis typically takes between 5 – 10 days to complete. If the remediation has been completed successfully and all validation samples meet remedial goals, then a soil validation report will be produced and submitted to HDC and ECan within 20 days of receiving the final analytical results.

8.2 Remediation Methodology

Soil above background and below residential standards, which is considered safe to remain on residential lots will either be disposed of at an off-site disposal facility or re-assessed to check suitability for re-use on site. Due to the NES Regulations applying to soil that contains contaminants above background criteria, re-use of soil on site that contains contaminant concentrations above background may trigger future NES consenting requirements and additional soil disposal costs for future lot owners. Soil mixing is a valid remedial technique and may be suitable for soil that is at concentrations marginally above the background values for the site. Verification of contaminant concentrations in soil re-used on site is recommended to be completed.

The depth of each remedial area is based on the current contamination distribution information with final depths dictated by soil validation sampling results. There are four proposed remedial areas as summarised in Table 7 and displayed in Figure 8 and 9. These remedial areas have been established on the known contaminant data and distribution. The remedial areas presented within the figures are approximate only and are not for set out purposes.

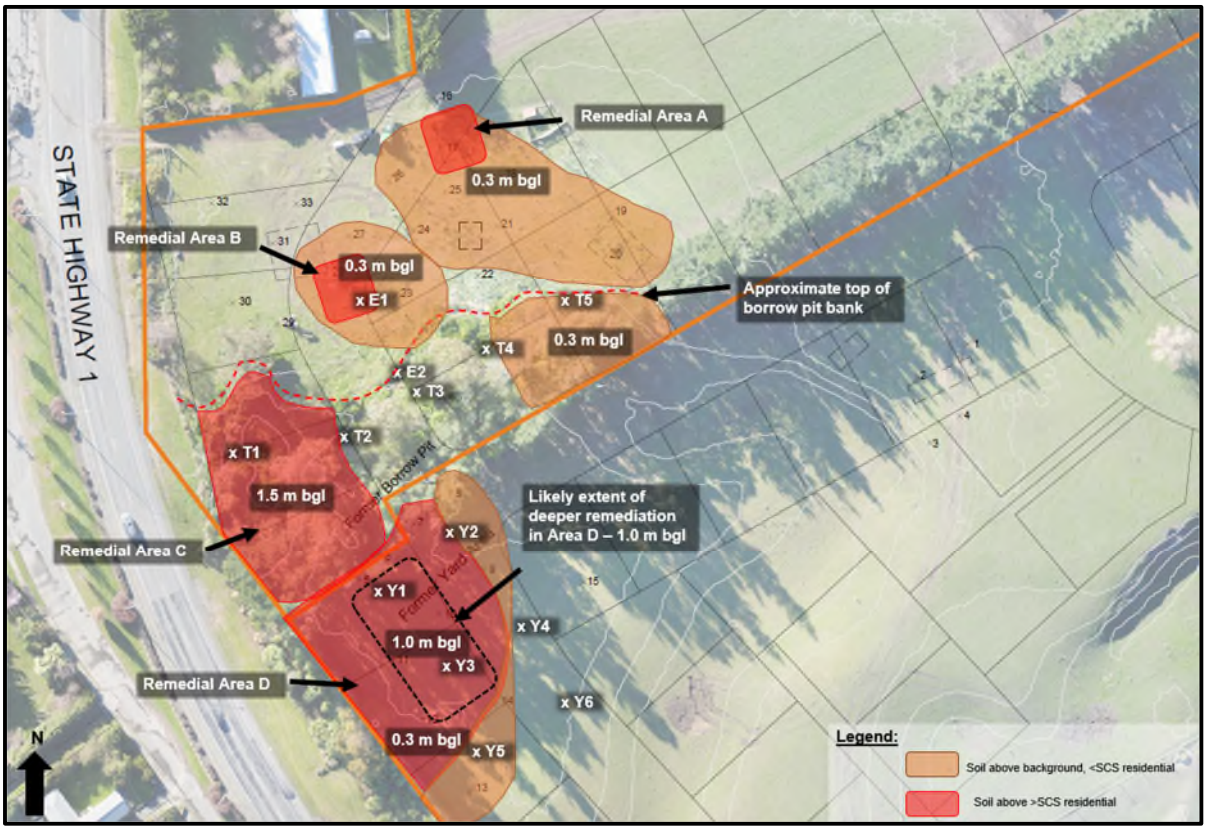

Figure 8 Remedial Action Plan.

A breakdown of the remedial volumes, recommended disposal route and remedial area dimensions are presented in Table 7, while the remedial areas A – D2 are shown in Figure 9.

Table 7: Assumed Earthwork Volumes and Cost						
Disposal Options			**Site Remedial Areas**			**Tonnes**
Remedial Area	**Contaminant**	**Disposal Site**	**Site Area m^2**	**Depth (m bgl)**	**Volumes (m^3)**	
A	Lead (619 mg/kg >SCS residential)	CCC Burwood Landfill	130	0.3	39	55
		Kate Valley Landfill				
A1	>background < SCS	Frews Hororata	1300	0.3	390	546
		re-use on site				
B	Lead (650 mg/kg)	CCC Burwood Landfill	130	0.3	39	55
		Kate Valley Landfill				
B1	>background < SCS	Frews Hororata	580	0.3	174	244
		re-use on site				
C	Arsenic (32 mg/kg)	CCC Burwood Landfill	1045	1.5	1568	2195
		Kate Valley Landfill				
C1	>background < SCS	Frews Hororata	510	0.3	153	214
		re-use on site				
D	Arsenic (107 mg/kg)	CCC Burwood Landfill	470	1	470	658
		Kate Valley Landfill				
D1	Arsenic (107 mg/kg)	CCC Burwood Landfill	895	0.3	269	376
		Kate Valley Landfill				
D2	>background < SCS	Frews Hororata	510	0.3	153	214
		re-use on site				
					m^3	**Tonnes**
Total estimate >SCS and requiring remediation					**2384**	**3338**
Total estimate above background but meets HH SCS for residential					**870**	**1218**

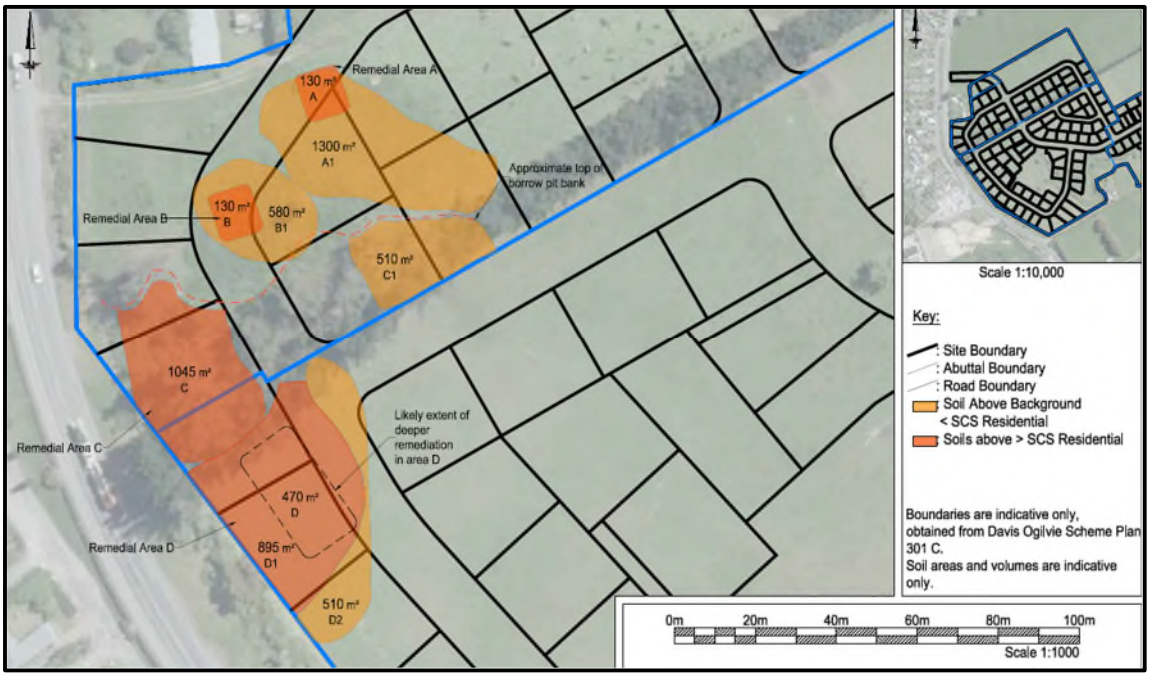

Figure 9: Proposed Remedial Areas A – D2.

The remedial areas are approximate only and are not for set out purposes.

8.3 Remediation Goals

The remediation goals for the project are summarised in Table 8. These goals must be met for the majority of soil validation samples analysed. XRF screening values will be used in the field to direct the remediation and will supplement the analytical results obtained from soil validation samples.

Adequate soil samples will be collected and analysed by an IANZ accredited laboratory using the approved analytical methods. Statistical analysis of the dataset will be completed during the remedial works and should the 95% upper confidence limit (UCL) of the mean exceed the remedial goal, then the remedial area will require further excavation and validation.

Table 8: Adopted Remedial Criteria

Contaminant	Receptor	Soil Remediation Criteria (mg/kg)	Remedial Goal Acceptance Criteria reference
Arsenic	Human Health – Residential (10% produce)	20	NES SCS
Lead	Human Health – Residential (10% produce)	210	NES SCS

If additional unexpected contamination is encountered during the works, remedial goals should be referenced from the NES (NES, 2011) and following the MfE Contaminated Land Management Guidelines No. 2 (MfE, 2011b). Unexpected contamination requiring additional remediation will need to be communicated to the District Council and / or Regional Council and this RAP updated and submitted for re-approval.

9.0 SITE MANAGEMENT CONTROLS

9.1 Erosion and Sediment Control

The below are recommended procedures to be completed with regards to erosion and sediment control during the remedial earthworks.

The site surface is currently unsealed and given the topography of the site and location of the impacted soil to be disturbed, stormwater is unlikely to come into contact with the contaminated soil and leave the site via runoff. However, where historical fill material is encountered and exposed, the following procedures are recommended:

- *Catch pits / sumps in the vicinity site shall be covered with silt socks and geotextile to prevent sediment entering the drains.*
- *Any wash water or stormwater from the truck loading areas will be directed back into the excavation, to ensure that any contaminated stormwater and wash water is captured by the excavation, and then removed from the excavation for disposal to registered landfill or the HDC waste water network, if appropriate.*
- *The area around the remedial areas is to remain paved until remediation completed. A sacrificial layer of gravel is recommended to be placed at the vehicle site entrance should the seal be removed. The layer of gravel should be constructed so as to remove entrained soil from vehicle tyres prior to exiting the site.*
- *Dust and debris on the site entrance and off-site related to the works shall be removed via road sweeper.*
- *Stockpiles of soil should have appropriate erosion mitigation measures in place if left over night or longer periods.*
- *The above measures will be inspected after every period of rainfall for erosion or breach. Any repairs required will be carried out immediately.*
- *Earthworks of contaminated soil should not be undertaken during inclement weather.*

To ensure potential environmental discharges are minimised during the earth works the controls shall remain in place until the area has been reinstated.

9.2 Noise

Given the site is located in an urban area with relatively higher background noise levels and the timing of the works occurring during typical 07:00 – 19:00 hours, the earthwork activities are considered to have a low potential to result in adverse noise impacts.

9.3 Traffic Management

Given the relatively small volume of material required to be excavated and disposed of off-site there will be a limited number of truck movements. Adverse traffic conditions are therefore not expected to occur adjacent to the site or the wider area as a result of the project related trucks. The site provides sufficient area for the manoeuvring and covering of trucks prior to and following loading or unloading of materials.

9.4 Decontamination

The following should be completed once the remedial works are completed:

- All machinery shall be decontaminated before leaving areas known to contain contaminated soil and prior to leaving the site. Decontamination should be conducted to remove all soil and all visible debris from the vehicles.
- Decontamination should be in the form of water applied via hose under low pressure and a brush and other hand tools to remove visible soil. The use of surfactants is not required. All decontamination water should be directed into excavations on-site or purpose-built site stormwater earthwork channels.
- Decontamination should occur in designated areas on the boundary of each area and is only required if vehicles are tracking over the exposed contamination. Once backfill material has been imported over the site, a wheel wash or similar will only be necessary at the site exit to ensure vehicles do not track of significant quantities of soil / dust onto the public road.
- Personnel involved in cleaning of equipment shall wear full PPE, as described in Section 11.2.

9.5 Soil Disposal

Soil removed from site will need to be disposed of to a managed disposal fill facility consented to accept the soil. Soil will not be disposed of to cleanfill, unless testing confirms that it is suitable to do so. Disposal of soils off-site will be in accordance with instructions provided by the disposal facility operator.

An assessment of potential off-site disposal options for excess spoil generated during site development works has been conducted. Dependent on the contamination conditions of the spoil, off-site disposal options range from disposal to *"cleanfill"* sites to hazardous waste landfill sites, as outlined in the publication *"Technical Guidelines for Disposal to Land"* (Waste Management Institute New Zealand (WasteMINZ), 2018).

Clean soil, Material or Virgin excavated natural materials (VENM) is defined as materials such as clay, soil and rock that are free of:

- *Combustible, putrescible, degradable or leachable components.*
- *Hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown.*
- *Products or materials derived from hazardous waste treatment, stabilisation, or disposal practices.*
- *Materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated.*
- *Contaminated soil and other contaminated materials.*
- *Liquid waste. When discharged to the environment, clean fill material will not have a detectable effect relative to the background.*

9.6 Waste Tracking

All waste soil removed from site should be tracked using industry standard waste manifest forms (See **Appendix B**). The waste manifest form essentially is transported with the waste from the waste source to its disposal location. There are three main stages which should be controlled to ensure the waste is handled appropriately and reaches its intended disposal destination. The three steps are the source site, the transporter, and the disposal destination. At each step the waste consignment and waste manifest are released to the next PCBU, the manifest is signed by the next recipient and so on. Once disposed, the signed form is returned to the principal contractor and / or SQEP for inclusion in a soil validation report.

10.0 MONITORING REQUIREMENTS

10.1 General

The following monitoring and supervision requirements are recommended:

- A suitably qualified and experienced environmental practitioner (SQEP) will liaise with the contractor on the controls in this RAP and conduct a site visit during the project to review controls and collect soil validation samples.
- A SQEP shall collect screening soil samples during the remedial work and shall collect soil validation samples once the works have been completed and will issue a soil validation report to document the monitoring and sampling completed during the project.

In addition to the SQEP monitoring, the Contractor shall maintain a daily site logbook (refer to **Appendix C**) containing the following information:

- Daily weather conditions, particularly wind direction, speed, and temperature.
- Progress / issues associated with contaminated soil and the site work.
- Numbers of personnel on site and use of personnel protective equipment.

- RAP Induction sheets.
- Dust and air monitoring data.
- Safety, health, and environmental discussions (including Toolbox meetings) and safety non-compliance issues.
- Third party complaints lodged regarding the works, as well as all corrective measures implemented.
- All incidents and near misses including staff sickness.
- Records of waste tracking and imported fill material.
- Any other relevant information.

The logbook data shall be provided to the SQEP following completion of the works and made available to the Council for a minimum period of two years after the completion of the works.

No discharges from site activities shall produce emissions, to an extent which is considered noxious, dangerous, offensive, or objectionable to site occupants or neighbours. The site foreman will be responsible for ensuring no visible or olfactory discharges occur via air or water during the works.

10.2 Spoil and Fill Monitoring

All excavated fill / soil generated from the works shall be disposed to a landfill licensed to accept contaminated material (subject to acceptance by the landfill operator).

The following records shall be maintained:

- Waste disposal acceptance receipts, and associated laboratory analysis (if any).
- Evidence to certify that all imported fill is either sourced directly from a licensed quarry or meets the criteria for Background Concentrations in Inorganic Elements in Soils Canterbury Region, 2007.

11.0 HEALTH AND SAFETY MANAGEMENT

This RAP identifies potential hazards associated with the presence of soils impacted with heavy metals and recommends procedures to mitigate these risks. Risks associated with elevated concentrations of heavy metals relate to accidental ingestion of soil, inhalation of dust containing contaminants and dermal contact with soil during earthwork activities.

11.1 Site-Specific Safety Plan (SSSP)

Before starting earth works, the Contractor (and sub-contractors) should develop and issue a Site-Specific Safety Plan (SSSP) to complement this RAP and to address other health and safety requirements that may be applicable to their site works. A copy of the SSSP should be communicated to all parties before undertaking the work. All site personnel will be required to review this RAP and SSSP.

At the start of each day a brief *"tool box"* meeting should be held to review the SSSP and the proposed work for the day, discuss potential perceived health and safety risks as well as environmental management procedures and to communicate these issues to project team.

Appropriate emergency procedures must be established before the commencement of earthworks on-site. The appointed Contractor is responsible for detailing these procedures, which will include the location of first aid kits, emergency telephones and medical emergency numbers.

11.2 Personal Protective Equipment

Use of appropriate PPE, dust suppression controls and behavioural practices will minimise exposure to contamination to a reasonably practicable standard. The following procedures shall be followed by all site workers who are likely to enter any identified remedial area:

- Each worker is required to wear full coveralls and gloves e.g., a Type 5 disposable coverall in either orange or white, with a disposable Hi-Vis vest and nitrile gloves.
- Chemical resistant disposable gloves, such as nitrile gloves, shall be worn at all times when contact with the soil is likely.
- Hands are to be washed prior to eating, drinking, or smoking.
- Eating, drinking, smoking and the use of mobile phones within remedial areas is prohibited.
- Half face respirators offering at least P2 protection should be worn if dust is visible, noting controls to minimise dust will need to be upgraded also.

For areas outside of the identified remedial areas, standard PPE requirements required for an earthwork site should be implemented by all site staff.

12.0 VALIDATION AND FINAL SITE REPORTING

Following the completion of the site's remedial works, soil validation will be required to confirm the remediation was successful. Several soil samples (approximately 1 per 100 m^2 of remedial area base and 10 m length of excavation side wall) will be collected for laboratory analysis. Samples will be analysed for heavy metals and within remedial Area D, OCPs also. If further, previously unidentified contamination is encountered during the remediation earthworks, further analytes may be required to be added to the validation sampling schedule of analysis.

Once the remediation criteria are achieved, a Soil Validation Report, will be produced outlining the following:

- Soil validation results, locations, and assessment against the remedial goals.
- Air monitoring data.
- Areas disturbed and capped.
- Survey height data (if applicable).
- Statement of the volumes of soil:
    - Disturbed by the works.
    - Relocated to recreational reserves.
    - Disposed of off-site and confirmation of disposal facility location.
- Records of site visits during the works by Hurunui District Council or other regulatory agency personnel (e.g., WorkSafe New Zealand, Environment Canterbury Regional Council).

13.0 CONTINGENCY PLAN

The following contingency measures have been developed if significant potentially contaminated material is encountered during the excavation. Work in the area of concern shall cease until Davis Ogilvie has assessed and identified the material.

The presence of contaminants in high concentrations, or other unexpected contaminants, may dictate further controls be implemented and additional or different containment / disposal be required.

In the event that significant contamination is identified, the excavation will be isolated with barriers and warning signs to restrict access. Access to the area will occur under supervision by Davis Ogilvie until a revised management / remediation methodology has been developed and appropriate controls implemented. All personnel accessing the area shall wear appropriate PPE equipment, including disposable coveralls and an approved respirator if necessary.

If the impacted material is identified as suitable to be disposed off-site, the excavation and disposal of the material shall be in accordance with the procedures outlined in this document. Validation samples shall be collected following the implementation of the remediation to demonstrate that no unacceptable risks to human health or the environment remain following the remedial works.

It is useful to note the following that the typical indicators of contamination may include:

- Buried drums or tanks with unknown liquid.
- Odour (petroleum hydrocarbons, oil).
- Discoloured soil (black, purple, or green staining most common).
- Asbestos-containing materials (ACM), as fragments are visible with the naked eye.
- Inclusions of deleterious materials.

14.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

Based on the requirements of Section 88 of the Recourse Management Act (RMA) and the framework set out in the Fourth Schedule of the RMA, the actual and potential environmental effects associated with the proposed works are summarised below in Table 9.

The environmental effects of the proposed activity, which includes the earthworks associated with remediation of contaminated soil, are expected to have no more than a minor effect on the environment. This is due to the limited extent of earthworks and the controls proposed.

Table 9: AEE

Schedule 4 Item	Assessment of Environmental Effects
Description of the proposal	Excavation of approximately 2,200 m^3 of soil containing heavy metals.
Positive effects	Removal of legacy contamination. By removing, chronic exposure and effects of the contamination to receptors will be reduced.
Where the activity is likely to result in significant adverse effects, **a description of the alternatives.**	Any actual or potential effects on the environment are likely to be no more than minor. No significant adverse effects identified. Alternatives involve not developing the site or adjusting design to cap the material in-situ and therefore avoid contaminated soil disturbance.
An assessment of **actual or potential effects** on the environment.	**Potential effect on Air Quality** Earthworks would be conducted in line with any consent conditions in addition to the proposed mitigation measures detailed in this RAP. Potential for remedial works to generate minor amounts of dust during the excavation and removal of impacted soil. Mitigation will involve utilising water to suppress dust and covering any soil stockpiled on-site as well as all truckloads leaving the site.

	Potential effect on Stormwater Quality Potential for stormwater runoff to be contaminated with sediment if it encounters the impacted soil. Soil is to be loaded directly into vehicles and stockpiling is to be avoided. If stockpiling is necessary, it will be within an excavation on site. Stockpiled will be covered until required to be loaded for disposal off site. **Potential effect on Noise Climate** Potential for minimal noise generation from excavators. Urban location with high background noise levels and remedial works anticipated to only take 1 – 2 days. Contribution of site generated noise is unlikely to be significant and will be completed within typical working hours. **Potential effect on Groundwater Quality** Nil. Groundwater was not encountered in the top 2.5 m on site. Earthworks are anticipated to extend to a depth of only 1.5 m bgl. Should groundwater be encountered, dewatering may be required to permit the remainder of the earthworks and foundation construction. Long term leaching of contaminants to groundwater is not considered to be significant given limited volume of material and thickness of unsaturated zone.
Where the activity includes the discharge of any contaminant, a description of: Nature of the discharge; Sensitivity of the receiving environment; Alternative methods of discharge.	**Construction Phase stormwater discharges** Stormwater during construction will be managed under the erosion and sediment control requirements. Based on the assessment completed to date, the site soil contains limited contaminant concentrations with only arsenic and lead found to be marginally in excess of adopted guideline values protective of stormwater receptors (ANZECC ISQG-High x3) in some locations. Stormwater from the earthworks will be visually monitored for TSS and the presence of visible contaminants in the form of colour, oil, or a sheen. Should these be present, works will cease until water is visibly free of impact and TSS <100 mg/L. Soil will not be stockpiled on-site or left uncovered in an excavation where run-off from the area can enter stormwater from the remainder of the site. **Air Discharge** During the earthworks, there is a potential for a discharge to air of dust. These controls, including water mists, will be employed and will also be beneficial for dust and other short-term effects (visual). Effects beyond the boundary are not anticipated.
Any effects on ecosystems including plants, or animals, physical disturbance of habitats in the vicinity?	In accordance with the MfE (1999) guidelines a Tier 1 ecological risk assessment has been conducted. No significant ecological receptors have been identified within close proximity of the site.
Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural, or other special values for present or future generation?	No effects anticipated.

Description of the mitigation measures (safeguards and contingency plans) where relevant to be undertaken to help prevent or reduce actual or potential effect.	See RAP controls for short term mitigation measures to be undertaken during the earthworks.
Where the scale or significance of the activity's effect are such that monitoring is required, a description of how, once the proposal is approved, effects will be monitored and by whom.	Monitoring of site conditions and soil volumes is proposed. Construction phase stormwater discharge should be monitored, and water quality monitoring should be under a total suspended level of 100 mg/L. Should this be exceeded, then works should cease and stormwater run-off captured and treated prior to discharge to the reticulated system. This monitoring should be completed by an independent environmental consultant.

15.0 REFERENCES

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RAP/SMP Induction Agreement and Acknowledgement Sheet

NAME	COMPANY	DATE	SIGNATURE

APPENDIX B

Waste Manifest Documents

Section 1 TO BE COMPLETED BY THE ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR

Consultant/Main Contractor Site Supervisor……

Project number……

Site Name……..

Site Address… ……

…… ……

Consultant/Main Contractor……

Cleanfill ☐ Controlled Fill ☐ Asbestos present ☐

Description of contamination ……..

Testing results comply with Waste Acceptance Criteria? Yes ☐ No ☐

Comments……..

DECLARATION BY ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR

I declare that the above waste is accurately described and is in a proper condition for transport in accordance with the applicable national and local regulations.

Name……. Signature …….

Title …….. Date …….. Estimated Quantity of Waste……

Section 2 TO BE COMPLETED BY THE TRANSPORTER

I acknowledge the receipt of the waste consignment describes the above;

Name…… Signature…….

Title…….. Date …… Estimated Quantity of Waste……

Section 3 TO BE COMPLETED BY THE DISPOSER/STORER

I acknowledge that the waste consignment described has been received

Name of Facility……..

Address of Facility……..

Name Signature Qty

Title Date

Method of disposal Landfill Managed Fill Treatment Storage

This form has to be completed and returned to final disposal location and the below address and should accompany waste invoices.

Level 1, 24 Moorhouse Ave, Addington / PO Box 589 / Christchurch 8140

gareth@do.nz, 021 851 349

APPENDIX C

Daily Logs

Site Conditions Log

Date	Weather Conditions	Site Conditions	Progress/Problems associated with site works	No. of personnel on site	Record of Soil taken Offsite	Record of Soil Imported Onsite	Environmental non-compliances	Complaints and Corrective Measures	Comments