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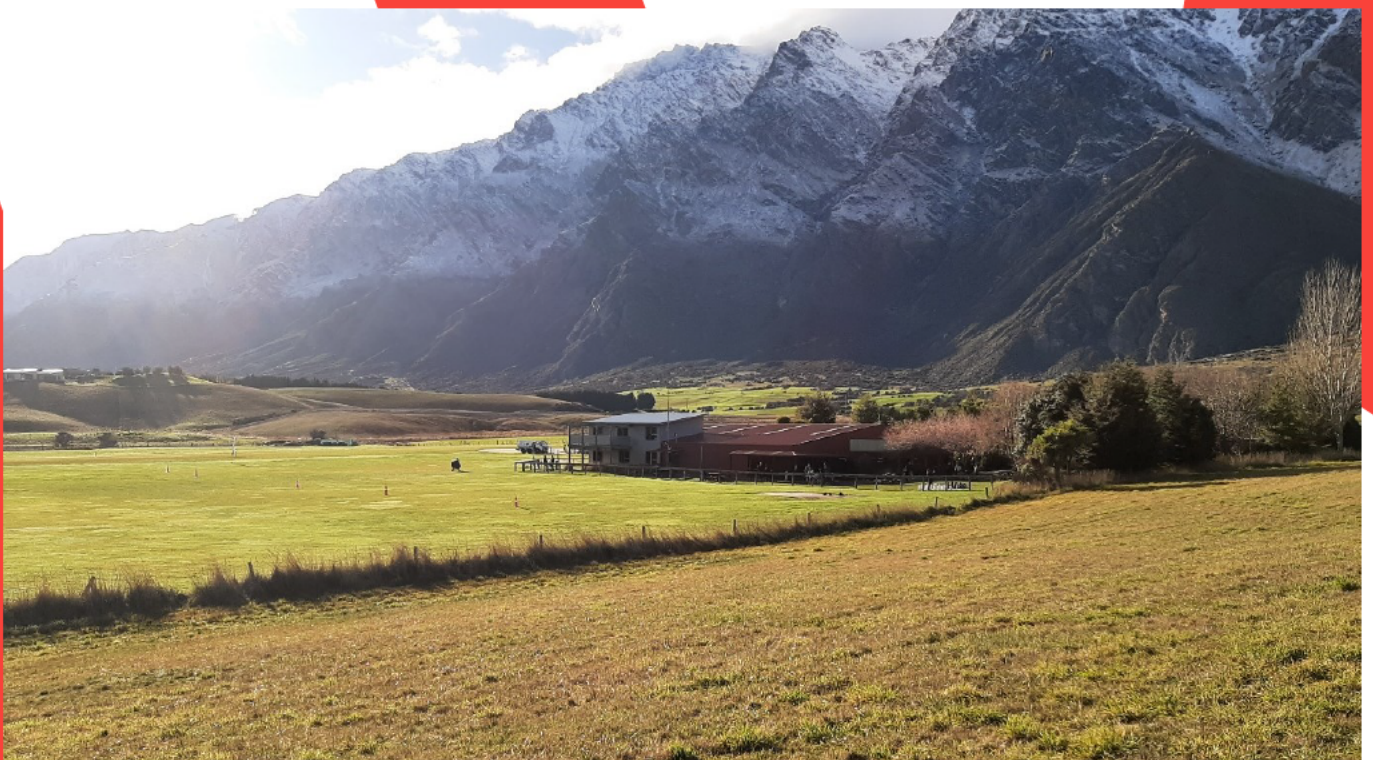
RCL Homestead Bay Limited

Detailed Site Investigation

786 Kingston Road, Queenstown

6 February 2025

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Detailed Site Investigation
786 Kingston Road, Queenstown
RCL Homestead Bay Limited

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EXECUTIVE SUMMARY

WSP New Zealand Limited (WSP) has been engaged by RCL Henley Downs Limited to prepare a Detailed Site Investigation (DSI) at Lot 8 DP 443832 and Lot 12 DP 364700; 786 Kingston Road, Jacks Point, Queenstown.

It is understood that the client wishes to develop the property from a rural to an urban/residential land use.

WSP undertook a Preliminary Site Investigation (PSI) in 2025 and consequently areas of the site have been listed on the Otago Regional Council's Listed Land Use Register for Hazardous Activities and Industries List (HAIL).

The objective of the DSI was to:

- Investigate the presence of contaminated soil within HAIL areas in accordance with the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*.

The DSI comprised the collection of soil samples from a total of 4 areas at the site from 0.1 m bgl:

- SD (Sheep dip)
- FZ (Fertiliser storage)
- LF (Landfill)
- HBR (Homestead Bay Road sheep pens)

No sampling was completed in the fuel storage area or airstrip for NZone as part of this DSI as these activities were likely to be ongoing for the next few years until development of this area is planned. Any current investigations of this area would need to be updated to assess contaminant risks from ongoing activities at the time of closure and findings from this investigation would be superseded. On this basis investigations for the NZone site at this time would not reflect conditions at the time of development and have therefore not been completed at this time.

Soil samples were submitted to Hill Laboratories and analysed for heavy metals and organochloride pesticides (OCP) depending on the activity noted in the area. Sampling and analysis was conducted in general accordance with CLMG5 and results reported in line with CLMG1.

Based on the results of the investigation and laboratory results, the following conclusions were made:

- With the exception of one marginally elevated cadmium result in the Fertiliser Storage area, concentrations of all heavy metals and OCP were below the adopted human health criteria in the areas investigated and therefore represent a low risk to human health.
- Soils within the Fertiliser Storage area would need to be managed in the form of a Remediation Action Plan to ensure that this HAIL area is suitable for a residential end use.
- Heavy metal concentrations above local background were encountered within the Fertiliser Storage area and Homestead Bay Road Sheep Pens area. As such the NES-CS applies to these HAIL areas.
- No contaminants were above background within the Sheep dip area and Landfill area with visual assessment indicating that no bath or dip was present in the sheep dip area and the landfilling comprised composting of waste organic materials including flax leaves from gardening activities in the NZone car parking area. As such the NES-CS **does not** apply to these areas of the site.
- With the exception of soils from the Fertiliser Storage area, all soils are suitable for reuse on site.

- Should off-site disposal be required, soil from the Sheep Dip (SD) and Landfill (LF) areas is likely suitable for disposal as cleanfill or at a Class 1, 3 or 4 landfill, subject to approval from the receiving facility.
- Soils from the Fertiliser Storage area and Homestead Bay Road Sheep Pens area would be subject to further assessment and analysis to determine off-site disposal acceptance.

Based on the findings of the DSI the following is recommended:

- Submission of this DSI report as part of any consent application;
- Submission of this report to ORC to facilitate updating of the HAIL database;
- The production of a Remediation Action Plan to manage soil disturbance on the Fertiliser Storage Area;
- TCLP analysis of soils from the Fertiliser Storage area if off-site disposal of soils is to be undertaken.
- Assessment of the NZone fuel storage and airstrip area be completed once, currently ongoing, activities in this area cease to assess risks associated with HAIL activities in this area.

1 INTRODUCTION

1.1 OVERVIEW

A Detailed Site Investigation (DSI) has been undertaken on behalf RCL Henley Downs Limited at Lot 8 DP 443832 and Lot 12 DP 364700; 786 Kingston Road, Jacks Point, Queenstown (herein referred to as 'the site'). The site is located approximately 9 kilometres (km) south-east of Queenstown and is located west of the Remarkables mountain range in the Jacks Point area as shown on the site location plan (Figure 1) in Appendix A. The site covers approximately 205 hectares (ha).

It is understood that the client wishes to develop the property from a rural to an urban/residential land use. Lot 8 of the site is currently used for livestock grazing and straw baling, with the northern part of the lot comprising an airstrip for commercial skydiving operations for NZone Queenstown. Lot 12 of the site is also used for grazing, however, also contains the Jacks Point Wastewater Treatment Plant (WWTP) and disposal field along with a cleanfill site and small area for sheep management which is likely to include drenching or other stock management activities.

Parts of the site are listed on the Otago Regional Council (ORC) Listed Land Use Register (LLUR) for Hazardous Activities and Industries (HAIL) and identified five HAIL activities at the site:

- A6 (Fertiliser manufacture or bulk storage);
- A8 (Livestock dip or spray race operations);
- A17 (Storage tanks or drums for fuel, chemicals or liquid waste);
- F1 (Airports including fuel storage, workshops, washdown area, or fire practice areas);
- G3 (Landfill sites).

As HAIL is present on the site a DSI was recommended for these locations to assess the risks associated with contaminated soil that may be disturbed during the works and provide guidance on how the contaminated soil will be managed. The DSI would also provide information for submission as part of the fast track consenting process for the site.

1.2 BACKGROUND

The majority of the site is currently used as production land. Commercial skydiving facilities are located in the northern part of the site with a reception area, café and toilet block. The airstrip runs along the northern boundary of Lot 8 with a refuelling pad adjacent the reception area.

It is understood that the client is seeking a land use change for development of the site from Rural to Residential via a fast-track consent application..

1.3 OBJECTIVES

The objectives of the DSI were to:

- Investigate the potential presence of contaminated soil in accordance with the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*.

1.4 SCOPE OF WORKS

The scope of works involved the following:

- Review of existing desktop information on the subject site including previous environmental reports and available design plans for the proposed works.
- Field investigation:
 - Hand excavating four areas of the site where HAIL has been identified to a maximum depth of approximately 0.5 metres below ground level (m bgl); and
 - Collecting soil samples..
- Analysis of soil samples at an International Accreditation New Zealand (IANZ) accredited environmental laboratory. Contaminants of concern were scheduled based on site observations along with the historical activity for the piece of land and included:
 - Heavy metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc; and
 - Organochloride pesticides (OCP).
- Preparation of this report

The general site location is presented in Appendix A, Figure 1 with the location of the investigation areas in Appendix A as Figure2 and the sampling locations for each area presented in Appendices A as Figures 3a, 3b, 3c and 3d.

1.4.1 EXCLUSIONS

No sampling was completed in the fuel storage area or airstrip for NZone as part of this DSI as these activities were likely to be ongoing for the next few years until development of this area is planned. Any current investigations of this area would need to be updated to assess contaminant risks from ongoing activities at the time of closure and findings from this investigation would be superseded. On this basis investigations for the NZone site at this time would not reflect conditions at the time of development and have therefore not been completed at this time.

1.5 CERTIFYING STATEMENT

WSP confirms that this DSI meets the requirements of the NESCS because it has been:

- Undertaken in accordance with the current edition of *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils* (CLMG No. 5) (MfE, 2021b).
- Reported on in accordance with the current edition of *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* (CLMG No. 1) (MfE, 2021a).
- The report has been reviewed by a suitably qualified and experienced practitioner (SQEP).

Evidence of the qualifications and experience of the SQEP(s) who completed this investigation and certified this report are available on request from WSP.

2 SITE AND ENVIRONMENT SETTING

2.1 SITE LOCATION

The site is located in Jacks Point, west of the Remarkables mountain range and approximately 9km south-east of Queenstown town centre. The site is accessed off Kingston Road. The majority of the site comprises vacant production land, however, a driveway off Kingston Road leads to a commercial skydiving facility with a grassed runway and refuelling area.

The site details and site layout are provided in Table 1 and Appendix A respectively.

Table 1: Site details

Site Address	786 Kingston Road, Kingston, Queenstown 9793	
Legal Description	Lot 8 DP 443832 & Lot 12 DP 364700	
Title	555575 & 262752	
Approximate total site area	Lot 8: 163.5 ha	Lot 12: 41.7 ha
Total:	205.2 ha	
NESCS Permitted Activity threshold volumes:		
1) total site disturbance, and	81,732m ³	
2) yearly off-site movement of soil based on the approximate total site area	16,346.4m ³	
Territorial Authority	Queenstown Lakes District Council	
Planning Zone(s)	Jacks Point Zone and Rural	
Current Site Use	Rural and Commercial (airstrip) and WWTP	

2.2 ENVIRONMENTAL SETTING

2.2.1 GEOLOGY AND TOPOGRAPHY

A detailed review of the environmental conditions was undertaken as part of the PSI completed on site and a summary of the findings is presented in this section.

The centre of the site is underlain by Late Pleistocene glacier deposits with generally unweathered, unsorted to sorted, loose sandy gravel silt and sand (till) in terminal and ground moraines. The northern, eastern and south-western part of the site comprise Holocene lake deposits, with laminated micaceous silt, mud, and sand in old lake deposits. Information is provided from the 1:250,000 scale GNS Geology Web Map from the Institute of Geological and Nuclear Sciences¹.

¹ Geological map accessed online at [Geology 2.0.0](#) 14 April 2025

2.2.2 HYDROLOGY AND HYDROGEOLOGY

Details of the site hydrology and hydrogeology have been obtained from a review of sources including Google Earth and a search of council records, refer to Table 2. Further environmental conditions and the hydrology/hydrogeology can be found in the PSI undertaken by WSP (WSP, 2025).

Table 2: Summary of topographical, hydrological and hydrogeological data

Topography	General slope towards the centre of the site. Slopes on the northern section are steep onto a relatively hummocky plain.
Nearest Surface Water Body	Several creeks flowing in a (south)westerly direction across the site. Creeks are generally ephemeral
Height above Mean Sea Level	Approximately 350-380m amsl
Inferred Groundwater Flow Direction	South-westerly
No. of known Boreholes and wells within 0.5km	Two

3 DESKTOP REVIEW

3.1 LISTED LAND USE REGISTER (LLUR)

The LLUR² is a register of sites ORC consider have been, or currently are, the location of activities or industries identified on the HAIL which have the potential to cause contamination. A review of information available on the ORC LLUR indicates that there are five HAIL activities associated with the site refer to the PSI undertaken by WSP in 2025 (WSP, 2025) for further information.

3.2 HISTORICAL AERIAL PHOTOGRAPHS

A summary of the observations made following the review of historical aerals is presented in the WSP PSI (WSP, 2025). Historical aerial photographs were available from 1959 and indicated that the site was generally used for rural purposes. Farmland predominated with notable production land parcels separated by shelter belts or fan channels for ephemeral streams.

The current airstrip on the northern part of Lot 8 was established in 2001. The wastewater treatment plant and disposal field noted in 2009 and earthworks associated with the cleanfill site on the eastern side of Lot 12 noted in 2015. The sheep pens on the southern part of Lot 8 were visible on the aerals in 2019, with the pens on the Homestead Bay Road area noted from 2021. The area where landfilling/composting was located was initially noted in 2019 on the aerals. Ground disturbance in the fertiliser storage area was initially noted in 2015, however storage of items not seen on the aerals until 2019.

3.3 ORC CONSENTS

A review of the Otago Maps database 'ORC Resource Consents layer'³, indicates there are three active ORC consents on-site and are described below in Table 3.

Table 3: Summary of on-site Consents

Consent Number	Consent Type	Status	Expiry Date	Activity
2005.447	Divert Water Permit	Current	31/03/2041	To divert part of an unnamed tributary of Lake Wakatipu to a new alignment, for the purpose of improving the direction of flow within the watercourse and to control the flow of water in the watercourses.
2009.312.V1	Discharge to Land Permit	Current	31/03/2045	To discharge treated domestic and commercial wastewater to land for the purpose of wastewater from a residential resort development.
RM13.334.01	Discharge to Land Permit	Current	10/09/2033	To discharge contaminants to land for the purpose of disposing of treated stormwater from a refuelling pad.

² Accessed online at maps.orc.govt.nz on 14 April 2025.

³ Accessed online at maps.orc.govt.nz on 15 April 2025.

3.4 PREVIOUS REPORTS / INVESTIGATIONS

WSP was engaged by RCL Henley Downs Ltd to complete a PSI at the site in 2023. This initial PSI covered area within Lot 8 and has since been updated in 2025 to incorporate Lot 12 and assess the likelihood of Hazardous Activities and Industries List (HAIL) activities and the associated potential risks to human health from contaminants in the soil.

The majority of site is currently used as a production land for livestock farming with commercial skydiving facilities in the northern part of the Lot 8 site. Part of Lot 12 is in use as a wastewater treatment plant and disposal field with the eastern part of Lot 12 containing a cleanfill site. The client is proposing to develop the site from a rural to an urban/residential end use.

Based on an initial review of the Otago Regional Council's (ORC) Listed Land Use Register, the PSI concluded that the site has been subject to HAIL activities associated with the airstrip (HAIL F1 and A17) and some uncontrolled landfilling (HAIL G3) along with bulk fertiliser storage (A6) and sheep dips (A8). Site inspections and historical searches have revealed that an additional Sheep dip is present on the site along with a Wastewater Treatment Plant and disposal field (HAIL G6).

As HAIL activities are considered to have been or currently be occurring on the site, it was concluded that the **NES-CS does apply** to the site. As such a DSI was recommended prior to any ground disturbance to assess the risks to human health and the environment.

3.5 PRELIMINARY CONCEPTUAL SITE MODEL FROM PSI

A conceptual site model (CSM) is used to support the decision-making process for contaminated land management. The potential risk has been assessed qualitatively using the 'source – pathway – receptor pollutant linkage' concept, which states that for a risk to arise, each stage of the pollutant linkage must be present. For there to be an effect on receptors there must be a contamination source and a mechanism (pathway) for contamination to affect the receptor.

Where a possible pollutant linkage has been identified, investigation and risk assessment via a DSI may be necessary to establish whether a significant pollutant linkage exists. Data gaps and uncertainties are identified during the preparation of the CSM, which assists in designing any DSI that may follow. A preliminary CSM based on the findings of the desktop review is presented in Table 4.

Table 4: Preliminary Conceptual Site Model

Likely Source	A review of all data sources and anecdotal evidence indicates that part of Lot 8 is currently being used as a skydiving facility with an airstrip and refuelling pad. Accidental spillage of fuel during refuelling may have occurred, causing ground contamination via run-off or stormwater discharge off the pad. In addition, if firefighting has occurred on the site, contaminants in the foam have possibly been discharged. An area north of the facilities has had some potential landfilling undertaken on it, with several burned areas noted. Anecdotal evidence suggests this area was used for storage of fertilisers flown in by helicopter. A sheep pen was noted on the central area on the southern part of Lot 8 with a mobile spray race used for livestock treatment. A second holding pen is noted to have occurred to the east of these pens adjacent to the gully on the south-eastern part of Lot 8. A further sheep pen holding and treatment area with empty containers was also present on the western portion of Lot 12. A community Wastewater treatment plant is present in the central area of Lot 12 with the disposal field taking up a good proportion of the centre of Lot 12. A cleanfill site is located on the eastern side of Lot 12.
Potentially Impacted Media	Impacts are generally likely to be limited to shallow soils (the upper metre). Groundwater is likely to be impacted by the drainage field for the WWTP.
Contaminants of Concern	Airfield: Heavy metals from refuelling, including lead, zinc and copper; Hydrocarbons (Total Petroleum Hydrocarbons (TPH); Polycyclic Aromatic Hydrocarbons (PAH); Benzene, toluene, ethylbenzene, xylene (BTEX)) associated with refuelling of vehicles and airplanes; Per-and polyfluoroalkyl substances (PFAS) originating from firefighting foam; Sheep pens: Heavy metals and/or organophosphate pesticides (OPPs) associated with livestock treatment; Neonicotinoids associated with drenching chemicals. Other sources: Fertilisers bulk storage; and Hydrocarbons (PAH) and heavy metals associated with the potential landfilling and burned areas. Biological contaminants (eColi), organic and inorganic chemical and microplastics associated with wastewater treatment and disposal
Potential Migration Pathways	Surface runoff containing impacted soil or dissolved contaminants; Infiltration of contaminants in soil; and Groundwater transport through soil, including in preferential pathways (service trenches, through higher permeability soils and/or high groundwater levels).
Potential Exposure Pathways	Ingestion or dermal contact with impacted soil, including surface soils including during excavation work; and Ingestion or dermal contact with impacted surface water or groundwater during excavation work. Inhalation of dust, vapours or fibres Ingestion of organics grown in impacted soils eg. vegetable gardens etc.
Potential Receptors	Workers and visitors at the site during the proposed site works; Residents and visitors following the development of the site; and Groundwater and surface water ecosystems.

4 SITE INVESTIGATION

4.1 DATA QUALITY OBJECTIVES

Systematic planning is critical to successful implementation of an environmental assessment and is used to define the type, quantity and quality of data needed to inform decisions. The United States Environmental Protection Agency (US EPA) has defined a process for establishing data quality objectives (DQOs), which has been referenced in the MfE CLMG No. 5.

DQOs ensure that:

- The study objectives are set;
- Appropriate types of data are collected (based on contemporary land use and chemicals of concern)
- The Tolerance levels are set for potential decision-making errors.

The DQO process is a seven-step iterative planning approach. The outputs of the DQO process are qualitative and quantitative statements which are developed in the first six steps. They define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose and specify that performance requirements for the quality of information to be obtained from the data. The output from the first six steps is then used in the seventh step to develop the data collection design that meets all performance criteria and other design requirements and constraint. The DQO process adopted for the DSI is outlined in Appendix B.

4.2 SAMPLING DESIGN AND RATIONALE

To achieve the objectives of the DSI, we adopted a targeted sampling plan. The sampling design involved investigation of surface sample collected from depths of approximately 0.1m to 0.3m bgl.

Due to the scale of the site and locations of HAIL activities which each forming a potential 'Piece of Land', sampling areas have been grouped with appropriate sampling identification for each HAIL area, shown on Figure 2 in Appendix A. Samples have been given individual labels associated with each area as follows:

- SD (Sheep dip)
- FZ (Fertiliser storage)
- LF (Landfill)
- HBR (Homestead Bay Road sheep pens)

A review of the airstrip and fuel storage tank during the site investigation revealed that refuelling Fuelhas occurred solely on a well-maintained concrete pad which contains adequate drainage to a sump with interceptor. The fuel tank is also located on a well-maintained concrete slab and comprises a double skinned container with no evidence of spills noted. As operations are still ongoing at the NZone site, ground disturbance of the concrete pads and grassed runway was not completed as part of this DSI. Discussions with owners and operators of the site revealed that PFAS chemicals (or similar) have never been used on site. The airfield has therefore been excluded from the DSI at this time, however investigations are advised during decommissioning of this area prior to development for completeness.

The sampling locations for each investigated HAIL area are shown in Appendix A, Figures 3a, 3b, 3c and 3d. Photographs of the sampling locations are provided in Appendix C.

4.3 FIELD WORK

The investigation works were undertaken on 1 April 2025. Soil samples were generally collected from near surface at 0.05 and 0.1 m bgl, with some samples collected from slightly deeper depths.

Soil samples were collected directly by hand from the trowel and a photograph taken. Subsurface conditions were logged with soil placed in laboratory supplied jars leaving minimal headspace and closed using Teflon-coated lids.

Dedicated disposable nitrile gloves were worn for each sampling location and all non-dedicated equipment was decontaminated between sampling locations with Decon90 to minimise the potential for cross contamination. Following sample collection, all samples were stored in sealed chilled coolers and transported to the laboratory under standard WSP chain of custody procedures.

4.4 LABORATORY ANALYSIS

Soil samples were submitted to RJ Hill Laboratories Limited (Hills), with select samples analysed for the contaminants of concern at the site. Hills is IANZ accredited for the analytical suite requested.

Table 5Error! Reference source not found. provides a summary of the laboratory analytical schedule for the DSI.

Table 5: Laboratory Analytical Schedule

Sample Location	Primary Samples	Field Duplicate Samples	Analyte
SD	6	1	Heavy Metals Organochlorine Pesticides (OCP)
FZ	4	0	Heavy Metals
LF	3	1	Heavy Metals
HBR	4	0	Heavy Metals Organochlorine Pesticides (OCP)

5 BASIS FOR GUIDELINE VALUES

This section summarises the guideline values that have been adopted for the proposed assessment of the site, considering future continued use as a reserve. The selected guidelines have been based on the *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011)* (CLMG No. 2) (MfE, 2011a) as detailed in Diagram 1.



Diagram 1: Hierarchy of guideline values

5.1 HANDLING AND LAND USE

The *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (Methodology) (MfE, 2011b) sets out a risk-based derivation methodology for health-based standards to apply to soil contaminants in New Zealand under the *Resource Management Act 1991*.

The Methodology provides a suite of numerical criteria for priority contaminants that are legally binding as gazetted under the NESCS. These numerical criteria are applied as screening criteria (Tier 1 criteria), as conservative clean-up targets to inform on-site management actions, or to trigger further investigation with a Tier 2 assessment. The Methodology utilises standardised receptors and exposure parameters to calculate soil contaminant standards (SCS) for the following five generic land-use scenarios:

- Rural residential/lifestyle (25% produce).
- Residential (10% produce).
- High-density residential.
- Recreational.
- Commercial/industrial outdoor worker.

As construction works are to take place at the site and the site will be used for residential purposes, analytical results have been compared against the SCS for residential land-use scenario. Table 6 details the selection criteria adopted for handling and land use.

Table 6: Selection Criteria for Handling, Land Use and Ecological Assessment

Matrix	Source Guideline	Land-use Criteria
Soil	Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Report No. LC2440, November 2015. (Landcare Research, 2016)	Proposed Background Concentrations
	Ministry for the Environment (2011). <i>Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health</i> . Publication number ME 1055, June 2011.	SCS for: Residential 10% Produce.
	National Environmental Protection Council (2013). <i>National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)</i> .	Health Investigation Levels (HILs) ¹ for: Residential with garden/accessible soil (HIL A).
	Landcare Research (2019). Development of Soil Guideline Values for the Protection of Ecological Receptors (Eco-SGVs) Landcare Research Update: 2019	Ecological Soil Guideline Values (Eco-SGV) for 80% species protection

¹ Applied for nickel and zinc only due to the absence of criteria in the NESCS.

5.2 USE AND DISPOSAL

We have used the guidelines shown in Table 7 to classify soil for off-site disposal.

Table 7: Disposal Criteria

Matrix	Source Guideline	Criteria
Soil	Waste Management Institute New Zealand (2023). <i>Technical Guidelines for Disposal to Land Revision 3.1</i> . September 2023 (Waste Management Institute New Zealand, 2023)	Waste Acceptance Criteria for: Class 1 landfills Class 2 landfills (C&D) Class 3 landfills (Managed Fill) Class 4 landfills (Controlled Fill)
	Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Report No. LC2440, November 2015. (Landcare Research, 2016)	Cleanfill classification: Proposed Background Concentrations

6 QUALITY ASSESSMENT AND QUALITY CONTROL

6.1 FIELD AND LABORATORY QUALITY PROGRAM

The field and laboratory quality assurance and quality control (QA/QC) program was based on data quality indicators (DQIs) chosen to assess the suitability of the dataset. Table 8 summarises the field quality program for the DSI and Table 9 summaries the laboratory quality program.

Table 8: Field quality program

Environmental consultant	The environmental consultant maintains quality assurance systems certified to AS/NZS ISO 9001:2015.
Procedures	All work was conducted in accordance with relevant statutory and WSP health, safety and environmental sampling guidelines and environmental field procedures. Standard field sampling sheets were used. Details recorded included WSP staff and contractors present, time on/off-site, weather conditions, calibration records and other observations relevant to the works.
Sampling	Collection of samples was undertaken by appropriately qualified and experienced personnel following WSP standard field procedures which are based on industry accepted standard practice. A chain of custody was used to ensure the integrity of samples from collection to receipt by the laboratory.
Equipment decontamination	Decontamination was undertaken after each sampling location where equipment used was not dedicated. Field sampling procedures conformed to WSP QA/QC protocols to prevent cross contamination, preserve sample integrity, and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory usability.
Transportation	Samples were stored in chilled coolers on-site and during transport to the laboratory. Chain of custody forms were completed on-site and sent with the samples. Chain of custody forms are presented with laboratory reports in Appendix D, and include the sampler's name, date of sampling, sample matrix, sample containers and preservation used, and analysis requested. The laboratory confirmed receipt of the samples and specified the condition on delivery and the scheduled analyses.
Reporting	This DSI report was completed in general accordance with CLMG No. 1.

Table 9: Laboratory quality program

Holding times	Samples were transported to the primary laboratory, and all primary samples were extracted and analysed within the holding times for the analyses requested.
Methods	Analysis was carried out by laboratories with IANZ certification for the required analyses. Methods used by the laboratory were consistent with CLMG No. 5.
Reporting Limits	Practical quantitation limits (PQLs) were sufficient to enable comparison against the appropriate guidelines.
Relative Percentage Difference (RPD)	Analytical results indicate that all heavy metal concentrations in field duplicate samples were within the acceptable <30-50% RPD range between duplicate samples. Overall, exceedances are not considered to impact the conclusions of this DSI. The RPD results are presented in Appendix E.

6.2 QA/QC DATA EVALUATION

6.2.1 CONSISTENCY

Consistent and repeatable sampling techniques and methods were utilised. The same samplers and methodology were used for each sampling locations. The sampling was undertaken in general accordance with the sampling and analysis procedures and as per standard industry procedures.

6.2.2 SUMMARY

WSP considers that the sample collection, documentation, handling, storage and transportation procedures utilised are of an acceptable standard and the analytical results provided by the laboratories are deemed reliable and complete, therefore the data are considered fit for purpose.

It is considered that the QA/QC procedures and results were acceptable and that the conclusions of the report have not been significantly affected by the sampling or analytical procedures.

Based on the results of laboratory QA/QC samples and the sampling and handling procedures used for the collection and analysis of soil, the data were generally considered representative and appropriate for use in this assessment, with the limitations discussed above.

7 RESULTS

7.1 SOIL CONDITIONS

Table 10 shows the soil conditions encountered at the sampling locations.

Table 10: Soil Conditions

Location	Sample ID	Depth (m bgl)	Soil Description	Notes
Sheep DIP	SD1	0.05	SILT, brown, dry, fine sands.	Holding paddock
	SD2	0.05	Clay SILT, dark brown, stiff.	Adjacent to inlet gate
	SD3	0.1	Sandy SILT, dry, dense, fine sands.	Adjacent to outlet gate (side holding pen)
	SD4	0.05	Silt CLAY, with rootlets, brown, dry, stiff.	Adjacent to outlet gate (exit to paddock)
	SD5	0.1	Clay SILT, brown, dry, stiff.	Paddock
	SD5	0.05	Clay SILT, brown, dry, stiff.	Near to gate at north of paddock
Landfill	LF1		Organic sand, dark brown, with lots of roots.	During the site visit it was discovered the area deemed a landfill was to be a large pile of flax leaves and cuttings which had been stockpiled for composting.
	LF2		Organic compost, dark brown and black. Strip of metal present.	
	LF3		SAND, with roots, brown, dry, organic compost material.	
Fertiliser Storage	FZ1	0.3	Sandy SILT, dark brown, with lots of wood chips, pinecones and organic material	Sample collected from elevated burn pile.
	FZ2	0.035	Sandy SILT, grey, fine sands, compacted angular gravels, dark brown.	
	FZ3	0.15	Sandy SILT, dry, compact with fine gravel.	Bare ground surrounded by grassed paddock. Dried out cow dung all over area. Possible cattle congregation area.
	FZ4	0.1	SILT, with coarse gravel, light grey, well compacted and almost white mottling in situ.	

Location	Sample ID	Depth (m bgl)	Soil Description	Notes
Homestead Bay Road Sheep Dip	HBR1	0.1	Sandy/gravel SILT, black, dry, stiff.	Adjacent to inlet gate
	HBR2	0.05	clay SILT, dry, stiff.	Holding paddock with temporary fencing for drenching
	HBR3	0.1	Organic SILT, dark brown, dry desiccated.	Holding paddock
	HBR4	0.05	Gravel/sandy SILT, brown, well compacted.	Near outlet gate from drenching/footbath area

7.2 ANALYTICAL RESULTS

The following sections summarise the analytical results of the DSI Laboratory reports and chain of custody documentation are provided in Appendix D and a summary of the results are tabulated with reference to the adopted assessment criteria in Appendix E.

7.2.1 HUMAN HEALTH AND ECOLOGICAL CRITERIA

No samples from the sheep dip, landfill area and Homestead Bay Road sheep pen area contained concentrations of metals or OCP exceeding the adopted human health criteria for a residential 10% produce land use.

One marginally elevated cadmium concentration (FZ2) was noted within the Fertiliser area. This concentration exceeds both human health and ecological criteria

Two exceedances of the Eco-SGV 'Target Limit' for 95% species protection were reported for heavy metals which were also above local background concentrations. Zinc was noted in two samples to exceed both criteria in HBR1 and HBR4, with HBR being significantly elevated.

7.2.2 BACKGROUND CONCENTRATIONS AND LABORATORY DETECTIONS

Zinc and cadmium were encountered above local background levels within three of the four samples from the Homestead Bay Road Sheep pens area. Zinc was above background in two of the four samples (HBR 1 & 4) which were located at each end of the footbath/drenching pen area and Cadmium was marginally elevated in HB3 associated with the holding paddock to the east of the drenching area.

Mercury and OCP compounds were all reported below laboratory PQLs in all samples analysed.

Cadmium was also noted to be elevated above background samples FZ1, FZ2 and FZ4 from the fertiliser storage area.

7.2.3 DISPOSAL/REUSE CRITERIA

Analytical results were compared against disposal criteria outlined in Section 5. Based on the concentrations of contaminants in soil, excess soil from the Sheep Dip (SD) and Landfill (LF) is likely suitable for disposal at a Class 1, 3 or 4 landfill, subject to approval from the receiving facility. It is also suitable for cleanfill disposal or for re-use on site.

Excess soil from the Fertiliser Storage (FZ) area is likely suitable for disposal at a Class 1 or 3 landfill, subject to approval from the receiving facility. It is not suitable for disposal as Controlled Fill without further assessment/analysis of soils following removal and/or stockpiling. Due to the elevated cadmium present the soils are not considered suitable for reuse on site.

Soils from the Homestead Bay Sheep Pen area would require further assessment including TCLP analysis to determine its acceptance at a Class 1 facility due to the elevated zinc concentrations present in the near surface soils. As contaminants do not exceed human health criteria, surface soils for the HBR pens are however considered suitable for reuse on site.

Due to elevated zinc concentrations no soils are acceptable for disposal at a Class 2 (construction & demolition waste) Landfill. A summary of the acceptability of soils for reuse/ cleanfill or disposal is presented in Table 11.

Table 11: Disposal and Reuse Summary

Location	Suitability			
	Reuse	Cleanfill	Disposal (Controlled Fill)	Disposal (Managed Fill)
Sheep Dip				
'Landfill' Area				
Fertiliser Storage Area			Subject to further assessment	
Homestead Bay Road Sheep Pens Area				

8 UPDATED CONCEPTUAL SITE MODEL

Based on the site inspection, desktop review, and results of the soil sampling investigation, an updated CSM has been developed for the site. The updated CSM is summarised in Table 12.

Table 12: Updated Conceptual Site Model

Likely Source	
Impacted Media	Near surface soils
Contaminants of Concern	— Cadmium is a contaminant of concern for human health in the Fertiliser Storage area. — Zinc is a contaminant of concern for the ecology in the Homestead Bay Road Sheep Dip area.
Potential Migration Pathways	— Surface runoff containing impacted soil or dissolved contaminants; — Infiltration of contaminants in soil; and — Groundwater transport through soil, including in preferential pathways (service trenches, through higher permeability soils and/or high groundwater levels).
Potential Exposure Pathways	— Ingestion or dermal contact with impacted soil, including surface soils including during excavation work; — Ingestion or dermal contact with impacted surface water during excavation work. — Inhalation of dust; — Ingestion of foods grown in impacted soils eg. vegetable gardens etc. — Sediment runoff during periods of high rainfall
Potential Receptors	— Workers and visitors at the site during the proposed site works; — Residents and visitors following the development of the site; and — Surface water ecosystems within on site ephemeral streams

9 CONCLUSIONS

This DSI comprised a targeted sampling investigation, limited to areas where HAIL activities have been identified for the proposed development of Lot 8 DP 443832 and Lot 12 DP 364700, 786 Kingston Road, Jacks Point, Queenstown. The Airstrip has been excluded from this investigation at this time due to its ongoing operations and current well-kept condition.

Based on the results of the investigation, the following conclusions were made:

- With the exception of one marginally elevated cadmium result in the Fertiliser Storage area, concentrations of all heavy metals and OCP were below the adopted human health criteria in the areas investigated and therefore represent a low risk to human health.
- Soils within the Fertiliser Storage area would need to be managed in the form of a Remediation Action Plan to ensure that this HAIL area is suitable for a residential end use.
- Heavy metal concentrations above local background were encountered within the Fertiliser Storage area and Homestead Bay Road Sheep Pens area. As such the NES-CS applies to these HAIL areas.
- No contaminants were above background within the Sheep dip area and Landfill area with visual assessment indicating that no bath or dip was present in the sheep dip area and the landfilling comprised composting of waste organic materials including flax leaves from gardening activities in the NZone car parking area. As such the NES-CS **does not apply** to these areas of the site.
- With the exception of soils from the Fertiliser Storage area, all soils are suitable for reuse on site.
- Should off-site disposal be required, soil from the Sheep Dip (SD) and Landfill (LF) areas is suitable for disposal as cleanfill or at a Class 1, 3 or 4 landfill, subject to approval from the receiving facility.
- Soils from the Fertiliser Storage area (FZ) and Homestead Bay Road Sheep Pens (HBR) area would be subject to further assessment and analysis to determine off-site disposal acceptance.

9.1 RECOMMENDATIONS

Based on the findings of the DSI the following is recommended:

- Submission of this DSI report as part of any consent application;
- Submission of this report to ORC to facilitate updating of the HAIL database;
- The production of a Remediation Action Plan to manage soil disturbance on the Fertiliser Storage Area;
- TCLP analysis of soils from the Fertiliser Storage area if off-site disposal of soils is to be undertaken.
- Assessment of the NZone fuel storage and airstrip area be completed once, currently ongoing, activities in this area cease to assess risks associated with HAIL activities in this area.

10 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for [RCL Homestead Bay Limited] ('Client') in accordance with the Short Form Agreement (1 June 2023) and Project Change Notice 02 with the Client dated 21 March 2025] ('Agreement').

Permitted Purpose

This Report has been prepared expressly for the purpose of a Detailed Site Investigation ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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The data reported and Conclusions drawn by WSP in this Report are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

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11 REFERENCES

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- WSP. (2025). *Preliminary Site Investigation – 786 Kingston Road, Queenstown*. 17 April 2025.



A

Figures





Legend

Site Boundary

0 250 m 500 m
LINZ CC BY 4.0 © Imagery Basemap contributors



Produced by **Datanest.earth**

Title:

Site Location

Client: RCL Henley Downs Limited

Size: A4

Project:
Detailed Site
Investigation

Drawn: TC

Figure No.: 1

Date: 16-04-2025

Checked: LB

Proj No:
6-XZ762.00

Scale:
1:15452

Version: Final



Legend

-  Landfilling
-  Homestead Bay Road Sheep Dip
-  Fertiliser Storage
-  Sheep DIP
-  Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors



Produced by **Datanest.earth**

Title:

Investigation Areas

Client: RCL Henley Downs Limited Size: A4

Project:
Detailed Site
Investigation

Drawn: TC

Figure No: 2

Date: 16-04-2025

Checked: LB

Proj No:
6-XZ762.00

Scale:
1:10844

Version: Final



Legend

-  Sheep Dip
-  Sampling Locations
-  Site Boundary

0 10 m 20 m

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Produced by **Datanest.earth**

Title: Sheep Dip Sampling Locations

Client: RCL Homestead Bay Limited		Size: A4
Project: Detailed Site Investigation	Drawn: TC	Figure: 3a
Date: 16-04-2025	Checked: LB	
Proj No: 6-XZ762.00	Scale: 1:1108	Version: Final



Legend

-  Landfilling
-  Sampling Locations
-  Site Boundary

0 5 m 10 m
LINZ CC BY 4.0 © Imagery Basemap contributors



Produced by **Datanest.earth**

Title: Landfilling Sampling Locations		
Client: RCL Henley Downs Limited		Size: A4
Project: Detailed Site Investigation	Drawn: TC	Figure: 3b
Date: 16-04-2025	Checked: LB	
Proj No: 6-XZ762.00	Scale: 1:287	Version: Final



Legend

-  Fertiliser Storage
-  Sampling Locations
-  Site Boundary

0 10 m 20 m
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Produced by **Datanest.earth**

Title: Fertiliser Storage Sampling Locations

Client: RCL Homestead Bay Limited		Size: A4
Project: Detailed Site Investigation	Drawn: TC	Figure: 3c
Date: 16-04-2025	Checked: LB	
Proj No: 6-XZ762.00	Scale: 1:705	Version: Final



- Legend**
-  Homestead Bay Road Sheep Pens
 -  Sampling Locations
 -  Site Boundary

0 5 m 10 m
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Produced by **Datanest.earth**

Title:
Homestead Bay Road Sheep Dip Sampling
Locations

Client: RCL Homestead Bay Limited	Size: A4
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Project: Detailed Site Investigation	Drawn: TC	Figure: 3d
Date: 16-04-2025	Checked: LB	

Proj No: 6-XZ762.00	Scale: 1:535	Version: Final
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B

Data Quality Objectives



Table B1 DQO process

STEP	DESCRIPTION	OUTCOMES
1	State the problem	Based on our understanding of the project, the following “problem” has been identified: The site has been used for a selection of land uses which are indicative of an increased risk of contamination. The client has an obligation under the Health and Safety at Work Act to identify risks to workers and contractors working on the site. One such risk is the risk of exposure to contaminants and therefore in order to properly understand the level of risk and how best to manage it further investigations of the soil contaminant conditions is required. The site is to be subdivided with development thereafter and will require soil disturbance. Some soil excess may be generated as a result of the works and may need to be disposed of off-site. Contaminant characteristics of the soil need to be understood in order to identify appropriate disposal locations for the soil excess. These works trigger the Resource Management (National Environmental Standard for Assessment and Management of Contaminated Soils to Protect Human Health) Regulations. Soil contaminant conditions must be understood as part of the consenting process.
2	Identify the decisions/goal of the investigation	The decisions to be made based on the results of the investigation are as follows: — Is the site investigation design sufficiently robust to meet the requirements of Contaminated Land Management Guideline No. 5, Site Investigation and Analysis of Soil? — Have all the contaminants of concern been identified? — Are the data gaps at the site clear? — Are there contaminant risks which need to be managed during the works? — Are there contaminant risks that need to be managed on completion of the works? — What controls are needed to manage the contaminant risks during and on completion of the works? — Where can the soil excess be disposed of? — What consents and permits are triggered by the presence of contamination?

STEP	DESCRIPTION	OUTCOMES
3	Identify the inputs to the decision	The inputs required to make the above decisions are as follows: — Background data on site history and materials used in the construction of the site and associated plant — Observation data including presence of odours and discolouration of the soil — Geological data — Concentrations of contaminants of concern in soil — Site assessment criteria for soil — Distribution of identified soil contamination (if any)
4	Define the study boundaries/constraints on data	The boundaries of the investigation have been identified as follows: — Spatial boundaries: the spatial boundary of the investigation area is defined as the geographical extent of the proposed works, as shown on Figure 2 and the depth of exploration. — Temporal boundaries: the date of the project inception (January 2025) to the completion of the field work under the proposed investigation.
5	Develop a decision rule <i>The purpose of this step is to define the parameters of interest, specify the action levels, and combine the outputs of the previous DQO steps into an 'if...then...' decision rule that defines the conditions that would cause the decision maker to choose alternatives actions.</i>	If concentrations exceed the adopted assessment criteria, then: — Consent will be sought — Controls will be implemented to manage contaminant risks during and on completion of works — Soil excess will be disposed of at a facility that is licenced to accept this type of waste. — Requirements for further assessment, remedial and/or management options will be considered.
6	Specify limits on decision errors	The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the data quality indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness and are presented in Tables B2 and B3.
7	Optimise the design for obtaining data <i>The purpose of this step is to identify a resource effective data collection design for generating data that satisfies the DQOs.</i>	This assessment has been designed considering the information obtained during the desktop review of information undertaken by WSP (2024). The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 4 (Site Investigation). It is based on the principles set out in CLMG No. 5 and the details of the proposed works. To ensure the design satisfies the DQOs, DQIs (for accuracy, comparability, completeness, precision and reproducibility) have been established to set acceptance limits on field methodologies and laboratory data collected. Further detail has on DQI has been provided below. Based on the contaminants of concern and size of each HAIL area on the site the number of samples collected would represent a detailed site investigation.

DQIs for sampling techniques and laboratory analysis of collected soil samples define the acceptable level of error required for this assessment. The adopted field methodologies and data obtained have been assessed by reference to DQIs as follows:

- Precision: a quantitative measure of the variability (or reproducibility) of data.
- Accuracy: a quantitative measure of the closeness of reported data to the true value.
- Representativeness: the confidence (expressed qualitatively) that data is representative of each media present on the site.
- Comparability: a qualitative parameter expressing the confidence with which one data set can be compared with another.
- Completeness: a measure of the amount of useable data (expressed as a percentage) from a data collection activity.

A summary of the field and laboratory DQIs for the validation assessment are provided in Tables B2 and B3.

Table B2 DQIs for field techniques

DQI
Precision
Standard operating procedures (SOPs) appropriate and complied with
Collection of intra-laboratory and inter-laboratory duplicates – not required. Field duplicates taken.
Accuracy
WSP SOPs appropriate and complied with
Representativeness
Appropriate media samples
Sample design appropriate to identify potential sources
Comparability
Same SOPs used on each occasion
Experienced sampler
Climatic conditions (temperature, rainfall, wind): Sampling was completed on the same day with no rainfall prior or during.
Same type of samples collected: Soil samples collected using laboratory supplied containers
Completeness
SOPs appropriate and complied with
All required samples collected

Table B3 DQIs for laboratory

DQI	ACCEPTABLE LIMITS
Precision	
International Accreditation New Zealand (IANZ) certified laboratory	IANZ accreditation for analyses performed
Accuracy	
Analysis of laboratory matrix spikes, laboratory control samples and surrogate recoveries	70-130% inorganics/metals 60-140% organics 10-40% semi-volatile organic compounds
Representativeness	
All required samples analysed	As per Section 10
Comparability	
Sample analytical methods used (including clean-up)	As per MfE CLMG No. 5
Same units	Justify/quantify if different
Same laboratories	Justify/quantify if different
Sample PQLs	Less than nominated criteria
Completeness	
All critical samples analysed	As per Section 7
All required analytes analysed	As per Section 7
Appropriate methods and PQLs	As per MfE CLMG No. 5
Sample documentation complete	
Sample holding times complied with	

wsp

C

Photographic Log



wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No.	Date	
1.	1/04/2025	
Description Location of sample Sheep Dip 1 (SD1) looking south.		

Photo No.	Date	
2.	1/04/2025	
Description Closeup of sample collected for SD1.		

		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No.	Date	
3.	1/04/2025	
Description Location of sample SD2 looking north.		

Photo No.	Date	
4.	1/04/2025	
Description Closeup of sample collected for SD2.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
5.	1/04/2025	
Description		
Location of sample SD3 looking southeast.		

	
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Photo No.	Date	
6.	1/04/2025	
Description Closeup of sample collected for SD3.		

		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
7.	1/04/2025	
Description Location of sample SD4 looking southwest.		

Photo No.	Date	
8.	1/04/2025	
Description Closeup of sample collected for SD4 & field duplicate.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
9.	1/04/2025	
Description Location of sample SD5 looking south.		

Photo No.	Date	
10.	1/04/2025	
Description Closeup of sample collected for SD5.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
11.	1/04/2025	
Description Location of sample SD6 looking west.		

Photo No.	Date	
12.	1/04/2025	
Description Closeup of sample collected for SD6.		

		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
13.	1/04/2025	
Description Location of landfilling looking south.		

Photo No.	Date	
14.	1/04/2025	
Description Landfill stockpile comprising organic material, mainly flax leaves.		

		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
15.	1/04/2025	
Description Closeup of sample collected for Landfill 1 (LF1).		

Photo No.	Date	
16.	1/04/2025	
Description Closeup of sample collected for LF2.		

		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
17.	1/04/2025	
Description Closeup of sample collected for LF3 with field duplicate.		

Photo No.	Date	
18.	1/04/2025	
Description Location of Fertilizer Storage looking north.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
19.	1/04/2025	
Description Location of Fertilizer Storage looking southwest.		

Photo No.	Date	
20.	1/04/2025	
Description Closeup of sample collected for Fertilizer Storage 1 (FZ1).		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
21.	1/04/2025	
Description Closeup of sample collected for FZ2.		

Photo No.	Date	
22.	1/04/2025	
Description Closeup of sample collected for FZ3.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
23.	1/04/2025	
Description Closeup of sample collected for FZ4.		

Photo No.	Date	
24.	1/04/2025	
Description		
Location of Homestead Bay Road Sheep Pens looking east.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
25.	1/04/2025	
Description Closeup of sample collected for Homestead Bay Road Sheep Pens 1 (HBR1).		

Photo No.	Date	
26.	1/04/2025	
Description Location of sample HBR2 looking east.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
27.	1/04/2025	
Description Closeup of sample collected for HBR2.		

Photo No.	Date	
28.	1/04/2025	
Description Location of sample HBR3 looking northwest.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date	
29.	1/04/2025	
Description Closeup of sample collected for HBR3.		

Photo No.	Date	
30.	1/04/2025	
Description Location of sample HBR4 looking northwest.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No	Date		
31.	1/04/2025		
Description Closeup of sample collected for HBR4.			

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No.	Date	
32.	1/04/2025	
Description Fuel tank and tanker at NZONE Skydive.		

Photo No.	Date	
33.	1/04/2025	
Description Airplane on refueling pad – NZone Skydiving.		

wsp		PHOTOGRAPHIC LOG	
Client Name Homestead Bay Ltd	Site Location Homestead Bay, 786 Kingston Road, Queenstown		Project No. 6-XZ762.PCN02

Photo No.	Date	
34.	1/04/2025	
Description Fuel tank at NZONE Skydive.		

Photo No.	Date	
35.	1/04/2025	
Description Fuel tank at NZONE Skydive.		



D

Laboratory Documentation





Quote No 82748 Lab Order No 515779

Primary Contact Lisa Bond 175913

Submitted By Lisa Bond 175913

Client Name WSP New Zealand Limited 205990

Address PO Box 273
Alexandra 9320

Phone Mobile

Email

Charge To WSP New Zealand Limited 205990

Client Reference 6x2762.00 Homestead Bay.

Additional Client Ref

Order No TBC

Results To Reports will be emailed to Primary Contact by default.
Additional Reports will be sent as specified below.

☒ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

Dates of testing are not routinely included in the Certificates of Analysis.
Please inform the laboratory if you would like this information reported.

ADDITIONAL INFORMATION / KNOWN HAZARDS

P.O.N. to be confirmed on receipt of
CoC

Quoted Sample Types

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	SD1	1/4/25	Soil	H. Metals + Hg OCP Screen.
2	SD2			
3	SD3			
4	SD4			
5	SD5			
6	SD6			
7	SD Dup.			
8	LF1			H. Metals + Hg.
9	LF2.			

ANALYSIS REQUEST

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

Job No. Date Recv. 03-Apr-25 08:30

384 2771

0508 HILL LAB 44 555 22

+64 7 858 2000

mail@hill-labs.co.nz

www.hill-labs.co.nz

Received by: David Manson



3138427715

CHAIN OF CUSTODY RECORD

Sent to
Hill Labs

Date & Time: 2/4/25

Name: L. Bond

☒ Tick if you require COC
to be emailed back

Signature: LAB.

Received at
Hill Labs

Date & Time:

Name:

Signature:

Condition

Temp:

☐ Room Temp ☐ Chilled ☐ Frozen

11.8

☐ Sample & Analysis details checked

Signature:

Priority ☐ Low ☐ Normal ☒ High

☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
10	LF 3	1/4/25	Soil	HM + Hg
11	LF Dup			↓.
12	FZ 1			HM + Hg
13	FZ 2			↓
14	FZ 3			
15	FZ 4			↓
16	HBR1			HM + Hg; OCP Screen.
17	HBR 2			↓
18	HBR 3			
19	HBR 4.	↓	↓	↓
20				
21				
22				
23				
24				
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27				
28				
29				
30				
31				
32				
33				
34				

Job Information Summary

Page 1 of 2

Client:	WSP New Zealand Limited	Lab No:	3842771
Contact:	Lisa Bond	Date Registered:	03-Apr-2025 2:49 pm
	C/- WSP New Zealand Limited	Priority:	High
	PO Box 273	Quote No:	82748
	Alexandra 9320	Order No:	required
		Client Reference:	6X2762.00 Homestead Bay
		Add. Client Ref:	
		Submitted By:	Lisa Bond
		Charge To:	WSP New Zealand Limited
		Target Date:	07-Apr-2025 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SD1 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
2	SD2 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
3	SD3 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
4	SD4 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
5	SD5 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
6	SD6 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
7	SD Dup 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
8	LF1 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
9	LF2 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
10	LF3 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
11	LF Dup 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
12	FZ1 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
13	FZ2 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
14	FZ3 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
15	FZ4 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level
16	HBR1 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
17	HBR2 01 Apr 2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
18	HBR3 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil
19	HBR4 01-Apr-2025	Soil	GSoil300	Heavy Metals with Mercury, Screen Level, Organochlorine Pesticides Screening in Soil

Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1 19

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1 19
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1 7, 16 19
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-7, 16-19

Certificate of Analysis

Page 1 of 4

Client:	WSP New Zealand Limited	Lab No:	3842771	SPV1
Contact:	Lisa Bond	Date Received:	03-Apr-2025	
	C/- WSP New Zealand Limited	Date Reported:	08-Apr-2025	
	PO Box 273	Quote No:	82748	
	Alexandra 9320	Order No:	588	
		Client Reference:	6X2762.00 Homestead Bay	
		Submitted By:	Lisa Bond	

Sample Type: Soil						
Sample Name:		SD1 01-Apr-2025	SD2 01-Apr-2025	SD3 01-Apr-2025	SD4 01-Apr-2025	SD5 01-Apr-2025
Lab Number:		3842771.1	3842771.2	3842771.3	3842771.4	3842771.5
Individual Tests						
Dry Matter	g/100g as rcvd	89	76	87	81	87
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	11	12	10	10
Total Recoverable Cadmium	mg/kg dry wt	0.11	0.12	0.13	0.11	0.14
Total Recoverable Chromium	mg/kg dry wt	13	13	14	15	13
Total Recoverable Copper	mg/kg dry wt	20	19	20	19	20
Total Recoverable Lead	mg/kg dry wt	14.0	13.1	15.2	15.6	15.0
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	13	13	14	15	14
Total Recoverable Zinc	mg/kg dry wt	87	89	96	86	87
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
beta-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	< 0.07	< 0.08	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.013	< 0.012	< 0.012	< 0.012

Sample Type: Soil						
Sample Name:		SD6 01-Apr-2025	SD Dup 01-Apr-2025	LF1 01-Apr-2025	LF2 01-Apr-2025	LF3 01-Apr-2025
Lab Number:		3842771.6	3842771.7	3842771.8	3842771.9	3842771.10
Individual Tests						
Dry Matter	g/100g as rcvd	83	82	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	11	6	< 2	8
Total Recoverable Cadmium	mg/kg dry wt	0.13	0.12	0.11	0.23	0.20
Total Recoverable Chromium	mg/kg dry wt	12	15	11	3	10
Total Recoverable Copper	mg/kg dry wt	20	19	15	17	19
Total Recoverable Lead	mg/kg dry wt	13.4	15.5	10.4	3.8	9.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	12	15	6	3	10
Total Recoverable Zinc	mg/kg dry wt	92	92	38	94	84
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.012	-	-	-
alpha-BHC	mg/kg dry wt	< 0.012	< 0.012	-	-	-
beta-BHC	mg/kg dry wt	< 0.012	< 0.012	-	-	-
delta-BHC	mg/kg dry wt	< 0.012	< 0.012	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.012	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.012	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.012	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.08	-	-	-
Dieldrin	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endosulfan I	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endosulfan II	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endrin	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Endrin ketone	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Heptachlor	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Methoxychlor	mg/kg dry wt	< 0.012	< 0.012	-	-	-
Sample Name:		LF Dup 01-Apr-2025	FZ1 01-Apr-2025	FZ2 01-Apr-2025	FZ3 01-Apr-2025	FZ4 01-Apr-2025
Lab Number:		3842771.11	3842771.12	3842771.13	3842771.14	3842771.15
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	5	5	5	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.21	0.77	3.4	0.32	0.44
Total Recoverable Chromium	mg/kg dry wt	9	13	26	10	14
Total Recoverable Copper	mg/kg dry wt	19	14	13	19	9
Total Recoverable Lead	mg/kg dry wt	8.9	8.0	6.5	10.0	5.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	7	8	11	< 2
Total Recoverable Zinc	mg/kg dry wt	76	51	48	60	12
Sample Name:		HBR1 01-Apr-2025	HBR2 01-Apr-2025	HBR3 01-Apr-2025	HBR4 01-Apr-2025	
Lab Number:		3842771.16	3842771.17	3842771.18	3842771.19	
Individual Tests						
Dry Matter	g/100g as rcvd	83	84	82	92	

Sample Type: Soil					
Sample Name:		HBR1 01-Apr-2025	HBR2 01-Apr-2025	HBR3 01-Apr-2025	HBR4 01-Apr-2025
Lab Number:		3842771.16	3842771.17	3842771.18	3842771.19
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	9	9	8	6
Total Recoverable Cadmium	mg/kg dry wt	0.10	< 0.10	0.15	< 0.10
Total Recoverable Chromium	mg/kg dry wt	11	11	15	9
Total Recoverable Copper	mg/kg dry wt	20	22	33	13
Total Recoverable Lead	mg/kg dry wt	10.5	11.7	13.7	8.6
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	11	13	13	9
Total Recoverable Zinc	mg/kg dry wt	3,900	87	111	330
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
alpha-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
beta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
delta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.07	< 0.08	< 0.07
Dieldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan I	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan II	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Endrin ketone	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Heptachlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011
Methoxychlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011

Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-19
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-19
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-7, 16-19
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-7, 16-19

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

Testing was completed between 03-Apr-2025 and 07-Apr-2025. 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.



Ara Heron BSc (Tech)
Client Services Manager - Environmental



E

Summary of Analytical Results and RPD



		Heavy Metals								OCPs			
		mg/kg								mg/kg			
		Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Aldrin	Lindane	Dieldrin
Background Concentrations ¹	Silt (HBR)	11.08	0.13	116.1	37.42	52.54	-	97.44	167	-	-	-	-
	Conglomerate Maui (LF; FZ)	11.04	0.43	60.82	47.36	38.8	-	33.42	191				
	Gravel (SD)	12.06	0.34	80.15	42.85	44.34	-	44.96	182.8				
Limit of Reporting (LOR)		0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05	0.01	0.01	0.01	0.01
NESCS ²	Residential (10% produce)	20	3	460	>10,000	210	310	-	-	70	-	-	2.6
IRB NEPM SGV HILD ³		-	-	-	-	-	-	400	7400	-	-	-	-
NZRB ⁵	Eco-SGV (95% species Protection)	20	1.5	190	55	280	-	-	80	-	-	-	-

Disposal ⁴	Class 1 Landfill	TCLP Required								TCLP Required			
	Class 2 C&D Landfill ⁶	20	4	20	10	20		20	20		-	1.6	-
	Class 3 Managed Fill	140	10	150	280	460		320	1200	2*	-	-	0.1*
	Class 4 Controlled Fill	17	0.8	150	220	160		35	190	2	-	-	0.1*
	Class 5 Clean Fill ⁷	10	0.65	10	10	10	0.4	20	20	0.7*	-	-	-

Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	mg/kg											
Sheep Dip															
SD1	1-Apr-25	3842771.1		11	0.11	13	20	14	<0.10	13	87	<0.07	<0.011	<0.011	<0.011
SD2		3842771.2		11	0.12	13	19	13.1	<0.10	13	89	<0.08	<0.013	<0.013	<0.013
SD3		3842771.3		12	0.13	14	20	15.2	<0.10	14	96	<0.07	<0.012	<0.012	<0.012
SD4		3842771.4		10	0.11	15	19	15.6	<0.10	15	86	<0.08	<0.012	<0.012	<0.012
SD5		3842771.5		10	0.14	13	20	15	<0.10	14	87	<0.07	<0.012	<0.012	<0.012
SD6		3842771.6		10	0.13	12	20	13.4	<0.10	12	92	<0.08	<0.012	<0.012	<0.012
SD Dup 1		3842771.7		11	0.12	15	19	15.5	<0.10	15	92	<0.08	<0.012	<0.012	<0.012
Landfill Area															
LF1	1-Apr-25	3842771.8		6	0.11	11	15	10.4	<0.10	6	38	-	-	-	-
LF2		3842771.9		<2	0.23	3	17	3.8	<0.10	3	94	-	-	-	-
LF3		3842771.1		8	0.2	10	19	9.8	<0.10	10	84	-	-	-	-
LF Dup		3842771.11		7	0.21	9	19	8.9	<0.10	10	76	-	-	-	-
Fertiliser Area															
FZ1	1-Apr-25	3842771.12		5	0.77	13	14	8	<0.10	7	51	-	-	-	-
FZ2		3842771.13		5	3.4	26	13	6.5	<0.10	8	48	-	-	-	-
FZ3		3842771.14		5	0.32	10	19	10	<0.10	11	60	-	-	-	-
FZ4		3842771.15		<2	0.44	14	9	5.8	<0.10	<2	12	-	-	-	-
Homestead Bay Road Sheep Pens															
HBR1	1-Apr-25	3842771.16		9	0.1	11	20	10.5	<0.10	11	3,900	<0.08	<0.012	<0.012	<0.012
HBR2		3842771.17		9	<0.10	11	22	11.7	<0.10	13	87	<0.07	<0.012	<0.012	<0.012
HBR3		3842771.18		8	0.15	15	33	13.7	<0.10	13	111	<0.08	<0.012	<0.012	<0.012
HBR4		3842771.19		6	<0.10	9	13	8.6	<0.10	9	330	<0.07	<0.011	<0.011	<0.011

Key:

Purple Box/Fill

Exceedance of Background Concentrations

Yellow Fill

Exceedance of Residential SCS

Red Writing

Exceedance of Ecological SGV (Only applicable if value exceeds local background)

Bold

Exceedance of Waste Disposal Criteria

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016

2. Values taken from Table 2.

2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).

4. WasteMINZ: Technical Guidelines for Disposal to Land Revision 3.1; September 2023

5. Landcare Research (2022). Exploring the implementation of ecological soil guideline values for soil contaminants (June 2022).

6. If total concentration exceeded TCLP required to assess acceptability

7. Acceptance criteria have not been set; rather compliance is achieved by demonstrating the soil or rock being disposed of is in its natural condition. Local Background conditions should be referred (a) Interim

* Check notes within Technical Guidelines for further information

RPD Calcs												
	Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Aldrin	Lindane	Dieldrin
Sheep Dip												
SD4	10	0.11	15	19	15.6	< 0.10	15	86	< 0.07	< 0.012	< 0.012	< 0.012
SD Dup	11	0.12	15	19	15.5	< 0.10	15	92	< 0.08	< 0.012	< 0.012	< 0.012
RPD	-10	-9	0	0	1	0	0	-7	0	0	0	0
Landfill Area												
LF3	8	0.2	10	19	9.8	< 0.10	10	84	-	-	-	-
LF Dup	7	0.21	9	19	8.9	< 0.10	10	76	-	-	-	-
RPD	13	-5	10	0	9	0	0	10	-	-	-	-

Key:

Red Bold 1 Indicates an exceedance of the MfE Data Quality Objectives

Grey Text Indicates concentration below the laboratory limit of reporting (LOR).