

Project Number: 25086

Date: 28/01/2026

Revision: B

DETAILED SITE INVESTIGATION

122 MORVEN FERRY ROAD

Prepared for **Gibbons Development Limited**

Executive Summary

Site Address	122 Morven Ferry Road
Area	~ 212 ha
Current Land Use	Rural residential, low-intensity pastoral farming
Proposed Land Use	Mixed-use development comprising ~1,250 dwellings, workers' accommodation, a village centre (retail, hospitality, office, community services), and extensive recreational and ecological amenity
Development Activities	Subdivision, soil disturbance, change in land use
Historic Land Use	The site has predominantly supported pastoral farming and rural residential use. Within this setting, several activities listed on the Hazardous Activities and Industries List (HAIL) have been identified, including: - Fuel storage (Aboveground storage tanks (ASTs), underground storage tank (UST), and barrels) (HAIL A17) - Sheep spray race and stock handling facilities (HAIL A8) - Clay target shooting area (HAIL C2) - Offal pit (HAIL G5) - Historic fly-tipping in a gully (HAIL G3) - Painted structures with deteriorated cladding (potential HAIL I) These activities are confined to discrete areas within the wider site.
Investigation	A targeted Detailed Site Investigation (DSI) was completed to characterise soil conditions in HAIL areas. Soil samples were analysed for heavy metals, hydrocarbons, PAHs, OCPs, and TCLP leachability to inform human health and environmental risk assessment and soil disposal pathways.
Conclusions	Contamination exceeding relevant human health criteria was identified in several HAIL areas, including: - Clay target shooting area – widespread lead and PAH in surface soils - Fuel storage and AST – low-level hydrocarbon and arsenic impact - Spray race and stockyards – sporadic arsenic and widespread zinc (Eco-SGV exceedances) - Livestock shed – isolated arsenic hotspot The UST and offal pit were unable to be accessed during this investigation, further assessment is therefore required during future earthworks.
NES-CS Application	Future redevelopment works will require consent as a Restricted Discretionary Activity under Regulation 10 of the NES-CS.
ORC Framework	Regional resource consent may be required under the Otago Regional Council's planning instruments (refer to Section 9).
Recommendations	- Prepare a Remedial Action Plan (RAP) and Contaminated Site Management Plan (CSMP) to guide soil handling, management of contaminated material, and disposal during construction. - Undertake further assessment of naturally occurring arsenic to confirm provenance and extent, for earthwork planning and disposal guidance purposes.

Document Control

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Certifying SQEP Statement

The individual(s) undertaking and/or certifying this investigation meet the definition of a Suitably Qualified and Experienced Practitioner (SQEP) under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS), holding the following credentials:

1. A tertiary qualification in environmental science or engineering.
2. A minimum of 10 years of relevant experience.
3. Registration with a recognised professional body that assesses and certifies environmental professionals based on competency, training, experience, professional conduct, and ethical standards.

This investigation has been conducted in accordance with applicable New Zealand regulations and guidance documents, with this report prepared in line with the Ministry for the Environment's *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* (2021).

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1 Introduction

Springline Limited (Springline) has been engaged by Gibbons Development Limited (the client) to prepare this Detailed Site Investigation (DSI) to support the redevelopment of 122 Morven Ferry Road, Queenstown (the site).

1.1 Proposed Development

The project is a master-planned development on an approximately 212-hectare site at 122 Morven Ferry Road, between Arrowtown and the Kawarau River in the Queenstown Lakes District.

The Ridgeburn development incorporates a mix of uses within a commercial village hub, including retail, shared working space, a daycare, and community facilities. Ridgeburn has been designed to integrate with a network of open space reserves and walking and cycling trails. Each neighbourhood includes access to local amenities and open space. Ridgeburn will be fully supported by on-site three waters infrastructure.

The project is anticipated to be delivered over a six-year timeframe in six development phases and comprises:

- 1,030 residential lots accommodating a total of 1,210 residential units across the site, including 180 affordable units;
- A commercial precinct located at the north-eastern corner of the site, providing approximately 17,420 m² commercial, retail, community and accommodation activities, including a supermarket, daycare, community hall/gym, workspace and retail uses, hospitality (woolshed bar and pizzeria), a pump station, and visitor accommodation/ workers accommodation;
- An estimated 6,554 full-time equivalent (FTE) job-years generated over the development period; and
- Approximately 32 hectares of reserve area, 103 hectares of Morven Hill and Kawarau Escarpment Native Restoration, green links and a mix of active and passive recreation areas.

A copy of the proposed masterplan is included in Appendix A.

1.2 Context

A Preliminary Site Investigation¹ (PSI) was completed in September 2025 to assess whether historical or current land use activities may have resulted in potential soil contamination at the site. The assessment identified several activities consistent with the Ministry for the Environment's (MfE's) *Hazardous Activities and Industries List (HAIL)*, further details of which are provided in Section 2.2.

This DSI has subsequently been undertaken to characterise soil conditions within the identified HAIL areas and assess the presence or extent of any contamination.

1.3 Purpose

The investigation has been carried out in general accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011² (NES-CS) and the MfE's Contaminated Land Management Guidelines³ (CLMG).

¹ Springline Limited (30/09/2025). Preliminary Site Investigation – 122 Morven Ferry Road. Dated, Revision A

² Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (2012)

³ Ministry for the Environment (MfE) Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand (Updated 2021); and No. 5: Site Investigation and Analysis of Soil (Updated 2021)

The primary purpose of this DSI is to assess the suitability of the site's intended land use, the objective of which is to determine any actual or potential sources of contamination, as required under the Resource Management Act 1991 (RMA).

The report also informs consent requirements and provides guidance on appropriate soil reuse or disposal pathways during future development.

1.4 Scope

The scope of work undertaken for this DSI includes the following:

- A targeted intrusive investigation, comprising:
 - Collection of soil samples from targeted and systematic locations
 - Laboratory analysis for potential contaminants of concern
- Interpretation of results against applicable guidelines and contaminant standards
- Classification of soils for off-site disposal or on-site reuse
- Risk assessment and development of an updated Conceptual Site Model (CSM) to support construction planning, soil management, and consent requirements.

2 Site Information

2.1 Site Setting

The site comprises a rural landholding located approximately 3.5 km south of Arrowtown, currently used for pastoral grazing, with several existing farm structures, fenced paddocks, and internal access tracks (refer to Figure 1, Appendix B).

Site details are provided in Table 1 below. Refer to the PSI¹ (2025) for detailed information on the site's environmental setting and historical land use.

Table 1: Site Details

Item	Detail
Address	122 Morven Ferry Road, Queenstown
Legal Description	Lot 2 DP 601937 (24.7 ha) (RT: 1174254) Lot 3 DP 529201 (2.05 ha) (RT: 857180) Lot 5 DP 300661 (9.5 ha), Section 21 Block IX Shotover SD, and Sections 23, 24, 71, 64, Blocks VIII Shotover SD (82.7 ha) (RT: 946021) Section 22 Block IX Shotover SD (23.1 ha) (RT: OT406/118) Section 23 Block IX Shotover SD (26.5 ha) (RT: OT7D/1456) Section 1-2 SO 478164, Section 25 Block IX Shotover SD, and Lots 3-4 DP 300661 (45.1 ha) (RT: 946040) Section 1 SO 420327 (8.6 ha) (RT: 492534)
Area	~ 212 ha
District Council	Queenstown Lakes District Council (QLDC)
Regional Council	Otago Regional Council (ORC)
Historic Site Use	Pastoral farming (sheep and cattle grazing), with associated farm structures, including a farmhouse, fencing, and access tracks

2.2 Site Contamination Risks

The PSI¹ (2025) identified several areas containing actual or potential HAIL activities, largely associated with historical farming and fuel storage practices.

A summary of identified HAIL activities is provided in Table 2 below, including associated contaminants of concern, site observations, and investigation requirements. The location of each feature is shown in Figures 2 and 3, Appendix B.

Table 2: Summary of Site Contamination (Identified in PSI)

HAIL / Features	Contaminants of Concern	Comments
Clay target shooting area (HAIL C2)	Heavy metals (including antimony), polycyclic aromatic hydrocarbons (PAHs)	A hobby-scale clay target range is located on the southern terrace boundary, adjacent to the escarpment above the Kowarau River. The range comprises an open shed facing a rising slope, which serves as the primary downrange area. Its historical use appears to have been occasional and recreational.
Former firewood storage yard (non-HAIL)	Total petroleum hydrocarbons (TPH), PAHs, heavy metals	A paddock south of the main residence and existing farm sheds was temporarily leased to Highlander Firewood for firewood processing. The area is now grassed, with no visible evidence of fill or historical disturbance. The landowner confirmed that no timber treatment was undertaken, and only untreated firewood was stored and processed. While the risk of contamination is considered low, limited confirmatory sampling was recommended.
Aboveground storage tank (AST) (HAIL A17)	TPH, PAHs, benzene, toluene, ethylbenzene, xylene (BTEX), volatile organic compounds (VOCs), heavy metals	A 500-1000L AST is located southeast of the residence. Surface staining was observed beneath the tank during the site inspection, indicating a localised soil impact.
Fuel storage barrels and general storage area (HAIL A17, HAIL I)	TPH, PAHs, BTEX, VOCs, heavy metals	Several empty fuel barrels were stored on bare ground near the AST. Although no surface staining was evident during the site walkover, the area showed signs of reduced vegetation and compacted soils, consistent with long-term use. It may also have been used for miscellaneous storage. Given the potential for minor hydrocarbon residues or historic spills, limited soil sampling was recommended.
Sheep Spray race (HAIL A8) and adjacent stock races	Heavy metals and organochlorines pesticides (OCPs)	A disused sheep spray unit is located north of the livestock sheds, with the former landowner advising it has not been used for over two decades. The spray unit itself is located on a concrete pad, while the adjoining timber stock races are unsealed, with exposed natural soils. Given the likelihood of historical overspray and dripping during livestock movement, there is potential for localised contamination in surrounding soils.
Livestock holding shed and timber clad structures (potential HAIL I)	Lead, arsenic (from spray race residues), OCPs	The livestock sheds east of the dwelling feature deteriorated painted timber cladding with visible flaking suggesting a potential for shallow lead deposition in surrounding shallow soils. Targeted soil sampling was recommended.

Underground storage tank (UST) (HAIL A17)	TPH, PAHs, BTEX, heavy metals	An in-situ UST is located south of the livestock sheds. Its operational status is unknown; however, vent pipes and fill points are visible at the surface, with no staining observed.
Offal pit (HAIL G5)	Nutrients (nitrogen, phosphorus), pathogens, metals, hydrocarbons (minor)	The location of the offal pit was identified by the landowner and is understood to have been used for the disposal of offal and general farm waste. Direct access was not possible, and the feature could not be visually confirmed during the site inspection.
Historic fly-tipping in steep gully (HAIL G5)	Metals, hydrocarbons, asbestos (potential in mixed waste)	A steep gully contains fly-tipped household waste, including timber, plastics, and general refuse. While the material appears predominantly inert, detailed inspection was not feasible due to the terrain.

3 Site Investigation

3.1 Sampling and Analysis Plan

Site investigations were undertaken on the 9 – 10th October 2025 to assess potential contamination associated with the identified HAIL activities. The sampling strategy for each area is summarised in Table 3 below. Sample analysis was based on the HAIL activities and associated contaminants of concern (Table 2) and was adjusted to account for actual site conditions observed during the intrusive investigation.

The investigation was designed to support a screening-level assessment of human health risk under the NES-CS, inform consenting and disposal pathways, and guide soil management during future earthworks.

3.2 Sampling Process

Sampling and field quality assurance and quality control (QA/QC) procedures were undertaken in general accordance with CLMG No.5. The procedures adopted during the investigation are summarised below:

- All sampling was undertaken by a suitably qualified and experienced practitioner (SQEP) with experience in contaminated land assessment.
- Test pits were excavated by hand with a stainless-steel trowel, hand auger, or spade, with soil logged and screened for visible staining, odour, debris, or other indicators of contamination.
- All sampling equipment was decontaminated between locations using a phosphate-free detergent (Decon 90).
- Samples were collected directly into laboratory-supplied containers, handled with powder-free nitrile gloves, and placed into chilled storage.
- Two field duplicate samples (DUP1 & DUP2) were collected from the spray-race area to assess analytical precision.
- No evidence of cross-contamination, equipment malfunction, or field anomalies was observed during the investigation.
- All samples were transported under formal chain-of-custody to an IANZ-accredited laboratory (Hill Laboratories) for analysis. Chain-of-custody forms accompanied each consignment which documented sample identifiers, requested analyses, and delivery times.

Table 3: Sampling and Analysis Plan

HAIL / Activity	Investigation Design	Sample References	Analysis Suite
Clay target shooting area (HAIL C2)	25 hand-dug test pits were advanced across the shooting range: - Five were located within and immediately adjacent to the firing stands - Ten were positioned across the mid-slope downrange on an approximately 15×15 m grid spacing where visible clay fragments and lead shot were concentrated - Seven were placed along the outer perimeter, within an approximately 10 m 'buffer' where surface evidence of clay fragments or lead shot was sparse - Three additional locations were established upslope, beyond visible range of deposition, to confirm lateral extent. - All locations were sampled at 0.0 – 0.1 m, with deeper samples (0.2 – 0.5 m) selectively analysed or retained for conditional analysis.	SS1 – SS25 Figure 4, Appendix B	Heavy metals (including antimony), PAH
Former firewood storage yard (non-HAIL)	- Six hand-dug test pits were selectively spaced across the former firewood storage yard, targeting the approximate footprint of the storage structure and surrounding activity areas as inferred from aerial imagery. - Surface soil samples (0.0–0.1 m) were collected from each location to provide precautionary screening for any evidence of historic soil impact.	SS26 – SS31 Figure 5, Appendix B	Heavy metals
Fuel storage barrels area (HAIL A17 , HAIL I)	- Six locations were systematically distributed across the storage area on a 3x3 m grid to provide representative coverage. - Surface samples (0.0 – 0.1 m) were collected from all locations, with deeper samples (0.4 m) retained under chain of custody at the laboratory for conditional analysis.	SS32 – SS37 Figure 6, Appendix B	TPH, PAHs, BTEX, heavy metals
Aboveground storage tank (AST) (HAIL A17)	- Five hand-dug pits were excavated in and around the visible surface staining directly beneath the AST fill point. - One location (SS38) was positioned directly within the stained soil while remaining locations were advanced around the perimeter of visible staining. - Surface samples (0.0 – 0.1 m) were analysed at all locations; one deeper 0.3 m bgl sample from SS38 was analysed to confirm vertical extent of hydrocarbon impact. - Additional deeper samples were collected and held at the laboratory for conditional analysis.	SS38 – SS42 Figure 6, Appendix B	TPH, PAHs, BTEX, heavy metals

Sheep spray race (HAIL A8) and adjacent stock races	32 hand-dug pits were advanced within stock races and holdings pens, and surrounding the former spray race infrastructure. 20 sample locations were advanced within the holding pens targeting stock runs and were systematically distributed to provide maximum cover. 12 locations were positioned in four transects perpendicular to the spray structure to evaluate lateral dispersion and/or run-off at 1.5 m intervals. - All locations were sampled at 0.0 – 0.1 m; while deeper samples (0.2–0.5 m) were collected and selectively analysed or held at the laboratory.	SS43 – SS74 Figure 7, Appendix B	Heavy metals, OCPs
Livestock holding shed and timber clad structures (potential HAIL I)	- Three hand-dug pits excavated adjacent to deteriorated timber-clad walls where flaking lead-based paint was observed. - Sampling targeted shallow soils (0.0–0.1 m) to evaluate potential surface impacts, with deeper samples (0.2–0.5 m) collected to assess vertical extent. - Locations selected to assess potential “lead halo” effects from historical paint degradation.	SS75 – SS77 Figure 7, Appendix B	Heavy metals
Underground storage tank (UST) (HAIL A17)	The UST remains in situ and was not directly investigated during the DSI. Intrusive sampling around in-situ USTs is not practical for assessing potential contamination, as the key source area (beneath or immediately adjacent to the tank) cannot be accessed without removal. Accordingly, the UST is best assessed during its formal decommissioning and removal, which is required under the NES-CS prior to site redevelopment. This process should be undertaken under SQEP supervision and include visual inspection, targeted soil sampling, and validation of any impacted material prior to disposal or site reuse.	N/A	N/A
Offal pit (HAIL G5)	The offal pit was not directly investigated due to access constraints. Further, reliable assessment of potential contamination is best undertaken during earthworks when the feature can be exposed and directly observed. This should be carried out under SQEP supervision, with visual inspection and targeted sampling undertaken to characterise the fill material.	N/A	N/A
Historic fly-tipping in steep gully (HAIL G5)	The fly-tipping area was not directly investigated due to safety and access constraints associated with the steep terrain. Given the topography, there is no practical exposure pathway to users of the site, and the area is unlikely to be disturbed during future development. The waste material appears predominantly inert, and its removal is recommended primarily for visual and ecological improvement, rather than soil or human health risk.	N/A	N/A

4 Ground Conditions

General observations and soil conditions encountered during the investigation are detailed in Table 4.

Table 4: Ground Conditions

HAIL / Feature	Observations	Soil Profile (m bgl)
Clay target shooting area (HAIL C2)	High quantities of visible lead pellet and clay fragments were observed on the topsoil surface across the mid-slope range, up to a distance of 50 – 60 m from the firing stands. Clay fragments and pellets were often observed within the upper 100-150 mm of the soil profile. Refer to Figure 4, Appendix B and Photographs 1 – 5, Appendix C.	0.0–0.3: TOPSOIL; organic brown SILT
		0.3–0.6: Grey SAND & SILT
Former firewood storage yard (non-HAIL)	The area was clear and covered with healthy grass cover, with no evidence of former storage yard activities observed. Refer to Photograph 6, Appendix C.	0.0–0.3: TOPSOIL; organic brown SILT
		0.3–0.4: Brown SILT
Fuel storage barrels area (HAIL A17 , HAIL I)	No signs of contaminated soils were observed. One empty fuel barrel appeared to contain residual liquid, although its contents could not be confirmed. The presence of bare soil and scattered equipment suggests the area has been used over an extended period for general storage. Refer to Photographs 7 & 8, Appendix C.	0.0–0.3: TOPSOIL; organic brown SILT
		0.3–0.4: Brown sandy SILT
Aboveground storage tank (AST) (HAIL A17)	Localised staining observed directly below AST, visibly impacting the upper 100 mm of topsoil cover. No visual or olfactory evidence of contamination was noted in underlying silts at ~300 mm bgl. The AST itself was in reasonable condition with no observable holes or defects; leaks appear to be from fuelling activities. Refer to Photograph 9, Appendix C.	0.0–0.3: TOPSOIL; organic brown SILT
		0.3–0.5: Brown clayey SILT
Sheep Spray race (HAIL A8) and adjacent stock races	The stockyards south of the livestock shed comprised shallow, loose organic topsoil to approximately 100 mm bgl, underlain by gravel silt. The gravel content may historically relate to imported or reworked soils beneath the stockyard and shed area.	0.0–0.2: TOPSOIL; organic brown SILT
		0.3–0.6: Brown/grey SILT
Livestock holding shed and timber clad structures (potential HAIL I)	No visual or olfactory evidence of contamination was identified. Refer to Photographs 10 - 14, Appendix C.	0.0–0.1: TOPSOIL; organic brown SILT
		0.1–0.2: Gravelly SILT

4.1 Groundwater

Groundwater was not encountered in the investigation, to a maximum test depth of 0.5 – 0.6 m bgl.

5 Assessment Criteria

Based on the environmental setting and proposed land use, the following soil guideline values and contaminant standards have been applied:

Table 5: Soil Assessment Criteria

Criteria	Reference
Tier 1 Human Health Risk Screening Levels	- NES-CS soil contaminant standards (SCSs) for residential land use (10% produce) - NES-CS SCSs for commercial / industrial land use - Petroleum Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (residential and commercial - All Pathways), 'Sand' soil type (<1 m)⁴
Ecological Criteria	Eco-SGV screening for the protection of ecological receptors⁵
Site-Specific Background Criteria	Landcare Research Limited Predicted Background Soil Concentrations - 95%ile values for gravel soil group (LRIS Portal)⁶
Disposal Criteria	- Fulton Hogan Shotover Delta Quarry Cleanfill & Luggate Quarry Cleanfill - Taiko Landfill Waste Acceptance Criteria

5.1 Protection of Human Health

Human health risks have been assessed using the NES-CS Soil Contaminant Standards (SCSs) for both residential (10% produce) and commercial/industrial land use scenarios, reflecting the proposed mixed-use development. The inclusion of commercial SCSs also serves as a screening framework for assessing occupational exposure risks during earthworks and construction.

For petroleum hydrocarbons, the 'All Pathways' scenario for 'sand' soils (<1 m depth) has conservatively been adopted for both residential and commercial land use settings.

5.2 Protection of Ecological Receptors

The Ecological Soil Guideline Values (Eco-SGVs)⁵ have been referenced to assess potential risks to ecological receptors, based on the site's environmental setting. Criteria for recreational/residential land use have been applied, reflecting the intended future use of the site.

The ANZG Default Guideline Values⁷ (DGVs) have not been adopted, as they are considered more applicable to sediment quality in aquatic environments such as waterways and wetlands, rather than the terrestrial context of this investigation.

5.3 Disposal Criteria

Soil results have been compared against the waste acceptance criteria (WAC) for select local cleanfill and managed-fill facilities to support assessment of off-site disposal pathways. While a range of facilities exist across the region, these facilities have been adopted to provide initial benchmark for classification.

Cleanfill criteria are based on the WasteMINZ definition, which requires soils to meet the natural background levels of the receiving facility. For this assessment, two local cleanfill facilities – Shotover

⁴ MfE Petroleum Guidelines: Ministry for the Environment (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand - Module 4 Tier 1 Soil Screening Criteria

⁵ Manaaki Whenua – Landcare Research (2019). UPDATED Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document.

⁶ Manaaki Whenua – Landcare Research: Predicted Background Soil Concentrations (PBC) - LRIS Portal (<https://lris.scinfo.org.nz/>). Accessed 18/11/2025

⁷ Australian and New Zealand Governments (2018). Australian and New Zealand guidelines for fresh and marine water quality. Department of Agriculture, Water and the Environment

Delta and Luggate Quarry – have been selected, with Predicted Background Concentrations (PBCs) for the underlying gravel and mudstone Pakihi soils derived from Landcare Research Manaaki Whenua data.

Taiko Landfill has been adopted as the benchmark managed fill facility, offering acceptance thresholds for ‘Low-Level’ and ‘Medium-Level’ contaminated soils. Where results exceed these screening thresholds, Toxicity Characteristic Leaching Procedure (TCLP) testing may be required to confirm leachability.

6 Results

6.1 Quality Assurance & Quality Control (QA/QC)

Two duplicate soil samples were analysed to review the reproducibility of the soil sampling and laboratory analysis. Table 6 summarises the duplicate sample results, their associated primary samples, and the calculated relative percentage differences (RPDs).

Table 6: Quality Assurance Results

Sample	Primary	Duplicate	RPD (%)	Primary	Duplicate	RPD (%)
	SS64	DUP1		SS70	DUP2	
Depth (m)	0.1	0.1		0.1	0.1	
Analyte (mg/kg)						
Arsenic	18	17	6	18	19	5
Cadmium	0.51	0.47	8	0.23	0.19	19
Chromium	16	16	0	18	17	6
Copper	19	19	0	23	21	9
Lead	29	38	27	198	38	136
Nickel	15	14	7	17	15	13
Zinc	151	151	0	104	90	14
ΣDDT	< 0.08	< 0.08	-	< 0.08	< 0.09	-
Dieldrin	< 0.014	< 0.013	-	< 0.014	< 0.014	-

The RPD values ranged from 0–27%, with the exception of lead in Duplicate 2 (136%). This elevated variance is likely the result of sample heterogeneity and may potentially relate to a discrete fragment of lead or flecks of lead-based paint that can affect the overall result.

Despite this outlier, the overall variability is acceptable for heterogeneous soils, indicating the sampling methodology and analytical results are considered generally reproducible.

6.2 Results Summary

Soil result summary tables are provided in Appendix B alongside the corresponding sampling location plan. The laboratory certificates are provided in Appendix D.

A summary of soil analytical results is provided in Table 7.

Table 7: Result Summary Against Assessment Criteria

HAIL / Feature	Reference	Published Background Concentrations	Ecological Criteria	Human Health
Clay target shooting area (HAIL C2)	Table 1a – 1c Figure 4, Appendix B	Heavy metals (predominantly lead) and PAH exceed background levels in surface soils (0.0 – 0.1 m bgl) in areas where visible pellets and clay fragments were observed. Deeper underlying topsoil (0.3 m bgl) and underlying silts (0.5 m bgl) were generally at or around PBCs.	Lead exceeds Eco-SGVs in two surface soil samples (SS11, SS12). Benzo(a)pyrene exceeds Eco-SGVs in three of the five samples analysed (SS08, SS11, SS12).	Eight surface soil samples (0.0 – 0.1 m bgl) exceed residential SCS for arsenic (SS03, SS11, SS12) lead (SS02, SS10 – SS12, SS15, SS16) and/or PAHs (SS08, SS11, SS16). Four surface soil samples (0.0 – 0.1 m bgl) exceed commercial / industrial SCS for lead (SS12) and PAHs (SS08, SS11, SS16).
Former firewood storage yard (non-HAIL)	Table 2 Figure 5, Appendix B	Arsenic exceeds PBCs in each surface soil sample (0.0 – 0.1 m bgl), with concentrations ranging 17 – 20 mg/kg.	No exceedances	No exceedances
Fuel storage barrels area (HAIL A17, HAIL I)	Table 3 Figure 6, Appendix B	Arsenic exceeds PBCs in each surface soil sample (0.0 – 0.1 m bgl), with concentrations ranging 16 – 28 mg/kg.	One exceedance for zinc (SS32, 0.0 – 0.1 m bgl).	Two exceedances of residential SCSs for arsenic in surface soil samples (SS34 & SS36).
AST (HAIL A17)		Arsenic exceeds PBCs in each surface soil sample (0.0 – 0.1 m bgl), with concentrations ranging 12 - 20 mg/kg. Lead exceedance in SS38 (55 mg/kg).	Two exceedances for TPH (C ₁₀ -C ₁₄ and C ₁₅ -C ₃) in SS38 (0.0 – 0.1 m bgl)	C ₁₀ -C ₁₄ of 12,200 mg/kg exceeds the adopted residential and commercial/industrial screening criteria in surface soils (0.0 – 0.1 m bgl) at SS38. C ₁₀ -C ₁₄ in the underlying sample (0.3 bgl) exceeds adopted residential screening criteria.

Sheep spray race and adjacent stock races (HAIL A8)	Table 4a – 4c Figure 7, Appendix B (SS43 – SS74)	Multiple exceedances of PBCs (arsenic, cadmium lead, and zinc)	Multiple zinc exceedances (in 20 of the 32 tested samples) Two arsenic exceedances (SS61, at 0.0-0.1 and 0.3 m bgl)	Arsenic exceeds the residential SCS in six sample locations, and the commercial SCS in one location (SS61: 0.0 – 0.1 and 0.3 m bgl, maximum concentration: 103 mg/kg). Cadmium exceeds the residential SCS in one location (SS67, 0.0 – 0.1 m bgl).
Livestock holding shed and timber clad structures (HAIL I)	Table 4a – 4c Figure 7, Appendix B (SS75 – SS77)	Multiple exceedances of PBCs (arsenic, cadmium lead, zinc)	Zinc exceedances in all four tested samples (240 – 1,110 mg/kg), and one arsenic exceedance in SS75	Arsenic exceeds the residential SCS in SS75 at 0.0 – 0.1 m bgl (48 mg/kg) and further exceeds the commercial SCS at 0.2 m bgl (77 mg/kg).

6.3 Leachate Assessment (TCLP)

To determine appropriate off-site disposal pathways, selected soil samples with the highest total contaminant concentrations were analysed using the Toxicity Characteristic Leaching Procedure (TCLP) in line with the landfill waste acceptance framework⁸ for Class 1 and Class 2 landfills.

TCLP results are summarised in Table 8, alongside their corresponding total concentration.

Table 8: TCLP Results

Sample Location	SS11	SS12	SS48	SS50	SS61	SS66	SS75
Depth	0.1	0.1	0.1	0.1	0.1	0.3	0.2
Total Concentration (mg/kg)							
Arsenic	-	-	-	-	79	103	77
Lead	2,100	4,200	-	-	-	-	-
Zinc	-	-	1,230	2,400	-	-	6,200
TCLP Concentration (g/m ³)							
Arsenic	-	-	-	-	0.32	0.098	0.189
Lead	62	38	-	-	-	-	-
Zinc	-	-	4.0	10.6	-	-	65

RED indicates TCLP concentrations exceed the adopted landfill thresholds, indicating treatment is likely required.

7 Result Discussion

Analytical results confirm that contamination is present in the following areas, with concentrations exceeding both residential and commercial/industrial land-use criteria at each identified HAIL location:

- Clay target shooting area (HAIL C2)
- Fuel storage barrels area (HAIL A17, HAIL I)
- Aboveground storage tank (HAIL A17)
- Sheep spray race and adjacent stock races (HAIL A8)
- Livestock holding shed and timber-clad structures (HAIL I)

Accordingly, remediation and/or management of these areas will be required under the NES-CS.

7.1 Clay Target Shooting Area

Investigations within the clay target shooting area confirmed elevated concentrations of PAH and lead in surficial soils (0.0 – 0.1 m bgl) exceeding both residential and commercial/industrial SCSs.

The impacted surface soils extend approximately 50 – 60 metres downrange (upslope) from the firing stand, throughout the area where high quantities of visible clay fragments and pellets were observed (refer to Figure 4, Appendix B). Within this zone, contamination appears heterogeneously distributed but widespread. While PAH analysis was limited to three locations along the central axis of the downrange area, the elevated results are considered representative of the broader zone where visible shooting debris is concentrated.

⁸ Waste Management Institute New Zealand (WasteMINZ) (2023). Technical Guidelines for Disposal to Land (Revision 3.1)

Beyond this area, a transitional buffer of approximately 10 m showed minimal visual evidence of shooting debris, and analytical results generally returned concentrations at or near PBCs. A single outlier (SS22, 0.1 m bgl) recorded elevated lead, but no exceedances were identified beyond 60 – 70 m.

Contamination appears shallow, with deeper samples (0.3 – 0.5 m bgl) decreasing in PAH and metal concentrations.

7.2 Former Firewood Storage Area

Investigations within the former firewood storage area did not indicate any evidence of contamination associated with historical use. Arsenic concentrations (18 – 20 mg/kg) were consistently recorded, above PBCs (12 mg/kg), while all other analytes were below background.

The uniformity and nature of the arsenic results suggest a possible geogenic origin, as discussed further in Section 9.3.

7.3 Fuel Storage Area

Soil results from the fuel storage area recorded predominantly heavy chain range (C₁₅–C₃₆) hydrocarbons across all six sampling locations. Concentrations were well below human health screening criteria.

Two surface soil samples recorded marginal exceedances of the residential SCS for arsenic (28 – 29 mg/kg), with concentrations below SCSs in the underlying silts (0.4 m bgl). Arsenic levels were consistent across the area and comparable to those recorded in the nearby firewood storage area, supporting the potential for natural background enrichment. This is further discussed in Section 9.3 and should be considered in the context of future remediation planning.

7.4 Aboveground Storage Tank (AST)

Elevated concentrations of TPH were identified in surface soils (0.0 – 0.1 m bgl) directly beneath the area of visible staining, with the C₁₀–C₁₄ fractions exceeding both residential and commercial/industrial SCSs. The underlying silt (0.3 m bgl) recorded a reduction in concentrations, though C₁₀–C₁₄ fractions remained above the residential SCS.

These results indicate shallow, localised hydrocarbon impact. Adjacent locations (SS39 and SS40), where no visual staining was present, recorded trace hydrocarbon concentrations, confirming that the impact is confined to the immediate footprint of visible surface staining.

7.5 Stockyards & Spray Race Area

Southern stock pens (south of livestock shed) – SS43 – SS58:

Soil results indicate a variable but low-level contamination profile. Surface soils recorded widespread zinc concentrations exceeding ecological guideline values, with one arsenic exceedance above the residential SCS. Zinc concentrations typically declined with depth. Minor organochlorine pesticide (OCP) detections were also noted. The presence of coarse gravel immediately beneath 100 mm topsoil cover suggests potential historical reworking or filling.

Northern stock races and spray race area – SS59 – SS74:

Arsenic was more consistently elevated than in the southern stock pens, with several exceedances of the residential SCS and one exceedance of the commercial SCS (SS61). There was one exceedance of cadmium above the residential SCS (SS67). Zinc concentrations also exceeded ecological guideline values across multiple locations, though levels remained below human health thresholds.

Overall, results suggest a shallow, sporadic impact from historical spraying and livestock operations, characterised by elevated zinc, isolated arsenic and cadmium exceedances, and minor OCP detections.

7.6 Livestock Shed

Soil sampling targeting deteriorated painted timber cladding, to assess potential lead-based paint impacts, identified no elevated lead concentrations, indicating lead-based paints are unlikely to be present.

One sample (SS75) returned high arsenic concentrations exceeding the residential SCS in the shallow topsoil (0.0 – 0.1 m bgl) and exceeding the commercial SCS in the underlying silts at 0.2 m bgl. The source of this exceedance is unclear. As arsenic was not elevated at the other two locations, the result is not considered representative of the cladding or the external building fabric and likely reflects a localised hotspot.

The internal footprint of the livestock shed was not investigated as part of this DSI.

8 Conceptual Site Model

A conceptual site model (CSM) has been developed to assess the potential exposure pathways and associated risks at the site. A complete CSM comprises three key components, all of which must be present and connected for a risk to exist:

1. A source of contamination
2. An exposure pathway by which contaminants may reach a receptor (e.g. inhalation, ingestion, dermal contact)
3. A receptor that may be affected by the contaminant

The CSM developed for this site, based on the findings of the investigation, is summarised in Table 9.

Table 9: Conceptual Site Model

Source	Pathway	Receptors	Risk / Mitigation / Comment
Clay target shooting area (HAIL C2) – antimony, arsenic, lead and PAH exceedances	Direct contact Ingestion	Future Site Users	Complete exposure pathway: Heavy metals and/or PAHs and TPH exceed relevant residential and commercial/industrial criteria. Remediation and/or management is required in accordance with the NES-CS. Specific requirements to be confirmed in the Remedial Action Plan (RAP) following completion of development design and assessment of remedial options.
Fuel storage barrels area (HAIL A17, HAIL I) – marginal arsenic exceedances		Construction Workers	Complete exposure pathway: Heavy metals and/or PAHs and TPH exceed commercial/industrial SCSs, representing potential exposure risk to site workers during construction phase. Management and controls will be addressed in a Contaminated Site Management Plan (CSMP) to ensure safe earthworks and handling of contaminated soils.
Above-ground storage tank (AST) (HAIL A17) – TPH exceedances	Uptake / ingestion	Terrestrial ecological receptors	Low risk – While multiple analytes exceeded the adopted Eco-SGVs across several investigation areas, the remediation required to address human health risks under the NES-CS is expected to also mitigate residual ecological risk. Ecological considerations should be incorporated into the Remedial Action Plan (RAP), and Otago Regional Council planning rules should be reviewed to determine whether any additional ecological management requirements apply.
Sheep spray race and adjacent stock races (HAIL A8) – arsenic and zinc exceedance (Eco-SGVs)			
Livestock holding shed and timber-clad structures (HAIL I) – arsenic exceedance			
Underground storage tank (UST) (HAIL A17)	Various (not assessed)	Future Site Users	Risk uncertain. These areas could not be investigated due to access limitations. Further assessment, including characterisation and/or decommissioning under SQEP supervision, is recommended during future earthworks. A contingency should be in place for targeted excavation and validation if contamination is encountered.
Offal pit (HAIL G5)		Construction Workers Terrestrial ecological receptors	
Historic fly-tipping in steep gully (HAIL G5)	N/A	Future Site Users	No exposure pathway: The historic fly-tipping area within the steep gully was not directly investigated as part of this DSI due to safety and access constraints associated with the terrain. The gully is located outside the proposed development and earthworks footprint and is not intended to be disturbed as part of the consented works. Based on site walkover observations, the fly-tipped material appears to comprise predominantly inert domestic waste. Given the steep topography, limited accessibility and exposure pathway, and absence of proposed ground disturbance, the fly-tipping area is considered to present a very low risk to human health under the proposed development scenario. Accordingly, no specific remediation is required from a human health perspective.

9 Development Considerations

The following sections present preliminary considerations based on the findings of this investigation. Final remediation strategies, earthwork methodologies, and consenting requirements should be confirmed once civil and geotechnical designs are complete, to ensure all assumptions regarding soil management and disposal align with the final design intent.

9.1 Remediation Requirements

Remediation will be required across all identified HAIL areas where contaminant concentrations exceed the relevant residential or commercial SCSs. As the proposed development comprises a mix of residential and commercial land uses, the final remediation thresholds must align with the intended land use of each area. For example, the former clay target range falls within a proposed residential zone and must be remediated to residential standards, while areas such as the stockyards and spray race, currently earmarked for commercial use, may be assessed against commercial/industrial SCSs.

The final remediation strategy will be detailed in a Remedial Action Plan (RAP) and is expected to involve targeted excavation and off-site disposal of contaminated soils, followed by validation sampling to confirm the site's suitability for the proposed end use.

Remediation planning should be integrated with the final civil and geotechnical design to optimise cut-to-fill volumes and minimise landfill waste-streams.

9.2 Earthwork Management

All earthworks within the HAIL areas are required to be undertaken under a Contaminated Site Management Plan (CSMP).

Conditions beneath the Underground Storage Tank (UST) (refer to Figure 2, Appendix B) and offal pit (refer to Figure 3, Appendix B) have not been assessed, and further investigation within these untested areas will be required during earthworks, when access permits.

9.3 Geogenic Arsenic

Elevated arsenic concentrations were detected across all investigation areas in the northern regions of the site, including within the former firewood storage yard which has been interpreted as a non-HAIL area. Given the consistency of arsenic concentrations across these varied land uses, the elevations above published background concentrations may reflect geogenic origin rather than anthropogenic input – a known regional occurrence attributed to natural enrichment from schist-derived soils⁹.

Naturally occurring geogenic arsenic is not considered a contaminant under the NES-CS and should therefore not be considered or influence the NES-CS consenting process. Further investigation is recommended primarily for the purpose of earthwork planning and confirming offsite disposal pathways.

9.4 Soil Disposal

Any surplus soil requiring off-site removal will require disposal to an appropriately consented facility. Based on the findings of this investigation, the majority of tested soils within the identified HAIL areas will not meet cleanfill acceptance criteria due to exceedances of regional background concentrations.

⁹ Crow & Druzicka (2023) Geological controls on locally elevated arsenic in the Glenorchy area, Otago, New Zealand <https://doi.org/10.1080/00288306.2023.2174147>

In addition, elevated TCLP concentrations recorded in the clay target shooting area (SS11 & SS12) and the stockyard and spray race area (SS50 & SS66), are likely to trigger treatment or stabilisation requirements prior to disposal.

Confirmation should be sought with the receiving disposal facility / consent owner. A copy of this report should be provided so they can make an informed decision with regards to material acceptance. All soil disposal should be documented by way of a soil waste transfer manifest, detailing the source area, the volume of soil, and receiving disposal facility.

9.5 Consent Requirements

9.5.1 National Environmental Standards (NES-CS)

Due to the presence of historic HAIL activities and the identification of contamination exceeding applicable soil contaminant standards, future redevelopment works will require consent as a Restricted Discretionary Activity under Regulation 10 of the NES-CS.

A supporting Remedial Action Plan and Contaminated Site Management Plan (RAP / CSMP) will be required as part of the consent application or imposed as consent conditions prior to the commencement of earthworks.

9.5.2 Otago Regional Council (Regional Plan)

Table 10 provides a preliminary assessment of ORC's regional planning requirements with respects to the results of this investigation (*note: it does not constitute a full planning review*).

Table 10: ORC Preliminary Planning Summary

Regional Plan		Discussion
Waste for Otago	Rule 5.6.1 – Hazardous Waste at Contaminated Sites <i>(Discretionary)</i>	Applicable due to identified contamination (i.e., contamination exceeding the Eco-SGVs) Consent is likely required for the disturbance of land (5.6.1 (1)).
	Rule 12.2.1A.3 – Groundwater Take for Construction Dewatering <i>(permitted)</i>	If dewatering is required, groundwater abstraction for construction dewatering is a permitted activity, with no explicit conditions relating to contaminated sites.
Water for Otago	Rule 12.B.3/4 – Discharge of Construction Phase Stormwater <i>(Discretionary or Restricted Discretionary)</i>	Discharge of construction-phase stormwater (including dewatered groundwater) may require consent under Rule 12.B.3(i), where contaminants are present.

This assessment is based on the current understanding of ground conditions and anticipated earthwork design. Confirmation should be sought following completion of detailed civil and geotechnical design to verify compliance.

10 Conclusions

Springline Limited has undertaken a Detailed Site Investigation (DSI) to support the redevelopment of 122 Morven Ferry Road, Queenstown.

The investigation was undertaken to characterise soil conditions, identify the presence and extent of any contamination associated with historical and current land use, and assess potential risks to human health and the environment in the context of the proposed redevelopment.

The findings of this investigation can be summarised as follows:

- Contamination requiring remediation or management was confirmed at all investigated HAIL-areas, including the clay target shooting area, fuel storage areas, aboveground storage tank, stockyards, spray race, and livestock shed.
- Elevated arsenic was identified across multiple HAIL and non-HAIL areas in the northern regions of the site. This may reflect naturally elevated geogenic background conditions; further assessment is recommended to confirm provenance.
- Two areas were not sampled due to access constraints: the underground storage tank (UST) and offal pit. These features will require further assessment and SQEP supervision during earthworks.

11 Recommendations

As development plans for the site are progressed, it is recommended that:

- Prepare a Remedial Action Plan (RAP) and Contaminated Site Management Plan (CSMP) to guide soil handling, management of contaminated material, and disposal during construction.
- Undertake further assessment of naturally occurring arsenic to confirm provenance and extent. The purpose of these additional geogenic arsenic investigations is to support future earthworks planning and enable more informed decisions around soil classification, disposal, and reuse.
- Submit this report to Queenstown Lakes District Council (QLDC) in support of the resource consent application for the proposed development.
- Provide this report to Otago Regional Council (ORC) to align with relevant requirements under the Regional Plan.

12 Limitations

Springline Ltd (Springline) has prepared this Detailed Site Investigation (DSI) report for Gibbons Development Limited in accordance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-CS) and the Contaminated Land Management Guidelines (CLMG No.1 & No.5).

Springline's opinions, conclusions, and recommendations are based on the information provided by the client and third parties. While reasonable efforts have been made to ensure the accuracy of this data, Springline does not warrant its completeness or correctness. Consequently, the findings may not reflect all actual site conditions, and it is possible that contamination or other hazards may exist beyond the scope of this investigation.

Springline has applied reasonable care in preparing this report, but no investigation can eliminate the possibility of undiscovered hazards. The conclusions are based on current regulatory standards, which may change over time. If new information or regulatory requirements emerge, further assessment may be necessary.

This report is intended solely for the use of Gibbons Development Limited for the purpose outlined in the scope of work. Springline accepts no liability for any reliance by third parties on this report. Reproduction or distribution of this report, in whole or in part, is prohibited without Springline's prior written consent, except as required for the intended purpose.

Appendix A Proposed Masterplan



Ridgeburn - Arrowtown Junction

at 122 Morven Ferry Road for Ridgeburn Ltd



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FILE REFERENCE: N:\2025\2512 122 Morven Ferry Road - Gibbons
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AC28_Site Masterplan_Lots off.pln

PRINTED: 20/05/2025

Scale @ A1: Not to Scale NOT FOR CONSTRUCTION

PD102 / Site Master Plan

GIBBONS

CO



NOVAK+MIDDLETON

RMM



Ridgeburn - Arrowtown Junction

at 122 Morven Ferry Road for Ridgeburn Ltd



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FILE REFERENCE: N:\2025\2512 122 Morven Ferry Road - Gibbons
\02-BL\PLN\250422-2512-122_Morven_Ferry_Rd-Site-BL-
AC28_Site Masterplan_Lots off.pln

PRINTED: 23/05/2025

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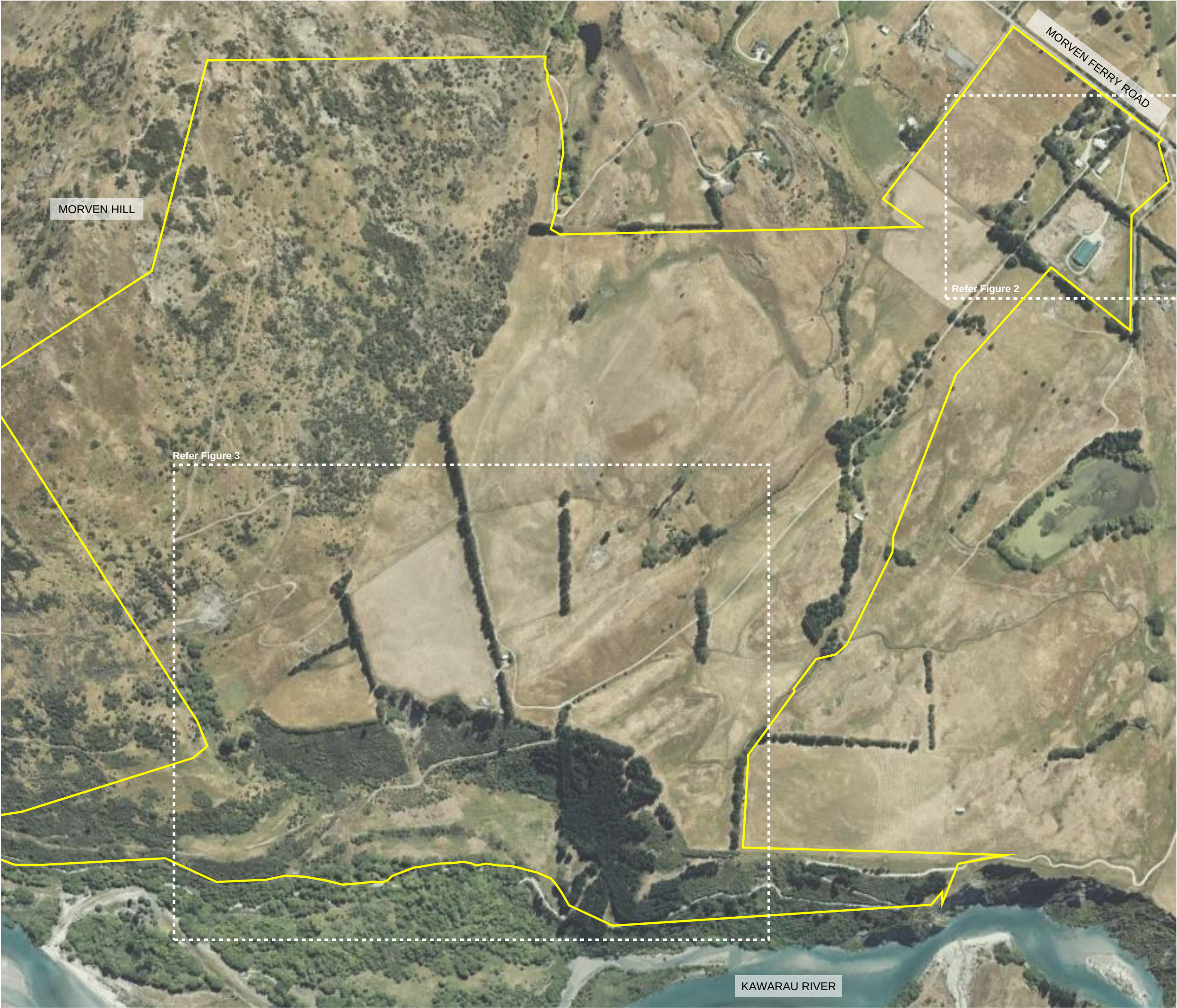
PD101 / Lot Plan

GIBBONS | CO

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RMM

Appendix B Figures & Results Summary



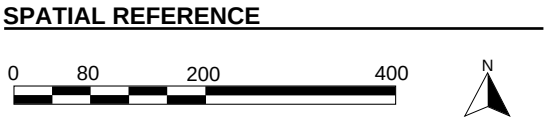
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TITLE
Figure 1: Site Plan

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

LEGEND
 Approximate Site Boundary

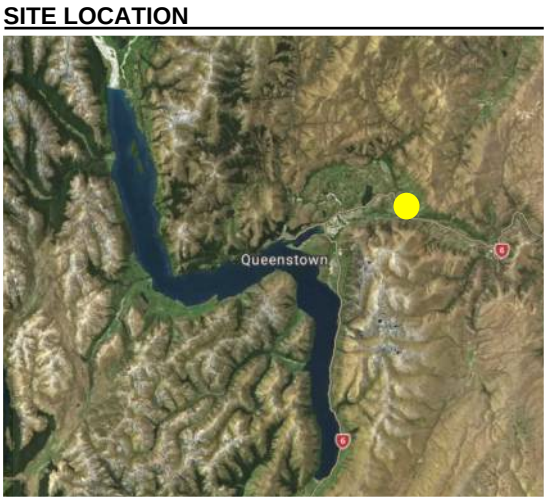


PROJECT MANAGEMENT

Approved	MN	Date	29.09.2025
Checked	JJ	Date	29.09.2025
Drawn	NN	Date	26.09.2025

ISSUE / REVISION

A	29.09.2025	Final





SPRINGLINE

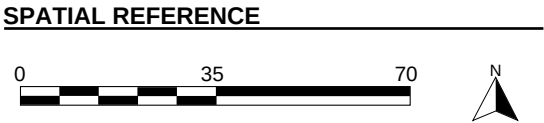
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Figure 2: Site Plan (Area 1)

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

LEGEND

- Approximate Site Boundary
- HAIL / Further Investigation Areas

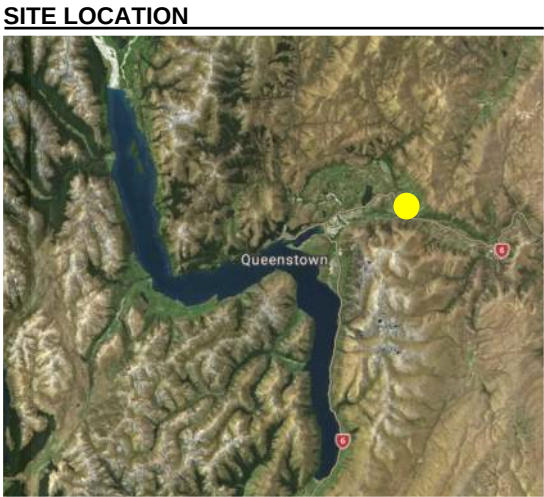


PROJECT MANAGEMENT

Approved	MN	Date	29.09.2025
Checked	JJ	Date	29.09.2025
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ISSUE / REVISION

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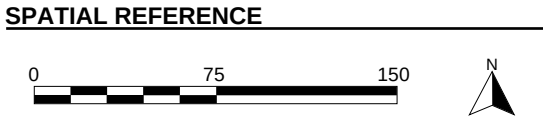


TITLE
Figure 3: Site Plan (Area 2)

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

- LEGEND**
- Approximate Site Boundary
 - HAIL / Further Investigation Areas

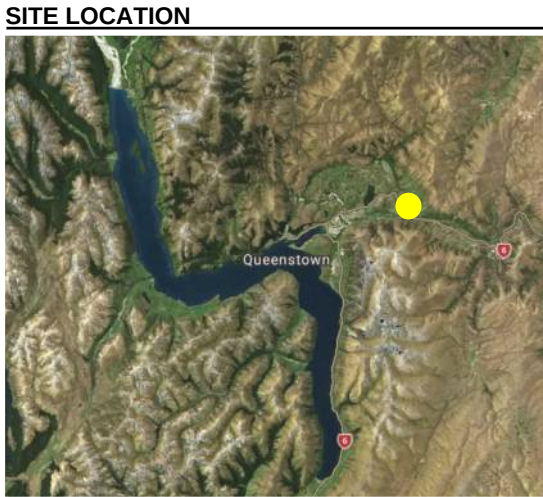


PROJECT MANAGEMENT

Approved	MN	Date	29.09.2025
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TITLE
Figure 4: Firing Range Test Plan

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

LEGEND

Approximate Site Boundary

High quantity of visible lead pellets and cartridges

Minimal lead pellets / cartridges

Test Location

SPATIAL REFERENCE

0510

PROJECT MANAGEMENT

Approved	MN	Date	17.11.2025
Checked	JJ	Date	17.11.2025
Drawn	NN	Date	17.11.2025

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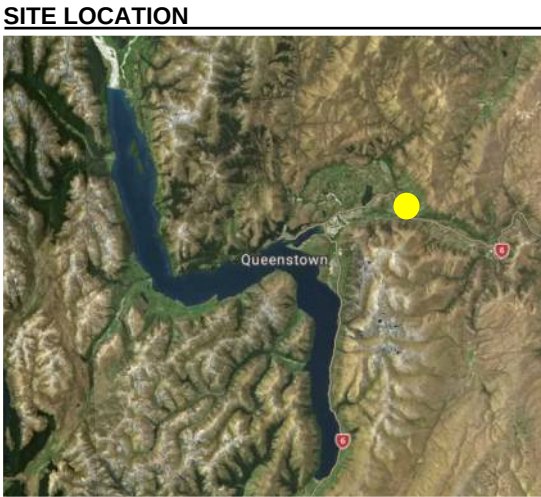


Table 1(a) - Firing Range

Soil Sample Results												
Sample Location	SS01	SS02			SS03	SS04	SS05	SS06	SS07			SS08
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.3	0.5	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.3	0.5	0.0 - 0.1
Soil Type	TOPSOIL	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	SILT	TOPSOIL
Heavy Metals												
Antimony	-	4.7	-	-	3.6	< 0.4	-	-	0.8	-	-	3
Arsenic	11	12	11	11	53	11	10	11	11	12	11	11
Cadmium	0.14	0.16	< 0.10	< 0.10	0.13	0.1	0.13	0.12	0.14	< 0.10	< 0.10	0.12
Chromium	12	12	13	13	21	12	11	13	12	13	16	11
Copper	13	14	14	12	33	14	12	15	13	14	13	13
Lead	68	230	13.4	12.6	81	15.9	22	22	36	13.9	13	83
Nickel	13	12	14	14	14	13	12	14	13	14	14	13
Zinc	56	62	60	59	79	60	50	58	57	61	56	53
Polycyclic Aromatic Hydrocarbons (PAH)												
Benzo[a]pyrene Toxic Equivalence (TEF)	-	-	-	-	-	-	-	-	-	-	-	99
Benzo[a]pyrene (BAP)	-	-	-	-	-	-	-	-	-	-	-	64
Napthalene	-	-	-	-	-	-	-	-	-	-	-	2.8
Pyrene	-	-	-	-	-	-	-	-	-	-	-	76

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available BDL = Below [laboratory] detection limits

References

¹ Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soil group (Landcare Research Manaaki Whenua).

² Manaaki Whenua Landcare Research. UPDATED Development of soil guideline values for the protection of ecological receptios (Eco-SGVs: Technical document. June 2019) & An implementation framework for ecological soil guideline values (2023, Envirolink C09X2206).

³ Ministry for the Environment (2011). National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health.

⁴ Australian National Environmental Protection (Assessment of Site Contamination) Measure (1999, revised 2013). Guideline on Investigation Levels for Soil and Groundwater. Schedule B1.

⁵ Manaaki Whenua Landcare Research (2015) Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Ref: C09X1402. - 95%ile values.

⁶ MfE Petroleum Guidelines: Ministry for the Environment (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand - Module 4 Tier 1 Soil Screening Criteria (All Pathways), 'Sand' soil type (<1 m).

⁷ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁸ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁹ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as advised by GHC Consulting Ltd November 2025

¹⁰Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

¹¹ Antimony (Sb) ecological toxicity: M.Tschan et al. (2009). Antimony in the soil-plant system - a review (EC₅₀)

¹²Antimony (Sb) Human Health guideline value: World Health Organisation (WHO). N. Bolan et al. (2022). Antimony contamination and its risk management in complex environmental settings: A review.

Assessment Criteria				Disposal Criteria			
Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³	Shotover Quarry Cleanfill ⁷	Luggate Quarry Cleanfill ⁸	Taiko Landfill ⁹ - low level contamination	Taiko Landfill ¹⁰ - medium level contamination
0.3 - 8.6 ¹¹	70 ¹¹	36 ¹²	-	-	-	-	-
12.06	60	20	70	9.97	12.06	70	70
0.34	12	2	1,300	0.33	0.34	10	1,300
80.15	390	460	6,300	56.88	80.15	150	6,300
42.85	120	>10,000	>10,000	48.14	42.85	280	-
44.34	900	210	3,300	25.83	44.34	460	3,300
44.96	-	400 ⁴	4,000 ⁴	35.15	44.96	320	-
182.8	130	8,000 ⁴	400,000 ⁴	97.97	182.8	1,200	-
0.105 ⁵	-	10	35	-	-	35	35
0.69 ⁵	22	0.27 ⁶	11 ⁶	-	-	-	-
BDL	-	58 ⁶	190 ⁶	-	-	640	640
BDL	-	1,600 ⁶	-	-	-	-	-

Table 1(b) - Firing Range

Soil Sample Results												
Sample Location	SS08	SS09			SS10	SS11		SS12		SS13	SS14	SS15
Depth (m bgl)	0.3	0.0 - 0.1	0.3	0.5	0.0 - 0.1	0.0 - 0.1	0.3	0.0 - 0.1	0.3	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1
Soil Type	TOPSOIL	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL
Heavy Metals												
Antimony	-	0.5	-	-	3.4	37	-	66	2.3	-	-	
Arsenic	10	9	9	9	9	16	10	23	10	9	10	11
Cadmium	< 0.10	0.18	< 0.10	< 0.10	0.25	0.41	< 0.10	0.48	< 0.10	0.18	< 0.10	0.12
Chromium	13	9	10	12	8	7	10	5	10	11	11	9
Copper	12	13	13	11	11	10	13	7	13	13	13	13
Lead	13.4	27	11.5	11.5	250	2,100	16.4	4,200	13	26	33	420
Nickel	13	11	11	12	9	7	11	5	12	11	13	11
Zinc	57	44	48	51	48	46	48	43	49	55	51	42
Polycyclic Aromatic Hydrocarbons (PAH)												
Benzo[a]pyrene Toxic Equivalence (TEF)	0.061	-	-	-	-	620	1.94	-	-	-	-	-
Benzo[a]pyrene (BAP)	0.047	-	-	-	-	400	1.28	-	-	-	-	-
Napthalene	< 0.07	-	-	-	-	12.7	< 0.07	-	-	-	-	-
Pyrene	0.039	-	-	-	-	370	1.14	-	-	-	-	-

Assessment Criteria			
Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³
0.3 - 8.6 ¹¹	70 ¹¹	36 ¹²	-
12.06	60	20	70
0.34	12	2	1,300
80.15	390	460	6,300
42.85	120	>10,000	>10,000
44.34	900	210	3,300
44.96	-	400 ⁴	4,000 ⁴
182.8	130	8,000 ⁴	400,000 ⁴
0.105 ⁵	-	10	35
0.69 ⁵	22	0.27 ⁶	11 ⁶
BDL	-	58 ⁶	190 ⁶
BDL	-	1,600 ⁶	-

Disposal Criteria			
Shotover Quarry Cleanfill ⁷	Luggate Quarry Cleanfill ⁸	Taiko Landfill ⁹ - low level contamination	Taiko Landfill ¹⁰ - medium level contamination
-	-	-	-
9.97	12.06	70	70
0.33	0.34	10	1,300
56.88	80.15	150	6,300
48.14	42.85	280	-
25.83	44.34	460	3,300
35.15	44.96	320	-
97.97	182.8	1,200	-
-	-	35	35
-	-	-	-
-	-	640	640
-	-	-	-

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available BDL = Below [laboratory] detection limits

References

¹ Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soil group (Landcare Research Manaaki Whenua).

² Manaaki Whenua Landcare Research. UPDATED Development of soil guideline values for the protection of ecological receptios (Eco-SGVs: Technical document. June 2019) & An implementation framework for ecological soil guideline values (2023, Envirolink C09X2206).

³ Ministry for the Environment (2011). National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health.

⁴ Australian National Environmental Protection (Assessment of Site Contamination) Measure (1999, revised 2013). Guideline on Investigation Levels for Soil and Groundwater. Schedule B1.

⁵ Manaaki Whenua Landcare Research (2015) Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Ref: C09X1402. - 95%ile values.

⁶ MfE Petroleum Guidelines: Ministry for the Environment (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand - Module 4 Tier 1 Soil Screening Criteria (All Pathways), 'Sand' soil type (<1 m).

⁷ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁸ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁹ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as advised by GHC Consulting Ltd November 2025

¹⁰Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

¹¹Antimony (Sb) ecological toxicity: M.Tschan et al. (2009). Antimony in the soil-plant system - a review (EC₅₀)

¹²Antimony (Sb) Human Health guideline value: World Health Organisation (WHO). N. Bolan et al. (2022). Antimony contamination and its risk management in complex environmental settings: A review.



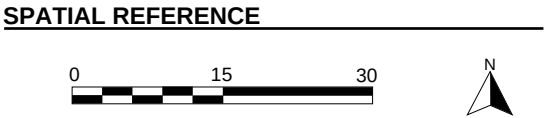
SPRINGLINE

TITLE
Figure 5: Firewood Storage Test Plan

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

- LEGEND**
- Approximate Site Boundary
 - Test Location



PROJECT MANAGEMENT

Approved	MN	Date	17.11.2025
Checked	JJ	Date	17.11.2025
Drawn	NN	Date	17.11.2025

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A	17.11.2025	Final

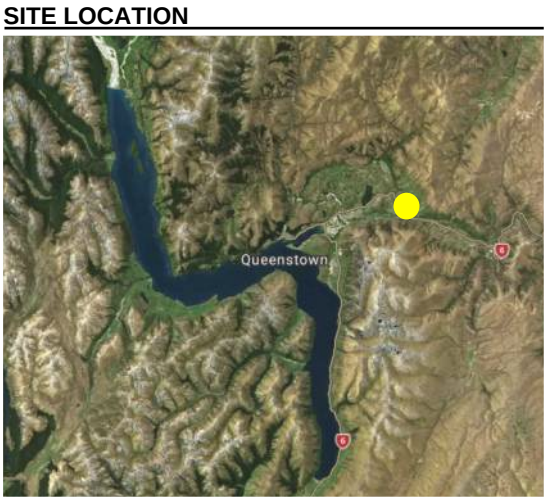


Table 2 - Former firewood storage area

Soil Sample Results													Assessment Criteria				Disposal Criteria			
Sample Location	SS26	SS27	SS28	SS29	SS30	SS31	-	-	-	-	-	-								
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	-	-	-	-	-	-	Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³	Shotover Quarry Cleanfill ⁵	Luggate Quarry Cleanfill ⁶	Taiko Landfill ⁷ - low level contamination	Taiko Landfill ⁸ - medium level contamination
Soil Type	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	TOPSOIL	-	-	-	-	-	-								
Heavy Metals																				
Arsenic	18	18	19	20	17	18	-	-	-	-	-	-	12.06	60	20	70	9.97	12.06	70	70
Cadmium	0.13	0.13	0.14	0.12	0.11	< 0.10	-	-	-	-	-	-	0.34	12	2	1,300	0.33	0.34	10	1,300
Chromium	21	22	22	23	22	20	-	-	-	-	-	-	80.15	390	460	6,300	56.88	80.15	150	6,300
Copper	20	21	22	22	22	20	-	-	-	-	-	-	42.85	120	>10,000	>10,000	48.14	42.85	280	-
Lead	13.5	14.1	14.2	14.7	15.7	13.8	-	-	-	-	-	-	44.34	900	210	3,300	25.83	44.34	460	3,300
Nickel	20	19	22	20	20	19	-	-	-	-	-	-	44.96	-	400 ⁴	4,000 ⁴	35.15	44.96	320	-
Zinc	62	61	63	66	66	65	-	-	-	-	-	-	182.8	130	8,000 ⁴	400,000 ⁴	97.97	182.8	1,200	-

Notes
"- " denotes analyte not tested or no soil guideline value/acceptance criteria available

References

¹ Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soil group (Landcare Research Manaaki Whenua).

² Manaaki Whenua Landcare Research. UPDATED Development of soil guideline values for the protection of ecological receptios (Eco-SGVs: Technical document. June 2019) & An implementation framework for ecological soil guideline values (2023, Envirolink C09X2206).

³ Ministry for the Environment (2011). National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health.

⁴ Australian National Environmental Protection (Assessment of Site Contamination) Measure (1999, revised 2013). Guideline on Investigation Levels for Soil and Groundwater. Schedule B1.

⁵ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁶ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁷ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as provided by GHC Consulting Ltd November 2025.

⁸ Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.



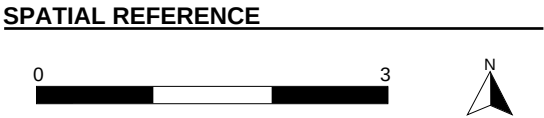
SPRINGLINE

TITLE
Figure 6: Fuel Area Test Plan

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

- LEGEND**
-  Test Location
 -  Sample Held / Not Analysed



PROJECT MANAGEMENT

Approved	MN	Date	17.11.2025
Checked	JJ	Date	17.11.2025
Drawn	NN	Date	17.11.2025

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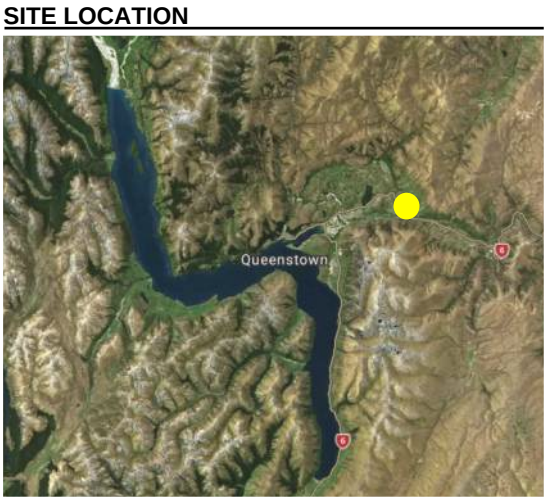


Table 3 - Fuel Storage Area

Soil Sample Results												
Sample Location	SS32	SS33	SS34		SS35	SS36		SS37	SS38		SS39	SS40
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.4	0.0 - 0.1	0.0 - 0.1	0.4	0.0 - 0.1	0.0 - 0.1	0.3	0.0 - 0.1	0.0 - 0.1
Soil Type	TOPSOIL	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL
Heavy Metals												
Arsenic	17	17	29	18	18	28	18	16	12	20	17	18
Cadmium	0.19	0.12	0.13	< 0.10	0.13	0.15	< 0.10	0.12	0.21	< 0.10	0.4	0.11
Chromium	17	18	23	19	18	17	19	17	18	21	20	20
Copper	21	17	24	18	17	21	18	16	19	18	20	18
Lead	17.8	13.6	18.3	12	15.5	15.4	12.9	13.7	55	14.5	22	17.9
Nickel	16	16	15	18	16	16	18	15	14	19	18	18
Zinc	143	60	63	58	62	66	55	60	136	64	73	66
Polycyclic Aromatic Hydrocarbons (PAH)												
Benzo[a]pyrene Toxic Equivalence (TEF)	< 0.033	< 0.032	0.068	-	0.057	0.172	-	0.39	< 0.35	< 0.032	< 0.033	< 0.031
Benzo[a]pyrene (BAP)	< 0.014	< 0.013	0.041	-	0.037	0.12	-	0.27	< 0.15	< 0.013	< 0.014	< 0.013
Napthalene	< 0.07	< 0.07	< 0.07	-	< 0.07	< 0.06	-	0.23	1.4	< 0.07	< 0.07	< 0.07
Pyrene	0.015	< 0.013	0.067	-	0.083	0.32	-	0.74	4.3	1.13	0.017	< 0.013
Total Petroleum Hydrocarbons (TPH)												
C ₇ -C ₉	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 300	< 20	< 20	< 20
C ₁₀ -C ₁₄	29	< 20	39	< 20	< 20	33	< 20	< 20	12,200	920	43	< 20
C ₁₅ -C ₃₆	470	64	960	560	90	510	300	191	95,000	4,900	1,650	82
C ₇ -C ₃₆ (Total)	500	< 80	1,000	570	97	540	310	192	107,000	5,800	1,690	87
BTEX												
Benzene	< 0.11	-	-	-	< 0.11	< 0.08	-	-	< 0.07	< 0.06	< 0.06	< 0.06
Toluene	< 0.11	-	-	-	< 0.11	< 0.08	-	-	< 0.07	< 0.06	< 0.06	< 0.06
Ethylbenzene	< 0.11	-	-	-	< 0.11	< 0.08	-	-	< 0.07	< 0.06	< 0.06	< 0.06
Xylenes	< 0.3	-	-	-	< 0.3	< 0.16	-	-	< 0.14	< 0.12	< 0.12	< 0.12

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available

BDL = Below [laboratory] detection limits

References

¹ Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soil group (Landcare Research Manaaki Whenua).

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³ Ministry for the Environment (2011). National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health.

⁴ Australian National Environmental Protection (Assessment of Site Contamination) Measure (1999, revised 2013). Guideline on Investigation Levels for Soil and Groundwater. Schedule B1.

⁵ Landcare Research Manaaki Whenua (2015). Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Ref: C09X1402. - 95%ile values.

⁶ MfE Petroleum Guidelines: Ministry for the Environment (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand - Module 4 Tier 1 Soil Screening Criteria (All Pathways), 'Sand' soil type (<1 m).

⁷ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁸ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁹ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as provided by GHC Consulting Ltd November 2025

¹⁰Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

Assessment Criteria			
Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³
12.06	60	20	70
0.34	12	2	1,300
80.15	390	460	6,300
42.85	120	>10,000	>10,000
44.34	900	210	3,300
44.96	-	400 ⁴	4,000 ⁴
182.8	130	8,000 ⁴	400,000 ⁴
0.105 ⁵	-	10	35
0.69 ⁵	22	0.27 ⁶	11 ⁶
-	-	58 ⁶	190 ⁶
-	-	1,600 ⁶	N/A
BDL	130	120 ⁶	120 ⁶
BDL	110	470 ⁶	1,500 ⁶
BDL	300	N/A	N/A
BDL	-	N/A	N/A
BDL	-	1.1 ⁶	3.0 ⁶
BDL	-	68 ⁶	94 ⁶
BDL	-	53 ⁶	180 ⁶
BDL	-	48 ⁶	150 ⁶

Disposal Criteria			
Shotover Quarry Cleanfill ⁷	Luggate Quarry Cleanfill ⁸	Taiko Landfill ⁹ - low level contamination	Taiko Landfill ¹⁰ - medium level contamination
9.97	12.06	70	70
0.33	0.34	10	1,300
56.88	80.15	150	6,300
48.14	42.85	280	-
25.83	44.34	460	3,300
35.15	44.96	320	-
97.97	182.8	1,200	-
-	-	35	35
-	-	-	-
-	-	640	640
-	-	-	-
-	-	120	120
-	-	6,500	6,500
-	-	-	-
BDL	BDL	0.11	0.11
BDL	BDL	19	19
BDL	BDL	10	10
BDL	BDL	25	25



SPRINGLINE

TITLE
Figure 7: Stockyard Test Plan

PROJECT
122 Morven Ferry Road

CLIENT
Gibbons Development Limited

LEGEND

-  Test Location
-  Sample Held / Not Analysed

SPATIAL REFERENCE

0 5 10 

PROJECT MANAGEMENT			
Approved	MN	Date	17.11.2025
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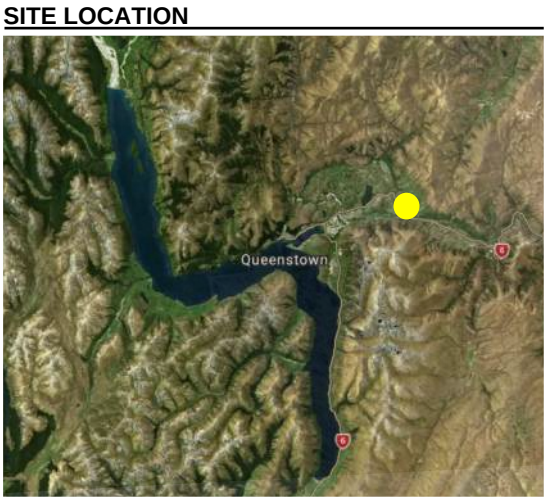


Table 4(a) - Stock Pens and Spray Race Area

Soil Sample Results													Assessment Criteria				Disposal Criteria			
Sample Location	SS43	SS46	SS48		SS49		SS50	SS52		SS56		SS58								
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.2	0.0 - 0.1	0.2	0.0 - 0.1	0.0 - 0.1	0.2	0.0 - 0.1	0.2	0.0 - 0.1	Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³	Shotover Quarry Cleanfill ⁶	Luggate Quarry Cleanfill ⁷	Taiko Landfill ⁸ - low level contamination	Taiko Landfill ⁹ - medium level contamination
Soil Type	TOPSOIL	TOPSOIL	TOPSOIL	GRAVELLY SILT	TOPSOIL	GRAVELLY SILT	TOPSOIL	TOPSOIL	GRAVELLY SILT	TOPSOIL	GRAVELLY SILT	TOPSOIL								
Heavy Metals																				
Arsenic	11	11	8	23	6	16	11	9	13	12	16	5	12.06	60	20	70	9.97	12.06	70	70
Cadmium	0.12	0.16	0.16	< 0.10	< 0.2	< 0.10	0.3	0.4	0.15	0.5	0.24	0.3	0.34	12	2	1,300	0.33	0.34	10	1,300
Chromium	12	14	9	12	6	10	13	11	14	17	14	5	80.15	390	460	6,300	56.88	80.15	150	6,300
Copper	25	24	26	28	23	28	27	31	26	45	34	25	42.85	120	>10,000	>10,000	48.14	42.85	280	-
Lead	19.9	24	20	25	17.1	23	42	35	31	125	70	32	44.34	900	210	3,300	25.83	44.34	460	3,300
Nickel	12	9	9	13	7	11	10	10	12	14	14	6	44.96	-	400 ⁴	4,000 ⁴	35.15	44.96	320	-
Zinc	90	122	1,230	135	150	158	2,400	300	112	310	147	200	182.8	130	8,000 ⁴	400,000 ⁴	97.97	182.8	1,200	-
Organochlorine Pesticides (OCPs)																				
ΣDDT	-	< 0.14	< 0.13	-	< 0.13	-	< 0.14	< 0.11	-	< 0.09	-	< 0.14	0.43 ⁵	4.8	70	1,000	-	-	35	35
Dieldrin	-	1.57	0.05	-	0.05	-	1.39	0.047	-	1.01	-	0.16	BDL	-	2.6	160	-	-	-	-

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available BDL = Below [laboratory] detection limits

References

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⁶ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁷ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁸ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as provided by GHC Consulting Ltd November 2025

⁹ Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

Table 4(b) - Stock Pens and Spray Race Area

Soil Sample Results													Assessment Criteria				Disposal Criteria			
Sample Location	SS59	SS61			SS62		SS63		SS64	SS66										
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.3	0.5	0.0 - 0.1	0.3	0.0 - 0.1	0.3	0.0 - 0.1	0.0 - 0.1	0.3	0.5	Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³	Shotover Quarry Cleanfill ⁶	Luggate Quarry Cleanfill ⁷	Taiko Landfill ⁸ - low level contamination	Taiko Landfill ⁹ - medium level contamination
Soil Type	TOPSOIL	TOPSOIL	SILT	SILT	TOPSOIL	SILT	TOPSOIL	SILT	TOPSOIL	TOPSOIL	SILT	SILT								
Heavy Metals																				
Arsenic	20	79	103	21	28	29	24	22	18	15	19	13	12.06	60	20	70	9.97	12.06	70	70
Cadmium	0.29	0.41	0.14	< 0.10	0.29	0.13	0.44	0.19	0.51	1.33	0.88	0.13	0.34	12	2	1,300	0.33	0.34	10	1,300
Chromium	13	18	20	8	22	21	21	17	16	17	17	11	80.15	390	460	6,300	56.88	80.15	150	6,300
Copper	29	23	20	13	20	20	22	18	19	27	17	13	42.85	120	>10,000	>10,000	48.14	42.85	280	-
Lead	59	45	29	12.9	39	23	26	21	29	104	18.5	12.9	44.34	900	210	3,300	25.83	44.34	460	3,300
Nickel	13	16	18	10	14	17	15	15	15	14	14	11	44.96	-	400 ⁴	4,000 ⁴	35.15	44.96	320	-
Zinc	190	640	250	38	146	95	139	91	151	6,200	640	98	182.8	130	8,000 ⁴	400,000 ⁴	97.97	182.8	1,200	-
Organochlorine Pesticides (OCPs)																				
ΣDDT	< 0.08	< 0.09	-	-	< 0.09	< 0.09	< 0.08	-	< 0.08	< 0.10	< 0.08	-	0.43 ⁵	4.8	70	1,000	-	-	35	35
Dieldrin	0.025	0.014	-	-	0.02	< 0.014	< 0.013	-	< 0.014	< 0.016	0.019	-	BDL	-	2.6	160	-	-	-	-

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available BDL = Below [laboratory] detection limits

References

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⁸ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as provided by GHC Consulting Ltd November 2025.

⁹ Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

Table 4(c) - Stock Pens and Spray Race Area

Soil Sample Results												
Sample Location	SS67	SS69		SS70	SS72			SS73	SS75		SS76	SS77
Depth (m bgl)	0.0 - 0.1	0.0 - 0.1	0.3	0.0 - 0.1	0.0 - 0.1	0.3	0.5	0.0 - 0.1	0.0 - 0.1	0.2	0.0 - 0.1	0.0 - 0.1
Soil Type	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL	SILT	SILT	TOPSOIL	TOPSOIL	SILT	TOPSOIL	TOPSOIL
Heavy Metals												
Arsenic	18	19	21	18	20	22	17	20	48	77	14	16
Cadmium	2.2	0.42	< 0.10	0.23	0.26	< 0.10	< 0.10	0.2	0.51	0.22	0.62	0.17
Chromium	16	18	21	18	18	22	16	19	18	21	14	16
Copper	18	20	17	23	20	19	17	20	26	26	22	35
Lead	23	25	17.7	198	18.6	17.3	13	21	82	60	101	63
Nickel	14	16	18	17	17	19	14	16	16	18	12	14
Zinc	148	165	76	104	142	70	43	112	860	240	1,110	151
Organochlorine Pesticides (OCPs)												
ΣDDT	< 0.08	< 0.09	< 0.08	< 0.08	< 0.09	-	-	< 0.09	-	-	-	-
Dieldrin	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	-	-	< 0.014	-	-	-	-

Notes

"-" denotes analyte not tested or no soil guideline value/acceptance criteria available BDL = Below [laboratory] detection limits

References

¹ Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soil group (Landcare Research Manaaki Whenua).

² Manaaki Whenua Landcare Research. UPDATED Development of soil guideline values for the protection of ecological receptios (Eco-SGVs: Technical document. June 2019) & An implementation framework for ecological soil guideline values (2023, Envirolink C09X2206).

³ Ministry for the Environment (2011). National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health.

⁴ Australian National Environmental Protection (Assessment of Site Contamination) Measure (1999, revised 2013). Guideline on Investigation Levels for Soil and Groundwater. Schedule B1.

⁵ Buckland, S. J., Ellis, H. K., Salter, R. T. (1998). Organochlorines in New Zealand: Ambient concentrations of selected organochlorines in soil. Published by Ministry for the Environment.

⁶ Fulton Hogan Shotover Delta Quarry, Fill Acceptance Criteria. Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for mudstone Pakahi soils.

⁷ Fulton Hogan Luggate Quarry, Fill Acceptance Criteria (dated: 30.03.2023). Local background concentrations taken from: Landcare Research Limited Predicted background soil concentrations - 95%ile values for gravel soils.

⁸ Taiko Landfill (low level contamination). Material that meets the levels in the Taiko T&C Requirments V2 is considered low level, as provided by GHC Consulting Ltd November 2025

⁹ Taiko Landfill (medium level contamination). Material that meets the Waste Acceptance Criteria in CRC224661 is considered medium level, as advised by GHC Consulting Ltd November 2025.

Assessment Criteria			
Site-Specific Background ¹	Eco-SGV ²	Residential SCS ³	Commercial SCS ³
12.06	60	20	70
0.34	12	2	1,300
80.15	390	460	6,300
42.85	120	>10,000	>10,000
44.34	900	210	3,300
44.96	-	400 ⁴	4,000 ⁴
182.8	130	8,000 ⁴	400,000 ⁴
0.43 ⁵	4.8	70	1,000
BDL	-	2.6	160

Disposal Criteria			
Shotover Quarry Cleanfill ⁶	Luggate Quarry Cleanfill ⁷	Taiko Landfill ⁸ - low level contamination	Taiko Landfill ⁹ - medium level contamination
9.97	12.06	70	70
0.33	0.34	10	1,300
56.88	80.15	150	6,300
48.14	42.85	280	-
25.83	44.34	460	3,300
35.15	44.96	320	-
97.97	182.8	1,200	-
-	-	35	35
-	-	-	-

Appendix C Site Photographs

Photograph 1



Photograph of the firing range, looking southward

Photograph 2



Firing stand area, SS4 in foreground

Photograph 3



Clay fragments and pellets on the topsoil surface, photograph taken at location SS10

Photograph 4



Clay fragments and pellets within the upper 100mm of the topsoil surface (location: SS16)

Photograph 5



Clay fragments and pellets within the upper 100mm of the topsoil surface (location: SS16)

Photograph 6



Former firewood processing yard

Photograph 7



Fuel storage area, showing area of bare soil and miscellaneous storage

Photograph 8



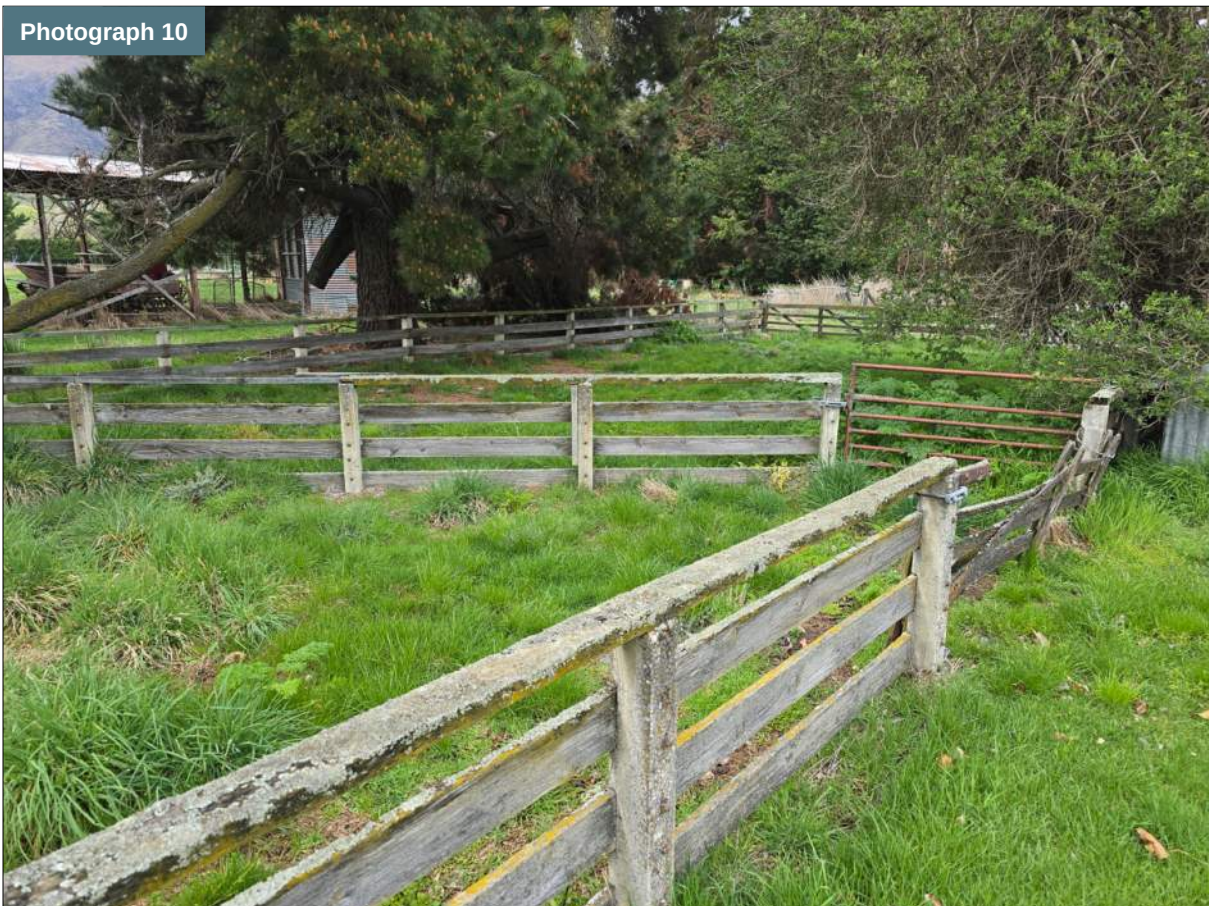
Fuel storage area, showing area of bare soil and miscellaneous storage, and AST in background

Photograph 9



AST, with visible surficial soil staining below

Photograph 10



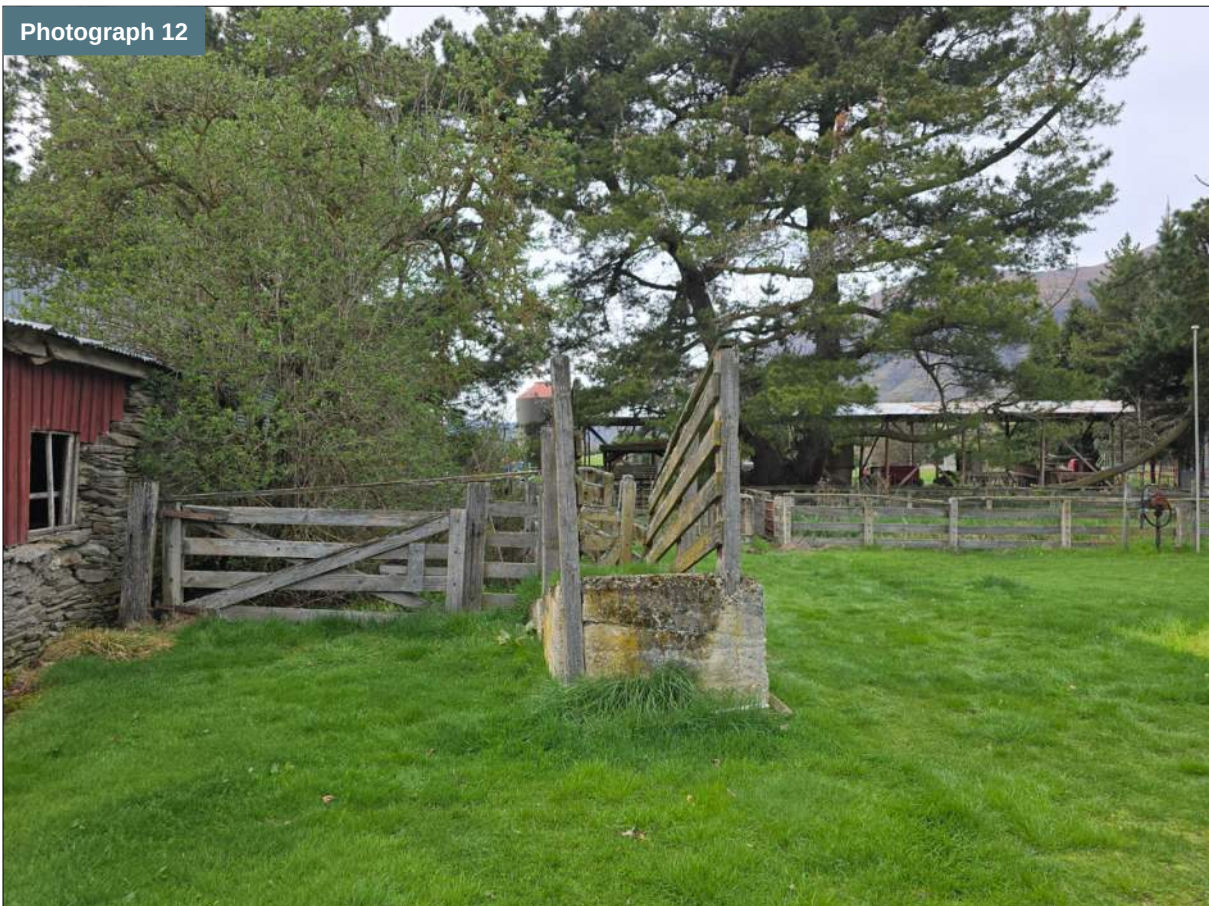
Holding pens south of the main livestock shed

Photograph 11



Holding pens/stock races south of the main livestock shed

Photograph 12



Holding pens/stock races south of the main livestock shed

Photograph 13



Stock race north of the livestock shed, leading to the spray race (behind) (location: SS61)

Photograph 14



Drone image showing spray race and surrounding stock pens/livestock shed

Appendix D Laboratory Documents

Certificate of Analysis

Page 1 of 20

Client:	Springline Limited	Lab No:	4007110	SPv4
Contact:	James Jackson C/- Springline Limited PO Box 26001 North Avon Christchurch 8148	Date Received:	13-Oct-2025	
		Date Reported:	24-Nov-2025	(Amended)
		Quote No:	141203	
		Order No:	25086	
		Client Reference:	25086 - 122 Morven Ferry Rd	
		Submitted By:	James Jackson	

Sample Type: Soil						
Sample Name:	SS01 0.1	SS02 0.1	SS02 0.3	SS02 0.5	SS03 0.1	
	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	
Lab Number:	4007110.1	4007110.3	4007110.4	4007110.5	4007110.6	
Individual Tests						
Total Recoverable Antimony	mg/kg dry wt	-	4.7	-	-	3.6
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	12	11	11	53
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.16	< 0.10	< 0.10	0.13
Total Recoverable Chromium	mg/kg dry wt	12	12	13	13	21
Total Recoverable Copper	mg/kg dry wt	13	14	14	12	33
Total Recoverable Lead	mg/kg dry wt	68	230	13.4	12.6	81
Total Recoverable Nickel	mg/kg dry wt	13	12	14	14	14
Total Recoverable Zinc	mg/kg dry wt	56	62	60	59	79
Sample Name:	SS04 0.1	SS05 0.1	SS06 0.1	SS07 0.1	SS07 0.3	
	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	
Lab Number:	4007110.8	4007110.10	4007110.12	4007110.14	4007110.15	
Individual Tests						
Total Recoverable Antimony	mg/kg dry wt	< 0.4	-	-	0.8	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	10	11	11	12
Total Recoverable Cadmium	mg/kg dry wt	0.10	0.13	0.12	0.14	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	11	13	12	13
Total Recoverable Copper	mg/kg dry wt	14	12	15	13	14
Total Recoverable Lead	mg/kg dry wt	15.9	22	22	36	13.9
Total Recoverable Nickel	mg/kg dry wt	13	12	14	13	14
Total Recoverable Zinc	mg/kg dry wt	60	50	58	57	61
Sample Name:	SS07 0.5	SS08 0.1	SS08 0.3	SS09 0.1	SS09 0.3	
	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	09-Oct-2025	
Lab Number:	4007110.16	4007110.17	4007110.18	4007110.19	4007110.20	
Individual Tests						
Dry Matter	g/100g as rcvd	-	74	80	-	-
Total Recoverable Antimony	mg/kg dry wt	-	3.0	-	0.5	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	11	10	9	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.12	< 0.10	0.18	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	11	13	9	10
Total Recoverable Copper	mg/kg dry wt	13	13	12	13	13
Total Recoverable Lead	mg/kg dry wt	13.0	83	13.4	27	11.5
Total Recoverable Nickel	mg/kg dry wt	14	13	13	11	11
Total Recoverable Zinc	mg/kg dry wt	56	53	57	44	48

Sample Type: Soil						
Sample Name:		SS07 0.5 09-Oct-2025	SS08 0.1 09-Oct-2025	SS08 0.3 09-Oct-2025	SS09 0.1 09-Oct-2025	SS09 0.3 09-Oct-2025
Lab Number:		4007110.16	4007110.17	4007110.18	4007110.19	4007110.20
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	640	0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	-	1.19	< 0.013	-	-
2-Methylnaphthalene	mg/kg dry wt	-	2.0	< 0.013	-	-
Acenaphthylene	mg/kg dry wt	-	0.048	< 0.013	-	-
Acenaphthene	mg/kg dry wt	-	7.9	< 0.013	-	-
Anthracene	mg/kg dry wt	-	9.3	< 0.013	-	-
Benzo[a]anthracene	mg/kg dry wt	-	52	0.029	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	64	0.047	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	100	0.061	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	99	0.061	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	74	0.053	-	-
Benzo[e]pyrene	mg/kg dry wt	-	40	0.033	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	49	0.037	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	27	0.023	-	-
Chrysene	mg/kg dry wt	-	44	0.031	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	14.7	< 0.013	-	-
Fluoranthene	mg/kg dry wt	-	70	0.039	-	-
Fluorene	mg/kg dry wt	-	3.8	< 0.013	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	52	0.034	-	-
Naphthalene	mg/kg dry wt	-	2.8	< 0.07	-	-
Perylene	mg/kg dry wt	-	15.9	< 0.013	-	-
Phenanthrene	mg/kg dry wt	-	39	0.017	-	-
Pyrene	mg/kg dry wt	-	76	0.039	-	-
Sample Name:		SS09 0.5 09-Oct-2025	SS10 0.1 09-Oct-2025	SS11 0.1 09-Oct-2025	SS11 0.3 09-Oct-2025	SS12 0.1 09-Oct-2025
Lab Number:		4007110.21	4007110.22	4007110.24	4007110.25	4007110.26
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	87	82	-
TCLP Weight of Sample Taken	g	-	-	50	-	50
TCLP Initial Sample pH	pH Units	-	-	8.5	-	8.9
TCLP Acid Adjusted Sample pH	pH Units	-	-	2.4	-	2.5
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	NaOH/Acetic acid at pH 4.93 +/- 0.05
TCLP Extraction Fluid pH	pH Units	-	-	4.9	-	4.9
TCLP Post Extraction Sample pH	pH Units	-	-	5.9	-	6.0
Total Recoverable Antimony	mg/kg dry wt	-	3.4	37	-	66
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	9	9	16	10	23
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.25	0.41	< 0.10	0.48
Total Recoverable Chromium	mg/kg dry wt	12	8	7	10	5
Total Recoverable Copper	mg/kg dry wt	11	11	10	13	7
Total Recoverable Lead	mg/kg dry wt	11.5	250	2,100	16.4	4,200
Total Recoverable Nickel	mg/kg dry wt	12	9	7	11	5
Total Recoverable Zinc	mg/kg dry wt	51	48	46	48	43
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	3,600	11.8	-
1-Methylnaphthalene	mg/kg dry wt	-	-	3.2	< 0.013	-
2-Methylnaphthalene	mg/kg dry wt	-	-	5.1	< 0.013	-
Acenaphthylene	mg/kg dry wt	-	-	0.196	< 0.013	-
Acenaphthene	mg/kg dry wt	-	-	28	0.086	-
Anthracene	mg/kg dry wt	-	-	41	0.149	-
Benzo[a]anthracene	mg/kg dry wt	-	-	300	0.92	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	400	1.28	-

Sample Type: Soil						
Sample Name:		SS09 0.5 09-Oct-2025	SS10 0.1 09-Oct-2025	SS11 0.1 09-Oct-2025	SS11 0.3 09-Oct-2025	SS12 0.1 09-Oct-2025
Lab Number:		4007110.21	4007110.22	4007110.24	4007110.25	4007110.26
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	620	1.94	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	620	1.93	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	500	1.62	-
Benzo[e]pyrene	mg/kg dry wt	-	-	240	0.84	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	250	0.90	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	180	0.56	-
Chrysene	mg/kg dry wt	-	-	270	0.83	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	86	0.23	-
Fluoranthene	mg/kg dry wt	-	-	380	1.26	-
Fluorene	mg/kg dry wt	-	-	13.5	0.052	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	270	0.97	-
Naphthalene	mg/kg dry wt	-	-	12.7	< 0.07	-
Perylene	mg/kg dry wt	-	-	98	0.35	-
Phenanthrene	mg/kg dry wt	-	-	171	0.57	-
Pyrene	mg/kg dry wt	-	-	370	1.14	-
Sample Name:		SS12 0.3 09-Oct-2025	SS13 0.1 09-Oct-2025	SS14 0.1 09-Oct-2025	SS15 0.1 09-Oct-2025	SS16 0.1 09-Oct-2025
Lab Number:		4007110.27	4007110.28	4007110.30	4007110.32	4007110.34
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	-	75
Total Recoverable Antimony	mg/kg dry wt	2.3	-	-	-	3.0
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	9	10	11	10
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.18	< 0.10	0.12	0.13
Total Recoverable Chromium	mg/kg dry wt	10	11	11	9	10
Total Recoverable Copper	mg/kg dry wt	13	13	13	13	12
Total Recoverable Lead	mg/kg dry wt	13.0	26	33	420	480
Total Recoverable Nickel	mg/kg dry wt	12	11	13	11	10
Total Recoverable Zinc	mg/kg dry wt	49	55	51	42	47
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	-	760
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	7.2
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	9.2
Acenaphthylene	mg/kg dry wt	-	-	-	-	0.108
Acenaphthene	mg/kg dry wt	-	-	-	-	15.2
Anthracene	mg/kg dry wt	-	-	-	-	20
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	57
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	56
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	89
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	88
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	66
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	36
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	41
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	23
Chrysene	mg/kg dry wt	-	-	-	-	50
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	12.6
Fluoranthene	mg/kg dry wt	-	-	-	-	95
Fluorene	mg/kg dry wt	-	-	-	-	9.8
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	42
Naphthalene	mg/kg dry wt	-	-	-	-	4.9

Sample Type: Soil						
Sample Name:		SS12 0.3 09-Oct-2025	SS13 0.1 09-Oct-2025	SS14 0.1 09-Oct-2025	SS15 0.1 09-Oct-2025	SS16 0.1 09-Oct-2025
Lab Number:		4007110.27	4007110.28	4007110.30	4007110.32	4007110.34
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Perylene	mg/kg dry wt	-	-	-	-	13.4
Phenanthrene	mg/kg dry wt	-	-	-	-	93
Pyrene	mg/kg dry wt	-	-	-	-	108
Sample Name:		SS16 0.3 09-Oct-2025	SS16 0.5 09-Oct-2025	SS17 0.1 09-Oct-2025	SS18 0.1 09-Oct-2025	SS19 0.1 09-Oct-2025
Lab Number:		4007110.35	4007110.36	4007110.37	4007110.39	4007110.40
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	10	10	8	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.12	0.11
Total Recoverable Chromium	mg/kg dry wt	10	9	11	10	9
Total Recoverable Copper	mg/kg dry wt	14	14	13	11	12
Total Recoverable Lead	mg/kg dry wt	15.9	10.0	38	13.4	10.8
Total Recoverable Nickel	mg/kg dry wt	13	12	12	11	10
Total Recoverable Zinc	mg/kg dry wt	52	41	52	48	41
Sample Name:		SS20 0.1 09-Oct-2025	SS21 0.1 09-Oct-2025	SS22 0.1 09-Oct-2025	SS23 0.1 09-Oct-2025	SS24 0.1 09-Oct-2025
Lab Number:		4007110.41	4007110.42	4007110.43	4007110.46	4007110.47
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	9	8	9	8
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.11
Total Recoverable Chromium	mg/kg dry wt	9	10	8	9	9
Total Recoverable Copper	mg/kg dry wt	11	12	10	12	11
Total Recoverable Lead	mg/kg dry wt	11.0	22	53	20	37
Total Recoverable Nickel	mg/kg dry wt	10	11	9	11	10
Total Recoverable Zinc	mg/kg dry wt	42	43	37	46	42
Sample Name:		SS25 0.1 09-Oct-2025	SS26 0.1 09-Oct-2025	SS27 0.1 09-Oct-2025	SS28 0.1 09-Oct-2025	SS29 0.1 09-Oct-2025
Lab Number:		4007110.48	4007110.51	4007110.52	4007110.53	4007110.54
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	18	18	19	20
Total Recoverable Cadmium	mg/kg dry wt	0.13	0.13	0.13	0.14	0.12
Total Recoverable Chromium	mg/kg dry wt	8	21	22	22	23
Total Recoverable Copper	mg/kg dry wt	12	20	21	22	22
Total Recoverable Lead	mg/kg dry wt	10.4	13.5	14.1	14.2	14.7
Total Recoverable Nickel	mg/kg dry wt	10	20	19	22	20
Total Recoverable Zinc	mg/kg dry wt	41	62	61	63	66
Sample Name:		SS30 0.1 09-Oct-2025	SS31 0.1 09-Oct-2025	SS32 0.1 09-Oct-2025	SS33 0.1 09-Oct-2025	SS34 0.1 09-Oct-2025
Lab Number:		4007110.55	4007110.56	4007110.57	4007110.59	4007110.61
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	73	74	72
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	17	18	17	17	29
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	0.19	0.12	0.13
Total Recoverable Chromium	mg/kg dry wt	22	20	17	18	23
Total Recoverable Copper	mg/kg dry wt	22	20	21	17	24
Total Recoverable Lead	mg/kg dry wt	15.7	13.8	17.8	13.6	18.3
Total Recoverable Nickel	mg/kg dry wt	20	19	16	16	15
Total Recoverable Zinc	mg/kg dry wt	66	65	143	60	63
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	-	< 0.11	-	-
Toluene	mg/kg dry wt	-	-	< 0.11	-	-
Ethylbenzene	mg/kg dry wt	-	-	< 0.11	-	-
m&p-Xylene	mg/kg dry wt	-	-	< 0.3	-	-

Sample Type: Soil						
Sample Name:		SS30 0.1 09-Oct-2025	SS31 0.1 09-Oct-2025	SS32 0.1 09-Oct-2025	SS33 0.1 09-Oct-2025	SS34 0.1 09-Oct-2025
Lab Number:		4007110.55	4007110.56	4007110.57	4007110.59	4007110.61
BTEX in Soil by Headspace GC-MS						
o-Xylene	mg/kg dry wt	-	-	< 0.11	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.4	< 0.4	0.5
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Acenaphthylene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Acenaphthene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.021
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.014	< 0.013	0.041
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.033	< 0.032	0.068
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.033	< 0.031	0.067
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.047
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.028
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.035
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.019
Chrysene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.028
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Fluoranthene	mg/kg dry wt	-	-	0.015	< 0.013	0.061
Fluorene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.037
Naphthalene	mg/kg dry wt	-	-	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	-	-	< 0.014	< 0.013	< 0.014
Phenanthrene	mg/kg dry wt	-	-	< 0.014	< 0.013	0.039
Pyrene	mg/kg dry wt	-	-	0.015	< 0.013	0.067
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	-	-	29	< 20	39
C15 - C36	mg/kg dry wt	-	-	470	64	960
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	500	< 80	1,000
Sample Name:		SS34 0.4 09-Oct-2025	SS35 0.1 09-Oct-2025	SS36 0.1 09-Oct-2025	SS36 0.4 09-Oct-2025	SS37 0.1 09-Oct-2025
Lab Number:		4007110.62	4007110.63	4007110.65	4007110.66	4007110.67
Individual Tests						
Dry Matter	g/100g as rcvd	90	74	89	90	76
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	18	18	28	18	16
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.13	0.15	< 0.10	0.12
Total Recoverable Chromium	mg/kg dry wt	19	18	17	19	17
Total Recoverable Copper	mg/kg dry wt	18	17	21	18	16
Total Recoverable Lead	mg/kg dry wt	12.0	15.5	15.4	12.9	13.7
Total Recoverable Nickel	mg/kg dry wt	18	16	16	18	15
Total Recoverable Zinc	mg/kg dry wt	58	62	66	55	60
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.11	< 0.08	-	-
Toluene	mg/kg dry wt	-	< 0.11	< 0.08	-	-
Ethylbenzene	mg/kg dry wt	-	< 0.11	< 0.08	-	-
m&p-Xylene	mg/kg dry wt	-	< 0.3	< 0.16	-	-
o-Xylene	mg/kg dry wt	-	< 0.11	< 0.08	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	0.5	1.9	-	4.8
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	0.011	-	0.050

Sample Type: Soil						
Sample Name:		SS34 0.4 09-Oct-2025	SS35 0.1 09-Oct-2025	SS36 0.1 09-Oct-2025	SS36 0.4 09-Oct-2025	SS37 0.1 09-Oct-2025
Lab Number:		4007110.62	4007110.63	4007110.65	4007110.66	4007110.67
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	0.012	-	0.063
Acenaphthylene	mg/kg dry wt	-	0.015	0.015	-	0.045
Acenaphthene	mg/kg dry wt	-	< 0.013	0.012	-	0.028
Anthracene	mg/kg dry wt	-	< 0.013	0.032	-	0.049
Benzo[a]anthracene	mg/kg dry wt	-	0.025	0.092	-	0.192
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.037	0.120	-	0.27
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	0.057	0.172	-	0.39
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	0.056	0.169	-	0.38
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.045	0.134	-	0.28
Benzo[e]pyrene	mg/kg dry wt	-	0.021	0.075	-	0.160
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.023	0.064	-	0.184
Benzo[k]fluoranthene	mg/kg dry wt	-	0.021	0.055	-	0.106
Chrysene	mg/kg dry wt	-	0.034	0.103	-	0.25
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	0.013	-	0.036
Fluoranthene	mg/kg dry wt	-	0.105	0.31	-	0.81
Fluorene	mg/kg dry wt	-	< 0.013	0.020	-	0.061
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.032	0.066	-	0.165
Naphthalene	mg/kg dry wt	-	< 0.07	< 0.06	-	0.23
Perylene	mg/kg dry wt	-	< 0.013	0.024	-	0.048
Phenanthrene	mg/kg dry wt	-	0.048	0.39	-	1.07
Pyrene	mg/kg dry wt	-	0.083	0.32	-	0.74
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	33	< 20	< 20
C15 - C36	mg/kg dry wt	560	90	510	300	191
Total hydrocarbons (C7 - C36)	mg/kg dry wt	570	97	540	310	192
Sample Name:		SS38 0.1 09-Oct-2025	SS38 0.3 09-Oct-2025	SS39 0.1 09-Oct-2025	SS40 0.1 09-Oct-2025	SS43 0.1 09-Oct-2025
Lab Number:		4007110.69	4007110.70	4007110.71	4007110.73	4007110.79
Individual Tests						
Dry Matter	g/100g as rcvd	67	75	74	76	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	20	17	18	11
Total Recoverable Cadmium	mg/kg dry wt	0.21	< 0.10	0.40	0.11	0.12
Total Recoverable Chromium	mg/kg dry wt	18	21	20	20	12
Total Recoverable Copper	mg/kg dry wt	19	18	20	18	25
Total Recoverable Lead	mg/kg dry wt	55	14.5	22	17.9	19.9
Total Recoverable Nickel	mg/kg dry wt	14	19	18	18	12
Total Recoverable Zinc	mg/kg dry wt	136	64	73	66	90
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	-
Toluene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	-
Ethylbenzene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	-
m&p-Xylene	mg/kg dry wt	< 0.14	< 0.12	< 0.12	< 0.12	-
o-Xylene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	22	1.1	< 0.4	< 0.4	-
1-Methylnaphthalene	mg/kg dry wt	3.2	< 0.013	< 0.014	< 0.013	-
2-Methylnaphthalene	mg/kg dry wt	0.80	< 0.013	< 0.014	< 0.013	-
Acenaphthylene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Acenaphthene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Anthracene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-

Sample Type: Soil						
Sample Name:		SS38 0.1 09-Oct-2025	SS38 0.3 09-Oct-2025	SS39 0.1 09-Oct-2025	SS40 0.1 09-Oct-2025	SS43 0.1 09-Oct-2025
Lab Number:		4007110.69	4007110.70	4007110.71	4007110.73	4007110.79
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[a]anthracene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.35	< 0.032	< 0.033	< 0.031	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.35	< 0.032	< 0.033	< 0.031	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Benzo[e]pyrene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Chrysene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Fluoranthene	mg/kg dry wt	0.21	< 0.013	< 0.014	< 0.013	-
Fluorene	mg/kg dry wt	10.2	< 0.013	< 0.014	< 0.013	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Naphthalene	mg/kg dry wt	1.4	< 0.07	< 0.07	< 0.07	-
Perylene	mg/kg dry wt	< 0.15	< 0.013	< 0.014	< 0.013	-
Phenanthrene	mg/kg dry wt	1.11	< 0.013	< 0.014	< 0.013	-
Pyrene	mg/kg dry wt	4.3	1.13	0.017	< 0.013	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 300	< 20	< 20	< 20	-
C10 - C14	mg/kg dry wt	12,200	920	43	< 20	-
C15 - C36	mg/kg dry wt	95,000	4,900	1,650	82	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	107,000	5,800	1,690	87	-
Sample Name:		SS46 0.1 09-Oct-2025	SS48 0.1 09-Oct-2025	SS48 0.2 09-Oct-2025	SS49 0.1 09-Oct-2025	SS49 0.2 09-Oct-2025
Lab Number:		4007110.84	4007110.87	4007110.88	4007110.89	4007110.90
Individual Tests						
Dry Matter	g/100g as rcvd	42	48	-	47	-
TCLP Weight of Sample Taken	g	-	50	-	-	-
TCLP Initial Sample pH	pH Units	-	5.0	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	5.0	-	-	-
TCLP Extractant Type*		-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-	-
TCLP Extraction Fluid pH	pH Units	-	4.9	-	-	-
TCLP Post Extraction Sample pH	pH Units	-	5.0	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	8	23	6	16
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.16	< 0.10	< 0.2	< 0.10
Total Recoverable Chromium	mg/kg dry wt	14	9	12	6	10
Total Recoverable Copper	mg/kg dry wt	24	26	28	23	28
Total Recoverable Lead	mg/kg dry wt	24	20	25	17.1	23
Total Recoverable Nickel	mg/kg dry wt	9	9	13	7	11
Total Recoverable Zinc	mg/kg dry wt	122	1,230	135	150	158
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
alpha-BHC	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
beta-BHC	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
delta-BHC	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
cis-Chlordane	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
trans-Chlordane	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
2,4'-DDD	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
4,4'-DDD	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
2,4'-DDE	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-

Sample Type: Soil						
Sample Name:		SS46 0.1 09-Oct-2025	SS48 0.1 09-Oct-2025	SS48 0.2 09-Oct-2025	SS49 0.1 09-Oct-2025	SS49 0.2 09-Oct-2025
Lab Number:		4007110.84	4007110.87	4007110.88	4007110.89	4007110.90
Organochlorine Pesticides Screening in Soil						
4,4'-DDE	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
2,4'-DDT	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
4,4'-DDT	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Total DDT Isomers	mg/kg dry wt	< 0.14	< 0.13	-	< 0.13	-
Dieldrin	mg/kg dry wt	1.57	0.05	-	0.05	-
Endosulfan I	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Endosulfan II	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Endosulfan sulphate	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Endrin	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Endrin aldehyde	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Endrin ketone	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Heptachlor	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Heptachlor epoxide	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Hexachlorobenzene	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Methoxychlor	mg/kg dry wt	< 0.03	< 0.03	-	< 0.03	-
Sample Name:		SS50 0.1 09-Oct-2025	SS52 0.1 09-Oct-2025	SS52 0.2 09-Oct-2025	SS56 0.1 09-Oct-2025	SS56 0.2 09-Oct-2025
Lab Number:		4007110.91	4007110.94	4007110.95	4007110.100	4007110.101
Individual Tests						
Dry Matter	g/100g as rcvd	59	56	-	66	-
TCLP Weight of Sample Taken	g	50	-	-	-	-
TCLP Initial Sample pH	pH Units	6.2	-	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	1.6	-	-	-	-
TCLP Extractant Type*	NaOH/Acetic acid at pH 4.93 +/- 0.05					
TCLP Extraction Fluid pH	pH Units	4.9	-	-	-	-
TCLP Post Extraction Sample pH	pH Units	5.0	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	9	13	12	16
Total Recoverable Cadmium	mg/kg dry wt	0.3	0.4	0.15	0.5	0.24
Total Recoverable Chromium	mg/kg dry wt	13	11	14	17	14
Total Recoverable Copper	mg/kg dry wt	27	31	26	45	34
Total Recoverable Lead	mg/kg dry wt	42	35	31	125	70
Total Recoverable Nickel	mg/kg dry wt	10	10	12	14	14
Total Recoverable Zinc	mg/kg dry wt	2,400	300	112	310	147
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
alpha-BHC	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
beta-BHC	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
delta-BHC	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
cis-Chlordane	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
trans-Chlordane	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
2,4'-DDD	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
4,4'-DDD	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
2,4'-DDE	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
4,4'-DDE	mg/kg dry wt	0.041	< 0.018	-	< 0.015	-
2,4'-DDT	mg/kg dry wt	0.026	< 0.018	-	< 0.015	-
4,4'-DDT	mg/kg dry wt	< 0.05	< 0.018	-	< 0.015	-
Total DDT Isomers	mg/kg dry wt	< 0.14	< 0.11	-	< 0.09	-
Dieldrin	mg/kg dry wt	1.39	0.047	-	1.01	-
Endosulfan I	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Endosulfan II	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Endosulfan sulphate	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Endrin	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-

Sample Type: Soil						
Sample Name:		SS50 0.1 09-Oct-2025	SS52 0.1 09-Oct-2025	SS52 0.2 09-Oct-2025	SS56 0.1 09-Oct-2025	SS56 0.2 09-Oct-2025
Lab Number:		4007110.91	4007110.94	4007110.95	4007110.100	4007110.101
Organochlorine Pesticides Screening in Soil						
Endrin aldehyde	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Endrin ketone	mg/kg dry wt	0.019	< 0.018	-	< 0.015	-
Heptachlor	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Heptachlor epoxide	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Hexachlorobenzene	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Methoxychlor	mg/kg dry wt	< 0.017	< 0.018	-	< 0.015	-
Sample Name:		SS58 0.1 09-Oct-2025	SS59 0.1 09-Oct-2025	SS61 0.1 09-Oct-2025	SS61 0.3 09-Oct-2025	SS61 0.5 09-Oct-2025
Lab Number:		4007110.103	4007110.104	4007110.108	4007110.109	4007110.110
Individual Tests						
Dry Matter	g/100g as rcvd	88	78	73	-	-
TCLP Weight of Sample Taken	g	-	-	50	50	-
TCLP Initial Sample pH	pH Units	-	-	5.7	6.2	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.6	1.6	-
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	4.9	4.9	-
TCLP Post Extraction Sample pH	pH Units	-	-	5.0	5.0	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	20	79	103	21
Total Recoverable Cadmium	mg/kg dry wt	0.3	0.29	0.41	0.14	< 0.10
Total Recoverable Chromium	mg/kg dry wt	5	13	18	20	8
Total Recoverable Copper	mg/kg dry wt	25	29	23	20	13
Total Recoverable Lead	mg/kg dry wt	32	59	45	29	12.9
Total Recoverable Nickel	mg/kg dry wt	6	13	16	18	10
Total Recoverable Zinc	mg/kg dry wt	200	190	640	250	38
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	0.02	< 0.013	< 0.014	-	-
alpha-BHC	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
beta-BHC	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
delta-BHC	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
cis-Chlordane	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
trans-Chlordane	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
2,4'-DDD	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
4,4'-DDD	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
2,4'-DDE	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
4,4'-DDE	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
2,4'-DDT	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
4,4'-DDT	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Total DDT Isomers	mg/kg dry wt	< 0.14	< 0.08	< 0.09	-	-
Dieldrin	mg/kg dry wt	0.16	0.025	0.014	-	-
Endosulfan I	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Endosulfan II	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Endrin	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Endrin aldehyde	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Endrin ketone	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Heptachlor	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-
Methoxychlor	mg/kg dry wt	< 0.03	< 0.013	< 0.014	-	-

Sample Type: Soil						
Sample Name:		SS62 0.1 09-Oct-2025	SS62 0.3 09-Oct-2025	SS63 0.1 09-Oct-2025	SS63 0.3 09-Oct-2025	SS64 0.1 09-Oct-2025
Lab Number:		4007110.111	4007110.112	4007110.114	4007110.115	4007110.117
Individual Tests						
Dry Matter	g/100g as rcvd	70	-	74	79	74
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	28	29	24	22	18
Total Recoverable Cadmium	mg/kg dry wt	0.29	0.13	0.44	0.19	0.51
Total Recoverable Chromium	mg/kg dry wt	22	21	21	17	16
Total Recoverable Copper	mg/kg dry wt	20	20	22	18	19
Total Recoverable Lead	mg/kg dry wt	39	23	26	21	29
Total Recoverable Nickel	mg/kg dry wt	14	17	15	15	15
Total Recoverable Zinc	mg/kg dry wt	146	95	139	91	151
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
alpha-BHC	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
beta-BHC	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
delta-BHC	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
gamma-BHC (Lindane)	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
cis-Chlordane	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
trans-Chlordane	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
2,4'-DDD	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
4,4'-DDD	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
2,4'-DDE	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
4,4'-DDE	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
2,4'-DDT	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
4,4'-DDT	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Total DDT Isomers	mg/kg dry wt	< 0.09	-	< 0.09	< 0.08	< 0.08
Dieldrin	mg/kg dry wt	0.020	-	< 0.014	< 0.013	< 0.014
Endosulfan I	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Endosulfan II	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Endosulfan sulphate	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Endrin	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Endrin aldehyde	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Endrin ketone	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Heptachlor	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Heptachlor epoxide	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Hexachlorobenzene	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Methoxychlor	mg/kg dry wt	< 0.015	-	< 0.014	< 0.013	< 0.014
Sample Name:		SS66 0.1 09-Oct-2025	SS66 0.3 09-Oct-2025	SS66 0.5 09-Oct-2025	SS67 0.1 09-Oct-2025	SS69 0.1 09-Oct-2025
Lab Number:		4007110.121	4007110.122	4007110.123	4007110.124	4007110.128
Individual Tests						
Dry Matter	g/100g as rcvd	64	80	-	76	73
TCLP Weight of Sample Taken	g	50	-	-	-	-
TCLP Initial Sample pH	pH Units	6.1	-	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	1.6	-	-	-	-
TCLP Extractant Type*	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-	-	-	-
TCLP Extraction Fluid pH	pH Units	4.9	-	-	-	-
TCLP Post Extraction Sample pH	pH Units	5.0	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	15	19	13	18	19
Total Recoverable Cadmium	mg/kg dry wt	1.33	0.88	0.13	2.2	0.42
Total Recoverable Chromium	mg/kg dry wt	17	17	11	16	18
Total Recoverable Copper	mg/kg dry wt	27	17	13	18	20
Total Recoverable Lead	mg/kg dry wt	104	18.5	12.9	23	25
Total Recoverable Nickel	mg/kg dry wt	14	14	11	14	16
Total Recoverable Zinc	mg/kg dry wt	6,200	640	98	148	165

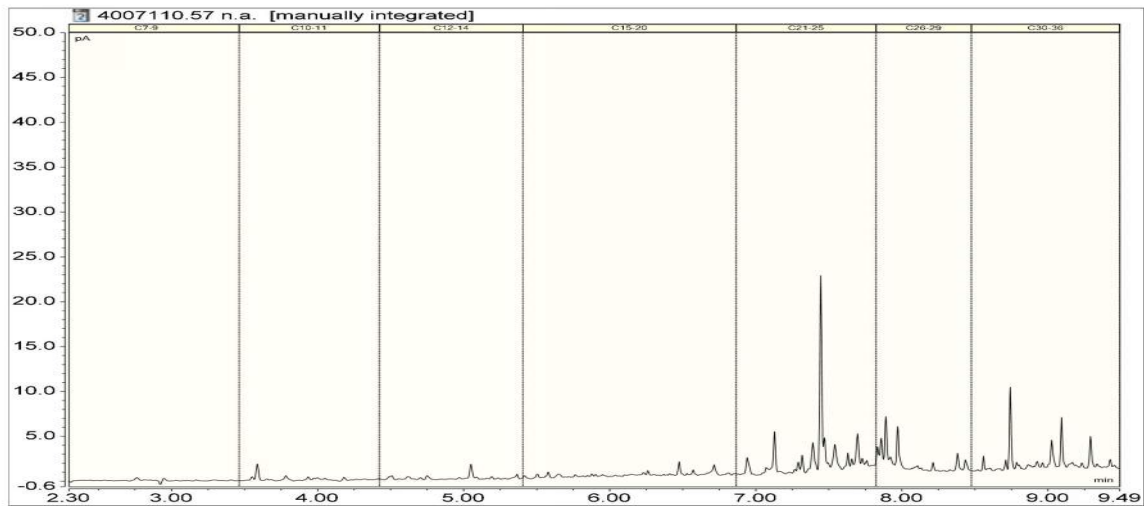
Sample Type: Soil						
Sample Name:		SS66 0.1 09-Oct-2025	SS66 0.3 09-Oct-2025	SS66 0.5 09-Oct-2025	SS67 0.1 09-Oct-2025	SS69 0.1 09-Oct-2025
Lab Number:		4007110.121	4007110.122	4007110.123	4007110.124	4007110.128
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
alpha-BHC	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
beta-BHC	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
delta-BHC	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
gamma-BHC (Lindane)	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
cis-Chlordane	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
trans-Chlordane	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
2,4'-DDD	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
4,4'-DDD	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
2,4'-DDE	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
4,4'-DDE	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
2,4'-DDT	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
4,4'-DDT	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Total DDT Isomers	mg/kg dry wt	< 0.10	< 0.08	-	< 0.08	< 0.09
Dieldrin	mg/kg dry wt	< 0.016	0.019	-	< 0.013	< 0.014
Endosulfan I	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Endosulfan II	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Endosulfan sulphate	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Endrin	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Endrin aldehyde	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Endrin ketone	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Heptachlor	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Heptachlor epoxide	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Hexachlorobenzene	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Methoxychlor	mg/kg dry wt	< 0.016	< 0.013	-	< 0.013	< 0.014
Sample Name:		SS69 0.3 09-Oct-2025	SS70 0.1 09-Oct-2025	SS72 0.1 09-Oct-2025	SS72 0.3 09-Oct-2025	SS72 0.5 09-Oct-2025
Lab Number:		4007110.129	4007110.131	4007110.135	4007110.136	4007110.137
Individual Tests						
Dry Matter	g/100g as rcvd	80	75	71	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	21	18	20	22	17
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.23	0.26	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	21	18	18	22	16
Total Recoverable Copper	mg/kg dry wt	17	23	20	19	17
Total Recoverable Lead	mg/kg dry wt	17.7	198	18.6	17.3	13.0
Total Recoverable Nickel	mg/kg dry wt	18	17	17	19	14
Total Recoverable Zinc	mg/kg dry wt	76	104	142	70	43
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.08	< 0.09	-	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-

Sample Type: Soil						
Sample Name:		SS69 0.3 09-Oct-2025	SS70 0.1 09-Oct-2025	SS72 0.1 09-Oct-2025	SS72 0.3 09-Oct-2025	SS72 0.5 09-Oct-2025
Lab Number:		4007110.129	4007110.131	4007110.135	4007110.136	4007110.137
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Endrin	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.014	< 0.014	-	-
Sample Name:		SS73 0.1 09-Oct-2025	SS75 0.1 09-Oct-2025	SS75 0.2 09-Oct-2025	SS76 0.1 09-Oct-2025	SS77 0.1 09-Oct-2025
Lab Number:		4007110.138	4007110.142	4007110.143	4007110.144	4007110.146
Individual Tests						
Dry Matter	g/100g as rcvd	70	-	-	-	-
TCLP Weight of Sample Taken	g	-	-	50	-	-
TCLP Initial Sample pH	pH Units	-	-	6.6	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.6	-	-
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-
TCLP Extraction Fluid pH	pH Units	-	-	4.9	-	-
TCLP Post Extraction Sample pH	pH Units	-	-	5.0	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	20	48	77	14	16
Total Recoverable Cadmium	mg/kg dry wt	0.20	0.51	0.22	0.62	0.17
Total Recoverable Chromium	mg/kg dry wt	19	18	21	14	16
Total Recoverable Copper	mg/kg dry wt	20	26	26	22	35
Total Recoverable Lead	mg/kg dry wt	21	82	60	101	63
Total Recoverable Nickel	mg/kg dry wt	16	16	18	12	14
Total Recoverable Zinc	mg/kg dry wt	112	860	240	1,110	151
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.014	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.09	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.014	-	-	-	-
Endrin	mg/kg dry wt	< 0.014	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.014	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.014	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.014	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.014	-	-	-	-

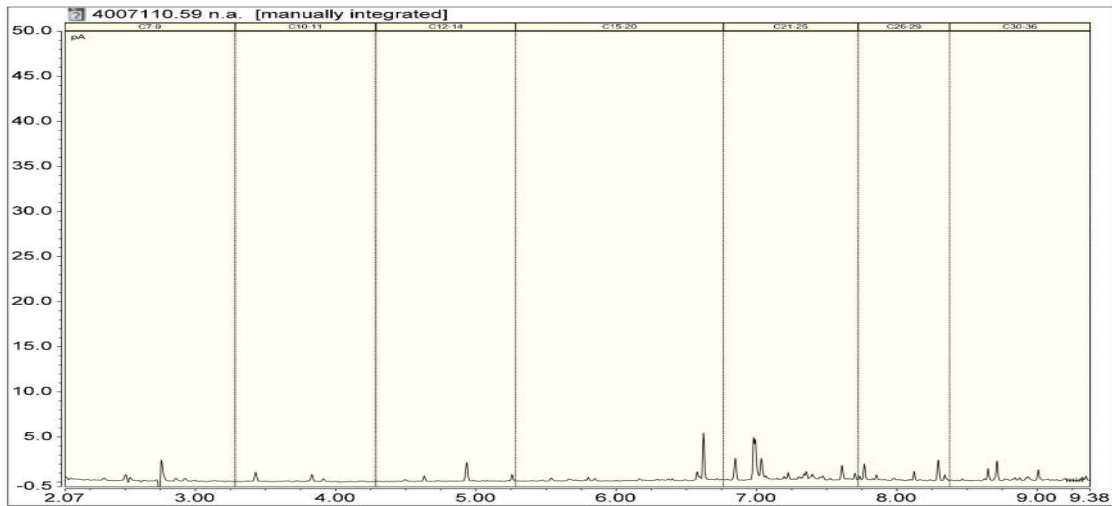
Sample Type: Soil					
Sample Name:		DUP1 09-Oct-2025		DUP2 09-Oct-2025	
Lab Number:		4007110.148		4007110.149	
Individual Tests					
Dry Matter	g/100g as rcvd	76		71	
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	17		19	
Total Recoverable Cadmium	mg/kg dry wt	0.47		0.19	
Total Recoverable Chromium	mg/kg dry wt	16		17	
Total Recoverable Copper	mg/kg dry wt	19		21	
Total Recoverable Lead	mg/kg dry wt	38		38	
Total Recoverable Nickel	mg/kg dry wt	14		15	
Total Recoverable Zinc	mg/kg dry wt	151		90	
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013		< 0.014	
alpha-BHC	mg/kg dry wt	< 0.013		< 0.014	
beta-BHC	mg/kg dry wt	< 0.013		< 0.014	
delta-BHC	mg/kg dry wt	< 0.013		< 0.014	
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013		< 0.014	
cis-Chlordane	mg/kg dry wt	< 0.013		< 0.014	
trans-Chlordane	mg/kg dry wt	< 0.013		< 0.014	
2,4'-DDD	mg/kg dry wt	< 0.013		< 0.014	
4,4'-DDD	mg/kg dry wt	< 0.013		< 0.014	
2,4'-DDE	mg/kg dry wt	< 0.013		< 0.014	
4,4'-DDE	mg/kg dry wt	< 0.013		< 0.014	
2,4'-DDT	mg/kg dry wt	< 0.013		< 0.014	
4,4'-DDT	mg/kg dry wt	< 0.013		< 0.014	
Total DDT Isomers	mg/kg dry wt	< 0.08		< 0.09	
Dieldrin	mg/kg dry wt	< 0.013		< 0.014	
Endosulfan I	mg/kg dry wt	< 0.013		< 0.014	
Endosulfan II	mg/kg dry wt	< 0.013		< 0.014	
Endosulfan sulphate	mg/kg dry wt	< 0.013		< 0.014	
Endrin	mg/kg dry wt	< 0.013		< 0.014	
Endrin aldehyde	mg/kg dry wt	< 0.013		< 0.014	
Endrin ketone	mg/kg dry wt	< 0.013		< 0.014	
Heptachlor	mg/kg dry wt	< 0.013		< 0.014	
Heptachlor epoxide	mg/kg dry wt	< 0.013		< 0.014	
Hexachlorobenzene	mg/kg dry wt	< 0.013		< 0.014	
Methoxychlor	mg/kg dry wt	< 0.013		< 0.014	

Sample Type: Aqueous						
Sample Name:		SS11 0.1 [TCLP Extract]	SS12 0.1 [TCLP Extract]	SS48 0.1 [TCLP Extract]	SS50 0.1 [TCLP Extract]	SS61 0.1 [TCLP Extract]
Lab Number:		4007110.150	4007110.151	4007110.152	4007110.153	4007110.154
Individual Tests						
Total Arsenic	g/m³	-	-	-	-	0.032
Total Lead	g/m³	62	38	-	-	-
Total Zinc	g/m³	-	-	4.0	10.6	-
Sample Name:		SS61 0.3 [TCLP Extract]		SS66 0.1 [TCLP Extract]		SS75 0.2 [TCLP Extract]
Lab Number:		4007110.155		4007110.156		4007110.157
Individual Tests						
Total Arsenic	g/m³	0.098		-		0.189
Total Zinc	g/m³	-		65		-

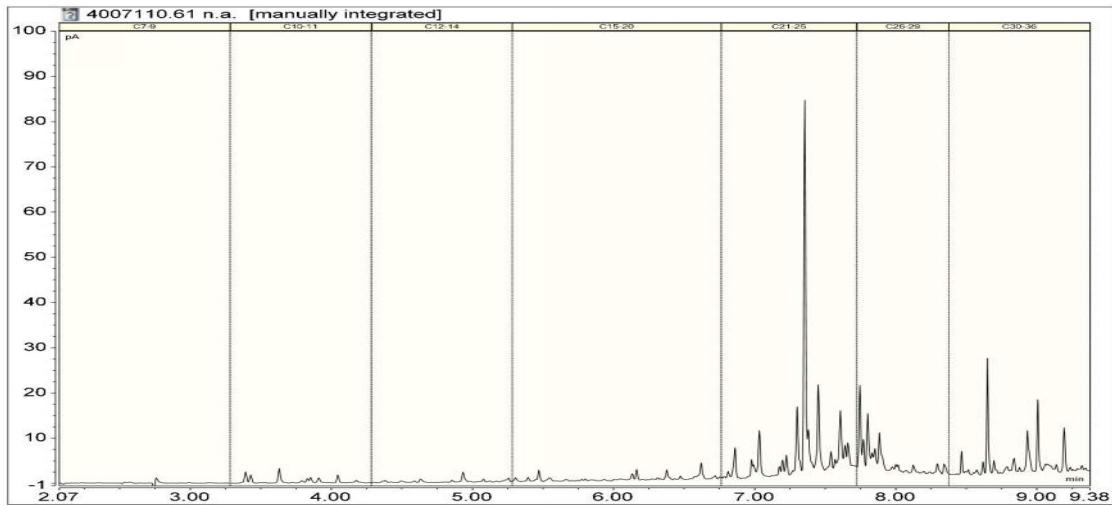
4007110.57
SS32 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



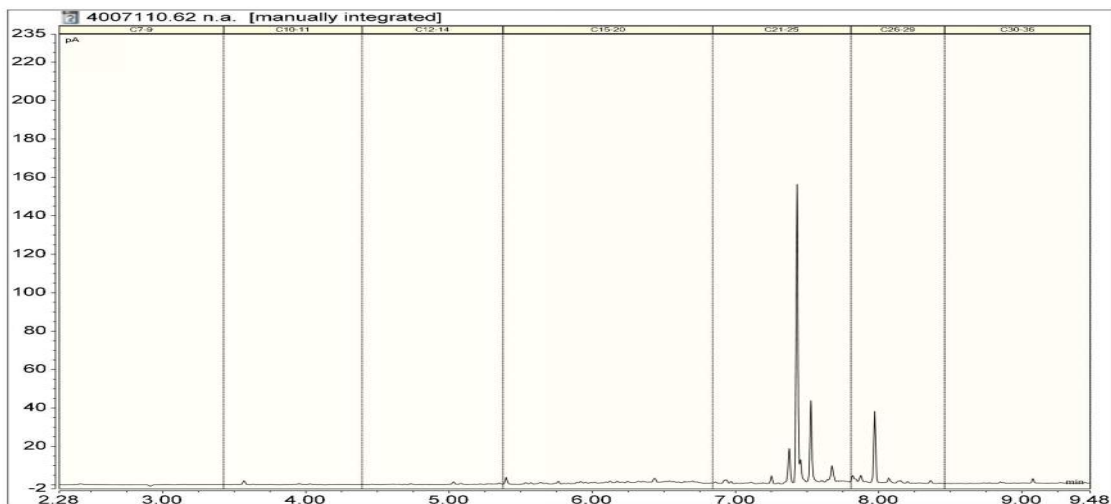
4007110.59
SS33 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



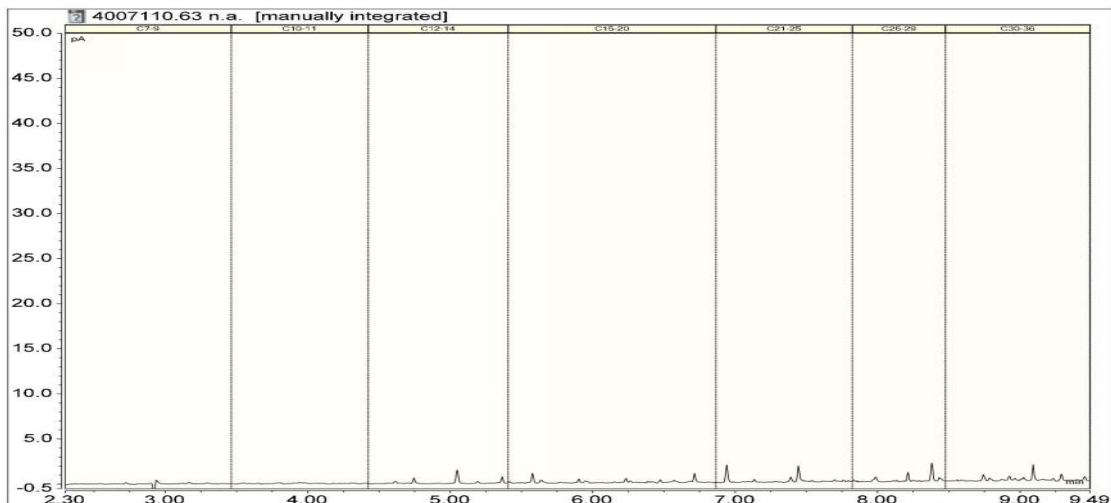
4007110.61
SS34 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



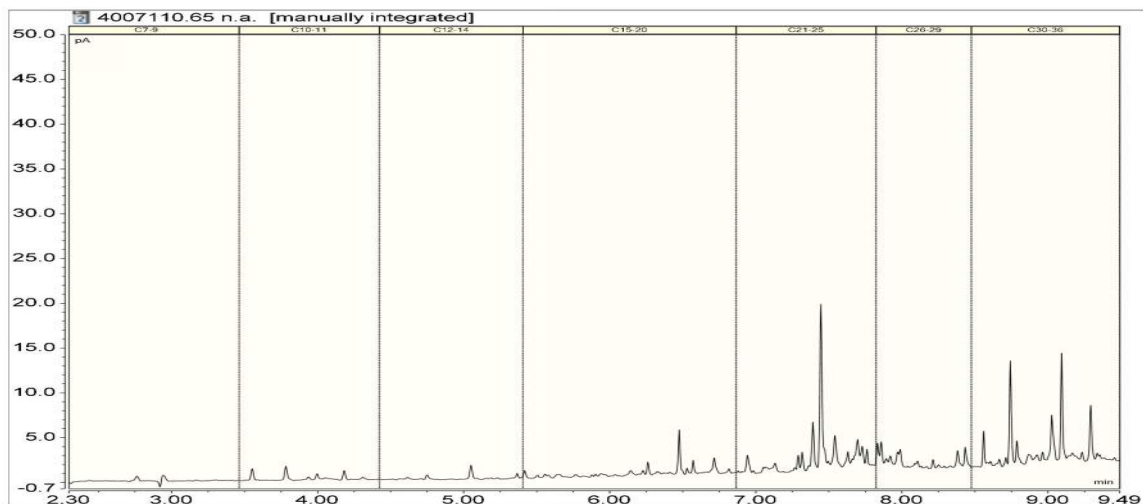
4007110.62
SS34 0.4 09-Oct-2025
Client Chromatogram for TPH by FID



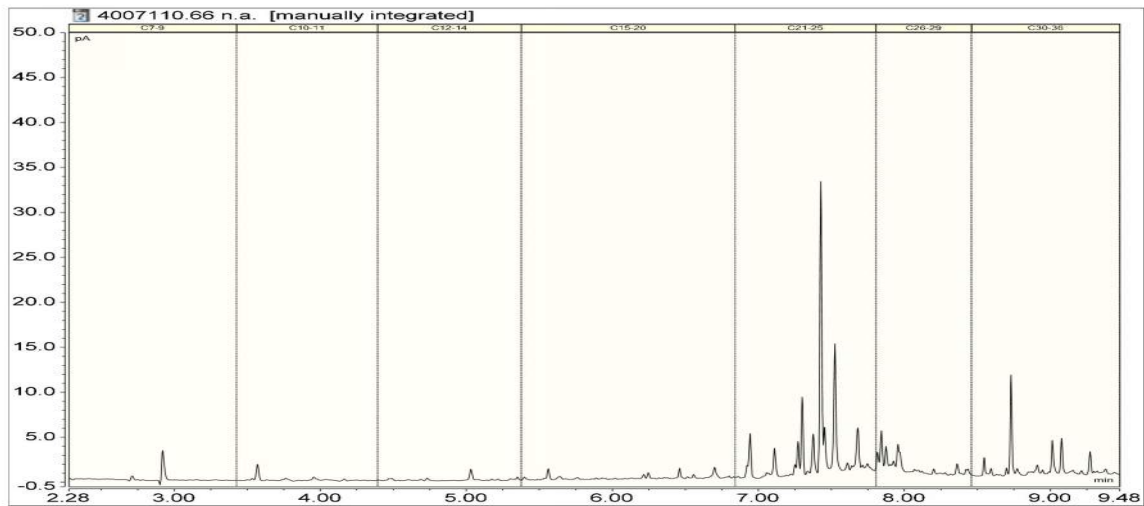
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SS35 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



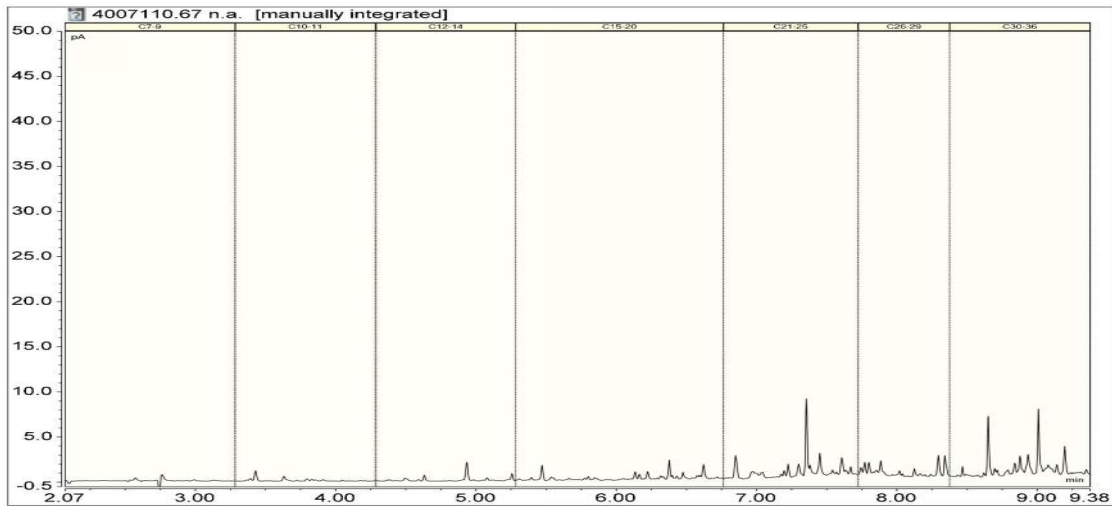
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SS36 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



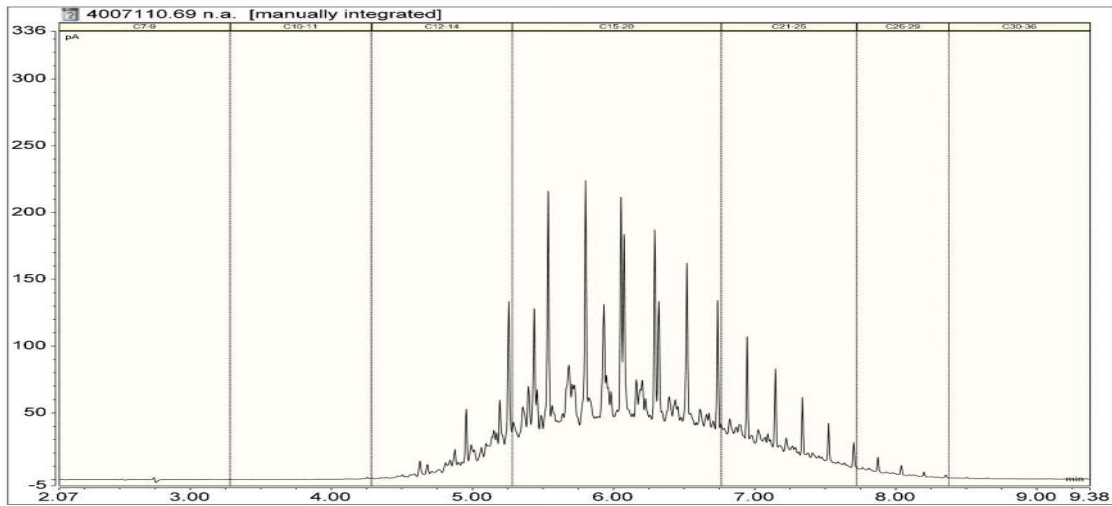
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SS36 0.4 09-Oct-2025
Client Chromatogram for TPH by FID



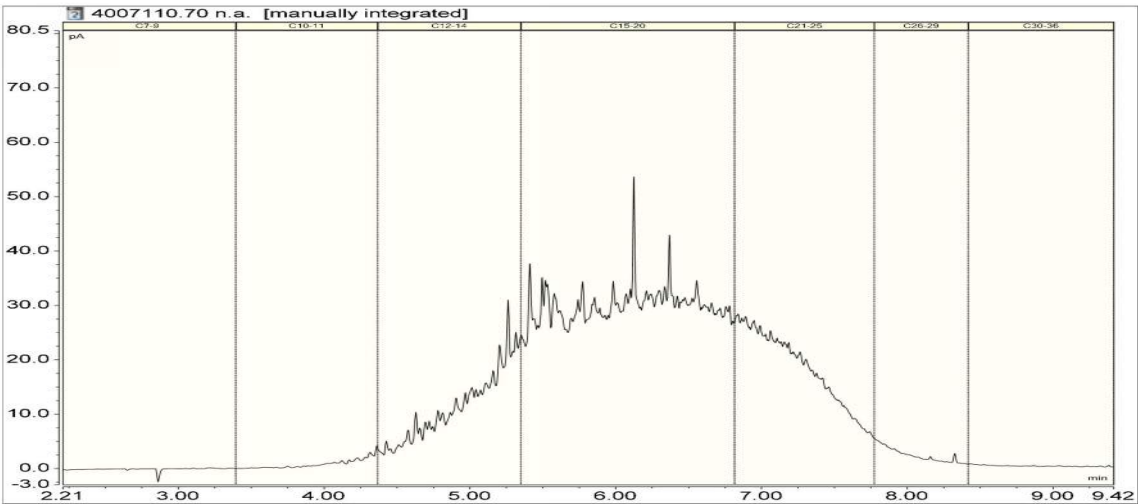
4007110.67
SS37 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



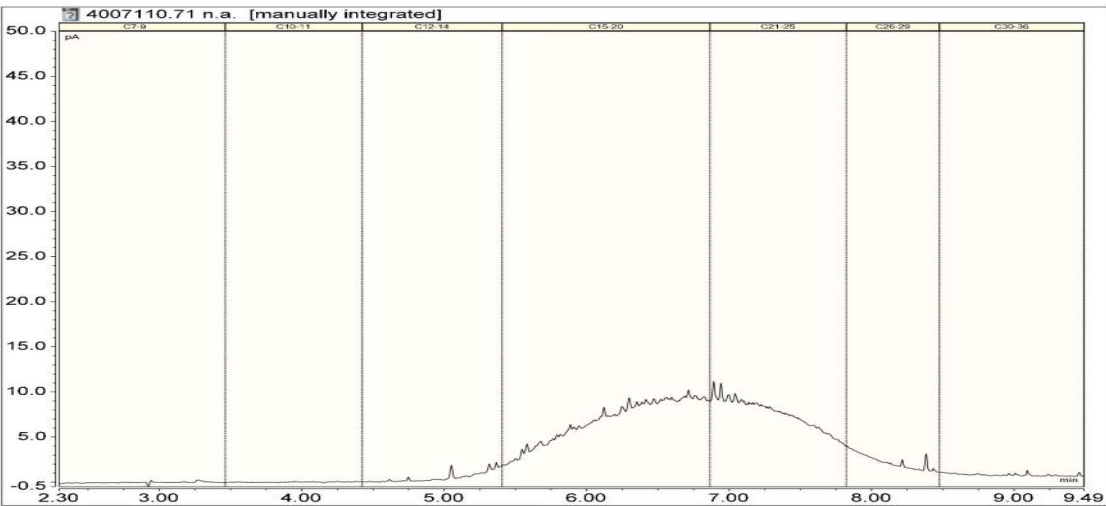
4007110.69
SS38 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



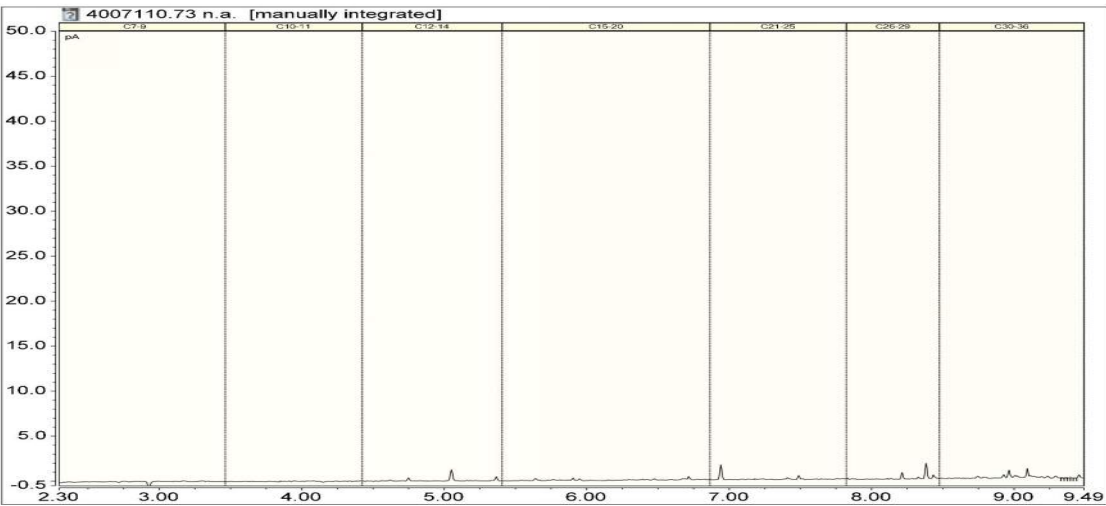
4007110.70
SS38 0.3 09-Oct-2025
Client Chromatogram for TPH by FID



4007110.71
SS39 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



4007110.73
SS40 0.1 09-Oct-2025
Client Chromatogram for TPH by FID



Analyst's Comments

It was observed that the container for sample 4007110/70 was not completely filled. Volatile loss may have occurred due to the headspace created in the container.

Amended Report: This certificate of analysis replaces report '4007110-SPv3' issued on 20-Nov-2025 at 8:56 pm.
Reason for amendment: Additional testing added as per client.

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
Individual Tests			
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, 3-6, 8, 10, 12, 14-22, 24-28, 30, 32, 34-37, 39-43, 46-48, 51-57, 59, 61-63, 65-67, 69-71, 73, 79, 84, 87-91, 94-95, 100-101, 103-104, 108-112, 114-115, 117, 121-124, 128-129, 131, 135-138, 142-144, 146, 148-149
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	17-18, 24-25, 34, 57, 59, 61, 63, 65, 67, 69-71, 73
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	17-18, 24-25, 34, 57, 59, 61-63, 65-67, 69-71, 73, 84, 87, 89, 91, 94, 100, 103-104, 108, 111, 114-115, 117, 121-122, 124, 128-129, 131, 135, 138, 148-149
Total Recoverable Antimony	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.4 mg/kg dry wt	3, 6, 8, 14, 17, 19, 22, 24, 26-27, 34
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	17-18, 24-25, 34, 57, 59, 61, 63, 65, 67, 69-71, 73

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	17-18, 24-25, 34, 57, 59, 61, 63, 65, 67, 69-71, 73
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	59, 61, 67
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.10 - 4 mg/kg dry wt	1, 3-6, 8, 10, 12, 14-22, 24-28, 30, 32, 34-37, 39-43, 46-48, 51-57, 59, 61-63, 65-67, 69-71, 73, 79, 84, 87-91, 94-95, 100-101, 103-104, 108-112, 114-115, 117, 121-124, 128-129, 131, 135-138, 142-144, 146, 148-149
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	57, 63, 65, 69-71, 73
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	84, 87, 89, 91, 94, 100, 103-104, 108, 111, 114-115, 117, 121-122, 124, 128-129, 131, 135, 138, 148-149
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	17-18, 24-25, 34, 57, 63, 65, 69-71, 73
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	24, 26, 87, 91, 108-109, 121, 143
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	57, 59, 61-63, 65-67, 69-71, 73
C7 - C9	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	57, 59, 61-63, 65-67, 69-71, 73
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	57, 59, 61-63, 65-67, 69-71, 73

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	57, 59, 61-63, 65-67, 69-71, 73
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	57, 59, 61-63, 65-67, 69-71, 73
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	24, 26, 87, 91, 108-109, 121, 143
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	24, 26, 87, 91, 108-109, 121, 143
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	24, 26, 87, 91, 108-109, 121, 143
TCLP Extractant Type*	US EPA 1311.	-	24, 26, 87, 91, 108-109, 121, 143
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	24, 26, 87, 91, 108-109, 121, 143
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	24, 26, 87, 91, 108-109, 121, 143

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	150-157
Total Arsenic	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.021 g/m ³	154-155, 157
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.0021 g/m ³	150-151
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.053 g/m ³	152-153, 156

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

Testing was completed between 14-Oct-2025 and 24-Nov-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.



Kim Harrison MSc
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