

6 November 2025
Job No: 1017353.2402

Hawkes Bay Regional Council
Private Bag 6006
Napier
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Attention: Harry Donnelly

Dear Harry

Pākōwhai Secondary Stopbank Additional Sampling – DSI Addendum

1 Introduction

This letter report presents the scope and findings of additional contaminated land investigations undertaken by Tonkin & Taylor Ltd (T+T) for the Hawke's Bay Regional Council (HBRC), as part of Variation Order 15 (VO15, dated 12 September 2025) for the Pākōwhai Secondary Stopbank project.

This report forms an addendum to (and should be read in conjunction with) the Detailed Site Investigation (DSI) completed by T+T in March 2025¹, to account for additional contaminated land investigations since March 2025.

2 Background

The Pākōwhai Secondary Stopbank is proposed to follow the true left bank of the Tūtaekurī-Waimate Stream, extending from the Ngaruroro River stopbank near Hodgson Road in the south to Links Road (SH50) in the north. A Preliminary Site Investigation (PSI)² was completed by T+T in September 2024 which identified a number of areas of potential ground contamination. A DSI was completed by T+T in March 2025 to assess ground contamination risks along the original proposed alignment, identified by the PSI and additional site observations. However, subsequent revision of the alignment through the detailed design phase³ has introduced new areas not previously assessed, necessitating further investigation.

Additionally, recent geotechnical investigations in July 2025 revealed previously unidentified areas of potential ground contamination. Further investigation was therefore required, as an addendum to the DSI, to reflect the updated alignment and to ensure that relevant areas are adequately assessed.

¹ Tonkin & Taylor Ltd, March 2025. *Pākōwhai Secondary Stopbank – Detailed Site Investigation*. Prepared for Hawke's Bay Regional Council. T+T job ref: 1017353.2403.

² Tonkin & Taylor Ltd, September 2024. *Pākōwhai Secondary Stopbank – Preliminary Site Investigation*. Prepared for Hawke's Bay Regional Council. T+T job ref: 1017353.2403.

³ Tonkin & Taylor Ltd, 23 October 2025. *Pākōwhai Secondary Stopbank Separable Portion 1 – Tender Issue*. Prepared for Hawke's Bay Regional Council.

The investigations will inform the development of a Contaminated Site Management Plan (CSMP) for Separable Portion 1 (SP1)⁴ construction works scheduled for the 2025–2026 summer earthworks season. Collectively, the DSI, this addendum, and the forthcoming CSMP(s) provide the necessary technical basis for managing contamination risks during construction and for supporting the Order in Council (OiC) framework.

3 Additional Field Investigation

The following sections outline the intrusive investigation activities which were undertaken between the 2 and 6 October 2025 to characterise the extent and magnitude of contamination of material within the areas of alignment not previously assessed. Sample locations are shown on Figures A1 to A7, **Appendix A**, along with the approximate stopbank alignment.

3.1 Test pitting and soil sampling rationale

Samples were positioned to target specific areas and depths of contamination based on the findings of the PSI, DSI and additional site observations (i.e. during recent geotechnical investigations). A summary of the soil sampling and analysis, with the sampling rationale for each area is detailed in **Table 3.1**, below.

Sample IDs were consistent with the naming convention used in the DSI, with the same site numbers used where additional sampling was carried out in a previously investigated area.

Two areas of suspected ground contamination (an old boiler and refuse burial site at 22 Chesterhope Road and a stock burial area at 1854 Pākōwhai Road) were excluded from this investigation due to uncertainty in the precise location and impracticality of intrusive investigation. These areas will be addressed in the CSMP through 'unexpected ground contamination protocols' during construction.

Table 3.1: Rationale and sampling/analysis summary for additional sites

Site ID and Address	Potential for Contamination and HAIL Category (where applicable)	Investigation and Sample ID	Laboratory Analysis
Site 6 1023 Links Road (refer Figure A5).	Uncontrolled filling, including refuse material identified during geotechnical investigations. Potential for a wide range of contaminants depending on the source of the fill material, typically asbestos and heavy metals, with the potential for hydrocarbons (total petroleum hydrocarbons and polycyclic aromatic hydrocarbons, TPH/PAH) and organochlorine pesticides (OCPs), particularly in farm waste areas.	7 x test pits (TP01 – TP07) to depths of up to 2.6 m bgl.	<ul style="list-style-type: none"> • 14 x heavy metals (+ 2 x TCLP/SPLP⁵ analysis). • 4 x TPH/PAH. • 9 X OCPs. • 9 x asbestos presence/absence.
Site 10 Behind the FEL kiwifruit orchard at 71 Franklin Road (refer Figure A6).	Contamination is likely to be present within fill/waste material itself, and the immediately underlying and surrounding soils.	12 x test pits (TP08 – TP19) to depths of up to 1.8 m bgl. Three surface soil samples (SS01 – SS03).	<ul style="list-style-type: none"> • 19 x heavy metals. • 6 x OCPs. • 15 x semi-quantitative asbestos analysis.

⁴ SP1 involves a 1,500 m section at the southern end of the stopbank alignment, northward from the Ngaruroro River.

⁵ TCLP refers to the 'toxicity characteristic leaching procedure' test, designed to determine the mobility of contaminants in waste/soil under weakly acidic conditions, simulating landfill conditions. SPLP refers to the 'synthetic precipitation leaching procedure' to determine the mobility of contaminants present in soils under neutral conditions.

Site ID and Address	Potential for Contamination and HAIL Category (where applicable)	Investigation and Sample ID	Laboratory Analysis
	<p><i>HAIL category:</i> <i>G3 – landfill sites</i> <i>Potentially E1 – asbestos products manufacture and disposal...</i></p>		
<p>Site 9 Chesterhope Station, across the Tūtaekurī-Waimate Stream from the Pākōwhai Memorial Hall (refer Figure A3).</p>	<p>Suspected farm waste pits and/or burn piles within updated proposed stopbank alignment on Chesterhope Station, based on recent aerial photographs. Investigation locations targeted potential farm waste pits/burn piles.</p> <p>Wide range of contaminants possible. Contaminants may include heavy metals, hydrocarbons, OCPs, and asbestos. Contamination (if present) is expected to be present within fill soils, or surface soils beneath former burn pit sites, and is likely to decrease with depth.</p> <p><i>HAIL category:</i> <i>If fill is present: G3 – landfill sites, including areas where deposition has occurred as a mound above the existing ground surface.</i> <i>Potentially I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.</i></p>	<p>5 x hand auger locations to a depth of 0.3 m (S9_SS1 – S9_SS5).</p>	<ul style="list-style-type: none"> • 5 x heavy metals. • 2 x TPH/PAH. • 2 x OCPs. • 2 x semi-quantitative asbestos analysis.
<p>Site 4c Farm cottage at 1854 Pākōwhai Road (refer Figure A1).</p>	<p>Further characterise risks from suspected asbestos-containing materials (ACM) and/or lead paint in buildings observed to be in deteriorated condition. Farm cottage identified as a potential source of ground contamination following investigation of nearby woolshed as part of the DSI.</p> <p>Contamination (if present) is likely to be most concentrated within surface soils immediately surrounding the buildings containing ACM and/or lead-based products (creating a 'halo' of contamination) and decrease with depth and distance from the buildings.</p> <p><i>HAIL category:</i> <i>E1 – Asbestos. Sites with buildings containing asbestos products known to</i></p>	<p>4 x surface sample locations (SS101 – SS104) – collected from the "halo" around the farm cottage.</p>	<ul style="list-style-type: none"> • 4 x heavy metals (+ 1 x TCLP/SPLP analysis). • 4 x semi-quantitative asbestos analysis.

Site ID and Address	Potential for Contamination and HAIL Category (where applicable)	Investigation and Sample ID	Laboratory Analysis
	<i>be in deteriorated condition. Potentially I – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.</i>		
Horticultural and orchard areas at 2068 and 1854 Pākōwhai Road and 1135 Links Road (refer Figures A1, A2, A4 and A7).	<p>Characterise soils in horticultural/orchard areas and to provide coverage of general soils across the site.</p> <p>Contaminants from horticultural areas typically comprise arsenic and OCPs (e.g. Dieldrin, DDT). Contamination (if present) would most likely occur in the surface soil and is expected to decrease with depth.</p> <p><i>HAIL category: Potentially I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.</i></p>	8 x surface sample locations (SS105 – SS112).	<ul style="list-style-type: none"> ● 8 x heavy metals. ● 2 x TPH. ● 2 x PAH. ● 7 x OCPs.

3.2 Soil sampling procedure

The soil sampling methodology for this investigation was carried out in general accordance with the MfE Contaminated Land Management Guidelines No. 5 (CLMG No. 5)⁶, consistent with the DSI. For further details, refer to the DSI report.

3.3 Assessment criteria

The assessment criteria selected for comparison of the results of the laboratory analysis are outlined in detail in the DSI. A summary of the assessment criteria is provided in **Table 3.2**.

⁶ Ministry for the Environment, revised 2021: *Contaminated Land management guidelines No.5: Site investigation and analysis of soils*.

Table 3.2: Summary of assessment criteria

Context/Purpose	CoC	Assessment Criteria	Source/Reference
Human Health (during construction).	Heavy metals, OCPs, TPH, PAHs.	NESCS Soil Contaminant Standards (SCS) – Commercial/Industrial land use.	MfE (2011) ^{7,8} .
	Asbestos.	Asbestos in Soil Guidelines – Commercial/Industrial land use.	WorkSafe / BRANZ (2024) ⁹ .
Environmental Protection (during construction).	Heavy metals, OCPs.	Ecological Soil Guideline Values (Eco-SGVs) – 60 % protection level.	Landcare Research & Marlborough DC (2022) ¹⁰ .
	Leachable contaminants.	SPLP analysis compared to Class 3 Managed Fill waste acceptance criteria (WAC).	WasteMINZ (2023) ¹¹ .
Soil Disposal.	Heavy metals, OCPs, TPH, PAHs.	Predicted background concentrations (for cleanfill acceptance).	Landcare Research (2015) ¹² .
	Leachable contaminants.	Class A landfill screening criteria (Ōmarunui Landfill).	MfE (2004) ¹³ .
Post-construction (long-term suitability of retained/imported fill).	Heavy metals, TPH, PAHs, OCPs.	Hawke's Bay Stopbank Construction Fill Acceptance Criteria.	T+T (2023) ¹⁴ .

3.4 Site observations

Relevant observations relating to each of the investigation areas are summarised below, including soil profiles observed within test pit and hand excavations. Further information relating to the soil profiles across the wider site is outlined in the DSI and geotechnical reports¹⁵. Investigation locations are shown in the figures presented in **Appendix A** and site photographs are attached in **Appendix B**.

Site 6 - 1023 Links Road:

- Laydown and storage area with a gravelly silt surface with trace wood, sawdust, old machinery, wooden crates and grassed areas.

⁷ MfE, 2011. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*.

⁸ MfE, 2011. *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*. Tier 1 Soil Acceptance Criteria used (commercial/industrial land use).

⁹ BRANZ, 2024. *New Zealand Guidelines for Assessing and Managing Asbestos in Soil*.

¹⁰ Landcare Research and Marlborough District Council, 2022. *Exploring the implementation of ecological soil guideline values for soil contaminants*.

¹¹ Waste Management Institute New Zealand (WasteMINZ), 2023. *Technical Guidelines for Disposal to Land, Revision 3.1*.

¹² Landcare Research, 2015. *Background soil concentrations of selected trace elements and organic contaminants in New Zealand*.

¹³ MfE, 2004. *Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification*.

¹⁴ Tonkin & Taylor Ltd, 2023. *Upper Limits for Contaminants in Hawke's Bay Stopbank Fill*. Prepared for Hawke's Bay Regional Council, T+T ref: 1017353.2102 v1.

¹⁵ Tonkin & Taylor Ltd, September 2025. *Geotechnical Assessment Report – Pākōwhai Secondary Stopbank*. Prepared for Hawke's Bay Regional Council, T+T ref: 1017353.2403 v1.0.

Tonkin & Taylor Ltd, October 2025. *Pākōwhai Secondary Stopbank – Geotechnical Factual Report*. Prepared for Hawke's Bay Regional Council, T+T ref: 1017353.2403 v2.

- Seven test pits excavated (TP01 – TP07) across the area.
- Material in the test pits comprised mainly of fill, between the surface and between 0.8 and 2.6 m bgl. Fill generally comprised sandy silt with varying amounts of refuse:
 - In test pits TP01 to TP03, and TP07, trace wood and/or brick fragments were observed in the surface 0.7 m of fill only.
 - Test pits TP04 to TP06 contained large volumes of wood, wire, charcoal, plastic, old tyres, cloth, and concrete and brick fragments within fill from the surface to depths of up to 2.6 m bgl.
- Natural material comprising of sands was encountered in most test pits at depth below 2.0 m bgl. Excavation to natural ground could not be achieved at TP04 due to the presence of concrete in the fill material.

Site 10 - Behind the FEL kiwifruit orchard:

- Area behind the orchard comprised mainly of grassed surface, with wooden crates and general rubbish associated with orchard operations.
- 12 tests pits (TP08 – TP19) excavated across the area and three surface samples (SS01 – SS03) collected.
- Material comprised mainly of topsoil, and fill to varying depths which was underlain by natural sands and silts:
 - Fill generally comprised silt or sand and was present to depths of up to 1.5 m bgl.
 - Varying amounts of refuse was observed in fill in a number of test pits (TP08 to TP14). Refuse material was not observed in fill in test pits TP15 to TP19, at the north-western end of the FEL kiwifruit orchard.
 - Refuse comprised plastic, wood, charcoal, asphalt, cloth, string, corrugated iron, wires, ceramic, and concrete and brick fragments.

Site 9 - Chesterhope Station, across the Tūtaekurī-Waimate Stream from the Pākōwhai Memorial Hall:

- Paddock area, mainly grassed with no noticeable fill. Paddock had been ploughed recently. No evidence of stockpiling, farm waste pits or recent burn piles was observed.
- Five locations (S9_SS1 – S9_SS5) excavated using a hand auger down to approximately 0.3 m.
- Soil comprised primarily topsoil and silty sand.
- No evidence of contamination was observed.

Site 4c - Farm cottage at 1854 Pākōwhai Road:

- Paddock area with former farm buildings/cottage.
- Farm cottages constructed with timber weatherboard cladding, and corrugated iron roofing. Buildings appeared in poor to moderate condition with peeling paint and damaged weatherboards.
- Surface samples were collected from the “halo” around the building (SS101 – SS104).
- Soils encountered during surface sampling comprised brown sandy silt (topsoil).
- No visible contamination encountered.

Horticultural and orchard areas at 1854, 2068 Pākōwhai Road and 1135 Links Road:

- Paddock and vineyard areas.
- Eight surface samples collected (SS105 – SS112).

- Sample material comprised mainly of topsoil and silty sand.
- No evidence of contamination was observed, however there was a strong hydrocarbon smell was noted near sample location SS107, which appeared to be coming from the nearby gravel driveway.

3.5 Soil sampling results

Analytical results for the additional soil samples tested are presented in **Table C1 – C3, Appendix C** together with adopted assessment criteria. Full laboratory transcripts included in **Appendix D**.

The results are summarised below. **Table 3.3** summarises the number of samples which exceed a particular assessment criterion to provide a simplified indication of ground contamination conditions at each site.

Table 3.3: Summary of soil samples exceeding assessment criteria

Site ID	Heavy metals, OCP, TPH, PAH						Asbestos		
	No. of samples tested	Background concentrations**	NESCS SCS for human health (during construction)	Eco-SGVs for environmental protection (during construction)	Class A landfill screening criteria	Stopbank construction fill criteria	No. of samples tested	Asbestos presence / absence in soil	Asbestos in soil guidelines for human health
		No. of samples exceeding criteria						No. of detections/samples exceeding	
Site 6	14	10	0	2	6	7	8	0	0
Site 10 - Behind the FEL kiwifruit orchard.	19	7	1	1	5	4	15	0	0
Site 9	5	0	0	0	0	0	2	0	0
Site 4c	4	4	0	1	4	3	4	0	0
1854 and 2068 Pākōwhai Road, and 1135 Links Road	8	0	0	0	0	0	0	N/A	N/A
Total	50	21	1	4	15	14	29	0	0

Notes:

** Low level concentrations of OCPs recorded from Site 6 and at one location at 2068 Pākōwhai Road but not considered 'above background' as no published background values.

'N/A' indicates that no samples were tested for asbestos from this site.

A single sample exceedance may relate to exceedances of multiple analytes for that sample.

Some exceedances may relate to different depths at the same investigation location.

Predicted background concentrations:

- Concentrations of heavy metals were detected above predicted background concentrations in 42 % of the samples collected from across the additional sites.
- The highest percentage of exceedances above predicted background concentrations for heavy metals is from Site 4c around the farm cottage with lead and zinc being elevated in all four samples collected from the “halo”.
- Site 6 – 1023 Links Road with 71 % of samples contained heavy metal concentrations above predicted background criteria.
- Site 10 – behind the FEL kiwifruit orchard, heavy metal concentrations are variable, with the majority of concentrations west of TP11 within predicted background range. Test pits TP08, TP10 and TP11 contained the highest concentrations of heavy metals, with regular exceedances of background concentrations, and the only sample locations at Site 10 which recorded exceedances of other assessment criteria. Test pits TP12 to TP19, and surface samples SS01 to SS03 generally recorded concentrations within the published background range, with the exception of the occasional exceedances for lead (up to 38 mg/kg).
- The surface samples collected from Site 9 and 1854 and 2068 Pākōwhai Road and 1135 Links Road recorded heavy metals within the predicted heavy metal background ranges, with the exception of arsenic which was recorded slightly above background concentrations at two surface sample locations at 1854 Pākōwhai Road, up to 12 mg/kg.
- Individual OCPS compounds were detected in one sample from Site 6 (TP04) and a surface sample (SS108). All other samples across the sites had concentrations below the laboratory limit of reporting (LOR).
- Individual TPH and PAH compounds were detected in two fill samples from Site 6 (TP04 and TP05), and TPH in one surface sample from 1135 Links Road.
- Asbestos was not identified in any sample analysed.

Assessment criteria for the protection of human health:

- One location recorded arsenic (107 mg/kg) above the NESCS Soil Contaminant Standards (Commercial / Industrial, 70 mg/kg):
 - Statistical analysis of arsenic results across all fill samples from Site 10 was conducted. At the 95 % upper confidence limit, the average arsenic concentration was calculated to be 55 mg/kg. This is below the human health assessment criterion of 70 mg/kg. Refer to **Appendix E** for statistical calculation sheets.

Assessment criteria for the protection of the environment (during construction):

- The environmental protection criteria were exceeded for zinc in three test pit samples (up to 4,700 mg/kg) from Site 6 and Site 10, and in one surface sample from Site 4c (510 mg/kg). Lead also exceeded the environmental protection criteria in the same Site 4c surface sample (SS101, 2,800 mg/kg).
- SPLP analysis for selected heavy metals has been carried out on two of these samples, where the highest concentrations of zinc and other metals in fill from both Site 6 and Site 10 were detected. The results of the SPLP analysis were below the WasteMINZ Managed Fill WAC.
- SPLP analysis of the sample where the highest concentration of lead and zinc was detected at Site 4c identified that concentrations were below the WasteMINZ Managed Fill WAC.

Class A landfill (Ōmarunui Landfill) screening criteria and leachability limits:

- **The Class A landfill screening criteria** was exceeded in 15 samples (six samples from Site 6, five samples from Site 10, and four samples from Site 4c), typically for copper, lead, or zinc. One arsenic exceedance was also recorded.
- TCLP analysis was carried out for samples where the highest concentrations of zinc and other metals in fill soils were detected (TP05 and TP06). The results of the TCLP analysis meet the Class A leachability limits.
- From the “halo” samples around the farm cottage in Site 4c, exceedances were recorded ranging from 240 – 2,800 mg/kg for lead and 450 and 510 mg/kg for zinc. TCLP analysis identified that concentrations of lead and zinc are below the Class A landfill leachability limits.

Hawke’s Bay Stopbank Construction Fill – Upper acceptance limits:

- Exceedances of the upper limits for stopbank construction fill were recorded in eight test pits from Site 6 and Site 10 for between one and four individual heavy metals, typically arsenic and zinc but also copper and lead in some locations. The exceedances were recorded across the profiles ranging from 0.2 to 2 m in depth in fill material.
- One exceedance of TPH in TP05 fill at 2 m bgl was also recorded.
- The topsoil samples from the “halo” around the farm cottage in Site 4c exceed the Stopbank criteria for lead and/or zinc at all four locations.
- No exceedances of the upper limits for stopbank construction fill were recorded at Site 9 or within samples collected from general horticulture/agriculture areas at 1854 and 2068 Pākōwhai Road, and 1023 Links Road.

4 Nature and Extent of Ground Contamination from Additional Sampling

Site 6 - 1023 Links Road

The surface and stockpiled soils at Site 6 were assessed as part of the initial DSI, however recent geotechnical investigations identified underlying uncontrolled fill in this area. Additional sampling to assess the vertical and lateral extent of underlying fill material indicates contamination is more widespread than previously identified in the DSI. Fill material, containing refuse, was present in all additional test pits (TP01 – TP07) in this area, with fill present at greater depths in the central portion of this area (identified at depths of up to 2.6 m bgl).

Elevated concentrations of heavy metals (arsenic, copper, lead and zinc) were present in soils across the site. Lead and zinc contamination was particularly elevated above the majority of assessment criteria in fill soils to a depth of at least 2.0 m in the central portion of Site 6 (around TP04, TP05 and TP06), where hydrocarbon and OCP contamination was also identified. Contaminant concentrations appear to be highest in the deeper fill layers, particularly in the test pits associated with the highest volume of refuse.

Contaminant concentrations are expected to decrease with depth below the fill material. Concentrations of contaminants in natural soils beneath fill at TP06 indicate that natural soils contain much lower concentrations of contaminants, below environmental assessment criteria, however, the vertical extent of contamination in natural soils has not been fully assessed for Site 6, particularly around TP05 and TP04 where the highest concentrations of contaminants were identified.

The concentrations of contaminants in shallow fill soils (< 0.5 m bgl) across the site, and deeper fill in the central portion of Site 6, indicate a potential risk to the environment during the proposed

construction works. Fill from these areas would not be appropriate for reuse in the stopbank construction if retained onsite, and are appropriate for offsite disposal.

The presence of contaminants above relevant acceptance criteria will have implications for the development, and management of Site 6.

Site 10 - Behind the FEL kiwifruit orchard

The area behind the FEL kiwi orchard comprised mainly of a grassed area, with stored wooden crates and general rubbish associated with the adjacent kiwifruit orchard operations. Uncontrolled fill is present in two areas, to depths of up to 1.5 m bgl.

Fill material encountered in the eastern portion of Site 10 (around test pits TP08, TP10 and TP11) contained heavy metal contamination (arsenic, lead and zinc) above certain assessment criteria, to at least 1.0 m bgl. Concentrations of heavy metals across the remainder of Site 10 contained much lower concentrations of contaminants, generally below background levels.

The concentrations of contaminants in fill soils in the eastern portion of Site 10 (east of TP12) indicate a potential risk to the environment during, and possibly on the completion of, the proposed construction works. Fill from these areas would not be appropriate for reuse in the stopbank construction if retained onsite.

Contaminant concentrations are expected to decrease with depth below the fill material, however, the vertical extent of contamination in natural soils has not been assessed for Site 10. Analysis of deeper, natural soil samples will be scheduled to inform soil management options in the CSMP.

The presence of contaminants above relevant acceptance criteria will have implications for the development, and management of Site 10 in those areas.

Site 9 - Chesterhope Station, across the Tūtaekurī-Waimate Stream from the Pākōwhai Memorial Hall

This area comprised of a recently ploughed and grassed paddock where recent aerial photography indicated that farm waste pits or burn piles may be present. No evidence of these features or other evidence of contamination was identified during the investigation. Samples comprised topsoil and laboratory analysis results recorded concentrations within the predicted background concentration ranges or below the laboratory LOR.

On this basis, no implications for the development and management of this area are required from a ground contamination perspective.

While no evidence of farm waste pits or burn piles was identified in this area during the investigation, there remains a possibility for these features to be present. Protocols for managing 'unexpected discoveries' will be described in the CSMP to be followed if buried fill or waste is encountered during construction works.

Site 4c - Farm cottage at 1854 Pākōwhai Road

This area consists of an old woolshed, spray race/stockyard and associated structures which was largely assessed as part of the DSI and identified elevated concentrations of lead and zinc in a "halo" around the woolshed (now outside of the proposed stopbank alignment). This investigation targeted an associated farm cottage which is within the proposed stopbank alignment and was not previously assessed. The investigation identified that heavy metal contamination is also present in topsoil as a "halo" around the footprint of the farm cottage.

Lead and zinc were recorded above background concentrations along all four sides of the building, with cadmium also elevated along two sides. Lead and/or zinc both exceeded the majority of risk-based assessment criteria at all four sample locations, indicating that they may present a risk to the

environment during construction works. Soil from this area does not meet the criteria for use as fill for the stopbank construction, however, are indicated to be appropriate for offsite disposal at an appropriate fill facility.

Soil contamination has not been delineated; however, concentrations are expected to reduce with depth and distance away from the farm cottage and other agricultural buildings. We expect that contamination around the farm cottage is likely to be confined to near surface soils (< 0.5 m bgl) within 2-3 metres of the building. Near-surface soil around the farm cottage cannot be reused for construction of the stopbank if retained onsite.

The presence of contaminants above relevant acceptance criteria will have implications for the development, and management, of Site 4c, particularly for soils surrounding old structures.

Horticultural and orchard areas at 1854 and 2068 Pākōwhai Road, and 1135 Links Road

These areas were predominantly grassed paddocks and orchard/vineyard areas, with samples targeting general horticultural soils across the site. Sample results for this area *generally* recorded concentrations within the predicted background concentration ranges or at/below the LOR.

All results from these areas were recorded below other assessment criteria. On this basis, no implications for the development and management of this area are indicated from a ground contamination perspective.

5 Conclusion

Additional contaminated land investigations have been undertaken for the Pākōwhai Secondary Stopbank project associated with a revision of the proposed stopbank alignment and to assess previously unidentified areas of potential ground contamination. Field investigation activities were carried out between 2 and 6 October 2025 and included collection of soil samples from a series of test pits, hand augers, and surface sample locations positioned to target potential sources of contamination identified by the previous T+T PSI, DSI, and recent geotechnical investigations.

Laboratory analysis was undertaken on selected samples for heavy metals, OCPs, TPH, PAHs, and/or asbestos presence/absence, with leachability testing (SPLP/TCLP) carried out for selected samples where elevated leachable contaminants were identified.

The results confirm that contamination is present in several areas, particularly Site 6, Site 4c, and the eastern portion of Site 10, where heavy metals (primarily arsenic, copper, lead, and zinc) concentrations will require management during the proposed works to mitigate environmental risks during and completion of the proposed stopbank construction works. No significant contamination was identified at Site 9, general farm areas at 1854 and 2068 Pākōwhai Road, and 1135 Links Road, or the western portion of Site 10, with sampling results *generally* reflective of predicted background concentrations (where applicable) or below laboratory limits of reporting.

This report forms an addendum to, and should be read in conjunction with the previous PSI and DSI reports. Collectively these investigations will inform the development of a CSMP to manage contamination risks during construction and for supporting the OiC framework.

Areas excluded from intrusive investigation due to access limitations will be managed under protocols for 'unexpected discovery' of ground contamination during construction, which will be described in the CSMP.

6 Applicability

This report has been prepared for the exclusive use of our client Hawke's Bay Regional Council , with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions contained in this report are based on our visual inspection and sampling of material within the proposed works area. The nature and continuity of the subsoil away from the test and sample locations is inferred but it must be appreciated that actual conditions may vary from the assumed model.

We understand and agree that this report will be used by Hawke's Bay Regional Council in undertaking their regulatory functions in relation to the site.

The persons undertaking, managing, providing technical review and certifying this assessment are suitably qualified and experienced practitioners as defined in the NESCS.

Tonkin & Taylor Ltd

Report prepared by:



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Report reviewed by:



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Senior Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:



Tim Morris
Project Director

6-Nov-25

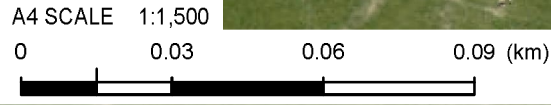
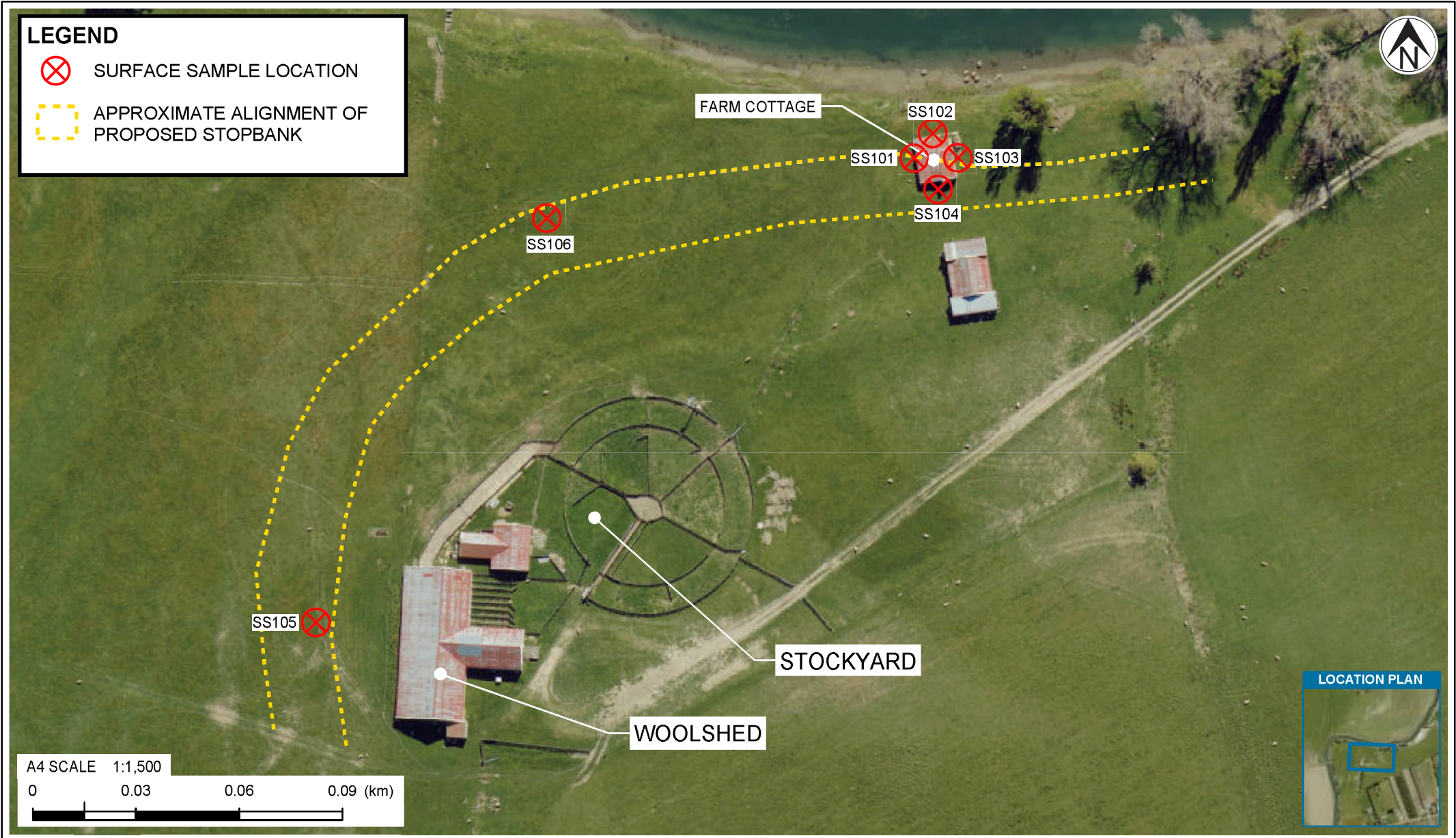
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Appendix A Figures

LEGEND

 SURFACE SAMPLE LOCATION

 APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK



NOTES:

CRS: WGS 1984 Web Mercator Auxiliary Sphere Credits: T+T, Hawkes Bay RC, LINZ, NIWA, Maxar, LINZ, Stats NZ, Esri, HERE, Garmin, Hawkes Bay RC, LINZ, LINZ, NIWA

PROJECT No. 1017353.2403		
DESIGNED	GEPA	OCT.25
DRAWN	-WEB-	OCT.25
CHECKED		

CLIENT	HAWKE'S BAY REGIONAL COUNCIL
PROJECT	PAKOWHAI SECONDARY STOPBANK
TITLE	GROUND CONTAMINATION INVESTIGATION SITE 4c AND 1854 PAKOWHAI ROAD



APPROVED DATE

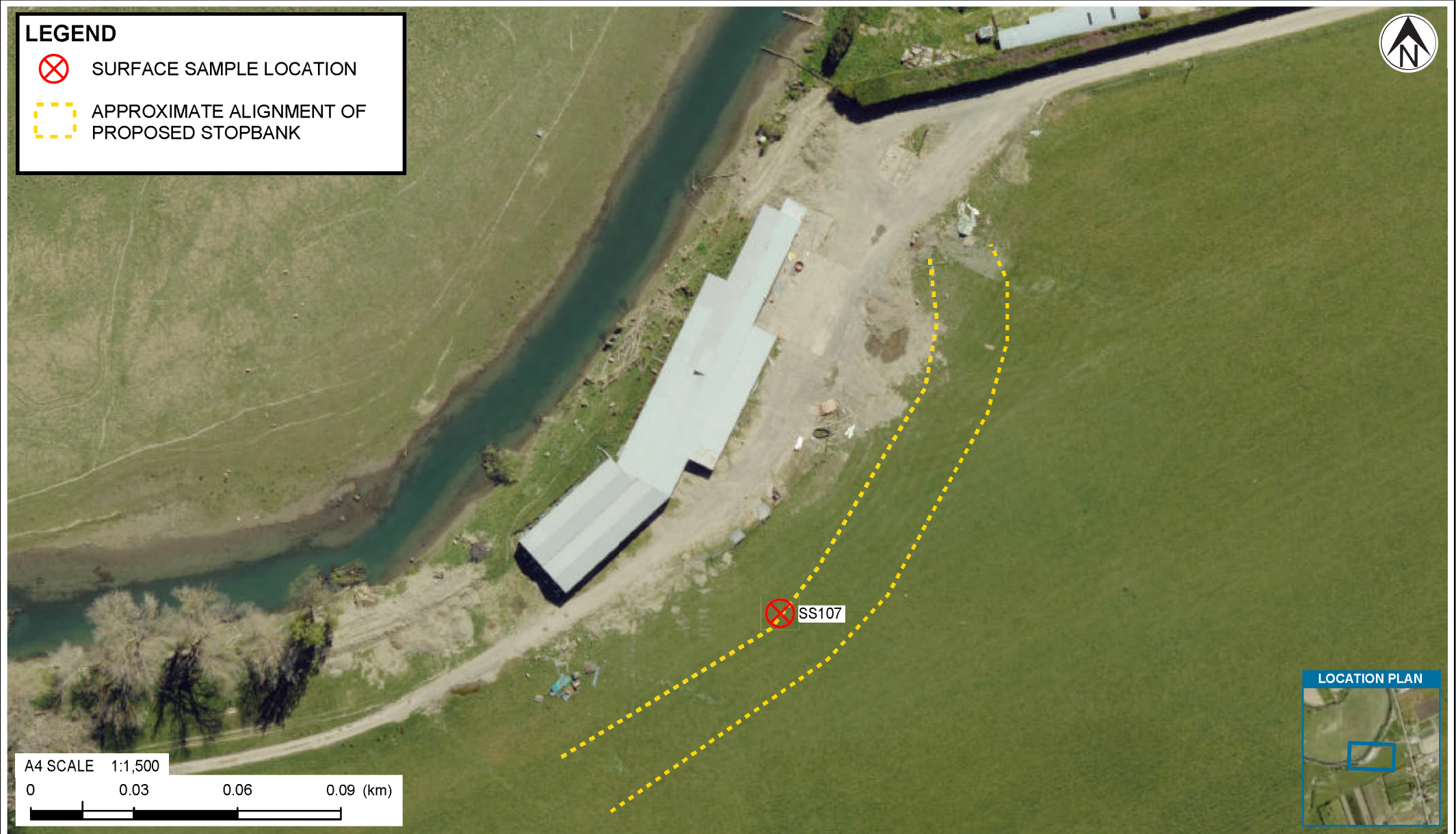
SCALE (A4) 1:1,500

FIG No. FIGURE A1

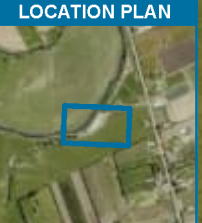
REV 0

LEGEND

-  SURFACE SAMPLE LOCATION
-  APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK



A4 SCALE 1:1,500
 0 0.03 0.06 0.09 (km)



NOTES:

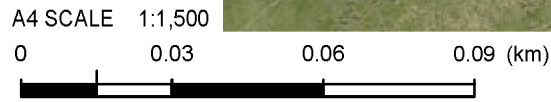
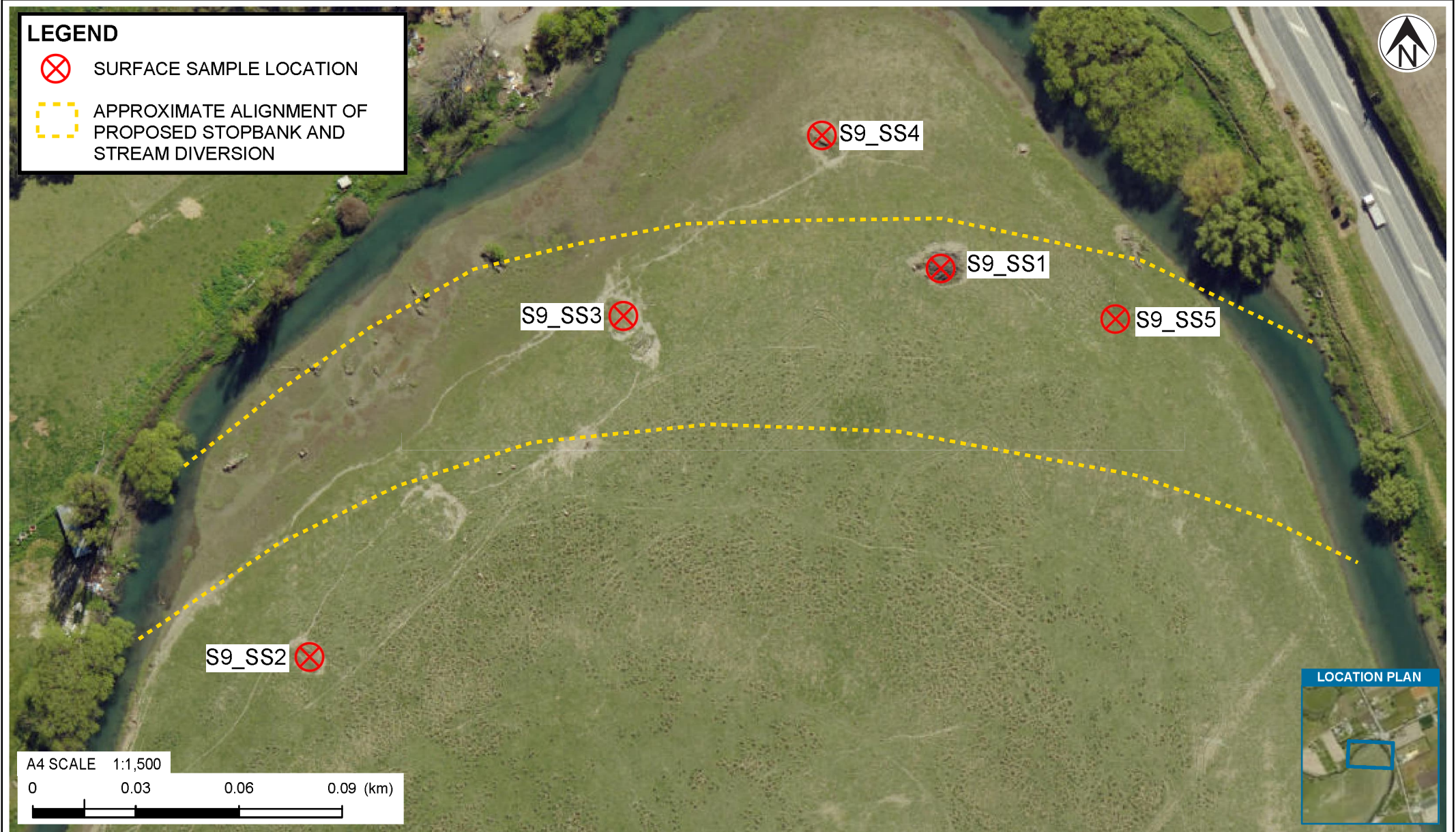
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PROJECT No. 1017353.2403			CLIENT HAWKE'S BAY REGIONAL COUNCIL		
DESIGNED	GEPA	OCT.25	PROJECT PAKOWHAI SECONDARY STOPBANK		
DRAWN	-WEB-	OCT.25	TITLE GROUND CONTAMINATION INVESTIGATION		
CHECKED			1854 PAKOWHAI ROAD		
APPROVED			SCALE (A4) 1:1,500		FIG No. FIGURE A2
DATE					REV 0

LEGEND

 SURFACE SAMPLE LOCATION

 APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK AND STREAM DIVERSION



NOTES:

CRS: WGS 1984 Web Mercator Auxiliary Sphere Credits: T+T, Hawkes Bay RC, LINZ, NIWA, Maxar, LINZ, Stats NZ, Esri, HERE, Garmin, Hawkes Bay RC, LINZ, LINZ, NIWA

PROJECT No. 1017353.2403

DESIGNED	GEPA	OCT.25
DRAWN	-WEB-	OCT.25
CHECKED		

APPROVED DATE

CLIENT **HAWKE'S BAY REGIONAL COUNCIL**
PROJECT **PAKOWHAI SECONDARY STOPBANK**

TITLE **GROUND CONTAMINATION INVESTIGATION**
SITE 9 - CHESTERHOPE STATION

SCALE (A4) 1:1,500

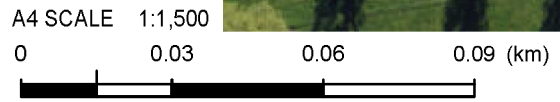
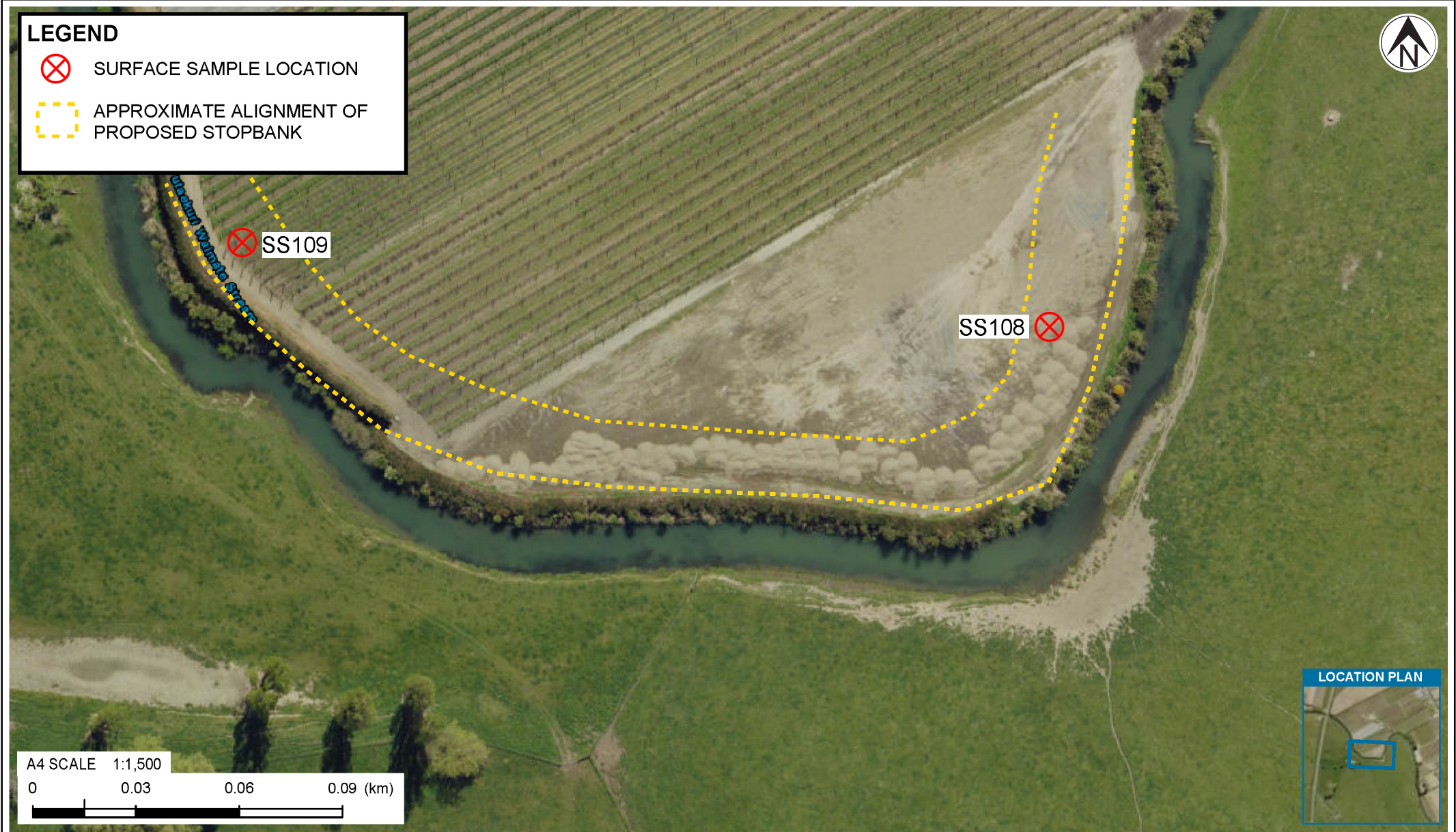
FIG No. FIGURE A3

REV 0

LEGEND



 SURFACE SAMPLE LOCATION

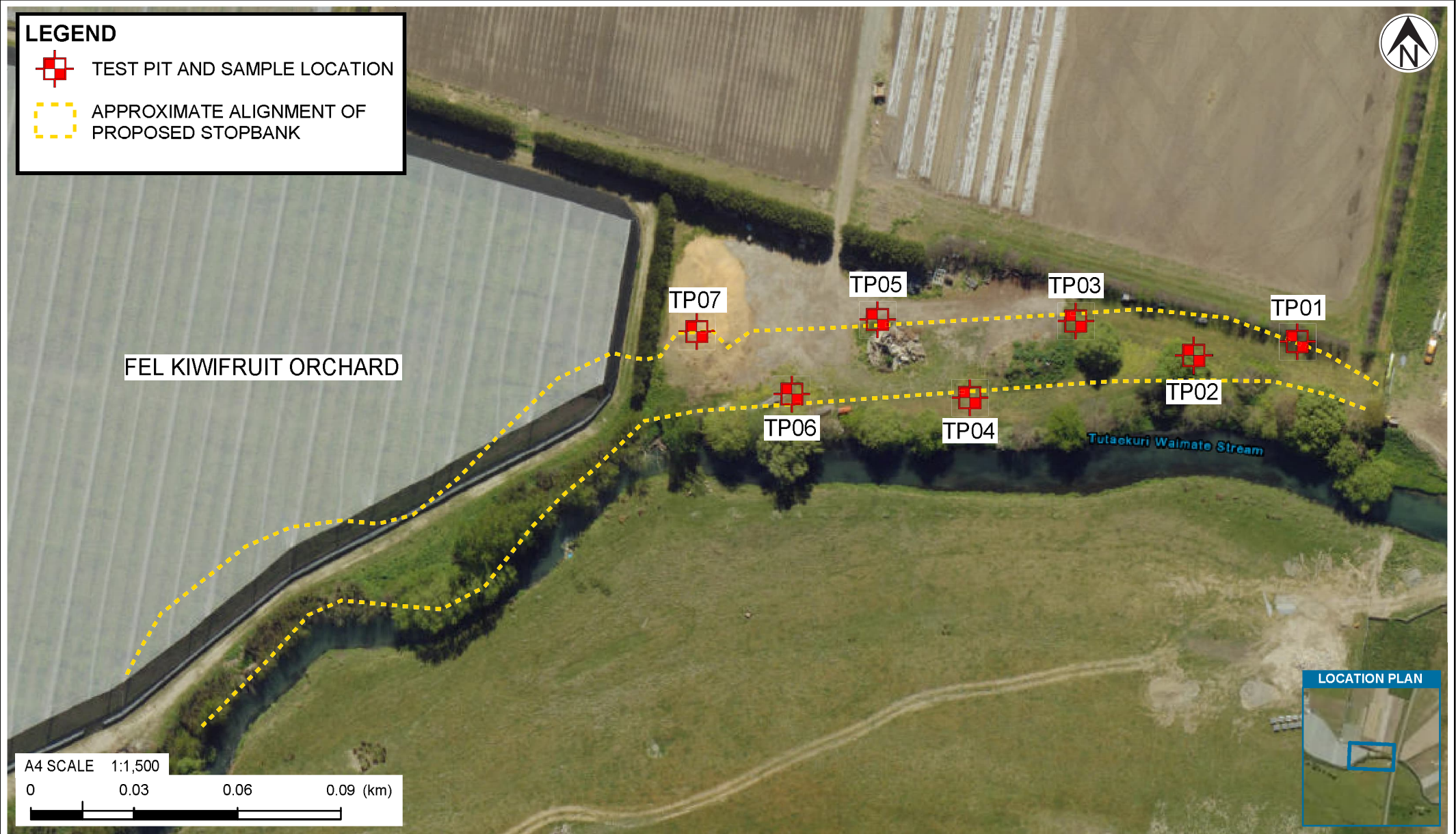
 APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK



NOTES:	PROJECT No. 1017353.2403		CLIENT HAWKE'S BAY REGIONAL COUNCIL	
	DESIGNED	GEPA	OCT.25	PROJECT PAKOWHAI SECONDARY STOPBANK
	DRAWN	-WEB-	OCT.25	
	CHECKED			TITLE GROUND CONTAMINATION INVESTIGATION
CRS: WGS 1984 Web Mercator Auxiliary Sphere Credits: T+T, Hawkes Bay RC, LINZ, NIWA, Maxar, LINZ, Stats NZ, Esri, HERE, Garmin, Hawkes Bay RC, LINZ, LINZ, NIWA				2068 PAKOWHAI ROAD
APPROVED		DATE		SCALE (A4) 1:1,500
				FIG No. FIGURE A4
				REV 0

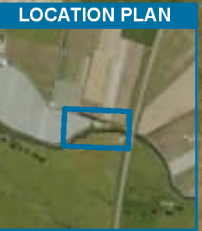
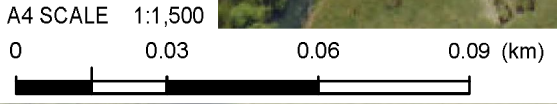
LEGEND

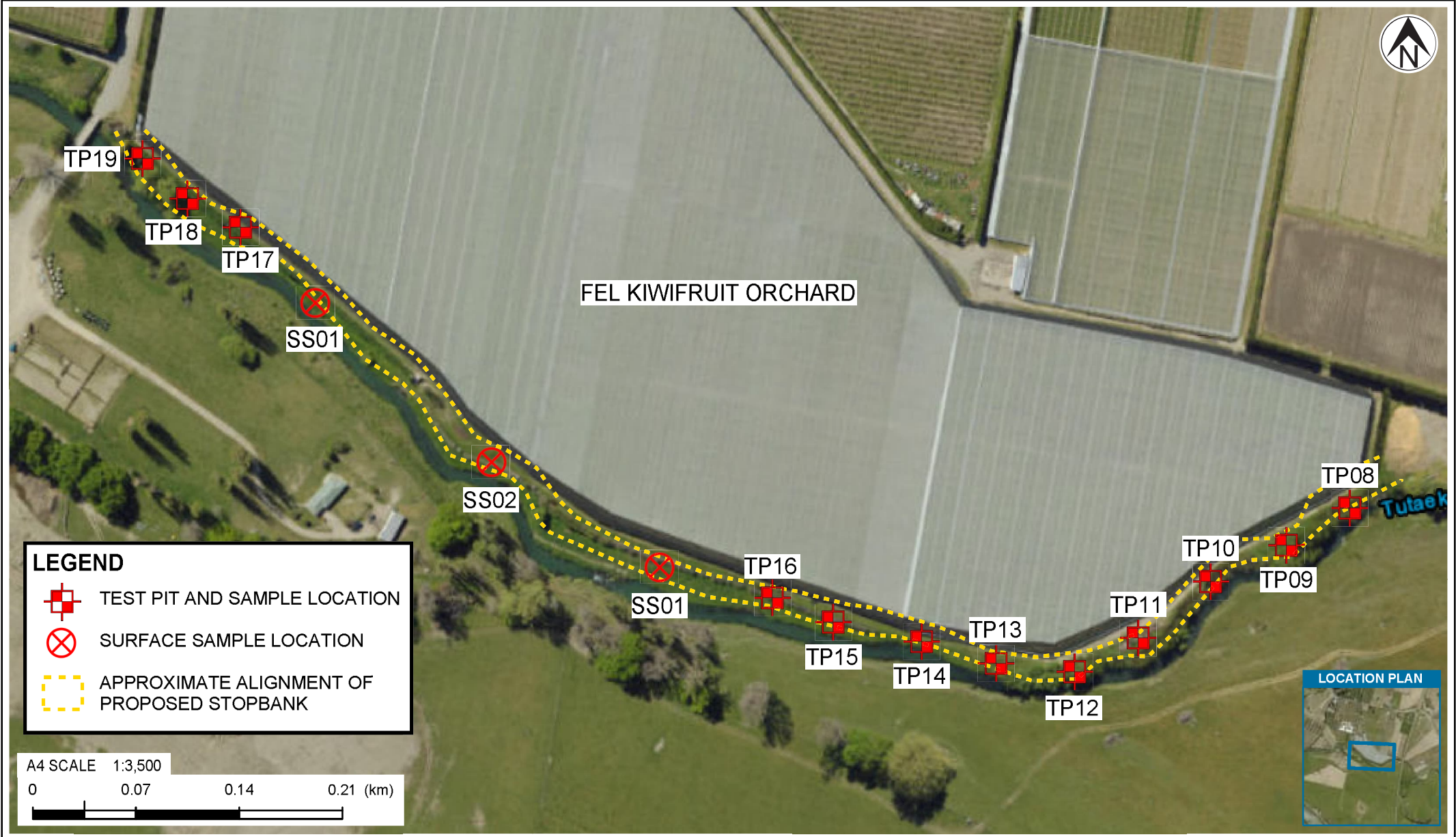
-  TEST PIT AND SAMPLE LOCATION
-  APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK






FEL KIWIFRUIT ORCHARD

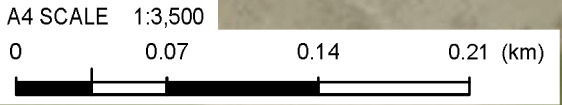
Tutaekuri Waimate Stream

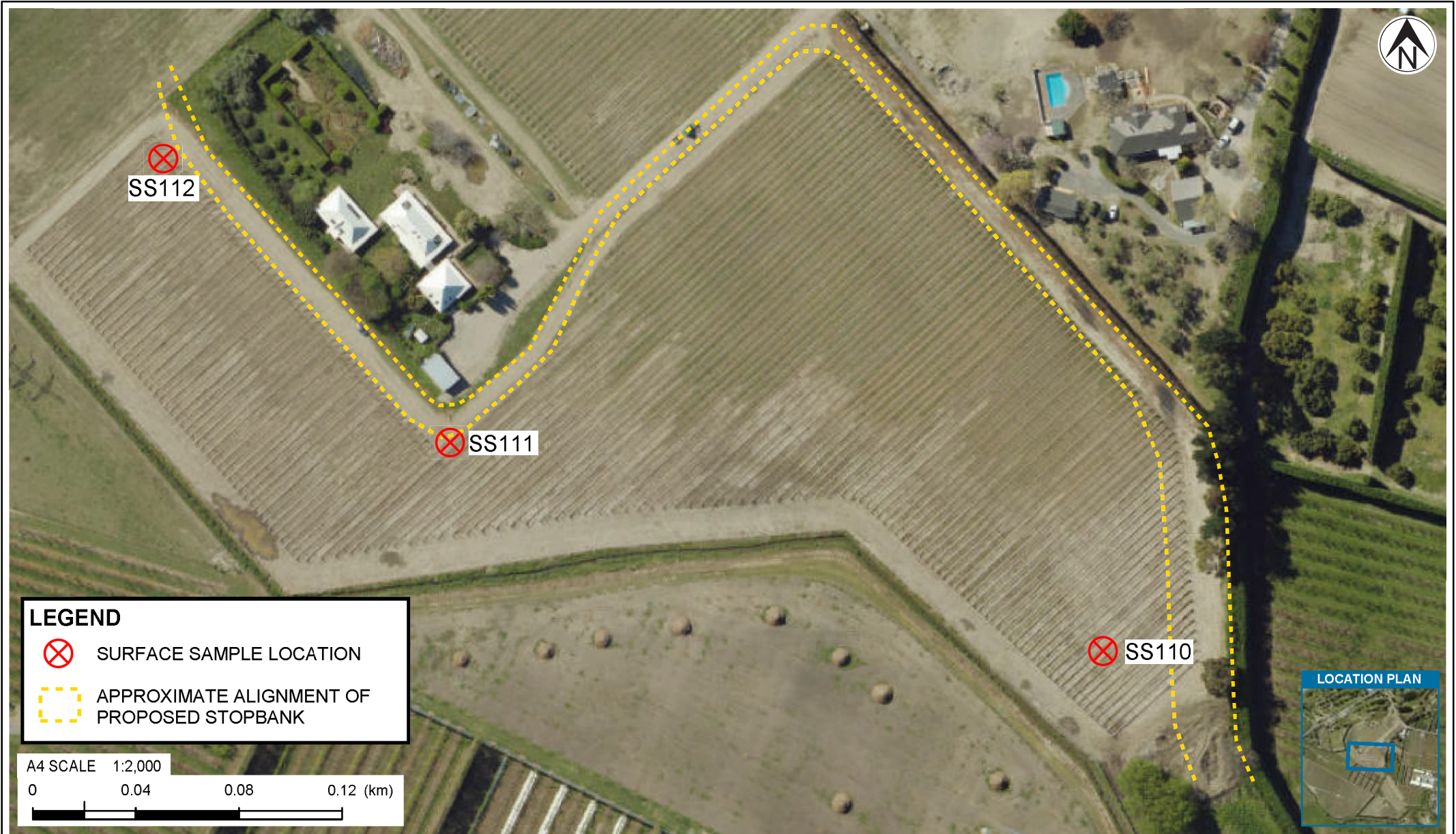






LEGEND

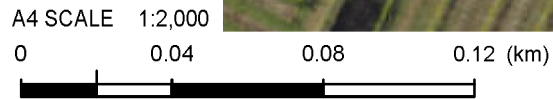
-  TEST PIT AND SAMPLE LOCATION
-  SURFACE SAMPLE LOCATION
-  APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK





LEGEND

-  SURFACE SAMPLE LOCATION
-  APPROXIMATE ALIGNMENT OF PROPOSED STOPBANK



NOTES:

CRS: WGS 1984 Web Mercator Auxiliary Sphere Credits: Hawkes Bay RC, LINZ, NIWA, T+T, Hawkes Bay RC, LINZ, NIWA, Maxar, LINZ, Stats NZ, Esri, HERE, Garmin

PROJECT No. 1017353.2403		
DESIGNED	GEPA	OCT.25
DRAWN	-WEB-	OCT.25
CHECKED		

CLIENT	HAWKE'S BAY REGIONAL COUNCIL
PROJECT	PAKOWHAI SECONDARY STOPBANK
TITLE	GROUND CONTAMINATION INVESTIGATION 1135 LINKS ROAD

APPROVED DATE

SCALE (A4) 1:2,000

FIG No. FIGURE A7

REV 0

Appendix B Site Photographs



Photograph Appendix B.1: Location TP01 in Site 6.



Photograph Appendix B.2: Site 6, old machinery and wooden crates.



Photograph Appendix B.3: Location TP05 in Site 6 showing the encountered fill material.



Photograph Appendix B.4: Natural material encountered in TP07.



Photograph Appendix B.5: Grassed are of Site 10 – behind the FEL orchard.



Photograph Appendix B.6: Farm cottage located in Site 4c. Halo sampling was undertaken around the building.



Photograph Appendix B.7: Site 9.



Photograph Appendix B.8: Horticultural and orchard areas at 2068 Pākōwhai Road and 1135 Links Road.



Photograph Appendix B.9: Horticultural and orchard areas at 2068 Pākōwhai Road and 1135 Links Road.

Appendix C Results Tables

Appendix D Laboratory Transcripts

Certificate of Analysis

Page 1 of 11

Client: Tonkin & Taylor	Lab No: 4003045	SPV3
Contact: Genevieve Palmer	Date Received: 08-Oct-2025	
C/- Tonkin & Taylor	Date Reported: 28-Oct-2025	(Amended)
PO Box 9544	Quote No: 80842	
Hamilton 3240	Order No: 1017353.2403-2101	
	Client Reference: 1017353.2403-2101	
	Submitted By: Genevieve Palmer	

Sample Type: Soil

Sample Name:	TP01 0.2m 02-Oct-2025	TP02 0.5m 02-Oct-2025	TP03 0.5m 02-Oct-2025	TP04 0.2m 02-Oct-2025	TP04 0.5m 02-Oct-2025	
Lab Number:	4003045.2	4003045.5	4003045.8	4003045.10	4003045.11	
Individual Tests						
Dry Matter	g/100g as rcvd	81	87	91	-	84
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	20	3	3	10	28
Total Recoverable Cadmium	mg/kg dry wt	0.23	< 0.10	< 0.10	0.13	0.28
Total Recoverable Chromium	mg/kg dry wt	23	14	13	16	20
Total Recoverable Copper	mg/kg dry wt	39	43	35	31	69
Total Recoverable Lead	mg/kg dry wt	42	10.5	9.0	32	320
Total Recoverable Nickel	mg/kg dry wt	13	11	10	11	12
Total Recoverable Zinc	mg/kg dry wt	109	57	46	90	290
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
alpha-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
beta-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
delta-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	0.043
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	0.050
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	0.24
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	0.020
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.07	< 0.07	-	0.37
Dieldrin	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	0.046
Endosulfan I	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Endosulfan II	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Endrin	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Endrin ketone	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Heptachlor	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012
Methoxychlor	mg/kg dry wt	< 0.013	< 0.012	< 0.011	-	< 0.012

Sample Type: Soil						
Sample Name:	TP01 0.2m 02-Oct-2025	TP02 0.5m 02-Oct-2025	TP03 0.5m 02-Oct-2025	TP04 0.2m 02-Oct-2025	TP04 0.5m 02-Oct-2025	
Lab Number:	4003045.2	4003045.5	4003045.8	4003045.10	4003045.11	
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	-	13.5
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.012
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.012
Acenaphthylene	mg/kg dry wt	-	-	-	-	0.138
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.012
Anthracene	mg/kg dry wt	-	-	-	-	0.142
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	1.00
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	1.36
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	1.95
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	1.93
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	1.45
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	0.79
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	0.89
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	0.54
Chrysene	mg/kg dry wt	-	-	-	-	0.88
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	0.168
Fluoranthene	mg/kg dry wt	-	-	-	-	1.92
Fluorene	mg/kg dry wt	-	-	-	-	0.049
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	0.93
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.06
Perylene	mg/kg dry wt	-	-	-	-	0.33
Phenanthrene	mg/kg dry wt	-	-	-	-	0.70
Pyrene	mg/kg dry wt	-	-	-	-	2.2
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	-	< 20
C10 - C14	mg/kg dry wt	-	-	-	-	< 20
C15 - C36	mg/kg dry wt	-	-	-	-	91
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	-	93
Sample Name:	TP05 0.2m 02-Oct-2025	TP05 Fill 1.0m 02-Oct-2025	TP05 Natural 1.0m 02-Oct-2025	TP05 Fill 2.0m 02-Oct-2025	TP06 0.2m 02-Oct-2025	
Lab Number:	4003045.12	4003045.13	4003045.14	4003045.15	4003045.16	
Individual Tests						
Dry Matter	g/100g as rcvd	-	79	-	77	-
SPLP Sample Weight	g	-	-	-	50	-
SPLP Extractant Type*		-	-	-	De-ionised Water, pH 5.8 +/- 0.4	-
SPLP Final pH	pH Units	-	-	-	9.1	-
TCLP Weight of Sample Taken	g	-	-	-	50	-
TCLP Initial Sample pH	pH Units	-	-	-	8.8	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	-	1.9	-
TCLP Extractant Type*		-	-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	-	5.0	-
TCLP Post Extraction Sample pH	pH Units	-	-	-	5.2	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	29	4	3	3	19
Total Recoverable Cadmium	mg/kg dry wt	0.37	< 0.10	< 0.10	0.21	0.29
Total Recoverable Chromium	mg/kg dry wt	27	15	14	13	20
Total Recoverable Copper	mg/kg dry wt	61	72	5	200	49
Total Recoverable Lead	mg/kg dry wt	113	16.0	7.9	44	93
Total Recoverable Nickel	mg/kg dry wt	11	11	10	9	11
Total Recoverable Zinc	mg/kg dry wt	290	370	46	4,700	330

Sample Type: Soil						
Sample Name:	TP05 0.2m 02-Oct-2025	TP05 Fill 1.0m 02-Oct-2025	TP05 Natural 1.0m 02-Oct-2025	TP05 Fill 2.0m 02-Oct-2025	TP06 0.2m 02-Oct-2025	
Lab Number:	4003045.12	4003045.13	4003045.14	4003045.15	4003045.16	
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.013	-	< 0.013	-
alpha-BHC	mg/kg dry wt	-	< 0.013	-	< 0.013	-
beta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.013	-
delta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.013	-
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.013	-	< 0.013	-
cis-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.013	-
trans-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.013	-
2,4'-DDD	mg/kg dry wt	-	< 0.013	-	< 0.013	-
4,4'-DDD	mg/kg dry wt	-	< 0.013	-	< 0.013	-
2,4'-DDE	mg/kg dry wt	-	< 0.013	-	< 0.013	-
4,4'-DDE	mg/kg dry wt	-	< 0.013	-	< 0.013	-
2,4'-DDT	mg/kg dry wt	-	< 0.013	-	< 0.013	-
4,4'-DDT	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Total DDT Isomers	mg/kg dry wt	-	< 0.08	-	< 0.08	-
Dieldrin	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endosulfan I	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endosulfan II	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endosulfan sulphate	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endrin	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endrin aldehyde	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Endrin ketone	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Heptachlor	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Methoxychlor	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.3	-	1.5	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	0.23	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	0.136	-
Acenaphthylene	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Acenaphthene	mg/kg dry wt	-	< 0.013	-	0.015	-
Anthracene	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	-	0.031	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.013	-	0.056	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.030	-	0.079	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.030	-	0.078	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.013	-	0.064	-
Benzo[e]pyrene	mg/kg dry wt	-	< 0.013	-	0.056	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.013	-	0.081	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.013	-	0.018	-
Chrysene	mg/kg dry wt	-	< 0.013	-	0.027	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Fluoranthene	mg/kg dry wt	-	< 0.013	-	0.075	-
Fluorene	mg/kg dry wt	-	< 0.013	-	0.020	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.013	-	0.031	-
Naphthalene	mg/kg dry wt	-	< 0.07	-	0.07	-
Perylene	mg/kg dry wt	-	< 0.013	-	< 0.013	-
Phenanthrene	mg/kg dry wt	-	< 0.013	-	0.065	-
Pyrene	mg/kg dry wt	-	< 0.013	-	0.45	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 20	-	< 20	-
C10 - C14	mg/kg dry wt	-	< 20	-	85	-
C15 - C36	mg/kg dry wt	-	< 40	-	1,510	-

Sample Type: Soil						
Sample Name:	TP05 0.2m 02-Oct-2025	TP05 Fill 1.0m 02-Oct-2025	TP05 Natural 1.0m 02-Oct-2025	TP05 Fill 2.0m 02-Oct-2025	TP06 0.2m 02-Oct-2025	
Lab Number:	4003045.12	4003045.13	4003045.14	4003045.15	4003045.16	
Total Petroleum Hydrocarbons in Soil						
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 80	-	1,590	-
Sample Name:	TP06 1.0m 02-Oct-2025	TP06 2.4m 02-Oct-2025	TP06 2.5m 02-Oct-2025	TP07 0.2m 02-Oct-2025	TP08 0.2m 02-Oct-2025	
Lab Number:	4003045.17	4003045.19	4003045.20	4003045.22	4003045.24	
Individual Tests						
Dry Matter	g/100g as rcvd	81	57	56	-	-
SPLP Sample Weight	g	50	-	-	-	-
SPLP Extractant Type*		De-ionised Water, pH 5.8 +/- 0.4		-	-	-
SPLP Final pH	pH Units	9.0	-	-	-	-
TCLP Weight of Sample Taken	g	50	-	-	-	-
TCLP Initial Sample pH	pH Units	9.0	-	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	2.1	-	-	-	-
TCLP Extractant Type*		NaOH/Acetic acid at pH 4.93 +/- 0.05		-	-	-
TCLP Extraction Fluid pH	pH Units	5.0	-	-	-	-
TCLP Post Extraction Sample pH	pH Units	5.8	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	21	7	6	5	14
Total Recoverable Cadmium	mg/kg dry wt	0.35	0.23	0.24	0.12	0.14
Total Recoverable Chromium	mg/kg dry wt	24	23	22	15	22
Total Recoverable Copper	mg/kg dry wt	210	21	15	19	42
Total Recoverable Lead	mg/kg dry wt	1,220	27	22	15.5	30
Total Recoverable Nickel	mg/kg dry wt	14	16	15	12	10
Total Recoverable Zinc	mg/kg dry wt	890	191	139	63	101
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.11	< 0.11	-	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endrin	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.017	< 0.018	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.5	-	-	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.017	-	-	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.017	-	-	-

Sample Type: Soil						
Sample Name:	TP06 1.0m 02-Oct-2025	TP06 2.4m 02-Oct-2025	TP06 2.5m 02-Oct-2025	TP07 0.2m 02-Oct-2025	TP08 0.2m 02-Oct-2025	
Lab Number:	4003045.17	4003045.19	4003045.20	4003045.22	4003045.24	
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Acenaphthylene	mg/kg dry wt	-	< 0.017	-	-	-
Acenaphthene	mg/kg dry wt	-	< 0.017	-	-	-
Anthracene	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.041	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.041	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[e]pyrene	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.017	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.017	-	-	-
Chrysene	mg/kg dry wt	-	< 0.017	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.017	-	-	-
Fluoranthene	mg/kg dry wt	-	< 0.017	-	-	-
Fluorene	mg/kg dry wt	-	< 0.017	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.017	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.09	-	-	-
Perylene	mg/kg dry wt	-	< 0.017	-	-	-
Phenanthrene	mg/kg dry wt	-	< 0.017	-	-	-
Pyrene	mg/kg dry wt	-	< 0.017	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 30	-	-	-
C10 - C14	mg/kg dry wt	-	< 30	-	-	-
C15 - C36	mg/kg dry wt	-	< 50	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 90	-	-	-
Sample Name:	TP08 1.0m 02-Oct-2025	TP09 0.2m 02-Oct-2025	TP10 0.2m 02-Oct-2025	TP10 1.0m 02-Oct-2025	TP11 0.2m 02-Oct-2025	
Lab Number:	4003045.25	4003045.27	4003045.30	4003045.31	4003045.33	
Individual Tests						
Dry Matter	g/100g as rcvd	76	-	-	-	83
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	18	3	9	13	107
Total Recoverable Cadmium	mg/kg dry wt	0.26	< 0.10	0.18	0.45	0.26
Total Recoverable Chromium	mg/kg dry wt	20	11	16	18	65
Total Recoverable Copper	mg/kg dry wt	48	9	31	27	99
Total Recoverable Lead	mg/kg dry wt	104	14.7	121	74	95
Total Recoverable Nickel	mg/kg dry wt	13	8	11	12	11
Total Recoverable Zinc	mg/kg dry wt	147	43	175	670	198
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.012
alpha-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.012
beta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.012
delta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	-	-	-	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.012

Sample Type: Soil						
Sample Name:		TP08 1.0m 02-Oct-2025	TP09 0.2m 02-Oct-2025	TP10 0.2m 02-Oct-2025	TP10 1.0m 02-Oct-2025	TP11 0.2m 02-Oct-2025
Lab Number:		4003045.25	4003045.27	4003045.30	4003045.31	4003045.33
Organochlorine Pesticides Screening in Soil						
Total DDT Isomers	mg/kg dry wt	< 0.08	-	-	-	< 0.08
Dieldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endosulfan I	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endosulfan II	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endrin	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Endrin ketone	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Heptachlor	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Methoxychlor	mg/kg dry wt	< 0.013	-	-	-	< 0.012
Sample Name:		TP11 1.0m 02-Oct-2025	TP12 0.2m 02-Oct-2025	TP13 0.2m 02-Oct-2025	TP13 1.0m 02-Oct-2025	TP14 0.2m 02-Oct-2025
Lab Number:		4003045.34	4003045.36	4003045.39	4003045.41	4003045.42
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	81	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	16	5	3	6	4
Total Recoverable Cadmium	mg/kg dry wt	0.29	< 0.10	< 0.10	0.15	< 0.10
Total Recoverable Chromium	mg/kg dry wt	18	14	10	17	11
Total Recoverable Copper	mg/kg dry wt	48	20	10	23	12
Total Recoverable Lead	mg/kg dry wt	98	34	13.0	16.9	38
Total Recoverable Nickel	mg/kg dry wt	10	11	7	12	8
Total Recoverable Zinc	mg/kg dry wt	250	62	47	97	81
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	< 0.013	-
alpha-BHC	mg/kg dry wt	-	-	-	< 0.013	-
beta-BHC	mg/kg dry wt	-	-	-	< 0.013	-
delta-BHC	mg/kg dry wt	-	-	-	< 0.013	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.013	-
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.013	-
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.013	-
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.013	-
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.013	-
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.013	-
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.013	-
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.013	-
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.013	-
Total DDT Isomers	mg/kg dry wt	-	-	-	< 0.08	-
Dieldrin	mg/kg dry wt	-	-	-	< 0.013	-
Endosulfan I	mg/kg dry wt	-	-	-	< 0.013	-
Endosulfan II	mg/kg dry wt	-	-	-	< 0.013	-
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.013	-
Endrin	mg/kg dry wt	-	-	-	< 0.013	-
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.013	-
Endrin ketone	mg/kg dry wt	-	-	-	< 0.013	-
Heptachlor	mg/kg dry wt	-	-	-	< 0.013	-
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.013	-
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.013	-
Methoxychlor	mg/kg dry wt	-	-	-	< 0.013	-

Sample Type: Soil

Sample Name:		TP15 0.3m 06-Oct-2025	TP16 0.3m 06-Oct-2025	TP17 0.3m 06-Oct-2025	TP18 0.3m 06-Oct-2025	TP19 0.3m 06-Oct-2025
Lab Number:		4003045.45	4003045.48	4003045.51	4003045.54	4003045.56
Individual Tests						
Dry Matter	g/100g as rcvd	76	-	-	-	88
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	6	4	4	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	0.12
Total Recoverable Chromium	mg/kg dry wt	16	16	13	13	14
Total Recoverable Copper	mg/kg dry wt	15	16	17	19	21
Total Recoverable Lead	mg/kg dry wt	12.1	16.6	11.7	11.6	38
Total Recoverable Nickel	mg/kg dry wt	10	11	10	9	11
Total Recoverable Zinc	mg/kg dry wt	74	75	56	58	82
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.011
alpha-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.011
beta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.011
delta-BHC	mg/kg dry wt	< 0.013	-	-	-	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	-	-	-	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.013	-	-	-	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.011
4,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.011
4,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.08	-	-	-	< 0.07
Dieldrin	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endosulfan I	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endosulfan II	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endrin	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Endrin ketone	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Heptachlor	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Methoxychlor	mg/kg dry wt	< 0.013	-	-	-	< 0.011
Sample Name:		SS01 0.0-0.1m 06-Oct-2025	SS02 0.0-0.1m 06-Oct-2025	SS03 0.0-0.1m 06-Oct-2025		
Lab Number:		4003045.59	4003045.60	4003045.61		
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	82	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	5	-	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	< 0.10	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	-	15	-	15
Total Recoverable Copper	mg/kg dry wt	4	-	11	-	17
Total Recoverable Lead	mg/kg dry wt	5.9	-	28	-	10.7
Total Recoverable Nickel	mg/kg dry wt	9	-	10	-	10
Total Recoverable Zinc	mg/kg dry wt	41	-	92	-	66
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	< 0.012	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.012	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.012	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.012	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.012	-	-
cis-Chlordane	mg/kg dry wt	-	-	< 0.012	-	-

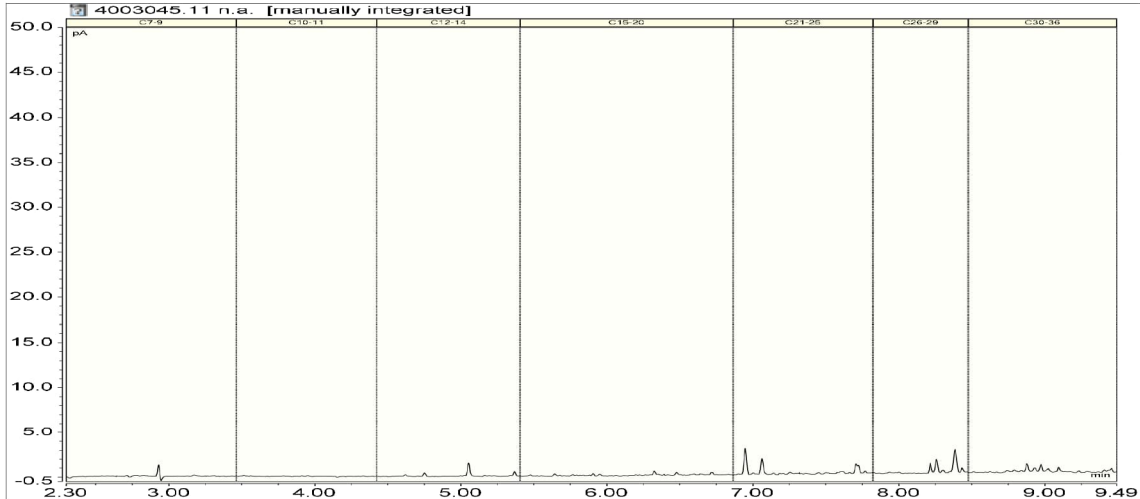
Sample Type: Soil				
Sample Name:		SS01 0.0-0.1m 06-Oct-2025	SS02 0.0-0.1m 06-Oct-2025	SS03 0.0-0.1m 06-Oct-2025
Lab Number:		4003045.59	4003045.60	4003045.61
Organochlorine Pesticides Screening in Soil				
trans-Chlordane	mg/kg dry wt	-	< 0.012	-
2,4'-DDD	mg/kg dry wt	-	< 0.012	-
4,4'-DDD	mg/kg dry wt	-	< 0.012	-
2,4'-DDE	mg/kg dry wt	-	< 0.012	-
4,4'-DDE	mg/kg dry wt	-	< 0.012	-
2,4'-DDT	mg/kg dry wt	-	< 0.012	-
4,4'-DDT	mg/kg dry wt	-	< 0.012	-
Total DDT Isomers	mg/kg dry wt	-	< 0.07	-
Dieldrin	mg/kg dry wt	-	< 0.012	-
Endosulfan I	mg/kg dry wt	-	< 0.012	-
Endosulfan II	mg/kg dry wt	-	< 0.012	-
Endosulfan sulphate	mg/kg dry wt	-	< 0.012	-
Endrin	mg/kg dry wt	-	< 0.012	-
Endrin aldehyde	mg/kg dry wt	-	< 0.012	-
Endrin ketone	mg/kg dry wt	-	< 0.012	-
Heptachlor	mg/kg dry wt	-	< 0.012	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.012	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.012	-
Methoxychlor	mg/kg dry wt	-	< 0.012	-

Sample Type: Aqueous					
Sample Name:		TP05 Fill 2.0m [TCLP Extract]	TP05 Fill 2.0m [SPLP Extract]	TP06 1.0m [TCLP Extract]	TP06 1.0m [SPLP Extract]
Lab Number:		4003045.62	4003045.63	4003045.64	4003045.65
Individual Tests					
Total Copper	g/m ³	0.50	0.0073	-	-
Total Zinc	g/m ³	9.9	0.0136 #1	-	-
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Arsenic	g/m ³	-	-	-	0.0123
Total Cadmium	g/m ³	-	-	-	< 0.000053
Total Chromium	g/m ³	-	-	-	0.00148
Total Copper	g/m ³	-	-	-	0.0190
Total Lead	g/m ³	-	-	-	0.0192
Total Nickel	g/m ³	-	-	-	0.00108
Total Zinc	g/m ³	-	-	-	0.037
Heavy metals, totals, screen As,Cd,Cr,Cu,Ni,Pb,Zn, for TCLP samples					
Total Arsenic	g/m ³	-	-	0.041	-
Total Cadmium	g/m ³	-	-	0.0011	-
Total Chromium	g/m ³	-	-	< 0.011	-
Total Copper	g/m ³	-	-	0.020	-
Total Lead	g/m ³	-	-	0.165	-
Total Nickel	g/m ³	-	-	< 0.011	-
Total Zinc	g/m ³	-	-	3.0	-

4003045.11

TP04 0.5m 02-Oct-2025

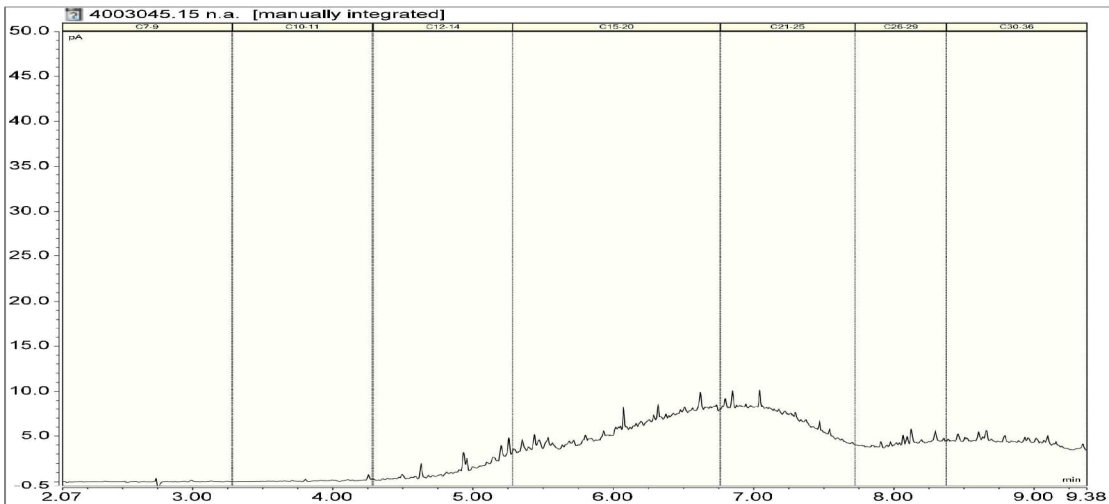
Client Chromatogram for TPH by FID



4003045.15

TP05 Fill 2.0m 02-Oct-2025

Client Chromatogram for TPH by FID



Analyst's Comments

Carbon particulates were observed in the matrix of sample 4003045.15 and this has absorbed some of the System Monitoring Compounds in the PAH analysis, whereby the recovery for Benzo[a]pyrene-d12 was 49%. Therefore the results presented for these analytes may not represent the actual concentration in the sample.

Carbon particulates were observed in the matrix of sample 4003045.13 and this has absorbed most of the System Monitoring Compounds in the PAH analysis, whereby the recovery for Fluoranthene-d10 and Benzo[a]pyrene-d12 was 60% and 25% respectively. Therefore the results presented for these analytes may not represent the actual concentration in the sample.

#1 It should be noted that the blank SPLP extract contained an elevated level of zinc (0.0012g/m³ c.f. detection limit of 0.0011g/m³). This has been corrected for on the sample SPLP extract concentrations. This should be kept in mind when interpreting these results

Amended Report: This certificate of analysis replaces report '4003045-SPv2' issued on 17-Oct-2025 at 8:07 am. Reason for amendment: Additional testing added as per client request.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill 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).	-	2, 5, 8, 10-17, 19-20, 22, 24-25, 27, 30-31, 33-34, 36, 39, 41-42, 45, 48, 51, 54, 56, 59-61
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	11, 13, 15, 19
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 5, 8, 11, 13, 15, 17, 19-20, 25, 33, 41, 45, 56, 60
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	11, 13, 15, 19
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	11, 13, 15, 19
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	11, 13, 15, 19
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	2, 5, 8, 10-17, 19-20, 22, 24-25, 27, 30-31, 33-34, 36, 39, 41-42, 45, 48, 51, 54, 56, 59-61
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	2, 5, 8, 11, 13, 15, 17, 19-20, 25, 33, 41, 45, 56, 60
SPLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1312.	-	15, 17
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	15, 17
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.	-	11, 15
C7 - C9	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	11, 13, 15, 19
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	11, 13, 15, 19
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	11, 13, 15, 19

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
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	11, 13, 15, 19
SPLP Profile			
SPLP Sample Weight	Gravimetric. US EPA 1312.	0.1 g	15, 17
SPLP Extractant Type*	US EPA 1312 (Modified for New Zealand conditions to use De-ionised Water unless otherwise specified).	-	15, 17
SPLP Final pH	pH meter. US EPA 1312.	0.1 pH Units	15, 17
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	15, 17
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	15, 17
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	15, 17
TCLP Extractant Type*	US EPA 1311.	-	15, 17
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	15, 17
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	15, 17

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.	-	62-65
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.011 g/m ³	62
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00053 g/m ³	63
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.053 g/m ³	62
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.0011 g/m ³	63
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.000053 - 0.0011 g/m ³	65
Heavy metals, totals, screen As,Cd,Cr,Cu,Ni,Pb,Zn, for TCLP samples	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B (modified) 23rd ed. 2017.	0.0011 - 0.053 g/m ³	64

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

Testing was completed between 14-Oct-2025 and 28-Oct-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.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

Certificate of Analysis

Page 1 of 5

Client: Tonkin & Taylor	Lab No: 4003666 A2Pv1
Contact: Genevieve Palmer	Date Received: 08-Oct-2025
C/- Tonkin & Taylor	Date Reported: 17-Oct-2025
PO Box 9544	Quote No: 80842
Hamilton 3240	Order No: 1017353.2403-2101
	Client Reference: 1017353.2403-2101
	Submitted By: Genevieve Palmer

Sample Type: Soil

Sample Name	Lab Number	As Received Weight Presence / Absence Testing (g)	Dry Weight Presence / Absence Testing (g)	<2mm Subsample Weight Presence / Absence Testing (g dry wt)	Asbestos Presence / Absence from Presence / Absence Testing	Description of Asbestos Form Presence / Absence Testing
TP01 0.2m	4003666.40	284.4	232.4	50.7	Asbestos NOT detected.	-
TP02 0.5m	4003666.43	314.2	279.3	51.4	Asbestos NOT detected.	-
TP03 0.5m	4003666.46	321.5	295.1	55.3	Asbestos NOT detected.	-
TP04 0.2m	4003666.48	300.1	256.9	50.5	Asbestos NOT detected.	-
TP05 Fill 1.0m	4003666.51	231.1	180.8	50.6	Asbestos NOT detected.	-
TP05 Fill 2.0m	4003666.53	216.0	168.6	50.0	Asbestos NOT detected.	-
TP06 1.0m	4003666.55	253.0	190.6	50.6	Asbestos NOT detected.	-
TP06 2.4m	4003666.57	253.3	141.3	51.0	Asbestos NOT detected.	-
TP07 0.2m	4003666.60	292.9	256.0	55.4	Asbestos NOT detected.	-

Sample Type: Soil

Sample Name:	TP08 0.2m 02-Oct-2025	TP08 1.0m 02-Oct-2025	TP09 1.2m 02-Oct-2025	TP10 0.2m 02-Oct-2025	TP10 1.0m 02-Oct-2025
Lab Number:	4003666.1	4003666.2	4003666.5	4003666.7	4003666.8
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
As Received Weight	g 624.9	g 589.0	g 771.2	g 781.1	g 711.2
Dry Weight	g 492.0	g 447.4	g 658.0	g 706.8	g 550.1
Moisture*	% 21	% 24	% 15	% 10	% 23
Sample Fraction >10mm	g dry wt 52.6	g dry wt 12.3	g dry wt 128.7	g dry wt 260.8	g dry wt 121.6
Sample Fraction <10mm to >2mm	g dry wt 91.4	g dry wt 96.3	g dry wt 200.8	g dry wt 174.1	g dry wt 169.1
Sample Fraction <2mm	g dry wt 345.6	g dry wt 337.4	g dry wt 324.3	g dry wt 271.7	g dry wt 257.6
<2mm Subsample Weight	g dry wt 55.4	g dry wt 53.1	g dry wt 52.0	g dry wt 58.8	g dry wt 52.4
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil

Sample Name:	TP11 0.2m 02-Oct-2025	TP11 1.0m 02-Oct-2025	TP12 1.0m 02-Oct-2025	TP13 0.8m 02-Oct-2025	TP14 0.5m 02-Oct-2025
Lab Number:	4003666.10	4003666.11	4003666.14	4003666.17	4003666.20
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
As Received Weight	g 677.6	g 629.8	g 784.8	g 601.2	g 690.4
Dry Weight	g 596.2	g 492.2	g 657.6	g 433.6	g 520.4
Moisture*	% 12	% 22	% 16	% 28	% 25
Sample Fraction >10mm	g dry wt 125.3	g dry wt 25.2	g dry wt 115.1	g dry wt 2.1	g dry wt 155.2
Sample Fraction <10mm to >2mm	g dry wt 96.8	g dry wt 101.2	g dry wt 218.0	g dry wt 49.5	g dry wt 133.6
Sample Fraction <2mm	g dry wt 372.4	g dry wt 364.7	g dry wt 323.5	g dry wt 380.6	g dry wt 230.6
<2mm Subsample Weight	g dry wt 50.2	g dry wt 51.0	g dry wt 53.1	g dry wt 52.6	g dry wt 50.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001

Sample Name:	TP15 0.7m 06-Oct-2025	TP16 0.7m 06-Oct-2025	TP17 0.7m 06-Oct-2025	TP18 0.3m 06-Oct-2025	TP19 0.7m 06-Oct-2025
Lab Number:	4003666.23	4003666.26	4003666.29	4003666.31	4003666.34
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
As Received Weight	g 811.2	g 812.7	g 674.8	g 723.2	g 622.3
Dry Weight	g 619.2	g 618.7	g 605.4	g 636.3	g 567.8
Moisture*	% 24	% 24	% 10	% 12	% 9
Sample Fraction >10mm	g dry wt < 0.1	g dry wt < 0.1	g dry wt < 0.1	g dry wt 105.3	g dry wt 2.0
Sample Fraction <10mm to >2mm	g dry wt 5.1	g dry wt < 0.1	g dry wt 5.2	g dry wt 212.3	g dry wt 62.4
Sample Fraction <2mm	g dry wt 613.7	g dry wt 618.0	g dry wt 599.5	g dry wt 317.2	g dry wt 502.6
<2mm Subsample Weight	g dry wt 54.4	g dry wt 52.3	g dry wt 52.2	g dry wt 53.1	g dry wt 52.5
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001

Sample Name:	SS01 0.0-0.1m 06-Oct-2025	SS03 0.0-0.1m 06-Oct-2025
Lab Number:	4003666.36	4003666.38
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001

Sample Type: Soil			
Sample Name:		SS01 0.0-0.1m 06-Oct-2025	SS03 0.0-0.1m 06-Oct-2025
Lab Number:		4003666.36	4003666.38
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001
As Received Weight	g	658.4	625.5
Dry Weight	g	539.5	474.7
Moisture*	%	18	24
Sample Fraction >10mm	g dry wt	< 0.1	3.4
Sample Fraction <10mm to >2mm	g dry wt	7.0	35.1
Sample Fraction <2mm	g dry wt	531.9	434.9
<2mm Subsample Weight	g dry wt	56.8	51.5
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001

Glossary of Terms

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

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

The following assumptions have been made:

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

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

Summary of Methods

The following table(s) give 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
Asbestos in Soil			
As Received Weight Presence / Absence Testing	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	40, 43, 46, 48, 51, 53, 55, 57, 60
Dry Weight Presence / Absence Testing	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	40, 43, 46, 48, 51, 53, 55, 57, 60
<2mm Subsample Weight Presence / Absence Testing	Sample dried at 100 to 105°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	-	40, 43, 46, 48, 51, 53, 55, 57, 60
Asbestos Presence / Absence from Presence / Absence Testing	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	40, 43, 46, 48, 51, 53, 55, 57, 60
Description of Asbestos Form Presence / Absence Testing	Description of asbestos form and/or shape if present.	-	40, 43, 46, 48, 51, 53, 55, 57, 60
New Zealand Guidelines Semi Quantitative Asbestos in Soil			

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 5, 7-8, 10-11, 14, 17, 20, 23, 26, 29, 31, 34, 36, 38

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

Testing was completed on 17-Oct-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.

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Jessica Griffin BSc, BOHS W504
Team Leader - Asbestos

Certificate of Analysis

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Client: Tonkin & Taylor	Lab No: 4006143	SPv4
Contact: Genevieve Palmer	Date Received: 11-Oct-2025	
C/- Tonkin & Taylor	Date Reported: 30-Oct-2025	(Amended)
PO Box 9544	Quote No: 80842	
Hamilton 3240	Order No: 1017353.2403-2101	
	Client Reference: 1017353.2403-2101	
	Submitted By: Genevieve Palmer	

Sample Type: Soil

Sample Name:	SS101 0.1m 10-Oct-2025	SS102 0.1m 10-Oct-2025	SS103 0.1m 10-Oct-2025	SS104 0.1m 10-Oct-2025	SS105 0.1m 10-Oct-2025
Lab Number:	4006143.1	4006143.2	4006143.3	4006143.4	4006143.5

Individual Tests

Test	Unit	4006143.1	4006143.2	4006143.3	4006143.4	4006143.5
Dry Matter	g/100g as rcvd	-	-	-	-	79
SPLP Sample Weight	g	50	-	-	-	-
SPLP Extractant Type*		De-ionised Water, pH 5.8 +/- 0.4	-	-	-	-
SPLP Final pH	pH Units	8.7	-	-	-	-
TCLP Weight of Sample Taken	g	50	-	-	-	-
TCLP Initial Sample pH	pH Units	6.8	-	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	1.7	-	-	-	-
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

Test	Unit	4006143.1	4006143.2	4006143.3	4006143.4	4006143.5
Total Recoverable Arsenic	mg/kg dry wt	5	5	3	5	12
Total Recoverable Cadmium	mg/kg dry wt	0.63	0.38	0.20	0.22	< 0.10
Total Recoverable Chromium	mg/kg dry wt	19	18	13	15	21
Total Recoverable Copper	mg/kg dry wt	16	22	10	12	14
Total Recoverable Lead	mg/kg dry wt	2,800	580	240	320	18.1
Total Recoverable Nickel	mg/kg dry wt	10	10	9	10	15
Total Recoverable Zinc	mg/kg dry wt	510	450	165	153	66

Organochlorine Pesticides Screening in Soil

Test	Unit	4006143.1	4006143.2	4006143.3	4006143.4	4006143.5
Aldrin	mg/kg dry wt	-	-	-	-	< 0.013
alpha-BHC	mg/kg dry wt	-	-	-	-	< 0.013
beta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
delta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	-	< 0.013
cis-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
trans-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
Total DDT Isomers	mg/kg dry wt	-	-	-	-	< 0.08
Dieldrin	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan I	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan II	mg/kg dry wt	-	-	-	-	< 0.013

Sample Type: Soil						
Sample Name:		SS101 0.1m 10-Oct-2025	SS102 0.1m 10-Oct-2025	SS103 0.1m 10-Oct-2025	SS104 0.1m 10-Oct-2025	SS105 0.1m 10-Oct-2025
Lab Number:		4006143.1	4006143.2	4006143.3	4006143.4	4006143.5
Organochlorine Pesticides Screening in Soil						
Endosulfan sulphate	mg/kg dry wt	-	-	-	-	< 0.013
Endrin	mg/kg dry wt	-	-	-	-	< 0.013
Endrin aldehyde	mg/kg dry wt	-	-	-	-	< 0.013
Endrin ketone	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	-	-	-	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	-	-	-	< 0.013
Methoxychlor	mg/kg dry wt	-	-	-	-	< 0.013
Sample Name:		SS106 0.1m 10-Oct-2025	SS107 0.1m 10-Oct-2025	SS108 0.1m 10-Oct-2025	SS110 0.1m 10-Oct-2025	SS111 0.1m 10-Oct-2025
Lab Number:		4006143.6	4006143.7	4006143.8	4006143.9	4006143.10
Individual Tests						
Dry Matter	g/100g as rcvd	87	78	81	-	84
SPLP Sample Weight	g	-	-	-	-	50
SPLP Extractant Type*		-	-	-	-	De-ionised Water, pH 5.8 +/- 0.4
SPLP Final pH	pH Units	-	-	-	-	8.8
TCLP Weight of Sample Taken	g	-	-	-	-	50
TCLP Initial Sample pH	pH Units	-	-	-	-	8.4
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	-	-	-	-	5.0
TCLP Post Extraction Sample pH	pH Units	-	-	-	-	5.1
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	9	6	6	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	0.12	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	23	18	18	21
Total Recoverable Copper	mg/kg dry wt	10	18	16	37	12
Total Recoverable Lead	mg/kg dry wt	13.4	23	14.8	12.1	14.4
Total Recoverable Nickel	mg/kg dry wt	10	17	14	13	15
Total Recoverable Zinc	mg/kg dry wt	57	78	65	68	68
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
alpha-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
beta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
delta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	0.012	-	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	< 0.08	-	< 0.07
Dieldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endosulfan I	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endosulfan II	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endrin	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Endrin ketone	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Heptachlor	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012

Sample Type: Soil						
Sample Name:	SS106 0.1m 10-Oct-2025	SS107 0.1m 10-Oct-2025	SS108 0.1m 10-Oct-2025	SS110 0.1m 10-Oct-2025	SS111 0.1m 10-Oct-2025	
Lab Number:	4006143.6	4006143.7	4006143.8	4006143.9	4006143.10	
Organochlorine Pesticides Screening in Soil						
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Methoxychlor	mg/kg dry wt	< 0.012	< 0.013	< 0.013	-	< 0.012
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.3	-	-	< 0.3
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Acenaphthylene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Acenaphthene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Anthracene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.030	-	-	< 0.028
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.030	-	-	< 0.028
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[e]pyrene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Chrysene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Fluoranthene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Fluorene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Naphthalene	mg/kg dry wt	-	< 0.07	-	-	< 0.06
Perylene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Phenanthrene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Pyrene	mg/kg dry wt	-	< 0.013	-	-	< 0.012
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 20	-	-	< 20
C10 - C14	mg/kg dry wt	-	< 20	-	-	< 20
C15 - C36	mg/kg dry wt	-	< 40	-	-	43
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 80	-	-	< 80
Sample Name:	SS112 0.1m 10-Oct-2025	S9_SS2 0.1m 10-Oct-2025	S9_SS1 0.1m 10-Oct-2025	S9_SS3 0.1m 10-Oct-2025	S9_SS4 0.1m 10-Oct-2025	
Lab Number:	4006143.11	4006143.12	4006143.14	4006143.15	4006143.17	
Individual Tests						
Dry Matter	g/100g as rcvd	93	82	85	-	72
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	5	6	6	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	17	16	15	15	20
Total Recoverable Copper	mg/kg dry wt	17	14	12	16	23
Total Recoverable Lead	mg/kg dry wt	11.9	12.8	12.4	12.9	16.0
Total Recoverable Nickel	mg/kg dry wt	11	12	11	11	15
Total Recoverable Zinc	mg/kg dry wt	63	55	52	56	70
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
alpha-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
beta-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
delta-BHC	mg/kg dry wt	< 0.011	< 0.013	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.013	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.013	-	-	-

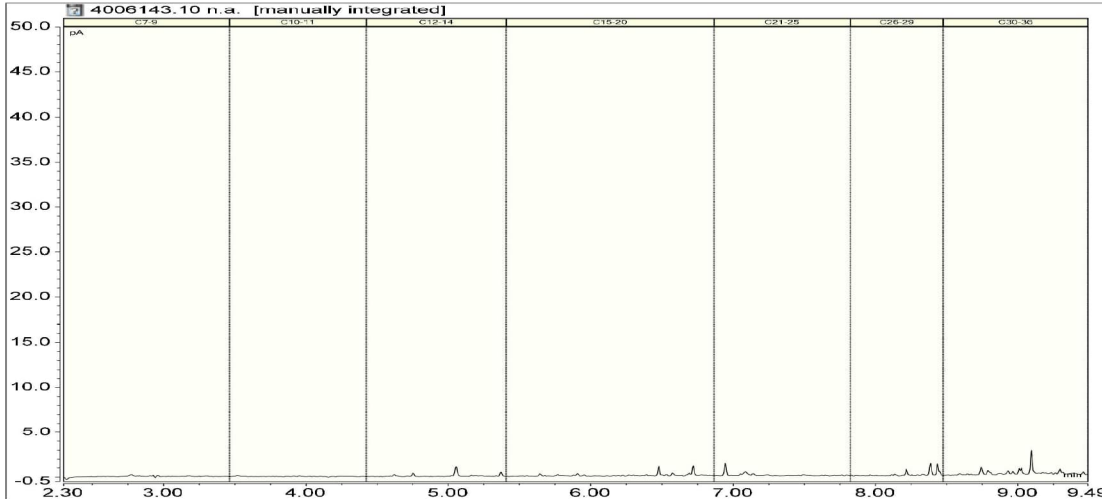
Sample Type: Soil						
Sample Name:	SS112 0.1m 10-Oct-2025	S9_SS2 0.1m 10-Oct-2025	S9_SS1 0.1m 10-Oct-2025	S9_SS3 0.1m 10-Oct-2025	S9_SS4 0.1m 10-Oct-2025	
Lab Number:	4006143.11	4006143.12	4006143.14	4006143.15	4006143.17	
Organochlorine Pesticides Screening in Soil						
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	-	-	-
Dieldrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan I	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan II	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Endrin ketone	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Heptachlor	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Methoxychlor	mg/kg dry wt	< 0.011	< 0.013	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.3	-	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Acenaphthylene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Acenaphthene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Anthracene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.028	-	< 0.033
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.028	-	< 0.033
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Chrysene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Fluoranthene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Fluorene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Naphthalene	mg/kg dry wt	-	-	< 0.06	-	< 0.07
Perylene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Phenanthrene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Pyrene	mg/kg dry wt	-	-	< 0.012	-	< 0.014
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 20	-	< 20
C10 - C14	mg/kg dry wt	-	-	< 20	-	< 20
C15 - C36	mg/kg dry wt	-	-	< 40	-	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	< 80	-	< 80
Sample Name:	S9_SS5 0.1m 10-Oct-2025			SS109 0.1m 10-Oct-2025		
Lab Number:	4006143.19			4006143.21		

Sample Type: Soil					
Sample Name:		S9_SS5 0.1m 10-Oct-2025		SS109 0.1m 10-Oct-2025	
Lab Number:		4006143.19		4006143.21	
Individual Tests					
Dry Matter	g/100g as rcvd	80		88	
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	5		3	
Total Recoverable Cadmium	mg/kg dry wt	< 0.10		< 0.10	
Total Recoverable Chromium	mg/kg dry wt	16		12	
Total Recoverable Copper	mg/kg dry wt	15		7	
Total Recoverable Lead	mg/kg dry wt	13.7		7.0	
Total Recoverable Nickel	mg/kg dry wt	12		9	
Total Recoverable Zinc	mg/kg dry wt	58		44	
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013		< 0.011	
alpha-BHC	mg/kg dry wt	< 0.013		< 0.011	
beta-BHC	mg/kg dry wt	< 0.013		< 0.011	
delta-BHC	mg/kg dry wt	< 0.013		< 0.011	
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013		< 0.011	
cis-Chlordane	mg/kg dry wt	< 0.013		< 0.011	
trans-Chlordane	mg/kg dry wt	< 0.013		< 0.011	
2,4'-DDD	mg/kg dry wt	< 0.013		< 0.011	
4,4'-DDD	mg/kg dry wt	< 0.013		< 0.011	
2,4'-DDE	mg/kg dry wt	< 0.013		< 0.011	
4,4'-DDE	mg/kg dry wt	< 0.013		< 0.011	
2,4'-DDT	mg/kg dry wt	< 0.013		< 0.011	
4,4'-DDT	mg/kg dry wt	< 0.013		< 0.011	
Total DDT Isomers	mg/kg dry wt	< 0.08		< 0.07	
Dieldrin	mg/kg dry wt	< 0.013		< 0.011	
Endosulfan I	mg/kg dry wt	< 0.013		< 0.011	
Endosulfan II	mg/kg dry wt	< 0.013		< 0.011	
Endosulfan sulphate	mg/kg dry wt	< 0.013		< 0.011	
Endrin	mg/kg dry wt	< 0.013		< 0.011	
Endrin aldehyde	mg/kg dry wt	< 0.013		< 0.011	
Endrin ketone	mg/kg dry wt	< 0.013		< 0.011	
Heptachlor	mg/kg dry wt	< 0.013		< 0.011	
Heptachlor epoxide	mg/kg dry wt	< 0.013		< 0.011	
Hexachlorobenzene	mg/kg dry wt	< 0.013		< 0.011	
Methoxychlor	mg/kg dry wt	< 0.013		< 0.011	
Sample Type: Aqueous					
Sample Name:		SS111 0.1m [TCLP Extract]	SS111 0.1m [SPLP Extract]	SS101 0.1m [TCLP Extract]	SS101 0.1m [SPLP Extract]
Lab Number:		4006143.22	4006143.23	4006143.24	4006143.25
Individual Tests					
Total Lead	g/m ³	< 0.0021	0.00074	0.147	0.032
Total Zinc	g/m ³	< 0.053	0.0036	1.94	0.062

4006143.10

SS111 0.1m 10-Oct-2025

Client Chromatogram for TPH by FID



Analyst's Comments

Amended Report: This certificate of analysis replaces report '4006143-SPv3' issued on 23-Oct-2025 at 4:24 pm. Reason for amendment: Additional testing added as per client request.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill 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).	-	1-12, 14-15, 17, 19, 21
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	7, 10, 14, 17
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	5-8, 10-12, 14, 17, 19, 21
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	7, 10, 14, 17
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	7, 10, 14, 17
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	7, 10, 14, 17
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	1-12, 14-15, 17, 19, 21
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	5-8, 10-12, 19, 21
SPLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1312.	-	1, 10

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	1, 10
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.	-	10
C7 - C9	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	7, 10, 14, 17
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	7, 10, 14, 17
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	7, 10, 14, 17
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	7, 10, 14, 17
SPLP Profile			
SPLP Sample Weight	Gravimetric. US EPA 1312.	0.1 g	1, 10
SPLP Extractant Type*	US EPA 1312 (Modified for New Zealand conditions to use De-ionised Water unless otherwise specified).	-	1, 10
SPLP Final pH	pH meter. US EPA 1312.	0.1 pH Units	1, 10
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	1, 10
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	1, 10
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	1, 10
TCLP Extractant Type*	US EPA 1311.	-	1, 10
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	1, 10
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	1, 10
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.	-	22-25
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.0021 g/m ³	22, 24
Total Lead	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00011 g/m ³	23, 25
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.053 g/m ³	22, 24
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.0011 g/m ³	23, 25

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

Testing was completed between 14-Oct-2025 and 30-Oct-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.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

Certificate of Analysis

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Client: Tonkin & Taylor	Lab No: 4006412 A2Pv1
Contact: Genevieve Palmer	Date Received: 11-Oct-2025
C/- Tonkin & Taylor	Date Reported: 16-Oct-2025
PO Box 9544	Quote No: 80842
Hamilton 3240	Order No: 1017353.2403-2101
	Client Reference: 1017353.2403-2101
	Submitted By: Genevieve Palmer

Sample Type: Soil

Sample Name:	SS101 0.1m 10-Oct-2025	SS102 0.1m 10-Oct-2025	SS103 0.1m 10-Oct-2025	SS104 0.1m 10-Oct-2025	S9_SS1 0.1m 10-Oct-2025
Lab Number:	4006412.1	4006412.2	4006412.3	4006412.4	4006412.11
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001
As Received Weight	g 637.7	g 462.6	g 653.3	g 661.5	g 715.3
Dry Weight	g 523.7	g 382.2	g 565.9	g 507.5	g 608.0
Moisture*	% 18	% 17	% 13	% 23	% 15
Sample Fraction >10mm	g dry wt 1.4	g dry wt < 0.1	g dry wt < 0.1	g dry wt < 0.1	g dry wt 1.8
Sample Fraction <10mm to >2mm	g dry wt 9.1	g dry wt 7.8	g dry wt 2.0	g dry wt 1.0	g dry wt 80.5
Sample Fraction <2mm	g dry wt 511.2	g dry wt 373.1	g dry wt 562.1	g dry wt 504.8	g dry wt 522.7
<2mm Subsample Weight	g dry wt 56.2	g dry wt 55.7	g dry wt 59.5	g dry wt 58.5	g dry wt 57.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001

Sample Name:	S9_SS4 0.1m 10-Oct-2025
Lab Number:	4006412.14
Asbestos Presence / Absence	Asbestos NOT detected.
Description of Asbestos Form	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001
As Received Weight	g 576.8
Dry Weight	g 409.2
Moisture*	% 29
Sample Fraction >10mm	g dry wt < 0.1



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil		
Sample Name:	S9_SS4 0.1m 10-Oct-2025	
Lab Number:	4006412.14	
Sample Fraction <10mm to >2mm	g dry wt	192.0
Sample Fraction <2mm	g dry wt	215.1
<2mm Subsample Weight	g dry wt	58.6
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001

Glossary of Terms

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

For further details, please contact the Asbestos Team.

Please refer to the **BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.**

<https://www.branz.co.nz/asbestos>

The following assumptions have been made:

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

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

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
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-4, 11, 14
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-4, 11, 14
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-4, 11, 14
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-4, 11, 14
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-4, 11, 14
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-4, 11, 14
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-4, 11, 14
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-4, 11, 14
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4, 11, 14

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4, 11, 14
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4, 11, 14
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4, 11, 14
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4, 11, 14
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4, 11, 14
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4, 11, 14

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

Testing was completed on 16-Oct-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.



Jessica Griffin BSc, BOHS W504
Team Leader - Asbestos

Appendix E Statistical Calculation Sheets

A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.129/10/2025 4:07:43 pm									
5	From File		UCL_Arsenic in surface fill_Site 10_a.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	14											
12												
13	General Statistics											
14	Total Number of Observations			11	Number of Distinct Observations			6				
15					Number of Missing Observations			0				
16	Minimum			3	Mean			14.18				
17	Maximum			107	Median			5				
18	SD			30.83	Std. Error of Mean			9.296				
19	Coefficient of Variation			2.174	Skewness			3.298				
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic			0.392	Shapiro Wilk GOF Test							
23	5% Shapiro Wilk Critical Value			0.85	Data Not Normal at 5% Significance Level							
24	Lilliefors Test Statistic			0.476	Lilliefors GOF Test							
25	5% Lilliefors Critical Value			0.251	Data Not Normal at 5% Significance Level							
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
30	95% Student's-t UCL			31.03	95% Adjusted-CLT UCL (Chen-1995)			39.35				
31					95% Modified-t UCL (Johnson-1978)			32.57				
32												
33	Gamma GOF Test											
34	A-D Test Statistic			2.438	Anderson-Darling Gamma GOF Test							
35	5% A-D Critical Value			0.764	Data Not Gamma Distributed at 5% Significance Level							
36	K-S Test Statistic			0.408	Kolmogorov-Smirnov Gamma GOF Test							
37	5% K-S Critical Value			0.265	Data Not Gamma Distributed at 5% Significance Level							
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)			0.724	k star (bias corrected MLE)			0.587				
42	Theta hat (MLE)			19.6	Theta star (bias corrected MLE)			24.16				
43	nu hat (MLE)			15.92	nu star (bias corrected)			12.91				
44	MLE Mean (bias corrected)			14.18	MLE Sd (bias corrected)			18.51				
45					Approximate Chi Square Value (0.05)			5.834				
46	Adjusted Level of Significance			0.0278	Adjusted Chi Square Value			5.079				
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))			31.39	95% Adjusted Gamma UCL (use when n<50)			36.05				
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic			0.642	Shapiro Wilk Lognormal GOF Test							
53	5% Shapiro Wilk Critical Value			0.85	Data Not Lognormal at 5% Significance Level							
54	Lilliefors Test Statistic			0.33	Lilliefors Lognormal GOF Test							
55	5% Lilliefors Critical Value			0.251	Data Not Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L				
56	Data Not Lognormal at 5% Significance Level															
57																
58	Lognormal Statistics															
59	Minimum of Logged Data				1.099				Mean of logged Data				1.821			
60	Maximum of Logged Data				4.673				SD of logged Data				0.999			
61																
62	Assuming Lognormal Distribution															
63	95% H-UCL				26.2				90% Chebyshev (MVUE) UCL				18.73			
64	95% Chebyshev (MVUE) UCL				22.88				97.5% Chebyshev (MVUE) UCL				28.63			
65	99% Chebyshev (MVUE) UCL				39.95											
66																
67	Nonparametric Distribution Free UCL Statistics															
68	Data do not follow a Discernible Distribution (0.05)															
69																
70	Nonparametric Distribution Free UCLs															
71	95% CLT UCL				29.47				95% Jackknife UCL				31.03			
72	95% Standard Bootstrap UCL				28.68				95% Bootstrap-t UCL				308.3			
73	95% Hall's Bootstrap UCL				141				95% Percentile Bootstrap UCL				32.73			
74	95% BCA Bootstrap UCL				41.64											
75	90% Chebyshev(Mean, Sd) UCL				42.07				95% Chebyshev(Mean, Sd) UCL				54.7			
76	97.5% Chebyshev(Mean, Sd) UCL				72.24				99% Chebyshev(Mean, Sd) UCL				106.7			
77																
78	Suggested UCL to Use															
79	95% Chebyshev (Mean, Sd) UCL				54.7											
80																
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.															
82	Recommendations are based upon data size, data distribution, and skewness.															
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).															
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.															
85																