



## Ohiti Road Stopbanks

### Preliminary and Detailed Site Investigation

Prepared for  
Hawke's Bay Regional Council

Prepared by  
Tonkin & Taylor Ltd

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## Table of contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Background	2
1.2	Objective and scope of works	3
<b>2</b>	<b>Site description</b>	<b>4</b>
2.1	Location and legal description	4
2.2	Site condition	5
2.3	Surrounding land use and environment	6
<b>3</b>	<b>Geology and hydrology</b>	<b>7</b>
3.1	Geology	7
3.1.1	Published geology	7
3.1.2	Previous investigation	7
3.2	Hydrogeology and hydrology	8
<b>4</b>	<b>Site history</b>	<b>9</b>
<b>5</b>	<b>Potential for ground contamination</b>	<b>10</b>
<b>6</b>	<b>Soil sampling</b>	<b>13</b>
6.1	Rationale	13
6.2	Soil sampling procedure	14
6.3	Site observations	14
6.4	Assessment criteria	15
6.5	Soil results	16
6.6	Data quality	18
<b>7</b>	<b>Nature and extent of ground contamination</b>	<b>19</b>
<b>8</b>	<b>Development implications</b>	<b>20</b>
8.1	General	20
8.2	Regulatory considerations	20
8.2.1	Flood mitigation Order in Council	20
8.3	Health and Safety at Work (Asbestos) Regulations	21
8.4	Other development implications	21
8.4.1	Soil disturbance general handling requirements	21
8.4.2	Soil reuse	22
8.4.3	Offsite disposal of soil	22
<b>9</b>	<b>Conclusions</b>	<b>23</b>
<b>10</b>	<b>Applicability</b>	<b>24</b>
<b>Appendix A</b>	<b>Figure</b>	
<b>Appendix B</b>	<b>Site photographs</b>	
<b>Appendix C</b>	<b>Historical information review</b>	
<b>Appendix D</b>	<b>Soil results summary table</b>	
<b>Appendix E</b>	<b>Laboratory transcripts</b>	
<b>Appendix F</b>	<b>Historic aerial photographs</b>	

## 1 Introduction

Hawkes Bay Regional Council (HBRC) has commissioned Tonkin & Taylor Ltd (T+T) to undertake Preliminary and Detailed Site Investigations (PSI and DSI) for proposed stopbanks at Ohiti Road and Taihape Road, Omaha (herein referred to as 'the site'). The location of the site is presented in Figure 1.1 below. This investigation builds on (and supersedes) a PSI with limited soil sampling, completed by T+T in April 2025<sup>1</sup>.

This report has been prepared in general accordance with the requirements for a PSI and DSI referred to in the National Environmental Standards for Assessing and Managing Contaminants in Soil (NESCS) regulations<sup>2</sup>, and as outlined in the Ministry for the Environment's (MfE) Contaminated Land Management Guidelines (CLMG)<sup>3</sup>.

The persons undertaking, managing, reviewing, and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NESCS and defined in the NESCS Users' Guide<sup>4</sup> (April 2012).

This report was undertaken in accordance with our proposal of 8 April 2024 and subsequent variations.

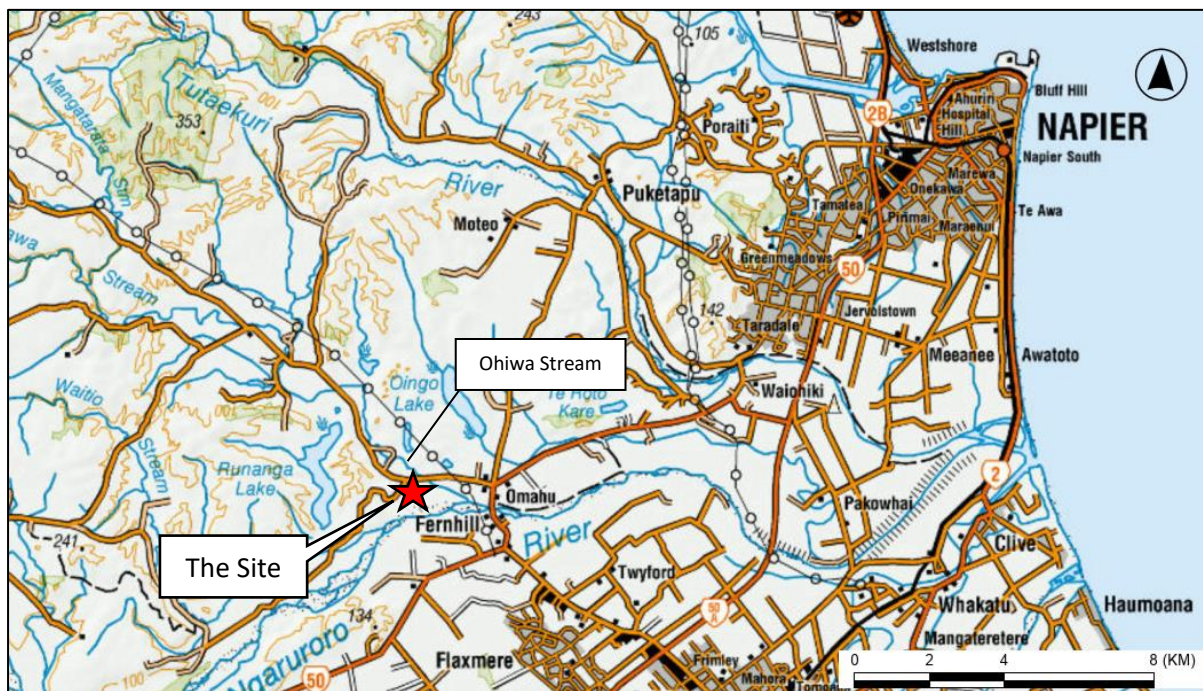


Figure 1.1: Site location. Topomap sourced from Land Information New Zealand (crown copyright reserved).

<sup>1</sup> T+T, 2025. Preliminary Site Investigation, Ohiti Stopbanks. T+T ref: 10175353.2402 v2.

<sup>2</sup> Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

<sup>3</sup> Ministry for the Environment, 2021. Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand.

<sup>4</sup> Ministry for the Environment, April 2012, User's Guide - National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

## 1.1 Background

We understand HBRC proposes to construct two stopbanks, and borrow area, as part of post Cyclone Gabrielle flood mitigation works. Proposed locations of works are shown in Figure 1.2 below. Proposed soil disturbance work will include removal of vegetation and topsoil, excavation to approximately 0.5 m to key in the toe of the stopbank and cut to fill to form the stopbank.

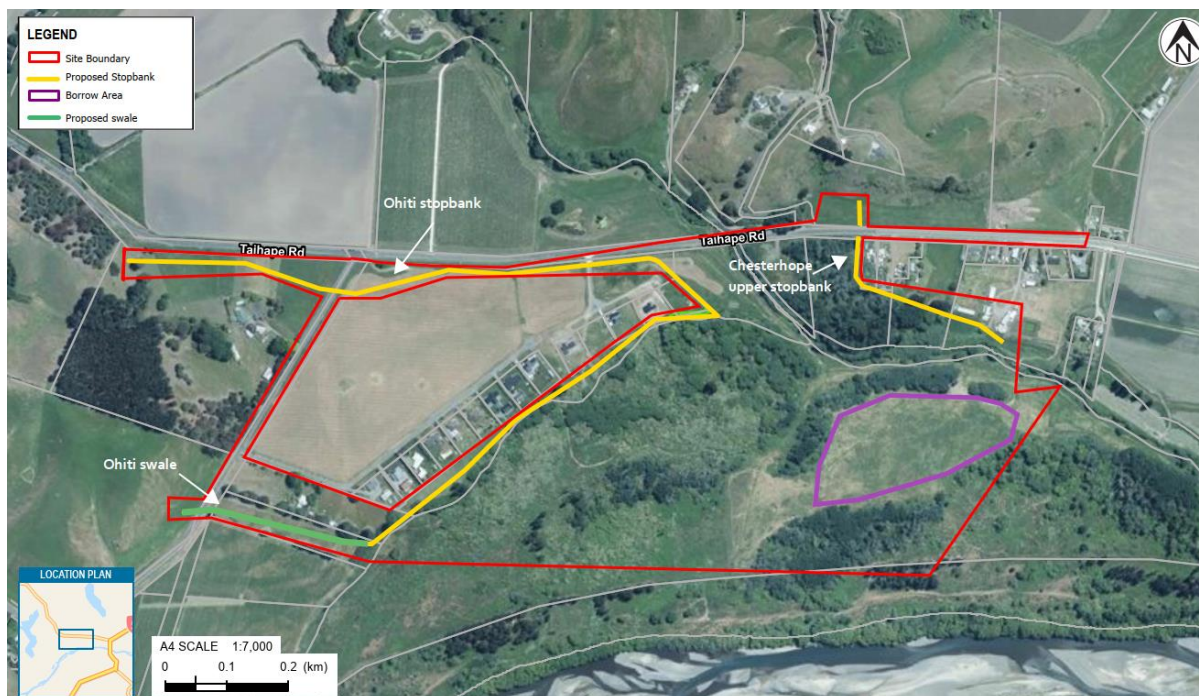


Figure 1.2: Current plan for the Ohiti/Chesterhope upper stopbanks and borrow area.

As shown in Figure 1.2, the works will include:

- The 'Ohiti stopbank' is approximately 1,720 m in length and is located adjacent to Taihape and Ohiti Roads, Omahu and runs along the eastern boundary of 203 to 209 Taihape Road and 23 to 31A Ohiti Road.
- A swale approximately 320 m in length along the southern boundary of 39 Ohiti Road.
- The 'Chesterhope upper stopbank' is approximately 390 m in length and runs perpendicular to Taihape Road, to the east and north of Ohiwa Stream.
- The 'Borrow area' is approximately 50,000 m<sup>2</sup> in area and is located in between Ohiwa Stream and Ngaruroro River, east and south of the Ohiti and Chesterhope upper Stopbanks respectively. Soil from the 'Borrow area' will be excavated and used to construct the stopbanks.

HBRC has been granted an Order in Council (OIC) to reduce the regulatory pathways for the flood mitigation works, following Cyclone Gabrielle. The OIC replaces the typical consenting pathway under the district and regional plans. The OIC includes a specific contaminated land related condition:

- **Condition 17: Works on contaminated land**, Outlines site management plan requirements. *Note: the condition requires all practicable measures must be taken to prevent the discharge of soil and stormwater from contaminated land to watercourses – if this won't apply, then the effects of any discharge from contaminated land will need to accompany the resource consent application to justify a change to this condition.*

The past land uses at the site may have included activities which have the potential to cause ground contamination. These activities are defined by the MfE on the Hazardous Activities and Industries List (HAIL<sup>5</sup>). If an activity or industry on the HAIL is, has, or is more likely than not to have occurred on a site, the NESCS will apply to any proposed soil disturbance and land development activities. If the NESCS applies to the site, the OiC contaminated land provisions will apply to the proposed stopbank construction works.

T+T completed a PSI for the proposed stopbank in May 2025. The purpose of the PSI was to assess whether HAIL activities have occurred or may have occurred along the alignment, and the potential for these activities to have resulted in ground contamination. The PSI identified confirmed and potential HAIL activities and ground contamination was unlikely to present a significant constraint to the proposed stopbank development. However, further investigation was required in areas where soil disturbance was proposed to assess risks to human health associated with potential HAIL activities. T+T undertook additional the soil investigations in May 2025.

## 1.2 Objective and scope of works

The objective of this investigation was to identify activities within the proposed Ohiti and Chesterhope upper Stopbank project area that may have resulted in ground contamination, and assess the likelihood, magnitude, and extent of any contamination as a result of those activities. These activities are defined by the MfE in the HAIL. Ultimately, this investigation aimed to identify whether the NESCS regulations apply to the site and, if so, whether the OiC contaminated land provisions apply<sup>6</sup> to the proposed stopbank construction works.

The assessment comprised two stages, a primarily desk based PSI including preliminary soil sampling and DSI works including additional targeted soil sampling. The scope for each stage is outlined below:

### PSI Stage

- Review of geological information for the site and wider area.
- Review of historical aerial imagery from the Hastings District Council (HDC) online GIS viewer and available from Retrolens and Google Earth.
- Review HBRC and HDC information relating to existing consents held for the site and adjacent areas.
- Review the HBRC's online hazard portal for HAIL information.
- Site walkover inspections in May 2024 and February 2025.
- Collection and testing of a soil sample and a suspected bulk asbestos containing material (ACM) in May 2024.

### DSI Stage

- The DSI works were undertaken to refine the ground contamination implications identified in the PSI. The DSI investigations included collection and laboratory analysis of 31 surface soil samples and two deeper soil samples to target sources of potential contamination<sup>7</sup> identified in the PSI.
- The results of laboratory testing were assessed against land use based human health assessment criteria and environmental criteria.

<sup>5</sup> Ministry for the Environment, 2011. *Hazardous Activities and Industries List (HAIL)*.

<sup>6</sup> The OiC defines contaminated land as land where the NESCS regulations apply.

<sup>7</sup> Former orchard, burn barrels, miscellaneous building debris stockpiles, miscellaneous storage, chemical storage and suspected ACM buildings.

- Preparation of this DSI report, amending the PSI report to document the PSI and DSI concurrently.

## 2 Site description

### 2.1 Location and legal description

For the purpose of this investigation, 'the site' is defined as the proposed Ohiti Stopbank and Chesterhope upper Stopbank footprint, borrow area and associated activities where construction activities will be undertaken during the development. Associated construction activities include vegetation clearance and roading works. The site area is shown on Figure 1.1.

The Ohiti Stopbank is located south of Taihape Road at the intersection with Ohiti Road. The site extends across several public and privately owned properties, as listed in Table 2.1 below.

The Chesterhope upper Stopbank is located east of the Ohiwa Stream and extends along several privately owned properties to the north and south of Taihape Road.

The Ohiwa Stream, with vegetated stream margins, extends from north to east through the north-east portion of the site. The site is classified as a combination of 'Rural' and 'Plains Production' zones under the HDC District Plan.

**Table 2.1: Property descriptions for Ohiti Stopbank**

Address	Legal description	Record of Title
Portion of 18-20 Ohiti Road.	Omahu 2C1B Block	HBH2/1167
Portion of property on eastern side of Ohiti/Taihape Road intersection. No street address.	Lot 10H PT Omahu 2C1C Block ML 529320	889918
Portion of property south and north of 203-209 Taihape Road and 23-39 Ohiti Road. No street address.	Lot 10N PT Omahu 2C1C Block ML 585802	1202180
Portion of property adjacent to 203 Ohiti Road. No street address.	Lot 10C Pt Omahu 2C1C Block ML 506974	778563
Portion of 39 Ohiti Road.	Lot 1 DP 6309, Lot 1 DP 7904	HB93/137, HB127/25
Portion of property west of Ohiti Road, opposite 39 Ohiti Road. No street address.	Lot 1 DP 472466	644382
Properties along Ohiwa Stream and Ngaruroro River. No street address.	Part Omahu 2C1C Block	No title
	Section 1 SO Plan 497236	856995
	Section 1 SO 10700	No title

**Table 2.2: Property descriptions for Chesterhope upper Stopbank**

Address	Legal description	Record of Title
151 Taihape Road.	Omahu 2D5E2 Block	409027
131 Taihape Road.	Omahu 2D5B2B2 Block	HBC3/397
Portion of property north of Taihape Road, opposite 157 Taihape Road. No street address.	Lot 4 DP 460685	604370
157 Taihape Road.	Omahu 2D5F2A Block	451226
Properties along Ohiwa Stream No street address.	PO, 1/1, Omahu 2D5F2B Block	456164

## 2.2 Site condition

A site walkover inspection was undertaken on 8 May 2024 and on 28 February 2025 under the supervision of a contaminated land specialist. The inspection focused primarily on the proposed Otihi stopbank and Chesterhope upper stopbank locations where potential HAIL activities were identified in the desktop study. Potential HAIL activities were not identified in the borrow area. The purpose of the walkover was to gather general information on topography and land use (both on site and the surrounding area) as well as making observations for evidence of potential ground contamination. Relevant observations made at the time of the inspection are summarised below. Key site features are shown on Figure A.1 (Appendix A) and selected photographs comprise Appendix B.

The site is currently used for agricultural and rural residential purposes. Key features and their location identified during the inspections are as follows:

- The area on the east side of Ohiwa Stream is currently being used as a laydown area with large stockpiles (approximately 900 m<sup>3</sup>) of gravels adjacent to the proposed stopbank alignment. There are also several stockpiles around the perimeter of the laydown area that contain silt material, gravels and miscellaneous building debris (including concrete, brick and timber). This is assumed to have originated from the Cyclone Gabrielle flood response. Separate small piles of both scrap metal and old tyres were also observed in this area. These stockpiles were observed to be overgrown in February 2025 (Photograph Appendix B.1 to Photograph Appendix B.5).
- A sign noting the use of pest (possum) control poison was observed on the eastern most paddock of the site (Photograph Appendix B.6). The sign was outside the proposed stopbank alignment.
- A large stockpile of silt material containing miscellaneous building debris was observed behind the property at 203 Taihape Road within a gully on the proposed stopbank alignment. The pile also extended along the adjoining paddock and covered an area of approximately 350 m<sup>2</sup> (the total volume of the stockpile is unclear as the gully was inaccessible at the time of the site walkover and therefore, the depth is unconfirmed). The stockpile contained concrete, brick, timber, tiles, plastic, wire and two visible fragments of fibreboard (suspected ACM). A bulk sample of this was collected (OH Bulk 01). Refer to Photograph Appendix B.7 to Photograph Appendix B.10 within Appendix B.
- Evidence of soil disturbance due to vehicle tracking to the stockpiling area, was observed in the paddock next to 203 Taihape Road, several pieces of exposed geofabric were seen across the area (Photograph Appendix B.11).

- Miscellaneous storage on unsealed ground was observed at 157 Taihape Road, along the stopbank alignment. Miscellaneous storage included timber, car bodies, temporary buildings, glass doors, a poor condition caravan, a steel drum and apparently empty intermediate bulk containers (IBC) (Photograph Appendix B.15). A suspected ACM clad shed is present at the rear of the property (Figure Appendix B.16). The suspected asbestos was observed to be in poor condition.
- A large approximately 30 m long and 2 m high stockpile of wood and branches with some metal was present along the western boundary of 151 Taihape Road, adjacent to the proposed stopbank alignment (Photograph Appendix B.18). 151 Taihape Road was generally overgrown.
- The rear of the property at 131 Taihape Road appears to have been used for dairy milking with a milking shed and other farm buildings. Suspected asbestos cladding was identified on two buildings adjacent to the proposed stopbank alignment. The suspected asbestos was observed to be in poor condition. A water pump and surface water body were present south of the milking shed. Several small (< 10 L) containers of what appeared to be argi-chemicals and rodent poison were stored on the concrete floor of the shed, and an IBC with unidentified dark coloured liquid at 131 Taihape Road. A potential dairy effluent storage pond was present in the eastern portion of 131 Taihape Road, outside of site boundary. Refer to Photograph Appendix B.19 to Photograph Appendix B.23 in Appendix B.
- A flood damaged shed constructed from wood cladding with an iron roof is present behind 109 Taihape Road (Photograph Appendix B.24). The shed is along the stopbank alignment.
- A portion of property parcel Lot 1 DP 7904 south of 203 and 209 Ohiti Road, and 23 and 37 Ohiti Road is used for a variety of uses including a chicken enclosure, vegetable gardens and storage of building materials and vehicles. Two burn barrels were observed on 28 February 2025. Refer to Photograph Appendix B.25 to Photograph Appendix B.28. The proposed stopbank alignment is through this area.
- The property parcel south of 39 Ohiti Road has large burn stockpiles at the front of the property near Ohiti Road. This property parcel is on the proposed stopbank alignment. The stockpiles comprise of wood/trees, old doors and suspected asbestos containing materials (Photograph Appendix B.29 and Photograph Appendix B.30). Charcoal fragments from previous burn piles were observed (Photograph Appendix B.31). Beehives occupied the southern portion of the property parcel (Photograph Appendix B.32).

### 2.3 Surrounding land use and environment

The land uses in the surrounding area include:

- North – Taihape Road, with agricultural/rural residential properties, vineyards, Kautuku Swamp, Lake Pataka, and Lake Oingo beyond.
- South – River reserve and Ngaruroro River with vineyards to the southwest.
- East – Rural residential and agricultural/horticultural properties.
- West – Rural residential and agricultural properties with Lake Runanga beyond.

### 3 Geology and hydrology

#### 3.1 Geology

##### 3.1.1 Published geology

The published geology of the area<sup>8</sup> shows that the site is underlain by Holocene River Deposits comprising of well sorted, rounded, fine to coarse gravels from the Heretaunga Formation, as shown in Figure 3.1 below.

##### 3.1.2 Previous investigation

A T+T geotechnical investigation was completed in March 2024 comprising of bore holes (maximum depth of 15.45 m below ground level (bgl)), hand augers (maximum depth of 2.4 m bgl) and test pits (maximum depth of 3.3 m bgl) along the proposed stopbank alignment, along Taihape Road. The investigation found that the near surface geology (beneath topsoil) comprised sand in the Ohiwa Stream area and also south-west of site, while the remainder of the surface geology comprised silt. The intrusive investigation found no indication of fill containing anthropogenic material or other evidence of ground contamination.

Further information regarding the site geology can be found within the T+T geotechnical factual report<sup>9</sup> and in Section 6.3 below.

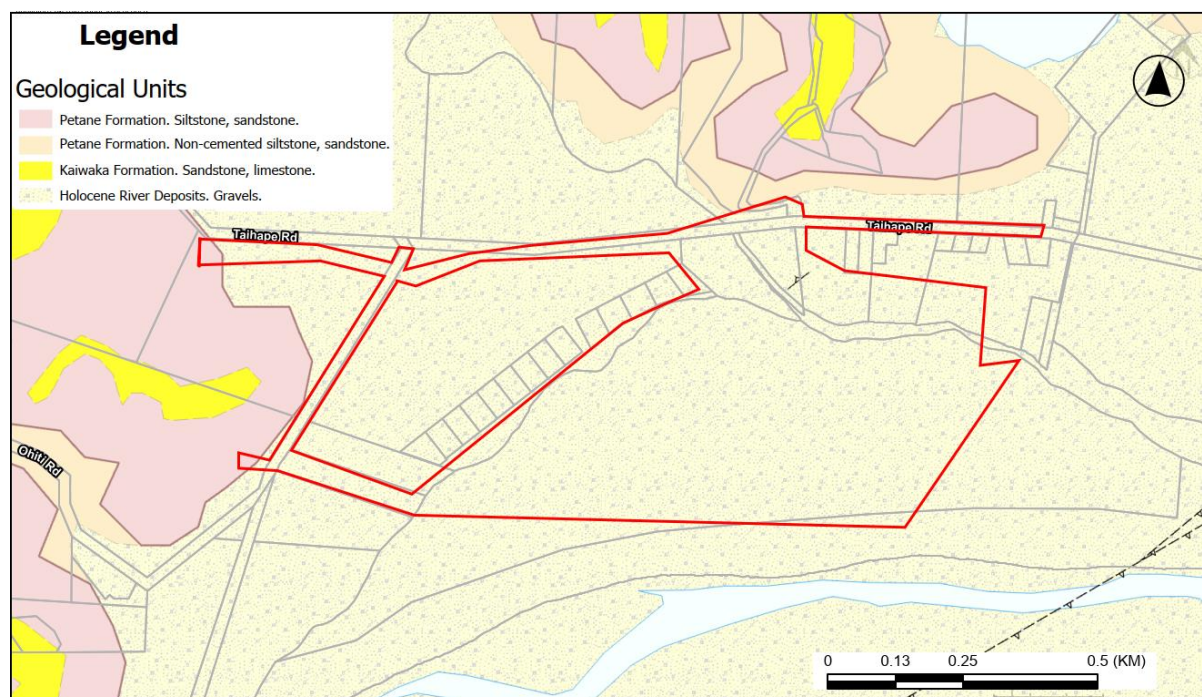


Figure 3.1: Published geology of the Ohiti Road Stopbank site area (source Lee J.M., et al) as per footnote.

<sup>8</sup> Lee J.M., Begg J.G., Bland K.J. 2020. NZL GNS GM7 Geology and Geomorphology of the Napier-Hastings Urban Area. Lower Hutt, NZ: GNS Science. GNS Science geological map.

<sup>9</sup> Tonkin & Taylor Ltd, March 2024. Ohiti Road, Omahu Stopbanks and Streamworks Design Factual report.

### 3.2 Hydrogeology and hydrology

Boreholes and test pits completed as part of the prior geotechnical investigation encountered groundwater ranging from 1.0 m bgl on the western side of site to 3.7 m bgl on the east of the site, generally following site topography.

The review of GNS national water table<sup>10</sup> suggests that surface water and shallow groundwater flows from west to east, most likely towards the Ngaruroro River, approximately 300 m southwest of the site, before ultimately discharging to the South Pacific Ocean, located 17 km east of the site (refer Figure 1.1).

There are three mapped groundwater wells within the site<sup>11</sup> and eight mapped upgradient groundwater wells surrounding the site. The use of the groundwater is likely for horticultural and agricultural use.

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<sup>10</sup> GNS Science. (2018). National water table model [Dataset]. GNS Science. <https://doi.org/10.21420/KZ52-NT28>.

<sup>11</sup> HBRC [Well Information](#). Accessed on 31 March 2025.

## 4 Site history

Historical information relating to the site has been collected from a variety of sources including the contamination register information from the HBRC, historic aerial photographs, and prior investigations. This history focuses on on-site activities, except for the aerial photograph review where comments are also provided on readily observable surrounding land use. The information reviewed is summarised in Appendix C.

In summary, the site has been predominantly occupied by rural and rural residential land uses for at least the past 75 years. The proposed borrow area was a river channel and flood plain of the Ngaruroro River. A section of this area was cleared of vegetation and converted into grazing pasture in the late 1960s. The proposed borrow area appears vacant and unchanged since the early 2000s.

An orchard or vineyard was present within the south-western portion of the site (property parcel south of 39 Ohiti Road) between the early 1970s to the late 1980s, and piles of material which appear to be green waste and/or timber with suspected asbestos fragments, have since been present in the area. During the February 2025 site walkover, charcoal fragments were identified on the ground confirming that burning had occurred previously. Recent geotechnical investigations along Taihape Road found no indication of fill containing anthropogenic material or other evidence of ground contamination. However, stockpile material including building debris, scrap metal and construction waste are present in the north-western portion of the site.

The properties along Taihape Road were constructed from the 1950s and appear to have a mixture of land uses. 131 Taihape Road appears to have been used for milking with supporting farming buildings for milk storage and an effluent pond from the late 1970s with the apparent construction of a stockpen and a dairy circle was constructed in the 1990s. The rear of 157 Taihape Road has been used for miscellaneous storage since early 2010. In the 2023 aerial photograph, several vehicles and small structures have been added to 157 Taihape Road.

## 5 Potential for ground contamination

Based on the review of historic information for the site, as well as the site walkover, there are activities associated with the site that have the potential to cause ground contamination. The inferred locations of these activities are presented on Figure A.1 within Appendix A.

The activities, potential contaminants, and an assessment of the potential magnitude of the effects are presented in Table 5.1, along with corresponding soil investigation location.

**Table 5.1: Potentially contaminating activities**

Land use/activity	Potential contaminants	Magnitude, possible extent, and likelihood of contamination	HAIL reference	Soil investigation location
Stockpiled material containing construction debris and other waste.	Unknown but a broad range of contaminants possible depending on where material originated. Typical contaminants expected to be metals and asbestos. If it originated from a pre-2000s building.	This has occurred in isolated pockets behind 203 Taihape Road and around the perimeter of the laydown area. Construction debris including concrete, brick, timber, tiles, plastic, wire and fragments of potential ACM were observed in the stockpile behind 203 Taihape Road. The result of the preliminary soil sample collected from the stockpiled material behind 203 Taihape Road indicate the presence asbestos and elevated concentrations of lead and zinc in the stockpile, both of which were found to be below human health criteria (refer to Section 6). Further soil sampling is required to confirm there is not a human health risk.	Potential HAIL I – <i>Only if the land was subject to intentional or accidental release of a hazardous substance in sufficient quantity to be a risk to human health or the environment.</i>	OH_SS_01, SS15-SS19
Orchard/vineyard use and possibly spray use for pastoral weed control.	Metals (As, Cu, Pb); wide range of organic compounds including acidic herbicides, organophosphates, and OCPs.	A former vineyard or orchard area has been identified in historic aerial images at the location of the southern area of the Ohiti Stopbank. There is potential for contamination of soils where use of pesticides/herbicides has occurred. Associated contamination is expected to be confined to near surface soils (typically to 400 mm depth) and would be most highly concentrated around chemical storage or mixing areas (none identified on site).	HAIL A.10 – <i>Persistent pesticide use or storage including market gardens and orchards.</i>	SS1-SS12

Land use/activity	Potential contaminants	Magnitude, possible extent, and likelihood of contamination	HAIL reference	Soil investigation location
Burning of waste material.	Dependant on original waste composition, could contain; heavy metals (particularly copper, chromium, and arsenic if treated timber has been burned), hydrocarbons, and asbestos.	Burning of waste piles has occurred in the area of the former orchard or vineyard, at 39 Ohiti Road and in burn barrels located south of 203 and 209 Ohiti Road, and 23 and 37 Ohiti Road (Southern Ohiti Stockpile area). The waste piles appeared to contain green waste, timber (pallets) and potentially plastic within Google Street View images between 2008 and February 2024. The February 2025 site walkover identified suspected asbestos fragments in the stockpile. There is potential for contamination of underlying shallow soils.	Potential HAIL I – <i>Only if the land was subject to intentional or accidental release of a hazardous substance in sufficient quantity to be a risk to human health or the environment.</i>	HA2, HA4, SS13 and SS14
Chemical storage in shed at 131 Taihape Road	Variable depending on chemical storage likely heavy metals (As, Cu, Pb) and pesticides such as organochlorine pesticides (OCPs) contaminants associated with agricultural land use. Potential hydrocarbons stored in the IBC.	Any potential contamination from this source would most likely have resulted in minor spills or leaks and hence would be expected to be confined to the hazardous goods storage area in the shed and around the IBC.  The shed has a concrete pad limiting the potential for impacts to underlying soils. Thus, OCP analysis was not undertaken for SS28.  The IBC is stored on unsealed ground with a dark coloured liquid. If a spill had occurred, the shallow soils beneath the IBC could be impacted.	A17 – Storage tanks or drums for fuel, chemicals or liquid waste.	SS28
Miscellaneous storage at 157 Taihape Road	A range of contaminants are possible depending on the items stored, but metals, hydrocarbons and asbestos are common.	157 Taihape Road is used for the storage of miscellaneous items on unsealed ground, including timber, car bodies, temporary buildings, glass doors, steel drum and empty IBCs.  There is potential for contamination of underlying soils from this storage. Contamination could be relatively widespread across this area but is expected to be limited to surface soils.	Potential HAIL I – <i>Only if the land was subject to intentional or accidental release of a hazardous substance in sufficient quantity to be a risk to human health or the environment.</i>	SS20-SS25

Land use/activity	Potential contaminants	Magnitude, possible extent, and likelihood of contamination	HAIL reference	Soil investigation location
Buildings constructed with Asbestos Containing Materials (ACM)	Asbestos as fibres, fines or fragments.	<p>Ancillary farm structures (sheds and garages) were constructed on the site when use of asbestos-containing building materials was common (roofing, cladding, soffits etc.). Suspected asbestos building materials were identified at 131 Taihape Road and 157 Taihape Road.</p> <p>If asbestos contamination occurs, it is most likely to reside in the shallow soils in 'halos' immediately around the buildings, unless mobilised by soil disturbance or water runoff.</p> <p>Furthermore, due to the period in which the site was developed, it is possible that underground services (current or redundant) are comprised of ACM.</p>	Activity E1 Asbestos products manufacture or disposal, including sites with buildings containing asbestos products known to be in a deteriorated condition.	SS24-SS27

## 6 Soil sampling

Intrusive investigations were undertaken on 8 May 2024 and 22 May 2025. Overall, the investigation involved observations and soil sample collection from 31 surface locations and two deeper soil samples (HA2 and HA04).

The sample locations, together with the proposed stopbank and enabling areas, area presented in Figure A.2 to A.6, Appendix A.

### 6.1 Rationale

The objective of the May 2024 sampling was to undertake a preliminary assessment of potential contaminant concentrations in soils where a stockpile of building debris was observed during the site walkover (behind 203 Taihape Road, the eastern portion of the proposed Ohiti Stopbank) that may be disturbed as part of the development of the stopbank. A sample of fibre cement sheeting, potentially ACM, was also collected from within the stockpile.

One soil sample was analysed for heavy metals, and one potential ACM fragment was tested.

The purpose of the May 2025 additional soil sampling was to further assess potential contamination risks identified in the PSI and inform management and offsite disposal options as part of the works. The sample locations and analysis are summarised below.

- 12 soil samples (SS1-SS12) were collected on an approximately 30 m by 30 m grid basis at the former orchard south of 39 Ohiti Road (Figure Appendix A.2). All 12 samples were analysed for OCPs, and six samples were analysed for heavy metals.
- Two surface soil samples and two deeper samples (0.1-0.4 m bgl) were positioned to target the presence of buried waste in burning areas identified in the former orchard (Figure Appendix A.2). Four samples were analysed for TPH. The two surface samples were also analysed for heavy metals, PAH and semi-quantitative asbestos.
- Two targeted surface soil samples were collected beneath the burn barrels behind 203-209 Ohiti Road (Figure Appendix A.3). The two samples were analysed for heavy metals, PAH and TPH.
- Five sample locations were collected from the stockpiled material to the rear of 203 Ohiti Road (Figure Appendix A.4). The sampling density was collected above the recommended density for stockpiled material specified in the NZ Asbestos in Soil Guidelines<sup>12</sup> (14 samples per 1,000 m<sup>3</sup> of stockpiled material). The samples were analysed for semi quantitative asbestos and heavy metals.
- Six surface soil samples collected on an approximately 10 m by 10 m grid basis at the miscellaneous storage at the rear of 157 Taihape Road (Figure Appendix A.5). Six samples were analyzed for heavy metals and PAH. Of the six samples, two were collected within the halo of the potential ACM building. These two samples were also analyzed for semi-quantitative asbestos.
- Two targeted surface soil samples around the potential ACM building halo at 131 Taihape Road (Figure Appendix A.6). The soil samples were tested for semi-quantitative asbestos.
- One targeted surface soil sample around the fuel storage IBC at the rear of 131 Taihape Road (Figure Appendix A.6). The soil sample was analyzed for heavy metals, PAH and TPH.

<sup>12</sup> BRANZ, 2024. New Zealand Guidelines for Assessing and Managing Asbestos in Soils.

- **TCLP and SPLP (leachability) analysis**<sup>13</sup> was scheduled for three samples that recorded elevated contaminants above the Class A landfill criteria.

We consider investigations carried out at the site to date constitute a DSI to a scale and degree of detail commensurate with the potential effects associated with the current development proposal.

## 6.2 Soil sampling procedure

Sampling was undertaken on 8 May 2024 and 22 May 2025 by T+T in general accordance with the requirements of the NESCS and CLMG No. 5<sup>14</sup>, using the following procedure:

- Freshly gloved hands, and a hand-trowel, were used to collect samples with the soil sample collected from the surface soils (from a depth of approximately 0.0-0.1 m bgl). Deeper samples (0.1-0.4 m bgl) were collected directly from the hand auger.
- Samples were placed into laboratory supplied sample containers.
- The trowel and hand auger were decontaminated prior to sample collection using clean water and Decon 90 (a phosphate-free detergent).
- Samples were delivered to IANZ accredited Analytica Laboratories and Hill Laboratory under chain of custody documentation for analysis.

## 6.3 Site observations

The following observations were made during May 2025 soil sampling:

- The soil profile at the site ranged from:
  - Topsoil near the stream and former orchard. Natural material was encountered between 0.1 m and 0.3 m bgl in the orchard.
  - Gravelly silt within the stockpiles at the rear of 203 Ohiti Road.
- Charcoal fragments were encountered at HA02 to HA04 within the burning areas of the former orchard. The charcoal fragments were encountered in topsoil (0-0.1 m bgl) and not deeper within natural soils.
- Ash and charcoal fragments were encountered at soil sample location SS14 within the burn barrel adjacent to 27 Ohiti Road.
- 11 small stockpiles were observed behind 203 Ohiti Road with each stockpile being approximately 3 m in length by 1 m in width and approximately 1 m high. The stockpiles comprised of sandy silt (inferred reworked natural material) with traces of general rubbish including glass, plastic and concrete. The estimated total volume of the stockpiles is 15 to 20 m<sup>3</sup>.
- No other visual or olfactory evidence of ground contamination was noted during sampling, including no surface staining beneath the IBC dispenser at 131 Taihape Road.

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<sup>13</sup> 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.

<sup>14</sup> Ministry for the Environment. Updated 2021. Contaminated Land Management Guidelines No. 5: Site investigation and Analysis of Soils. Ministry for the Environment, Wellington.

## 6.4 Assessment criteria

The assessment criteria were selected in accordance with the requirements of the regulatory framework:

- For the protection of human health:
  - The NESCS Soil Contaminant Standards (SCS)<sup>4</sup> for commercial/industrial use, as a proxy for outdoor workers involved in the proposed development.
  - Where NESCS SCS values have not been derived, guidance from the below documents were used, as per MfE’s “*Contaminated Land Management Guideline No. 2, Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011)*”:
    - o [Australian] National Environment Protection (Assessment of Site Contamination) Measure 1999, updated 2013.
  - Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand<sup>15</sup>, for commercial/industrial use, as a proxy for outdoor workers involved in the proposed development.
  - For asbestos in soil contamination, the criteria defined in the Asbestos-in-Soil Guidelines<sup>11</sup> have been adopted.
- For protection of environmental receptors:
  - New Zealand ecological soil guideline values (Eco-SGVs)<sup>16</sup> for commercial/industrial use.
  - Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand<sup>13</sup> for protection of groundwater quality.
- For soil disposal:
  - Predicted background concentrations specific to the area<sup>17</sup> as a proxy for acceptance of soil to cleanfill sites. Of note, the background concentration for chromium is derived from one soil sample and should be interpreted with discretion.
  - Class A landfill (Ōmarunui Landfill) soil screening criteria and leachability limits<sup>18</sup>.
- For protection of human health, ecological receptors, and water quality **on completion of the stopbank construction** (applicable for soil importation from the proposed borrow area, and soils retained on site for stopbank construction):
  - Hawke’s Bay Stopbank Construction Upper Limit for Fill Acceptance criteria (stopbank fill acceptance criteria)<sup>19</sup> and soil leachability targets to determine acceptability of soil.

<sup>15</sup> MfE, June 1999, revised 2011. Guidelines for assessing and managing petroleum hydrocarbons contaminated sites in New Zealand.

<sup>16</sup> Landcare Research, 2019. UPDATED Development of soil guidance values for the protection of ecological receptors (Eco-SGVs) – Technical document.

<sup>17</sup> Landcare Research Limited, 2016. PBC - Predicted Background Soil Concentrations, New Zealand, <https://iris.scinfo.org.nz/layer/48470-pbc-predicted-background-soil-concentrations-new-zealand/>

<sup>18</sup> MfE, 2004. *Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification*.

<sup>19</sup> Tonkin & Taylor Ltd, 2023. Upper Limits for Contaminants in Hawke’s Bay Stopbank Fill. Prepared for Hawke’s Bay Regional Council, T+T ref: 1017353.2102R v1.

## 6.5 Soil results

A summary table of the analytical results for the tested samples is included as Table Appendix D.1 in Appendix D and full laboratory transcripts are included in Appendix E. The soil results are summarised below based on the potential for contamination.

### Former orchard south of 39 Ohiti Road

- The tested samples reported concentrations below human health, environmental criteria and stopbank fill acceptance criteria.
- Concentrations of measured organic contaminants, OCPs, were all recorded below laboratory limits of reporting (LOR).
- Four of the six samples tested reported one or more heavy metal analytes (cadmium and/or copper) above predicted background criteria.

### Buried waste in burning areas identified in the former orchard

- The tested samples reported concentrations below human health and environmental criteria.
- Heavy end hydrocarbons, C<sub>15</sub>- C<sub>36</sub> were reported above the laboratory LOR in surface soil (0-0.1 m bgl) samples collected from HA2 and HA4. The concentration of C<sub>15</sub>- C<sub>36</sub> in sample HA2 0-0.1 (500 mg/kg) exceeds the stopbank fill acceptance criteria (300 mg/kg).
- Deeper soil samples (0.1-0.4 m bgl) tested for hydrocarbons were recorded below laboratory LOR. The results indicate that the elevated heavy end hydrocarbon concentrations are isolated to a small/shallow hotspot which will degrade over time. These soils are not expected to present a risk to human health or the environment.
- Concentrations of cadmium were reported above predicted background criteria in both surface soil samples.
- PAH analyte concentrations were reported below the laboratory LOR.

### Burn barrels behind 27-37 Ohiti Road

- Surface soil sample SS13, collected from the burn barrel adjacent to 37 Ohiti Road reported concentrations below human health and environmental criteria.
- Surface soil sample SS14 collected from the burn barrel adjacent to 27 Ohiti Road reported concentrations of heavy metals above human health and environmental criteria, including:
  - Arsenic concentration of 73 mg/kg marginally above the NESCS SCS commercial/industrial land use criteria (70 mg/kg) adopted to protect worker health. Considering the reported laboratory measurement of uncertainty for this sample (+/-12 mg/kg), we assess the marginal exceedance of arsenic may be below the NESCS SCS commercial/industrial land use criteria.
  - Copper concentrations (1,270 mg/kg) above the adopted environmental criteria (630 mg/kg).
- Low concentrations (within 20 mg/kg of the laboratory LOR) of heavy end hydrocarbons, C<sub>15</sub>- C<sub>36</sub>, were reported above the laboratory LOR in surface samples (0-0.1 m bgl).
- Concentrations of PAHs were all recorded below laboratory limits of reporting (LOR).
- Zinc and/or copper concentrations were reported above the Class A landfill screening criteria in both samples.

Arsenic, copper, mercury and zinc concentrations were reported above the stopbank fill acceptance criteria in sample SS14.

### Stockpiled material to the rear of 203 Ohiti Road

- The tested samples reported contaminant concentrations below human health.
- Asbestos in soil was detected in one soil sample OH\_SS01 with a concentration of loose fibres < 0.001 % w/w (weight by weight) in May 2025. Asbestos was not detected in the fibre cement sample.
- Asbestos was not detected in the five soil samples analysed in May 2025.
- Lead concentration in soil sample SS19 (720 mg/kg) exceeds the New Zealand ecological soil guideline value (280 mg/kg) for commercial/industrial land use.
- Stopbank fill acceptance criteria was exceeded for one or more analytes in four of the six samples tested. Two samples marginally exceeded the acceptance criteria for mercury which is set at the laboratory LOR. We note that no regional baseline concentration was established for mercury, due to data limitations, so the acceptance criteria is likely conservative.
- Class A landfill screening criteria for one or more heavy metals were exceeded in two (SS16 and SS19) of the six soil samples tested.
- Five of the six samples tested reported heavy metal concentrations above predicted regional background concentrations.

### Miscellaneous storage at the rear of 157 Taihape Road

- Five of the six tested samples reported concentrations below human health and environmental criteria.
- Surface soil sample SS24 reported concentrations of heavy metals above human health and environmental criteria, including:
  - Arsenic concentration of 260 mg/kg above the NESCS SCS commercial/industrial land use criteria (70 mg/kg) adopted to protect worker health.
  - Arsenic (260 mg/kg), lead (1,440 mg/kg) and zinc (950 mg/kg) concentrations above the adopted environmental criteria (100 mg/kg, 100 mg/kg and 200 mg/kg, respectively).
- Stopbank fill acceptance criteria was exceeded for one or more analytes in three of the six samples tested. Surface soil samples SS23 (215 mg/kg) marginally exceeded the acceptance criteria for zinc (214 mg/kg) and within the laboratory reported limit of uncertainty (16 mg/kg).
- Class A landfill screening criteria for one or more heavy metals were exceeded in three (SS23, SS24 and SS25) of the six soil samples tested.
- Low concentrations of PAHs were reported above laboratory LOR in soil samples SS24 and SS25.

### Potential ACM building halo at 157 Taihape Road

Asbestos was not detected in soil samples collected within the building halo.

### Potential ACM building halo at 131 Taihape Road

- Loose asbestos fibres were detected within the two soil samples collected and tested within the shed halo. Fibrous asbestos and asbestos fines (FA/AF) were above the risk-based criteria for commercial/industrial land use ( $\leq 0.001$  % w/w).

### Fuel storage IBC at the rear of 131 Taihape Road

- Reported concentrations were below human health and environmental criteria.
- Heavy end hydrocarbons, C<sub>15</sub>- C<sub>36</sub> were reported above the laboratory LOR in soil sample SS28 with a concentration of 52 mg/kg.

- PAH concentrations were below the laboratory LOR.
- Reported zinc concentration in soil sample SS28 (300 mg/kg) exceeds the Class A landfill screening criteria of 200 mg/kg and stopbank fill acceptance criteria of 214 mg/kg.
- Concentrations of arsenic, cadmium, and zinc were reported above predicted background criteria.

#### **TCLP and SPLP (leachability) analysis**

TCLP and SPLP analysis was schedule for three samples (SS14, SS19 and SS24) which recorded elevated heavy metal contaminants above the Class A landfill screening criteria and stopbank fill acceptance criteria. The samples were selected to be representative of an individual HAIL area and in general, samples with the maximum concentrations were selected for TCLP/SPLP. The results are presented on Table Appendix D.3 and Table Appendix D.4 in Appendix D in summary:

- The TCLP results from the three samples tested were below the Class A landfill leachability limits.
- The SPLP concentrations for heavy metals were below the soil leachability targets to evaluate acceptability of fill for the stopbanks, except for lead in Samples S19 and S24.

#### **6.6 Data quality**

A quantitative measure of the variability in the results was undertaken independently of the laboratory by calculating the Relative Percentage Difference (RPD) values for contaminants in a sample collected from SS01 and their duplicates. RPD values were not calculated where analytes were below the laboratory limit of detection in both samples.

As shown in Table Appendix D.2, the RPDs were less than 6 %. This indicates that variability in sample collection, handling and analysis is unlikely to impact on the findings of this investigation.

## 7 Nature and extent of ground contamination

The site investigations have confirmed soils in some areas along the stopbank alignment have been impacted by previous land uses/activities. These have resulted in hotspots of soil contamination, including:

- Burn barrel adjacent to 27 Ohiti Road hotspot with copper and zinc concentrations which could present a risk to the environment. This contamination is likely directly from the burning of waste materials within the burn barrel. The extent of the hotspot is likely restricted to the surface soils (up to 0.2 m) beneath and with a 1 m radius of the burn barrels.
- Storage of miscellaneous items on unsealed ground at the rear of 157 Ohiti Rd, specifically a hotspot around soil sample SS24. Arsenic and zinc are present in soils at concentrations that could present a risk to human health and/or the environment. The contamination is likely limited to surface soils (0-0.2 m depth). The extent of the contamination hotspot has not been confirmed and will be dependent on the extent and duration of the items being stored on unsealed ground.
- Asbestos is present in soils around the shed at the rear of 131 Taihape Road at concentrations that could present a risk to human health (> 0.001 %w/w). Impacted soils are expected to be limited to the upper 0.1 m deep, in a 2 m halo around the shed which is considered to be the source of the asbestos in soils.

## 8 Development implications

### 8.1 General

The presence of HAIL activities within the wider site and along the stopbank alignment, as identified during this PSI investigation and confirmed in this DSI, indicates that some regulatory implications and requirements apply to the proposed development of the Ohiti Stopbank and Chesterhope upper Stopbank. These are set out below.

If development plans for the Ohiti Stopbank and Chesterhope upper Stopbank are to change and/or additional areas incorporated, this report must be reviewed and updated to reflect the updates to proposed development plans to ensure that the implication and conclusions remain valid.

The construction works for the Ohiti Stopbank and Chesterhope upper Stopbank are to be completed under the Flood Mitigation OiC, as detailed in Section 8.2.1 below.

### 8.2 Regulatory considerations

#### 8.2.1 Flood mitigation Order in Council

As detailed in Section 1.1, HBRC has been granted an OiC to reduce the regulatory pathways for the flood mitigation works, following Cyclone Gabrielle. The OiC defines contaminated land as land where the NESCS regulations apply. Because soil disturbance is proposed in areas where HAIL activities have or have potentially occurred, the NESCS regulations apply and therefore the OiC contaminated land provisions (Condition 17) are triggered for the proposed Ohiti and Chesterhope upper Stopbank construction.

Assessment against contaminated land related rules of the regional and district plans is therefore not required because the OiC sets out standardised conditions and matters of controls to be addressed, as follows:

#### **Condition 17 Works on contaminated land**

- 1 *This clause applies if the consent holder undertakes earthworks or any other soil disturbance on contaminated land.*
- 2 *The consent holder must ensure that any soil and other materials that are removed from the site and identified as being contaminated are taken to a facility legally authorised to receive soil and materials of that kind.*
- 3 *The consent holder must take all practicable measures to—*
  - a) *prevent the discharge of soil and stormwater from contaminated land to watercourses; and*
  - b) *maintain the integrity of any structure designed to contain contaminated soil or other contaminated materials; and*
  - c) *replace the soil to an erosion-resistant state at the completion of the relevant works.*

#### **Matters of control**

##### *Contaminated land (human health)*

- d) *Potential adverse effects on human health from disturbance or use of contaminated soil.*
- e) *Measures to avoid, remedy, or mitigate those effects, including—*
  - i. *posed by contaminants; and*
  - ii. *timing of remediation; and*
  - iii. *standard of remediation on completion of works.*

A Contamination Site Management Plan (CSMP)<sup>20</sup> has been prepared to address the requirements of Condition 17 and manage potential adverse effects on human health and the environment during and on completion of the stopbank construction. Condition 7(3) (e (ii)) requires that procedures for the management of hazards from the discharge of any contaminant are included in the Construction Environmental Management Plan (CEMP), which is required by Condition 10 of the OiC. Therefore, we recommend that the CSMP forms an appendix to the CEMP.

### 8.3 Health and Safety at Work (Asbestos) Regulations

The Health and Safety at Work (Asbestos) Regulations (2016)<sup>21</sup> were enacted on 4 April 2016, herein referred to as the Asbestos Regulations.

In order to help achieve compliance with the Asbestos Regulations, WorkSafe New Zealand has prepared an Approved Code of Practice (ACoP): Management and Removal of Asbestos (September 2016). The ACoP refers readers to the “New Zealand Guidelines for Assessing and Managing Asbestos in Soil” (herein referred to as the Asbestos-in-Soil Guidelines<sup>12</sup>) which were published in November 2017 and updated in 2024 by BRANZ Ltd.

BRANZ also defines the level of oversight and controls (including personal protective equipment, decontamination, etc.) that is required to be implemented dependent on the concentration of asbestos fibres/fines or fragments that are present in the soil.

Asbestos was detected in a soil at two areas at the site and specific soil disturbance controls will be required during construction. The two areas are shown on Figure Appendix A.7, Appendix A. In summary:

- The soil sample collected from a stockpile of building debris behind 203 Ohiti Road reported asbestos below the human health risk-based criteria (0.001% w/w). Additional soil sampling was undertaken in May 2025 to meet BRANZ sampling density guidance and further assess asbestos in soils risk in the stockpiled material containing building debris. No further asbestos was detected in soil. ‘Trace asbestos contamination’ controls for the management of asbestos when disturbing the stockpiles will need to be implemented.
- The soil sample collected within the building halo at the rear of 131 Taihape Road reported a FA/AF concentration of 0.002 % w/w, above the human health risk-based criteria. ‘Low level asbestos contamination’ controls for the management of asbestos when disturbing the soil within the halos of the building will need to be implemented.

Controls for the management of asbestos will be outlined in the CSMP. If higher concentrations are encountered and the volume ACM is more than 10 m<sup>2</sup>, then licenced asbestos work and higher levels of controls may apply.

### 8.4 Other development implications

#### 8.4.1 Soil disturbance general handling requirements

Soil disturbance in two areas, stockpiles behind 203 Ohiti Road and within the building halo of 131 Taihape Road, will require additional controls for the management of asbestos.

Standard earthwork controls should be sufficient for the remainder of the site to minimise the discharge of contaminants to the environment during soil disturbance. These include but are not limited to dust control, stormwater controls, and erosion and sediment controls. Controls will be outlined in the CSMP for the site.

<sup>20</sup> T+T, July 2025. Contamination Site Management Plan. Ohiti Road stopbank.

<sup>21</sup>Ministry of Business, Innovation, and Employment, February 2016. *Health and Safety at Work (Asbestos) Regulations*.

Accidental discovery protocols and offsite disposal of contaminated soil should be included in the CSMP in the event that unexpected contamination is discovered during the works.

#### **8.4.2 Soil reuse**

The soil testing (including SPLP results) indicates that most of the soil from the site is suitable for reuse in construction of the stopbanks. However, due to the leachability potential of lead, the following is not suitable for reuse:

- Stockpiled soil at the Rear of 203 Ohiti Road.
- Near surface soils around SS24 at the rear of 157 Taihape Road.

There is no stopbank fill acceptance criteria for asbestos. If soils containing asbestos are used as stopbank fill, these will need to be used at depth and recorded in an asbestos register or disposed offsite. Soils with concentrations of FA/AF over 0.001 % w/w will require an ongoing site management plan under the NZ Asbestos-in-Soil Guideline.

#### **8.4.3 Offsite disposal of soil**

Offsite disposal of soil is not proposed. However, if soil is not suitable for reuse for the construction of the stopbanks and cannot be otherwise retained onsite, it may need to be disposed of offsite. Based on the TCLP testing undertaken, all soil is suitable for disposal at Ōmarunui landfill.

Asbestos in soil is accepted by Ōmarunui landfill. Additional controls for transportation of FA/AF above 0.001 % w/w will be required, including truck wrapping. These controls are outlined in the CSMP.

## 9 Conclusions

T+T has been commissioned by HBRC to undertake a PSI and DSI for the proposed Ohiti and Chesterhope upper Stopbank construction. The intention of the investigations was to build on the existing PSI to assess the nature and extent of contamination at the site and inform management of contaminated land during the works.

A summary of the findings is below:

- The site has been occupied by rural and rural residential use, since at least the 1950s.
- Potentially contaminating activities included in the MfE's HAIL have been undertaken on site including the presence of a potential orchard or vineyard, the burning of waste, storage of chemicals and miscellaneous storage on unsealed ground, buildings containing ACM as well stockpiles containing building debris including asbestos containing material.
- Soil sampling was undertaken to target HAIL (and potential HAIL) activities and areas where soil disturbance is proposed. Two exceedances of human health criteria were reported:
  - Arsenic concentration of 260 mg/kg above the NESCS SCS commercial/industrial land use criteria (70 mg/kg) at SS24 at the rear of 157 Taihape Road.
  - FA/AF were above the Asbestos in Soil guideline value for commercial/industrial land use ( $\leq 0.001$  % w/w) within the building halo at 131 Taihape Road.
- Environmental criteria for one or more heavy metal analytes were exceeded at two soil sample locations (SS14 and SS24).
- HBRC has been granted an Order in Council (OiC) to reduce the regulatory pathways for the flood mitigation works, following Cyclone Gabrielle. Because soil disturbance is proposed in areas where HAIL activities or potential HAIL activities have occurred, the NESCS regulations apply and therefore the OiC contaminated land provisions are triggered for the proposed Ohiti and Chesterhope upper stopbank construction.
- Asbestos specific management controls will need to be implemented during soil disturbance in two areas:
  - Trace asbestos contamination controls for the stockpile of building debris behind 203 Ohiti Road.
  - Low level asbestos contamination for soil disturbance within the building halo at the rear of 131 Taihape Road.

The asbestos specific management controls will be outlined in the CSMP.

- Soil disturbance outside of the two asbestos areas noted above can be undertaken under standard earthwork controls. Additional controls will be required where there is potential risk to the environmental (burn barrel soil sample SS14) and human health (rear of 157 Ohiti Road soil sample SS24). These controls will be outlined in the CSMP.
- Soil is suitable for reuse as stopbank construction fill, except for material from the stockpile at the Rear of 203 Ohiti Road and near surface soils around the rear of 157 Taihape Road. Soil containing asbestos would need to be used at depth and recorded in an asbestos register.
- Soil removed from site is suitable for disposal to Ōmarunui Landfill based on the TCLP testing undertaken.

## 10 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.

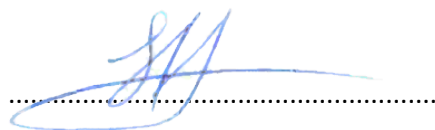
Recommendations and opinions contained in this report are based on our visual inspection and sampling of material within the proposed works area. The nature and continuity of the subsoil away from the test and sample locations is inferred but it must be appreciated that actual conditions may vary from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

We understand and agree that this report will be used by Hawkes Bay Regional Council in undertaking its regulatory functions in connection with the Ohiti Road Stopbanks works.

Tonkin & Taylor Ltd  
Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:

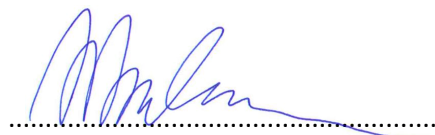


Sami Myers-Hutchings  
Contaminated Land Consultant



Tim Morris  
Project Director

Report certified by a suitably qualified and experienced practitioner as prescribed under the NESCS Users Guide (April 2012).



Alex Davies-Colley  
Senior Environmental Scientist

KAPI/SAHU  
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dsi\_final\20250724\_ohiti road stopbanks dsi\_final.docx

# Appendix A      Figure

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*Figure Appendix A.1: HAIL areas*

*Figure Appendix A.2: Soil sample location plan*

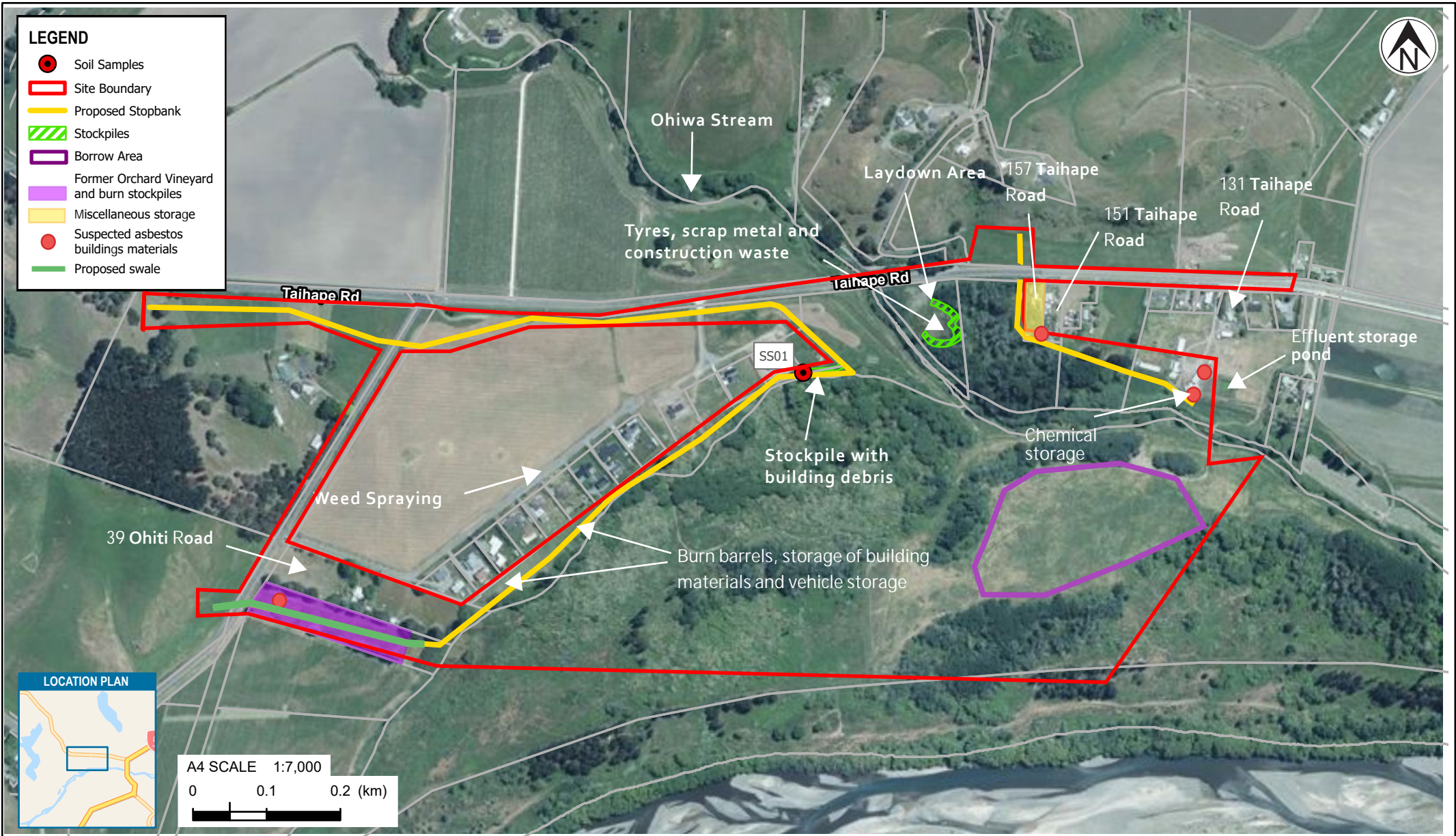
*Figure Appendix A.3: Soil sample location plan*

*Figure Appendix A.4: Soil sample location plan*

*Figure Appendix A.5: Soil sample location plan*

*Figure Appendix A.6: Soil sample location plan*

*Figure Appendix A.7: Areas of asbestos management controls*

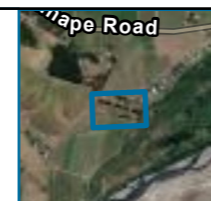


<b>NOTES:</b> aerial: NZ Navigation Map: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.	<b>REVISIONS</b>	<b>NO.</b>	<b>BY</b>	<b>PROJECT No.</b> 1017353.2402			<b>CLIENT</b> HAWKE'S BAY REGIONAL COUNCIL		
	First version (31/07/24)	0	KAPI	<b>DESIGNED</b> KAPI JUL.24 <b>DRAWN</b> SAHU JUL.24 <b>CHECKED</b> AJDC JUL.24	<b>PROJECT</b> OHITI PROPOSED STOPBANK			<b>TITLE</b> KEY SITE FEATURES	
<b>APPROVED</b>				<b>DATE</b>			<b>SCALE (A4)</b> 1:7,000	<b>FIG No.</b> FIGURE A.1	<b>REV</b> 0



NOTES: \* Soil sample collected and not analyzed.

CRS: NZGD 2000 New Zealand Transverse Mercator Credits: Hawkes Bay RC, LINZ, Hawkes Bay RC, Earthstar Geographics, Esri Community Maps Contributors, LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS



PROJECT No. 1017353.2402		
DESIGNED	SAHU	JUL.25
DRAWN	SAHU	JUL.25
CHECKED	AJDC	JUL.25

CLIENT	HAWKE'S BAY REGIONAL COUNCIL
PROJECT	Detailed Site Investigation
TITLE	Soil sample location plan



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LOCATION PLAN

APPROVED

DATE

SCALE (A3) 1:766

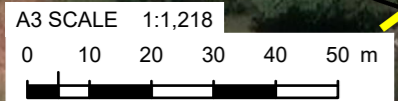
FIG No. FIGURE A.2

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**LEGEND**

- Site boundary
- Proposed stopbank
- Soil sample location



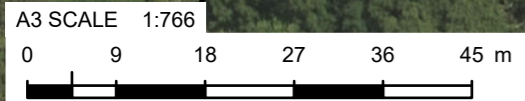
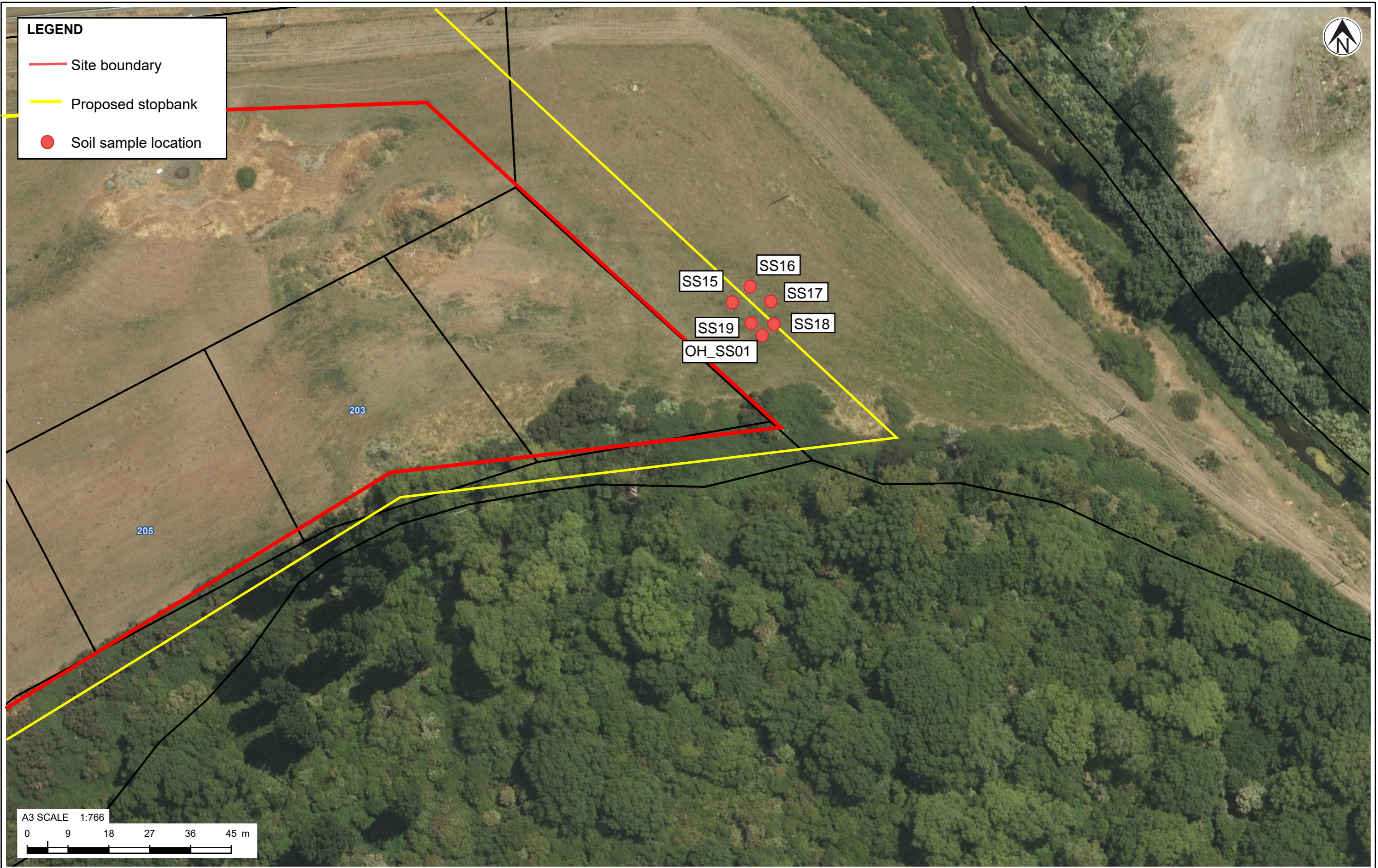
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PROJECT No. 1017353.2402		
DESIGNED	SAHU	MAR.25
DRAWN	-WEB-	MAR.25
CHECKED	AJDC	
APPROVED DATE		

CLIENT	<b>HAWKE'S BAY REGIONAL COUNCIL</b>
PROJECT	<b>Detailed Site Investigation</b>
TITLE	Soil sample location plan
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FIG No.	FIGURE A.3
REV	0



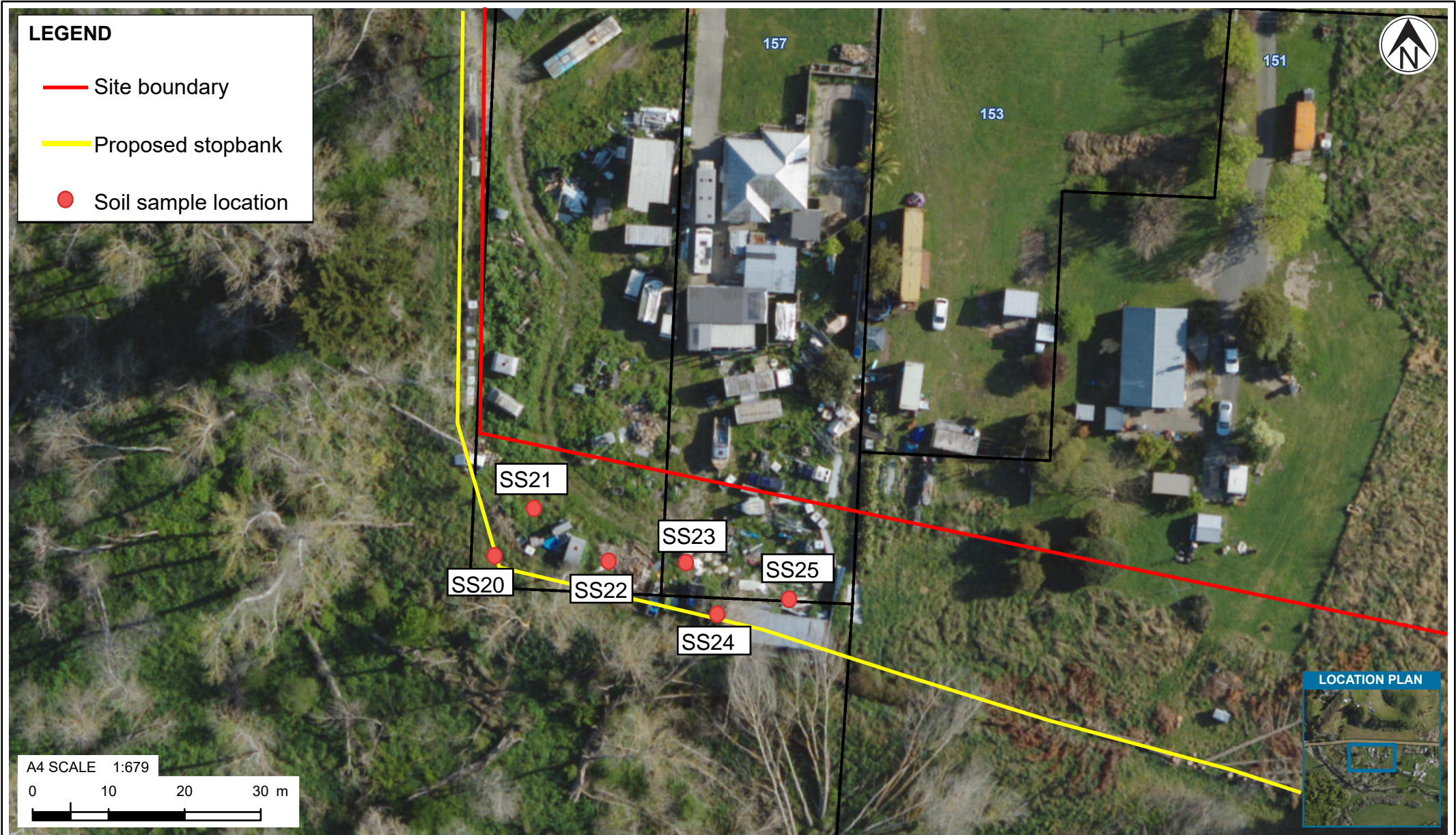
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PROJECT No. 1017353.2402		
DESIGNED	SAHU	JUL.25
DRAWN	SAHU	JUL.25
CHECKED	AJDC	JUL.25
APPROVED	DATE	

CLIENT	<b>HAWKE'S BAY REGIONAL COUNCIL</b>
PROJECT	<b>Detailed Site Investigation</b>
TITLE	Soil sample location plan
SCALE (A3)	1:766
FIG No.	FIGURE A.4
REV	0



**NOTES:**

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**PROJECT No.** 1017353.2402

<b>DESIGNED</b>	SAHU	JUL.25
<b>DRAWN</b>	SAHU	JUL.25
<b>CHECKED</b>	AJDC	JUL.24

**APPROVED** **DATE**

**CLIENT** HAWKE'S BAY REGIONAL COUNCIL

**PROJECT** Detailed Site Investigation

**TITLE** Soil sample location plan

**SCALE (A4)** 1:679

**FIG No.** FIGURE A.5

**REV** 0



**LEGEND**

- Site boundary
- Proposed stopbank
- Soil sample location

A4 SCALE 1:679

0 10 20 30 m

**LOCATION PLAN**

**Tonkin+Taylor**

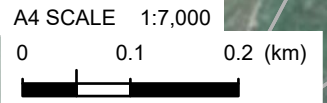
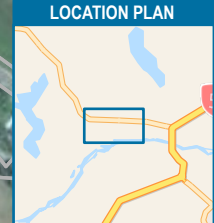
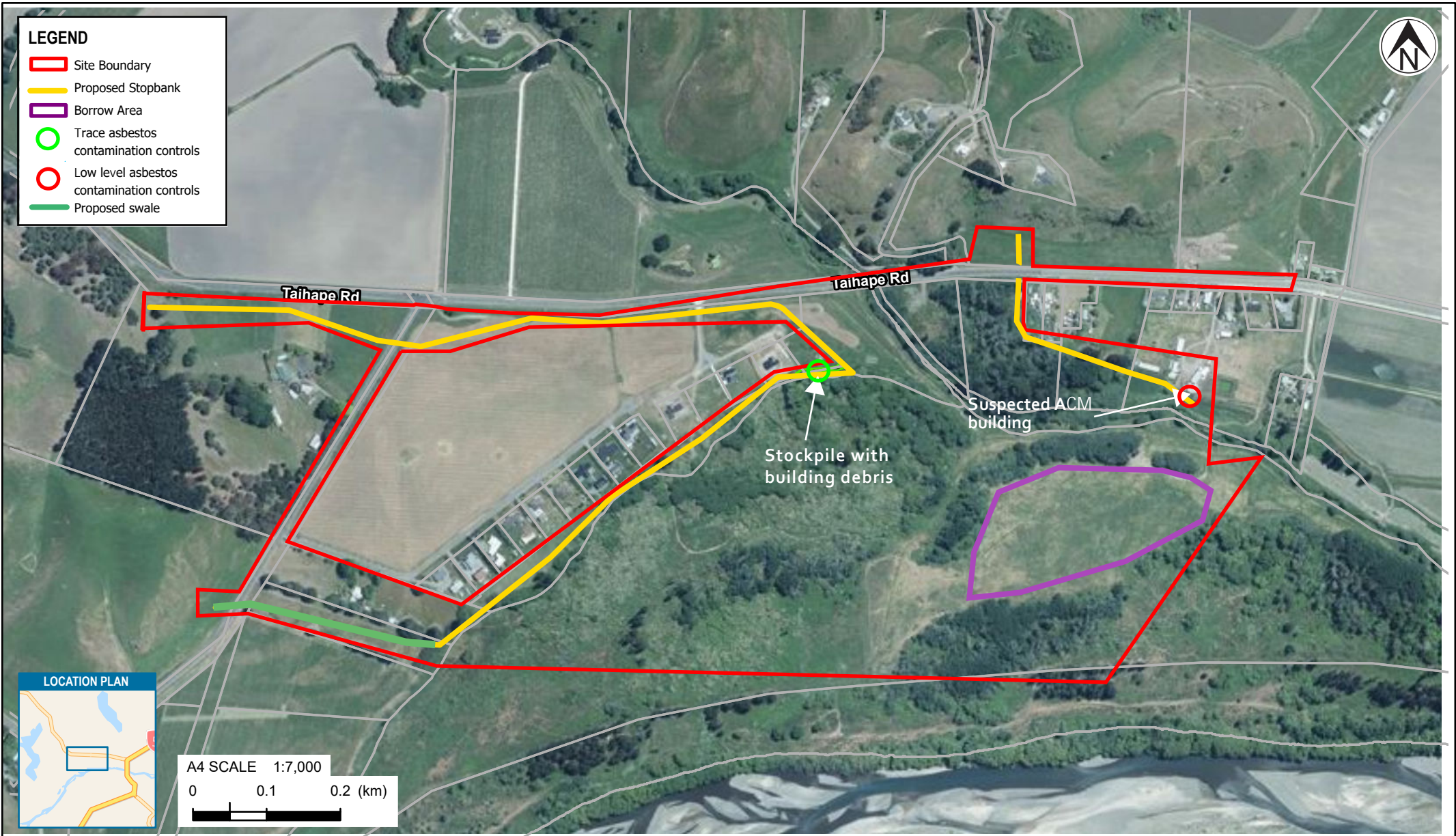
www.tonkintaylor.co.nz

Exceptional thinking together

**NOTES:**

CRS: NZGD 2000 New Zealand Transverse Mercator Credits: Hawkes Bay RC, LINZ, NIWA, Esri Community Maps Contributors, LINZ, Stats NZ, Esri, TomTom, Garmin, METI/NASA, USGS, LINZ, Stats NZ, Esri, TomTom, Garmin, METI/NASA, USGS, Hawkes Bay RC, LINZ, LINZ, NIWA

<b>PROJECT No.</b> 1017353.2402			<b>CLIENT</b> HAWKE'S BAY REGIONAL COUNCIL		
<b>DESIGNED</b>	SAHU	JUL.25	<b>PROJECT</b>	<b>Detailed Site Investigation</b>	
<b>DRAWN</b>	SAHU	JUL.25			
<b>CHECKED</b>	AJDC	JUL.24			
<b>TITLE</b> Soil sample location plan			<b>SCALE (A4)</b> 1:679		
<b>APPROVED</b>			<b>FIG No.</b> FIGURE A.6.		<b>REV</b> 0



**NOTES:**  
aerial: NZ Navigation Map: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.

REVISIONS	NO.	BY
First version (31/07/24)	0	KAPI

PROJECT No. 1017353.2402		
DESIGNED	KAPI	JUL.24
DRAWN	SAHU	JUL.24
CHECKED	AJDC	JUL.24

CLIENT	<b>HAWKE'S BAY REGIONAL COUNCIL</b>
PROJECT	<b>OHITI PROPOSED STOPBANK</b>
TITLE	Areas of asbestos management controls

## Appendix B Site photographs

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*Photograph Appendix B.1: Stockpile of gravel on the eastern banks of the Ohiwa Stream, looking west on 8 May 2024.*



*Photograph Appendix B.2: Stockpile of tyres and scrap metal, located on the eastern portion of the site on 8 May 2024.*



*Photograph Appendix B.3: Stockpile of tyres and scrap metal, located on the eastern portion of the site on 28 February 2025.*



*Photograph Appendix B.4: Stockpile of asphalt/bitumen located on the eastern portion of the site on 28 February 2025.*



Photograph Appendix B.5: Stockpiles of silt around the perimeter of the laydown area, located at the eastern portion of the site, looking southwest on 8 May 2024.



Photograph Appendix B.6: Hazard sign that outlines the pest control on site. Located on the west side of Ohiwa Stream, looking south on 8 May 2024.



*Photograph Appendix B.7: Stockpile of silt located at the back of 203 Taihape Road, looking east on 8 May 2024.*



*Photograph Appendix B.8: Stockpile of silt and building debris located at at the back of 203 Taihape Road, looking west on 8 May 2024.*



*Photograph Appendix B.9: Stockpile of silt and building debris located at the rear of 203 Taihape Road, looking south on 8 May 2024.*



*Photograph Appendix B.10: Location of OH\_SS\_01. Pieces of tile are visible around the sampling location and the fibre cement material sampled is visible in the top left corner of the image on 8 May 2024.*



*Photograph Appendix B.11: Exposed geofabric present in the paddock next to 203 Taihape Road on 8 May 2024.*



*Photograph Appendix B.12: Boundary of 203 Taihape Road, looking west on 8 May 2024.*



*Photograph Appendix B.13: Vineyard present north of the site, looking north across Taihape Road on 8 May 2024.*



*Photograph Appendix B.14: Looking east towards the site from the Ohiti Road and Taihape Road corner on 8 May 2024.*



*Photograph Appendix B.15: Looking northeast across 157 Taihape Road on 28 February 2025.*



*Figure Appendix B.16: Suspected asbestos board on shed at rear of 157 Taihape Road on 28 February 2025. The suspected asbestos was observed to be in poor condition.*



*Photograph Appendix B.17: Looking north across 157 Taihape Road on 28 February 2025.*



*Photograph Appendix B.18: Wood and branch stockpile with some metal at the western parcel boundary of 151 Taihape Road on 28 February 2025.*



*Photograph Appendix B.19: Suspected asbestos cladding on shed at the rear of 131 Taihape Road on 28 February 2025. The suspected asbestos was observed to be in poor condition. An assumed water pump and surface water body is present near the gate in the left of the photograph.*



*Photograph Appendix B.20: Suspected asbestos cladding on the milking shed at the rear of 131 Taihape Road on 28 February 2025. The suspected asbestos was observed to be in poor condition. An IBC with unknown dark coloured liquid is present near the gate in the left of the photograph.*



*Photograph Appendix B.21: Chemical storage within the shed at the rear of 131 Taihape Road on 28 February 2025.*



*Photograph Appendix B.22: Roofing iron stored on the ground at 131 Taihape Road on 28 February 2025.*



*Photograph Appendix B.23: Potential effluent pond east of the site boundary at 131 Taihape Road.*



*Photograph Appendix B.24: Flood damaged shed at 209 Taihape Road on 28 February 2025.*



*Photograph Appendix B.25: Building supplies and vehicles stored on the south of 209 Taihape Road on 28 February 2025.*



*Photograph Appendix B.26: Vehicles and burn barrel located on the land south of 27 Ohiti Road on 28 February 2025.*



*Photograph Appendix B.27: Burn barrel located on the land south of 209 Taihape Road on 28 February 2025.*



*Photograph Appendix B.28: Chicken enclosure located on the land south of 35 Ohiti Road on 28 February 2025. Vehicles parked in the background.*



*Photograph Appendix B.29: Property south of 39 Ohiti Road on 28 February 2025. Apparent burn piles of timber and trees with some building materials.*



*Photograph Appendix B.30: Property south of 39 Ohiti Road. Large piles of timber and trees.*



*Photograph Appendix B.31: Charcoal observed on the ground on the property south of 39 Ohiti Road indicating location of a previous burn pile.*



*Photograph Appendix B.32: Beehives on the southern portion of the property south of 39 Ohiti Road.*

# Appendix C Historical information review

## C1 Historical aerial photographs

Historical aerial photographs from Retrolens and Land Information New Zealand (LINZ) have been reviewed as stated in Table Appendix C.1. Relevant features of the site and surrounding land are summarised from each aerial photograph in Table Appendix C.1. Copies of the aerial photographs comprise Appendix F.

**Table Appendix C.1: Summary of aerial photograph review**

Date, run number, and source	Key site features	Surrounding land features
1950 Retrolens	<ul style="list-style-type: none"> <li>• The site is generally in vacant/agricultural use with occasional road and driveways.</li> <li>• The Ohiwa Stream cuts through the north-eastern section of site from north to east.</li> <li>• Majority of the southern portion of the site appears to comprise a former stream/river channel or flood plain of the Ngaruroro River. Some shrubs and trees are present in this area.</li> <li>• A small forestry block is present on the far northwest corner of site, within the property at 20 Taihape Road.</li> <li>• An area of land depression (possible former stream channel) extends through the site adjacent to Taihape Road.</li> <li>• A building is present at 153 Taihape Road.</li> </ul>	<ul style="list-style-type: none"> <li>• The surrounding area is occupied by agricultural land and rural residential properties.</li> <li>• The Ngaruroro River, and associated flood plain, is located to the south-east of the site. Ohiwa Stream flows into the Ngaruroro River to the south-east of the site.</li> </ul>
1964 Retrolens	<ul style="list-style-type: none"> <li>• Vegetation clearance of the forestry block, identified in the 1950 image, has occurred at the north-west corner.</li> <li>• The shrubs and trees have further established on the former river channel/floodplain of the Ngaruroro River within the centre of the site.</li> <li>• Additional rural residential development has occurred at 131, 157 and 153 Taihape Road.</li> </ul>	<ul style="list-style-type: none"> <li>• Additional rural residential development has occurred to the east and the west of the site.</li> <li>• A farm shed and associated stockyards have been constructed to the south of the site, adjacent to Ohiti Road. A potential sheep dip may be present within this area.</li> <li>• A steam channel within a paddock north of Taihape Road appears to have been partially filled. The paddock now appears to have been ploughed and potentially planted in stock crop.</li> </ul>

Date, run number, and source	Key site features	Surrounding land features
		<ul style="list-style-type: none"> <li>Further rural residential development, including a dwelling and an ancillary shed, has been constructed off Ohiti Road, to the south-west of the farm shed and stockyards.</li> </ul>
1969 Retrolens	<ul style="list-style-type: none"> <li>An area of flood plain of the Ngaruroro River in the south-east portion of the site appears to have been cleared of vegetation and converted into pasture for stock grazing.</li> <li>An area of disturbed soil has appeared on the south-west boundary of the site, behind what would be 207 Taihape Road. This appears to comprise a natural erosion feature associated with the adjacent hillslope.</li> </ul>	<ul style="list-style-type: none"> <li>No significant changes to surrounding area.</li> </ul>
1974 Retrolens	<ul style="list-style-type: none"> <li>The thin section of the southern portion of the site that extends west across Ohiti Road has been planted in rows. The resolution of the image does not allow for confirmation of what has been planted although the nature of the rows indicates it may be vineyard or orchard.</li> <li>Further growth of the vegetation has occurred on the flood plain. The area previously cleared for pasture has been extended to the west.</li> </ul>	<ul style="list-style-type: none"> <li>No significant changes to surrounding area.</li> </ul>
1977 Retrolens	<ul style="list-style-type: none"> <li>Vegetation has continued to establish across the former river channel/floodplain and on the banks of Ohiwa Stream.</li> <li>A rectangular building, likely shed, has been constructed at 131 Taihape Road.</li> <li>A potential stockpen, likely for dairy farming, has been constructed at 131 Taihape Road, east of the sheds.</li> </ul>	<ul style="list-style-type: none"> <li>The dwelling on the north side of Taihape Road (222 Taihape Road) has been demolished.</li> <li>The property to the west of the site (20 Ohiti Road) has been further developed with another new farm dwelling, a paved tennis court, shed and pool all constructed. There are also several other smaller structures or vehicles and equipment visible.</li> </ul>
1980 Retrolens	<ul style="list-style-type: none"> <li>No significant changes within the site.</li> </ul>	<ul style="list-style-type: none"> <li>A shed structure has been constructed to the rear of 39 Ohiti Road, outside of the site boundary.</li> <li>Additional sheds have been constructed at 20 Ohiti Road.</li> <li>Infilling of the stream channel to the north of Taihape Road has occurred.</li> <li>An apparent surface water body has formed east of Ohiwa Stream.</li> </ul>

Date, run number, and source	Key site features	Surrounding land features
1988 Retrolens	<ul style="list-style-type: none"> <li>The potential vineyard or orchard on the thin section of the southern portion of the site, south of 39 Ohiti Road, is no longer present.</li> </ul>	<ul style="list-style-type: none"> <li>Vineyards have been established north of Taihape Road, and to the south of the site off Ohiti Road.</li> <li>Further development has occurred on 20 Ohiti Road (to the west of site) with more smaller structures now visible.</li> <li>Further rural residential development along Taihape Road northeast of the site at 137, 139 and 143 Taihape Road.</li> <li>Soil disturbance is visible east of 131 Taihape Road indicating potential future development.</li> </ul>
1996 Retrolens	<ul style="list-style-type: none"> <li>A concrete circular pen has been constructed east of the sheds 131 Taihape Road.</li> </ul>	<ul style="list-style-type: none"> <li>No significant changes to surrounding area.</li> </ul>
2011 LINZ	<ul style="list-style-type: none"> <li>An access track has been established extending from near the Taihape/Ohiti Road intersection through to the eastern portion of the site.</li> <li>Piles of potential waste (potential green waste and/or timber) material is visible near Ohiti Road in the location of the former orchard or vineyard at the southern portion of the site. A review of Google Street View images shows that burning of these waste piles has occurred.</li> <li>A further two buildings have been constructed at the rear of 131 Taihape Road.</li> <li>The rear of 157 Taihape Road appears to be used for miscellaneous storage.</li> </ul>	<ul style="list-style-type: none"> <li>A residential property has been constructed to the north of Taihape Road.</li> <li>Evidence of soil disturbance is visible on the thin section of sit to the north-west, within the 20 Ohiti Road property.</li> <li>A forestry block has been planted to the west of the site.</li> <li>The vineyard to the south of site has been extended northwards and is now immediately adjacent to the site boundary.</li> <li>The farm shed, stock yards and potential sheep dip are no longer present.</li> <li>Several trees and structures have been removed from the property at 20 Ohiti Road, within the area outside of the site extent.</li> </ul>
2014-2015 LINZ	<ul style="list-style-type: none"> <li>A square area of vegetation clearance and soil disturbance with vehicle tracks is visible on the north-east portion of the site, adjacent to the eastern banks of Ohiwa Stream.</li> <li>A vehicle track has formed from the dwellings at 203 Ohiti Road across the Ngaruroro River flood plain.</li> </ul>	<ul style="list-style-type: none"> <li>A residential development comprised of several dwellings and sheds have been constructed between 203 and 209 Ohiti Road, and 23 and 37 Ohiti Road, immediately adjacent to the Ngaruroro River flood plain of the site.</li> <li>The vineyard north of site has extended on to a small portion of agricultural land, between the existing vineyard and Ohiwa Stream.</li> </ul>

Date, run number, and source	Key site features	Surrounding land features
2020 LINZ	<ul style="list-style-type: none"> <li>The area of disturbed soil on the north-east portion of the site appears to have had gravel cover the exposed surface.</li> </ul>	<ul style="list-style-type: none"> <li>The small section of vineyard to the north of the site, that was identified in 2015 image, is no longer visible.</li> <li>Further residential development has occurred to the north of Taihape Road.</li> <li>An apparent manmade water pond has been constructed east of the site at 131 Taihape Road.</li> </ul>
2023 LINZ	<ul style="list-style-type: none"> <li>The gravelled area is still present on the north-east portion of the site but now appears to have been grassed over.</li> <li>Several vehicles (i.e., buses, car bodies) and small structures have been added to 157 Taihape Road.</li> </ul>	
2024 Google Earth	<ul style="list-style-type: none"> <li>Stockpiled of material adjacent to the eastern banks of Ohiwa Stream.</li> <li>Potential burn piles at property south of 39 Ohiti Road.</li> </ul>	<ul style="list-style-type: none"> <li>A firewood business occupies the property west of 124 Taihape Road.</li> </ul>

Readily available aerial images from Retrolens, Google Earth and Land Information New Zealand have been used in this assessment.

## C2 Council contamination enquiry

A contamination enquiry was placed in May 2024 with HBRC who instructed that their online hazard portal<sup>22</sup> be used to check for sites on the Selected Land Use Register (SLUR). The SLUR was reviewed in May 2024 and February 2025. There were no properties on, or in the immediate vicinity of the site, included on the HBRC 'SLUR.

## C3 On site and nearby consents

Resource consents related to the site or properties immediately surrounding the site (including existing, superseded and surrendered consents) are summarised in Table Appendix C.2 below.

The onsite consents have been identified in Table Appendix C.2, consents held on the surrounding properties have been reviewed and comprise a large number of Water Permits, Discharge Permits, and Land Use Consents (for the construction of bores), associated with the rural and horticultural activities occurring on surrounding properties.

Discharge Permits relating to the discharge of secondary treated domestic effluent (such as septic tank systems) are not summarised in Table Appendix C.2 as these wastewater discharges may contain biological hazards, the amount of organic or inorganic contaminants that could persist in soil will generally be low<sup>23</sup>.

The adjacent residential properties at 203-209 Taihape Road and 23-37A Ohiti Road, were subdivided from the larger property (Lot 10H Pt Omahu 2C1C Block and Lot 10I Pt Omahu 2C1C

<sup>22</sup> Hawkes Bay Regional Council, 2024. [Hawke's Bay Hazard Portal \(hbrc.govt.nz\)](https://www.hbrc.govt.nz/). Accessed on 29 May 2024 and 13 February 2025.

<sup>23</sup> MFE, 2023. Hazardous Activities and Industries List guidance. Identifying HAIL land.

Block) in 2009, or 2010. Further information regarding the subdivision was not accessible at the time of this investigation.

Onsite consents, as well as the consents held by properties surrounding the sites, are considered unlikely to have resulted in soil contamination-at the Ohiti Road Stopbanks site. This is because of their location, nature and likely extent of the contaminants at those locations.

**Table Appendix C.2: Ground contamination-related resource consents**

Location	Consent ID	Type of consent	Activity description	Issuing authority	Status/expiry
Onsite					
769 Taihape Road, Pukehamoamo, Hastings.	AUTH-121467-02	Water Permit	To take and use water from well nos. 7822, 15407 (100 mm diameter), and 15733 (200 mm diameter), the Ohiwa Stream and the Okawa Stream to irrigate 104.6 hectares of process crops.	Hastings District	31/05/2025
769 Taihape Road, Pukehamoamo, Hastings.	AUTH-121467-01	Water Permit	To takes and use water from the Okawa Stream to irrigate 77 hectares of crops.	Hastings District	31/05/2025
769 Taihape Road, Pukehamoamo, Hastings.	AUTH-116826-01	Water Permit	To take water from the Okawa Stream to irrigate 43 hectares of pasture.	Hastings District	31/05/2015
Corner Ohiti and Taihape Roads, Hastings.	AUTH-108760-01	Land Use Consent	To drill a 150 mm bore (No. 4035) to provide a supply of domestic/stock water.	Hastings District	N/A
116 and 131 Taihape Road, Fernhill, Napier.	AUTH-108474-01	Discharge Permit	To discharge dairy farm effluent from a dairy herd of 100 cows onto the ground in circumstances which may result in the contaminant entering water.	Hastings District	31/05/2001

## **Appendix D    Soil results summary table**

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Appendix D Table 2: Summary of QA/QC results - Ohiti Road stopbanks

Sample name	SS01 0-0.1	DUP	RPD (%)
Date	22/05/2024		
Laboratory number	2897944.1	3897944.34	
<b>Heavy metals</b>			
Arsenic	5.4	5.1	5.7%
Cadmium	0.117	0.118	NC
Chromium	12.9	12.4	4.0%
Copper	13.8	13.4	2.9%
Lead	12.3	11.9	3.3%
Mercury	< 0.10	< 0.10	NC
Nickel	8.9	8.4	5.8%
Zinc	50	49.8	0.4%

**Appendix D Table 2: Toxicity Characteristic Leachate Procedure Sampling Results - Ohiti Road and Taihape Road stopbank**

Sample ID	SS14	SS19	SS24	Class A Landfill Concentration in leachate (Omarunui Landfill) <sup>1</sup>
Laboratory Reference	3897944.35	3897944.37	3897944.4	
Date	22/05/2025	22/05/2025	22/05/2025	
Location	Burn barrel adjacent to 27 Ohiti Road	Rear of 203 Ohiti Road	Rear of 157 Taihape Road	
Sample depth	0-0.1	0-0.1	0-0.1	
Geological unit	Sandy SILT	Gravelly SILT	Silty SAND	
<b>Heavy Metals</b>				
Arsenic	0.089	0.096	2	5
Cadmium	< 0.0011	0.027	0.0025	1
Chromium	0.015	< 0.011	< 0.011	5
Copper	< 0.011	0.071	0.048	5
Lead	< 0.0021	0.83	0.115	5
Nickel	< 0.011	0.023	< 0.011	10
Zinc	0.25	3.1	2.5	10

**Notes:**

All values in g/m<sup>3</sup> unless specified.

1. Criteria from MfE, 2004. Landfill Waste Acceptance Criteria and Landfill Classification.

**Appendix D Table 3: Synthetic Precipitation Leaching Protection Sampling Results - Ohiti Road and Taihape Road stopbank**

Sample ID	SS14	SS19	SS24	Hawke's Bay Stopbank Construction. Soil leachability targets to determine acceptability of fill <sup>1</sup>
Laboratory Reference	3897944.35	3897944.37	3897944.4	
Date	22/05/2025	22/05/2025	22/05/2025	
Location	Burn barrel adjacent to 27 Ohiti Road	Rear of 203 Ohiti Road	Rear of 157 Taihape Road	
Sample depth	0-0.1	0-0.1	0-0.1	
Geological unit	Sandy SILT	Gravelly SILT	Silty SAND	
<b>Heavy Metals</b>				
Arsenic	0.030	0.0032	0.092	0.10
Cadmium	< 0.000053	0.000091	< 0.000053	0.02
Chromium	0.0156	0.0020	0.0072	-
Copper	0.0131	0.020	0.027	0.14
Lead	0.0023	0.038	0.027	0.02
Nickel	0.00116	0.0022	0.00130	-
Zinc	0.0112	0.042	0.031	0.80

**Notes:**

All values in g/m<sup>3</sup> unless specified.

'-' denotes no leachability target set

1- Tonkin & Taylor Ltd, 2023. Upper Limits for Contaminants in Hawke's Bay Stopbank Fill. Prepared for Hawke's Bay Regional Council, T+T ref: 1017353.2102R v1. Table 5.5- Soil leachability targets to determine acceptability of fill.

10	Exceeds Hawke's Bay stopbank construction fill acceptance Soil leachability targets to determine acceptability of fill
----	--

## **Appendix E      Laboratory transcripts**

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## Certificate of Analysis

Tonkin and Taylor Ltd  
 Level 3, 161 Victoria Street, Te Aro  
 Wellington 6011

Attention: Miriam Lindsay  
 Phone: 0275473311  
 Email: mlindsay@tonkintaylor.co.nz

Sampling Site: Ohiti Rd

Lab Reference: 24-15350  
 Submitted by: Miriam Lindsay  
 Date Received: 11/05/2024  
 Testing Initiated: 13/05/2024  
 Date Completed: 16/05/2024  
 Order Number: QT\_24-14782  
 Reference: 1017353.2402

### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories (or at the subcontracted laboratories, when applicable). Samples were in acceptable condition unless otherwise noted on this report. Specific testing dates are available on request.

### Heavy Metals in Soil

Client Sample ID		OH_SS 01	
Date Sampled		8/05/2024	
Analyte	Unit	Reporting Limit	24-15350-1
Arsenic	mg/kg dry wt	0.125	9.4
Beryllium	mg/kg dry wt	0.013	0.71
Boron	mg/kg dry wt	1.25	7.4
Cadmium	mg/kg dry wt	0.005	0.12
Chromium	mg/kg dry wt	0.125	17.4
Copper	mg/kg dry wt	0.075	15.0
Lead	mg/kg dry wt	0.25	66.3
Mercury	mg/kg dry wt	0.025	0.079
Nickel	mg/kg dry wt	0.05	11.7
Zinc	mg/kg dry wt	0.05	99.3

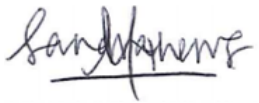
Columns removed  
 Results relate to 1017353.2401

Columns removed  
 Results relate to 1017353.2401

Columns removed  
Results relate to 1017353.2401

## Method Summary

<b>Elements in Soil</b>	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
<b>OCP in Soil</b>	Samples are extracted with hexane, pre-concentrated then analysed by GC-MSMS. (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor). (In accordance with in-house procedure).
<b>Total DDT</b>	Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)



Sandra Mathews, B.Eng.  
Technologist



Astra Southerwood,                      Prianshu Chawla, B.Tech  
Sample Preparation Team Leader      Technologist



## Certificate of Analysis

Tonkin and Taylor Ltd  
Level 3, 161 Victoria Street, Te Aro  
Wellington 6011  
Attention: Miriam Lindsay  
Phone: 0275473311  
Email: milindsay@tonkintaylor.co.nz

Lab Reference: 24-15713  
Submitted by: Miriam Lindsay  
Date Received: 13/05/2024  
Testing Initiated: 15/05/2024  
Date Completed: 15/05/2024  
Order Number: 1017353.2401  
Reference: QT - 24- 14782

Sampling Site: Ohiti Rd Waiohiki  
Description of Work: Bulk/ SQ - QT - 24- 14782

### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories (or at the subcontracted laboratories, when applicable).  
Samples were in acceptable condition unless otherwise noted on this report.  
Specific testing dates are available on request.

## Asbestos Fibres in Bulk (Qualitative)

### Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
24-15713-1	OH_BULK_02		Bulk Materials (130 x 45 x 4 mm)	8/05/2024	15/05/2024

Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled.

### Analysis Results

Laboratory ID	Client Sample ID	Sample Layers	Fibre Types	Asbestos (Present / Absent)
24-15713-1	OH_BULK_02	L1 - Fibrous Cement Sheet L2 - Surface Debris	Asbestos NOT Detected. Organic Fibres	Absent

Information in the above table supplied by the client: Client Sample ID.

### Asbestos Fibres in Bulk (Qualitative) Approver:

Millie Campbell  
Lab Technician

## Method Summary

### **Asbestos Fibres in Bulk Materials (Qualitative)**

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with the guidelines of AS4964-2004 Method for the qualitative identification of asbestos in bulk samples.

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 3: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.



## Certificate of Analysis

Tonkin and Taylor Ltd  
Level 3, 161 Victoria Street, Te Aro  
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Attention: Miriam Lindsay  
Phone: 0275473311  
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Lab Reference: 24-15713  
Submitted by: Miriam Lindsay  
Date Received: 13/05/2024  
Testing Initiated: 15/05/2024  
Date Completed: 5/07/2024  
Order Number: 1017353.2402  
Reference: QT - 24- 14782

Sampling Site: Ohiti Rd Waiohiki  
Description of Work: Bulk/ SQ - QT - 24- 14782

### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories (or at the subcontracted laboratories, when applicable). Samples were in acceptable condition unless otherwise noted on this report. Specific testing dates are available on request.

AMENDED REPORT. This report replaces in full a previous version [R00] sent on 4/07/2024. Amended PO number as per client's request.

## Asbestos in Soil (Semi-Quantitative)

### Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
24-15713-2	OH_SS_01		Soil	9/05/2024	16/05/2024

Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled

### Analysis Results (Summary)

Laboratory ID	Client Sample ID	Asbestos	Sample Weight as Received	Moisture Content	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
		Units	g	%		
24-15713-2	OH_SS_01	Chrysotile (White Asbestos) Organic Fibres	816.8	7.7	Absent	Present

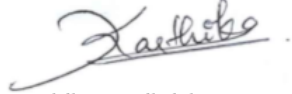
Information in the above table supplied by the client: Client Sample ID

## Analysis Results (Size Fraction Breakdown)

Laboratory ID	Client Sample ID	Fraction Size	Fraction Weight*	AF/FA Weight*	ACM Weight*	ACM Content*	Asbestos Matrix	Asbestos Weight*	W/W% Asbestos*
		<i>Units Reporting Limit</i>	g 0	g 0	g 0	%		g 0	
24-15713-2	OH_SS_01	>10mm	110.20	0.0000	0.0000	0	No Asbestos Detected	0.0000	<0.001 (ACM)
		2-10mm	202.60	0.0000	-	-	No Asbestos Detected	0.0000	<0.001 (AF/FA)
		<2mm	441.18	0.0003	-	-	Free Fibres	0.0013	

Information in the above table supplied by the client: Client Sample ID

### Asbestos in Soil (Semi-Quantitative) Approver:



Karthika Unnikrishnan, M.Sc.  
Technician

## Method Summary

### Asbestos Fibres in Soil (Semi-Quantitative)

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in soil samples.

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present.

Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.

## Certificate of Analysis

Page 1 of 12

<b>Client:</b>	Tonkin & Taylor	<b>Lab No:</b>	3897944	SUPV3
<b>Contact:</b>	Sami Myers-Hutchings C/- Tonkin & Taylor PO Box 5271 Auckland 1141	<b>Date Received:</b>	24-May-2025	
		<b>Date Reported:</b>	18-Jul-2025	(Amended)
		<b>Quote No:</b>	80842	
		<b>Order No:</b>	1017353.24	
		<b>Client Reference:</b>	1017353.24	
		<b>Submitted By:</b>	Maddy Kaye	

Sample Type: Soil					
Sample Name:		SS1 22-May-2025	SS2 22-May-2025	SS3 22-May-2025	SS4 22-May-2025
Lab Number:		3897944.1	3897944.2	3897944.3	3897944.4
Individual Tests					
Dry Matter	g/100g as rcvd	86.0 ± 5.0	81.3 ± 5.0	79.1 ± 5.0	81.3 ± 5.0
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	5.4 ± 1.6	-	3.9 ± 1.5	-
Total Recoverable Cadmium	mg/kg dry wt	0.117 ± 0.068	-	0.153 ± 0.069	-
Total Recoverable Chromium	mg/kg dry wt	12.9 ± 2.4	-	12.5 ± 2.4	-
Total Recoverable Copper	mg/kg dry wt	13.8 ± 2.3	-	43.6 ± 6.1	-
Total Recoverable Lead	mg/kg dry wt	12.3 ± 1.9	-	12.9 ± 2.0	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	-	< 0.10 ± 0.067	-
Total Recoverable Nickel	mg/kg dry wt	8.9 ± 1.8	-	9.5 ± 1.8	-
Total Recoverable Zinc	mg/kg dry wt	50.0 ± 4.5	-	54.2 ± 4.7	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.012 ± 0.0045	< 0.013 ± 0.0047	< 0.013 ± 0.0047	< 0.012 ± 0.0047
alpha-BHC	mg/kg dry wt	< 0.012 ± 0.0045	< 0.013 ± 0.0047	< 0.013 ± 0.0047	< 0.012 ± 0.0047
beta-BHC	mg/kg dry wt	< 0.012 ± 0.0051	< 0.013 ± 0.0054	< 0.013 ± 0.0054	< 0.012 ± 0.0054
delta-BHC	mg/kg dry wt	< 0.012 ± 0.0048	< 0.013 ± 0.0050	< 0.013 ± 0.0051	< 0.012 ± 0.0050
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012 ± 0.0044	< 0.013 ± 0.0046	< 0.013 ± 0.0046	< 0.012 ± 0.0046
cis-Chlordane	mg/kg dry wt	< 0.012 ± 0.0047	< 0.013 ± 0.0049	< 0.013 ± 0.0049	< 0.012 ± 0.0049
trans-Chlordane	mg/kg dry wt	< 0.012 ± 0.0045	< 0.013 ± 0.0047	< 0.013 ± 0.0047	< 0.012 ± 0.0047
2,4'-DDD	mg/kg dry wt	< 0.012 ± 0.0050	< 0.013 ± 0.0052	< 0.013 ± 0.0052	< 0.012 ± 0.0052
4,4'-DDD	mg/kg dry wt	< 0.012 ± 0.0059	< 0.013 ± 0.0063	< 0.013 ± 0.0063	< 0.012 ± 0.0062
2,4'-DDE	mg/kg dry wt	< 0.012 ± 0.0047	< 0.013 ± 0.0049	< 0.013 ± 0.0049	< 0.012 ± 0.0049
4,4'-DDE	mg/kg dry wt	< 0.012 ± 0.0061	< 0.013 ± 0.0065	< 0.013 ± 0.0065	< 0.012 ± 0.0064
2,4'-DDT	mg/kg dry wt	< 0.012 ± 0.0062	< 0.013 ± 0.0066	< 0.013 ± 0.0067	< 0.012 ± 0.0066
4,4'-DDT	mg/kg dry wt	< 0.012 ± 0.0068	< 0.013 ± 0.0072	< 0.013 ± 0.0073	< 0.012 ± 0.0072
Total DDT Isomers	mg/kg dry wt	< 0.07 ± 0.015	< 0.08 ± 0.015	< 0.08 ± 0.016	< 0.08 ± 0.015
Dieldrin	mg/kg dry wt	< 0.012 ± 0.0056	< 0.013 ± 0.0059	< 0.013 ± 0.0059	< 0.012 ± 0.0059
Endosulfan I	mg/kg dry wt	< 0.012 ± 0.0050	< 0.013 ± 0.0052	< 0.013 ± 0.0052	< 0.012 ± 0.0052
Endosulfan II	mg/kg dry wt	< 0.012 ± 0.0056	< 0.013 ± 0.0059	< 0.013 ± 0.0059	< 0.012 ± 0.0059
Endosulfan sulphate	mg/kg dry wt	< 0.012 ± 0.0071	< 0.013 ± 0.0076	< 0.013 ± 0.0077	< 0.012 ± 0.0076
Endrin	mg/kg dry wt	< 0.012 ± 0.0075	< 0.013 ± 0.0080	< 0.013 ± 0.0081	< 0.012 ± 0.0080
Endrin aldehyde	mg/kg dry wt	< 0.012 ± 0.0066	< 0.013 ± 0.0070	< 0.013 ± 0.0071	< 0.012 ± 0.0070
Endrin ketone	mg/kg dry wt	< 0.012 ± 0.0059	< 0.013 ± 0.0063	< 0.013 ± 0.0063	< 0.012 ± 0.0062
Heptachlor	mg/kg dry wt	< 0.012 ± 0.0048	< 0.013 ± 0.0050	< 0.013 ± 0.0051	< 0.012 ± 0.0050
Heptachlor epoxide	mg/kg dry wt	< 0.012 ± 0.0044	< 0.013 ± 0.0046	< 0.013 ± 0.0046	< 0.012 ± 0.0046
Hexachlorobenzene	mg/kg dry wt	< 0.012 ± 0.0048	< 0.013 ± 0.0050	< 0.013 ± 0.0051	< 0.012 ± 0.0050
Methoxychlor	mg/kg dry wt	< 0.012 ± 0.0075	< 0.013 ± 0.0080	< 0.013 ± 0.0081	< 0.012 ± 0.0080

Sample Type: Soil					
Sample Name:		SS5 22-May-2025	SS6 22-May-2025	SS7 22-May-2025	SS8 22-May-2025
Lab Number:		3897944.5	3897944.6	3897944.7	3897944.8
Individual Tests					
Dry Matter	g/100g as rcvd	78.6 ± 5.0	74.7 ± 5.0	82.3 ± 5.0	80.0 ± 5.0
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	5.3 ± 1.6	-	4.7 ± 1.5	-
Total Recoverable Cadmium	mg/kg dry wt	0.184 ± 0.070	-	0.119 ± 0.068	-
Total Recoverable Chromium	mg/kg dry wt	15.9 ± 2.8	-	14.2 ± 2.6	-
Total Recoverable Copper	mg/kg dry wt	43.6 ± 6.1	-	9.5 ± 1.9	-
Total Recoverable Lead	mg/kg dry wt	15.5 ± 2.4	-	20.9 ± 3.2	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	-	< 0.10 ± 0.067	-
Total Recoverable Nickel	mg/kg dry wt	12.2 ± 2.1	-	10.8 ± 2.0	-
Total Recoverable Zinc	mg/kg dry wt	59.5 ± 5.0	-	73.0 ± 5.8	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013 ± 0.0048	< 0.014 ± 0.0050	< 0.012 ± 0.0046	< 0.012 ± 0.0047
alpha-BHC	mg/kg dry wt	< 0.013 ± 0.0048	< 0.014 ± 0.0050	< 0.012 ± 0.0046	< 0.012 ± 0.0047
beta-BHC	mg/kg dry wt	< 0.013 ± 0.0055	< 0.014 ± 0.0058	< 0.012 ± 0.0052	< 0.012 ± 0.0053
delta-BHC	mg/kg dry wt	< 0.013 ± 0.0051	< 0.014 ± 0.0054	< 0.012 ± 0.0049	< 0.012 ± 0.0050
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013 ± 0.0046	< 0.014 ± 0.0048	< 0.012 ± 0.0045	< 0.012 ± 0.0046
cis-Chlordane	mg/kg dry wt	< 0.013 ± 0.0049	< 0.014 ± 0.0052	< 0.012 ± 0.0048	< 0.012 ± 0.0049
trans-Chlordane	mg/kg dry wt	< 0.013 ± 0.0048	< 0.014 ± 0.0050	< 0.012 ± 0.0046	< 0.012 ± 0.0047
2,4'-DDD	mg/kg dry wt	< 0.013 ± 0.0053	< 0.014 ± 0.0056	< 0.012 ± 0.0051	< 0.012 ± 0.0052
4,4'-DDD	mg/kg dry wt	< 0.013 ± 0.0064	< 0.014 ± 0.0068	< 0.012 ± 0.0061	< 0.012 ± 0.0062
2,4'-DDE	mg/kg dry wt	< 0.013 ± 0.0049	< 0.014 ± 0.0052	< 0.012 ± 0.0048	< 0.012 ± 0.0049
4,4'-DDE	mg/kg dry wt	< 0.013 ± 0.0066	< 0.014 ± 0.0070	< 0.012 ± 0.0063	< 0.012 ± 0.0064
2,4'-DDT	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0073	< 0.012 ± 0.0064	< 0.012 ± 0.0066
4,4'-DDT	mg/kg dry wt	< 0.013 ± 0.0074	< 0.014 ± 0.0079	< 0.012 ± 0.0070	< 0.012 ± 0.0071
Total DDT Isomers	mg/kg dry wt	< 0.08 ± 0.016	< 0.08 ± 0.017	< 0.07 ± 0.015	< 0.08 ± 0.015
Dieldrin	mg/kg dry wt	< 0.013 ± 0.0060	< 0.014 ± 0.0064	< 0.012 ± 0.0057	< 0.012 ± 0.0059
Endosulfan I	mg/kg dry wt	< 0.013 ± 0.0053	< 0.014 ± 0.0056	< 0.012 ± 0.0051	< 0.012 ± 0.0052
Endosulfan II	mg/kg dry wt	< 0.013 ± 0.0060	< 0.014 ± 0.0064	< 0.012 ± 0.0057	< 0.012 ± 0.0059
Endosulfan sulphate	mg/kg dry wt	< 0.013 ± 0.0078	< 0.014 ± 0.0084	< 0.012 ± 0.0073	< 0.012 ± 0.0075
Endrin	mg/kg dry wt	< 0.013 ± 0.0082	< 0.014 ± 0.0088	< 0.012 ± 0.0077	< 0.012 ± 0.0079
Endrin aldehyde	mg/kg dry wt	< 0.013 ± 0.0072	< 0.014 ± 0.0077	< 0.012 ± 0.0068	< 0.012 ± 0.0070
Endrin ketone	mg/kg dry wt	< 0.013 ± 0.0064	< 0.014 ± 0.0068	< 0.012 ± 0.0061	< 0.012 ± 0.0062
Heptachlor	mg/kg dry wt	< 0.013 ± 0.0051	< 0.014 ± 0.0054	< 0.012 ± 0.0049	< 0.012 ± 0.0050
Heptachlor epoxide	mg/kg dry wt	< 0.013 ± 0.0046	< 0.014 ± 0.0048	< 0.012 ± 0.0045	< 0.012 ± 0.0046
Hexachlorobenzene	mg/kg dry wt	< 0.013 ± 0.0051	< 0.014 ± 0.0054	< 0.012 ± 0.0049	< 0.012 ± 0.0050
Methoxychlor	mg/kg dry wt	< 0.013 ± 0.0082	< 0.014 ± 0.0088	< 0.012 ± 0.0077	< 0.012 ± 0.0079
Sample Name:		SS9 22-May-2025	SS10 22-May-2025	SS11 22-May-2025	SS12 22-May-2025
Lab Number:		3897944.9	3897944.10	3897944.11	3897944.12
Individual Tests					
Dry Matter	g/100g as rcvd	79.4 ± 5.0	81.1 ± 5.0	82.6 ± 5.0	81.6 ± 5.0
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	6.8 ± 1.7	-	3.9 ± 1.5	-
Total Recoverable Cadmium	mg/kg dry wt	0.164 ± 0.070	-	0.156 ± 0.069	-
Total Recoverable Chromium	mg/kg dry wt	12.9 ± 2.4	-	13.9 ± 2.6	-
Total Recoverable Copper	mg/kg dry wt	41.9 ± 5.9	-	56.0 ± 7.8	-
Total Recoverable Lead	mg/kg dry wt	14.6 ± 2.2	-	12.6 ± 1.9	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	-	< 0.10 ± 0.067	-
Total Recoverable Nickel	mg/kg dry wt	9.7 ± 1.8	-	9.9 ± 1.9	-
Total Recoverable Zinc	mg/kg dry wt	68.3 ± 5.5	-	56.5 ± 4.8	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013 ± 0.0048	< 0.012 ± 0.0047	< 0.012 ± 0.0047	< 0.013 ± 0.0047
alpha-BHC	mg/kg dry wt	< 0.013 ± 0.0048	< 0.012 ± 0.0047	< 0.012 ± 0.0047	< 0.013 ± 0.0047
beta-BHC	mg/kg dry wt	< 0.013 ± 0.0054	< 0.012 ± 0.0053	< 0.012 ± 0.0053	< 0.013 ± 0.0054
delta-BHC	mg/kg dry wt	< 0.013 ± 0.0051	< 0.012 ± 0.0050	< 0.012 ± 0.0050	< 0.013 ± 0.0051
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013 ± 0.0046	< 0.012 ± 0.0046	< 0.012 ± 0.0045	< 0.013 ± 0.0046

Sample Type: Soil					
Sample Name:		SS9 22-May-2025	SS10 22-May-2025	SS11 22-May-2025	SS12 22-May-2025
Lab Number:		3897944.9	3897944.10	3897944.11	3897944.12
Organochlorine Pesticides Screening in Soil					
cis-Chlordane	mg/kg dry wt	< 0.013 ± 0.0049	< 0.012 ± 0.0049	< 0.012 ± 0.0048	< 0.013 ± 0.0049
trans-Chlordane	mg/kg dry wt	< 0.013 ± 0.0048	< 0.012 ± 0.0047	< 0.012 ± 0.0047	< 0.013 ± 0.0047
2,4'-DDD	mg/kg dry wt	< 0.013 ± 0.0052	< 0.012 ± 0.0052	< 0.012 ± 0.0051	< 0.013 ± 0.0052
4,4'-DDD	mg/kg dry wt	< 0.013 ± 0.0063	< 0.012 ± 0.0062	< 0.012 ± 0.0061	< 0.013 ± 0.0063
2,4'-DDE	mg/kg dry wt	< 0.013 ± 0.0049	< 0.012 ± 0.0049	< 0.012 ± 0.0048	< 0.013 ± 0.0049
4,4'-DDE	mg/kg dry wt	< 0.013 ± 0.0065	< 0.012 ± 0.0064	< 0.012 ± 0.0063	< 0.013 ± 0.0065
2,4'-DDT	mg/kg dry wt	< 0.013 ± 0.0067	< 0.012 ± 0.0066	< 0.012 ± 0.0065	< 0.013 ± 0.0067
4,4'-DDT	mg/kg dry wt	< 0.013 ± 0.0073	< 0.012 ± 0.0072	< 0.012 ± 0.0070	< 0.013 ± 0.0073
Total DDT Isomers	mg/kg dry wt	< 0.08 ± 0.016	< 0.08 ± 0.015	< 0.08 ± 0.015	< 0.08 ± 0.016
Dieldrin	mg/kg dry wt	< 0.013 ± 0.0060	< 0.012 ± 0.0059	< 0.012 ± 0.0058	< 0.013 ± 0.0059
Endosulfan I	mg/kg dry wt	< 0.013 ± 0.0052	< 0.012 ± 0.0052	< 0.012 ± 0.0051	< 0.013 ± 0.0052
Endosulfan II	mg/kg dry wt	< 0.013 ± 0.0060	< 0.012 ± 0.0059	< 0.012 ± 0.0058	< 0.013 ± 0.0059
Endosulfan sulphate	mg/kg dry wt	< 0.013 ± 0.0077	< 0.012 ± 0.0075	< 0.012 ± 0.0074	< 0.013 ± 0.0077
Endrin	mg/kg dry wt	< 0.013 ± 0.0081	< 0.012 ± 0.0079	< 0.012 ± 0.0078	< 0.013 ± 0.0081
Endrin aldehyde	mg/kg dry wt	< 0.013 ± 0.0071	< 0.012 ± 0.0070	< 0.012 ± 0.0069	< 0.013 ± 0.0071
Endrin ketone	mg/kg dry wt	< 0.013 ± 0.0063	< 0.012 ± 0.0062	< 0.012 ± 0.0061	< 0.013 ± 0.0063
Heptachlor	mg/kg dry wt	< 0.013 ± 0.0051	< 0.012 ± 0.0050	< 0.012 ± 0.0050	< 0.013 ± 0.0051
Heptachlor epoxide	mg/kg dry wt	< 0.013 ± 0.0046	< 0.012 ± 0.0046	< 0.012 ± 0.0045	< 0.013 ± 0.0046
Hexachlorobenzene	mg/kg dry wt	< 0.013 ± 0.0051	< 0.012 ± 0.0050	< 0.012 ± 0.0050	< 0.013 ± 0.0051
Methoxychlor	mg/kg dry wt	< 0.013 ± 0.0081	< 0.012 ± 0.0079	< 0.012 ± 0.0078	< 0.013 ± 0.0081
Sample Name:		SS13 22-May-2025	SS14 22-May-2025	SS15 22-May-2025	SS16 22-May-2025
Lab Number:		3897944.13	3897944.14	3897944.15	3897944.16
Individual Tests					
Dry Matter	g/100g as rcvd	80.8 ± 5.0	72.4 ± 5.0	-	-
SPLP Sample Weight	g	-	50	-	-
SPLP Extractant Type*		-	De-ionised Water, pH 5.8 +/- 0.4	-	-
SPLP Final pH	pH Units	-	8.5 ± 0.1	-	-
TCLP Weight of Sample Taken	g	-	50	-	-
TCLP Initial Sample pH	pH Units	-	8.9 ± 0.1	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	2.2 ± 0.1	-	-
TCLP Extractant Type*		-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-
TCLP Extraction Fluid pH	pH Units	-	5.0 ± 0.1	-	-
TCLP Post Extraction Sample pH	pH Units	-	6.5 ± 0.1	-	-
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	7.7 ± 1.8	73 ± 12	4.1 ± 1.5	7.4 ± 1.8
Total Recoverable Cadmium	mg/kg dry wt	0.142 ± 0.069	0.62 ± 0.11	< 0.10 ± 0.067	0.359 ± 0.082
Total Recoverable Chromium	mg/kg dry wt	14.2 ± 2.6	63 ± 10	12.3 ± 2.4	16.6 ± 2.9
Total Recoverable Copper	mg/kg dry wt	10.8 ± 2.0	1,270 ± 180	9.3 ± 1.9	42.2 ± 5.9
Total Recoverable Lead	mg/kg dry wt	13.4 ± 2.1	80 ± 13	12.3 ± 1.9	208 ± 32
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	0.174 ± 0.071	< 0.10 ± 0.067	0.166 ± 0.070
Total Recoverable Nickel	mg/kg dry wt	10.1 ± 1.9	38.5 ± 5.1	9.9 ± 1.9	14.9 ± 2.4
Total Recoverable Zinc	mg/kg dry wt	91.0 ± 7.0	482 ± 34	49.9 ± 4.4	273 ± 20
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	< 0.013 ± 0.032	< 0.014 ± 0.032	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.013 ± 0.032	< 0.014 ± 0.032	-	-
Acenaphthylene	mg/kg dry wt	< 0.013 ± 0.0067	< 0.014 ± 0.0068	-	-
Acenaphthene	mg/kg dry wt	< 0.013 ± 0.0070	< 0.014 ± 0.0072	-	-
Anthracene	mg/kg dry wt	< 0.013 ± 0.0071	< 0.014 ± 0.0073	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.013 ± 0.0070	< 0.014 ± 0.0072	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013 ± 0.0067	< 0.014 ± 0.0067	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.030 ± 0.0097	< 0.033 ± 0.0097	-	-

Sample Type: Soil					
Sample Name:		SS13 22-May-2025	SS14 22-May-2025	SS15 22-May-2025	SS16 22-May-2025
Lab Number:		3897944.13	3897944.14	3897944.15	3897944.16
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.030 ± 0.0097	< 0.033 ± 0.0097	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.013 ± 0.0069	< 0.014 ± 0.0070	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.013 ± 0.0067	< 0.014 ± 0.0067	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0069	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0069	-	-
Chrysene	mg/kg dry wt	< 0.013 ± 0.0069	< 0.014 ± 0.0070	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0069	-	-
Fluoranthene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0068	-	-
Fluorene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0068	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013 ± 0.0067	< 0.014 ± 0.0068	-	-
Naphthalene	mg/kg dry wt	< 0.07 ± 0.035	< 0.07 ± 0.036	-	-
Perylene	mg/kg dry wt	< 0.013 ± 0.0067	< 0.014 ± 0.0067	-	-
Phenanthrene	mg/kg dry wt	< 0.013 ± 0.0069	0.0162 ± 0.0070	-	-
Pyrene	mg/kg dry wt	< 0.013 ± 0.0068	< 0.014 ± 0.0069	-	-
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 20 ± 6.7	< 20 ± 6.7	-	-
C10 - C14	mg/kg dry wt	< 20 ± 7.6	< 20 ± 7.6	-	-
C15 - C36	mg/kg dry wt	45.2 ± 9.8	60 ± 11	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80 ± 15	< 80 ± 15	-	-
Sample Name:		SS17 22-May-2025	SS18 22-May-2025	SS19 22-May-2025	SS20 22-May-2025
Lab Number:		3897944.17	3897944.18	3897944.19	3897944.20
Individual Tests					
Dry Matter	g/100g as rcvd	-	-	-	76.1 ± 5.0
SPLP Sample Weight	g	-	-	50	-
SPLP Extractant Type*		-	-	De-ionised Water, pH 5.8 +/- 0.4	-
SPLP Final pH	pH Units	-	-	9.2 ± 0.1	-
TCLP Weight of Sample Taken	g	-	-	50	-
TCLP Initial Sample pH	pH Units	-	-	9.2 ± 0.1	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.9 ± 0.1	-
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	5.0 ± 0.1	-
TCLP Post Extraction Sample pH	pH Units	-	-	5.5 ± 0.1	-
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	6.3 ± 1.7	8.4 ± 1.9	10.4 ± 2.1	3.8 ± 1.5
Total Recoverable Cadmium	mg/kg dry wt	0.229 ± 0.073	0.219 ± 0.072	1.05 ± 0.16	< 0.10 ± 0.067
Total Recoverable Chromium	mg/kg dry wt	15.0 ± 2.7	18.8 ± 3.2	20.7 ± 3.5	12.9 ± 2.4
Total Recoverable Copper	mg/kg dry wt	28.0 ± 4.1	30.9 ± 4.5	155 ± 22	8.3 ± 1.8
Total Recoverable Lead	mg/kg dry wt	59.5 ± 8.9	59.9 ± 9.0	720 ± 110	11.1 ± 1.7
Total Recoverable Mercury	mg/kg dry wt	0.182 ± 0.071	0.128 ± 0.068	1.11 ± 0.19	< 0.10 ± 0.067
Total Recoverable Nickel	mg/kg dry wt	12.9 ± 2.2	15.4 ± 2.4	23.0 ± 3.3	9.4 ± 1.8
Total Recoverable Zinc	mg/kg dry wt	144 ± 11	147 ± 11	544 ± 39	57.0 ± 4.9
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.013 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.013 ± 0.032
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0067
Acenaphthene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0071
Anthracene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0072
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0071
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.013 ± 0.0067
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	< 0.031 ± 0.0097

Sample Type: Soil					
Sample Name:		SS17 22-May-2025	SS18 22-May-2025	SS19 22-May-2025	SS20 22-May-2025
Lab Number:		3897944.17	3897944.18	3897944.19	3897944.20
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	< 0.031 ± 0.0097
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0070
Benzo[e]pyrene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0067
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Chrysene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0069
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Fluoranthene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Fluorene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Naphthalene	mg/kg dry wt	-	-	-	< 0.07 ± 0.035
Perylene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0067
Phenanthrene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0069
Pyrene	mg/kg dry wt	-	-	-	< 0.013 ± 0.0068
Sample Name:		SS21 22-May-2025	SS22 22-May-2025	SS23 22-May-2025	SS24 22-May-2025
Lab Number:		3897944.21	3897944.22	3897944.23	3897944.24
Individual Tests					
Dry Matter	g/100g as rcvd	72.1 ± 5.0	67.1 ± 5.0	79.2 ± 5.0	66.7 ± 5.0
SPLP Sample Weight	g	-	-	-	50
SPLP Extractant Type*		-	-	-	De-ionised Water, pH 5.8 +/- 0.4
SPLP Final pH	pH Units	-	-	-	8.9 ± 0.1
TCLP Weight of Sample Taken	g	-	-	-	50
TCLP Initial Sample pH	pH Units	-	-	-	8.2 ± 0.1
TCLP Acid Adjusted Sample pH	pH Units	-	-	-	1.8 ± 0.1
TCLP Extractant Type*		-	-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05
TCLP Extraction Fluid pH	pH Units	-	-	-	5.0 ± 0.1
TCLP Post Extraction Sample pH	pH Units	-	-	-	5.5 ± 0.1
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	4.4 ± 1.5	6.2 ± 1.6	12.7 ± 2.3	257 ± 39
Total Recoverable Cadmium	mg/kg dry wt	0.145 ± 0.069	< 0.10 ± 0.067	0.148 ± 0.069	0.74 ± 0.13
Total Recoverable Chromium	mg/kg dry wt	13.4 ± 2.5	12.1 ± 2.3	16.5 ± 2.9	104 ± 17
Total Recoverable Copper	mg/kg dry wt	13.2 ± 2.3	8.8 ± 1.8	16.9 ± 2.7	320 ± 44
Total Recoverable Lead	mg/kg dry wt	17.5 ± 2.7	15.2 ± 2.3	101 ± 16	1,440 ± 220
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	< 0.10 ± 0.067	< 0.10 ± 0.067	< 0.10 ± 0.067
Total Recoverable Nickel	mg/kg dry wt	8.7 ± 1.8	7.7 ± 1.7	8.5 ± 1.8	12.8 ± 2.1
Total Recoverable Zinc	mg/kg dry wt	144 ± 11	85.6 ± 6.6	215 ± 16	951 ± 67
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.3	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.014 ± 0.032	< 0.015 ± 0.032	< 0.013 ± 0.032	< 0.015 ± 0.032
2-Methylnaphthalene	mg/kg dry wt	< 0.014 ± 0.032	< 0.015 ± 0.032	< 0.013 ± 0.032	< 0.015 ± 0.032
Acenaphthylene	mg/kg dry wt	< 0.014 ± 0.0068	< 0.015 ± 0.0068	< 0.013 ± 0.0067	< 0.015 ± 0.0068
Acenaphthene	mg/kg dry wt	< 0.014 ± 0.0072	< 0.015 ± 0.0073	< 0.013 ± 0.0070	< 0.015 ± 0.0073
Anthracene	mg/kg dry wt	< 0.014 ± 0.0073	< 0.015 ± 0.0075	< 0.013 ± 0.0071	< 0.015 ± 0.0074
Benzo[a]anthracene	mg/kg dry wt	< 0.014 ± 0.0072	< 0.015 ± 0.0073	< 0.013 ± 0.0070	0.0163 ± 0.0076
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	0.0343 ± 0.0071
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.033 ± 0.0097	< 0.036 ± 0.0097	< 0.031 ± 0.0097	0.047 ± 0.011
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.033 ± 0.0097	< 0.036 ± 0.0097	< 0.031 ± 0.0097	0.047 ± 0.011
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.014 ± 0.0070	< 0.015 ± 0.0071	< 0.013 ± 0.0069	0.054 ± 0.013
Benzo[e]pyrene	mg/kg dry wt	< 0.014 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	0.0241 ± 0.0069
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0068	0.0272 ± 0.0080

Sample Type: Soil					
Sample Name:		SS21 22-May-2025	SS22 22-May-2025	SS23 22-May-2025	SS24 22-May-2025
Lab Number:		3897944.21	3897944.22	3897944.23	3897944.24
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0068	0.0171 ± 0.0070
Chrysene	mg/kg dry wt	< 0.014 ± 0.0070	< 0.015 ± 0.0070	< 0.013 ± 0.0069	0.0199 ± 0.0073
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0068	< 0.015 ± 0.0069
Fluoranthene	mg/kg dry wt	< 0.014 ± 0.0068	< 0.015 ± 0.0068	< 0.013 ± 0.0068	0.0155 ± 0.0068
Fluorene	mg/kg dry wt	< 0.014 ± 0.0068	< 0.015 ± 0.0069	< 0.013 ± 0.0068	< 0.015 ± 0.0069
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014 ± 0.0068	< 0.015 ± 0.0068	< 0.013 ± 0.0067	0.0329 ± 0.0073
Naphthalene	mg/kg dry wt	< 0.07 ± 0.036	< 0.08 ± 0.036	< 0.07 ± 0.035	< 0.08 ± 0.036
Perylene	mg/kg dry wt	< 0.014 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	< 0.015 ± 0.0067
Phenanthrene	mg/kg dry wt	< 0.014 ± 0.0069	< 0.015 ± 0.0070	< 0.013 ± 0.0069	< 0.015 ± 0.0069
Pyrene	mg/kg dry wt	< 0.014 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0068	0.0213 ± 0.0072
Sample Name:		SS25 22-May-2025	SS28 22-May-2025	HA2 0.0-0.1m 22-May-2025	HA2 0.1-0.4m 22-May-2025
Lab Number:		3897944.25	3897944.26	3897944.28	3897944.29
Individual Tests					
Dry Matter	g/100g as rcvd	81.5 ± 5.0	67.8 ± 5.0	78.8 ± 5.0	84.0 ± 5.0
Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	9.6 ± 2.0	25.7 ± 4.1	4.0 ± 1.5	-
Total Recoverable Cadmium	mg/kg dry wt	0.295 ± 0.077	0.141 ± 0.069	0.151 ± 0.069	-
Total Recoverable Chromium	mg/kg dry wt	15.9 ± 2.8	36.1 ± 5.8	11.7 ± 2.3	-
Total Recoverable Copper	mg/kg dry wt	27.6 ± 4.0	28.6 ± 4.2	26.1 ± 3.8	-
Total Recoverable Lead	mg/kg dry wt	71 ± 11	19.2 ± 2.9	11.5 ± 1.8	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	< 0.10 ± 0.067	< 0.10 ± 0.067	-
Total Recoverable Nickel	mg/kg dry wt	9.2 ± 1.8	9.0 ± 1.8	8.9 ± 1.8	-
Total Recoverable Zinc	mg/kg dry wt	237 ± 17	303 ± 22	58.6 ± 4.9	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	< 0.3	-
1-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.015 ± 0.032	< 0.013 ± 0.032	-
2-Methylnaphthalene	mg/kg dry wt	< 0.012 ± 0.032	< 0.015 ± 0.032	< 0.013 ± 0.032	-
Acenaphthylene	mg/kg dry wt	< 0.012 ± 0.0067	< 0.015 ± 0.0068	< 0.013 ± 0.0067	-
Acenaphthene	mg/kg dry wt	< 0.012 ± 0.0069	< 0.015 ± 0.0073	< 0.013 ± 0.0070	-
Anthracene	mg/kg dry wt	< 0.012 ± 0.0070	< 0.015 ± 0.0074	< 0.013 ± 0.0071	-
Benzo[a]anthracene	mg/kg dry wt	< 0.012 ± 0.0070	< 0.015 ± 0.0073	< 0.013 ± 0.0070	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.012 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.029 ± 0.0096	< 0.035 ± 0.0097	< 0.030 ± 0.0097	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.029 ± 0.0096	< 0.034 ± 0.0097	< 0.030 ± 0.0097	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.012 ± 0.0069	< 0.015 ± 0.0071	< 0.013 ± 0.0069	-
Benzo[e]pyrene	mg/kg dry wt	< 0.012 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.015 ± 0.0069	< 0.013 ± 0.0068	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.015 ± 0.0069	< 0.013 ± 0.0068	-
Chrysene	mg/kg dry wt	< 0.012 ± 0.0069	< 0.015 ± 0.0070	< 0.013 ± 0.0069	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.015 ± 0.0069	< 0.013 ± 0.0068	-
Fluoranthene	mg/kg dry wt	0.0131 ± 0.0068	< 0.015 ± 0.0068	< 0.013 ± 0.0068	-
Fluorene	mg/kg dry wt	< 0.012 ± 0.0068	< 0.015 ± 0.0069	< 0.013 ± 0.0068	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.012 ± 0.0067	< 0.015 ± 0.0068	< 0.013 ± 0.0067	-
Naphthalene	mg/kg dry wt	< 0.06 ± 0.035	< 0.08 ± 0.036	< 0.07 ± 0.035	-
Perylene	mg/kg dry wt	< 0.012 ± 0.0067	< 0.015 ± 0.0067	< 0.013 ± 0.0067	-
Phenanthrene	mg/kg dry wt	0.0120 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0069	-
Pyrene	mg/kg dry wt	0.0136 ± 0.0069	< 0.015 ± 0.0069	< 0.013 ± 0.0068	-
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	-	< 20 ± 6.7	< 20 ± 6.7	< 20 ± 6.7
C10 - C14	mg/kg dry wt	-	< 20 ± 7.6	< 20 ± 7.6	< 20 ± 7.6
C15 - C36	mg/kg dry wt	-	52.0 ± 9.5	110 ± 11	< 40 ± 9.3
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 80 ± 14	127 ± 15	< 80 ± 14

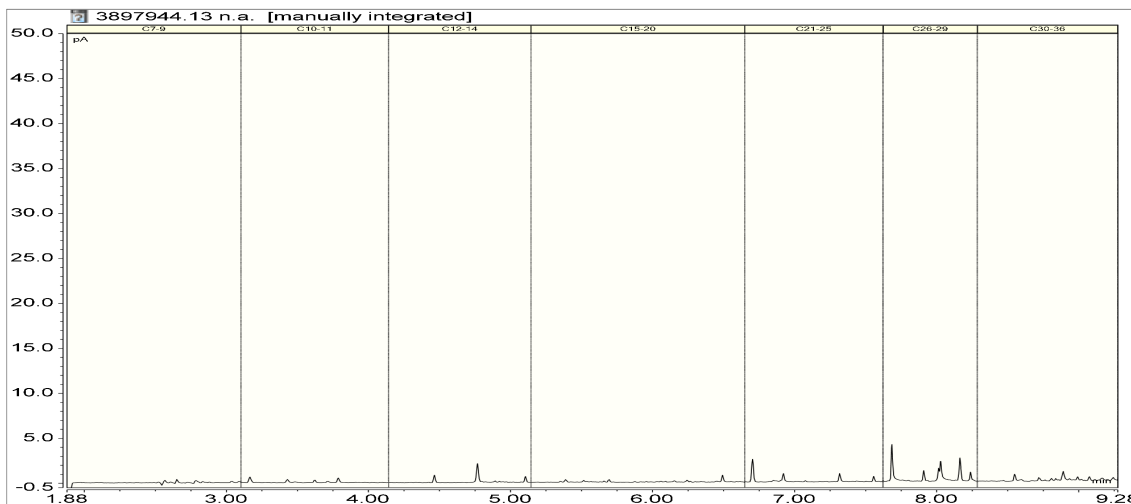
Sample Type: Soil				
<b>Sample Name:</b>		HA4 0.0-0.1m 22-May-2025	HA4 0.1-0.5m 22-May-2025	SS1 DUP
<b>Lab Number:</b>		3897944.32	3897944.33	3897944.34
Individual Tests				
Dry Matter	g/100g as rcvd	71.5 ± 5.0	85.1 ± 5.0	85.7 ± 5.0
Heavy Metals with Mercury, Screen Level				
Total Recoverable Arsenic	mg/kg dry wt	3.5 ± 1.4	-	5.1 ± 1.6
Total Recoverable Cadmium	mg/kg dry wt	0.250 ± 0.074	-	0.118 ± 0.068
Total Recoverable Chromium	mg/kg dry wt	10.3 ± 2.1	-	12.4 ± 2.4
Total Recoverable Copper	mg/kg dry wt	29.8 ± 4.3	-	13.2 ± 2.3
Total Recoverable Lead	mg/kg dry wt	46.4 ± 7.0	-	11.9 ± 1.9
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.067	-	< 0.10 ± 0.067
Total Recoverable Nickel	mg/kg dry wt	7.6 ± 1.7	-	8.4 ± 1.7
Total Recoverable Zinc	mg/kg dry wt	61.4 ± 5.1	-	49.8 ± 4.4
Organochlorine Pesticides Screening in Soil				
Aldrin	mg/kg dry wt	-	-	< 0.012 ± 0.0046
alpha-BHC	mg/kg dry wt	-	-	< 0.012 ± 0.0046
beta-BHC	mg/kg dry wt	-	-	< 0.012 ± 0.0052
delta-BHC	mg/kg dry wt	-	-	< 0.012 ± 0.0049
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.012 ± 0.0045
cis-Chlordane	mg/kg dry wt	-	-	< 0.012 ± 0.0047
trans-Chlordane	mg/kg dry wt	-	-	< 0.012 ± 0.0046
2,4'-DDD	mg/kg dry wt	-	-	< 0.012 ± 0.0050
4,4'-DDD	mg/kg dry wt	-	-	< 0.012 ± 0.0060
2,4'-DDE	mg/kg dry wt	-	-	< 0.012 ± 0.0047
4,4'-DDE	mg/kg dry wt	-	-	< 0.012 ± 0.0062
2,4'-DDT	mg/kg dry wt	-	-	< 0.012 ± 0.0063
4,4'-DDT	mg/kg dry wt	-	-	< 0.012 ± 0.0069
Total DDT Isomers	mg/kg dry wt	-	-	< 0.07 ± 0.015
Dieldrin	mg/kg dry wt	-	-	< 0.012 ± 0.0057
Endosulfan I	mg/kg dry wt	-	-	< 0.012 ± 0.0050
Endosulfan II	mg/kg dry wt	-	-	< 0.012 ± 0.0057
Endosulfan sulphate	mg/kg dry wt	-	-	< 0.012 ± 0.0072
Endrin	mg/kg dry wt	-	-	< 0.012 ± 0.0076
Endrin aldehyde	mg/kg dry wt	-	-	< 0.012 ± 0.0067
Endrin ketone	mg/kg dry wt	-	-	< 0.012 ± 0.0060
Heptachlor	mg/kg dry wt	-	-	< 0.012 ± 0.0049
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.012 ± 0.0045
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.012 ± 0.0049
Methoxychlor	mg/kg dry wt	-	-	< 0.012 ± 0.0076
Polycyclic Aromatic Hydrocarbons Screening in Soil*				
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014 ± 0.032	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014 ± 0.032	-	-
Acenaphthylene	mg/kg dry wt	< 0.014 ± 0.0068	-	-
Acenaphthene	mg/kg dry wt	< 0.014 ± 0.0072	-	-
Anthracene	mg/kg dry wt	< 0.014 ± 0.0073	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014 ± 0.0072	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014 ± 0.0067	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.033 ± 0.0097	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.033 ± 0.0097	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.014 ± 0.0070	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014 ± 0.0067	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014 ± 0.0069	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014 ± 0.0069	-	-
Chrysene	mg/kg dry wt	< 0.014 ± 0.0069	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014 ± 0.0069	-	-

Sample Type: Soil					
<b>Sample Name:</b>	HA4 0.0-0.1m 22-May-2025	HA4 0.1-0.5m 22-May-2025	SS1 DUP		
<b>Lab Number:</b>	3897944.32	3897944.33	3897944.34		
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Fluoranthene	mg/kg dry wt	< 0.014 ± 0.0068	-	-	
Fluorene	mg/kg dry wt	< 0.014 ± 0.0068	-	-	
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014 ± 0.0068	-	-	
Naphthalene	mg/kg dry wt	< 0.07 ± 0.036	-	-	
Perylene	mg/kg dry wt	< 0.014 ± 0.0067	-	-	
Phenanthrene	mg/kg dry wt	< 0.014 ± 0.0069	-	-	
Pyrene	mg/kg dry wt	< 0.014 ± 0.0069	-	-	
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 20 ± 6.7	< 20 ± 6.7	-	
C10 - C14	mg/kg dry wt	25.7 ± 8.2	< 20 ± 7.6	-	
C15 - C36	mg/kg dry wt	502 ± 48	< 40 ± 9.3	-	
Total hydrocarbons (C7 - C36)	mg/kg dry wt	531 ± 49	< 80 ± 14	-	
Sample Type: Aqueous					
<b>Sample Name:</b>	SS14 [TCLP extract]	SS14 [SPLP extract]	SS19 [TCLP extract]	SS19 [SPLP extract]	
<b>Lab Number:</b>	3897944.35	3897944.36	3897944.37	3897944.38	
Individual Tests					
Total Mercury	g/m <sup>3</sup>	< 0.0021 ± 0.0014	< 0.00011 ± 0.000074	< 0.0021 ± 0.0014	0.000163 ± 0.000097
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Arsenic	g/m <sup>3</sup>	-	0.0302 ± 0.0020	-	0.00316 ± 0.00076
Total Cadmium	g/m <sup>3</sup>	-	< 0.000053 ± 0.000036	-	0.000091 ± 0.000036
Total Chromium	g/m <sup>3</sup>	-	0.0156 ± 0.0013	-	0.00201 ± 0.00039
Total Copper	g/m <sup>3</sup>	-	0.0131 ± 0.0014	-	0.0204 ± 0.0021
Total Lead	g/m <sup>3</sup>	-	0.00227 ± 0.00016	-	0.0384 ± 0.0024
Total Nickel	g/m <sup>3</sup>	-	0.00116 ± 0.00038	-	0.00216 ± 0.00044
Total Zinc	g/m <sup>3</sup>	-	0.0112 ± 0.0012	-	0.0425 ± 0.0035
Heavy metals, totals, screen As,Cd,Cr,Cu,Ni,Pb,Zn, for TCLP samples					
Total Arsenic	g/m <sup>3</sup>	0.089 ± 0.015	-	0.096 ± 0.016	-
Total Cadmium	g/m <sup>3</sup>	< 0.0011 ± 0.00074	-	0.0266 ± 0.0023	-
Total Chromium	g/m <sup>3</sup>	0.0152 ± 0.0074	-	< 0.011 ± 0.0074	-
Total Copper	g/m <sup>3</sup>	< 0.011 ± 0.0074	-	0.071 ± 0.011	-
Total Lead	g/m <sup>3</sup>	< 0.0021 ± 0.0014	-	0.834 ± 0.051	-
Total Nickel	g/m <sup>3</sup>	< 0.011 ± 0.0074	-	0.0226 ± 0.0078	-
Total Zinc	g/m <sup>3</sup>	0.25	-	3.1	-
<b>Sample Name:</b>	SS24 [TCLP extract]	SS24 [SPLP extract]			
<b>Lab Number:</b>	3897944.39	3897944.40			
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Arsenic	g/m <sup>3</sup>	-	0.0917 ± 0.0056		
Total Cadmium	g/m <sup>3</sup>	-	< 0.000053 ± 0.000036		
Total Chromium	g/m <sup>3</sup>	-	0.00725 ± 0.00068		
Total Copper	g/m <sup>3</sup>	-	0.0268 ± 0.0028		
Total Lead	g/m <sup>3</sup>	-	0.0268 ± 0.0017		
Total Nickel	g/m <sup>3</sup>	-	0.00130 ± 0.00039		
Total Zinc	g/m <sup>3</sup>	-	0.0308 ± 0.0026		
Heavy metals, totals, screen As,Cd,Cr,Cu,Ni,Pb,Zn, for TCLP samples					
Total Arsenic	g/m <sup>3</sup>	2.04 ± 0.13		-	
Total Cadmium	g/m <sup>3</sup>	0.00254 ± 0.00076		-	
Total Chromium	g/m <sup>3</sup>	< 0.011 ± 0.0074		-	
Total Copper	g/m <sup>3</sup>	0.0485 ± 0.0088 #1		-	
Total Lead	g/m <sup>3</sup>	0.1149 ± 0.0071 #1		-	
Total Nickel	g/m <sup>3</sup>	< 0.011 ± 0.0074		-	
Total Zinc	g/m <sup>3</sup>	2.5		-	

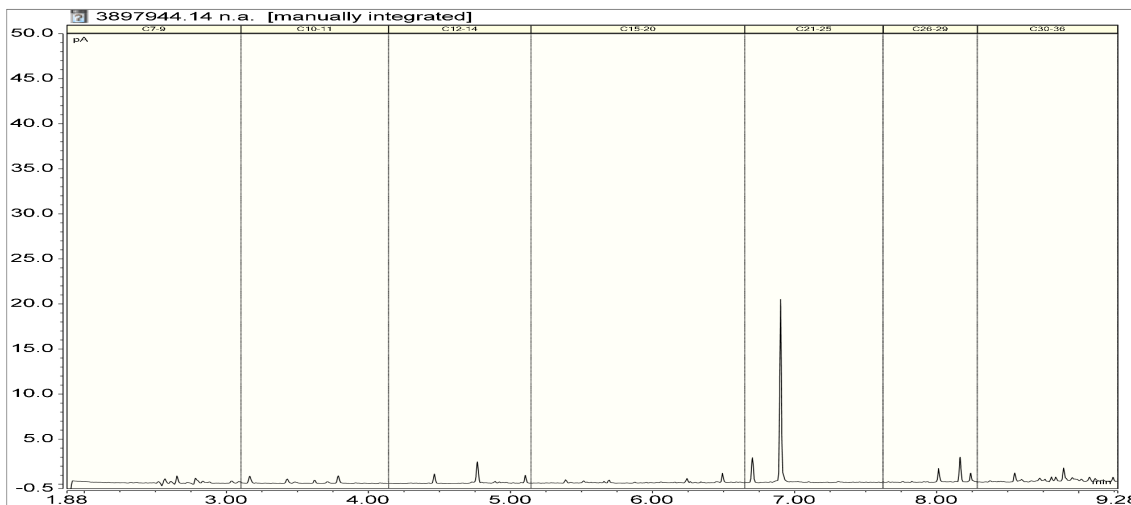
The reported uncertainty is an expanded uncertainty with a level of confidence of approximately 95 percent (i.e. two standard deviations, calculated using a coverage factor of 2). Reported uncertainties are calculated from the performance of typical matrices, and do not include variation due to sampling.

For further information on uncertainty of measurement at Hill Laboratories, refer to the technical note on our website: [www.hill-laboratories.com/files/Intro\\_To\\_UOM.pdf](http://www.hill-laboratories.com/files/Intro_To_UOM.pdf), or contact the laboratory.

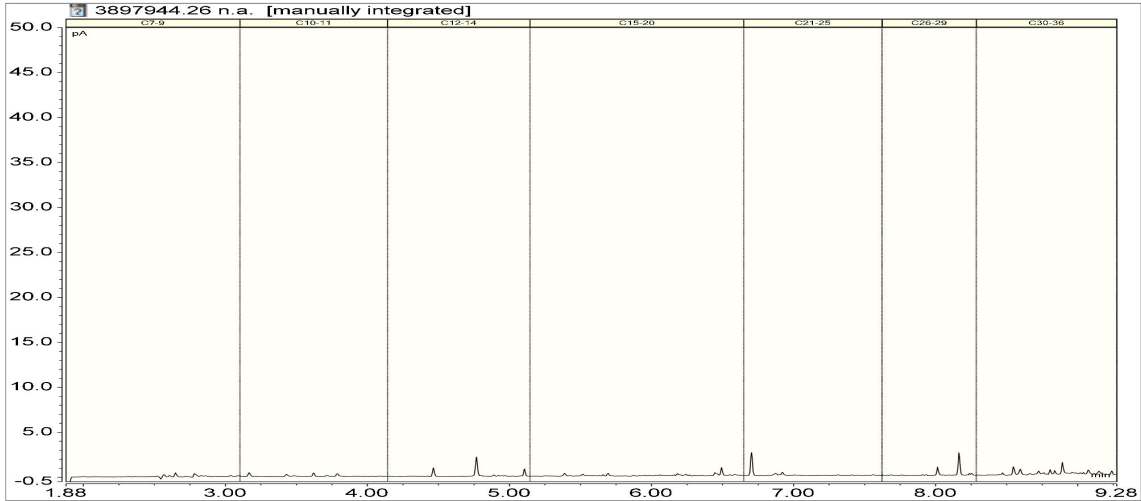
3897944.13  
SS13 22-May-2025  
Client Chromatogram for TPH by FID



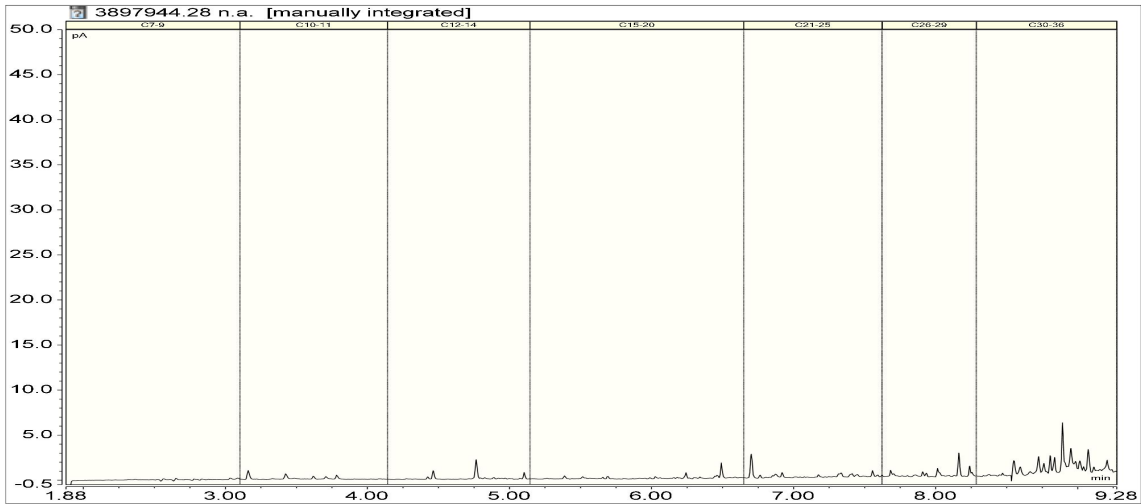
3897944.14  
SS14 22-May-2025  
Client Chromatogram for TPH by FID



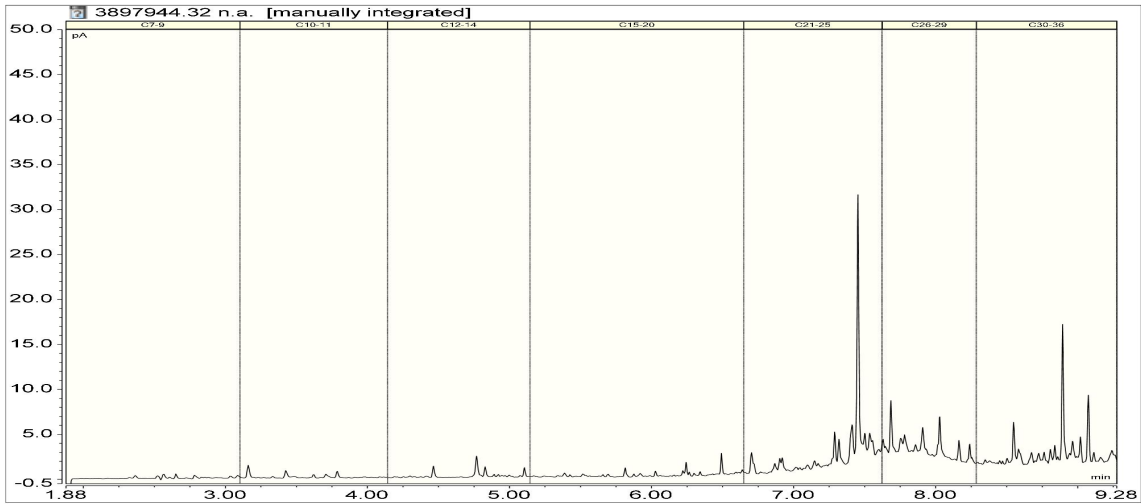
3897944.26  
SS28 22-May-2025  
Client Chromatogram for TPH by FID



3897944.28  
HA2 0.0-0.1m 22-May-2025  
Client Chromatogram for TPH by FID



3897944.32  
HA4 0.0-0.1m 22-May-2025  
Client Chromatogram for TPH by FID



The reported uncertainty is an expanded uncertainty with a level of confidence of approximately 95 percent (i.e. two standard deviations, calculated using a coverage factor of 2). Reported uncertainties are calculated from the performance of typical matrices, and do not include variation due to sampling.

For further information on uncertainty of measurement at Hill Laboratories, refer to the technical note on our website: [www.hill-laboratories.com/files/Intro\\_To\\_UOM.pdf](http://www.hill-laboratories.com/files/Intro_To_UOM.pdf), or contact the laboratory.

**Analyst's Comments**

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample.

**Amended Report:** This certificate of analysis replaces report '3897944-SUPv2' issued on 18-Jun-2025 at 5:27 pm.  
Reason for amendment: Additional testing added as per clients 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, 3, 5, 7, 9, 11, 13-26, 28, 32, 34
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	13-14, 20-26, 28, 32
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-14, 20-26, 28-29, 32-34
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	13-14, 20-26, 28, 32
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	13-14, 20-26, 28, 32
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	13-14, 26, 28, 32
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3, 5, 7, 9, 11, 13-26, 28, 32, 34
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-12, 34
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	20-25
SPLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1312.	-	14, 19, 24
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	14, 19, 24
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.	-	13-14, 26, 28, 32
C7 - C9	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	13-14, 26, 28-29, 32-33

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	13-14, 26, 28-29, 32-33
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	13-14, 26, 28-29, 32-33
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	13-14, 26, 28-29, 32-33
SPLP Profile			
SPLP Sample Weight	Gravimetric. US EPA 1312.	0.1 g	14, 19, 24
SPLP Extractant Type*	US EPA 1312 (Modified for New Zealand conditions to use De-ionised Water unless otherwise specified).	-	14, 19, 24
SPLP Final pH	pH meter. US EPA 1312.	0.1 pH Units	14, 19, 24
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	14, 19, 24
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	14, 19, 24
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	14, 19, 24
TCLP Extractant Type*	US EPA 1311.	-	14, 19, 24
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	14, 19, 24
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	14, 19, 24
Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Total Digestion with HCl	Nitric/hydrochloric acid digestion. APHA 3030 E (modified) : Online Edition.	-	35-38
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	35-40
Total Mercury	Acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.0021 g/m <sup>3</sup>	35, 37
Total Mercury	Acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.00011 g/m <sup>3</sup>	36, 38
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 <sup>3</sup>	36, 38, 40
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 <sup>3</sup>	35, 37, 39

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

Testing was completed between 27-May-2025 and 18-Jul-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)  
Client Services Manager - Environmental

## Certificate of Analysis

Page 1 of 4

<b>Client:</b> Tonkin & Taylor	<b>Lab No:</b> 3898195 <span style="float: right;">A2Pv1</span>
<b>Contact:</b> Sami Myers-Hutchings	<b>Date Received:</b> 24-May-2025
C/- Tonkin & Taylor	<b>Date Reported:</b> 30-May-2025
PO Box 5271	<b>Quote No:</b> 80842
Auckland 1141	<b>Order No:</b> 1017353.24
	<b>Client Reference:</b> 1017353.24
	<b>Submitted By:</b> Maddy Kaye

### Sample Type: Soil

Sample Name:	SS15	SS16	SS17	SS18	SS19
	22-May-2025	22-May-2025	22-May-2025	22-May-2025	22-May-2025
Lab Number:	3898195.1	3898195.2	3898195.3	3898195.4	3898195.5
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 793.5	g 752.6	g 776.7	g 741.4	g 732.5
Dry Weight	g 689.4	g 664.6	g 696.2	g 636.4	g 651.5
Moisture*	% 13	% 12	% 10	% 14	% 11
Sample Fraction >10mm	g dry wt 58.8	g dry wt 97.8	g dry wt 127.3	g dry wt 113.6	g dry wt 90.4
Sample Fraction <10mm to >2mm	g dry wt 188.7	g dry wt 218.3	g dry wt 223.0	g dry wt 239.2	g dry wt 204.8
Sample Fraction <2mm	g dry wt 440.7	g dry wt 348.1	g dry wt 345.1	g dry wt 282.9	g dry wt 356.0
<2mm Subsample Weight	g dry wt 57.1	g dry wt 56.6	g dry wt 52.0	g dry wt 53.1	g dry wt 54.0
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:	SS24	SS25	SS26	SS27	HA2 0.0-0.1m
	22-May-2025	22-May-2025	22-May-2025	22-May-2025	22-May-2025
Lab Number:	3898195.10	3898195.11	3898195.12	3898195.13	3898195.15
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Amosite (Brown Asbestos) detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	Loose fibres	Loose fibres	-
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 0.002	% 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 0.002	% w/w < 0.001
As Received Weight	g 539.4	g 521.0	g 650.6	g 522.4	g 548.1
Dry Weight	g 368.4	g 419.8	g 520.7	g 458.6	g 427.9



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:	SS24	SS25	SS26	SS27	HA2 0.0-0.1m	
	22-May-2025	22-May-2025	22-May-2025	22-May-2025	22-May-2025	
Lab Number:	3898195.10	3898195.11	3898195.12	3898195.13	3898195.15	
Moisture*	%	32	19	20	12	22
Sample Fraction >10mm	g dry wt	7.6	5.4	2.0	4.7	2.7
Sample Fraction <10mm to >2mm	g dry wt	58.1	71.7	30.7	24.1	73.2
Sample Fraction <2mm	g dry wt	302.5	342.0	487.2	429.2	350.2
<2mm Subsample Weight	g dry wt	52.5	58.3	58.3	57.1	52.7
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	0.00466	0.00924	< 0.00001

Sample Name:	HA4 0.0-0.1m 22-May-2025				
Lab Number:	3898195.19				
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	742.7			
Dry Weight	g	687.4			
Moisture*	%	7			
Sample Fraction >10mm	g dry wt	< 0.1			
Sample Fraction <10mm to >2mm	g dry wt	4.2			
Sample Fraction <2mm	g dry wt	681.9			
<2mm Subsample Weight	g dry wt	55.6			
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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%	1-5, 10-13, 15, 19
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19
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	1-5, 10-13, 15, 19

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

Testing was completed on 30-May-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.

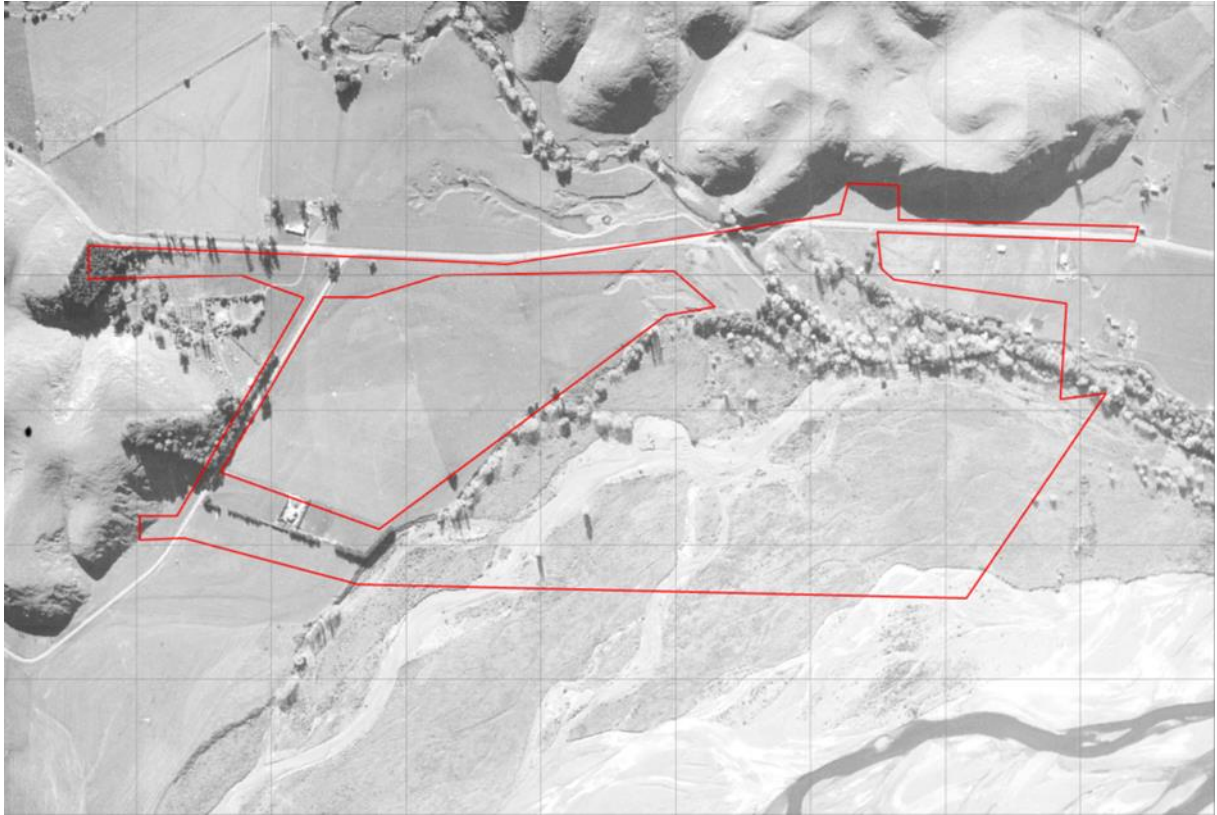
This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

A handwritten signature in blue ink, appearing to be 'JG', with a horizontal line above it.

Jessica Griffin BSc, BOHS W504  
Team Leader - Asbestos

## Appendix F Historic aerial photographs

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*Photograph Appendix F.1: 1950. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN541, Run Number 1704, Photo Number 22.*



*Photograph Appendix F.2: 1964. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN1654, Run Number 3850, Photo Number 25.*



*Photograph Appendix F.3: 1969. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN3183, Run Number 4202, Photo Number 16.*



*Photograph Appendix F.4: 1974. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN3697, Run Number C, Photo Number 7.*



*Photograph Appendix F.5: 1977. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN5135, Run Number C, Photo Number 6.*



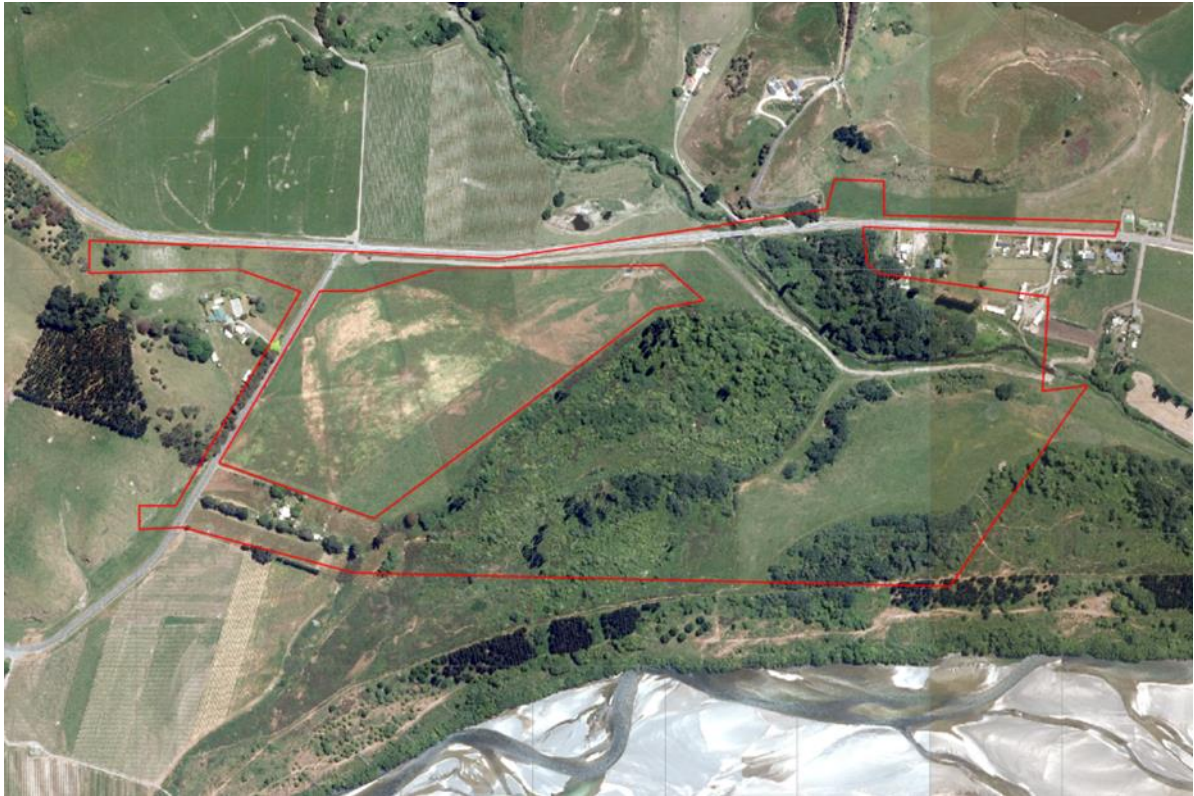
*Photograph Appendix F.6: 1980. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN5752, Run Number K, Photo Number 12.*



*Photograph Appendix F.7: 1988. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN8985, Run Number L, Photo Number 11.*



*Photograph Appendix F.8: 1996. Indicative site boundary shown in red. Source: Retrolens, Survey Number SN9585, Run Number C, Photo Number 6.*



*Photograph Appendix F.9: 2011. Indicative site boundary shown in red. Source: LINZ Hawkes Bay 0.4m Rural Aerial Photos (2010-2011).*



*Photograph Appendix F.10: 2015. Indicative site boundary shown in red. Source: LINZ Hasting District 0.3m Urban Aerial Photos (2014-2015).*



Photograph Appendix F.11: 2020. Indicative site boundary shown in red. Source: LINZ Hawkes Bay 0.3m Rural Aerial Photos (2019-2020).



Photograph Appendix F.12: 2023. Indicative site boundary shown in red. Source: LINZ Hawke's Bay 0.10m Cyclone Gabrielle Aerial Photos (2023).

