Hawke’s Bay Regional Council
Wairoa Floodway Design Phase

Preliminary Site Investigation and Limited Detailed Site Investigation

05 August 2025

2-T4441.03

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Hawke's Bay Regional Council

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REV	DATE	DETAILS
A	05/08/25	Report for issue

	NAME	DATE	SIGNATURE
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Reviewed by:	Lisa Bond	5/08/2025	
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EXECUTIVE SUMMARY

WSP New Zealand Limited (WSP) was contracted by Hawke's Bay Regional Council (HBRC) to undertake a Preliminary Site Investigation and Limited Detailed Site Investigation (PSI/Limited DSI) for a proposed floodway and stopbank in Wairoa ('the Site').

WSP has undertaken this PSI/LimitedDSI to assess if it is more likely than not that industries or activities described in the Ministry for Environment (MfE) *Hazardous Activities and Industries List* (HAIL) (MfE, 2011) are occurring, or have historically been undertaken, on or near the Site and therefore, if the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (NESCS) applies to the proposed development. The outcome of this report will be used to provide a recommendation on whether a Contaminated Soil Management Plan is required.

The scope of works for this PSI/Limited DSI consisted of a desktop study review of publicly available information for the site geology and hydrogeology, historical aerial imagery available on Retrolens (Retrolens, 2025) and Google Earth (GoogleEarth, 2025), information on the Hawke's Bay Regional Council Land Use Register (LUR), preliminary design plans of the proposed project, the collection of surface soil samples for analysis and preparation of this report.

Based on information from council records, historical aerials, geological and hydrogeological information, no HAIL categories were found to apply to the site. Observations during the site walkover identified the following activities to potentially apply to the site:

- HAIL A10 - Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
- HIAL A17 - Storage tanks or drums for fuel, chemicals or liquid waste
- HAIL A18 - Bulk storage of treated timber outside.
- E1 - Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
- G5 - Waste disposal to land

Based on the findings of the DSI, WSP concludes the following:

The NESCS is considered to apply to the site because it is considered more likely than not that an activity described in the HAIL has been undertaken on it, the use of the land in some areas is being changed so that it will cause the land to be production land, and soil sampling analysis has shown that contaminants exceed background concentrations in some areas.

- The concentrations of contaminants of concern in soils sampled do not exceeded adopted criteria for protection of human health and the environment for commercial/ industrial land use therefore soils are considered suitable for re-use on site within the alignment. Of these samples, the following exceedances were also identified:
  - Ten of the total 19 soil samples collected reported at least one of the heavy metals above predicted background concentrations.
  - Seven of the total 19 19 soil samples collected reported at least one analyte above the Class 4 Managed Fill WAC.
- On the basis of the limited investigations completed, there were no soil contamination matters identified in surface soils that are likely to present a constraint to the development of the protection scheme or give rise to human health risks during construction.
- Pieces of Land considered to be HAIL were identified and may require further assessment to fully determine risks to human health.

- WSP considers that a CSMP is not required as none of the results of the limited soil sampling exceeded human health guidelines and all soils are intended to be reused on site.

Based on the findings WSP recommends the following:

- An Unexpected Discovery Protocol (UDP) is prepared for disturbance works outlining the procedures and processes that will be followed should anything of contaminated relevance be identified during excavations works (i.e. asbestos or buried rubbish).
- A small area of visibly stained soils identified in one location as exceeding the Class 4 WAC for TPH should be removed from site to an appropriately licence facility.
- Buildings identified with asbestos cladding should be assessed and if required an Asbestos Removal and Control Plan completed by licenced asbestos removal specialists under the supervision of a Licensed Asbestos Assessor.

1 PROJECT BACKGROUND

1.1 INTRODUCTION

WSP New Zealand Limited (WSP) was contracted by Hawke's Bay Regional Council (HBRC) to undertake a Preliminary and Limited Detailed Site Investigation (PSI/ Limited DSI) for a proposed floodway and stopbank in Wairoa (the Site).

As a consequence of severe weather events, most notably Cyclone Gabrielle in 2023, which affected Hawke's Bay and Tairāwhiti/Gisborne regions, there is an increased need to protect these communities against severe future flooding. HBRC has engaged WSP to undertake the design for the Wairoa Flood Mitigation Project, comprising a floodway and a townside stopbank.

1.2 CONSENT PROCESS

This project's consenting falls under an Order In Council (OIC) process. This PSI/limited DSI will form part of the consent application under this OIC process.

1.3 PROPOSED DESIGN

The floodway will be constructed between two sections of the Wairoa River as shown in Figure 1. The floodway is approximately 1,150 m long from inlet to outlet and bypasses approximately 8 km of river channel.

The floodway consists of an excavated channel with side batters (stopbanks). The inlet begins on the true left of the Wairoa River, between Railway Road and Ruataniwha Road. The eastern stopbank follows Railway Road for about 1 km, then turns south to meet Ruataniwha Road, before curving east to rejoin the riverbank within LOT 4 DP 17920. The western stopbank runs along Ruataniwha Road for roughly 600 m, then turns southeast to intersect Waihirere Road, before curving south to meet the river within TAUMATAOTEO 18B ML 392091 BLK V CLYDE SD. Construction of the floodway will require excavating 1.5 to 2 m below ground level.

In addition to the stopbanks flanking the floodway, a stopbank (the "townside" stopbank) will be constructed on the true right of the Wairoa River, directly opposite the outlet of the newly formed floodway. It will begin on the western side of the Wairoa town bridge, follow the river for approximately 1.2 km around the Ski Club, and then turn inland by about 100 m at 56 Mitchell Road (see Figure 2). This stopbank is designed to manage adverse flood effects from the floodway.

1.4 OBJECTIVES

WSP has undertaken this PSI/Limited DSI to assess if it is more likely than not that industries or activities described in the Ministry for Environment (MfE) *Hazardous Activities and Industries List* (HAIL) (MfE, 2011) are occurring, or have historically occurred on or near the Site and therefore if the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (NESCS) applies to the proposed development.

Limited soil samples were collected during the site walkover in areas where evidence of potential soil contamination was observed in order to identify if the observed activities have had an impact on surrounding soils and provide an indication of whether further contaminated land investigations should be undertaken prior

to the commencement of works and if a Contaminated Soil Management Plan will be required for consenting purposes/

It should be noted that assessment of buildings and/or other structures with regard to asbestos is outside the scope of this report.

1.5 SCOPE OF WORKS

The scope of work comprised:

- A site walkover to assess the current site condition and its surrounding environment, including any potential present-day HAIL activities in proposed floodway area.
- A review of publicly available information relating to site history, resource consents (through eDocs or similar), geological conditions, and hydrology of the site and its surrounds.
- HAIL assessment of the proposed townside stopbank area
- Liaison with HBRC to gain additional information they may have regarding the HAIL activities on or near the site should it be required.
- The collection of surface soil samples from identified areas of interest in the proposed floodway area.
- Preparation of a PSI/Limited DSI report containing:
  - The findings of the desktop information review and site walkover.
  - HAIL assessment findings for the townside stopbank area.
  - Development of a preliminary conceptual site model (CSM).
  - Risk assessment of potential soil borne contamination.
  - Assessment of the results of the soil sampling and analysis.
  - Conclusions and recommendations regarding implications of the findings for the proposed development.

1.6 CERTIFYING STATEMENT

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

- Reported on in accordance with the current edition of the CLMG No. 1.
- The report has been reviewed and approved by a Suitably Qualified and Experienced Practitioner (SQEP).
- Evidence of the qualifications and experience of the SQEP(s) who have done this investigation are available on request. The investigation manager and principal certifier details are provided in Table 1-1.

Table 1-1 Investigation management

Item	Details
Investigation Manager	
Name	Rachael Forrest CEnvP
Job title	Environmental Scientist
Years' industry experience	10
Approver	
Name	Lisa Bond CEnvP SC
Job title	Principal Consultant - Environmental
Years' industry experience	23

2 SITE LOCATION AND SETTING

2.1 SITE AND SURROUNDING LAND USES

The proposed Site area for the project is located in rural land in Wairoa (Figure 1). The following details in Table 2-1 were acquired using the HBRC 'Land Valuation Information' online GIS map (HBRC, 2025) .

Table 2-1 Site Property Details- Floodway

Address	Legal Description	LINZ Parcel ID	Approximate Site area	Current Site Use
70 Waihirere Road	Lot 3 DP 17920 TAUMATAOTEO 16A ML 391098 PTS 20A 20B6 BLK V CLYDE SD	Part Taumataoteo 20B Block	7.5733	Agricultural
55 Waihirere Road	Lot 4 DP 17920	Lot 4 DP 17920	4.5335	Agricultural
63 Waihirere Road	TAUMATAOTEO 19B3 BLK V CLYDE S D	Taumataoteo 19B3 Block	0.1012	Rural-residential
61 Waihirere Road	TAUMATAOTEO 19B2 BLK V CLYDE S D	Taumataoteo 19B2 Block	0.1012	Rural-residential
67 Waihirere Road	TAUMATAOTEO 18A BLK V CLYDE S D	Taumataoteo 18A Block	0.1012	Rural-residential
102 Ruataniwha Road	TE RATO 3E3B1 BLK I CLYDE S D	Te Rato 3E3B1 Block	0.1669	Rural - residential
92 Ruataniwha Road	Lot 1 D P 6472 BLK I CLYDE S D	Lot 1 DP 6472	1.4154	Rural - residential
78 Ruataniwha Road	TE RATO 1F1 BLK I CLYDE S D	HBV3/823	0.5437	Rural - residential
75 Ruataniwha Road	Lot 2 DP 17914 BLK V CLYDE SD	Lot 2 DP 17914	1.4154	Agricultural
56 Ruataniwha Road	TE RATO 1E1 1E2 BLK I CLYDE SD	Part Te Rato 1E2 BlockPart Te Rato 1E1 Block	4.0051	Rural - residential
46 Ruataniwha Road	TE RATO 1A2 1A3 1A4A 1A4B 1A4C 1A4D PTS1B 1C 1D Part TAUMATA-O-TEO 32D BLKS I V CLYDE S D	Te Rato 1A4D Block Te Rato 1A4C Block Te Rato 1A4B Block Te Rato 1A4A Block Te Rato 1A3 Block Te Rato 1A2 Block Part Te Rato 1D Block Part Te Rato 1C Block Part Te Rato 1B Block	9.2005	Agricultural / Recreational
41 Railway Road	Lot 2 D P 5279 BLK I CLYDE S D	Lot 2 DP 5279	1.6653	Rural - residential

147 Railway Road	LOT 1 DP 6699 LOTS 1 3 DP 5279 PT PAEROA 1E7B2 BLK LOT 1 DP 5233 LOT 3 DP 16115	HB103/31 HB179/22 HB73/270 HBC2/1033 HBC	78.0197	Agricultural
165 Railway Road	LOT 2 DP 5233 BLK I CLYDE S D	GSL4/760	13.5417	Agricultural
End of Railway Road (177)	LOT 1 DP 4680 LOT 1 DP 5085 BLK I CLYDEE S D	HBC4/771	22.8015	Agricultural

Table 2-2 Site Property Details -Townside stopbank

Address	Legal Description	LINZ Parcel ID	Approximate Site area	Current Site Use
14 Mitchell Road	Lot 3 DP 9927	HBM3/292	1.1548	Residential
20A Mitchell Road	Lot 1 DP 28534	HBY2/361	1.1469	Residential
28 Mitchell Road	POUTAKA 8 -INC 1/2 SHARE IN DRIVEWAY-	HB61/125	0.3945	Residential
30 Mitchell Road	POUTAKA 9 -INC 1/2 SHARE IN DRIVEWAY-	HBA4/84	0.3819	Residential
38 Mitchell Road	Lot 3 DP 17077	HBJ4/329	0.5204	Residential
42 Mitchell Road	Lot 2 D P 7513	HB119/117	0.8013	Residential
46 Mitchell Road	POUTAKA 12B	HBH1/108	0.994	Residential
50–52 Mitchell Road	POUTAKA 13C	HBF3/389	0.4578	Residential
56 Mitchell Road	POUTAKA 13A1	HBA3/56	0.3389	Residential
27 Churchill Road	POUTAKA 4A	HBB4/1499	0.263	Residential

2.2 GEOLOGY AND TOPOGRAPHY

A review of the GNS Geology Web Map 1:250,000 scale (GNS, 2024) indicates that the Site is underlain by Holocene age river deposits consisting of gravel, sand and silt of the Pakihi Supergroup.

The S-Map Online Soils Map Viewer (Manaaki Whenua, 2022) indicates that the site soils are deep, with the majority of the soils across the site consist of imperfectly to poorly drained soils. Soils in the CBD protection area near the Wairoa Playground are described as well drained sand.

The WDC Topographic Infomap (WDC, 2025) indicates the site is flat at approximately 20 m above mean sea level (amsl).

2.3 SURFACE WATER AND HYDROLOGY

The HBRC Bore Reference Data Map (HBRC Data, 2025) shows that there are no bores within 500m of the Site. The nearest natural surface water body to the Site is the Wairoa River, which is located at the north and south ends of the Floodway and the north side of the stopbank area.

Groundwater is expected to flow south and/or southwest trending in line with the Wairoa River, toward the Pacific Ocean.

3 DESKTOP REVIEW

3.1 HISTORICAL AERIAL PHOTOGRAPHS

WSP undertook a review of relevant historical aerial photographs available on Retrolens (Retrolens, 2025) and Google Earth (GoogleEarth, 2025) to assess whether any historical land use activities are present within 100 m of the Site that may resulted in soil contamination within the Site boundaries.

A summary of the historical aerial photograph review is presented in Table 3-1 and historical aerial photography reviewed during this PSI/Limited DSI is presented in Appendix A.

Table 3-1 Summary of Historic Aerials

Year of Aerial (Source)	Floodway	Townside
1942 (Retrolens)	45 Railway Road had house and small orchard present. The A&P Showgrounds main hall is in the same location as in the present day, but the building is smaller, the yards for stock animals are located to the east of the present-day location. 56 Ruataniwha Road is pasture with no house or barns seen; 75 Ruataniwha Road is pasture only with no house present.	Churchill Ave not yet developed; 30 and 28 Mitchell Road are present as is 50. Remainder of site is pasture
1962 (Retrolens)	A residential house present to the north of 45 Railway Road and an access track from Railway Road to behind the Te Kopua Urupa (cemetery) has been constructed. An excavation can be seen between the river and the track. Some new animal pens have been constructed within the A&P Showgrounds. 56 Ruataniwha Road has a house at the rear of the section by the river. 92 Ruataniwha Road had a main house and many outbuildings. 55, 61 and 63 Waihirere Road appear in a layout similar to modern day.	56 Mitchell Road has a house on the south end of the property; 40 Mitchell Road is developed. More house on Mitchel but waterfront is still mainly pasture. Outdoor swimming pool is visible at the Wairoa Community Centre on Marine Parade.
1970 (Retrolens)	No significant changes	More established trees along the riverbank
1978 (Retrolens)	Shed between Te Kopua Urupa and 45 Railway Road has been constructed. House, Pig sties and barn are constructed at 56 Ruataniwha Road – dwelling on north end of property no longer present	Churchill Ave has been constructed and has been developed as a residential area. More residential housing is represented on Mitchell Street.
1979 (Retrolens)	No significant changes	No significant changes
1981 (Retrolens)	No significant changes	Rimu Drive has been constructed off Mitchell Road

Year of Aerial (Source)	Floodway	Townside
1983 (Retrolens)	Orchards present at 41 Railway Road and 56 Ruataniwha Road.	Wairoa Community Centre swimming pool is now indoors.
2003 Retrolens	Orchard at 41 Railway Road removed; 75 Railway Road property developed; New stockyard at A&P showgrounds. Stop bank construction on Railway Road properties	Houses developed as they appear in present day. Skate Park feature at Marine Parade Park has been constructed.
2011 Google Earth)	Property at 44 Railway Road no longer has a house present. Orchard planted at 175 Railway Road	No significant changes
2019 Google Earth)	No significant changes	Playground at Marine Parade Park
2015 Google Earth)	No significant changes	No significant changes
2024 (Google Earth)	No significant changes	No significant changes

3.2 HAWKE'S BAY REGIONAL COUNCIL SELECTED LAND USE REGISTER

A search of the Hawke's Bay Hazard Portal (HBRC, 2025) was undertaken for information relating to HAIL activities associated with the Site. The map shows that the Site does not have any HAIL activities currently recorded as having occurred on it. The nearest HAIL property is located approximately 100m to the south from the southern stopbank area at its nearest point. This activity is described in Table 3-2.

Table 3-2 Neighbouring HAIL Sites

Location	Address (BOPRC Reference)	HAIL Categories Recorded	Status
Southwest of eastern end of southern stopbank.	60 Marine Parade (SLS-10516)	F7: Service Stations	Verified HAIL - Risk Not Quantified

It must be noted that the SLUR is not a comprehensive list of HAIL activities on properties and the absence from the list does not mean that HAIL has not occurred on a site, rather the site has not as yet been assessed, and if considered HAIL, listed.

3.3 NEW ZEALAND GEOTECHNICAL DATABASE

A review of the New Zealand Geotechnical Database (NZGD, 2025) identified three boreholes and 20 cone penetrometer tests (CPTs) located within or adjacent to the Site boundary in the Townside area. CPTs were generally advanced from 20 to 30 m with reported soils consisted of silts, sandy silts, and sandy clays. Fill material was reported in some of the investigations. Although it was not clear what the source of the fill was, it is considered likely to be material deposited during flooding. Groundwater was generally detected from between 2.5 to 4 m bgl. Copies of the investigation logs are provided in Appendix B.

3.4 PREVIOUS WSP INVESTIGATIONS

WSP has undertaken a number of investigations in July 2025 as a part of the Wairoa Floodway Project and includes Ecological Assessments, LandscapeAassessments, Geological Mapping and Geotechnical Assessments and Investigations. Findings from these reports are consistent with the information provided in this report and are provided in the overall Wairoa Floodway Design Package outputs.

4 SITE WALKOVER

The Site was visited by a WSP Contaminated Land Specialist (CLS) on 3 and 4 July 2025. WSP was accompanied on Site to most locations by Sue Wilson, the landowner engagement specialist from HBRC. In some instances where Ms Wilson was not able to accompany WSP, she called ahead to the relevant landowners to inform them of our presence and confirm access was permitted. Not all locations were made available to WSP for the Site walkover. A summary of the observations made are given in Table 4-1 and Table 4-2 Site walkover Observations – Stopbank., points of interest are shown on Figure 2 and Site Photographs are provided in Appendix C.

Table 4-1 Site Walkover Observations - Floodway

Location	Observations	Photo Reference
177 Railway Road	Property Is agricultural with a recent citrus orchard planted adjacent to the proposed stopbank location.	Photo 1
165 Railway Road	Property is agricultural, observed adjacent to the proposed stopbank location was fenced pasture and Railway Road. The southern end of the Site had a shed or workshop present which was accessed from a farm track off Railway Road adjacent to 41 Railway Road. The workshop was observed to be a steel and timber construction. No access to the inside of the shed was possible. Waste oil drums were observed outside the shed with soil staining on the ground. Looking towards the north alongside the Wairoa River, an existing stopbank was observed. The proposed stopbank is located in the location of this shed and extends north adjacent to Te Kopua Urupa (cemetery).	Photo 2, 3, 4, 5
45 Railway Road	This property had a residential home and associated paddocks. Stock animals onsite included chickens and sheep. The proposed stopbank passes through the paddocks approximately 100m from the rear of the residential home.	Photo 6
Wairoa A&P Showgrounds	The Wairoa A&P Showgrounds is a grassed areas with a range of buildings for use as sheds, function rooms, a shearing shed, animal pens and toilets. Observed on Site were also stacked piles of treated timber that had been used for fencing in the old horse arena area. Timber stacks were stored off the ground on separate timber runners. Signs of clean up from flooding events were seen in stockpiles of coarse vegetation and silt. Evidence of recent subsidence along the riverbank was also seen with the fence line on the northern end having dropped down the edge of the riverbank edge.	Photo 7, 8, 9 10, 11, 12
56 Ruataniwha Road	This property consisted of an abandoned home, a pair of barns, and an orchard. Ms Wilson reported at the time that the house had been identified by the council as having asbestos materials. The house was in very poor condition and was observed from the exterior. The orchard was growing citrus fruit. The animal barns were of timber construction and were not used. The floors were covered in silt from the recent flooding events. One of the barns contained a number of household appliances and farm implements were also stored there. At the north end of the Site were also a number of green waste piles and a pile of used building material and furniture. Towards the riverbank were also two empty plastic intermediate bulk containers (IBC's) that were labelled has having contained a caustic	Photo 13, 14, 15, 16, 17

	substance. The IBCs were in a moderate condition and did not appear to be damaged.	
102 Ruataniwha Road	This property had fibre cement cladding of an unknown age with the potential to be ACM. Old farm machinery was observed stored on Site, along with large piles of building materials stacked up on the north side of the property.	Photo 18, 19
75 Ruataniwha Road	The proposed floodway encompasses the existing pasture on this property. The paddocks were observed to be recently harvested maize crops.	Photo 20
70 Waihirere Road	70 Waihirere Road is located to the South of 75 Ruataniwha Road and was also recently harvested for maize.	Photo 21
55 Waiherere Road	This property is situated in the proposed floodway. A house located on the Site had been recently demolished due the flood damage from the recent weather event. The house had been replaced with two modular homes. Waste building materials from the demolished house were present on Site adjacent to a stream gully that drains southeast towards the Wairoa River. An Urupa associated with Takitimu Marae was located to the east of the Site.	Photo 22, 23

Townside

Table 4-2 Site walkover Observations – Stopbank.

Location	Observations	Photo Reference
Wairoa Park	Wairoa Park was located on Marine Parade adjacent to The Wairoa River to the north. Observed on Site was a children's playground, a skate park, a pumpstation and the Wairoa community centre. The area where the stopbanks are located was observed to be tidy mown grass used for recreational purposes.	Photo 24, 25, 26, 27, 28
Wairoa Ski Club	The ski club building and the boat ramp were observed during the walkover. No evidence of contaminating activities was observed however access was not available for the building, it is unknown if fuel is stored on Site.	Photo 29, 30
25 Churchill Street, 14 to 52 Mitchell Street.	The riverbank area adjacent to the properties on Mitchell Street and Churchill Street was observed and photographs collected. This part of the Site is council owned land but the residential properties adjacent to this area maintaining the land that adjoins their properties. The property located at 30 Mitchell Street had constructed a boat house and were in the process of building a small dock. Some of the riverbank was used for green waste disposal, piles of lawn clippings and tree trimmings were observed near 48 and 52 Mitchell Road.	Photos 30 to 37

5 SITE CHARACTERISATION

5.1 HAIL SUMMARY

Information obtained from the Land Use Information Register (LUIR) held by council did not identify any HAIL activities to apply to the Site. Desk study information from historical aerials and the Site walkover identified the following four potential HAIL activities observed to be currently occurring onsite, these activities are presented in Table 5-1.

Table 5-1 Observed HAIL Activities

HAIL Activity	Property Location	Activity Description	Associated Hazardous Substances	Site Notes/
A10	56 Ruataniwha St 177 Railway Road	Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Arsenic, lead, copper, mercury; wide range of organic compounds including acidic herbicides, organophosphates, and organochlorines (e.g., endosulfan on golf and bowling greens).	The property at 177 Railway Road is a relatively recent citrus orchard and unlikely to have been subject to widespread application or bulk storage of pesticides.
A17	147 Railway Road (Shed next to 41 Railway Road)	Storage tanks or drums for fuel, chemicals or liquid waste	Petroleum hydrocarbons Solvents, Polycyclic aromatic hydrocarbons (PAHs), BTEX compounds, Heavy metals, Chlorinated solvents, Acids and alkalis, Pesticide residues	The shed associated with the property at 147 Railway had waste oil drums with noticeable soil staining around them. The soil staining was limited in extent.
A18	46 Ruataniwha Road	Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside.	Chromated copper arsenate (CCA)	Treated timber from former horse yards is stored in piles around the northern boundary of the A&P Showgrounds property.
E1	56 Ruataniwha Road 102 Ruataniwha Road	Asbestos products manufacture or disposal including Sites with buildings containing asbestos products known to be in a deteriorated condition	Asbestos	Buildings will be managed. 56 Ruataniwha Road has previously been identified as having ACM.102 Ruataniwha Road was observed to have potential ACM cladding.
G5	46 Ruataniwha Road 56 Ruataniwha Road 102 Ruataniwha Road 55 Waiherere Road	Waste disposal to land	Dependent on original waste composition, wide range of hydrocarbons and metals, organic acids, landfill gas, and ammonia	Materials were observed to be inert building materials and silts from flooding events.

6 DETAILED SITE INVESTIGATION

6.1 SAMPLING DESIGN AND RATIONALE

In order to identify if any of the potential HAIL activities observed during the Site walkover have had an impact on surrounding soils, judgemental samples were collected from 20 locations across the Site in the areas the activities were identified. Sampling involved the collection of surface samples to a maximum depth of 0.05 mbgl (10mm) in the proposed floodway.

The objective of the soil sampling is to provide an indication of whether further contaminated land investigations should be undertaken prior to the commencement of works and if a Contaminated Soil Management Plan will be required for consenting purposes.

The sampling locations are shown on Figure 3 to 3D. Photographs of the sampling locations are provided in Appendix C.

6.2 FIELDWORK

The investigation works were undertaken on 3 and 4 July 2025 by a WSP CLS. All soil samples were collected by hand using a stainless-steel trowel from surface soil at depths of approximately 0.05 mbgl in all locations.

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

6.3 LABORATORY ANALYSIS

Soil samples were submitted to Hill Laboratories Limited (Hills). Selected samples were analysed for heavy metals, hydrocarbons, organochlorine pesticide residues and asbestos in soil. Hills is IANZ accredited for the analytical suite requested. Soil

Table 6-1 provides a summary of the laboratory analytical schedule for the DSI.

Table 6-1 Summary of analysis

Analyte	Primary Samples	QA/QC Samples	Table
Heavy metals	19	2	D-1
TPH	13	1	D-2
PAH	13	1	
OCPs	3		
Asbestos in Soil (Semi-quantitative)	3	0	

7 QUALITY ASSESSMENT AND QUALITY CONTROL

7.1 FIELD AND LABORATORY QUALITY PROGRAM

As part of the limited DSI, an assessment of the quality assurance/quality control (QA/QC) program implemented during fieldwork and completed by the laboratories was undertaken to assess the appropriateness of the analytical data. This section presents the results of the QA/QC program.

The field work for this investigation was carried out in accordance with MfE CLMG No.5 (MfE, 2011) guidance, and WSP's Quality System which operates in accordance with AS/NZS ISO 9001:2015.

7.1.1 SAMPLING PROCEDURE

WSP standard procedures, which are based on industry accepted standard practice, were followed throughout the soil sampling works to prevent cross contamination, preserve sample integrity and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory useability. All fieldwork was undertaken by an experienced field scientist with all samples transported under chain of custody procedures and signed chain of custody documents, included in Appendix E.

7.1.2 QUALITY CONTROL SAMPLES

Two field duplicates were collected and analysed for quality assurance/quality control purposes with both primary and duplicate samples analysed by Hills. An assessment of accuracy and precision of the primary laboratory analytical data was undertaken by calculating the relative percentage differences (RPD) between the primary and duplicate results. RPD is calculated as the difference between the two results divided by the average of the two results, expressed as a percentage. Typical variations in RPD values are expected to be within 50% of the mean concentration.

The RPDs for the samples are shown in Tables – Table 4 and show the relative percentage difference (RPD) for heavy metals or Heavy Metals and Hydrocarbons (TPH/PAH) between the primary samples and duplicate samples (QA01 and QA02). The RPDs between samples was calculated according to the following formula:

$$RPD = \frac{(Result\ No.1 - Result\ No.2)\ x\ 100}{(Mean\ of\ result\ No.1 + result\ No.2)}$$

Five of the 36 reported RPD's were above the maximum data quality objective of 50%, this is considered to be due to natural local soil variability.

7.1.3 QAQC SUMMARY

WSP considers that the analytical results provided by the laboratories are deemed reliable and complete based on:

- All samples were delivered to laboratory and extracted within designated holding times.
- Hills laboratories holding IANZ certification for the analysis undertaken.
- The majority of the results from the WSP field duplicate samples were aligned with the parent samples as shown in Table 5; and
- The laboratory detection limits are less than the assessment criteria.

- Consistent and repeatable sampling techniques and methods were utilised. The same sampler and methodology were used for each sampling location and decontamination was undertaken in conjunction with WSP QA/QC protocols and standard industry procedures to prevent cross contamination, preserve sample integrity and allow for collection of a suitable data set from which to make technically sound and justifiable decisions.

WSP considers that the sample collection, documentation, handling, storage and transportation procedures utilised are of an acceptable standard therefore the data is considered fit for purpose. It is considered that the QA/QC procedures and results were acceptable and that the conclusions of the report have not been significantly affected by the sampling or analytical procedures.

8 BASIS FOR GUIDELINE VALUES

8.1 HIERARCHY OF SELECTION

This section summarises the reference sources for guideline values that have been adopted for the proposed assessment of the Site, considering the proposed works. The selected guidelines have been based on the *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011)* (CLMG No. 2) (MfE, 2011b) as detailed inFigure 8-1.

Figure 8-1: Hierarchy of guideline values

8.2 HANDLING AND LAND USE

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

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

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

As the Site will be used as a floodway for emergency drainage during heavy rainfall events, analytical results have been compared against the SCS for a Commercial/ Industrial Land use scenario and the Soil Guideline Values (SGV) adopted under the NZGAMAS for Commercial/Industrial land use, Table 8-7-1 details the selection criteria adopted for handling and land use.

Table 8-7-1 Selection Criteria for Handling and Land Use Assessment

Matrix	Source Guideline	Land-use Criteria
Soil	Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (MfE, 2011c)	SCS for: **Commercial Industrial**
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013) (National Environmental Protection Council, 2013).	Health Investigation Levels (HILs)[1] for: **Commercial Industrial** (HIL D)
	New Zealand Guidelines for Assessing and Managing Asbestos in Soil (NZGAMAS, 2025)	Soil Guideline Values (SGVs) for: **Commercial Industrial**

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

8.3 USE AND DISPOSAL

We have used the guidelines shown in Table 8-7-2, to classify soil for off-site disposal.

Table 8-7-2 Disposal Criteria

Matrix	Source Guideline	Criteria
Soil	Predicted background soil contaminants (PBC) (LRISPortal, 2025)	Pakihi Mudstone
	Technical Guidelines for Disposal to land (WasteMINZ, 2023)	Clean fill acceptance criteria. Controlled fill acceptance criteria

9 ANALYTICAL RESULTS AND DISCUSSION

9.1 INTRODUCTION

Analytical results as provided by the laboratory, are included in Appendix E. Results are discussed below in the context of exceedances of the adopted guideline value, consent activity status under the NES-CS and the soils suitability for handling and ongoing land use. The analytical results, where present above detection limits, are compared against respective human health and waste disposal criteria, are summarised in Appendix D, Tables D-1 to D-4. OCP's were not detected above the laboratory limit of reporting and data for these have therefore not been placed in a summary table. Data for these results can be reviewed in Appendix E.

9.2 OBSERVATIONS

The soil sampling was undertaken on 3 and 4 July 2025.

Surface soils on Site were observed to be grey-brown fine sandy silts. Deeper soils were not investigated.

Some buildings with potential asbestos cladding were observed to be in a deteriorated condition, however no visible asbestos fragments were observed on top of the soils during the Site works.

9.3 ANALYTICAL RESULTS

9.3.1 HUMAN HEALTH ASSESSMENT

No exceedances of the adopted Commercial / Industrial human health criteria were reported for any of the samples collected.

9.3.2 BACKGROUND ASSESSMENT

Ten of the nineteen primary samples analysed from test pits reported 1 or more metal analyte above the predicted background value. Zinc (7 samples) Lead (6 samples) arsenic (5 Samples) cadmium (3 samples) and copper (1 sample). The samples exceeding the background are summarised in Table 9-1.

Table 9-1 Samples with Background Exceedances

Location	Sample ID	Background Exceedances
102 Ruataniwha Road	WFW_003_0.01	Arsenic
	WFW_004_0.01	Cadmium, lead, zinc
56 Ruataniwha Road - Barns	WFW_005_0.01	Zinc
55 Waihirere Road Waste Pile	WFW_010_0.01	Arsenic, lead, zinc
	WFW_011_0.01	Arsenic, cadmium, lead, zinc
A&P Showgrounds - Timber Stockpiles	WFW_012_0.01	Arsenic
	WFW_014_0.01	Arsenic
147 Railway Road Shed (at 45 Railway Road)	WFW_018_0.01	Cadmium, Lead, zinc
	WFW_019_0.01	Lead, zinc
	WFW_020_0.01	Copper. Lead, zinc

9.3.3 *DISPOSAL ASSESSMENT*

Metals were found to exceed the Class 4 WAC for metals in six samples and for TPH in one sample.

The TPH sample was collected from soils on the east side of the Railway Road workshop building located to the south of Te Kopua Urupa. The visibly stained soils in this area should be disposed of at a suitable Class 3 managed landfill. This location is shown in Figure 3. The samples exceeding the WAC are summarised in Table 9-2.

Aside from the visibly stained soils in one location, the remaining surface soils present within the site boundary would be considered appropriate for re-use on site if required.

Table 9-2 Samples with Waste Acceptance Criteria Exceedances

Location	Sample ID	Class 4 WAC Excedences
102 Ruataniwha Road	WFW_004_0.01	Zinc
A&P Showgrounds	WFW_012_0.01	Arsenic
55 Waihirere Road Waste Pile	WFW_010_0.01	Arsenic, lead, zinc
	WFW_011_0.01	Zinc
147 Railway Road Shed (at 45 Railway Road)	WFW_018_0.01	Zinc, TPH*
	WFW_019_0.01	Zinc
	WFW_020_0.01	Zinc

10 CONCEPTUAL SITE MODEL

Using the identified potential HAIL activities or industries, publicly available information from council websites geological map, historic aerial and geotechnical databases, a preliminary Conceptual Site Model (CSM) has been developed.

The CSM is used to support the decision-making process for contaminated land management. The five basic activities associated with developing a conceptual site model are:

- Identification of potential contaminants
- Identification and characterisation of the source(s) of contamination
- Delineation of potential migration pathways through environmental media, such as groundwater, surface water, soils sediment, biota, air, service lines
- Identification and characterisation of potential receptors (human, ecological or building infrastructure)
- Determination of the limits of the study area or system boundaries

Data gaps and uncertainties are identified during the preparation of the conceptual site model, which assists in designing any detailed investigation that may follow. For there to be an effect on receptors there must be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

A possible pollutant linkage between the contaminant source and receptor is defined as one that has the potential to represent unacceptable risks to human health or the environment. The desk-based information and subsequent surface sampling on the Site has enabled the development of a CSM as shown in The CSM is summarised in Table 10-1.

Table 10-1 Conceptual Site Model

SOURCE	PATHWAYS	RECEPTORS	SPR LINKAGE	REASONING
Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)	Dermal contact with contaminated soil Inhalation of dust Ingestion of impacted soil	Construction workers during the proposed works Future Site users	Pathway incomplete	Concentrations of all heavy metals analysed were below the relevant human health criteria. Therefore, there is unlikely to be a risk to ongoing Site users and site workers during the proposed works.
Hydrocarbons (TPH, PAH)			Pathway incomplete	Concentrations of all hydrocarbons analysed were below the relevant human health criteria. Therefore, there is unlikely to be a risk to ongoing site users and site workers during the proposed works.
Pesticides			Pathway incomplete	Concentrations of all pesticide residues in the soil samples analysed were below their limit of reporting and relevant human health criteria. Therefore, there is unlikely to be a risk to ongoing site users and site workers during the proposed works.
Asbestos fibres in soil	Inhalation of dust or fibres.		Pathway incomplete	Asbestos was not detected in any of the soil samples
Asbestos Containing Material	Inhalation of dust or fibres.		Potentially complete	ACM cladding in deteriorated condition was observed on some of the houses.

10.1 UPDATED HAIL SUMMARY

Whilst four potential HAIL activities were observed during the Site walkover and are presented in Table 10-2, results of the Limited DSI have indicated that soils present across all surface samples for each site were not above human health guidelines. Elevated background concentrations were noted on some areas of the site in areas of potential HAIL.

Table 10-2 Revised Assessment of HAIL Activities

HAIL Activity	Property Location	Activity Description	Associated Hazardous Substances	Site Notes/ DSI Findings	HAIL Risk –Impact to Site soils
A10	56 Ruataniwha St 177 Railway Road	Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Arsenic, lead, copper, mercury; wide range of organic compounds including acidic herbicides, organophosphates, and organochlorines.	The property at 177 Railway Road is a relatively recent citrus orchard. Two surface soil samples were analysed from the orchard at 56 Ruataniwha Road and none of the results exceed the human health guidelines. Background concentrations for the site were all below the predicted background levels.	Unlikely Soil contaminants were at or below background therefore the NESCS does not apply.
A17	147 Railway Road (Shed next to 45 Railway Road)	Storage tanks or drums for fuel, chemicals or liquid waste	Petroleum hydrocarbons Solvents, Polycyclic aromatic hydrocarbons (PAHs), BTEX compounds, Heavy metals, Acids and alkalis, Pesticide residues	The shed associated with the property at 147 Railway had waste oil drums with noticeable soil staining around them. The soil staining was limited in extent. Three surface soil samples were analysed and none of the results exceed the human health guidelines.	Likely, however: Soil contaminants are not considered to be in sufficient quantity to be a risk to human health, therefore it is highly unlikely to be a risk to human health. The NESCS may apply to this area of the site following further investigation

				Background concentrations of lead and zinc were exceeded in all three samples, cadmium and copper exceed the PBC in on sample each.	
A18	A&P Showgrounds (46 Ruataniwha Road	Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside.	Chromated copper arsenate (CCA)	Two of the three surface soil samples collected from beneath the timber stockpiles exceeded the PBC for arsenic, one of these samples also exceeded the Class 4 Controlled Fill WAC. Contaminants do not exceed the protection of human health soil guideline values for land in a commercial/industrial land use scenario. Soils are considered suitable to be re-used on site but will not be considered suitable to be removed from site as cleanfill.	Likely - Due to the presence of HAIL and contaminants in excess of background the NESCS applies to this piece of land.
E1	56 Ruataniwha Road 102 Ruataniwha Road	Asbestos products manufacture or disposal including Sites with buildings containing asbestos products known to be in a deteriorated condition	Asbestos	Buildings will be managed during demolition. 56 Ruataniwha Road has previously been identified as having ACM.102 Ruataniwha Road was observed to have potential ACM cladding.	Unlikely – provided buildings are managed by a licenced asbestos removalist. NESCS does not apply

				No asbestos was identified in soil samples	
G5	102 Ruataniwha Road	Waste disposal to land	Dependent on original waste composition, wide range of hydrocarbons and metals.	Materials were observed to include building materials Two of the three surface soil samples collected from this location exceeded the PBC for one or more analyte and one of these samples also exceeded the Class 4 Controlled Fill WAC for zinc.	Likely background concentrations are exceeded and are considered to be HAIL–, however, Contaminants do not exceed the protection of human health soil guideline values for land in a commercial/industrial land use scenario NESCS applies to these Pieces of Land
	56 Ruataniwha Road			Materials were observed to include building materials and household appliances. One of the two surface soil samples collected from this location exceeded the PBC for zinc	

	55 Waiherere Road			Materials were observed to include building materials from a demolished house. Both of the two surface soil samples collected from this location exceeded the PBC for one or more analyte and both samples also exceeded the Class 4 Controlled Fill WAC for zinc.	
	A&P Showgrounds			Materials were observed to include stockpiles of silt removed during previous flood clean up event.	Unlikely Soil contaminants were at or below background therefore the NESCS does not apply.

11 SUMMARY OF REGULATORY COMPLIANCE

11.1 APPLICABILITY OF NESCS – DISTURBING SOIL AS A CONTROLLED ACTIVITY

Based on the observations made during the site walkover and the results of soil sampling, the NESCS is considered to apply to specific Pieces of Land on the Site, these are shown in Figure 4. The criteria for this to apply is shown in Table 11-1.

Table 11-1 Controlled Activity Criteria

9 (1) *Removing or replacing fuel storage system, sampling soil, or disturbing soil*	
If a requirement described in any of regulation 8(1) to (3) is not met, the activity is a controlled activity while the following requirements are met:	
a) a detailed site investigation of the piece of land must exist:	Requirement partially met - A limited detailed site investigation has been undertaken and the findings are reported in this document. Further assessment of outlined HAIL Pieces of Land may be warranted to further assess risks to human health on these areas.
b) the report on the detailed site investigation must state that the soil contamination does not exceed the applicable standard in regulation 7:	Requirement met – The surface soil sampling results meet the applicable standards for the protection of human health for priority contaminants.
c) the consent authority must have the report:	Requirement met – this report will be issued to the consent authority as a part of the wider consent for the works.
d) conditions arising from the application of subclause (2), if there are any, must be complied with.	N/A
(2) The matters over which control is reserved are as follows:	
a) the adequacy of the detailed site investigation, including— **i. site sampling:** **ii. laboratory analysis:** **iii. risk assessment:**	Sampling of surface soils has been undertaken and from the results it is considered that there are unlikely to be any effects on human health from exposure to site soils under the proposed land use scenario. - Sample analysis was undertaken by a Laboratory 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. - Samples were compared to the Resource Management National Environmental Standard for

	Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (NESCS, 2011) for a commercial industrial land use criteria.
b) how the activity must be— **i. managed, which may include the requirement of a site management plan:** **ii. monitored:** **iii. reported on:**	An Unexpected Discovery Protocol (UDP) should be prepared for disturbance works outlining the procedures and processes that will be followed should anything of contaminated relevance be identified during excavations works (i.e. asbestos or buried rubbish). - Monitoring and reporting requirements will be specified in the UDP and may include site inspections and soil validation testing.
c) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity	The transport, disposal and tracking of contaminated soils will be specified if required. There are currently no plans to remove soils from site.
d) the timing and nature of the review of the conditions in the resource consent	- This information is not yet known.
e) the duration of the resource consent.	- This information is not yet known.

The NESCS does not apply to all activities on production land that is potentially contaminated by HAIL activities. However, under Regulation 5(8), the NESCS is considered to apply to production land when one of the following activities are undertaken:

- removing or replacing a fuel storage system.
- sampling or disturbing soil under or near existing or proposed residential buildings
- subdividing land or changing its use in a way that causes it to stop being production land.

As this DSI demonstrates that contaminants within the site boundaries are present above background concentrations within the site boundary, the NESCS will be considered to apply to the site and, as contaminant concentrations are below the applicable standard, a Controlled Activity NESCS Consent may be required.

11.2 SEVERE WEATHER EMERGENCY RECOVERY (HAWKE'S BAY FLOOD PROTECTION WORKS) ORDER 2024

The Severe Weather Emergency Recovery Legislation Act allows a number of laws to be changed to help communities continue their recovery from recent severe weather events by using a piece of secondary legislation called an Order in Council. These Orders in Council have been developed to provide a streamlined consenting process to speed up the delivery of flood mitigation works that would reduce the flood risk to properties in Hawke's Bay.

The following clause is relevant to this report:

Clause 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.

12 CONCLUSIONS

12.1 CONCLUSIONS

Based on the findings of the DSI, WSP concludes the following:

The NESCS is considered to apply to the site because it is considered more likely than not that an activity described in the HAIL has been undertaken on it, the use of the land in some areas is being changed so that it will cause the land to be production land, and soil sampling analysis has shown that contaminants exceed background concentrations in some areas.

- The concentrations of contaminants of concern in soils sampled do not exceeded adopted criteria for protection of human health and the environment for commercial/ industrial land use therefore soils are considered suitable for re-use on site within the alignment. Of these samples, the following exceedances were also identified:
  - Ten of the total 19 soil samples collected reported at least one of the heavy metals above predicted background concentrations.
  - Seven of the total 19 19 soil samples collected reported at least one analyte above the Class 4 Managed Fill WAC.
- On the basis of the limited investigations completed, there were no soil contamination matters identified in surface soils that are likely to present a constraint to the development of the protection scheme or give rise to human health risks during construction.
- Pieces of Land considered to be HAIL were identified and may require further assessment to fully determine risks to human health.
- WSP considers that a CSMP is not required as none of the results of the limited soil sampling exceeded human health guidelines and all soils are intended to be reused on site.

Based on the findings WSP recommends the following:

- An Unexpected Discovery Protocol (UDP) is prepared for disturbance works outlining the procedures and processes that will be followed should anything of contaminated relevance be identified during excavations works (i.e. asbestos or buried rubbish).
- A small area of visibly stained soils identified in one location as exceeding the Class 4 WAC for TPH should be removed from site to an appropriately licence facility.
- Buildings identified with asbestos cladding should be assessed and if required an Asbestos Removal and Control Plan completed by licenced asbestos removal specialists under the supervision of a Licensed Asbestos Assessor.

13 LIMITATIONS

This report ('Report') has been prepared by WSP exclusively for Hawke's Bay Regional Council ('Client') in relation to the Wairoa Flood Alleviation Design project('Purpose') and in accordance with the Proposal letter dated 9 July 2025 and accepted on 18 July 2025 ('Agreement').

Permitted Purpose

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

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FIGURES

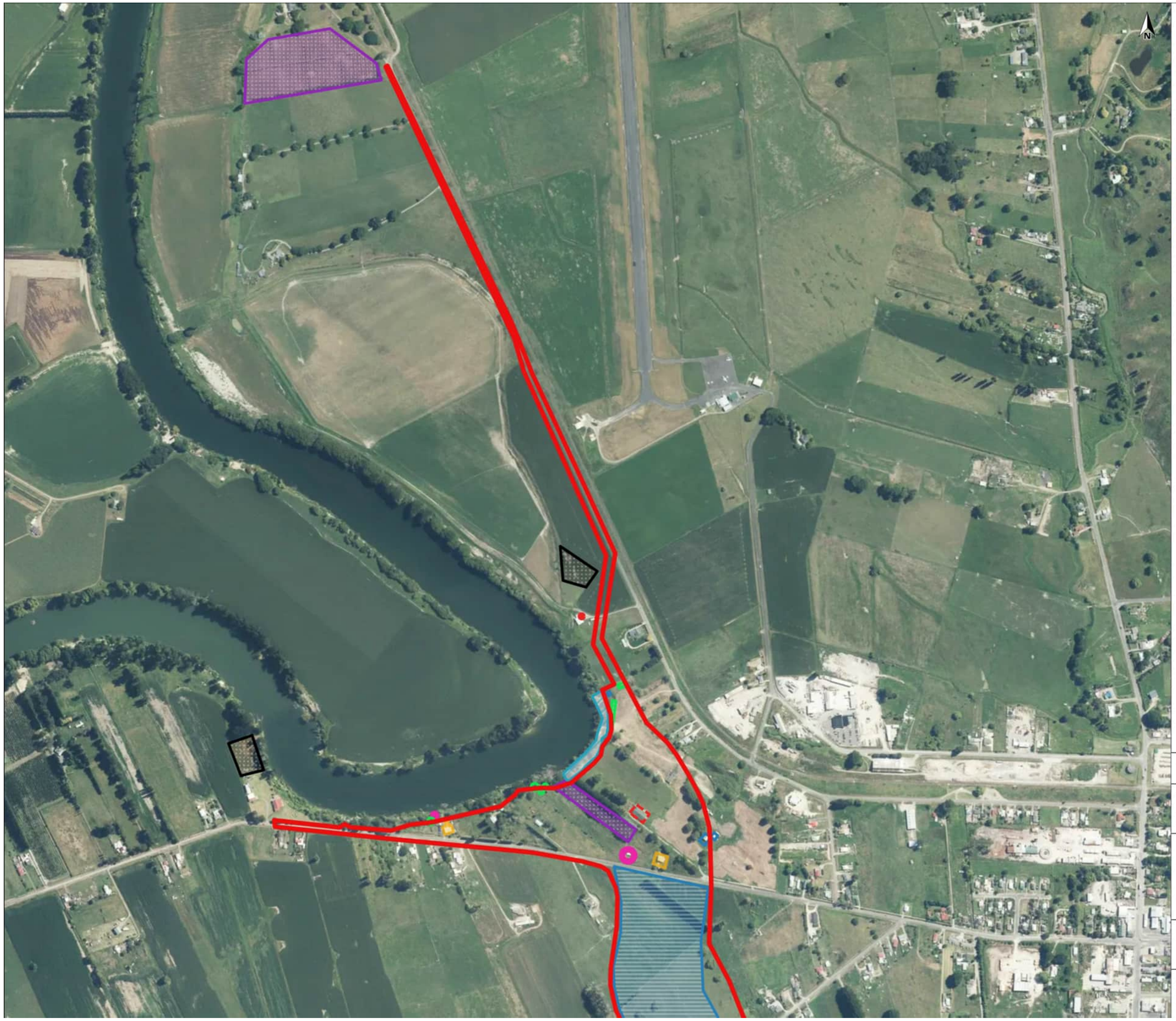
Legend

- Site Boundary - Townside
- Site Boundary - Floodway

0 250 m 500 m

Produced by **Datanest.earth**

Title: Site Location Plan		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1
Date: 24-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:12222	Version: draft
Projection: EPSG:3857 Web Mercator		



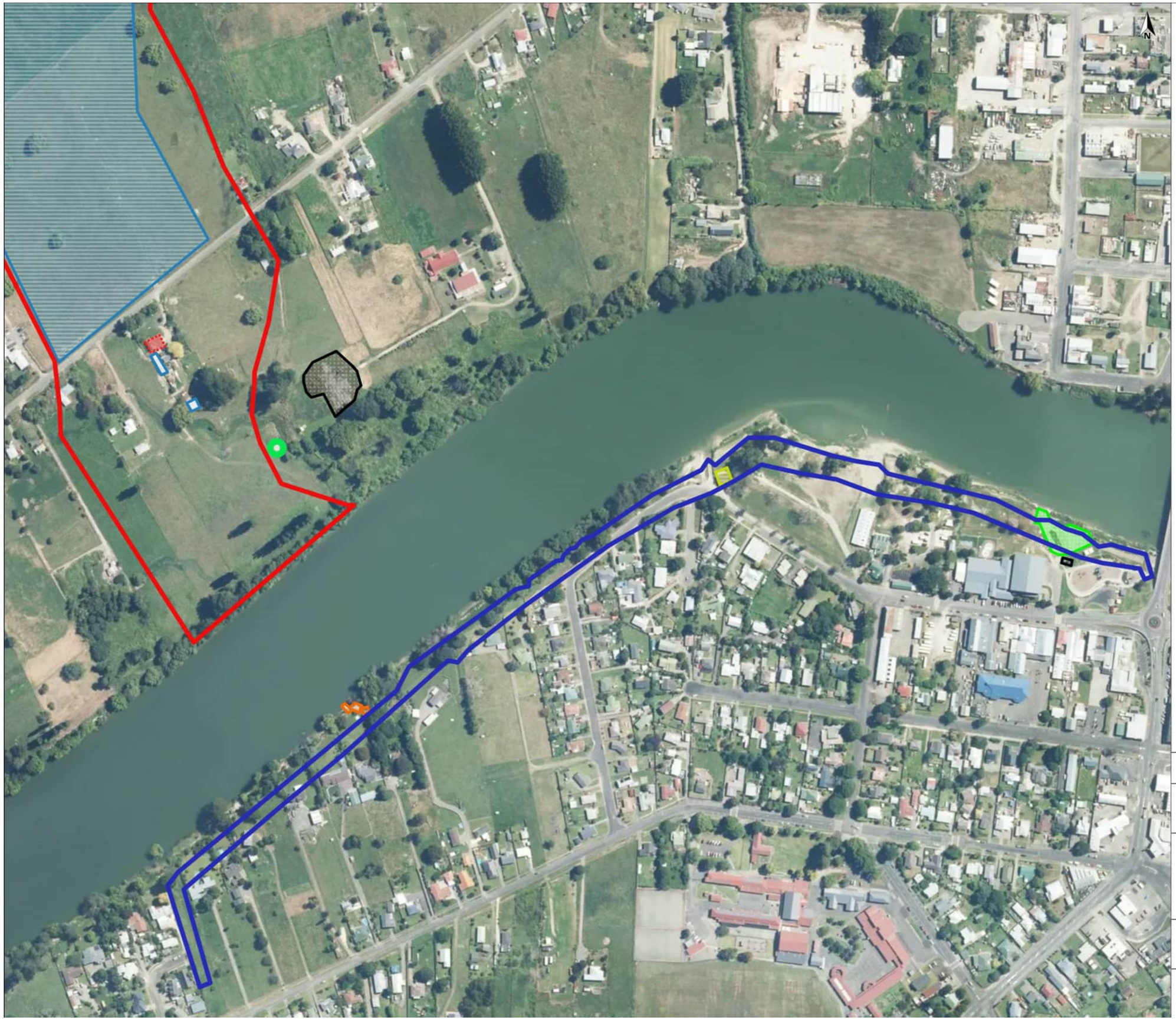
Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- Subsidence
- Stockpiled Timber
- Showgrounds Hall
- Urupa
- Shed/Barn
- Waste Pile
- Orchard
- Harvested Maize
- Potential ACM Cladding
- Pig Sty
- Oil Spill
- House demolished

0 100 m 200 m

Produced by **Datanest.earth**

Title: Site Walkover Observations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 2A
Date: 30-06-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:8086	Version: draft



Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- Demolished House
- Boat house/Boat ramp
- Ski Club
- Pump Station
- Skate Park
- Urupa
- Shed/Barn
- Waste Pile
- Harvested Maize

0 50 m 100 m

Produced by **Datanest.earth**

Title: Site Walkover Observations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 2B
Date: 28-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:3742	Version: Final

Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- WSP Samples December 2024
- Soil Samples July 2025

0 25 m 50 m

Produced by **Datanest.earth**

Title: Soil Sample Locations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 3A
Date: 24-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:1289	Version: draft

Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- WSP Samples December 2024
- Soil Samples July 2025

0 25 m 50 m

Produced by **Datanest.earth**

Title: Soil Sample Locations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 3B
Date: 24-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:1624	Version: Final

Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- WSP Samples December 2024
- Soil Samples July 2025

0 5 m 10 m

Produced by **Datanest.earth**

Title: Soil Sample Locations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 3C
Date: 24-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:311	Version: Final

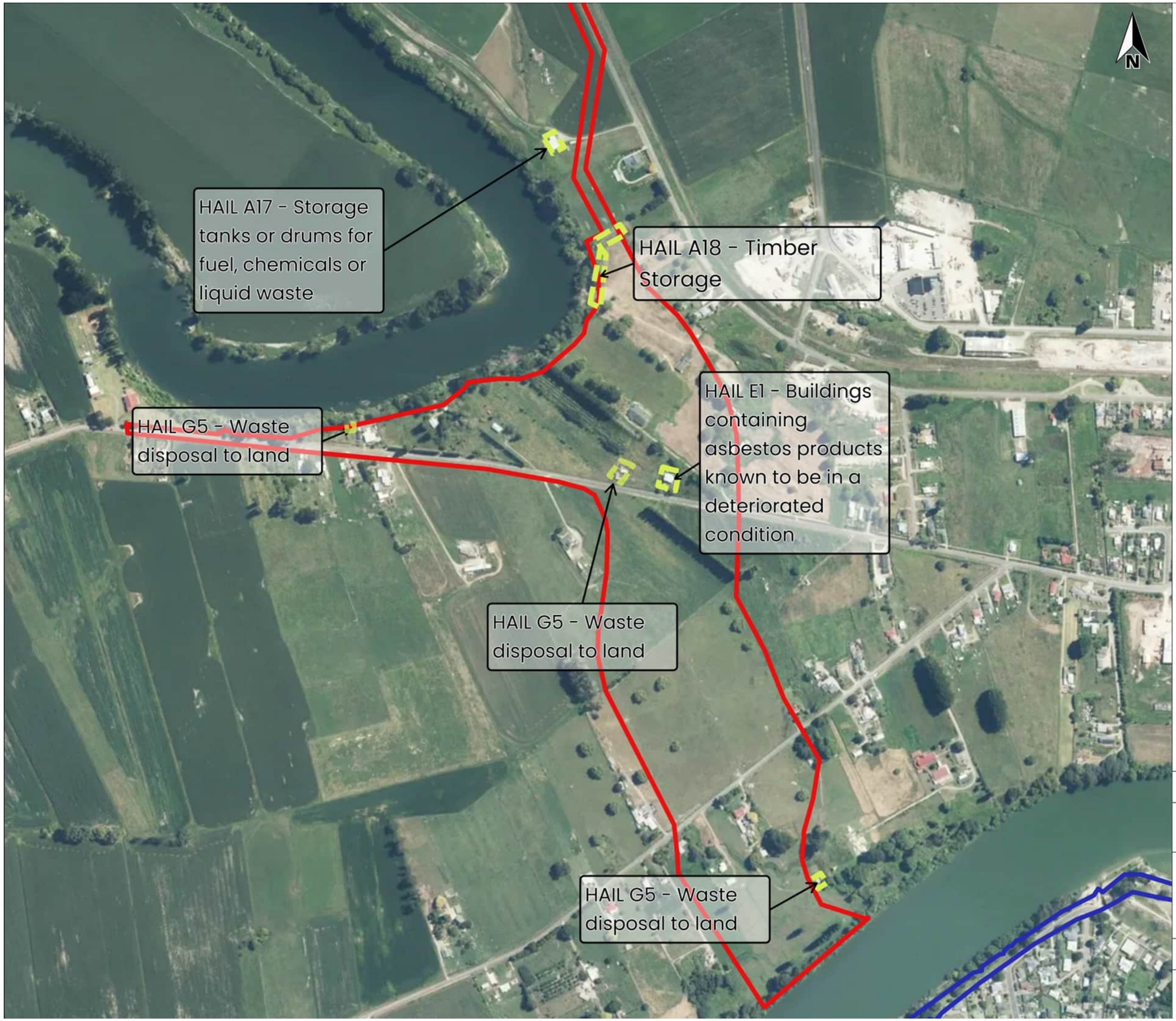
Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- Soil Samples July 2025

0 10 m 20 m

Produced by **Datanest.earth**

Title: Soil Sample Locations		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 3D
Date: 24-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:701	Version: Final



Legend

- HAIL Activities
- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

Produced by **Datanest.earth**

Title: Observed HAIL Activities		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure: 4A
Date: 31-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:5773	Version: Final

APPENDIX A

HISTORIC AERIAL PHOTOS

Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- Historic Aerials

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 1942		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Drawing No.: 1942
Date: 21-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7992	Version: Final

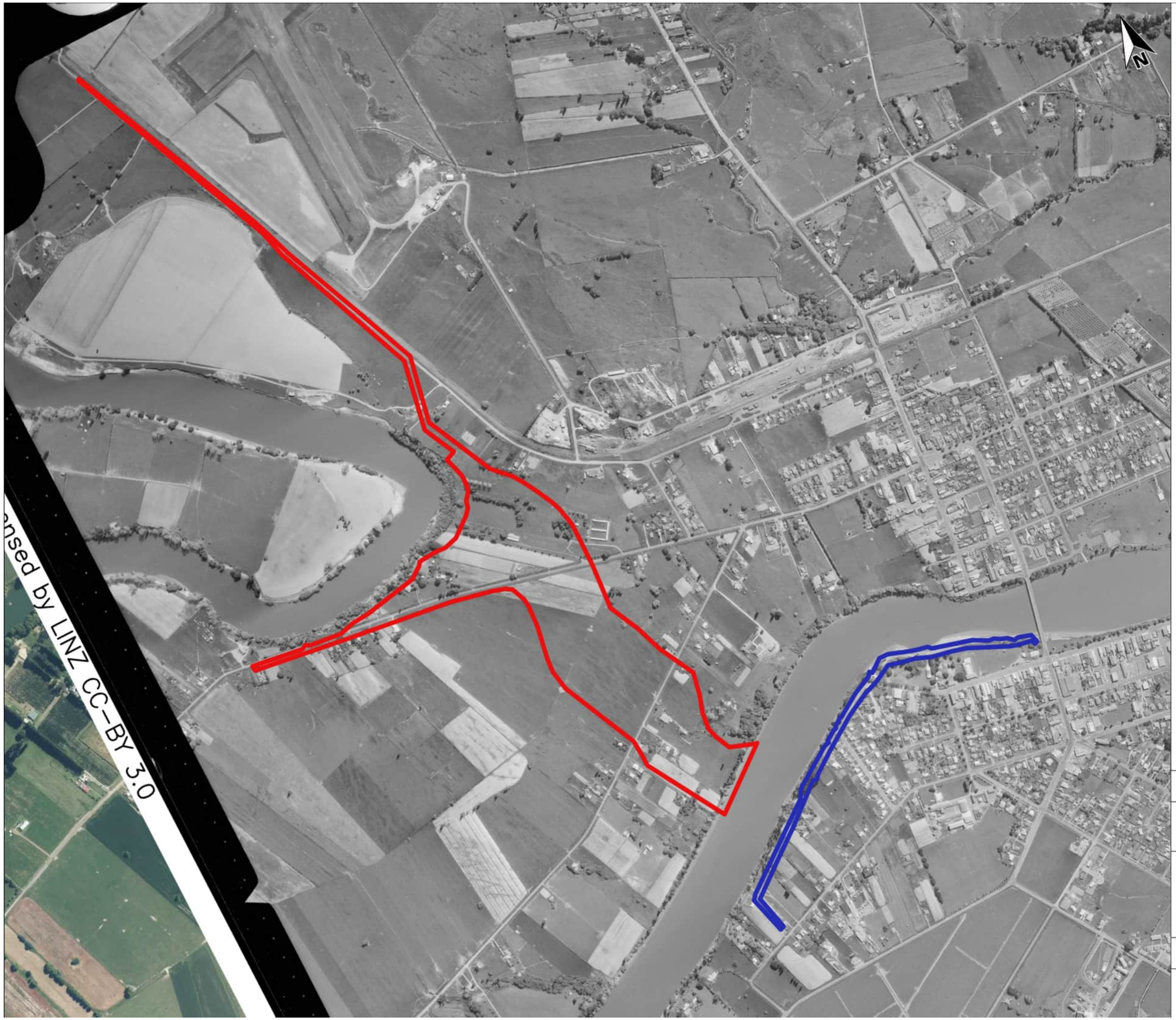
Legend

- Site Boundary - Floodway
- Site Boundary - Townside
- Historic Aerials

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 1962		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Drawing No.: 1962
Date: 21-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7993	Version: Final



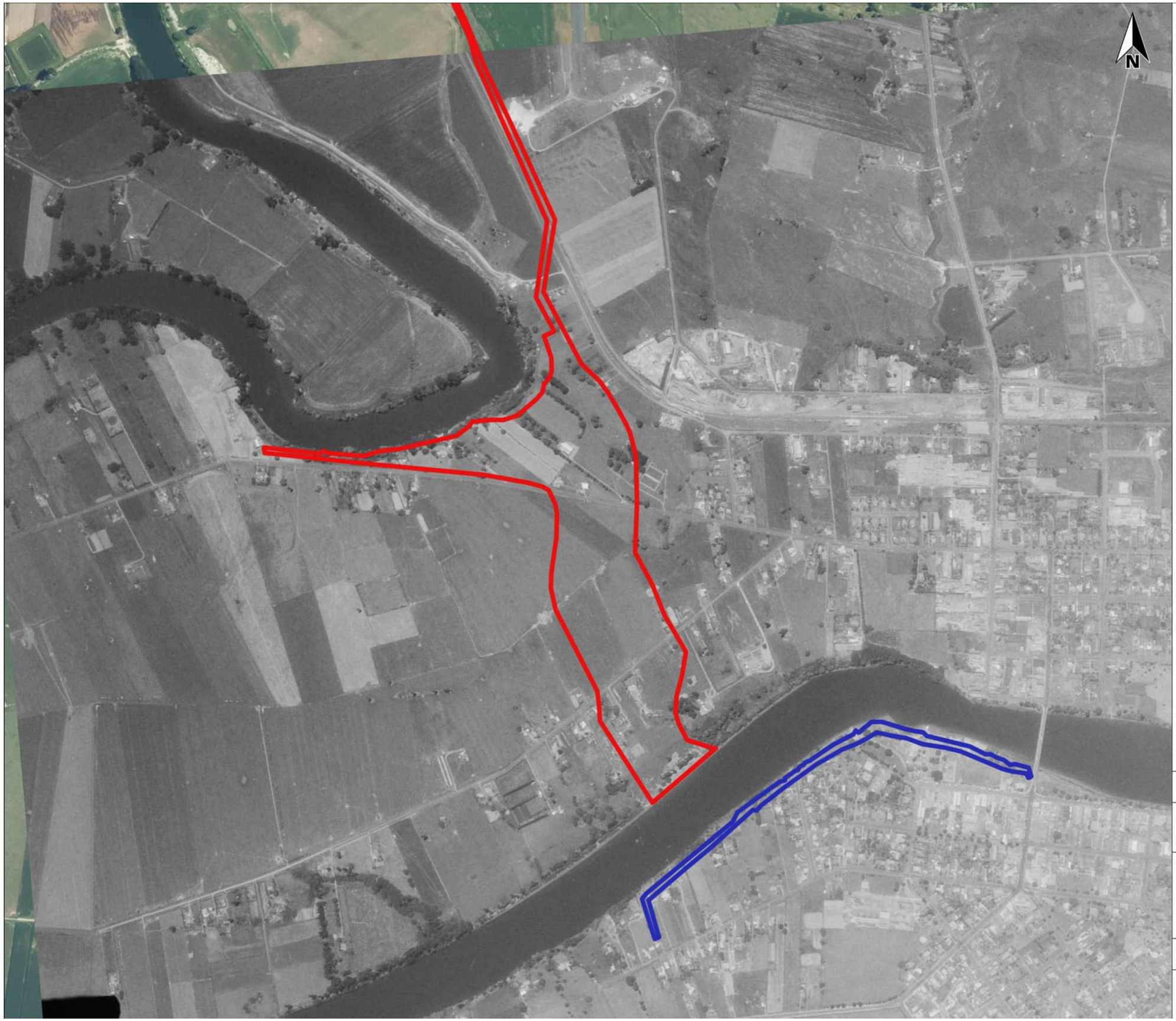
Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 1970		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1970
Date: 21-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:10071	Version: Final



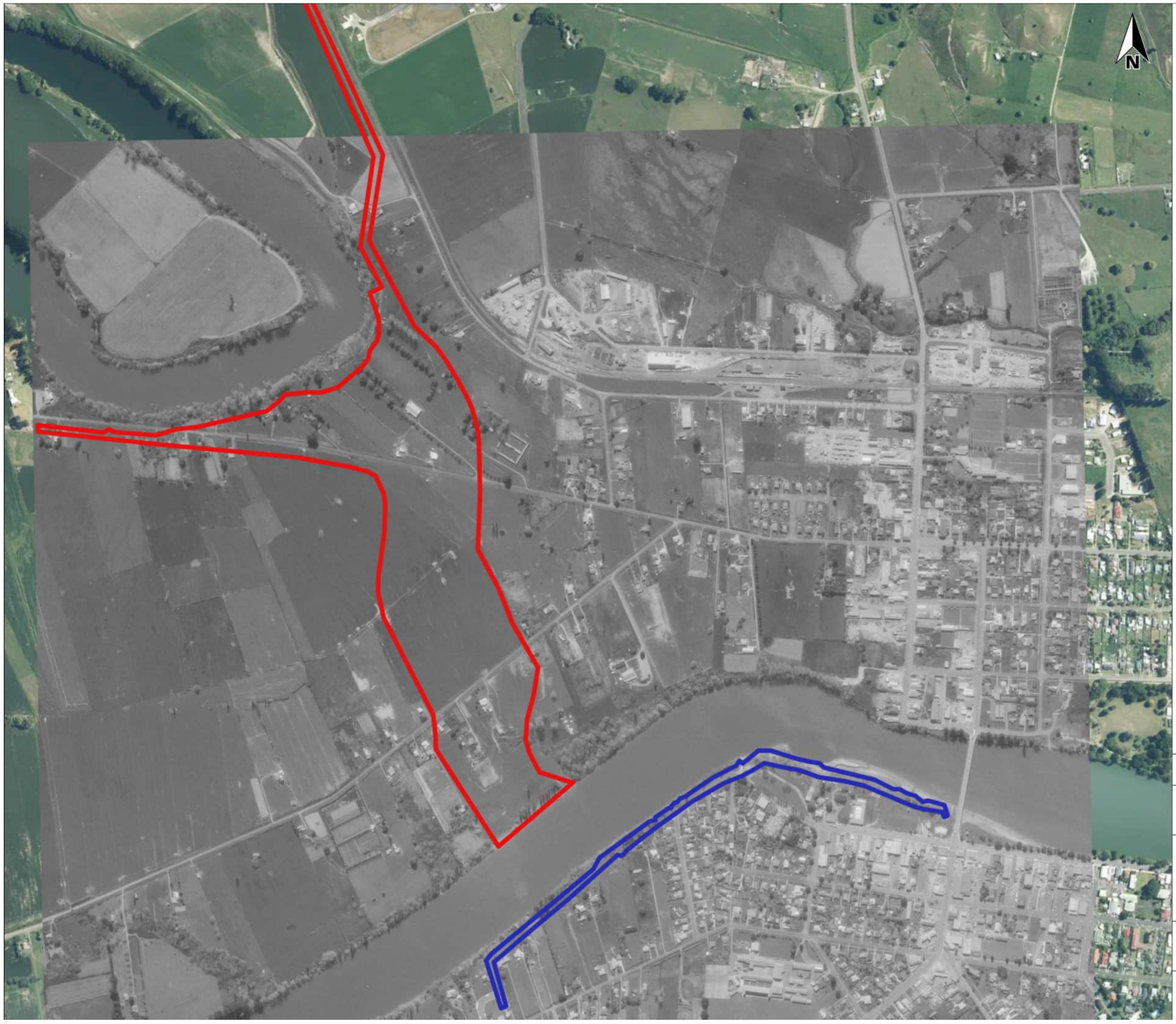
Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 1978		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1978
Date: 21-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:9477	Version: Final



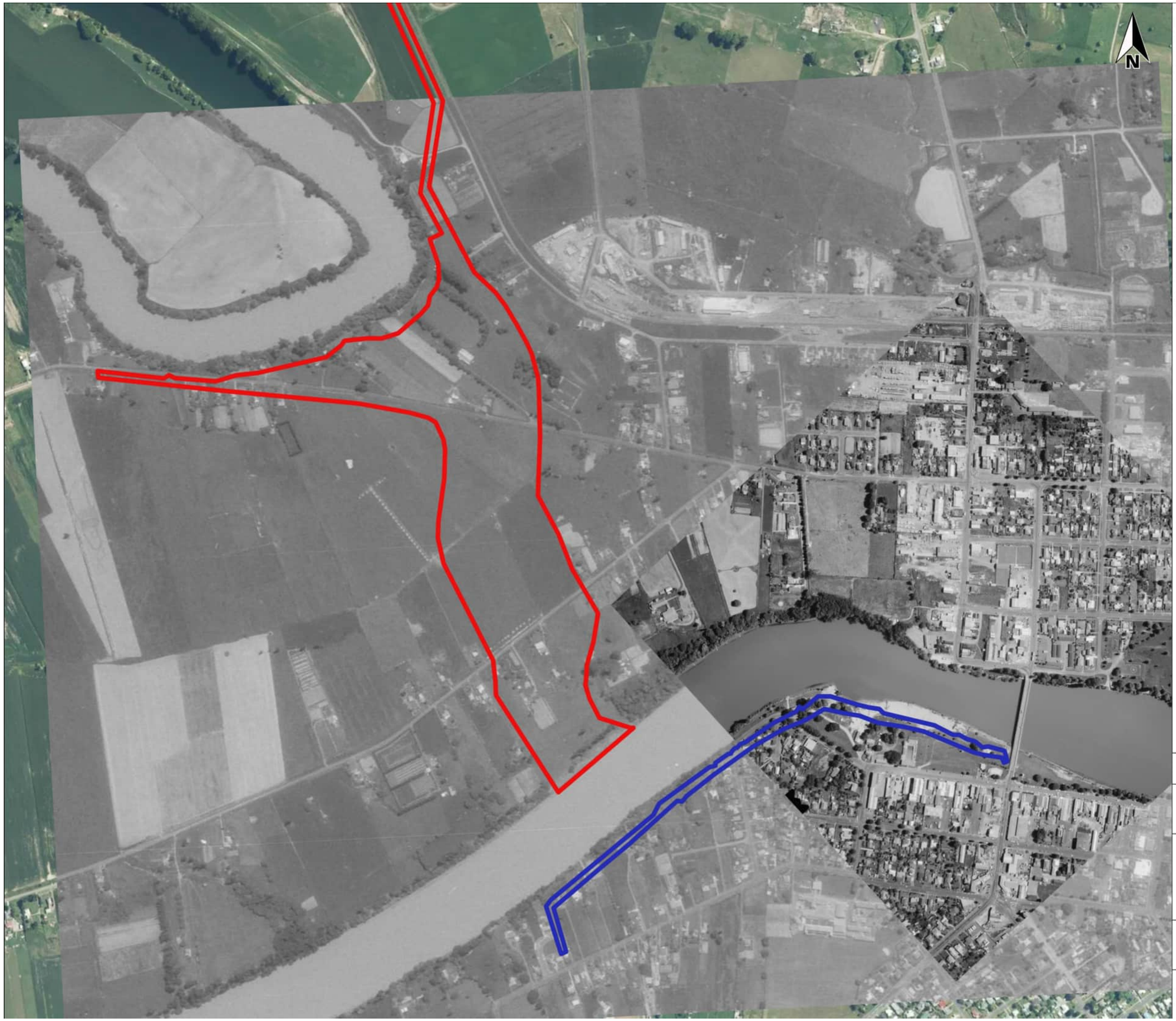
Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 1981		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1981
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7993	Version: Final



Legend

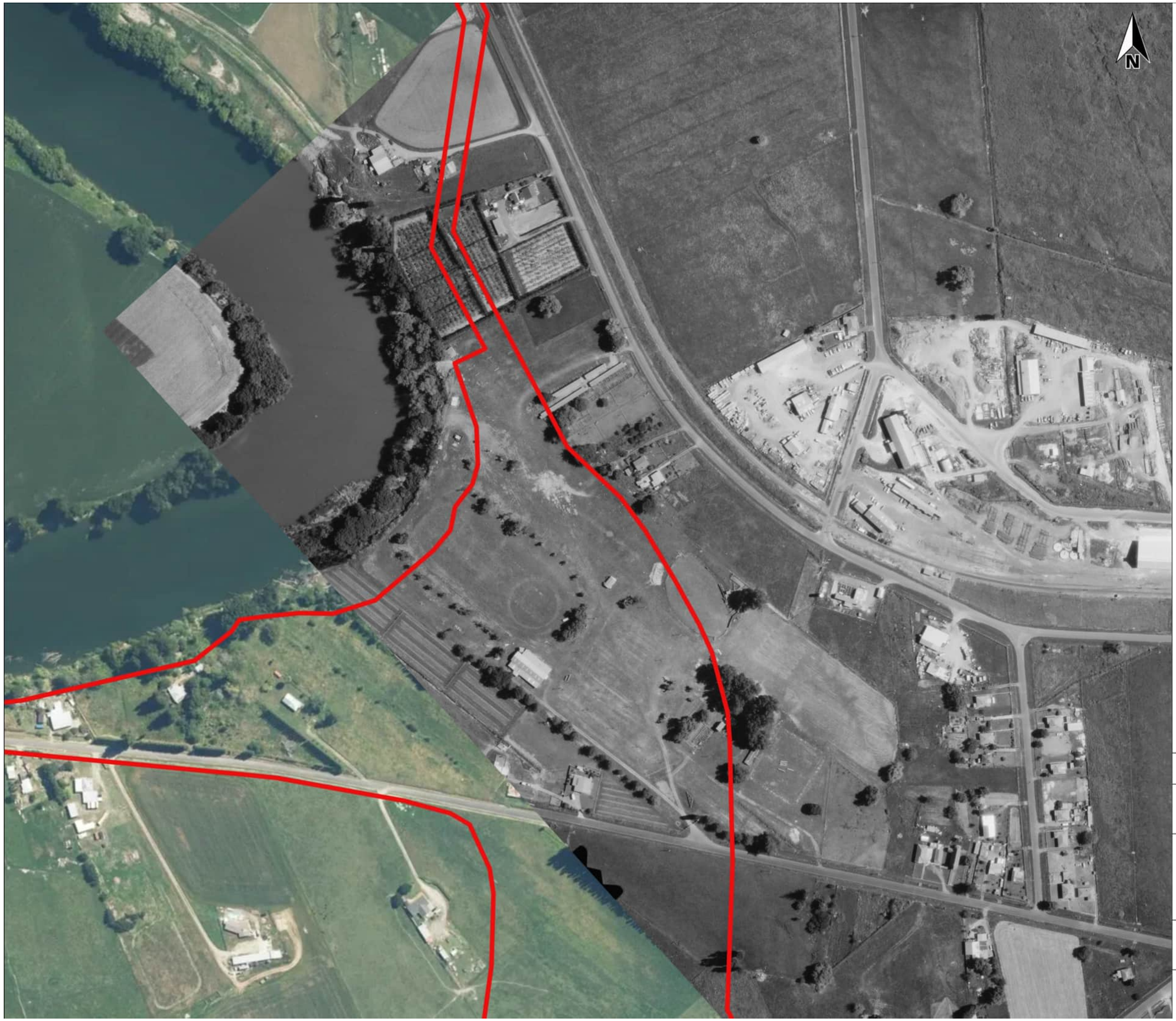
- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

wsp

Produced by **Datanest.earth**

Title: Historic Aerial 1983		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1983
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7993	Version: Final



Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 50 m 100 m

wsp

Produced by **Datanest.earth**

Title: Historic Aerial 1985		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 1985
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:3172	Version: Final

Legend

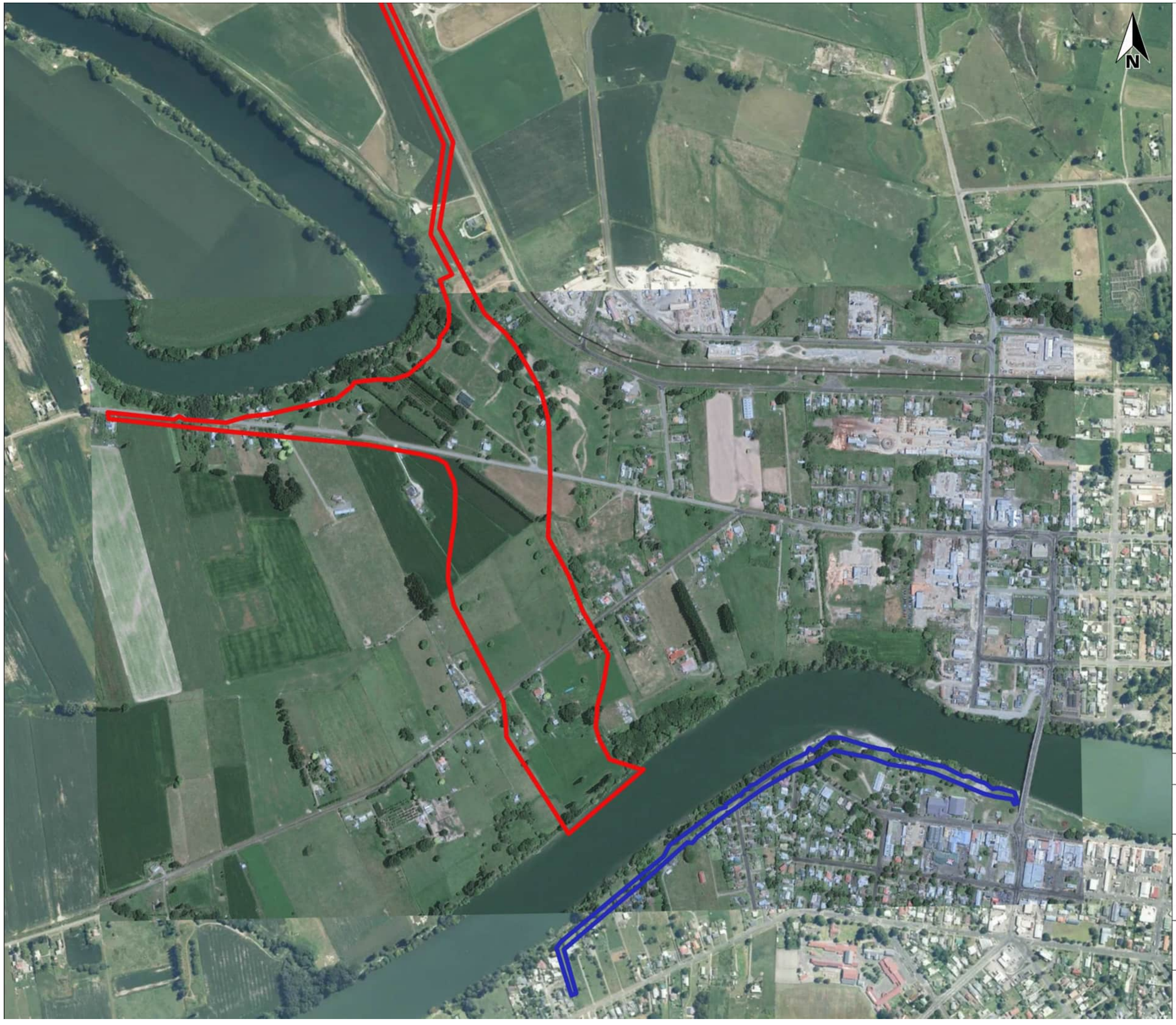
- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

wsp

Produced by **Datanest.earth**

Title: Historic Aerial 2003		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 2003
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:6344	Version: Final



Legend

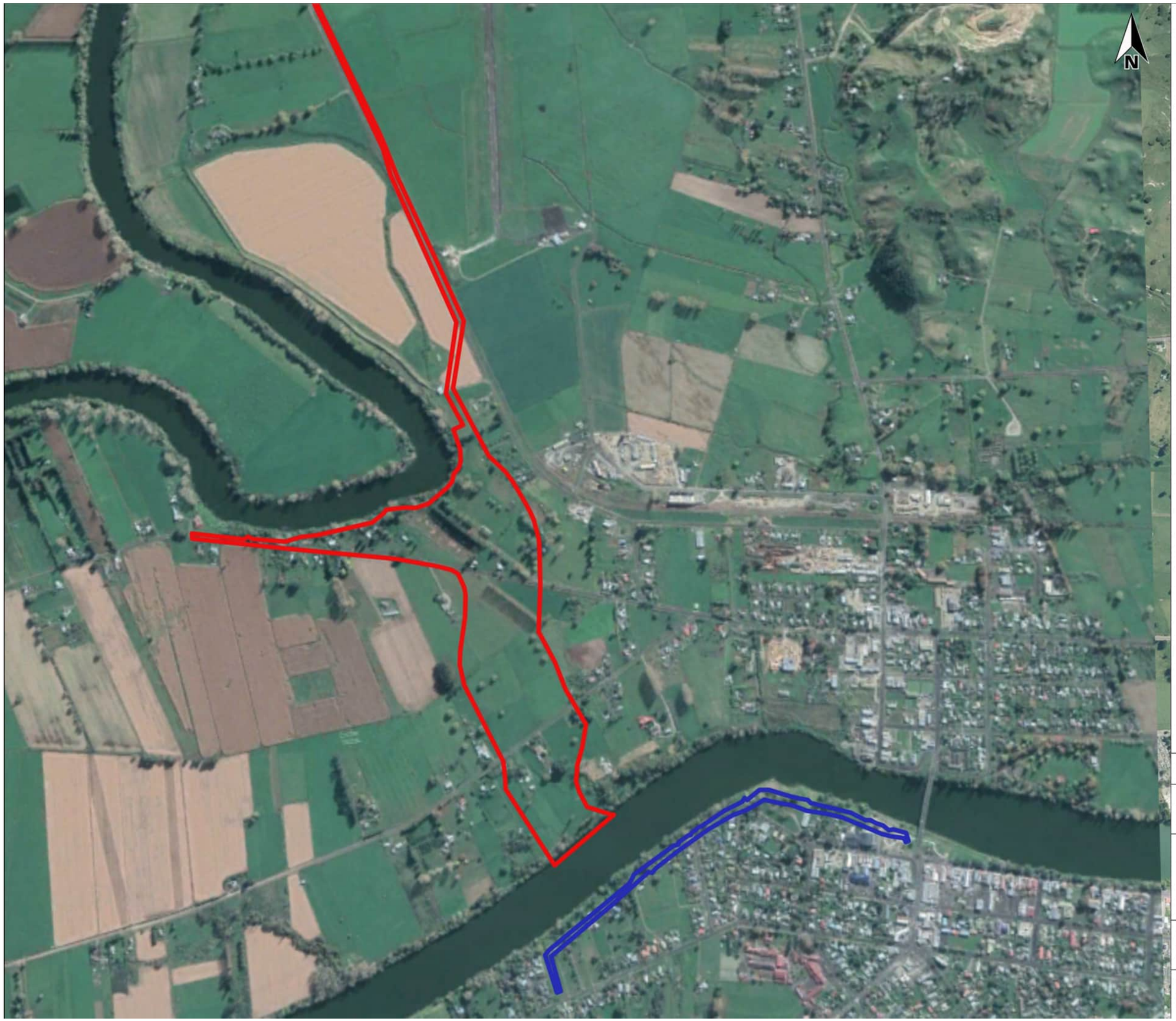
- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

wsp

Produced by **Datanest.earth**

Title: Historic Aerial 2011		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 2011
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7993	Version: Final



Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

Produced by **Datanest.earth**

Title: Historic Aerial 2019		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 2019
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:10139	Version: Final

Legend

- Site Boundary - Floodway
- Site Boundary - Townside

0 100 m 200 m

wsp

Produced by **Datanest.earth**

Title: Historic Aerial 2024		
Client: Hawkes Bay Regional Council		Size: A3
Project: Wairoa Floodway Design Phase	Drawn: RF	Figure No.: 2024
Date: 22-07-2025	Checked: LB	
Proj No: 2-T4441.03	Scale: 1:7395	Version: Final

APPENDIX B

BORE AND TEST PIT LOGS

GEOTECHNICS

BOREHOLE LOG

BOREHOLE No.: **BH05**

PROJECT: Wairoa Ferry Hotel and South Bank	LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306
CO-ORDINATES: (NZTM2000) 5670412 mN 1982323 mE	DRILL TYPE: Track Mounted Drill Rig
R.L.: 4m	METHOD: Rotary cored
DATUM: NZVD2016	DRILL FLUID:
HOLE STARTED: 17/01/2024	HOLE FINISHED: 17/01/2024
DRILLED BY: Geotech Drilling Ltd	LOGGED BY: MKAY CHECKED: JWY

GEOLOGICAL | METHOD OBSERVATIONS | ENGINEERING DESCRIPTION

Columns: GEOLOGICAL UNIT/ ADDITIONAL OBSERVATIONS; FLUID LOSS (%) 25 50 75; WATER; CASING; CORE RECOVERY (%); METHOD; TESTS; RL (m); DEPTH (m); GRAPHIC LOG; WEATHERING CLASSIFICATION; MOISTURE CLASSIFICATION; CONSISTENCY / DENSITY CLASSIFICATION; ESTIMATED SOIL SHEAR STRENGTH (Su, kPa) VS 12 S 25 F 50 St 100 VSt 200 H; ESTIMATED ROCK COMPRESSIVE STRENGTH (qu, MPa) EW 1 VW 5 W 20 MS 50 S 100 VS+; DEFECT SPACING (mm) 20 60 200 600 2000; DESCRIPTION

Geological units: Fill (0.00–1.00 m); Alluvial Deposits (1.00 m onward)

Water: 17/01/2024 (approx. 3.2 m)

Casing: 18.5m

Method observations:

Depth (approx.)	Core Recovery (%)	Method	Tests
0.0–1.5	70	HQTT	
1.5–1.95	100	SPT	2/1// 2/0/3/4 N=9
1.95–3.0	100	HQTT	
3.0–3.45	100	SPT	0/0// 0/4/4/4 N=12
3.45–4.5	100	HQTT	
4.5–4.95	100	SPT	0/0// 0/0/0/0 N=0
4.95–6.0	100	HQTT	
6.0–6.45	100	SPT	0/0// 0/0/0/0 N=0
6.45–7.5	100	HQTT	
7.5–7.95	100	SPT	0/0// 0/0/1/1 N=2
7.95–9.0	100	HQTT	
9.0–9.45	100	SPT	1/1// 1/1/2/3 N=7
9.45–10.0	100	HQTT	

Engineering description:

Depth	Moisture	Consistency / Density	Description
0.00m	S	F	*0.00m:* Sandy SILT, some organics; brown. Firm, saturated, non-plastic. Sand, fine to coarse, well graded.
0.75m	W		*0.75m:* SILT, some sand, trace rootlets; dark brown. Firm, wet, non-plastic. Sand, fine to coarse, well graded.
1.00m			*1.00m:* Core loss
1.40m	W-S	L	*1.40m:* Silty fine to coarse SAND; light brown and grey. Loose, wet to saturated, non-plastic. Sand, well graded.
1.95m	M	F-St	*1.95m:* SILT, some sand; light brown with mottled orange and grey. Firm to stiff, moist, non-plastic. Sand, fine to medium, uniformly graded.
3.00m	W-S	St	*3.00m:* SILT, some sand; bluish grey mottled brown. Stiff, wet to saturated, low to medium plasticity. Sand, fine to medium, uniformly graded.
4.00m	M	VL	*4.00m:* Silty fine to coarse SAND; bluish grey mottled brown. Very loose, moist. Sand, well graded.
4.50m	W-S	VS	*4.50m:* Silty CLAY; bluish grey. Very soft, wet to saturated, medium to high plasticity.
6.00m		S	*6.00m:* Sandy SILT; greyish blue. Soft, wet to saturated, non-plastic. Sand, fine to coarse, well graded.
7.00m		VL	*7.00m:* Silty fine to coarse SAND; greyish blue mottled brown. Very loose, wet to saturated, non-plastic. Sand, well graded.
7.95m	W	S	*7.95m:* SILT, some sand, trace clay; bluish grey. Soft, wet, low to medium plasticity. Sand, fine, uniformly graded.
8.25m	S	F-St	*8.25m:* Sandy SILT; greyish blue. Firm to stiff, saturated, non-plastic. Sand, fine to coarse, well graded.
9.50m		MD	*9.50m:* Fine to coarse SAND, some silt; grey mottled brown. Medium dense, saturated. Sand, well graded.

RL (m): 4, 3, 2, 1, 0, -1, -2, -3, -4, -5 — Depth (m): 1–9

COMMENTS:

Hole Depth 18.45m

Scale 1:50

Rev.: A

GEOTECHNICS

BOREHOLE LOG

BOREHOLE No.: **BH05**

SHEET: 2 OF 2

PROJECT: Wairoa Ferry Hotel and South Bank

LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306

CO-ORDINATES: (NZTM2000) 5670412 mN 1982323 mE

R.L.: 4m

DATUM: NZVD2016

DRILL TYPE: Track Mounted Drill Rig

METHOD: Rotary cored

DRILL FLUID:

HOLE STARTED: 17/01/2024

HOLE FINISHED: 17/01/2024

DRILLED BY: Geotech Drilling Ltd

LOGGED BY: MKAY CHECKED: JWY

GEOLOGICAL	METHOD OBSERVATIONS															ENGINEERING DESCRIPTION
GEOLOGICAL UNIT/ ADDITIONAL OBSERVATIONS	FLUID LOSS (%)	WATER	CASING	CORE RECOVERY (%)	METHOD	TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	ESTIMATED ROCK COMPRESSIVE STRENGTH (qu, MPa)	DEFECT SPACING (mm)	DESCRIPTION
				100	SPT	1/3// 3/3/3/4 **N=13**	-6	11			S	MD				[CONT] *9.50m:* Fine to coarse SAND, some silt; grey mottled brown. Medium dense, saturated. Sand, well graded.
				50	HQTT		-7									*10.95m:* Core loss
Alluvial Deposits				100	SPT	0/0// 0/0/0/0 **N=0**	-8	12			W	L-MD				*11.50m:* Fine to coarse SAND, trace silt; grey mottled brown. Loose to medium dense, wet. Sand, well graded. Becomes very loose.
				100	HQTT						M-W	S				*12.45m:* CLAY, some silt; greyish blue. Soft, moist to wet, high plasticity.
				100	SPT	1/1// 2/3/5/6 **N=16**	-9	13			M	VSt				*12.90m:* Sandy SILT; greyish blue. Very stiff, moist, non-plastic. Sand, fine to coarse, well graded.
				100	HQTT		-10	14								
				100	SPT	1/2// 5/5/6/8 **N=24**	-11	15			M-W	MD				*15.00m:* Silty fine to coarse SAND; blueish/grey. Medium dense, moist to wet. Sand, well graded.
				100	HQTT		-12	16								
				100	SPT	2/1// 3/5/7/9 **N=24**	-13	17								
				0	HQTT											*16.95m:* No Recovery
				100	SPT	1/1// 3/4/7/7 **N=21**	-14	18			W	MD				*18.00m:* Silty fine to coarse SAND; bluish grey. Medium dense, wet. Sand, well graded.
							-15	19								18.45m: END OF BOREHOLE. Target depth.

COMMENTS:

Hole Depth 18.45m

Scale 1:50

Rev.: A

NZGD ID: 224220

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH05**

PROJECT: Wairoa Ferry Hotel and South Bank		LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306	
CO-ORDINATES: (NZTM2000)	5670411.95 mN 1982322.92 mE	DRILL TYPE: Track Mounted Drill Rig METHOD: Rotary cored	HOLE STARTED: 17/01/2024 HOLE FINISHED: 17/01/2024 DRILLED BY: Geotech Drilling Ltd
R.L.:	4m		
DATUM:	NZVD2016	DRILL FLUID:	LOGGED BY: MKAY CHECKED: JWY

0.00-6.00m

6.00-10.50m

NZGD ID: 224220

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH05**

SHEET: 2 OF 2

PROJECT: Wairoa Ferry Hotel and South Bank		LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306	
CO-ORDINATES: (NZTM2000)	5670411.95 mN 1982322.92 mE	DRILL TYPE: Track Mounted Drill Rig METHOD: Rotary cored	HOLE STARTED: 17/01/2024 HOLE FINISHED: 17/01/2024 DRILLED BY: Geotech Drilling Ltd
R.L.:	4m		
DATUM:	NZVD2016	DRILL FLUID:	LOGGED BY: MKAY CHECKED: JWY

10.50-15.80m

15.80-18.45m

NZGD ID: 224220

GEOTECHNICS

BOREHOLE LOG

BOREHOLE No.: **BH06**

SHEET: 1 OF 2

PROJECT: Wairoa Ferry Hotel and South Bank
LOCATION: Wairoa Ferry Hotel and Wairoa South
JOB No.: 1017353.2306

CO-ORDINATES: (NZTM2000) 5670331 mN, 1982499 mE
R.L.: 3m
DATUM: NZVD2016

DRILL TYPE: Track Mounted Drill Rig
METHOD: Rotary cored
DRILL FLUID:

HOLE STARTED: 17/01/2024
HOLE FINISHED: 18/01/2024
DRILLED BY: Geotech Drilling Ltd
LOGGED BY: MKAY
CHECKED: JWY

Geological unit	Core recovery (%)	Method	Tests	Moisture	Consistency / Density	Description
Fill	70	HQTT		M-W	L	*0.00m:* Silty fine to coarse SAND; brown with mottled grey. Loose, moist to wet, non-plastic. Sand, well graded.
Fill				M	F-St	*0.35m:* SILT, trace rootlets and trace sand; dark brown/grey with mottled orange. Firm to stiff, moist, non-plastic. Sand, fine to medium, poorly graded.
Alluvial Deposits						*1.00m:* Core loss
	100	SPT	0/1// 2/1/2/5 N=10	M	MD	*1.45m:* Silty fine to coarse SAND; light brown with mottled grey. Medium dense, moist, non-plastic. Sand, well graded.
	0	HQTT				*1.95m:* No Recovery
	100	SPT	0/0// 0/0/0/0 N=0	M-W	VS	*3.00m:* Silty CLAY; blueish/grey with mottled black. Very soft, moist to wet, medium plasticity.
	100	HQTT		M	S	*4.00m:* Clayey SILT, trace sand; bluish grey mottled light brown. Soft, moist, low plasticity. Sand, fine.
	100	SPT	0/0// 0/0/0/0 N=0	S	VS	*4.50m:* Sandy SILT; bluish grey. Very soft, saturated, non-plastic. Sand, fine to medium.
	100	HQTT		M	S	*5.25m:* SILT, trace sand; bluish grey. Soft, moist, low plasticity. Sand, fine to medium.
						5.70m: Core loss
	100	SPT	0/0// 0/0/0/0 N=0	S	VL	*5.90m:* Silty fine to coarse SAND; bluish grey. Very loose, saturated, non-plastic. Sand, well graded.
	80	HQTT			VS	*6.60m:* Sandy SILT; bluish grey. Very soft, saturated, low plasticity. Sand, fine to coarse.
					VL	*7.00m:* Silty fine to medium SAND; blusih grey. Very loose, saturated, non-plastic. Sand, uniformly graded.
	100 / 90	SPT / HQTT	0/0// 0/0/0/0 N=0			*7.50m:* Fine to coarse SAND, trace clay; grey mottled brown. Very loose, saturated. Sand, well graded. Becomes loose.
	100	SPT	2/2// 3/3/6/6 N=18			
	0	HQTT				*9.45m:* No Recovery

Water: 18/01/2024 (water level at approx. 3.0 m)

COMMENTS:

Hole Depth 9.95m

Scale 1:53

Rev.: A

GEOTECHNICS

BOREHOLE LOG

BOREHOLE No.: **BH06**

SHEET: 2 OF 2

PROJECT: Wairoa Ferry Hotel and South Bank | LOCATION: Wairoa Ferry Hotel and Wairoa South | JOB No.: 1017353.2306

CO-ORDINATES: (NZTM2000) 5670331 mN, 1982499 mE
R.L.: 3m
DATUM: NZVD2016

DRILL TYPE: Track Mounted Drill Rig
METHOD: Rotary cored
DRILL FLUID:

HOLE STARTED: 17/01/2024
HOLE FINISHED: 18/01/2024
DRILLED BY: Geotech Drilling Ltd
LOGGED BY: MKAY
CHECKED: JWY

GEOLOGICAL UNIT/ ADDITIONAL OBSERVATIONS: Alluvial Deposits

Core Recovery (%)	Method	Tests	Moisture	Consistency / Density	Description
100	SPT	1/0// 1/4/6/9 N=20	M-W	MD	*10.50m:* Fine to coarse GRAVEL, some silt and some sand; greyish blue. Medium dense, moist to wet. Gravel, sub-rounded to sub-angular, well graded; sand, fine to coarse, well graded.
30	HQTT		M	F-St	*11.10m:* Sandy SILT; bluish grey. Firm to stiff, moist, non-plastic. Sand, fine to coarse.
100	SPT	5/0// 0/1/4/4 N=9			
0	HQTT				*12.45m:* No Recovery
100	SPT	3/6// 3/3/5/7 N=18	M-W	VSt	*13.50m:* Gravelly SILT, trace sand; grey and black. Very stiff, moist to wet, medium plasticity. Gravel, fine to medium, sub-rounded to sub-angular; sand, fine to coarse.
100	HQTT		M	F	*14.50m:* Sandy SILT; grey mottled black. Firm, moist, non-plastic. Sand, fine to coarse.
100	SPT	2/1// 3/4/7/9 N=23			*15.50m:* Core loss
80	HQTT		W-S	F	*15.70m:* Sandy SILT; greyish black. Firm, wet to saturated, low plasticity. Sand, fine to coarse.
100	SPT	1/1// 2/1/0/1 N=4			
100	HQTT			MD-D	*16.95m:* Silty fine to coarse SAND, some gravel; bluish grey mottled brown. Medium dense to dense, wet to saturated. Gravel, fine to coarse, sub-rounded to sub-angular, well graded.
100	SPT	2/2// 6/6/8/10 N=30			
100	HQTT		W	VSt-H	*18.45m:* Sandy SILT, some gravel; grey with black and brown. Very stiff to hard and Loose to medium dense, wet, low plasticity. Sand, fine to coarse; gravel, fine to coarse, sub-rounded to sub-angular, well graded.
			M	F	*19.00m:* Sandy SILT, some clay; grey. Firm, moist, low plasticity. Sand, fine to coarse.
100	SPT	0/0// 0/0/0/0 N=0		VS	*19.30m:* Clayey SILT; grey with mottled black. Very soft, moist, low plasticity.

Depth (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
RL (m): -8, -9, -10, -11, -12, -13, -14, -15, -16, -17

19.95m: END OF BOREHOLE. Target depth.

COMMENTS:

Hole Depth 19.95m

Scale 1:53

Rev.: A

NZGD ID: 224221

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Wairoa Ferry Hotel and South Bank	LOCATION: Wairoa Ferry Hotel and Wairoa South	JOB No.: 1017353.2306
CO-ORDINATES: 5670331.06 mN (NZTM2000) 1982499.36 mE	DRILL TYPE: Track Mounted Drill Rig	HOLE STARTED: 17/01/2024
R.L.: 3m	METHOD: Rotary cored	HOLE FINISHED: 18/01/2024
DATUM: NZVD2016	DRILL FLUID:	DRILLED BY: Geotech Drilling Ltd
		LOGGED BY: MKAY CHECKED: JWY

0.00-4.95m

4.95-8.60m

NZGD ID: 224221

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Wairoa Ferry Hotel and South Bank		LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306	
CO-ORDINATES: (NZTM2000)	5670331.06 mN 1982499.36 mE	DRILL TYPE: Track Mounted Drill Rig METHOD: Rotary cored	HOLE STARTED: 17/01/2024 HOLE FINISHED: 18/01/2024
R.L.:	3m		DRILLED BY: Geotech Drilling Ltd
DATUM:	NZVD2016	DRILL FLUID:	LOGGED BY: MKAY CHECKED: JWY

8.60-15.60m

15.60-19.95m

NZGD ID: 224221

GEOTECHNICS

BOREHOLE LOG

BOREHOLE No.: **BH04**

PROJECT: Wairoa Ferry Hotel and South Bank

LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306

CO-ORDINATES: (NZTM2000) 5670471 mN 1982149 mE

R.L.: 3m

DATUM: NZVD2016

DRILL TYPE: Track Mounted Drill Rig

METHOD: Rotary cored

DRILL FLUID:

HOLE STARTED: 16/01/2024

HOLE FINISHED: 16/01/2024

DRILLED BY: Geotech Drilling Int

LOGGED BY: MKAY

CHECKED: JWY

Geological unit	Core recovery (%)	Method	Tests	Moisture	Consistency / Density	Description
Fill	67	HQTT		M	L	*0.00m:* Silty fine to coarse SAND, trace organics; brown with some grey. Loose, moist. Sand, well graded; organics, rootlets.
Alluvial Deposits				W	VL	*0.75m:* Silty fine to coarse SAND; bluish grey. Very loose, wet, non-plastic.
	100	SPT	1/0// 1/0/1/1 N=3			
	0	HQTT				*1.95m:* No Recovery
	100	SPT	0/0// 0/1/1/1 N=3	S	S	*3.00m:* Sandy SILT; bluish grey speckled brown. Soft, saturated. Sand, fine to coarse, well graded.
	100	HQTT				
	100	SPT	1/1// 1/0/1/0 N=2			
	100	HQTT		M	S-F	*5.00m:* Silty CLAY, trace sand; bluish grey. Soft to firm, moist, medium plasticity. Sand, fine to medium.
				W	L	*5.50m:* Fine to coarse SAND, some clay; bluish grey. Loose, wet. Sand, well graded.
	100	SPT	0/0// 1/1/1/1 N=4			
						6.50m: Core loss
	67	HQTT		S	VL	*6.80m:* Fine to coarse SAND, some silt, trace gravel; bluish grey. Very loose, saturated. Sand, well graded; gravel, fine to coarse, sub-rounded to sub-angular, greywacke, well graded.
	100	SPT	0/0// 1/1/0/0 N=2	W	VL-L	*7.50m:* Fine to coarse SAND, some silt; grey with light brown sand. Very loose to loose, wet. Sand, well graded.
	100	HQTT			L-MD	*8.50m:* Silty fine to medium SAND. Loose to medium dense, wet. Sand, poorly graded.
	0	SPT	1/1// 3/2/1/2 N=8			*9.00m:* No recovery
	0	HQTT				

Water: 16/01/2024 (at approx. 4.0m depth)

Casing: 20.0m

COMMENTS:

Hole Depth 19.95m

Scale 1:53

Rev.: A

GEOTECHNICS

BOREHOLE LOG

PROJECT: Wairoa Ferry Hotel and South Bank | LOCATION: Wairoa Ferry Hotel and Wairoa South | JOB No.: 1017353.2306

CO-ORDINATES: (NZTM2000) 5670471 mN 1982149 mE
R.L.: 3m
DATUM: NZVD2016

DRILL TYPE: Track Mounted Drill Rig
METHOD: Rotary cored
DRILL FLUID:

HOLE STARTED: 16/01/2024
HOLE FINISHED: 16/01/2024
DRILLED BY: Geotech Drilling Int
LOGGED BY: MKAY
CHECKED: JWY

Geological unit: Alluvial Deposits

Core recovery (%)	Method	Tests	Depth (m)	RL (m)	Moisture	Consistency / Density	Description
100	SPT	2/1// 3/3/3/3 N=12	10.55				[CONT] *9.00m:* No recovery
67	HQTT		11.00	-8			*11.00m:* Core loss
			11.40		S	MD	*11.40m:* Sandy fine to coarse GRAVEL, trace silt; greyish blue mottled brown. Medium dense, saturated. Gravel, sub-rounded to sub-angular, greywacke, well graded; sand, fine to coarse, well graded.
100	SPT	2/1// 2/2/4/4 N=12	12.00	-9			
0	HQTT		12.45				*12.45m:* No Recovery Trouble with flowing sands into core barrel. Unable to recover core.
100	SPT	2/2// 1/1/2/4 N=8	13.50	-10			
0	HQTT		14.00	-11			
100	SPT	0/1// 1/3/3/5 N=12	15.00	-12	W	St	*15.00m:* SILT, some sand, trace gravel; bluish grey. Stiff, wet, low plasticity. Sand, fine to coarse, well graded; gravel, medium to coarse, sub-rounded to sub-angular.
71	HQTT		15.70				*15.70m:* Core loss
		54/14 kPa	16.00	-13	M	F-St	*16.00m:* SILT; bluish grey. Firm to stiff, moist, non-plastic to low plasticity.
100	SPT	1/0// 2/2/4/6 N=14	16.50		W	St	*16.50m:* Sandy SILT; bluish grey mottled brown. Stiff, wet, non-plastic. Sand, fine, poorly graded. Becomes very stiff to hard.
100	HQTT		17.00	-14			
100	SPT	4/6// 6/6/7/10 N=29	18.00	-15			
100	HQTT		19.00	-16			
100	SPT	0/2// 4/7/10/10 N=31	19.50				
			19.95	-17			19.95m: END OF BOREHOLE. Target depth.

COMMENTS:

Hole Depth 19.95m

Scale 1:53

NZGD ID: 224219

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH04**

PROJECT: Wairoa Ferry Hotel and South Bank		LOCATION: Wairoa Ferry Hotel and Wairoa South JOB No.: 1017353.2306	
CO-ORDINATES: (NZTM2000)	5670470.82 mN 1982149.05 mE	DRILL TYPE: Track Mounted Drill Rig METHOD: Rotary cored	HOLE STARTED: 16/01/2024 HOLE FINISHED: 16/01/2024 DRILLED BY: Geotech Drilling Int
R.L.:	3m		
DATUM:	NZVD2016	DRILL FLUID:	LOGGED BY: MKAY CHECKED: JWY

0.00-6.00m

6.00-12.00m

GEOTECHNICS

CORE PHOTOS

BOREHOLE No.: **BH04**

SHEET: 2 OF 2

PROJECT: Wairoa Ferry Hotel and South Bank	LOCATION: Wairoa Ferry Hotel and Wairoa South	JOB No.: 1017353.2306
CO-ORDINATES: 5670470.82 mN (NZTM2000) 1982149.05 mE	DRILL TYPE: Track Mounted Drill Rig	HOLE STARTED: 16/01/2024
R.L.: 3m	METHOD: Rotary cored	HOLE FINISHED: 16/01/2024
DATUM: NZVD2016	DRILL FLUID:	DRILLED BY: Geotech Drilling Int
		LOGGED BY: MKAY CHECKED: JWY

12.00-18.45m

18.45-19.95m

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT06

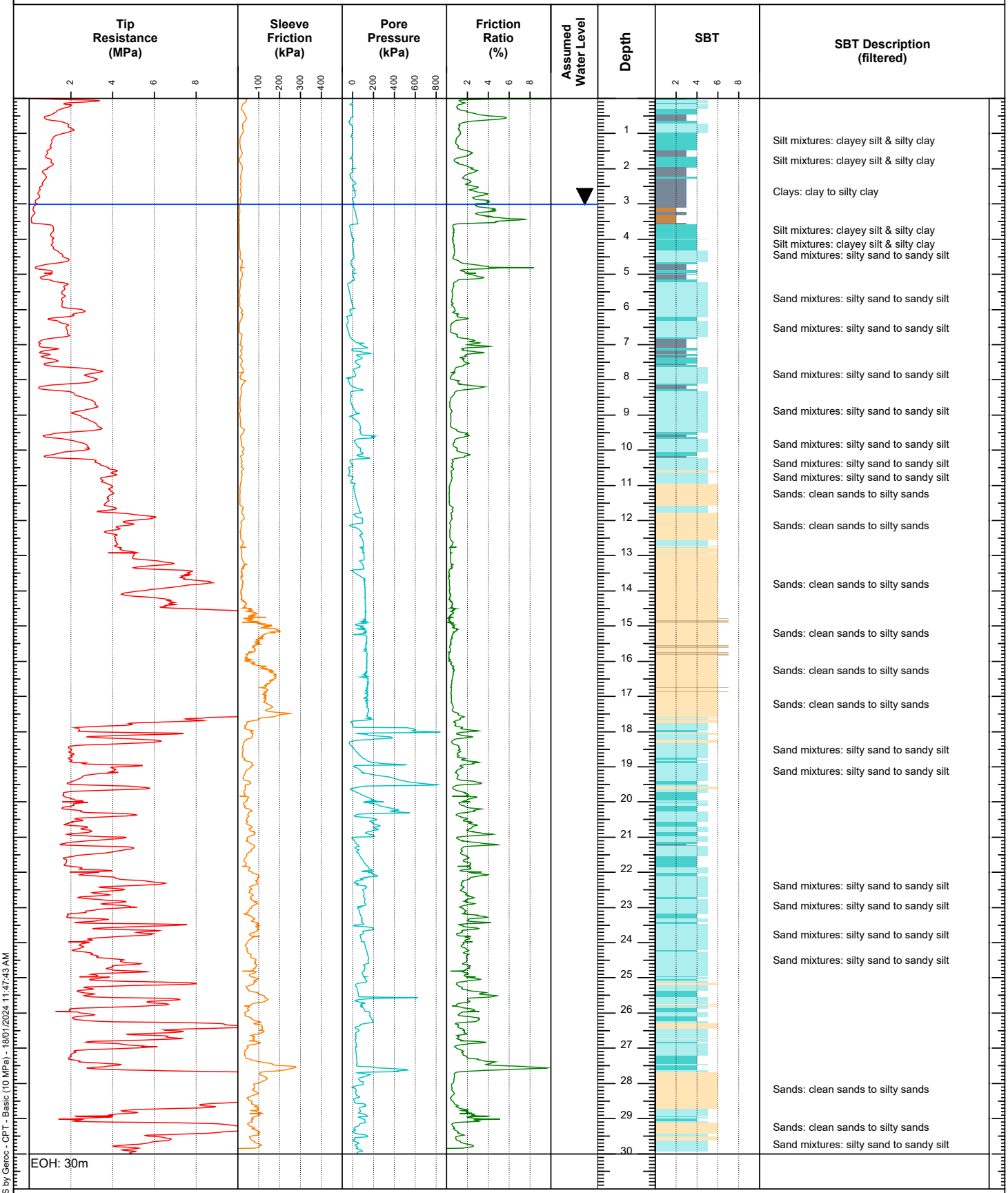
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982016mE, 5670444mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 15/01/2024
END DATE: 15/01/2024



REMARKS:

NOTES:

Generated with CORE-GS by Geroc - CPT - Basic (10 MPa) - 18/01/2024 11:47:43 AM

NZGD ID: 213365

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT07

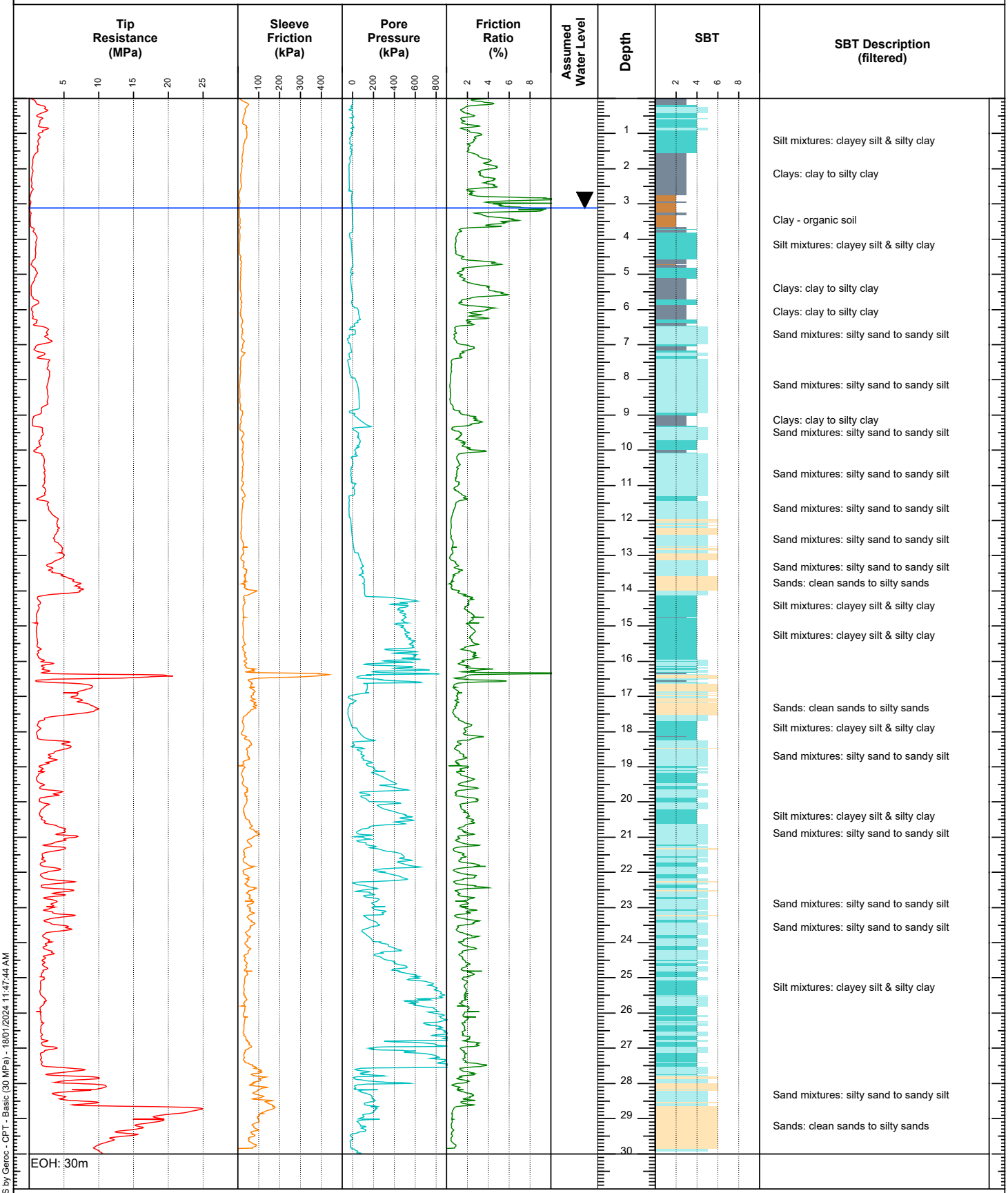
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982056mE, 5670465mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 15/01/2024
END DATE: 15/01/2024



REMARKS:

NOTES:

NZGD ID: 213974

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT08

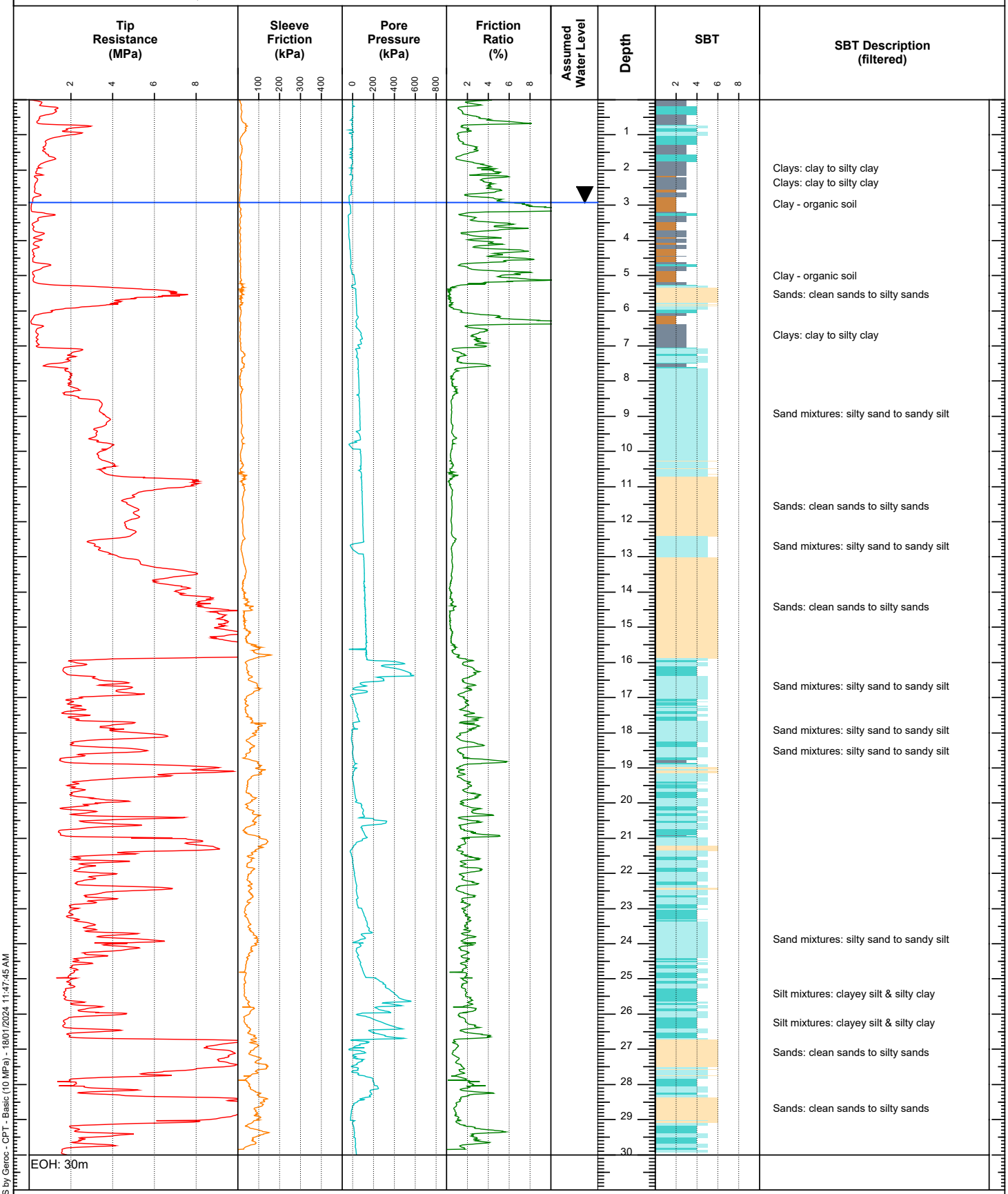
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982097mE, 5670485mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 15/01/2024
END DATE: 15/01/2024



REMARKS:

NOTES:

NZGD ID: 213975

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT09

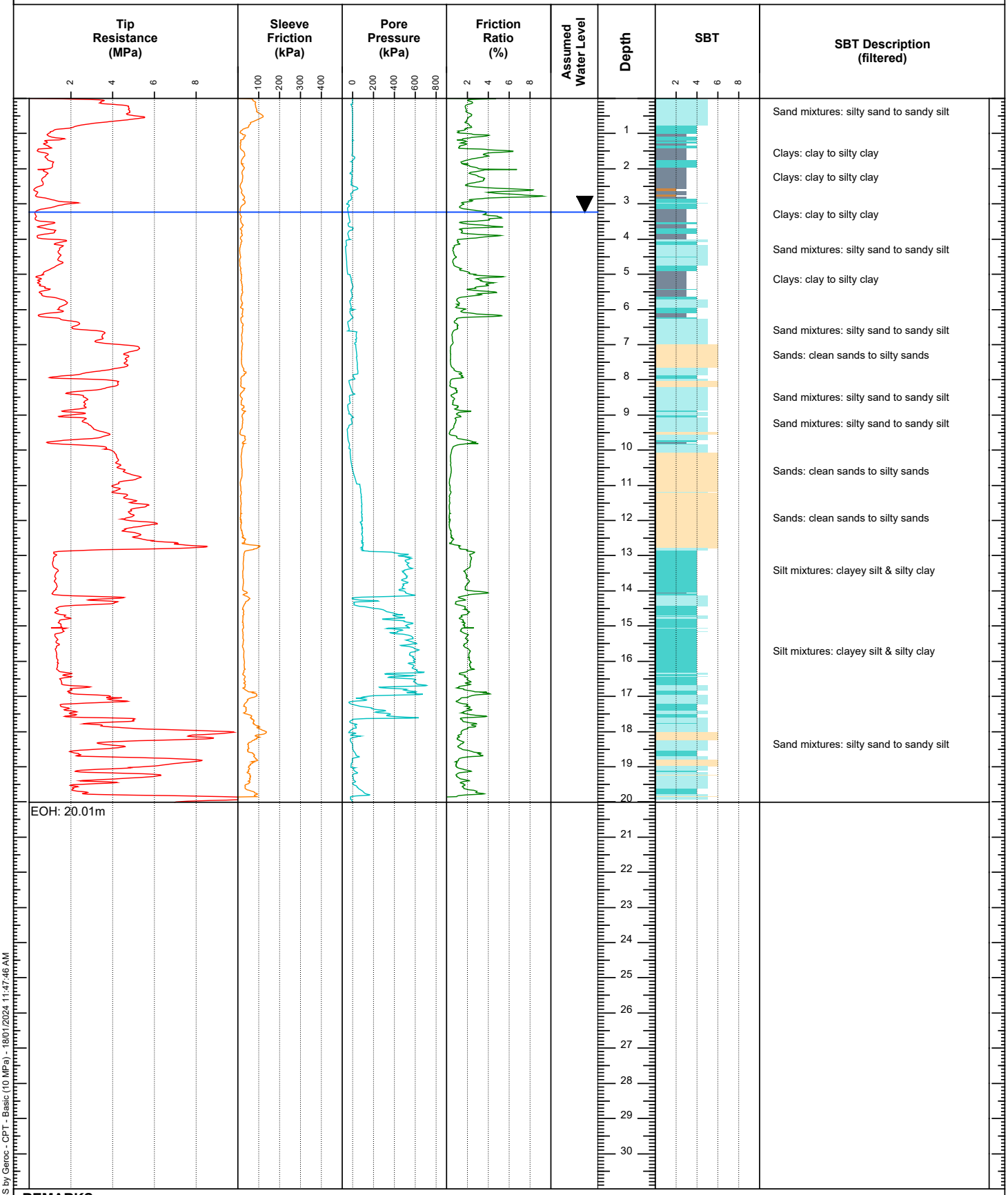
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982074mE, 5670458mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 15/01/2024
END DATE: 15/01/2024



REMARKS:

NOTES:

NZGD ID: 213976

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT10

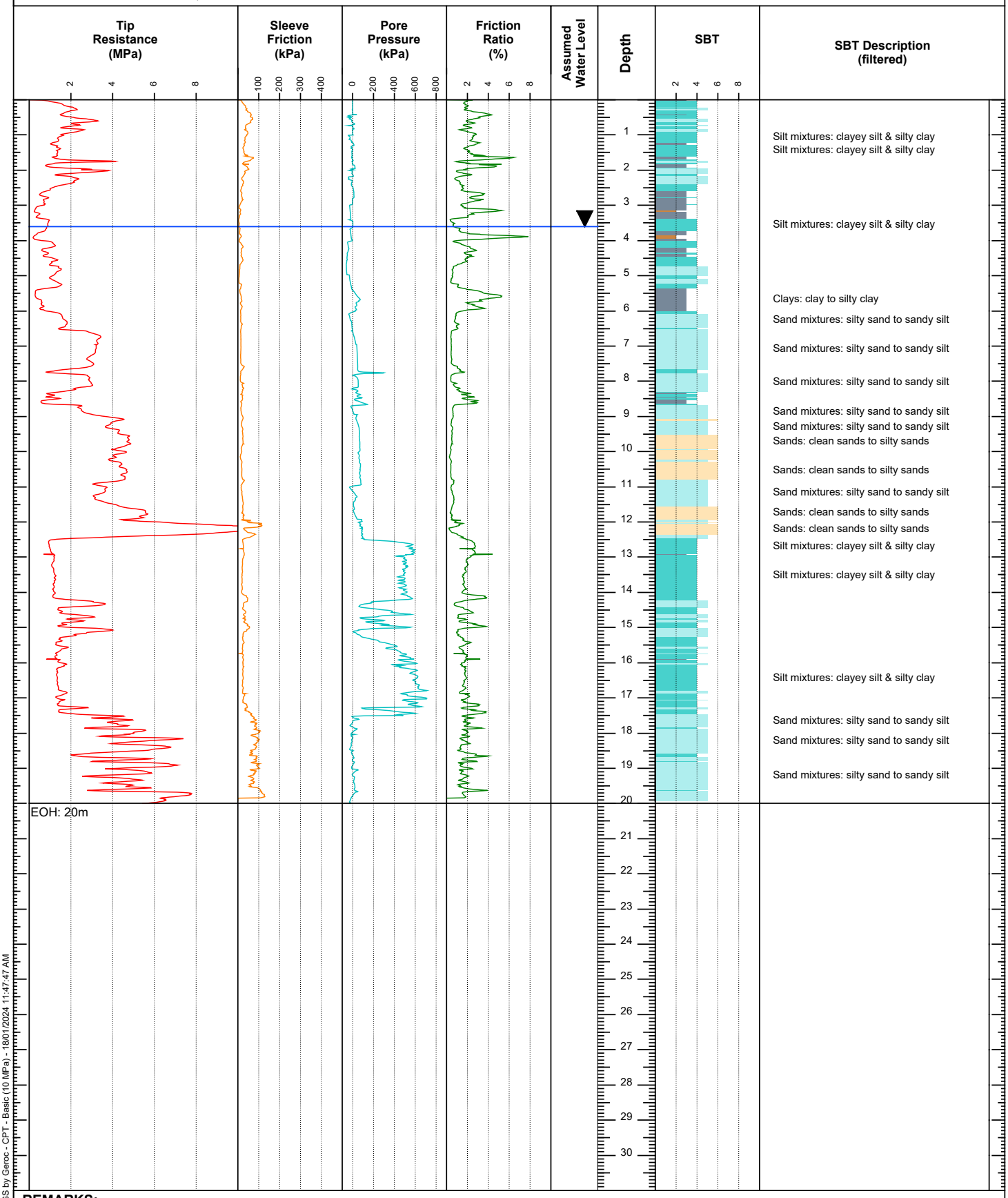
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982121mE, 5670457mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213977

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT11

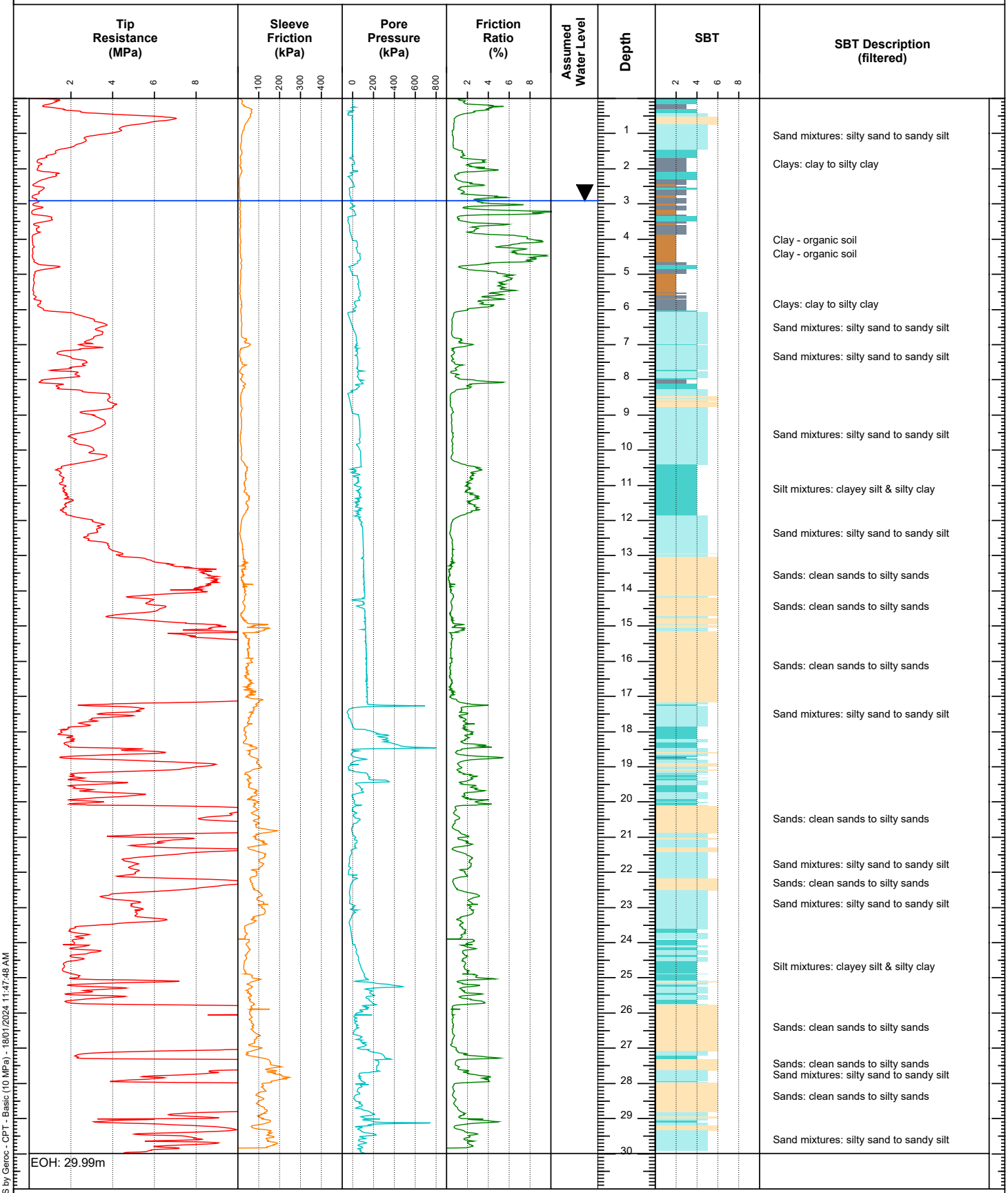
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982123mE, 5670484mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 15/01/2024
END DATE: 15/01/2024



REMARKS:

NOTES:

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NZGD ID: 213978

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT12

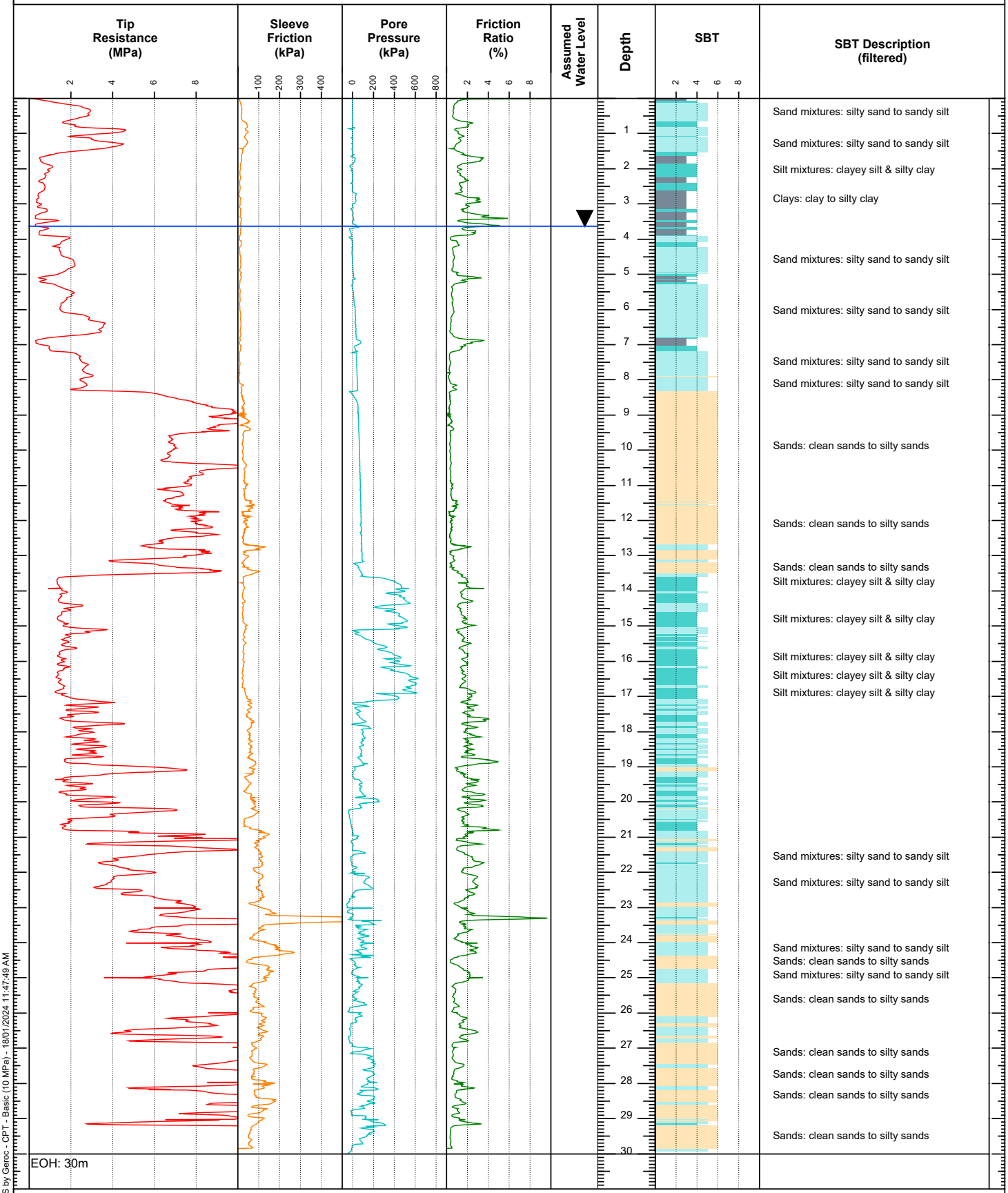
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982154mE, 5670466mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213979

CONE PENETRATION TEST (CPT) LOG

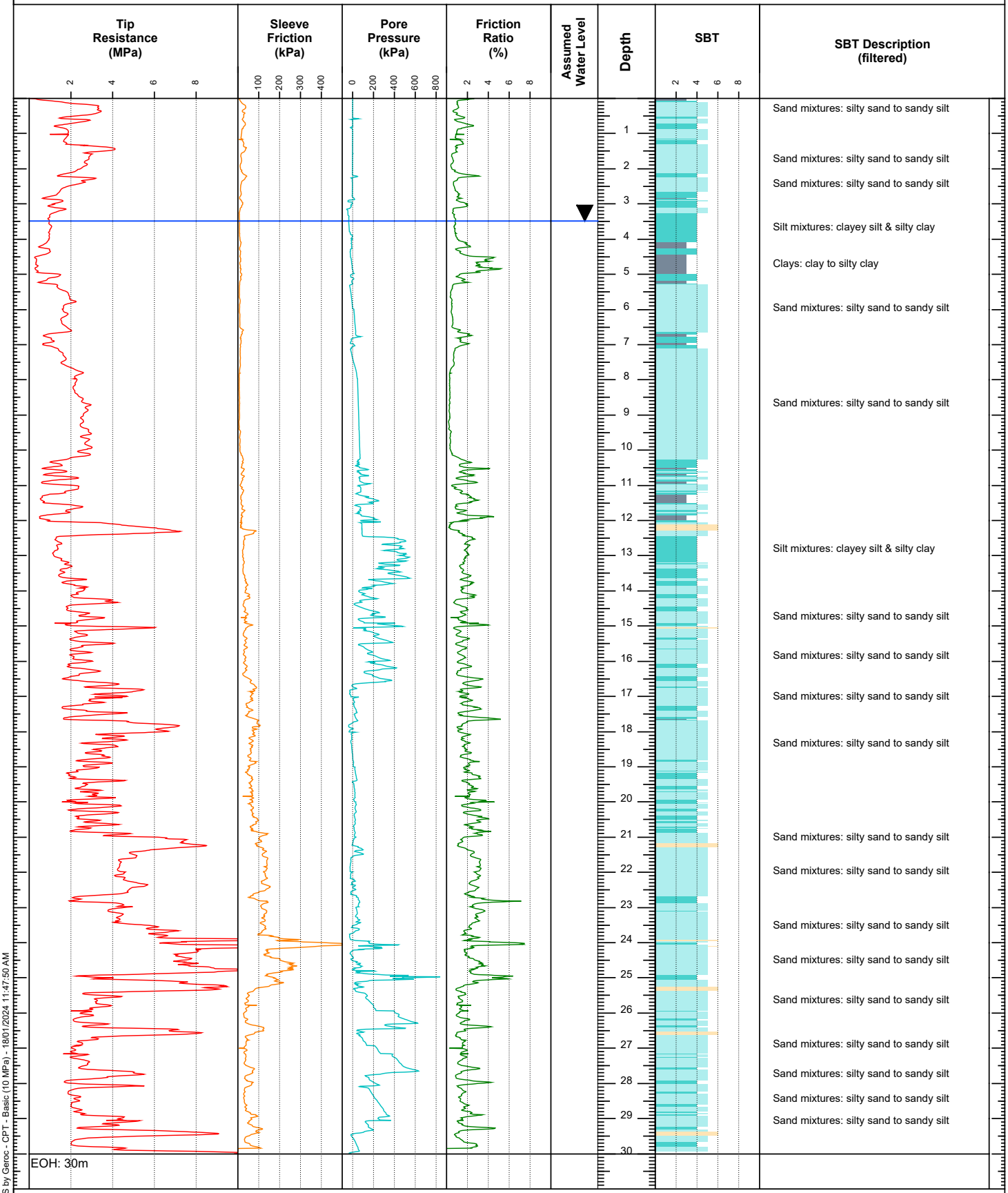
HOLE NO.: CPT13

CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CONTRACTOR: Geotech Drilling Ltd
START DATE: 16/01/2024

CO-ORDINATES: 1982191mE, 5670454mN
ELEVATION: Ground
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213980

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT14

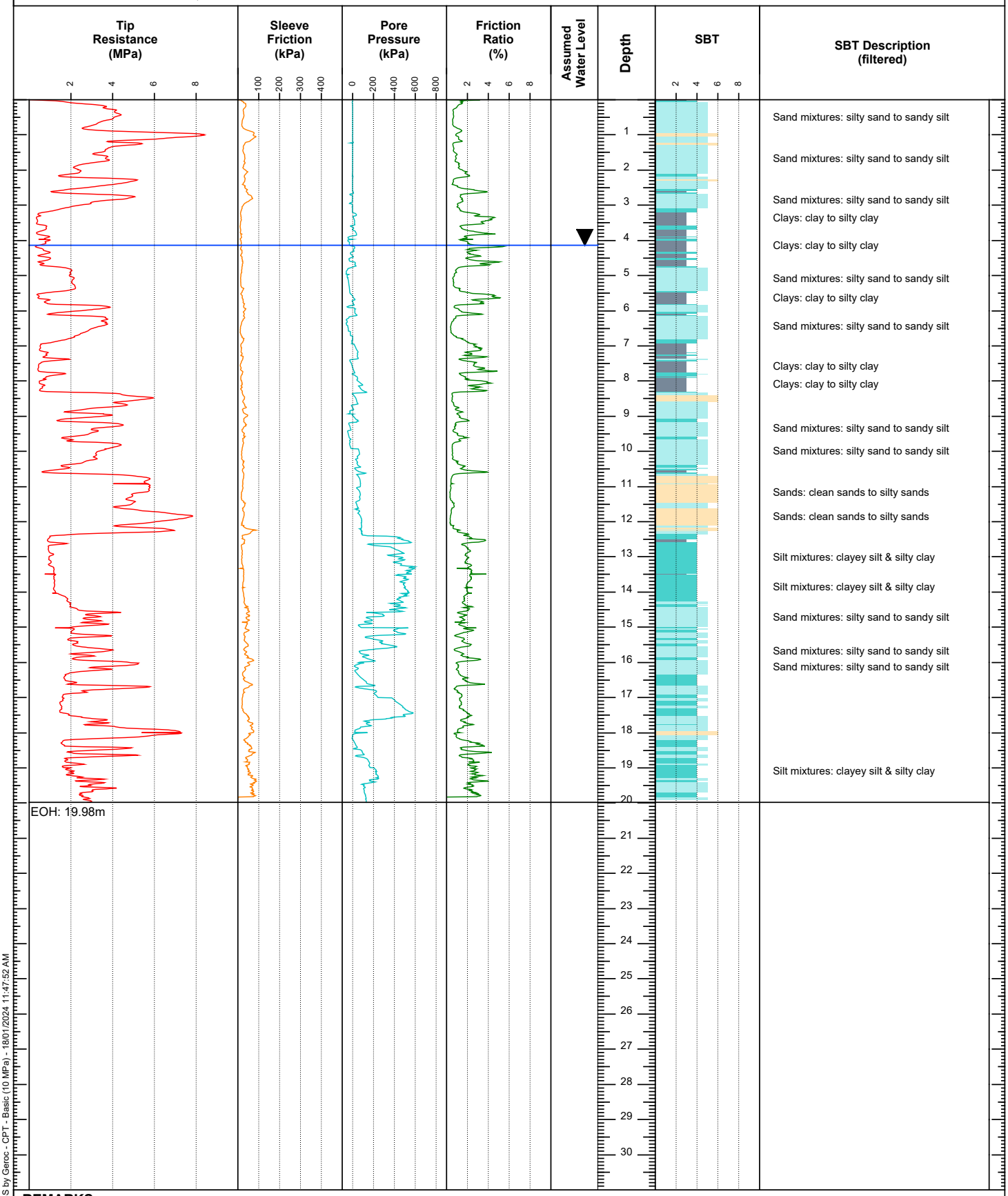
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982175mE, 5670443mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213981

CONE PENETRATION TEST (CPT) LOG

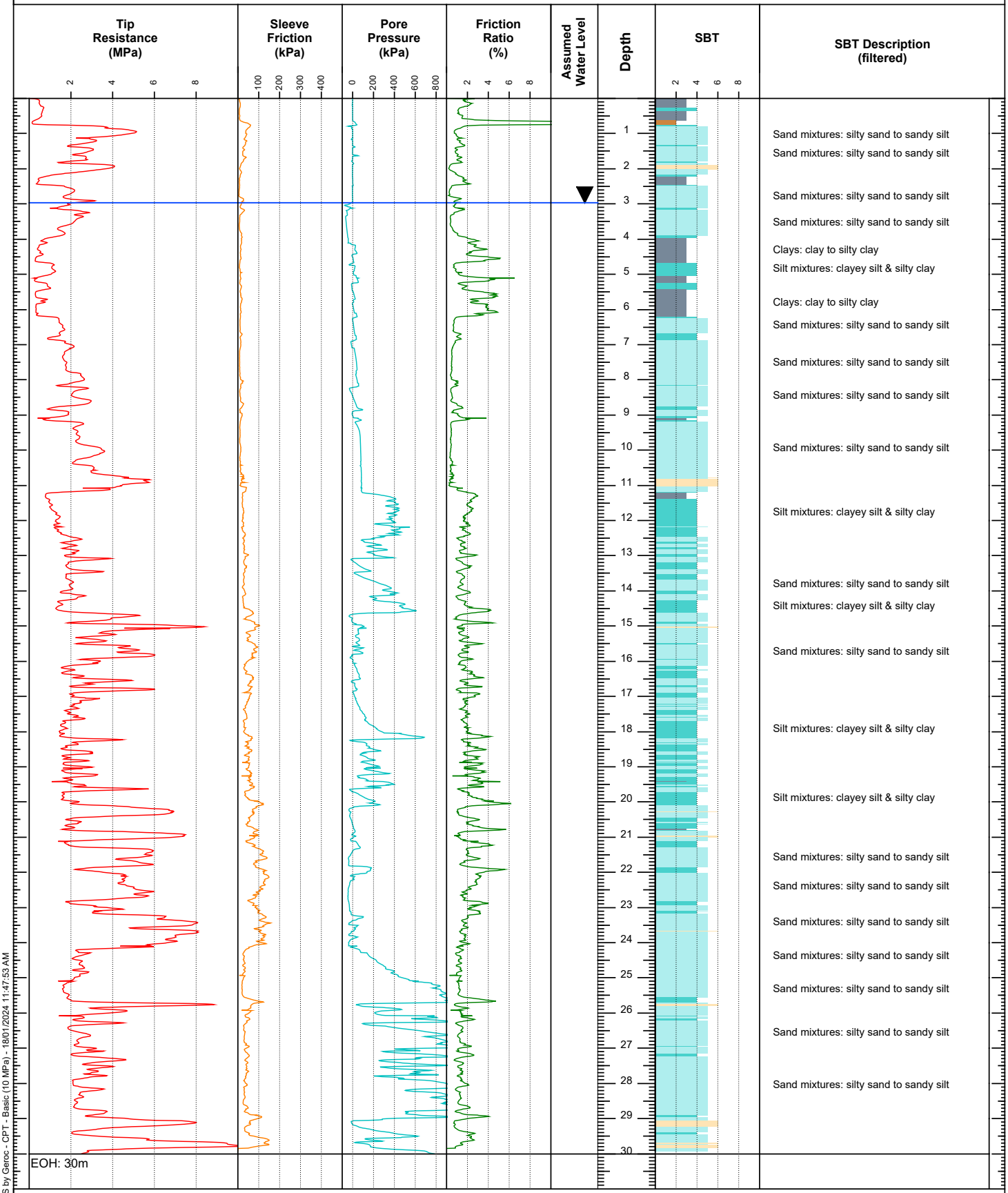
HOLE NO.: CPT15

CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CONTRACTOR: Geotech Drilling Ltd
START DATE: 16/01/2024

CO-ORDINATES: 1982215mE, 5670450mN
ELEVATION: Ground
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213982

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT16

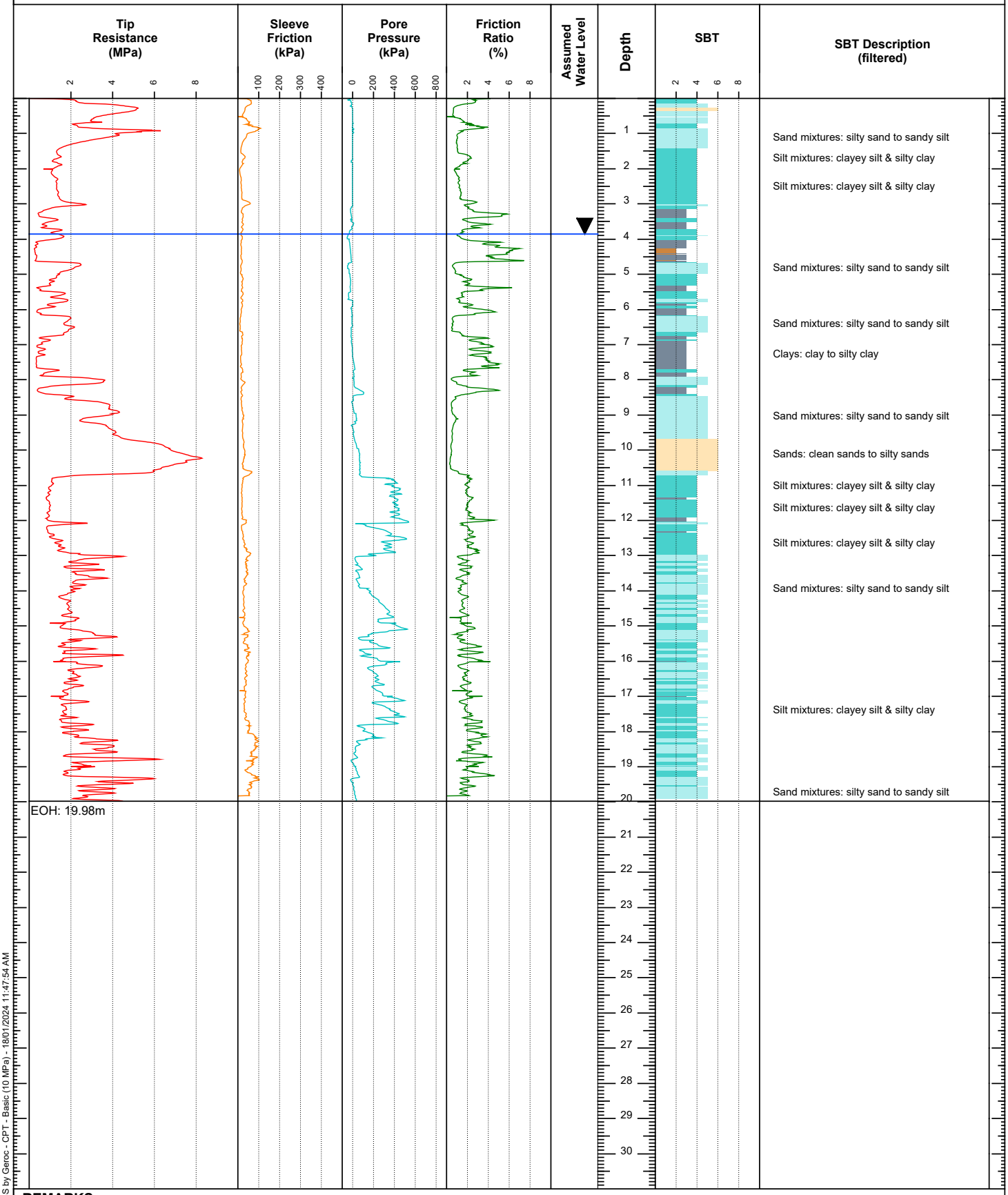
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982237mE, 5670416mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213983

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT17

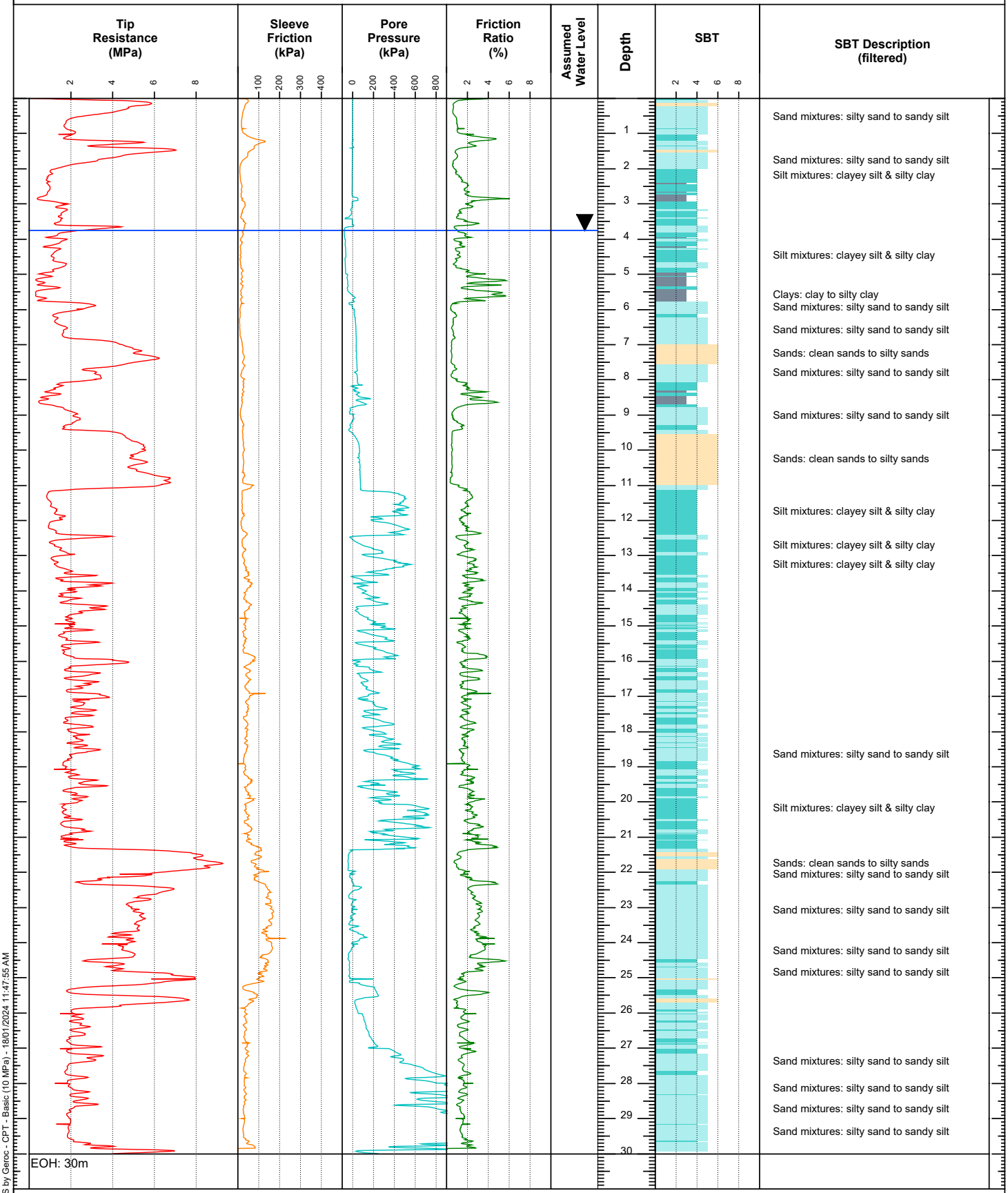
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982262mE, 5670424mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213984

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT18

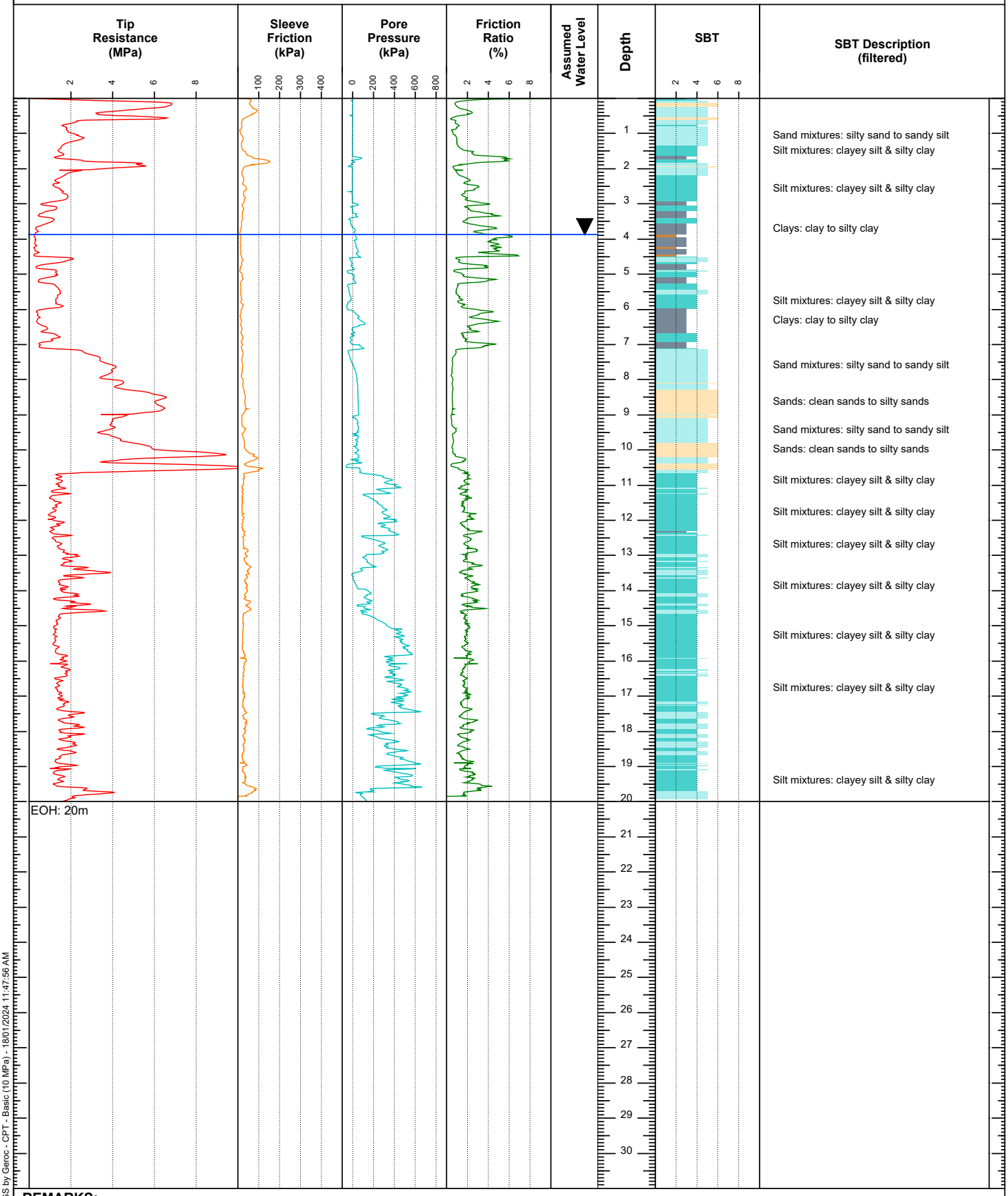
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982277mE, 5670402mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

NZGD ID: 213985

CONE PENETRATION TEST (CPT) LOG

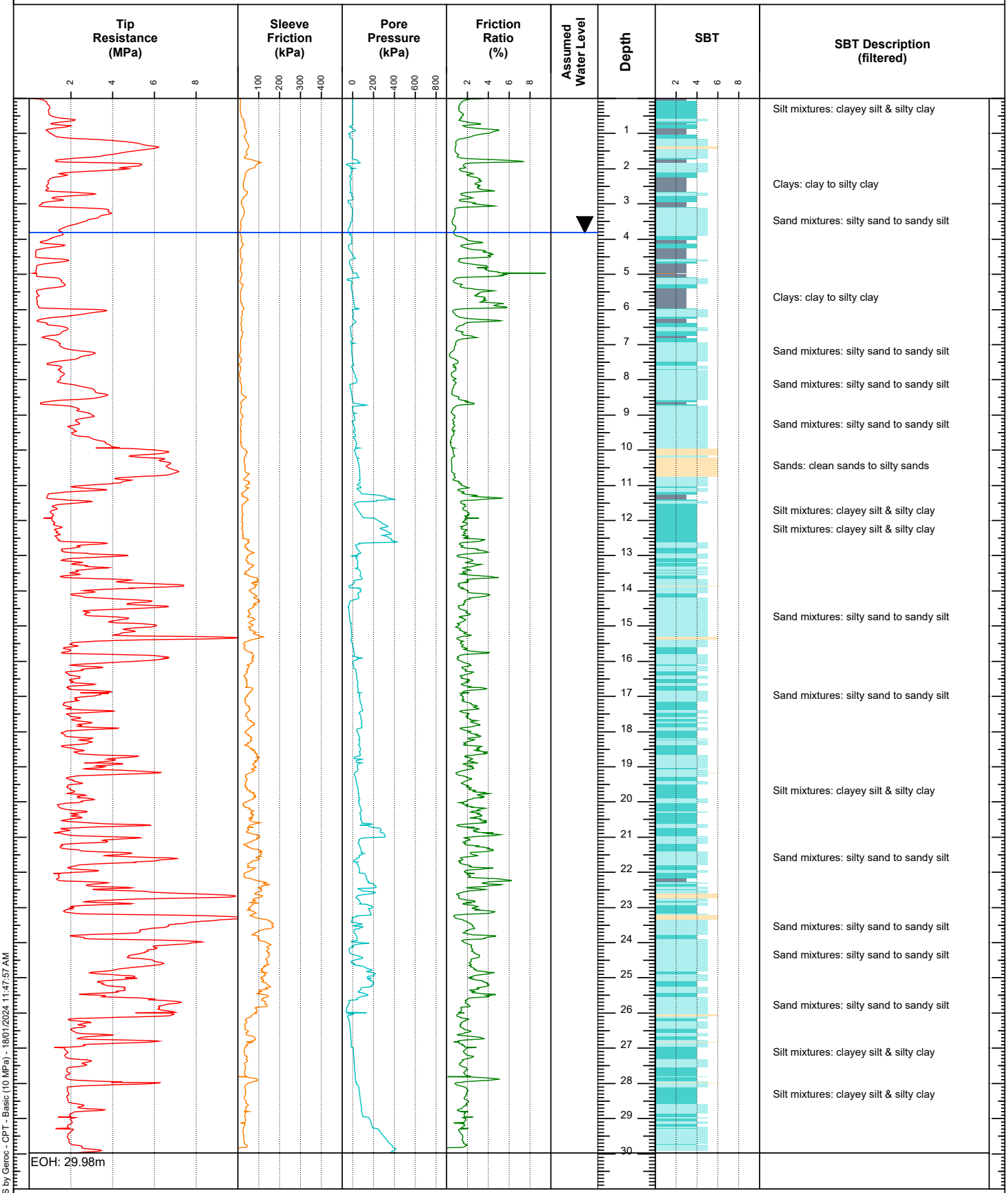
HOLE NO.: CPT19

CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CONTRACTOR: Geotech Drilling Ltd
START DATE: 17/01/2024

CO-ORDINATES: 1982317mE, 5670412mN
ELEVATION: Ground
END DATE: 17/01/2024



REMARKS:

NOTES:

Generated with CORE-GS by Geroc - CPT - Basic (10 MPa) - 18/01/2024 11:47:57 AM

NZGD ID: 213986

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT20

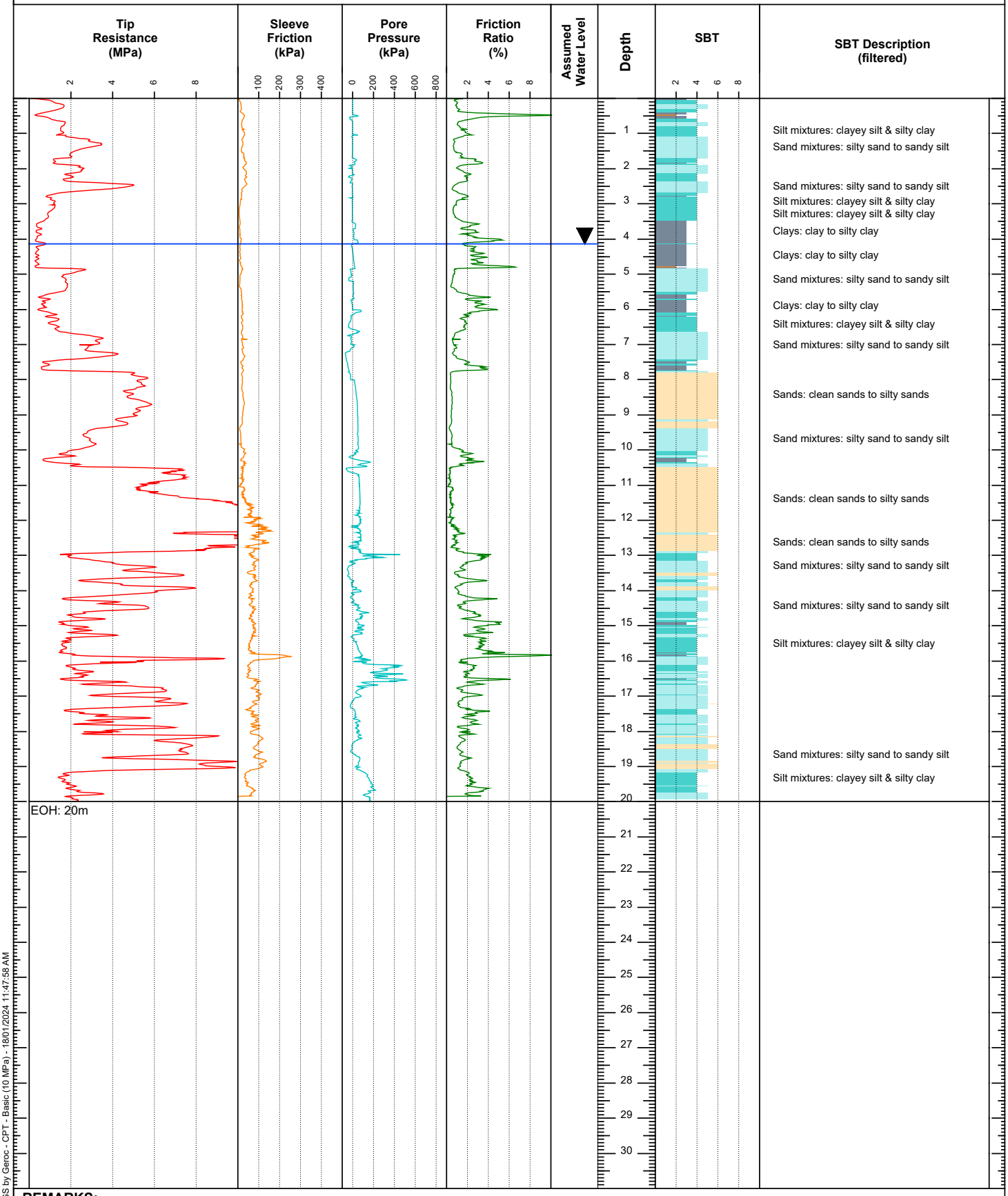
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982328mE, 5670388mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 17/01/2024
END DATE: 17/01/2024



REMARKS:

NOTES:

Generated with CORE-GS by Geroc - CPT - Basic (10 MPa) - 18/01/2024 11:47:58 AM

CONE PENETRATION TEST (CPT) LOG

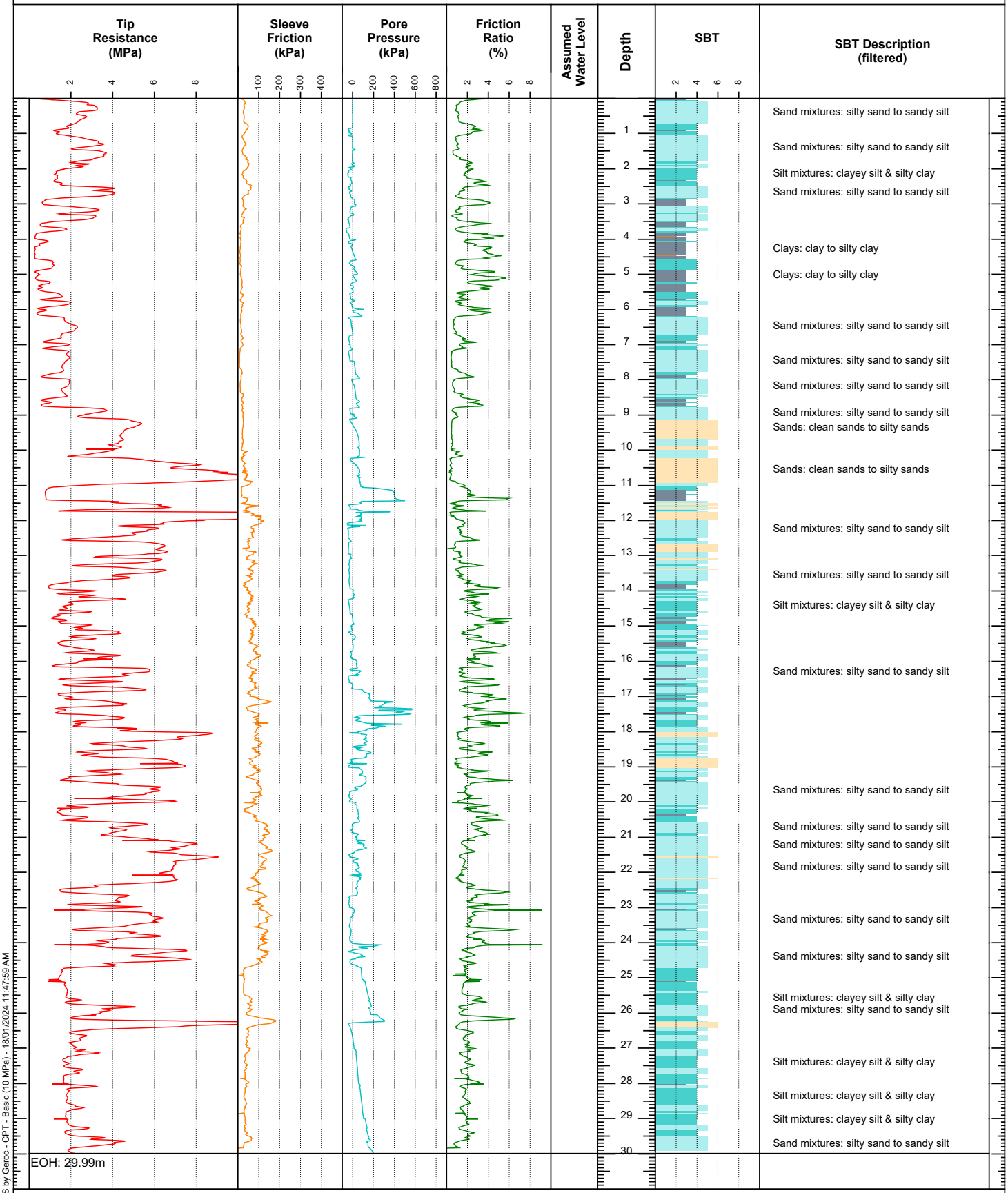
HOLE NO.: CPT21

CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CONTRACTOR: Geotech Drilling Ltd
START DATE: 17/01/2024

CO-ORDINATES: 1982356mE, 5670399mN
ELEVATION: Ground
END DATE: 17/01/2024



REMARKS:

NOTES:

NZGD ID: 213988

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT22

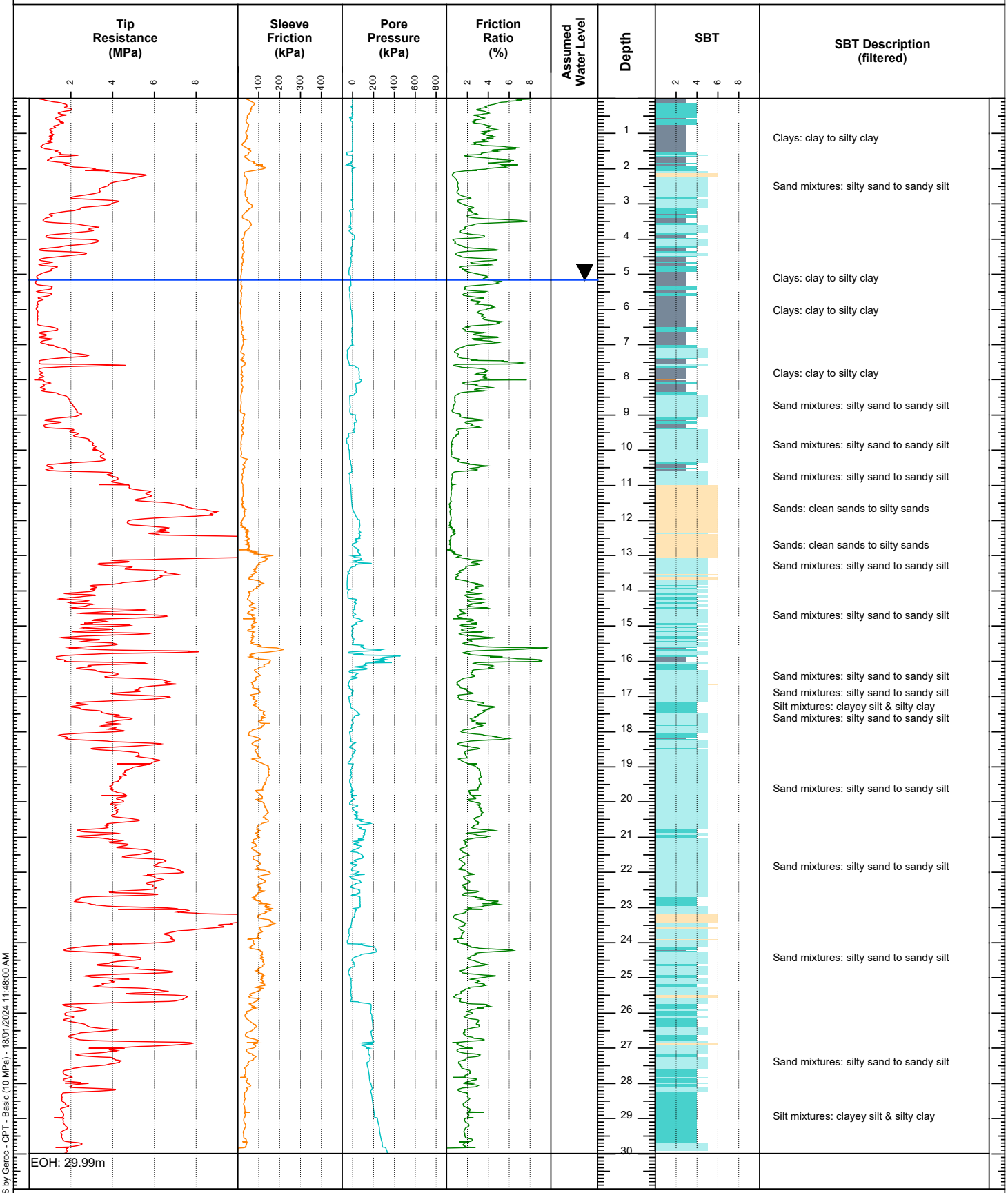
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982381mE, 5670388mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 17/01/2024
END DATE: 17/01/2024



REMARKS:

NOTES:

Generated with CORE-GS by Geroc - CPT - Basic (10 MPa) - 18/01/2024 11:48:00 AM

NZGD ID: 213989

CONE PENETRATION TEST (CPT) LOG

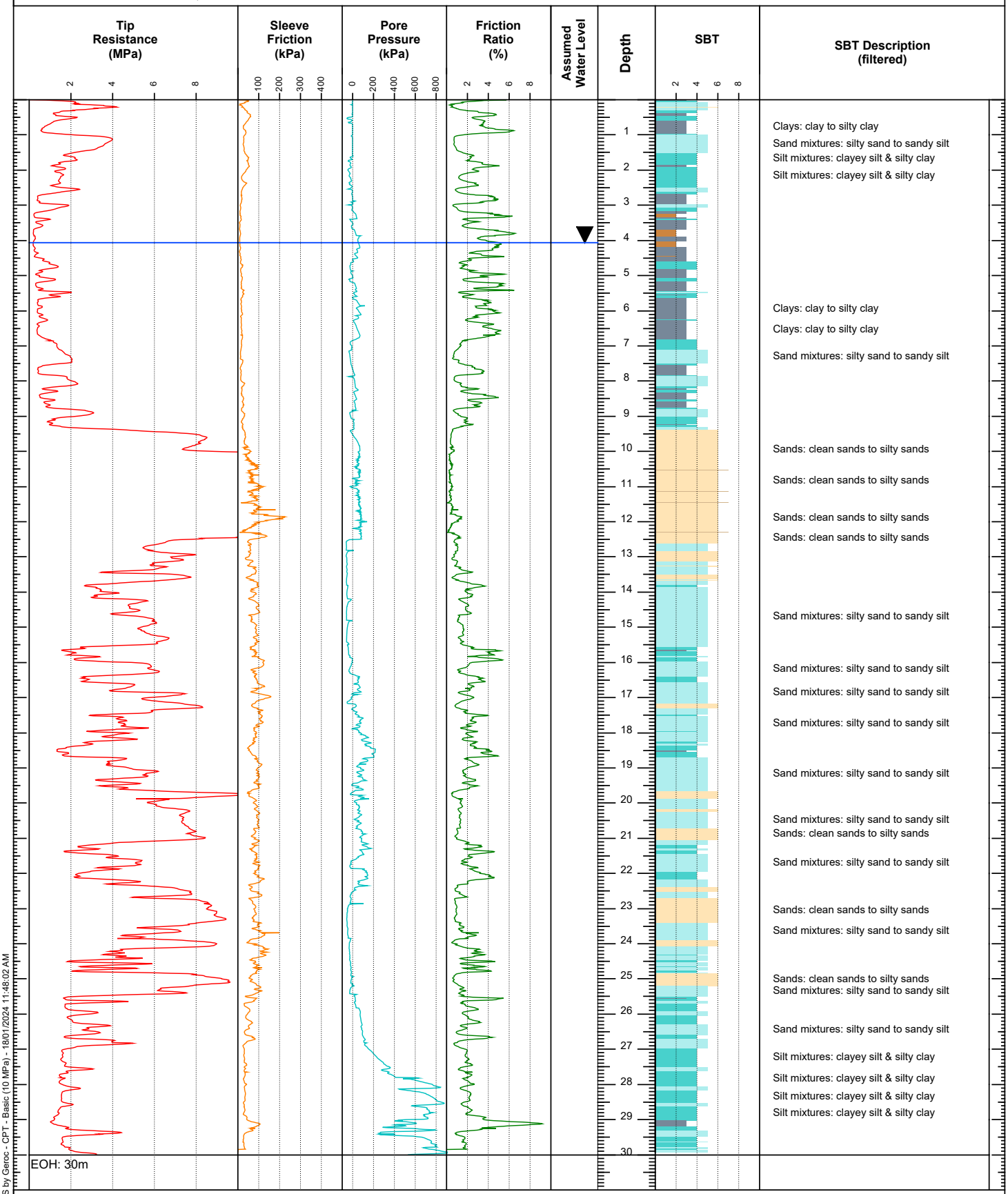
HOLE NO.: CPT24

CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CONTRACTOR: Geotech Drilling Ltd
START DATE: 17/01/2024

CO-ORDINATES: 1982412mE, 5670374mN
ELEVATION: Ground
END DATE: 17/01/2024



REMARKS:

NOTES:

NZGD ID: 213990

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT26

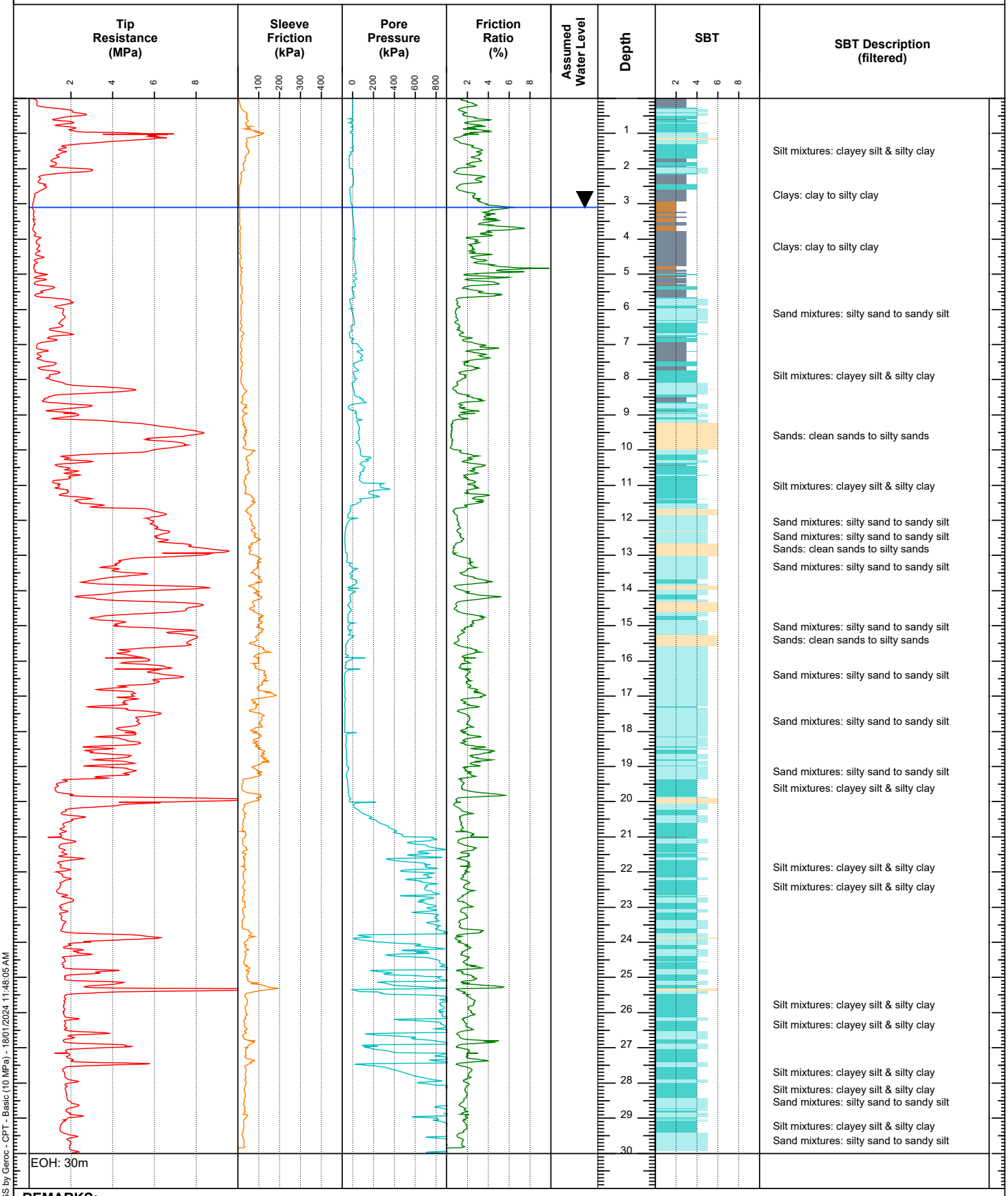
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982493mE, 5670341mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:
NO WATER LEVEL RECORDED, HOLE COLLAPASED AT 1.8M

NOTES:

NZGD ID: 213992

CONE PENETRATION TEST (CPT) LOG

HOLE NO.: CPT27

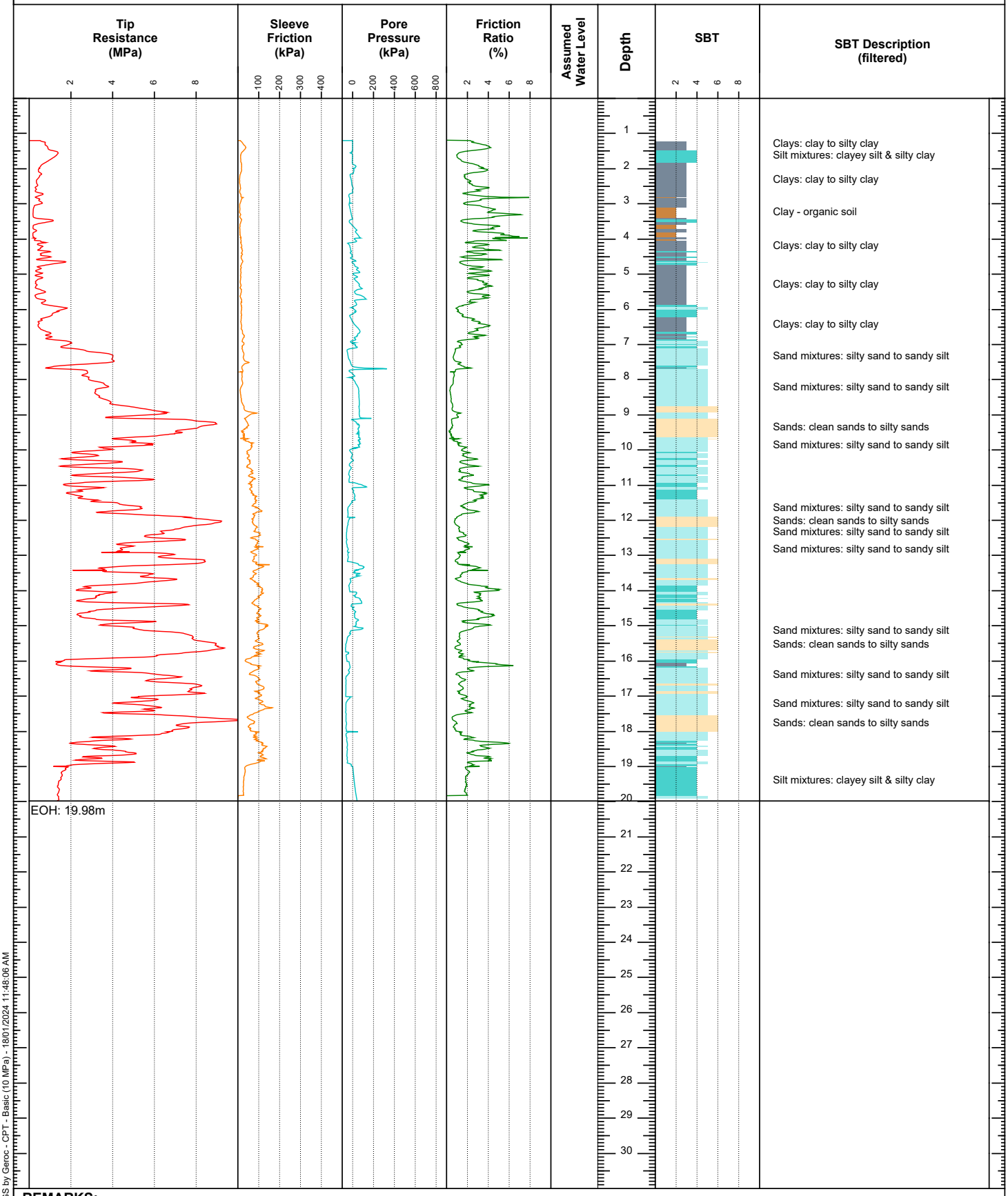
CLIENT: TONKIN & TAYLOR LTD
PROJECT: WAIROA SOUTH BANK

JOB NO.: WAIROA SOUTH BANK

SITE LOCATION:
CO-ORDINATES: 1982500mE, 5670320mN

CONTRACTOR: Geotech Drilling Ltd
ELEVATION: Ground

START DATE: 16/01/2024
END DATE: 16/01/2024



REMARKS:

NOTES:

Generated with CORE-GS by Geroc - CPT - Basic (10 MPa) - 18/01/2024 11:48:06 AM

NZGD ID: 213993

APPENDIX C

SITE PHOTOGRAPHS

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Floodway Section

Photo No. 1	**Date:** 03/07/2025
Description: 177 Railway Road looking towards the southeast.	

Photo No. 2	**Date:** 03/07/2025
Description: 165 Railway Road looking towards the southeast.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 3	**Date:** 03/07/2025
Description: 165 Railway Road southeast at south end by 45 Railway Road showing oil staining on soil.	

Photo No. 4	**Date:** 03/07/2025
Description: 165 Railway Road southeast at south end by 45 Railway Road.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 5	**Date:** 03/07/2025

Description:

165 Railway Road southeast at south end by 45 Railway Road.

Photo No. 6	**Date:** 03/07/2025

Description:

45 Railway Road looking south towards the Wairoa Showgrounds.

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 7	**Date:** 03/07/2025
Description: Wairoa Showgrounds main building.	

Photo No. 8	**Date:** 03/07/2025
Description: Wairoa Showgrounds looking northwest.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 9	**Date:** 03/07/2025

Description:

Shed at north end of showgrounds site.

Photo No. 10	**Date:** 03/07/2025

Description:

Flood damaged fencing stockpile on eastern side of showgrounds.

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 11	**Date:** 03/07/2025
Description: Fenceposts from flood damaged horse yards on north side of Wairoa Showgrounds	

Photo No. 12	**Date:** 03/07/2025
Description: Stockyards located on eastern side of Wairoa Showgrounds.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 13	**Date:** 03/07/2025
Description: 56 Ruataniwha Roa90 northwest end – adjacent to river empty chemical IBC container.	

Photo No. 14	**Date:** 03/07/2025
Description: 56 Ruataniwha Road– stockpiled greenwaste and household waste.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 15	**Date:** 03/07/2025
Description: 56 Ruataniwha Road Citrus Orchard	

Photo No. 16	**Date:** 03/07/2025
Description: 56 Ruataniwha Road abandoned house with potential ACM cladding,	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 7	**Date:** 03/07/2025
Description: 56 Ruataniwha Raod pig sty and implement shed on west side of property.	

Photo No. 18	**Date:** 03/07/2025
Description: 102 Ruataniwha Road, showing minor deterioration to exterior cladding, potential ACM.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 19	**Date:** 03/07/2025
Description: 102 Ruataniwha Road, stockpiled materials on north west side of site.	

Photo No. 20	**Date:** 03/07/2025
Description: 75 Ruataniwha Road, looking towards the south.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 21	**Date:** 03/07/2025
Description: 70 Waihirere Road towards the west.	

Photo No. 22	**Date:** 03/07/2025
Description: **55 Waihirere Road footprint of former residence damaged during cyclone Gabriel.**	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 23	**Date:** 03/07/2025
Description: **Stockpiled waste material from demolished house at 55 Waihirere Road.**	

Stopbank Section

Photo No. 24	**Date:** 04/07/2025
Description: Wairoa Bridge, looking towards the north east from Wairoa Park.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 25	**Date:** 04/07/2025
Description: Pumpstation at Wairoa Prk.	

Photo No. 26	**Date:** 04/07/2025
Description: North side of Wairoa Community Centre looking towards the east.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 27	**Date:** 04/07/2025
Description: North side of Wairoa Community Centre.	

Photo No. 28	**Date:** 04/07/2025
Description: Empty swimming pool on north side of Wairoa Community Centre.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 29	**Date:** 04/07/2025
Description: **Recreational area between Ski Club and Park.**	

Photo No. 30	**Date:** 04/07/2025
Description: Wairoa Ski Club, looking towards the south and Marine Parade.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 31	**Date:** 04/07/2025
Description: 25 Churchill Street, looking southwest.	

Photo No. 32	**Date:** 04/07/2025
Description: 14 Mitchell Street looking east.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 33	**Date:** 04/07/2025
Description: 30 Mitchell Street, looking northwest.	

Photo No. 34	**Date:** 04/07/2025
Description: 38 Mitchell Street looking east.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 35	**Date:** 04/07/2025
Description: 48 Mitchell Street Looking East	

Photo No. 36	**Date:** 04/07/2025
Description: 52 Mitchell Street looking east.	

		PHOTOGRAPHIC LOG
Client Name Hawkes Bay Regional Council	**Site Location**	**Project No.** 2-T4441.03

Photo No. 37	**Date:** 04/07/2025

Description:

View From 52 Mitchell Street towards Waihirere Road.

APPENDIX D

TABLES OF RESULTS

				Heavy Metals						
				Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PBC - New Zealand				9.97	0.33	56.88	48.14	25.83	33.15	97.97
WasteMINZ (2022) Class 4 Controlled Fill WAC				17	0.8	150	220	160	35	190
SCS(health) - Commercial / industrial outdoor worker (unpaved)				70	1,300	10000	10,000	3,300	4000	400000
Location	**Field ID**	**Date**	**Lab Report Number**							
102 Ruataniwha Road	WFW_002_0.01	02-07-2025	3931405	4	<0.10	12	8	7.9	13	46
	WFW_003_0.01	02-07-2025	3931405	**17**	<0.10	18	10	7.2	12	44
	WFW_004_0.01	02-07-2025	3931405	9	**0.35**	13	19	**61**	17	**240**
56 Ruataniwha Road - Barns	WFW_005_0.01	02-07-2025	3931405	6	0.13	14	11	14.2	15	**112**
	WFW_006_0.01	02-07-2025	3931405	5	<0.10	13	8	7.2	13	56
56 Ruataniwha Road - Orchard	WFW_007_0.01	02-07-2025	3931405	3	<0.10	10	15	6.2	9	44
	WFW_008_0.01	02-07-2025	3931405	3	<0.10	10	18	6.4	10	45
55 Waihirere Road - Shed	WFW_009_0.01	02-07-2025	3931405	4	<0.10	10	6	7.2	12	50
55 Waihirere Road Waste Pile	WFW_010_0.01	02-07-2025	3931405	**28**	0.26	21	24	**220**	12	**500**
	WFW_011_0.01	02-07-2025	3931405	**17**	**0.51**	39	45	**122**	10	**340**
A&P Showgrounds - Timber	WFW_012_0.01	03-07-2025	3931405	**24**	<0.10	24	21	6.7	11	48
	WFW_013_0.01	03-07-2025	3931405	7	0.10	11	9	9.9	10	52
	WFW_014_0.01	03-07-2025	3931405	**10**	<0.10	14	11	7.5	14	50
A&P Showgrounds - Silt Stockpiles	WFW_015_0.01	03-07-2025	3931405	5	<0.10	11	7	7.0	12	74
	WFW_016_0.01	03-07-2025	3931405	4	<0.10	11	6	6.6	12	41
	WFW_017_0.01	03-07-2025	3931405	4	<0.10	11	6	6.6	11	38
147 Railway Road Shed (at 45 Railway Road)	WFW_018_0.01	03-07-2025	3931405	7	**0.78**	27	31	**143**	10	**260**
	WFW_019_0.01	03-07-2025	3931405	7	0.33	13	14	**72**	11	**390**
	WFW_020_0.01	03-07-2025	3931405	5	0.28	16	**64**	**92**	12	**290**

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

A:GA, 2024, NZ GAMAS (2024) - Commercial and Industrial
Ministry for the Environment, 2011, SCS(health) - Commercial / industrial outdoor worker (unpaved)
National Environment Protection (Assessment of Site Contamination) Measure 1999, HIL-D
https://lris.scinfo.org.nz/layer/48470-pbc-predicted-background-soil-concentrations-new-zealand-deprecated/ U95%

				Total Petroleum Hydrocarbons				Polyaromatic Hydrocarbons
				TRH C7 - C9 Fraction	TRH C10 - C14 Fraction	TRH C15 - C36 Fraction	TRH C7 - C36 Fraction	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg TEQ
MfE (2011) Tier 1 Commercial / Industrial, SANDY SILT				500	1700	N/A	N/A	
WasteMINZ (2022) Class 4 Clean Fill Organic WAC				110	58	-	-	
SCS(health) - Commercial / industrial outdoor worker (unpaved)								35
SCS(health) - Rural residential / lifestyle block 25% produce								6
Location	**Field ID**	**Date**	**Lab Report Number**					
102 Ruataniwha Road	WFW_002_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.033
	WFW_003_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.032
	WFW_004_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.030
56 Ruataniwha Road - Barns	WFW_005_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.034
	WFW_006_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.029
55 Waihirere Road - Shed	WFW_009_0.01	02-07-2025	3931405	<20	<20	<40	<80	<0.030
55 Waihirere Road Waste Pile	WFW_010_0.01	02-07-2025	3931405	<30	<20	52	<90	<0.037
	WFW_011_0.01	02-07-2025	3931405	<40	<40	64	<130	<0.063
A&P Showgrounds - Silt Stockpiles	WFW_016_0.01	03-07-2025	3931405	<20	<20	<40	<80	<0.030
	WFW_017_0.01	03-07-2025	3931405	<20	<20	<40	<80	<0.031
147 Railway Road Shed (at 45 Railway Road)	WFW_018_0.01	03-07-2025	3931405	21	133	32,000	32,000	0.66
	WFW_019_0.01	03-07-2025	3931405	<30	<20	55	<90	<0.036
	WFW_020_0.01	03-07-2025	3931405	<30	<20	79	81	0.041

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

A:GA, 2024, NZ GAMAS (2024) - Commercial and Industrial
Ministry for the Environment, 2011, SCS(health) - Commercial / industrial outdoor worker (unpaved)
Ministry for the Environment, 2011, SCS(health) - Rural residential / lifestyle block 25% produce

	Asbestos			
	AF in Soil (as asbestos)*	Asbestos (Fines and Fibrous FA+AF)	Asbestos from ACM in Soil	FA in Soil (as asbestos)*
	% w/w	% (w/w)	%w/w	% w/w
NZ GAMAS (2024) - Commercial and Industrial	-	0.001	0.05	-

Location	Field ID	Date	Lab Report Number				
102 Ruataniwha Road	WFW_001_0.01	02-07-2025	3931411.1	<0.001	<0.001	<0.001	<0.001
	WFW_003_0.01	02-07-2025	3931411.2	<0.001	<0.001	<0.001	<0.001
	WFW_004_0.01	02-07-2025	3931411.3	<0.001	<0.001	<0.001	<0.001
55 Waihirere Road - Shed	WFW_009_0.01	02-07-2025	3931411.4	<0.001	<0.001	<0.001	<0.001
55 Waihirere Road Waste Pile	WFW_010_0.01	02-07-2025	3931411.5	<0.001	<0.001	<0.001	<0.001
	WFW_011_0.01	02-07-2025	3931411.6	<0.001	<0.001	<0.001	<0.001
A&P Showgrounds - Silt Stockpiles	WFW_015_0.01	03-07-2025	3931405	<0.001	<0.001	<0.001	<0.001
	WFW_016_0.01	03-07-2025	3931405	<0.001	<0.001	<0.001	<0.001
	WFW_017_0.01	03-07-2025	3931405	<0.001	<0.001	<0.001	<0.001

NZGAMAS. (2025). New Zealand Guidelines for Assessing and Managing Asbestos Iin Soil. Porirua, New Zealand: BRANZ Ltd

				Heavy Metals							Total Petroleum Hydrocarbons			
				Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	TRH C15 - C36 Fraction	TRH C7 - C36 Fraction	TRH C7 - C9 Fraction	TRH C10 - C14 Fraction
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lab Report Number	Field ID	Matrix Type	Date											
3599327	WFW012	Soil	3/07/2025	24	<0.10	24	21	6.7	11	48				
	QA01	Soil	3/07/2025	6	<0.10	12	8	9.1	11	49				
RPD				**120**	0	**67**	**90**	30	0	2				
3599327	WFW020	Soil	3/07/2025	5	0.28	16	64	92	12	290	<30	<20	79	81
	QA02	Soil	3/07/2025	4	0.29	14	63	106	10	290	<20	<20	40	80
RPD				22	4	13	2	14	18	0	0	0	**66**	1

				Polycyclic aromatic hydrocarbons																
				Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	Benzo[a]pyrene Toxic Equivalence (TEF)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Perylene	Pyrene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lab Report Number	Field ID	Matrix Typ	Date																		
3599327	WFW020	Soil	3/07/2025	0.041	0.040	0.034	<0.015	<0.015	<0.015	0.020	0.027	0.015	0.015	0.019	<0.015	0.046	<0.015	0.022	<0.08	0.022	<0.015
	QA02	Soil	3/07/2025	0.053	0.053	0.043	<0.014	<0.014	<0.014	0.027	0.035	0.026	0.017	0.025	<0.014	0.058	<0.014	0.026	<0.07	0.028	<0.014
RPD				26	28	23	0	0	0	30	26	**54**	13	27	0	23	0	17	0	24	0

***RPDs have only been considered where a concentration is greater than 1 times the EQL.**

****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 30 x EQL); 50 (> 30 x EQL))**

APPENDIX E

LABORATORY CERTIFICATES AND COCS

ANALYSIS REQUEST

R J Hill Laboratories Limited
221A Ellis Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Job No: 393 1411
Date Recv: 04-Jul-25 18:15
Received by: Isaac Broadbent

Quote No
Primary Contact Ray Forrest
Submitted By Ray Forrest
Client Name WSP HAMILTON
Address
Postcode
Phone Mobile
Email
Charge To
Client Reference 2-T4441.03
Order No

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

☑ Email Primary Contact ☐ Email Submitter ☐ Email Client
☐ Email Other
☐ Other

CHAIN OF CUSTODY RECORD

Sent to Hill Labs
Date & Time: 04/07/25 6pm
Name: R. Forrest
☐ Tick if you require COC to be emailed back
Signature:

Received at Hill Labs (Refer to Lab created Job No above)
Date & Time:
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 12.4

ADDITIONAL INFORMATION / KNOWN HAZARDS

Priority ☐ Low ☑ Normal ☐ High
☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date: 0000000000000

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	WFW_001 - 0.01	02/07/25	Asbestos Metals	soil	Ruataniwha Road House
2	WFW_002 - 0.01		Metals TPH PAH		Ruataniwha Road Tractors
3	WFW_003_0.01		Metals TPS PAH Asbestos		Ruataniwha Road Workshop East
4	WFW_004_0.01		Metals TPS PAH Asbestos		Ruataniwha Road Workshop West
5	WFW_005_0.01		Metals TPS PAH Asbestos	OCPs	Ruataniwha Road Pig Sty South
6	WFW_006_0.01		Metals TPS PAH Asbestos		Ruataniwha Road Pig Sty north
7	WFW_007_0.01		Metals ocps		Ruataniwha Road Orchard South
8	WFW_008_0.01		MetalsOCPs		Ruataniwha Road Orchard North
9	WFW_009_0.01		Metals Asbestos TPH PAH		Wahirere Road Shed
10	WFW_010_0.01		Metals Asbestos TPH PAH		Wahirere Road House waste North
11	WFW_011_0.01	02/07/25	Metals Asbestos TPH pah		Wahirere Road House Waste South
12	WFW012_0.01	03/07/25	Metals	soil	Showgrounds timber Stockpile

Continued on next page

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (If not as per Quote)
13	WFW_013_0.01	03/07/25	Metals	Soil	Showgrounds Timber Stockpiel
14	WFW_014_0.01		Metals		Showgrounds Timber stockpile
15	WFW_015_0.01		Metals Asbestos		Showgrounds Sediment Stockpile
16	WFW_016_0.01		Metals Asbestos TPH pah		Showgrounds Sediment Stockpile
17	WFW_017_0.01		Metals Asbestos TPH pah		Showgrounds Sediment Stockpile
18	WFW_018_0.01		Metals TPH pah		Railway Road Shed East
19	WFW_019_0.01		Metals TPH pah		Railway Raod Shed North
20	WFW_020_0.01		Metals TPH pah		Railway Road Shed West
21	QA01		Metals Asbestos TPH pah		Railway Road Shed South
22	QA02	03/07/25	Metals TPH pah	Soil	
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

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

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	WSP New Zealand Limited	**Lab No:**	3931411
Contact:	Rachael Forrest	**Date Registered:**	04-Jul-2025 6:17 pm
	C/- WSP New Zealand Limited	**Priority:**	High
	Private Bag 3057	**Quote No:**	82748
	Hamilton East	**Order No:**	
	Hamilton 3240	**Client Reference:**	2-T4441.03
		Add. Client Ref:	
		Submitted By:	Rachael Forrest
		Charge To:	WSP New Zealand Limited
		Target Date:	09-Jul-2025 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	WFW_001_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold
2	WFW_003_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold
3	WFW_004_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold
4	WFW_009_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold
5	WFW_010_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold
6	WFW_011_0.01 02-Jul-2025	Soil	PSoil500Asb	Hold Cold

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3739590	SPv1
Contact:	Lisa Bond	**Date Received:**	13-Dec-2024	
	C/- WSP New Zealand Limited	**Date Reported:**	15-Jan-2025	
	PO Box 273	**Quote No:**	82748	
	Alexandra 9320	**Order No:**	372	
		Client Reference:	2-T4441.02 (Wairoa)	
		Submitted By:	Lisa Bond	

Sample Type: Soil

Sample Name:		ENV24-201 10-Dec-2024 4:25 pm	ENV24-202 10-Dec-2024 4:50 pm	ENV24-203 10-Dec-2024 5:00 pm	ENV24-204 10-Dec-2024 4:35 pm	ENV24-205 10-Dec-2024 4:45 pm
Lab Number:		3739590.1	3739590.2	3739590.3	3739590.4	3739590.5
Individual Tests						
Dry Matter	g/100g as rcvd	89	92	95	89	87
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	3	3	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.13	< 0.10
Total Recoverable Chromium	mg/kg dry wt	9	9	9	10	11
Total Recoverable Copper	mg/kg dry wt	9	5	5	11	7
Total Recoverable Lead	mg/kg dry wt	6.5	6.3	5.9	6.9	6.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	9	12	10	10	13
Total Recoverable Zinc	mg/kg dry wt	40	37	34	44	41
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
alpha-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
beta-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
delta-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endosulfan I	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endosulfan II	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Endrin ketone	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Heptachlor	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012
Methoxychlor	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.012	< 0.012

Sample Type: Soil						
Sample Name:		ENV24-206 10-Dec-2024 5:25 pm	ENV24-207 10-Dec-2024 5:35 pm	ENV24-208 10-Dec-2024 5:30 pm	ENV24-209 10-Dec-2024 5:40 pm	ENV24-210 10-Dec-2024 5:40 pm
Lab Number:		3739590.6	3739590.7	3739590.8	3739590.9	3739590.10
Individual Tests						
Dry Matter	g/100g as rcvd	90	91	81	90	83
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	3	3	3
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	9	10	10	9	10
Total Recoverable Copper	mg/kg dry wt	11	6	9	10	9
Total Recoverable Lead	mg/kg dry wt	6.9	6.5	6.6	7.7	6.9
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	9	12	10	9	12
Total Recoverable Zinc	mg/kg dry wt	43	38	41	40	43
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.08	< 0.07	< 0.08
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.013	< 0.011	< 0.012

Sample Name:		ENV24-211 10-Dec-2024 5:50 pm	ENV24-212 10-Dec-2024 5:55 pm	ENV24-213 10-Dec-2024 5:50 pm	ENV24-214 10-Dec-2024 6:00 pm	ENV24-215 10-Dec-2024 6:00 pm
Lab Number:		3739590.11	3739590.12	3739590.13	3739590.14	3739590.15
Individual Tests						
Dry Matter	g/100g as rcvd	89	90	88	88	88
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	3	3	3
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.11	< 0.10
Total Recoverable Chromium	mg/kg dry wt	9	10	9	10	9
Total Recoverable Copper	mg/kg dry wt	10	6	10	16	8
Total Recoverable Lead	mg/kg dry wt	6.9	6.5	6.3	7.4	7.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	9	12	9	10	10
Total Recoverable Zinc	mg/kg dry wt	44	37	43	52	41
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012

Sample Type: Soil						
Sample Name:		ENV24-211 10-Dec-2024 5:50 pm	ENV24-212 10-Dec-2024 5:55 pm	ENV24-213 10-Dec-2024 5:50 pm	ENV24-214 10-Dec-2024 6:00 pm	ENV24-215 10-Dec-2024 6:00 pm
Lab Number:		3739590.11	3739590.12	3739590.13	3739590.14	3739590.15
Organochlorine Pesticides Screening in Soil						
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.012	< 0.012

Sample Name:		ENV24-DUP1 10-Dec-2024 5:20 pm	ENV24-DUP2 10-Dec-2024 6:00 pm
Lab Number:		3739590.16	3739590.17
Heavy Metals with Mercury, Screen Level			
Total Recoverable Arsenic	mg/kg dry wt	3	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	10
Total Recoverable Copper	mg/kg dry wt	11	7
Total Recoverable Lead	mg/kg dry wt	6.8	6.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	13
Total Recoverable Zinc	mg/kg dry wt	44	41

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-17
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	1-17
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	1-15
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	1-15

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

Testing was completed between 11-Jan-2025 and 15-Jan-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

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3931411	A2Pv1
Contact:	Rachael Forrest	**Date Received:**	04-Jul-2025	
	C/- WSP New Zealand Limited	**Date Reported:**	17-Jul-2025	
	Private Bag 3057	**Quote No:**	82748	
	Hamilton East	**Order No:**		
	Hamilton 3240	**Client Reference:**	2-T4441.03	
		Submitted By:	Rachael Forrest	

Sample Type: Soil

Sample Name:		WFW_001_0.01 02-Jul-2025	WFW_003_0.01 02-Jul-2025	WFW_004_0.01 02-Jul-2025	WFW_009_0.01 02-Jul-2025	WFW_010_0.01 02-Jul-2025
Lab Number:		3931411.1	3931411.2	3931411.3	3931411.4	3931411.5
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	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	593.1	729.5	634.9	706.9	482.5
Dry Weight	g	475.7	533.4	501.1	565.9	299.0
Moisture*	%	20	27	21	20	38
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	< 0.1	3.0
Sample Fraction <10mm to >2mm	g dry wt	13.4	< 0.1	35.1	2.4	81.1
Sample Fraction <2mm	g dry wt	461.5	532.8	465.0	562.6	213.3
<2mm Subsample Weight	g dry wt	52.3	53.6	57.2	50.2	54.4
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	< 0.00001	< 0.00001	< 0.00001

Sample Name:		WFW_011_0.01 02-Jul-2025
Lab Number:		3931411.6
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	426.6
Dry Weight	g	206.0
Moisture*	%	52
Sample Fraction >10mm	g dry wt	3.2

Sample Type: Soil		
Sample Name:		WFW_011_0.01 02-Jul-2025
Lab Number:		3931411.6
Sample Fraction <10mm to >2mm	g dry wt	105.2
Sample Fraction <2mm	g dry wt	96.3
<2mm Subsample Weight	g dry wt	54.4
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	1-6
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	1-6
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-6
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	1-6
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	1-6
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	1-6
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%	1-6
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-6
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	1-6

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-6
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	1-6
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	1-6
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	1-6
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	1-6
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	1-6

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

Testing was completed on 11-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.

Jessica Griffin BSc, BOHS W504
Team Leader - Asbestos