INITIA

GEOTECHNICAL SPECIALISTS

WESTHAVEN RESIDENTIAL LP

188 BEAUMONT STREET – DEVELOPMENT

GEOTECHNICAL ASSESSMENT REPORT FOR FTAA APPLICATION

INITIA REF P-002883 REV C

FEBRUARY 2026

Contents

1. Introduction

1.1 General

This Geotechnical Assessment Report (GAR) has been prepared to provide geotechnical advice and recommendations for a proposed residential-led mixed use apartment development. The report has been prepared in relation to the preliminary design phase and for the purpose of a substantive application submitted by Westhaven Residential Limited Partnership for a referred project under the Fast-Track Approvals Act 2024 (FTAA) in respect of the 188 Beaumont Street project (the 'Project'). The Project is an urban development project in Auckland's city centre involving a residential-led mixed use building comprising approximately 210 residential apartments, ground floor retail and ancillary car parking. The location for the project is 188 Beaumont Street, Auckland Central.

1.2 General

This geotechnical assessment has been led and reviewed by Matt Wansbone, a Senior Geotechnical Engineer and Director of Initia. Matt has a Bachelor of Engineering (Hons) and is a Chartered Geotechnical Engineer with Engineering New Zealand. He has 20 years' experience in geotechnical engineering including for major infrastructure jobs and apartment towers. Matt is familiar with the local ground conditions and was the geotechnical lead for the recent existing development at the Orams Site 18 site (including the seawall strengthening, Orams heavy duty yard and Orams Buildings 1A, 1B and 2).

Matt was assisted by Kieran Bursell, a Geotechnical Engineer with 7 years' experience in geotechnical engineering. Kieran holds a Bachelor of Engineering (Hons).

1.3 Site Description and Background

The project is located at 188 Beaumont Street, Wynyard Quarter, adjoining Jellicoe St to the north, Beaumont St to the east, Westhaven Marina to the west and the existing Orams Marine maintenance site to the south. The site is relatively level, situated on the historic western harbour reclamation. Site levels vary from about 2.8 mRL to 3.3 mRL (NZVD2016).

The site is currently predominantly paved with a combination of concrete and asphalt and is occupied by carparking and temporary storage. The site has a long history of land use in particular as an oil / petroleum storage site. A detailed review of the site history has not been undertaken for this report; however previous reporting by Tonkin & Taylor Ltd (2018) provides a summary of the wider site history[1]. The site history is also summarised in the Ground Contamination report[2] for the substantive application.

The adjacent Orams Marine site to the south was recently redeveloped, with works including seawall strengthening, a new heavy-duty pavement for the 850t "Travel-lift" and new boat worksheds. New office buildings adjacent to Beaumont St are also currently under construction.

The western end of the subject site is retained by a seawall originally constructed during the historic reclamation works for Wynyard Quarter. In 2020, seawall strengthening works were completed which involved the installation of 1200 mm diameter reinforced concrete soldier piles with a reinforced concrete capping beam. The existing seawall facing was structurally tied into the capping beam. Geotechnical design of the seawall strengthening is summarised in the Initia (December 2019) report[3].

[1] Tonkin & Taylor Report: Orams Site 18, 142-188 Beaumont Street, Preliminary Geotechnical Interpretative Report, Ref 30881.2000 V0, dated November 2018

[2] Williamson Water & Land Advisory (19/11/2025). *118 Beaumont Street, Ground Contamination Support For Fast Track Consenting.* Ref: WWLA1615.

[3] Initia Ltd (December 2019). *Orams Marine, Site 18. Northern Seawall Geotechnical Analysis Report.* Rev A. Ref: P-000555.

The strengthening works were designed to support the site for a 50 year design life, with consideration for liquefaction and lateral spread effects under a 1 in 500 year design earthquake.

The extent of the soldier pile seawall strengthening works extends across the full length of the project site's boundary. Figure 1-1 below presents the approximate extent of the solider pile wall along with other pertinent site features. Recent seawall strengthening has also extended south of the soldier pile wall extent but using a different strengthening system (Barette piles with tie backs to sheet pile dead men).

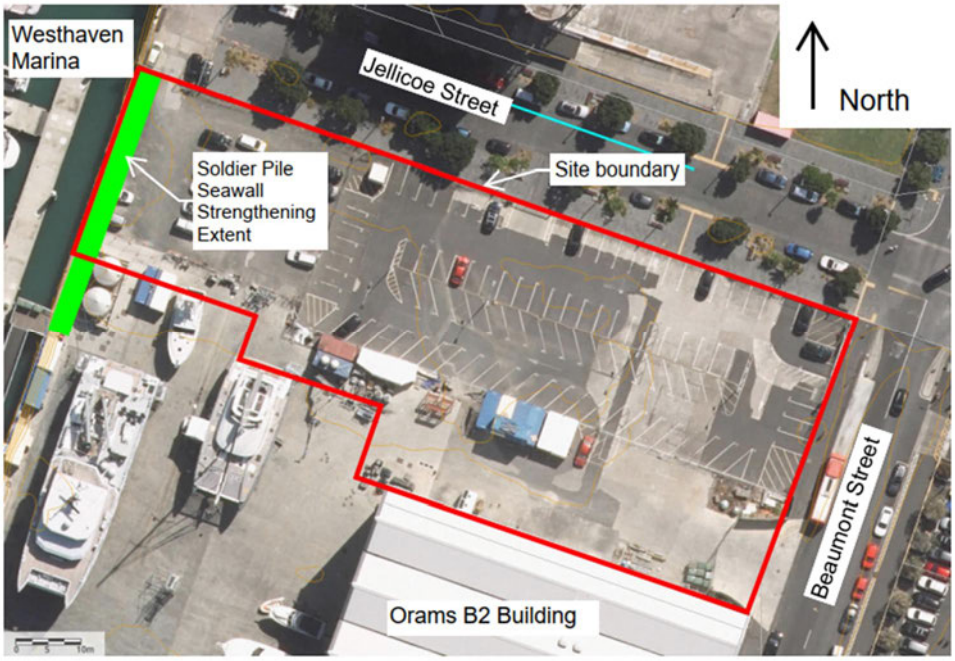

Figure 1-1: Site boundary and pertinent site features

1.4 Proposed Development

Based on the Warren and Mahoney "100% Preliminary Design" drawings[4], dated 19/12/2025, the proposed development comprises a three-tower apartment development with a shared carpark podium. Four carparking levels are proposed, with a central 19-storey central apartment tower above (total 23 storeys). Two shorter towers will partly wrap the carparking levels. These include the Marina Building, extending 4 storeys above the carpark podium (total 8 levels) and the Beaumont Building, extending 6 storeys above the carpark podium (total 10 levels). An elevation view of the proposed development is presented in Figure 1-2 below.

[4] Warren and Mahoney (19/12/2025). *188 Beaumont Street. Design Statement – 100% Preliminary Design. Appendix I. Drawings*

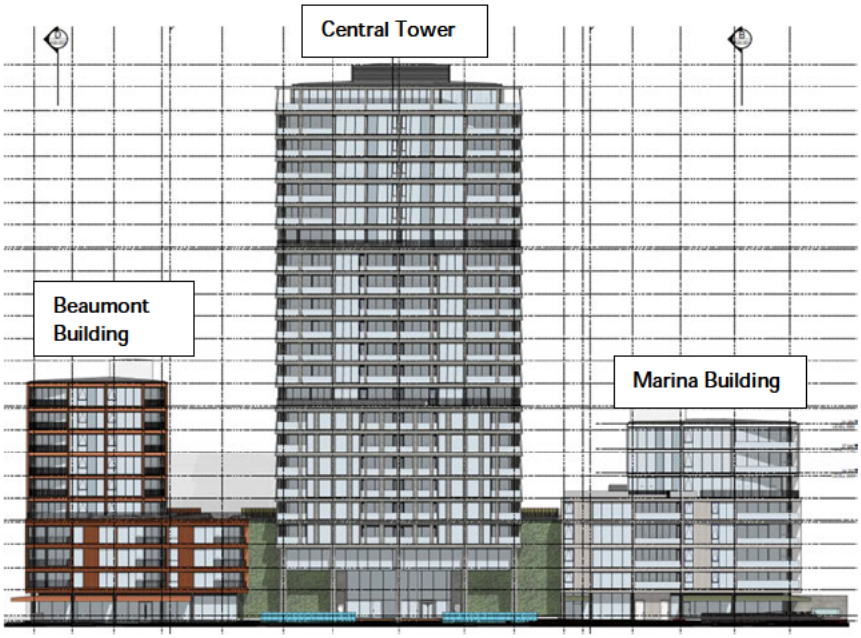

Figure 1-2: Northern Elevation View (Source: WAM North Elevation, dated 19/12/2025)

No basement levels are proposed, with the ground floor levels proposed to range from RL 3.0m to RL 3.9m which typically sits 0 – 0.5 m above existing ground levels. Vehicle access will be provided off Beaumont Street at ground floor level. The proposed building covers the majority of the site, however localised on-grade pedestrian areas are proposed to the north of the central tower and the west of the Marina Building. Levels for the pedestrian areas are proposed to typically sit more or less at existing ground levels between RL 2.7 m and RL 3.2 m.

The central tower and Marina Building are intended to include a structural central "core" which will include lift shafts underlain by structure piles, tied together with a core cap. The concept structural markups[5] indicate the underside of the core caps will sit at approximately RL -1.0 m (depending on the core concept option adopted). This will necessitate localised temporary excavations that extend up to approximately 4 m below existing ground levels to form the core.

Reinforced bored concrete piles embedded into the underlying East Coast Bays Formation rock are expected to be the preferred foundation solution (although driven steel piles could also be considered for more lightly loaded areas). The piles will be interconnected by a grillage of ground beams. The ground floor slab is proposed to be suspended above existing ground level.

Civil drawings[6] indicate that civil works will generally be limited to service connections and minor stormwater drainage.

[5] Robert Bird Group (28/10/2025). *Core cap concept options.* (Received via email).
[6] Tonkin & Taylor Ltd (October 2025). *118 Beaumont Street Civil Preliminary Design. External Civils. General Layout Plan.* Dwg No. 1096948.0020. Rev 1.

2. Published Geology

The published geological map for the site and surrounding area is presented in Figure 2-1 below. The geological map indicates the surficial geological unit is Reclamation Fill (light grey). East Coast Bays Formation (orange) is mapped 500 m south of the site and is described as alternating sandstone and mudstone with variable volcanic content and interbedded volcaniclastic grits.

The site-specific investigations encountered Reclamation Fill at the site, typically comprising an upper layer of granular fill underlain by hydraulic fill. This is underlain by Takaanini Formation deposits comprising Holocene Marine sediments underlain by older Pleistocene aged sediments. East Coast Bays Formation siltstone and sandstone rock was encountered at depth.

Figure 2-1: Published Geological Map of the Area (Sourced from GNS Science)

3. Geotechnical Investigations

3.1 Historical Investigations

Geotechnical Investigations have previously been conducted within and adjacent to the site by Beca, Tonkin & Taylor and Initia. Relevant investigations are summarised below and investigation locations are presented on Figure 2883-G01 in Appendix A. Investigation logs of relevant geotechnical investigations are presented in Appendix C.

Beca Investigations (2011)

1 No. machine drilled borehole was drilled to 28.7 m depth at the north-western corner of the subject site by Beca in December 2011. The hole was drilled using sonic drilling methods. SPT testing was typically undertaken at 1.5 m depth intervals.

Tonkin & Taylor Investigations (2018)

Geotechnical and ground contamination investigations were conducted by Tonkin & Taylor in July to December 2018 to support preliminary design and consenting across the wider Orams Marine site development. This included the following relevant investigations within or adjacent to the subject site:

- 2 No. Cone Penetration Tests pushed to effective refusal at depths between 16.5 – 20 m;
- 8 No. machine drilled geotechnical boreholes drilled to depths between 15.5 – 31.5 m. SPT testing was typically undertaken at 1.5 m depth intervals, except for within the upper fill materials; and
- 3 No. machine drilled boreholes drilled for contamination monitoring/sampling purposes.

Initia Historical Investigations (2018 – 2019)

Cone Penetration Tests were previously conducted within and adjacent to the site to support previous development on the Wider Orams Marine site development. Relevant Cone Penetration Tests include:

- 7 No. Cone Penetration Tests undertaken at the western end of the site to support the Seawall strengthening design; and
- 1 No. Cone Penetration Test conducted at the south-eastern corner of the site for the adjacent Orams Building B2.

The Cone Penetration Tests were advanced until effective refusal at depths between 3.0 - 26.3 m

3.2 Recent Initia Site Investigations

Initia carried out site specific investigations to supplement the existing investigation information for preliminary design. The geotechnical investigations were undertaken between 14th and 15th October 2025 and comprised:

- 4 No. Cone Penetration Tests; and
- 1 No. machine drilled borehole

Additionally, 5 No. shallow Gas Monitoring Wells were installed on behalf of the ground contamination consultants, WWLA.

The investigation locations were recorded using a GPS rover with an estimated horizontal and vertical accuracy of +/- 100 mm. Investigation locations are presented on Figure 2883-G01 in Appendix A. Investigation details are summarised below and investigation logs are attached in Appendix B.

3.2.1 Cone Penetration Tests

4 No. Static Cone Penetration Tests were completed by WSP on 14th October 2025 under the direction of an Initia Engineering Geologist. The Cone Penetration Tests were completed with a 10 tonne dead weight rig and were pushed until effective refusal (i.e. 10 tonne push force or high inclination). The CPTs terminated at depths between 2.0 – 24.3 m.

3.2.2 Geotechnical Machine Borehole

1 No. rotary cored borehole was drilled by DCN drilling under the full-time supervision of an Initia Engineering Geologist. The borehole was drilled to a target depth of 33.2 m and lined with a grouted PVC pipe to allow downhole shear wave velocity testing.

Standard Penetration Testing (SPTs) was typically undertaken at 1.5 m intervals and the soil arisings were logged by an Initia Engineering Geologist in general accordance with the New Zealand Geotechnical Society guidelines[7].

Downhole shear wave velocity testing was undertaken in a washed drilled hole adjacent to BH501. The results of this are presented in Appendix I.

Table 3-1: Summary of Initia Investigations

Investigation ID	Investigation Type	Co-ordinates (NZTM)[1]		Ground Surface Elevation[2] (m RL)	Termination Depth (m BGL)
		Easting (mE)	Northing (mN)		
BH501	Machine Borehole	1756412.2	5921394.5	3.0	33.2
CPT502	Cone Penetration Test	1756389.8	5921411.0	3.3	24.3
CPT506	Cone Penetration Test	1756410.4	5921390.0	3.0	24.3
CPT508	Cone Penetration Test	1756452.6	5921368.3	2.8	24.3
CPT510	Cone Penetration Test	1756440.6	5921396.5	2.8	2.0

Note 1: Co-ordinate system – NZTM. Test location coordinates determined using a GPS unit with an estimated horizontal accuracy of +/- 100 mm
Note 2: Datum – NZVD2016. Ground surface elevations determined using GPS unit with an estimate vertical accuracy of +/- 100 mm .

3.3 Laboratory Testing

Geotechnical laboratory testing comprising 2 No. Unconfined Compressive Strength (UCS) tests was completed by Babbage Geotechnical Laboratory. The tests were undertaken on samples of Slightly Weathered East Coast Bays Formation Rock from Initia BH501. The test results are summarised in Table 3-2 below. Laboratory test reports are presented in Appendix D.

Table 3-2: Unconfined Compressive Strength Testing Summary

Borehole ID	Sample Depth (m begl)	Sample Description	Unconfined Compressive Strength (kPa)	Strain at Failure (%)
BH501	31.3 – 33.5	Slightly Weathered ECBF	900	1.1
BH501	32.6 – 32.9	Slightly Weathered ECBF	500	1.2

[7] New Zealand Geotechnical Society Inc (December 2005). *Field Description of Soils and Rock.*

4. Subsurface Conditions

The geotechnical model presented in this report is based on available information obtained from geotechnical investigations completed at point locations by Initia and other suitably qualified professionals. The nature and continuity of the subsoil conditions away from the investigations are inferred and it must be appreciated that the actual soil conditions may vary from the assumed model. Further geotechnical investigations are recommended at the detailed design stage to update and refine the geotechnical model.

4.1 Soil Units

The historic and recent investigations indicate the site is underlain by the following sequence of geological units, in order from youngest to oldest:

- Granular and Mixed Fill;
- Hydraulic Fill;
- Takaanini Formation[8] deposits comprising:
    - Unit 1: Holocene aged marine sediments;
    - Unit 2: Pleistocene aged Firm to stiff fine-grained sediments;
    - Unit 3: Pleistocene sediments comprising stiff to hard SILTs and loose to medium dense SANDs;
    - Unit 4: Pleistocene sediments comprising medium dense to very dense SANDs and hard sandy SILT
- East Coast Bays Formation interbedded sandstone and siltstone rock

The geological units are described in the subsections below. Table 4-1 summarises the site stratigraphy and in-situ testing.

A geological cross section through the site is presented in Appendix A. A preliminary inferred “top of rock” contour plan is also presented in Appendix A. It is expected that this plan will be updated following additional investigations at subsequent design stages.

4.1.1 Granular and Mixed Fill

Granular and Mixed fill materials were encountered beneath the existing surfacing across the site. These materials are variable spatially and with depth but typically comprise GRAVEL mixtures with silts, brick, cobbles and boulders. Typically, the granular fill is between approximately 1 – 1.5 m thick but is locally thicker at the western end of the site (behind the sea wall) where up to 6 m thickness was encountered. Pockets of deeper fill may also be locally present across other areas of the site.

4.1.2 Hydraulic Fill

The Granular and Mixed Fill materials were generally underlain by Hydraulic Fill materials, placed during the initial land reclamation of the site. The Hydraulic Fill typically comprises soft to firm SILT mixtures (clayey SILT and sandy SILT) interbedded with layers of loose SAND mixtures. Shells were regularly encountered within the fill. The hydraulic fill is generally thickest in the central and eastern areas of the site (typically 3 – 6 m thick) and tapers out towards the western end of the site where the overlying Granular/Mixed Fill is thicker.

4.1.3 Takaanini Formation

The fill materials are underlain by a sequence of sedimentary deposits of the Takaanini Formation. The deposits have been delineated into four broad sub-units, as described below:

[8] Takaanini Formation was formally referred to as the Tauranga Group.

Unit 1: Marine Sediments
The upper Takaanini Formation sediments comprise young Holocene-aged Marine Sediments typically comprising very soft to stiff SILTs and CLAYs with some sand, shells and gravel. This unit was encountered across within all investigations and ranged in thickness between 2 – 4.3 m. CPT tip resistances typically ranged between 0.35 – 0.7 MPa.

Unit 2: Firm to Stiff SILTS and CLAYs
The Marine Sediments are underlain by firm to stiff SILTs and CLAYs with occasional organics. These deposits are inferred to be Pleistocene aged. CPT tip resistances typically ranged between 0.4 – 2.0 MPa.

Unit 3: Stiff to hard SILTs and Loose to medium dense Silty SANDs
The firm to stiff SILTs and CLAYs are underlain by variable Pleistocene aged sediments. This unit typically comprises stiff to hard SILTs and Sandy SILTs described as non-plastic to low plasticity, interbedded with high plasticity Clayey SILTs and loose to medium dense Silty SANDs. This unit ranged between 6 – 14.5 m thick and had variable SPT N values of 2 to 39 with a median of approximately 12.

Unit 4: Medium Dense to Very Dense SANDs and hard Sandy SILT
The lower Takaanini Formation deposits typically comprise medium dense to very dense SANDs and Silty SANDS, interbedded with occasional hard Sandy SILT. SPT N values of 19 to 50+ were recorded in this unit, with a median of approximately 30.

4.1.4 East Coast Bays Formation

Interbedded East Coast Bays Formation siltstone and sandstone rock was encountered beneath the Takaanini Formation deposits. The rock was typically described as slightly weathered and very weak. Unconfined compressive strengths of 0.5 MPa and 0.9 MPa were measured in this material (classifying it as extremely weak), however, sample photos indicate the UCS samples likely failed along inclined bedding planes. SPT-N values of 50+ were recorded within this unit.

4.2 Site Stratigraphy and In situ Testing

Table 4-1 presents a summary of the site stratigraphy and in situ testing. It is noted that elevations presented on the Tonkin & Taylor and Beca logs are presented in terms of the Chart Datum Elevation have been converted into the NZVD2016 Datum, based on an assumed datum offset of 2.1 m.

Table 4-1: Summary of Site Stratigraphy and In situ Testing

Geological Unit	Typical Material Description	Depth to Top of Unit (m, bgl)	Elevation of top of unit (m RL) (NZVD2016)	Typical layer Thickness (m) [mean]	In Situ Strength Parameters Range [Typical value]	
					SPT 'N'	CPT q_c (MPa)
Granular Fill and Mixed Fill	Heterogeneous fill material including GRAVEL, SAND, SILT, bricks, COBBLES and BOULDERS	0	2.6 to 3.3	0.5 to 6 [1] [1]	1 to 8 [2]	0.5 to 20 [1.5]
Hydraulic Fill	Soft to firm SILTs and loose SANDs	0 to 5.5	-2.7 to 2.4	0 to 6.0 [3] [4.5]	2 to 7 [4]	0.3 to 8 [1]
Takaanini Formation	Unit 1: Holocene Marine Sediments Very soft to stiff SILTs and CLAYs with some sand, shells and gravel	5 to 6.7	-3.7 to -1.8	2.0 to 4.3 [3]	0 to 5 [0]	0.35 to 0.7 [0.45]
	Unit 2: Firm to stiff SILTs and CLAYs with some organics	7 to 9.7	-6.7 to -3.8	0.7 to 4.8 [3]	0 to 7 [2]	0.4 to 2 [0.7]
	Unit 3: Stiff to hard SILTs and Loose to medium dense Silty SANDs	9.5 to 14.5	-11.5 to -6.6	6.0 to 14.5 [10]	2 to 39 [12]	1 to 8 [3]
	Unit 4: Medium dense to very dense SANDs and hard Sandy SILT	16.5 to 25	-22.3 to -13.5	1.2 – 11.5 [5]	19 – 50+ [30]	5 – 20+ [8]
East Coast Bays Formation	Slightly Weathered Interbedded Sandstone and Mudstone – Extremely to Very Weak	22.2 to 30.8	-27.7 to -19.0	Inferred >100 m	50+	-

Notes:
[1] Typically ≤ 1.5 m except for behind the seawall at the western end of the site.
[2] SPT testing only undertaken in this unit in Beca BH01.
[3] Not encountered within Beca BH01.

4.3 Groundwater

Groundwater levels at the site are influenced by tidal levels, with the tidal response rapidly attenuating to the east. Groundwater monitoring was previously undertaken across the wider Orams Marine site by Tonkin & Taylor in August 2018, including monitoring on the subject site. The monitoring included continuous measurements using electronic level loggers installed within GBH111 (located near the south-western corner of the apartment site -behind the sea wall) and GBH103P (located at the eastern end of the apartment site). The monitoring results are summarised in Table 4-2 below and monitoring plots are presented in Appendix E (note graphs are presented in the Chart Datum, offset 2.1 m below NZVD2016).

Table 4-2: Summary of historical groundwater monitoring relevant to the site

Investigation ID	Monitoring Period	Measured Groundwater Elevation (m RL) NZVD2016		Tidal Elevation (m RL) NZVD2016		Groundwater Levels Tidally Influenced?
		Maximum Recorded	Minimum Recorded	Maximum Recorded	Minimum Recorded	
GBH111	3/08/2018 to 14/08/2018	+1.4	- 1.2	+1.5	- 1.9	Yes
GBH103P	3/08/2018 to 14/08/2018	+ 1.3	+ 1.2	+1.5	- 1.9	Negligible tidal influence

The strong tidal response behind the seawall is inferred to be attributable to deeper high permeability granular fill which is present behind the sea wall within tidal levels. Further to the east, the granular fill depth generally reduces considerably and lower permeability hydraulic fill materials are typically present across the tidal levels. It is noted however that the original groundwater monitoring was undertaken prior to the seawall strengthening works and prior to the installation of a groundwater

cutoff wall across the western side of the site. The cutoff wall is expected to have resulted in an attenuation of tidal response to groundwater.

Groundwater was recorded at RL 0.9 m in Initia BH501 (located near the centre of the site) on 16/10/2025, one day following the completion of drilling. The tidal level at the time of measurement is not known.

Based on the monitored levels, groundwater is typically expected to be encountered between RL +0.7 to RL +1.3 m across the building platform, with some tidal fluctuation. This corresponds to typical depths of 1.5 to 2.5 m below existing ground surface level.

5. Geotechnical Considerations

5.1 General

The following geotechnical considerations are pertinent for the preliminary design and substantive application (Resource Consent) stage of the project:

- Site seismicity/site subsoil class;
- Liquefaction triggering and effects;
- Excavation support and groundwater control for the proposed lift-pit excavations;
- Piled foundation preliminary design parameters and considerations;
- Shallow ground beam lateral design parameters and considerations; and
- Pavement considerations.

The above considerations are outlined in the subsections below to support the preliminary design phase of the project and substantive application (Resource Consent). Further geotechnical investigation, analysis and reporting will be required to support the detailed design phase and Building Consenting.

5.2 Seismic Considerations

5.2.1 NZS1170.5 Subsoil Class and Design Spectra

The site subsoil class has been assessed in accordance with NZS1170.5 based on measured shear wave velocities and calculated natural site period. The results of the site specific downhole shear wave velocity testing, including the measured shear wave velocity profile and the calculated site period is attached in Appendix I. A natural site period T_{site} of about 0.5s has been calculated. On this basis, the site can be considered "Class C[9]" in accordance with NZS1170.5, as the site period is below the maximum value of 0.6s for "Class C" sites

5.2.2 Active Faults

No known active faults are within the vicinity of the site. Accordingly no specific design considerations relating to active faults are necessary.

5.2.3 Seismic Loading for Geotechnical Design

For the purposes of geotechnical design (e.g. liquefaction assessment) design peak ground acceleration (PGA) and associated magnitude M_w for Serviceability (SLS) and Ultimate (ULS) Limit States has been assessed in accordance with the MBIE Geotechnical Guidelines, Module 1, based on the following assumptions:

- 50 year design life
- Importance Level 3
- Site Subsoil Class C or D
- Annual probability of exceedance for ULS of 1 in 500
- Annual probability of exceedance for SLS of 1 in 25

The derived seismic parameters are presented in Table 5-1 below.

[9] This class influences the magnitudes of seismic loading that need to be considered by the structural engineer in the building design. This is presented to assist with preliminary design.

Table 5-1: Seismic Loading for Geotechnical Design

Seismic Design Case	Peak Ground Acceleration (PGA)	Effective Earthquake Magnitude (M_w)
Serviceability Limit State	0.05g	5.9
Ultimate Limit State	0.19g	6.5

5.2.4 Liquefaction Susceptibility and Triggering Assessment

Liquefaction occurs when soil loses shear resistance under cyclic seismic loading (cyclic shear strains). For liquefaction to develop, the following conditions must be present:

- Material with the potential to densify under cyclic loading (usually loose sand and silt mixtures);
- Saturated ground (beneath the groundwater level); and
- Cyclic shear loading (usually a seismic event).

A CPT-based liquefaction susceptibility and triggering assessment has been undertaken for the SLS and ULS seismic loading based on the following method/assumptions:

- Boulanger & Idriss (2014) method;
- $I_c \leq 2.6$ liquefaction susceptibility cut-off;
- Seismic loading in accordance with Table 5-1; and
- Groundwater depth 1.5 m below existing ground level

A summary of the liquefaction susceptibility and triggering assessment is provided in Table 5-2 below. Where liquefaction is shown to be triggered, it is further discussed below. Liquefaction assessment outputs are presented in Appendix F.

Table 5-2: Liquefaction Assessment Summary

Geological Unit	Liquefaction Susceptibility	Liquefaction Triggering SLS Loading	Liquefaction Triggering ULS Loading
Existing Fill (Granular, Mixed Fill, Hydraulic Fill)	Soils above the groundwater table (≤1.5 m depth) not susceptible Loose sands and silt mixtures below groundwater table susceptible.	Not triggered	Liquefaction triggered within discontinuous sand/silt bands between 2 – 6 m deep.
Takaanini Unit 1: Marine Sediments Very soft to stiff SILTs and CLAYs with some sand, shells and gravel	Not susceptible $I_c > 2.6$	N/A	N/A
Takaanini Unit 2: Firm to stiff SILTs and CLAYs with some organics	Not susceptible $I_c > 2.6$	N/A	N/A
Takaanini Unit 3: Stiff to hard SILTs and Loose to medium dense Silty SANDs	Marginally susceptible $I_c = 2.2$ to 2.7 Pleistocene aged Soils	Not triggered	Liquefaction triggered within loose to medium dense sand/silt layers, generally in the central and eastern areas of the site.
Takaanini Unit 4: Medium dense to very dense SANDs and hard Sandy SILT	Marginally susceptible $I_c < 2.2$ Pleistocene aged soils	Not triggered	Not triggered Too dense to liquefy under seismic loading
East Coast Bays Formation Slightly Weathered Interbedded Sandstone and Mudstone	Not susceptible (Rock)	N/A	N/A

The CPT-based triggering assessment indicated that liquefaction is not triggered under SLS levels of shaking. Under ULS levels of shaking, liquefaction is triggered within discontinuous bands of loose fill materials between 2 – 6 m depth (typically between 3 – 6 m depth). The depth and extent of liquefiable fill varies between the CPT locations, indicating a lack of continuity of liquefiable soil layers.

The Takaanini Formation Unit 3 soils are considered to be marginally susceptible to liquefaction with most soils of this unit within the site having an I_c between 2.3 – 2.6. This indicates the unit generally comprises transitional soils bordering on "clay-like" (i.e. non-liquefiable) and "sand-like" (i.e. liquefiable) behaviour. Soils encountered within borehole logs were also generally described as low-plasticity SILT mixtures (indicating they may exhibit "clay-like" behaviour) interbedded with less frequent non-plastic SILT and sand lenses. Furthermore, the soils are Pleistocene aged and studies by Youd and Perkins (1978) suggests that cohesionless soils of this age generally have very low to low susceptibility to liquefaction due to aging effects.

Notwithstanding, it is recommended that for preliminary design, it is assumed that liquefaction is triggered within the Takaanini Formation Unit 3 soils under ULS seismic loading as shown in the preliminary assessment outputs in Appendix F. Liquefaction is triggered within discrete layers between 10 – 24.5 m depth (typically between 12 – 22 m depth). It is noted that negligible liquefaction was triggered within this unit at the western end of the site (where CPTs generally indicated soils were either too plastic or too dense to liquefy).

A parametric assessment indicates the onset of liquefaction typically occurs at peak ground accelerations between approximately 0.12g – 0.15g (consistent with an approximately 200 to 500 year return period).

Preliminary design considerations for liquefaction effects are outlined in Section 5.2.5 below.

5.2.5 Design Considerations for Liquefaction Effects

As outlined in Section 5.2.4, the preliminary liquefaction assessment indicates liquefaction may be triggered within fill materials and Takaanini Formation Unit 3 soils under ULS seismic loading. The following liquefaction effects should be considered for preliminary foundation design:

- Reduction of vertical skin friction capacity for foundation piles;
- Vertical down-drag loading on foundation piles;
- Reduction in lateral foundation capacity/stiffness; and
- Lateral spreading and kinematic loading.

These considerations are summarised below.

Reduction in Skin Friction:

Skin friction in compression and tension should be neglected within all soil units above the Takaanini Formation Unit 4 for all ULS seismic and post seismic design cases, as outlined in Table 5-5.

Vertical Down-Drag Loading:

Following ULS earthquake shaking, once excess pore pressures dissipate, reconsolidation of liquefied soils can result in liquefaction-induced ground settlements and subsequent down-drag loading (negative skin friction) on pile shafts. For preliminary design, it is recommended that down-drag loading is considered from ground level to the base of Takaanini Formation Unit 3 (16.5 to 25 m below existing ground levels). A typical negative skin friction value of 30 kPa is recommended for preliminary design. As down-drag occurs in a post-seismic case, down-drag loading does not need to be combined with ULS seismic inertial loading and need only be considered with respect to post-seismic settlement.

Reduction in Lateral Foundation Capacity/Stiffness:

Shallow ground beams (embedded less than 1.5 m below existing ground levels) are expected to be founded in non-liquefiable soils (i.e. above the groundwater table) so the preliminary lateral capacities and stiffnesses presented in Section 5.5.2.1 may be adopted for all design cases.

The triggering of liquefaction within fill materials below the groundwater table and Takaanini Formation Unit 3 soils will reduce the lateral capacity and stiffness of the ground response for foundation piles (and any other deep foundation components). This will require further assessment at developed/detailed design, however, preliminary advice in relation to soil springs and seismic load combinations is provided in Section 5.5.2

Lateral Spreading and Kinematic Loading:

Lateral spreading involves the horizontal displacement of blocks of material towards an open face as a result of sliding along a liquefied soil layer. Lateral spreading requires the presence of continuous liquefiable layers of sufficient thickness, located at a depth at which the lateral spreading mechanism is kinematically feasible.

Initia previously assessed[10] the lateral spreading hazard at the site towards the western boundary during the design of the seawall strengthening works. As the depth and extent of liquefiable fill varies between CPT locations, there is a lack of continuity of liquefiable soils layers that would be necessary for full lateral spreading conditions to occur. Similarly, due to the depth and discontinuity of potentially liquefiable layers within the Takaanini Formation (particularly at the western end of the site) there is not considered to be a risk of lateral spreading within the Takaanini Formation soils.

Notwithstanding this, the recent seawall strengthening works, completed in 2020, was conservatively designed to account for a degree of lateral spreading within the fill materials and support the site under an ULS seismic event. This is detailed in the Initia design report[10] for the seawall strengthening works. Accordingly, there is a negligible risk of lateral spreading towards the west. There is also not considered to be a lateral spread risk towards the north-east or south due to the discontinuity of the liquefiable fill layers and the considerable offset from the nearest free faces.

Building foundations therefore do not need to accommodate lateral spreading but should be designed to accommodate seismic kinematic ground displacements. A preliminary assessment of kinematic displacements in accordance with the methodology presented in Tokimastu and Asaka (1998)[11] has been undertaken which indicates the following:

- Approximately **50 mm** kinematic displacement within the fill soils across a typical depth range of **3 – 6 m below existing ground level**; and
- Approximately **150 mm** kinematic displacement within the Takaanini Formation Unit 3 soils, across a typical depth of **12 – 22 m below existing ground level.**

Preliminary design of piles shall consider these displacements; however, this shall be refined at developed/detailed design. Loading from kinematic ground displacement will not need to be considered in conjunction with 100% ULS base shear inertial loading, as outlined in Section 5.5.2.

5.3 Earthworks and Lift Pit Considerations

Earthworks at the site are generally expected to be limited to:

- Minor backfilling around ground beams or to backfill historic pits etc.;
- Shallow excavations for ground beams/pile caps (generally less than 1.5 m depth);
- Deeper excavations up to approximately 4 m below existing site levels (i.e. to approximately RL –1 m) for the 2 No. central cores caps positioned below lift pits.

Geotechnical recommendations with respect to general earthworks and lift pit excavations are presented in the subsections below.

[10] Initia Ltd (December 2019). *Orams Marine, Site 18. Northern Seawall Geotechnical Analysis Report.* Rev A. Ref: P-000555.

[11] Tokimastu, K. & Asakam Y. (1998). *Effects of liquefaction-induced ground displacements on pile performance in the 1995 Hyogoken-Nambu earthquake.* Soils and Foundations, Special Issue on the Geotechnical Aspects of the January 17, 1995 Hyogoken-Nambu (Kobe) Earthquake, Vol. 38, pp. 163–177.

5.3.1 Earthworks Filling Recommendations

Widespread bulk filling should be avoided below and adjacent to the building platform as it will trigger consolidation settlements (particularly within the existing fill and marine sediments) which will in turn impose down-drag loading on foundation piles. Ground floor slabs and ancillary ramps should be suspended on piles.

Minor filling may be required to backfill behind temporary cut batters (e.g. around ground beams). It is recommended a well graded hardfill (e.g. GAP65) is utilised for this purpose. Compaction criteria shall be defined at detailed design.

5.3.2 Minor Excavation (≤1.5 m depth) Recommendations

Shallow excavations (e.g. for ground beams and pile caps) less than approximately 1.5 m below existing ground levels are not expected to encounter groundwater. The excavations are also generally expected to be able to be formed unsupported, however, due to the variability in the fill materials, benching and battering will likely be required where loose materials are encountered.

Temporary sheet pile retention may be required along the southern boundary where there may be insufficient space to bench/batter excavations due to the existing Orams B2 building. Whilst the temporary works should be designed/reviewed by a geotechnical engineer, the monitoring of retaining wall deflections should not be required. This is because the B2 building is suspended on steel UC piles[12] driven to rock and the sheet pile wall and temporary retention will be of limited retained height.

The existing fill materials are understood to be contaminated and specific site controls and disposal requirements may be required as detailed in the separate Ground Contamination Report[13].

5.3.3 Lift Pit/Core Excavation Recommendations

The structural system of the central tower and marina building necessitates structural piles with a core cap below the proposed lift pits. This will necessitate locally deeper excavations to form the core caps. Structural concept markups[14] indicate the underside of the lift pits will sit at circa RL + 1.1 m and the underside of the core caps at circa RL -1.0 m (however options with shallower excavations are also being considered). Accordingly, temporary excavation depths of up to approximately 4.2 m below existing ground levels will be required.

The central tower core excavation is expected to sit within hydraulic fill materials (below a thin capping of granular/mixed fill). The marina building excavation is also expected to likely sit within hydraulic fill, however, deeper granular/mixed fill may also be present, given the proximity to the seawall.

Based on groundwater levels recorded in BH501 (located adjacent to the central tower core excavation) and GBH111P (located 20 m south-west of the western tower core), temporary excavations to RL –1.0 m are expected to extend below groundwater levels by:

- Approximately 2 – 2.5 m during high tide conditions; and
- Approximately 1 - 2 m during low tide conditions.

Accordingly, temporary dewatering will be required to construct the core-caps. Based on our previous experience at the adjacent Orams site developments, a temporary groundwater cut-off wall around the perimeter of each excavation will be required to facilitate this, given the high permeability of some of the fill materials and the recharge from the adjacent harbour. Design of the cut-off wall will be undertaken during detailed design, but it is expected the cut-off wall will need to extend approximately

[12] Stratagroup Consulting Engineers (21/03/2019). *Orams Marine. Wynyard Quarter Workshops and Retail Complex. Beaumont Street, Auckland. Building B1b-B2 Foundation and Ground Floor Slab For Building Consent.* Drawing Set. Project No. J4793.
[13] Williamson Water & Land Advisory (19/11/2025). *118 Beaumont Street, Ground Contamination Support For Fast Track Consenting.* Ref: WWLA1615.
[14] Robert Bird Group (28/10/2025). *Core Cap Concept Options PDF.* Received 28/10/2025.

3 - 4 m into the low permeability Pleistocene aged Takaanini Formation soils (Unit 2 & 3) (i.e. to approximately 10-13 m depth or 6-9 m below the underside of excavation). Provided this is undertaken, it is expected that groundwater inflows into the excavation will be able to be controlled via a series of sump pumps inside the cut-off wall. It is noted that both the soils and groundwater extracted from the excavations may be contaminated so appropriate controls will be required.

The cut-off wall could comprise sheet-piling, a secant pile wall or Cutter Soil Mixing (CSM) panels. It is expected that sheet-piling or CSM panels will be the most economic option. The cut-off wall will also need to be designed to maintain stability of the 4.2 m deep temporary cuts. If sheet piles are adopted, it is expected that temporary propping will be required (likely comprising steel corner struts and/or cross struts). CSM panels may need to be reinforced using steel sections.

A concept markup of a temporary sheet pile option is presented on Figure 5-1 below. It is noted that specific geotechnical and structure design will be required to detail the cut-off wall and the dimensions presented below are indicative only.

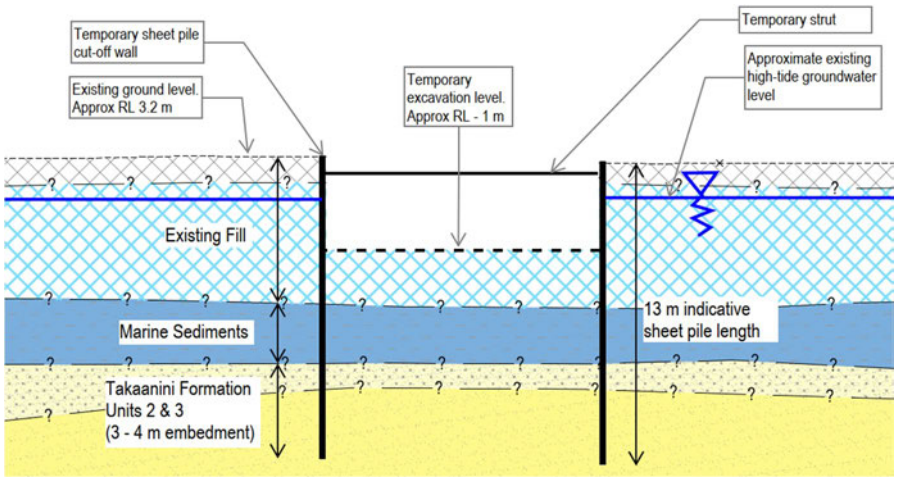

Figure 5-1: Concept Sketch – Sheet pile cutoff wall for core excavations

The permanent core/lift pit structures should be designed to be fully tanked with consideration for groundwater pressures acting on the base and walls of the pit. It is recommended that the structural and waterproofing design accommodates hydrostatic pressures arising from groundwater levels rising up to ground surface level (i.e. approximately RL 3.2 m) in the extreme case.

5.3.3.1 Auckland Unitary Plan and Settlement Effects Considerations

The Auckland Unitary Plan (AUP) generally requires specific consents to be applied for where excavations extend below the natural groundwater level. Based on the groundwater monitoring, the proposed core cap excavations for the central and western towers will extend approximately 1 – 2 m below low tide groundwater levels and 2 – 2.5 m below peak high tide groundwater levels. Accordingly, temporary groundwater take will be required during construction. In the long term, the lift pits/core caps will not require groundwater take (as they will be designed to be tanked) but will sit below existing groundwater levels.

The proposed excavations have been assessed against the AUP Groundwater Take and Divert Permitted Activity Criteria. Based on the assessment, attached in Appendix G, the core cap excavations will not meet the permitted activity for groundwater on the basis that:

- The permanent core caps may extend marginally greater than 2 m below the natural high-tide water level (i.e. not a permitted activity under E7.7.1.10 – diversion); and
- Temporary dewatering (i.e. groundwater take) to enable the construction of the core caps may take greater than 30 days (i.e. may not be a permitted activity under E7.6.1.6 – groundwater take).

On this basis, a Groundwater Consent is being sought for take and diversion (i.e. under activities A20 and A28 of Table E7.4.1 of the Auckland Unitary Plan). An assessment of groundwater take/divert effects is presented below. In carrying out this assessment reference to the assessment criteria in E7 of the Auckland Unitary Plan has been made.

Assessment of Groundwater Take Effects:

A qualitative review has been undertaken to review the hazard of offsite settlement effects resulting from groundwater drawdown and deflections (mechanical settlement) behind the temporary cut-off walls. As shown on Figure 5-2 and Table 5-3 below, the nearest structure is the B2 Orams Building which is offset a minimum of 24.5 m from the excavations and is not sensitive to shallow settlement effects as it is fully piled. The nearest service is the Jellicoe Street Water Main which comprises a 250 mm diameter ductile iron pipe offset a minimum of 12.8 m from the excavations. Services generally have a high tolerance to settlement effects and a paper by O'Rourke And Trautmann[15] (1982) suggests cast iron pipes with diameters greater than 200 mm can generally tolerate differential settlements up to 1:140.

Provided the core cap excavations are supported with an appropriately designed cut-off wall, both groundwater and mechanical settlement effects on adjacent structures and services are expected to be negligible (i.e. well below the tolerances outlined above). This is on the basis that:

- Mechanical settlements will be negligible on the basis that the minimum horizontal offset is greater than 3x the excavation depth (4.2 m); and
- Groundwater drawdown settlements will be negligible on the basis that the groundwater cut-off wall will minimise the groundwater drawdown radius, particularly as it will extend below the low permeability Marine Sediments and Firm to Stiff Takaanini Formation Silts/Clays. The groundwater drawdown radius is expected to be less than the minimum 12.8 m offset from the excavation.

On this basis, there will be none to negligible offsite groundwater take effects. Accordingly, no specific groundwater or settlement monitoring is considered to be necessary as a condition of the groundwater consent.

Table 5-3: Summary of nearest structures and services to core cap excavations

Existing Structure/Infrastructure	Minimum offset from excavations	Structure/Infrastructure details.
Orams B2 Building (Closest structure)	24.5 m	Workshop and retail building. Constructed in 2020s. Supported on steel piles driven to ECBF rock.
Jellicoe Street Water Main (Closest Public Buried Service)	12.8 m	250 mm diameter ductile iron pipe installed 2011.
Jellicoe Street Undefined Water Main	18.5 m	100 mm undefined material pipe. Installed 1955.
Jellicoe Street Stormwater Pipe	21.5 m	600 – 750 mm diameter concrete pipe. Installed 2013.
Jellicoe Street Sewer Pipe	25.8 m	225 mm vitrified clay pipe. Installed 2011.

[15] O'Rourke, T.D. Trautmann, C.H. (1982). "Buried pipeline response to tunnelling ground movements". Europipe '82 Conference, Basel, Switzerland, Paper 1.

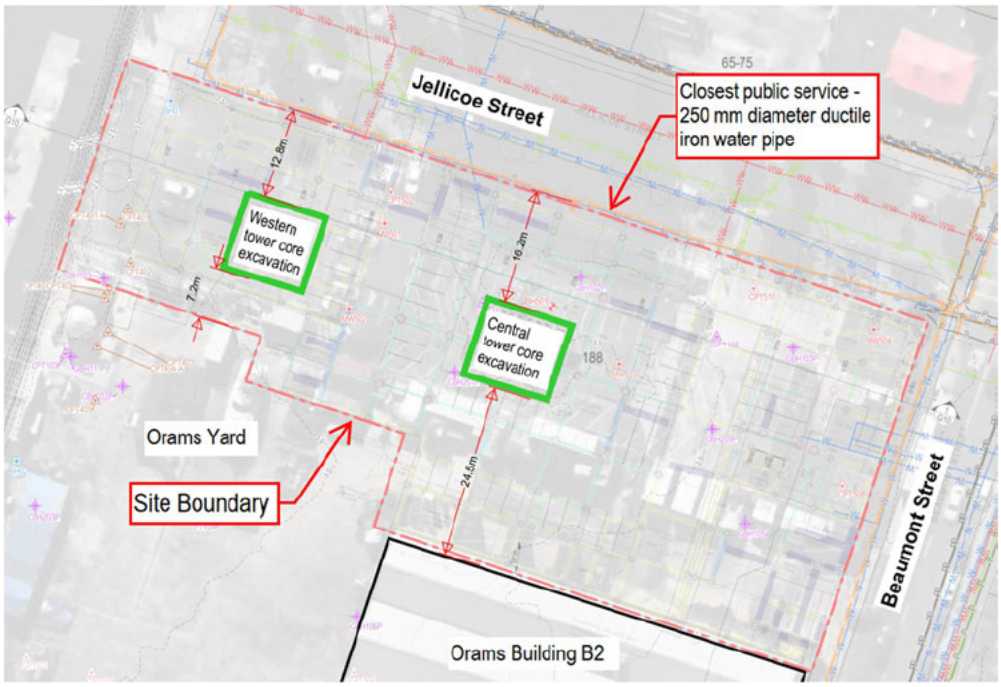

Figure 5-2: Markup of proposed core excavation locations relative to existing buildings and services

Assessment of Groundwater Diversion Effects:

Due to the limited width of the lift pits/core caps (i.e. less than 15 m width), the offset from the neighbouring sites and limited lift pit/core cap depth (i.e. extending less than 2.5 m below groundwater levels during high tide conditions and less than 2 m during low tide conditions) the core caps will have negligible effects on the groundwater flows/regime on neighbouring sites. Accordingly, no specific controls or monitoring are considered necessary in relation to groundwater diversion effects.

We have been requested to address the items in AUP E7.8.1(6)(a-f) specifically. This assessment is presented in Table 5-4 below:

Table 5-4: AUP E7.8.1(6) Assessment

AUP Item No.	AUP Text	Assessment
E7.8.1(6)(a)	...how the proposal will avoid, remedy or mitigate adverse effects:	
(i)	on the base flow of rivers and springs;	Not relevant, there are no rivers and springs in the vicinity, i.e. the proposal will have no effect on river and spring base flow.
(ii)	on levels and flows in wetlands;	Not relevant, there are no wetlands in the vicinity, i.e. the proposal will have no effect on wetland levels and flow.
(iii)	on lake levels;	Not relevant, there are no lakes in the vicinity, i.e. the proposal will have no effect on lakes.
(iv)	on existing lawful groundwater takes and diversions;	Not relevant, there are no groundwater takes/diversions in the vicinity, i.e. the proposal will have no effect on existing groundwater takes/diversions.

(v)	on groundwater pressures, levels or flow paths and saline intrusion	As discussed in the report sections above, the proposed excavations will have negligible effects on groundwater pressures, levels and flowpaths outside the property boundary (and will only have minor effects inside the property boundary during the construction of the tower cores), provided the recommendations in this report are followed. The risk of saline intrusion (beyond that which naturally occurs due to tidal movements) is considered to be negligible, given the presence of the groundwater cutoff wall across the site and the limited excavation depth.
(vi)	from ground settlement on existing buildings, structures and services including roads, pavements, power, gas, electricity, water mains, sewers and fibre optic cables;	As discussed above groundwater drawdown settlements are assessed as being negligible provided the recommendations of this report are follows.
(vii)	arising from surface flooding including any increase in frequency or magnitude of flood events;	There is a negligible increased risk of surface flooding as a result of the proposed excavations, the excavations are not sufficiently deep or wide to cause groundwater damming that could affect flooding.
(viii)	from cumulative effects that may arise from the scale, location and/or number of groundwater diversions in the same general area;	The diversion will be short term only during construction and not in the vicinity of other diversions. Accordingly cumulative effects are considered to be negligible.
(ix)	from the discharge of groundwater containing sediment or other contaminants;	Not a geotechnical consideration, not assessed as part of this report.
(x)	on any scheduled historic heritage place;	Not relevant, there are no scheduled historic heritage places in the vicinity, i.e. the proposal will have no effect on a historic heritage place.
(xi)	on terrestrial and freshwater ecosystems and habitats.	The proposal will have no effect on terrestrial and freshwater ecosystems and habitats, it is in a fully developed urban environment with no off site effects.
(b)	The need for mineral extraction within a Special Purpose - Quarry Zone to carry out dewatering or groundwater level control and diversion and taking of groundwater in the context of mineral extraction activity	Not relevant
(c)	monitoring and reporting requirements incorporating, but not limited to: (i) the measurement and recording of water levels and pressures; (ii) the measurement and recording of the settlement of the ground, buildings, structures and services;	As discussed above, given the negligible offsite effects, specific monitoring and reporting is not considered to be warranted.

	(iii) the measurement and recording of the movement of any retaining walls constructed as part of the excavation or trench; and (iv) requiring the repair, as soon as practicable and at the cost of the consent holder, of any distress to buildings, structures or services caused by the groundwater diversion.	
(d)	the duration of the consent and the timing and nature of reviews of consent conditions;	Not a geotechnical consideration, not assessed as part of this report. However it is noted that the take and diversion will only occur during construction.
(e)	the requirement for and conditions of a financial contribution and/or bond;	Not a geotechnical consideration, not assessed as part of this report.
(f)	the requirement for a monitoring and contingency plan or contingency and remedial action plan.	As discussed above, given the negligible offsite effects, specific monitoring and reporting is not considered to be warranted.

5.4 Long Term Stability Considerations

As previously outlined in Section 5.2.5, works were previously completed in 2020 to strengthen the existing seawall along the western boundary. The geotechnical design of the strengthening is documented in the Initia Geotechnical Design Report[16]. The strengthening works comprised 1200 mm diameter reinforced concrete piles with a reinforced concrete capping beam. The piles were installed behind the existing seawall structure and ties were installed to structurally connect the existing seawall to the new capping beam. The strengthening works extended across the full length of the boundary of the subject site.

The strengthening works were designed for a 50 year design life including ULS seismic loading under a 1 in 500 year return period earthquake. The design considered short term surcharge loading of 20 kPa and long-term loading surcharge loading of 10 kPa (allowing for traffic loading).

On this basis, provided the proposed building does not surcharge the wall (i.e. it is founded on pile foundations, as recommended in this report) the seawall will support the site over the design life of the development and no further specific stabilisation measures are required along this boundary.

The remainder of site is near flat (both currently and post-development) and presents no long-term stability hazard including to people and property in the immediate and surrounding environment.

5.4.1 PC120 Stability Review

The Auckland Council GIS Landslide Susceptibility Maps have been reviewed. The site and surrounding area (within 150 m of the site) is mapped as having “very low” large scale landslide susceptibility, as shown on Figure 5-3 below. The site and surrounding area (within 150 m of the site) has been mapped as having “low to very low” shallow landslide susceptibility, except for one “square” offset 30 m from the site, mapped as having “very high” shallow landslide susceptibility, as shown on Figure 5-4 below.

[16] Initia Ltd (December 2019). *Orams Marine, Site 18. Northern Seawall Geotechnical Analysis Report.* Rev A. Ref: P-000555.

This “very high” square appears to relate to existing seawalls supporting neighbouring sites and therefore poses no credible landslide hazard to the development site.

A landslide risk assessment has been completed in accordance with PC120 (due to the presence of the “very high” risk square) and is presented in Appendix J. The desk study assessment (Stage 1) concludes no credible moderate, high or very high susceptibility areas are present. Consequently, the landslide risk is assessed as low (acceptable) and no further assessment is required.

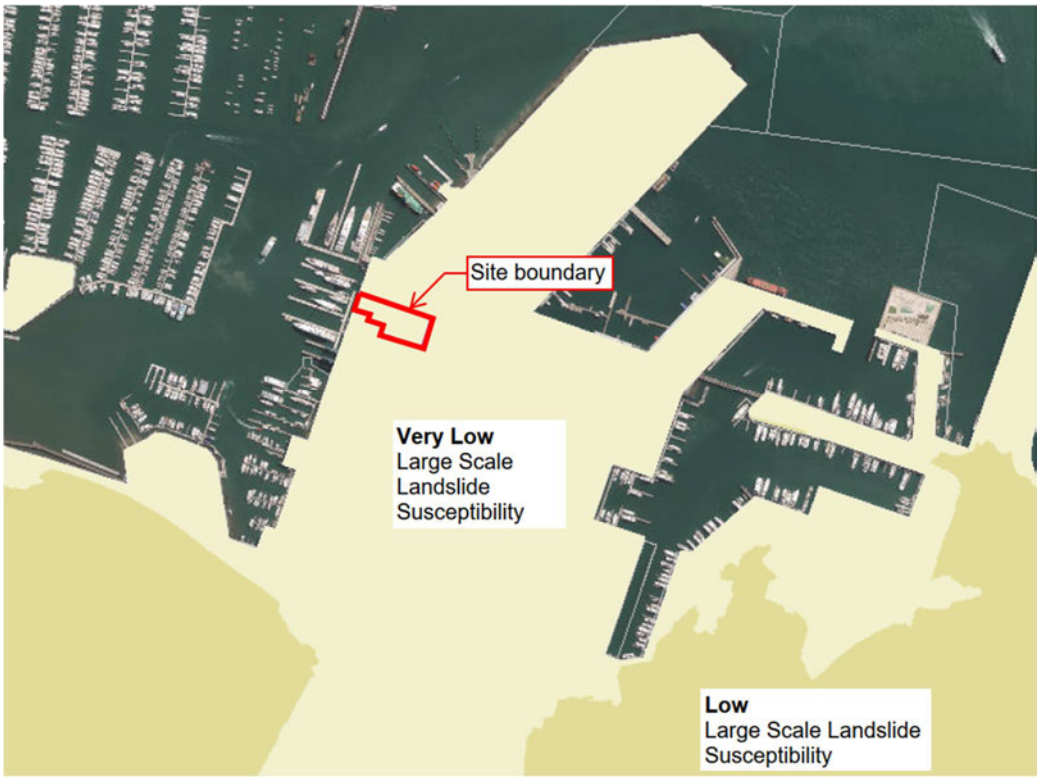

Figure 5-3: Auckland Council Large Scale Landslide Susceptibility Map (2025)

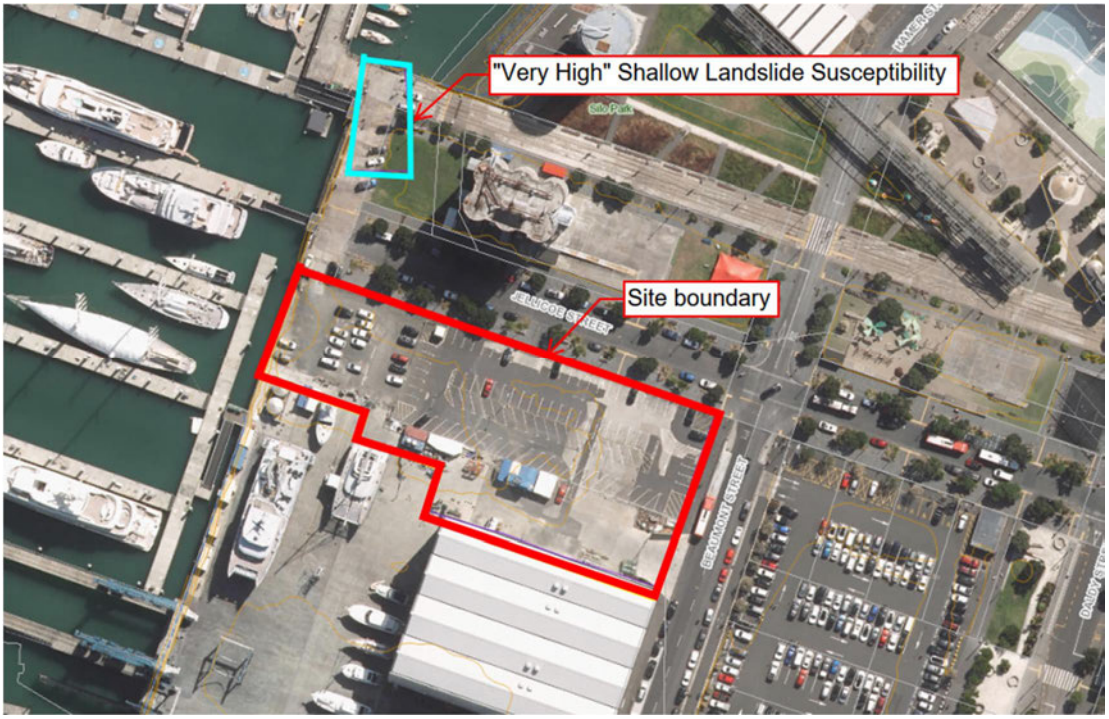

Figure 5-4: Auckland Council Shallow Landslide Susceptibility – markup of “Very High” square. All other areas within 150 m of the site mapped as Very Low to Low Susceptibility

5.5 Building Foundations

Given the variability in the fill materials and the strengths/compressibility of the alluvium deposits, it will be necessary to support the buildings on piled foundations extending to East Coast Bays Formation siltstone and sandstone rock. For clarity, it is noted that the proposed buildings can feasibly be founded on piled foundations at the site, and the proposed building heights are not constrained by the site geotechnical conditions.

It is understood the intended foundation type comprises reinforced concrete bored piles interconnected via a series of embedded pile caps and ground beams which may contribute to the lateral resistance of the foundation system. The ground floor slab should be detailed to be fully suspended.

The following subsections provide geotechnical advice in relation to:

- Preliminary axial (vertical) foundation design parameters;
- Preliminary lateral foundation design parameters;
- Concrete exposure class; and
- Piling construction considerations.

It is noted that further geotechnical investigation and analysis will be required in subsequent design stages to confirm design details and parameters for the foundation system.

5.5.1 Preliminary Axial Foundation Design Recommendations

The key geotechnical considerations for preliminary axial design of the proposed reinforced concrete bored piles include:

- Depth to East Coast Bays Formation Rock (which will influence pile lengths);
- Skin friction and end bearing resistances; and
- Vertical pile spring stiffnesses.

Preliminary advice is provided in the subsections below.

5.5.1.1 Depth to East Coast Bays Formation Rock

As presented on Table 4-1, the top of East Coast Bays Formation rock level varies across the subject site from approximately -19mRL to -28mRL (NZVD). An inferred Top of Rock contour plan has been prepared and is attached in Appendix A for the purpose of preliminary pile length estimates. It is noted however that deep investigation information is relatively limited across the apartment site and, accordingly, the levels presented are as being uncertain between the investigation point locations. Notwithstanding, it is expected that all foundation piles supporting vertical loads will likely be in the order of 25 to 40 m in length.

5.5.1.2 Bored Pile Vertical Capacities

Parameters in Table 5-5 may be assumed for the preliminary axial design of bored, reinforced concrete pile foundations (compression and uplift).

As outlined in Section 5.2.5, for the ULS seismic loading design case, skin friction within all units above Takaanini Formation Unit 4 should be neglected (due to liquefaction effects).

In a post ULS-seismic design case, down-drag (negative skin friction) loading should be assumed to act from the top of the pile down to the base of Takaanini Formation Unit 4 (16.5 to 25 m below existing ground levels). A typical negative skin friction value of 30 kPa is recommended for preliminary design.

Table 5-5: Preliminary Bored Pile Axial Design Parameters

Geological unit	Geotechnical Ultimate Skin Friction Capacity in Compression (kPa)	Geotechnical Ultimate Skin Friction Capacity in Tension (kPa)	Geotechnical Ultimate End Bearing Capacity (kPa)
Fill Materials	Ignore	Ignore	N/A
Takaanini Formation Unit 1: Marine sediments	Ignore	Ignore	N/A
Takaanini Formation Unit 2: Firm/stiff CLAY and SILT	Ignore	Ignore	N/A
Takaanini Formation Unit 3: Stiff to hard SILTs and Loose to medium dense Silty SAND	45	35	N/A
Takaanini Formation Unit 4: Medium dense to very dense SANDs and hard Sandy SILT	65	50	N/A
ECBF sandstone/ siltstone (SPT N>50)	500 (Ungrooved)[1]. 700 (Grooved)[1].	400 (Ungrooved) 550 (Grooved)	6,000 [1]

Note [1] Assumes a minimum embedment of 3 x D (D = pile diameter) into the rock.

For comparison with ultimate limit state (ULS) design cases (including seismic), a strength reduction factor of 0.5 should be applied to both the geotechnical ultimate end bearing and skin friction parameters presented above. A strength reduction factor of 0.8 may be applied seismic over-strength cases.

5.5.1.3 Bored Pile Vertical Spring Stiffnesses

Vertical spring stiffnesses have been assessed based on the elastic solution presented in Pells (1999)[17] for rock socketed piles, together with the experience of rock socket piles into ECBF in the Auckland Region. A pile concrete modulus, E_c, of 25-30GPa has been assumed. A range of rock mass moduli

[17] Pells, P.J.N. (1999). State of practice for the design of socketed piles in rock. Proc. 8th ANZ Conf on Geomechanics, Hobart.

have been adopted based on typical rock stiffnesses for very weak ECBF rock in the Auckland region of 250-550MPa, to provide upper and lower end spring stiffnesses. Sensitivity to this range of spring stiffnesses should be considered.

Recommended preliminary vertical spring stiffness values are presented in Table 5-6 below. These spring values represent the response of the entire pile, including an allowance for elastic shortening above the rock socket, based on a typical depth to the top of the rock of 25 m. The spring stiffnesses are only valid up to the ULS capacities presented in Table 5-5 above given above, and for pile spacings greater than 3D.

Vertical pile springs will vary based on depth to rock and rock socket depth so should be reviewed at detailed design for specific pile arrangements.

Table 5-6: Equivalent Vertical Pile Springs (for piles socketed into ECBF rock)

Pile Diameter (mm)	Vertical Pile Spring Value (kN/mm) for Rock Socket Length of >3D
750	250-400
900	400-700
1200	500-900

5.5.2 Preliminary Lateral Foundation Design

Lateral base shear takeout may be taken out by a combination of:

- Passive resistance against shallow ground beams/pile caps; and
- Passive/lateral resistance of foundation piles.

Preliminary lateral springs and capacities for ground beams and piles are presented in Section 5.5.2.1 and Section 5.5.2.2 below.

As outlined in Section 5.2.5 above, in a ULS seismic event, liquefaction may be triggered within existing fill materials (typically between 3 – 6 m depth) and within Takaanini Formation Unit 3 soils at depth. The liquefaction triggering will result in a reduction of lateral pile spring stiffness/capacity and will apply kinematic loading on piles from lateral ground movement.

As discussed in MBIE Seismic Module 4, liquefaction triggering and kinematic ground displacement generally does not occur in conjunction with peak ground accelerations, particularly when the onset of liquefaction occurs at accelerations greater than 50% of the design PGA (as is the case on this site). Therefore, it will not be necessary to consider full peak inertial (base-shear) demands in conjunction with liquefaction effects. It is anticipated that it will be appropriate to consider three seismic design stages as summarised in Table 5-7 below.

Table 5-7: Summary of Lateral Foundation Design Cases for ULS Seismic Design

ULS Seismic Design Stage	Applied Lateral Loads		Lateral Foundation Stiffnesses/Capacities	
	Structural inertial loads (base-shear %)	Lateral Kinematic Soil Loading on Piles	Shallow ground beams (< 2 m depth)	Foundation piles
Stage 1: Pre-Liquefaction	100%	None	Non-liquefied springs/capacities	Non-liquefied springs/capacities
Stage 2: Liquefaction Triggering	Approx 50 – 70%	None	Non-liquefied springs/capacities	Partially liquefied springs/capacities within fill (typically between 3 – 6 m depth) and Takaanini Formation Unit 3 soils

Stage 3: Liquefaction Induced Kinematic Displacement	< 50 %	Kinematic displacements within fill materials and Takaanini Formation Unit 3 soils. (Refer Section 5.2.5 for recommended displacements and depth ranges for preliminary design)	Non-liquefied springs/capacities	Partially liquefied springs/capacities within fill (typically between 3 – 6 m depth) and Takaanini Formation Unit 3 soils

Structural design actions arising from kinematic displacements can be derived by the Geotechnical Engineer using L-pile software at the developed/detailed design stage.

5.5.2.1 Ground Beam and Pile Cap Lateral Resistance

Ground beams and pile caps should preferably be embedded less than 1.5 m below existing ground levels to minimise risks of encountering groundwater during construction. At this depth, ground beams should generally be embedded in granular/mixed fill materials.

Passive resistance against embedded shallow ground beams may be relied upon for all lateral loading cases. Preliminary parameters for ground beams embedded between 1 – 1.5 m below existing ground levels are presented below. It is noted that if parallel ground beams have a clear spacing less than 3x the ground beam depth, full passive resistance may not be developed for the trailing ground beam so passive resistance should be neglected unless specifically reviewed by a geotechnical engineer.

Preliminary parameters for ground beam lateral resistance (assumes 1 to 1.5 m embedment):

- K_p = 4.2
- Unit weight = 18 kN/m^3
- Spring stiffness = 1.5 to 4 kPa/mm

If ground beams are embedded deeper than 1.5 m (e.g. for the lift pits/central cores) lateral resistances should be specifically reviewed with consideration for liquefaction effects.

5.5.2.2 Lateral Pile Spring Stiffnesses

Preliminary non-liquefied lateral spring stiffnesses have been estimated using lateral pile analysis software "L-pile" and are presented in Table 5-8 below for 900 mm diameter piles. The presented spring values are an estimate only and it is recommended that sensitivity analyses be undertaken with spring stiffness values of 70 to 150% of that presented. Geotechnical ultimate lateral capacities are also presented. A strength reduction factor of 0.5 should be applied to these capacities.

Stiffnesses and capacities for other pile diameters can be estimated by scaling accordingly by the pile diameter.

As outlined in Table 5-7, partially liquefied soil springs will need to be considered for ultimate limit state seismic design. Liquefied springs shall be derived at the developed and detailed design stages.

The presented stiffnesses/capacities assume piles are widely spaced (i.e. ≥3.75D c/c perpendicular to the direction of loading and ≥7D c/c spacing parallel to the direction of loading. For more closely spaced piles, pile interaction effects will occur and lateral springs will need to be reduced by appropriate interaction factors. Interaction factors shall be derived during developed/detailed design.

Table 5-8: Lateral pile spring stiffnesses and ultimate pile capacities for 900mm dia. bored piles

Geological Unit	Secant spring stiffness (MN/m^2) at spring displacements of [1], [3] :					Geotechnical Ultimate Lateral Pile Capacity [2] (kN/m)
	1mm	5mm	10mm	20mm	50mm	

Granular Fill and Mixed Fill	40	20	15	10	5	240
Hydraulic Fill and Marine Sediments	60	18	11	7	4	280
Takaanini Formation Unit 2: (Firm to Stiff)	120	40	25	13	6.5	480
Takaanini Formation Unit 3: (Stiff to Hard and Loose to Medium Dense)	250	70	40	25	13	900
Takaanini Formation Unit 4: (Medium Dense to Very Dense and Hard)	500	260	200	160	90	4500
ECBF sandstone/ siltstone	700	375	280	230	-	6400

Notes for Table 5-8:

1. The spring stiffnesses presented are in units of MN/m^2 and are for a 900mm pile. These values will need to be scaled by the pile diameter for different pile sizes and multiplied by the tributary length of pile over which the spring represents.
2. The ultimate pile capacities are presented in units of kN/m and are for a 900mm pile. These values will need to be scaled by the pile diameter for different pile sizes.
3. The spring values presented are for the secant stiffness at each level of displacement. Stiffnesses between the displacement levels given may be interpolated.
4. It is recommended that sensitivity to springs 70% to 150% as stiff as those presented by considered in design
5. The pile springs assume the pile springs are spaced sufficiently far apart that there will not be interaction. For spacings less than 7 times the pile width, please refer back to Initia. For preliminary analysis, it is recommended that an interaction factor of 0.6 be applied to the closely spaced core piles. This can be reviewed if required.

5.5.3 Concrete Exposure Class

A Ground Contamination Detailed Site Investigation[18] was previously completed by Tonkin & Taylor across the wider Orams Marine development site and included measurements of pH, sulphate concentrations and chloride concentrations in groundwater (including on the subject site). A summary of the measurements is provided in Table 5-9 below and plans with measurement locations is presented in Appendix H.

Table 5-9: Summary of previous Tonkin & Taylor groundwater monitoring results

Groundwater Measurement	Wider Orams Development Site	188 Beaumont Street (Subject Site)
pH	6.6 – 8	7.2 - 7.6
Sulphate Concentration (mg/L)	<0.5 – 1,220	0.8 – 780
Chloride Concentration (mg/L)	30 – 10,600	30 – 6,600

Based on the measurements, sulphate concentrations are highly variable across the site, but the higher

[18] Tonkin & Taylor Ltd (November 2018). *Preliminary and Detailed Site Investigations (Ground Contamination).* Version 3. Ref: 30881.2000.2 v3.

recorded concentrations would fall under the XA2 exposure classification (Moderately aggressive chemical environment) in accordance with Table 3.3 of NZS3301[19].

5.5.4 Pile Constructability Considerations

The site has been subject to a long history of development and buried structures may be present across the site (tank bases, piles or other underground structures). Accordingly a demolition, removal phase to clear the site in advance of the main piling works should be considered.

The proposed bored piles will extend below the groundwater table and through loose fill materials and sands. Accordingly, temporary support, potentially down to the top of East Coast Bays Formation Rock, will likely be required to prevent pile hole collapse. Given the depth over which temporary support will likely be required, it will likely be most cost effective to use support fluids (e.g. bentonite or polymers). A suitably experienced piling contractor should be consulted for further advice on suitable support fluids for the site. Short temporary stub casings may also be required through the upper granular fill to mitigate loss of support fluid.

The base of pile holes will need to be cleaned using a clean-out bucket prior to pouring concrete and concrete shall be tremie poured.

It is noted that drilling spoil will include contaminated soils which will need to be disposed of appropriately in accordance with the separate Ground Contamination Report[20].

It is likely that piles below the central cores/lift shafts would be dead-drilled, prior to excavation of the cores.

5.5.5 Pavement Considerations

It is understood the extent of any on-grade pavements at the site will be negligible, given it is proposed the building footprint will extend across the majority of the site.

For any localised pavement areas, subgrade conditions will comprise existing fill materials that are expected to be variable. Shallow ground improvements may be required to form a suitable subgrade surface. In situ cement stabilisation has been successfully adopted at the adjacent Orams site and could be an effective option. However, given the localised extent of pavements, localised undercutting and replacement may be more practical.

5.6 National Policy Statement on Natural Hazards 2025

An assessment of natural hazard risk has been undertaken in accordance with the with the National Policy Statement on Natural Hazards 2025 (NPS-NH) for the following potential natural hazards:

- Landslips;
- Active faults;
- Liquefaction.

These are discussed below. For each potential natural hazard, a two step process has been followed:

1. Hazard identification
2. If a hazard has been identified in Step 1 above, a semiquantitative risk assessment of the hazard in accordance with Appendix 1 of NPS-NH has been carried out.

5.6.1 Landslips

[19] The concrete exposure class is presented to assist with preliminary structural design and influences the type of concrete specified for various structural elements.
[20] Williamson Water & Land Advisory (19/11/2025). *118 Beaumont Street, Ground Contamination Support For Fast Track Consenting.* Ref: WWLA1615.

Hazard Identification

With reference to landslip hazard risk, hazard identification (and risk assessment if necessary) is a part of the Auckland Council Plan Change 120 "Appendix 24 method". We have followed this method, as discussed in Section 5.4.1 above. Based on this, no landslip/landslide hazard has been identified with respect to the proposed development.

Semiquantitative Risk Assessment

As no hazard has been identified, no semiquantitative risk assessment is required/possible.

5.6.2 Active Faults

Hazard Identification

As discussed in Section 5.2.2 above, no known active faults are located in the vicinity of the site. No active faults are mapped in the vicinity of the site in the GNS active faults database (and no active faults are mapped in the Auckland urban area). On this basis (and based on the low seismicity of the Aukland Region), no active fault hazard has been identified with respect to the proposed development.

Semiquantitative Risk Assessment

As no hazard has been identified, no semiquantitative risk assessment is required/possible.

5.6.3 Liquefaction

Hazard Identification

As discussed in Section 5.2.4 above, a potential liquefaction hazard has been identified at the site.

Semiquantitative Risk Assessment

Given a potential liquefaction hazard has been identified at the site, a semiquantitative risk assessment has been undertaken in accordance with Appendix 1 of NPS-NH.

Scenario 1, 1 in 500 year Earthquake

As discussed in Section 5.2.4 above, liquefaction has been assessed as first triggering at the site as a result of an approximately 1 in 200 to 1 in 500 year seismic event. In accordance with Table 1 of NPS-NH, this corresponds to a likelihood level of "**Unlikely**".

The consequences associated with this level of liquefaction are considered to be "**Minor"** as per Table 2 of NPS-NH, provided the recommendations in this report are followed.

Scenario 2, Rare Earthquake (1 in 500 to 1 in 5000 year event)

More significant liquefaction could occur during larger "**Rare**" earthquakes (as per Table 1 of NPS-NH). A consequence assessment has been undertaken considering this potentially more significant liquefaction triggering. It is noted that any liquefaction will be coincident with significant earthquake shaking associated with such a rare earthquake. Earthquake shaking is not covered by the NPS-NH. Accordingly when assessing the consequences of liquefaction during a rare earthquake, only the incremental consequences beyond those that may be anticipated by earthquake shaking alone have been considered.

Provided the recommendations of this report are followed, while structural damage from strong earthquake shaking remains possible as a result of a rare earthquake (consistent with Building Code performance expectations), the extent of such damage is not expected to be significantly exacerbated by liquefaction. The consequences attributable to liquefaction are therefore assessed as **Moderate** as per Table 2 of NPS-NH (some incremental land and building damage is possible, but not to the level that could be described as Major in Table 2).

Overall Risk Level

Based on the above assessed likelihood and consequence pairs (**Unlikely/Minor** and **Rare/Moderate**), a risk level of "**Low**" is determined as per Figure 1 of NPS-NH.

5.7 Further Work

5.7.1 Design

This report has been prepared to support preliminary design. The assessment and reporting is considered appropriate for the purpose of the substantive application under the Fast Track Approvals Act (2024).

Additional geotechnical analyses and reporting will be required to support developed and detailed design. It is also anticipated that supplementary ground investigations will be warranted to de-risk and optimise the projects design, particularly in relation to liquefaction effects, depths to rock and seismic subsoil classification. Further work may include the following:

- Supplementary machine boreholes and/or CPTs to map depths to rock and refine pile length estimates;
- Sampling of soils which are marginally susceptible to liquefaction to refine liquefaction analyses and subsequent effects;
- Detailed design of temporary groundwater cut-off/retention structures for the central and western tower core cap excavations;
- Detailed analysis of vertical pile springs;
- Detailed analysis of horizontal pile and ground beam springs, including consideration for liquefied springs and kinematic ground displacements.

Further to the above, Initia should be given the opportunity to review the civil and structural drawing sets ahead of submission for Building Consent to check that the recommendations in this report and subsequent reporting are correctly interpreted and implemented.

5.7.2 Construction Monitoring

Geotechnical construction monitoring will be required to confirm the design assumptions (e.g. foundation pile and ground beam embedment conditions) are consistent with the design assumptions and design ground model. Specific construction monitoring requirements will depend on the detailed design of the building. It is recommended that geotechnical construction monitoring requirements be confirmed by the project geotechnical engineer at the end of the detailed design stage.

6. Conclusions and Recommendations

The following key geotechnical conclusions can be made in relation to the preliminary design and the substantive application (under the Fast-track Approvals Act 2024) of the development at 188 Beaumont Street, Auckland Central:

Subsurface Conditions

1. The site is underlain by uncontrolled reclamation fill, typically comprising an upper layer of granular/mixed fill underlain by Hydraulic Fill (typically SILT and SAND mixtures). The fill materials are underlain by deep deposits of Takaanini Formation sediments including an upper layer of recent Marine Deposits underlain by older Pleistocene aged soils. East Coat Bays Formation siltstone and sandstone rock underlies the site from typical depths between 22 – 31 m.
2. Groundwater levels at the western end of the site are tidally influenced but the tidal response rapidly attenuates towards the east (and is further attenuated by the groundwater cut off wall that has been installed across the western part of the site). Groundwater levels up to approximately RL +1.5 m (NZVD2016) may be expected during high tide.

Seismic Subsoil Class

3. Based on site specific shear wave velocity testing undertaken, the site has been classified as Class C in accordance with NZS1170.5:2004.

Liquefaction Triggering and Effects

4. Under SLS levels of shaking (1 in 25 year return period earthquake) liquefaction is not triggered at the site;
5. Under ULS levels of shaking, liquefaction is triggered within loose fill layers (typically between 3 – 6 m depth) and within marginal Pleistocene aged SILT/SAND mixtures of the Takaanini Formation (typically between 12 – 22 m depth).
6. Preliminary foundation design should consider liquefaction effects (i.e. reduction of skin friction and lateral support, down-drag loading and kinematic displacement loading) due to liquefaction with the fill and Takaanini Formation deposits.

Long Term Stability Considerations

7. The existing western sea wall was recently strengthened in 2020 using reinforced concrete soldier piles with structural ties to the existing seawall facing. Provided the proposed building does not surcharge the wall (i.e. is founded on deep piles) there is not considered to be a site stability risk over the 50 year design life of the building under both static and seismic design cases. The sea wall strengthening has mitigated existing potential lateral spreading hazards at the site.
8. The remainder of the site is near flat (currently and post development) and accordingly poses no long term landslide stability hazard.
9. The site and surrounding area has a low landslide susceptibility in accordance with Appendix 24 of PC120. Accordingly, the development complies with the PA standards in E36.6.A1 of PC120.

Earthworks Considerations

10. Excavations for shallow pile caps and ground beams (<1.5 m depth) are unlikely to encounter groundwater and can generally be formed using temporary unsupported cuts, with benching where required.
11. Locally deeper excavations, approximately 4.2 m below existing ground levels will be required for the central cores below the central and western towers. These will require a temporary

retention structure that can support the temporary cut and provide a groundwater cut-off. A propped sheet pile wall or CSM panels may be suitable options.

12. Based on the current structural concept, the excavation of the central and western tower cores will not be a permitted activity in accordance with the AUP E7 (Groundwater Take and Divert) and will require a specific groundwater consent which is sought as a part of this substantive application.
13. Given the significant lateral offset between the central core excavations and existing buildings/public infrastructure, groundwater or settlement monitoring is not considered to be required as a condition of the groundwater consent. This is provided that the excavations are supported be appropriately detailed groundwater cutoff and retention walls.
14. The excavated soils and groundwater at the site may be contaminated and appropriate controls will be required, in accordance with the separate Ground Contamination report[21].

Building Foundations Considerations

15. The buildings can be feasibly founded on piled foundations extending to the East Coast Bays Formation Rock, and the building heights are not constrained by the geotechnical conditions at the site.
16. Bored reinforced concrete piles, socketed into East Coast Bays Formation siltstone and sandstone are expected to be the preferred foundation solution for the proposed buildings;
17. Temporary support of pile shafts will likely be required to prevent collapse. This is expected to likely include bentonite (or polymer) support fluids, potentially in conjunction with temporary steel casing within upper granular fill materials.
18. Axial pile design should consider liquefaction induced down-drag loading in a post-ULS seismic design case.
19. Lateral base shear is expected be taken out via passive ground resistance against both shallow ground beams and piles.
20. Lateral foundation design for ULS seismic loading will need to consider loss of support/stiffness due to liquefaction and lateral kinematic loading. These liquefaction effects will not need to be assessed in combination with 100% base shear inertial loading, as outlined in Table 5-7.
21. Existing environmental testing by Tonkin & Taylor indicates the site may constitute an aggressive chemical environment with respect to the NZS3101 concrete exposure classification.

National Policy Statement – Natural Hazards (NPS-NH)

An assessment of natural hazards in the context of NPS-NH has been undertaken with respect to active fault, landslip and liquefaction hazards. In summary, no active fault or landslip hazards have been identified in relation to the site or development. A potential liquefaction hazard exists. The risk associated with the identified liquefaction hazard has been assessed as low per NPS-NH, provided the recommendations of this report are followed.

Further Work

22. Further geotechnical investigation, analysis and reporting will be required to support developed and detailed design stages of the project. Further details are provided in Section 5.7.1.
23. The scope of geotechnical assessment and reporting presented in this report is considered appropriate to support the substantive application under the Fast-track Approvals Act (2024).

[21] Williamson Water & Land Advisory (19/11/2025). *118 Beaumont Street, Ground Contamination Support For Fast Track Consenting.* Ref: WWLA1615.

7. Applicability

This report has been prepared for our client, Westhaven Residential LP, with respect to the brief provided to us. The advice and recommendations presented in this report should not be applied to any other project or used in any other context without prior written approval from Initia Limited.

Report prepared by:

Kieran Bursell
Geotechnical Engineer

Report reviewed and authorised by:

Matt Wansbone
Senior Geotechnical Engineer

Document Control Record

Report Title		188 Beaumont Street – Development Geotechnical Assessment Report For FTAA Application			
Initia Project Reference		P-002883			
Client		Westhaven Residential LP			
Revision	Date	Revision Detail	Author	Reviewer	Approved By
A	04-02-2026	First Issue	K. Bursell	M. Wansbone	M. Wansbone
B	19-02-2026	Updated with NPS-NH Section	K. Bursell	M. Wansbone	M. Wansbone
C	27-02-2026	Final Issue	K. Bursell	M. Wansbone	M. Wansbone
Current Revision		C			

Appendix A Initia Figures

LEGEND

INITIA INVESTIGATIONS (OCT 2025)

- CPT506 — CONE PENETROMETER TEST
- BH501 — MACHINE BOREHOLE
- MW503 — GAS MONITORING WELL

HISTORICAL INVESTIGATIONS

- CPT402 — CONE PENETROMETER TEST (INITIA - OCT 2019)
- TP203 — TEST PIT (INITIA - DEC 2018)
- CPT327 — CONE PENETROMETER TEST (INITIA - DEC 2018)
- BH03 — MACHINE BOREHOLE (BECA - DEC 2011)
- CPT8A — CONE PENETROMETER TEST (URS - 2008)
- CPT106 — CONE PENETROMETER TEST (T+T - 2018)
- TP103 — TEST PIT (T+T - 2018)
- GBH109P — MACHINE BOREHOLE (T+T - 2018)
- BH3/MW3 — MACHINE BOREHOLE (T+T - PRE 2018)
- CBH207P — MACHINE BOREHOLE CONTAMINATION INVESTIGATION (T+T - 2018)

SITE BOUNDARY

0.1 EXISTING GROUND CONTOUR (0.1m INTERVAL)

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATE DATUM: MOUNT EDEN 2000
3. LEVEL DATUM: NEW ZEALAND VERTICAL DATUM 2016 (NZVD2016)
4. PROPERTY BOUNDARY, LIDAR CONTOUR AND EXISTING SERVICES TAKEN FROM AUCKLAND COUNCIL DATE 2017.
4. AERIAL IMAGE TAKEN FROM NEARMAP DATED MAY 2025.
5. FOUNDATION PLAN OVERLAY REFERENCED "ROBERT BIRD GROUP, STRUCTURAL CONCEPT REPORT. REV 01". DATED 28/07/2025

SCALE A3 1:500
0 5 10 15 20 25m

Rev	Revision Description	Designed	Drawn	Checked
B	OCTOBER 2025 INITIA INVESTIGATION ADDED (29/10/2025)	KB	GG	KB
A	FIRST ISSUE (03/09/2025)	MW	JG	MW

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DATE:
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INITIA GEOTECHNICAL SPECIALISTS

Unit 6, Level 1, 114 St Georges Bay Road Parnell, Auckland, 1052
Phone: +64 09 977 0460
Email: enquiries@initia.co.nz

WESTHAVEN RESIDENTIAL LP

ORAMS SITE 18 - RESIDENTIAL APARTMENT DEVELOPMENT

GEOTECHNICAL INVESTIGATION LOCATION PLAN

Initia Project ref: P-002883
Figure Number 2883-G01
Revision B

INFORMATION ONLY

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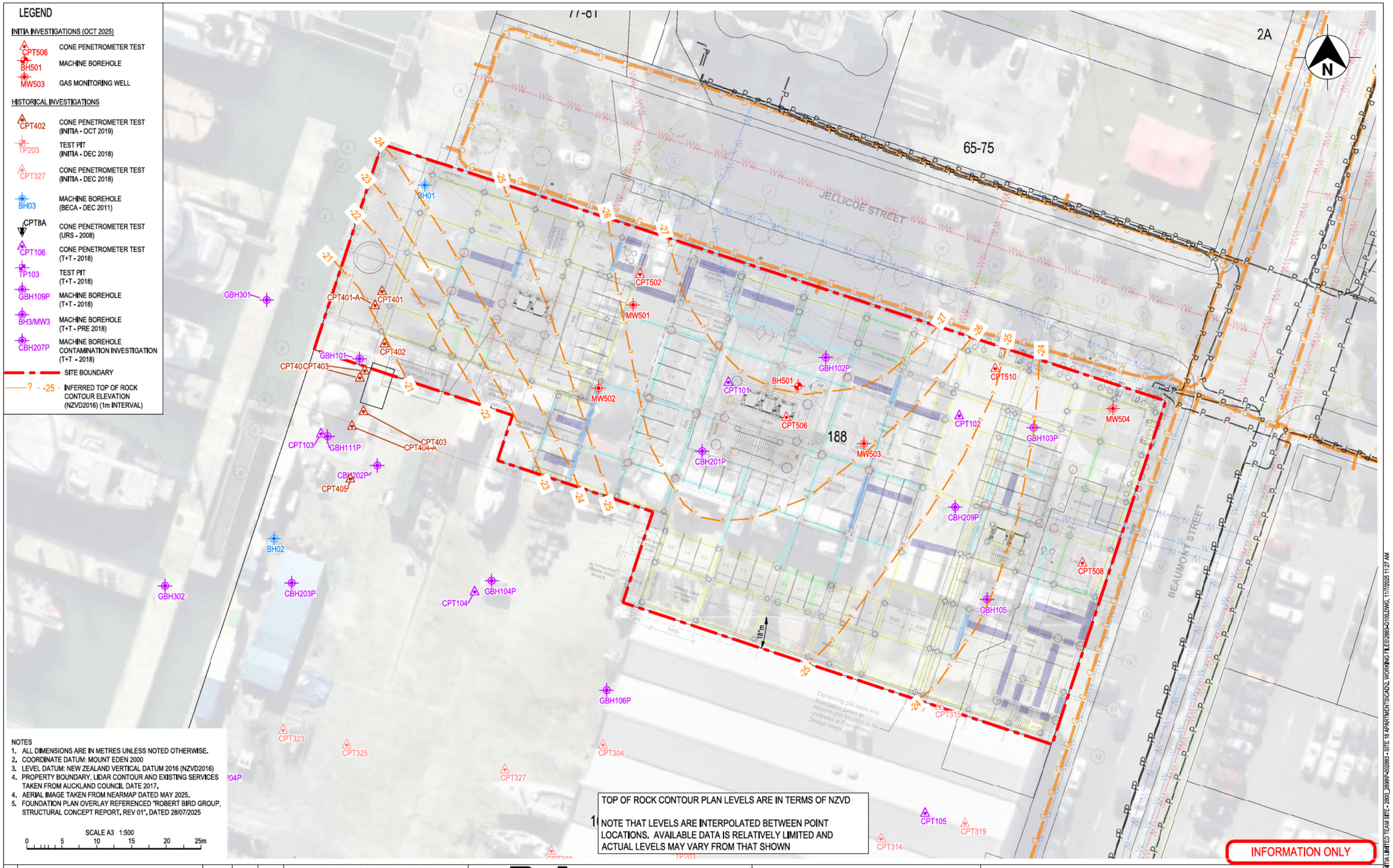

Rev	Revision Description	Designed	Drawn	Checked
A	FIRST ISSUE (07/11/2025)	KB	JG	MW

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INITIA GEOTECHNICAL SPECIALISTS
Unit 6, Level 1, 114 St Georges Bay Road Parnell, Auckland, 1052
Phone: +64 09 977 0460
Email: enquiries@initia.co.nz

WESTHAVEN RESIDENTIAL LP

ORAMS SITE 18 - RESIDENTIAL APARTMENT DEVELOPMENT

GEOTECHNICAL INVESTIGATION
ROCK CONTOUR PLAN

Initia Project ref: P-002883
Figure Number 2883-G100
Revision A

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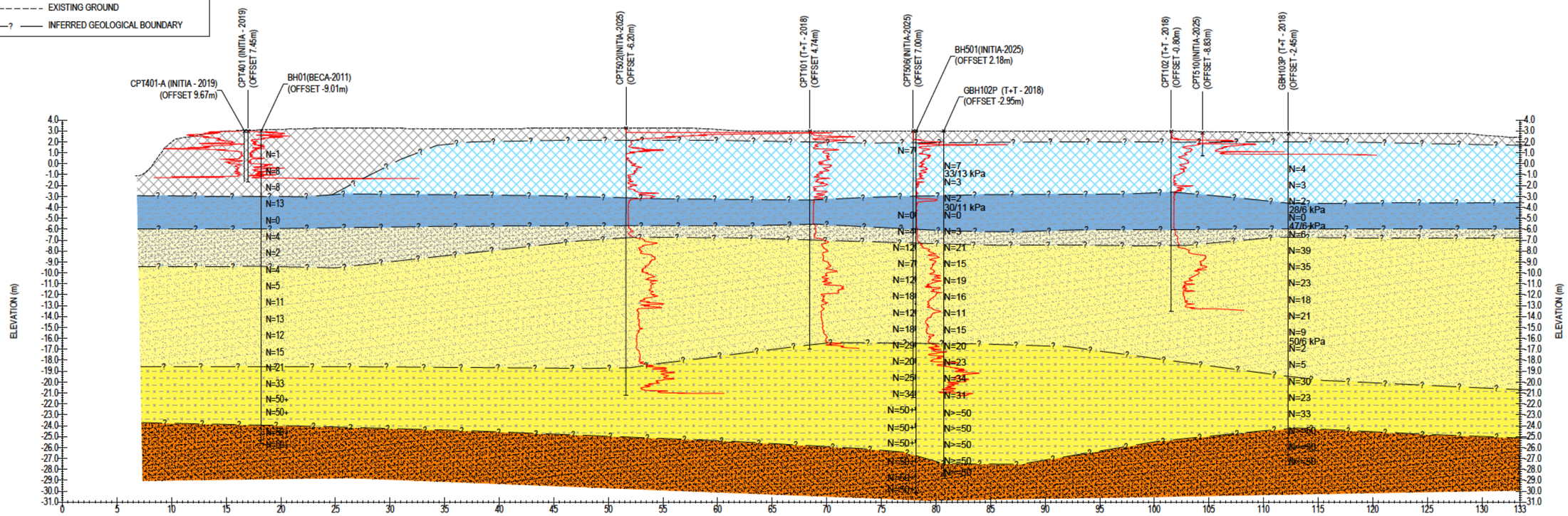
LEGEND

- GRANULAR FILL AND MIXED FILL - VARIABLE GRAVELS, SILT, BRICK, COBBLES AND BOULDERS
- HYDRAULIC FILL - LOOSE SANDS AND SOFT TO FIRM SILTS WITH SHELLS
- MARINE SEDIMENTS (TAKAANINI FORMATION UNIT 1) - VERY SOFT TO STIFF SILT AND CLAY WITH SOME SAND, SHELLS AND GRAVEL
- TAKAANINI FORMATION UNIT 2 - FIRM TO STIFF SILTS AND CLAYS WITH SOME ORGANICS
- TAKAANINI FORMATION UNIT 3 - STIFF TO HARD SILTS AND LOOSE TO MEDIUM DENSE SILTY SANDS
- TAKAANINI FORMATION UNIT 4 - MEDIUM DENSE TO VERY DENSE SANDS AND HARD SANDY SILT
- EAST CAST BAYS FORMATION - SLIGHTLY WEATHERED INTERBEDDED SANDSTONE AND SILTSTONE
- EXISTING GROUND
- INFERRED GEOLOGICAL BOUNDARY



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SCALE 1:400 (A3)

SCALE A3 1:400
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Rev	Revision Description	Designed	Drawn	Checked
A	FIRST ISSUE (29/10/2025)	KB	GG	KB

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INITIA GEOTECHNICAL SPECIALISTS
Unit 6, Level 1, 114 St Georges Bay Road Parnell, Auckland, 1052
Phone: +64 09 977 0460
Email: enquiries@initia.co.nz

WESTHAVEN RESIDENTIAL LP

ORAMS SITE 18 - RESIDENTIAL APARTMENT DEVELOPMENT

GEOTECHNICAL INVESTIGATION
GEOLOGICAL SECTION 1

Initia Project ref: P-002883
Figure Number 2883-G10
Revision A

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Appendix B Initia Investigation Logs

DRILLHOLE LOG

INITIA
GEOTECHNICAL SPECIALISTS

CLIENT: Westhaven Residential LP	**SITE LOCATION:** 188 Beaumont Street, Auckland Central	**HOLE NO.:** BH501
PROJECT: Site 18 Orams		**Project Ref.:** P-002883
CO-ORDINATES: 1756412.2mE, 5921394.5mN	**ELEVATION:** 3.04m	**CONTRACTOR:** DCN Drilling
Co-ordinate system: NZTM	**Datum:** NZVD 2016	**RIG:** Trailer Rig
Location method: SURVEY	**Level method:** SURVEY	**DRILLER:** Dave
ORIENTATION (°): Vertical	**INCLINATION (°):** 90	**START DATE:** 14/10/2025
		END DATE: 15/10/2025
		LOGGED BY: TO
		CHECKED BY: FWH

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	GRAPHIC	WEATHERING (UW SW MW HW CW EW)	STRENGTH (VW W MS S VS ES)	DEPTH	RL	SAMPLES	METHOD	TCR (%)	RQD (%)	INSITU TESTING SPT 'N' Vane shear strength	DISCONTINUITIES DESCRIPTION	WATER	INSTALLATION	CORE BOXES
Fill	0.00 m - 0.05 m: Asphalt 0.05 m - 0.20 m: Core loss GRAVEL; dark grey and red. Tightly packed; dry; gravel, fine to coarse, angular to subround.				0	3.0		HQTT	33					Bentonite Grout	
	1.00 m - 1.20 m: Core loss							HQTT	100						
	Shelly SAND; dark grey. Loose; moist; sand, coarse; Strong Hydrocarbon odor. 1.70 m -2.70 m: Core loss				1	2.0		HQTT	100						
								HQTT	60						
					2	1.0		SPT	55		1, 2 / 2, 1, 2, 2 N=7		16/10/2025		
	3.00 m - 4.10 m: Core loss				3	0.0		HQTT	28						
	SHELLS, with some sand; dark grey. Loosely packed; wet; sand, fine; Strong Hydrocarbon odor. Shelly SAND; dark grey. Loosely packed; moist; sand, coarse; Strong Hydrocarbon odor.				4	-1.0			28						
Marine Deposits	Silty CLAY, with some sand, with trace shells; dark grey. Stiff; high plasticity; moist.				5	-2.0		HQTT	100						Box 1, 0.0-5.4m
	Silty SAND, with some clay, with minor shells; dark grey. Loosely packed; low plasticity; moist; sand, fine. 6.00 m - 7.40 m: Core loss				6	-3.0									
	Silty CLAY, with minor sand, with trace shells; dark grey. Very stiff; moist; sand, fine.				7	-4.0									
					8	-5.0		SPT	100		0, 0 / 0, 0, 0, 0 N=0				
								HQTT	100						
Undifferentiated Takaanini Formation	CLAY, with minor silt; grey with orange mottles. Very stiff; high plasticity; moist. 9.45 m - 9.90 m: Core loss				9	-6.0		SPT	100		0, 0 / 1, 1, 1, 1 N=4				
	Silty CLAY, with trace sand; grey with orange							HQTT	66						Box 2, 5.4-11.3m

REMARKS:
Machine borehole terminated at target depth.

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Ver 3.0.

DRILLHOLE LOG

INITIA
GEOTECHNICAL SPECIALISTS

HOLE NO.: BH501

CLIENT: Westhaven Residential LP
PROJECT: Site 18 Orams
SITE LOCATION: 188 Beaumont Street, Auckland Central
Project Ref.: P-002883

CO-ORDINATES: 1756412.2mE, 5921394.5mN
Co-ordinate system: NZTM
Location method: SURVEY
ORIENTATION (°): Vertical
ELEVATION: 3.04m
Datum: NZVD 2016
Level method: SURVEY
INCLINATION (°): 90
CONTRACTOR: DCN Drilling
RIG: Trailer Rig
DRILLER: Dave
START DATE: 14/10/2025
END DATE: 15/10/2025
LOGGED BY: TO
CHECKED BY: FWH

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	DEPTH	RL	METHOD	TCR (%)	RQD (%)	INSITU TESTING SPT 'N' Vane shear strength	DISCONTINUITIES DESCRIPTION	WATER	INSTALLATION	CORE BOXES
Undifferentiated Takaanini Formation	[CONT] Silty CLAY, with trace sand; grey with orange mottles. Firm; high plasticity; moist; sand, fine. 10.55m: Grades to Grey with black streaks	11	-7.0	HQTT	66		30 / - kPa 1, 1 / 2, 2, 4, 4 N=12			Grout	Box 2, 5.4-11.3m
	SILT, with some clay and sand; light greenish grey. Very stiff; low plasticity; moist; sand, fine.		-8.0	SPT	100						
	Sandy SILT, with some clay; grennish grey. Very stiff; low plasticity; moist; sand, fine.	12	-9.0	HQTT	100		108 / 18 kPa 1, 1 / 1, 2, 2, 2 N=7				
	13.50m: Grades to stiff	13	-10.0	SPT	100		69 / - kPa 1, 1 / 2, 2, 4, 4 N=12				
	13.95 m - 14.80 m: Core loss	14	-11.0	HQTT							
	Silty SAND, with minor wood fragments; greenish grey. Medium dense; non-plastic; moist; sand, fine.	15	-12.0	SPT	100		2, 3 / 5, 4, 5, 4 N=18				Box 3, 11.3-16.2m
	Sandy SILT, with minor clay; grey. Very stiff; low plasticity; moist; sand, fine.	16	-13.0	HQTT	70		123 / 24 kPa				
	SAND, with some silt; grey. Medium dense; non-plastic; moist; sand, fine.	17	-14.0	SPT	100		1, 2 / 3, 3, 3, 3 N=12				
				HQTT	100						
	18.45 m - 18.80 m: Core loss	18	-15.0	SPT	100		2, 3 / 3, 5, 4, 6 N=18				
		19	-16.0	HQTT	66						
				SPT	100		2, 4 / 6, 6, 8, 9 N=29				Box 4, 16.2-20.9m

REMARKS:
Machine borehole terminated at target depth.

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Ver 3.0.

DRILLHOLE LOG

INITIA
GEOTECHNICAL SPECIALISTS

HOLE NO.: BH501

CLIENT: Westhaven Residential LP
PROJECT: Site 18 Orams
SITE LOCATION: 188 Beaumont Street, Auckland Central
Project Ref.: P-002883

CO-ORDINATES: 1756412.2mE, 5921394.5mN
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LOGGED BY: TO
CHECKED BY: FWH

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	DEPTH	RL	SAMPLES	METHOD	TCR (%)	RQD (%)	INSITU TESTING SPT 'N' Vane shear strength	DISCONTINUITIES DESCRIPTION	WATER	INSTALLATION	CORE BOXES
Undifferentiated Takaanini Formation	[CONT] 19.45 - 20.30 m: Core loss		17.0		HQTT	66						Box 4, 16.2-20.9m
	Silty SAND, with minor shells; grey. Medium dense; non-plastic; moist; sand, fine to medium.	21	18.0		SPT	100		2, 5 / 5, 6, 5, 4 N=20				
	21.45 m - 22.40 m: Core loss	22	19.0		HQTT							
					SPT	100		2, 3 / 4, 7, 7, 7 N=25				
	22.95 m - 23.80 m: Core loss	23	20.0		HQTT							
		24	21.0		SPT	100		4, 6 / 7, 7, 10, 10 N=34				
	24.45 m - 24.80 m: Core loss				HQTT	66					Grout	
East Coast Bays Formation (Slightly weathered)	Slightly weathered; dark grey; SANDSTONE; very weak.	25	22.0		SPT	100		8, 12 / 18, 25 N=50+ for 150mm				
		26	23.0		HQTT	100	41					
		27	24.0		SPT	100		10, 13 / 15, 13, 16, 6 for 30mm N=50+ for 255mm				Box 5, 20.9-28.2m
		28	25.0		HQTT	100	27					
					SPT	100		13, 22 / 30, 20 for 45mm N=50+ for 120mm				
		29	26.0		HQTT	100						Box 6, 28.2-31.4m

REMARKS:
Machine borehole terminated at target depth.

Generated with COREGS by Geroc - Drillhole_Initia - 29/10/2025 3:29:26 pm
Ver 3.0.

DRILLHOLE LOG

INITIA
GEOTECHNICAL SPECIALISTS

HOLE NO.: BH501

CLIENT: Westhaven Residential LP
PROJECT: Site 18 Orams
SITE LOCATION: 188 Beaumont Street, Auckland Central
Project Ref.: P-002883

CO-ORDINATES: 1756412.2mE, 5921394.5mN
Co-ordinate system: NZTM
Location method: SURVEY
ORIENTATION (°): Vertical
ELEVATION: 3.04m
Datum: NZVD 2016
Level method: SURVEY
INCLINATION (°): 90
CONTRACTOR: DCN Drilling
RIG: Trailer Rig
DRILLER: Dave
START DATE: 14/10/2025
END DATE: 15/10/2025
LOGGED BY: TO
CHECKED BY: FWH

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	GRAPHIC	WEATHERING (UW SW MW HW CW EW)	STRENGTH (VW W MS S VS ES)	DEPTH	RL	SAMPLES	METHOD	TCR (%) (25 50 75)	RQD (%) (25 50 75)	INSITU TESTING (SPT 'N' Vane shear strength)	DISCONTINUITIES DESCRIPTION	WATER	INSTALLATION	CORE BOXES
East Coast Bays Formation (Slightly weathered)	[CONT] Slightly weathered; dark grey; SANDSTONE; very weak.				31	28.0	1 (C)	HQTT	100	36	14, 18 / 33, 17 for 25mm N=50+ for 100mm			Grout	Box 6, 28.2-31.4m
					32	29.0	2 (C)	HQTT	100	71	12, 34 / 16 for 25mm N=50+ for 25mm				Box 7, 31.4-33.2m
	EOH: 33.19m				33	30.0		SPT			17, 31 / 19 for 35mm N=50+ for 35mm			33.19m	

REMARKS:
Machine borehole terminated at target depth.

Generated with COREGS by Geroc - Drillhole_Initia - 29/10/2025 3:29:26 pm
Ver 3.0.

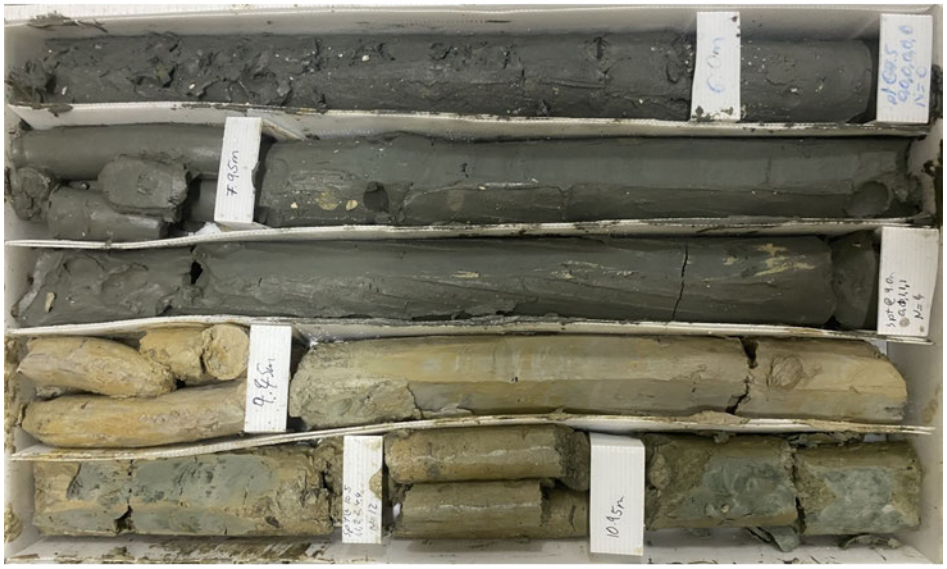
CORE PHOTOS

HOLE NO.: **BH501**

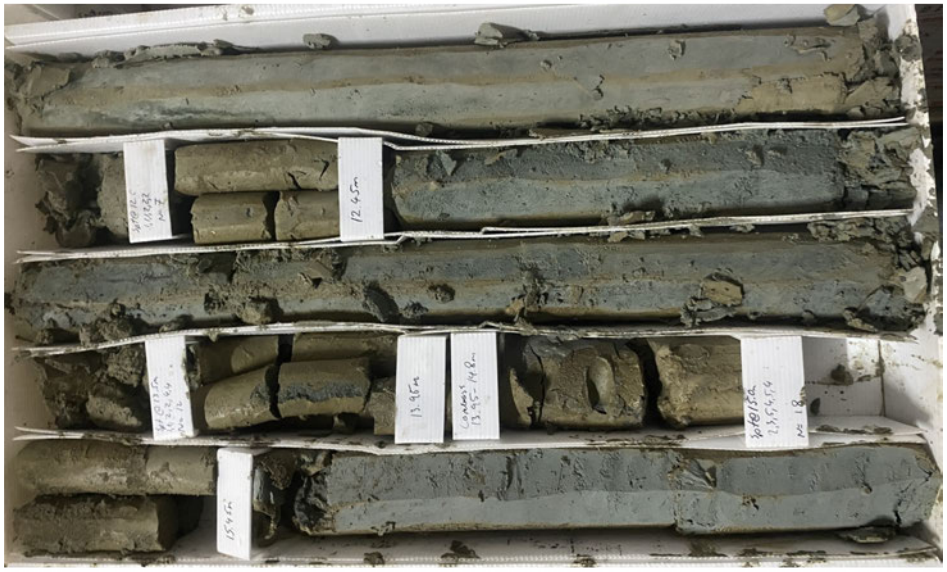
JOB NO.: P-002883

Box 1, 0.0-5.4m

Box 2, 5.4-11.3m

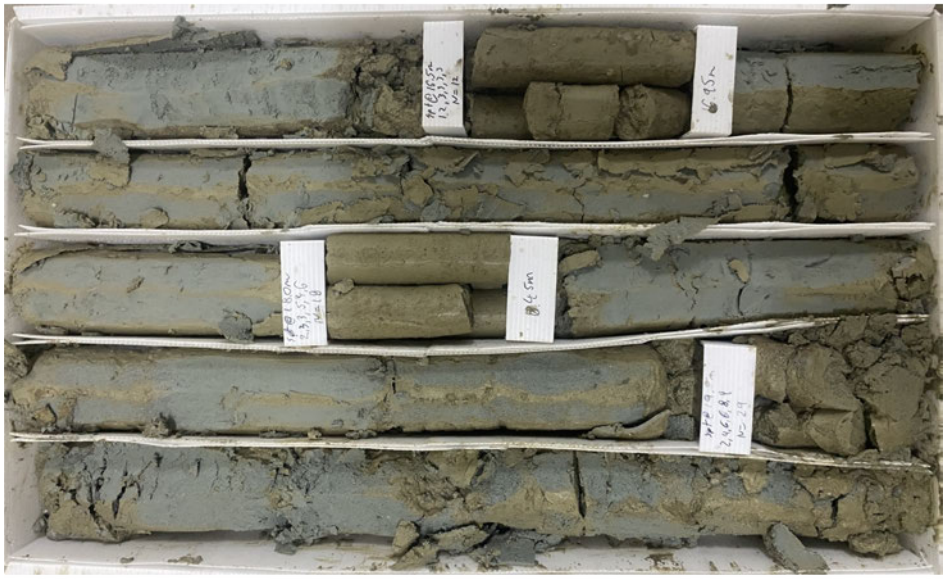


Box 3, 11.3-16.2m



Generated with CORE-GS by Geroc - Drillhole_Initia - 29/10/2025 3:29:26 pm

Box 4, 16.2-20.9m



Box 5, 20.9-28.2m

Box 6, 28.2-31.4m

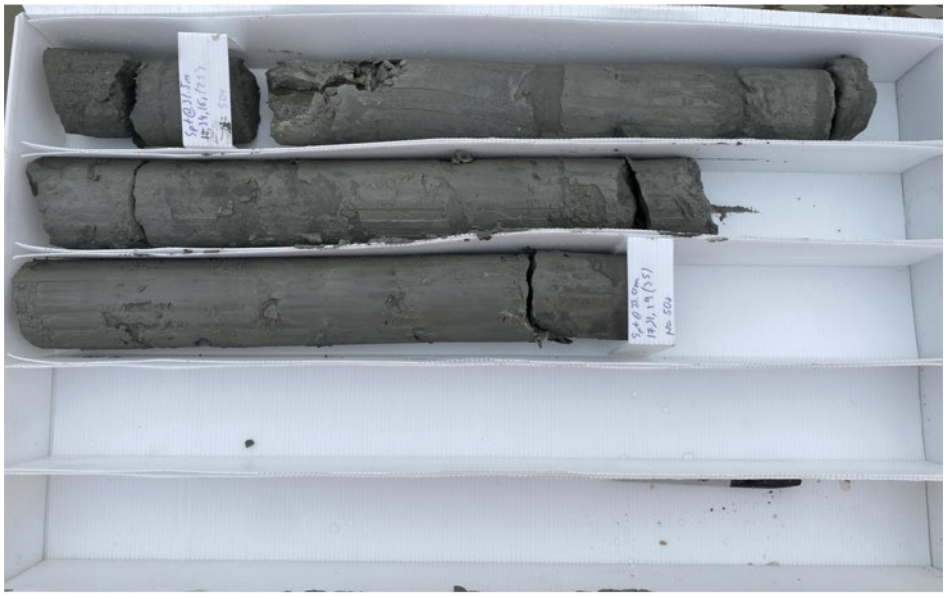
Generated with CORE-GS by Geroc - Drillhole_Initia - 29/10/2025 3:29:26 pm

CORE PHOTOS

HOLE NO.: **BH501**

JOB NO.: P-002883

Box 7, 31.4-33.2m



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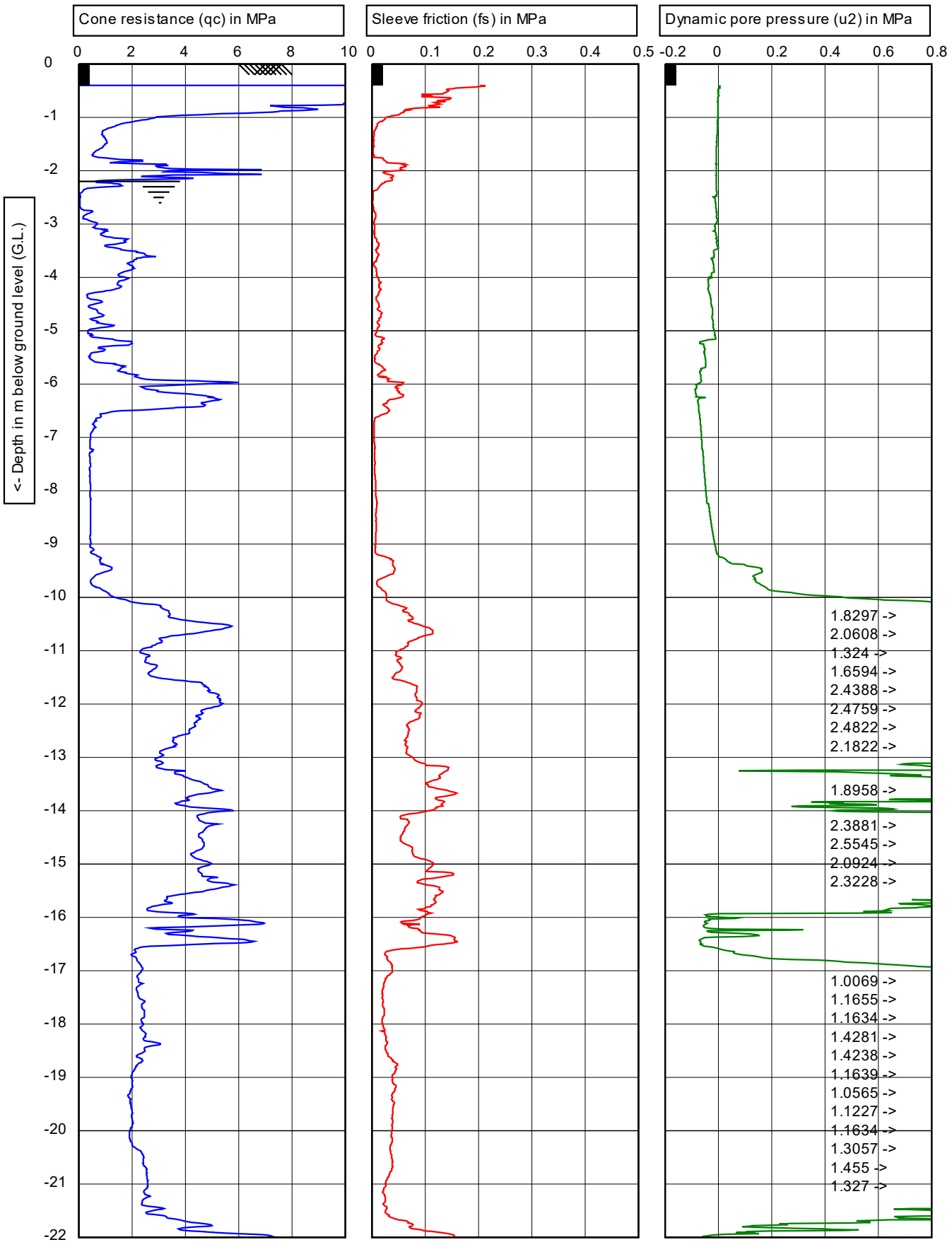
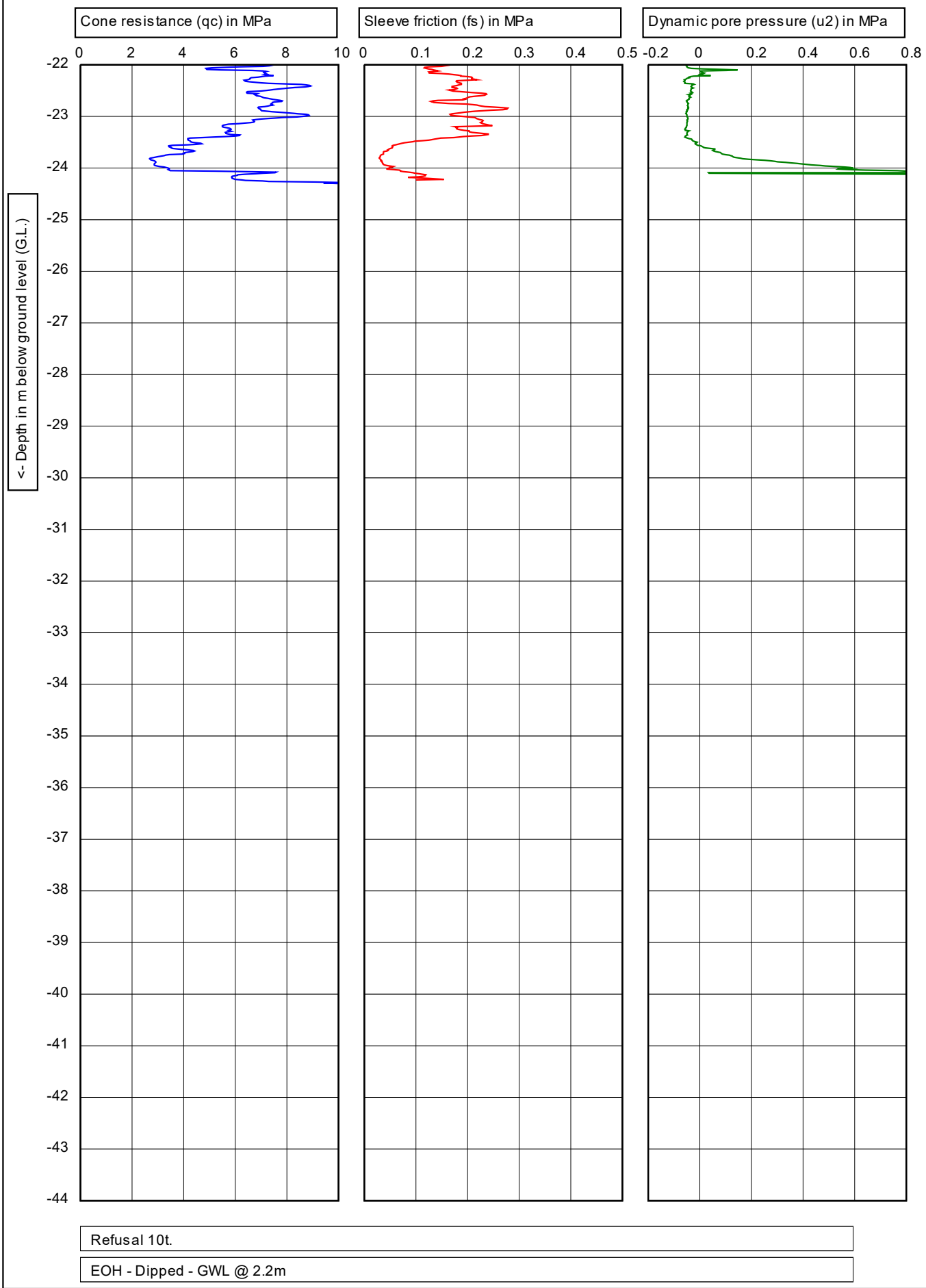


Graphs on this page are not IANZ accredited

u2
150 cm²
10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013		Predrill:	**0.40 m Predrilled**
G.L.: **0.00 m MSL**	W.L.: **-2.20 m**	Date:	**14/10/2025**
Project:	**Orams Site 18 (P-002883)**	Cone no.:	**C10CFIIP.C241654**
Location:	**Wynyard Quarter - Auckland**	Project no.:	**2-68207.00_HA15719**
Position:	**1756392, 5921412 NZTM**	CPT no.:	**502** 1/12

1.49



Refusal 10t.

EOH - Dipped - GWL @ 2.2m

Graphs on this page are not IANZ accredited

u2 150 cm² 10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013

G.L.: **0.00 m MSL** W.L.: **-2.20 m**

Project: **Orams Site 18 (P-002883)**

Location: **Wynyard Quarter - Auckland**

Position: **1756392, 5921412 NZTM**

Predrill: **0.40 m Predrilled**

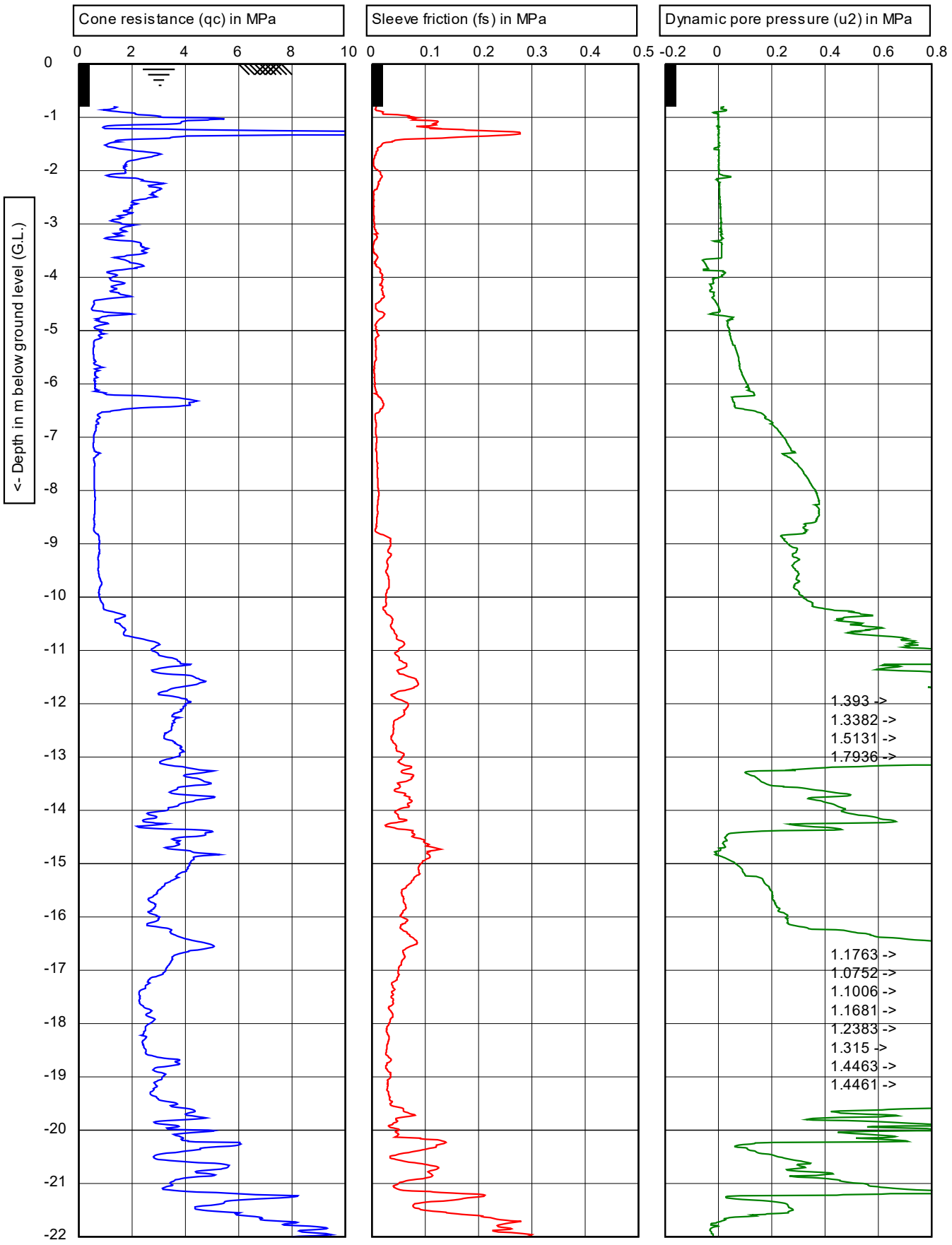
Date: **14/10/2025**

Cone no.: **C10CFIIP.C241654**

Project no.: **2-68207.00_HA15719**

CPT no.: **502** **2/12**

1.49

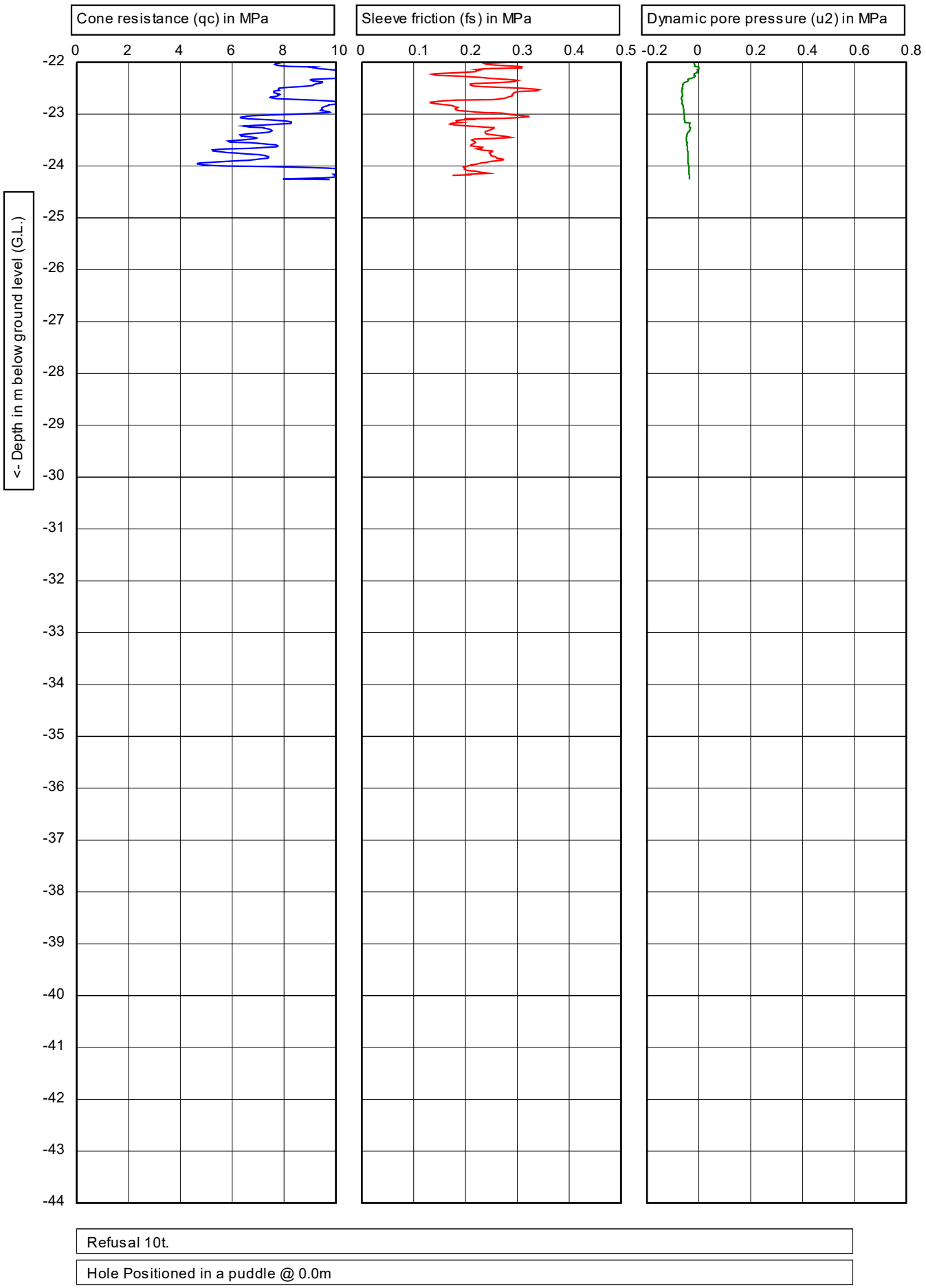


Graphs on this page are not IANZ accredited

u2
150 cm²
10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013		Predrill:	**0.80 m Predrilled**
G.L.: **0.00 m MSL**	W.L.: **0.00 m**	Date:	**14/10/2025**
Project: **Orams Site 18 (P-002883)**		Cone no.:	**C10CFIIP.C241654**
Location: **Wynyard Quarter - Auckland**		Project no.:	**2-68207.00_HA15719**
Position: **1756415, 5921389 NZTM**		CPT no.:	**506** 1/12

1.49



Refusal 10t.

Hole Positioned in a puddle @ 0.0m

Graphs on this page are not IANZ accredited

u2 150 cm² 10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013

G.L.: **0.00 m MSL** W.L.: **0.00 m**

Project: **Orams Site 18 (P-002883)**

Location: **Wynyard Quarter - Auckland**

Position: **1756415, 5921389 NZTM**

Predrill: **0.80 m Predrilled**

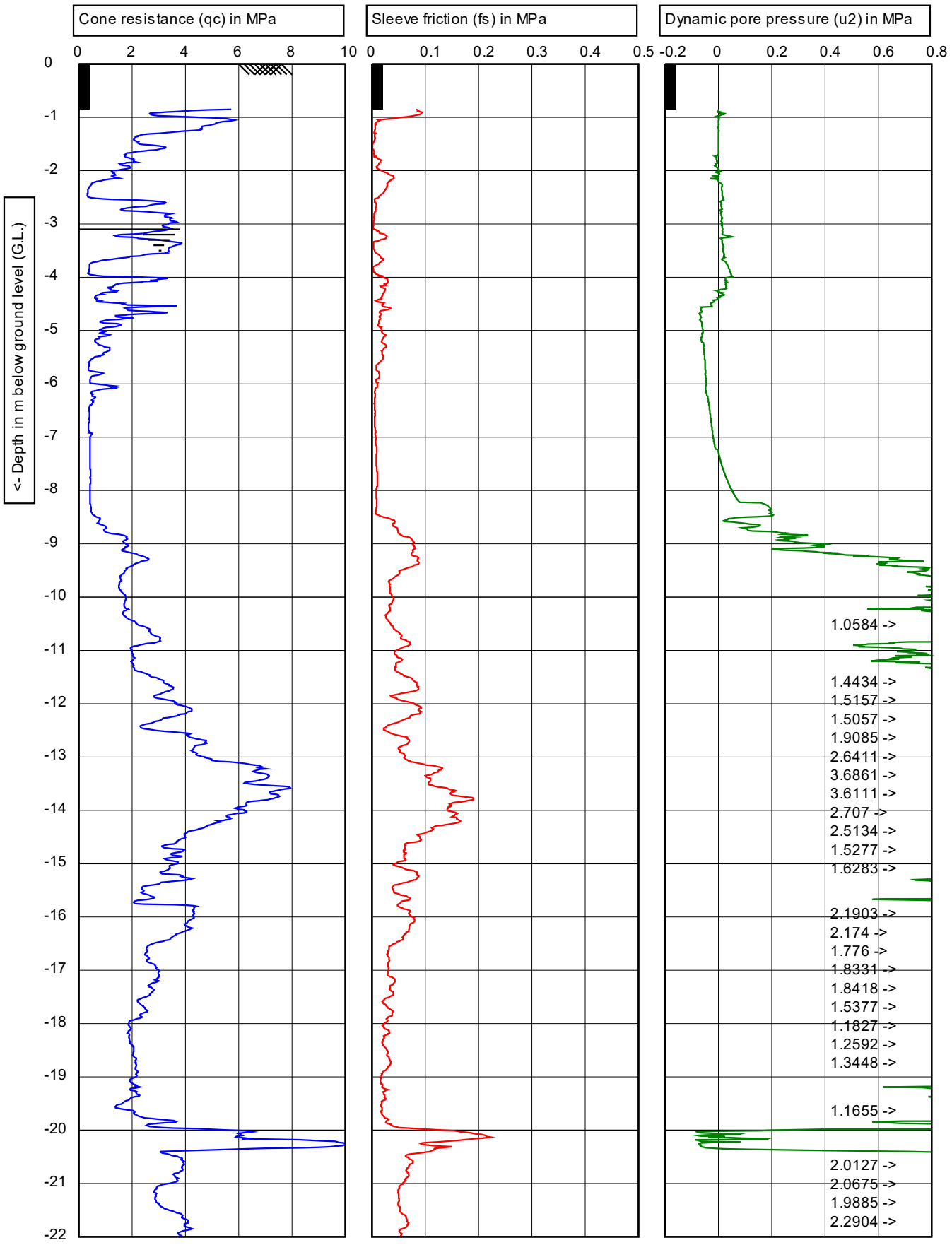
Date: **14/10/2025**

Cone no.: **C10CFIIP.C241654**

Project no.: **2-68207.00_HA15719**

CPT no.: **506** **2/12**

1.49



Graphs on this page are not IANZ accredited

u2 150 cm² 10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013

G.L.: **0.00 m MSL** W.L.: **-3.10 m**

Project: **Orams Site 18 (P-002883)**

Location: **Wynyard Quarter - Auckland**

Position: **1756453, 5921367 NZTM**

Predrill: **0.85 m Predrilled**

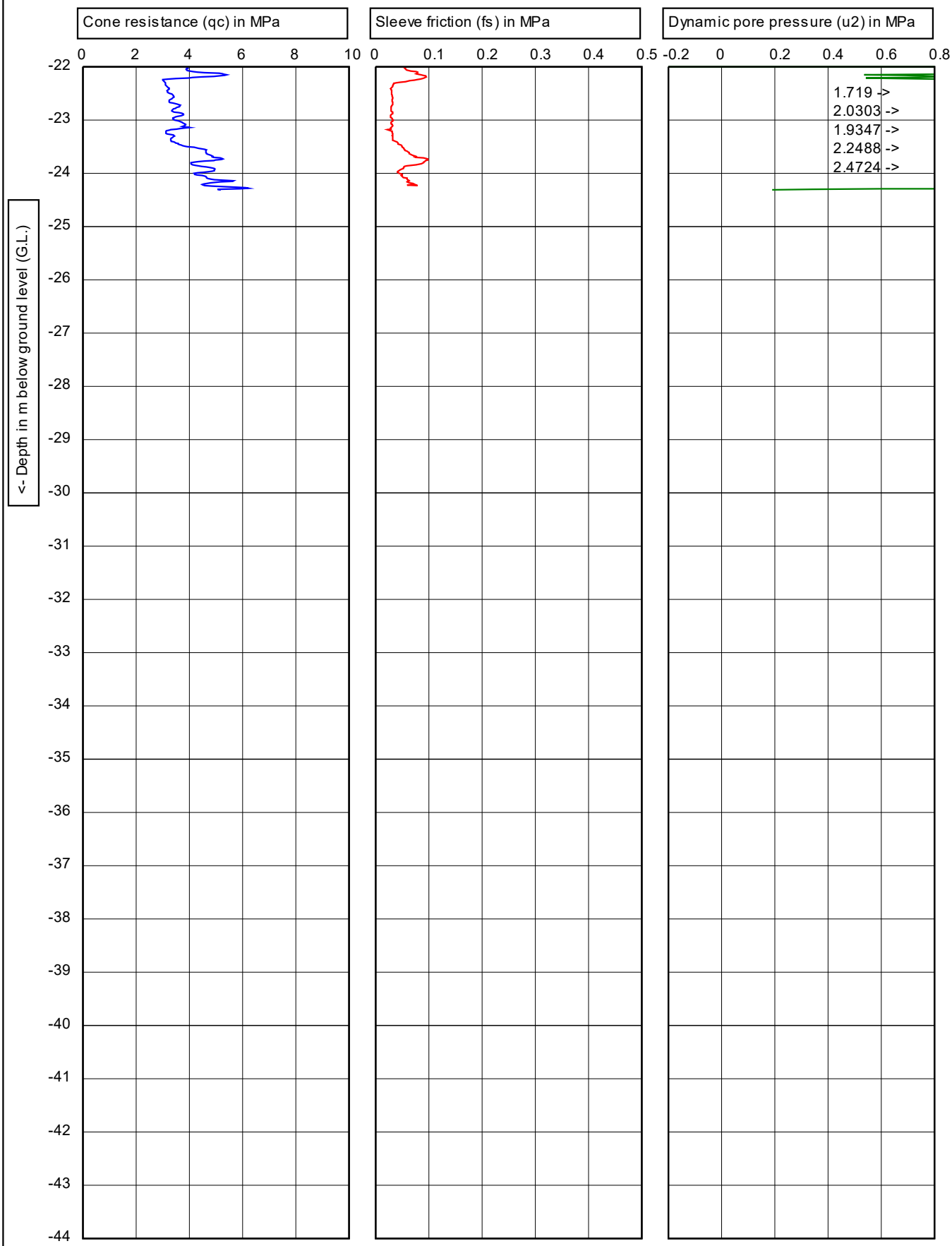
Date: **14/10/2025**

Cone no.: **C10CFIIP.C20361**

Project no.: **2-68207.00_HA15719**

CPT no.: **508** **1/12**

1.49



Refusal 10t.

EOH - Dipped - GWL @ 3.1m

Graphs on this page are not IANZ accredited

u2 150 cm² 10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013

G.L.: **0.00 m MSL** W.L.: **-3.10 m**

Project: **Orams Site 18 (P-002883)**

Location: **Wynyard Quarter - Auckland**

Position: **1756453, 5921367 NZTM**

Predrill: **0.85 m Predrilled**

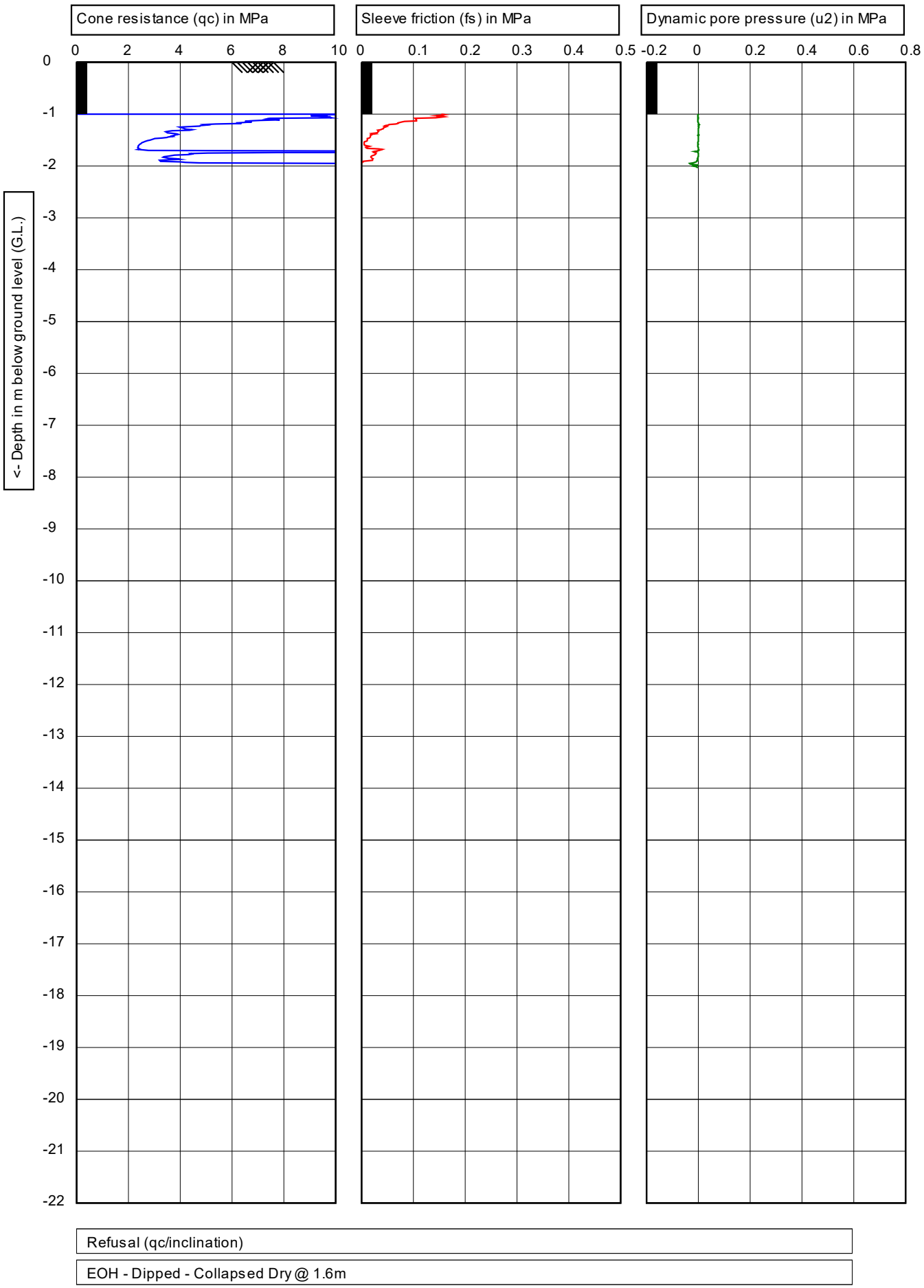
Date: **14/10/2025**

Cone no.: **C10CFIIP.C20361**

Project no.: **2-68207.00_HA15719**

CPT no.: **508** **2/12**

1.49



Refusal (qc/inclination)

EOH - Dipped - Collapsed Dry @ 1.6m

Graphs on this page are not IANZ accredited

u2 150 cm² 10 cm²

Method:ASTM D5778-20&ISO 22476:1:2012cor.2013

G.L.: **0.00 m MSL**

Project: **Orams Site 18 (P-002883)**

Location: **Wynyard Quarter - Auckland**

Position: **1756441, 5921394 NZTM**

Predrill:	**1.00 m Predrilled**
Date:	**14/10/2025**
Cone no.:	**C10CFIIP.C241654**
Project no.:	**2-68207.00_HA15719**
CPT no.:	**510**

1.49

Appendix C Relevant Historical Geotechnical Investigation Logs

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 1 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921399.03 mN 1756349.14 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.25m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete																	
	0.10m: Cobbly GRAVEL, with some sand, with minor clay and silt; dark reddish brown. Loosely packed; wet; gravel, subrounded to subangular, basalt; cobbles, up to 100mm.					GBH101-.15-.2m @ 0.2m 0.1ppm	5	0.5										
	0.24m: Concrete																	
	0.40m: Cobbly GRAVEL, with some sand, with minor silt; dark reddish brown. Loosely packed; wet; gravel, subangular to subrounded, basalt; cobbles, up to 100mm.			HVAC	33	GBH101-.45.5m @ 0.5m 0.1ppm												
						GBH101-.9-1m @ 0.9m 0.4ppm		1.0										
						GBH101 -1.4-1.45m @ 1.4m 0.4ppm	4	1.5										
	1.5m: Core loss																	
	1.80m: Sandy GRAVEL, with some clay and silt; dark reddish brown. Loosely packed; moist; gravel, fine to coarse, subangular to subrounded, BRICK with some basalt; sand, fine to coarse.			PQTT	31	GBH101-2 -2.3m @ 2.0m 8.1ppm		2.0										
	2.3m: Core loss						3	2.5										
	2.75m: Sandy GRAVEL, with some silt and cobbles. Loosely packed; gravel, subrounded to subangular, BRICK with subord scoria basalt ; cobbles, up to 100mm.			PQTT	35													
	3.00m: Core loss			PQTT	10			3.0										
	3.90m: GRAVEL, with some silt and sand. Loosely packed; gravel, medium to coarse, subrounded to subangular, vesiclar basalt. Single shard of glass			PQTT	50		2	3.5										
	4.00m: Core loss			PQTT	70			4.0										
								4.5										
Fill																		

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:38 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 2 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921399.03 mN 1756349.14 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.25m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	4.85m [Cont'd]: COBBLES, with some gravel; dark reddish brown. Loosely packed; cobbles, subrounded to subangular, up to 200mm, vesicular basalt.			PQTT	33		0	5.5										
	5.50m: Core loss			PQTT	0													
				SPT	0	3/2 2/2 1/1 N=6	-1	6.0										
Marine Sediments	6.45m: SILT, with some clay and shell fragments, with trace sand; dark greenish grey. Soft; low plasticity; moist; sand, fine. Strong sulphur odour.			PQTT	100	DUP19 @ 6.5m GBH101 -6.5- 7.05m @ 6.5m 0.1ppm		6.5										
	7.05m: SILT, with minor clay, sand and shell fragments; dark greenish grey. Soft; low plasticity; moist; sand, fine.						-2	7.0										Box 1, 0.0-7.4m
						● 22/5 kPa In barrel												
	7.50m: Core loss			SPT	31	0/0 0/1 0/1 N=2		7.5										
	7.80m: SILT, with minor clay, sand and shell fragments, with trace fibrous organic material ; dark greenish grey. Firm; low plasticity; moist; sand, fine.																	
				PQTT	100	GBH101 -8.5- 8.7m @ 8.5m 0.1ppm	-3	8.0										
	8.60m: Silty SAND, with minor clay and shell fragments; dark greenish grey. Loosely packed; low plasticity; moist; sand, fine to medium.							8.5										
Tauranga Group	8.70m: Clayey SILT, minor fibrous organic material; light grey. Stiff; high plasticity; moist. *8.80 - 8.90m:* gravel sized wood fragments					GBH101-8.8-9m @ 8.8m 0.2ppm 73/25 kPa In barrel												
				SPT	100	0/0 1/1 2/2 N=6	-4	9.0										
								9.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:38 PM - Produced with Core-GS by GeRoc v3.0

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 3 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921399.03 mN, 1756349.14 mE (NZTM2000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.25m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	10.30m: Silty SAND, with minor clay, with trace fibrous organic material; light grey with yellow staining. Very loose to loose; low plasticity; moist; sand, fine to medium.			PQTT	100		-5	10.5										
	10.50m: Core loss			SPT	66	1/2 2/1 1/1 **N=5**												
	10.65m: Clayey SILT, with trace fibrous organic material; light greenish grey. Stiff; high plasticity; moist.						-6	11.0										
				PQTT	85			11.5										
						● 98/28 kPa In barrel												
				SPT	100	1/1 1/2 1/2 **N=6**	-7	12.0										
	12.30m: SILT, with some clay, with minor wood fragments; light greyish brown. Stiff; low plasticity; moist.							12.5										
	12.75m: SILT, with some clay, with trace amorphous organic material; light greyish green. Stiff; low plasticity; moist.			PQTT	89			13.0										
	13.30m: Sandy SILT, with minor clay, with trace amorphous organic material; light greyish green. Stiff to very stiff; non-plastic; moist; sand, fine. *13.40 - 13.55m:* Silty SAND, with minor clay; light greyish green. Loose; non-plastic; moist; sand, fine.			SPT	100	1/0 1/2 3/4 **N=10**	-8	13.5										
				PQTT	98		-9	14.0										
								14.5										

Box 3, 10.1-12.9m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:38 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 4 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921399.03 mN 1756349.14 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.25m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, MW, SW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	16.00m: SILT, with some clay, with minor sand, with trace amorphous organic material; greenish grey. Stiff to very stiff; low plasticity; moist; sand, fine.			SPT	77	1/2 3/4 5/5 N=17	-10	15.5										Box 4, 12.9-15.3m
				PQTT	91			16.0										
	16.25m: Clayey SILT with thinly interbedded organic leaf material; brownish green. Stiff to very stiff; high plasticity; moist.						-11											
	16.50m: Core loss			SPT	13	3/4 5/5 5/5 N=20		16.5										
	16.89m: Sandy SILT, with some fibrous leaf material, with minor clay; dark greenish grey. Stiff; low plasticity; moist; sand, fine. *17.00m:* 50mm wood fragments at 17m and 17.15m			PQTT	100		-12	17.0										
	17.17m: Clayey SILT, with minor amorphous organic material; light greenish grey. Very stiff; high plasticity; moist.							17.5										Box 5, 15.3-17.9m
				SPT	84	● 120/28 kPa In barrel 0/1 2/2 2/3 N=9	-13	18.0										
	18.45m: Sandy SILT, with some clay, with trace amorphous organic material; light greenish grey. Very stiff; low plasticity; moist; sand, fine.			PQTT	100			18.5										
							-14	19.0										
				SPT	100	● 123/28 kPa In barrel 1/3 4/4 4/5 N=17		19.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:38 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 5 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921399.03 mN 1756349.14 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.25m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	19.90m [Cont'd]: SILT, with some clay and sand; greenish grey. Stiff; high plasticity; moist; sand, fine.																	
	20.30m: Sandy SILT, with minor clay; greenish grey. Stiff to very stiff; low plasticity; moist; sand, fine.			PQTT	91		-15	20.5										Box 6, 17.9-20.4m
				SPT	88	2/2 4/6 7/9 **N=26**	-16	21.0										
	21.35m: Silty SAND, with minor clay; greenish grey. Medium dense; low plasticity; moist; sand, fine.			PQTT	95			21.5										
	22.20m: Gravelly SAND, with some silt, with minor clay; dark greenish grey. Medium dense; moist; sand, coarse; gravel, fine to medium, subrounded to subangular.						-17	22.0										
	22.50m: SAND, with some silt, with minor clay; dark greenish grey. Medium dense; non-plastic; moist; sand, fine to medium.			SPT	77	3/4 6/6 7/8 **N=27**		22.5										Box 7, 20.4-23.0m
	22.80m: Sandy SILT, with minor clay; greenish grey. Very stiff; low plasticity; moist; sand, fine.							23.0										
	23.40m: Clayey SILT, trace amorphous organic material; light greenish grey. Very stiff; high plasticity; moist.			PQTT	93		-18	23.5										
East Coast Bays Formation	23.50m: Sandy SILT, with minor clay; dark greenish grey. Hard; low plasticity; moist; sand, fine.																	
	23.70m: Slightly weathered; dark greenish grey; massive; SILTSTONE; very weak.							24.0										
	24.00m: Slightly weathered; dark greenish grey; massive; SANDSTONE; very weak.			SPT	100	6/9 15/19 17 for 50mm **N>=50**	-19											
	24.20m: Slightly weathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE; very weak.							24.5				92						

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:38 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH101

SHEET: 6 OF 6

PROJECT: Orams Site 18	CO-ORDINATES: 5921399.03 mN, 1756349.14 mE (NZTM2000)	R.L. GROUND: 5.25m
JOB No.: 30881.2000_1000	DIRECTION: 0°	R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	ANGLE FROM HORIZ.: -90°	DATUM: Site
		SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 23/07/2018
FINISH DATE: 24/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	*25.00 - 25.10m:* Slightly weathered; dark greenish grey; SANDSTONE; very weak.			HQTT	92		-20	25.5				92						Box 8, 23.0-25.5m
	25.40m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.			SPT	0	38/12 for 20mm **N>=50** Solid												
	25.80m: Unweathered; dark grey; massive; SANDSTONE; weak.							26.0										
	26.20m: Unweathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE; weak.			HQTT	96		-21	26.5				96						Box 9, 25.5-27.0m
				SPT	0	39/11 for 15mm **N>=50** Solid		27.0										
							-22	27.5										
								28.0										
							-23	28.5										
								29.0										
							-24	29.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 27.09m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:39 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: GBH102P

SHEET: 1 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.18m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM / DSA
CHECKED: MHU
START DATE: 10/07/2018
FINISH DATE: 12/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation
Fill	0.00m: Asphalt
	0.05m: Sandy GRAVEL, with some silt; reddish brown. Loosely packed; dry; gravel, fine to coarse, subrounded to subangular, basalt; sand, coarse.
	0.35m: Gravelly SILT, with some clay, with minor sand; dark greenish brown. Firm to stiff; low plasticity; moist; gravel, fine to coarse, subangular to subrounded, brick and basalt; sand, fine.
	0.50m: Sandy GRAVEL, with some silt; reddish brown. Loosely packed; dry; gravel, fine to coarse, subrounded to subangular, scoria basalt; sand, fine to coarse.
	0.70m: Silty GRAVEL, with some clay and sand; light green. Loosely packed; high plasticity fines; moist; gravel, fine to coarse, subangular to subrounded, basalt scoria and minor brick; sand, fine.
	0.80m: Gravelly SAND, with some silt; greenish black. Loosely packed; moist; sand, fine to coarse; gravel, fine to coarse, subangular to subrounded; hydrocarbon odour.
	1.00m: Sandy GRAVEL, with some silt; black. Loosely packed; wet; gravel, fine to coarse, subrounded to subangular, basalt scoria, mudstone, steel scree, gas works waste; strong hydrocarbon odour.
	1.0m: Sandy SILT, with some shell fragments; grey. Firm, wet, low plasticity. [Hydraulic Fill]
	2.5m: Core loss
	3.0m: Sandy SILT, with some shell fragments; grey. Firm, wet, low plasticity. [Hydraulic Fill]
	3.45m: Core loss
	3.75m: Sandy SILT, with some shell fragments and thin layers of silty fine to medium sand; grey. Firm, wet, low plasticity. [Hydraulic Fill]
	4.4m: Silty CLAY; grey. Firm, wet, high plasticity. [Hydraulic Fill]
	4.5m: Core loss

Depth (m)	RL (m)	Sampling Method	Core Recovery (%)	Testing	Rock Weathering	Rock Strength	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
0	5	PQTT	10	GBH102-0.05-.15m @ 0.1m 4.9ppm												
0.5				GBH012-.4-.5m @ 0.4m 10.7ppm												
1.0	4		96	GBH102-.8-1m @ 0.8m 62.2ppm												
1.5				GBH102 -1.3-1.5m @ 1.3m 11.8ppm												
				GBH102 -1.5-1.6m @ 1.5m 8.6ppm												
				GBH102 1.6-1.7m @ 1.6m												
2.0	3		66	GBH102-1.9-2.0 @ 1.9m 400.8ppm												
2.5				GBH102 -2.4-2.5M @ 2.4m 1305.0ppm									03/08/2018			Box 1, 0.0-2.0m
3.0	2	SPT	100	1/2 1/2 2/2 N=7												
3.5		PQTT	71	GBH102-3.75-3.85m @ 3.8m 66.7ppm												
4.0	1			33/13 kPa In barrel												
4.5		SPT	0	1/0 1/0 1/1 N=3												

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:39 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 2 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.18m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM / DSA
CHECKED: MHU
START DATE: 10/07/2018
FINISH DATE: 12/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation
Fill	4.95m [Cont'd]: CLAY, minor fine to medium sub angular gravel, minor fine sand; grey. Firm, wet, high plasticity.
	5.25m: Fine to medium SAND, minor fine to coarse gravel, pocket of CLAY, minor fine sand at 5.3-5.35m; 5.35-5.5m: COBBLE; grey. Loose, wet. Gravel is fine to medium sandstone
	5.5m: Core loss
Marine Sediments	6.0m: Sandy shelly SILT; grey. 6.15m-6.25m: CLAY; grey. Firm, wet, high plasticity; 6.25m-6.45m: Fine to medium SAND; grey
	6.45m: Organic CLAY, minor fine to medium sand, trace silt, trace pockets of silty fine sand; dark grey. Firm, wet, high plasticity
	6.75m: CLAY, some fine to medium sand, minor shell, trace organic specs; grey. Firm, wet, high plasticity
	7.5m: CLAY, minor fine to medium sand, trace shell and organic material; grey. Firm, wet, high plasticity
	9.0m: Core loss
Tauranga Group	9.45m: CLAY, trace specks of amorphous organic matter; light brown mottled orange brown. Stiff, wet, high plasticity

Depth (m)	RL (m)	Sampling Method	Core Recovery (%)	Testing	Rock Weathering	Rock Strength	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
5.5	-1	PQTT	52	GBH102 -5.0- 5.1m @ 5.0m 395.2ppm GBH102 -5.9- 6.0m @ 5.4m 9.2ppm												
6.0	-1	SPT	100	0/1 0/0 1/0 N=2												Box 2, 2.0-6.5m
6.5	-2	PQTT	100	GBH102- 6.75-6.85 @ 6.8m 2.9ppm 30/11 kPa In barrel												
7.5	-2	SPT	0	0/0 0/0 0/0 N=0												
8.0	-3	PQTT	100	GBH102 -8.0- 8.1m @ 8.0m												Box 3, 6.5-9.0m
9.0	-4	SPT	0	0/0 0/1 1/1 N=3												
9.5																

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 3 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.18m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM / DSA
CHECKED: MHU
START DATE: 10/07/2018
FINISH DATE: 12/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, CW, DW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	10.0m: Core loss			PQTT	100		-5	10.5										
	10.5m: Sandy SILT, trace clay; grey mottled greenish grey, trace streaks of organic matter (decomposing rootlets). Stiff, wet, low plasticity *10.80m:* Becomes sandy SILT			SPT	100	2/3 5/5 5/6 **N=21**		11.0										
	11.60m: Becomes light brownish grey			PQTT	100		-6	11.5										
	11.95m: Wood fragment			SPT	100	1/2 3/3 4/5 **N=15**	-7	12.0										Box 4, 9.0-12.0m
	12.65m: Grades to sandy SILT; greenish grey mottled grey, trace dark grey mottles			PQTT	100			12.5										
	13.90m: Becomes bluish grey			SPT	100	2/3 4/4 5/6 **N=19**	-8	13.0										
	14.2m: Fine to medium SAND, minor silt; bluish grey. Medium dense, wet							13.5										
	14.35m: Fine SAND, minor silt; grey. Medium dense, wet *14.30 - 14.35m:* Some laminae of grey CLAY and dark grey fine to medium SAND			PQTT	100		-9	14.0										Box 5, 12.0-14.3m
	14.7m: Fine to coarse SAND, some organic matter, trace silt; grey with dark brown streaks. Medium dense, wet *14.85m:* Trace organic material							14.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

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BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 4 OF 7

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE	R.L. GROUND: 5.18m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed
DRILLED BY: James	LOGGED BY: JASM / DSA	CHECKED: MHU
START DATE: 10/07/2018	FINISH DATE: 12/07/2018	CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	15.0m: SILT, minor fine sand, trace clay; brownish grey. Very stiff, wet, low plasticity			SPT	100	3/3 3/4 4/5 **N=16**	-10	15.5										
	15.3m: SILT, some clay, some fine sand; bluish grey. Very stiff, wet, low plasticity			PQTT	100		-11	16.0										
				SPT	100	0/1 2/3 3/3 **N=11**		16.5										Box 6, 14.3-17.0m
				PQTT	100		-12	17.0										
	18.0m: Sandy SILT; grey, minor white specs. Medium dense, wet. Sand; fine to coarse.			SPT	0	1/2 3/3 4/5 **N=15**	-13	17.5 18.0										
				PQTT	100			18.5										
	19.3m: Grades to silty fine to medium SAND; grey. Medium dense, wet			SPT	100	2/3 4/5 5/6 **N=20**	-14	19.0 19.5										Box 7, 17.0-20.0m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 5 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.18m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM / DSA
CHECKED: MHU
START DATE: 10/07/2018
FINISH DATE: 12/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW, CW)	Rock Strength (FS, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	20.0m: Silty fine SAND; grey. Medium dense, wet.			PQTT	100		-15	20.5										
				SPT	100	3/4 5/5 6/7 **N=23**	-16	21.0										
				PQTT	100			21.5										
							-17	22.0										
				SPT	100	3/4 7/7 9/11 **N=34**		22.5										Box 8, 20.0-23.0m
	22.95m: Core loss			HQTT	0		-18	23.0										
	24.0m: Silty fine SAND; grey, minor brownish grey mottles. Dense, wet			SPT	100	2/3 7/8 8/8 **N=31**	-19	23.5										
	24.45m: Core loss							24.0										
	24.7m: Sandy SILT, trace organic matter; grey minor black streaks. Very stiff to hard; wet.							24.5										
	24.85m: Fine to medium SAND; grey. Very dense, moist																	

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 6 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921398.43 mN 1756416.41 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.18m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM / DSA
CHECKED: MHU
START DATE: 10/07/2018
FINISH DATE: 12/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	24.85m [Cont'd]: Fine to medium SAND; grey. Very dense, moist			HQTT	100		-20	25.5										
	25.5m: SILT, minor fine sand. Very stiff to hard, moist, low plasticity			SPT	100	5/8 14/15 21 for 75mm N>=50												
	25.65m: Fine to medium SAND, minor silt. Very dense, moist																	
	25.8m: SILT; grey. Very stiff to hard, moist, low plasticity																	
	25.9m: Fine SAND, trace silt; grey. Very dense, moist *26.20 - 26.30m:* Silty fine SAND			HQTT	64		-21	26.0										
	26.3m: Core loss							26.5										
	26.7m: Fine SAND, minor silt; grey. Very dense, moist *26.90 - 27.00m:* Carbonaceous *26.98m:* Lense of light grey, strongly cemented SILTSTONE			SPT	100	14/17 23/27 for 55mm N>=50	-22	27.0										
	26.45m: Fine to medium SAND, trace coarse SAND; grey. Very dense, wet			HQTT	86			27.5										Box 9, 23.0-27.9m
	27.7m: Core loss																	
	27.85m: Fine SAND, trace silt; grey. Very dense, moist																	
	27.9m: Fine to medium, trace coarse SAND; grey. Very dense, wet							28.0										
	28.0m: Fine SAND, trace silt; grey. Very dense, wet *28.40 - 28.50m:* Minor carbonaceous material and brown organic streaks						-23											
	28.55m: Clayey SILT; grey. Very stiff to hard, moist, non plastic, fissile			SPT	100	14/20 26/24 for 60mm N>=50		28.5										
	28.7m: Fine SAND, minor to some silt; grey. Very dense, wet																	
	28.95m: Slightly weathered, light grey becoming grey from 29.02m, SILTSTONE. Moderately to strongly cemented							29.0					*29.00m:* Calcite vein, VN, 40 deg dip					
	29.05m: Fine SAND, minor light whitish grey medium to coarse sand [pumice?]; grey. Very dense, moist *29.10 - 29.15m:* Lense of silty fine SAND with some brown organic streaks and black carbonaceous specks *29.50 - 29.55m:* Light grey SILT, becomes grey from 29.44m *29.55 - 29.57m:* Trace brown organic streaks			HQTT	100		-24	29.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH102P

SHEET: 7 OF 7

PROJECT: Orams Site 18	CO-ORDINATES: 5921398.43 mN (NZTM2000) 1756416.41 mE	R.L. GROUND: 5.18m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed
		DRILLED BY: James
		LOGGED BY: JASM / DSA
		CHECKED: MHU
		START DATE: 10/07/2018
		FINISH DATE: 12/07/2018
		CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	30.0m: Fine to medium SAND, minor light whitish grey medium to coarse sand [pumice?]; grey. Very dense, moist			SPT	0	22/28 for 65mm **N>=50** Solid	-25	30.5										
East Coast Bays Formation	30.75m: Unweathered, interbedded, grey, fine to medium SANDSTONE and SILTSTONE. Uncemented to weakly cemented. Beds are thin to moderately thin (20mm to 120mm). *30.95 - 30.97m:* Lense light grey SILTSTONE			HQTT	100		-26	31.0										Box 10, 27.9-30.9m
	31.1m: Unweathered, grey, carbonaceous SILTSTONE, with thin bed of fine SANDSTONE from 31.21m to 31.23m. Uncemented																	
	31.3m: Unweathered, grey, fine SANDSTONE. Weakly cemented					26/24 for 35mm **N>=50** Solid		31.5										Box 11, 30.9-31.6m
	31.5m: No Recovery (Solid Cone SPT)			SPT	0													
							-27	32.0										
								32.5										
							-28	33.0										
								33.5										
							-29	34.0										
								34.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 6.07-8.07m and packed with K2 sand.

Hole Depth 31.61m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: GBH103P

SHEET: 1 OF 7

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921387.66 mN 1756445.97 mE	R.L. GROUND: 4.95m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 04/07/2018
FINISH DATE: 06/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete																	
	0.15m: Sandy GRAVEL, with some cobbles, with trace silt; reddish brown. Loosely packed; moist; gravel, basalt scoria.					GBH103_.15-.25m @ 0.2m 3.8ppm												
						GBH103_.5-.6m @ 0.5m 6.6ppm		0.5										
	0.70m: Shelly SILT, with minor sand, with trace clay; greenish brown. Firm; low plasticity; moist.			HVAC	96	GBH103_.7-.95m @ 0.7m 5.3ppm												Box 1, 0.0-0.4m
	0.70 - 1.30m: Minor clay SILT lenses - dark greenish brown.							1.0										Box 2, 0.4-0.7m
	1.30m: Silty SAND; dark grey. Loosely packed; moist; shell rich. Strong hydrocarbon odour. [Hydraulic Fill]					GBH103_1.3-1.55m @ 1.3m 738ppm												
	1.55m: Core loss					DUP6 @ 1.3m		1.5										Box 3, 0.7-1.3m
	2.15m: Shelly silty SAND; dark grey. Loosely packed; moist. Strong hydrocarbon odour. [Hydraulic Fill]			PQTT	58													Box 4, 1.3-1.6m
	2.30m: Sandy SILT; dark grey with black lenses. Very loose; moist. Strong hydrocarbon odour. [Hydraulic Fill]					GBH03_2.35-2.6m @ 2.4m 886ppm		2.0										
	2.60m: Shelly silty SAND, with trace clay; dark greenish grey. Very loose; moist. Hydrocarbon odour. [Hydraulic Fill]														03/08/2018			
	3.00m: Core loss			SPT	48	1/1 1/1 1/1 N=4		2.5										
	3.23m: Silty SAND, with trace clay; dark greenish grey. Very loose; moist; shell rich sand. Hydrocarbon odour. [Hydraulic Fill]							3.0										
	3.45m: Core loss																	
	3.85m: Shelly silty SAND, with trace clay; dark greenish grey. Loosely packed; moist. Hydrocarbon odour. [Hydraulic Fill]			PQTT	61			3.5										
	4.10m: Sandy SILT, with minor clay, gravel and shell fragments; dark grey. Firm; low plasticity; moist; gravel, Mudstone. Hydrocarbon odour. [Hydraulic Fill]					GBH03_4.-4.5m @ 4.1m 760ppm		4.0										
	4.50m: Core loss			SPT	55	1/1 0/1 1/1 N=3		4.5										
	4.75m: Sandy SILT, with minor clay, gravel and shell fragments; dark grey. Firm; low plasticity; moist; gravel, Mudstone. Hydrocarbon odour. [Hydraulic Fill]																	

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 2 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921387.66 mN 1756445.97 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.95m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 04/07/2018
FINISH DATE: 06/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	4.95m: Sandy SILT, with some clay, with minor gravel and shell fragments; dark greenish grey. Soft to firm; low plasticity; moist; gravel, subangular, Mudstone. Hydrocarbon odour. [Hydraulic Fill]			PQTT	95	GBH103_5.45-5.7m @ 5.5m 8.4ppm		5.5										
	4.95 - 6.00m: Minor silty SAND lenses																	
	5.90 - 5.95m: shell rich lense																	
	6.00m: Core loss			SPT	11	0/0 1/0 1/0 N=2	-1	6.0										
Marine Sediments	6.40m: Clayey SILT, with some shell fragments, with minor sand; dark greenish grey. Soft to firm; low plasticity; moist.			PQTT	100	GBH103_6.55-6.75m @ 6.6m 7.5ppm		6.5										
						● 28/6 kPa In barrel	-2	7.0										
	7.5m: Core loss			SPT	11	0/0 0/0 0/0 N=0		7.5										
	7.90m: Clayey SILT, with some shell fragments, with minor sand; dark greenish grey. Soft to firm; low plasticity; moist.			PQTT	80	GBH103_8.15-8.5m @ 8.2m 8.4ppm	-3	8.0										Box 6, 5.3-8.5m
	8.50m: Sandy SILT, with some clay, with minor shell fragments, with trace amorphous organic material; dark greenish grey. Soft to firm; moist.							8.5										
Tauranga Group	8.80m: Silty CLAY, with minor amorphous organic material; light grey. Firm to stiff; high plasticity; moist.					● 47/6 kPa In barrel	-4	9.0										
				SPT	100	0/1 1/1 2/2 N=6												
	9.45m: Clayey SILT, with trace sand; light greyish green. Stiff to very stiff; low plasticity; moist.					GBH103_9.45-9.75m @ 9.5m 5.7ppm		9.5										
							-5											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 3 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921387.66 mN 1756445.97 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.95m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 04/07/2018
FINISH DATE: 06/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (EB, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	10.10m: Clayey SILT, with trace sand; greenish grey. Very stiff to hard; low plasticity; moist.			PQTT	100													
				SPT	100	4/6 8/9 10/12 **N=39**	-6	10.5										
	10.95m: Core loss							11.0										Box 7, 8.5-11.0m
	11.25m: Clayey SILT, with trace sand, with minor fibrous organic leaf material; greenish grey. Hard; high plasticity; moist.			PQTT	71			11.5										
				SPT	100	4/5 7/9 9/10 **N=35**	-7	12.0										
	12.45m: Core loss			HQTT	42		-8	12.5										
	13.05m: Clayey SILT, with trace sand, with minor fibrous organic leaf material; greenish grey. Hard; high plasticity; moist.							13.0										
	13.20m: Clayey SILT, with minor sand and amorphous organic material; light greenish grey. Hard; high plasticity; moist.																	
	13.50m: Core loss			SPT	17	4/4 4/6 6/7 **N=23**		13.5										
	13.87m: Clayey SILT, with minor sand and amorphous organic material; light greenish grey. Hard; high plasticity; moist.						-9											
	13.95m: Core loss							14.0										
	14.12m: Clayey SILT, with minor sand and amorphous organic material; light greenish grey. Hard; high plasticity; moist.			HQTT	83			14.5										
	14.65m: Clayey SILT, with some fibrous leaf material; dark greenish grey. Firm to stiff; high plasticity; moist.																	
	14.95m: Silty SAND, with minor clay; dark greenish						-10											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 4 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921387.66 mN 1756445.97 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.95m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 04/07/2018
FINISH DATE: 06/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	*15.00 - 15.05m:* wood fragment			SPT	77	1/3 3/4 5/6 **N=18**	-11	15.5										
	15.45m: Core loss																	
	15.80m: Clayey SILT, with minor amorphous organic material; grey; bedded. Stiff to very stiff; low plasticity; moist; Very thin bedding.			HQTT	66			16.0					16.00 - 16.40m: B, 15° dip, VN					
	16.40m: Clayey SILT, with some sand, with trace amorphous organic material and 5mm diameter white pods; greenish grey. Very stiff; high plasticity; moist.			SPT	100	3/3 4/5 6/6 **N=21**	-12	16.5										
	17.45m: Clayey SILT, with minor sand; greenish grey. Stiff to very stiff; high plasticity; moist.			HQTT	95			17.0										
	17.95m: Clayey SILT, with trace sand, with minor amorphous organic material; greenish grey. Firm to stiff; high plasticity; moist.			SPT	100	1/2 2/2 2/3 **N=9**	-13	17.5										
				HQTT	90	● 50/6 kPa In barrel	-14	18.0										
	19.50m: Core loss			SPT	66	0/0 0/0 0/2 **N=2**	-15	18.5										
	19.65m: Clayey SILT, with trace sand, with minor amorphous organic material; greenish grey. Firm to stiff; high plasticity; moist.							19.0										
								19.5										

Box 8, 11.0-15.8m

Box 9, 15.8-18.9m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 5 OF 7

PROJECT: Orams Site 18	CO-ORDINATES: 5921387.66 mN, 1756445.97 mE (NZTM2000)	R.L. GROUND: 4.95m
JOB No.: 30881.2000_1000	DIRECTION: 0°	R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	ANGLE FROM HORIZ.: -90°	DATUM: Site
		SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 04/07/2018
FINISH DATE: 06/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	*20.55m:* 20mm black wood fragment			HQTT	99		-16	20.5										
	20.80m: Clayey SILT, with trace sand, with minor amorphous organic material; greenish grey. Firm; high plasticity; moist.																	
	21.00m: Core loss			SPT	0	0/0 0/1 2/2 **N=5**		21.0										
	21.45m: Clayey SILT, with trace sand, with minor amorphous organic material; greenish grey. Firm; high plasticity; moist.			HQTT	100		-17	21.5										
	21.85m: Clayey SILT, with minor sand; light greenish grey. Firm; moist; sand, fine.							22.0										
	[Cont'd]: Clayey SILT, with minor sand; light greenish grey. Firm; moist; sand, fine.																	
	22.50m: Core loss			SPT	66	2/3 5/8 8/9 **N=30**		22.5										
	22.65m: Silty SAND, with minor clay; greenish grey. Medium dense; moist; sand, fine to coarse.						-18											
	22.95m: Core loss			HQTT	0			23.0										
	22.65m: Silty SAND, with minor clay; greenish grey. Medium dense; moist; sand, fine to coarse.			SPT	44	3/5 5/5 6/7 **N=23**	-19	23.5 24.0										
	24.45m: Core loss							24.5										
							-20											Box 10, 18.9-22.4m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 6 OF 7

PROJECT: Orams Site 18

JOB No.: 30881.2000_1000

LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921387.66 mN, 1756445.97 mE (NZTM2000)

DIRECTION: 0°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.95m

R.L. COLLAR:

DATUM: Site

SURVEY: Total Station\Surveyed

DRILLED BY: James

LOGGED BY: JASM

CHECKED: MHU

START DATE: 04/07/2018

FINISH DATE: 06/07/2018

CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group				HQTT	0													
				SPT	55	4/6 7/7 8/11 **N=33**	-21	25.5										
	25.70m: Silty SAND, with some gravel, with trace clay; dark greenish grey. Medium dense to dense; moist; gravel, fine, quartz and mudstone.																	
	25.95m: Core loss			HQTT	34			26.0										
	26.60m: Sandy SILT, with minor clay; greenish grey. Firm; moist; sand, fine to coarse.							26.5										
East Coast Bays Formation	26.65m: Silty SAND; greenish grey. Loosely packed; moist; sand, fine to coarse.						-22											
	26.75m: Silty SAND, with minor clay; dark greenish grey. Tightly packed; moist; sand, fine.							27.0										
	26.85m: Unweathered; dark greenish grey; SANDSTONE; very weak.			SPT	0	36/14 for 45mm **N>=50** Solid												
	27.00m: Core loss																	
	27.60: Unweathered; dark greenish grey; SANDSTONE; very weak.			HQTT	64		-23	27.5				64						
	28.45m: Unweathered; dark grey; bedded, sub-horizontal, laminated; SILTSTONE; weak.							28.0										
	28.50m: No recovery			SPT	0	50 for 70mm **N>=50** Solid		28.5										
	28.77m: Unweathered; dark grey; bedded, sub-horizontal, laminated; SILTSTONE; weak.						-24						28.70 - 28.75m: BF, 5° dip, VN					
	29.20m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.			HQTT	85			29.0				85						Box 11, 22.4-29.5m
	29.50 - 29.55m: Unweathered; dark grey; , bedded, sub-horizontal, laminated; SILTSTONE; weak.							29.5										Box 12, 29.5-30.0m
	29.75m: Unweathered; dark grey; bedded, sub-horizontal, very thin; SILTSTONE; weak.						-25											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH103P

SHEET: 7 OF 7

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921387.66 mN 1756445.97 mE	R.L. GROUND: 4.95m	DRILLED BY: James
JOB No.: 30881.2000_1000		R.L. COLLAR:	LOGGED BY: JASM
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site	CHECKED: MHU
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed	START DATE: 04/07/2018
			FINISH DATE: 06/07/2018
			CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
						50 for 65mm **N>=50** Solid	-26	30.5										
								31.0										
								31.5										
							-27	32.0										
								32.5										
							-28	33.0										
								33.5										
							-29	34.0										
								34.5										
							-30											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.08-5.58m and packed with K2 sand.

Hole Depth 30.07m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH104P

SHEET: 1 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921367.17 mN 1756367.75 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.00m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 02/07/2018
FINISH DATE: 03/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete			PQTT	100													
	0.25m: Sandy GRAVEL, with some silt; dark reddish grey. Loosely packed; moist; gravel, scoria; strong hydrocarbon odour.			PQTT	48	GBH104_.3-.7m @ 0.3m 4.7ppm		0.5										
				PQTT	40													
	0.70m: Silty GRAVEL, with some cobbles, with minor sand and thin black silt [hydrocarbon rich]; dark orangish brown. Tightly packed; moist; gravel, scoria and greywacke gravels; Hydrocarbon odour.			PQTT	70													
				PQTT	82	GBH104_.8-1.2m @ 0.8m 208ppm	4	1.0										
	1.20m: Silty GRAVEL, with some sand; dark orangish grey. Tightly packed; low plasticity; moist; gravel, Brick fragments.			PQTT	80	GBH104_1.2-1.7m @ 1.2m DUP3 @ 1.2m												Box 1, 0.0-1.4m
	1.5m: Core loss							1.5										
				PQTT	38		3	2.0										
	2.50m: Clayey SILT, with some gravel, with minor moderately thin lenses of black glossy sands and gravels [gas works coke]; light greyish yellow. Firm to stiff; high plasticity; moist.							2.5										
	3.00m: Core loss							3.0										
				PQTT	30		2	3.5										
	4.05m: Gravelly SILT; dark grey. Firm to stiff; high plasticity; moist. [Hydraulic Fill]							4.0							04/07/2018			
	4.10m: Silty SAND, with some shell fragments; dark grey. Firm; low plasticity; moist. [Hydraulic Fill]						1								03/07/2018			
	4.50m: Core loss					GBH104_4.5-5m @ 4.5m 211ppm		4.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:40 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: GBH104P

SHEET: 2 OF 6

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921367.17 mN 1756367.75 mE	R.L. GROUND: 5.00m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 02/07/2018
FINISH DATE: 03/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	4.70m [Cont'd]: Clayey SILT, with some gravel, with minor fibrous root material; dark greenish grey. Soft to firm; high plasticity; moist; gravel, greywacke. Light hydrocarbon odour. Orange and black staining. [Hydraulic Fill]																	
	5.40m: Shelly silty SAND; dark grey. Soft; low plasticity; moist; sand.[Hydraulic Fill]			PQTT	86	GBH104_5.5-5.8 @ 5.5m		5.5										Box 2, 1.4-5.8m
Marine Sediments	5.90m: Sandy SILT, with some gravel and cobbles; dark greenish grey. Firm; low plasticity; moist; gravel, sandstone.						-1	6.0										
	6.00m: Core loss			PQTT	56	GBH104_6-7 @ 6.0m 20ppm												
	6.65m: Sandy SILT, with some gravel and cobbles; dark greenish grey. Firm; low plasticity; moist; gravel, sandstone.						-2	7.0										
	7.25m: Clayey SILT, with minor shell fragments; light greenish grey. Soft to firm; low plasticity; moist.			SPT	100	0/0 0/0 0/0 N=0		7.5										
				PQTT	104	GBH104_8-8.5 @ 8.0m 9ppm	-3	8.0										
						● 13/3 kPa In barrel		8.5										Box 3, 5.8-8.7m
				SPT	100	1/1 1/1 1/2 N=5	-4	9.0										
	9.45m: Core loss							9.5										
Tauranga Group	9.75m: Clayey SILT, minor amorphous organic material; light greenish grey. Stiff to very stiff; high plasticity; moist.						-5											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:41 PM - Produced with Core-GS by GeRoc v3.0

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH104P

SHEET: 3 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921367.17 mN 1756367.75 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.00m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 02/07/2018
FINISH DATE: 03/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: Clayey SILT, minor amorphous organic material; light greenish grey. Stiff to very stiff; high plasticity; moist.			PQTT	71	GBH104_10-10.5 @ 10.0m 9.5ppm >40 kPa In barrel	-5	10.5										
				SPT	100	0/0 0/1 1/1 N=3												
	11.60m: Clayey SILT, with minor fibrous leaf material; greenish grey. Firm; low plasticity; moist.			PQTT	100	28/6 kPa In barrel	-6	11.0										Box 4, 8.7-11.5m
				SPT	100	0/0 0/0 0/0 N=0	-7	11.5 12.0										
	13.00m: Clayey SILT, minor fibrous organic material; dark greenish grey. Firm; low plasticity; moist. *13.00 - 14.10m:* minor moderately thin sand lenses.			PQTT	100	39/13 kPa In barrel	-8	12.5 13.0										Box 5, 11.5-13.5m
				SPT	100	0/0 1/1 1/1 N=4		13.5										
	14.10m: Clayey SILT, minor fibrous wood fragments; greenish grey. Firm to stiff; high plasticity; moist.			PQTT	100	101/28 kPa In barrel	-9	14.0 14.5										
	14.60m: Clayey SILT, with minor fibrous organic material; light greenish grey. Stiff; high plasticity; moist.						-10											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH104P

SHEET: 4 OF 6

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921367.17 mN 1756367.75 mE	R.L. GROUND: 5.00m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed
DRILLED BY: James	LOGGED BY: JASM	CHECKED: MHU
START DATE: 02/07/2018	FINISH DATE: 03/07/2018	CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: Clayey SILT, with minor fibrous organic material; light greenish grey. Stiff; high plasticity; moist.	UW SW MW HW CW	ES VS S MS W VW EW	SPT	100	0/1 1/2 2/2 **N=7**	-11	15.5										
	15.90m: Sandy SILT, with minor fibrous wood fragments, with trace clay; grey. Firm to stiff; low plasticity; moist.			PQTT	100			16.0										
	16.70m: Sandy SILT, with minor clay and fibrous wood fragments up to 50mm in diameter; dark grey. Stiff to very stiff; low plasticity; moist.			SPT	100	1/2 2/3 4/4 **N=13**	-12	16.5										Box 6, 13.5-16.7m
				PQTT	100			17.0										
								17.5										Box 7, 16.7-17.9m
	18.10m: Silty SAND, with some clay, with minor fibrous wood fragments; dark grey. Stiff to very stiff; low plasticity; moist. *18.50 - 18.75m:* black wood fragments up to .08m thick			SPT	88	● 107/22 kPa In barrel 2/4 5/6 7/8 **N=26**	-13	18.0										
				PQTT	100			18.5										
	19.10m: Clayey SILT; light greenish grey. Very stiff to hard; high plasticity; moist.						-14	19.0										
	19.50m: Clayey SILT, with minor sand, thin bedded sand lenses; dark greenish grey. Stiff to very stiff; high plasticity; moist.			SPT	100	● 126/25 kPa In barrel 1/1 2/2 3/3 **N=10**		19.5										Box 8, 17.9-20.0m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH104P

SHEET: 5 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921367.17 mN, 1756367.75 mE (NZTM2000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.00m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 02/07/2018
FINISH DATE: 03/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	19.95m [Cont'd]: Clayey SILT, with trace sand; dark greenish grey. Stiff to very stiff; high plasticity; moist; sand, fine.			PQTT	99			20.5										
	21.00m: Core loss			SPT	0	0/0 0/2 2/2 **N=6**	-16	21.0										
	21.45m: Clayey SILT, with trace sand; dark greenish grey. Stiff to very stiff; high plasticity; moist; sand, fine. *22.30 - 22.35m:* black wood fragment			PQTT	100	● 136/41 kPa In barrel		21.5										
	22.50m: Core loss			SPT	0	0/1 2/2 3/3 **N=10**	-17	22.0										
	22.95m: Clayey SILT, with trace sand; dark greenish grey. Stiff to very stiff; high plasticity; moist; sand, fine.							22.5										
	23.20m: Silty SAND, with minor clay and gravel; dark greenish grey. Very dense; low plasticity; moist; well graded; gravel, fine, subrounded to subangular.			PQTT	100		-18	23.0										Box 9, 20.0-23.1m
								23.5										
East Coast Bays Formation	24.35m: Slightly weathered; dark greenish grey; SILTSTONE; very weak.			SPT	100	2/4 15/11 15/17 **N>=50**	-19	24.0										
	24.45m: Core loss							24.5				76						
	24.70m: Slightly weathered; dark greenish grey; SILTSTONE; very weak.						-20											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH104P

SHEET: 6 OF 6

PROJECT: Orams Site 18

JOB No.: 30881.2000_1000

LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921367.17 mN, 1756367.75 mE (NZTM2000)

DIRECTION: 0°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.00m

R.L. COLLAR:

DATUM: Site

SURVEY: Total Station\Surveyed

DRILLED BY: James

LOGGED BY: JASM

CHECKED: MHU

START DATE: 02/07/2018

FINISH DATE: 03/07/2018

CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	[Cont'd]: Slightly weathered; dark greenish grey; SILTSTONE; very weak.			HQTT	76							76						
	25.50m: No recovery			SPT	0	26/24 35 for 75mm **N>=50** Solid	-21	25.5										
	25.72m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.																	
	26.00m: Unweathered; dark grey; SILTSTONE; very weak.							26.0										
	26.30m: Unweathered; dark greenish grey; SANDSTONE; weak.			HQTT	100			26.5				100						
	27.00m: No recovery			SPT	0	21/12 13/30 2 for 5mm **N>=50** Solid	-22	27.0										
	27.30m: Unweathered; dark greenish grey; SILTSTONE; weak.			HQTT	100			27.5				100	27.80m: J, 45° dip, , VN					Box 10, 23.1-27.7m
	27.95m: Unweathered; dark greenish grey; SANDSTONE; weak.						-23	28.0					28.00m: J, 75° dip, VN					Box 11, 27.7-28.2m
	28.15m: Unweathered; dark greenish grey; SILTSTONE; weak.					50 for 65mm **N>=50** Solid		28.5										Box 12, 28.2-28.5m
							-24	29.0										
								29.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.09-5.51m and packed with K2 sand.

Hole Depth 28.57m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 1 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete																	
	0.15m: Sandy GRAVEL, with minor silt and cobbles; reddish brown. Loosely packed; moist; gravel, subrounded to subangular, basalt; cobbles, up to 100mm.					GBH105 -.15-.25 m @ 0.2m 4ppm												Box 1, 0.2-0.5m
	0.50m: Silty SAND, with minor gravel; dark greenish grey. Loosely packed; wet; gravel, subrounded to subangular; strong hydrocarbon odour. [Hydraulic Fill]			HVAC	90	GBH105-.5-1m @ 0.5m 630ppm		0.5										
	1.50 - 1.55m: Clayey SILT; light greenish grey.							1.0										Box 2, 0.5-1.3m
	1.50m: Silty SAND, with minor gravel; blackish grey. Loosely packed; saturated; gravel, subrounded to subangular. Dark hydrocarbon fluids and strong hydrocarbon odour. [Hydraulic Fill]					GBH105-1.55-1.65m @ 1.6m 1797ppm		1.5										
	1.65m: Core loss			PQTT	44			2.0										
	2.40m: Silty SAND, with minor gravel; blackish grey. Loosely packed; saturated; gravel, subrounded to subangular; Dark fluid. Strong hydrocarbon odour. [Hydraulic Fill]							2.5										
	2.60m: Shelly silty SAND, with trace clay; dark greenish grey. Loosely packed; non plastic; moist; sand, fine to coarse; strong hydrocarbon odour. [Hydraulic Fill]					GBH105-2.7-3m @ 2.7m 1340ppm		3.0										Box 3, 1.3-1.7m
	3.00m: Core loss *2.85 - 2.88m:* Sandy SILT, with minor clay; light greenish grey. Soft; moist. *2.93 - 2.97m:* Sandy SILT, with minor clay; light greenish grey. Soft; moist.			PQTT	33			3.5										
	3.50m: Shelly silty SAND, with trace clay; dark greenish grey. Loosely packed; dilatant; moist; sand, fine to coarse; strong hydrocarbon odour. [Hydraulic Fill]							4.0										
	4.20m: Silty SAND, with minor clay; dark greenish grey. Loosely packed; moist; sand, fine, Quartz. [Hydraulic Fill]					GBH105 -4.2-4.5m @ 4.2m 32.6ppm												
	4.40m: SILT, with some clay, with trace sand; dark greenish grey. Soft to firm; low plasticity; moist; sand, fine. [Hydraulic Fill]					21/1 kPa In barrel		4.5										
	4.50m: Core loss			SPT	11	0/0 1/1 2/2 N=6												
	4.90m: Shelly sandy SILT, with some clay and gravel; dark grey. Very soft; low plasticity; wet; sand, fine; gravel, fine to coarse, subangular. [Hydraulic																	

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 2 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	4.95m [Cont'd]: Core loss																	
	5.2m: Shelly sandy SILT, with some clay and gravel; dark grey. Very soft; low plasticity; wet; sand, fine; gravel, fine to coarse, subangular, Mudstone. [Hydraulic Fill]			PQTT	76	GBH105 -5.3- 5.65m @ 5.3m 5ppm		5.5										
	6.00m: Core loss			SPT	11	0/1 0/0 1/1 **N=2**	-1	6.0										
	6.40m: Shelly sandy SILT, with some clay and gravel; dark grey. Very soft; low plasticity; wet; sand, fine; gravel, fine to coarse, subangular, Mudstone. [Hydraulic Fill]							6.5										Box 4, 1.7-6.5m
Marine Sediments	6.65m: Clayey SILT, with some shell fragments, with trace sand; dark greenish grey. Soft; low plasticity; moist; sand, fine.			PQTT	100	GBH105-6.85-7.25m @ 6.9m 4.9ppm	-2	7.0										
	7.50m: Core loss			SPT	0	0/0 0/0 0/0 **N=0**		7.5										
	7.95m: Clayey SILT, with some shell fragments, with trace sand; dark greenish grey. Soft; low plasticity; moist; sand, fine.			PQTT	90	GBH105-8.25-8.45m @ 8.3m 7.1ppm	-3	8.0										
Tauranga Group	8.45m: Clayey SILT, with minor fibrous organic material, with trace sand; light greenish grey. Stiff; moist; sand, fine.					GBH105 -8.5- 8.9m @ 8.5m 6.6ppm		8.5										
	9.00m: Core loss			SPT	66	54/25 kPa In barrel 1/1 1/2 2/2 **N=7**	-4	9.0										
	9.15m: Clayey SILT, with minor fibrous organic material, with trace sand; light greenish grey. Stiff; moist; sand, fine.							9.5										Box 5, 6.5-9.7m
							-5											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 3 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921363.21 mN, 1756438.16 mE (NZTM2000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: Clayey SILT, with minor fibrous organic material, with trace sand; light greenish grey. Stiff; moist; sand, fine.			PQTT	88	● 98/24 kPa In barrel												
				SPT	100	1/1 1/2 2/2 **N=7**		10.5										
	10.80m: Clayey SILT; greenish grey. Stiff; high plasticity; moist.						-6											
	10.95m: Core loss							11.0										
	11.26m: Clayey SILT; greenish grey. Very stiff; high plasticity; moist.			PQTT	70			11.5										
				SPT	100	● 115/22 kPa In barrel 1/1 2/2 3/3 **N=10**	-7	12.0										
	12.65m: SILT, with some fibrous wood fragments up to 50mm in diameter; greenish white; bedded. Stiff to very stiff; low plasticity; moist.			PQTT	100			12.5										Box 6, 9.7-12.5m
	13.05m: Clayey SILT, with minor amorphous organic material; light greenish grey. Stiff to very stiff; high plasticity; moist.						-8	13.0										
				SPT	88	● >221 kPa In barrel 3/4 5/6 7/7 **N=25**		13.5										
	13.70m: Clayey SILT; greyish green. Very stiff; high plasticity; moist.						-9											
	13.95m: Core loss							14.0										
	14.18m: Clayey SILT; greyish green. Very stiff; high plasticity; moist.			PQTT	78			14.5										
	14.85m: Interbedded sandy SILT and silty SAND, with minor fibrous organic material; greyish green. Stiff to very stiff; low plasticity; moist; sand, fine to medium.						-10											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 4 OF 7

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, CW, DW)	Rock Strength (EB, VS, WB, W, MW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	15.00m: Core loss			SPT	33	2/3 5/5 6/6 **N=22**	-11	15.5										Box 7, 12.5-15.5m
	15.30m: Sandy SILT, with minor fibrous organic material; moderately thin interbedded sandy SILT to silty SAND; greyish green. Stiff to very stiff; low plasticity; moist; sand, fine to medium.			PQTT	100													
	15.50m: Silty SAND, with some fibrous organic material - leaves and wood fragments; dark greyish green; bedded.Tightly packed; moist; sand, fine to medium; thin to moderately thin bedded.							16.0										
	15.85m: Clayey SILT, with trace sand; light greenish grey. Very stiff; high plasticity; moist; sand, fine.																	
				SPT	100	3/3 5/7 8/9 **N=29**	-12	16.5										
	16.95m: Core loss							17.0										
	17.10m: Clayey SILT, with trace sand; light greenish grey. Very stiff; high plasticity; moist; sand, fine.			PQTT	85													Box 8, 15.5-17.7m
						● 161/38 kPa In barrel	-13	17.5										
				SPT	100	2/2 3/4 5/8 **N=20**		18.0										
	18.45m: Core loss																	
				PQTT	33		-14	18.5										
	19.20m: Very strong light green layer [rhyolite?]							19.0										
	19.15m: Gravelly SILT, with minor clay; light brown. Firm; high plasticity; moist; gravel, fine to coarse, subrounded																	
	19.35m: Clayey SILT, with minor sand; dark green. Firm; high plasticity; moist; sand, fine.					● 38/19 kPa In barrel		19.5										
	19.50m: Core loss			SPT	0	2/3 4/4 4/3 **N=15**	-15											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 5 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	19.95m [Cont'd]: SILT, with some clay, with trace sand; greenish grey. Stiff to very stiff; high plasticity; moist; sand, fine. *20.45 - 20.55m:* Sandy SILT, with minor clay; greenish grey. Stiff to very stiff; low plasticity; moist; sand, fine. *20.55 - 20.60m:* wood fragment			HQTT	90		-16	20.5										
				SPT	100	● 110/16 kPa In barrel 1/1 1/2 3/3 **N=9**		21.0										Box 9, 17.7-21.5m
	21.45m: SILT, with some clay, with minor amorphous organic material, with trace sand; greenish grey. Very stiff to hard; low plasticity; moist; sand, fine.			HQTT	100		-17	21.5										
	22.50m: Core loss			SPT	0	2/3 5/5 7/7 **N=24**		22.0										
	22.95m: SILT, with some clay, with trace sand; light greenish grey. Very stiff to hard; low plasticity; moist; sand, fine.			HQTT	100		-18	22.5										
								23.0										
	24.10m: Sandy SILT, with minor clay; greenish grey. Very stiff to hard; low plasticity; moist; sand, fine to medium.			SPT	100	4/6 7/7 9/12 **N=35**	-19	23.5										
	24.45m: Core loss							24.0										
								24.5										
							-20											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: GBH105

SHEET: 6 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW EW HW MW DW CW)	Rock Strength (ES VS S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	24.95m [Cont'd]: Sandy SILT, with minor clay; greenish grey. Very stiff to hard; low plasticity; moist; sand, fine to medium.			HQTT	52		-21	25.5										Box 10, 21.5-25.5m
	25.50m: Core loss			SPT	0	3/4 6/9 9/11 **N=35**												
	25.95m: Gravelly SILT, with some sand; greenish grey. Moist; gravel, subrounded to subangular, Black; strong to very strong basalt; sand, fine.							26.0										
	26.05m: Core loss			HQTT	4													
							-22	26.5										
East Coast Bays Formation	27.00m: Slightly weathered; greenish grey; , bedded, gently inclined, thin; SILTSTONE; very weak.			SPT	58	5/10 20/14 16 for 40mm **N>=50**		27.0										
	27.65 - 27.70m: Slightly weathered; dark greenish grey; coarse fabric; SANDSTONE; very weak.			HQTT	79			27.5				79	27.85m: BF, 15° dip, VN					
	27.95m: Unweathered; dark greenish grey; massive; SANDSTONE; very weak; fine to medium sand.						-23	28.0										
	28.35m: Unweathered; greenish grey; bedded, gently inclined, very thin; SILTSTONE; very weak.																	
	28.50m: No recovery			SPT	0	21/24 26/24 for 50mm **N>=50** Solid		28.5				0						
	28.77m: Core loss			HQTT	60		-24	29.0				60						
	29.20m: Unweathered; greenish grey; bedded, gently inclined, very thin; SILTSTONE; very weak.																	
	29.25m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.							29.5										
	29.50m: Unweathered; dark greenish grey; bedded, gently inclined, very thin; SILTSTONE; weak.																	
	29.68m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.						-25											Box 11, 25.5-30.0m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH105

SHEET: 7 OF 7

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921363.21 mN 1756438.16 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 06/07/2018
FINISH DATE: 10/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
	29.89m [Cont'd]: Unweathered; dark greenish grey; bedded, gently inclined, thin; SILTSTONE; weak.				0	50 for 65mm **N>=50** Solid	-26	30.5										
								31.0										
								31.5										
							-27	32.0										
								32.5										
							-28	33.0										
								33.5										
							-29	34.0										
								34.5										
							-30											

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 30.06m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 1 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921388.32 mN 1756344.38 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 19/07/2018
FINISH DATE: 23/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete						0										
	0.15m: GRAVEL, with minor silt and sand; greyish brown. Loosely packed; dry; Some brick fragments.						0.5										
	0.55m: Gravelly SILT, with minor clay; black mottled orange brown. Loosely packed; moist.			HVAC	100		1.0										
	1.00m: Clayey SILT, with minor gravel; black mottled orange brown. Moist; gravel, fine, brick fragments.						1.5										
	1.50m: No recovery				0		2.0							01/08/2018			
	2.10m: BOULDERS, with some cobbles; dark reddish brown. Loosely packed; dry; boulders, subangular, up to 500mm.			OB	88		2.5										
	3.00m: Core loss						3.0							06/08/2018			
	3.55m: BOULDERS, with some cobbles; dark reddish brown. Loosely packed; dry; boulders, subangular, up to 500mm.			PQTT	63		3.5										
							4.0										
							4.5										

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 2 OF 6

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921388.32 mN 1756344.38 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 19/07/2018
FINISH DATE: 23/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	[Cont'd]: BOULDERS, with some cobbles; dark reddish brown. Loosely packed; dry; boulders, subangular, up to 500mm.			PQTT	20			5.5										
	5.30m: Core Loss																	
	6.20m: Fine SAND; grey. Loose, moist.			SPT	55	4/3 3/1 1/2 N=7	-1	6.0										Box 1, 2.1-6.5m
Marine Sediments	6.45m: SILT with minor clay and fine sand, with trace shell fragments; grey. Very soft, wet, low plasticity.			PQTT	95	CPT103-6.45-6.60 @ 6.5m 0.5ppm		6.5										
	6.90m: SILT with minor clay; grey. Soft, wet, low plasticity.					CPT103-7.40-7.50 @ 7.4m 19/5 kPa In barrel	-2	7.0										
				SPT	100	0/0 0/0 0/0 N=0		7.5										
				PQTT	100	DUP18 @ 8.4m CPT103 -8.4-8.7m @ 8.4m 0.4ppm	-3	8.0										
	8.50m: Fine sandy SILT, with some shell fragments, with trace clay. Grey, Stiff, moist low plasticity.							8.5										
Tauranga Group	8.70m: Silty CLAY; grey with mottled brown. Stiff, moist, high plasticity.					CPT103-8.7-9m @ 8.7m 0.3ppm 66/35 kPa In barrel	-4	9.0										Box 2, 6.5-9.0m
	9.45m: Core loss			SPT	100			9.5										
	9.68m: Silty CLAY; grey with mottled brown. Stiff, moist, high plasticity.						-5											

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc v3.0

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 3 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921388.32 mN 1756344.38 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 19/07/2018
FINISH DATE: 23/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	10.20m: Clayey SILT; light grey. Stiff; high plasticity; moist; some orange staining.			PQTT	68	● 66/35 kPa In barrel		10.5										
				SPT	100	0/0 1/1 1/2 **N=5**	-6											
	10.95m: Core loss							11.0										
	11.17m: Clayey SILT; light grey. Stiff; high plasticity; moist; some orange staining.																	
	11.30m: Clayey SILT, with trace sand; light greyish green. Stiff; high plasticity; moist; sand, fine. *11.40 - 11.45m:* Lense of black organic clay			PQTT	79			11.5										Box 3, 9.0-11.8m
				SPT	100	● 60/19 kPa In barrel 0/1 2/1 2/2 **N=7**	-7	12.0										
	12.80m: Sandy SILT, with minor clay; light greyish green. Firm; low plasticity; moist; sand, fine.			PQTT	100			12.5										
	13.00m: Silty SAND, with minor clay; light greyish green. Loose; low plasticity; moist; sand, fine.						-8	13.0										
				SPT	100	0/0 1/1 1/2 **N=5**		13.5										
	13.70m: Silty SAND, with minor clay; light greyish green. Loose; low plasticity; moist; sand, fine.						-9	14.0										
				PQTT	90			14.5										Box 4, 11.8-14.3m
							-10											

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 4 OF 6

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921388.32 mN, 1756344.38 mE (NZTM2000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 19/07/2018
FINISH DATE: 23/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, SW, CW, DW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	15.00m: Core loss			SPT	55	0/1 0/1 1/2 **N=4**	-11	15.5										
	15.20m: Silty SAND, with minor clay; light greyish green. Loose; low plasticity; moist; sand, fine.																	
	15.45m: Core loss			PQTT	70			16.0										
	15.76m: Silty SAND, with minor clay; light greyish green. Loose; low plasticity; moist; sand, fine.																	
	16.00m: SAND, with some wood fragments and silt, with minor clay; greyish green. Loose; non-plastic; moist; sand, fine to coarse. *16.00 - 17.50m:* Moderately thin interbedded sand and fibrous black wood fragments up to 50mm thick			SPT	95	1/0 1/1 2/3 **N=7**	-12	16.5										
				PQTT	95			17.0										
	17.50m: Clayey SILT, with trace amorphous organic material; light greyish green. Very stiff; high plasticity; moist.							17.5										
	18.10m: SAND, with some silt, with minor clay; greenish grey. Loose to medium dense; non-plastic; moist; sand, fine to medium.			SPT	88	2/2 2/3 3/4 **N=12**	-13	18.0										
	18.20m: Sandy SILT, with minor clay, with trace amorphous organic material lenses and spots; greyish green. Medium dense to dense; low plasticity; moist; sand, fine.			PQTT	100			18.5										
							-14	19.0										
				SPT	100	2/3 5/6 8/9 **N=28**		19.5										
							-15											

Box 5, 14.3-17.1m

Box 6, 17.1-19.9m

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 5 OF 6

PROJECT: Orams Site 18	CO-ORDINATES: 5921388.32 mN (NZTM2000) 1756344.38 mE	R.L. GROUND: 4.93m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Total Station\Surveyed

DRILLED BY: James
LOGGED BY: JASM
CHECKED: MHU
START DATE: 19/07/2018
FINISH DATE: 23/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	20.00m: Sandy SILT, with minor clay, with trace amorphous organic material lenses and spots; greyish green. Medium dense to dense; low plasticity; moist; sand, fine.			PQTT	95		-16	20.5										
	21.00m: Core loss			SPT	66	2/3 4/5 7/8 **N=24**		21.0										
	21.15m: Silty SAND, with minor clay; greyish green. Medium dense; low plasticity; moist to wet; sand, fine.							21.5										
	22.00m: Sandy SILT, with minor clay, with trace amorphous organic material; greyish green. Stiff; low plasticity; moist; sand, fine.			PQTT	95		-17	22.0										
				SPT	100	● 69/25 kPa In barrel 3/4 5/7 8/9 **N=29**		22.5										Box 7, 19.9-22.5m
	23.52 - 23.53m: Black fibrous wood fragment			PQTT	100		-18	23.0										
				SPT	77	2/3 4/5 5/5 **N=19**	-19	23.5 24.0										
								24.5										
							-20											

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH111P

SHEET: 6 OF 6

PROJECT: Orams Site 18

JOB No.: 30881.2000_1000

LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921388.32 mN 1756344.38 mE

DIRECTION: 0°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.93m

R.L. COLLAR:

DATUM: Site

SURVEY: Total Station\Surveyed

DRILLED BY: James

LOGGED BY: JASM

CHECKED: MHU

START DATE: 19/07/2018

FINISH DATE: 23/07/2018

CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	25.25m: SAND, with some silt, with minor clay; dark greyish green. Tightly packed; non-plastic; moist; sand, fine to coarse.			PQTT	95			25.5										Box 8, 22.5-25.3m
East Coast Bays Formation	25.34m: Clayey SILT; greyish green. Very stiff to hard; high plasticity; moist.			SPT	100	8/12 19/31 for 70mm **N>=50**	-21											
	25.46m: Slightly weathered; dark greenish grey; , bedded, gently inclined, very thin; SILTSTONE; very weak.							26.0										
	25.50m: Slightly weathered; dark greenish grey; massive; SANDSTONE; very weak.																	
	25.65m: Slightly weathered; dark greenish grey; SILTSTONE with trace plastic peat; very weak.																	
	26.20m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.			HQTT	91			26.5				91						
	26.40m: Unweathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE with trace layers of amorphous peat; very weak.																	
				SPT	0	32/18 for 20mm **N>=50** Solid	-22	27.0										
	27.20m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.			HQTT	96			27.5										
	27.65m: Unweathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE; very weak. *27.90 - 27.95m:* SANDSTONE.						-23	28.0				96						Box 9, 25.3-28.3m
	28.30m: Unweathered; dark greenish grey; massive; SANDSTONE; weak.			SPT	0	29/21 for 45mm **N>=50** Solid		28.5										Box 10, 28.3-28.5m
							-24	29.0										
								29.5										
							-25											

Elevation in Chart Datum. Hole was originally planned as CPT103 but because of basalt boulders at surface was changed to a borehole. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC. Slotted 6.11-8.07m and packed with K2 sand.

Hole Depth 28.62m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH301

SHEET: 1 OF 4

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921407.91 mN 1756336.26 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -4.47m
R.L. COLLAR:
DATUM: Site
SURVEY: Handheld GPS

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 27/07/2018
FINISH DATE: 30/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation
Marine Sediments	0.00m: Core loss
	0.30m: SILT, with minor clay, sand, shell fragments and amorphous organic material; dark greenish grey. Very soft to soft; low plasticity; wet; sand, fine.
Tauranga Group	0.75m: Clayey SILT, with trace amorphous organic material (black and orange colour); light greenish grey. Firm to stiff; high plasticity; moist.
	1.25m: SILT, with minor clay and amorphous organic material, with trace sand; light greenish grey. Stiff; low plasticity; moist; sand, fine.
	2.55m: Clayey SILT with trace amorphous organic material; light greenish grey. Very stiff; high plasticity; moist.
	3.00m: SILT, with some clay and amorphous organic material; dark brown. Firm; low plasticity; moist.
	3.35m: Sandy SILT, with minor clay, with trace amorphous organic material; light greenish gey. Very stiff; low plasticity; moist; sand, fine.
	3.75m: Core loss

Rock Weathering: UW, EW, HW, MW, HW, CW, DW
Rock Strength: ES, VS, S, MS, M, W, VW, EW

Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
OB	87	GBH301-.3-.4m @ 0.3m 0ppm	-5	0.5
		GBH301-.5-.6m @ 0.5m 0ppm		
		GBH301-.6-.7m @ 0.6m 0.6ppm		
		GBH301-.85-1.05m @ 0.9m 0ppm		1.0
		GBH301-1.25-1.45m @ 1.3m 1.8ppm	-6	1.5
		● 79/22 kPa In barrel		
HQTT	87	GBH301-2.25-2.45m @ 2.3m 1.1ppm	-7	2.0
				2.5
		● 132/50 kPa In barrel		3.0
		GBH301-3.1-3.3m @ 3.1m 0.7ppm	-8	3.5
HQTT	48			4.0
		GBH301-4.5-5m @ 4.5m 0.6ppm	-9	4.5

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) 2000, 600, 200, 60, 20; RQD (%); Description & Additional Observations

Fluid Loss (%) 25, 50, 75; Water Level; Casing; Installation; Core Box No

Box 1, 0.0-2.8m

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 19.33m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: GBH301

SHEET: 2 OF 4

PROJECT: Orams Site 18	CO-ORDINATES: (NZTM2000) 5921407.91 mN 1756336.26 mE	R.L. GROUND: -4.47m
JOB No.: 30881.2000_1000		R.L. COLLAR:
LOCATION: Orams Site 18, Beaumont St, Auckland	DIRECTION: 0°	DATUM: Site
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 27/07/2018
FINISH DATE: 30/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: Core loss			HQTT	26	GBH301-5.6-6m @ 5.6m 0.6ppm	-10	5.5										
	5.6m: SAND, with some silt, with minor clay; greenish grey. Loose to medium dense; non-plastic; wet to saturated; uniformly graded; sand, fine to medium.			SPT	88	1/2 1/2 2/6 N=11		6.0										
	6.45m: Core loss			HQTT	53	GBH301-6.45-6.85m @ 6.5m 0.2ppm	-11	6.5										
	6.94m: SAND, with some silt, with minor clay; greenish grey. Loosely packed; non-plastic; wet to saturated; uniformly graded; sand, fine to medium.							7.0										
	7.40m: Clayey SILT with trace organic material; light greenish grey. Very stiff; high plasticity; moist; uniformly graded. *7.40 - 7.50m:* Wood fragment			SPT	100	1/2 2/2 2/3 N=9	-12	7.5										Box 2, 2.8-8.0m
				HQTT	100		-13	8.0 8.5										
	8.90m: SILT, with some sand, with minor clay; light greenish grey. Stiff; low plasticity; moist; well graded; sand, fine.			SPT	100	1/2 3/3 4/4 N=14		9.0										
							-14	9.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 19.33m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH301

SHEET: 3 OF 4

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921407.91 mN 1756336.26 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -4.47m
R.L. COLLAR:
DATUM: Site
SURVEY: Handheld GPS

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 27/07/2018
FINISH DATE: 30/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Tauranga Group	10.00m: Sandy SILT, with minor clay; light greenish grey. Stiff; low plasticity; moist; sand, fine.			HQTT	95		-15	10.5										Box 3, 8.0-10.6m
	10.60m: Core loss			SPT	55	4/4 5/8 10/11 **N=34**												
	10.80m: Silty SAND, with trace clay; light greenish grey. Medium dense to dense; non-plastic; moist; sand, fine to medium.							11.0										
	11.05m: Core Loss			HQTT	0		-16	11.5										
	12.00m: Silty SAND, with minor clay and gravel; light greenish grey. Medium dense; non-plastic; moist; sand, fine to coarse; gravel, fine, subrounded to rounded.			SPT	44	2/2 4/5 7/8 **N=24**		12.0										
	12.60m: Sandy SILT, with minor clay and wood fragments; light greenish grey. Stiff; low plasticity; moist; sand, fine.			HQTT	72		-17	12.5										
	13.00m: Core loss			SPT	0	13/11 10/10 6/6 **N=32** Solid		13.0										
East Coast Bays Formation	13.45m: Slightly weathered; greenish grey; SILTSTONE; very weak.			HQTT	22		-18	13.5										
	13.55m: Core loss																	
	13.90m: Slightly weathered; dark greenish grey; SILTSTONE; very weak.			SPT	18	5/8 9/11 16/14 for 60mm **N>=50** Solid		14.0										
	13.98m: Core loss						-19	14.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 19.33m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH301

SHEET: 4 OF 4

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921407.91 mN 1756336.26 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -4.47m
R.L. COLLAR:
DATUM: Site
SURVEY: Handheld GPS

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 27/07/2018
FINISH DATE: 30/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
East Coast Bays Formation	15.20m: Slightly weathered; greenish grey; SILTSTONE; very weak. 15.26m: Core loss			HQTT	0													
				SPT	100	37/13 for 10mm **N>=50** Solid	-20	15.5										
				HQTT	0			16.0										
	16.50m: Unweathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE; very weak. 16.56m: Core loss			SPT	46	22/28 for 60mm **N>=50** Solid	-21	16.5										
				HQTT	0			17.0										
	17.70m: Unweathered; dark greenish grey; , bedded, gently inclined, thin; SILTSTONE; very weak.						-22	17.5										Box 4, 10.6-18.0m
	18.05m: Unweathered; dark greenish grey; massive; SANDSTONE; very weak.			HQTT	100			18.0				100	18.10 - 19.10m: J, 80° dip, T, no infill					
							-23	18.5										Box 5, 18.0-19.2m
				SPT	0	29/21 for 55mm **N>=50** Solid		19.0										
							-24	19.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted.

Hole Depth 19.33m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:44 PM - Produced with Core-GS by GeRoc

BECA

BOREHOLE No: **BH01**

MACHINE BOREHOLE LOG

SHEET 1 of 3

PROJECT: Jellicoe to Madden Western Edge — JOB NUMBER: 3122212

SITE LOCATION: Jellicoe St — CLIENT: Auckland Waterfront Development A

CIRCUIT: NZTM — BOREHOLE LOCATION: see plan

COORDINATES: N 5,921,423.84 m — R L: 4.6m CD m

E 1,756,358.96 m — DATUM:

DRILLING: FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	IN-SITU TESTS: SV	T (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		0 %	V.E									GW	D	Concrete.	FILL	
														Cuttings: fine to coarse GRAVEL, minor cobbles, trace sand, trace silt; greyish brown; dry, non plastic. Gravel: moderately strong, slightly weathered, sub-angular to sub-rounded basalt.		
		56 %	SPT					2 2 1 0 0 0 N=1		1		SW	M	Cuttings: gravelly fine to coarse SAND, minor cobbles, trace silt; light greyish brown; moist, non plastic. (Fill: concrete, bricks, basalt).		
														1.65m: moderately thin bed of clayey SILT, some fine to coarse gravel, minor fine to coarse sand, trace shells; yellowish brown mottled orange; moist, highly plastic.		
		95 %	SONIC							2		SM	W	1.8m: moderately thin bed of clayey SILT, some fine to coarse gravel, minor fine to coarse sand, trace shells; yellowish brown mottled orange; moist, highly plastic.		
														Very loose silty SAND, minor fine to coarse gravel; brownish green speckled orange; wet, non plastic. Gravel: moderately strong, slightly weathered, subangular basalt.		
												ML	M	Dark green mottled dark grey and mottled orange.		
		100 %	SPT					4 4 2 1 2 3 N=8		3		GW	M	Soft SILT, minor fine sand, minor clay, trace organics; green speckled brown; moist, low plasticity.		
		86 %	SONIC							4				Loosely packed COBBLES,some fine to coarse gravel, trace silt, trace sand; blackish grey; moist, non plastic. Cobbles/Gravel: moderately strong, slightly weathered, sub-angular to sub-rounded basaltic scoria. 3.15m: moderately thin bed of silty SAND, trace shells; greenish grey; wet, non plastic. (Strong presence/smell of hydrocarbons).		
		100 %	SPT					3 4 1 3 2 2 N=8		5						
		100 %	SONIC													
		22 %	SPT					0 2 8 4 1 0 N=13		6				No Recovery.		
		100 %	SONIC			10/0	16/0			7		ML	M	Very soft sandy SILT, trace clay, trace shells, trace organics; greyish green speckled brown; moist, low plasticity; green speckled brown; moist, low plasticity. Poor recovery in SPT.	Tauranga Group	
		100 %	SPT			12/2	20/3	0 0 0 0 0 0 N=0		8						
		100 %	SONIC									SM	W	Very loose silty SAND, trace shells; greyish green speckled white; wet, non plastic.		
		53 %	SPT					0 0 0 1 1 2 N=4		9		CH	M	Firm silty CLAY, some sand; brownish grey mottled orange; moist, highly plastic, sensitive.		
		100 %	SONIC													

DATE STARTED: 15/12/11 — DRILLED BY: Pro-drill (Auck) Ltd

DATE FINISHED: 15/12/11 — EQUIPMENT: Super Sonic 1000

LOGGED BY: BGW — DRILL METHOD: Sonic

SHEAR VANE No: Geo613 — DRILL FLUID:

DIAMETER/INCLINATION: - / 90°

COMMENTS:
V.E = Vacuum Excavation. SC = Solid Cone SPT

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\3122\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA.GDT 24/2/12

A4 Scale 1:50

Beca

BOREHOLE No: **BH01**

MACHINE BOREHOLE LOG

SHEET 2 of 3

PROJECT: Jellicoe to Madden Western Edge
JOB NUMBER: 3122212
SITE LOCATION: Jellicoe St
CLIENT: Auckland Waterfront Development A

CIRCUIT: NZTM
COORDINATES: N 5,921,423.84 m
E 1,756,358.96 m
BOREHOLE LOCATION: see plan
R L: 4.6m CD m
DATUM:

DRILLING: FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	SONIC									CH	M	Grey mottle orange.		
		100 %	SPT			20/5	32/7	0 0 0 1 1 0 N=2						Light brown speckled orange and dark purple.		
										11		CH	M	Firm sandy silty CLAY; light brownish grey mottled orange; moist, high plasticity.		
												SM	W	Very loose silty SAND; greyish green; wet, non plastic.		
		95 %	SONIC									MH	M	Stiff sandy SILT, some clay, trace organics; green speckled brown; moist, high plasticity.		
		100 %	SPT			50/25	80/38	0 0 0 1 2 1 N=4		12						
		100 %	SONIC									SM	M	Loose silty SAND, trace organics, trace shells; greyish green speckled brown; moist, non plastic. Organics: amorphous.		
		100 %	SPT					0 0 1 1 1 2 N=5		13						
		100 %	SONIC													
		0 %	SPT					1 1 1 3 3 4 N=11		14						
		100 %	SONIC											15.85m: moderately thin bed of fine to coarse SAND; dark grey.		
		0 %	SPT							15				Lensoid of fine to coarse SAND; dark grey.	Tauranga Group (Contd.)	
		100 %	SONIC					1 1 3 3 3 4 N=13		16						
		100 %	SPT			140+	140+	1 2 3 3 3 3 N=12		17		CH	M	Very stiff silty CLAY, trace sand; light green; moist, high plasticity. Light brown mottled dark brown. Trace fibrous organics.		
		100 %	SONIC							18		SM	M	Medium dense silty SAND; greyish green speckled dark green and white, stained purple; moist, non plastic.		
		100 %	SPT					1 3 3 3		19				Trace organics.		

DATE STARTED: 15/12/11
DATE FINISHED: 15/12/11
LOGGED BY: BGW
SHEAR VANE No: Geo613

DRILLED BY: Pro-drill (Auck) Ltd
EQUIPMENT: Super Sonic 1000
DRILL METHOD: Sonic
DRILL FLUID:
DIAMETER/INCLINATION: - / 90°

COMMENTS:
V.E = Vacuum Excavation. SC = Solid Cone SPT

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\3122\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA_GINT 24/2/12

A4 Scale 1:50

Beca

BOREHOLE No: **BH01**

MACHINE BOREHOLE LOG

SHEET 3 of 3

PROJECT:	Jellicoe to Madden Western Edge	JOB NUMBER:	3122212
SITE LOCATION:	Jellicoe St	CLIENT:	Auckland Waterfront Development A
CIRCUIT:	NZTM	BOREHOLE LOCATION:	see plan
COORDINATES:	N 5,921,423.84 m E 1,756,358.96 m	R L:	4.6m CD m
		DATUM:	

DRILLING						IN-SITU TESTS										
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	T (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	SONIC					4 5 N=15				SM	M	Medium dense silty SAND; greyish green speckled dark green and white, stained purple; moist, non plastic.	Tauranga Group (Contd.)	
		100 %	SPT					2 4 4 6 5		21				21.35m: moderately thin bed of fine to coarse silty fine gravelly SAND; grey; wet, non plastic.		
		100 %	SONIC					6 N=21				SM	W	Medium dense fine to coarse SAND, minor silt; greyish green; wet, non plastic. 21.8m: moderately thick bed of fine to coarse silty fine gravelly SAND; grey; wet, non plastic.		
		100 %	SPT					5 8 10 8 8		22		MH	M	Hard clayey SILT, trace sand; greyish green; moist, high plasticity.		
		100 %	SONIC					7 N=33		23				22.75m: moderately thin bed of fine to coarse SAND, minor silt; greyish green; wet, non plastic.		
		100 %	SPT					10 13 25 25 for 55mm N=50+		24		SW	M	Very dense fine to coarse SAND, some medium to coarse gravel, some silt; greenish grey; wet, non plastic.		
		100 %	SONIC							25		MH	M	Hard clayey SILT, trace sand; greyish green; moist, high plasticity.		
		SC	SPT					23 27 for 75mm N=50+		26						
		100 %	SONIC									SW	W	Trace amorphous organics. Speckled brown. Very dense fine to coarse SAND, some silt; grey; wet, non plastic.	Waitemata Group	
		SC	SPT					12 15 22 28 for 75mm N=50+		27		ML	M	Hard clayey SILT, trace sand; greyish green; moist, high plasticity. Moderately thinly interbedded with dense fine to medium SAND. [Extremely weak SW-MW silstone and sandstone?].		
		100 %	SONIC							28						
		SC	SPT					18 32 for 70mm N=50+						END OF LOG @ 28.65 m		
										29						

DATE STARTED:	15/12/11	DRILLED BY:	Pro-drill (Auck) Ltd	COMMENTS:
DATE FINISHED:	15/12/11	EQUIPMENT:	Super Sonic 1000	V.E = Vacuum Excavation. SC = Solid Cone SPT
LOGGED BY:	BGW	DRILL METHOD:	Sonic	
SHEAR VANE No:	Geo613	DRILL FLUID:		
		DIAMETER/INCLINATION:	- / 90°	

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\312\3122212\TGE\ELLICOE TO MADDEN WESTERN EDGE.GPJ BECA_SGT 24/2/12

A4 Scale 1:50

MACHINE BOREHOLE LOG

BOREHOLE No: **BH02**

SHEET 1 of 4

PROJECT:	Jellicoe to Madden Western Edge	JOB NUMBER:	3122212
SITE LOCATION:	Jellicoe St	CLIENT:	Auckland Waterfront Development A
CIRCUIT:	NZTM	BOREHOLE LOCATION:	see plan
COORDINATES:	N 5,921,372.38 m E 1,756,336.47 m	R L:	4.6m CD m
		DATUM:	

DRILLING						IN-SITU TESTS									
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	'f' (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		0 %	V.E							0				Concrete.	FILL	
														No recovery. Vacuum extracted.		
										1						
												SP	M	Loosely packed gravelly SAND, minor silt; greenish brown; moist, non plastic.		
												MH	M	Soft gravelly clayey SILT, minor sand; dark greenish brown; moist, high plasticity.		
										2		GP	W	Loosely packed fine to coarse sandy fine to medium GRAVEL, minor silt; dark grey; wet, non plastic.		
														Brown.		
		100 %	SPT					2 1 0 17		3						
								2 15 N=34				GW	W	Dense COBBLES, some fine to coarse gravel, trace silt, trace sand; dark grey; wet, non plastic.		
		100 %	SONIC													
										4		MH	W	Minor wood fragments.		
														Soft SILT, some clay, minor sand; greenish dark grey, mottled black; wet, high plasticity.		
		22 %	SPT					1 1 1 1				SW	W	Some cobbles.		
								2 1 N=5		5				Loose SAND, some silt, minor shells; greenish grey; wet, non plastic. Poor recovery in SPT.		
		100 %	SONIC													
		100 %	UT							6				Undisturbed tube.		
		0 %	SPT					0 0 0 0						No recovery in SPT.		
		100 %	SONIC			7/2	10/3	0 N=0		7		MH	W	Very soft clayey SILT, trace sand; greyish green; wet, high plasticity.		
								0						Some sand.		
		33 %	SPT			8/2	13/3	1 0 1				ML	M	Very soft SILT, minor clay, trace organics, trace sand; grey mottled orange, speckled brown; moist, low plasticity. Organics: fibrous.		
		100 %	SONIC			24/4	38/7	0 0 N=1		8		MH	W	Firm clayey SILT, trace sand; greyish green; wet, high plasticity.	Tauranga Group	
		18 %	SPT			36/16	57/26	0 0 0 0 1		9				Poor recovery in SPT.		
		100 %	SONIC					1 N=2								

DATE STARTED:	16/12/11	DRILLED BY:	Pro-drill (Auck) Ltd	COMMENTS:	
DATE FINISHED:	16/12/11	EQUIPMENT:	Super Sonic 1000	V.E = Vacuum Excavation. SC = Solid Cone SPT	
LOGGED BY:	BGW	DRILL METHOD:	Sonic		
SHEAR VANE No:	Geo613	DRILL FLUID:			
		DIAMETER/INCLINATION:	- / 90°		

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:50

MACHINE_BOREHOLE P:\3122\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA_GINT 24/2/12

BECA

BOREHOLE No: **BH02**

MACHINE BOREHOLE LOG

SHEET 2 of 4

PROJECT: Jellicoe to Madden Western Edge
JOB NUMBER: 3122212
SITE LOCATION: Jellicoe St
CLIENT: Auckland Waterfront Development A

CIRCUIT: NZTM
COORDINATES: N 5,921,372.38 m
E 1,756,336.47 m
BOREHOLE LOCATION: see plan
R L: 4.6m CD m
DATUM:

DRILLING: FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	SONIC									MH	M	Very soft SILT, some clay, trace organics, trace sand; grey speckled brown; moist, high plasticity. Organics: fibrous.		
		58 %	SPT					1 1 1 0 1 2 N=4						Soft.		
		97 %	SONIC							11						
		100 %	SPT			10/5	16/7	0 0 0 0 0 0 N=0		12				Greyish brown speckled brown.		
		97 %	SONIC													
										13		MH	M	Firm sandy SILT, minor clay, trace organics; greyish green mottled green; moist, high plasticity. Organics: amorphous.		
		89 %	SPT					1 1 1 2 2 3 N=8				SM	M	Loose silty SAND, trace organics; greenish grey streaked brown; moist, non plastic. Organics: fibrous.		
		97 %	SONIC							14		SM	M	Medium dense SAND, some silt, trace organics; grey mottled green; wet, non plastic		
		0 %	SPT					2 3 4 5 5 4 N=18		15				No recovery in SPT.		
		100 %	SONIC									SM	M	Medium dense SAND, some silt, trace organics; grey mottled green; wet, non plastic		
		56 %	SPT					1 2 2 3 3 4 N=12		16		MH	W	Very stiff clayey SILT, trace sand; green; moist, high plasticity. Extremely closely spaced very thin beds of fine to coarse SAND, minor silt.		
		100 %	SONIC									SM	M	Medium dense silty SAND, some organics; greyish green mottled dark brown; moist, non plastic. Organics: wood fragments. 16.48m: Thin beds of fine to coarse SAND.		
		22 %	SPT					1 1 2 2 1 1 N=6		17				17.25m: moderately thin beds of clayey SILT, trace sand; green; moist, high plasticity.		
		100 %	SONIC							18				Some wood fragments-semi decomposed. Loose; light greyish green speckled light brown. Trace amorphous organics. Poor recovery in SPT.		
		0 %	SPT					1 2 2 3		19				No recovery in SPT.		

Tauranga Group *(Contd.)*

DATE STARTED: 16/12/11
DATE FINISHED: 16/12/11
LOGGED BY: BGW
SHEAR VANE No: Geo613

DRILLED BY: Pro-drill (Auck) Ltd
EQUIPMENT: Super Sonic 1000
DRILL METHOD: Sonic
DRILL FLUID:
DIAMETER/INCLINATION: - / 90°

COMMENTS:
V.E = Vacuum Excavation. SC = Solid Cone SPT

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\3121\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA_GST 24/2/12

A4 Scale 1:50

BECA

BOREHOLE No: **BH02**

MACHINE BOREHOLE LOG

SHEET 3 of 4

PROJECT: Jellicoe to Madden Western Edge
JOB NUMBER: 3122212
SITE LOCATION: Jellicoe St
CLIENT: Auckland Waterfront Development A

CIRCUIT: NZTM
COORDINATES: N 5,921,372.38 m
E 1,756,336.47 m
BOREHOLE LOCATION: see plan
R L: 4.6m CD m
DATUM:

DRILLING: FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	SONIC					3 3 N=11				SM	M	Medium dense silty SAND, some organics; greyish green mottled dark brown; moist, non plastic. Organics: wood fragments.		
		100 %	SPT					2 4 4 4 5 6 N=19		21		SW	W	Medium dense fine to coarse SAND, some silt; grey; wert, non plastic.		
		100 %	SONIC							22				22.15m: laminated beds of fine GRAVEL, trace silt.		
		0 %	SPT					1 2 4 4				SM	M	22.3m: laminated beds of fine GRAVEL, trace silt. Grades to medium dense silty fine SAND; greenish grey; moist, non plastic. Trace fibrous organics. Brownish grey streaked and speckled brown. No recovery in SPT.		
		95 %	SONIC					3 4 N=15		23		SM	M	Grades to medium dense silty fine SAND; greenish grey; moist, non plastic.		
		100 %	SPT					1 2 4 7 10 6 N=27		24		MH	M	Minor wood fragments. 24.2m: moderately thin bed of clayey SILT, trace sand; brownish green; moist, high plasticity. Hard clayey SILT, trace sand; brownish green; moist, high plasticity.	Tauranga Group *(Contd.)*	
		97 %	SONIC							25		ML	M	Very stiff SILT, minor clay, minor sand, trace organics; greyish green mottled brown; moist, low plasticity. Organics: amorphous.		
		100 %	SPT					4 7 4 9 12 12 N=37		26		MH	M	Hard clayey SILT, trace sand; brownish green; moist, high plasticity. 25.8m: moderately thin beds of fine to coarse SAND, some silt; grey; moist, non plastic. 25.9m: thin bed of fine to coarse SAND, some silt; grey; moist, non plastic. 26.3m: moderately thick bed of fine to coarse SAND, some silt; grey; moist, non plastic.		
		100 %	SONIC													
		96 %	SPT					8 15 25 25 for 70mm N=50+		27		SW	M	Very dense fine to coarse SAND, some silt; greenish grey; moist, non plastic.		
		100 %	SONIC							28		ML	M	Hard SILT, trace sand, trace mica, trace shell fragments; greenish grey; moist, low plasticity.		
		100 %	SPT					13 15 23 27 for 70mm N=50+		29						
		100 %	SONIC													

DATE STARTED: 16/12/11
DATE FINISHED: 16/12/11
LOGGED BY: BGW
SHEAR VANE No: Geo613

DRILLED BY: Pro-drill (Auck) Ltd
EQUIPMENT: Super Sonic 1000
DRILL METHOD: Sonic
DRILL FLUID:
DIAMETER/INCLINATION: - / 90°

COMMENTS:
V.E = Vacuum Excavation. SC = Solid Cone SPT

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\3121\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA_3.5T 24/2/12

A4 Scale 1:50

BOREHOLE No: **BH02**

MACHINE BOREHOLE LOG

SHEET 4 of 4

PROJECT: Jellicoe to Madden Western Edge
JOB NUMBER: 3122212
SITE LOCATION: Jellicoe St
CLIENT: Auckland Waterfront Development

CIRCUIT: NZTM
COORDINATES: N 5,921,372.38 m
E 1,756,336.47 m
BOREHOLE LOCATION: see plan
R L: 4.6m CD m
DATUM:

DRILLING						IN-SITU TESTS										
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	ROD	CASING	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		SC	SPT					18 32 for 70mm N=50+		31		SW	M	Very dense fine to medium SAND, some silt; greenish grey; moist, non plastic.	Waitemata Group	
		100 %	SONIC									ML	M	Hard SILT, trace sand, trece shell fragments; greenish grey; moist, low plasticity. Gently inclined contact.		
		SC	SPT					30 20 for 45mm N=50+						END OF LOG @ 31.62 m		
										32						
										33						
										34						
										35						
										36						
										37						
										38						
										39						

DATE STARTED: 16/12/11
DATE FINISHED: 16/12/11
LOGGED BY: BGW
SHEAR VANE No: Geo613

DRILLED BY: Pro-drill (Auck) Ltd
EQUIPMENT: Super Sonic 1000
DRILL METHOD: Sonic
DRILL FLUID:
DIAMETER/INCLINATION: - / 90°

COMMENTS:
V.E = Vacuum Excavation. SC = Solid Cone SPT

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

MACHINE_BOREHOLE P:\3121\3122212\TGE\JELLICOE TO MADDEN WESTERN EDGE.GPJ BECA.GDT 24/2/12

A4 Scale 1:50

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH106P

SHEET: 1 OF 4

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921351.23 mN 1756383.79 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.01m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 24/07/2018
FINISH DATE: 26/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.00m: Concrete																	
	0.50m: Silty GRAVEL, with some cobbles, with minor sand; darn brown. Loosely packed; moist; gravel, fine to coarse, subangular, basalt; cobbles, up to 80mm; sand, coarse.			SNC	81	GBH106-5-.8m @ 0.5m 0.8ppm		0.5										
	0.80m: GRAVEL, with some silt and sand and cobbles; dark brown. Loosely packed; moist; gravel, fine to coarse, subangular, basalt and brick fragments; cobbles, up to 150mm.																	
	1.10m: GRAVEL, with some silt and sand; dark brown. Loosely packed; moist; gravel, fine to coarse, subangular, basalt. *1.20m:* Vapor barrier HDPE black sheet			HVAC	85	GBH106 -1.2-1.4m @ 1.2m 11.3ppm	4	1.0										
	1.50m: Core loss			SNC	10	GBH106-1.5-2m @ 1.5m 5.5ppm		1.5										
	1.95m: SILT & GRAVEL, with some clay and sand; dark brown. Loosely packed; saturated; gravel, fine to medium, subangular; Faint hydrocarbon odour.						3	2.0							01/08/2018			
	2.00m: Core loss			SNC	21													
	2.55m: Gravelly SILT, with some sand, with minor clay; dark greenish grey with orange staining. Soft; low plasticity; wet; gravel, fine to coarse, subangular, Mudstone and sandstone; sand, fine to coarse. Hydrocarbon odour. [Hydraulic Fill]			SNC	100	GBH106-2.7-3m @ 2.7m 122ppm		2.5										
	3.00m: Piston sample			PT	80	PT1 @ 3.0m	2	3.0										Box 1, 0.0-3.0m
	3.50m: Core loss							3.5										
	3.91m: Gravelly SILT, with some sand, with minor clay; dark greenish grey. Soft; low plasticity; wet; gravel, fine to coarse, subangular, Mudstone and sandstone; sand, fine to coarse. Hydrocarbon odour. Orange staining. [Hydraulic Fill]			SNC	59	GBH106 -4.1-4.3m @ 4.1m 4.6ppm DUP20 @ 4.1m	1	4.0										
	4.40m: Clayey SILT, with trace sand; light grey. Soft; high plasticity; moist; sand, fine. [Hydraulic Fill]					19/5 kPa In barrel												
	4.50m: Piston sample			PT	100	PT2 @ 4.5m		4.5										

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.10-4.29m and packed with K2 sand.

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.: GBH106P

SHEET: 2 OF 4

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921351.23 mN 1756383.79 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.01m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 24/07/2018
FINISH DATE: 26/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	5.00m: Core loss																	
	5.40m: SILT, with minor clay, with trace sand; dark grey. Soft; low plasticity; moist; sand, fine; Hydrocarbon odour. [Hydraulic Fill]			SNC	60	GBH106 @ 5.4m 1ppm		5.5										
	5.70m: Shelly SAND, with some silt, with minor clay; dark grey. Loosely packed; low plasticity; wet; sand, fine to coarse. [Hydraulic Fill]						-1											
	6.00m: Piston sample dropped out of tube			PT	0			6.0										
	6.50m: Core loss							6.5										
Marine Sediments	6.75m: SILT, with some clay, with minor sand, shell and wood fragments; dark greenish grey. Soft to firm; low plasticity; moist; sand, fine.			SNC	75	GBH106-6.85-7.15m @ 6.9m 0.2ppm DUP21 @ 6.9m 23/4 kPa In barrel	-2	7.0										Box 2, 3.0-7.4m
	7.50m: Piston sample			PT	100			7.5										
	8.00m: Core loss						-3	8.0										
	8.40m: SILT, with minor clay, with trace sand and shell fragments; dark greenish grey. Soft to firm; low plasticity; moist; sand, fine.			SNC	60	GBH106 -8.4-8.8m @ 8.4m 0.3ppm		8.5										
	9.00m: Piston sample			PT	100		-4	9.0										
	9.50m: Core loss							9.5										
Tauranga Group	9.70m: Clayey SILT, with minor amorphous organic material; light brownish grey. Firm to stiff; high plasticity; moist.					GBH106 -9.7-10.3m @ 9.7m												

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.10-4.29m and packed with K2 sand.

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH106P

SHEET: 3 OF 4

Tonkin+Taylor

PROJECT: Orams Site 18
JOB No.: 30881.2000_1000
LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: 5921351.23 mN, 1756383.79 mE (NZTM2000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.01m
R.L. COLLAR:
DATUM: Site
SURVEY: Total Station\Surveyed

DRILLED BY: Lance
LOGGED BY: JASM
CHECKED: MHU
START DATE: 24/07/2018
FINISH DATE: 26/07/2018
CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, SW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: Clayey SILT, with minor amorphous organic material; light brownish grey. Firm to stiff; high plasticity; moist.			SNC	80	● 57/13 kPa In barrel		10.5										Box 3, 7.4-10.3m
				SPT	100	0/0 0/0 0/0 N=0	-6	11.0										
	11.10m: Clayey SILT, with trace sand, with minor organic material; light greenish grey. Soft to firm; low plasticity; moist; sand, fine. *11.20m:* wood fragment and white sandy SILT pod *11.80m:* 50mm wood fragment			SNC	93			11.5										
	11.90m: SILT, with some clay, with trace sand and amorphous organic material; dark greenish grey. Firm; low plasticity; moist; sand, fine.			SNC	100	● 35/6 kPa In barrel 0/0 0/0 0/0 N=0	-7	12.0										
				SNC	100		-8	12.5 13.0										Box 4, 10.3-13.0m
	13.35 - 13.37m: Sandy SILT; greenish grey. *13.45 - 13.46m:* Sandy SILT.			SNC	100	● 28/6 kPa In barrel	-9	13.5 14.0										
	14.15m: SILT, with some clay, with trace amorphous organic material; light grey. Stiff; low plasticity; moist.							14.5										
	14.60m: SILT, with some clay; greenish grey. Very stiff; low plasticity; moist.																	

Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.10-4.29m and packed with K2 sand.

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: GBH106P

SHEET: 4 OF 4

PROJECT: Orams Site 18

JOB No.: 30881.2000_1000

LOCATION: Orams Site 18, Beaumont St, Auckland

CO-ORDINATES: (NZTM2000) 5921351.23 mN 1756383.79 mE

DIRECTION: 0°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.01m

R.L. COLLAR:

DATUM: Site

SURVEY: Total Station\Surveyed

DRILLED BY: Lance

LOGGED BY: JASM

CHECKED: MHU

START DATE: 24/07/2018

FINISH DATE: 26/07/2018

CONTRACTOR: DCN

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Tauranga Group	[Cont'd]: SILT, with some clay; greenish grey. Very stiff; low plasticity; moist.			SPT	77	4/5 7/8 9/13 **N=37**												Box 5, 13.0-15.5m
	15.45m: Refusal						-11	16.0										
								16.5										
							-12	17.0										
								17.5										
							-13	18.0										
								18.5										
							-14	19.0										
								19.5										

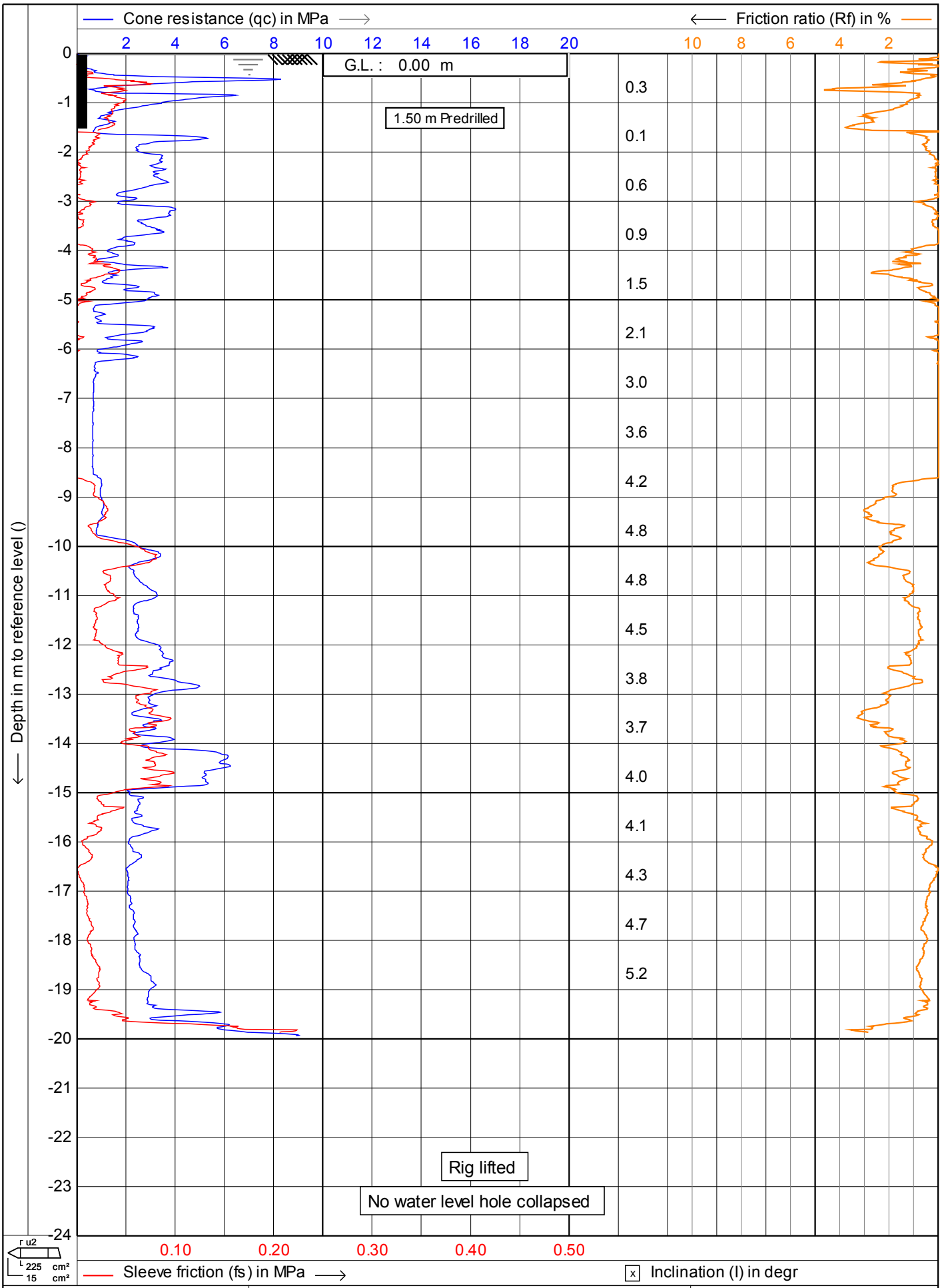
Elevation in Chart Datum. Peak and remoulded shear strength measured using shear vane SV111. Presented shear vane values have been corrected. All shear vane measurements taken from within core barrel unless over-wise indicted. Standpipe piezometer installed. 50mm PVC pipe. Slotted 1.10-4.29m and packed with K2 sand.

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 3/10/2018 12:39:42 PM - Produced with Core-GS by GeRoc



Test according NEN 5140 class 1

Project : **Orams Marine site 18**

Location: **Auckland**

Position: **0, 0**

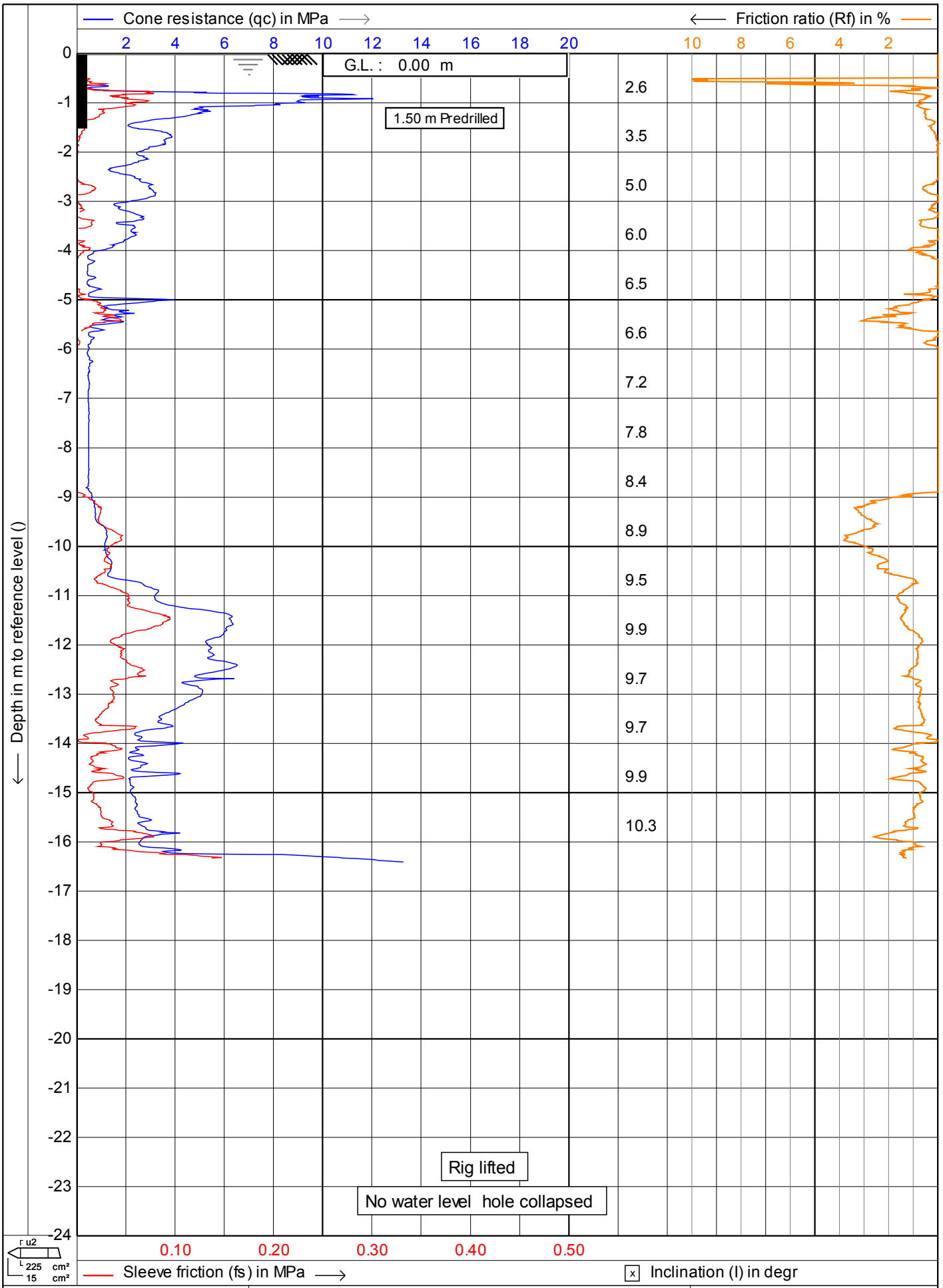
Date : **12/07/2018**

Cone no. : **S15CFIIP.S17385**

Project no. : **30881.1000**

CPT no. : **CPT101** 1/15

1.47



Test according NEN 5140 class 1

Project : **Orams Marine site 18**

Location: **Auckland**

Position: **0, 0**

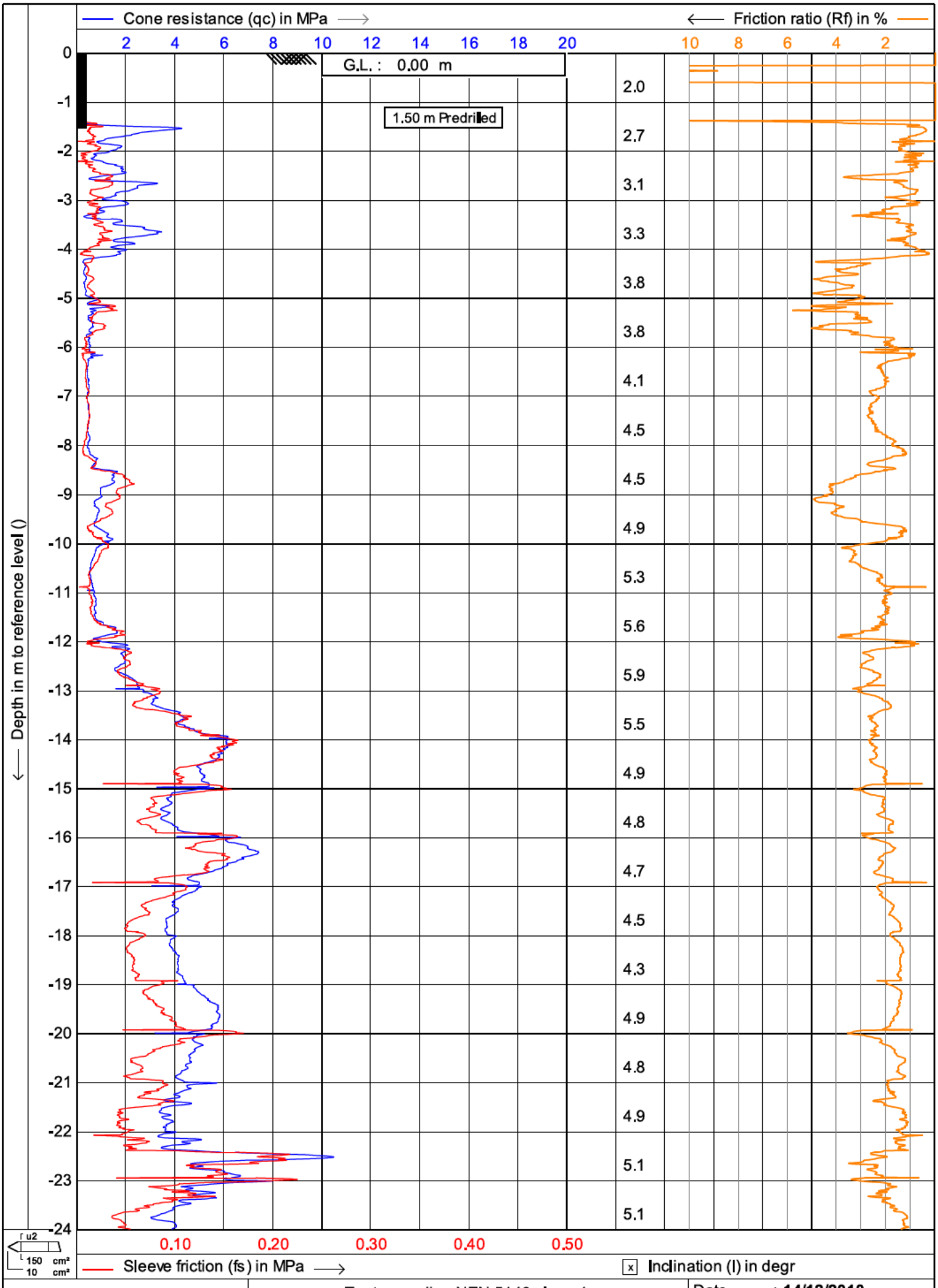
Date : **12/07/2018**

Cone no. : **S15CFIIP.S17385**

Project no. : **30881.1000**

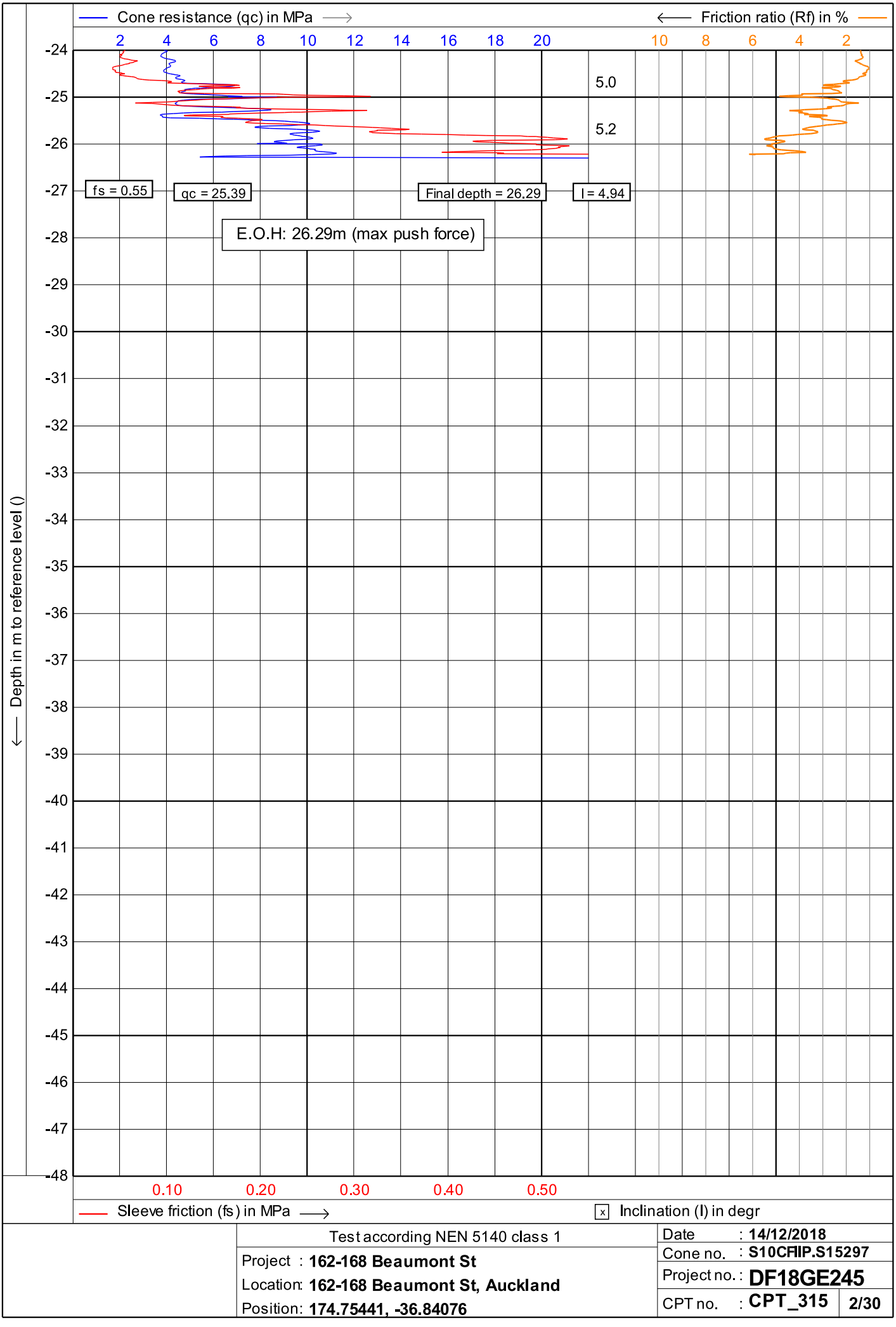
CPT no. : **CPT102** **1/15**

1.47



	Test according NEN 5140 class 1	Date : **14/12/2018**
	Project : **162-168 Beaumont St**	Cone no. : **S10CFIIP.S15297**
	Location: **162-168 Beaumont St, Auckland**	Project no. : **DF18GE245**
	Position: **174.75441, -36.84076**	CPT no. : **CPT_315** 1/30

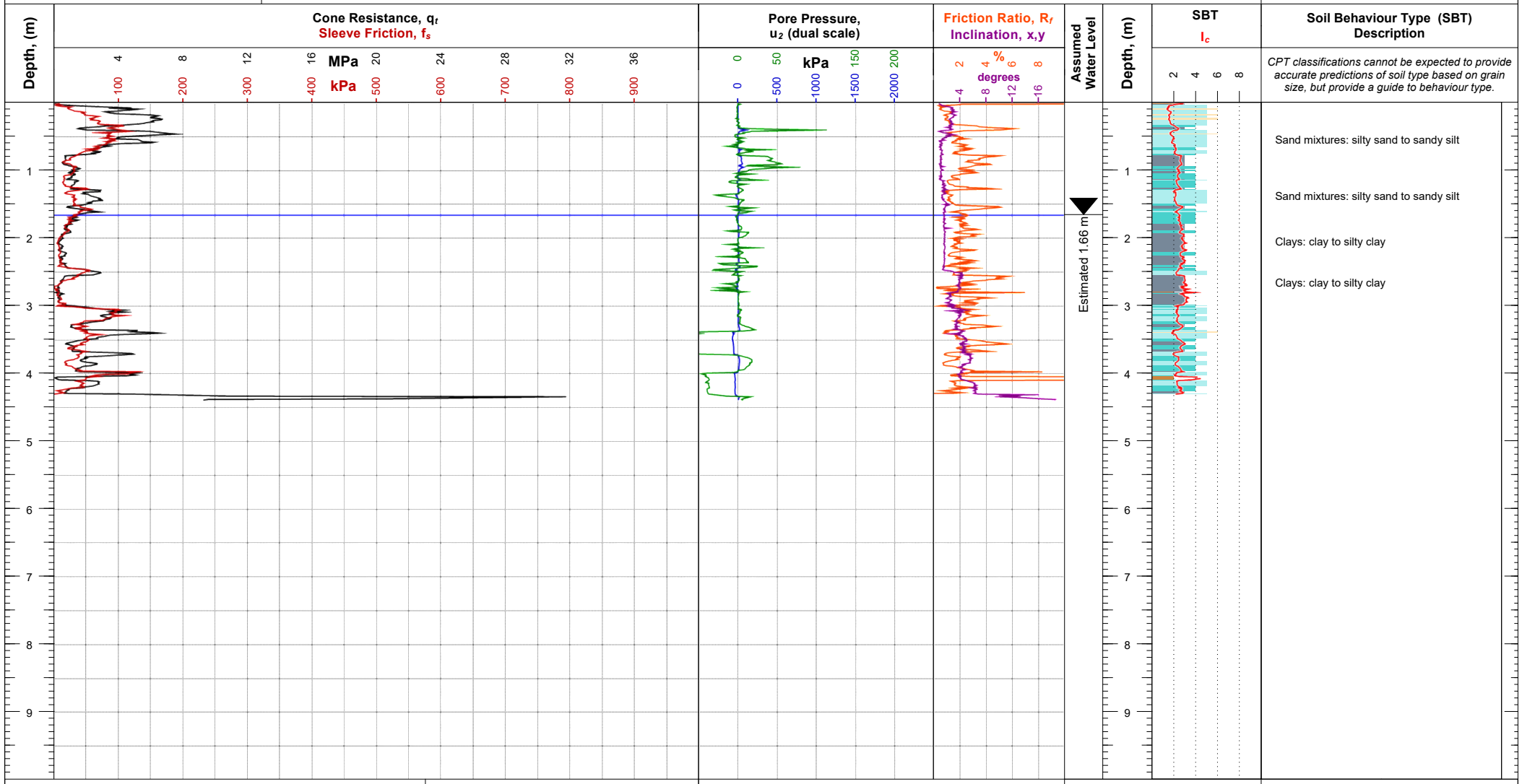
1.47



	Test according NEN 5140 class 1	Date : **14/12/2018**
	Project : **162-168 Beaumont St**	Cone no. : **S10CFIIP.S15297**
	Location: **162-168 Beaumont St, Auckland**	Project no. : **DF18GE245**
	Position: **174.75441, -36.84076**	CPT no. : **CPT_315** **2/30**

1.47

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921408.85, 1756353.31
WGS84, (deg): -36.840298, 174.753513
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Inclination high or rapid increase

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 4.39
Pre-Drill (m): N/A

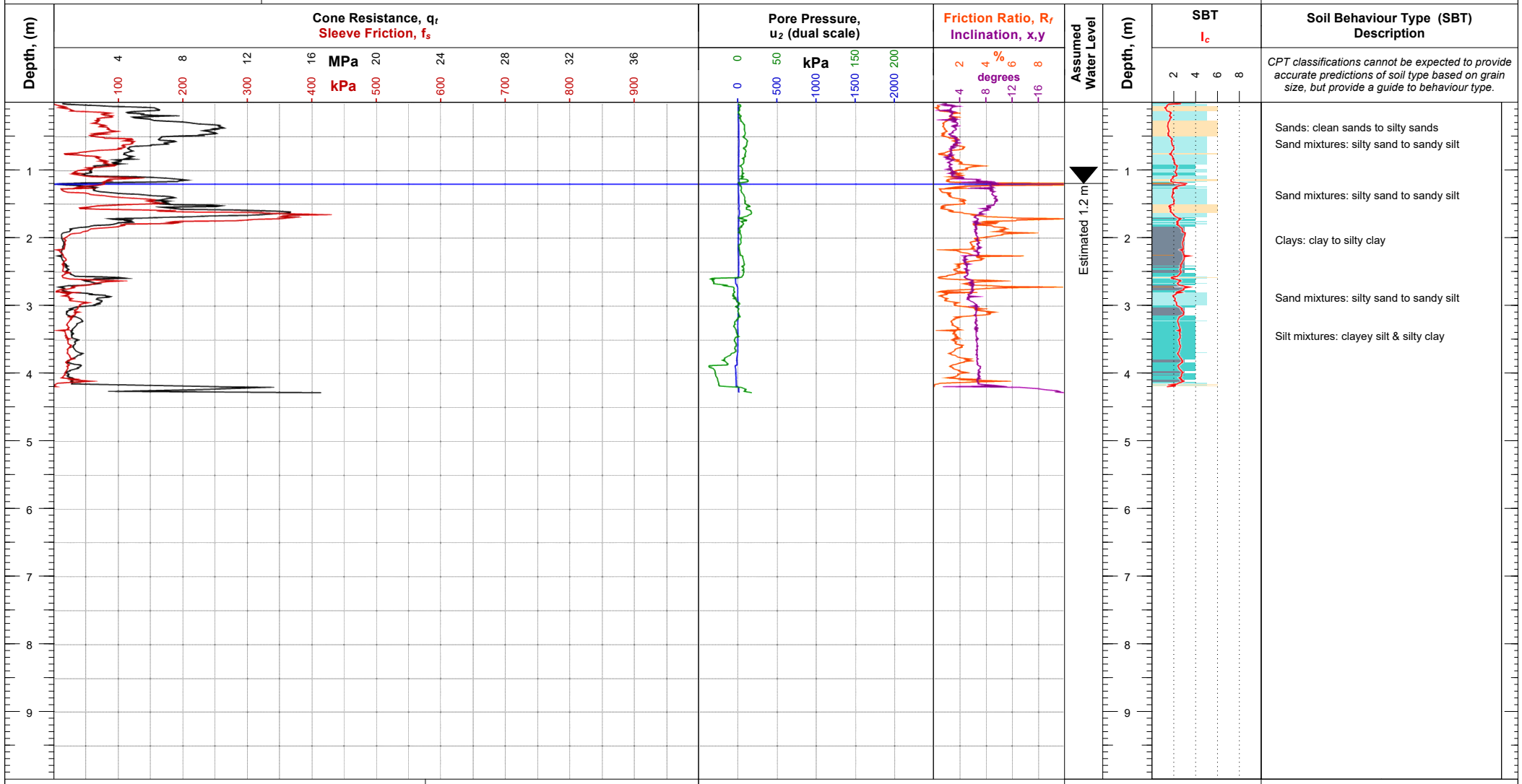
Client Job Ref:

CPT Number: **CPT-401**

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921406.65, 1756352.11
WGS84, (deg): 6.840318, 174.753500
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Inclination high or rapid increase

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 4.28
Pre-Drill (m): N/A

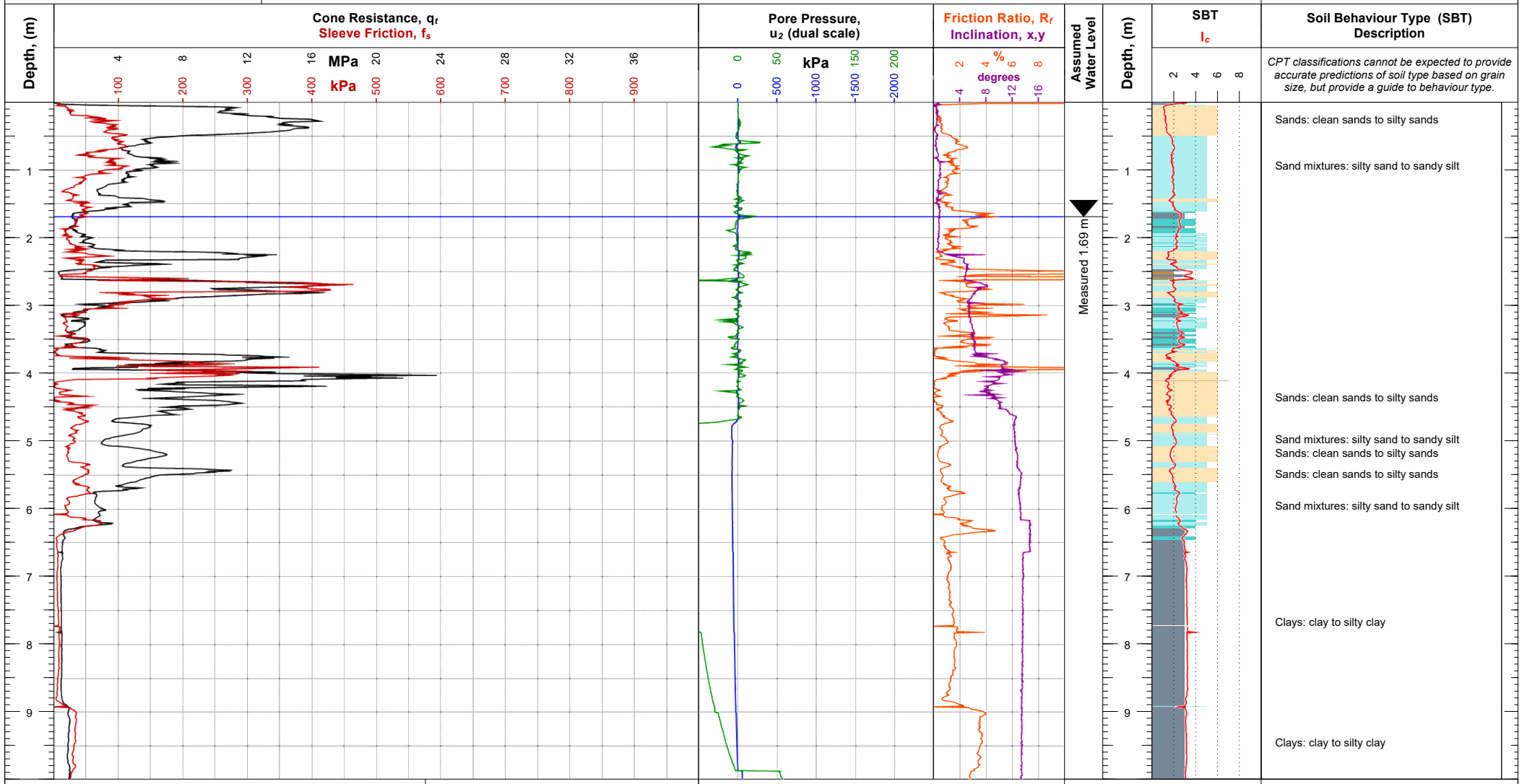
Client Job Ref:

CPT Number: CPT-401A

G.I. Job Ref: 190821

Remarks: Retest in an attempt to penetrate deeper

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C18614
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921401.75, 1756353.18
WGS84, (deg): -36.840362, 174.753513
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.34
Pre-Drill (m): N/A

Termination Reason: Inclination high or rapid increase

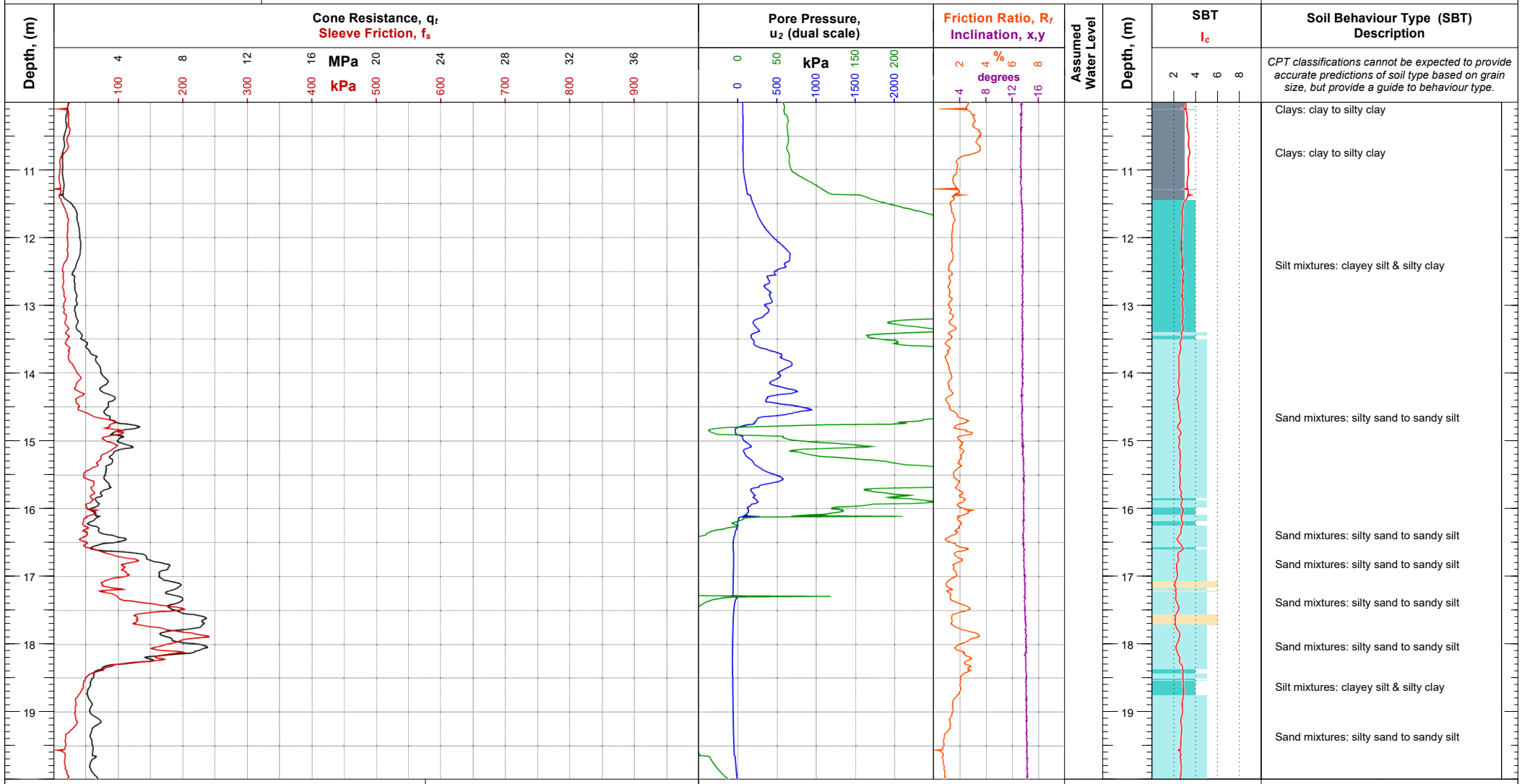
Client Job Ref:

CPT Number: CPT-402

G.I. Job Ref: 190821

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C18614
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921401.75, 1756353.18
WGS84, (deg): -36.840362, 174.753513
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.34
Pre-Drill (m): N/A

Client Job Ref:

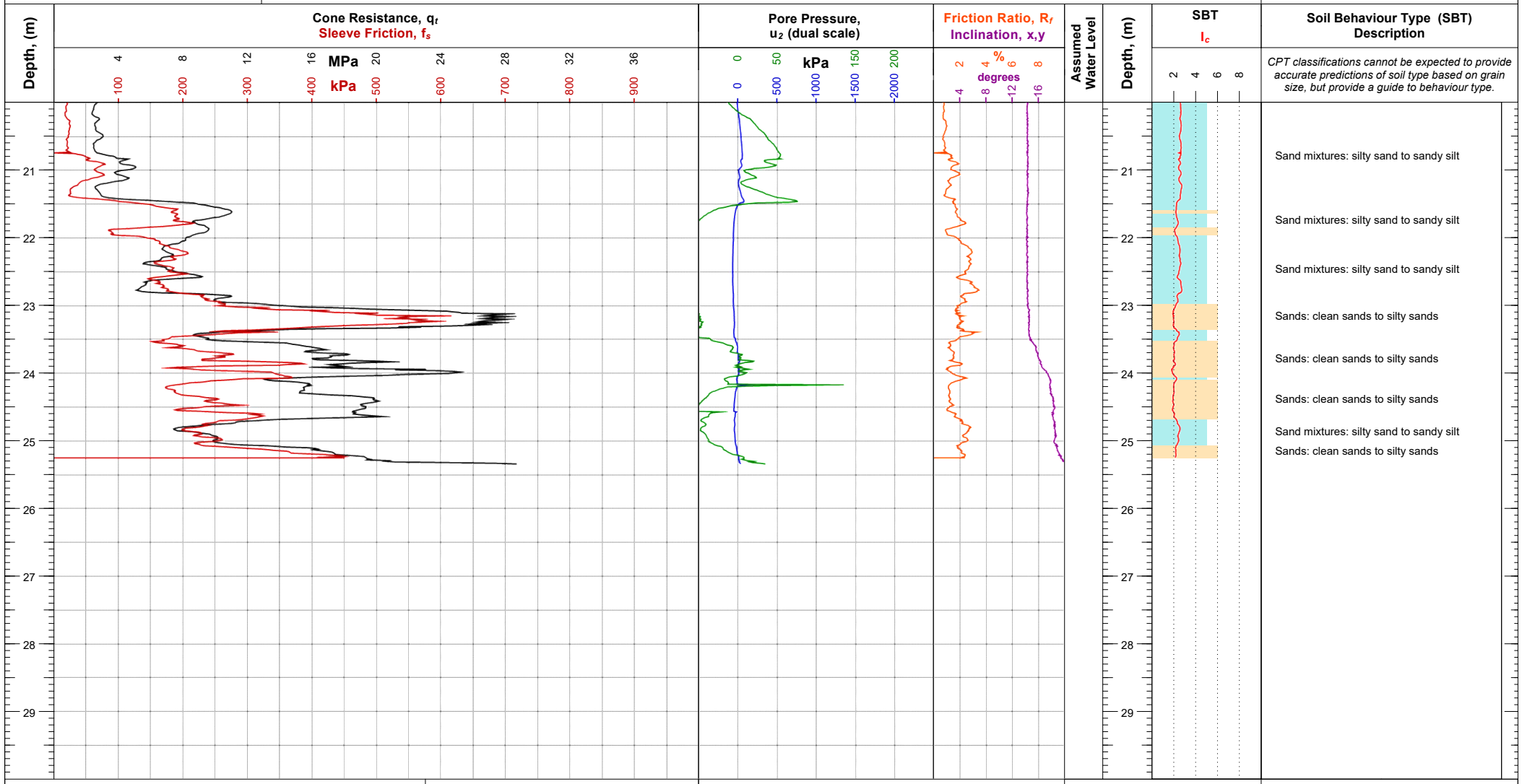
CPT Number: **CPT-402**

Termination Reason: Inclination high or rapid increase

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C18614
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921401.75, 1756353.18
WGS84, (deg): -36.840362, 174.753513
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.34
Pre-Drill (m): N/A

Client Job Ref:

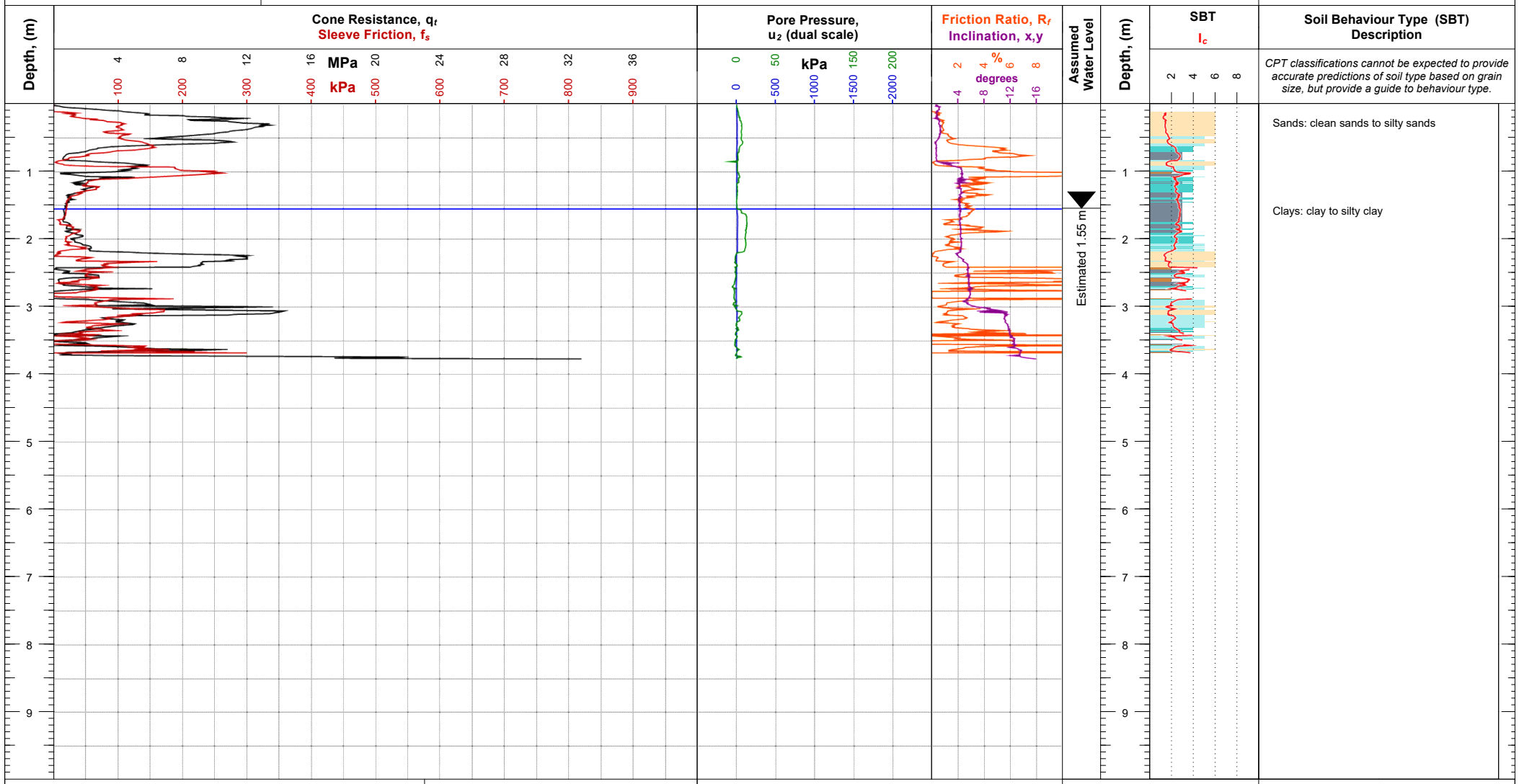
CPT Number: **CPT-402**

Termination Reason: Inclination high or rapid increase

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C18614
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921397.36, 1756350.06
WGS84, (deg): -36.840402, 174.753479
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Inclination high or rapid increase

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 3.77
Pre-Drill (m): N/A

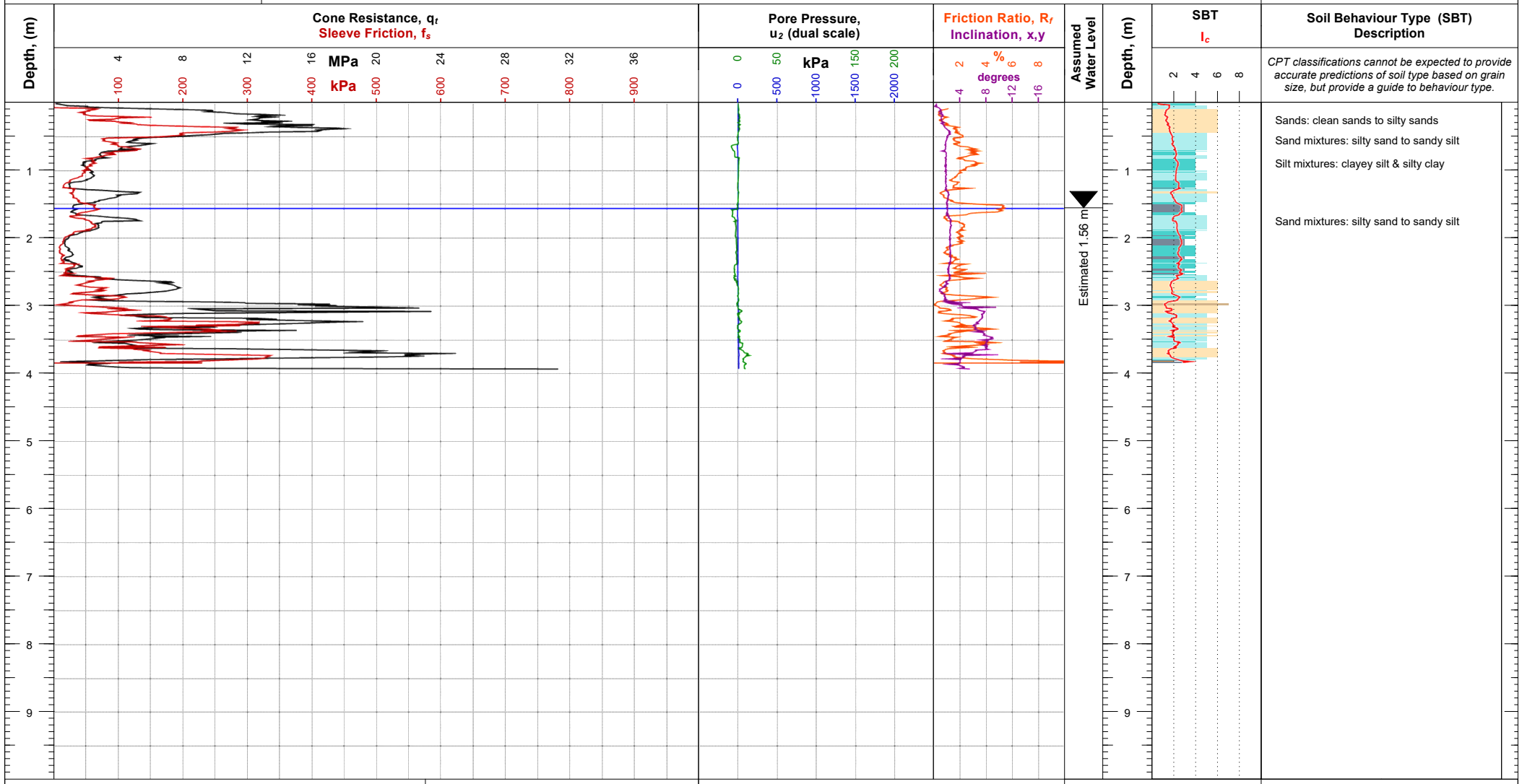
Client Job Ref:

CPT Number: **CPT-403**

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C18614
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921395.81, 1756349.95
WGS84, (deg): -36.840416, 174.753478
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Danger of buckling rods

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 3.93
Pre-Drill (m): N/A

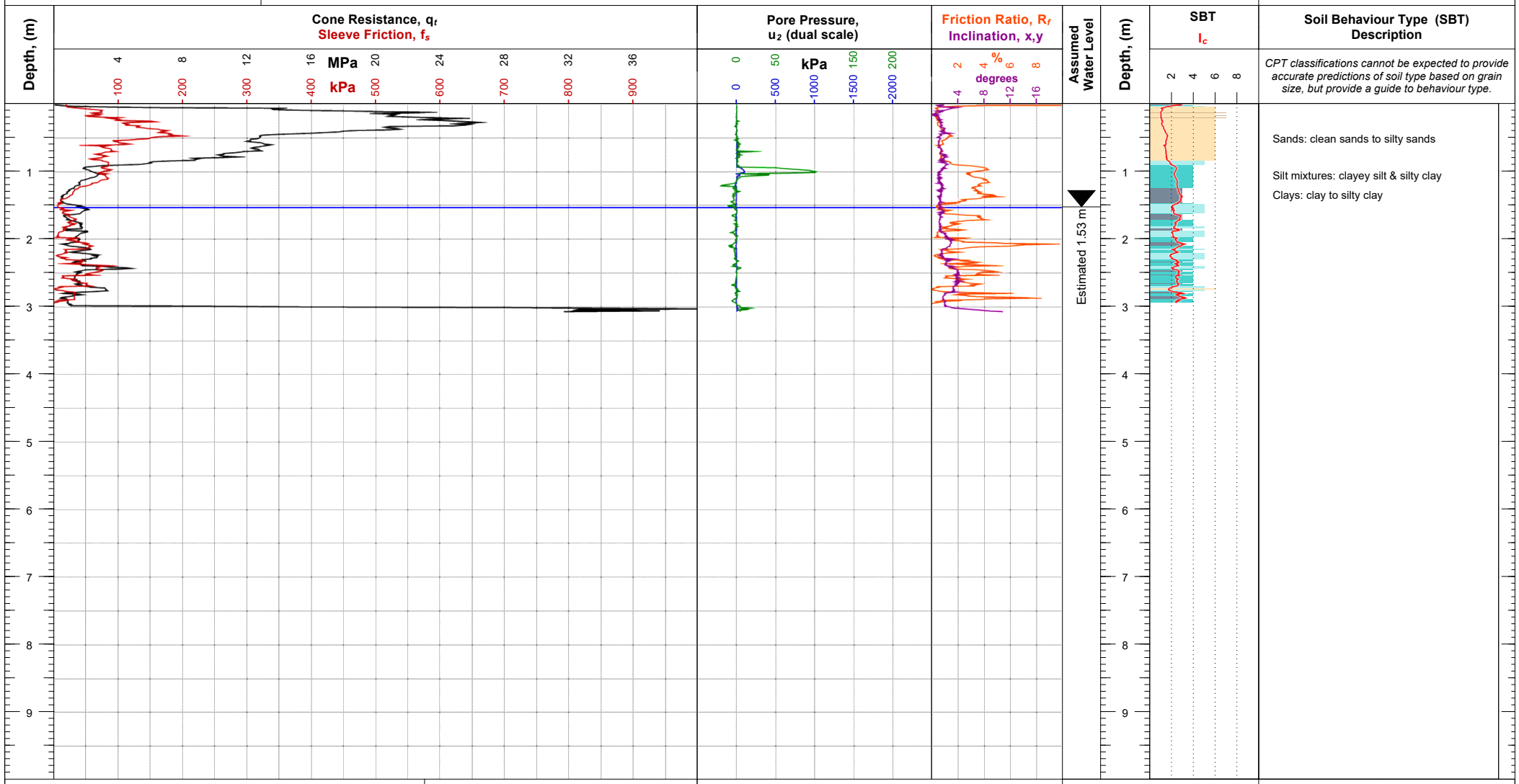
Client Job Ref:

CPT Number: CPT-403A

G.I. Job Ref: 190821

Remarks: Retest in an attempt to penetrate deeper

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921391.38, 1756349.78
WGS84, (deg): -36.840456, 174.753477
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Inclination high or rapid increase

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 3.07
Pre-Drill (m): N/A

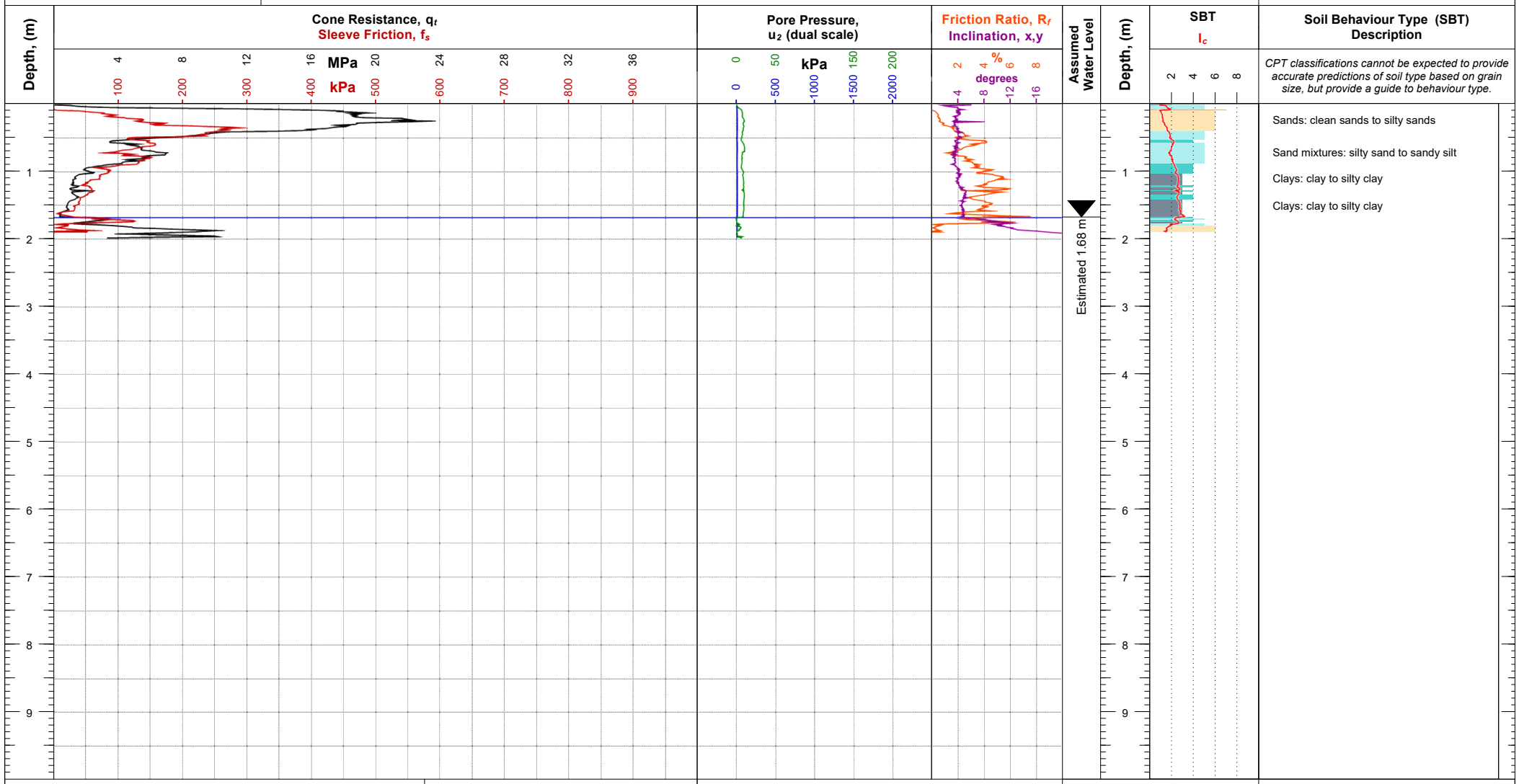
Client Job Ref:

CPT Number: **CPT-404**

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921389.63, 1756348.41
WGS84, (deg): -36.840472, 174.753462
Location Method: Handheld GPS
Surveyor: N/A
Termination Reason: Inclination high or rapid increase

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 1.98
Pre-Drill (m): N/A

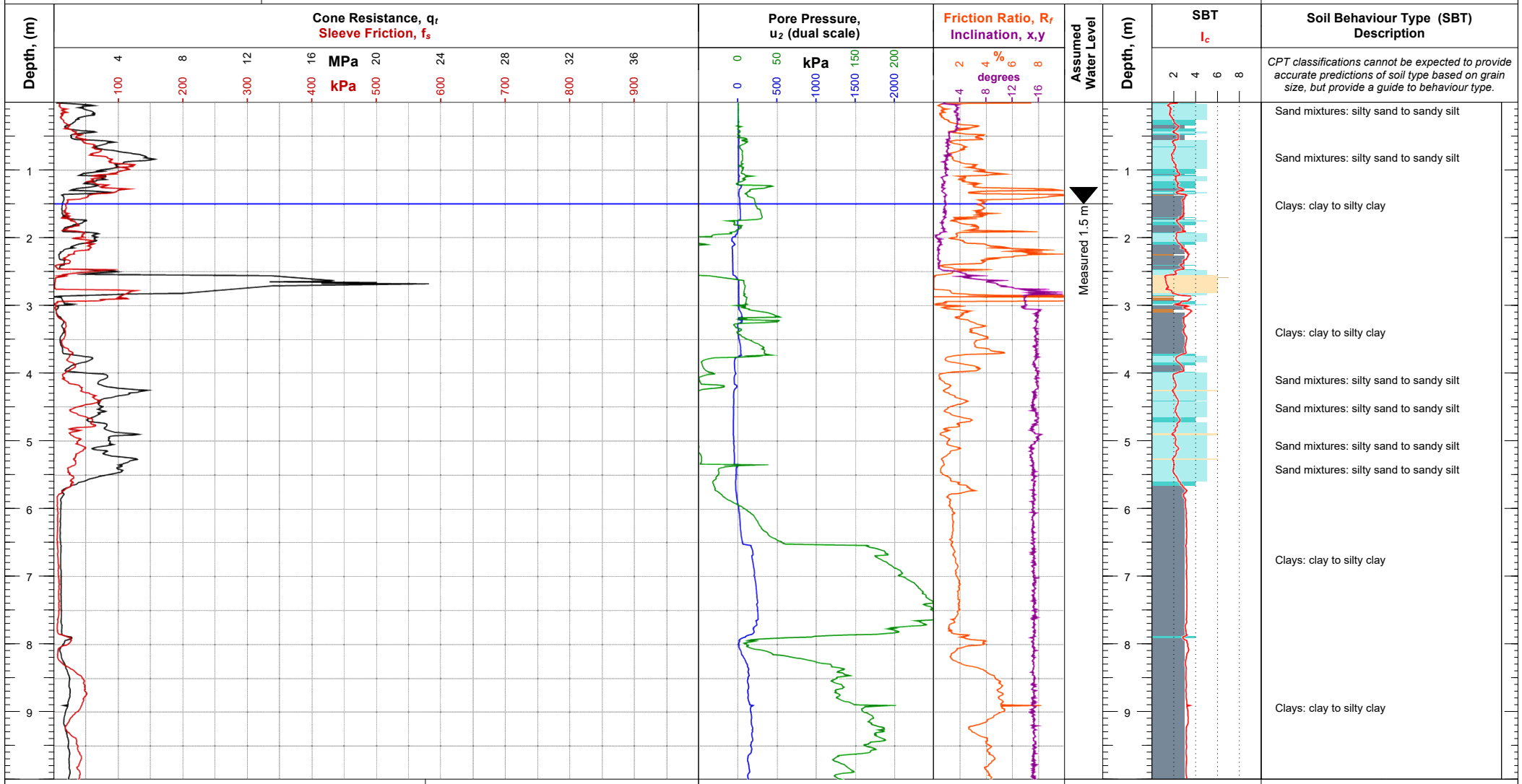
Client Job Ref:

CPT Number: CPT-404A

G.I. Job Ref: 190821

Remarks: Retest in an attempt to penetrate deeper

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921381.86, 1756348
WGS84, (deg): -36.840542, 174.753459
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.18
Pre-Drill (m): N/A

Client Job Ref:

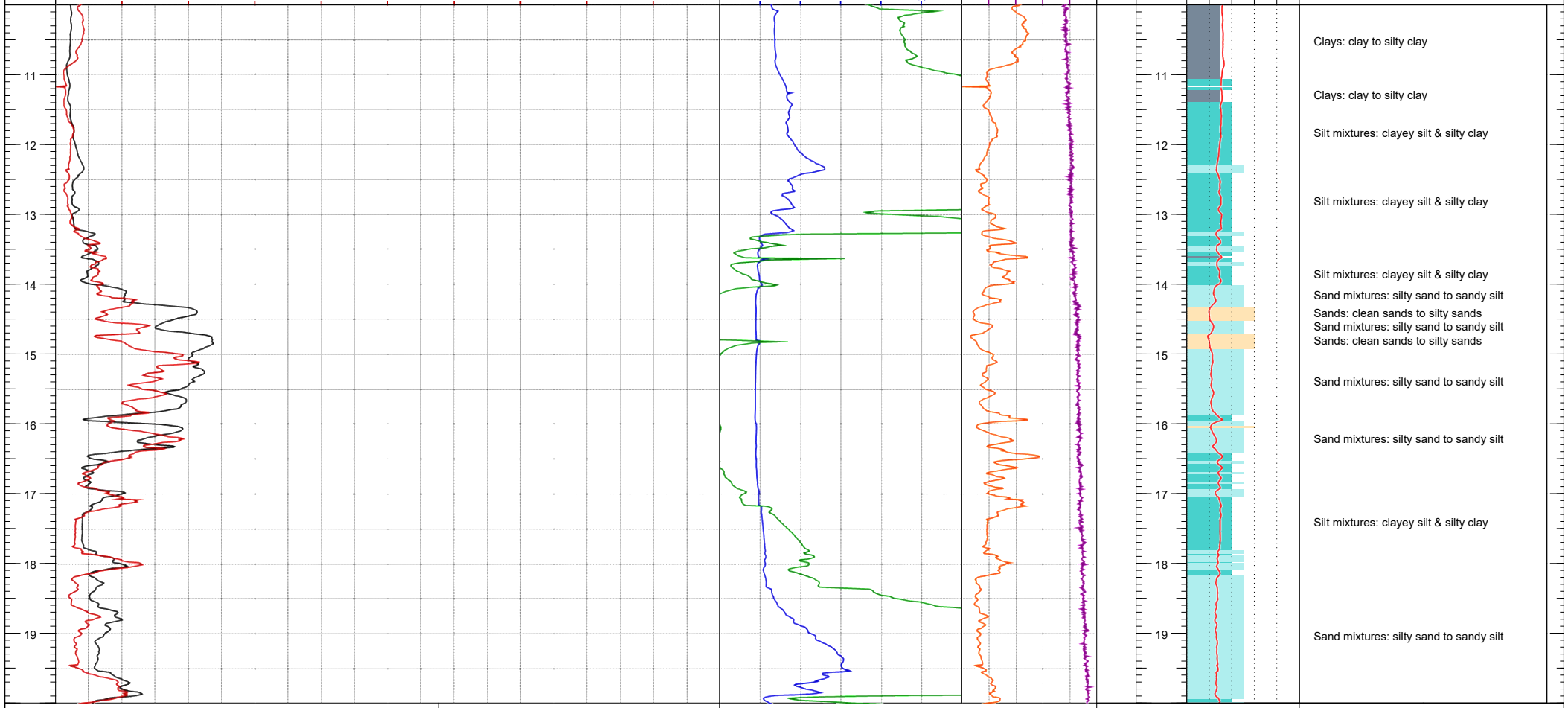
CPT Number: CPT-405

Termination Reason: Inclination high or rapid increase

G.I. Job Ref: 190821

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921381.86, 1756348
WGS84, (deg): -36.840542, 174.753459
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.18
Pre-Drill (m): N/A

Client Job Ref:

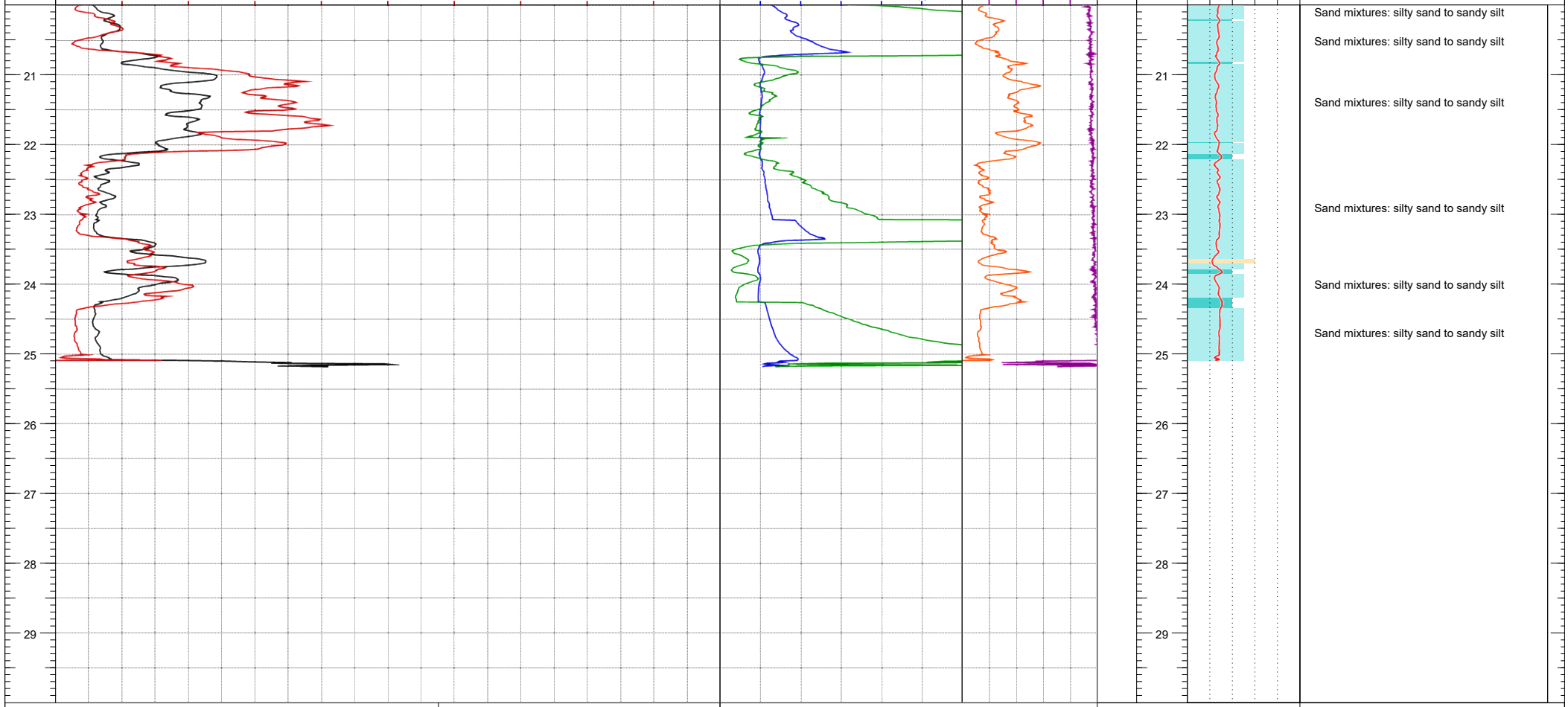
CPT Number: **CPT-405**

Termination Reason: Inclination high or rapid increase

G.I. Job Ref: **190821**

Remarks:

CONE PENETRATION TEST (CPT) LOG



Client: Initia Ltd
Project: Site 18, Beaumont Street
Location: Auckland CBD, Auckland
Engineer: Matt Wansbone
Contractor: Ground Investigation Ltd. www.g-i.co.nz

Operator: Marcelo Martinez
Cone Ref: C15CFIIPT.C17195
Cone Type: 15 cm² Compression
Area Ratio: 0.8
Filter Type: u2

NZTM2000 N,E (m): 5921381.86, 1756348
WGS84, (deg): -36.840542, 174.753459
Location Method: Handheld GPS
Surveyor: N/A

Elevation (m): Unknown
Date of Test: 25/10/2019
Depth (m): 25.18
Pre-Drill (m): N/A

Client Job Ref:

CPT Number: **CPT-405**

Termination Reason: Inclination high or rapid increase

G.I. Job Ref: **190821**

Remarks:

Appendix D Laboratory Test Reports

Babbage Geotechnical Laboratory
Level 4
68 Beach Road
Auckland 1010
Telephone
E-mail

P O Box 2027
New Zealand
64-9-367 4954
[redacted]

Please reply to: W.E. Campton

INITIA LTD.
PO Box 47647,
Ponsonby,
Auckland 1144

Attention: **THOMAS OVERY**

Job Number: 63578#L
BGL Registration Number: 2819
Checked by: WEC

28th October 2025

UNCONFINED COMPRESSIVE STRENGTH (UCS) TESTING

Dear Sir,

Re: SITE 18 ORAMS

Your Reference: P-002883
Report Number: 63578#L/UCS Site 18 Orams

The following report presents the results of Uniaxial Unconfined Compressive Strength Testing at BGL of rock core samples delivered to this laboratory on the 22nd of October 2025.

These samples were tested in accordance with the following standards:

Water Content:	NZS4402: 1986: Test 2.1
Unconfined Compressive Strength Test:	NZS4402: 1986: Test 6.3.1

The table below summarises the test results, with the following pages presenting sample measurements and test data.

Borehole Number	Sample Number	Depth (m)	FAILURE CONDITIONS			
			Unconfined Compressive Strength (kPa)	Strain at Failure		Failure Mode
				%	mm	
BH01	Sample 1	31.30 – 31.50	900	1.1	1.3	planar
BH01	Sample 2	32.60 – 32.90	500	1.2	1.4	planar

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. As per the reporting requirements of NZS4402: 1986: Test 6.3.1: UCS, dry density is reported to the nearest 0.05t/m^3, the unconfined compressive strength is reported to two significant figures, and the strain & rate of axial compression at failure is reported to two significant figures.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
Key Technical Person
Assistant Laboratory Manager
Babbage Geotechnical Laboratory

ACCREDITED
TESTING LABORATORY
№ 126

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full & with written approval from BGL.

BGL Babbage Geotechnical Laboratory	Job No:	Reg. No:	Report No:	Page 3 of 8
	63578#L	2819	63578#L/UCS Site 18 Orams	
	PROJECT:	SITE 18 ORAMS		

Unconfined Compressive Strength of Cohesive Soils	Tested By:	JL	23-Oct-25
	Compiled By:	JL	24-Oct-25
Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1	Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By:	Wayne Campton

Borehole Number:	BH01	Sample Number:	Sample 1	Depth:	31.30 - 31.50m

Time (minutes)	Compression Gauge (mm)	Specimen Compression (mm)	Strain	Load Gauge (mm)	Axial Force (N)	Corrected Area (mm^2)	Axial Stress (kPa)
0.00	4.979	0.000	0.000	9.692	0.0	2869.1	0
0.37	5.068	0.089	0.001	9.699	35.5	2871.2	12
0.75	5.156	0.177	0.001	9.708	81.1	2873.3	28
1.12	5.238	0.259	0.002	9.719	137.2	2875.3	48
1.50	5.313	0.334	0.003	9.733	208.9	2877.1	73
1.87	5.381	0.402	0.003	9.751	300.1	2878.7	104
2.25	5.437	0.458	0.004	9.773	406.7	2880.1	141
2.62	5.476	0.498	0.004	9.790	493.9	2881.0	171
3.00	5.533	0.555	0.005	9.813	608.4	2882.4	211
3.37	5.596	0.617	0.005	9.841	746.1	2883.9	259
3.75	5.655	0.677	0.006	9.870	895.8	2885.4	310
4.12	5.718	0.739	0.006	9.901	1049.3	2886.9	363
4.50	5.774	0.795	0.007	9.935	1218.1	2888.2	422
4.87	5.828	0.850	0.007	9.969	1391.3	2889.6	481
5.25	5.885	0.906	0.008	10.002	1556.2	2890.9	538
5.62	5.943	0.964	0.008	10.033	1709.3	2892.3	591
6.00	5.997	1.018	0.009	10.068	1883.8	2893.7	651
6.37	6.052	1.073	0.009	10.102	2053.7	2895.0	709
6.75	6.108	1.129	0.009	10.135	2220.8	2896.4	767
7.12	6.167	1.188	0.010	10.167	2378.6	2897.8	821
7.50	6.238	1.259	0.011	10.189	2491.5	2899.5	859
7.87	**6.303**	**1.325**	**0.011**	**10.215**	**2623.7**	**2901.2**	**904**
8.25	6.416	1.437	0.012	10.212	2604.9	2903.9	897
8.62	6.549	1.570	0.013	10.190	2496.6	2907.2	859
9.00	6.697	1.718	0.014	10.158	2337.4	2910.8	803
9.37	6.792	1.813	0.015	10.145	2271.3	2913.2	780

Unconfined Compressive Strength: 900 kPa

Babbage Geotechnical Laboratory	Job No:	Reg. No:	Report No:	Page 4 of 8
	63578#L	2819	63578#L/UCS Site 18 Orams	

PROJECT: **SITE 18 ORAMS**

Unconfined Compressive Strength of Cohesive Soils

Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1

Tested By:	JL	23-Oct-25
Compiled By:	JL	24-Oct-25
Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By:	Wayne Campton

Borehole Number:	BH01	Sample No:	Sample 1	Depth:	31.30 - 31.50m

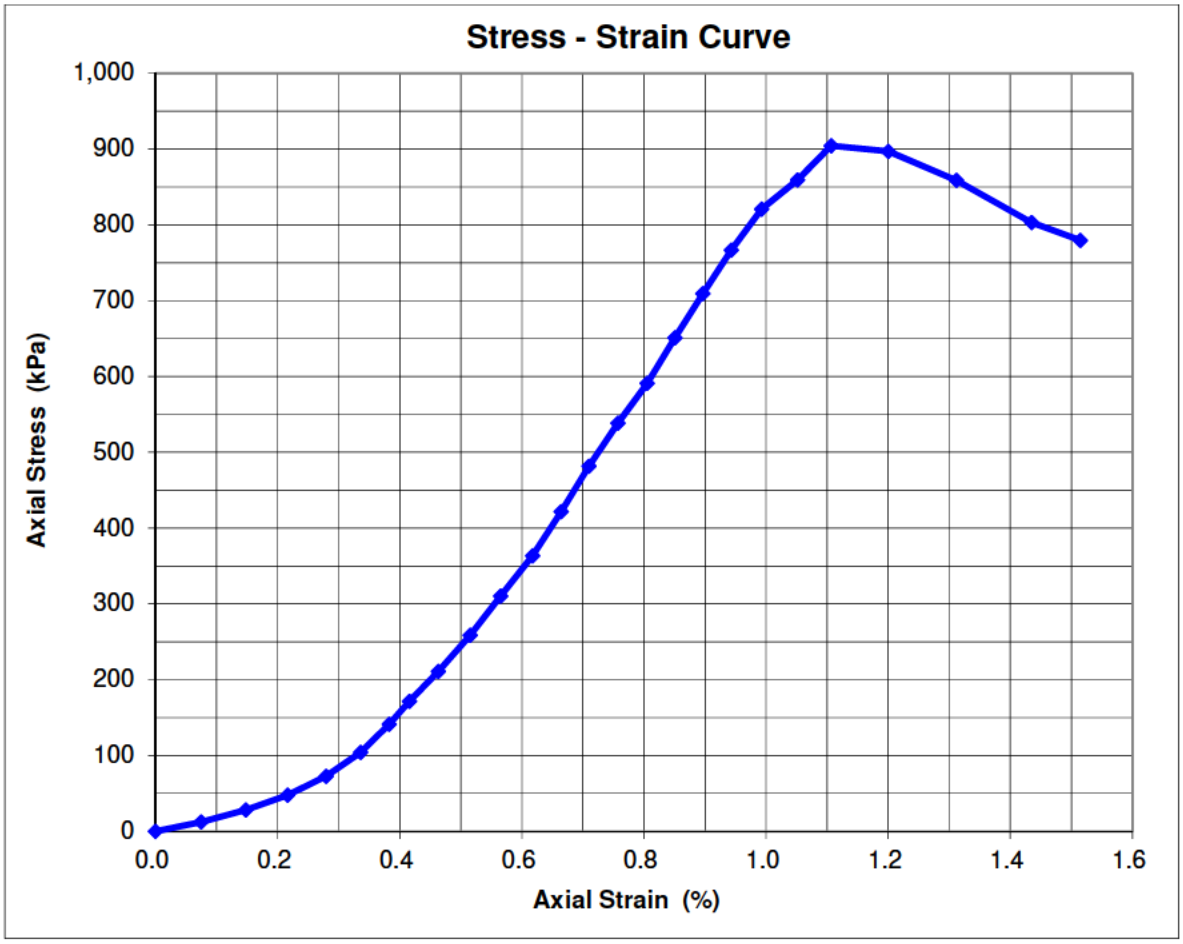
Material Type: rock / ~~whole soil~~
Sample History: undisturbed / ~~remoulded / recompacted / unknown~~
Sampling Method: core sample / ~~push-tube sample~~

Sample Details

Initial Diameter:	60.44	mm
Initial Length:	119.73	mm
Initial Mass:	744.57	g
Initial Bulk Density:	2.17	t/m^3
Initial Dry Density:	1.85	t/m^3
Water Content After Test:	16.6	%

Failure Conditions

Strain at failure:	1.1	%
Compression at failure:	1.3	mm
Rate of Compression:	0.17	mm / minute
Mode of Failure:	planar	
Length to Diameter Ratio:	2.0 : 1	



Babbage Geotechnical Laboratory	Job No:	Reg. No:	Report No:	Page 5 of 8
	63578#L	2819	63578#L/UCS Site 18 Orams	
PROJECT:	SITE 18 ORAMS			

Unconfined Compressive Strength of Cohesive Soils	Tested By:	JL	23-Oct-25
Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1	Compiled By:	JL	24-Oct-25
	Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By	Wayne Campton

Borehole Number:	BH01	Sample Number:	Sample 1	Depth:	31.30 - 31.50m

Sample Description (*not part of BGL IANZ Accreditation*):

BANDED FINE SANDSTONE & SILTSTONE, extremely weak, grey, uncemented.

SAMPLE BEFORE TEST

SAMPLE AFTER TEST

BGL Babbage Geotechnical Laboratory	Job No:	Reg. No:	Report No:	Page 6 of 8
	63578#L	2819	63578#L/UCS Site 18 Orams	
	PROJECT:	SITE 18 ORAMS		

Unconfined Compressive Strength of Cohesive Soils	Tested By:	JL	23-Oct-25
	Compiled By:	JL	24-Oct-25
Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1	Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By:	Wayne Campton

Borehole Number:	BH01	Sample Number:	Sample 2	Depth:	32.60 - 32.90m

Time (minutes)	Compression Gauge (mm)	Specimen Compression (mm)	Strain	Load Gauge (mm)	Axial Force (N)	Corrected Area (mm^2)	Axial Stress (kPa)
0.00	4.704	0.000	0.000	9.693	0.0	2923.7	0
0.37	4.793	0.089	0.001	9.704	54.0	2925.8	18
0.75	4.883	0.179	0.001	9.715	108.7	2928.0	37
1.12	4.968	0.264	0.002	9.728	175.5	2930.1	60
1.50	5.047	0.343	0.003	9.743	250.8	2932.0	86
1.87	5.124	0.420	0.003	9.759	330.2	2933.9	113
2.25	5.190	0.486	0.004	9.776	411.8	2935.6	140
2.62	5.242	0.538	0.004	9.791	486.7	2936.8	166
3.00	5.314	0.610	0.005	9.808	575.2	2938.6	196
3.37	5.381	0.677	0.006	9.829	680.3	2940.3	231
3.75	5.452	0.748	0.006	9.850	782.6	2942.0	266
4.12	5.521	0.817	0.007	9.870	884.6	2943.7	300
4.50	5.591	0.887	0.007	9.891	992.0	2945.4	337
4.87	5.661	0.957	0.008	9.912	1096.8	2947.2	372
5.25	5.730	1.026	0.009	9.934	1203.7	2948.9	408
5.62	5.800	1.096	0.009	9.956	1317.4	2950.6	446
6.00	5.869	1.165	0.010	9.977	1418.2	2952.3	480
6.37	5.973	1.269	0.011	9.969	1378.1	2954.9	466
6.75	6.055	1.351	0.011	9.978	1424.9	2957.0	482
7.12	**6.140**	**1.436**	**0.012**	**9.986**	**1466.2**	**2959.1**	**495**
7.50	6.274	1.570	0.013	9.955	1309.1	2962.4	442
7.87	6.451	1.747	0.015	9.893	998.5	2966.8	337

Unconfined Compressive Strength: 500 kPa

BGL Babbage Geotechnical Laboratory	Job No: 63578#L	Reg. No: 2819	Report No: 63578#L/UCS Site 18 Orams	Page 7 of 8
PROJECT:	SITE 18 ORAMS			

Unconfined Compressive Strength of Cohesive Soils

Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1

Tested By:	JL	23-Oct-25
Compiled By:	JL	24-Oct-25
Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By:	Wayne Campton

Borehole Number:	BH01	Sample No:	Sample 2	Depth:	32.60 - 32.90m

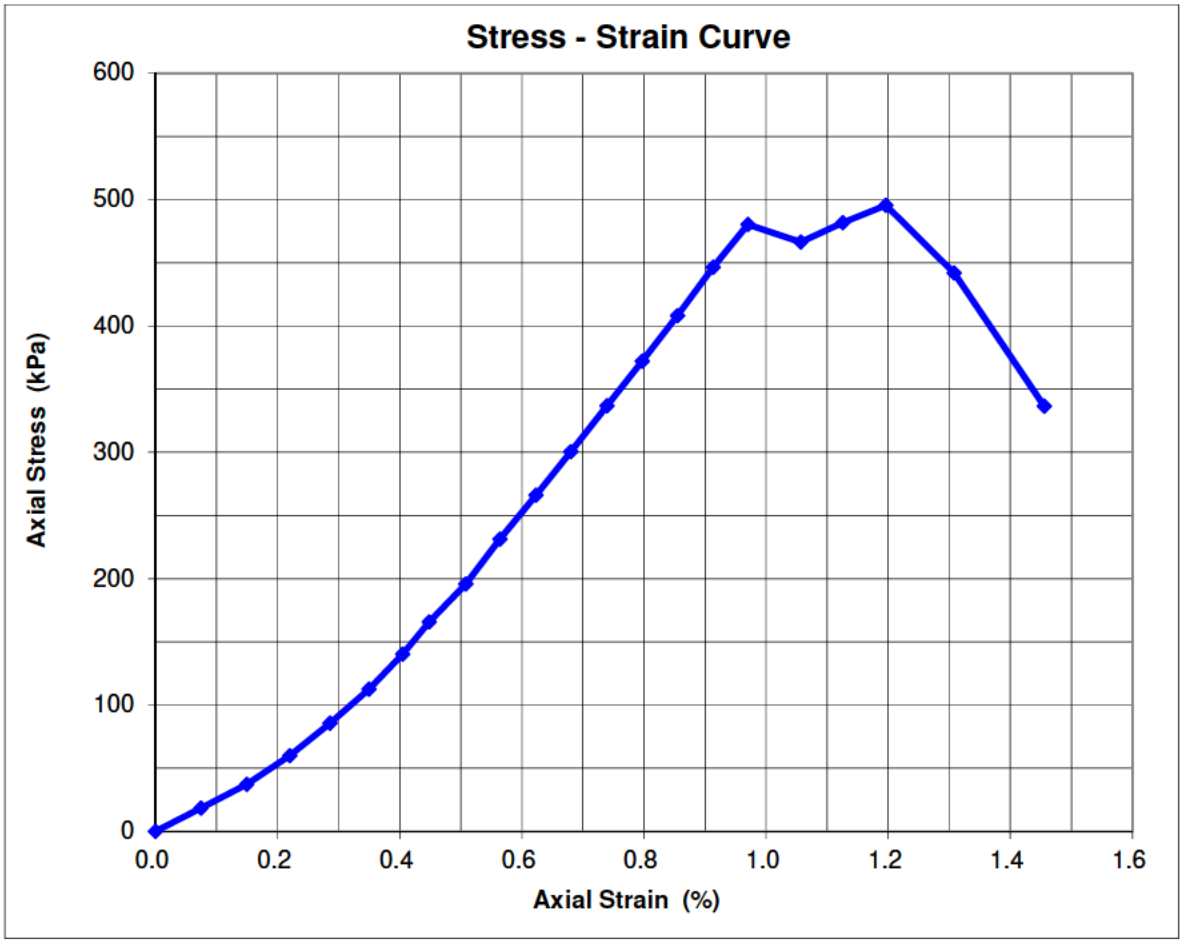
Material Type: rock / ~~whole soil~~
Sample History: undisturbed / ~~remoulded / recompacted / unknown~~
Sampling Method: core sample / ~~push-tube sample~~

Sample Details

Initial Diameter:	61.01	mm
Initial Length:	120.04	mm
Initial Mass:	745.77	g
Initial Bulk Density:	2.13	t/m^3
Initial Dry Density:	1.80	t/m^3
Water Content After Test:	18.4	%

Failure Conditions

Strain at failure:	1.2	%
Compression at failure:	1.4	mm
Rate of Compression:	0.20	mm / minute
Mode of Failure:	planar	
Length to Diameter Ratio:	2.0 : 1	



Babbage Geotechnical Laboratory	Job No:	Reg. No:	Report No:	Page 8 of 8
	63578#L	2819	63578#L/UCS Site 18 Orams	
PROJECT:	SITE 18 ORAMS			

Unconfined Compressive Strength of Cohesive Soils	Tested By:	JL	23-Oct-25
Test Methods: NZS4402: 1986: Test 2.1 / Test 6.3.1	Compiled By:	JL	24-Oct-25
	Checked By:	JF	28-Oct-25

Version Number:	3	Version Date:	July 2022	Authorised By	Wayne Campton

Borehole Number:	BH01	Sample Number:	Sample 2	Depth:	32.60 - 32.90m

Sample Description (*not part of BGL IANZ Accreditation*):

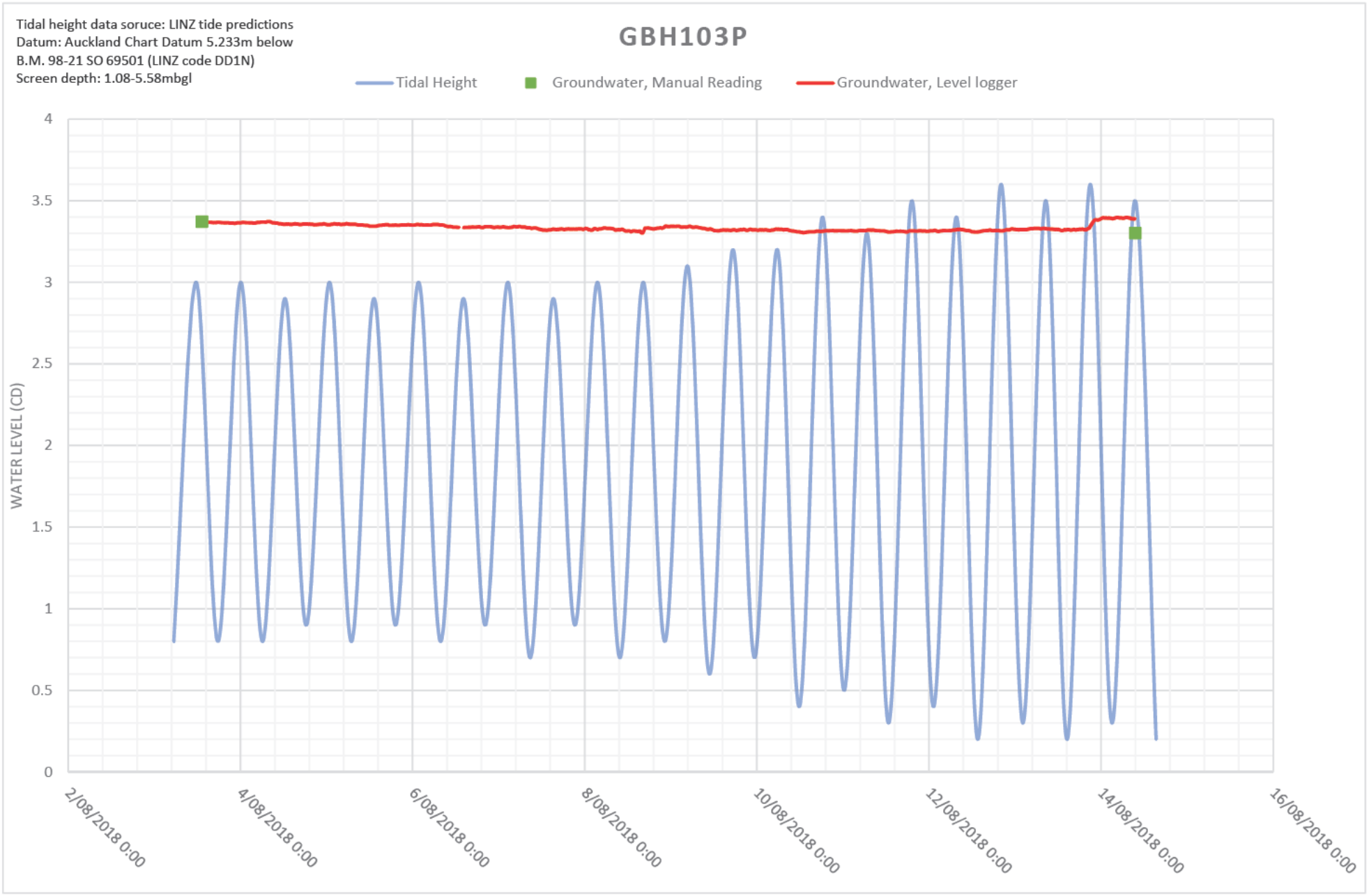
BANDED FINE SANDSTONE & SILTSTONE, extremely weak, grey with dark brown streaks, uncemented, carbonaceous inclusions.

SAMPLE BEFORE TEST

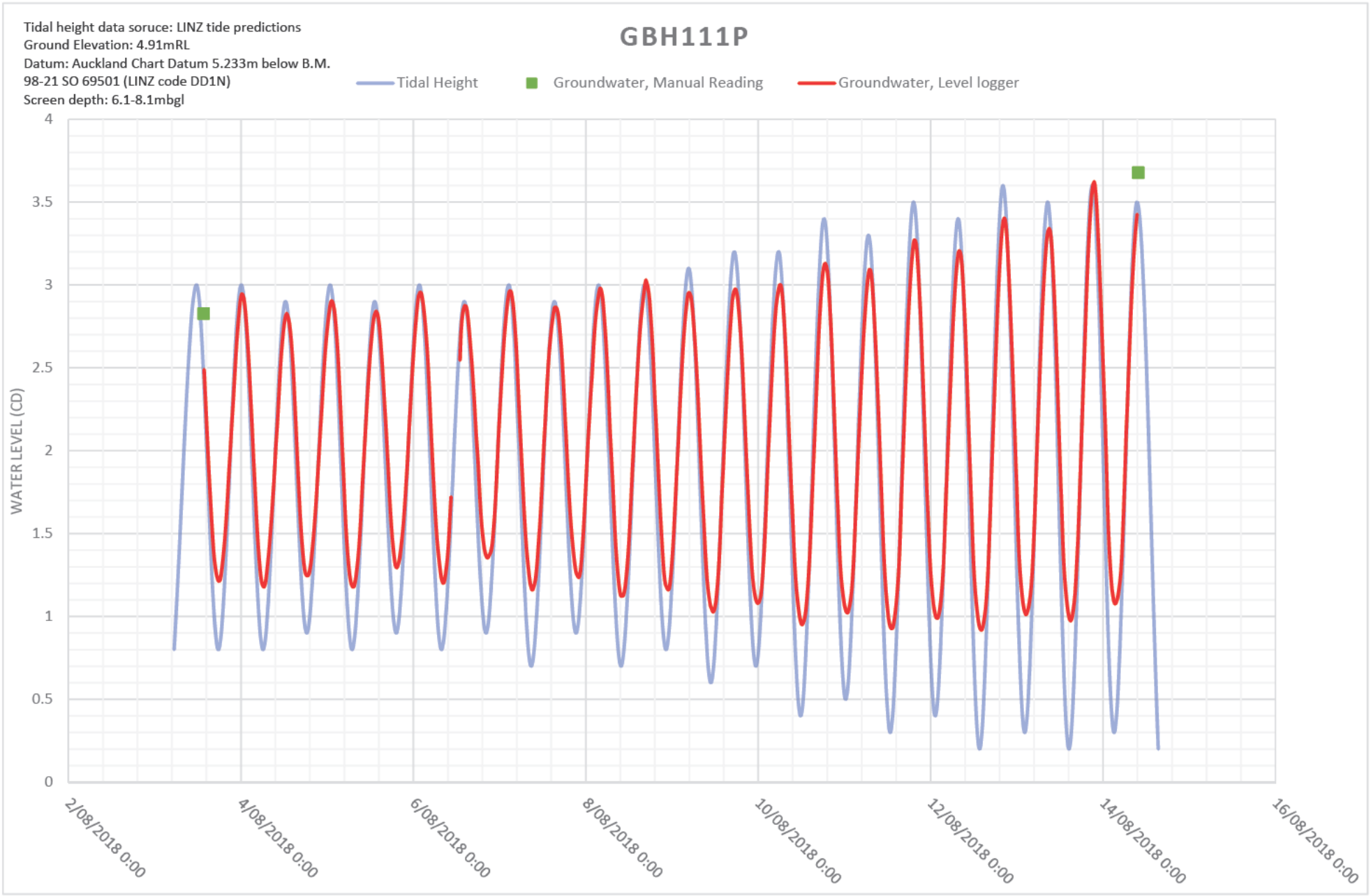
SAMPLE AFTER TEST

Appendix E Historical Groundwater Monitoring Plots

Tidal height data soruce: LINZ tide predictions
Datum: Auckland Chart Datum 5.233m below B.M. 98-21 SO 69501 (LINZ code DD1N)
Screen depth: 1.08-5.58mbgl



Tidal height data soruce: LINZ tide predictions
Ground Elevation: 4.91mRL
Datum: Auckland Chart Datum 5.233m below B.M. 98-21 SO 69501 (LINZ code DD1N)
Screen depth: 6.1-8.1mbgl

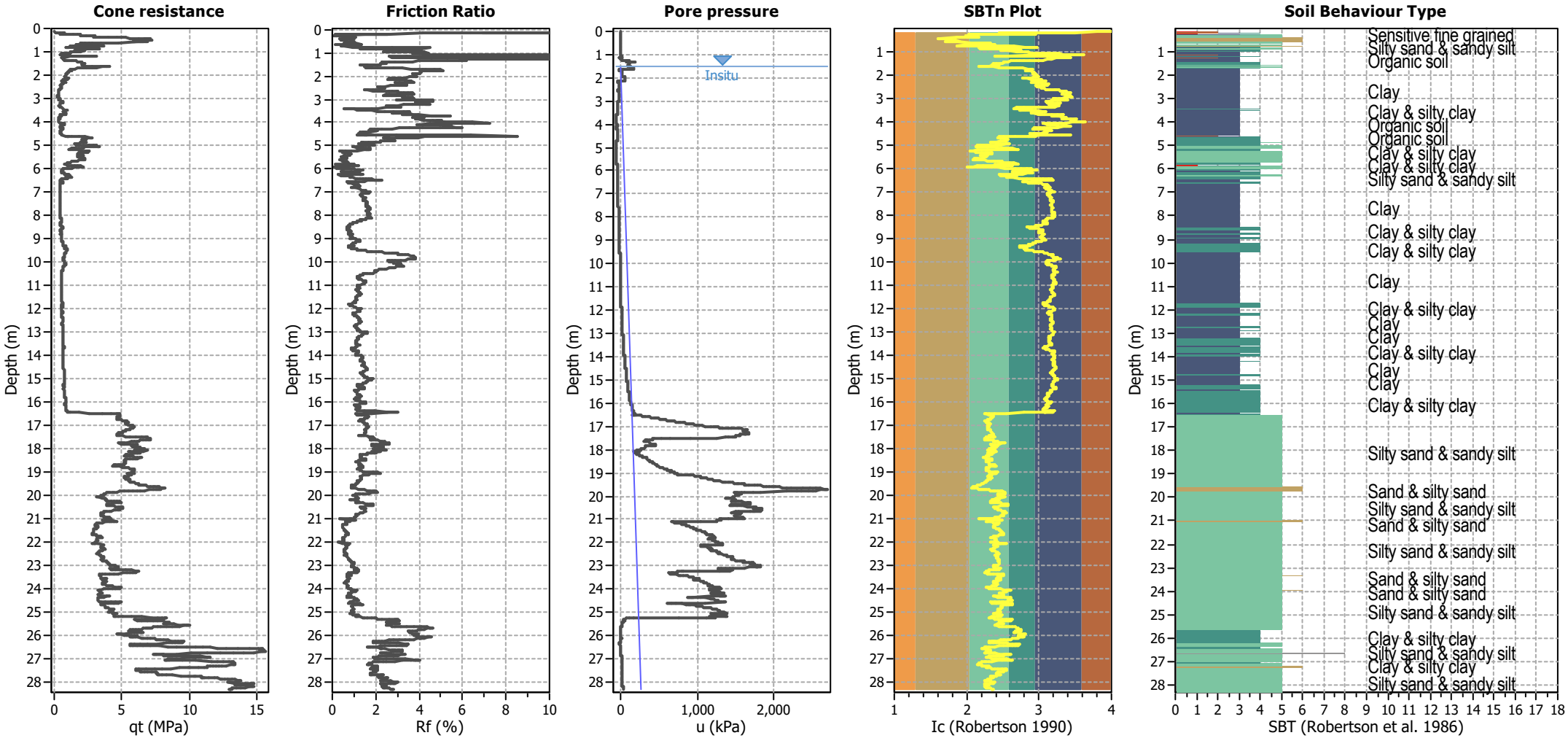


Appendix F ULS Liquefaction Assessment Outputs

GeoLogismiki
Geotechnical Engineers
Merarhias 56
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT304
Total depth: 28.31 m



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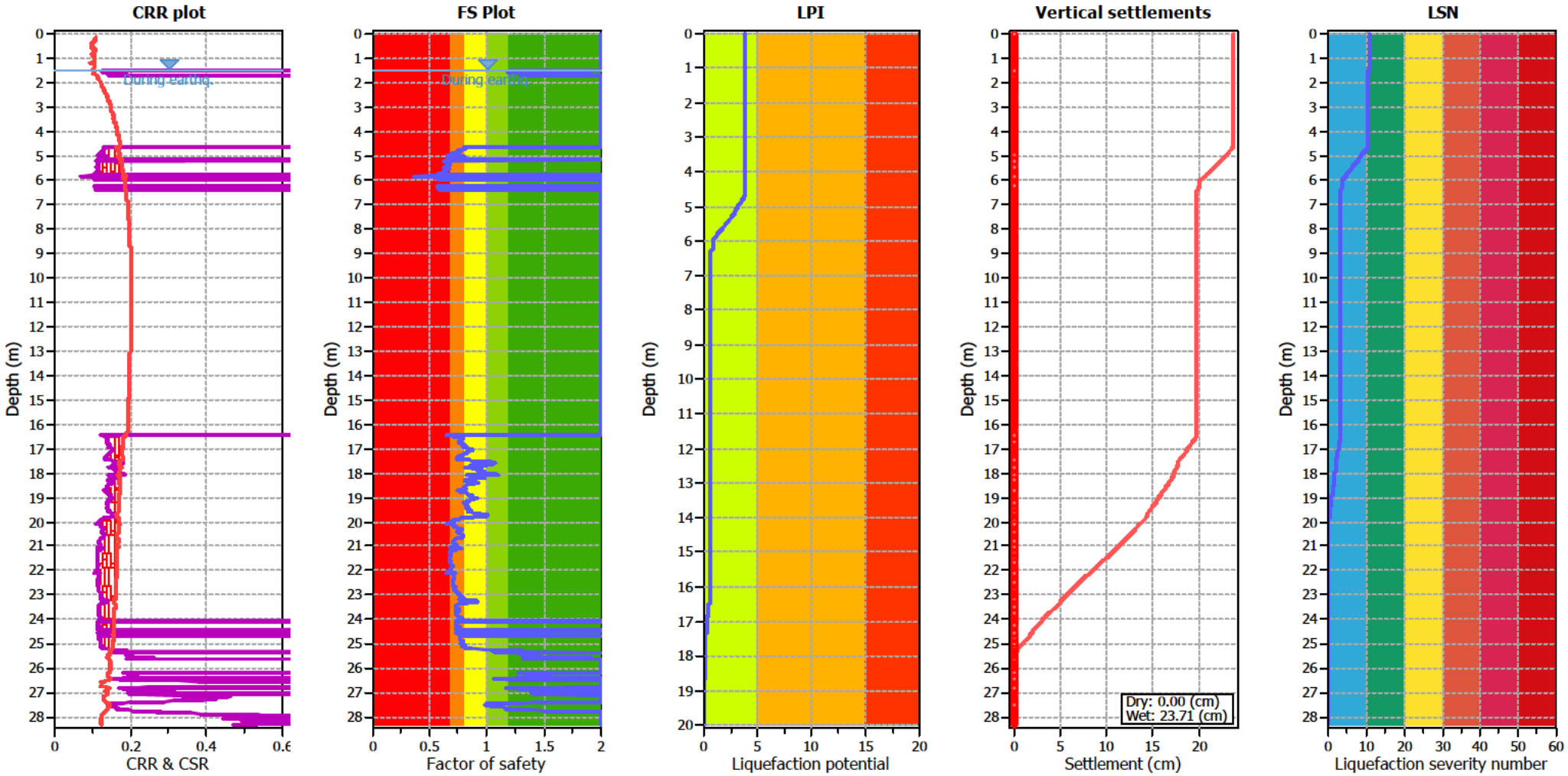
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

GeoLogismiki
Geotechnical Engineers
Merarhias 56
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT304
Total depth: 28.31 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

GeoLogismiki
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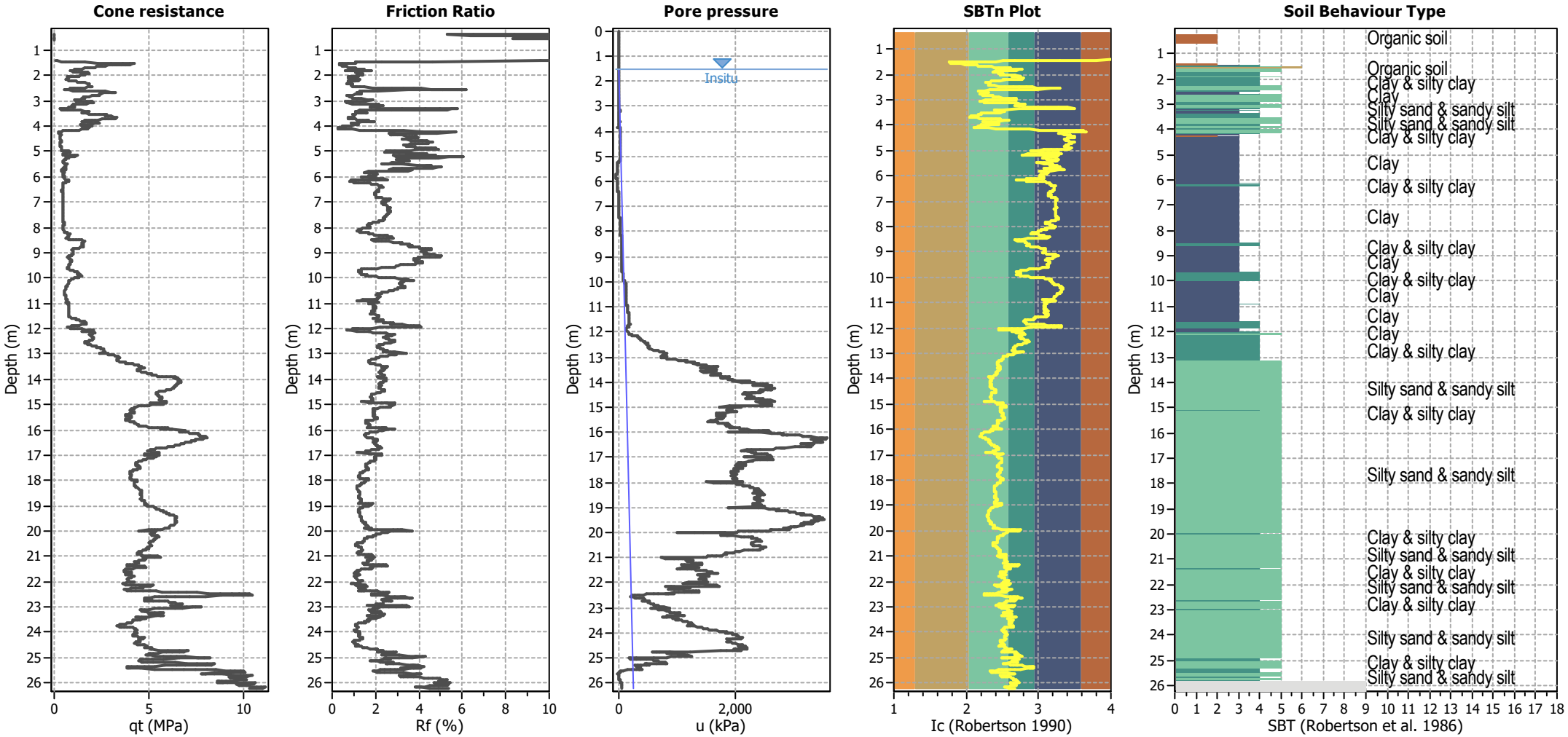
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT315
Total depth: 26.22 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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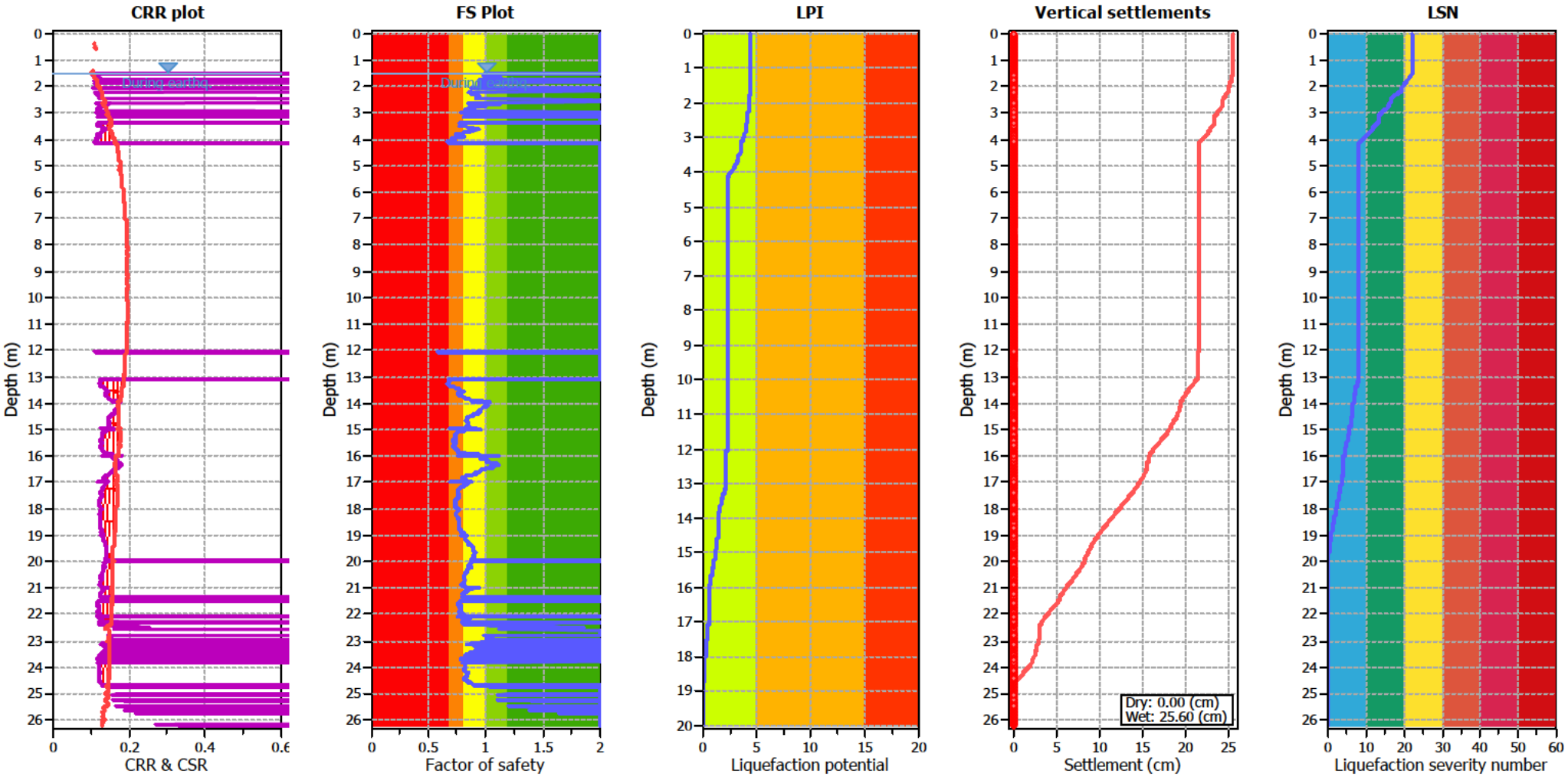
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT315
Total depth: 26.22 m



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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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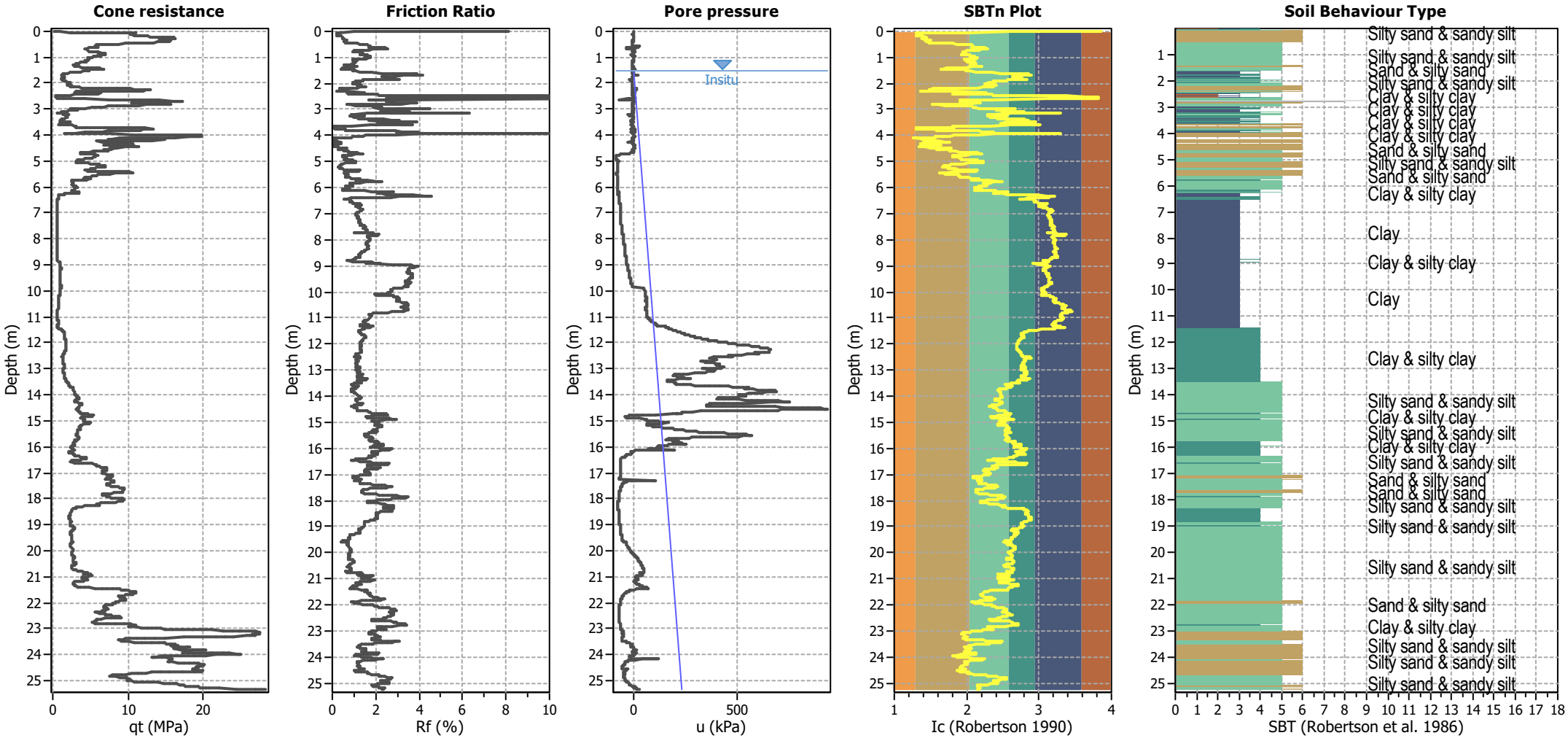
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT-402
Total depth: 25.34 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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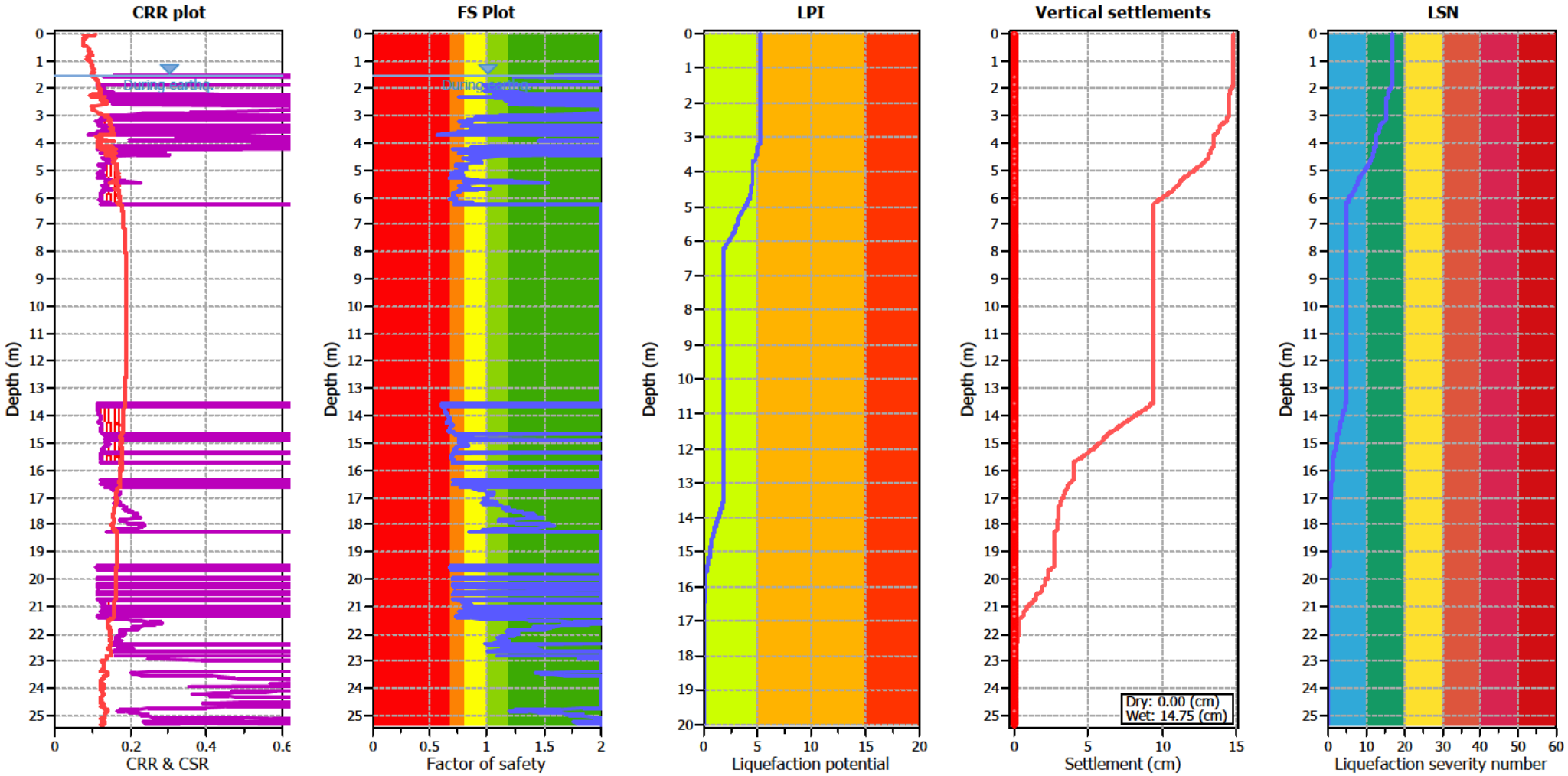
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT-402
Total depth: 25.34 m



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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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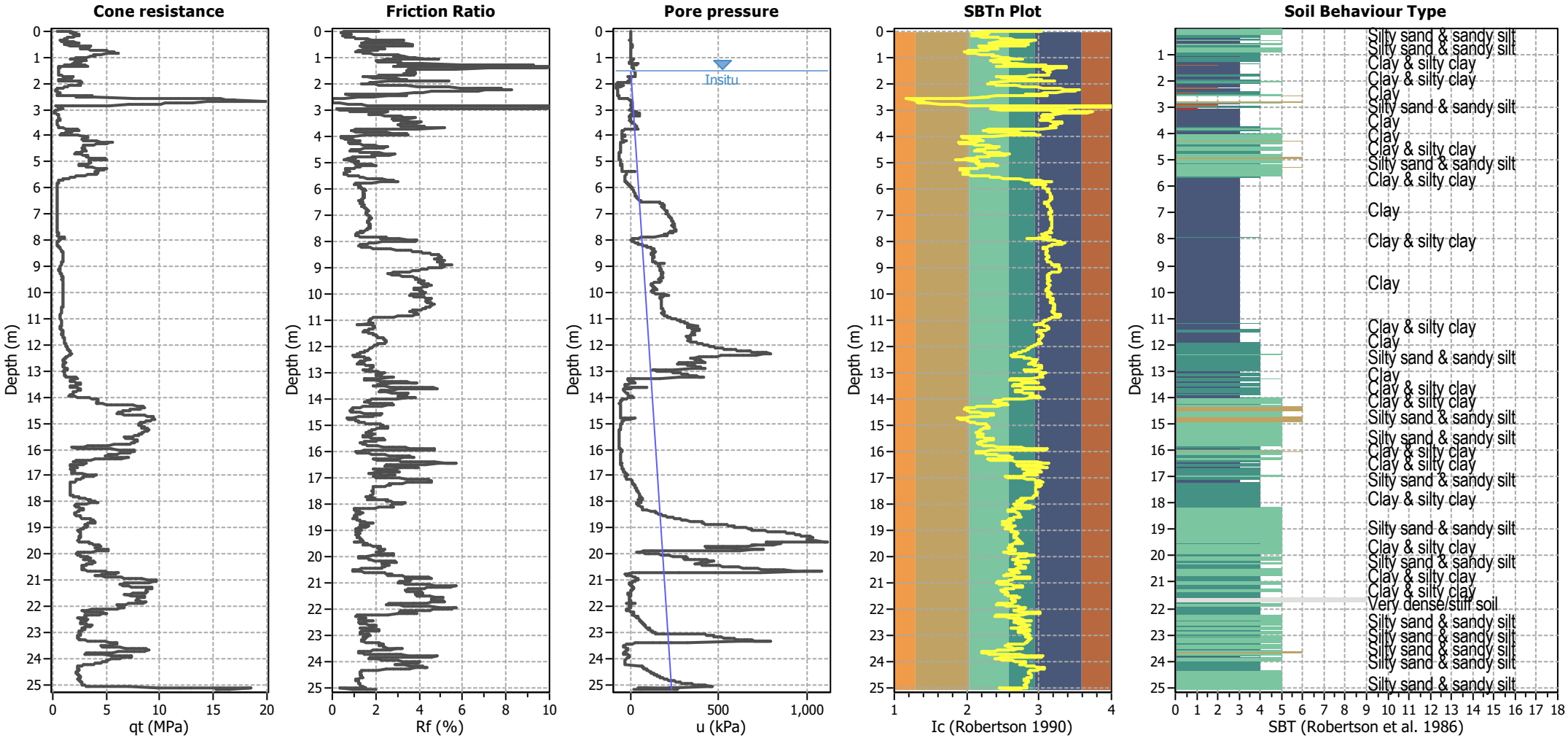
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT-405
Total depth: 25.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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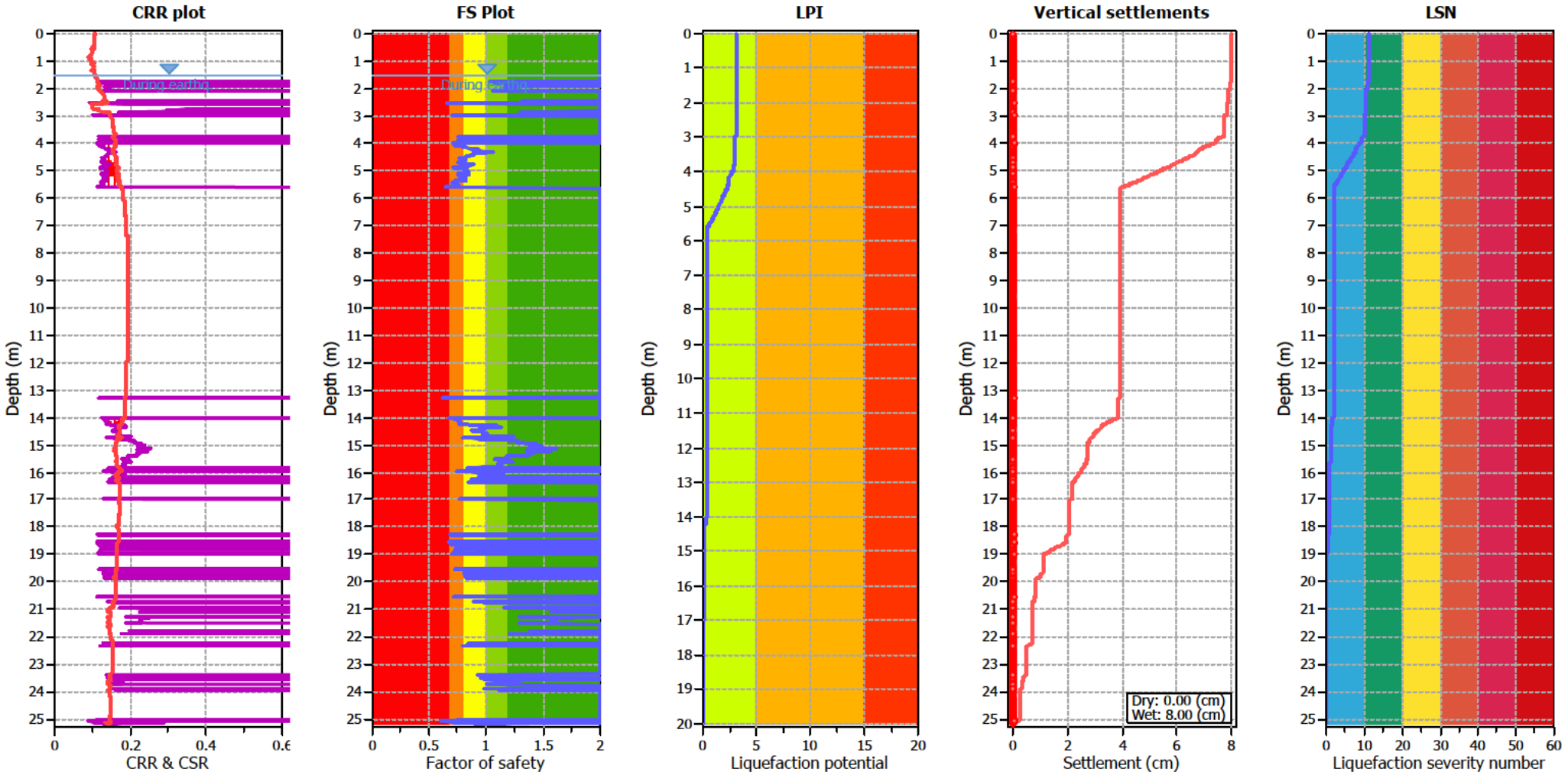
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT-405
Total depth: 25.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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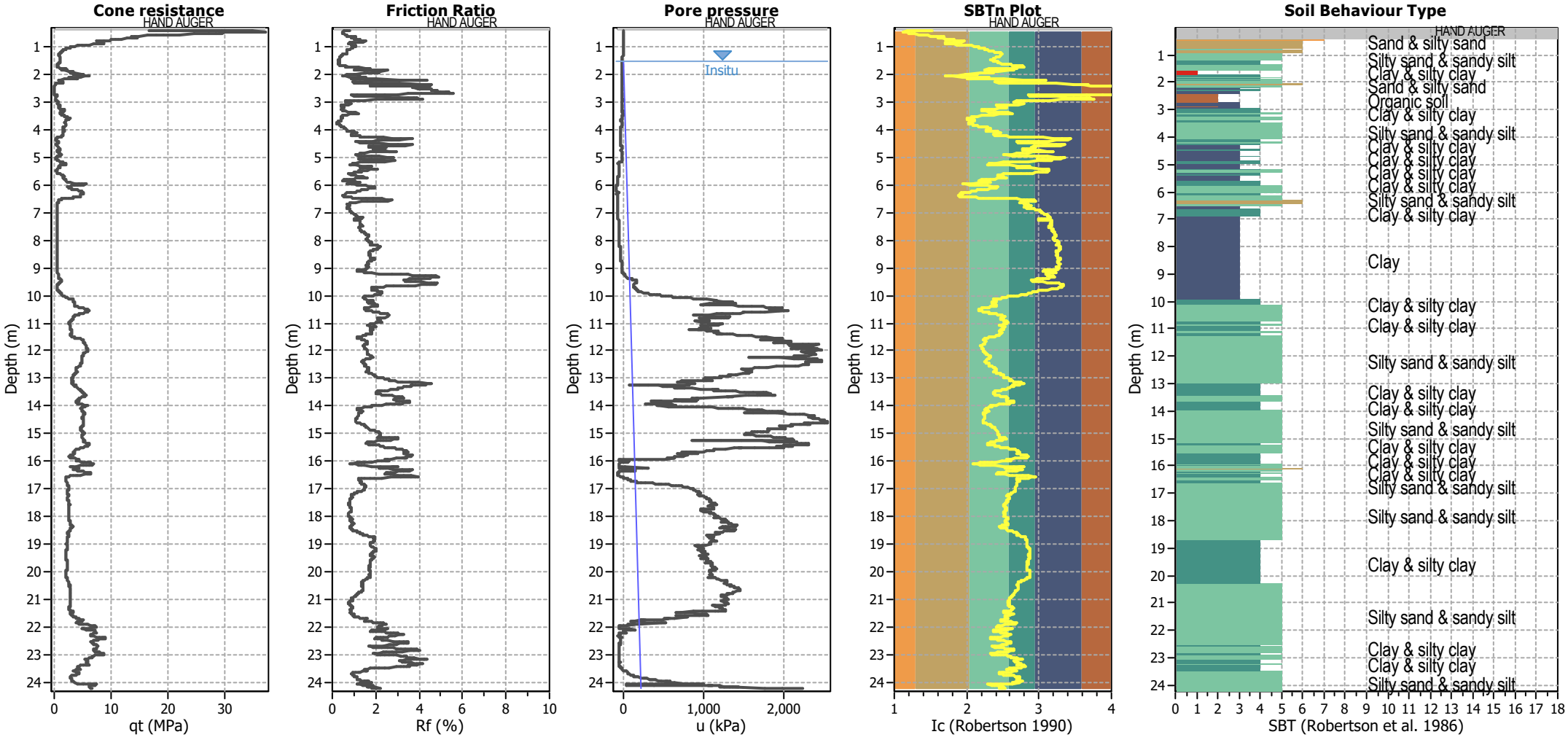
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT502
Total depth: 24.23 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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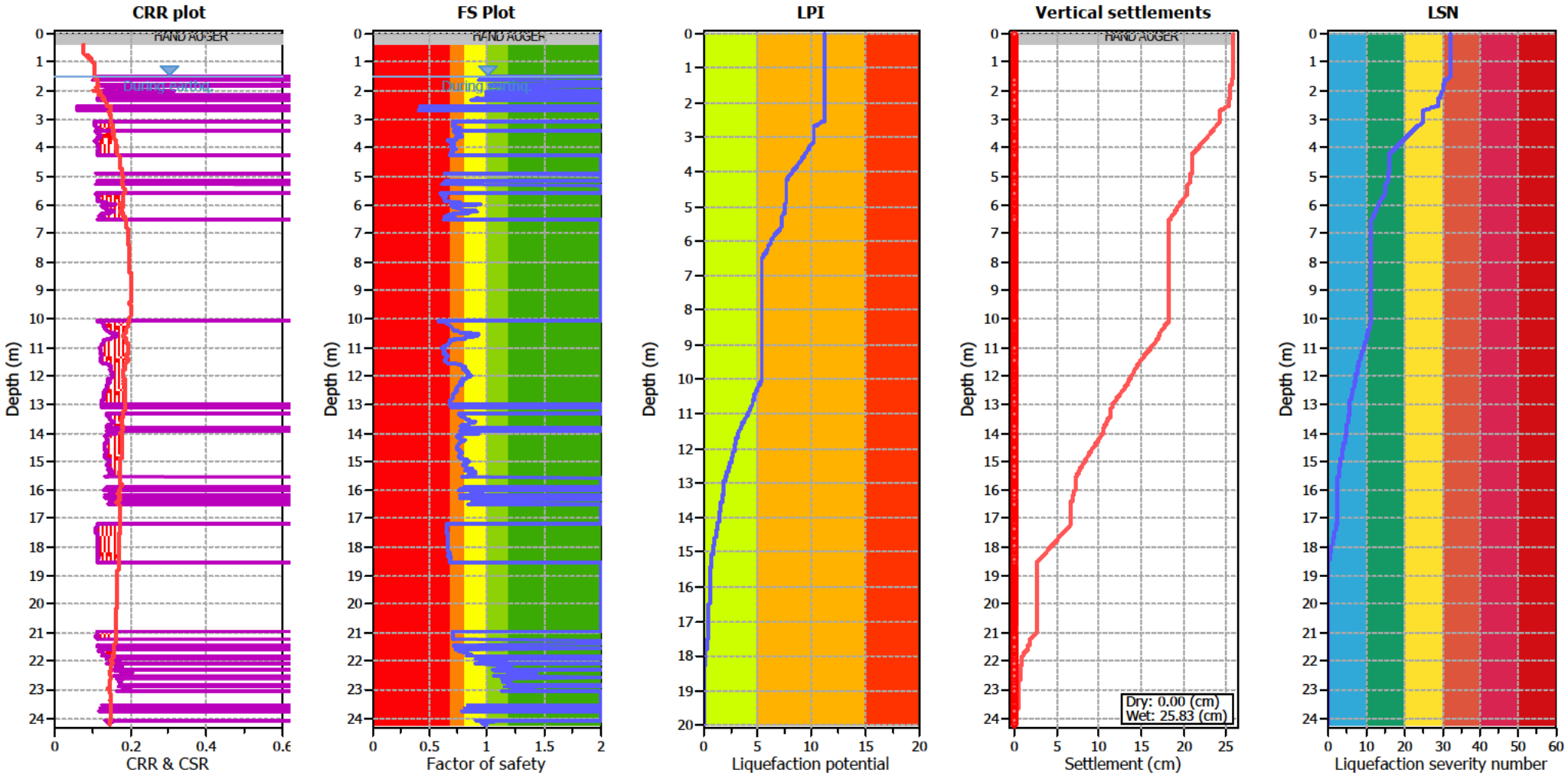
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT502
Total depth: 24.23 m



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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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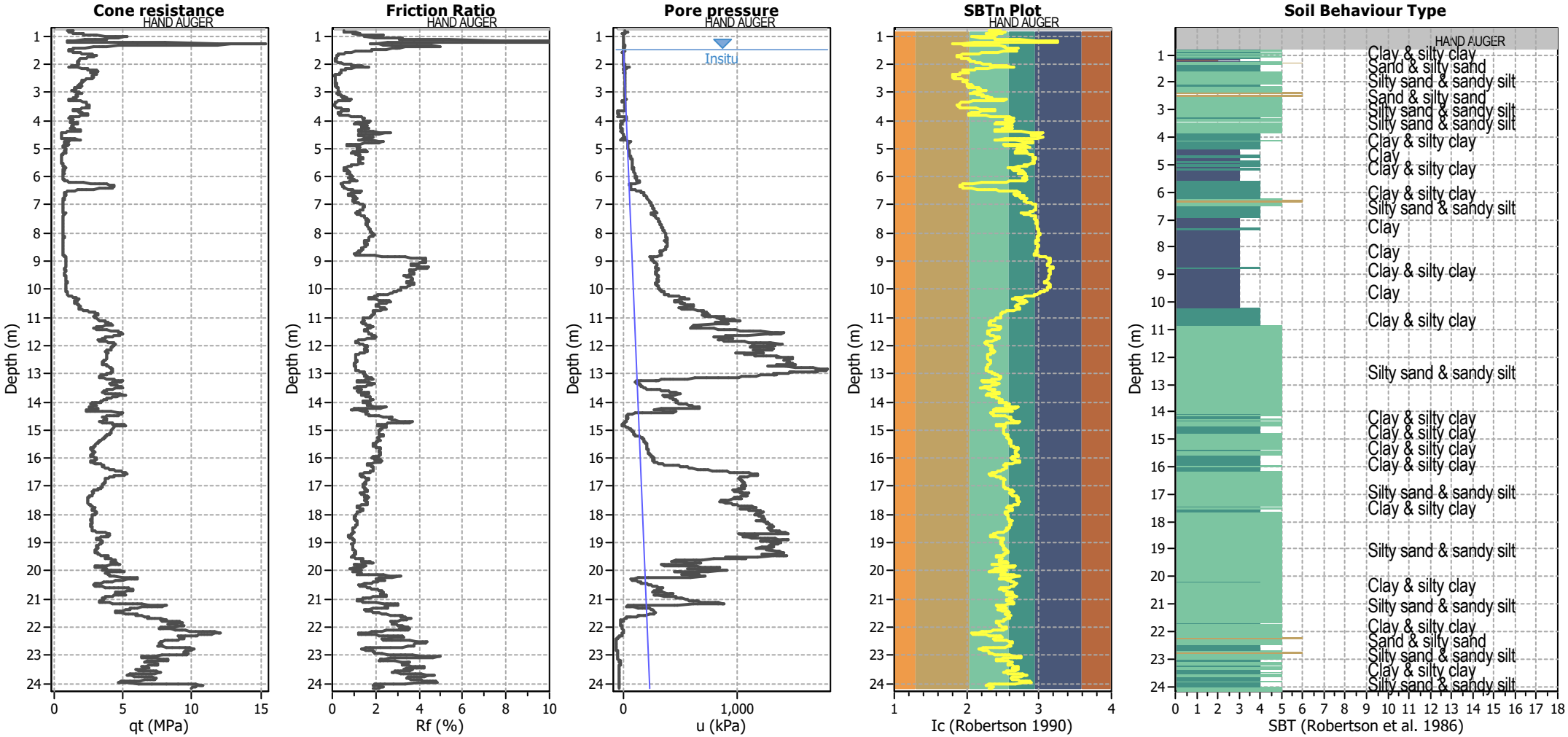
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT506
Total depth: 24.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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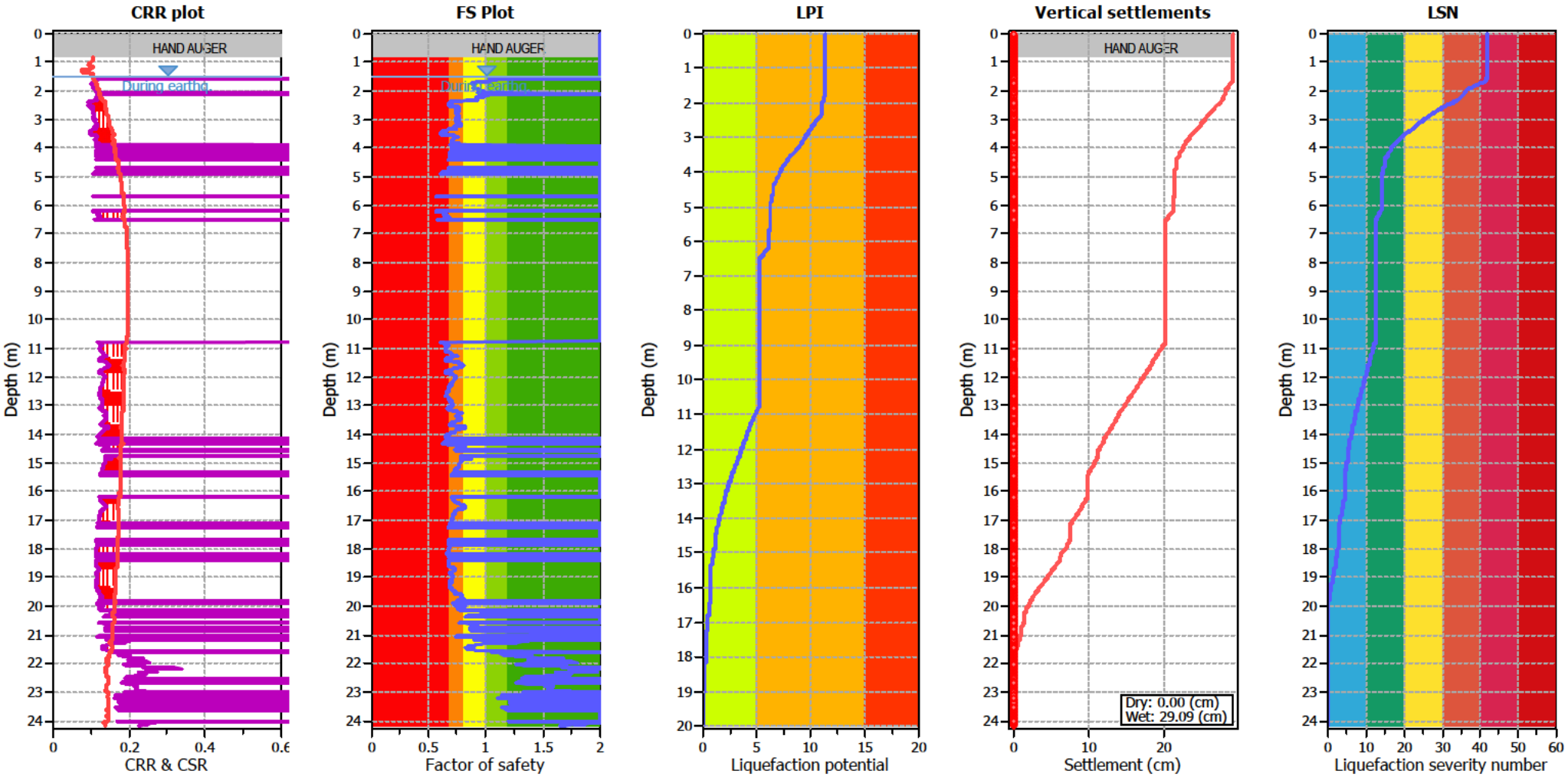
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT506
Total depth: 24.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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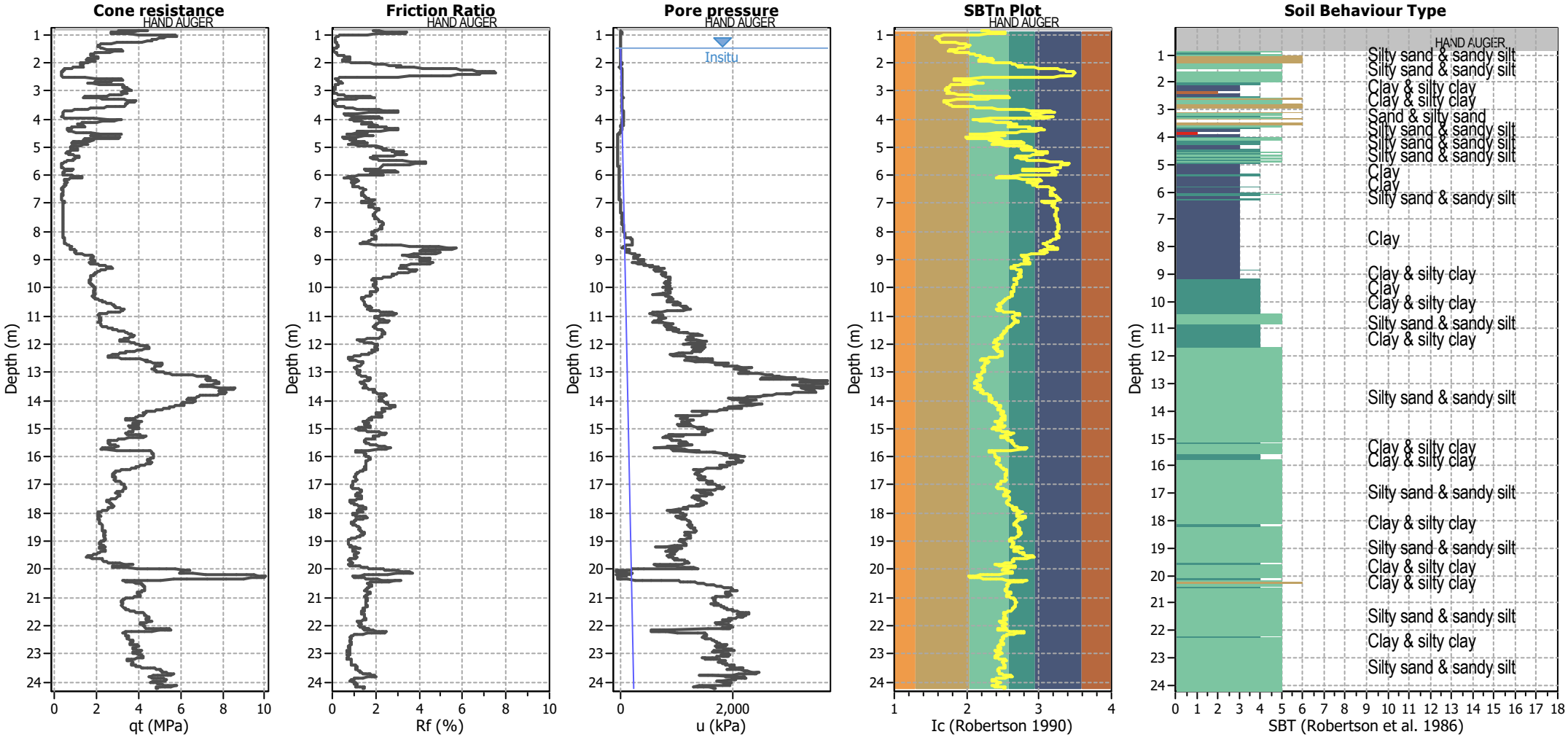
Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT508
Total depth: 24.23 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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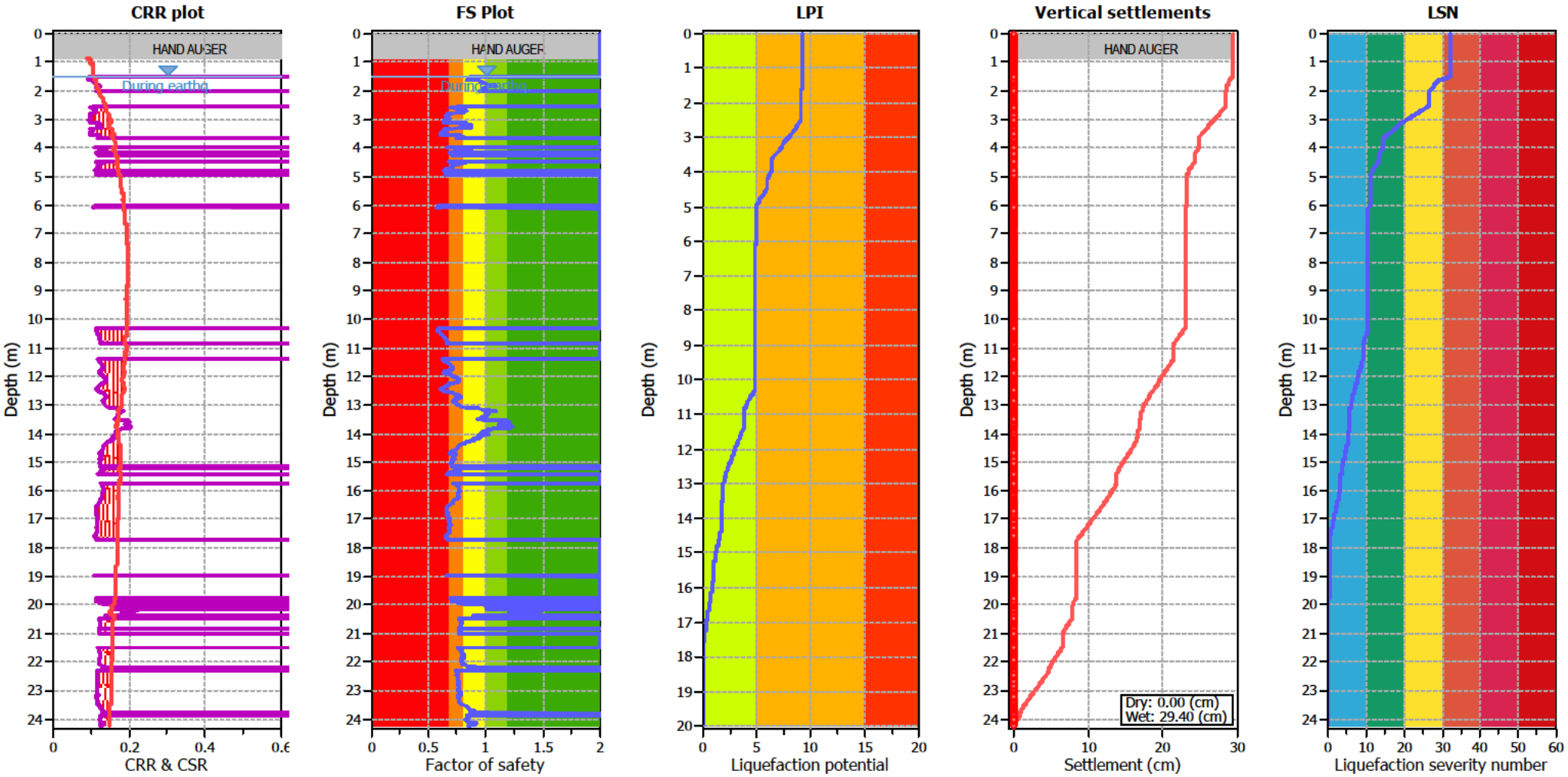
http://www.geologismiki.gr

Project: 188 Beaumont Street
Location: Wynyard Quarter

CPT: CPT508
Total depth: 24.23 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

Appendix G Auckland Unitary Plan Groundwater Take/Divert Assessment

Assessment against Auckland Unitary Plan groundwater take/divert Permitted activity Standards

The proposed ground floor excavation has been assessed against the Auckland Unitary Plan rules E7.6.1.10 and E7.6.1.6. **This has confirmed a take/diversion groundwater consent is required.** The outcome of this is summarised in the Table below.

Groundwater Diversion - E7.6.1.10: Diversion of groundwater caused by any excavation, (including trench) or tunnel	
Permitted Activity Standard	Assessment
(1) All of the following activities are exempt from the Standards E7.6.1.10(2) – (6): (a) pipes cables or tunnels including associated structures which are drilled or thrust and are less than 1.2m in external diameter; (b) pipes including associated structures up to 1.5m in external diameter where a closed faced or earth pressure balanced machine is used; (c) piles up to 1.5m in external diameter are exempt from these standards; (d) diversions for no longer than 10 days; or, (e) diversions for network utilities and road network linear trenching activities that are progressively opened, closed and stabilised where the part of the trench that is open at any given time is no longer than 10 days.	Piles expected to be ≤ 1.5 m diameter Core excavations for central and western towers are not exempt under this criteria
(2) Any excavation that extends below natural groundwater level, must not exceed: (a) 1ha in total area; and, (b) 6m depth below the natural ground level.	✓ Complies - No excavation will exceed these limits
(3) The natural groundwater level must not be reduced by more than 2m on the boundary of any adjoining site.	✓ Complies – groundwater will be reduced by less than 2 m at the site boundary, provided appropriately designed groundwater cut-off walls and adopted.
(4) Any structure, excluding sheet piling that remains in place for no more than 30 days, that physically impedes the flow of groundwater through the site must not: (a) impede the flow of groundwater over a length of more than 20m; and, (b) extend more than 2m below the natural groundwater level.	× Does Not Comply – The permanent core caps may extend marginally greater than 2 m below the natural high-tide groundwater level. The core cap footprints are less than 20 m in length.

Groundwater Diversion - E7.6.1.10: Diversion of groundwater caused by any excavation, (including trench) or tunnel	
Permitted Activity Standard	**Assessment**
(5) The distance to any existing building or structure (excluding timber fences and small structures on the boundary) on an adjoining site from the edge of any: (a) trench or open excavation that extends below natural groundwater level must be at least equal to the depth of the excavation; (b) tunnel or pipe with an external diameter of 0.2 - 1.5m that extends below natural groundwater level must be 2m or greater; or, (c) a tunnel or pipe with an external diameter of up to 0.2m that extends below natural groundwater level has no separation requirement	✓ Complies – offset to nearest building is significantly greater than the excavation depth (approximately 4.2 m)
(6) The distance from the edge of any excavation that extends below natural groundwater level, must not be less than: (a) 50m from the Wetland Management Areas Overlay; (b) 10m from a scheduled Historic Heritage Overlay; or, (c) 10m from a lawful groundwater take.	✓ Complies
Is groundwater diversion permitted under Standard E7.6.1.10?	**× Does Not Comply - Excavation extends below the natural groundwater level so activity is not Permitted under Standard E7.6.1.10**
Groundwater Take - E7.6.1.6: Dewatering or groundwater level control associated with a groundwater diversion permitted under Standard E7.6.1.10, all of the following must be met:	
Permitted Activity Standard	**Assessment**
(1) The water take must not be geothermal water;	✓ Complies – Take is not geothermal.
(2) The water take must not be for a period of more than 10 days where it occurs in peat soils, or 30 days in other types of soil or rock;	× Does Not Comply – assumed groundwater take may be required for longer than 30 days to enable construction of the core caps
(3) The water take must only occur during construction.	✓ Complies – lift pit structures will be permanently tanked.
Is groundwater take permitted under Standard E7.6.1.6?	**× Does Not Comply**
Is Resource Consent required for Groundwater Diversion and/or Take?	**Groundwater Consent is Required**

Appendix H Historical Groundwater Sulphate and Chloride Measurements

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C:\12dSynergy\data\ALBTCAD\Orams Expansion Facility_166\CAD\FIG\30881-CONT-F11B.dwg 2018-Nov-02 3:31:59 PM Plotted By: MARK ENNION

LEGEND

- SITE EXTENT
- BOUNDARY
- SHALLOW PIEZOMETER
- 6-8m PIEZOMETER
- VP — 2018 VAPOUR MONITORING POINT
- VMP — 2012 VAPOUR MONITORING POINT

CHEMICAL EXPOSURE CLASSIFICATION:
SULPHATE CONCENTRATION IN GROUNDWATER

- 500 — mg/L
- XA2
- XA1

NOTE: pH ALL UNRESTRICTED ie. >6.5

GEOTECHNICAL INVESTIGATION:

- GBH302 — BOREHOLE LOCATION
- GBH102P — BOREHOLE WITH PIEZOMETER
- TP102 — TEST PIT LOCATION

CONTAMINATION INVESTIGATION:

- CBH206P — BOREHOLE WITH PIEZOMETER LOCATION
- SS01 — SURFACE SAMPLE

PREVIOUS INVESTIGATION:

- 90-BH1 — BOREHOLE LOCATION BY T+T
- BH03 — BOREHOLE LOCATION BY OTHERS

NOTES:

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2. ALL SEABED ARE IN CHART DATUM UNLESS NOTED OTHERWISE.
3. ALL LEVELS ON THE LAND ARE IN COORDINATE DATUM: NZGD2000, MT EDEN CIRCUIT COORDINATES. NEW ZEALAND VERTICAL 2016.
4. PROPOSED BUILDING OUTLINE PROVIDED BY RTA STUDIO, REF. "18122 - Site 18_RC01_SK-010 - SITE PLAN_WIP.dwg" DATED 2/07/2018.

PROJECT No.	30881.2000	
DESIGNED	LKH	Aug. 18
DRAWN	JC	Aug. 18
CHECKED	AMM	Nov.18
APPROVED	WMW	DATE Nov.18

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CLIENT	ORAMS MARINE
PROJECT	142-188 BEAUMONT STREET
TITLE	GROUND CONTAMINATION SITE INVESTIGATION SULPHATE CONCENTRATIONS IN GROUNDWATER
SCALE (A3)	1:1000
FIG No.	CONT - FIGURE 11B
REV	2

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE - IF IN DOUBT, ASK.

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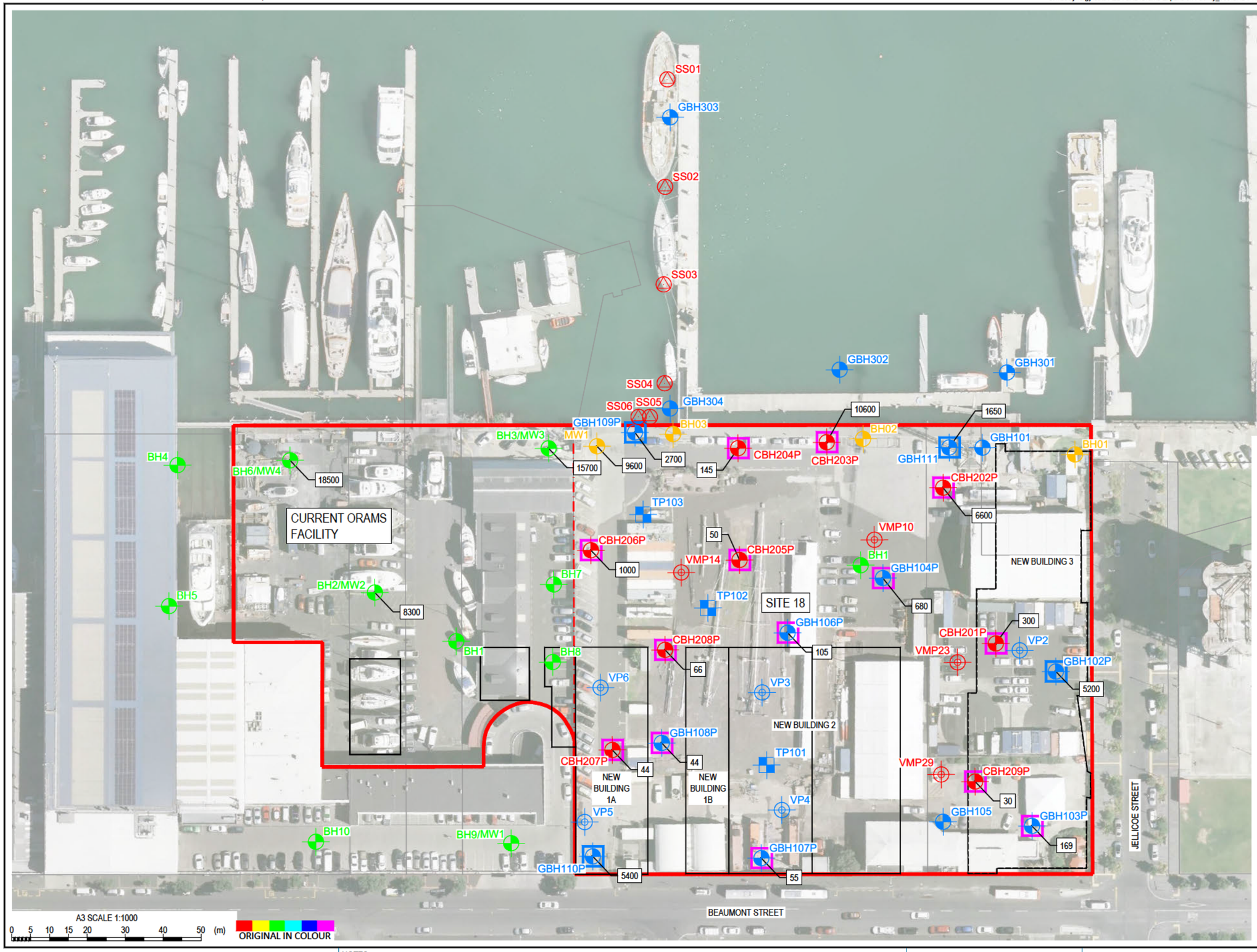

LEGEND

- SITE EXTENT
- BOUNDARY
- SHALLOW PIEZOMETER
- 6-8m PIEZOMETER
- VP 2018 VAPOUR MONITORING POINT
- VMP 2012 VAPOUR MONITORING POINT

CHLORIDE CONCENTRATION IN GROUNDWATER:

5000 mg/L

GEOTECHNICAL INVESTIGATION:

- GBH302 BOREHOLE LOCATION
- GBH102P BOREHOLE WITH PIEZOMETER
- TP102 TEST PIT LOCATION

CONTAMINATION INVESTIGATION:

- CBH206P BOREHOLE WITH PIEZOMETER LOCATION
- SS01 SURFACE SAMPLE

PREVIOUS INVESTIGATION:

- 90-BH1 BOREHOLE LOCATION BY T+T
- BH03 BOREHOLE LOCATION BY OTHERS

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CHECKED	AMM	Nov.18
APPROVED	WMW	Nov.18

CLIENT **ORAMS MARINE**

PROJECT **142-188 BEAUMONT STREET**

TITLE GROUND CONTAMINATION SITE INVESTIGATION CHLORIDE CONCENTRATIONS IN GROUNDWATER

SCALE (A3) 1:1000 FIG No. CONT - FIGURE 11C REV 2

Appendix I Downhole Seismic Testing Report

INITIA
GEOTECHNICAL SPECIALISTS

WESTHAVEN RESIDENTIAL LP
C/- AECOM, Attention: Will Brown Douglas
Email: will.browndouglas@aecom.com

Our Reference: P-002883
16 November 2025

Dear Will,

Downhole Seismic Testing Report
188 Beaumont Street - Residential Apartment Development

1. Introduction

This report summarizes data acquisition, processing, interpretation and results of a downhole seismic test carried out at machine borehole 188 Beaumont Street, Auckland Central, Auckland. The key objective of this test was to measure the time averaged shear wave velocity above rock level for the purposes of estimating the site period and assessing the site subsoil class in accordance with NZS1170.5. In addition, the time averaged shear wave velocity upper 30 m of the soil profile ($V_{s,30}$) has been assessed for the purpose of site classification in accordance with draft specification TS1170.5.

2. Data Acquisition

Geotechnical site investigations were carried out on the 14th and 15th October 2025. All investigation details and borehole logs are summarised in the Initia Geotechnical Assessment Report, dated November 2025.

As part of this investigation, machine borehole BH501 was core-drilled and logged to a depth of 33.19 m below ground level (bgl), the purpose of both geotechnical characterisation and down-hole seismic testing. The hole was lined with 50 mm diameter PVC tube, grouted in place with a water-bentonite-cement mixture accordance with ASTM-D7400-008.

A downhole seismic survey was conducted on the 20th October 2025. However, this survey was not able to reach beyond 11.0m bgl due to failure of the grouted pipe.

A second borehole BH501A was drilled for the sole purpose of seismic testing, located 4.0 m offset from BH501. This was wash drilled to 33.5 m with no geotechnical logging.

A downhole seismic survey was conducted at the site on November 10th, 2025 from 11:00 AM to 5:00PM. All testing was performed during times when no vehicle movements were taking place to minimise interference from ambient noise.

Details of source-receiver geometry and acquisition parameters are provided in Table 1. The survey was performed in accordance with ASTM D7400-08.

A 2.2 m long shear beam was used as the seismic source. It was positioned in a magnetic East-West orientation, centred about the borehole at a 1.0 m lateral offset. The front wheels of a light vehicle were placed on top of the beam to ensure firm coupling between the beam and the ground surface.

The borehole receiver was deployed incrementally in 1.0 m depth intervals, reference from the top of the standpipe. Due to grout shrinkage or loss around the top of each hole, testing of BH501 commenced at 2.0m and BH501A commenced at 3.0m.

At each depth, the receiver was mechanically clamped against the borehole wall. The downhole receiver features an inbuilt fluxgate compass and orientation system that allows for sensors to rotate in a geographic reference frame.

At each depth increment, shear waves were generated by horizontally striking the shear beam in opposing directions-designated as LH (left-hand) and RH (right-hand) shots- to induce oppositely polarised shear waves in alignment with beam's orientation.

Compression waves (P-waves) were generated independently by vertically striking a 300 x 300 mm Ultra High Molecular Weight Polythene plate.

Each shot was repeated a minimum of three times, and resulting recordings were stacked during post-processing to enhance signal-to-noise ratio (SnR), waveform repeatability, and shear wave polarization were monitored alongside the testing using in-house proprietary Python scripts.

Although the test was carried out at a time when traffic was low, significant noise was observed at times. As a result, some individual shots were repeated.

Table 1: Data acquisition parameters

Site geometry		
	Test 2: BH501	**Test 1: BH501A (CPT506)**
Coordinates (NZTM)	1756411E, 5921388N	1756413E, 5921394N
Vs Test Depth	32m	11m
Distance borehole to center of shear beam (Ls)	1.0m	1.5m
Distance borehole to vertical striker plate (Lp)	0.8 m	0.6m
Length shear beam	2.2m	2.2m
Length of standpipe top above ground level	0.0m	0.0m
Water level measured in standpipe at start of test	2.2mbgl	
Naming convention	LH – West to East shot RH – East to West shot	LH – West to East shot RH – East to West shot
Instrument acquisition parameters		
Acquisition system	Geometrics GEODE	
Downhole receiver	Geostuff BHG-3 (three-axial)	
Data format	seg2 (3 channel)	

Record length	500ms
Delay	-0.05s
Sample Interval	62.5 µs
Acquisition filters	out
Gain	No gain applied
Stacking	No stack
Accuracy	
Depth accuracy	± 0.02m
Measurement accuracy (L)	± 0.05m
File labelling convention	
Stacking	1 file per shot, all stacking carried out during post-processing, file count starting with 1000.dat
LH, RH, Vertical shots	RH shots - SOURCE_LOCATION < 0
	LH shots - SOURCE_LOCATION > 0
	Vertical - SOURCE_LOCATION not an integer

3. Data Processing and Interpretation

All data processing and interpretation were conducted using in-house Python scripts. The recorded seismic data were first sorted into depth intervals and categorised into left-hand (LH), right-hand (RH), and vertical (P-wave) shots. Each set of shots was then stacked to improve the SnR. No frequency filter was applied to the raw or stacked data.

For shear wave (s-wave) recordings, data from channel 1 (vertical receiver) were excluded from analysis, while for compression wave (p-wave) recordings, all data from the two horizontal receivers (channel 2 & 3) were omitted.

For shear wave interpretation, both channel 1 and channel 2 traces were plotted. With correct sensor orientation the source-aligned (east-west) receiver is expected to provide the best shear wave signal. However, the channel with the best signal was not consistent through the test. This may be the result of receiver mis-orientation due to magnetic interference or shifting orientation of the shear wave with depth.

For each depth interval, three key arrival times were manually identified, as shown on Figure 1.

- **First Arrival (FA):** The initial crossover between oppositely polarized shear wave components.
- **First Peak (FP):** The first identifiable peak in the waveform exhibiting opposite polarities.
- **Maximum Peak (MP):** The peak with the maximum amplitude among oppositely polarized components, in all cases this was the second peak.

In theory, first arrival picks should provide an appropriate tool to estimate Vs, however first arrivals can be difficult to identify, especially if the shear wave arrivals are obscured by ambient noise or constraint on the epistemic uncertainty associated with arrival time picking (see for example Stolte et al,2020, Wentz et al.,2019).

For p-wave recordings one single arrival (first arrival) was picked from each stack.

A shot gather was subsequently generated, representing the scaled ground motions of the principal component as a function of depth (refer to the appendices).

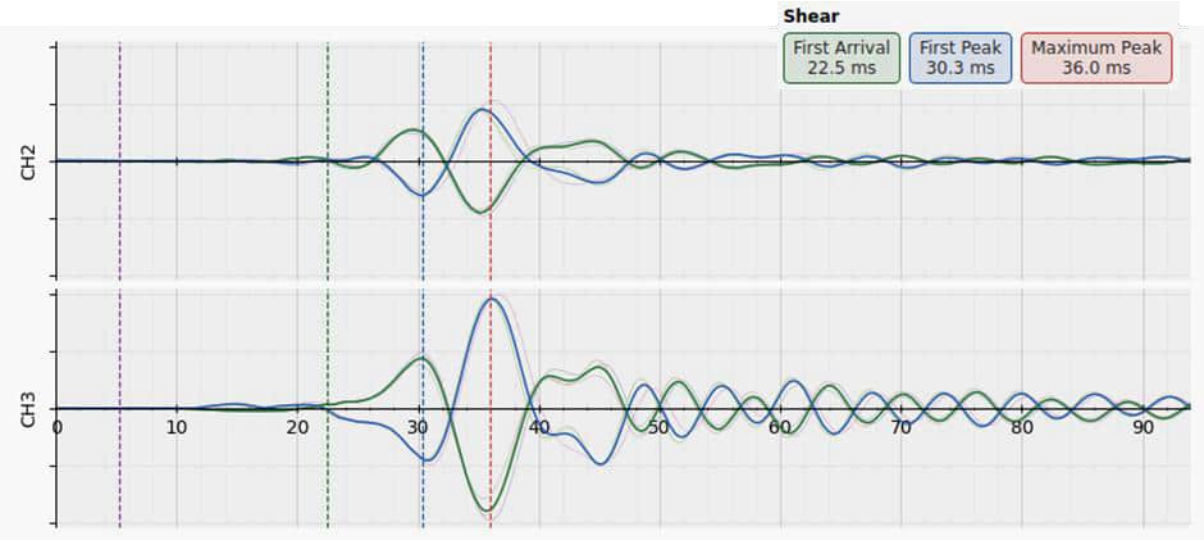


Figure 1: Example of the stacked seismic recordings on channels 2 & 3 at a receiver depth of 5m, displaying the three arrivals (FA, FP, MP) picked. In this case channel 3 is the "principal component"

4. Velocity Estimation

Following arrival time picking, first arrival (FA), first peak (FP) and maximum peak (MP) arrival times were analysed in two ways to estimate shear wave velocity, both following the methods described in Wentz, 2019:

1. **Pseudo-Interval Method:** Interval velocities were calculated by evaluating the time difference between arrivals at adjacent depth steps.
2. **Slope Method:** Arrival times are corrected to equivalent vertical travel times, based on the slope of the offset seismic source from the vertical borehole. FP and MP arrival times are then also corrected with a unit-averaged "time shift factor" to provide first arrival-equivalent times.

   The profile is then segmented based known geological/geotechnical boundaries or where step changes in arrival time slopes with depth occur, indicating changes in v_s.

   A segmented linear regression is then produced for each set of arrival times, to provide a least-squares fit of arrival time to depth, constrained to a zero-intercept and across segment boundaries. The slope of each segment then gives a velocity across that unit.

The shear wave velocities derived using the pseudo-interval method can be subject to large variations caused by small errors in the trigger timing or selection of arrivals. This is error becomes more significant in higher shear wave velocity materials.

The individual layer velocities presented below were therefore derived using the slope method. We provide a mean values for each layer by averaging the layer velocities calculated from first arrival (FA), first peak (FP) and maximum peak (MP) arrival picks.

The time-averaged shear wave velocity over the upper 30 metres of the soil column $v_{s,30}$ is defined by the following formula:

$$v_{s,30} = \frac{30}{\sum \frac{d_i}{v_{S,i}}}$$

Where d_i and $v_{s,i}$ represent the thickness and velocity for each interval.

5. Results

The results below present a composite of the two tests carried out; BH501 to 11m bgl, and BH501A to 32m bgl). The BH501 results provided a more coherent signal and are expected to provide a more accurate characterisation of the reclamation fill and Holocence marine sediments, while BH501A provides a continuous and has been used for $v_{s,30}$ estimation.

The trace gathers for the selected principal shear component and for channel 1 (p-wave arrivals) are displayed in Appendix A, together with a tabular summary time of all arrival time picks. Travel time plots with the selected slopes utilized in the slope method are displayed in Appendix B.

Individual layer velocities are detailed in Table 2 below. Higher resolution images of the individual velocity models are presented in Appendix C.

Table 2 presents the layer velocities derived from the three different picking methods discussed in Section 3 from which a mean and standard deviation were calculated.

Layer velocities derived using the slope method were used to calculate the travel-time averaged shear wave velocity over the upper 30 m of the soil profile of the site (here referred to as $v_{s,30}$). Only the result from BH501A were used for this purpose, being continuous to 30m depth.

The three velocity models derived using the slope method, and the mean of these models returned a consistent $v_{s,30}$ value of **233 m/s.**

This is well aligned with the velocity derived from the absolute travel time to 30m depth, which was 234 m/s approximately.

Depth-velocity models derived using the slope method and pseudo-interval method are presented in Appendix B.

Table 2: Layered shear wave velocity model derived for geotechnical units using the slope method.

Unit[1]	Unit Description	Top (m bgl)	Base (m bgl)	v_s, FA (m/s)	v_s, FP (m/s)	v_s, MP (m/s)	Mean v_s (m/s)
Granular fill/ Mixed fill/ Hydraulic fill[2]	Granular fill overlying SILT and SAND, soft to firm and loose	0	5	204 [234]	203 [231]	202 [232]	**203** **[233]**
TF Unit 1 & 2[2]	CLAY and SILT, soft to stiff	5	10	128 [148]	128 [148]	130 [147]	**129** **[148]**

Unit[1]	Unit Description	Top (m bgl)	Base (m bgl)	v_s, FA (m/s)	v_s, FP (m/s)	v_s, MP (m/s)	Mean v_s (m/s)
TF Unit 3	SAND and SILT, medium dense/stiff to hard	10	15	289	300	294	**295**
TF Unit 4	SAND and SILT, medium dense to very dense / hard	15	25	269	260	258	**262**
ECBF[3]	SANDSTONE, very weak	25	32	469	508	528	**501**

[1] Units are correlated to those presented in the Initia Geotechnical Assessment Report (November 2024). TF = Takaanini Formation. ECBF = East Coast Bays Formation.
[2] Value in brackets represent the first test in BH501, undertaken to 11m bgl. All other values of from the second test in BH501A.

Table 3: Layered compression wave velocity model derived using the slope method.

Unit[1]	Top (m bgl)	Base (m bgl)	v_p (m/s)
Fill unsaturated	0	3	**362**
Saturated fill & TF Unit 1 & 2	3	10	**931**
Lower TF and ECBF	10	32	**1696**

[1] A simplified model is used for the compression wave velocity profile based on the known groundwater level (above 3.0m bgl), and the visible changes is velocity in arrival time - depth plots.

6. Uncertainty and Commentary

Sensor and Shear Wave Orientation

During establishment on site, magnetic interference was noted during set out of the shear beam, with apparent north deviations of about 30°. This is thought to be associated with the uncontrolled fill at the site, which may contain ferrous material. The beam was oriented to the expected magnetic north with reference to the site plan. Interference of the orientation mechanism in the receiver may have occurred during testing.

The extent to which this influenced the senor orientation is not known. There were however clear changes in the principal shear wave orientation, relative to the sensor, as shown on the trace gather plots.

There is a slight vertical offset between the two horizontal sensors, meaning that there is a small time different between arrivals to each channel. This introduces some interval error when picking from the principal component, being a mixture of CH2 and CH3. This error is not significant over larger travel distances (i.e. for the slope method).

Signal Strength

The shear wave signal strength decayed significantly through the test. The signal-to-noise ratio of individual shots reached a minimum of about 10 dB at 32 m depth and was about 15 dB after stacking.

At this noise level, the first arrival 'break' is obscured within the noise floor and so picking becomes less precise at depth.

Combined with the relatively high velocity and limited thickness encountered in the borehole, the shear wave velocity through East Coast Bays Formation is not as precisely characterised as the other units, as reflected in the distribution of unit v_s values.

Pick Correction

The time shift factor used to correct first peak and maximum peak arrivals to first arrival equivalent was calculated as the average difference between first and later arrivals within each unit/velocity segment, to allow for changing shear wave frequency components with depth. This is carried out inclusive of the lower boundary point, where this lies directly on a boundary.

The resulting corrected picks are generally very consistent with the actual first arrival times and so the computed velocities are highly consistent.

It should be noted that the velocity profiles derived from each set of picks are not independent estimates. They are derived to reduce the effect of 'bad' picks on the resulting velocities.

Linear Regression

A continuous, segmented (piecewise) linear regression is used to derive the velocity profiles across the depth-arrival time datasets with defined breakpoints (unit boundaries). This prevents discontinuities in the velocity profile, which may occur when fitting to subsets of the data independently.

The arrival times at unit boundaries have more influence on unit velocities. This is evident at the upper boundary of the East Coast Bays Formation, where the short line segment is heavily influenced by its upper boundary position and likely under-predicts velocity as a result.

7. Site Subsoil Classification In Accordance With NZS1170.5

Initia has previously issued a preliminary geotechnical assessment report for the development – "188 Beaumont Street – Residential Apartment Development. Geotechnical Assessment Report" Initia Ref P-002883, Rev A, dated November 2025. This report presents an assessment of ground conditions at the site and a preliminary assessment of site subsoil class in accordance with NZS1170.5. Based on the results of the downhole shear wave velocity testing presented in this report, the site period, T_{site}, has been re-evaluated with an estimated period of about 0.5 seconds. On this basis, the site can be considered "Class C" in accordance with NZS1170.5. This assessment supersedes that presented in our November 2025 report.

8. References

- ASTM D7400-19, Standard Test Methods for Downhole Seismic Testing.
- Stolte et al. (2020), Assessing the quality and uncertainty of in-situ seismic investigation methods.
- Wentz, 2019, Quake Centre Invasive Seismic Testing – A summary of Methods and Good Practice.
- INITIA REF P-002883, Geotechnical Interpretative Report.

9. Limitations of Geophysical Testing

This report has been prepared for our client, WESTHAVEN RESIDENTIAL LP, with respect to the brief provided to us. The advice and recommendations presented in this report should not be applied to any other project or used in any other context without prior written approval from Initia Limited.

The geophysical ground model presented in this report is based on the interpretation of indirect geophysical measurements, informed by the ground conditions encountered in nearby borehole and cone penetration test (CPT) investigations. While all interpretations have been carried out with due care and professional skill, it is important to acknowledge the inherent uncertainties associated with geophysical data inversion and interpretation. These uncertainties should be considered when using the model for design or further assessment.

Your sincerely,

Report Prepared by:

Vidhan Chopra
Geotechnical Engineer

Report Reviewed by:

Finlay Wallen-Halliwell
Senior Engineering Geologist

Authorised for Initia by:

Matt Wansbone
Senior Geotechnical Engineer

Attached:

- Appendix A: Tabulated Shear Wave Arrival Times
- Appendix B: Shot Gathers (Waterfall Plots)
- Appendix C: Depth-Arrival Time and Depth-Velocity Plots

Appendix A: Tabulated Arrival Times

Tabulated shear and compression wave arrival times for BH501.

Depth (m)	Arrival Time (ms)			
	Shear FA	Shear FP	Shear MP	Comp. FA
2	10.5	14.2	20.1	2.9
3	13.9	19.7	24.9	3.5
4	17.7	24.2	28.8	4.7
5	22.5	30.3	36.0	5.3
6	30.0	37.1	42.4	5.6
7	35.7	42.7	48.3	11.4
8	41.7	49.9	55.7	12.0
9	49.1	56.1	62.9	13.2
10	56.2	64.1	69.6	13.5
11	61.5	68.9	74.4	13.9

Tabulated shear and compression wave arrival times for BH501A

Depth (m)	Arrival Time (ms)			
	Shear FA	Shear FP	Shear MP	Comp. FA
3	14.9	18.5	24.5	8.9
4	18.1	22.4	30.1	9.5
5	26.5	32.0	38.2	10.2
6	33.9	38.3	45.0	11.1
7	39.8	44.2	50.1	13.2
8	48.1	52.6	58.0	14.3
9	57.0	61.2	66.9	14.1
10	62.8	67.9	74.0	15.9
11	66.9	72.4	78.2	16.1
12	71.4	76.4	81.9	16.9
13	74.4	79.8	86.5	17.1
14	77.6	83.3	90.4	18.1
15	82.1	88.3	95.6	18.7
16	85.9	91.4	97.6	19.9
17	89.1	94.2	102.1	19.9
18	92.0	97.4	108.4	21.0
19	94.8	102.1	112.2	21.6
20	96.7	104.5	114.7	21.5
21	101.7	108.6	118.7	22.6
22	105.7	113.8	121.1	23.2
23	109.4	117.6	125.6	24.4
24	113.6	121.7	130.5	24.0
25	118.6	124.6	134.9	24.3
26	122.5	127.2	137.1	25.2
27	124.8	129.2	138.1	26.2
28	125.8	130.8	139.7	26.3
29	126.4	130.8	139.7	26.2
30	128.4	132.8	141.1	28.0
31	130.9	135.3	143.0	27.8
32	131.6	135.3	145.4	28.7

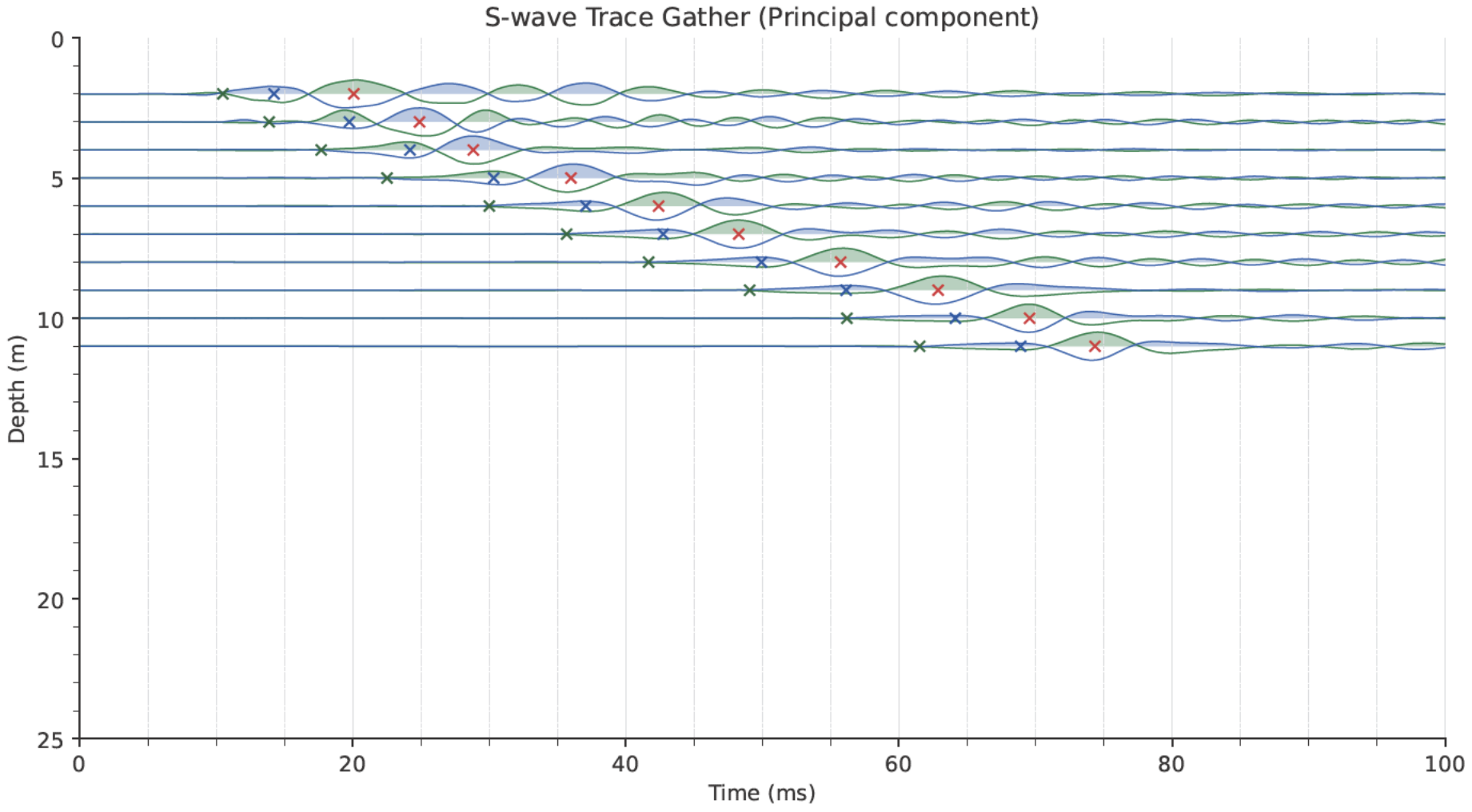
Notes:

Depth given in meters below the top of the standpipe. The distance between the center of shear beam and the receiver location was used for the calculation of layer velocities.

Shear FA: First arrival, FP First Peak, MP: Max Peak arrival times measured on horizontal sensor that recorded the Principal Component (ms)

Comp. FA: Compression wave arrival time measured on channel 1.Shot Gathers (Waterfall Plots)

Appendix B: Shot Gathers (Waterfall Plots)



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

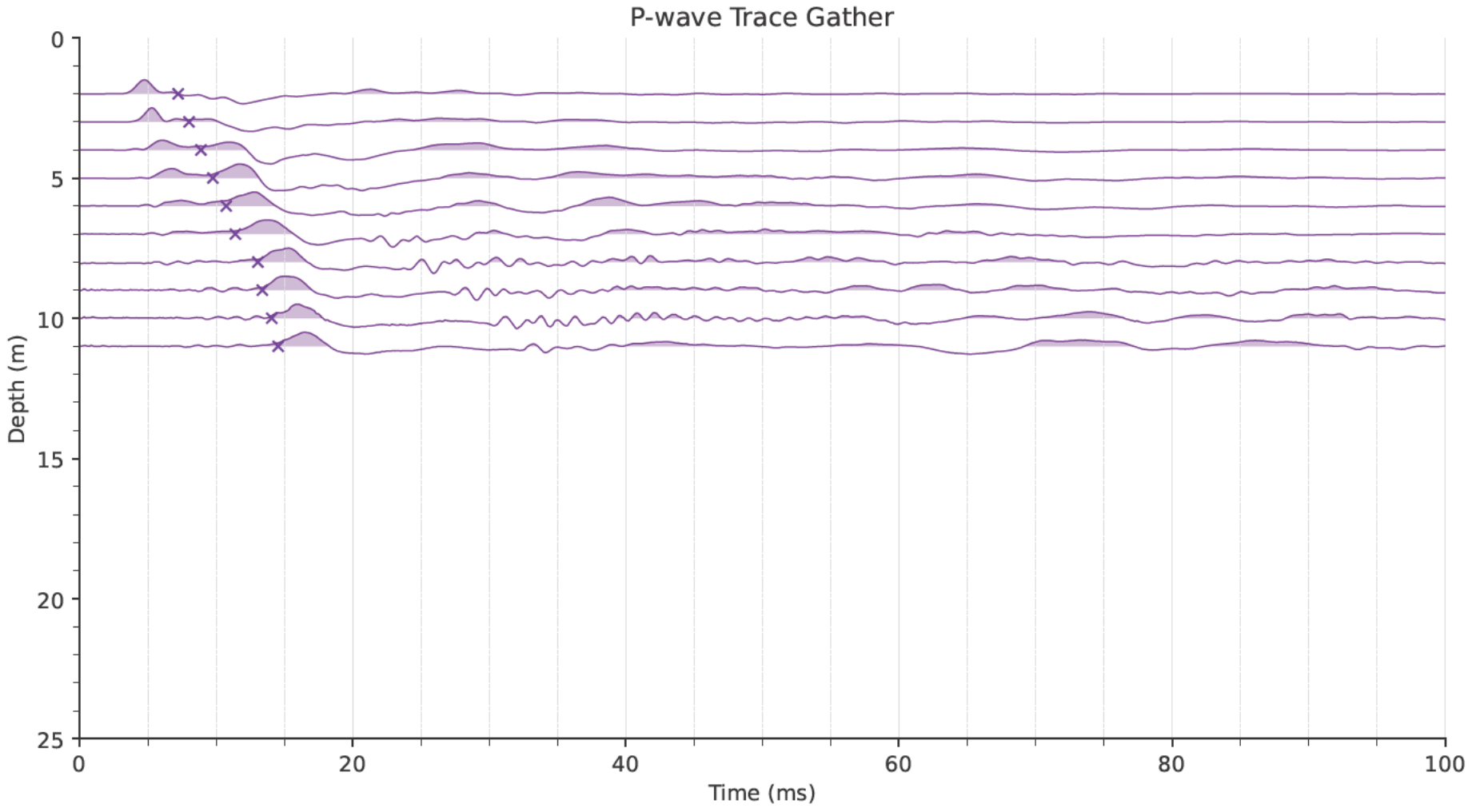
Title: BH501 DHVs Test - S-wave trace gather

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

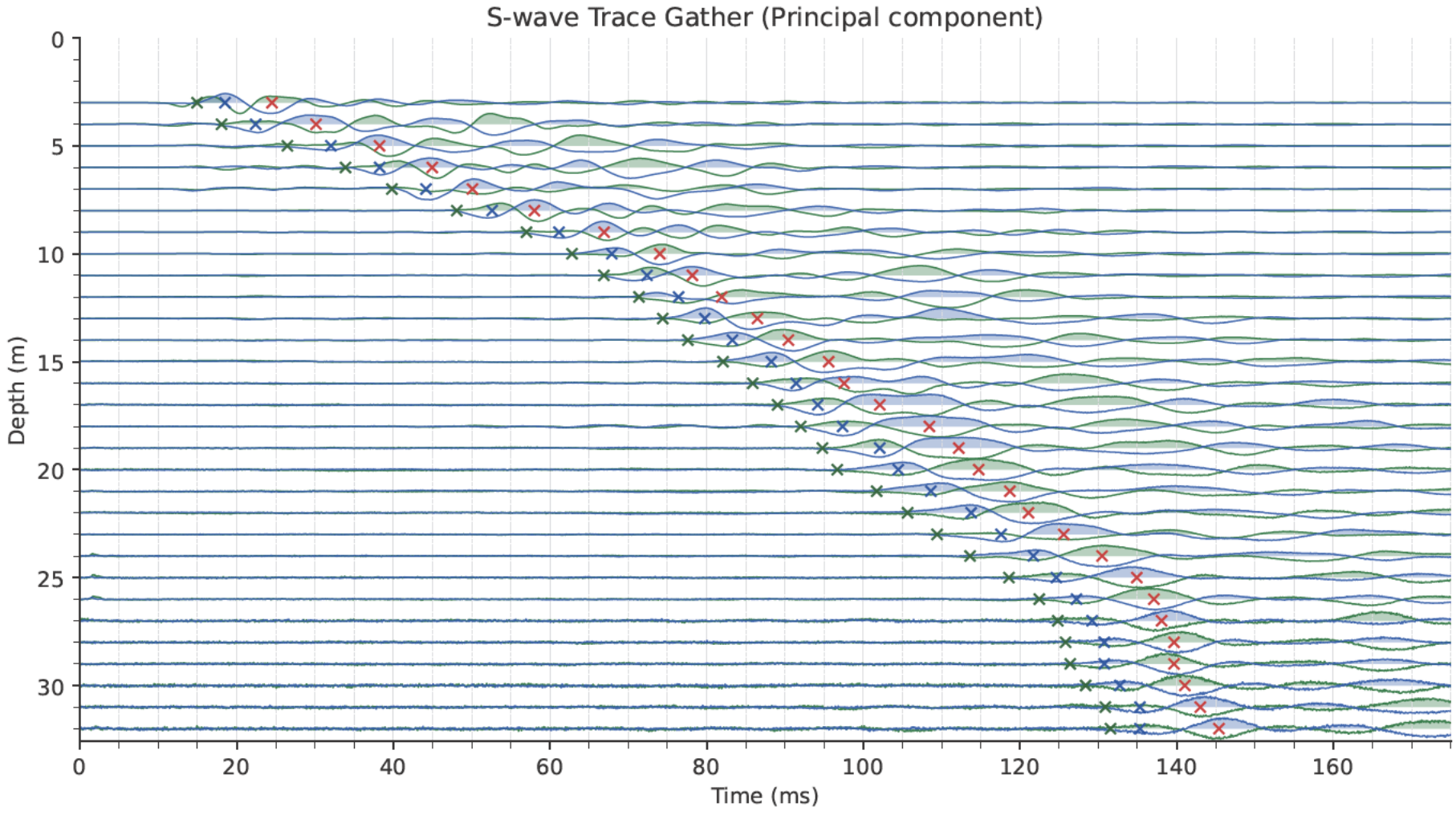
Title: BH501 DHVs Test - P-wave trace gather

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

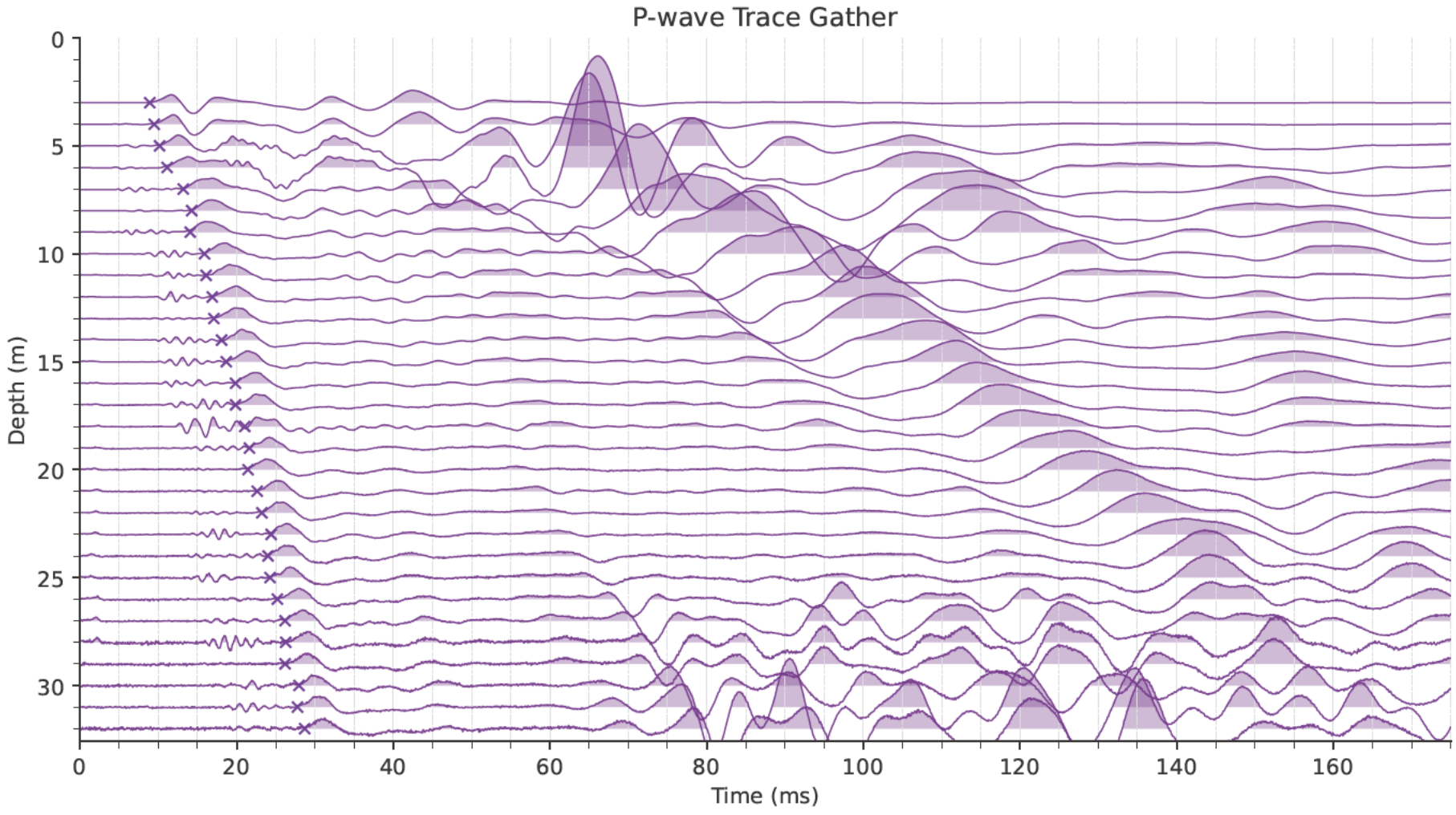
Title: BH501A DHVs Test - S-wave trace gather

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

Title: BH501A DHVs Test - P-wave trace gather

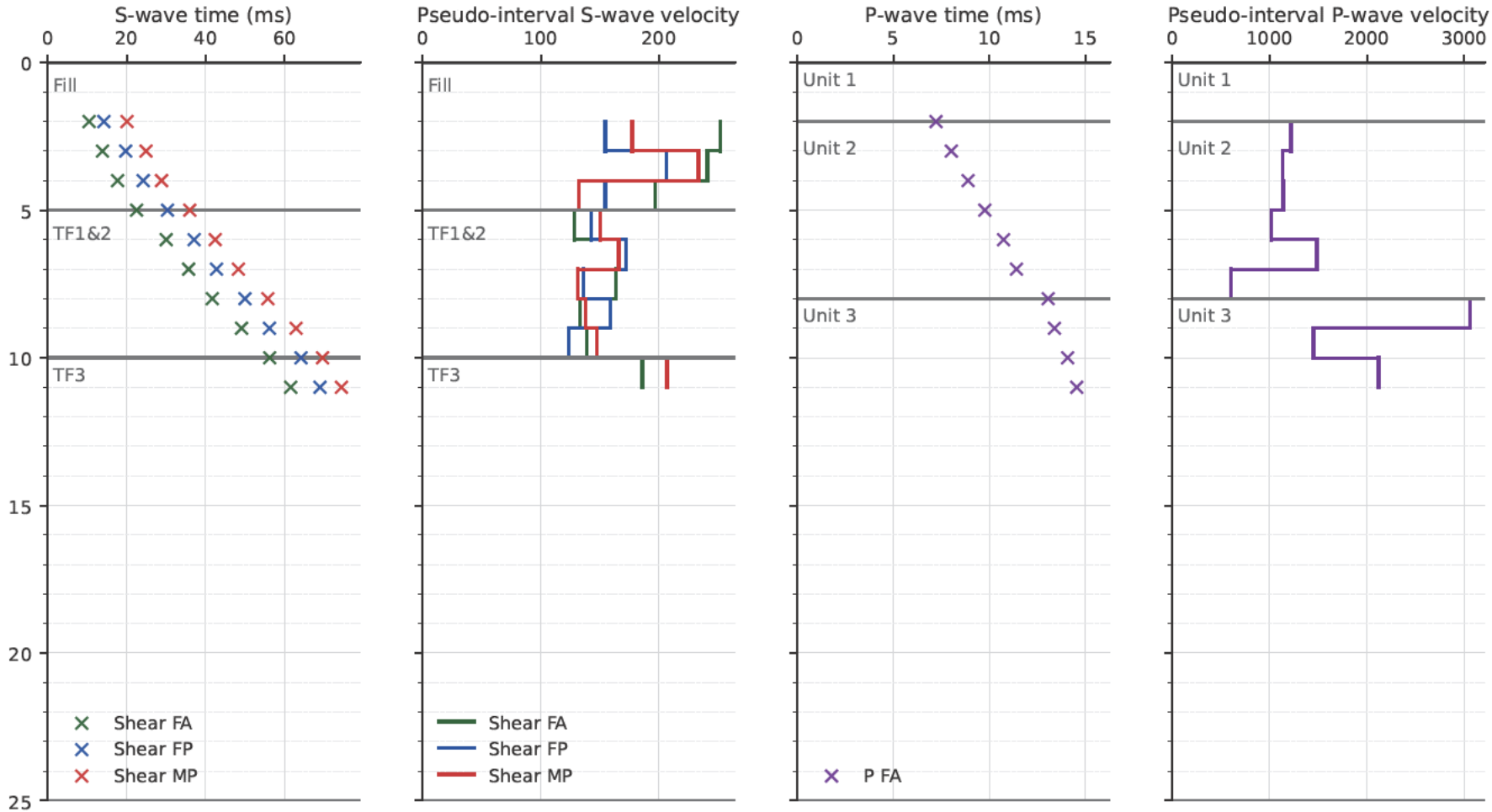
Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025

Appendix C: Depth-Arrival Time and Depth-Velocity Plots



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

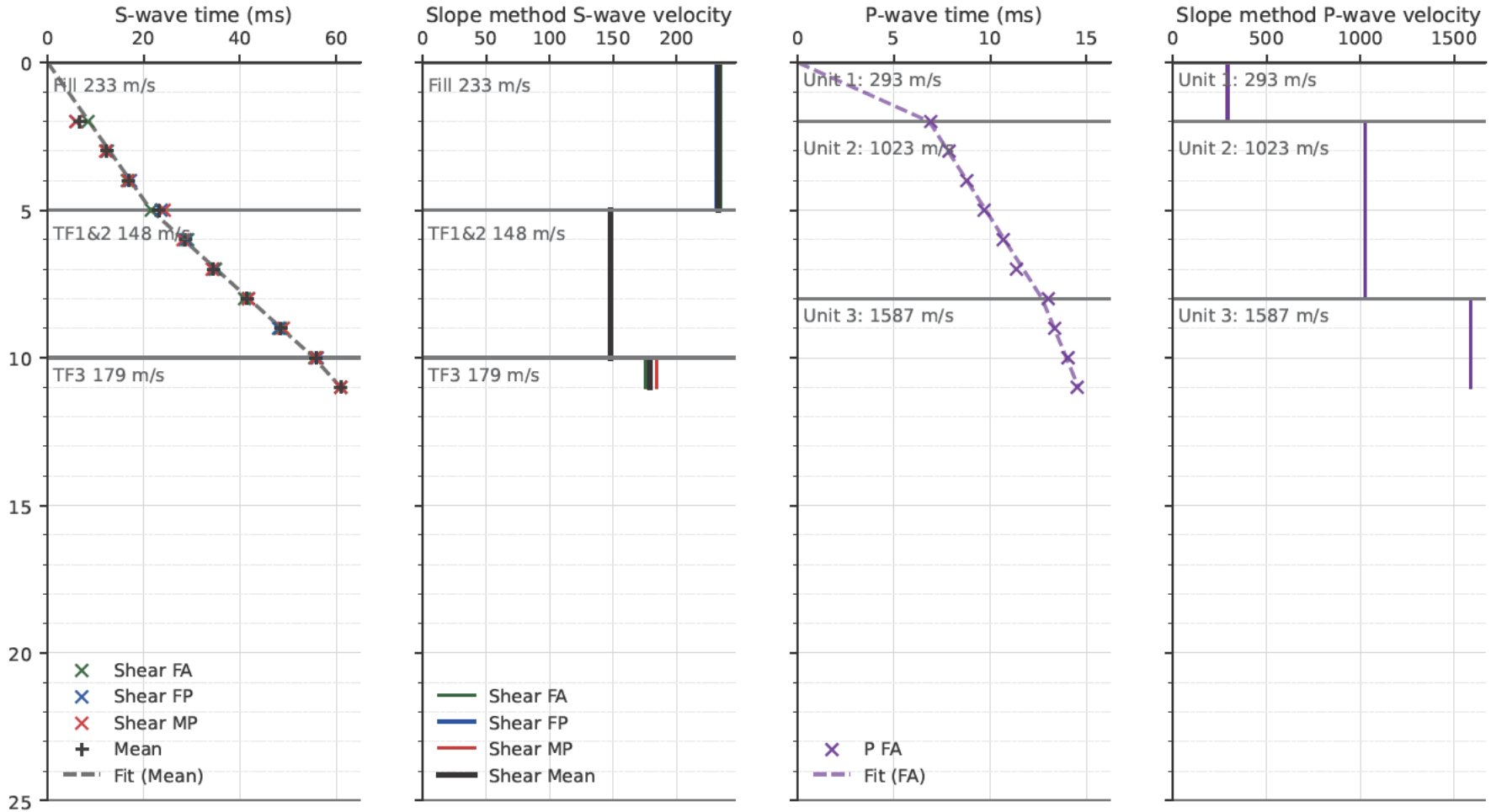
Title: BH501 DHVs Test - Raw Picks and Pseudo-Interval Velocities

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

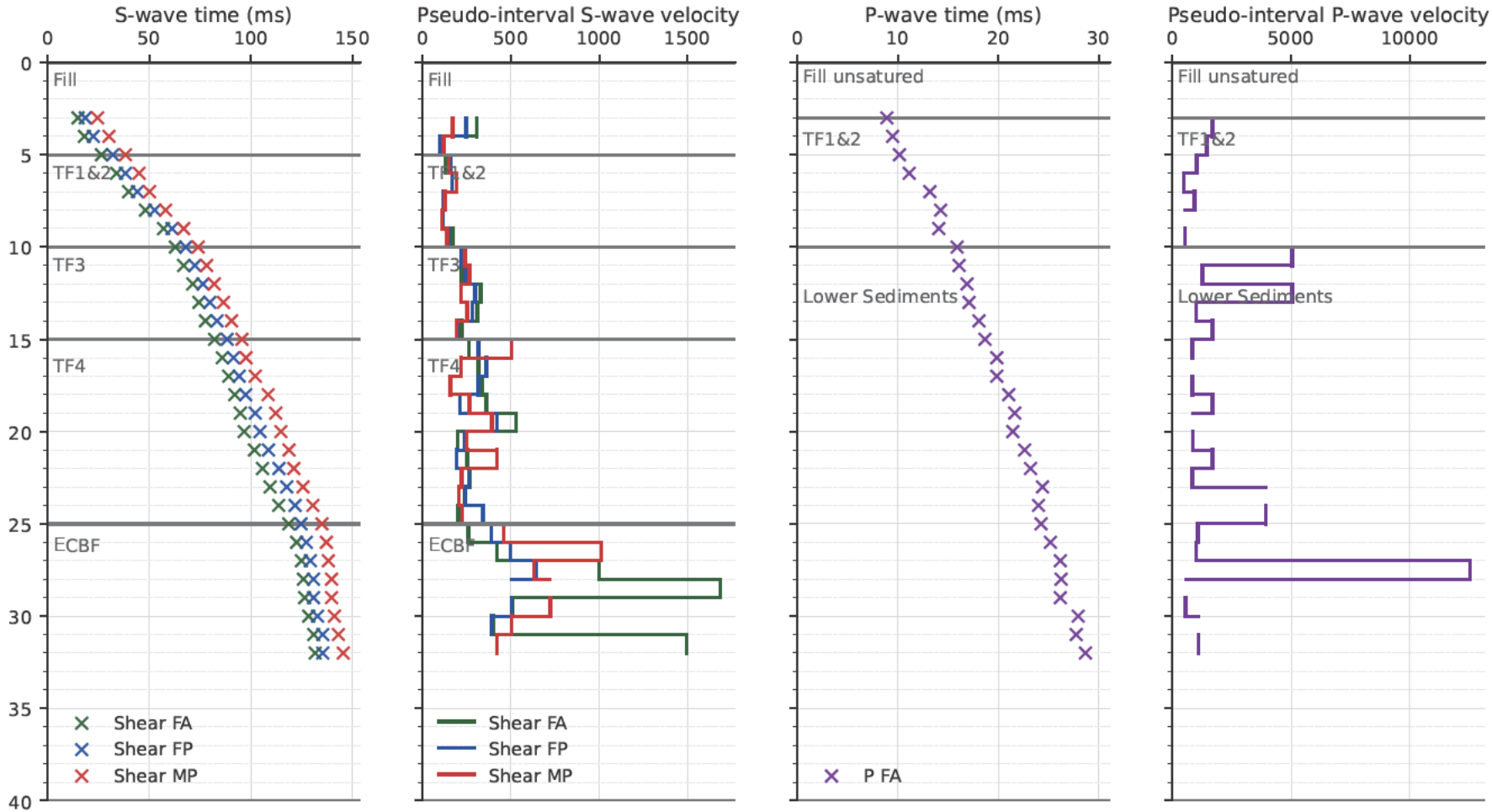
Title: BH501 DHVs Test - Corrected Picks and Unit Velocities

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report

INITIA
GEOTECHNICAL SPECIALISTS

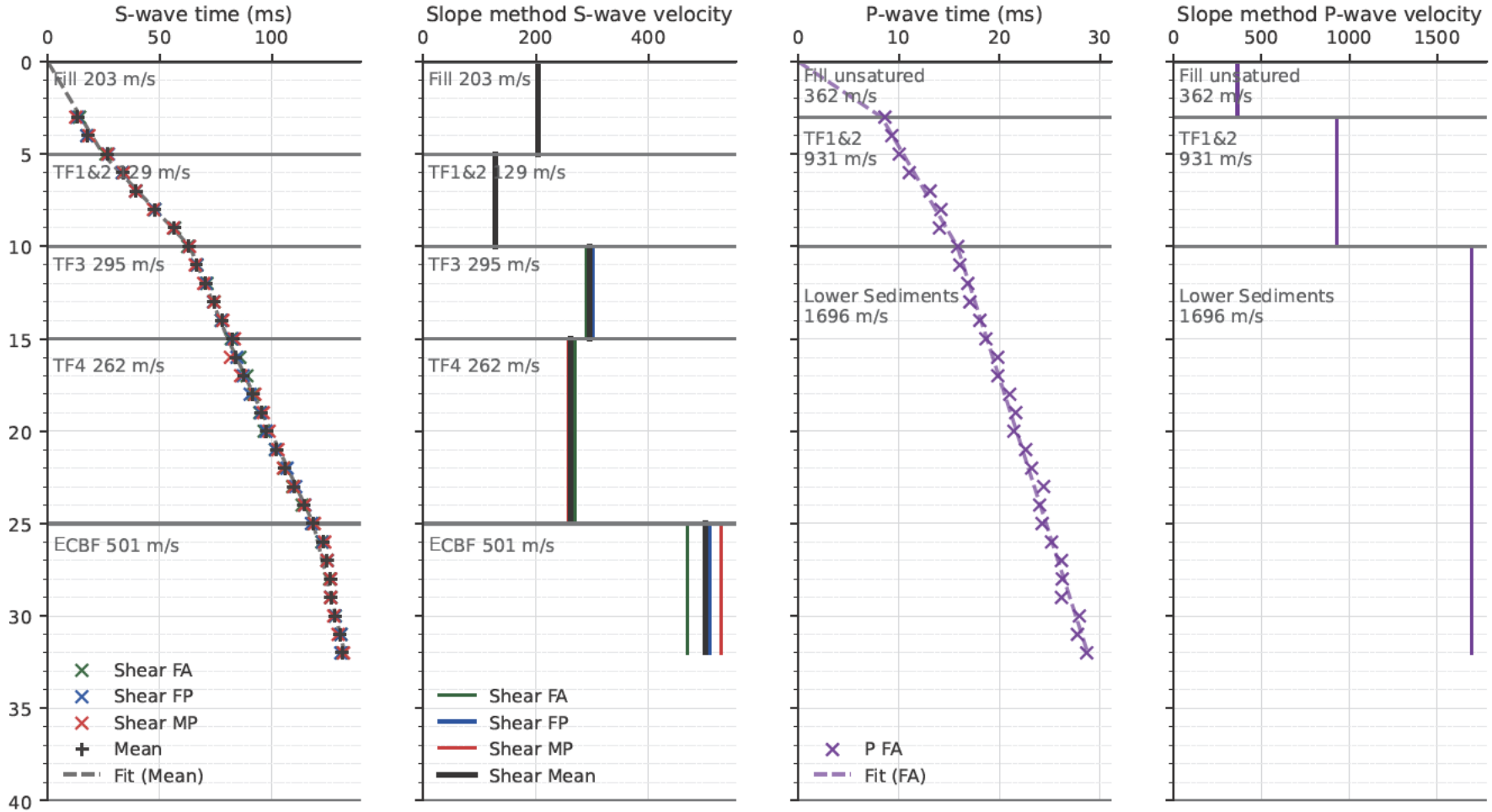
Title: BH501A DHVs Test - Raw Picks and Pseudo_Interval Velocities

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025



To be read in conjunction with the testing report.
Picks shown here corrected from slant travel time to vertical travel time equivalent. FP and MP points are corrected to FA equivalent.

INITIA
GEOTECHNICAL SPECIALISTS

Title: BH501A DHVs Test - Corrected Picks and Unit Velocities

Client: Westhaven Residential LP

Project: P-002883 188 Beaumont Street Apartments

Drawn by: FWH

Date: 11/12/2025

Appendix J PC120 Landslide Risk Assessment

A landslide risk assessment for the proposed development at 188 Beaumont Street, in accordance with Appendix 24 of the Auckland Unitary Plan, PC120.

Stage 1: Desk study

Sub-stage		Results / Comments
1.1	Does landslide inventory show a pre-existing landslide at the location where the activity will occur.	No landslides have been mapped at the site location or in the vicinity, based on a review of: - The Auckland Council Geomaps landslide inventory; - The Natural Hazards Commission claims portal; - The Earth Sciences New Zealand Landslide Database and Geological Maps
1.3	Review Landslide Susceptibility Maps for landslide susceptibility at the site.	**Shallow Landslide Susceptibility Map:** The site and area within 150 m of the site is predominantly mapped as Low and Very Low Susceptibility. One "square" of very high susceptibility is mapped 30 m north of the site. This appears to triggered due to the grade change supported by the seawall north of the Te Wero Walkway. Given the setback between this wall and the site, any instability of this wall poses no credible stability risk to the subject site. **Large Scale Landslide Susceptibility Map:** The site and area within 150 m of the site is mapped as very low susceptibility.
1.4	Review Landslide Susceptibility Maps for susceptibility to landslide runout.	There are no moderate, high or very high susceptibility areas within 150m of the site from which debris could reach the site. The site sits above the grade change (Te Wero Walkway seawall) that is mapped as a "very high" shallow landslide risk.
1.5	Determination of landslide susceptibility and requirement for Stage 2 assessment	No moderate, high or very high susceptibility areas have been identified in 1.3 and 1.4 above. On this basis the risk is assessed as Low (acceptable). **No further assessment required.**