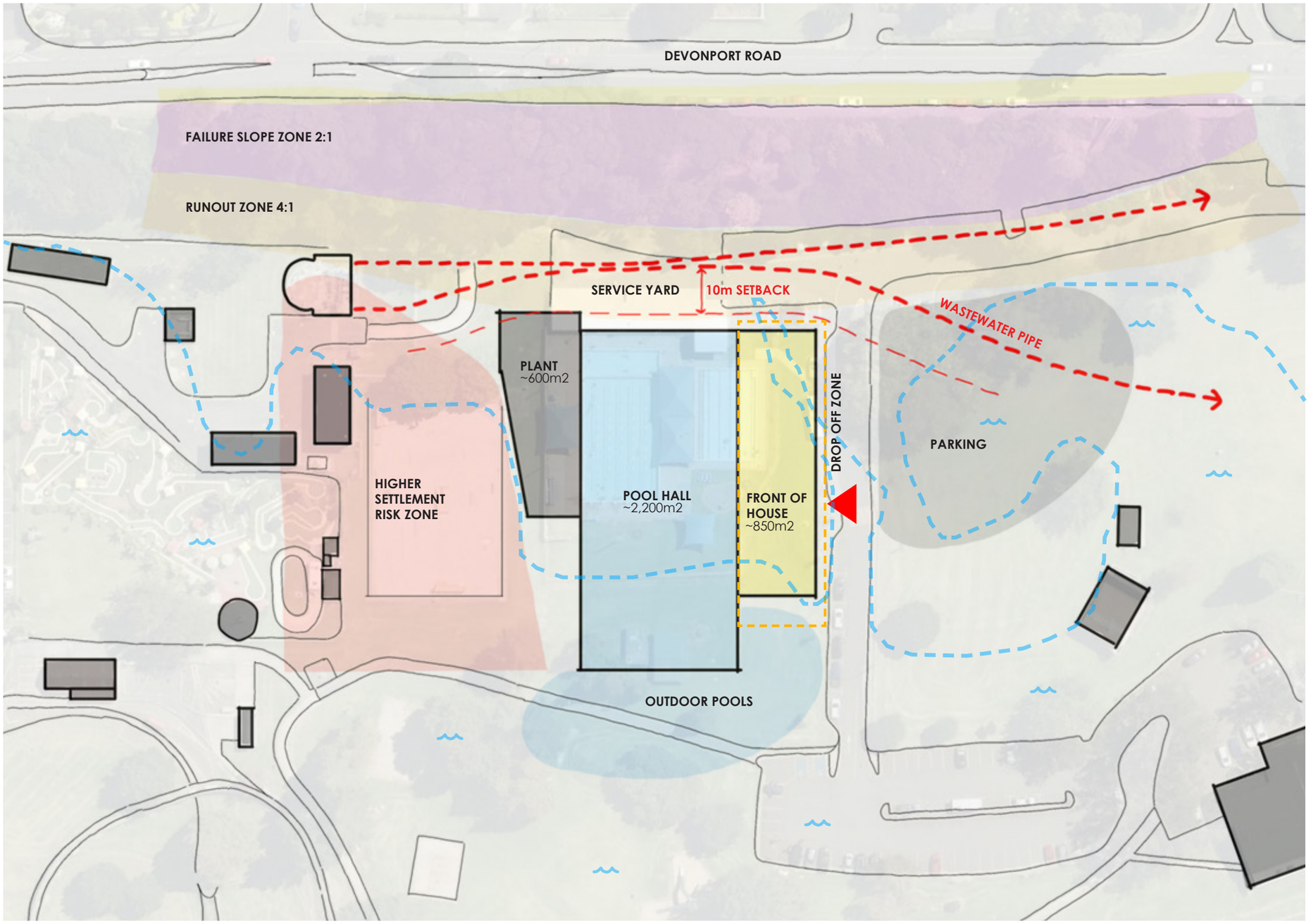
ATTACHMENTS

Ordinary Council meeting
Separate Attachments 1

Tuesday, 16 September 2025

Table of Contents



N

KEY:

- Potential entry
- Higher settlement risk zone.
- Slope failure zone 2:1
- Slope runout zone 4:1
- Major overland flow
- Fitness centre above front of house admin / change / foyer

NOTES:
Slope, flood and colsolidation settlement risk zones based on ENGEO drawings dated 26/06/25.

Moderate and high risk settlement zones are not shown for drawing clarity. Only the very high risk zone is shown. Refer to ENGEO drawings for extents.

Pool hall size nominally based on the original scheme. Note outdoor pools & plant areas are reduced.

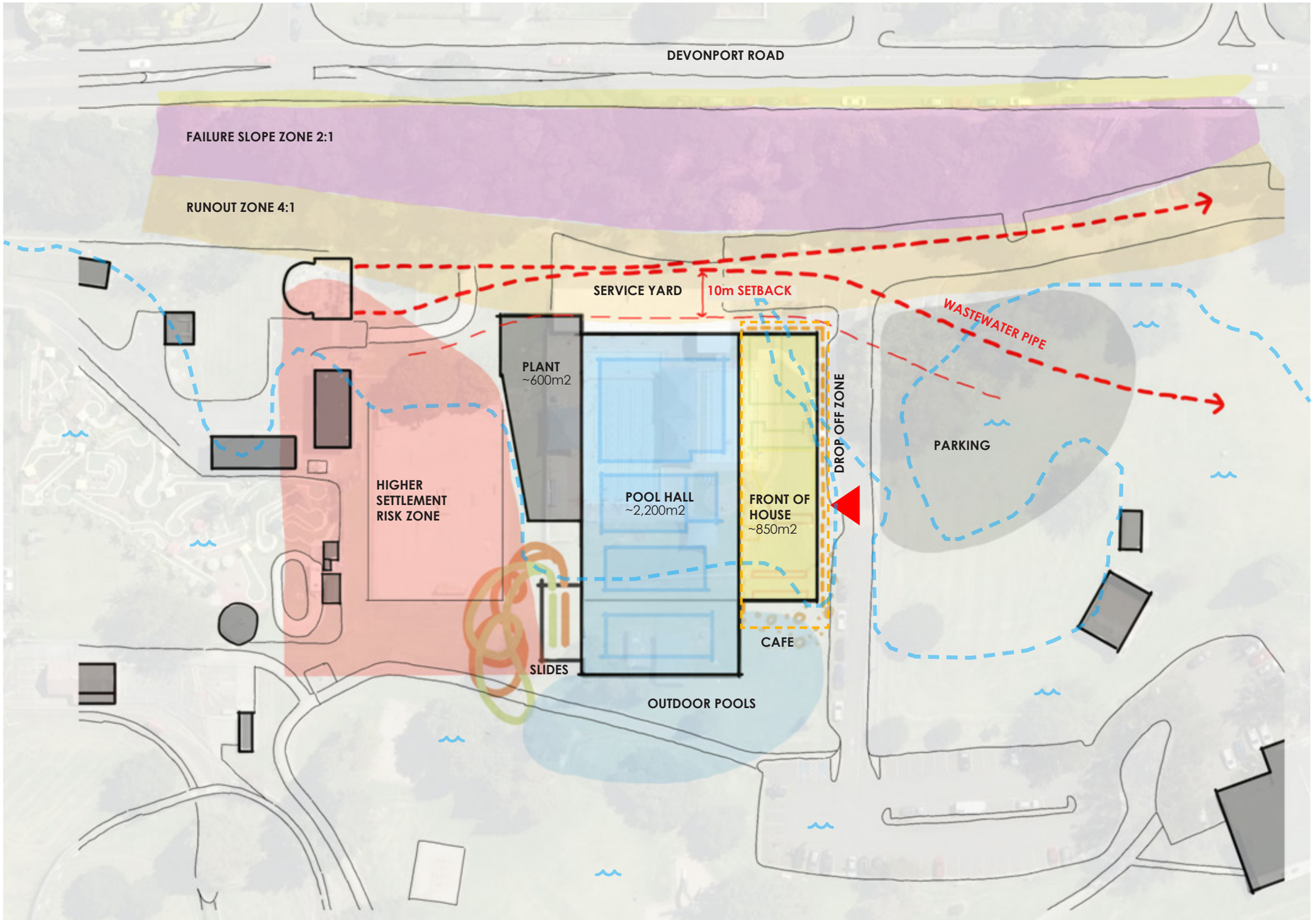
PROJECT: Memorial Park Aquatic Centre

DRAWING: SK250813_002

SITE CONSTRAINTS & OPPORTUNITIES DIAGRAM

Apollo PROJECTS

ARCHITECTURE HDT



N

KEY:

- Potential entry
- Higher settlement risk zone.
- Slope failure zone 2:1
- Slope runout zone 4:1
- Major overland flow
- Fitness centre above front of house admin / change / foyer

NOTES:
Slope, flood and colsolidation settlement risk zones based on ENGEO drawings dated 26/06/25.

Moderate and high risk settlement zones are not shown for drawing clarity. Only the very high risk zone is shown. Refer to ENGEO drawings for extents.

Pool hall size nominally based on the original scheme. Note outdoor pools & plant areas are reduced.

PROJECT: Memorial Park Aquatic Centre

DRAWING: SK250813_003

SITE CONSTRAINTS & OPPORTUNITIES DIAGRAM

Apollo PROJECTS

ARCHITECTURE HDT

ENGEO

GEOLOGY
GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES

27 June 2025

Apollo Projects Limited
Attn: Sam Toulmin
Sam.Toulmin@apolloprojects.co.nz

Dear Sam,

Geotechnical Summary Letter – Memorial Park, Devonport Road, Tauranga 3110

(Our Reference: 28836.000.001_01)

1 Introduction

ENGEO Ltd was requested by Apollo Projects Limited to prepare a Geotechnical Summary Letter summarising a preliminary geotechnical assessment of the 'Study Area' (refer Figure 1) at Memorial Park, Devonport Road, Tauranga 3110. This work has been carried out in accordance with our signed agreement dated 21 May 2025.

Our scope of work includes review of existing nearby geotechnical information, intrusive investigation in the vicinity of the existing Memorial Park swimming pool complex (the 'Study Area') and preparation of a high-level letter summarising generalised ground conditions and constraints for a development that may be similar to that previously considered for near the existing QEII building. Our assessment of the land near the QEII building is summarised in our Geotechnical Interpretive Report (GIR) dated 19 November 2024 (Ref. 024667.000.001_03).

This letter is not suitable for Resource Consent or Building Consent purposes as it is only preliminary in nature. Further site-specific investigation, analysis and design will be required once the nature and extent of future development is known. ENGEO would be happy to support these if requested.

2 Site Description

Memorial Park Reserve is a significant Tauranga City Council (TCC) reserve encompassing a plan area of approximately 11.6 hectares. It extends from Eleventh Avenue to the south, Seventh Avenue to the north, Devonport Road to the west and by Fraser Street and the inner Tauranga Harbour to the east.

Memorial Park Reserve is located across predominantly low-lying topography at an elevation between 1 to 4 m RL (NZVD2016 Datum), with a general fall from northwest to southeast. Beyond the southern and western boundaries, the landform rises at gentle to moderate gradients up to 17 to 20 m RL along Devonport Road, associated with higher elevation terrace topography.

Memorial Park Reserve is occupied by several facilities, including the Queen Elizabeth Youth Centre, Memorial Pool, Tauranga Model Railway Club, skatepark and a mini golf course. There are also green spaces, sealed roads, carparks and significant buried infrastructure including the Southern Pipeline and associated wastewater pump station.

The 'Study Area' includes an existing swimming pool facility which appears to have been constructed at close to original ground level with landscaping fill placed around it, and a public skate park.

3 Desktop Study

3.1 Geological Setting

3.1.1 Regional Geology

Published geology[1] notes the Tauranga area as including a late Pliocene to Pleistocene aged sequences of volcanic rocks and sediments including volcanoes, lava domes and ignimbrite flows intercalated with terrestrial and estuarine sedimentary deposits of the Matua Subgroup.

The Matua Subgroup was deposited after the Waitetariki Ignimbrite, infilling the ancient Tauranga Basin. It is described as poorly to moderately sorted gravels, sands and silts with distal ignimbrites that underly many of the terraces and peninsulas across Tauranga.

The terraces and peninsulas were mantled by a thick layer of Late Pleistocene and Holocene tephras, including the Hamilton Ash, Rotoehu Ash and a sequence of younger tephras derived from the Taupo Volcanic Zone. These tephras can be absent across steeper slopes. They can also be absent across low-lying valleys, rivers and streams where instead there may be several to tens of metres of alluvium and peat deposits of Holocene and Late Pleistocene age.

3.1.2 Geology and Geomorphology

The published geology shows a geological boundary near the southern and western parts of memorial park and the study area, coinciding with the transition from lower to higher elevation topography. To the south is Pleistocene age Te Ranga Ignimbrite, described as a non-welded pumice-poor ignimbrite, while to the west is Pleistocene age fluvial deposits of the Matua Subgroup. Both of these materials are likely mantled by a sequence of younger airfall ashes, including the Hamilton Ash, Rotoehu Ash and Post-Rotoehu Ashes.

The remainder of Memorial Park and the study area, where it is at low elevation, is shown to be underlain by Holocene age alluvial gravels, sands, silts, muds and clays with local peat.

The elevated land and steeply sloping ground present to the west of the study area is interpreted as relic (ancient) sea cliffs, which rise steeply to around 17 m RL at a grade locally exceeding 1V:2H, with Devonport Road located immediately at the slope crest. The low-lying land is interpreted as harbour / estuary margin land, locally overlain by colluvium and estuarine 'shore' deposits, along with fills associated with human activities and developments.

[1] Briggs, R.M. et al, 1996, Geology of the Tauranga Area, Institute of Geological and Nuclear Sciences Limited, Sheet U14, 1:50,000.

3.2 Council GIS

With reference to TCC GIS and Bay of Plenty Regional Council (BoPRC) GIS, the following natural hazard information is considered pertinent to the Study Area:

- Land Features: The Study Area is mapped as predominantly being associated with Harbour Margin geomorphological terrain. The southwest corner and northern margins of the Study Area are mapped as being associated with the Lower Alluvial Terrace geomorphological terrain. More elevated terrain to the north and south of the Study Area is mapped as Upper (Ignimbrite) Terrace geomorphological terrain. Definitions of these terrains are provided in Aurecon's Tauranga City Western Zone Liquefaction Vulnerability Study referenced on TCC's website.
- Coastal Erosion: There is a Coastal Erosion Hazard Area associated with the inner Tauranga Harbour. The 2013 SLR 1.4 m – extremely unlikely scenario is not shown to extend into the Study Area.
- Flooding Hazard: The flooding overlays presented in the GIS are based on climate adjusted 1% AEP events. A significant portion of the Study Area is shown to be within either flood plains and / or overland flow paths extending from Tenth Avenue / Devonport Road. The mapped flood hazard is shown on Figure 2.
- Harbour Inundation: The Harbour Inundation overlay presented in the GIS for the Year 2130 SLR 1.05 m (NZVD) is based on a climate adjusted 1% AEP event. A significant portion of the Study Area is shown to be within a Harbour Inundation zone, to an extent comparable to the Flooding Hazard zone.
- Tsunami Hazard: The Study Area is not mapped to be affected by tsunami hazard, with the Tsunami Evacuation Zones and Flooding associated with a 9 M scenario both shown to be located 50 m or more to the east of the Study Area.
- Slopes and Relic Slips: A relic slip is shown west of the Study Area. These features are based on a study carried out in early 2000's using air-photo interpretation supplemented by field checking. The study identified more than 2000 features of actual or probable landslip origin within the volcanic and fluviatile / estuarine deposits of the Tauranga District.
- Slope Hazard Zones: These are areas where there is existing, or the potential for, instability of a slope and are based on a TCC commissioned in 2023 based on new landslide data and geomorphological mapping (study of landforms and the processes that form them). Slope hazard zones are shown to extend into the western part of the Study Area - these are shown on Figure 2.
- Liquefaction Vulnerability: The Study Area is situated across low elevation topography mapped as where liquefaction vulnerability is High. Land damage assessments (incorporating climate change adjusted groundwater levels) indicate the following:
    - Under the 1 in 25-year return period the land damage is classified as None to Minor.
    - Under the 1 in 100-year return period the land damage is classified as Minor to Moderate.
    - For the 1 in 250-year and greater return period events up to and including the 1 in 1000-year event the land damage is classified as Moderate to Severe.

- Volcanism: The nearest centre of volcanism is the Okataina Volcanic Centre which includes Okataina and Rotorua Calderas, located approximately 35 km southeast, which have been active within the last 20,000 years. Previous modelling by GNS for this centre suggests a moderate chance of ash fall impacting the Western Bay of Plenty and Tauranga area from this volcanic centre during an eruptive event given the prevailing wind direction.
- Services: TCC GIS shows numerous public services extend across Memorial Park Reserve. It is likely there are other services within the Study Area that haven't been presented.
- Groundwater: TCC had a network of groundwater monitoring wells installed to record groundwater levels across parts of the city. The nearest ones to Memorial Park Reserve are C5bi and C5ai, approximately 700 m to the north-northeast (NNE) and 600 m to the south-southeast (SSE). With reference the well monitoring data, groundwater is in the order of 0 to 1.0 m below existing ground level (1.0 – 2.0 m RL).

3.3 Existing Site Investigations

The New Zealand Geotechnical Database (NZGD) shows historic and recent geotechnical investigations have been undertaken across Memorial Park Reserve, including machine boreholes and cone penetration tests. The locations of these tests are shown on Figure 1, and selected data is included in Appendix 1.

There are also several existing geotechnical reports available, relating to geotechnical investigations across Memorial Park. These are referred to in our above-referenced GIR so aren't repeated here.

4 Site Investigations

ENGEO visited the Study Area on 3 and 5 June 2025 to undertake the following scope of works:

- Site walkover to assess relevant surface characteristics.
- Arrange and supervise utility clearance and completion of hydrovac at eight identified test locations.
- Supervise the completion of eight Cone Penetrometer Tests (CPTs) at the locations shown on Figure 1, to depths of up to 27.8 m. Each CPT was paired with a shallow hand auger borehole to check the composition of near surface soils and depths of any non-engineered fills. Hand auger termination was on account of poor sample recovery in saturated subsoils.

A copy of CPT test results and hand auger borehole logs are presented in Appendix 1, with soil descriptions prepared in general accordance with NZGS (2005) guidance.

5 Ground Model Development

Following the site-specific investigations and desktop studies described above, ENGEO has developed an interpretation of geological and groundwater conditions across the Study Area.

The following key engineering geological units have been developed and are considered relevant to the Study Area:

- **Undocumented Fill** – historic fill, comprising stiff to very stiff silts, and loose sands with intermixed topsoil and locally crushed aggregate was encountered across the Study Area. It is anticipated this fill was placed during building platform preparation for the existing pool and during land modification for surrounding amenity areas, and unlikely to be placed under engineering supervision. Given the ENGEO test locations were preceded by hydro-vaccing, the presence of fill may not have been distinctly identified or confirmed at many of the test locations, as our hand auger boreholes also typically met refusal.
- **Recent Alluvium** – Recent alluvial deposits were encountered across the Study Area, deposited during the Holocene period (last 11,700 years) For the purpose of this report, the Recent Alluvium has been split into two main units as follows:
    - *Recent Alluvium – Sand Deposits (RA-SD)* – Typically comprising very loose to loose sands and silty sands. These soils are present below the fill and above the estuarine silts within the east and northeast of the Study Area and are also present as a layer within the estuarine deposits in the east and northeast.
    - *Recent Alluvium – Estuarine Deposits (RA-ED)* – Typically comprising terrestrial organic sediments and very soft to soft silts and clays, associated with accumulated estuarine deposits that have infilled an historic gully feature within the southern part of the Study Area. Similar shallow soils are anticipated to mangle the central and eastern portions of the Study Area. Another similar (but perhaps slightly older) estuarine deposit was encountered below a layer of sand in the central and eastern portions of the Study Area.
- **Matua Subgroup** – Beneath the RA-SD and RA-ED, the investigations encountered the Matua Subgroup at all locations ranging from a few metres thick to tens of metres thick (beyond the maximum depth of the investigations undertaken). This deposit has an age range of c. 2 Ma to c. 350 ka.

  The Matua Subgroup was closest to the ground surface within the western part of the Study Area (near the relic sea cliff).

  For this report, the Matua Subgroup unit has been divided into two units based primarily on density:
    - *Upper Matua Subgroup (UMS)* – Typically comprising very loose to medium dense interbedded clayey silts, silts and sands.
    - *Lower Matua Subgroup (LMS)* - Typically medium dense to very dense or very stiff to hard interbedded clayey silts, silts and sands.

The depth and extent of these deposits is presented on the interpretive cross section sketches included in Appendix 2.

6 Groundwater

With reference the well monitoring data, groundwater is in the order of 0 to 1.0 m below existing ground level (1.0 – 2.0 m RL).

Groundwater was encountered during our site investigation at 0.3 to 1.7 metres depth, which equates to 0.7 to 3.9 m RL. This is expected to vary seasonally due to the low elevation of the Study Area and proximity to the Inner Tauranga Harbour. Note these measurements were taken during winter months following wet weather.

7 Preliminary Geo-Hazard Assessment

Based on review of the above-referenced reports and investigations, our preliminary comments and recommendations with respect to key geotechnical hazards, to inform Apollo, are given as follows:

7.1 Natural Escarpment Stability

The natural slopes to the west of the Study Area are at gradients locally steeper than 1:2 (vertical to horizontal) and are anticipated to provide slope stability factors of safety that do not comply with current building codes and standards.

To manage the risk of slope instability impacting future building development, an offset distance is typically applied from the escarpment crest to future building locations. Where insufficient space is available, then slope stabilisation measures can be introduced.

The Council mapped 1V:4H runout risk zone has been shown on Figure 2. If building work is proposed within this zone, then physical land protection / stabilisation works such as a debris bund or debris collection barrier (such as a row of upstanding piles located parallel to the slope crest) would be required for the at-risk length of the future development.

This hazard was not relevant to the prior QEII location.

7.2 Liquefaction

Soil liquefaction can occur due to the loss of strength during cyclic loading, such as during an earthquake, with soils most susceptible to liquefaction including clean, loose, saturated, uniformly graded, cohesionless materials.

As the majority of the site soils comprise predominantly loose to dense cohesionless sands and silts, they may be prone to liquefaction. The RA-ED deposit is not considered to be at risk of liquefaction due to it being fine grained but could be subject to cyclic softening.

With reference to our earlier report referenced above, the following is summarised:

- *Liquefaction is not predicted to trigger during the 25-year return period SLS event.*
- *Significant liquefaction triggering appears to begin to occur at a PGA of 0.10 to 0.12 g (approximately a 50-year to 75-year return period).*
- *Near to full ULS liquefaction is occurring at about 0.15 g (approximately a 100-year return period) with very little additional liquefaction induced settlement occurring for PGA greater than this.*

- *Under IL2 ULS conditions, free-field liquefaction induced settlements are predicted to range between approximately 120 mm and 520 mm with liquefaction is shown to be occurring through the majority of the soil column below groundwater, to the full depth of the CPT testing.*
- *Under IL3 ULS conditions, free-field liquefaction induced settlements are predicted to range between approximately 120 mm and 540 mm and also shown to be occurring through the majority of the soil column below groundwater, to the full depth of the CPT testing.*

From review of existing geotechnical information, preliminary indications are that induced total and differential foundation settlements under the Serviceability Limit State and Ultimate Limit State seismic conditions are anticipated to be outside of Building Code limits.

7.3 Lateral Spreading

Lateral spreading involves lateral ground movement due to liquefaction and significant seismic induced ground shaking. Lateral spread is considered a low risk for the Study Area given there are no nearby significant slopes or water bodies such as stream terraces or riverbanks that present a saturated free face. The Tauranga harbour sea floor located to the east of Memorial Park Reserve is a broad and level to very gently sloping topography with the main estuary channel located more than 300 m from the eastern edge of Memorial Park and 400 m from the Study Area.

Lateral spreading does not need to be specifically addressed for the development near the western edge of Memorial Park Reserve due to the significant distance to a free face but may need to be considered where development moves progressively closer to the harbour.

Considerations for loss of lateral support and confinement to foundations due to liquefaction, as well as reduction in base shear, will need to be addressed separately as part of the foundation considerations.

7.4 Seismic Hazard, Site Subsoil Class and Importance Level

Based on the geotechnical investigations summarised above and our experience in the local ground conditions, structural design actions are likely to require consideration with site Class D (deep or soft soil site) with respect to NZS1170.5:2004.

Please be aware that an update to the National Hazard Seismic Model was released in October 2022. Whilst there are no immediate changes to the current building code, updates to NZS1170 are expected to be released in the near future which may result in reasonably significant changes to seismic ground accelerations and structural assessment guidance with respect to seismicity to be adopted for the Study Area in future.

Interim guidance (Earthquake Design for Uncertainty Advisory) has been issued by NZSEE / SESOC / NZGS which for geotechnical assessment purposes points to the adoption of best practice guidance developed by MBIE (Geotechnical Practice Modules). To increase structural resilience, designers are encouraged to consider seismic effects through a full range of earthquake shaking intensity, including Serviceability Limit State (SLS), Ultimate Limit State (ULS) and beyond ULS design shaking.

7.5 Load Induced Static Settlements

Load-induced settlements occur in subsoils that are subject to static loading (e.g. by filling and / or building loads) where the magnitude of settlement is a function of soil stiffness and consolidation characteristics.

Figure 3 shows inferred consolidation settlement risk for shallow founded structures and fills, noting these boundaries are defined on the basis of very limited site investigation so should only be taken as approximate and subject to refinement by future site investigation. A very high risk is present in the south, associated with very young estuarine sediments infilling an inferred channel. The high risk zone covered other areas where young estuarine soils are encountered but are either from an older channel deposit or are thinner. The moderate zone includes areas expected to have limited thicknesses of soft ground, however, there remains risk of ongoing consolidation under load.

The young estuarine subsoils within the 'very high' and 'high' risk zones are expected to have a relatively low modulus (spring stiffness) anticipated to have a relatively high sensitivity to changes in load conditions, with high settlements expected. Shallow strip or pad foundations are expected to be susceptible to significant settlements and, as such, static and differential angular distortions are anticipated to be well outside the Building Code limit of 25 mm over 6 metres under the serviceability limit state load combinations of NZS1170.0. These soils are also expected to settle significantly under fill loading. On this basis, the 'very high' and 'high' risk zones are considered unsuitable to support buildings founded on shallow foundations. Filling in isolated areas may be considered, subject to understanding boundary settlement effects, particularly on existing buildings and infrastructure.

The duration for settlement to occur is currently not well understood, however it is anticipated that primary consolidation in the 'very high' and 'high' risk areas may take two or more years, and that secondary (creep) settlement would continue over the life of the structure or fill embankment.

The subsoils within the 'moderate' risk zone are likely not suitable for shallow founded structures given the performance of the existing changing sheds and buildings around the current swimming pool. It is possible that a larger portion of settlement in this area would be elastic and occur rapidly and could be managed through design and / or preload.

7.6 Stormwater and Surface Water Management

Memorial Park Reserve is mapped as at risk of flood inundation and overland flow to an elevation of approximately 4 m RL (Refer Figure 2). Due to this, and the shallow measured groundwater, the Study Area is unsuitable for in-ground soakage.

All stormwater collected from hardstand and roofing should be collected and discharged to reticulated Council services. An engineer approved outfall could be considered, however this is likely to be inundated in the event of surface flooding.

During construction, appropriate measures shall be undertaken to control and treat stormwater runoff, with silt and erosion controls complying with local body guidelines for erosion and sediment control.

8 Geotechnical Considerations for Future Development

8.1 Earthworks

Bulk filling is not recommended due to the potential to trigger consolidation settlement, which is likely to affect structures and infrastructure below and near any filling work.

If limited earthworks are undertaken, such as removal and replacement of shallow non-engineered fill soils and replacement with engineered fills, the requirements of NZS 4431 and the TCC Infrastructure Development Code will apply, and the filling work should be completed under the guidance of an Accredited Category 1 Geo-Professional.

A Sediment and Erosion Control plan will be required for the development, including silt fencing, stabilised entranceways, storage / sorting areas for the soil and clean water diversion bunding and channels which outline how the site will be prepared as part of the initial stage of works at the site.

Where imported fills are required, these shall comply with the technical specifications and shall be approved by the engineer prior to use.

The suitability of soils cut from the site for subsequent reuse will need to be evaluated as part of future site-specific geotechnical investigations and will be evaluated based on its geotechnical suitability for its intended use as a landscape or structural fill. Based on our investigation the existing fill soils are not considered suitable for reuse as engineered fill on account of a high proportion of topsoil and other unsuitable inclusions. Our assessment does not include environmental or contamination assessment which are beyond the scope of this report.

Imported fills are likely to be required as part of foundation subgrade improvements, including construction of geogrid reinforced gravel rafts beneath foundation areas.

8.2 Building Foundations and Subgrades

Based on a review of the geotechnical reports and site investigations the ground conditions are generally similar to those characterised in the above-referenced ENGEO GIR and therefore reference can be made to that report for shallow and deep foundation options. We anticipate that most (or all) building work will requiring piling.

Where limited surface loads are to be supported on shallow foundations (with ground improvement) all historical filling, topsoil and suitable soils identified beneath future foundation areas will be removed to expose the underlying natural subsoils, with this material removed from the site. Localised over-excavation and replacement with compacted filling may be required (as well as preloading) where weak / soft or otherwise unsuitable natural ground is exposed beneath proposed foundation locations.

Shallow subgrade ground improvements may also be required and comprise geogrid reinforced gravel rafts upon which future foundations are constructed. These measures may be introduced for a variety of reasons to improve foundation subgrade performance under a variety of conditions including static and seismic conditions.

8.3 Existing Utilities

There are a number of public assets within and around the Study Area which are likely present within soils susceptible to settlement or vibration. Placement of fill, vibration due to earthworks or installation of piles, dewatering and other building related processes have the potential to put these at risk and will require careful management.

Avoiding placement of any above ground fill and supporting all building loads off the underlying Lower Matua Subgroup (LMS) helps to reduce this risk.

9 Future Work

The above geotechnical comments and recommendations are based on the geological model derived from a review of available geotechnical investigations sourced from NZGD, existing reports and a limited site investigation by ENGEO.

In order to confirm the geological model for the Study Area and inform detailed design recommendations it will be necessary to undertake additional site investigation and analyses to address relevant geotechnical issues prior to application for Resource Consent and Building Consent. This must be completed under the direction of an accredited Category 1 Geo-Professional.

The following future geotechnical work is expected to be required to inform subsequent project stages:

- Further site-specific geotechnical investigations and reporting to inform resource consenting and preliminary design. This is likely to include future seismic investigations to define Vs30 profiles following TS 1170.5 (2024) and future anticipated updates to NZGS/MBIE Module 1.
- Detailed design and reporting to support Building Consents for future building foundations, subgrade improvements, inground palisade walls, and stormwater structures, as well as other relevant ancillary infrastructure requiring geotechnical involvement / input.
- Review of earthworks design and preparation and / or input into earthworks specification.
- Geotechnical construction observations and support.
- Geotechnical completion reporting and preparation of Producer Statements.

ENGEO would be happy to support these if requested.

10 Limitations

i. We have prepared this geotechnical summary letter in accordance with the brief as provided. This geotechnical summary letter has been prepared for the use of our client, Apollo Projects Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this geotechnical summary letter. No liability is accepted for the use of any part of the geotechnical summary letter for any other purpose or by any other person or entity.

ii. The recommendations in this geotechnical summary letter are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this geotechnical summary letter does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

v. This geotechnical summary letter is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (07) 777 0209 if you require any further information.

Report prepared by

Max McLean, CMEngNZ (PEngGeol)
TCC Category 1 Geo Professional
Associate Engineering Geologist

Report reviewed by

Matt Packard, CMEngNZ (CPEng)
TCC Category 1 Geo Professional
Associate Geotechnical Engineer

FIGURES

Legend

- Study Area
- Hand Auger Borehole (ENGEO 2025)
- Cone Penetration Test (ENGEO 2025)
- Existing CPTs
- Existing BH
- Section 3A
- Section 3B
- Section 3C

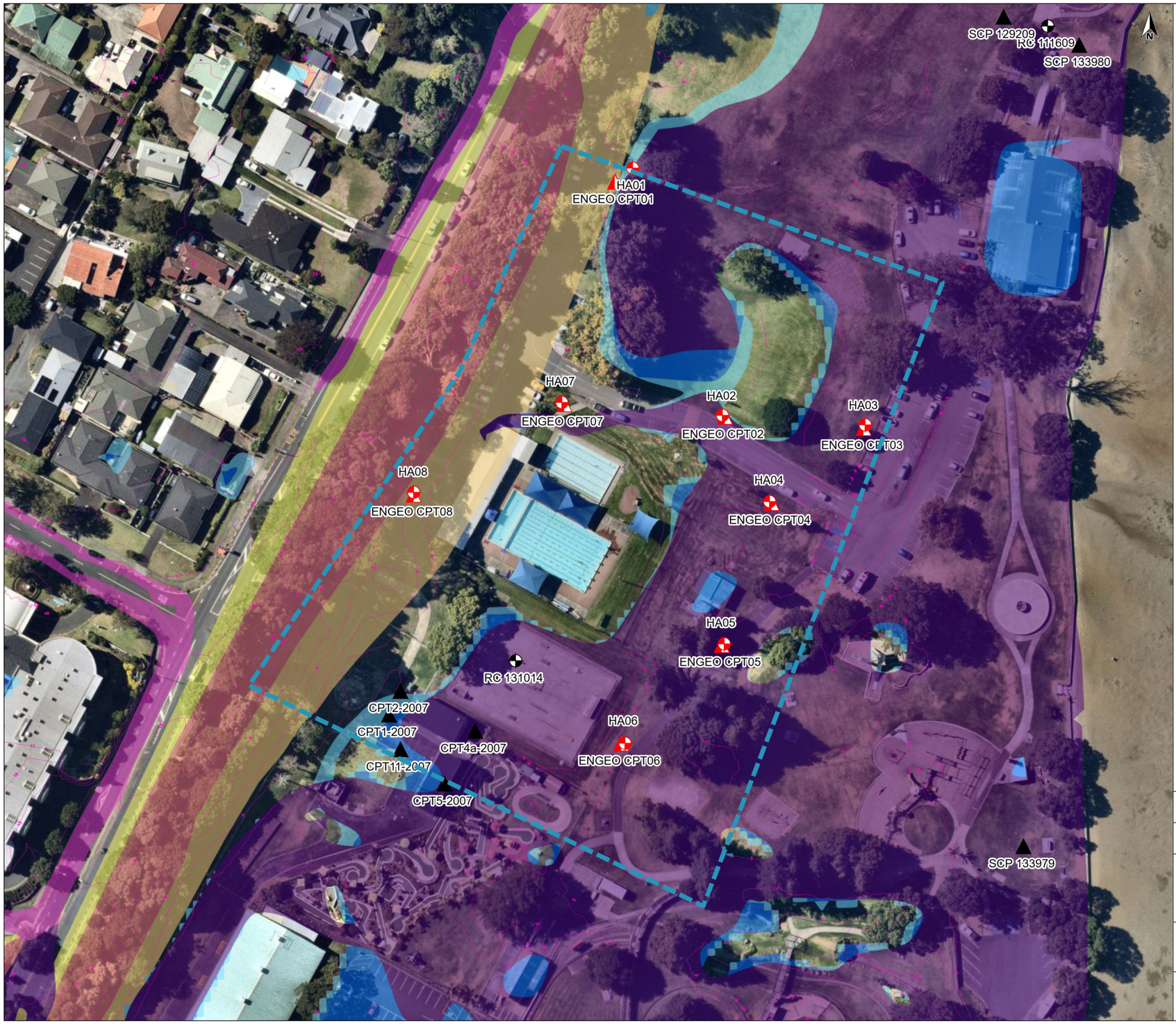
TCC 2022 Elevation Contours NZVD2016
- Contour 1m 2022 NZVD16

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: Investigation Plan		
Client: Apollo Projects Limited		Size: A3
Project: Memorial Park Pool	Drawn: MM	Figure No.: 1
Date: 12-06-2025	Checked: MJP	
Proj No: 28836	Scale: 1:1000	Version: draft



Legend

- Study Area
- Hand Auger Borehole (ENGEO 2025)
- Cone Penetration Test (ENGEO 2025)
- Existing CPTs
- Existing BH

TCC 2022 Elevation Contours NZVD2016
- Contour 1m 2022 NZVD16

Natural Hazards
FloodRisk
- Flood plain
- Flooding depth 100-300mm
- Flooding depth over 300mm
- Minor overland flow
- Major overland flow

Slope Hazard Zones 2023
- Failure Zone 2:1
- Regression Zone 3:1
- Runout Zone 4:1
- Slope Hazard Zones Study Area

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: Slope and Flooding Risk Plan		
Client: Apollo Projects Limited		Size: A3
Project: Memorial Park Pool	Drawn: MM	Figure No.: 2
Date: 27-06-2025	Checked: MJP	
Proj No: 28836	Scale: 1:1000	Version: Final

Legend

- Study Area
- Moderate Risk
- High Risk
- Very High Risk
- Hand Auger Borehole (ENGEO 2025)
- Cone Penetration Test (ENGEO 2025)
- Existing CPTs
- Existing BH

TCC 2022 Elevation Contours NZVD2016
- Contour 1m 2022 NZVD16

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: Colsolidation Settlement Risk (Surface Structures and Fills)		
Client: Apollo Projects Limited		Size: A3
Project: Memorial Park Pool	Drawn: MM	Figure No.: 3
Date: 26-06-2025	Checked: MJP	
Proj No: 28836	Scale: 1:1000	Version: draft

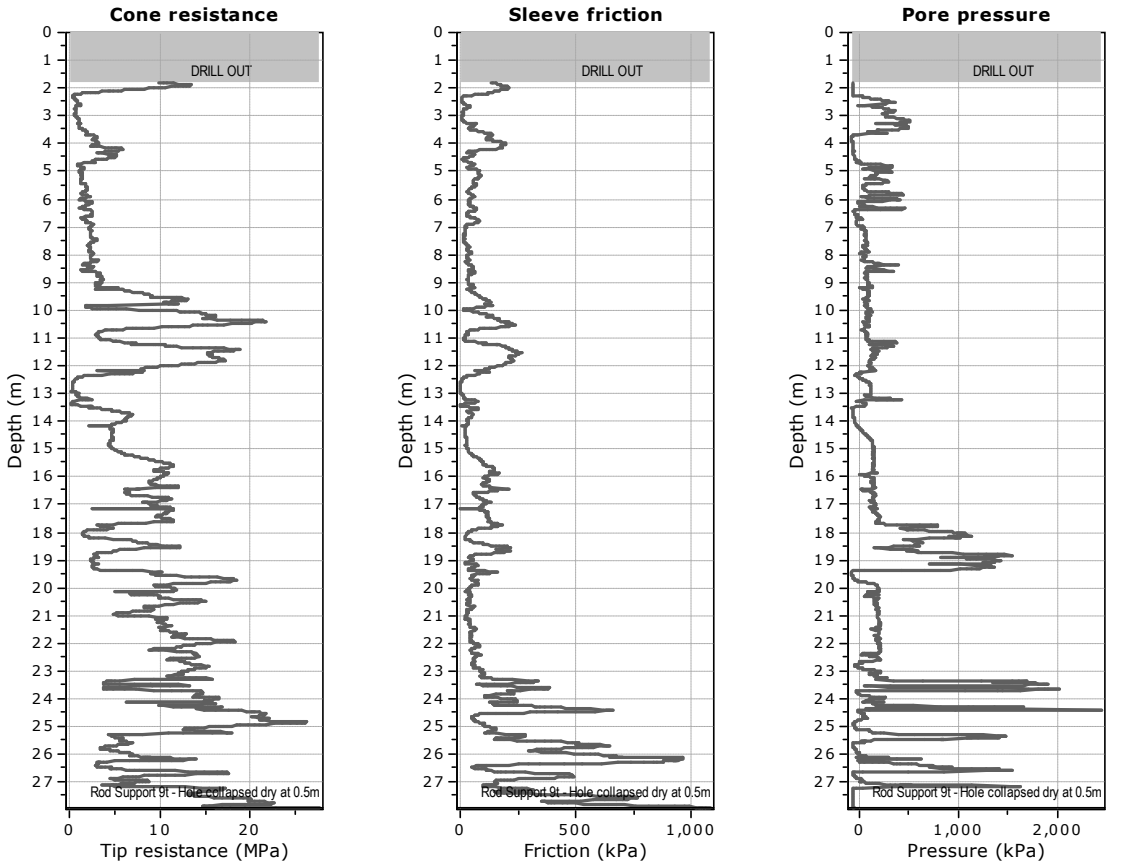
APPENDIX 1

Investigation Data

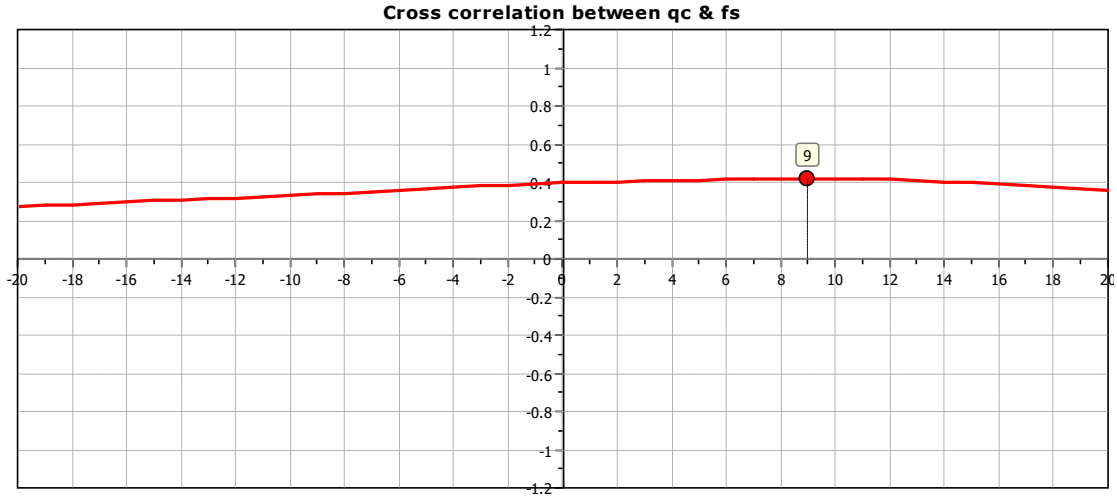
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 01
Total depth: 27.95 m, Date: 3/06/2025
Coords: lat -37.696933° lon 176.164397°
Cone Type: DC10

Project: ENGEO Limited | 28836 | GDS NZ Ltd
Location: Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter



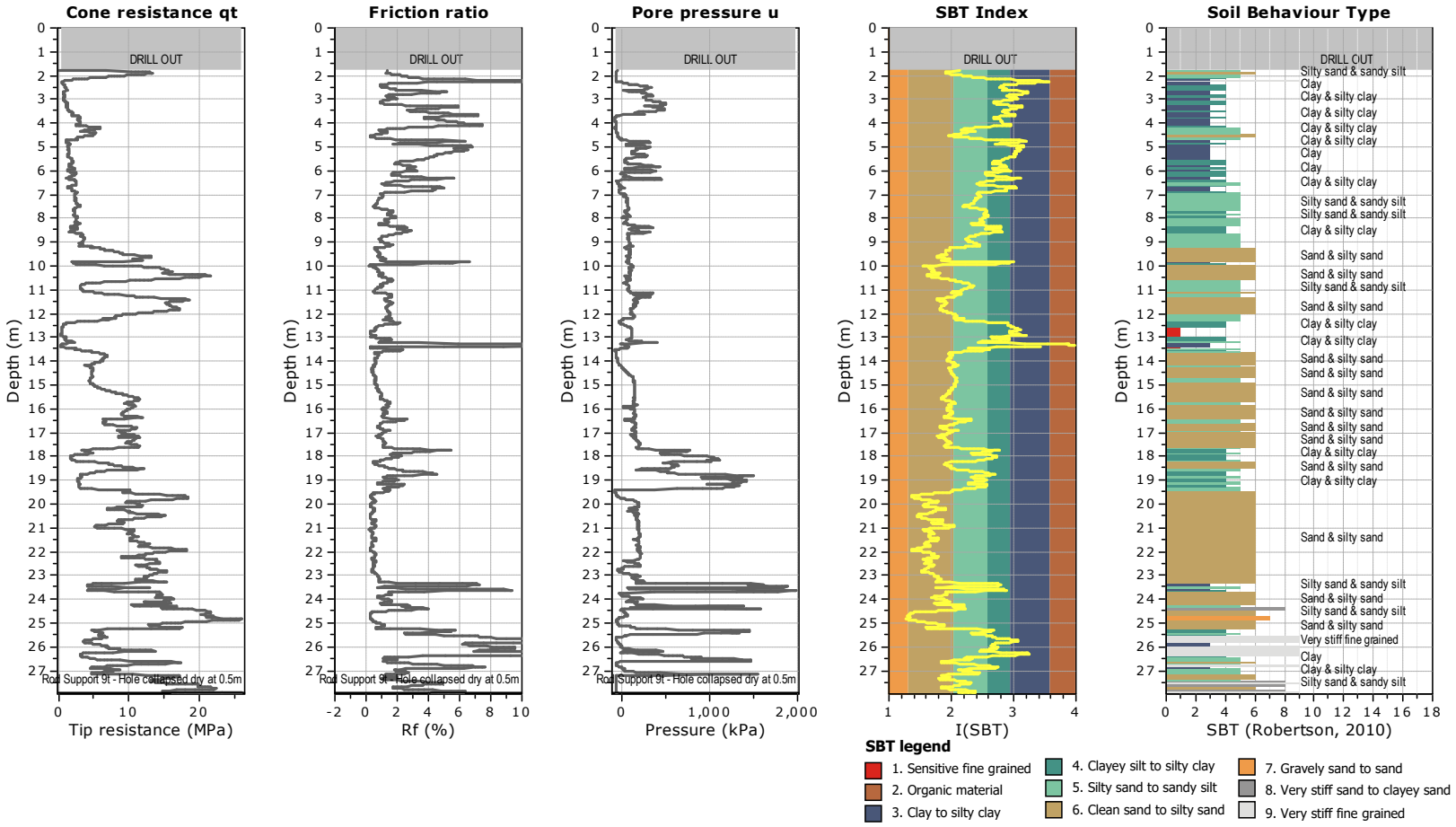
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 01
Total depth: 27.95 m, Date: 3/06/2025
Coords: lat -37.696933° lon 176.164397°
Cone Type: DC10

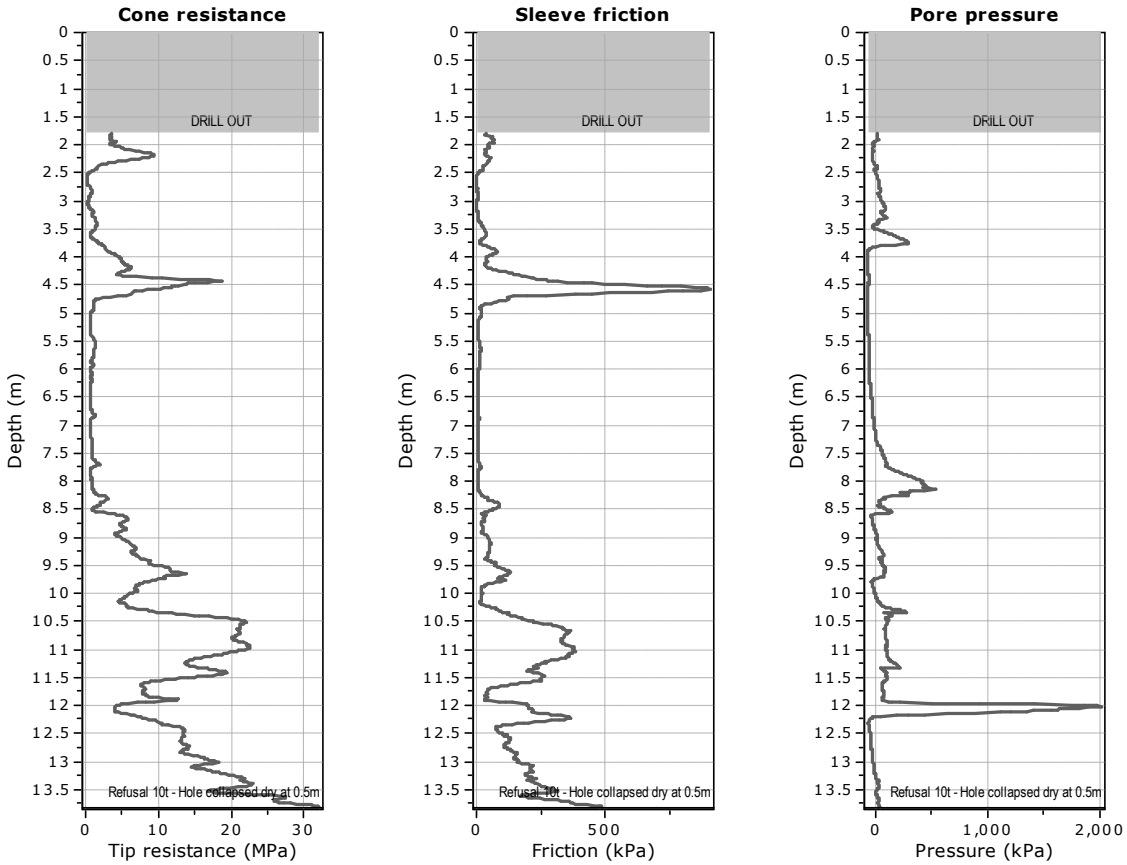
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



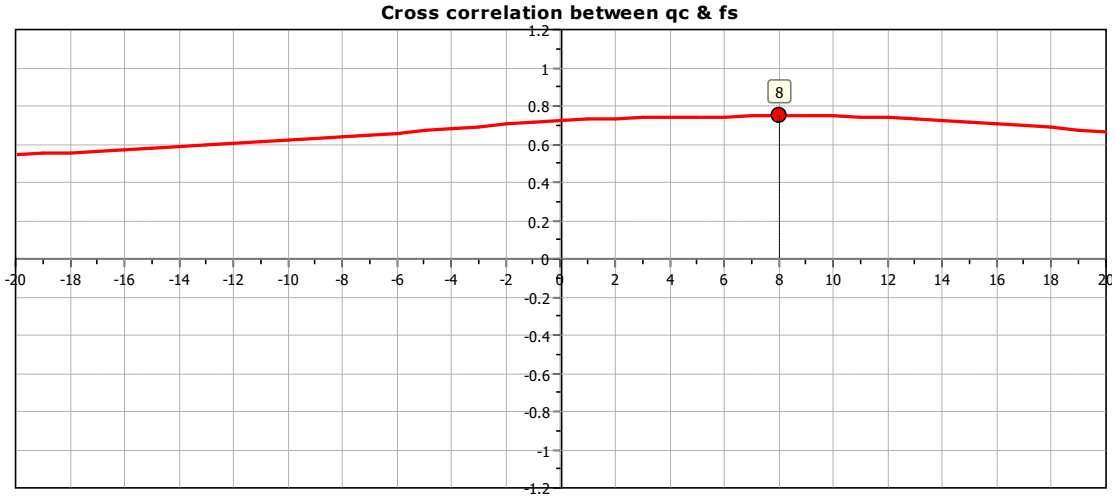
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 02
Total depth: 13.81 m, Date: 3/06/2025
Coords: lat -37.697514° lon 176.164741°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



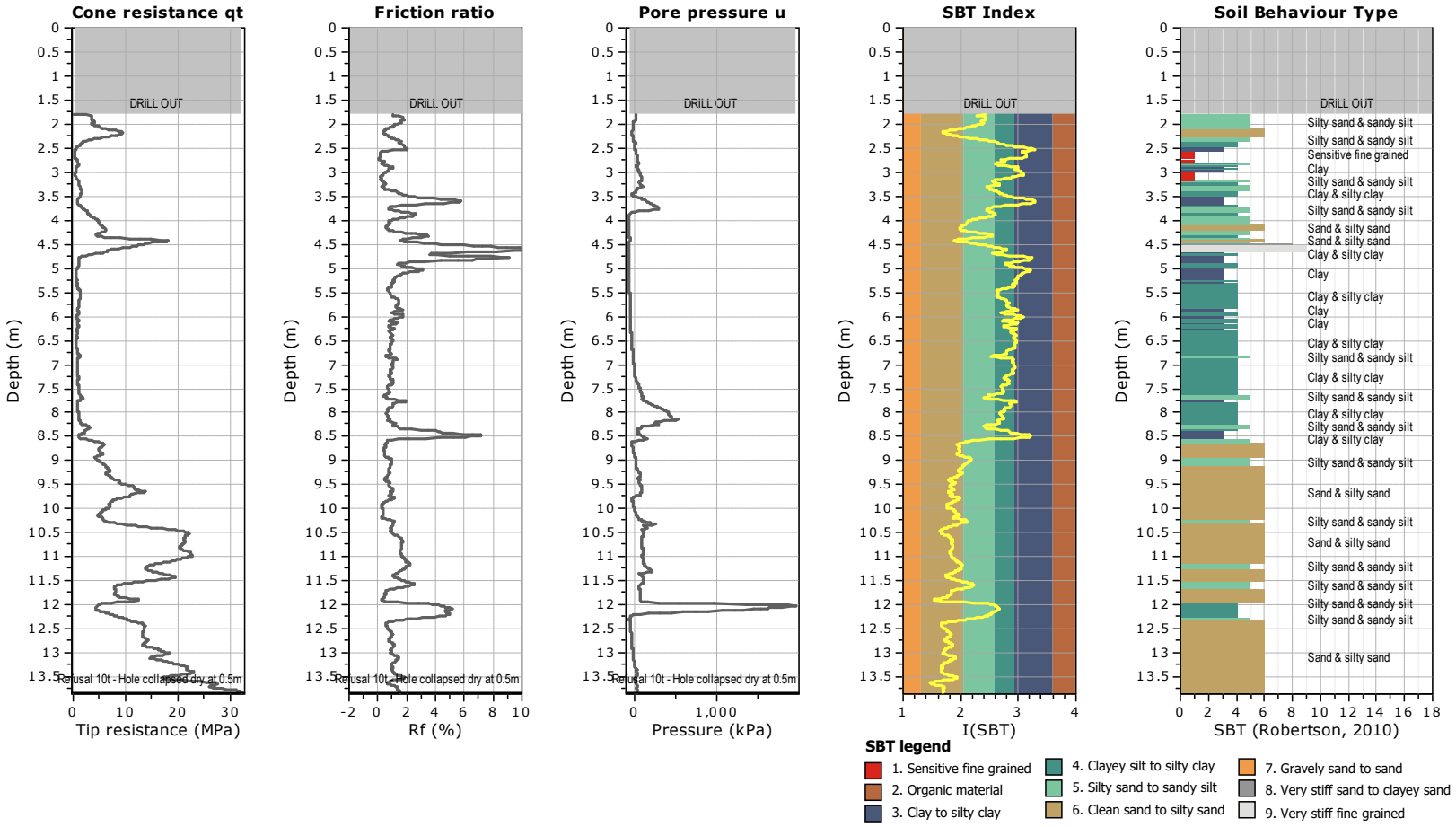
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 02
Total depth: 13.81 m, Date: 3/06/2025
Coords: lat -37.697514° lon 176.164741°
Cone Type: DC10

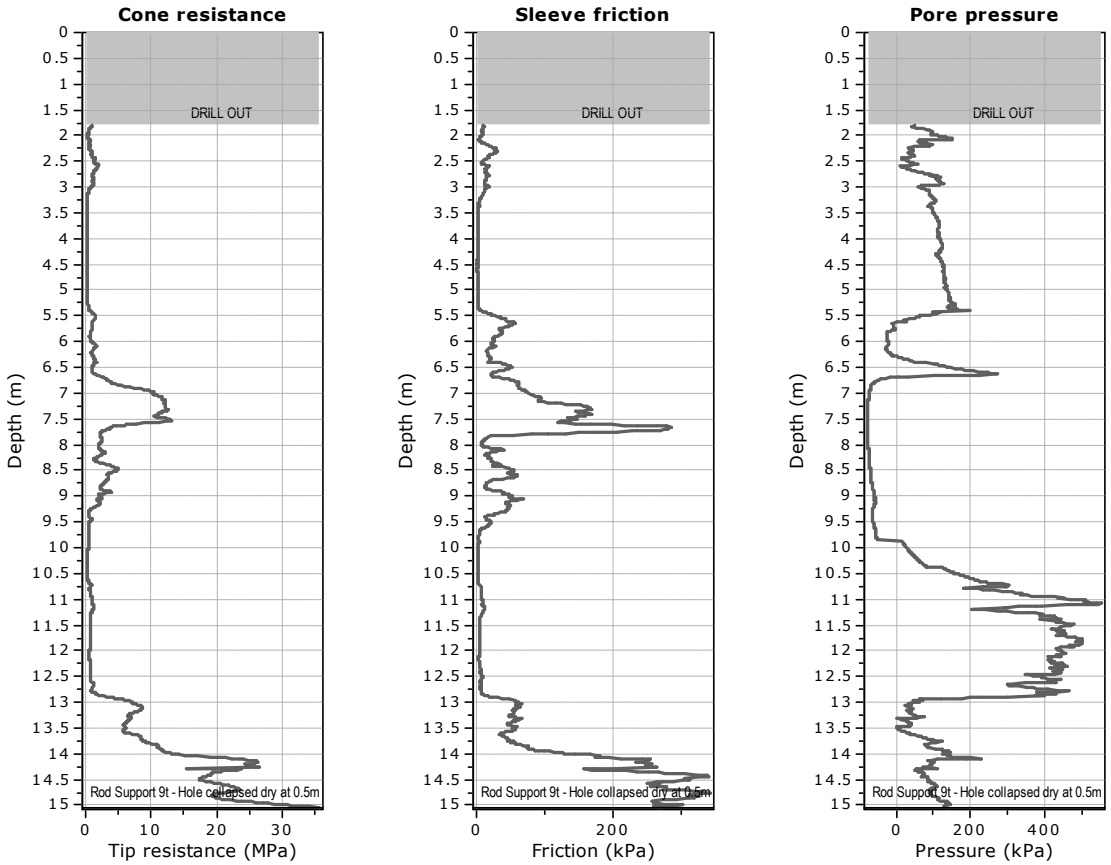
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



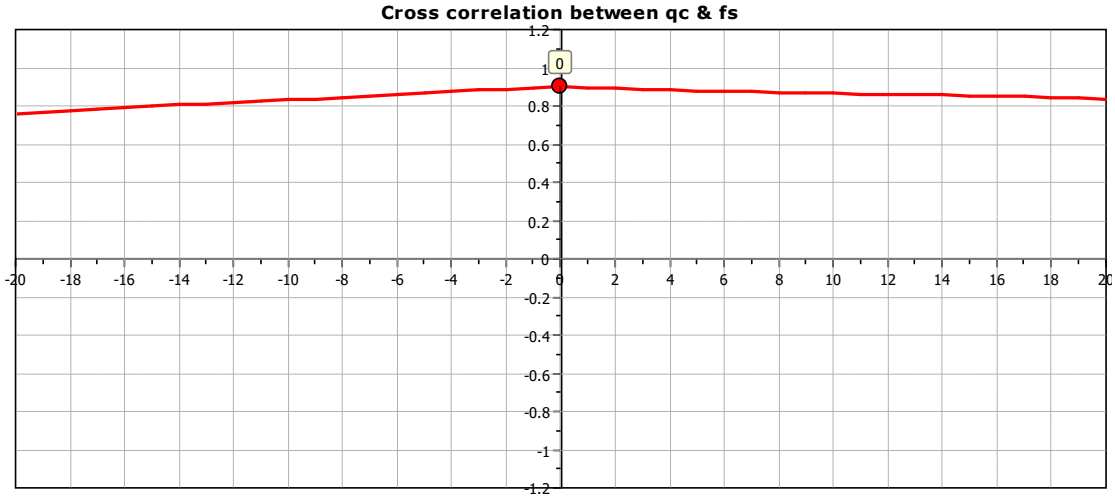
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 03
Total depth: 15.04 m, Date: 3/06/2025
Coords: lat -37.697543° lon 176.165176°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



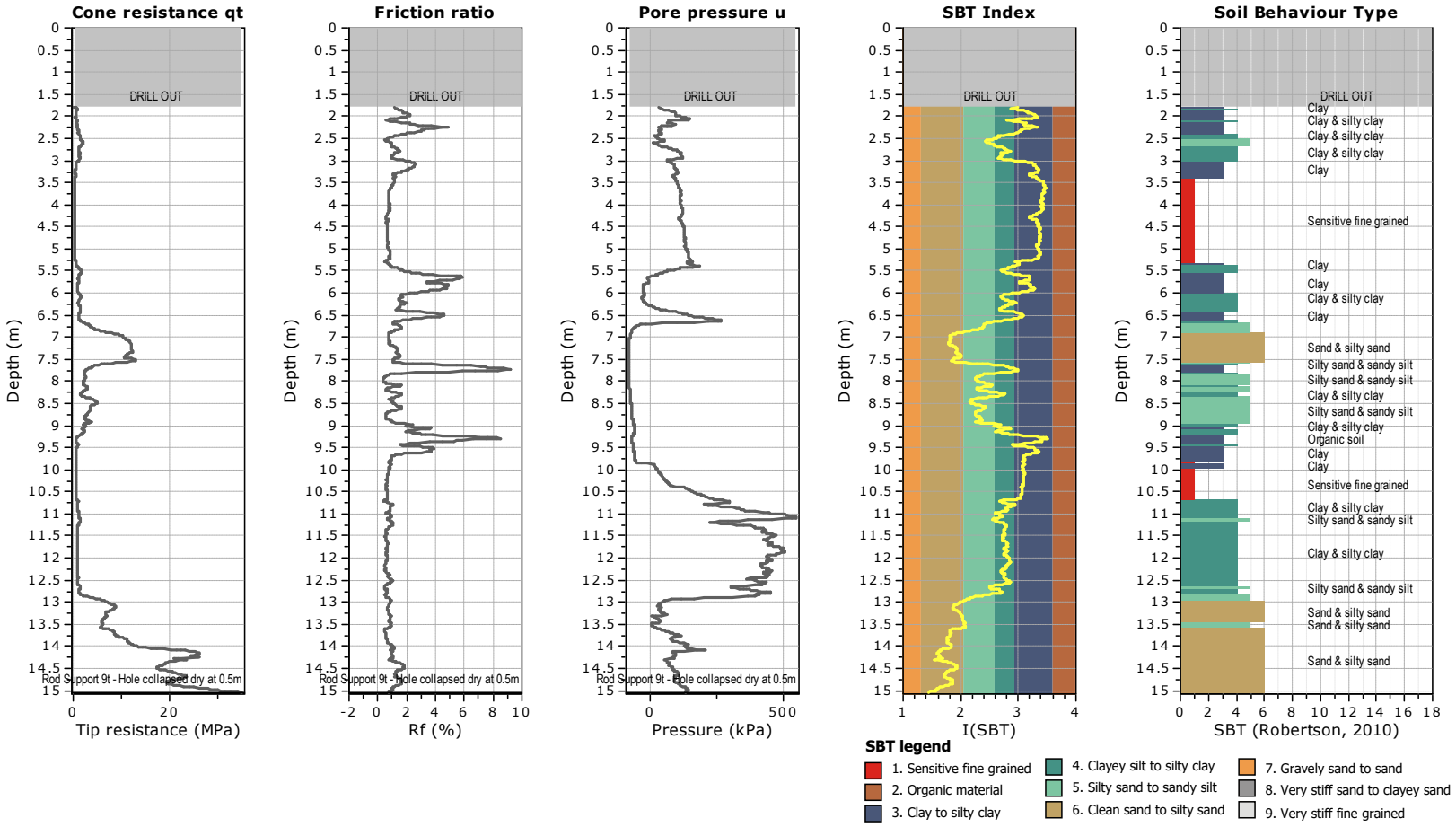
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 03
Total depth: 15.04 m, Date: 3/06/2025
Coords: lat -37.697543° lon 176.165176°
Cone Type: DC10

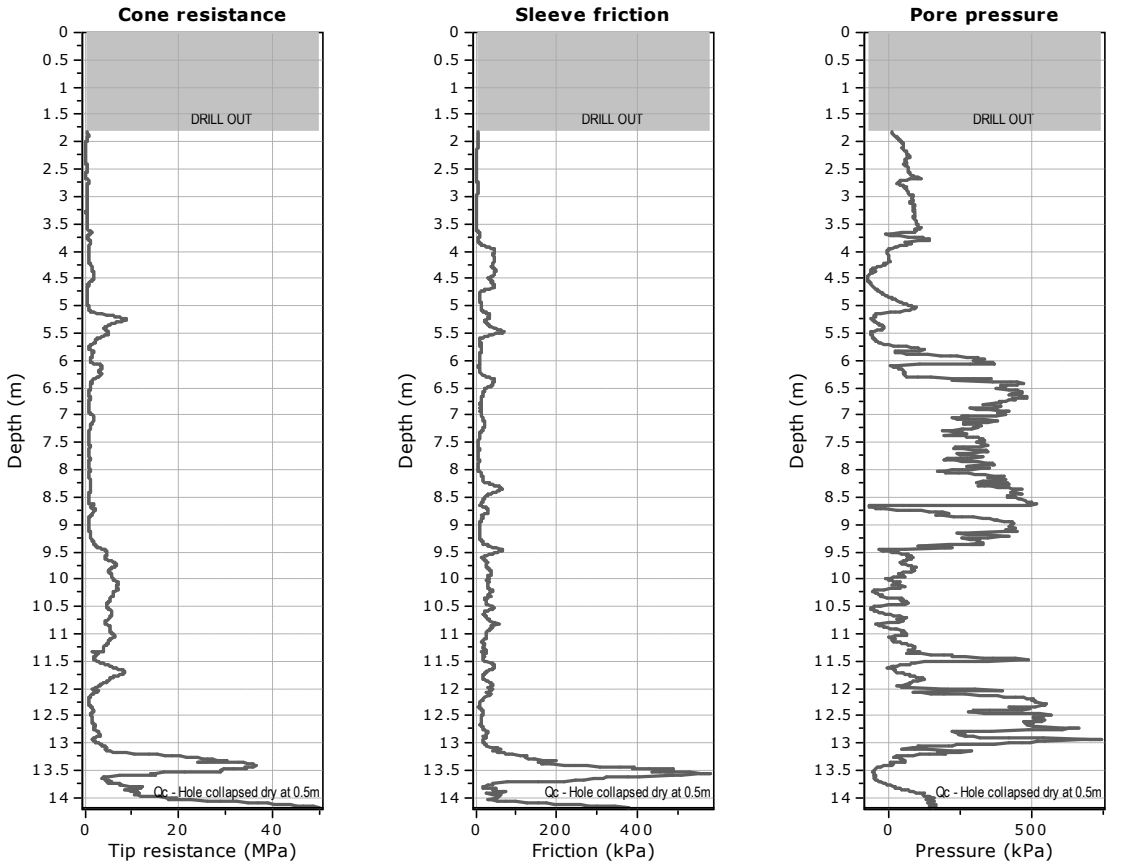
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



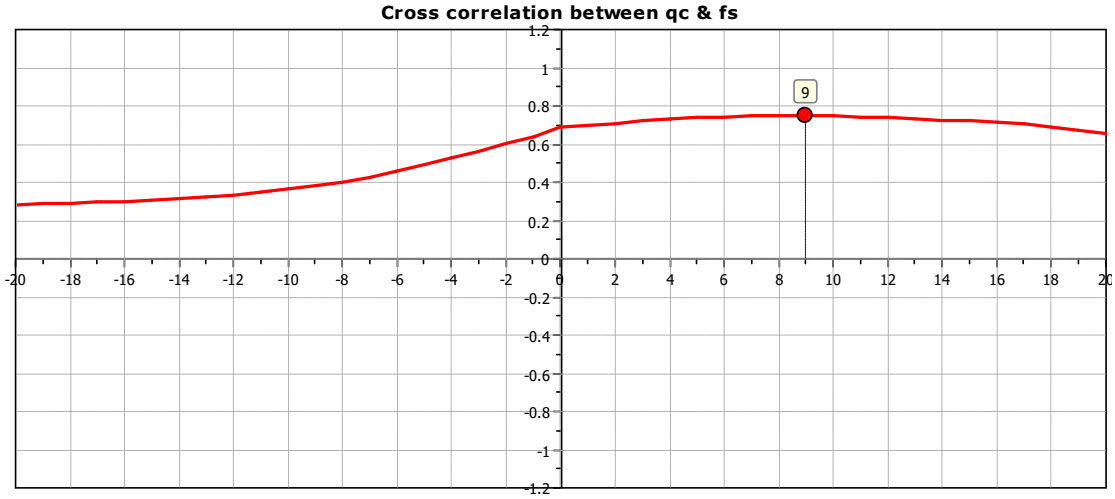
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 04
Total depth: 14.17 m, Date: 3/06/2025
Coords: lat -37.697729° lon 176.164889°
Cone Type: DC10

Project: ENGEO Limited | 28836 | GDS NZ Ltd
Location: Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter



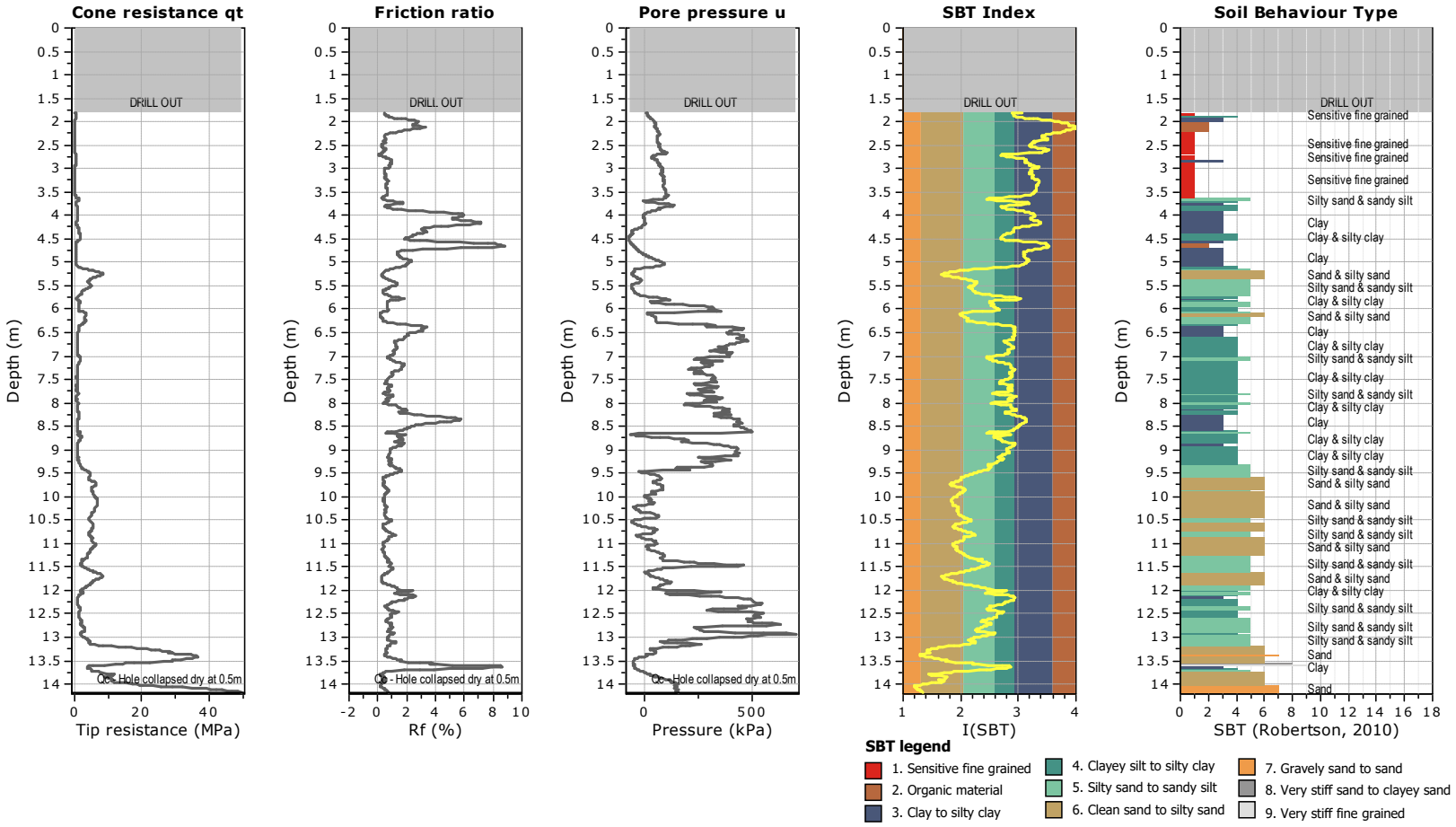
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 04
Total depth: 14.17 m, Date: 3/06/2025
Coords: lat -37.697729° lon 176.164889°
Cone Type: DC10

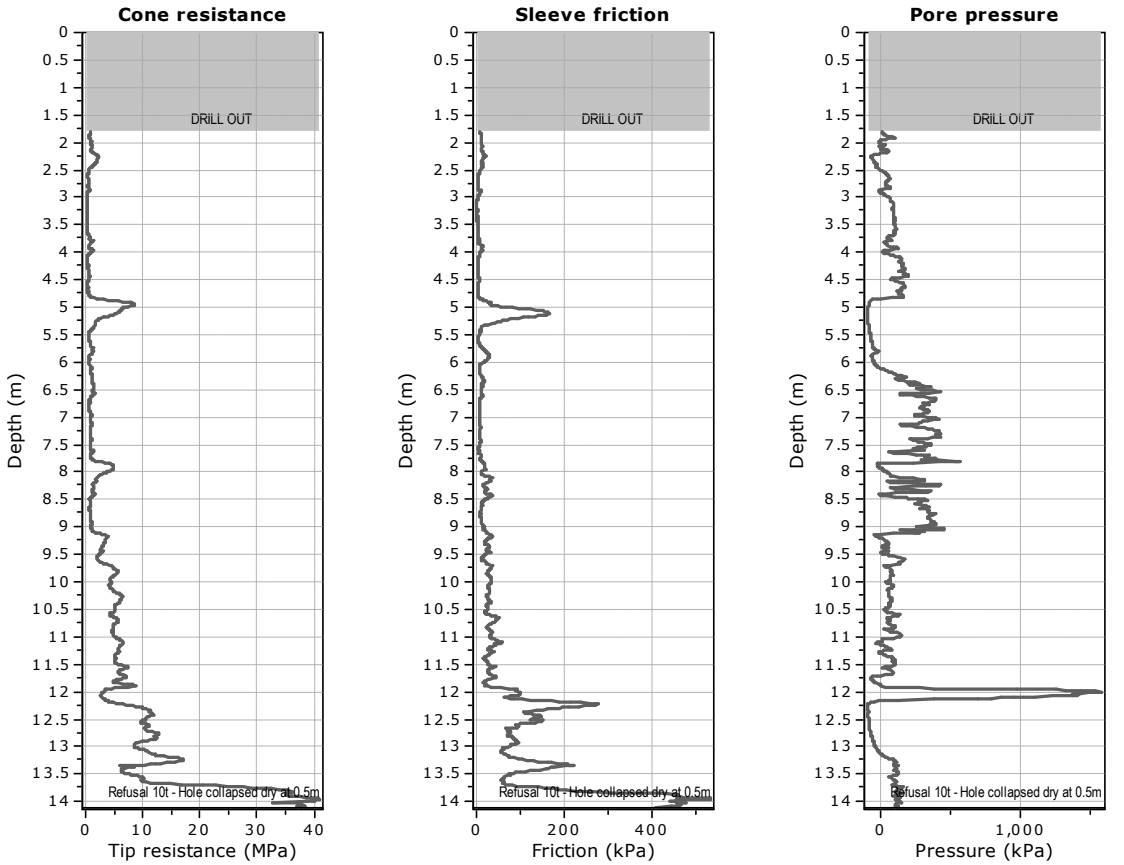
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



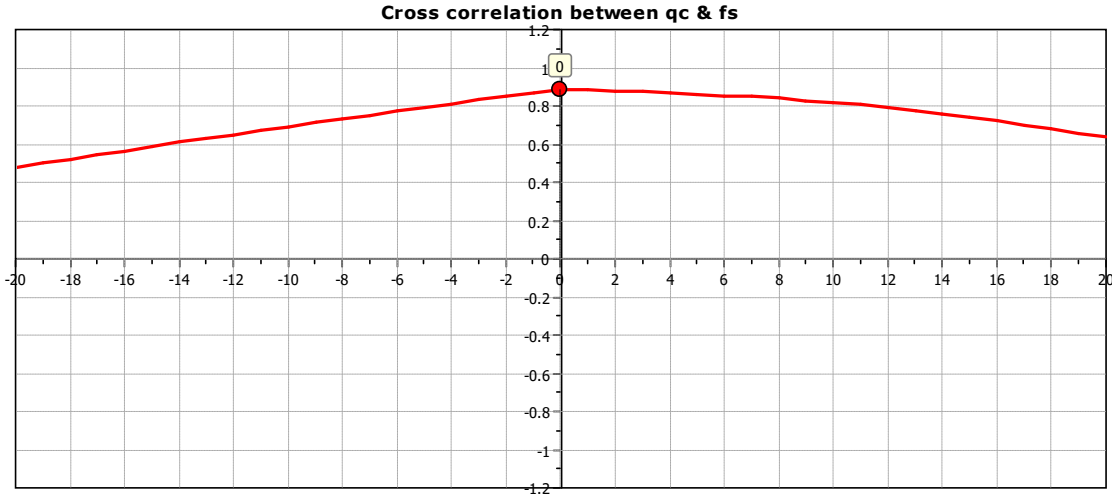
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 05
Total depth: 14.10 m, Date: 3/06/2025
Coords: lat -37.698079° lon 176.16473°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



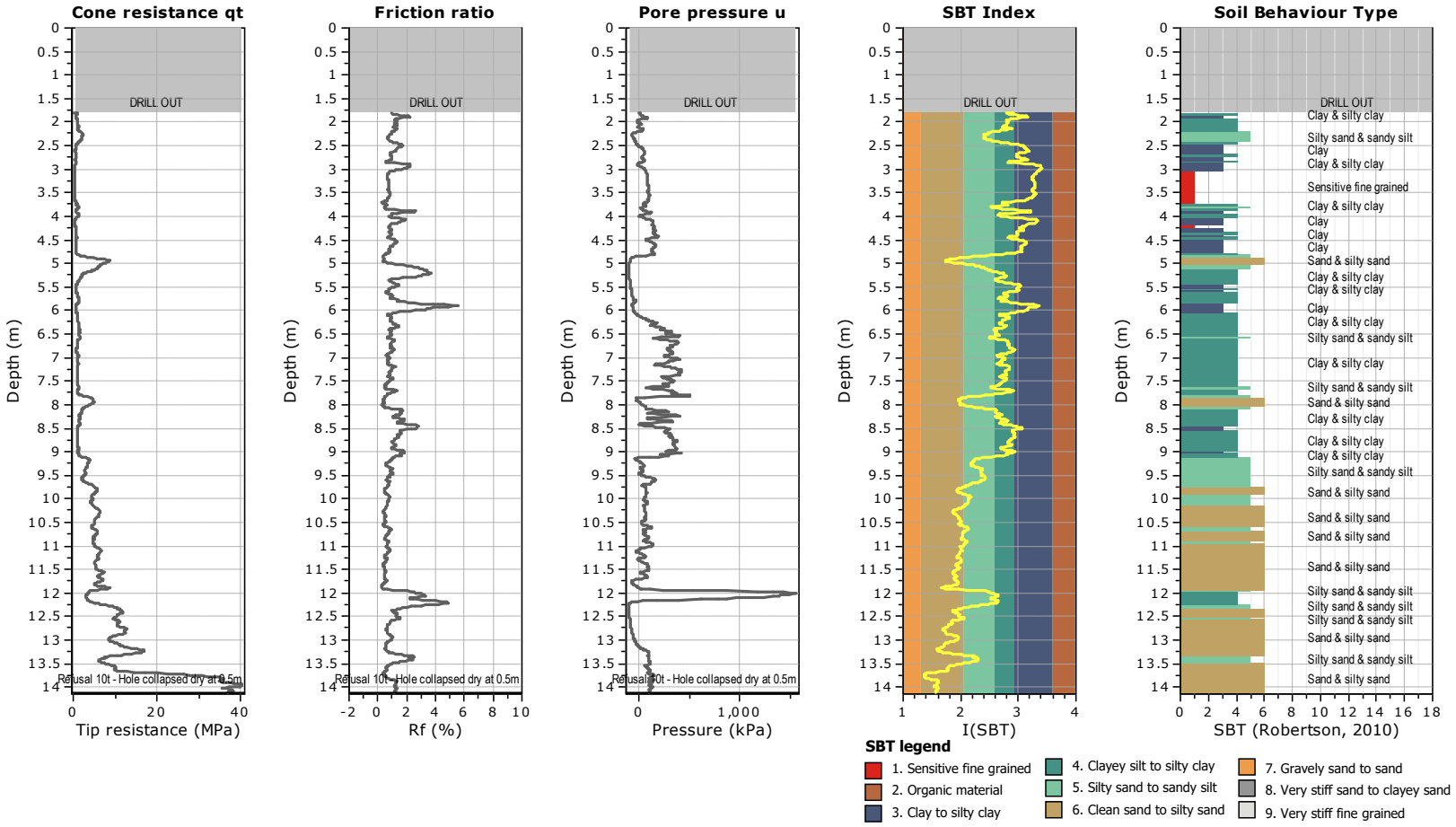
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 05
Total depth: 14.10 m, Date: 3/06/2025
Coords: lat -37.698079° lon 176.16473°
Cone Type: DC10

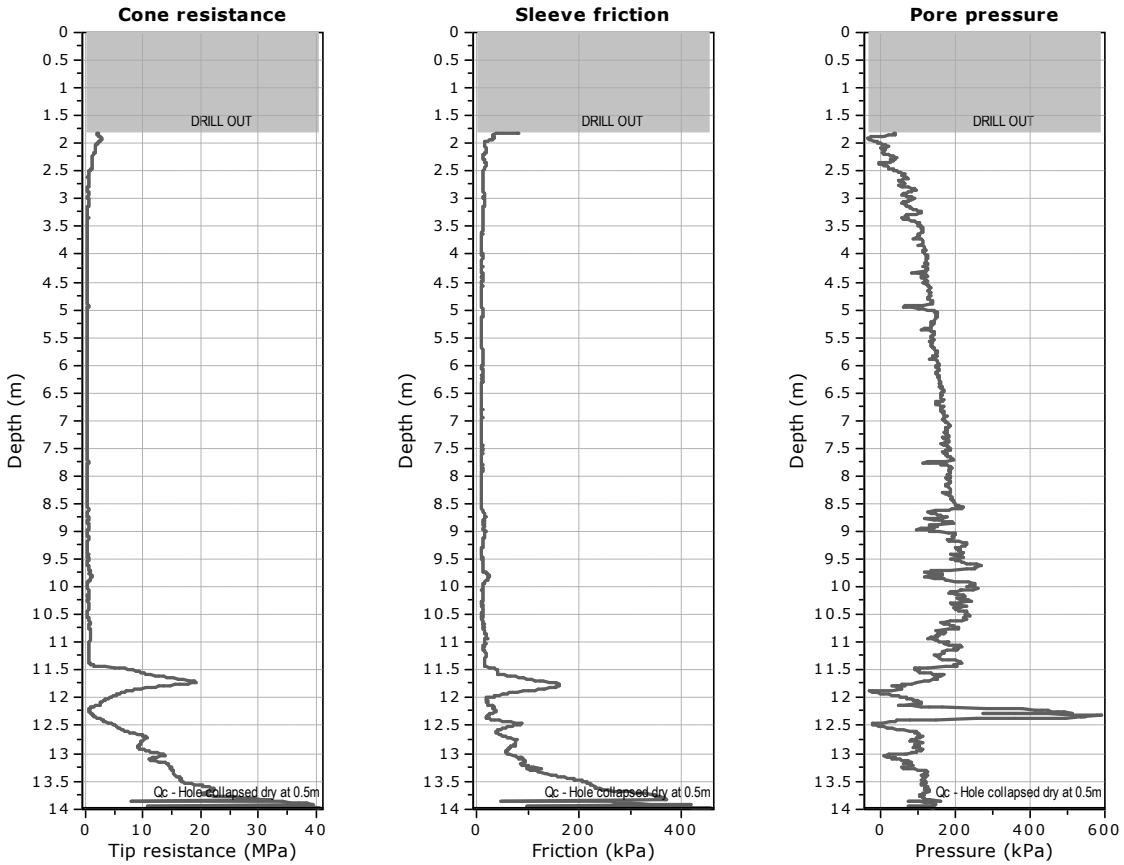
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



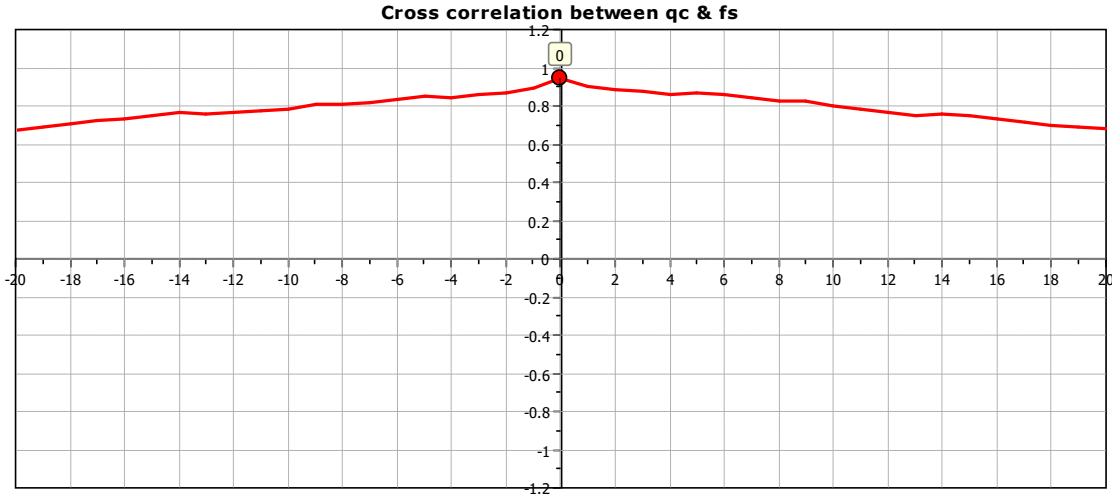
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 06
Total depth: 13.98 m, Date: 3/06/2025
Coords: lat -37.69832° lon 176.164416°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



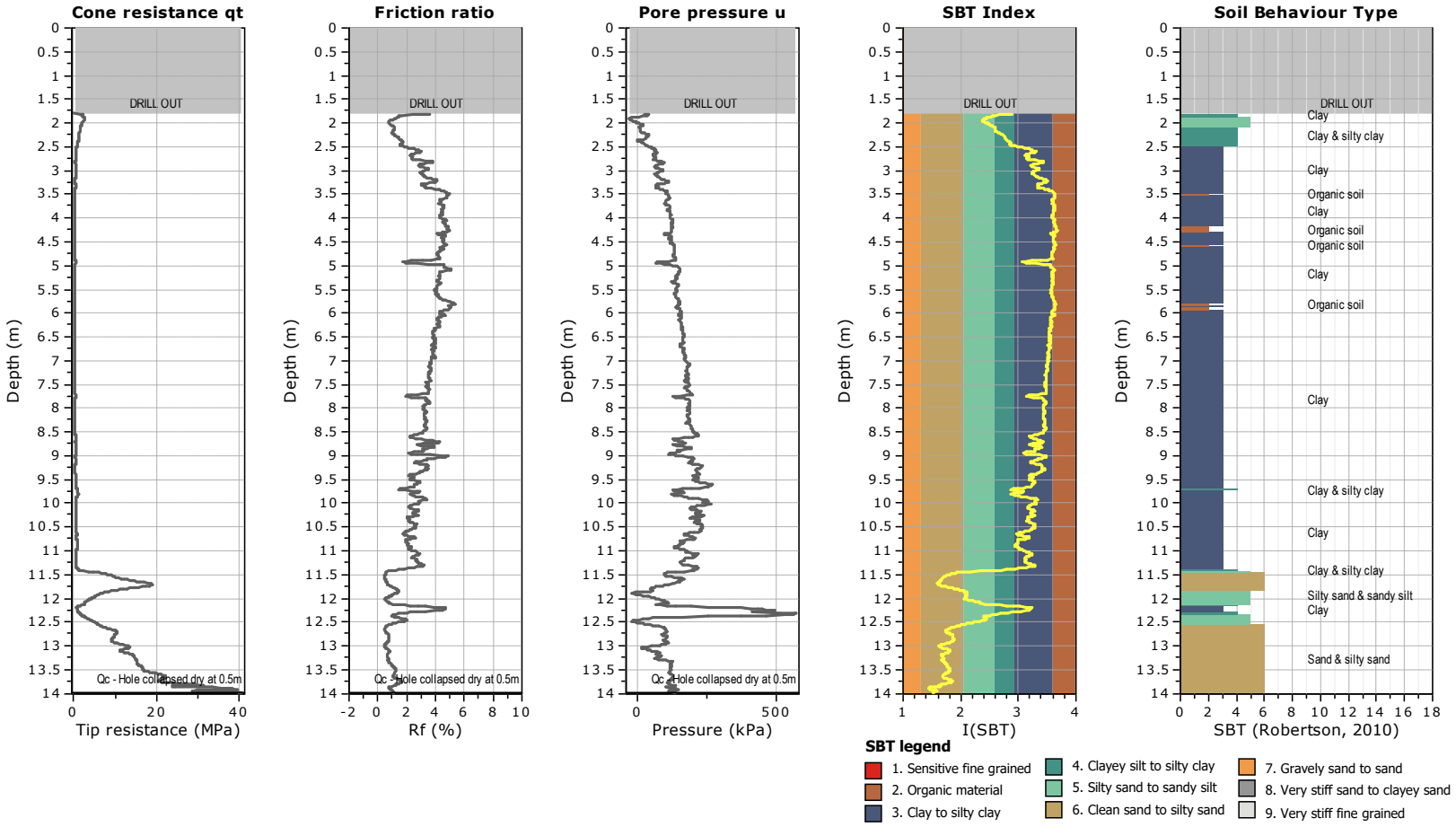
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 06
Total depth: 13.98 m, Date: 3/06/2025
Coords: lat -37.69832° lon 176.164416°
Cone Type: DC10

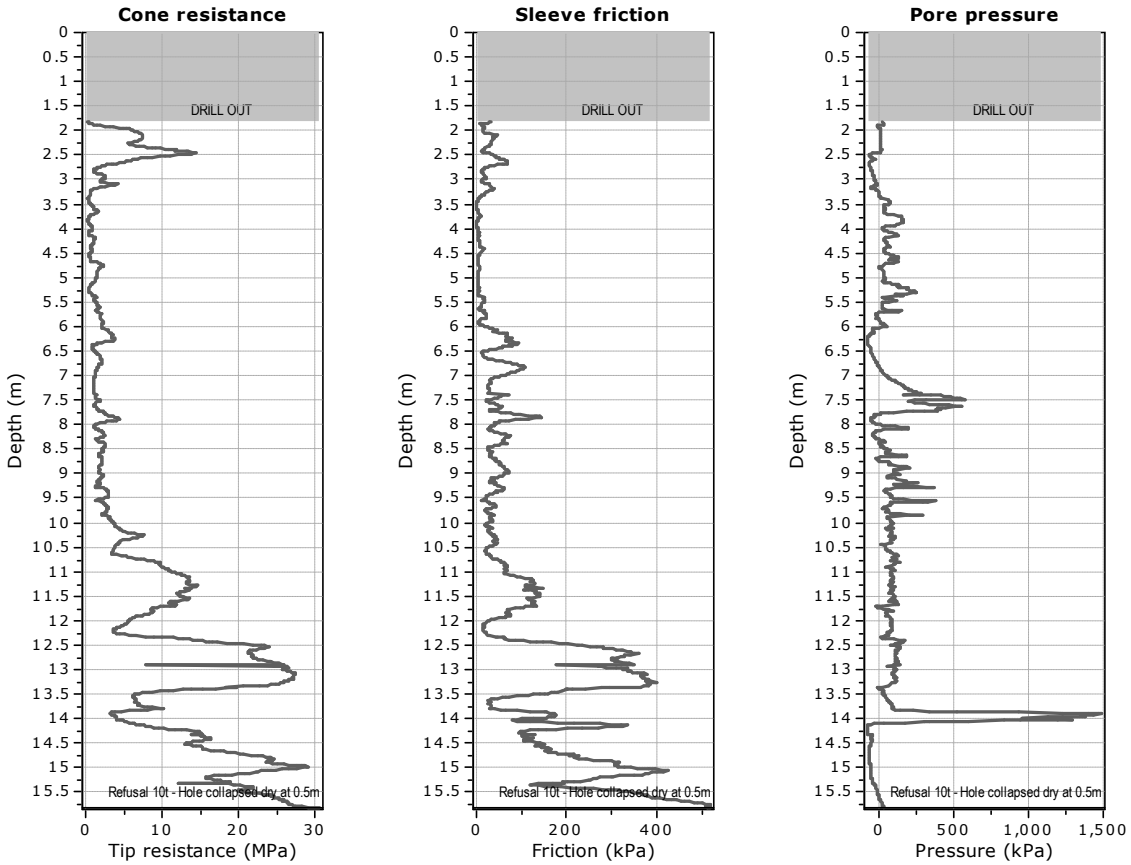
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



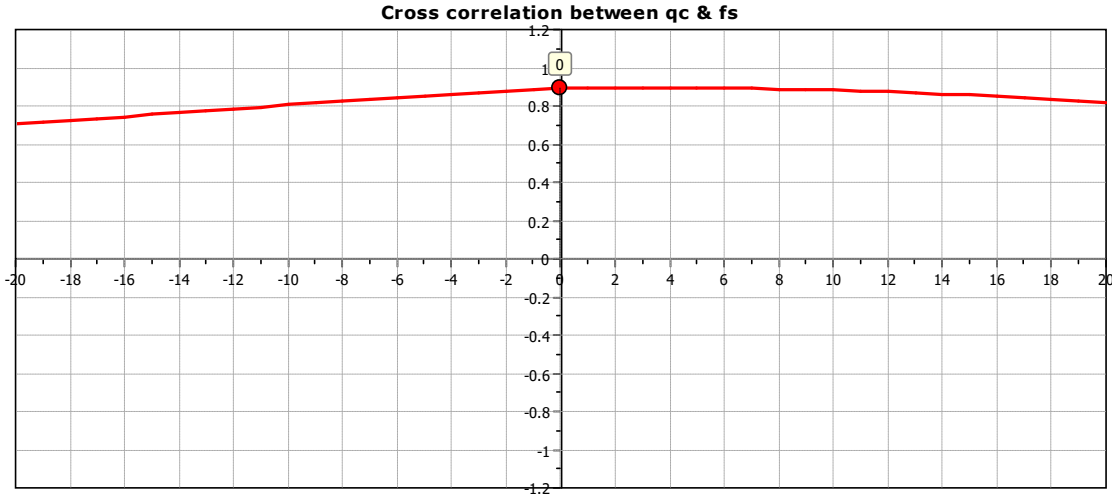
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 07
Total depth: 15.82 m, Date: 3/06/2025
Coords: lat -37.697488° lon 176.164238°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



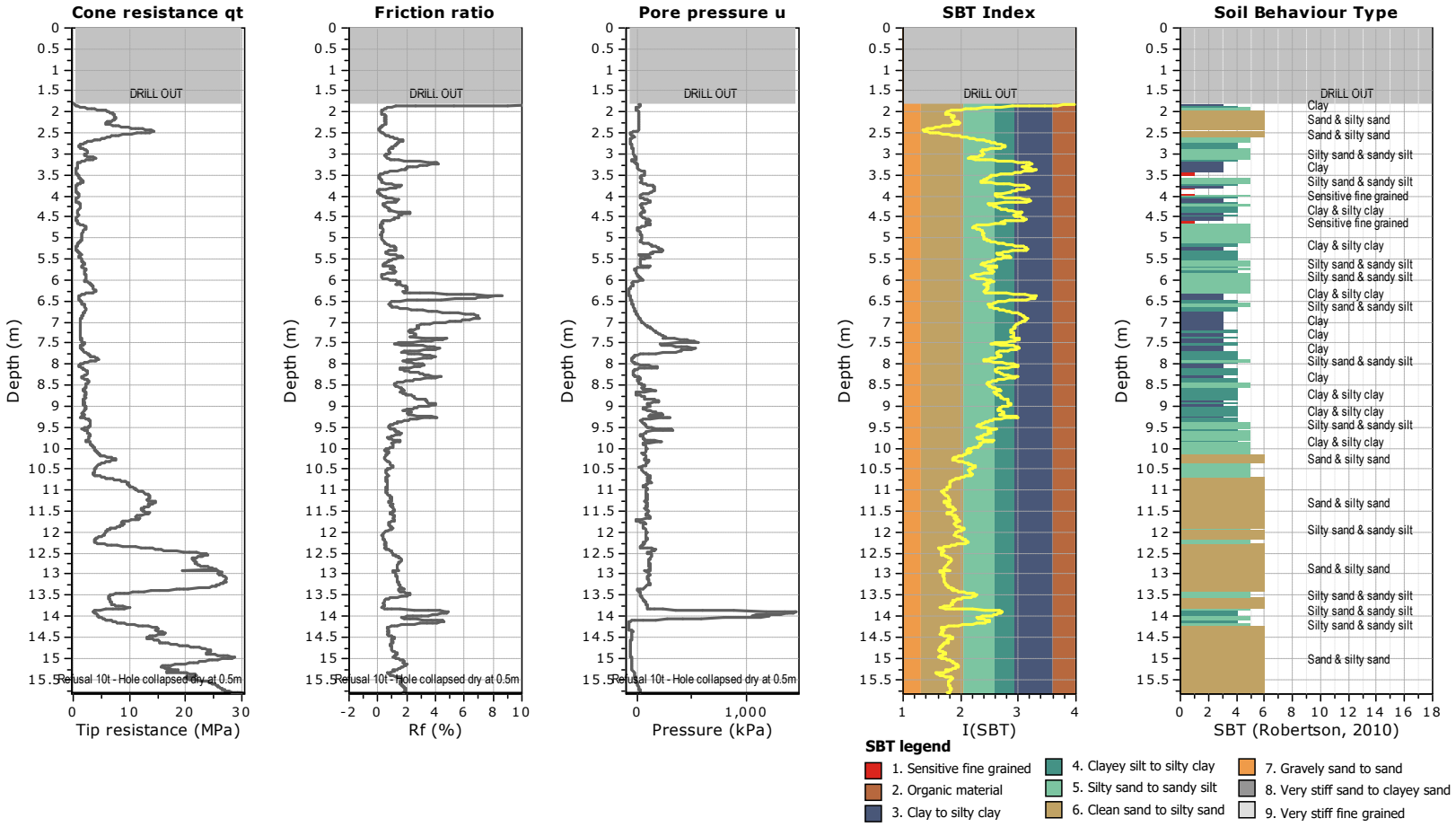
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 07
Total depth: 15.82 m, Date: 3/06/2025
Coords: lat -37.697488° lon 176.164238°
Cone Type: DC10

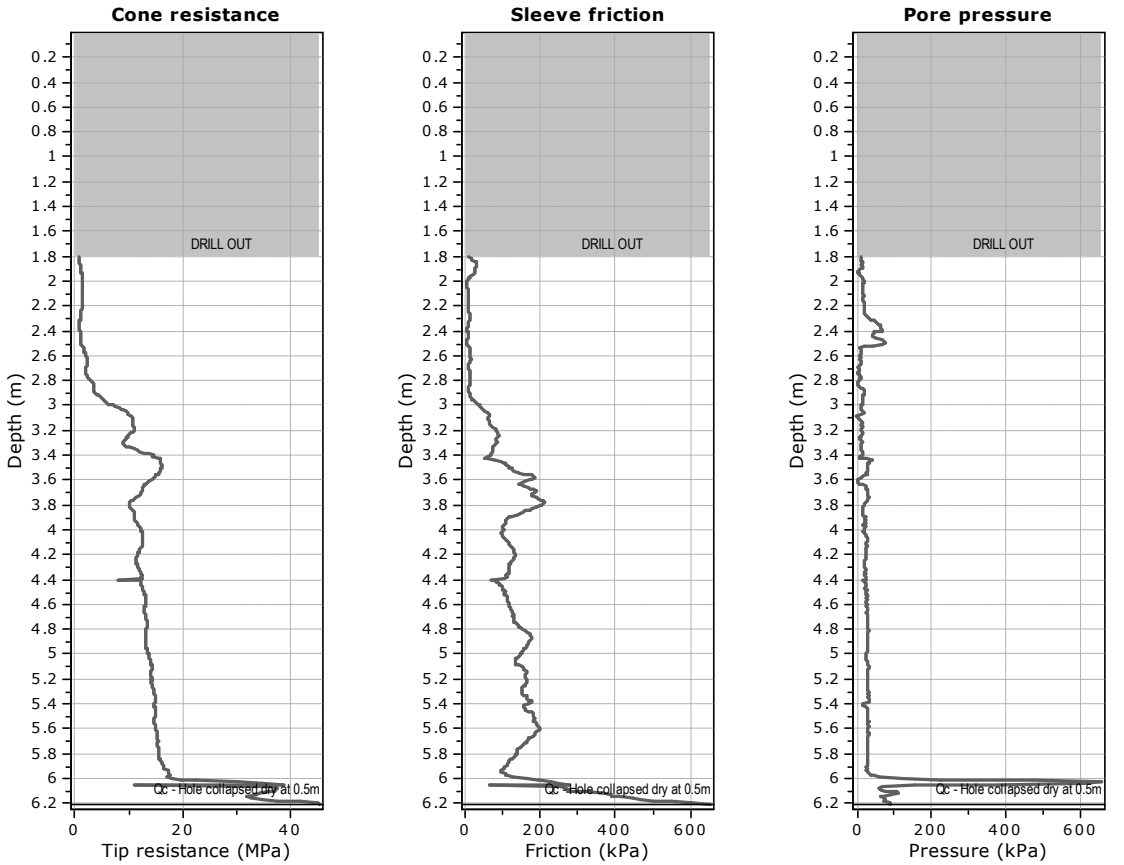
Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



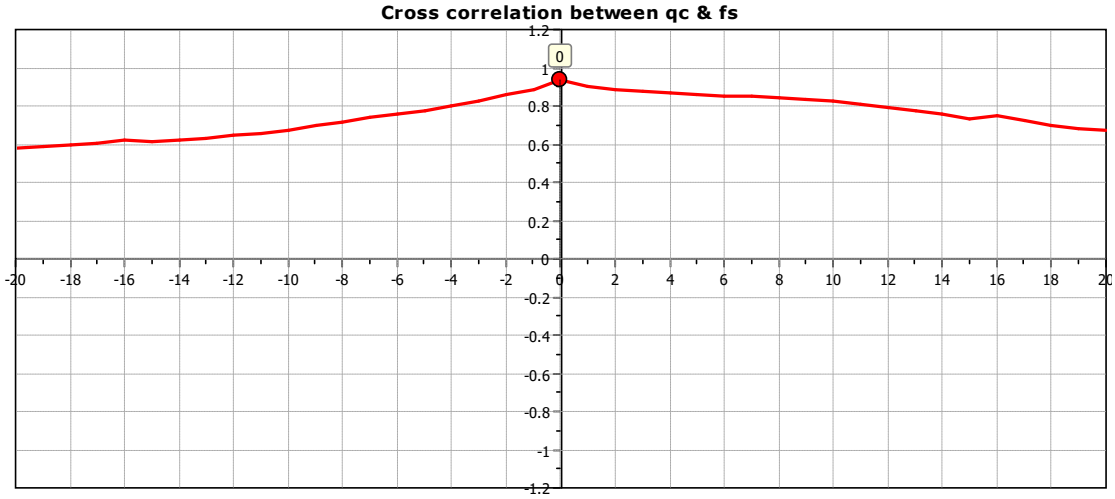
Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 08
Total depth: 6.21 m, Date: 3/06/2025
Coords: lat -37.697707° lon 176.163767°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



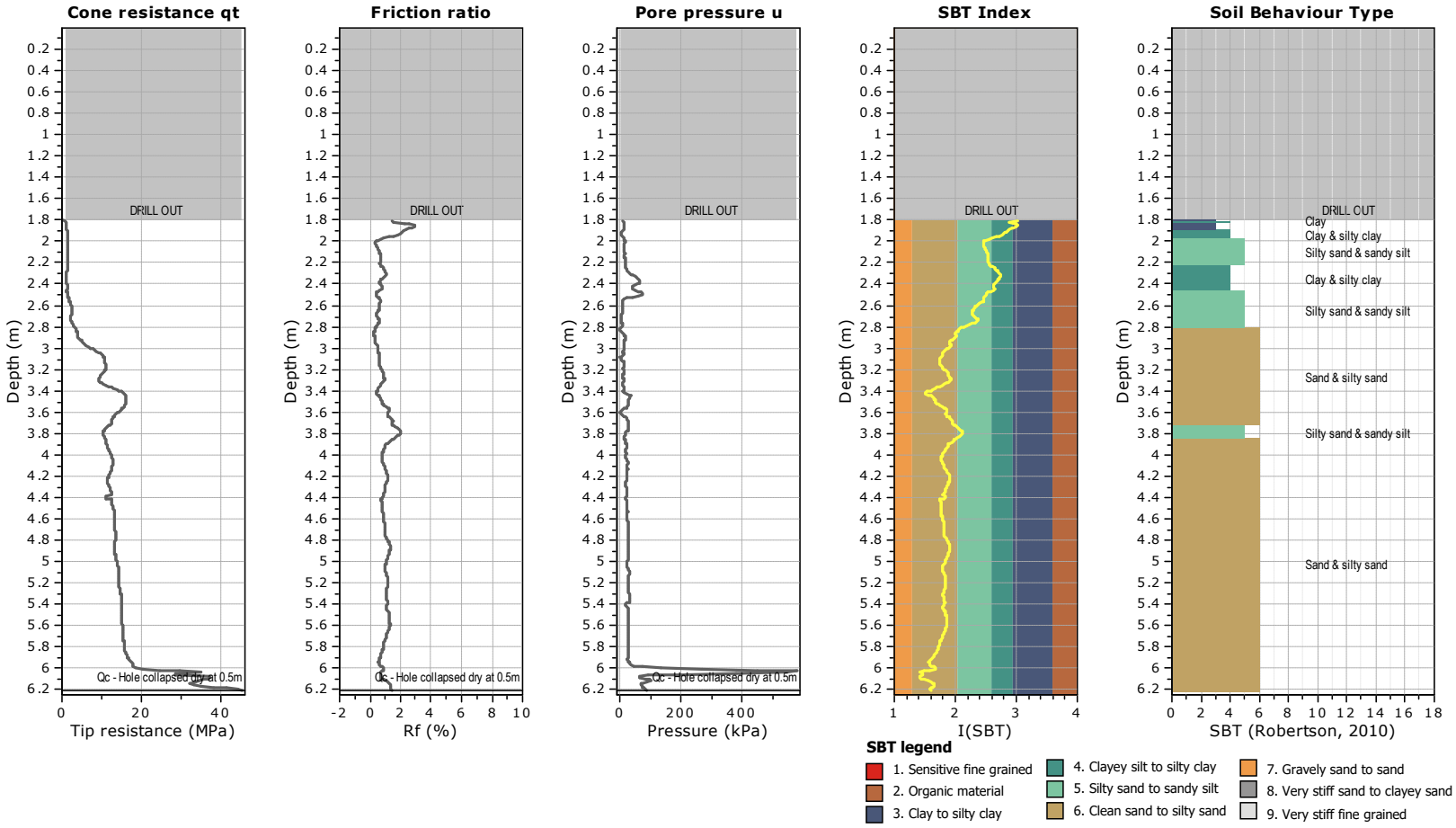
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Geo Data Solutions (GDS) NZ Ltd.
Email: Josh@gdsnz.co. nz
www.gdsnz.co.nz

CPT: 08
Total depth: 6.21 m, Date: 3/06/2025
Coords: lat -37.697707° lon 176.163767°
Cone Type: DC10

Project: **ENGEO Limited | 28836 | GDS NZ Ltd**
Location: **Memorial Park Pool, 322 Devonport Road, Tauranga | Holes dipped onsite using Dipmeter**



LOG OF AUGER HA01

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 1.4 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6969103
Longitude : 176.1644455

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]							
0.5	FILL	ML	[FILL] Clayey SILT with minor sand; dark blackish brown with occasional light brown and dark brownish red mottles. Low plasticity. Sand is fine to medium.		2	▼	M			
1.0	BTS	OL	[BURIED TOPSOIL]			▽				
	RA	ML	Clayey SILT with minor sand; greyish brown with dark greyish brown mottles. Low plasticity. Sand is fine. 1.3 m - Sand becomes fine to coarse; light brownish grey.				W S			
1.5			End of Hole Depth: 1.4 m Termination Condition: Practical refusal							
2.0										
2.5										

Hand auger met practical refusal on hard material at at 1.4 m depth .
Dip test showed standing groundwater at 0.7 m approx. 2 hours after drilling.
Groundwater encountered at 1.1 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

T = Topsoil; BTS = Buried Topsoil.
RA = RECENT ALLUVIUM

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA02

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 1.35 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6975227
Longitude : 176.1647267

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]							
	FILL	ML	[FILL] Clayey SILT with minor sand and trace rootlets; dark brownish grey. Low plasticity. Sand is fine to medium.		2		M			
1.0	BTS	OL	[BURIED TOPSOIL] with minor decomposed woody debris.				W			
	R	ML	SILT with minor sand and trace clay; brownish grey. Low plasticity. Sand is fine.				S			
1.35			End of Hole Depth: 1.35 m Termination Condition: Practical refusal							

Hand auger met practical refusal on hard material at at 1.35 m depth . T = Topsoil; BTS = Buried Topsoil.
Dip test showed standing groundwater at 0.6 m approx. 2 hours after drilling. R = RECENT ALLUVIUM
Groundwater encountered at 0.9 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA03

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 1.6 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6975463
Longitude : 176.1651745

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	T	OL	[TOPSOIL]							
0.5	FILL	ML	[FILL] Clayey SILT with minor sand and trace rootlets; dark brownish grey. Low plasticity. Sand is fine to medium.							
	BTS	OL	[BURIED TOPSOIL]		1					
1.0	RA-SD	SP	Fine to medium SAND; light brownish grey. Poorly graded.			▼	M			
1.5		SW	Silty fine to coarse SAND with trace rootlets; light brown. Well graded.							
			End of Hole Depth: 1.6 m Termination Condition: Practical refusal							
2.0										
2.5										

Hand auger met practical refusal on hard material at at 1.6 m depth .
Dip test showed standing groundwater at 1.0 m approx. 2 hours after drilling.
Standing groundwater was not encountered during drilling.
Elevations and coordinates estimated using TCC Mapi.

T = Topsoil; BTS = Buried Topsoil.
RA-SD = RECENT ALLUVIUM - SAND DEPOSITS

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

ENGEO

LOG OF AUGER HA04

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 1 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6977364
Longitude : 176.1648749

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	T	OL	[TOPSOIL]		2					
0.5	FILL	ML	[FILL] Clayey SILT with minor sand and trace rootlets; dark brownish grey. Low plasticity. Sand is fine to medium.				M			
	FILL	SW	[FILL] Silty fine to coarse SAND; dark brownish grey. Well graded. Sand is fine to coarse; coarse sands are subrounded, river deposits.							
	RA-SD	SW	Fine to coarse SAND with minor silt; brownish grey. Well graded.							
1.0			End of Hole Depth: 1 m Termination Condition: Practical refusal							
1.5										
2.0										
2.5										

Hand auger met practical refusal on hard material at at 1 m depth .
Dip test showed standing groundwater at 0.2 m approx. 2 hours after drilling.
Groundwater encountered at 1.0 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

RA-SD = RECENT ALLUVIUM - SAND DEPOSITS

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA05

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 0.6 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6980898
Longitude : 176.1647327

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	T	OL	[TOPSOIL]							
0	FILL	ML	SILT with minor sand, minor clay, trace gravel and trace rootlets; light brown with dark brown, orange brown and white mottles. Low plasticity. Sand is fine to coarse. Gravel is fine; subrounded to subangular; aggregates.		2		M			
0.5			0.5 m - Becomes with some sand and trace clay.							
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal							
1.0										
1.5										
2.0										
2.5										

Hand auger met practical refusal on hard material at at 0.6 m depth .
Standing groundwater was not encountered during drilling.
Elevations and coordinates estimated using TCC Mapi.

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA06

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 2 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6983358
Longitude : 176.164421

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	T	OL	[TOPSOIL]							
0.5	FILL	ML	[FILL] CLayey SILT, minor sand, trace gravel, trace rootlets and trace organics; orange brown with occsional dark brown and grey mottles. Low plasticity. Sand is fine to coarse. Gravel is fine; sub angular to angular; greywacke. Organics are amorphous; weak odour.			▼	M			
		SW	Silty fine to medium SAND with trace gravel and trace organics; whitish grey with occasional dark brownish mottles. Well graded. Gravel is fine; subangular to angular; greywacke. Organics are amorphous.							
1.0	BTS	OL	[BURIED TOPSOIL] with trace rootlets.		1	▽				
	RA-SD	SW	Silty fine to coarse SAND; dark brown. Well graded.				W			
1.5			1.8 m - with trace roots (5-15mm); becomes dark brown.				S			
2.0			End of Hole Depth: 2 m Termination Condition: Practical refusal		0					
2.5										

Hand auger met practical refusal on hard material at at 2 m depth .
Dip test showed standing groundwater at 0.5 m approx. 2 hours after drilling.
Groundwater encountered at 1.1 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

RA-SD = RECENT ALLUVIUM - SAND DEPOSITS

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA07

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 2.1 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6974912
Longitude : 176.1642235

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	FILL	ML	SILT intermixed with some topsoil, minor clay, minor sand, trace gravel and trace rootlets; bkackish brown with occasional light brown and light grey mottles. Low plasticity. Organic odour. Sand is fine to coarse. Gravel is fine; subangular to angular; aggregates.		3	▼ ▽	M			
1.5	RA-SD	ML	Clayey SILT with some sand; light brown with dark brown mottles. Low plasticity. Sand is fine to coarse.		2		W			
2.0		SP	Fine to coarse SAND with some silt; dark greyish brown. Poorly graded.				S			
2.1			End of Hole Depth: 2.1 m Termination Condition: Target depth							

Hand auger met target depth at 2.1 m.
Dip test showed standing groundwater at 1.2 m approx. 2 hours after drilling.
Groundwater encountered at 1.3 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

RA-SD = RECENT ALLUVIUM - SAND DEPOSITS

GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

LOG OF AUGER HA08

Geotechnical Investigation
Memorial Park Eleventh Avenue
Tauranga
28836.000.001

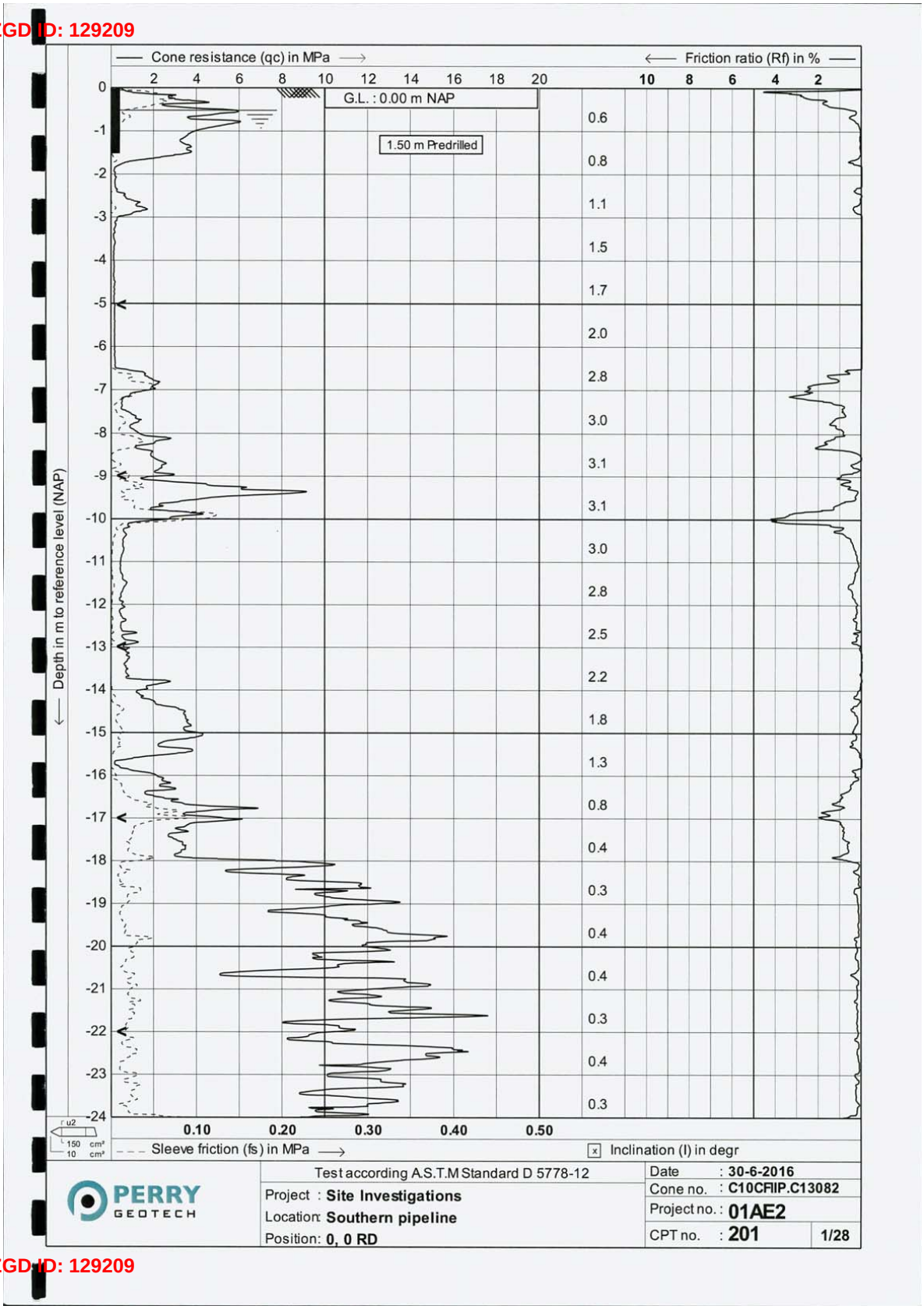
Client : Apollo Projects Limited
Client Ref. : 28836.000.001
Date : 05.06.2025
Hole Depth : 2.1 m
Hole Diameter : 50 mm
Shear Vane No : N/A
Logged By : HM
Reviewed By : MM
Latitude : -37.6977137
Longitude : 176.1637583

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	T	OL	[TOPSOIL]							
0.5	FILL	ML	[FILL] Clayey SILT with some sand, trace gravel and trace rootlets; dark greyish brown with occasional dark orange brown and light brown mottles. Low plasticity. Sand is fine to coarse. Gravel is fine; dark orange brown; silt clasts.		4	▼	M			
1.0	BTS	OL	[BURIED TOPSOIL] with trace decomposed woody debris.			▽	W			
1.5	COLLUVIUM	ML	Sandy SILT with trace clay; light grey. Low plasticity. Sand is fine.		3		S			
2.0			End of Hole Depth: 2.1 m Termination Condition: Practical refusal							
2.5										

Hand auger met practical refusal on hard material at at 2.1 m depth . T = Topsoil; BTS = Buried Topsoil.
Dip test showed standing groundwater at 0.3 m approx. 2 hours after drilling.
Groundwater encountered at 0.7 m during drilling.
Elevations and coordinates estimated using TCC Mapi.

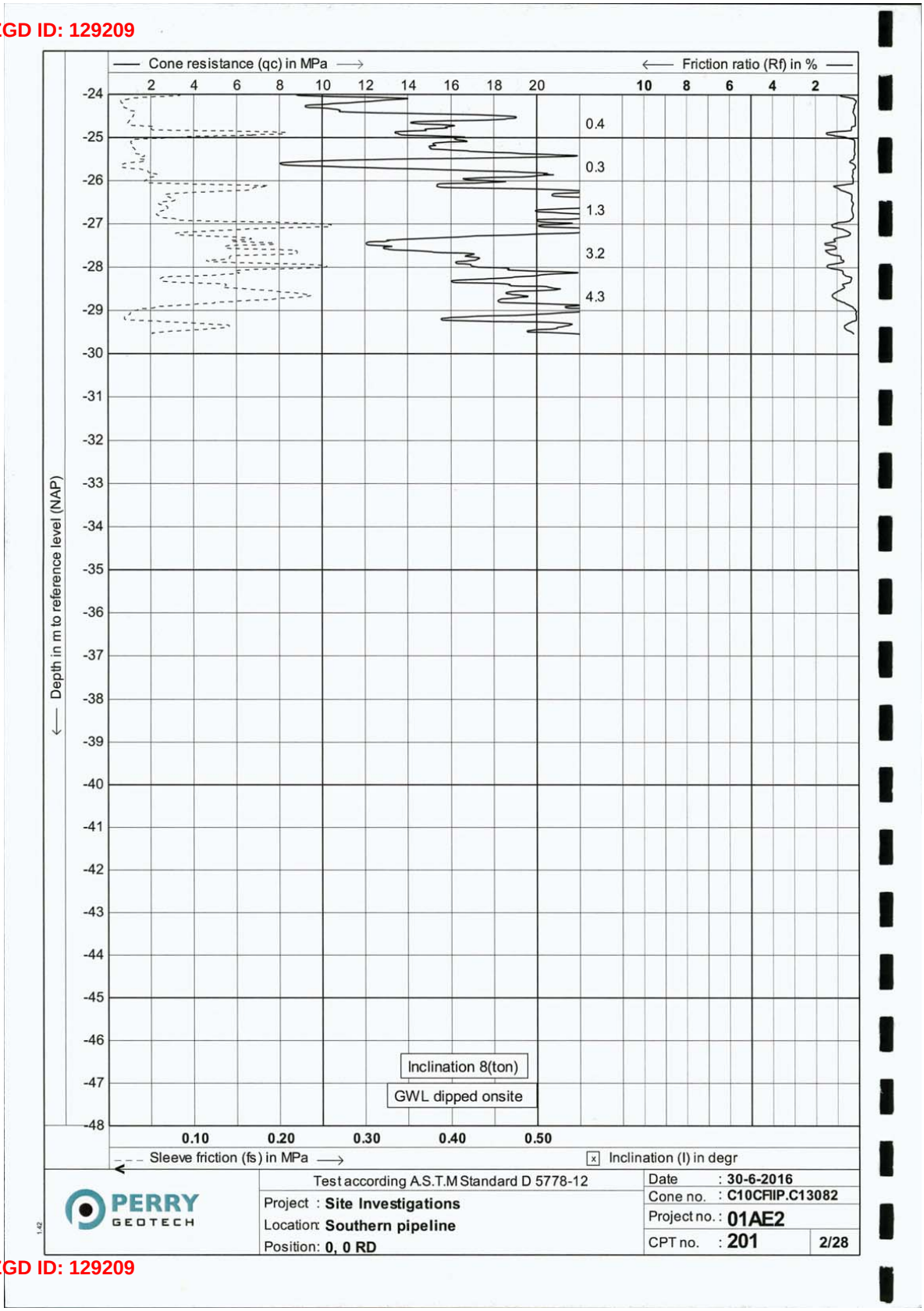
GEOTECH HAND AUGER 2019.12.18 - GINT TEMPLATE.GPJ NZ DATA TEMPLATE 2.GDT 27/6/25

NZGD ID: 129209



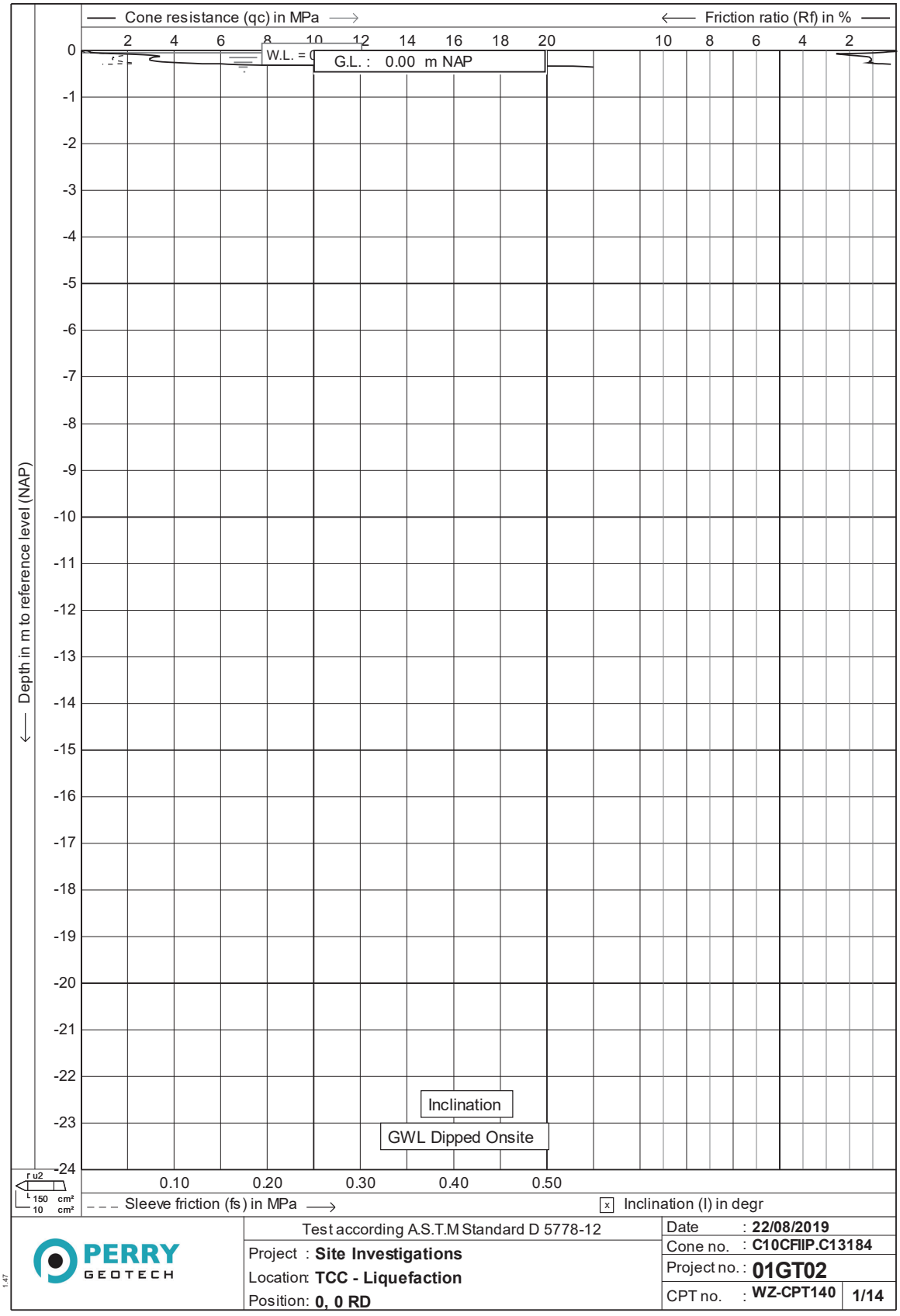
NZGD ID: 129209

NZGD ID: 129209



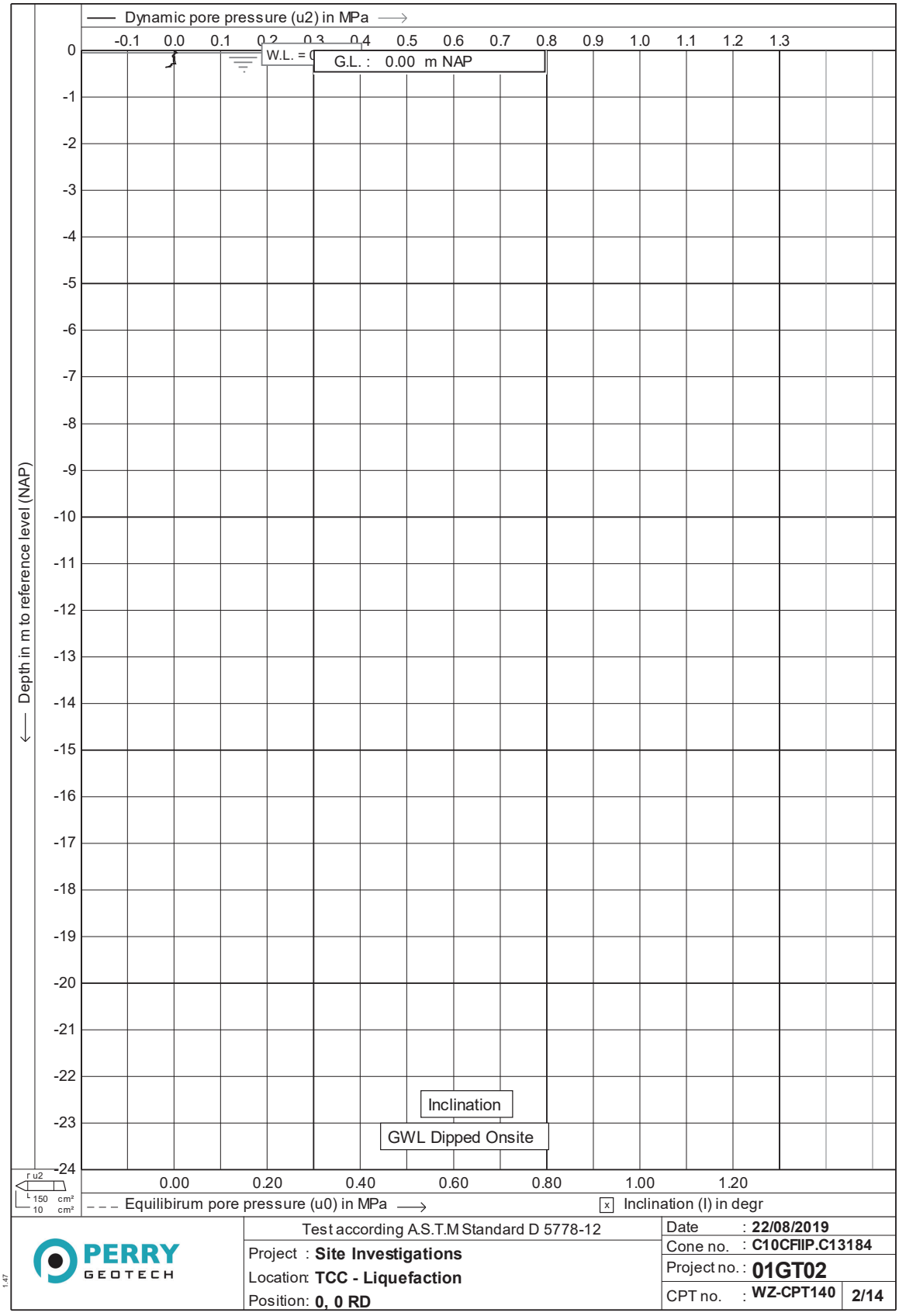
NZGD ID: 129209

NZGD ID: 133980



NZGD ID: 133980

NZGD ID: 133980



NZGD ID: 133980

NZGD ID: 111609

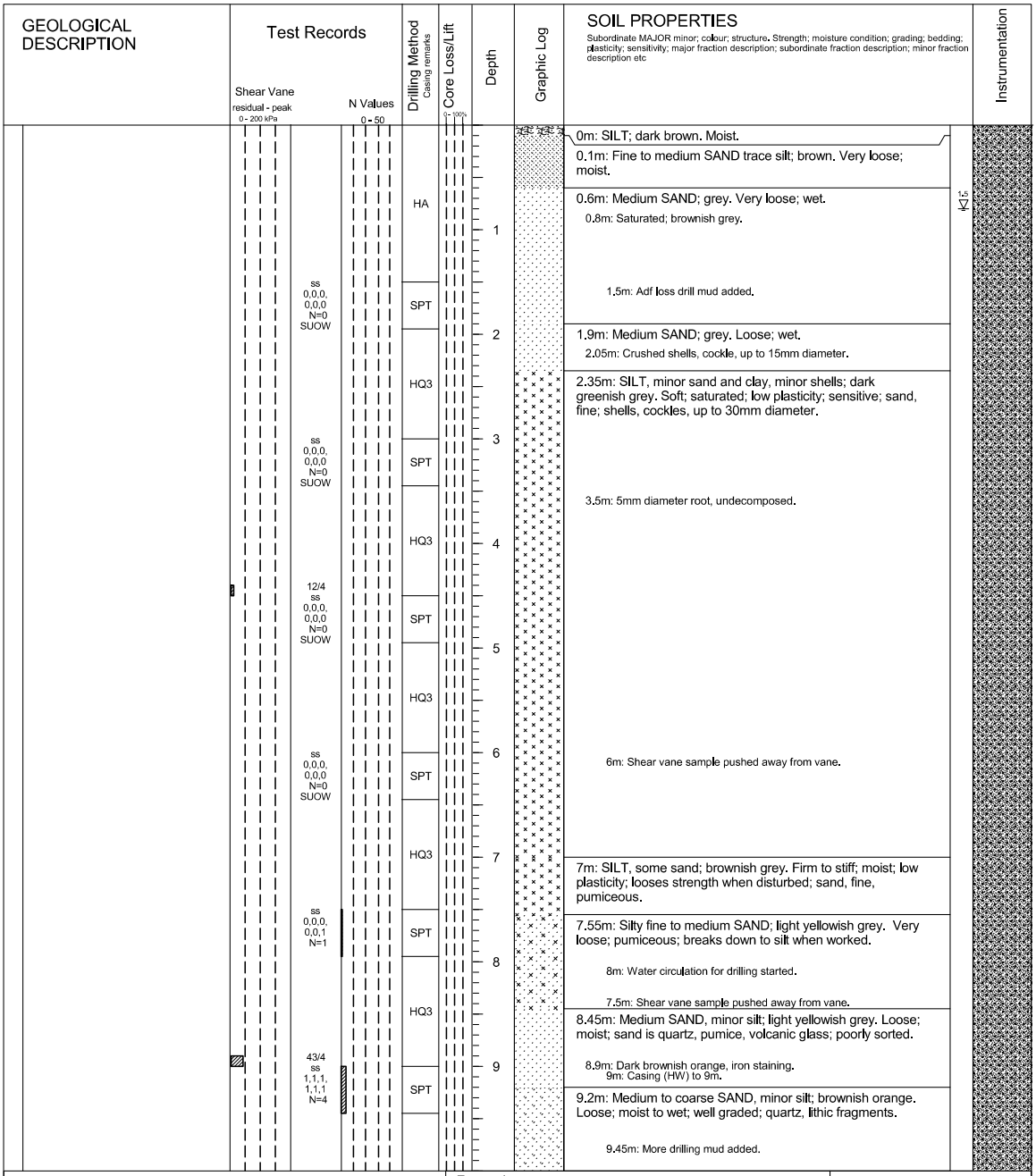
AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **BH201**

Client Tauranga City Council
Project Harbour Crossing
Project number 60435329

Co-ordinates 1879121mE 5823131mN
Orientation -90° Elevation (Approx)
Location Tauranga Harbour. North of Waimapu Esturary and south of rail bridge.
Feature Approximately 20m north of rowing club



FLUID DEPTHS DURING DRILLING

Date Time	Drilled Depth (m)	Casing Depth (m)	Fluid Depth (m)
14/06/2016 00:00	1.50	-	0.8

Hand Held Shear Vane
DR1870: 19mm blade: Correction Factor = 1.621
vane shear strength per NZGS guideline

Remarks
233 kPa is the shear vane limit. NZGD2000 / New Zealand Transverse Mercator 2000

Casing Details

Depth	Diameter
9	-

Date logged 16/06/2016
Logged RJS
Checked DM

Driller Perry
Started 14/06/2016
Drill Rig Track Mounted Rig
Finished 16/06/2016
Core Boxes 15
Page 1 of 13

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

Date Printed: 4/08/2016

NZGD ID: 111609

NZGD ID: 111609

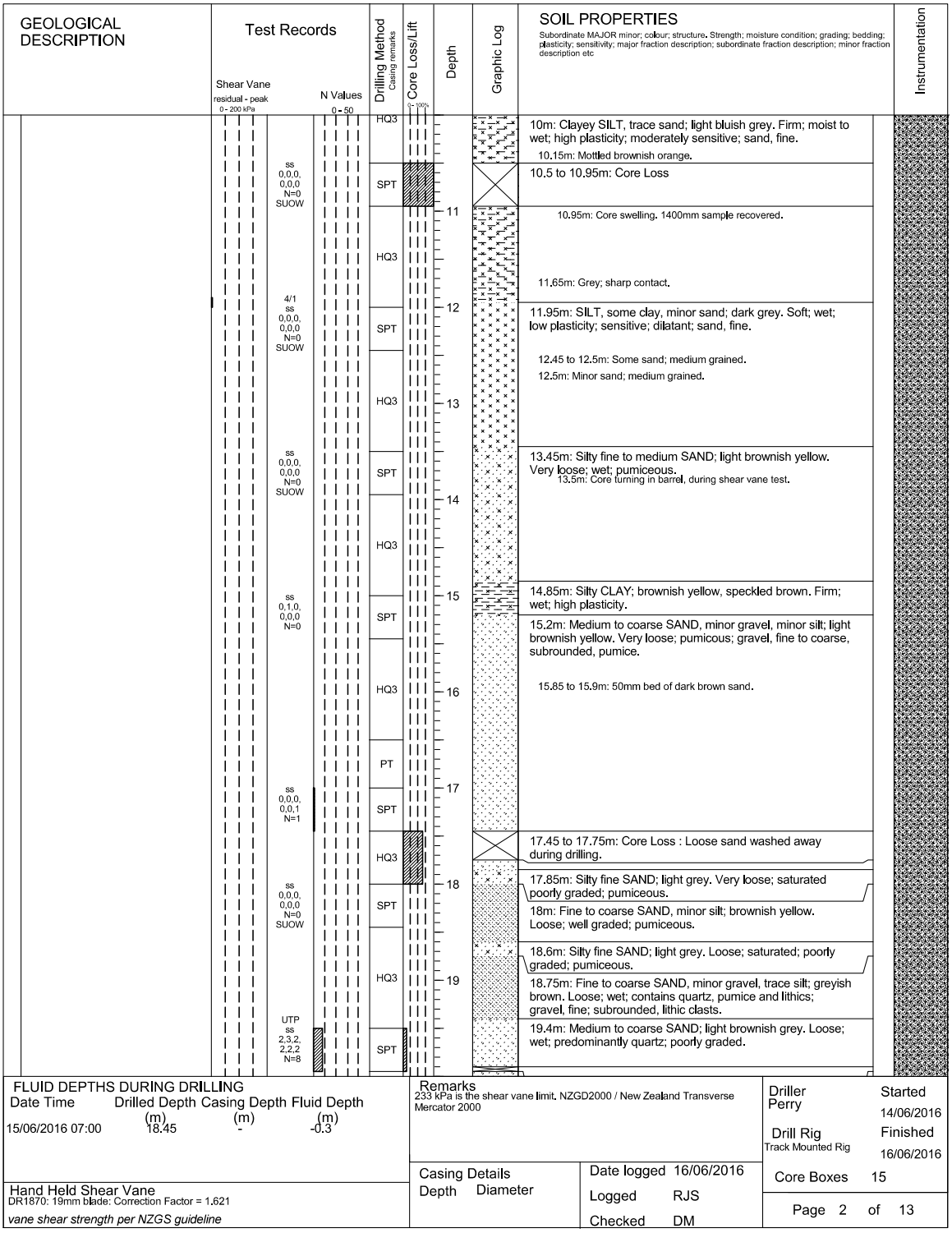
AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **BH201**

Client Tauranga City Council
Project Harbour Crossing
Project number 60435329

Co-ordinates 1879121mE 5823131mN
Orientation -90° Elevation (Approx)
Location Tauranga Harbour. North of Waimapu Esturary and south of rail bridge.
Feature Approximately 20m north of rowing club



DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

FLUID DEPTHS DURING DRILLING

Date Time	Drilled Depth (m)	Casing Depth (m)	Fluid Depth (m)
15/06/2016 07:00	18.45	-	-0.3

Hand Held Shear Vane
DR1870: 19mm blade: Correction Factor = 1.621
vane shear strength per NZGS guideline

Remarks
233 kPa is the shear vane limit. NZGD2000 / New Zealand Transverse Mercator 2000

Casing Details
Depth Diameter

Date logged 16/06/2016
Logged RJS
Checked DM

Driller Perry
Started 14/06/2016
Drill Rig Track Mounted Rig
Finished 16/06/2016
Core Boxes 15

Page 2 of 13

Date Printed: 4/08/2016

NZGD ID: 111609

NZGD ID: 111609

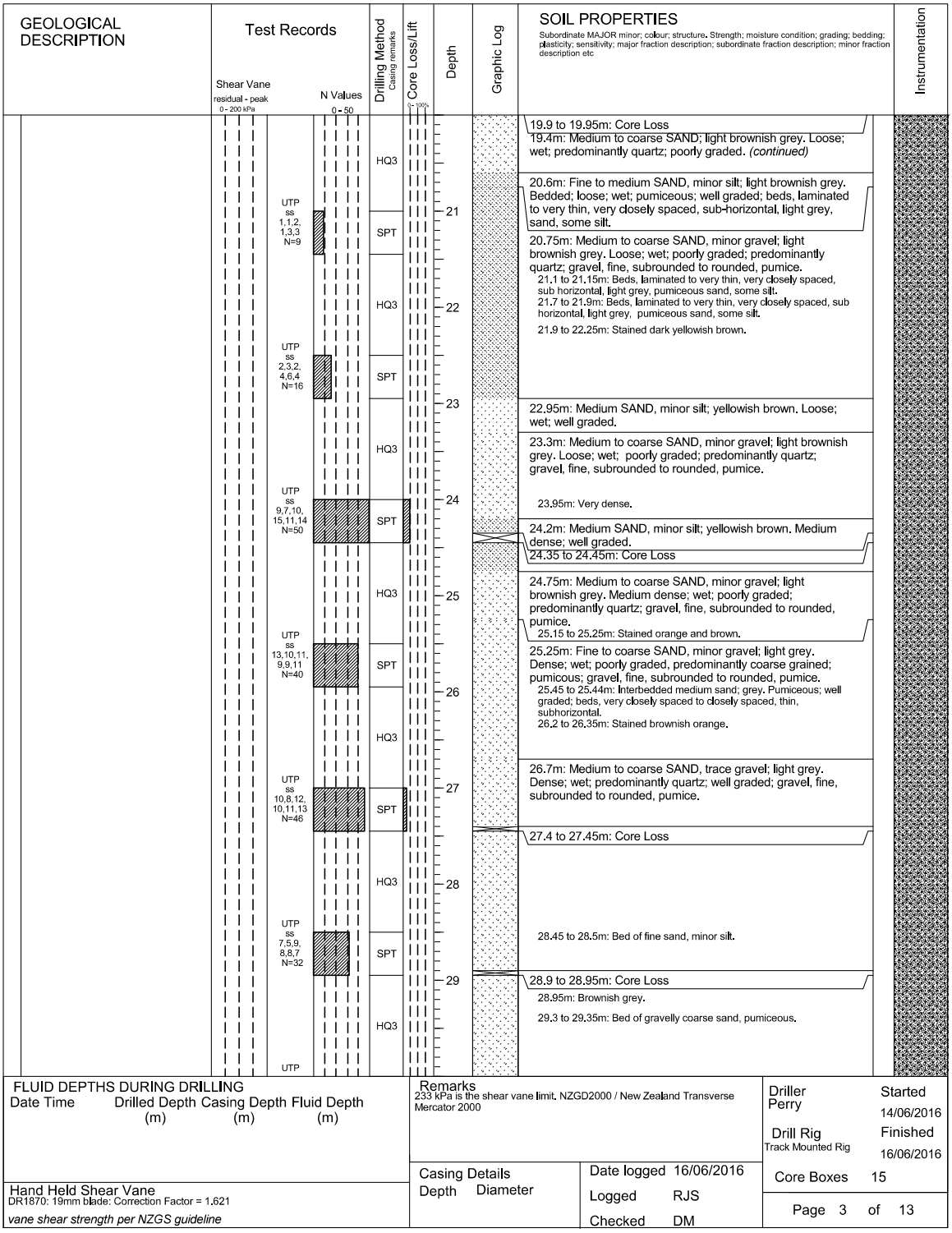
AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **BH201**

Client Tauranga City Council
Project Harbour Crossing
Project number 60435329

Co-ordinates 1879121mE 5823131mN
Orientation -90° Elevation (Approx)
Location Tauranga Harbour. North of Waimapu Esturary and south of rail bridge.
Feature Approximately 20m north of rowing club



FLUID DEPTHS DURING DRILLING

Date	Time	Drilled Depth (m)	Casing Depth (m)	Fluid Depth (m)

Hand Held Shear Vane
DR1870: 19mm blade: Correction Factor = 1.621
vane shear strength per NZGS guideline

Remarks
233 kPa is the shear vane limit. NZGD2000 / New Zealand Transverse Mercator 2000

Casing Details
Depth Diameter

Date logged 16/06/2016
Logged RJS
Checked DM

Driller Perry
Started 14/06/2016
Drill Rig Track Mounted Rig
Finished 16/06/2016
Core Boxes 15

Page 3 of 13

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

Date Printed: 4/08/2016

NZGD ID: 111609

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **BH201**

Client Tauranga City Council
Project Harbour Crossing
Project number 60435329

Co-ordinates 1879121mE 5823131mN
Orientation -90° Elevation (Approx)
Location Tauranga Harbour. North of Waimapu Esturary and south of rail bridge.
Feature Approximately 20m north of rowing club

GEOLOGICAL DESCRIPTION	Test Records (Shear Vane residual - peak 0 - 200 kPa; N Values 0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	SOIL PROPERTIES	Instrumentation
	SS 9,13,10, 7,9,16 N=42	SPT				26.7m: Medium to coarse SAND, trace gravel; light grey. Dense; wet; predominantly quartz; well graded; gravel, fine, subrounded to rounded, pumice. *(continued)*	
		HQ3				30.3 to 30.45m: Core Loss	
				31		30.8m: Medium SAND; grey. Dense; wet; well graded; pumiceous.	
	UTP SS 5,7,4, 6,8,4 N=22	SPT				30.95m: Orange staining, sub horizontal to gently inclined, very thin, closely spaced.	
		HQ3		32		31.4m: Fine to coarse SAND, minor gravel; light grey. Dense; wet; pumiceous; poorly graded, predominantly coarse grained; gravel, fine to coarse, subrounded to subangular, pumice.	
	UTP SS 4,6,7, 8,6,8 N=29	SPT		33		32.7 to 39.45m: Stained yellowish brown.	
		HQ3		34			
	UTP SS 7,4,5, 9,7,7 N=28	SPT					
		HQ3		35			
	UTP SS 12,9,8, 10,13,9 N=40	SPT		36			
		HQ3		37		36.56 to 37.16m: No gravel.	
	UTP SS 10,7,5, 7,17,21 for 50mm N>50	SPT					
		HQ3		38			
	UTP SS 9,11,7, 11,6,15 N=39	SPT		39		38.55 to 38.85m: trace coarse gravel to cobble sized clasts; completely weathered; extremely weak pumice; silty fine sand, light brownish grey, orange rings around outside of clasts; maximum 90mm diameter.	
						39.3 to 39.45m: Core Loss	
						39.45m: Medium SAND; brownish grey. Dense; wet; pumiceous; well graded.	
						description next page	

FLUID DEPTHS DURING DRILLING

Date Time	Drilled Depth (m)	Casing Depth (m)	Fluid Depth (m)

Hand Held Shear Vane
DR1870: 19mm blade: Correction Factor = 1.621
vane shear strength per NZGS guideline

Remarks
233 kPa is the shear vane limit. NZGD2000 / New Zealand Transverse Mercator 2000

Casing Details
Depth Diameter

Date logged 16/06/2016
Logged RJS
Checked DM

Driller Perry
Started 14/06/2016
Drill Rig Track Mounted Rig
Finished 16/06/2016
Core Boxes 15

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

Date Printed: 4/08/2016

NZGD ID: 111609

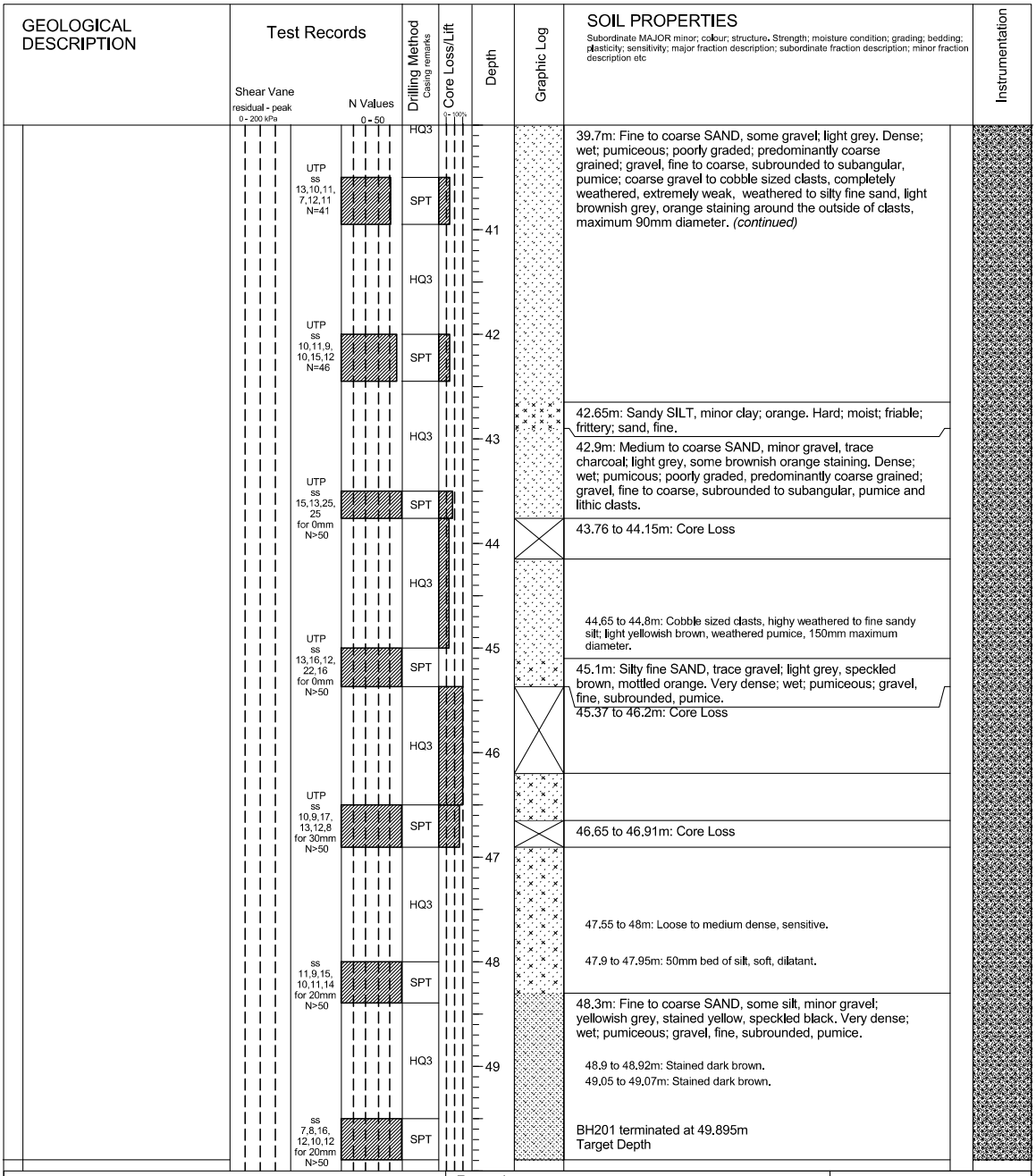
AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **BH201**

Client Tauranga City Council
Project Harbour Crossing
Project number 60435329

Co-ordinates 1879121mE 5823131mN
Orientation -90° Elevation (Approx)
Location Tauranga Harbour. North of Waimapu Esturary and south of rail bridge.
Feature Approximately 20m north of rowing club



FLUID DEPTHS DURING DRILLING

Date Time	Drilled Depth (m)	Casing Depth (m)	Fluid Depth (m)

Hand Held Shear Vane
DR1870: 19mm blade: Correction Factor = 1.621
vane shear strength per NZGS guideline

Remarks
233 kPa is the shear vane limit. NZGD2000 / New Zealand Transverse Mercator 2000

Casing Details
Depth Diameter

Date logged 16/06/2016
Logged RJS
Checked DM

Driller Perry
Started 14/06/2016
Drill Rig Track Mounted Rig
Finished 16/06/2016
Core Boxes 15

Page 5 of 13

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

Date Printed: 4/08/2016

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

Box: 1 of 15 - Depth: 0.00m to 3.00m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 2 of 15 - Depth: 3.00m to 6.45m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION **BH201**

Box: 3 of 15 - Depth: 6.45m to 9.65m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 4 of 15 - Depth: 9.65m to 12.80m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION **BH201**

Box: 5 of 15 - Depth: 12.80m to 16.30m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 6 of 15 - Depth: 16.30m to 20.55m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

Box: 7 of 15 - Depth: 20.55m to 23.65m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 8 of 15 - Depth: 23.65m to 27.45m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

Box: 9 of 15 - Depth: 27.45m to 31.05m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 10 of 15 - Depth: 31.05m to 34.45m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

Box: 11 of 15 - Depth: 34.45m to 37.95m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 12 of 15 - Depth: 37.95m to 41.05m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

Box: 13 of 15 - Depth: 41.05m to 44.70m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

Box: 14 of 15 - Depth: 44.70m to 49.00m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

NZGD ID: 111609

NZGD ID: 111609

AECOM

PHOTOGRAPHIC LOG OF DRILLHOLE

Project Harbour Crossing

Location Tauranga Harbour, North of Waimapu Esturary and south of rail bridge.

HOLE IDENTIFICATION BH201

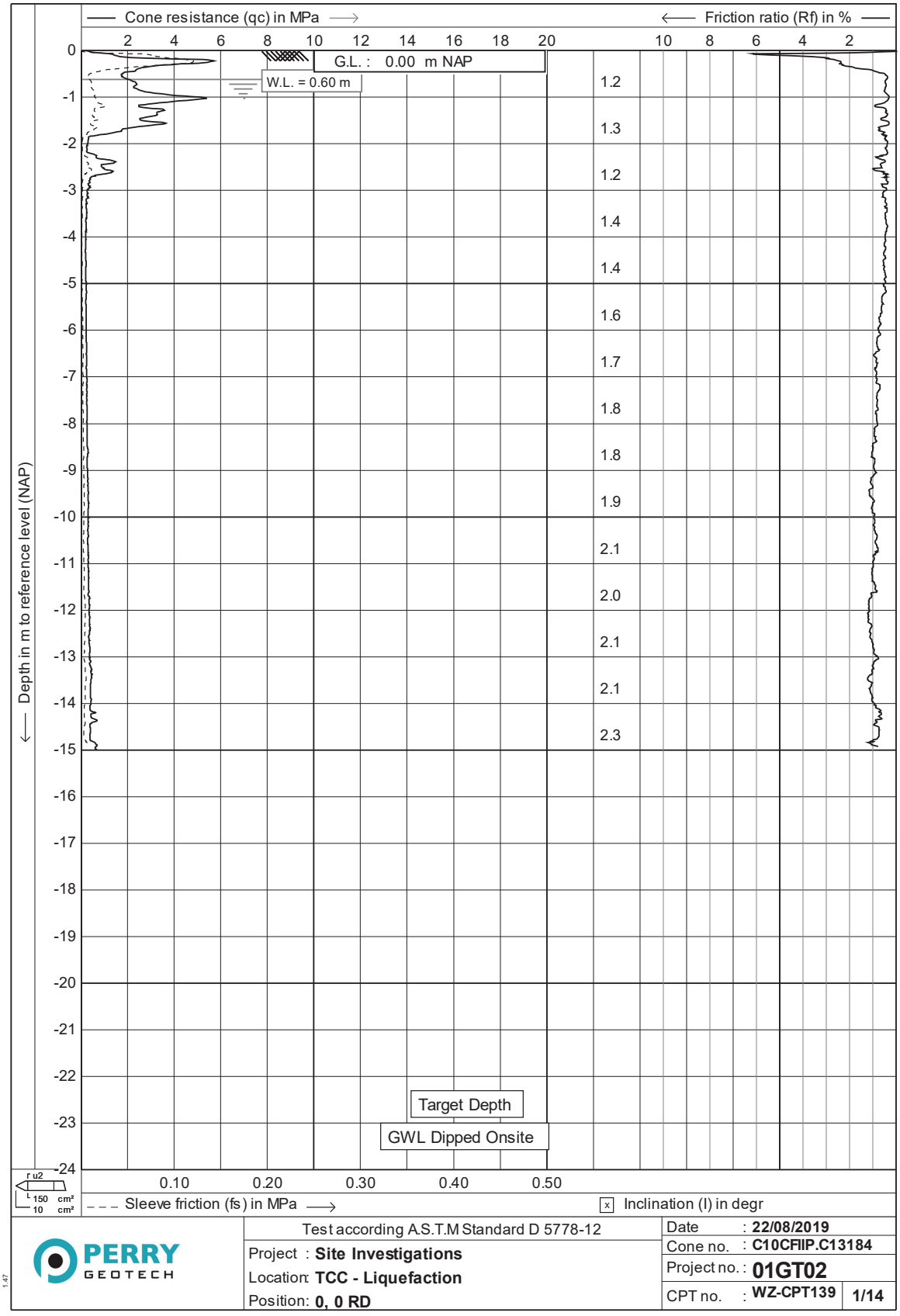
Box: 15 of 15 - Depth: 49.00m to 49.98m of 49.90m

Date Drilled 14/06/2016 to 16/06/2016

DRILLHOLE LOG SOIL HARBOUR CROSSING MASTER 20160804.GPJ BASE.GDT 04/08/16

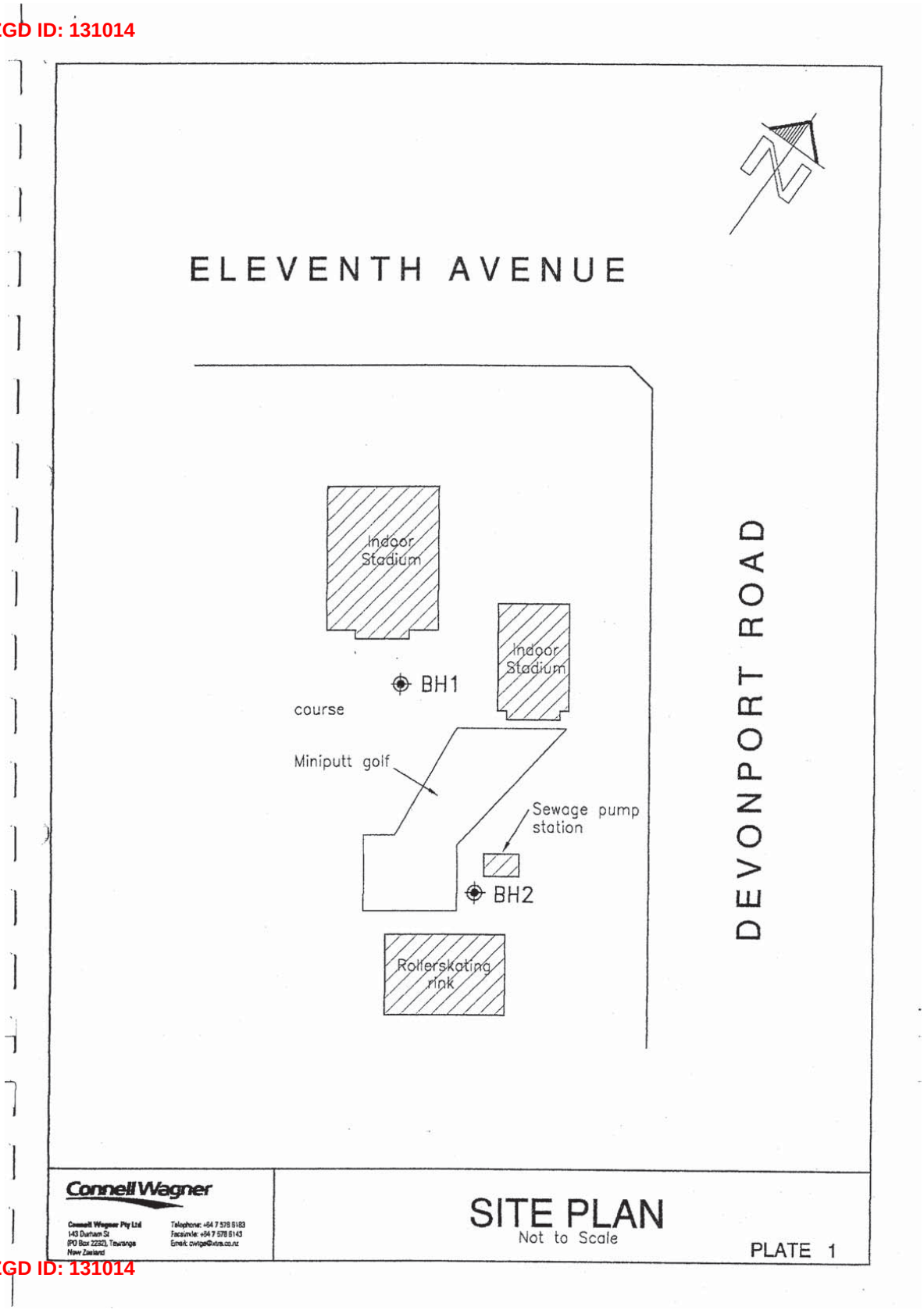
NZGD ID: 111609

NZGD ID: 133979



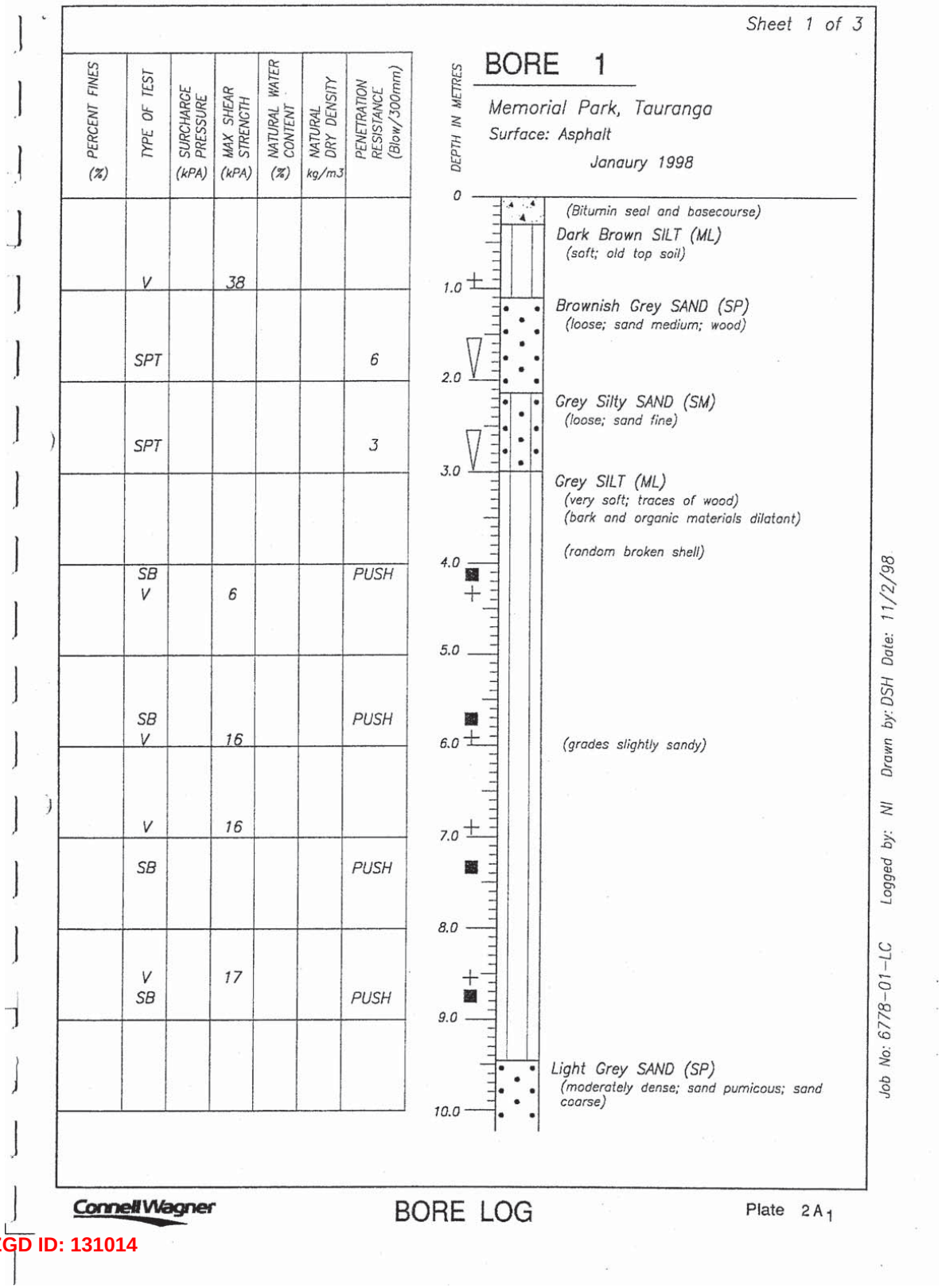
NZGD ID: 133979

NZGD ID: 131014



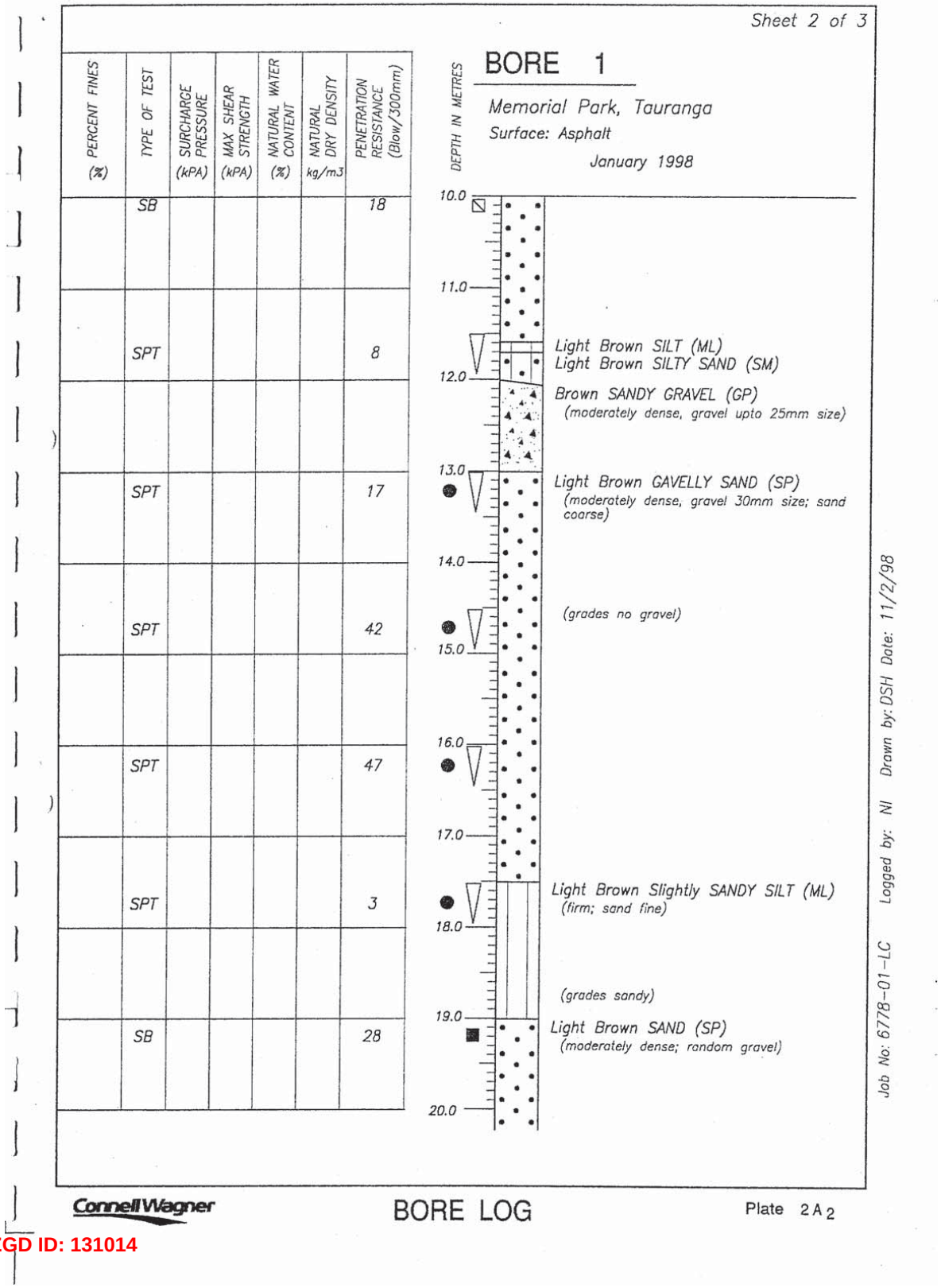
NZGD ID: 131014

NZGD ID: 131014



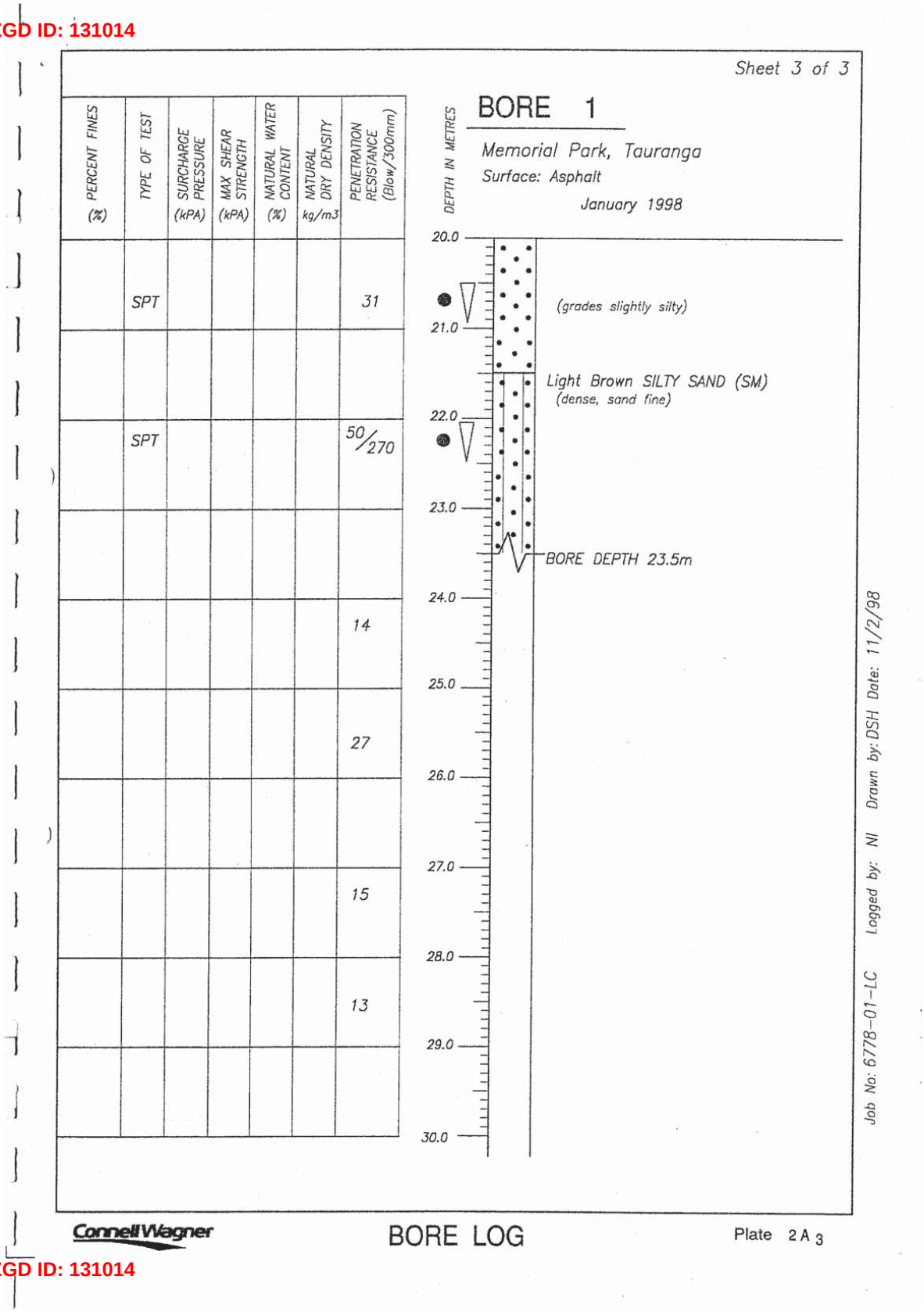
NZGD ID: 131014

NZGD ID: 131014

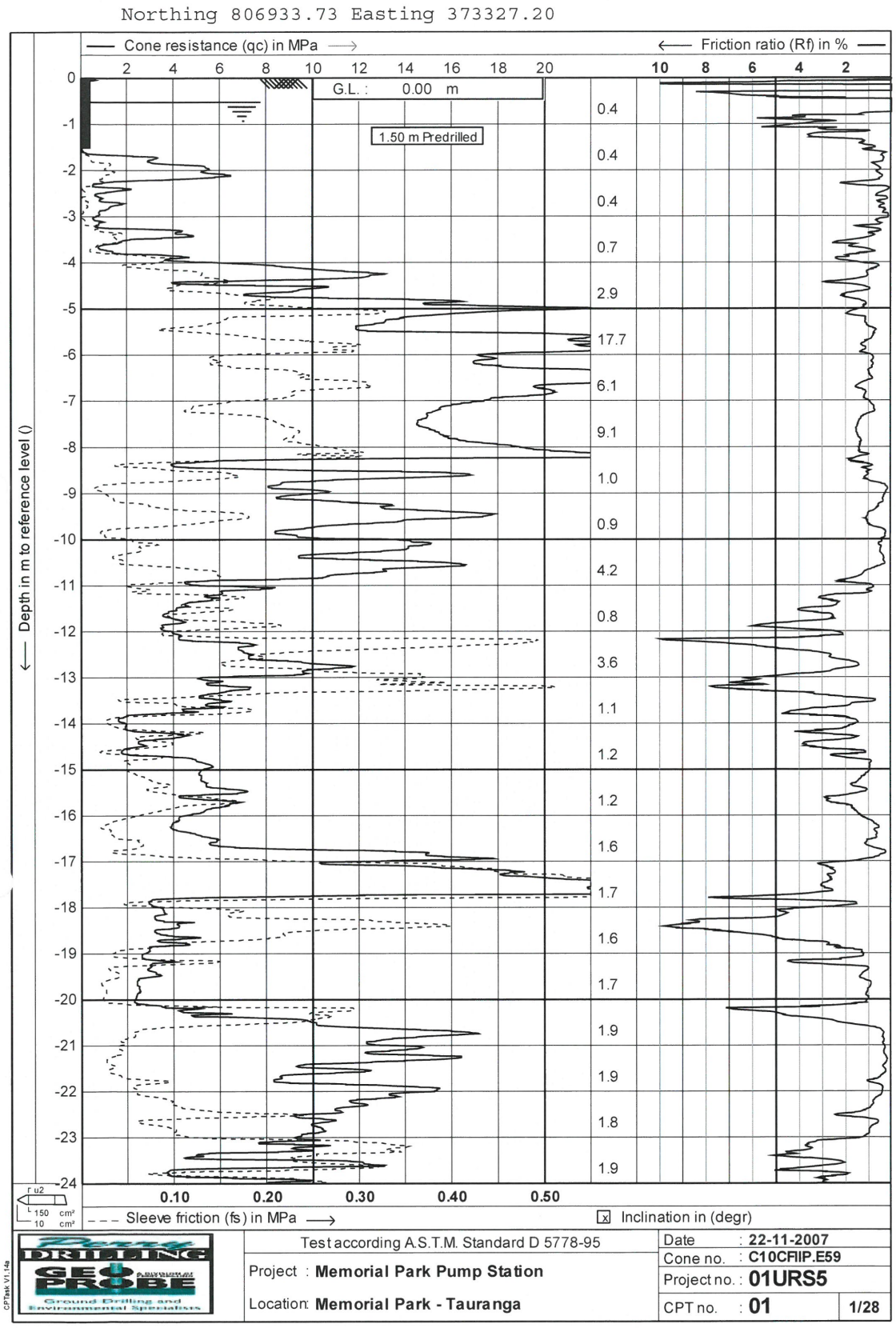


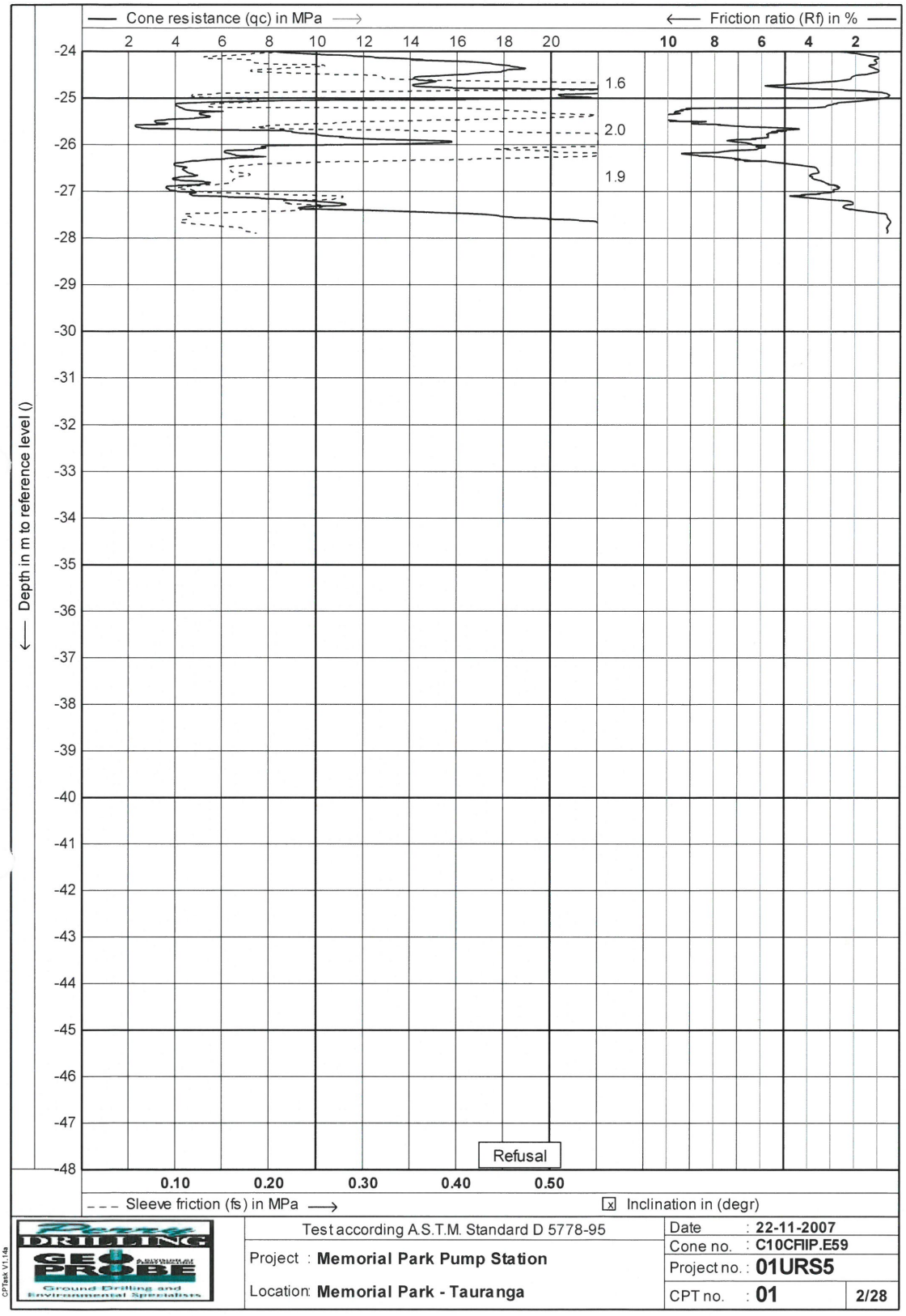
NZGD ID: 131014

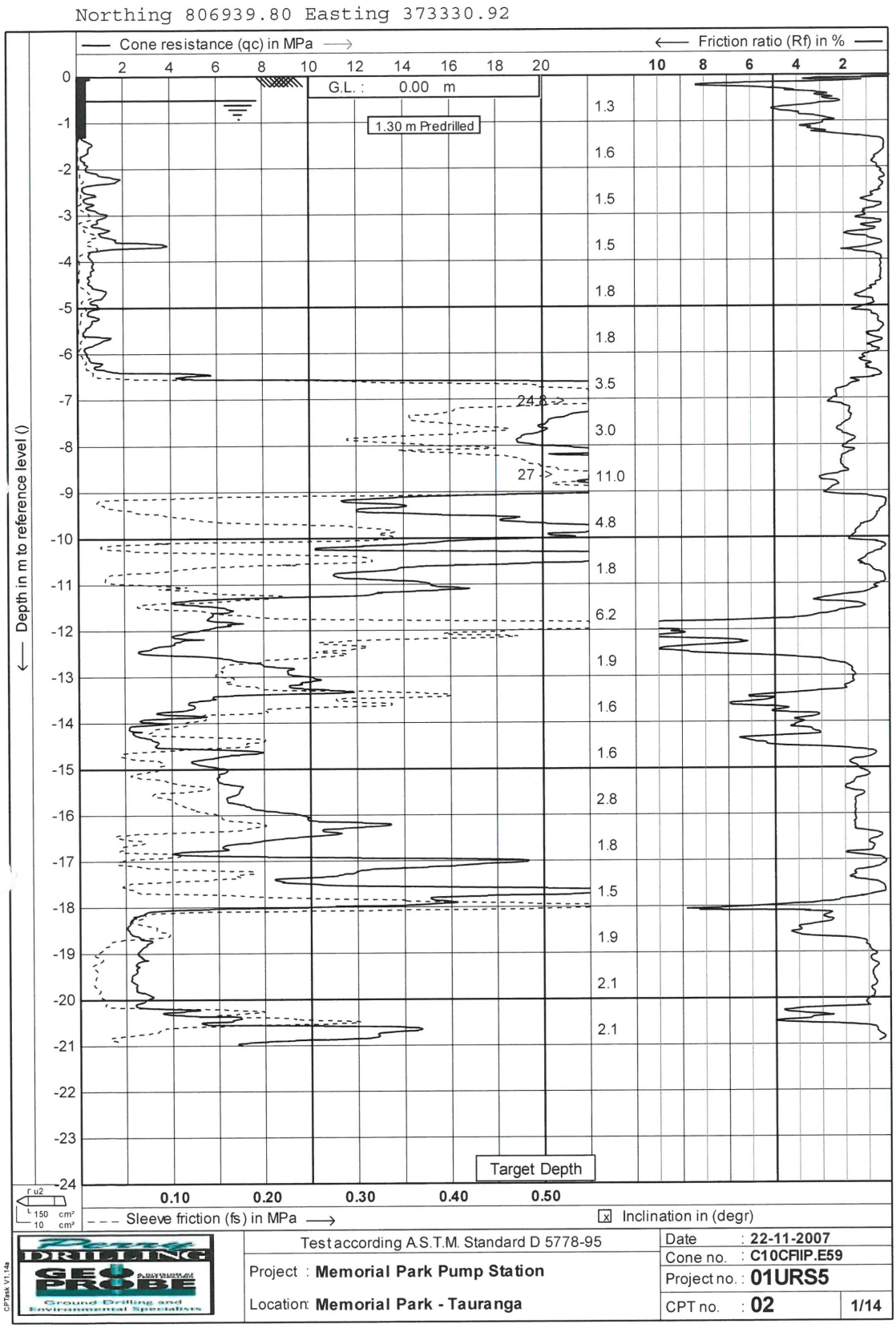
NZGD ID: 131014

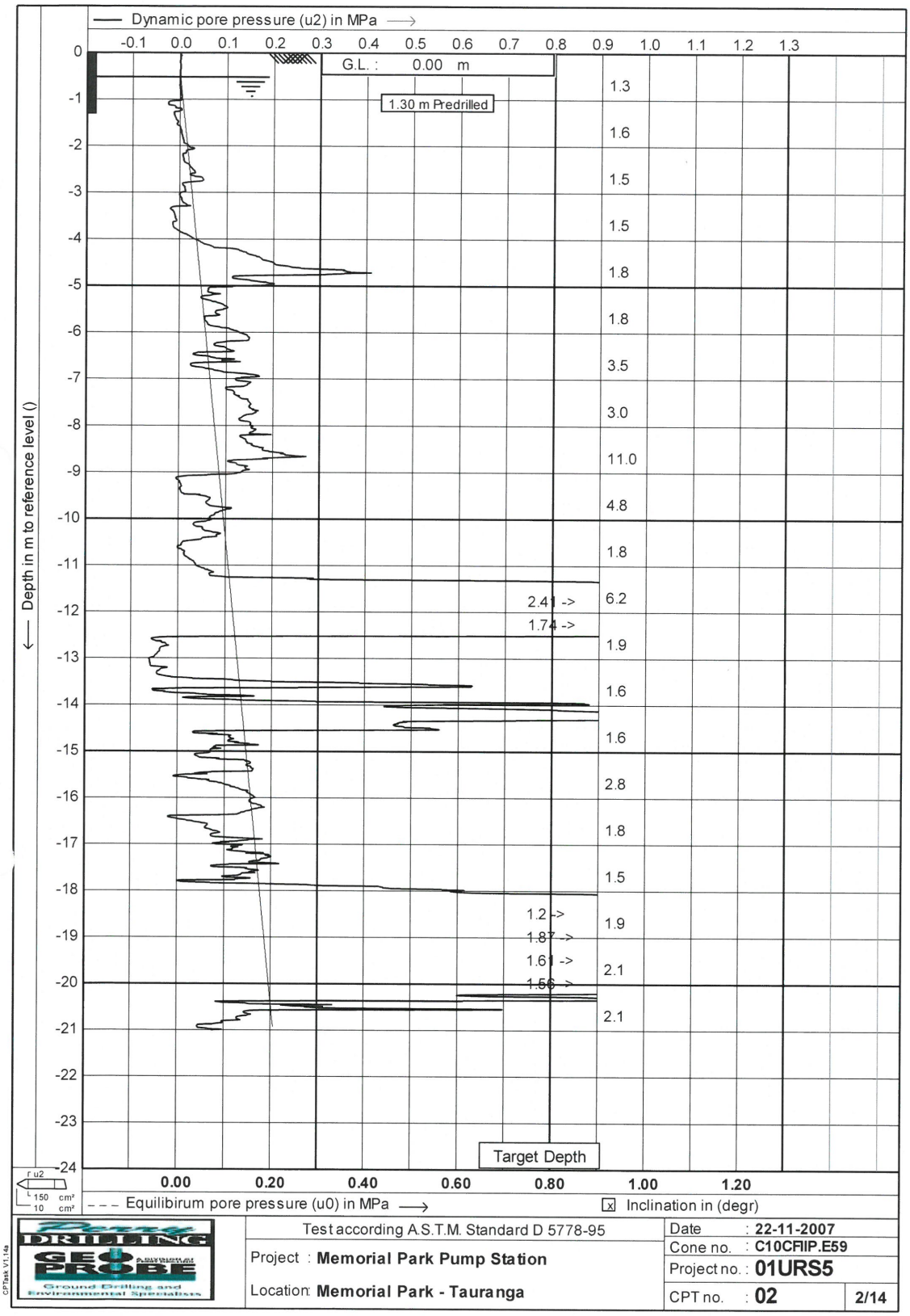


NZGD ID: 131014

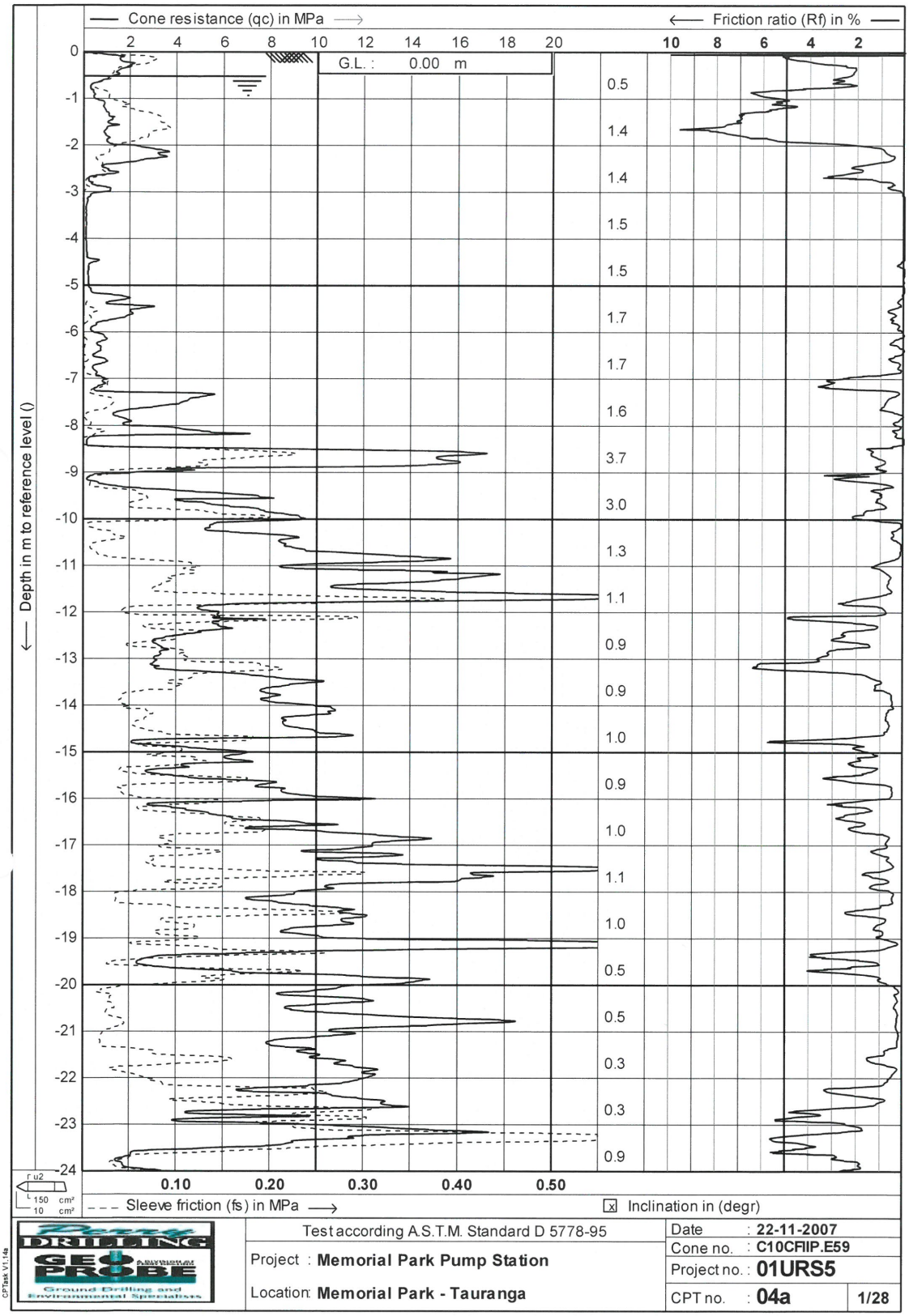

Northing 806933.73 Easting 373327.20
Cone resistance (qc) in MPa
Friction ratio (Rf) in %
G.L. : 0.00 m
1.50 m Predrilled
Depth in m to reference level ()
Sleeve friction (fs) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 01
1/28

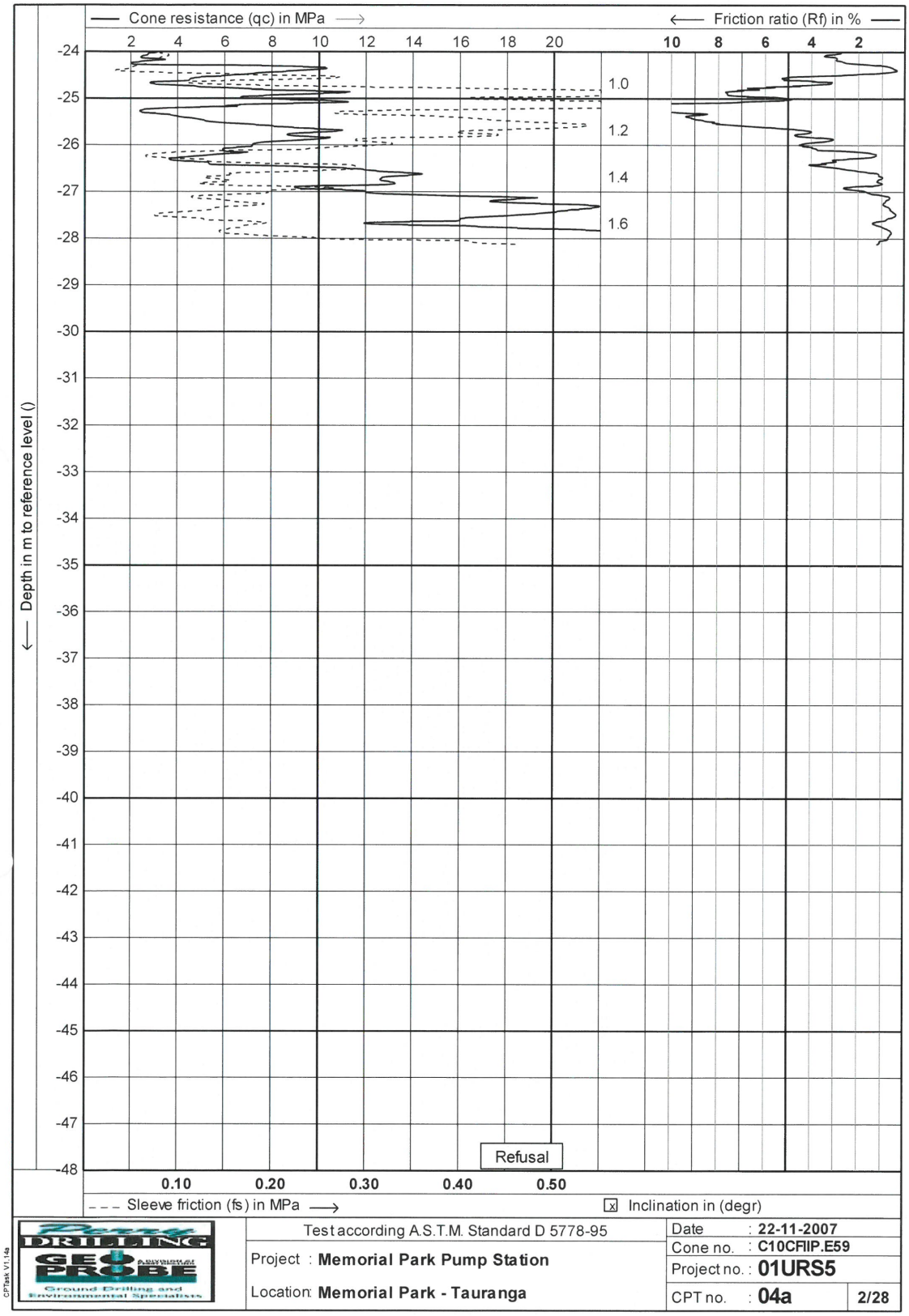

Cone resistance (qc) in MPa
Friction ratio (Rf) in %
Depth in m to reference level ()
1.6
2.0
1.9
Refusal
Sleeve friction (fs) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 01
2/28

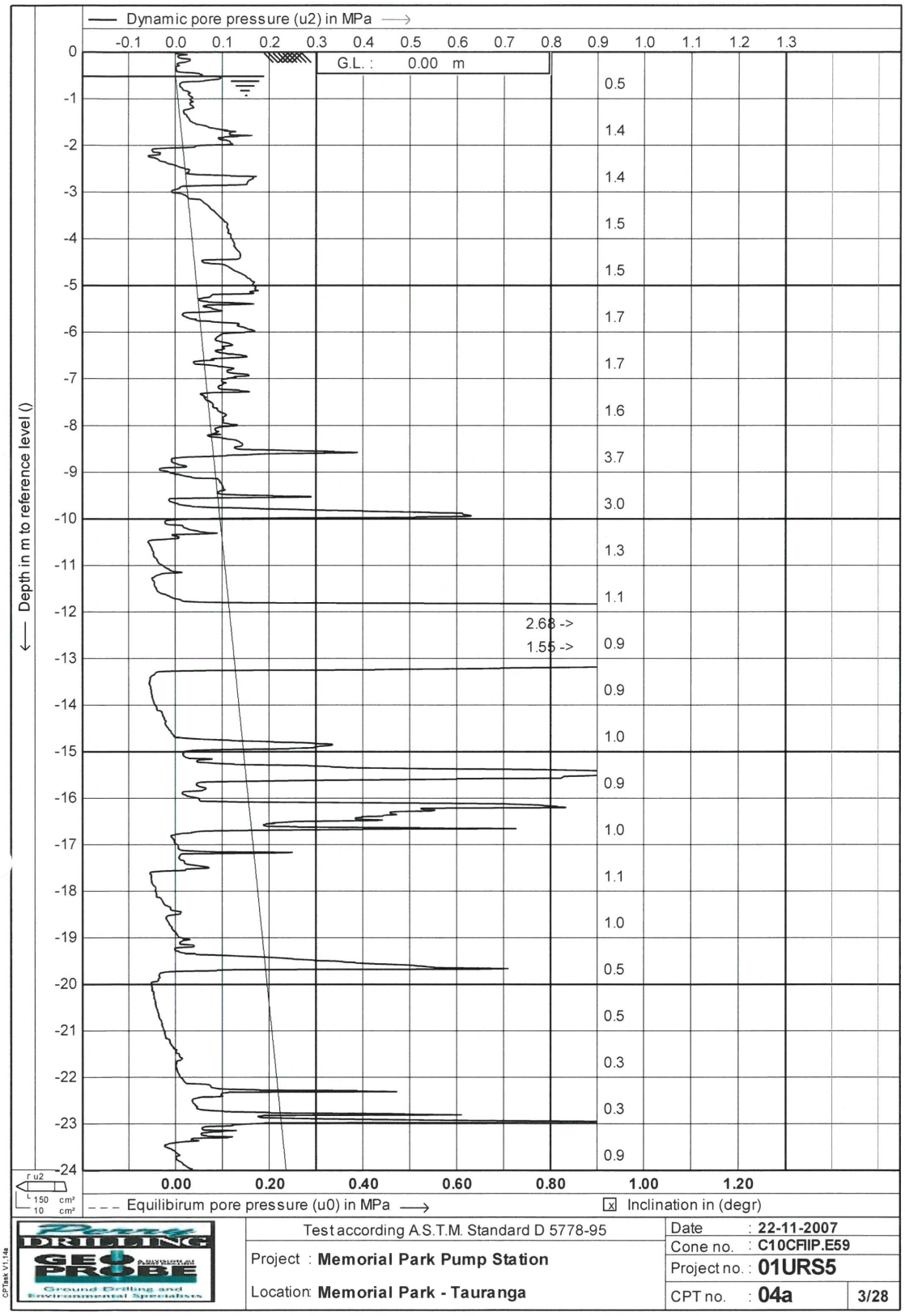

Northing 806939.80 Easting 373330.92
Cone resistance (qc) in MPa
Friction ratio (Rf) in %
G.L. : 0.00 m
1.30 m Predrilled
Depth in m to reference level ()
24.6
27
Target Depth
Sleeve friction (fs) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 02
1/14

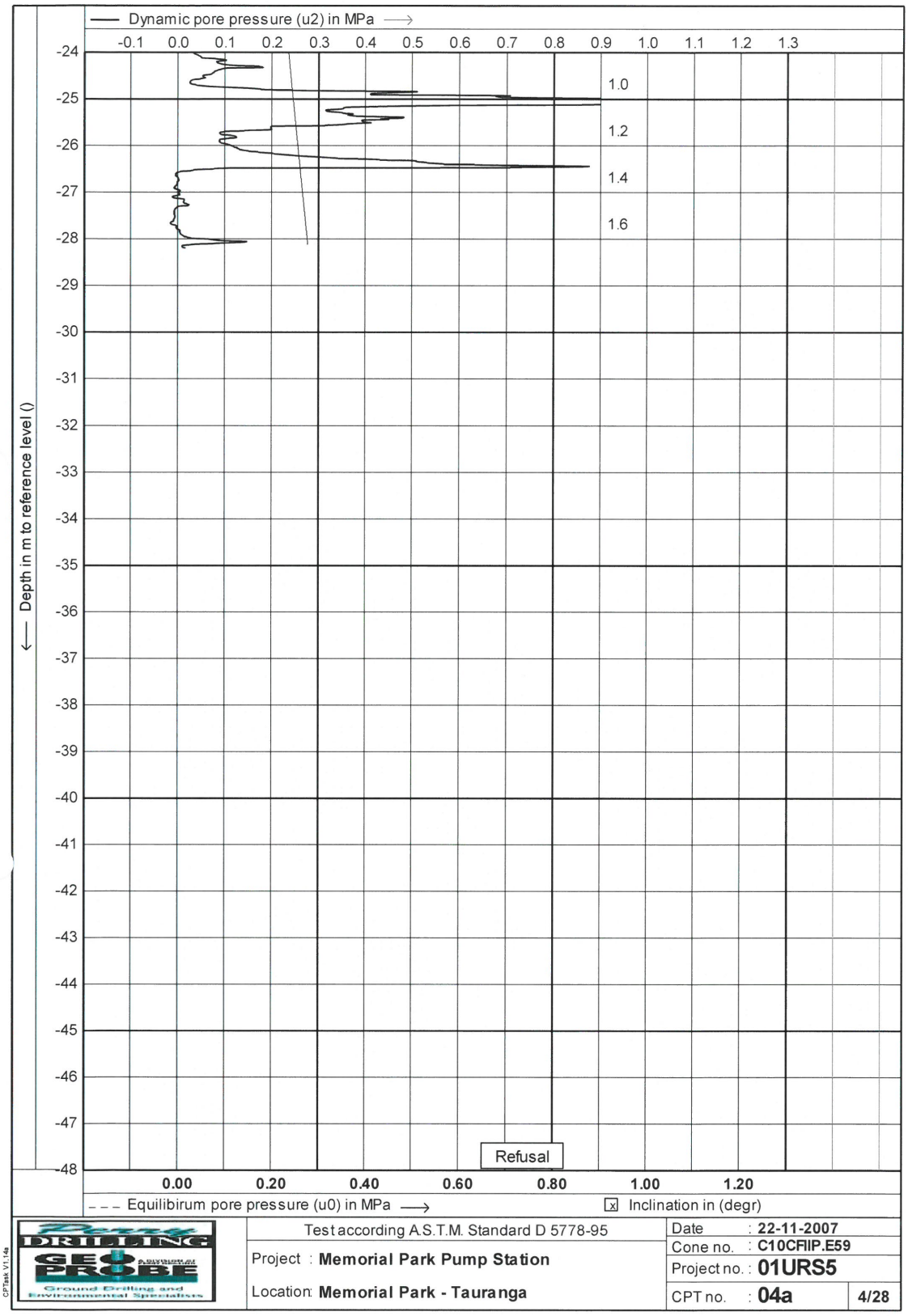

Dynamic pore pressure (u2) in MPa
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
G.L. : 0.00 m
1.30 m Predrilled
Depth in m to reference level ()
0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -12 -13 -14 -15 -16 -17 -18 -19 -20 -21 -22 -23 -24
1.3 1.6 1.5 1.5 1.8 1.8 3.5 3.0 11.0 4.8 1.8 6.2 1.9 1.6 1.6 2.8 1.8 1.5 1.9 2.1 2.1
2.41 ->
1.74 ->
1.2 ->
1.87 ->
1.61 ->
1.56 ->
Target Depth
0.00 0.20 0.40 0.60 0.80 1.00 1.20
Equilibirum pore pressure (u0) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 02
2/14

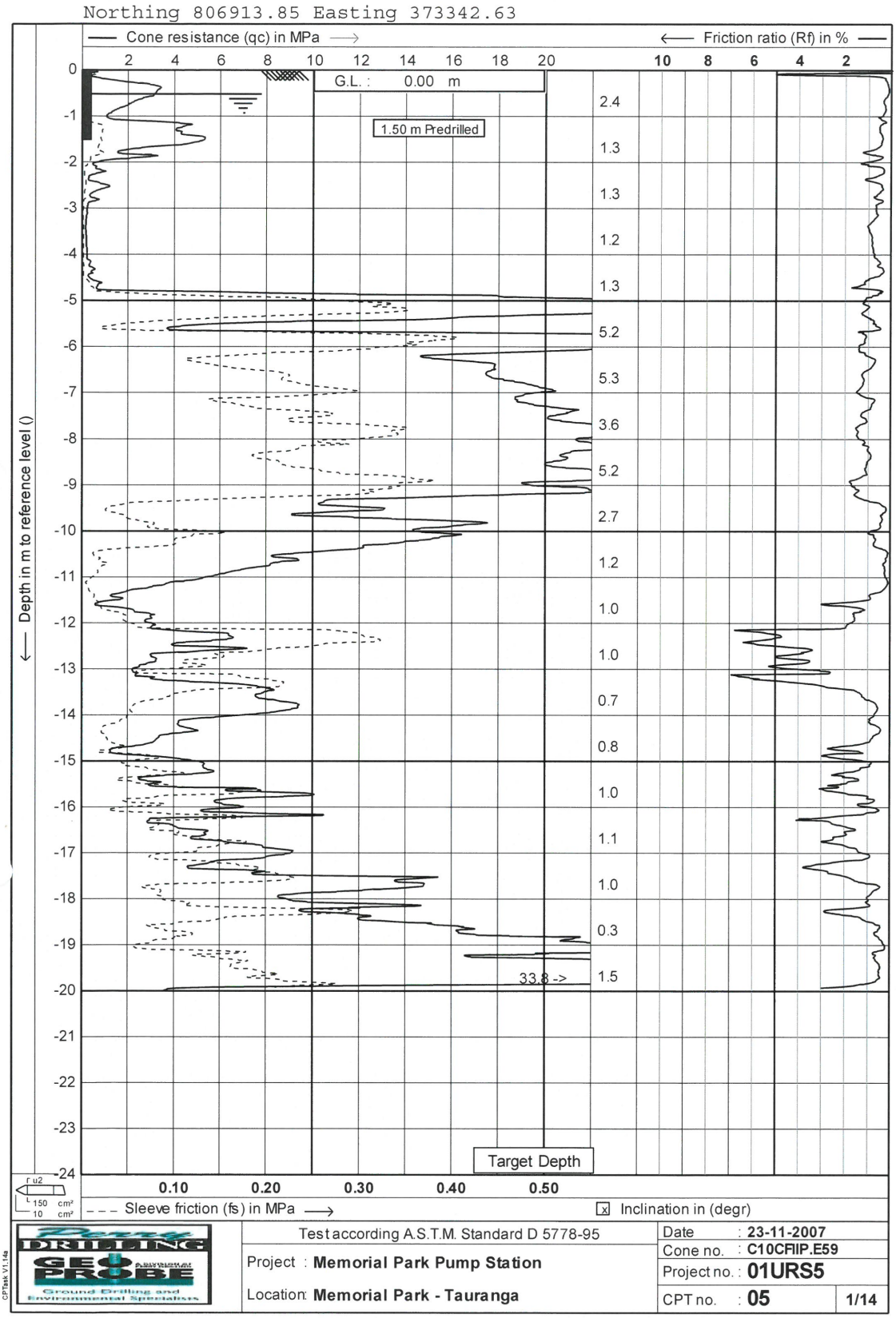
Northing 806928.23 Easting 373350.96

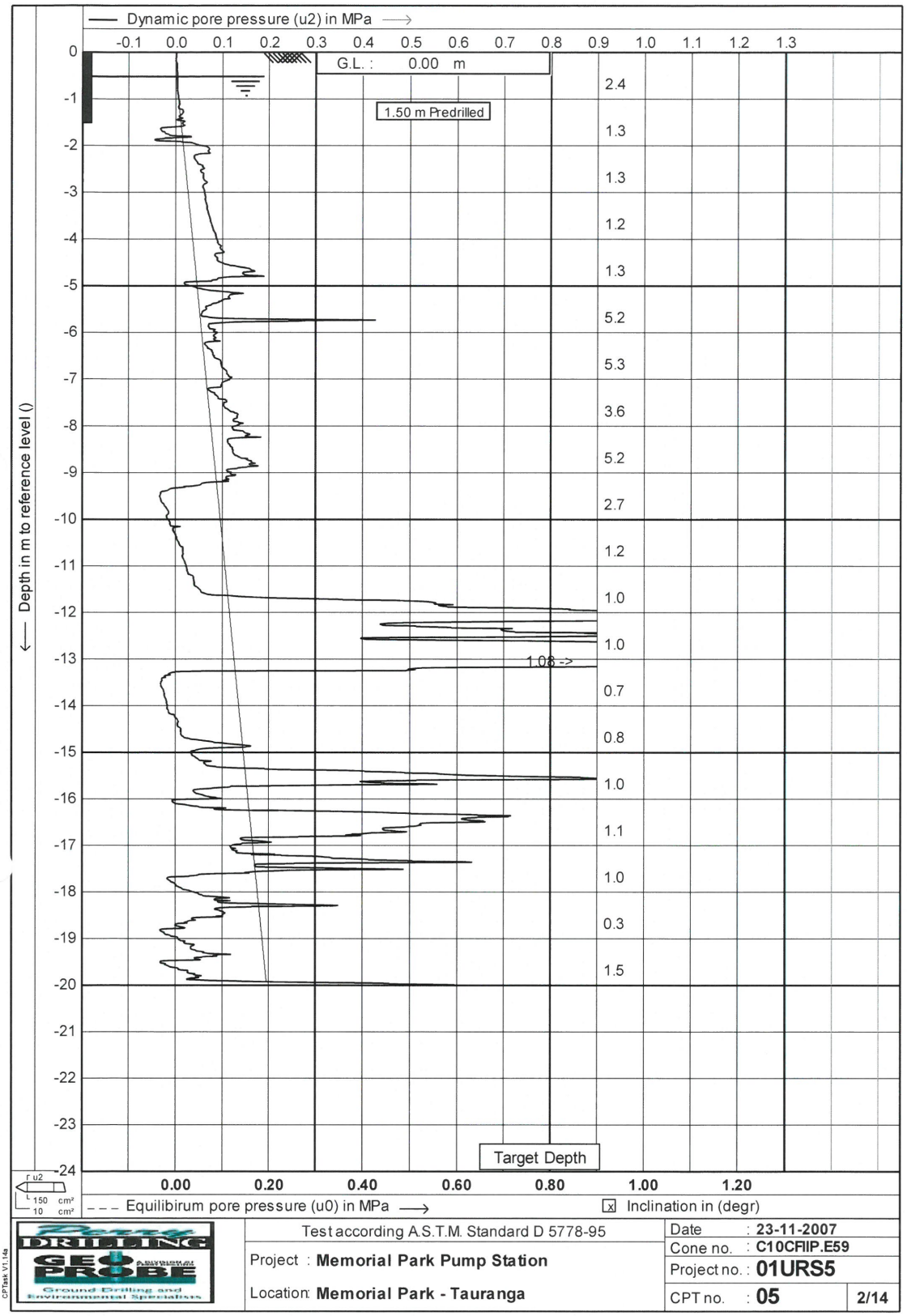



Cone resistance (qc) in MPa
Friction ratio (Rf) in %
Depth in m to reference level ()
Refusal
Sleeve friction (fs) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 04a
2/28

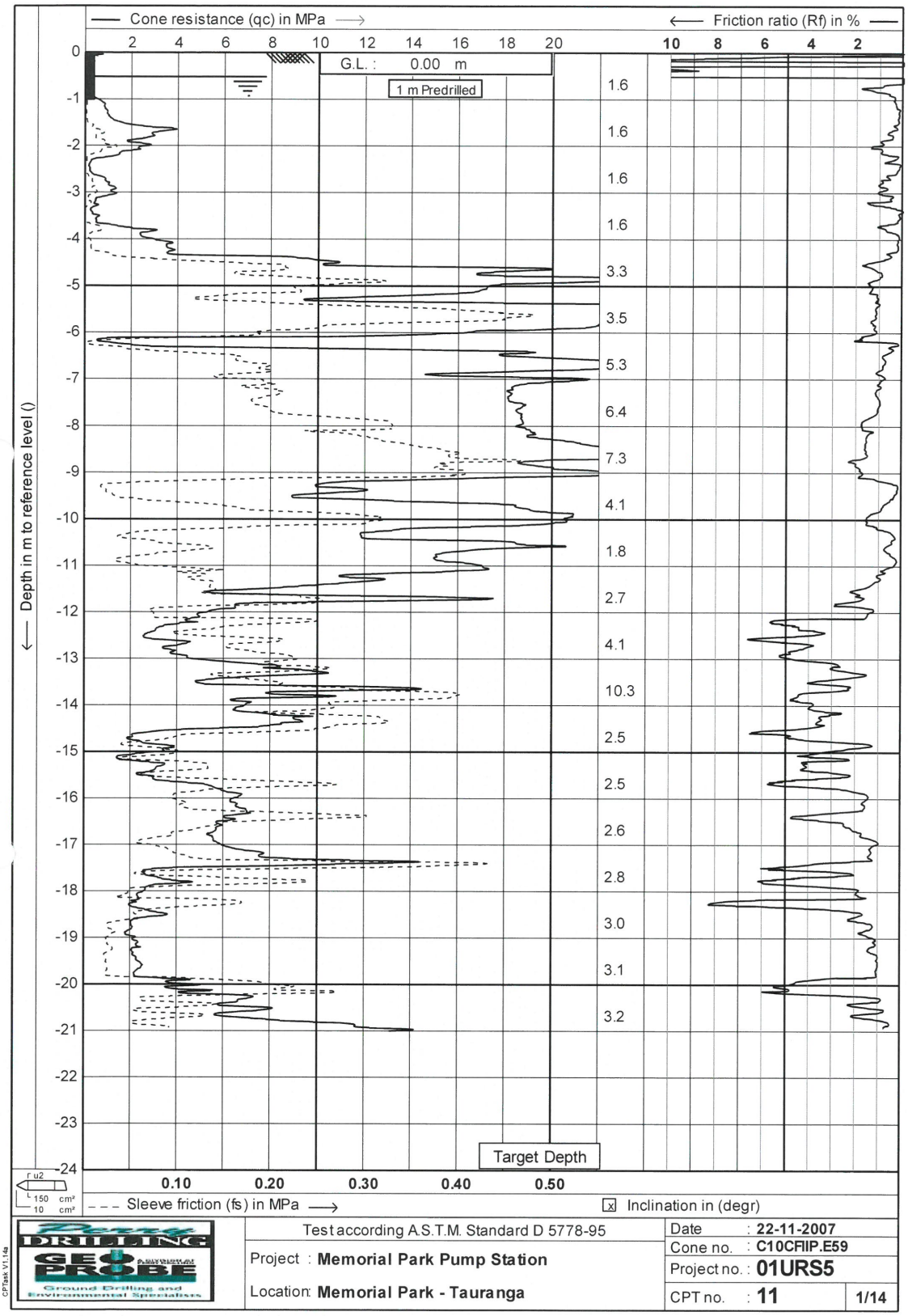

Dynamic pore pressure (u2) in MPa
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
G.L. : 0.00 m
Depth in m to reference level ()
0.5
1.4
1.4
1.5
1.5
1.7
1.7
1.6
3.7
3.0
1.3
1.1
2.68 ->
1.55 ->
0.9
0.9
1.0
0.9
1.0
1.1
1.0
0.5
0.5
0.3
0.3
0.9
u2
150 cm²
10 cm²
0.00 0.20 0.40 0.60 0.80 1.00 1.20
Equilibirum pore pressure (u0) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 04a
3/28
CPTask V1.14a

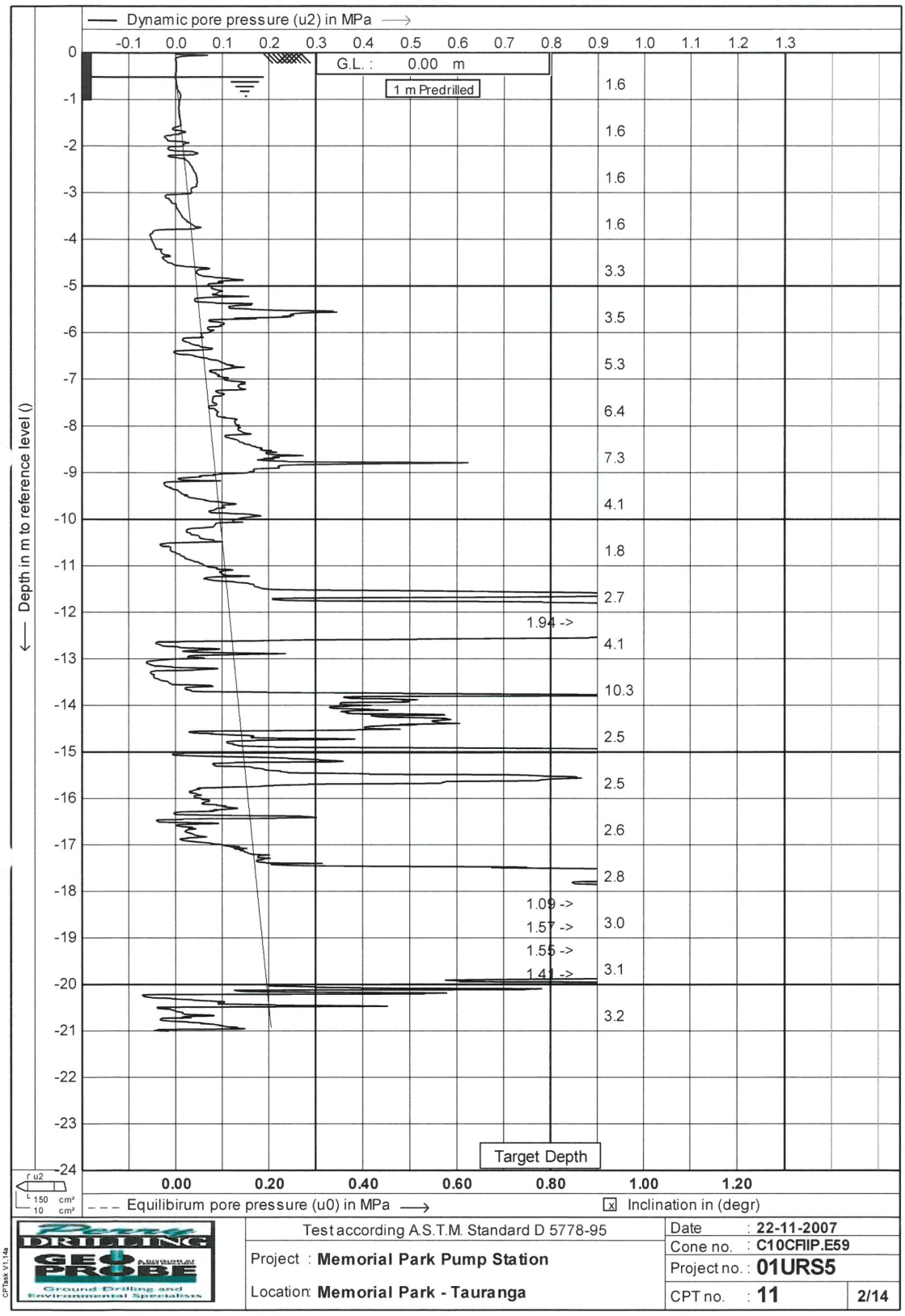

Dynamic pore pressure (u2) in MPa
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
Depth in m to reference level ()
-24 -25 -26 -27 -28 -29 -30 -31 -32 -33 -34 -35 -36 -37 -38 -39 -40 -41 -42 -43 -44 -45 -46 -47 -48
1.0
1.2
1.4
1.6
Refusal
0.00 0.20 0.40 0.60 0.80 1.00 1.20
Equilibirum pore pressure (u0) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 04a
4/28
CPTask V1.14a


Northing 806913.85 Easting 373342.63
Cone resistance (qc) in MPa
Friction ratio (Rf) in %
G.L. : 0.00 m
1.50 m Predrilled
Depth in m to reference level ()
Target Depth
33.8 ->
Sleeve friction (fs) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 23-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 05
1/14


Dynamic pore pressure (u2) in MPa
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
G.L. : 0.00 m
1.50 m Predrilled
Depth in m to reference level ()
2.4 1.3 1.3 1.2 1.3 5.2 5.3 3.6 5.2 2.7 1.2 1.0 1.0 1.06 -> 0.7 0.8 1.0 1.1 1.0 0.3 1.5
Target Depth
0.00 0.20 0.40 0.60 0.80 1.00 1.20
Equilibirum pore pressure (u0) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 23-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 05
2/14

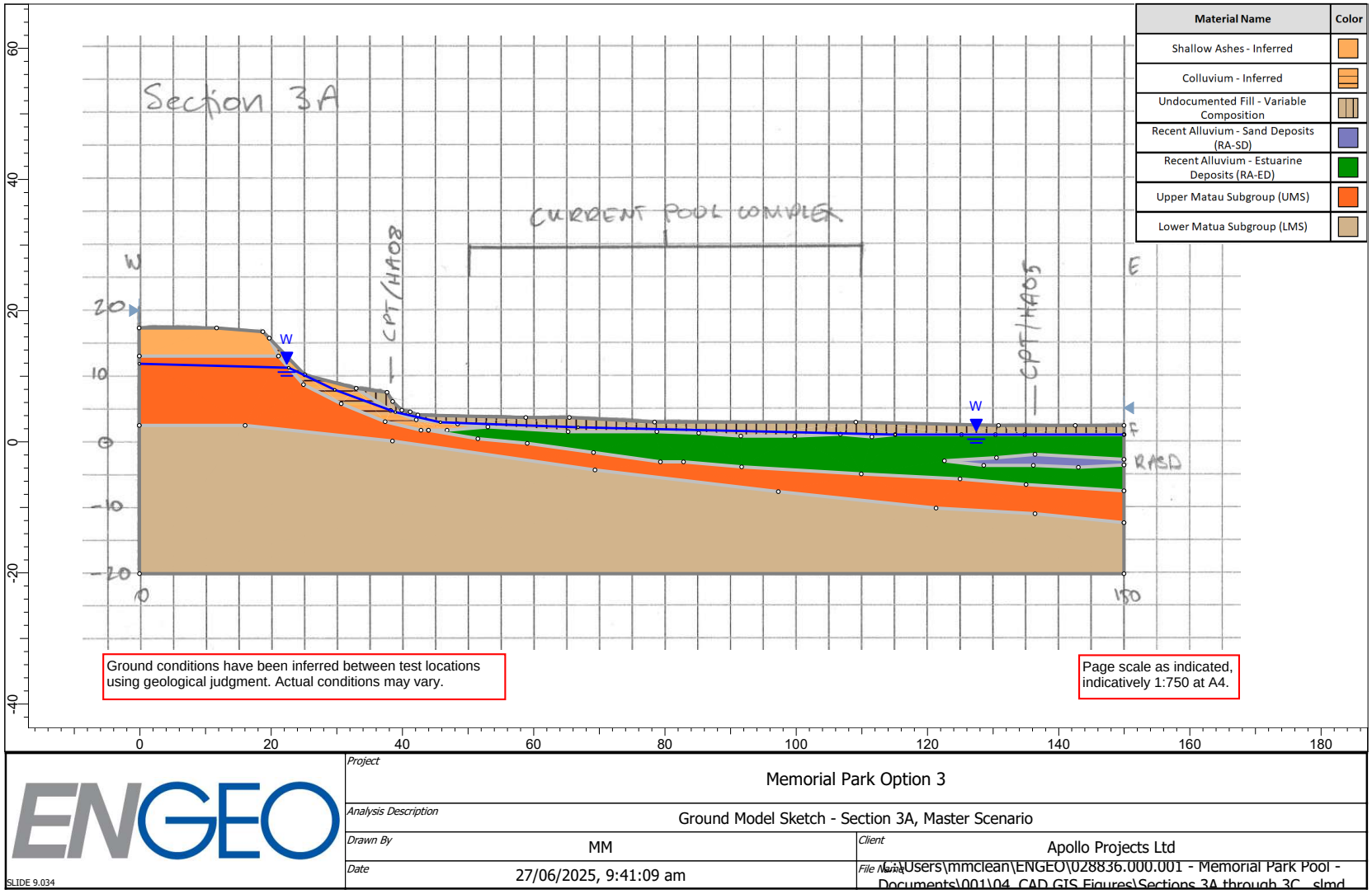
Northing 806923.73 Easting 373330.00

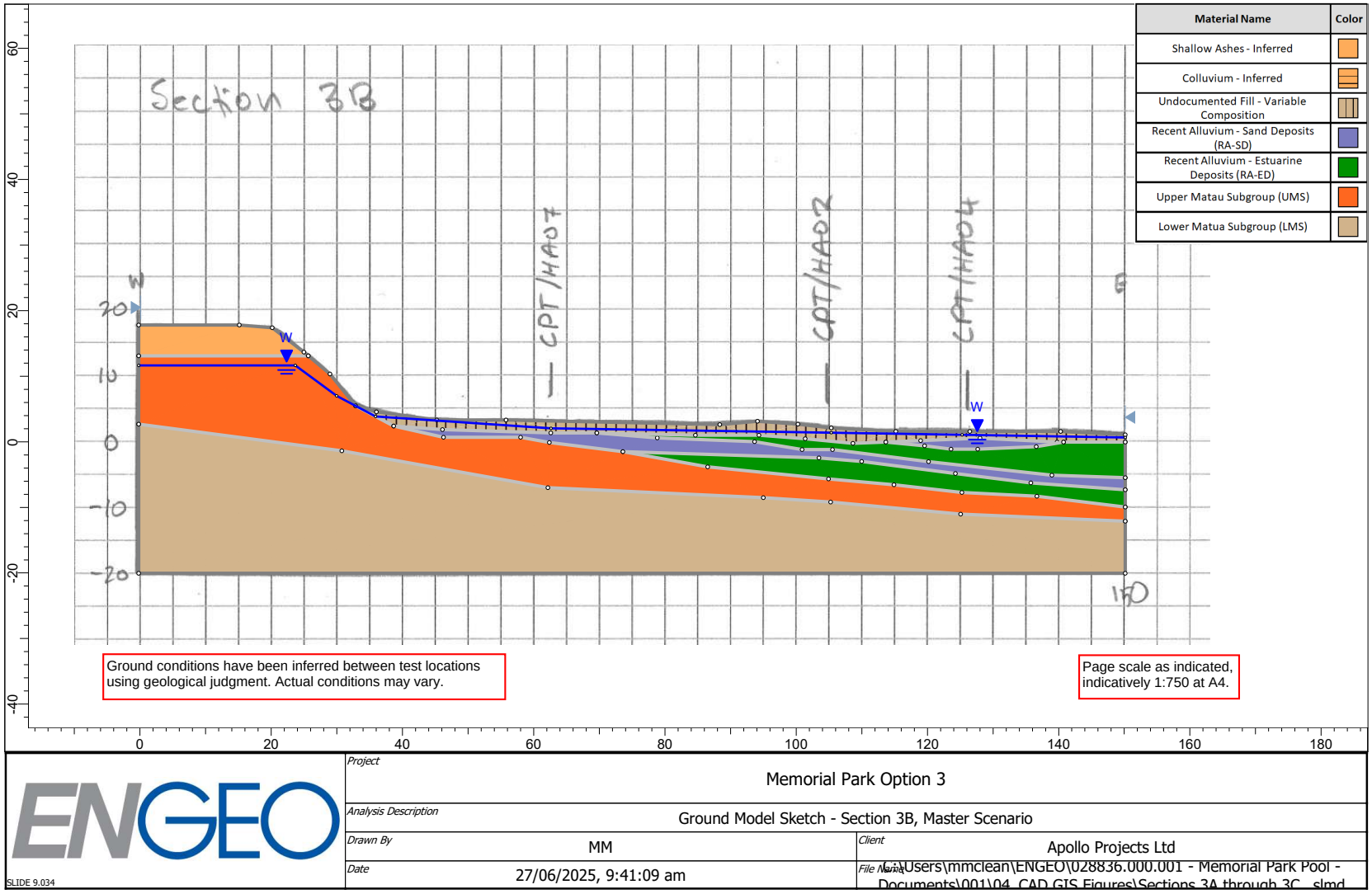


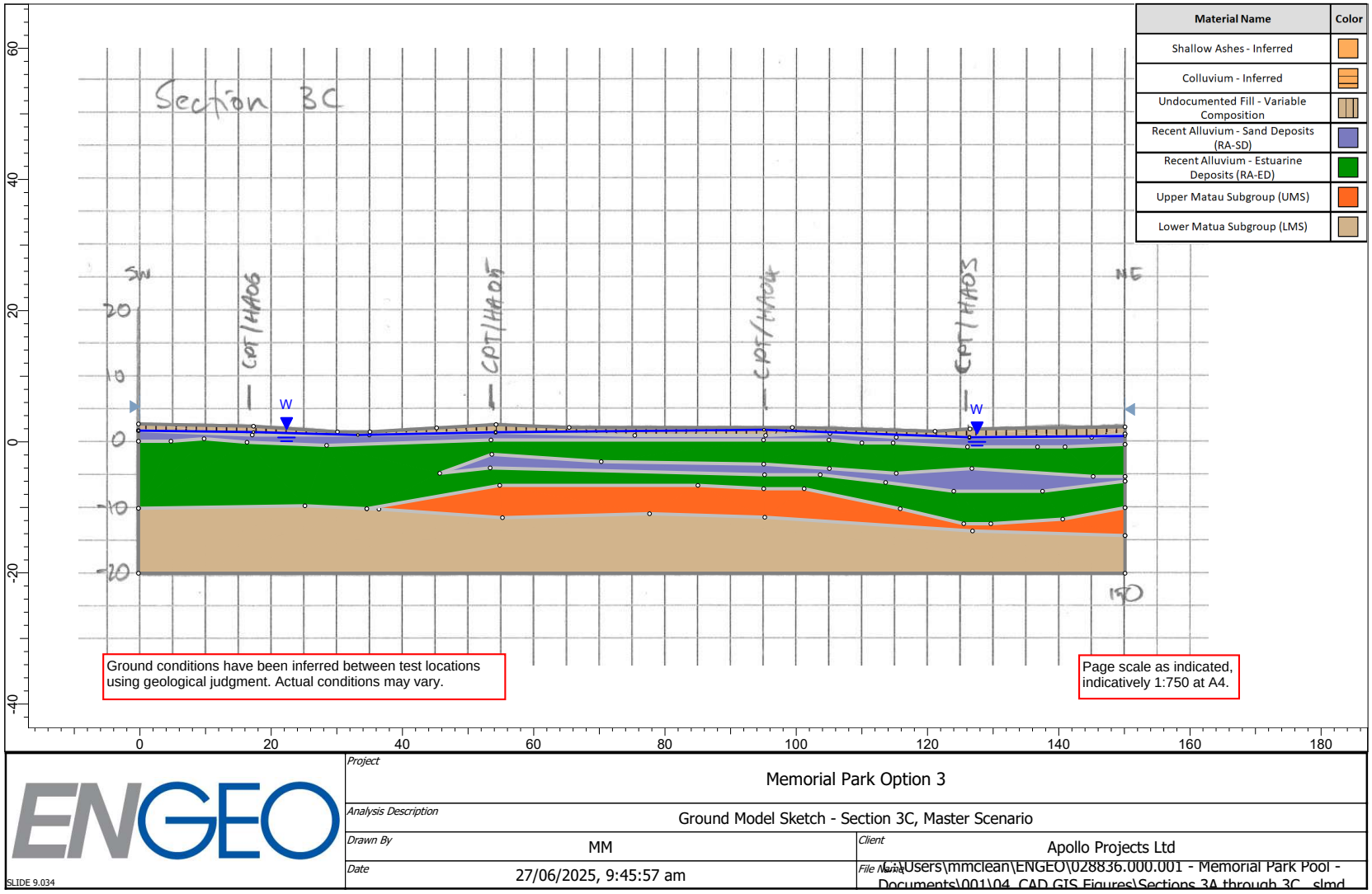

Dynamic pore pressure (u2) in MPa
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
G.L. : 0.00 m
1 m Predrilled
Depth in m to reference level ()
0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -12 -13 -14 -15 -16 -17 -18 -19 -20 -21 -22 -23 -24
1.6 1.6 1.6 1.6 3.3 3.5 5.3 6.4 7.3 4.1 1.8 2.7
1.94 ->
4.1 10.3 2.5 2.5 2.6 2.8
1.09 ->
1.57 ->
3.0
1.55 ->
1.41 ->
3.1 3.2
Target Depth
qc
fs u2
150 cm²
10 cm²
0.00 0.20 0.40 0.60 0.80 1.00 1.20
Equilibirum pore pressure (u0) in MPa
Inclination in (degr)
Test according A.S.T.M. Standard D 5778-95
Project : Memorial Park Pump Station
Location: Memorial Park - Tauranga
Date : 22-11-2007
Cone no. : C10CFIIP.E59
Project no. : 01URS5
CPT no. : 11
2/14
CPTask V1.14a

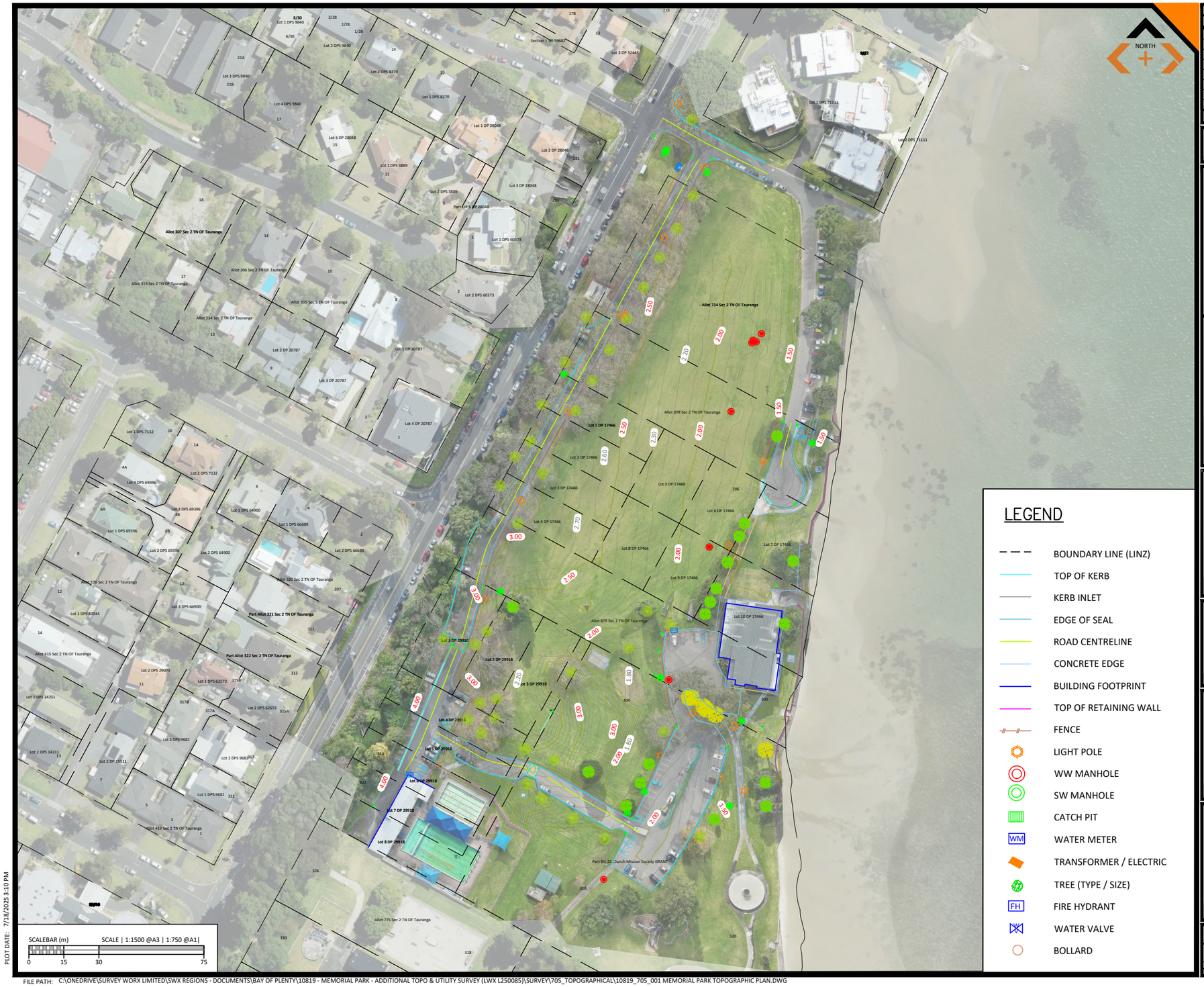
APPENDIX 2:

Ground Model Sketches


Section 3A
CURRENT POOL COMPLEX
CPT/HA08
CPT/HA05
W
E
RASD
Material Name
Color
Shallow Ashes - Inferred
Colluvium - Inferred
Undocumented Fill - Variable Composition
Recent Alluvium - Sand Deposits (RA-SD)
Recent Alluvium - Estuarine Deposits (RA-ED)
Upper Matau Subgroup (UMS)
Lower Matua Subgroup (LMS)
Ground conditions have been inferred between test locations using geological judgment. Actual conditions may vary.
Page scale as indicated, indicatively 1:750 at A4.
ENGEO
SLIDE 9.034
Project
Memorial Park Option 3
Analysis Description
Ground Model Sketch - Section 3A, Master Scenario
Drawn By
MM
Client
Apollo Projects Ltd
Date
27/06/2025, 9:41:09 am
File Name
C:\Users\mmclean\ENGEO\028836.000.001 - Memorial Park Pool - Documents\001\04_CAD GIS Figures\Sections 3A through 3C_.slmd


Section 3B
CPT/HA07
CPT/HA02
CPT/HA04
W
W
Material Name
Color
Shallow Ashes - Inferred
Colluvium - Inferred
Undocumented Fill - Variable Composition
Recent Alluvium - Sand Deposits (RA-SD)
Recent Alluvium - Estuarine Deposits (RA-ED)
Upper Matau Subgroup (UMS)
Lower Matua Subgroup (LMS)
Ground conditions have been inferred between test locations using geological judgment. Actual conditions may vary.
Page scale as indicated, indicatively 1:750 at A4.
60
40
20
0
-20
-40
0
20
40
60
80
100
120
140
160
180
ENGEO
SLIDE 9.034
Project
Memorial Park Option 3
Analysis Description
Ground Model Sketch - Section 3B, Master Scenario
Drawn By
MM
Client
Apollo Projects Ltd
Date
27/06/2025, 9:41:09 am
File Name
C:\Users\mmclean\ENGEO\028836.000.001 - Memorial Park Pool - Documents\001\04_CAD GIS Figures\Sections 3A through 3C_.slmd


Section 3C
SW
NE
W
W
CPT/HA06
CPT/HA07
CPT/HA08
CPT/HA09
Material Name
Color
Shallow Ashes - Inferred
Colluvium - Inferred
Undocumented Fill - Variable Composition
Recent Alluvium - Sand Deposits (RA-SD)
Recent Alluvium - Estuarine Deposits (RA-ED)
Upper Matau Subgroup (UMS)
Lower Matua Subgroup (LMS)
Ground conditions have been inferred between test locations using geological judgment. Actual conditions may vary.
Page scale as indicated, indicatively 1:750 at A4.
Project
Memorial Park Option 3
Analysis Description
Ground Model Sketch - Section 3C, Master Scenario
Drawn By
MM
Client
Apollo Projects Ltd
Date
27/06/2025, 9:45:57 am
File Name
C:\Users\mmclean\ENGEO\028836.000.001 - Memorial Park Pool - Documents\001\04_CAD GIS Figures\Sections 3A through 3C_.slmd
SLIDE 9.034



PLOT DATE: 7/18/2025 3:10 PM

FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG

LEGEND

- BOUNDARY LINE (LINZ)
- TOP OF KERB
- KERB INLET
- EDGE OF SEAL
- ROAD CENTRELINE
- CONCRETE EDGE
- BUILDING FOOTPRINT
- TOP OF RETAINING WALL
- FENCE
- LIGHT POLE
- WW MANHOLE
- SW MANHOLE
- CATCH PIT
- WATER METER
- TRANSFORMER / ELECTRIC
- TREE (TYPE / SIZE)
- FIRE HYDRANT
- WATER VALVE
- BOLLARD

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025

REV	AMENDMENTS	DATE
1	ORIGINAL ISSUE	17.07.2025

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.

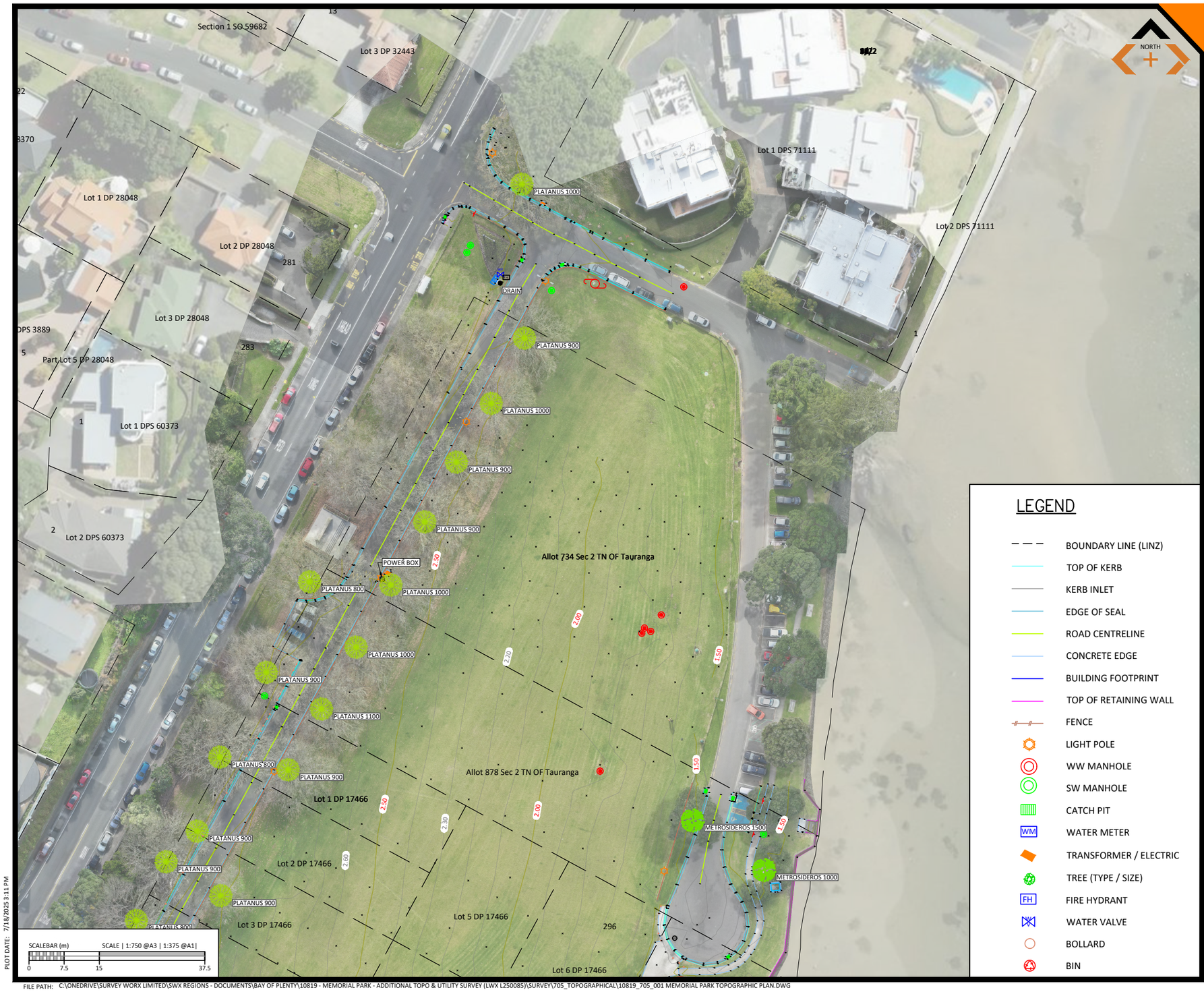
SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: **0800 NZ WORX**
www.surveyworx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

TITLE
SITE OVERVIEW

SCALE	(A1)		(A3)	
1:750		1:1500		
DRAWING No	SHEET		REVISION	
10819_705_001	1	of 6	1	



PLOT DATE: 7/18/2025 3:11 PM

FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG

LEGEND

- BOUNDARY LINE (LINZ)
- TOP OF KERB
- KERB INLET
- EDGE OF SEAL
- ROAD CENTRELINE
- CONCRETE EDGE
- BUILDING FOOTPRINT
- TOP OF RETAINING WALL
- FENCE
- LIGHT POLE
- WW MANHOLE
- SW MANHOLE
- CATCH PIT
- WATER METER
- TRANSFORMER / ELECTRIC
- TREE (TYPE / SIZE)
- FIRE HYDRANT
- WATER VALVE
- BOLLARD
- BIN

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025

REV	AMENDMENTS	DATE
1	ORIGINAL ISSUE	17.07.2025

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.

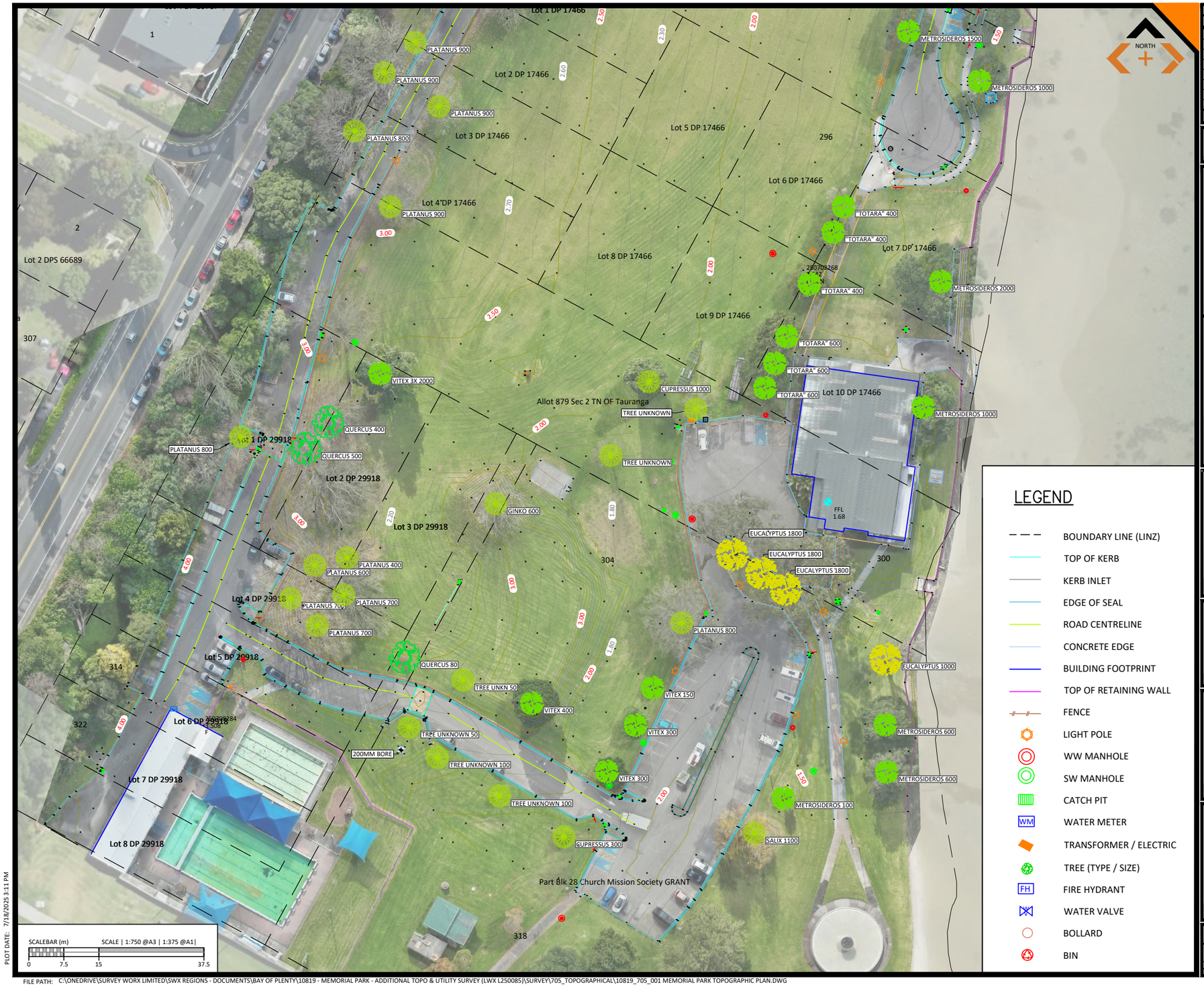
SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: 0800 NZ WORX
www.survey worx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

TITLE
MEMORIAL PARK TOPOGRAPHICAL SURVEY 1/2

SCALE	1:375 (A1)	1:750 (A3)	
DRAWING No	SHEET	REVISION	
10819_705_001	2 of 6	1	



LEGEND

- BOUNDARY LINE (LINZ)
- TOP OF KERB
- KERB INLET
- EDGE OF SEAL
- ROAD CENTRELINE
- CONCRETE EDGE
- BUILDING FOOTPRINT
- TOP OF RETAINING WALL
- FENCE
- LIGHT POLE
- WW MANHOLE
- SW MANHOLE
- CATCH PIT
- WATER METER
- TRANSFORMER / ELECTRIC
- TREE (TYPE / SIZE)
- FIRE HYDRANT
- WATER VALVE
- BOLLARD
- BIN

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025
1	ORIGINAL ISSUE				17.07.2025
REV	AMENDMENTS				DATE

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.

SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: **0800 NZ WORX**
www.surveyworx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

TITLE
MEMORIAL PARK TOPOGRAPHICAL SURVEY 2/2

SCALE	(A1)		(A3)	DRAWING No	SHEET	REVISION
1:375		1:750		10819_705_001	3 of 6	1

FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025

REV	AMENDMENTS	DATE
1	ORIGINAL ISSUE	17.07.2025

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.
- FOR GPR AND SERVICE REPORT, CONSULT "L250085-1025-R_Memorial Park_Locate Summary Report_RS" IN CONJUNCTION WITH THIS PLAN.

LEGEND

- BOUNDARY LINE (LINZ)
- TOP OF KERB
- KERB INLET
- EDGE OF SEAL
- BUILDING FOOTPRINT
- TOP OF RETAINING WALL
- STORMWATER PIPE
- WASTEWATER PIPE
- UNDERGROUND POWER
- UNDERGROUND GAS
- UNDERGROUND WATER
- UNDERGROUND CHORUS
- LIGHT POLE
- WW MANHOLE
- SW MANHOLE
- CATCH PIT
- WATER METER (WM)
- TRANSFORMER / ELECTRIC
- FIRE HYDRANT (FH)
- WATER VALVE

SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: 0800 NZ WORX
www.surveyworx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

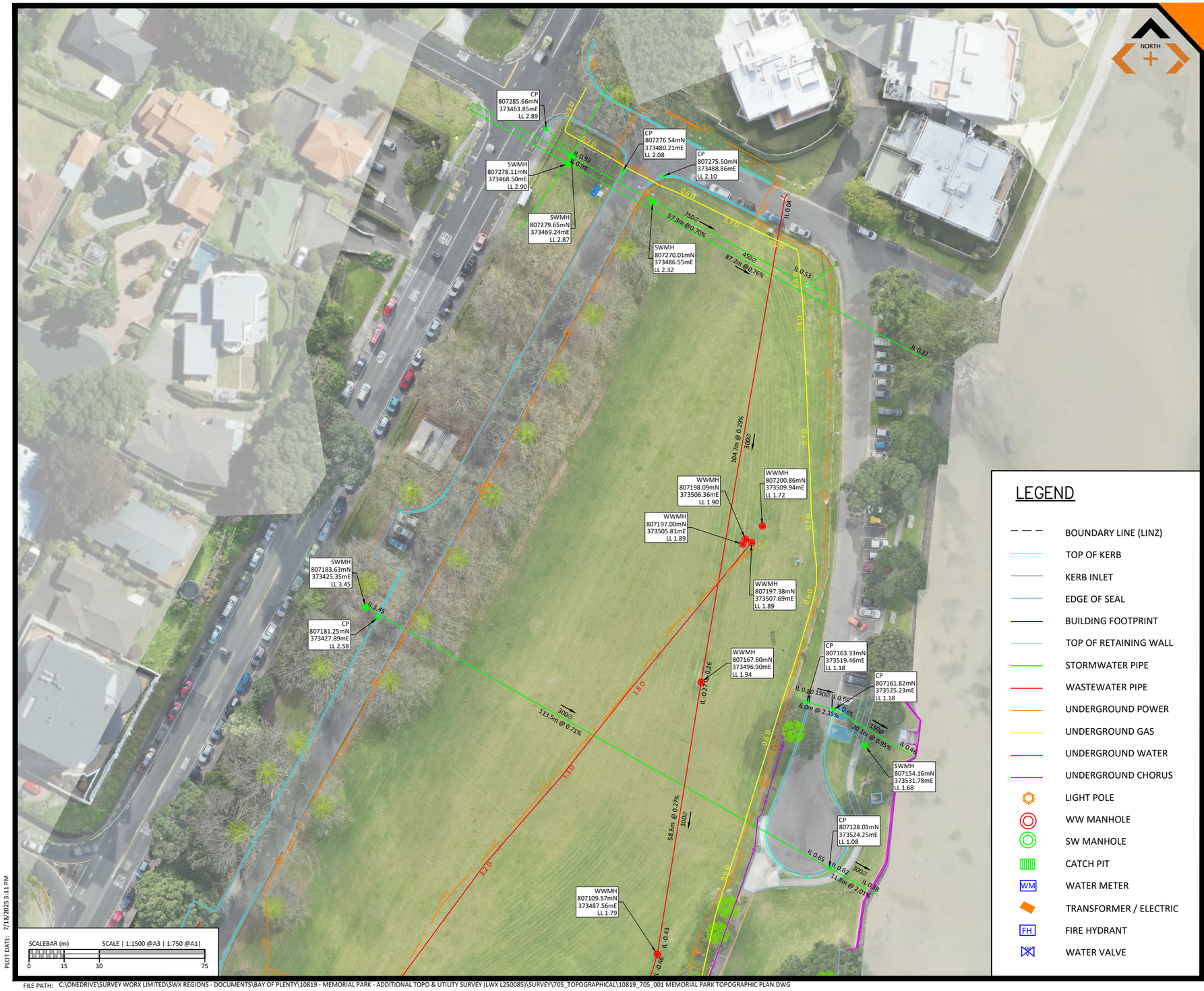
TITLE
SITE SERVICES OVERVIEW

SCALE	1:750	(A1)	1:1500	(A3)

DRAWING No	SHEET	REVISION
10819_705_001	4 of 6	1

PLOT DATE: 7/18/2025 3:11 PM

FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG



FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025

REV	AMENDMENTS	DATE
1	ORIGINAL ISSUE	17.07.2025

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.
- FOR GPR AND SERVICE REPORT, CONSULT "L250085-1025-R_Memorial Park_Locate Summary Report_RS" IN CONJUNCTION WITH THIS PLAN.

SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: **0800 NZ WORX**
www.surveyworx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

TITLE
SITE SERVICES PLAN 1

SCALE	1:750	(A1)	1:1500	(A3)
DRAWING No	SHEET		REVISION	
10819_705_001	5 of 6		1	

FILE PATH: C:\ONEDRIVE\SURVEY WORX LIMITED\SWX REGIONS - DOCUMENTS\BAY OF PLENTY\10819 - MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY (LWX L250085)\SURVEY\705_TOPOGRAPHICAL\10819_705_001 MEMORIAL PARK TOPOGRAPHIC PLAN.DWG

LEGEND

- BOUNDARY LINE (LINZ)
- TOP OF KERB
- KERB INLET
- EDGE OF SEAL
- BUILDING FOOTPRINT
- TOP OF RETAINING WALL
- STORMWATER PIPE
- WASTEWATER PIPE
- UNDERGROUND POWER
- UNDERGROUND GAS
- UNDERGROUND WATER
- UNDERGROUND CHORUS
- LIGHT POLE
- WW MANHOLE
- SW MANHOLE
- CATCH PIT
- WM WATER METER
- TRANSFORMER / ELECTRIC
- FH FIRE HYDRANT
- WATER VALVE

SURVEYED	DATE	DRAWN	DATE	CHECKED	DATE
IH	08.07.2025	IH	16.07.2025	SRM	17.07.2025

REV	AMENDMENTS	DATE
1	ORIGINAL ISSUE	17.07.2025

SURVEY NOTES:

- BEARING AND COORDINATE DATUM IS NZGD2000 BAY OF PLENTY 2000 CIRCUIT
- LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
- ORIGIN OF SURVEY **RM II SO 58618** GD CODE: **C3UQ** **806647.427mN 373440.672mE** RL **8.14m**
- XML BOUNDARY PARCELS ARE SOURCED FROM LINZ LANDONLINE DATABASE.
- BOUNDARIES ARE SUBJECT TO SURVEY.

GENERAL NOTES:

- AERIAL IMAGE HAS BEEN CAPTURED BY UAV ON 08/07/2025.
- ANY BACKGROUND IMAGE FROM LINZ DATABASE
- SURFACE CONTOURS ARE SHOWN AT 0.1m INTERVALS.
- THE CONTOURS HAVE BEEN ELECTRONICALLY GENERATED BETWEEN SURVEY FIXES AND MAY NOT REPRESENT THE TRUE GROUND LEVEL.
- TREE TYPES, SIZES, AND POSITIONS SHOWN ARE APPROXIMATE AND SHOULD BE CONFIRMED BY AN ARBORIST IF CRITICAL.
- FOR GPR AND SERVICE REPORT, CONSULT "L250085-1025-R_Memorial Park_Locate Summary Report_RS" IN CONJUNCTION WITH THIS PLAN.

SURVEY WORX
CONSTRUCTION & LAND SURVEYORS
PHONE: 0800 NZ WORX
www.surveyworx.co.nz

CLIENT
APOLLO PROJECTS

PROJECT
MEMORIAL PARK - ADDITIONAL TOPO & UTILITY SURVEY

TITLE
SITE SERVICES PLAN 2

SCALE	(A1)	(A3)	DRAWING No	SHEET	REVISION
1:750	1:1500		10819_705_001	6 of 6	1

Apollo PROJECTS

MEMORIAL POOL AQUATIC CENTRE – ALTERNATIVE SITE FEASIBILITY STUDY

Prepared for

TAURANGA CITY COUNCIL

Prepared by

APOLLO PROJECTS

Revision Date: Friday, 29 August 2025

CONTENTS

1. INTRODUCTION

1.1. OVERVIEW

Following on from the previous Memorial Park Aquatic Centre (MPAC) scheme development for the current Queen Elizabeth Youth Centre (QEYC) site, TCC have indicated a preference to retain the existing indoor court facility at QEYC. Consideration for an alternate site for the proposed MPAC, within the wider Memorial Park is now required.

This report outlines the opportunity to utilise the current Memorial Pool outdoor pool facility site, and the investigations undertaken to confirm the suitability of the site to support a new indoor aquatic centre development.

1.2. SCOPE

The scope of this feasibility assessment relates to the site geotechnical conditions, existing civil infrastructure and topographical features which are likely to influence the ability to develop and new aquatic centre. Specific requirements for the aquatic centre have not been defined for this assessment, and therefore the schemes developed for the previously proposed QEYC aquatic facility have been used to help inform the likely scale and type of development for this assessment.

1.3. SITE LOCATION

The diagram below indicates the main areas under consideration. The existing Queen Elizabeth Youth Centre (QEYC) building was the proposed location for the previous Memorial Park Aquatic Centre concept schemes which is located at the Southwest corner of Memorial Park in central Tauranga. The other key features located nearby are the miniature railway, the wastewater pumping station and associated infrastructure, the minigolf course, skate park, outdoor pools complex, and the hot water bore buildings.

Figure 1: Memorial Park overview (image from Google Earth)

The proposed alternate site corresponds to the location of the current outdoor pools complex, the location plan below indicates the approximate extent of the alternate site considered which is immediately North of the previous QEYC site.

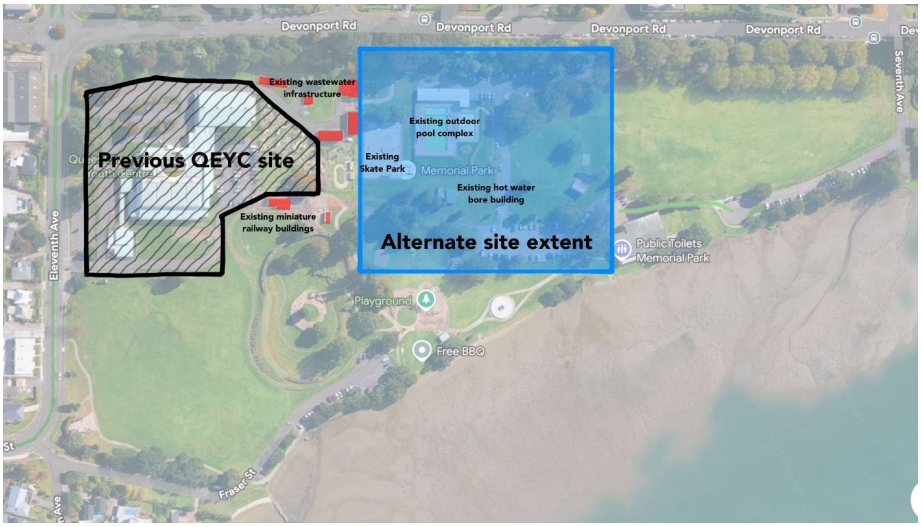


Figure 2: Location plan showing alternate site extents (image from Google Earth)

2. GEOTECHNICAL

Apollo commissioned ENGEO to undertake preliminary geotechnical testing and assessment of the proposed Memorial Pool alternative site. The basis of the testing and assessment was to correlate the findings with the previous work undertaken on the QEYC site, and compare the expected geotechnical performance of the site and any influence it may have on the construction of a new aquatic centre.

Refer to Appendix A for a copy of the ENGEO Geotechnical Summary Letter.

This preliminary (stage 1) geotechnical assessment will be reviewed once the confirmed scope and footprint of the new aquatic centre is defined and more detail around the building loads and footprint is established. The stage 2 geotechnical assessment will involve some further on site investigations and detailed analysis and coordination between the structural engineer, geotechnical engineer and piling/ground improvement contractor.

2.1. INVESTIGATION RESULTS

On site deep CPT testing has been completed across the broader area surrounding the current outdoor Memorial Pool. The testing included 8 CPT tests to a depth of 27.8m coupled with shallow hand auger testing.

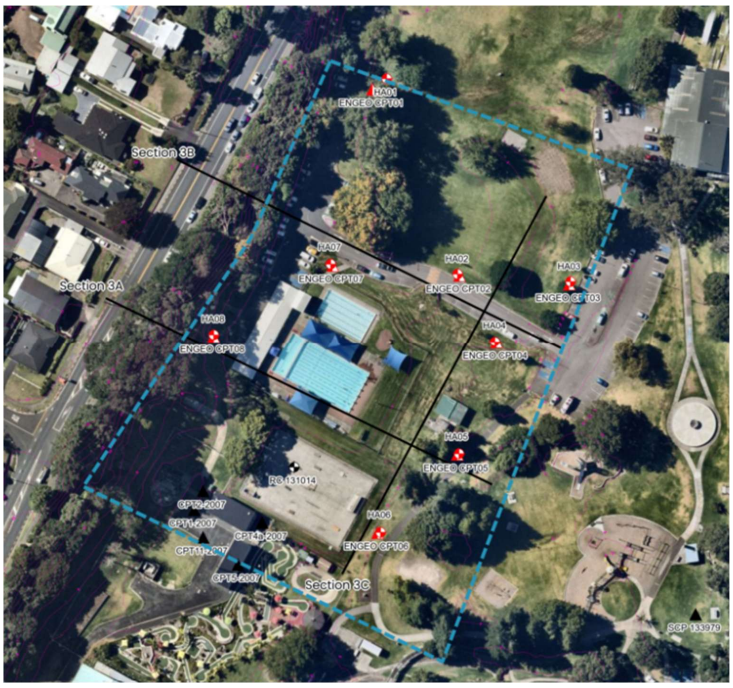


Figure 3: Test Locations (copy from ENGEO summary)

In general, the testing revealed similar geotechnical conditions as the QEYC site, with softer estuarine deposits of varying thickness overlaying deeper soils. There are layers on non-engineered backfill placement across the site which appears to be related to the construction on the current outdoor pool. To the south, there is an area of higher settlement risk due to deeper soils, that is less suitable for building development. To the West, the natural terrain results in shallower soft soils (lower settlement risk). Heading Northward the subsurface conditions appear relatively uniform. The depth of softer soils continues to increase heading East across the site towards the harbour.

2.2. GROUNDWATER

Groundwater at the site was recorded at between 0.3m to 1.7m depth. Whilst this was recorded during wet winter months, it indicates that it is likely that deeper excavations will require some level of dewatering during construction. This is similar to the expected construction groundwater management required for the QEYC site.

2.3. SLOPE STABILITY

Slope stability of the natural escarpment to the West of the site needs to be considered for any development of the site. Any new development will need to consider the slope runout zone and ideally be located outside of this zone to avoid the need for any slope stabilisation.

Figure 4: Diagram showing slope stability and settlement hazards (copy from ENGEO summary)

2.4. FOUNDATION CONSIDERATIONS

The key challenges in relation to foundations relate to the presence of the overlaying softer surface layers which are prone to settlement under load and therefore not suitable for shallow foundations. The depth to the competent bearing layers increases in depth as across the site from West to East towards the harbour.

Similar to the QEYC site, the settlement risk of softer shallow soils can be overcome using a deep ground improvement or piled solution, combined with a shallow gravel raft under the building footprint. This is the same as the intended foundation approach for the QEYC site.

The areas of uncontrolled fill which surround the existing outdoor pool are not suitable for development and any fill will need to be removed as part of the development of the site.

2.5. FURTHER INVESTIGATIONS

The preliminary geotechnical investigations completed across the wider Memorial Pool site now provide a good level of detail to help inform the most suitable areas for development.

Once a building footprint is established and proposed development agreed, further on site detailed investigations will be undertaken to fully define the geotechnical parameters to support structural and civil design as well as help confirm the extents of any ground improvement or piling works to reduce the risk during construction. A full geotechnical report will be required to support Building and Resource Consent processes.

3. CIVIL

Apollo commissioned BECA to undertake an assessment of the existing underground services that transect the alternate Memorial Pool site, in addition to reviewing any key physical constraints that may impact the ability to develop the site. To help inform this assessment, the extent of topographic surveying across the wider Memorial Park has been extended to capture the existing outdoor pool and surrounding areas that may be required for this new development.

A copy of the detailed BECA assessment is included in the Appendix B. In addition, a copy of the updated survey information from Survey Worx is included in Appendix C.

3.1. SITE ACCESS

Permanent public site access for the proposed alternate site will be from Devonport Road, as opposed to the QEYC scheme which would have been accessed from Eleventh Avenue. Whilst there will be some minor geometric adjustments to Devonport Road to suit larger vehicles and traffic demand, these are not significant and are expected to be able to be easily achieved. The previous QEYC site by contrast would have required more significant traffic control to manage safety and future traffic demands. The proposed alternate site is therefore preferable in terms of site access.

3.2. EXISTING UNDERGROUND SERVICES

The extent of existing underground services has been mapped using local records, and MAPI GIS combined with on site surveying or surface features.

WASTEWATER

Across the NW side of the site (running parallel to Devonport Road), close to the toe of the bank there is large existing pressurised wastewater pipes 800dia and 500dia. These pipes are significant assets which service a large area, and would be cost prohibitive and disruptive to modify. It is recommended that any proposed building development is designed so that these pipe can remain as is without modification. An appropriate service clearance with need to maintained.

In addition to the main pressure wastewater line, a smaller 300dia gravity wastewater line running parallel to the shoreline serving adjacent commercial and residential properties. It is feasible to make adjustments to this asset, however it would be preferable to keep this asset in its current location if it does not significant impact future development.

The wastewater constraints on this site are similar to the constraints on the previous QEYC site and therefore not considered a barrier to potential development.

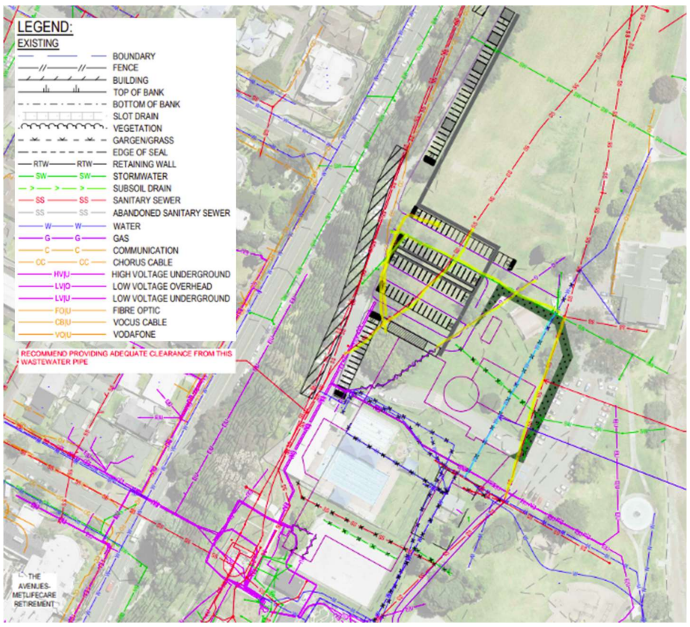


Figure 5: Existing underground services (copy from BECA report)

STORMWATER

The majority of the existing stormwater infrastructure at the site will become redundant as the existing facilities at the site are decommissioned as they relate to the existing outdoor pool and pavements. Given the proximity to the shoreline, stormwater management for new surfaces and structures will likely be able to be distributed to an ocean outlet without the need for on-site attenuation and only minor treatment for road and parking areas. This is an advantage over the QEYC site which was likely to require some level of attenuation.

Overland flow paths for stormwater naturally flow from West to East from the base of the Devonport Road slope. To avoid coastal inundation risk, building levels will need to be developed to similar levels as the proposes QEYC or around 4.3mRL. To avoid any large retaining structures, a reasonable setback from the shoreline needs to be maintained.

OTHER SERVICES

Other existing buried services including water supply, electrical and data are present at the site. The majority of these services will become redundant and can be readily removed or relocated to accommodate a new pool development.

3.3. SERVICES CONNECTIONS

There are multiple options for creating sufficient services connections for a new aquatic centre development at the site. Subject to confirmation of the site demand and proposed building layout, there do not appear to be any significant constraints regarding providing new services connections at the alternate site.

3.4. SITE TOPOGRAPHY

As noted above, to control overland stormwater flow and comply with planning requirements for coastal inundation the floor level for a new facility is expected to be around 4.3mRL, this is approximately the same level as the existing QEYC building and approximately 600-700mm above the current outdoor pool surface.

The site naturally grades down from West to East from approximately 4.0mRL at the toe of the Devonport Road slope, to 1.3mRL at the shoreline. The site will require filling to achieve a suitable building platform height. Any new development should consider a suitable offset from the shoreline to avoid the need for retaining structures.

Figure 6: Site topographic survey (copy from Survey Worx)

4. FUTURE DEVELOPMENT

Through the assessment of the geotechnical conditions, civil infrastructure and topographic information, the alternate site corresponding to the current outdoor pool presents a good option for the potential development of a new aquatic centre.

4.1. REDUNDANT STRUCTURES

The site includes existing structures which are nearing end of life or will become redundant with the development of a new aquatic centre.

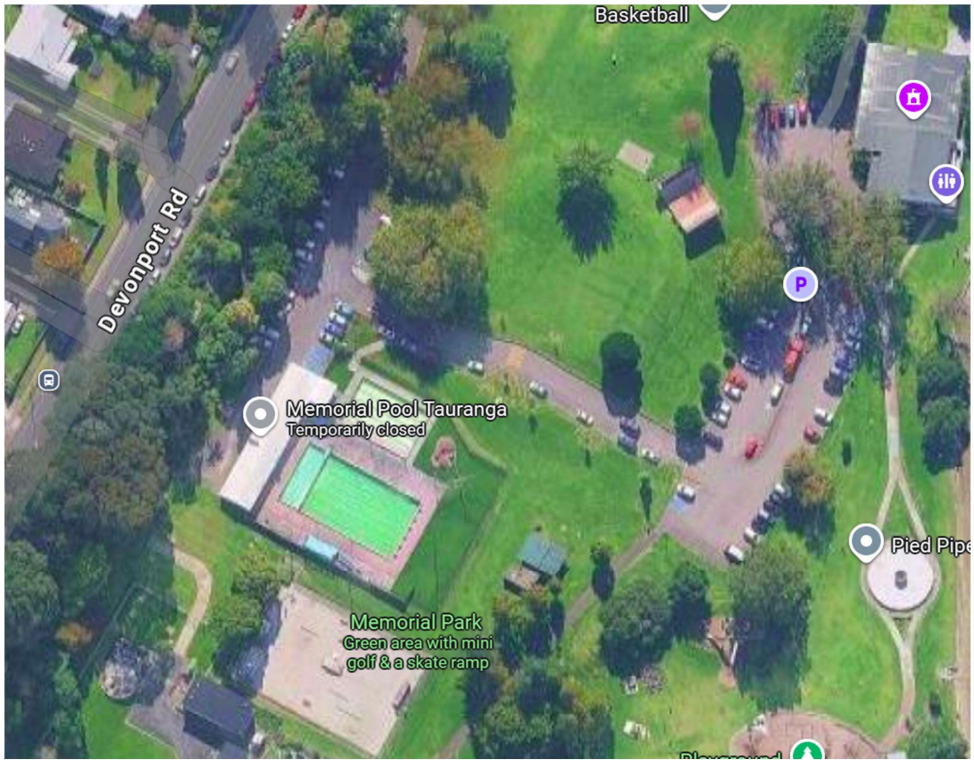


Figure 7: Site image (image form Google Maps)

EXISTING OUTDOOR AQUATIC FACILITY

The existing outdoor pools and associated amenities are located centrally to the proposed future development area. It is understood that there are ongoing challenges with maintaining the current pool which would require significant investment to continue operations. The current level of the pool is approx. 3.6mRL which would be too low to adjoin any new development at the site which will require an expected floor level of 4.3mRL. It is not considered feasible to retain the existing facility in conjunction with the development of a new centre.

EXISTING HOT WATER BORE

Separate investigations into the viability of the existing hot water bore, immediately to the East and currently serving the existing outdoor pool, have indicated that the bore is nearing the end of its life and will require replacement soon. The current location of the bore will constrain the layout of any future development at the site if it is retained and it is expected that it will be decommissioned and removed to allow for future development.

EXISTING SKATE PARK

The existing skate park is located at the southern end of the proposed alternate site. The geotechnical investigations have indicated that this area is less suited for future development and therefore it could potentially be retained as is. Whilst it is less preferable, it is still feasible to develop this area if required.

4.2. POTENTIAL AQUATIC CENTRE DEVELOPMENT

Overall, whilst the ground conditions at the site are similar to the previously considered QEYC site, there are some advantages to the proposed alternate site from a geotechnical and civil infrastructure perspective that make it more favourable for development. The key constraints for development at the site are:

- Slope stability runout zone at the toe of the Devonport Road slope to the West of the site
- Coastal inundation risk at lower levels towards the harbour at the east
- Higher risk settlement zone to the southern end of the investigation area (corresponding with current skate park)
- Large existing wastewater services running along the toe of the Devonport Road slope.

By using the constraints identified above a preferred envelope for potential development has been developed as shown below. The scale of the layout shown below is similar to the most recent scheme developed for the QEYC site.

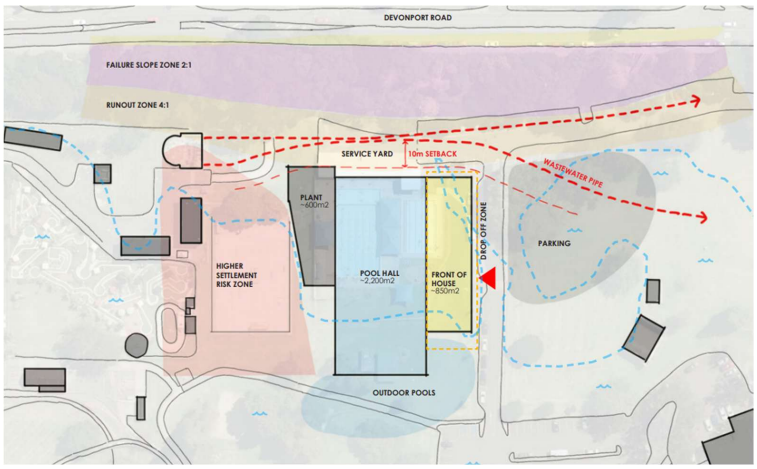


Figure 8: Potential development option

Refer to Appendix D for larger format plans of the above layout option.

The scale, layout and configuration of the proposed centre can be adjusted to suit the actual requirements of the development. The layout above utilises the Western side of the site for services access where the opportunity for buildings is limited due to the existing services and slope runout zone. The existing skate park area is unchanged and provides a buffer to the existing wastewater pump station infrastructure whilst avoiding the higher settlement risk zone. Parking and public entry is located to the North, nearest to the existing site entry off Devonport Road. The potential for outdoor pools is located to the East, nearest the harbour, with an opportunity to terrace the site down to match closer to the natural surface levels of the site.

Based on the feasibility investigations undertaken, the alternate Memorial Pool site has been assessed as a suitable option for the potential development of a new community aquatic centre.

Whilst there are some new constraints related to the development of this site compared with the previously considered QEYC site, these are no more onerous and can be readily overcome through planning and design. An initial building scheme has been developed which shows that an aquatic centre, of a similar scale to the concept previously developed for the QEYC site, can be achieved on the new alternate site.

4.3. NEXT STEPS

Subject to support from TCC, further work is recommended to continue developing a potential Memorial Park Aquatic Centre scheme at the alternate site. Whilst the components of the previous QEYC scheme can all be accommodated on the alternate site, the change in sites provide an opportunity to restart the concept design, with the key project requirements reconfirmed to ensure alignment with scope and budget expectations. Apollo can support TCC through this process by utilising the knowledge developed through previous projects around New Zealand and the previous MPAC scheme for the QEYC site

Key items to be defined:

- Define and prioritise the project requirements, identify what are the minimum requirements, and what is nice to have, subject to the budget expectations
- Set the budget expectations, including any potential staging

Once the scope and budget expectations are defined by TCC, Apollo can continue to develop potential options for the facility based around the constraints for the alternate site. Initially this is expected to be a high-level exercise to broadly agree the scope and budget and may include multiple options. This can then be followed by a more detailed Design and Feasibility (DFR) process once the preferred option is identified. The DFR will fully define the scope, programme and budget for the project.

APPENDIX A – ENGEO GEOTECHNICAL SUMMARY LETTER

APPENDIX B – BECA CIVIL INFRASTRUCTURE REPORT

APPENDIX C – TOPOGRAPHICAL SURVEY PLANS

APPENDIX D – POTENTIAL AQUATIC CENTRE SCHEME PLANS

Sensitivity: General

Memorial Park Aquatic Facility

Feasibility Report for Alternative Site Location: Civils and Traffic

Prepared for Apollo Projects Ltd
Prepared by Beca Limited

2 September 2025

Contents

Sensitivity: General

Appendices

Appendix A - Sketch Plan (Existing Services)

Appendix B – Surveyworx Topographical Survey and Locate Summary Report

Appendix C – Engeo Geotechnical Initial Advice

Revision History

Sensitivity: General

Revision N°	Prepared By	Description	Date
A	Ryan Kendal Alyssa Greaney	Draft issue to Client	07/08/2025
B	Ryan Kendal	Final issue following Client review	29/08/2025

Document Acceptance

Action	Name	Signed	Date
Prepared by	Ryan Kendal Alyssa Greaney		29/08/2025
Reviewed by	Chris Moore		02/09/2025
Approved by	Sean Gledhill		04/09/2025
on behalf of	Beca Limited		

Executive Summary

This civil engineering feasibility assessment provides inputs for a decision-making process regarding the alternative site location for the Memorial Park Aquatic Centre. Should TCC select this site location to develop an aquatic centre, in addition to this summary report, further civil engineering design information has been considered, developed and can be harnessed by Beca to further developing the civil engineering aspects of the design.

The scope of this report includes a high-level assessment of:

- The existing services and physical constraints that may affect the proposed development.
- Traffic implications in terms of parking requirements and vehicle and pedestrian access
- Proposed service connections for aquatic facilities.
- The next steps to develop a site layout proposal.

Notwithstanding the requirement to avoid or deal adequately with the existing site constraints, the site location proposed should be regarded as a feasible alternative to the current location at the Queen Elizabeth Youth Centre (QEYC).

The high-level desktop study in this report can be summarised as:

- The existing Devonport Road / Seventh Avenue intersection is suitable for servicing the development with some local road widening and footpath relocation to facilitate vehicle movement for a 14.5m coach bus. A right turn lane should also be investigated through further traffic modelling. Widening will require some existing services requiring relocation. The access can be considered more suitable than the current location at the QEYC in terms of relative location, safety and future traffic demands.
- Provision can be made for approximately 150 passenger and mobility parking bays by utilising approximately 60 existing bays and an additional 90 bays proposed. Area available for additional parking is more favourable than the QEYC location.
- Protection or relocation of the existing in-ground services in the area provide constraints that require careful consideration and further investigation and development. Of particular importance are the southern wastewater rising mains (2 No.) in immediate proximity to the site as well as the 300 dia. gravity bulk main to the immediate east of the outdoor pools. The QEYC site had similar constraints in dealing with the 1600 dia. incoming southern wastewater line.
- Similar to the QEYC site, the geotechnical considerations are challenging and need to consider recommendations from further study, site investigations and testing. The proposed solutions for building foundations and earthworks fill are also similar in nature with ground improvements and preloading required to facilitate a foundation solution for differential soil settlement and high groundwater levels.
- The proposed pipe connections for wastewater, stormwater and water supply are feasible and similar to the QEYC site solution. Stormwater attenuation is not considered as a requirement due to the proximity to the receiving environment and water quality treatment limited to new impervious areas of road and parking areas using devices such as gross pollutant traps and biofilter landscaping strips. Existing pipe capacities need to be checked with short sections of stormwater and water supply possibly require upsizing. Certain existing pipes are aged and condition assessments are recommended where building over, near or connecting to existing.

Sensitivity: General

1 Introduction

Apollo Projects requested Beca provide a feasibility study for the civil engineering considerations for the proposed alternative site location for the Memorial Park Aquatic Centre. The current location is situated at the existing Queen Elizabeth Youth Centre facility whilst the proposed alternative site is at the existing pools approximately 200m to the north within Memorial Park. Refer to Figure 1 below for locations.

Figure 1 : Site locations

2 References

- Memorial Park Recreation Hub – Concept Report by Beca dated 20 October 2023 (Previous location study)
- Initial Geotechnical Advice – Alternative Site by Engeo dated 19 June 2025
- Southern Pipeline Harbour Crossing As built drawings by Beca dated 07 February 2019
- Stormwater Management Plan for Tauranga CBD by GHD dated 13 January 2023

CODES/ STANDARDS/ GUIDELINES

- TCC Infrastructure Development Code (IDC)
- Tauranga City Plan Operative 9 September 2013
- AS/NZS 2890.1 2004 Parking Facilities Part 1: Off-street car parking

3 Scope of Works

The Civil design scope includes a high-level feasibility study of:

- Existing services in the area and that provide constraints to the development.
- The proposed earthworks and three waters connections for a facility in the proposed location
- Stormwater management considerations for primary, overland flows and water quality treatment
- Transport considerations for access, parking and pedestrians
- Outlining key risks
- Other design and construction considerations
- High level commentary comparing the two site locations being considered

In developing the above and outside of this report, Beca have also assessed the following to inform site feasibility which can be used for further design development:

- creating a basic development footprint surface model for the building, outdoor pool area and surrounding parking areas considering geotechnical, structural and stormwater inputs to inform the feasibility.
- The ground improvement solutions considered as well as excavations for the pool shells to provide high level cut and fill volumes.
- Basic vehicle tracking checks and car parking requirements for the development.

4 Existing Design Features

Refer to the existing services plan sketch no. 5015600-CA-SK001 Appendix A. The services information provided is a combination of MAPI GIS, Before U Dig and recent survey investigations from Surveyworx.

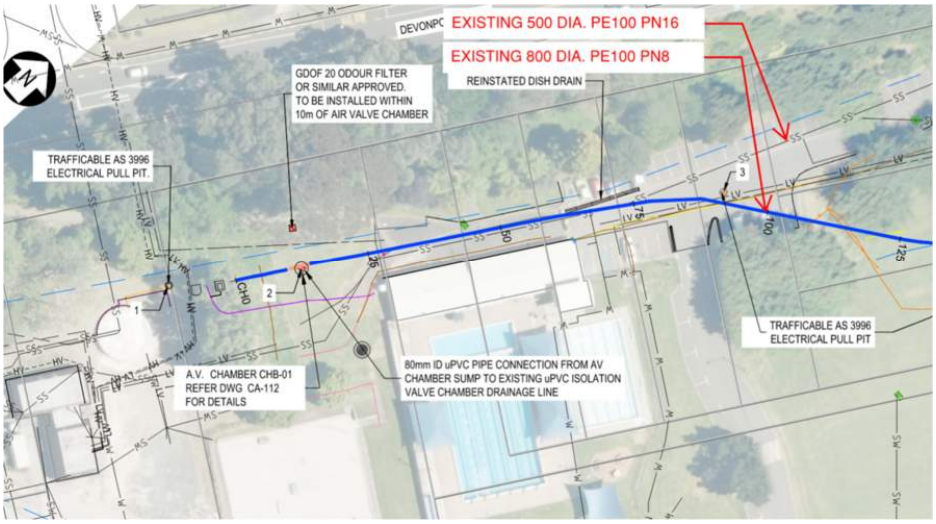
4.1 Wastewater

The existing network within the park is relatively extensive with a series of 100,150 and a 300 dia. gravity pipes feeding into the Memorial Park pump station (PS134). A topographical survey and manhole investigations have been recently done with pipe routings, sizes, materials, invert and lid levels obtained.

There are two existing wastewater constraints currently identified:

- **Constraint 1**: The southern bulk wastewater rising main system (800dia and 500dia. PE100) that exit the TCC Memorial Park pump station (PS134) and run parallel to the existing pools. The 500 dia. runs in a northerly direction towards Tauranga Central to the Chapell St. WWTP and the 800 dia. runs across Memorial Park and crosses under the harbour towards the Te Maunga WWTP. Of particular interest would be the sections immediately behind the existing pools.

  Refer to Figure 2 which provides the GIS Mapi position of the 500 dia and as-built position for the 800 dia bulk rising mains with the invert depths shown in the pipe longitudinal section.



Sensitivity: General

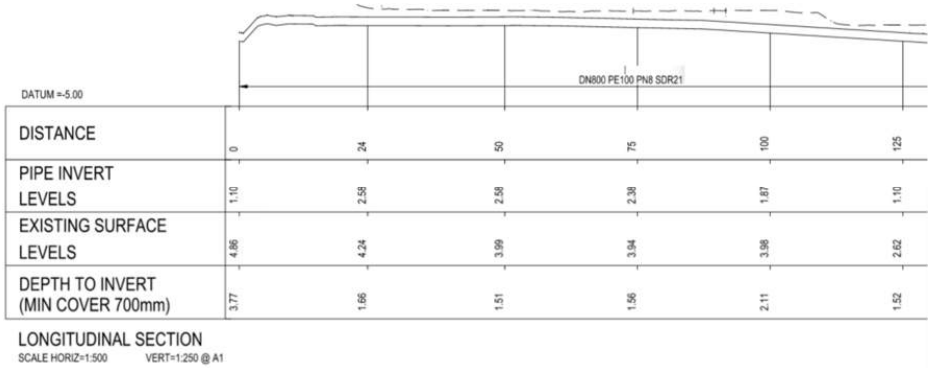


Figure 2: Existing Southern Wastewater bulk mains

Any proposed development needs to take into strong consideration this pipework. The below provides an allowance of 10m minimum approach distance from this service behind the main building and currently provided in the site layout sketches.

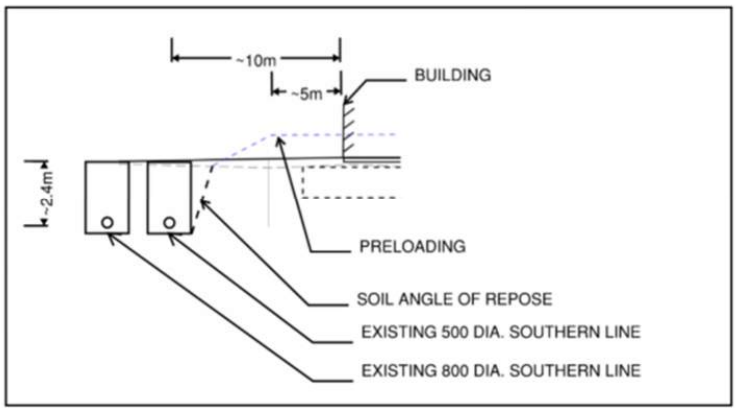


Figure 3: Proposed close approach

Geotechnical inputs will provide the soil characteristics to confirm the suitability of the site which as this stage is given as being similar to the QEYC site. Refer to the geotech statement provided by Engeo dated 24/06/2025 for details.

Tauranga City Council (Wastewater) and Powerco (Electrical) are to be consulted to determine any specific requirements for close approach work for their services particularly in the area behind the existing pools.

Constraint 2: The bulk wastewater gravity main (300 dia RCRRJ) is in close proximity to the east and also important to the network servicing the residential and commercial property blocks to the north between Ninth and Fourth Ave. The pipe section to the east of the pools is relatively aged and laid at a flat grade (~45 yrs RCRRJ @ 1:400) and if relocation or connection into this main is considered, then a condition assessment /CCTV investigation is suggested to confirm suitability and inform any protection measures for close proximity works.

4.2 Stormwater

Refer to 5015600-CA-SK002 Appendix A for the existing stormwater pipework in the area.

The existing pipework within the project extent consists largely of a network of 150/225/375 dia. RCRJJ and PVC pipes at approximately 0.6 – 1,5m depth falling west to east. A series of pipes serve the buildings and roadway at the TCC Wastewater Pump Station (WWPS) and others serve to assist in draining low areas of the existing parking and the landscaped park areas which outfall to the Harbour at two locations near the rowing club.

Refer to the figure 4 below for the existing overland flow paths (OFP's). They flow west to east at three locations across the park, typically as shown by the directional arrows. The 1% AEP RCP 8.5 flood zone as well as harbour inundation exist in the major overland flow areas shown across the park.

1% AEP top water levels (TWL) are also shown (provided by TCC stormwater department) with an approximate existing road level behind the pools as ~4.0m. Allowing 300mm flood freeboard in accordance with Plan Change 27 for flood prone areas for business activities, suggests:

- a building finished floor level (FFL) of ~4.30 RL.
- An external pool area with minimum platform level PL of ~3.00 RL.

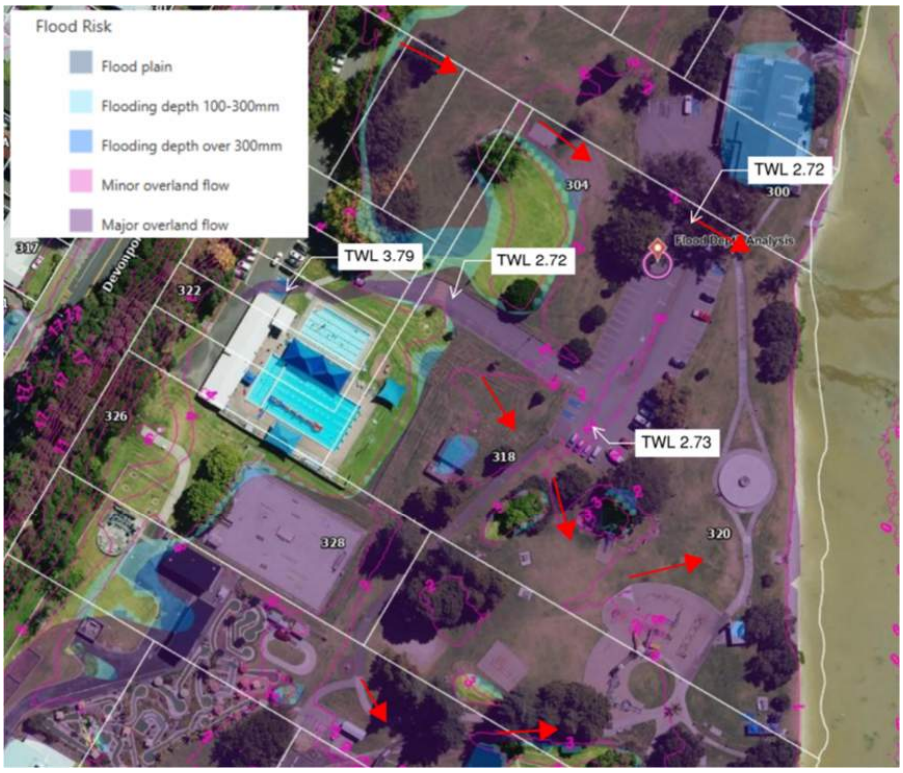


Figure 4: Rainfall Flooding 1% AEP RCP 8.5 with Major Overland Flow Paths

The existing flow paths should be maintained as far as practically possible. To this end, any new roadway connections or alternatively relocation of the existing access to the Rowing club parking area, will need to consider maintaining OFP's and the relative surface levels between the building and surrounding parking area.

4.3 Potable Water Supply

The existing Memorial pools water supply is provided as a 50mm dia PE80 connection at the northern end of the building. This is proposed to be abandoned and replaced with a new connection with details still to be determined.

4.4 Fire supply

Results from the TCC WMOP60 water model were received on 12/09/2023 for the MPRH concept design. A fire flow simulation was run individually and two hydrant locations are marked in the sketch below.

The model shows there is reasonable fire flow availability at each of the hydrants as:

- FH3 - 210 l/s at 10m pressure
- FH4 - 50 l/s at 10m pressure

Further testing locations will be considered at future design stages for MPAC.

Figure 5: Existing watermain flow test locations

4.5 Transport

4.5.1 External and internal roads

Roads adjacent to Memorial Park include Devonport Road, Seventh Avenue and Eleventh Avenue. The road characteristics are detailed in Table 1 below.

Table 1 External Road characteristics[1]

Road name	Average Daily Traffic (2024/25)	% Heavy Vehicles	One Network Framework (ONF) Classification	TCC Road Hierarchy
Devonport Road	12, 600	6.03	**Activity Street** (from Sixth Avenue to Ninth Avenue) **Urban Connector** (from Ninth Avenue to the Devonport	**Secondary Arterial**

[1] Average Daily Traffic volumes are sourced from Mobile Road, ONF is sourced from Mega Maps and TCC Road Hierarchy is sourced from the TCC City Plan.

Road name	Average Daily Traffic (2024/25)	% Heavy Vehicles	One Network Framework (ONF) Classification	TCC Road Hierarchy
			Road/Eleventh Avenue intersection)	
Seventh Avenue (adjacent to Memorial Park)	520	5.03	**Local Street**	**Local Road**
Eleventh Avenue (from Edgecumbe Road to Fraser Street)	17, 200	5.52	**Activity Street**	**Secondary Arterial**

The existing Memorial Park Aquatic Centre has one access road which intersects with Seventh Avenue. The access road also connects to the Tauranga Rowing Club carpark. The speed limit on the access road is 25km/h and there are traffic calming measures along the road such as speed humps and a grassed kerb extension.

4.5.2 Parking

The internal access road has carparking in various locations. The existing parking spaces include:

- Approximately 45 parking spaces along the west side of the access road. This includes two accessible car parks and one campervan park which may be retained
- 15 parking spaces on the east side of the access road. These may be able to be retained dependant on the proposed development layout
- 9 on-street existing access road leading to the Rowing Club carpark which may require removal along with the relocation of the access road.

It should be noted that the carpark spaces immediately adjacent to the rowing club building have not been considered in servicing the proposed site.

4.5.3 Walking, cycling and public transport infrastructure

There are existing walking and cycling facilities in Memorial Park but these lack consistent connectivity throughout the park.

There is a short footpath from the access road to the existing facility. The main footpaths are on the east side of Memorial Park along the waterfront area which connect pedestrians to the north car park, and playground and Tauranga Mini Golf located south. There are no walking/cycling facilities from Devonport Road/Seventh Avenue intersection into Memorial Park. This means users would have to walk on the grass or walk on the road. There is a footpath connecting the Devonport Road bus stops (located near Devonport Road / Eleventh Avenue intersection) with the existing facility.

There are two sets of bus stops along Devonport Road which are serviced by route 1 (*Figure 6*). This route travels from Pyes Pa – Greerton – Fraser Cove – Tauranga CBD and operates every 30 minutes.

Several bus routes also travel along Cameron Road and can also be used by people travelling to and from Memorial Park. Bus stops along Cameron Road are 300 to 500m away. These stops are served by bus routes 59 (Greerton, every hour), 55 (Ohauiti – CBD, every 30 mins), 22 (Papamoa Beach – CBD, every hour), 62 (Bethlehem, every 30 mins) and 71 (Matua – Brookfield – CBD, every 30 mins).

There are three cycle parking spaces at the Rowing Club carpark.

Sensitivity: General

Figure 6 Existing roads, footpaths and parking in Memorial Park

5 Proposed Services/Infrastructure

5.1 Earthworks

The Engeo geotechnical initial advice email dated 16 June 2025 refers.

Limitations in the current modelling are:

- The existing ground surface used is a TCC lidar ground surface which has only been considered suitable for a high-level feasibility study of the terrain. An extension to the detailed topographical survey is still awaited which will be used in any further design development.
- The geotechnical inputs are currently limited to the basic Engeo statement with further investigation required to develop the earthworks solutions.

The key drivers in determination of the proposed platform levels are currently driven by the following factors:

- Surface Flooding mitigation - using existing surrounding road levels and estimated 1% AEP RCP 8.5 top water levels (TWL's).
- The groundwater table – currently assumed as ~1m below existing ground level (EGL) which is subject to additional Piezometer / hydrological study.
- Tie-ins into the existing roadways and existing parking area.

- Preload requirements. This includes an additional footprint of approximately 5m extending past the proposed foundations. Further geotechnical and structural inputs are needed to develop a solution although preload staging should be considered to limit the volume of any imported material need for this operation.
- Harbour flood inundation. Mapi provides an inundation level of ~3.4m RL which noted is currently above into the proposed lowest level of the external pool area and parking.
- Geotechnical soil profiles and ground improvements as described in the Engeo Geotech statement.
- Existing floor levels. These are currently provided as:
    - Existing pool building and changerooms ~ RL 3.75m
    - Outdoor Pool surround – RL 3.60m
- Structural foundation requirements including any ground improvement layers

External retaining walls should be kept to a minimum and could be engineered out in further design development.

Sheet piling should be considered during construction to assist in dealing with high groundwater levels as well as the existing services proximity constraints.

Further refinement in subsequent design stages is needed to optimise the cut-fill balance and manage earthworks volumes. The bulk earthworks outcomes and inputs from a geotechnical factual report can significantly impact the project outturn cost.

Finished surface levels should allow for a 300mm freeboard above the 1% AEP TWL's for a RCP 8.5 (2130) flood scenario for commercial buildings.

Pre and post construction erosion control should be a priority with existing sheet flows not altered to concentrated flows. An erosion and sediment control plan should be provided for TCC approval prior to construction.

TCC Mapi data shows a portion of the development impacted by coastal erosion which will need to be considered in further development stages.

A geo-referenced site plan will need to be developed in the next stage of design to confirm the bulk earthworks volumes.

5.2 Stormwater Management

Stormwater design from building to site connection point will be designed in accordance with the Tauranga City Council Infrastructure Development Code (IDC) part DS-5 as well as the applicable New Zealand design standards for stormwater design.

The primary and secondary stormwater discharges will flow across the site in a general west to east direction towards the Harbour. Primary flows will be designed for and connect to a series of existing pipes within the park at two locations. The Surveyworx and TCC GIS information show the connections are possible with manhole modifications. Any proposed pipe upgrades or relocation of existing pipes will be based on a developed architectural layout and any additional impervious areas.

Primary system

The proposed primary stormwater system is conceptualised as a similar solution to the QEYC site as:

- Roof water: As far as practically possible, rainwater harvesting should be considered through the use of rainwater tanks and utilised within the facility. Rainwater tanks can also assist in detention and any existing downstream pipework with capacity constraints.
- Roads/paving and carparks: It is proposed that a combination of existing and new sumps capture the existing and new roadway, paving and parking areas for the Q10 flows prior to connection to the existing pipe network.

Stormwater Quality treatment (WQT)

WQT should be accommodated in accordance with the IDC guidelines and the existing network discharge consent requirements, where applicable. It is proposed that the water quality flow from existing and new roadway, paved and parking areas servicing the facility are collected and treated:

- Using a treatment at source and treatment train approach as far as practically possible.
- Paved and parking surface runoff is collected and passed through biofiltration devices for such purposes. A treatment swale is a preferred solution through the park areas
- If required, mechanical devices such as a gross pollutant trap may also be considered as an alternative.

Due to the proximity of the harbour receiving environment, no on-site attenuation is proposed. The existing overland flow paths downstream of the development are maintained through the existing swales and the footpath through the playground and towards the harbour.

Design assumptions should typically be:

- Primary flow considered as a 10% AEP storm event
- Minimum hydraulic residence time for WQF of 9 minutes for infiltration swales (DS-5.5.15.1)

Secondary system

The secondary stormwater overland flow paths can be described as:

- Retaining the current OFP's across the park as much as practically possible.
- Freeboard requirements for building floor levels for flood mitigation above the 1% AEP rainfall event is taken as 300mm for commercial buildings.
- Avoiding new concentrated flows. Maintain the existing OFP between the skatepark and the new building creating a shallow swale and then dissipating flows towards the Harbour through the playground. Flows to the north of the site currently flow through the carparks and then directed to the into the general landscaped contouring of the park towards the Harbour. Although there is emphasis in retaining the current overland flow paths as far as practically possible, a new swale and berm combination can be utilised directing overland flows from the service area behind the facility between the existing WWPS and the proposed plant room as indicatively shown below.

- The OFP through the rowing club parking area should be retained directing flows via the new access road.

Being in the flood prone area, depth x velocity and the compliance with stormwater design requirements in this regard will need consideration.

Due to the high-water table on site, subsoil drainage beneath the proposed building should be considered to reduce water pressure in the soil. The groundwater table across the developed site is currently assumes as being on average approximately 1.0 metre below the existing ground level.

5.3 Wastewater

The proposed wastewater connections should be relatively simple with existing capacity and falls being feasible. Similar to the QEYC site, wastewater demand will be in accordance with TCC IDC DS-6 and the building sanitary ware and pool plant requirements.

Wastewater attenuation may be required to control flow to sewer during the maintenance process. This could potentially include temporary storage tanks within the facility throttling flows to the downstream waste lines to avoid surcharge when the pools are annually drained for maintenance.

Water quality from pool drainage to sewer needs to consider any impact pool dosage chemicals may have on the downstream pipework, particularly the RCRRJ pipes.

5.4 Water Supply

Water Supply design from building to site connection point will be designed in accordance with the Tauranga City Council Infrastructure Development Code (IDC) part DS-7 as well as the applicable New Zealand design standards for water supply design and the New Zealand Building Code G12.

The civils works comprises of:

- Abandoning or uplifting of existing watermains under the new buildings.
- Provision of a new site connection and supply main to the new building for potable and fire supply.

- Relocation of any watermains supplying the rest of the park falling under the new buildings.

The existing pool site connection is a 50mm diameter AC watermain to the building from the north. This should be abandoned or uplifted in accordance with asbestos removal requirements and a new connection provided. The existing 100 dia main should be checked for existing pressure and flows however should be currently suitable for connection purposes

Similar key design requirements to the MPRH site are:

- Operating pressure of 300kPa – 800kPa at the point of supply will need to be achieved.
- Fire flow as 3300 l/min

A separate fire connection should be considered from the mains in Devonport Rd should the required fire flows and pressure not be achieved with the existing 100 dia. pipe.

5.5 Transport

5.5.1 Access

The existing access road to the pools is a 6m wide two-way asphalt surfaced public roadway with sections available for on-street perpendicular parking. Drainage is provided through recessed sumps and small diameter pipes connecting to the existing park drainage. It is anticipated that the existing roadway layout is suitable for the proposed facility for both public and servicing needs. The existing road pavement should be checked for present condition and suitability to accept any additional traffic loading that the new facility may require eg: pool maintenance vehicles.

5.5.1.1 Devonport Road/Seventh Avenue Intersection

It is assumed that a 14.5m school bus would be utilised for school trips. All movements in and out encroach on the existing intersection and traffic lanes.

The previous Memorial Park Recreational Hub (MPRH) feasibility study identified Eleventh Avenue as the main access point to the proposed facility however, the alternative location uses proposes the Devonport Road/Seventh Avenue intersection as the main entrance. As mentioned in section 4.5.1, Eleventh Avenue is classified as a Secondary Arterial and movements are generated to the west (Bethlehem, Judea etc), east (Welcome Bay, Pāpāmoa etc) and south (Greerton, Tauriko etc) suburbs in Tauranga. Seventh Avenue, however, is a local road with low traffic volumes and currently only accesses housing and the Memorial Park waterfront.

Vehicle movements are likely to be generated from across the City. It is important to note the Devonport Road / Seventh Avenue intersection does not have any facilities for right-turn movements (right turn bay etc). The intersection is located in between two vertical crests which may also create safety issues with vehicles travelling high speeds down both crests and other vehicles stopping to turn into Seventh Avenue.

Accessing the site via Seventh Avenue is more challenging as a vehicle needs to do right turns into the site without a right turn bay or exit without flushed medians. In comparison, a right turn bay and flushed medians are provided at the Eleventh Avenue access.

Changes at the intersection may be necessary to safely accommodate traffic movements. This will need to be defined in future.

5.5.2 Parking and Pedestrian Access

The Memorial Park Recreational Hub (MPRH) feasibility study recommended 150 parking spaces which is used as a benchmark for this facility.

Additional parking is required to meet the recommended 150 parking spaces required. This may be proposed as follows however not necessarily the only solution but rather indicative:

- The existing access road providing approximately 23 new parking spaces while retaining the trees.
- Additional parking provided in the immediate vicinity within the park.

6 Other Design Considerations

6.1 Geotechnical

A preliminary geotechnical assessment for the alternative site has undertaken by Engeo with site investigations undertaken on 3 June 2025. Refer to A

Summarizing the key findings related to the civils infrastructure:

- The ground conditions for Option 3 are very similar to the QEYC location and the conclusions and recommendations are also likely to be very similar in nature and magnitude.
- Consolidation settlement is a key risk will need to be considered due to the existing soft silts/clays (Estuarine Muds).
- The placement of fill will cause settlement with risk to proposed structures. The existing fill material is not considered suitable for new fills.
- The placement of fill, dewatering and other construction related processes may impact the existing infrastructure in the area.
- By relocating the development there may be an opportunity to reduce the geotechnical risks however it is unlikely that relocation alone will mitigate these.

6.2 Survey Inputs

A topographical survey was undertaken in September 2023 for the existing QEYC facility which can be used for assessing further design stages for the Option 3 location. This survey will need to be extended further northwards to include the entire development area

Existing underground services investigations will be required to confirm the current design assumptions.

7 Construction Considerations

7.1 Demolition and soil contamination

The development currently requires demolition of the existing pool facility which includes foundations and top structure, concrete pool shells, slabs, existing pipework and fittings, tanks and other equipment which will need to be removed off site.

A separate assessment is currently being undertaken by TCC to determine the extent of possible water leaks from the existing pools, pipes or equipment. Areas of soft soils may be encountered as a result and removed or dealt with accordingly.

Abandoned pipework is evident and identified in the Council Mapi GIS system with asbestos or other hazardous materials possibly encountered.

The Bay of Plenty Regional Council Maps GIS does not include as a HAIL site.

7.2 Dewatering

Due to the close proximity to the harbour, a high ground water table will be a similar factor to consider. Sheet piling and suitable dewatering solutions should be considered when excavating for the ground foundations in wet conditions.

7.3 Staging and Preloading

In a similar fashion to the previous location, a staged approach may be considered during construction. This includes placement of any preload material with an area extending approximately 5m beyond the building/fill footprint.

7.4 Existing geothermal bore

Refer to Appendix B for the location of the existing TCC owned geothermal bore and the associated structures in the proposed area. The bore is planned to be decommissioned with the timing and all other associated factors considered when locating option 3 relative to these works. A hydrogeological study for the bore should include these considerations.

8 Risks

8.1 Key project risks

Earthworks:

- Cut and fill requirements should be established at an early design stage. The requirement for any large volumes of imported fill should be minimised.
- The proposed founding conditions for structures and buildings requires consideration in dealing with differential settlement which will involve close co-ordination between geotechnical, structural and civil disciplines.

Stormwater:

- Stormwater overland flow paths: Desktop analysis in this design stage has identified proposed overland flow paths around buildings and across parking areas towards swales directing flows to the receiving harbour. This concept can be developed further but needs to consider the stormwater management principles of:

a) Maintaining adequate freeboard above the 1% AEP RCP8.5 flood scenario for buildings

b) Maintaining the required depth x velocity considerations

c) Displacement effects from the new building and the external pool platform area in concentrating overland flows

- High Groundwater table: Ongoing Piezometer readings should be assessed for a more accurate assessment of the groundwater levels to determine:

a) the final levels of the building, plant room and pools

b) buoyancy effects on structures

c) dewatering considerations during construction

Wastewater:

- The IDC requires any new manhole located within the stormwater overland flow path to be either raised 500mm above the 1% AEP level or the lids adequately sealed. This will require further design consideration.
- Depending on the pool filtration, maintenance and cleaning requirements, wastewater attenuation may be required to control flows to sewer. This would potentially include temporary storage tanks throttling flows to the downstream waste lines to avoid surcharge when the pools are periodically drained.
- The existing critical wastewater main pipework identified in constraints 1 and 2 (rising mains and bulk gravity line) are within the vicinity of the site location and will require careful consideration in building near or across these services.

Further consideration is required in future design for:

- The impacts the development provides for the existing TCC southern pipeline and bulk gravity main infrastructure.
- The existing pipe network capacities need to be checked for acceptance of any additional development flows.
- Existing services information i.e.: underground services investigations and topographical survey needs to confirm current assumptions for proposed connections.
- Floatation of pipes and chambers that are below the groundwater table.
- Existing and proposed stormwater overland flow paths require further design development and co-ordination with the overall stormwater management and TCC stormwater modelling.
- Management of groundwater – groundwater levels require confirmation through further piezometer analysis. Consider floatation of pipes and chambers that are below the groundwater table.
- A comprehensive construction management plan will be required in dealing with the above physical constraints

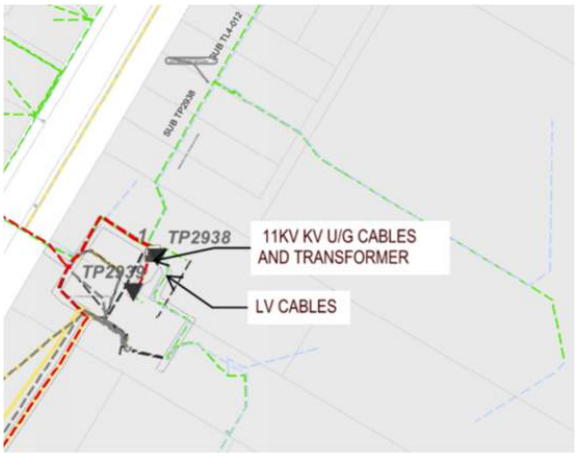
Water:

- An upgrade of the existing 100 dia PE80 watermain at the site connection point may be required dependant on pressure and flow test results.
- Water demand over a year period generally fluctuates for aquatic centres and requires consideration in the design.

Sensitivity: General

Electrical:

- There is currently existing electrical infrastructure which falls in close proximity to the proposed location. The record of title 132228 outlines an easement for the right to convey electricity in favour of Powerco for the services as indicated on drwg no. 5015600-CA-SK002 who should be contacted in this regard.



Transport

- There is an opportunity to integrate the pedestrian walkways inside Memorial Park to the existing walkways and cycle paths along Devonport Road.
- There are potential safety risks at the Devonport Road/Seventh Avenue intersection as mentioned in section 5.5.1.1 and an intersection upgrade may be necessary.

9 Recommendations

9.1.1 Transport

- Devonport Road/Seventh Avenue intersection may require an intersection upgrade i.e. right turn bay to reduce queuing and enable right turn in movements. This will depend on the expected turning volumes into the access and can be further investigated when the design of the facility is developed. This may also mean bus stops and car parking need to be moved.
- The existing roadway connecting the access road to the pools with the rowing club parking intersects the site and may require relocation northwards.
- Any proposal tranffic circulation within the site will need to accommodate the 14.5m tour bus access and movements including pick up and drop off.
- Up to 150 parking spaces are recommended as per the previous MPRH feasibility study. The following recommendations aim to achieve this (and visualised in Appendix A) and should be addressed in the next stage of design;
  - The existing access road from Devonport Road/Seventh Avenue intersection to the Facility may accommodate approximately 22 parallel parking spaces east and 13 west of the road, located between the trees.

  - The existing parking east of the access road near the Facility entrance can be retained and it is recommended to be extended to accommodate approximately 13 parking spaces.
  - Additional proposed carparking outside the facility could accommodate the approximately 100 parking spaces required.
  - There are no specific required bicycle parking spaces as per the City Plan, but these should be integrated in the next stage of design. There are approximately 17 cycle parking spaces currently available within the wider Memorial Park.
- Accessible parking requirements per Tauranga City District Plan:
    - At least three accessible car parking spaces are required (refer to Section 4B.2.4 and NZ Building Code), noting this is the minimum space requirement and the new location removes two of the approximately 15 accessible parking spaces currently available in the wider Memorial Park. These should be located in the proposed car park close to the Facility's entrance.
- Improved pedestrian connectivity between the proposed Facility and the proposed and existing car parks should be incorporated in the next design stage as indicated in Appendix A.

9.1.2 Civils

- Consideration should be given to the position of the building and exterior areas and parking to provide sufficient clearance or protection of the bulk wastewater infrastructure as described in Section 4.1.
- Develop the stormwater management recommendations to concept stage.
- Optimization of bulk earthworks to minimize any imported fill requirements.
- Undertake underground services detection and the additional topographical survey required to cover the entire development area.
- Assess and develop any retaining wall requirements.

9.2 Next steps

- Develop the architectural design and update the site layout incorporating the civil and transport considerations identified.
- Complete an Integrated Transport Assessment for the transport infrastructure at Devonport Road/Seventh Avenue intersection, car parking, walking and cycling facilities.
- Provide a geotechnical study and investigations to inform further concept designs.
- Stormwater flood modelling inputs provided for the developed site and then incorporated into the broader TCC catchment model for analysis.
- Initiate any other discipline concept studies.
- Engage with stakeholders and TCC representatives to discuss project viability, opportunities and risks.
- TCC Arborist or appointed specialist to comment on tree retention or removal as well as any new road seal or construction impacts on existing tree health.

A

Appendix A –Sketch Plan Existing Services

B

Appendix B - Surveyworx Topographical Survey/ Locate Summary Report

C

Appendix C – Geotechnical Advice

Drawing Plotted: 12:41 pm

EXISTING 800 DIA. WW RISING MAIN (2018) - IMPACTS TO BE ASSESSED

EXISTING TREE IMPACTS ON ACCESS POSITION TO BE DETERMINED AT CONCEPT STAGE

EXISTING 300 DIA. WW GRAVITY RCRRJ (1981) - IMPACTS TO BE ASSESSED. PROTECTION, AVOIDANCE OR RELOCATION

EXISTING 11KV HV ELECT. CABLES AND TRANSFORMER REQUIRING AVOIDANCE, RELOCATION OR CLOSE APPROACH CONSENT. POWERCO TO BE CONTACTED

EXISTING LV ELECT. CABLES REQUIRING AVOIDANCE OR RELOCATION. POWERCO TO BE CONTACTED

THE AVENUES- METLIFECARE RETIREMENT

DEVONPORT ROAD

LEGEND:

EXISTING

- BOUNDARY
- FENCE
- BUILDING
- TOP OF BANK
- BOTTOM OF BANK
- SLOT DRAIN
- VEGETATION
- GARGEN/GRASS
- EDGE OF SEAL
- RETAINING WALL
- STORMWATER
- SUBSOIL DRAIN
- SANITARY SEWER
- ABANDONED SANITARY SEWER
- WATER
- GAS
- COMMUNICATION
- CHORUS CABLE
- HIGH VOLTAGE UNDERGROUND
- LOW VOLTAGE UNDERGROUND
- FIBRE OPTIC
- VOCUS CABLE
- TCC TMN NETWORK (TELECOMS)
- SERVICE DUCT

- STREET LIGHT
- WATER TOBY
- SIGN
- UTILITY MARKER
- HYDRANT
- WATER METER
- POWER BOX
- GULLY TRAP
- FENCE GATE
- BARBEQUE FACILITY
- DOWNPIPE
- SS MANHOLE
- SW MANHOLE
- VALVE
- CATCHPIT
- PUMP
- BOLLARD
- POST
- LIGHT BOLLARD
- TREE

PROPOSED

- EXISTING SERVICE-TO BE RELOCATED, DEMOLISHED OR ABANDONED IN PLACE

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING INDIVIDUAL SERVICE AUTHORITY PERMITS TO WORK IN CLOSE PROXIMITY TO THE ASSETS OF THOSE AUTHORITIES.
2. RELOCATION/UPGRADING OF GAS, FIBRE, COMMUNICATION AND ELECTRICAL SERVICES ARE TO BE CONFIRMED WITH SERVICE PROVIDERS BY CONTRACTOR.
3. WHERE THE CONTRACTOR ENCOUNTERS/ EXPOSES EXISTING SERVICES, THE CONTRACTOR SHALL BACKFILL THE TRENCHES TO THE RELEVANT SERVICE OWNERS TRENCH DETAILS INCLUDING MARKER TAPE ABOVE THE SERVICE. THE INFORMATION OF THE SERVICES SHALL BE RECORDED ON AN AS BUILT AND SUPPLIED TO THE RELEVANT SERVICE OWNER.
4. THE CONTRACTOR IS RESPONSIBLE TO REPAIR ANY DAMAGE CAUSED TO SERVICES DURING CONSTRUCTION (REPAIR TO BE APPROVED BY THE SERVICE OWNER).
5. ABANDONED SERVICES ARE TO BE REMOVED AND TRENCH BACKFILLED WITH HARDFILL UNLESS NOTED OTHERWISE. SERVICES THAT HAVE BEEN ACCEPTED FOR ABANDONMENT IN THE GROUND TO BE BLANKED OFF AND CAPPED AT EITHER END.
6. THE CONTRACTOR IS TO PROVIDE THE ENGINEER WITH A CONSTRUCTION MANAGEMENT PLAN PRIOR TO CONSTRUCTION FOR APPROVAL. THIS SHOULD INCLUDE DETAILS OF HOW ALL EXISTING SERVICES ARE TO BE LOCATED AND PROTECTED DURING CONSTRUCTION.
7. UNDERGROUND SERVICES LOCATION INVESTIGATIONS SHOULD BE UNDERTAKEN AS WELL AS CONDITION ASSSESSMENTS FOR THE BULK WASTEWATER MAINS FOR THE ENGINEER'S REVIEW.
8. THE EXISTING SERVICES INFORMATION PROVIDED IS GATHERED FROM BEFORE U DIG AND TCC MAPI GIS. THE ACCURACY AND CONTENT IS PROVIDED FOR THE PURPOSES OF THIS STUDY ONLY AND NOT ALL SERVICES ARE NECESSARILY SHOWN.

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	FINAL ISSUE TO CLIENT	ZD	RK		02.09.25
A	ISSUE FOR CLIENT REVIEW	ZD	RK		16.07.25

Original Scale (A1) 1:750
Reduced Scale (A3) 1:1500

Design	Z.DLAMINI	16.07.25	Approved For Construction*
Drawn	A.GREANEY	16.07.25	
Dsg Verifier	C.MOORE	16.07.25	
Dsg Check	R.KENDAL	16.07.25	Date

* Refer to Revision 1 for Original Signature

Beca

Client: Apollo PROJECTS

Project: MEMORIAL PARK AQUATIC FACILITY ALTERNATIVE SITE FEASIBILITY STUDY

Title: EXISTING SERVICES

Discipline: CIVIL ENGINEERING

Drawing No.: 5015600-CA-SK002 Rev.: B

DO NOT SCALE FOR SET OUT DIMENSIONS

www.beca.com

ORIGINAL IN COLOUR

www.beca.com

Document No.: 5015600-CA-SK002.DWG

Project Name	**Memorial Park Aquatic Centre**		
Project Manager	Mike Naude		
	6 November 2024	0.1	Reviewed and updated

UPDATED BY ROZ			Inherent Risk Assessment				Residual Risk Assessment				Risk Response Action Plan	
Risk Name	**Risk Description**	**Risk Status**	**Likelihood Score**	**Consequence Score**	**Inherent Risk Rating**	**Risk Controls**	**Likelihood**	**Consequence**	**Residual Risk Rating**	**Risk Reponse**	**Action Required**	**Action Update**
Name of risk	[Cause] may lead to/leading to **[Uncertain Event (Risk)]** resulting in [Effect].	Select from drop-down list	Select from drop-down list	Select from drop-down list	Red - Critical Yellow - High Green - Moderate Blue - Low	List existing plans, processes, procedures etc. that reduce the likelihood or consequence	Select from drop-down	Select from drop-down	Red - Critical Yellow - High Green - Moderate Blue - Low	Select from drop-down	Describe action	DD/MM/YY - Progress since last update.
Health and safety in design	Failure to consider **health and safety in design** resulting in loss of life, multiple serious harms, permanent severe disability as a result of design failures / implications, regulatory intervention or prosecution, financial implications for remediation, ongoing reputational damage or unbudgeted maintenance costs.	Active	Almost Certain	Severe		Follow HSW05-SD01 TCC's HSW Contract Management Standard (A14109416) Refer to HSW05-GL02 TCC's Health and Safety by Design Guideline (A13578425)	Rare	Severe		Treat	Follow SID guidelines Conduct SID workshops during design phases Risk workshop completed with Apollo 16/07	Follow SID guidelines Conduct SID workshops during design phases Risk workshop completed with Apollo 16/07
Risk of high level change in strategic direction.	Potential for programme delays with achievement of strategic outcomes, financial, service delivery to community, organisational capability and capacity, and reputational consequences.	Active	Almost Certain	Severe		- Clear documentation of business case, functional design specification and decision making required to support the project as it progresses. - Maintaining project delivery and progress against programme.	Likely	Significant		Treat	To be updated regularly. Refer Council meeting 17 Sept. Workshop & reports to Councillors to refine & confirm scope to be held in October.	To be updated regularly. THIS PROJECT IS CURRENTLY ON HOLD PENDING OUTCOME OF COUNCIL MEETING 12 NOVEMBER 2024.
Risk of programme delays [Project].	This risk would impact achievement of strategic outcomes, financial, service delivery to community, organisational capability and capacity and reputational consequenece categories. For example, - Delays would extend design / construction duration, deferring opening and operation - making achievement of strategic outcomes, service delivery to community, organisational capability and capacity and reputational consequences likely. - The financial impact of construction escalation for a project of this scale is significant, any programme delays at any point in the project will have a significant cost impact. The additional risk of losing programme momentum is that it becomes exponentially difficult to regain momentum and maintain the teams interest - as an example a delay to extensively review options to bring project cost down could incur a greater cost than potential savings.	Active	Almost Certain	Significant		- TCC and Bay Venues to have an ongoing role in project governance to reduce the risk of suprises and streamline decision making. - TCC, Bay Venues, mana whenua and stakeholders to be kept regularly aware of when in the project process their input will be required, and the significant cost impact of programme delays.	Almost Certain	Significant		Treat	To be updated regularly Project delayed due to project interdependcies eg extreme seismic strengthening work for 483 Cameron Road has delayed MPAF. Changes to political environment has also created delays due to changes in decision making process and reprioritisation.	To be updated regularly Project delayed due to project interdependcies eg extreme seismic strengthening work for 483 Cameron Road has delayed MPAF. Changes to political environment has also created delays due to changes in decision making process and reprioritisation.
Risk of functional design specification scope change or extended optioneering.	Potential for scope creep leading to programme delays and increased cost.	Active	Almost Certain	Severe		- Clear business case and functional design specification to be developed by design team in consultation with TCC, Bay Venues, mana whenua and stakeholders, and approved by TCC. - Change control process to be implemented to assess and manage potential changes. - Regular cost estimate updates to confirm architectural scope remains within the budget.	Likely	Moderate		Treat	To be updated regularly Scope is likey to be reduced.	To be updated regularly Scope is likey to be reduced.

Risk of protracted project approvals process.	This risk would impact achievement of strategic outcomes, financial, service delivery to community, organisational capability and capacity and reputational consequenece categories. For example, - Delays would extend design / construction duration, deferring opening and operation - making achievement of strategic outcomes, service delivery to community, organisational capability and capacity and reputational consequences likely. - The financial impact of construction escalation for a project of this scale is significant, any programme delays at any point in the project will have a significant cost impact. The additional risk of losing programme momentum is that it becomes exponentially difficult to regain momentum and maintain the teams interest - as an example a delay to extensively review options to bring project cost down could incur a greater cost than potential savings.	Active	Almost Certain	Significant		- Project Control and Steering Groups to be established with terms of reference and clear levels of delegated authority. - Delegations and approvals process to be articulated clearly to the design team so they can plan resources appropriately. - Project Sponsor to be confirmed.	Likely	Moderate		Treat	Board approval has been obtained. But now require Council approval, which is currently being reported on.	Board approval has been obtained. But now require Council approval, which is currently being reported on. THIS PROJECT IS CURRENTLY ON HOLD PENDING OUTCOME OF COUNCIL MEETING 12 NOVEMBER 2024.
Risk operational expense impact is higher than anticipated.	Potential impact on rates and user costs resulting from: - Insufficient focus on and assessment of whole of life costs, or - Cost escalation e.g. utility costs.	Active	Almost Certain	Significant		- Project team to complete life cycle costing exercise to inform design options e.g. selection of materials and equipment to optimise operation and maintenance costs. - Procurement of utilities companies to consider competitive rates.	Possible	Moderate		Treat	01/10 In ongoing discussion with Bay Venues to discuss operation needs Energy reports submitted by Beca, Project team to review the reports.	01/10 In ongoing discussion with Bay Venues to discuss operation needs Energy reports submitted by Beca, Project team to review the reports.
Risk of programme delays resulting from partner and stakeholder engagement.	Conflicting / competing / changing stakeholder requirements lead to conflicting requests, redesign and delays, and associated cost impacts.	Active	Almost Certain	Significant		- Stakeholder Engagement Plan. - Dedicated Stakeholder Engagement Manager. - Change Management process.	Unlikely	Moderate		Treat	01/10 Ongoing engagement with stakeholders. Two engagement meetings held on Sept.	01/10 Ongoing engagement with stakeholders. Two engagement meetings held on Sept.
Risk of insufficient capability and capacity of experts - internal and external.	Resourcing is critical to maintaining the project programme and ultimately to achieving strategic outcomes and service delivery to community.	Active	Almost Certain	Significant		Advanced planning of resource requirements and communication to those resources to enable suitable scheduling of their input.	Unlikely	Moderate		Treat	To be updated regularly	To be updated regularly
Cost impact of Sustainability initiatives / Framework	Sustainability initiatives may result in higher capex	Active	Almost Certain	Significant		- Identification from Project Team to budget from Day 1 - Project team aware of requirements - Design to be able to meet sustainable environmental requirements - Independent Commissioning Agent (ICA) initiatives - Business case to evaluate initiatives	Almost Certain	Minor		Treat	Working towards 5 star Greenstar rating in accordance with Central Govt guidelines & TCC policy. Risk mainly tied to potential budget increase.	Working towards 5 star Greenstar rating in accordance with Central Govt guidelines & TCC policy. Risk mainly tied to potential budget increase.
Disruption to existing Park users, poor customer experience during construction	- Construction and demolition works commenced, restricting access to certain areas.	Active	Almost Certain	Significant		- Design Interface staging and sequence to be understood by all stakeholders. - Communication of impacts to users undertaken early with mitigation strategies noted.	Almost Certain	Significant		Treat	01/10 Only minor disruption with geotech & bore testing. No major works onsite yet.	01/10 Only minor disruption with geotech & bore testing. No major works onsite yet.
Delay in Resource & Building Consent approval, then there will be a delay in programme and additional costs for redesign if required	Capacity contraints at TCC & BOPRC to process applications Incomplete and or non compliant applications 3rd party reviewing consents Sequencing of consents	Active	Almost Certain	Significant		- Pre-application meeting and identification of consenting staff and key account manager - Documenting agreed requirements - consenting completed as soon as possible - Regular communications as consenting progresses	Likely	Significant		Treat	01/10 Pre app will be held with the BCA and Regional Council once design finalised	01/10 Pre app will be held with the BCA and Regional Council once design finalised

Risk of very late and influential changes resulting from stakeholder feedback.	Potential for stakeholders to provide feedback that isn't adopted, and that they leverage new council to make late changes. This would cause programme delays and increased design and construction costs. Scope is clearly defined and accepted within the feasibility studies and scope changes currently being discussed include increased budgets.	Active	Almost Certain	Significant		- Clear business case and functional design specification to be developed in consultation with TCC, Bay Venues, mana whenua and stakeholders, and approved by TCC. - Careful management of stakeholder expectations required. - Feedback to be given to stakeholders to keep them informed of decisions made and rationale. - Clear documentation of decisions made to support the project as it progresses. - Change control process to be implemented at commencement of concept design stage.	Likely	Moderate		Treat	01/10 Ongoing engagement with stakeholders. Two engagement meetings held on Sept.	01/10 Ongoing engagement with stakeholders. Two engagement meetings held on Sept.
Risk of insufficient geothermal capacity and consenting risk.	Further to the capacity risk which requires investigation, regional consents are for 10 years which presents an operational risk of the consent not being renewed should geothermal be progressed.	Active	Almost Certain	Moderate		- Geothermal capacity to be investigated. - Potential to negotiate a longer consent with the regional council, however it is anticipated that some residual risk would remain.	Unlikely	Moderate		Treat	01/10 Testing will be done on exisiting bore to get more information regarding capacity. Test dates booked first week of september.	01/10 Testing will be done on exisiting bore to get more information regarding capacity. Test dates booked first week of september.
Resilience risk of poor ground conditions with ground water, risk of storm surges and inundation.	Further to the financial risk, there is a health and safety risk relating to the risk of storm surges and inundation particularly during construction.	Active	Almost Certain	Moderate		- Further site investigations required, design team to design suitable solution. - Consider peer review of solutions for key design matters.	Possible	Moderate		Treat	Site investigation undertaken, design to accommodate ground conditions	Site investigation undertaken, design to accommodate ground conditions
Risk of inconsistent mana whenua engagement across TCC projects.	Mana whenua are seen as a project partner, engagement approach to be consistent with other TCC projects.	Active	Almost Certain	Moderate		- Memorandum of understanding is being established to support consistent mana whenua engagement. - Refer to Stakeholder Engagement Plan	Unlikely	Moderate		Treat	01/10 Mana Whenua will be engaged further into the project	01/10 Mana Whenua will be engaged further into the project
Risk that the facility does not achieve both user and operator requirements.	Not achieving operator and user requirements would be expected to have financial impacts, for example increased life guard staffing requirements and reduced facility usage. It would also be expected to have service delivery to community and reputational consequences.	Active	Almost Certain	Minor		- Clear business case and functional design specification to be developed in consultation with TCC, Bay Venues and stakeholders. - Project manager to monitor and track development of the design in accordance with the functional design specification.	Unlikely	Significant		Treat	01/10 Ongoing engagement with stakeholders. Two engagement meetings held last on Sept.	01/10 Ongoing engagement with stakeholders. Two engagement meetings held last on Sept.
Contingency Risk	- Tauranga market pricing might be higher than anticipated - Tight subcontractor market with high demand - Consideration of local/social procurement targets - Design development process	Active	Almost Certain	Significant		Regular discussions with contractor on procurement progress and concerns - Monitoring of variations and cost recovery with a focus on delivery within budget - discussions on financial risk / position at PCG	Possible	Moderate		Treat	To be updated regularly	To be updated regularly
Delay due to code compliance and public use certificates	- Contractor planning/performance	Active	Almost Certain	Significant		- Early engagement with TCC & BOPRC regulatory Team and Contractor planning - Contingency in programme - identification of all requirements and tracking of completion - Temporary Certificate of Public use (CPU)	Possible	Moderate		Treat	To be updated regularly	To be updated regularly
Interface with other work packages / Masterplan work packages	- Minimal interface / demarcation lines not agreed. - Lack of understanding around scope - Poor coordination which leads to re-work / impacts overall design.	Active	Almost Certain	Significant		- Regular interface meeting scheduled on a fortnightly basis to discuss design / construction status. - Clear hierarchy of decision making, keep everyone informed of what is happening	Unlikely	Minor		Treat	To be updated regularly	To be updated regularly
Archaelogical discovery	- Historical/archaeological discovery during earthworks or excavation phase	Active	Almost Certain	Significant		- Heritage NZ archeological authority - Undertake heritage review early before site works. - Discuss protocols with Iwi - Review procurement options to include early bulk earthworks package to minimise risk to Main Contract from delays due to accidental discovery.	Possible	Moderate		Treat	To be updated regularly Archaelogical report has been completed. Iwi site monitoring will be in place.	To be updated regularly Archaelogical report has been completed. Iwi site monitoring will be in place.
Risk that local sub trades aren't utilised	Reputational risk that TCC aren't using and supporting local businesses	Active	Almost Certain	Moderate		D&B Contractor to report on where contractors are from To use local sub contractors where possible	Unlikely	Minor		Treat	01/10 Assurance from Apollo that they will use local trades where possible	01/10 Assurance from Apollo that they will use local trades where possible