CMW Geosciences
Great People | Practical Solutions

15 March 2024

SOUTHERN LINKS SL1

SOUTHWESTERN BOUNDARY OF HAMILTON

GEOTECHNICAL DESKTOP REPORT

Colliers Project Leaders Limited

HAM2024-0017AB Rev 0

CMW Geosciences
Great People | Practical Solutions

HAM2024-0017AB		
Date	**Revision**	**Comments**
10 March 2024	A	Initial draft for internal review
15 March 2024	0	Issue to support Initial Feasibility Study

	Name	Signature	Position
Prepared by	Ben McKay		Project Geotechnical Engineer MEngNZ
Reviewed by	Kori Lentfer		Associate Engineering Geologist MEngNZ
Authorised by	Dave Morton		Principal Geotechnical Engineer CMEngNZ, CPEng

TABLE OF CONTENTS

1 INTRODUCTION 1
2 SITE DESCRIPTION 1
2.1 Site Location 1
2.2 Landform 1
3 PROPOSED DEVELOPMENT 2
4 DOCUMENTS REVIEWED 2
5 GROUND MODEL 3
5.1 Published Geology 3
5.2 Stratigraphic Units 3
5.3 Groundwater 4
6 PRELIMINARY GEOHAZARDS ASSESSMENT 5
6.1 Liquefaction 5
6.2 Lateral Spread 5
6.3 Slope Stability 6
6.4 Load Induced Settlement 6
7 PRELIMINARY RECOMMENDATIONS 7
7.1 Liquefaction / Lateral Spread Mitigation 7
7.2 Slope Stability Management 7
7.3 Ground Improvement for Static Settlement 7
8 FURTHER WORK 8
9 CLOSURE 9

DRAWINGS

Drawing 01: Geotechnical Site Plan
Drawing 02: Geological Section A-A'
Drawing 03: Geological Sections B-B'
Drawing 04: Peat Depth Plan
Drawing 05: Proposed Test Plan for Private Plan Change

APPENDICES

Appendix A: Proposed Development Plan
Appendix B: Existing Geotechnical Data
Appendix C: Liquefaction Analysis Plots
Appendix D: Static Settlement Results

1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Colliers Project Leaders Limited (Colliers) to carry out a desktop geotechnical investigation of the Southern Links 1 (SL1) area located at Southwestern Boundary of Hamilton, which is being considered by Hamilton City Council to be incorporated into the Hamilton City Limits as an area of future mixed residential/industrial development.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced HAM2024-0017AA Rev 0 dated 7 March 2024.

This report is for planning/feasibility study purposes for Colliers Project Leaders Limited.

2 SITE DESCRIPTION

2.1 Site Location

The site comprises an area of approximately 447.25Ha and is located directly adjacent to the south-western Hamilton City Limits as shown on Figure 1 below.

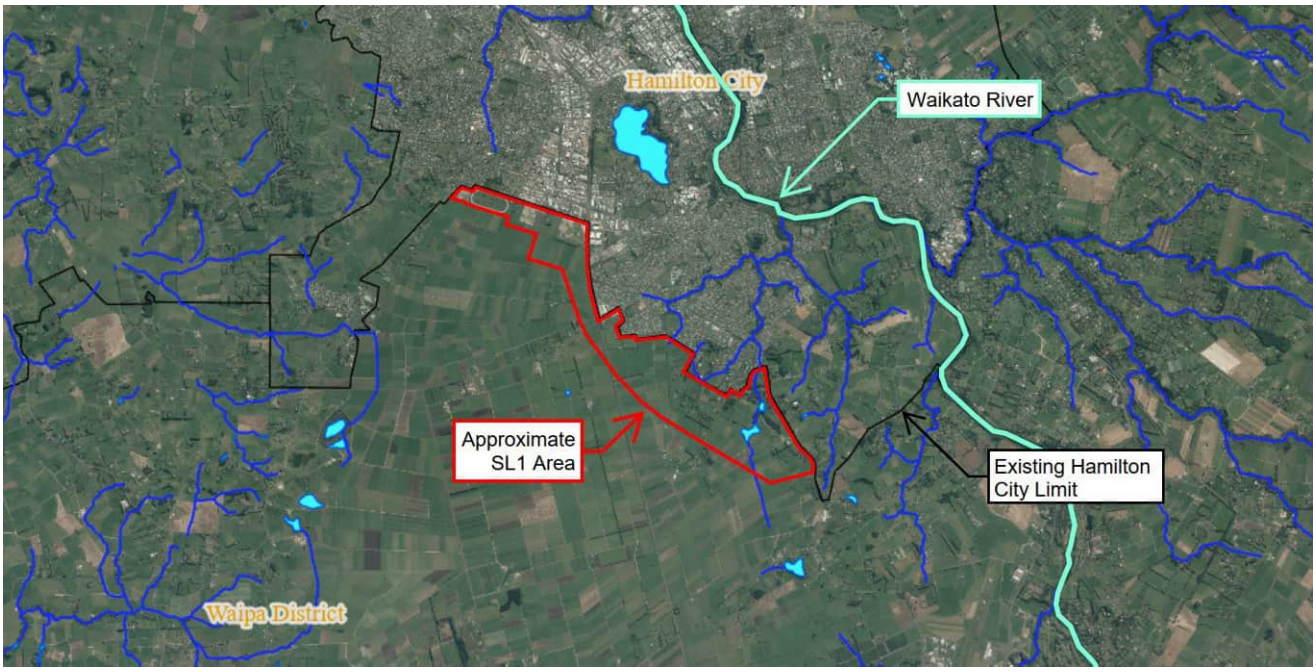


Figure 1: Site Location Plan (Source: WRC Online Maps)

2.2 Landform

The current general landform, together with associated features located within and adjacent to the site is presented on the attached Site Plan as ***Drawing 01.***

The site is dominated by two major landforms – the 'Low Hamilton Hills' and the 'Wetland/Alluvial Plain':

- Low Hamilton Hills – found predominantly in the south- eastern part of the SL1 development area. These areas are generally defined by gently undulating to moderately steep rolling hill country at between RL81m and RL43m (Moturiki Datum) elevated above the adjacent alluvial plain. Gully systems with tributary streams to the Waikato River can be found throughout the Low Hamilton Hill Areas. Approximately 25% of the subject site is within the Low Hamilton Hills landform.

- Wetland/Alluvial Plain – occupies the full north to south length of the SL1 development area. This landform is defined by an essentially level to gently undulating plain at between RL43m and RL35m (Moturiki Datum) that lies to the west of the Low Hamilton Hills. The plains are often crossed with a network of open drains which are typical of farmland in peat areas. Approximately 75% of the subject site is within the Wetland/Alluvial Plains landform.

The Waikato River lies approximately 2km to the north-east of the subject site at an approximate level of RL14m.

The North Island Main Trunk (NIMT) of the NZ rail network passes through the centre of the SL1 area.

The SL1 site is bound along its north-eastern boundary by the Hamilton City Limits, occupied typically by a combination of residential and commercial properties at the southern end of the site, and commercial/industrial properties at the northern end of the site. The remaining boundaries lie adjacent to rural/agricultural land parcels.

3 PROPOSED DEVELOPMENT

At the time of undertaking this investigation and of writing this report the project was in the early stages of planning and a desktop geotechnical assessment was proposed to provide details of preliminary feasibility options for development of the site.

A preliminary structure plan (see ***Appendix A***) has been provided by Colliers, indicating a mixture of industrial and medium to high density residential areas with a central commercial area, associated roading, stormwater reserves/open space, primary school and potential new rail station.

We have anticipated the ground will be built up over the Wetland/Alluvial Plain areas to increase the vertical distance between the future development from the existing groundwater and wetland soil deposits.

4 DOCUMENTS REVIEWED

The geotechnical desktop study for this phase of the development consisted of a review of the following data:

- New Zealand Geotechnical Database (NZGD) test logs, including Cone Penetrometer Testing (CPTu), Test Pit (TP), Hand Auger (HA), Machine Auger (MA) and Dynamic cone (Scala) penetrometer (DCP) logs. Logs were a mixture of ags/xls/pdf file formats.
- GNS Geological Map of New Zealand soil maps.
- Drone-captured elevation data provided by Maven Associates.
- Previous CMW reporting for a site within the SL1 investigation area, titled “3134 Ohaupo Road, Rukuhia, Hamilton”, issued 19 April 2019, ref. TGA2019-0030AA Rev 0.
- Previous AECOM reporting for a site within the SL1 investigation area, titled “Golden Valley Farm – Saxbys Road”, issued 1 March 2017, ref. p:\605x\60525520\6. draft docs\6.1 reports\2017-03-01 final rpt development feasibility assessment gvf.docx.

Test logs taken from NZGD have been attached in ***Appendix B***. The approximate locations of the respective investigation sites referred to above are shown on the Existing Geotechnical Data Overview Plan as ***Drawing 01***. Test locations coordinates and elevation were taken from the NZGD website data.

5 GROUND MODEL

5.1 Published Geology

Published geological maps[1] for the area depict the regional geology as comprising soils belonging to the Piako Subgroup, Hinuera Formation and Walton Subgroup, as illustrated in Figure 2 below.

- Piako Subgroup – comprised soft, dark brown to black, organic mud, muddy peat and woody peat. Age of deposit is within last 14,000yrs.
- Hinuera Formation - comprised cross-bedded pumice sand, silt and gravel with interbedded peat. Age of deposits is between 11.9Ka and 58.8Ka.
- Walton Subgroup – comprised alluvium dominated by primary and reworked, non-welded ignimbrite with volcanic ashes mantling older deposits. Age of deposits is between 0.42Ma and 2.59Ma.

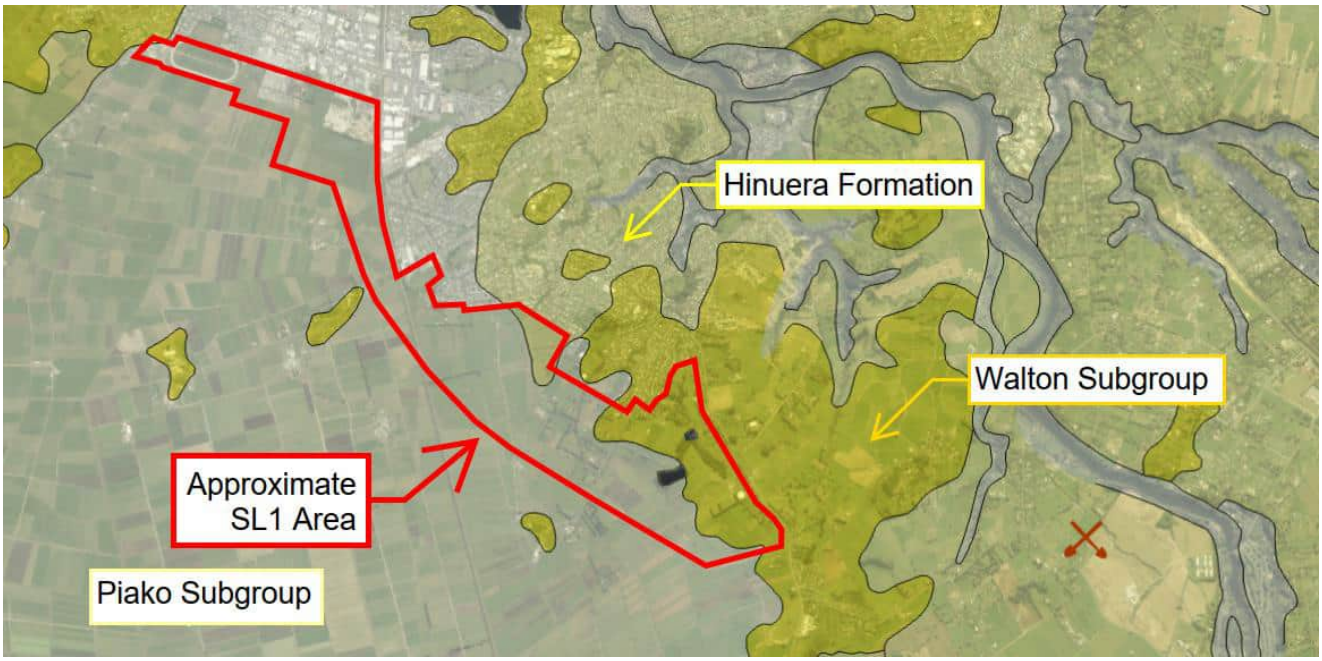


Figure 2: Regional Geology (Source: GNS 1:250k Geological Map of New Zealand)

Note that the Hinuera Formation is likely more extensive that what is shown on Figure 2.

Based on the known history of the site and surrounding land levels, some superficial depths of fill could be anticipated as a result of soft landscaping/agricultural activity.

5.2 Stratigraphic Units

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area and can be generalised according to the following subsurface sequences.

[1] GNS 1:250k Geological Map of New Zealand. Sourced from https://data.gns.cri.nz/geology/.

Table 1: Summary of Strata Encountered		
Strata/ Unit	**Approximate Depth to Base of Unit (m)**	**Description of Material and Distribution**
Topsoil	0.0 – 0.6	Organic topsoil expected over the majority of the site at ground level.
Peat (Piako Subgroup)	0.0 – 7.0	PEAT was encountered over much of the Wetland/Alluvial Plain . The peat is a variable mixture of amorphous, muddy and fibrous in texture with areas of organic silt. Soil strengths range from soft to stiff. Distribution is bound by the Low Hamilton Hills terrain and levee deposits of the underlying Hinuera Formation materials, with localised deepening's within infilled paleochannel features. Typical peat depths are less than 3-4m within the site.
Interbedded Sand/Silt Mixtures (Hinuera Formation)	0.4 - >30.5	Interbedded SAND/SILT mixtures were encountered over the Wetland/Alluvial Plain, typically underlying Peat deposits in the west. The Hinuera Formation is at ground level between the peat to the west and Low Hamilton Hills to the east, plus in isolated areas over the plain. Silt strengths typically stiff to very stiff. Sand strengths vary greatly from very loose to dense, but are typically medium dense.
Silt/Clay Mixtures (Walton Subgroup)	0.2 - >30	SILT/CLAY mixtures were encountered near the ground surface over the Low Hamilton Hill areas. Walton Subgroup soils are of volcanic origin and include a mantle of weathered volcanic ashes over primary and reworked, non-welded ignimbrite. Includes Puketoka Formation silt/clay beneath the ashes that can be sensitive to disturbance. Soil strengths are typically stiff to very stiff. Deeper primary ignimbrite sands are typically dense to very dense. Walton Subgroup underlies the younger Piako Subgroup/Hinuera Formation at depth below the Wetland/Alluvial Plain and also 'outcrops' above the plain as isolated low hills to the west of the site.

Peat depth contours are presented on ***Drawing 02***, based on the available site investigation data. These contours are preliminary and take into account very limited information in some areas. Contours have been extrapolated/interpolated using digital 3D ground modelling, geomorphic features along with geological knowledge of the area.

There is significant uncertainty in peat depths in areas without site investigation data. In particular, this is the case in the southern part of the site where peat has been assumed to be present based on geomorphology only. Refinement of these contours will continue with further site investigation and modelling.

The distribution of the various units encountered is presented in the appended Geological Sections on ***Drawings 02*** *and* ***03***.

5.3 Groundwater

Investigation data considered as part of this desktop assessment has been taken from the late 1990's to early 2020's investigations, with testing occurring over varying seasons and groundwater conditions.

Within the Wetland/Alluvial Plain areas, groundwater was encountered between 0.0m to 6.7m below the existing ground surface at time of testing.

Within the Low Hamilton Hill areas, groundwater was encountered between 0.0m to >16.2m below the existing ground surface at time of testing. Groundwater within the Low Hamilton Hills areas is expected to get closer to the ground surface the lower in elevation the ground surface is. Perched groundwater tables can be present within the layered Walton Subgroup deposits.

Groundwater levels are expected to rise and fall with seasonal fluctuations and long-term climate change trends.

6 PRELIMINARY GEOHAZARDS ASSESSMENT

6.1 Liquefaction

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

Preliminary liquefaction analyses were undertaken with reference to NZGS guidance[2] to determine peak horizontal ground acceleration or PGA (a_{max}) values based on a 50-year design life in accordance with the NZ Building Code and importance level (IL) 2 structures in accordance with MBIE/NZGS guidance[3].

Due to the file format of the publicly available logs, a liquefaction analysis was only possible within the Wetland/Alluvial Plains areas of the investigation area. Results are presented in ***Appendix C*** and are summarised as in Table 2:

Table 2: Liquefaction Analyses Results

SLS Settlement (mm)	Total ULS Settlement (mm)	Index ULS Settlement (mm)	Depth to Liquefied Layer (m)
<5-25	65-190	70-215	0.7-4.6

Note: All settlements and depths based on existing ground profile.

Index settlements are calculated based on the upper 10m of the soil profile using no depth weighting factor.

Total ULS settlements are based on the full depth of the CPT trace with a depth weighting factor applied.

Index settlements are for assessment of the site against the MBIE site Technical Category guidelines and are not comparable to the total ULS settlements.

Liquefaction hazard risk within Low Hamilton Hills areas underlain by Walton Subgroup materials is considered to be low for residential land development.

Recommendations to mitigate effects of liquefaction settlements on the proposed development are provided below in Section 7.

6.2 Lateral Spread

Following the onset of liquefaction, the liquefied soils behave as a very weak undrained material, which can give rise to lateral spreading where a free face is present within the vicinity of the site or where proposed cut and fill batters are proposed over or within liquefied soils.

The potential for lateral spread beneath the Wetland/Alluvial Plain areas of the site where there are open drains/sloping soils is expected to be high, with significant ground deformation near these areas predicted. The lateral spread extent can be assessed as part of detailed landform design.

Lateral spread risk within the Low Hamilton Hill areas of the site is expected to be low.

[2] NZGS (2021) Earthquake Geotechnical Engineering Practice, Module 1; Overview of the geotechnical guidelines, New Zealand.
[3] Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (November 2021)

6.3 Slope Stability

The stability of cut batters and fill embankments under a range of design conditions is expressed in terms of a factor of safety, which is defined as the ratio of forces resisting failure to the forces causing failure.

Soils within the Wetland/Alluvial Plain landscape (Piako Subgroup peat and Hinuera Formation silts/sands) typically only form gently undulating to slightly steep slopes. Given the shallow groundwater level and low soil strength when saturated, where slopes are steeper than 15 degrees (1v:4h) are present within the Wetland/Alluvial Plain areas, they may be subject some movement under static/elevated GW/seismic conditions.

Soils within the Low Hamilton Hills landscape (Walton Subgroup silts/clays) typically occur on gently undulating to moderately steep slopes. Given the cohesive nature and strength of these materials, slopes consisting of Walton Subgroup soils are typically stable when slopes are less than 25 degrees.

These findings are subject to further investigation and analyses at future investigation phases.

6.4 Load Induced Settlement

If is anticipated that land development will involve filling over the low-lying Wetland/Alluvial Plain to raise ground levels to provide separation from groundwater table and organic/peat soils. Proposed fill embankments and future building loads will induce settlements within the Wetland/Alluvial Plain subsoils. The soft and compressible peat soils that underlie the majority of those areas will experience significant primary consolidation and long-term secondary creep settlements in response to the placement of this filling.

For the purposes of this analysis, we have assumed that a 2m to 4m thick fill embankment will be formed over the Wetland/Alluvial Plain development area. A nominal 6m high embankment height has also been considered for potential NIMT rail overbridge abutments.

Preliminary estimated static settlements were calculated using assumed a unit weight of 16kN/m3 for the locally sourced earthfill over the peat. Back calculated parameters have been used from the Temple View project located on the same Wetland/Alluvial Plain to the west of the site, which has involved filling and preloading over up to 6m of peat. A typical $Cc/(1 + e_o)$ value of 0.19 was back calculated from a significant data set and extensive field monitoring for estimation of static settlements, as summarised below.

Table 3: Estimated Fill Induced Static Settlements (without remedial measures)

Peat Thickness (m)	Primary Settlement (t_{90}) (m)	Long-term Creep Settlement (m)	Total Settlement (m)
2.0	0.7	0.1	0.8
4.0	1.3	0.2	1.5
6.0	1.8	0.3	2.1

Notes: Embankment construction using available borrow materials (unit weight = 16kN/m^3) assumed, greater settlements will occur if using imported rockfill or sand.

Predicted post construction ground settlements are excessive for the proposed development and specific ground improvement measures will be required, as discussed in Section 7.3 below.

7 PRELIMINARY RECOMMENDATIONS

7.1 Liquefaction / Lateral Spread Mitigation

Based on the assessment outlined in Sections 6.1 & 6.2, we consider the risk of liquefaction and the associated risk of potentially unacceptable liquefaction induced settlements or lateral spread to be moderate to high for the Wetland/Alluvial Plain area for the design cases considered. Mitigation options could include:

- Excavate and replace upper 1 m of soil and replacement with geogrid-reinforced compacted aggregate under Specific Engineered Design Waffle Slab Foundations for residential structures to mitigate liquefaction-induced vertical settlements. This may be incorporated into bulk earthfill process as a part of land development.
- Ground improvement such as Rammed Aggregate Piers (RAPs) or Rigid Inclusions' may present a viable option for critical infrastructure (such as Wastewater Pump Stations and bridge abutments) and multi-storey commercial buildings. RAPs are unlikely to be economically viable option for residential applications.
- The layout/design of remedial measures is subject to detailed design.

Whilst no specific analysis has yet been completed for the Low Hamilton Hills area, based on our extensive experience in the Hamilton region, we consider the risk of liquefaction and the associated liquefaction induced settlement or lateral spread risk to be low for the residential land development. This is subject to further investigation/analysis at a future investigation stage.

7.2 Slope Stability Management

Slope stability is discussed in Section 6.3 above demonstrates that the Low Hamilton Hills over the investigation area are expected to achieve an appropriate FoS under different site conditions.

Where Piako Subgroup unconsolidated peat is exposed in cuts such as stormwater basin excavations, the maximum cut batter for these materials that meets the required FoS is likely to be in the order of 1v:5h. Depending the cut heights, further slope support measures may be required.

Where Hinuera Formation sand/silt is exposed in future cut areas, the maximum cut batter for these materials that meets the required FoS is likely to be in the order of 1v:3h.

Where Walton Subgroup silt/clay is exposed in future cut areas, the maximum cut batter for these materials that meets the required FoS is likely to be in the order of 1v:2h.

Once earthworks levels/volumes are known, cut and fill slope stability will need to be assessed.

Detailed analysis and design of slope stability measures is subject to specific design and Council approval. These findings are subject to further analyses at future investigation phases.

7.3 Ground Improvement for Static Settlement

Where peat is less than 1.5m deep, it is typically more economical to excavate the peat material and backfill excavations with structural earthfill. Construction dewatering /subsoil drainage would be expected in this case.

Where peat is greater than 1.5m thick, temporary surcharge filling (preloading) of peat to induced/accelerate primary consolidation and reduce long-term creep settlements to within acceptable limits is a viable option.

It is recommended that a varying thickness of surcharge is adopted depending on peat thickness to help keep long term post construction creep settlements more uniform thereby reducing long term differential settlement.

Using the static settlement calculations in Section 6.4 and allowing for a long-term widespread surcharge load of 5kPa (to model single storey buildings on raft foundations), the following structural fill and surcharge thicknesses would be required to keep long term (50 year building design life) post construction creep settlements to less than nominally 25mm.

Table 4: Preliminary Pre-load Design Requirements

Peat Thickness (m)	Reqd. Structural Fill thickness (m)	Reqd. Pre-load thickness (m)	Construction settlement (m)	Pre-load removal thickness (m)	Net ground level above natural (m)	Net fill thickness below finished level (m)
2.0	2.0	1.5	0.8	0.7	2.0	2.8
4.0	2.0	2.5	1.5	1.0	2.0	3.5
6.0	2.0	3.0	2.1	0.9	2.0	4.1
Note: Preload design is preliminary for concept development stage only .						

It is expected that Council infrastructure will require a 100yr design life. In particular, buried stormwater and sanitary sewer pipe are commonly installed within road reserves and due to relatively flat grades can be sensitive to settlement. Our experience is that post construction creep settlement magnitudes are negligible following appropriate preloading when no future loading occurs.

Based on our experience working with similar materials to those encountered on-site, the pre-load requirements presented in Table 4 above are based on achieving 90% settlement (t90), is predicted to take the following periods of time:

Table 5: Summary of Estimated Pre-load Durations

Peat Thickness (m)	Time to reach t90 (months)
2.0	6
4.0	9
6.0	12

It must be noted that pre-load durations are difficult to predict and a contingency to the above time estimates should be applied. Settlement monitoring is a critical part of successful pre-loading to confirm suitable preload thickness and duration.

The excavation/consolidation of peat materials near the existing NIMT will need to be carefully managed, as earthworks is likely to cause accelerated settlement/movement of the NIMT rails. Tamping of the railway is likely to be required more regularly during construction. We recommend that the client open conversations with KiwiRail at the earliest opportunity to manage treatment of the earthworks and railway in this area.

8 FURTHER WORK

Based on our conversations with the client, the next phase of anticipated work for the SL1 development is to gather the necessary data for a Plan Change application to Hamilton City Council. For this purpose, we would recommend:

- Additional site investigations to increase coverage of site test data to allow development of a more refined ground model. The proposed test plan is presented in ***Drawing 05***, and would consist of:
    - Site walkover and geomorphic mapping by Project Engineering Geologist/Geotechnical Engineer;

- 65x CPT to 20m (or refusal);
- 4x machine boreholes to 20m (or refusal) with piezometer installation;
- 40x test pits to 5m (or refusal);
- 60x hand augers up to 5m (or refusal); and
- Groundwater level monitoring over summer-winter cycle.

- Refinement of modelling and analyses:
  - Liquefaction analysis – updated liquefaction analyses considering the Importance Levels specific to infrastructure and zoned areas, with complete data set for investigation area, will be required. Peat within the investigation area may not be as susceptible to liquefaction as the CPT traces indicate - carrying out additional laboratory testing of the peat material encountered on-site (fines content and plasticity index testing) will help to determine soil behaviour under seismic conditions, and may lead to a reduced liquefaction-induced vertical settlement being calculated.
  - Slope stability analysis – slope model development and computer stability analysis under various failure mechanisms.
  - Static settlement analysis – update settlement analyses based on back calculated values of similar soils to those on site considering proposed earthwork levels.

9 CLOSURE

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by Colliers Project Leaders Limited in relation to the Southern Links SL1 Southwestern Boundary of Hamilton project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Colliers Project Leaders Limited seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

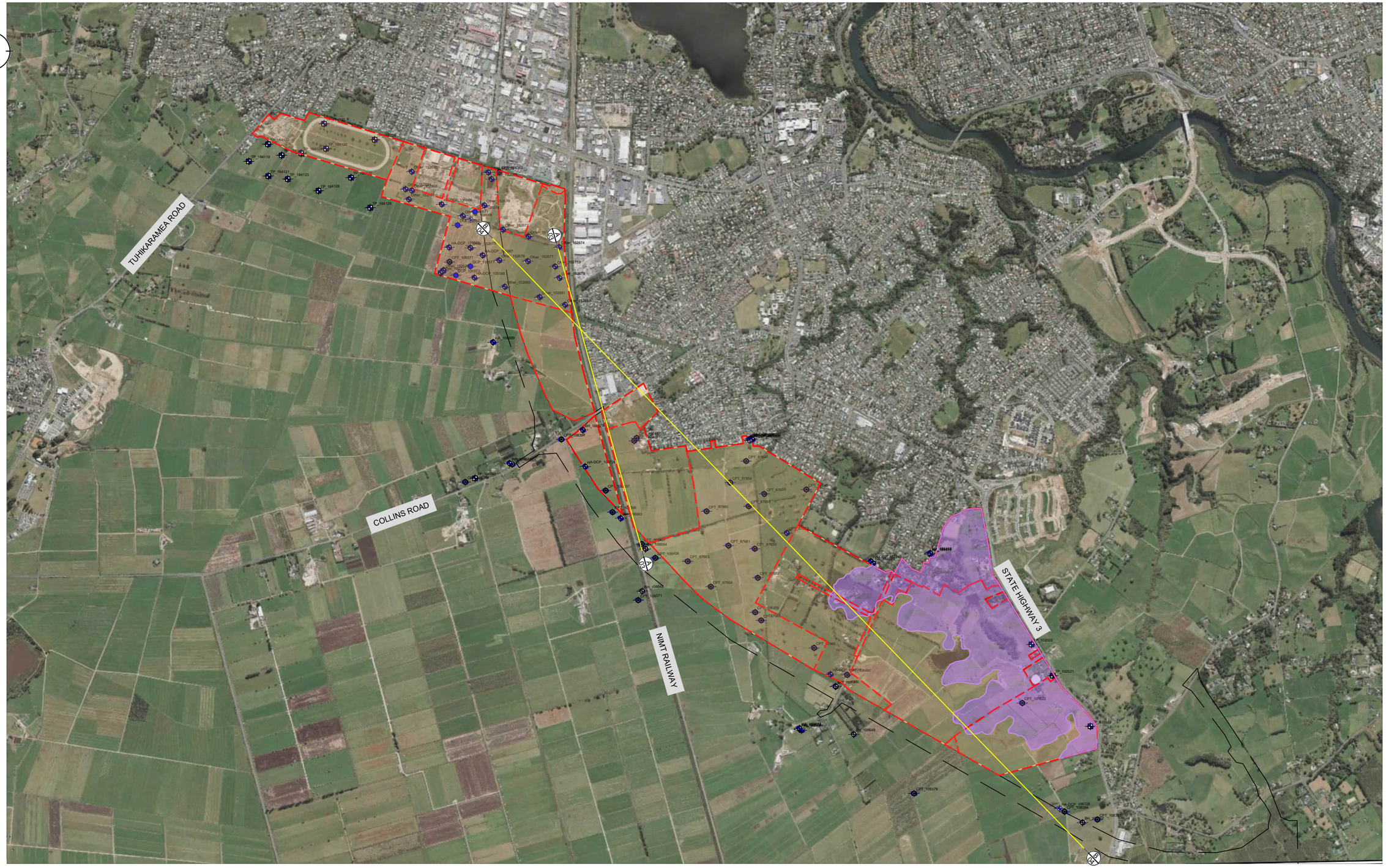
Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.



LEGEND:

- HA01 — HAND AUGER (HA, HA-DCP, Other) LOCATION
- BH01 — DEEP MACHINE BOREHOLE (BH) LOCATION
- CPT01 — CONE PENETROMETER TEST (CPT) LOCATION
- TP01 — TEST PIT (TP) LOCATION
- DCP01 — DYNAMIC CONE PENETROMETER (DCP) LOCATION
- SITE BOUNDARY
- PROPOSED SOUTHERN LINKS DESIGNATION
- LOW HAMILTON HILLS
- WETLAND/ALLUVIAL PLAIN
- A 03 — A 03 CROSS SECTIONS

NOTES:

1. SITE BOUNDARIES ADAPTED FROM INDICATIVE LAND OWNERSHIP PLAN SUPPLIED BY THE CLIENT.
2. AERIAL IMAGE COURTESY OF GOOGLE EARTH.
3. GEOLOGY ADAPTED FROM GNS 1:250,000 QMAPS DATABASE.
4. HISTORIC TEST LOCATIONS SOURCED FROM NZGD DATABASE AND ARE INDICATIVE ONLY.

1:250,000 — 0 250 500 750 1000 1250 m

CMW Geosciences

CLIENT: COLLIERS PROJECT LEADERS LIMITED	DRAWN: MM	PROJECT: HAM2024-0017	
PROJECT: SOUTHERN LINKS DEVELOPMENT	CHECKED: BM	DRAWING: 01	
	REVISION: 0	SCALE: 1:25000	
TITLE: EXISTING GEOTECHNICAL DATA OVERVIEW	DATE: 14/03/2024	SHEET: A3 L	

C:\Users\MarkMcVinnie\CMW Geosciences Pty Ltd\Hamilton Office - HAM2024-0017 Southern Links Geotechnical Assessment\Drawings\HAM2024-0017_(MM Edits Rev C)_Southern Links_Overview Plan.dwg

LEGEND:

- HA01 — HAND AUGER (HA, HA-DCP, Other) LOCATION
- BH01 — DEEP MACHINE BOREHOLE (BH) LOCATION
- CPT01 — CONE PENETROMETER TEST (CPT) LOCATION
- TP01 — TEST PIT (TP) LOCATION
- DCP01 — DYNAMIC CONE PENETROMETER (DCP) LOCATION
- SOUTHERN LINKS (SL1) LAND HOLDINGS BOUNDARIES
- PROPOSED SOUTHERN LINKS DESIGNATION
- ? — PEAT DEPTH CONTOURS
- A 03 — A 03 CROSS SECTIONS

NOTES:

1. SITE BOUNDARIES ADAPTED FROM INDICATIVE LAND OWNERSHIP PLAN SUPPLIED BY THE CLIENT.
2. AERIAL IMAGE COURTESY OF HCC ONLINE MAPPING SERVICES.
3. HISTORIC TEST LOCATIONS SOURCED FROM NZGD DATABASE AND ARE INDICATIVE ONLY.
4. PEAT DEPTHS ARE INDICATIVE AND SUBJECT TO CHANGE.
5. PEAT DEPTH CONTOURS AT 1m INTERVALS.

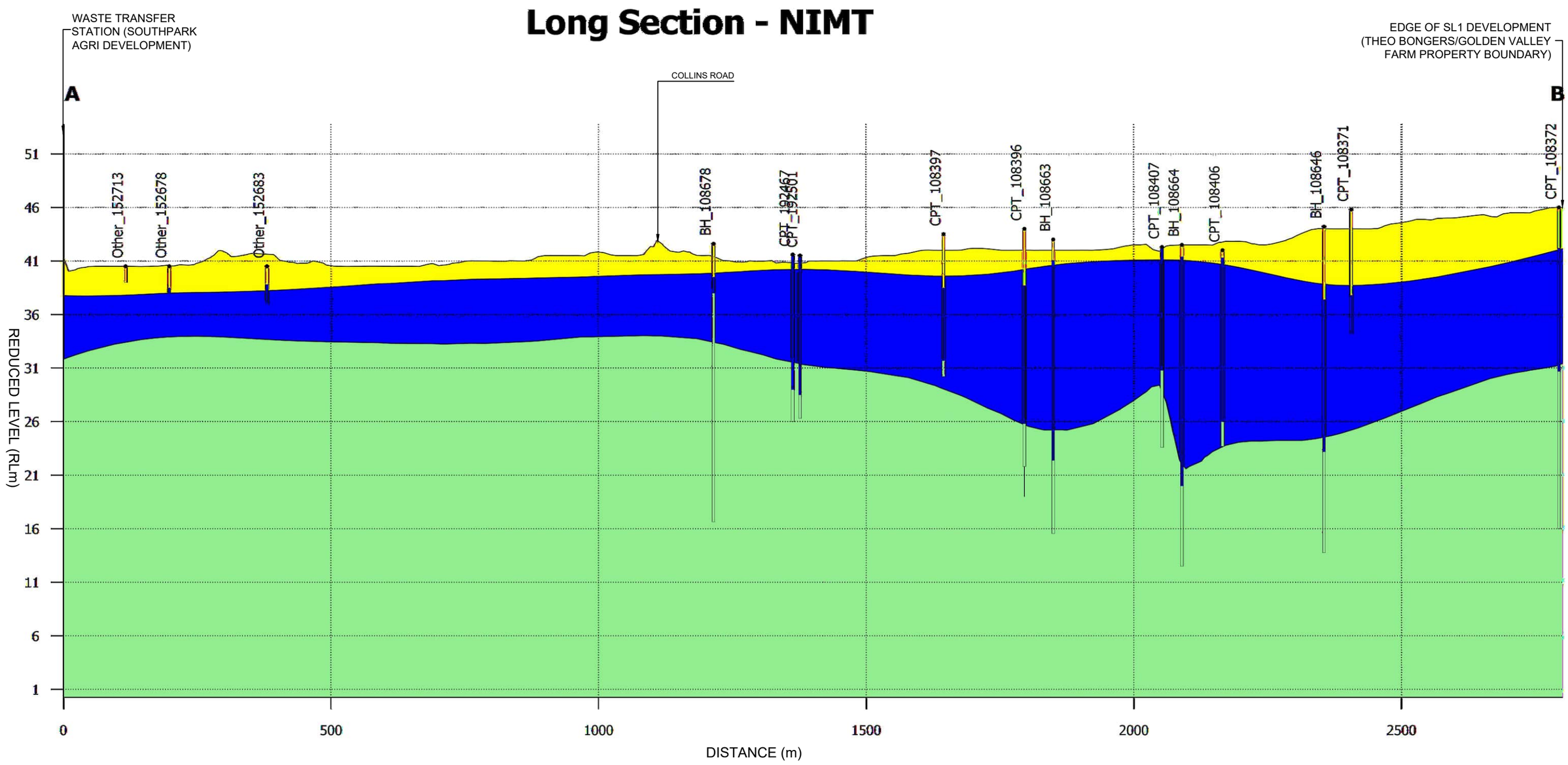
1:25000 — 0 250 500 750 1000 1250 m

CMW Geosciences

CLIENT: COLLIERS PROJECT LEADERS LIMITED	DRAWN: BM	PROJECT: HAM2024-0017	
PROJECT: SOUTHERN LINKS DEVELOPMENT	CHECKED: MM	DRAWING: 02	
	REVISION: 0	SCALE: 1:25000	
TITLE: PRELIMINARY PEAT CONTOUR PLAN	DATE: 14/03/2024	SHEET: A3 L	

C:\Users\MarkMcVinnie\CMW Geosciences Pty Ltd\Hamilton Office - HAM2024-0017 Southern Links Geotechnical Assessment\Drawings\HAM2024-0017_(MM Edits Rev C)_Southern Links_Overview Plan.dwg

Long Section - NIMT



Location

A: 444084, 696382

B: 444832, 693683

Scale: 1:7,500

Vertical exaggeration: 20x

0m 1000m

LEGEND:

- PEAT (HOLLOCENE SWAMP DEPOSITS)
- INTERBEDDED SAND/SILT (HINUERA FORMATION)
- CLAY/SILT (HAMILTON ASH / WALTON SUBGROUP)

NOTES:

1. CROSS SECTION DERIVED FROM LEAPFROG 3D MODELLING SOFTWARE UTILISING EXISTING NZGD DATA. THE GEOLOGIC SURFACES ARE INDICATIVE ONLY.
2. ALL TESTS WITHIN 200M OF THE CROSS SECTION HAVE BEEN PRESENTED. AS SUCH, DISCREPANCIES BETWEEN TEST GEOLOGY AND MODEL SURFACES ARE DUE TO SETBACK.
3. GROUND SURFACE DERIVED FROM DRONE SURVEY DATA COURTESY OF MAVEN CONSULTANTS.
4. VERTICAL DATUM MOTURIKI 1953.

CMW Geosciences

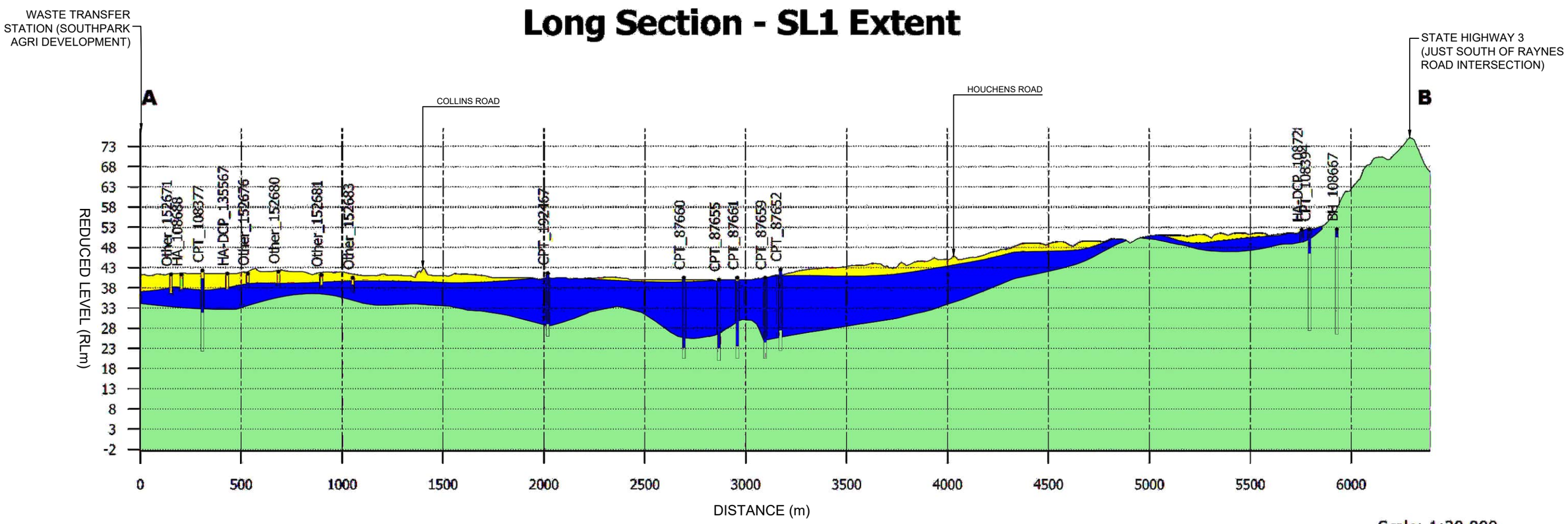
CLIENT: COLLIERS PROJECT LEADERS LIMITED		DRAWN: MM	PROJECT: HAM2024-0017
PROJECT: SOUTHERN LINKS DEVELOPMENT		CHECKED: BM	DRAWING: 03
		REVISION: 0	SCALE: 1:7500
TITLE: GEOLOGICAL CROSS SECTION A-A		DATE: 14/03/2024	SHEET: A3 L

C:\Users\MarkMcVinnie\CMW Geosciences Pty Ltd\Hamilton Office - HAM2024-0017 Southern Links Geotechnical Assessment\Drawings\HAM2024-0017_(MM Edits Rev C)_Southern Links_Overview Plan.dwg

NORTH-WEST

SOUTH-EAST

Long Section - SL1 Extent



Location

A: 443265, 696636

B: 447756, 692091

Scale: 1:20,000

Vertical exaggeration: 20x

0m 1000m

LEGEND:

- PEAT (HOLLOCENE SWAMP DEPOSITS)
- INTERBEDDED SAND/SILT (HINUERA FORMATION)
- CLAY/SILT (HAMILTON ASH / WALTON SUBGROUP)

NOTES:

1. CROSS SECTION DERIVED FROM LEAPFROG 3D MODELLING SOFTWARE UTILISING EXISTING NZGD DATA. THE GEOLOGIC SURFACES ARE INDICATIVE ONLY.
2. ALL TESTS WITHIN 200M OF THE CROSS SECTION HAVE BEEN PRESENTED. AS SUCH, DISCREPANCIES BETWEEN TEST GEOLOGY AND MODEL SURFACES ARE DUE TO SETBACK.
3. GROUND SURFACE DERIVED FROM DRONE SURVEY DATA COURTESY OF MAVEN CONSULTANTS.
4. VERTICAL DATUM MOTURIKI 1953.

CMW Geosciences

CLIENT: COLLIERS PROJECT LEADERS LIMITED	DRAWN: MM	PROJECT: HAM2024-0017	
PROJECT: SOUTHERN LINKS DEVELOPMENT	CHECKED: BM	DRAWING: 04	
	REVISION: 0	SCALE: 1:7500	
TITLE: GEOLOGICAL CROSS SECTION B-B	DATE: 14/03/2024	SHEET: A3 L	

C:\Users\MarkMcVinnie\CMW Geosciences Pty Ltd\Hamilton Office - HAM2024-0017 Southern Links Geotechnical Assessment\Drawings\HAM2024-0017_(MM Edits Rev C)_Southern Links_Overview Plan.dwg

LEGEND:

- HA24-01 — PROPOSED CMW HAND AUGER LOCATION
- BH24-01 — PROPOSED CMW DEEP MACHINE BOREHOLE (BH) LOCATION
- CPT24-01 — PROPOSED CMW CONE PENETROMETER TEST (CPT) LOCATION
- TP24-01 — PROPOSED CMW TEST PIT (TP) LOCATION
- EXISTING (NZGD) TEST LOCATIONS
- SOUTHERN LINKS (SL1) LAND HOLDINGS BOUNDARIES
- PROPOSED SOUTHERN LINKS DESIGNATION
- ? PEAT DEPTH CONTOURS

NOTES:

1. SITE BOUNDARIES ADAPTED FROM INDICATIVE LAND OWNERSHIP PLAN SUPPLIED BY THE CLIENT.
2. AERIAL IMAGE COURTESY OF HCC ONLINE MAPPING SERVICES.
3. HISTORIC TEST LOCATIONS SOURCED FROM NZGD DATABASE AND ARE INDICATIVE ONLY.
4. PEAT DEPTH CONTOURS AT 1m INTERVALS.

1:25000 — 0 250 500 750 1000 1250 m

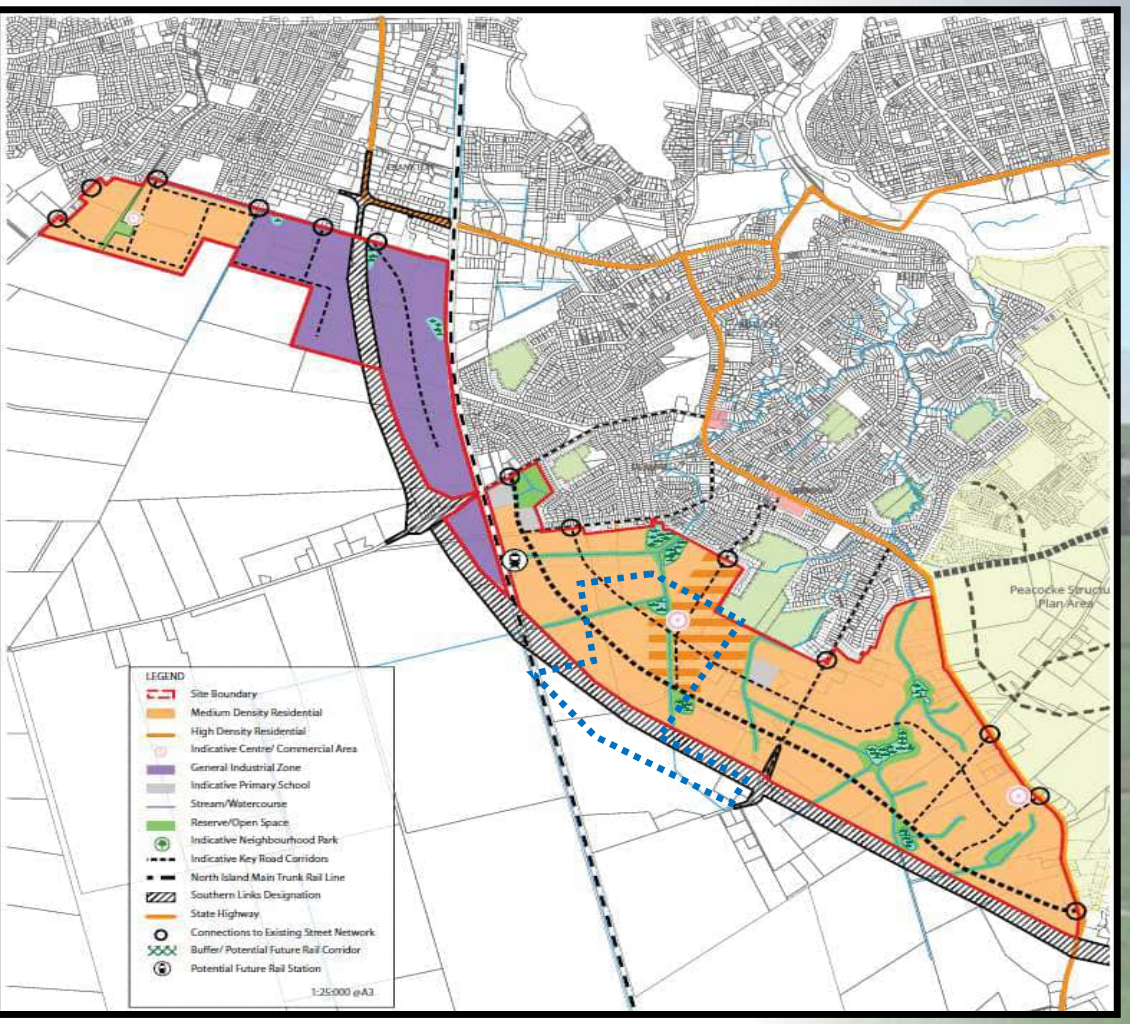
CMW Geosciences

CLIENT: COLLIERS PROJECT LEADERS LIMITED	DRAWN: BM	PROJECT: HAM2024-0017	
PROJECT: SOUTHERN LINKS DEVELOPMENT	CHECKED: MM	DRAWING: 05	
	REVISION: 0	SCALE: 1:25000	
TITLE: PROPOSED TEST PLAN FOR PRIVATE PLAN CHANGE	DATE: 14/03/2024	SHEET: A3 L	

C:\Users\MarkMcVinnie\CMW Geosciences Pty Ltd\Hamilton Office - HAM2024-0017 Southern Links Geotechnical Assessment\Drawings\HAM2024-0017_(MM Edits Rev C)_Southern Links_Overview Plan.dwg

APPENDIX A: PROPOSED DEVELOPMENT PLAN

PROPOSED STRUCTURE PLAN



8,000 – 12,000 Dwellings

110 Ha of Industrial land linked to Frankton.

Three new neighbourhood centres and a local centre.

Southern Links becomes the urban edge to Hamilton with Rail opportunities.

5km walk or cycle to Hamilton CBD.

Freshwater wetland /stream analysis. IB preliminary investigation. Enhancement options within existing ecological network

Transport analysis including accessibility, PT, multi-modal.

Temporary/long-term options and integration of Three Waters. Water reuse/efficiency targets and 'rainwater harvesting'.

Geotechnical, peat management and earthworks contained within the site.

APPENDIX B: EXISTING GEOTECHNICAL DATA

INVESTIGATION LOG

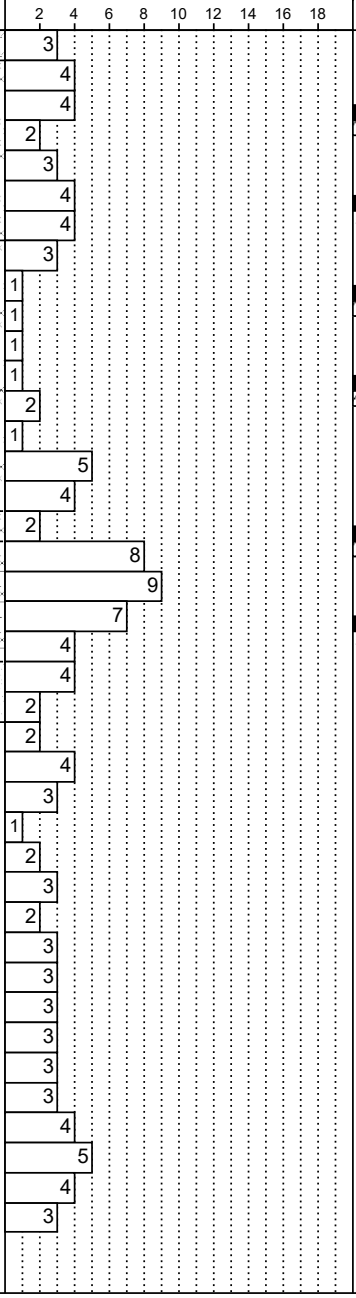
Client:		**Job No.:**	HD2422
Project:	41 Aloma Way, Hamilton	**No.:**	HA01
Location:	Within proposed Lot 2.	**Date:**	19.07.22
Co-ordinates:	1801396mE, 5810452mN	**Logged By:**	SW
Elevation:	Ground	**Checked By:**	BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)
Topsoil	TOPSOIL; brown. Moist; rootlets.
Colluvium	SILT, with some sand, with trace clay and gravel; brown, mottled orange. Very stiff; moist; low plasticity, sensitive; sand, fine; gravel, fine, subangular. 0.3 m: becomes white, streaked brown. 0.4 m: becomes brown, mottled orange. 0.5 m: becomes brownish white, mottled orange.
Holocene Swamp Deposits	Organic SILT; dark blackish brown, mottled reddish brown. Soft to stiff; moist, insensitive to sensitive; trace rootlets. 1.2 m - 1.6 m: no recovery.
	SILT, with trace clay; grey, mottled orange. Very stiff; wet; moderate dilatency, sensitive.
	Clayey SILT; grey. Hard; wet; high plasticity. 2.0 m: becomes saturated.
	Sandy SILT; grey. Loose to medium dense; saturated; sand, fine.
	EOH: 2.30 m
	3.0 m: becomes medium dense.

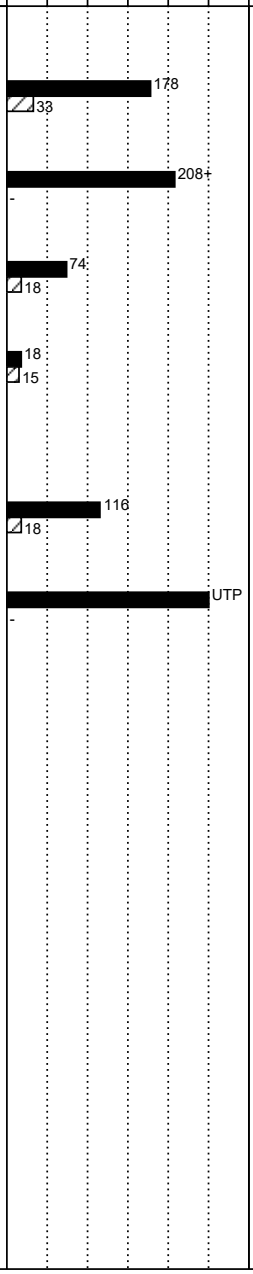
Depth (m): 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0

Legend

Scala Penetrometer (Blows / 100 mm)



Vane Shear Strength (kPa)



Water: 2 m

Photo

Remarks

End of log at 2.3 m - no recovery.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Generated with CORE-GS by Geroc - 20/07/2022 10:57:20 AM

NZGD ID: HA_108688

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1798770mE	5812780mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Kahikatea Drive		

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	Test Records: Shear Vane (kPa) (Residual - Peak; 0 kPa, 100 kPa, 200 kPa)	Sampling	Dynamic Cone Penetrometer (Blows per 100 mm)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	Graphic Log	Instrumentation
	TOPSOIL: Topsoil	51/34		1, 1, 0, 1, 0, 0	PEAT; dark brown. Stiff; dry to moist; insensitive, normal.		
	PIAKO SUBGROUP: River, lake and swamp deposits consisting of soft, dark brown to black, organic-rich silt and peat.	51/30		0, 0, 1	PEAT; dark blackish brown. Firm to hard; moist; fibrous; insensitive, normal. 0.7m:Grades to wet.		
1		UTP		1, 0, 0	0.9m:Contains fragments of decomposed wood.		
		34/34		1, 2, 1			
		51/41		2, 1, 1			
		68/68		1, 1, 1			
2		51/34		1, 1, 1			
		51/34		1, 1, 1			
		47/30		1, 1, 1			
3		54/41		1, 1, 1			
		51/34		2, 2, 2			
	Alluvial pumice, sand, silt and gravel with interbedded peat. (Hinuera Formation)	57/37		3, 3, 3	SILT; light brownish grey. Stiff, moist to wet; insensitive, normal. (hard to obtain sample)		
4		118/81		4, 4, 3	SILT, trace of clay; dark grey. Stiff; moist to wet; insensitive, normal. (hard to obtain sample)		
				4, 4, 5, 5, 6, 5, 5, 6, 6	AH05 terminated at 4.2m		
5							

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations

Miniature shear vane

Vane number DR2944 Blade 19mm Factor 1.69

Vane shear strength per NZGS guideline

Remarks

Existing farmland.

Started 25/02/2011

Finished 25/02/2011

Date logged 7/03/2011

Logged CDB

Checked DMM

Page 1 of 1

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

08/06/2005

NZGD ID: HA_108688

NZGD ID: HA_108689

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH06**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1798906mE	5811959mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Collins Road		

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	Test Records: Shear Vane (kPa) Residual - Peak (0 kPa, 100 kPa, 200 kPa)	Sampling	Dynamic Cone Penetrometer (Blows per mm) 6 12 18 24	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	Graphic Log	Instrumentation
	Topsoil.				SILT; dark brown. Soft; moist.		
	River, lake and swamp deposits consisting of soft, dark brown to black, organic-rich silt and peat. (PIAKO SUBGROUP)	32/17			PEAT; dark reddish brown. Soft; moist; fibrous; spongy.		
		12/9			0.5m:Wet.		
1		14/12					
		14/14					
		29/14					
2							
3		32/17					
4							
5					AH06 terminated at 5m		

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations

Miniature shear vane
Vane number GEOVANEBlade 19mm Factor 1.44
Vane shear strength per NZGS guideline

Remarks
Existing farmland.

Started 25/02/2011
Finished 25/02/2011
Date logged 7/03/2011
Logged CDB
Checked MDT

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

NZGD ID: HA_108689

INVESTIGATION LOG

Job No.:	HD2291		
Client:		**No.:**	ST01
Project:	37a Saxbys Road, Hamilton		
Location:	North of existing shed.	**Date:**	15.03.22
Co-ordinates:	1800618mE, 5811279mN	**Logged By:**	MM
Elevation:	Ground	**Checked By:**	BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Topsoil	TOPSOIL; dark blackish brown. Dry; trace rootlets.	0.2				Groundwater Not Encountered
Hinuera Formation	SAND, with some silt; light brownish orange. Dry; poorly graded; sand, fine to medium.	0.4				
	SAND, with trace silt; light brown. Dry to moist; poorly graded; sand, fine to medium.	0.6, 0.8				
	SAND; brown. Moist; well graded; sand, fine to coarse. 1.5 m: becomes brownish red.	1.0, 1.2, 1.4, 1.6, 1.8				
	EOH: 2.00 m	2.0				
		2.2, 2.4, 2.6, 2.8, 3.0				

Scala Penetrometer scale: 2, 4, 6, 8, 10, 12, 14, 16, 18

Vane Shear Strength scale: 50, 100, 150, 200, 250

Photo

Remarks

End of log at 2 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Generated with CORE-GS by Geroc - 15/03/2022 2:51:16 PM

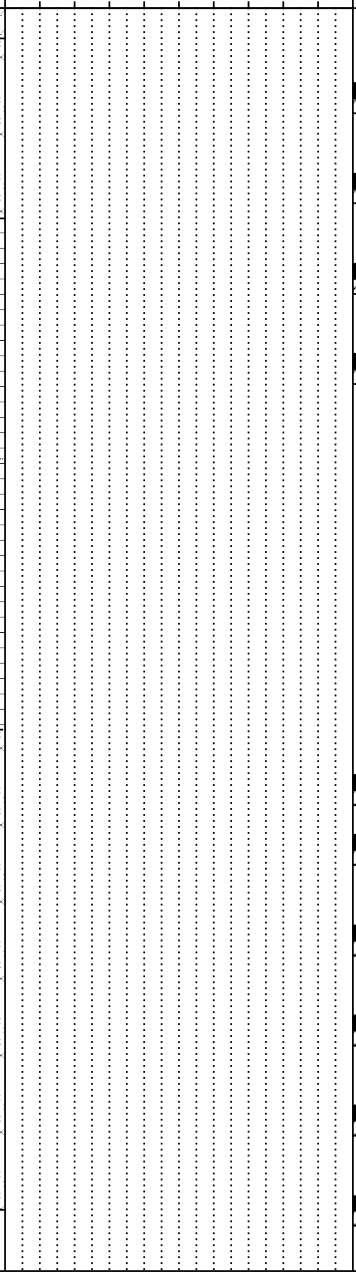
INVESTIGATION LOG

Client:		**Job No.:** HD2422
Project:	41 Aloma Way, Hamilton	**No.:** HA02
Location:	Within proposed Lot 3.	**Date:** 19.07.22
Co-ordinates:	1801410mE, 5810439mN	**Logged By:** SW
Elevation:	Ground	**Checked By:** BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; blackish grey. Moist; trace rootlets.	
Colluvium	SILT, with trace clay and sand and gravel; light brownish white, mottled orange. Stiff to very stiff; moist; moderate to high dilatency, sensitive; sand, fine, gravel, fine, subangular. 0.4 m: becomes saturated.	0.2, 0.4, 0.6
Holocene Swamp Deposits	CLAY, with minor silt; brown. Very stiff; saturated; high plasticity, moderately sensitive to extra sensitive. 1.5 m - 2.4 m: no recovery.	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4
	SILT, with trace sand; grey. Firm to very stiff; saturated; moderate to high dilatency, insensitive to sensitive; sand, medium to coarse; limited recovery. 3.4 m: becomes stiff; moderately sensitive.	2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8
	EOH: 4.00 m	4.0

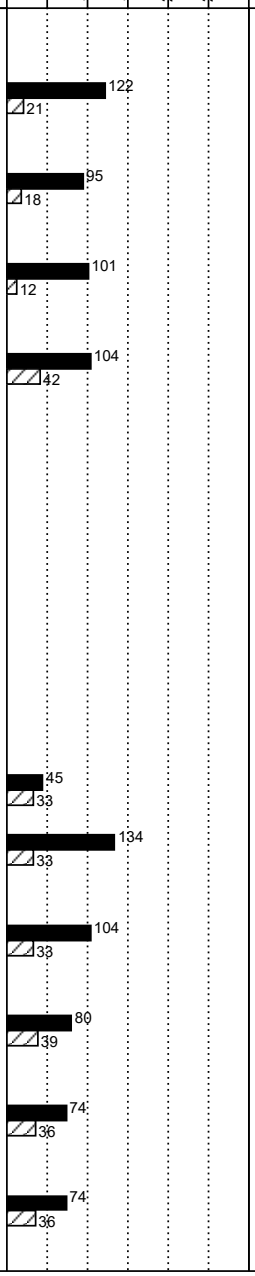
Legend

Scala Penetrometer (Blows / 100 mm)



Vane Shear Strength (kPa)

Vane: 2639



Water: 0.4 m

Photo

Remarks

End of log at 4 m - target depth achieved.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Generated with CORE-GS by Geroc - 20/07/2022 10:57:21 AM

SHEAR VANE & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Bill and Christine Hebditch	Scala Penetrometer:	
Site Address:	22 Acacia Crescent	Hand Auger No.	HA-01
Town/City:	Hamilton	Job No.:	2220364
Logged By: BM	Checked By: SBT	Date:	26/07/22
Logged Date: 27/07/22	Checked Date: 01/08/22	Weather:	Rainy
		Operator:	NS + BM

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)
Topsoil		Organic SILT (OL); dark brown. Moist, non-plastic; [TOPSOIL].		OL			
Walton Subgroup		Silty CLAY (CL); dark brown. Stiff, moist, low plasticity.		CL			123/41
	0.5						142/55
		0.7m: Becomes orange brown, very stiff					164/60
	1.0						UTP
		1.2m: Becomes light brown					191+
	1.5						153/27
	2.0						175/93
							191+
	2.5						184/77
	3.0	3.0m: Becomes brown				26/07/2022	143/85
		3.3m: Becomes light brown					150/55
	3.5						134/57
		3.8m: Contains grey streaks					163/44
	4.0	3.9m: Becomes whitish grey, contains brown and dark brown streaks					
		4.0m: Becomes reddish brown					123/66
		4.1m: Becomes pinkish brown, contains grey streaks					
		4.2m: Becomes brown					
	4.5						191+
		4.8m: Becomes light grey, contains light orange streaks					UTP
		4.9m: Contains brown mottles					
	5.0	EOH: 5.00m					UTP
		5.0m: Target depth achieved					
	5.5						

Blows per 100 mm of Penetration: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

SHEAR VANE & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Bill and Christine Hebditch	Scala Penetrometer:	
Site Address:	22 Acacia Crescent	Hand Auger No.	HA-02
Town/City:	Hamilton	Job No.:	2220364
Logged By: BM	Checked By: SBT	Date:	26/07/22
Logged Date: 27/07/22	Checked Date: 01/08/22	Weather:	Rainy
		Operator:	NS + BM

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)
Topsoil		Organic SILT (OL); dark brown. Moist, non-plastic; [TOPSOIL].		OL			
Walton Subgroup		Silty CLAY (CL). Stiff, moist, low plasticity.		CL			
	0.5						131/44
		0.7m: Becomes orange brown					167/74
	1.0						191+
		1.1m: Becomes light brown					UTP
	1.5						152/55
	2.0						UTP
							UTP
	2.5						191+
							171/93
	3.0	3.0m: Becomes brown					178/93
	3.5	3.4m: Becomes light brownish grey, contains black mottles					UTP
		3.6m: Becomes pinkish grey					191+
		3.8m: Becomes dark brown, contains black mottles				26/07/2022	
	4.0	3.9m: Becomes reddish brown					137/56
		4.1m: Becomes brown					
		4.2m: Contains black specks					138/68
	4.5	4.8m: Becomes reddish brown					137/55
		4.9m: Becomes light brown					
		5.0m: Contains black mottles, trace amounts of medium sand					UTP
	5.0	EOH: 5.00m					
		5.0m: Target depth achieved					
	5.5						

Blows per 100 mm of Penetration: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

SHEAR VANE & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Bill and Christine Hebditch	Scala Penetrometer:	
Site Address:	22 Acacia Crescent	Hand Auger No.	HA-03
Town/City:	Hamilton	Job No.:	2220364
Logged By: BM	Checked By: SBT	Date:	26/07/22
Logged Date: 27/07/22	Checked Date: 01/08/22	Weather:	Rainy
		Operator:	NS + BM

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)
Fill		SAND (S); grey. Moist, sand, fine to medium; [PAVING SAND]. *HA undertaken below paving stone*.		S			68/14
Walton Subgroup		SILT (M); dark brown. Firm to stiff, moist, high plasticity.		M			156/68
	0.5	Silty CLAY (CL); dark brown. Very stiff, moist, low plasticity.					191+
		0.7m: Contains grey streaks					
	1.0	0.9m: Becomes brown				26/07/2022	UTP
		1.3m: Becomes light brown					167/66
	1.5			CL			UTP
	2.0	2.0m: Becomes brown					150/68
							UTP
	2.5						150/79
		2.7m: Contains orange and grey streaks, trace amounts fine whitish sand					191+
	3.0	2.9m: Becomes greyish brown, contains black mottles					UTP
		SILT (M), with some clay; brown. Very stiff, moist, low plasticity.		M			
		3.3m: Contains black mottles, orange streaks					160/79
	3.5	Silty CLAY (CL); brown. Very stiff, moist, low plasticity; contains black mottles, orange streaks.					191+
	4.0			CL			UTP
		4.2m: Becomes light orange brown, contains brown streaks					191+
	4.5	4.4m: Becomes light greyish brown. contains orange streaks					180/55
		EOH: 5.00m					158/55
	5.0	5.0m: Target depth achieved					
	5.5						

Blows per 100 mm of Penetration: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

NZGD ID: HA_193673

TITUS
CONSULTING ENGINEERS

Log:

HA1

Address: 249 Houchens Road
Date: 12/04/2022
Testers: AmalroyT

Project №: 13563

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm: (5, 10, 15)	Shear Strength (kPa): Undrained:	Remoulded:	Sensitivity:
Not Found	100, 200	Undefined		Topsoil				
	300, 400, 500, 600	Holocene swamp deposits		SILT, brownish grey mottled orange, low plasticity, moist, stiff		95	36	2.6
	700, 800, 900, 1000, 1100, 1200	Pleistocene River Deposits and Ignimbrite		CLAY with some silt, brown mottled black, high plasticity, moist, stiff to very stiff		127	76	1.7
						174	71	2.4
	1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100			*End of Borehole @1200mm*				

NZGD ID: HA_193673

NZGD ID: HA_193674

TITUS
CONSULTING ENGINEERS

Log:

HA2

Address: 249 Houchens Road
Date: 12/04/2022
Testers: AmalroyT

Project №: 13563

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm: (5, 10, 15)	Shear Strength (kPa): Undrained:	Remoulded:	Sensitivity:
Not Found	100, 200	Undefined		Topsoil				
	300, 400, 500	Pleistocene River Deposits and Ignimbrite		SILT, brownish grey, low plasticity, dry to moist, stiff		127	52	2.4
	600, 700, 800, 900, 1000			Silty CLAY, light brown, high plasticity, moist, stiff		141	54	2.6
	1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000			CLAY, light brown mottled black, high plasticity, moist, stiff to very stiff		159	63	2.5
						127	43	3
						135	59	2.3
	2100			*End of Borehole @2000mm*				

NZGD ID: HA_193674

NZGD ID: HA_193676

TITUS
CONSULTING ENGINEERS

Log:

HA3

Address: 249 Houchens Road
Date: 12/04/2022
Testers: AmalroyT

Project №: 13563

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm: (5, 10, 15)	Shear Strength (kPa): Undrained:	Remoulded:	Sensitivity:
	100, 200	Undefined		FILL (medium GRAVEL), light greyish blue, poorly graded, dry				
	300, 400, 500	Holocene swamp deposits		SILT, brownish grey, low plasticity, moist, stiff		125	41	3
	600, 700, 800	Pleistocene River Deposits and Ignimbrite		CLAY, light brown mottled orange and grey, high plasticity, moist, stiff		127	54	2.4
	900, 1000, 1100, 1200, 1300, 1400, 1500			CLAY with some silt, light brown, high plasticity, moist, stiff		143	63	2.2
▼	1600, 1700, 1800, 1900, 2000			CLAY, dark brownish bluish grey, high plasticity, moist, stiff		146	48	3.1
						146	48	3.1
	2100			*End of Borehole @2000mm*				

NZGD ID: HA_193676

NZGD ID: HA_193677

TITUS
CONSULTING ENGINEERS

Log:

HA4

Address: 249 Houchens Road
Date: 12/04/2022
Testers: AmalroyT

Project №: 13563

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm: (5, 10, 15)	Shear Strength (kPa): Undrained:	Remoulded:	Sensitivity:
Not Found	100, 200	Undefined		Topsoil				
	300, 400, 500	Pleistocene River Deposits and Ignimbrite		SILT, brownish grey, low plasticity, moist, stiff		127	52	2.4
	600, 700, 800			Clayey SILT, brown mottled orange and grey, low plasticity, moist, stiff		128	59	2.2
	900, 1000, 1100, 1200, 1300, 1400, 1500, 1600			Silty CLAY, brown, high plasticity, moist, very stiff		190	67	2.9
						190	35	5.5
	1700, 1800, 1900, 2000			CLAY, brown, high plasticity, moist, very stiff		203	78	2.6
	2100			*End of Borehole @2000mm*				

NZGD ID: HA_193677

NZGD ID: HA-DCP_108690

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH07**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1798523mE	5811224mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Cobham Drive		

Depth	Geological Description (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	Test Records: Shear Vane (kPa)	Sampling	Dynamic Cone Penetrometer (Blows per 100 mm)	Material Description (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	Graphic Log	Instrumentation
	Fill: Uncontrolled fill.			5, 9, 8	SILT with fine to coarse gravel; dark brown. Firm; moist; gravel, angular.		
	Hinuera Formation: Alluvial pumice, sand, silt and gravel with interbedded peat.	105/23		3, 1, 1	SILT; light grey mottled orange. Stiff; moist.		
		39/8		2, 2	0.6m:Firm, extra sensitive to quick.		
		39/8		3, 3, 3	0.8m:Minor fragments of decomposed wood.		
1		66/16		2, 4, 4	1.2m:Stiff, grades to brownish grey, mottled light grey, trace of rootlets.		
		70/12		5, 4, 4			
		105/35		4, 3, 4			
2		237max		4, 6, 8	2.1m:Hard, grades to light greyish brown, mottled yellow.		
				6, 11, 8	Silty fine SAND; light greyish brown mottled yellow and dark orange. Dense; moist.		
		213/31	>>	9, 9, 9	SILT; light grey. Hard; moist; sensitive. 2.7m:Grades to brownish orange, trace fragments of charcoal.		
3		159/23		10	Clayey SILT with trace sand; brownish grey mottled orange. Stiff; moist; sand, fine, pumiceous; sensitive. 3.2m:Grades to light grey, speckled black & mottled brown, trace of fine sand.		
		178/39					
		155/19					
		175/23					
4					AH07 terminated at 4m		
5							

Test Records: Shear Vane (kPa) — Residual - Peak; 0 kPa, 100 kPa, 200 kPa. Dynamic Cone Penetrometer: 6 12 18 24.

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations

Miniature shear vane

Vane number DR1870 Blade 19mm Factor 1.94

Vane shear strength per NZGS guideline

Remarks

Reserve west of existing bridge.

Started 2/03/2011

Finished 2/03/2011

Date logged 7/03/2011

Logged GMP

Checked ERC

Page 1 of 1

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

08/06/2005

NZGD ID: HA-DCP_108690

NZGD ID: HA-DCP_108726

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH104**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799504mE	5811119mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Houchens Road		

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks
	Topsoil.	SILT; dark brown. Soft, moist.
	Swamp deposits, dark brown to black, organic-rich silt and peat. (PIAKO SUBGROUP)	PEAT; black. Soft, moist to wet, fibrous.
1		0.9m:Wet.
2		1.6m:Bed of brown silt.
	Alluvial pumice, sand and silt. (Hinuera Formation)	Fine SAND, minor silt; light grey. Loose to medium dense, wet.
3		AH104 terminated at 3m
4		
5		

Test Records: Shear Vane (kPa) — Residual - Peak; 0 kPa, 100 kPa, 200 kPa

Sampling

Dynamic Cone Penetrometer (Blows per 100 mm) — 6 12 18 24

Dynamic Cone Penetrometer blows: 1, 1, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 2, 1, 1, 2, 1, 1, 2, 1, 2, 2, 3, 2, 2, 3, 3, 3, 2, 4, 5, 4, 6, 6, 6, 5

Graphic Log

Instrumentation

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations
0.9m.	21/02/2012	

Miniature shear vane

Vane number Blade Factor

Vane shear strength per NZGS guideline

Remarks

Existing farmland.

Started 21/02/2012

Finished 21/02/2012

Date logged 7/03/2011

Logged GMP

Checked DMM

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

NZGD ID: HA-DCP_108726

NZGD ID: HA-DCP_108727

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH107**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801112mE	5809704mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Cobham Drive		

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	Test Records: Shear Vane (kPa) (Residual - Peak, 0 kPa, 100 kPa, 200 kPa)	Sampling	Dynamic Cone Penetrometer (Blows per 100 mm)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	Graphic Log	Instrumentation
	Topsoil.			1, 1, 2	SILT; dark brown. Firm; moist.		
	Alluvial pumice, sand, silt and gravel. (Hinuera Formation)	101/19		2, 3, 3	SILT; light brown. Stiff; moist; extra sensitive.		
		136/19		3, 4, 3, 3	0.6m:Very stiff. 0.8m:Trace of fine sand, slightly friable.		
1				3, 3, 3, 4, 3, 3, 3, 2	Sandy SILT; light brownish grey. Stiff; moist; sand, fine. 1.2m:Minor fine pumiceous sand.		
		140/23		5, 5, 5, 5, 7	SILT; light grey. Very stiff; moist; extra sensitive.		
2				6, 6, 9, 6, 5, 6	Fine SAND, trace of silt; light grey. Medium dense to dense; moist.		
				2, 2	SILT with minor sand; brown, mottled light brown. Stiff; moist; sand, fine, pumiceous. 2.9m:Iron staining.		
3				2, 2, 6, 6, 5, 5	Sandy SILT; grey. Stiff; moist to wet; sand, fine.		
		155/35		4, 5	Clayey SILT; brownish orange. Very stiff; moist; sensitive.		
		194/43		5, 5	Silty CLAY; brownish orange. Very stiff; moist.		
4					AH107 terminated at 4m		
5							

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations

Miniature shear vane

Vane number DR1870 Blade 19mm Factor 1.94

Vane shear strength per NZGS guideline

Remarks

Reserve east of existing bridge.

Started 2/03/2011

Finished 2/03/2011

Date logged 7/03/2011

Logged GMP

Checked MDT

Page 1 of 1

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

08/06/2005

NZGD ID: HA-DCP_108727

NZGD ID: HA-DCP_108728

AECOM

LOG OF AUGERHOLE

HOLE IDENTIFICATION **AH110**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802622mE	5808781mN	
Orientation	-90°	Elevation	
Location	South Hamilton		
Feature	Day Road		

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological features, Stratigraphic Unit)	Test Records: Shear Vane (kPa) (Residual - Peak, 0 kPa – 200 kPa)	Sampling	Dynamic Cone Penetrometer (Blows per 100 mm)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	Graphic Log	Instrumentation
	Topsoil.			2, 1	SILT; dark brown. Firm, moist.		
	Alluvial pumice sand and silt. (Hinuera Formation)	130/29		4, 5, 4, 3	SILT, trace sand; light brownish grey, mottled orange. Very stiff; moist; sand, fine.		
		109/40		5	0.5m:Some fine sand.		
1				5, 10, 10, 11, 11, 10, 9, 10	Silty fine SAND; light grey. Medium dense; moist. 0.95m:Moist to wet and pumiceous.		
2				10, 10, 10, 11, 10, 8, 8, 8, 5, 5, 6, 6, 8, 7, 8	Fine SAND: brownish grey. Medium dense; saturated.		
3				7	AH110 terminated at 3m		
4							
5							

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Depth (m)	Date	Post strike observations
1.5m.	29/02/2012	

Miniature shear vane
Vane number GEOVANEBlade 19mm Factor 1.44
Vane shear strength per NZGS guideline

Remarks
Existing farmland.

Started 29/02/2012
Finished 29/02/2012
Date logged 7/03/2011
Logged GMP
Checked DMM

Page 1 of 1

AUGERHOLE LOG (HAMILTON - FOR 30 NO. BLOW COUNTS) SLINKS MASTER 03-04-2012.GPJ BASE.GDT 12/04/12

08/06/2005

NZGD ID: HA-DCP_108728

INVESTIGATION LOG

Job No.:	HD769
No.:	HA01
Sheet:	1 of 1
Date:	23/10/18

Client: Southpark Agri Developments Ltd	**Coordinates:** -	**Ground Level:** Ground
Project: 16 Wickham Street, Hamilton	**Location:** NW corner of site	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100mm)	Vane Shear Strength (kPa) Vane:	Values	Water
Holocene Swamp Deposits	PEAT (PT); dark brown; homogeneous. Stiff; dry; Rootlets.	0.2	TS	2 4 6 8 10 12 14 16 18	50 100 150 200		23/10/2018
	PEAT (PT); dark brown. Firm; wet; Fibrous, spongy.	0.4	TS				
		0.6					
		0.8					
		1.0					
		1.2					
		1.4					
		1.6					
		1.8					
		2.0					
		2.2					
		2.4					
		2.6					
		2.8					
	3.0m - 3.0m: Wood present	3.0					
		3.2					
		3.4					
		3.6					
		3.8					
		4.0					
		4.2					
		4.4					
		4.6					
		4.8					
		5.0					
ko Sub gro	SILT (ML); light grey. Firm; saturated; low plasticity; dilatant.	5.2					
	EOH: 5.20m	5.4					
		5.6					
		5.8					
		6.0					
		6.2					
		6.4					

Photo

Remarks

Hole collapse from 1.8 m.
Poor sample return from saturated peat and silt.

Water

- Standing Water Level
- Out flow
- In flow

Investigation Type

- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Contractor:	Rig/Plant Used:	Logged By:	Checked By:	Hole Depth:
		JB	GP	5.20 m

Produced with Core-GS

Printed: 9/11/2018 1:12:12 PM Page: 1 of 1

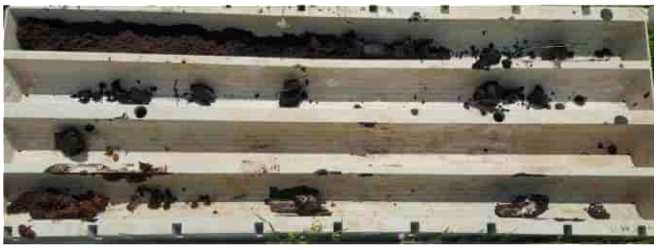
INVESTIGATION LOG

Job No.:	HD769
No.:	HA02
Sheet:	1 of 1
Date:	23/10/18

Client: Southpark Agri Developments Ltd	**Coordinates:** -	**Ground Level:** Ground
Project: 16 Wickham Street, Hamilton	**Location:** Western boundary	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100mm)	Vane Shear Strength (kPa) Vane: Values	Water
Holocene Swamp Deposits	PEAT (PT); dark brown; homogeneous. Stiff; dry; Rootlets.	0.2	TS	2 4 6 8 10 12 14 16 18	50 100 150 200	
	PEAT (PT); dark brown. Firm; wet; Fibrous, spongy.	0.4	TS			
	0.8m - 0.8m:	0.6, 0.8				23/10/2018
		1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8				
	3.1m - 3.1m: Wood present	3.0, 3.2, 3.4				
ko Sub gro	SILT (ML); light grey. Firm; saturated; low plasticity; dilatant.	3.6, 3.8				
	EOH: 3.80m	4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4				

Photo



Remarks

Hole collapse from 0.8 m.
Poor sample return from saturated peat and silt.

Water

- ▼ Standing Water Level
- ◁ Out flow
- ▷ In flow

Investigation Type

- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Contractor:	Rig/Plant Used:	Logged By:	Checked By:	Hole Depth:
		JB	GP	3.80 m

Produced with Core-GS

Printed: 9/11/2018 1:12:13 PM Page: 1 of 1

INVESTIGATION LOG

Job No.:	HD769
No.:	HA03
Sheet:	1 of 1
Date:	23/10/18

Client: Southpark Agri Developments Ltd	**Coordinates:** -	**Ground Level:** Ground
Project: 16 Wickham Street, Hamilton	**Location:** SE corner of site	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100mm)	Vane Shear Strength (kPa) Vane:	Values	Water
Holocene Swamp Deposits	PEAT (PT); dark brown; homogeneous. Stiff; dry; Rootlets.	0.2	TS	2 4 6 8 10 12 14 16 18	50 100 150 200		
	PEAT (PT); dark brown. Firm; wet; Fibrous, spongy.	0.4	TS				
		0.6					
		0.8					
		1.0					
		1.2					23/10/2018
		1.4					
		1.6					
		1.8					
		2.0					
		2.2					
		2.4					
		2.6					
		2.8					
		3.0					
		3.2					
		3.4					
		3.6					
Piako Subgroup	SILT (ML), with some sand; light grey. Firm; saturated; low plasticity; sand, fine to medium; dilatant.	3.8					
	EOH: 4.20m	4.0					
		4.2					
		4.4					
		4.6					
		4.8					
		5.0					
		5.2					
		5.4					
		5.6					
		5.8					
		6.0					
		6.2					
		6.4					

Photo

Remarks

Hole collapse from 1.4 m.
Poor sample return from saturated peat and silt.

Water

- ▼ Standing Water Level
- ◁ Out flow
- ▷ In flow

Investigation Type

- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Contractor:	Rig/Plant Used:	Logged By:	Checked By:	Hole Depth:
		JB	GP	4.20 m

Produced with Core-GS

Printed: 9/11/2018 1:12:14 PM Page: 1 of 1

INVESTIGATION LOG

Job No.:	HD769
No.:	HA04
Sheet:	1 of 1
Date:	23/10/18

Client: Southpark Agri Developments Ltd	**Coordinates:** -	**Ground Level:** Ground
Project: 16 Wickham Street, Hamilton	**Location:** Eastern boundary of site	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100mm)	Vane Shear Strength (kPa) Vane: Values	Water
Holocene Swamp Deposits	PEAT (PT); dark brown; homogeneous. Stiff; dry; Rootlets.	0.2	TS			
	PEAT (PT); dark brown. Firm; wet; Fibrous, spongy.	0.4	TS			
		0.6				
		0.8				
		1.0				
		1.2				
		1.4				▼ 23/10/2018
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				
		3.4				
		3.6				
		3.8				
		4.0				
		4.2				
		4.4				
		4.6				
		4.8				
		5.0				
		5.2				
		5.4				
Subd	SAND (SM), with some silt, with trace gravel; light orange grey. Firm; saturated; moderate dilatency; sand, fine to coarse; gravel, fine, subround; Poor sample return.	5.6				
	EOH: 5.60m	5.8				
		6.0				
		6.2				
		6.4				

Scala Penetrometer scale: 2 4 6 8 10 12 14 16 18

Vane Shear Strength scale: 50 100 150 200

Photo

Remarks

Hole collapse from 1.4 m.
Poor sample return from saturated peat and sand.

Water

- ▼ Standing Water Level
- ◁ Out flow
- ▷ In flow

Investigation Type

- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Contractor:	Rig/Plant Used:	Logged By:	Checked By:	Hole Depth:
		JB	GP	5.60 m

Produced with Core-GS

Printed: 9/11/2018 1:12:16 PM Page: 1 of 1

INVESTIGATION LOG

Client:		**Job No.:** HD2291
Project:	37a Saxbys Road, Hamilton	**No.:** HA01
Location:	Southern side of proposed house.	**Date:** 15.03.22
Co-ordinates:	1800604mE, 5811271mN	**Logged By:** MM
Elevation:	Ground	**Checked By:** BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa)	Water
Topsoil	TOPSOIL; dark blackish brown. Dry; trace rootlets.	0.2	3, 2, 2		Groundwater Not Encountered
		0.4	3		
Hinuera Formation	SAND, with some silt; light brown. Loose to medium dense; dry; poorly graded; sand, fine to medium.	0.6	3, 2, 2		
		0.8	4		
	SAND; reddish brown. Medium dense to dense; dry to moist; poorly graded; sand, fine to medium.	1.0	5, 12		
	SAND; light brown. Medium dense to dense; moist; well graded; sand, fine to coarse.	1.2	11, 8		
		1.4	6, 7		
	1.5 m: becomes brown.	1.6	7, 12		
		1.8	7, 8		
	SAND, with some gravel; dark brown. Dense; moist; well graded; sand, fine to coarse; gravel, fine, subrounded.	2.0	11, 12		
	2.0 m: becomes medium dense.	2.2	6, 7		
		2.4	7, 6		
		2.6	5, 5		
	2.7 m: becomes light brown.	2.8	6, 7		
	EOH: 3.00 m	3.0	4, 6		

Legend: Topsoil; Hinuera Formation

Scala Penetrometer scale: 2, 4, 6, 8, 10, 12, 14, 16, 18

Vane Shear Strength (kPa) scale: 50, 100, 150, 200, 250

Photo

Remarks

End of log at 3 m - target depth.

Shear Vanes	Water	Investigation Type
Peak	Standing Water Level	✓ Hand Auger
Remoulded	Out flow	Investigation Pit
	In flow	Machine Borehole

Generated with CORE-GS by Geroc - 15/03/2022 2:51:05 PM

INVESTIGATION LOG

Client:		**Job No.:** HD2291
Project:	37a Saxbys Road, Hamilton	**No.:** HA02
Location:	Western side of proposed house.	**Date:** 15.03.22
Co-ordinates:	1800598mE, 5811276mN	**Logged By:** MM
Elevation:	Ground	**Checked By:** BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Topsoil	TOPSOIL; dark blackish brown. Dry; trace rootlets.	0.2		5, 3, 3		Groundwater Not Encountered
Hinuera Formation	Silty SAND; light greyish brown. Loose; dry; poorly graded; sand, fine to medium.	0.4		2, 1		
	SAND, with trace silt; light greyish brown. Loose; dry; poorly graded; sand, fine to medium.	0.6		2, 1		
	0.7 m: becomes medium dense to dense.	0.8		5, 9		
	SAND; brown. Medium dense; dry to moist; well graded; sand, fine to coarse.	1.0		6, 5		
		1.2		4, 6		
		1.4		6		
	SAND, with minor silt and gravel; reddish brown. Medium dense to dense; dry to moist; well graded; sand, fine to coarse; gravel, fine, subrounded.	1.6		10, 9, 7		
		1.8		9, 8		
		2.0		6, 6		
		2.2		6, 6		
	SAND, with minor gravel; brown. Medium dense; moist; well graded; sand, fine to coarse; gravel, fine to medium, subrounded.	2.4		4, 5		
		2.6		6		
	SAND; yellowish brown. Medium dense; moist; well graded; sand, fine to coarse.	2.8		5, 5, 3		
	EOH: 3.00 m	3.0		5		

Scala Penetrometer scale: 2, 4, 6, 8, 10, 12, 14, 16, 18

Vane Shear Strength scale: 50, 100, 150, 200, 250

Photo

Remarks

End of log at 3 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Generated with CORE-GS by Geroc - 15/03/2022 2:51:07 PM

INVESTIGATION LOG

Client:		**Job No.:** HD2291
Project:	37a Saxbys Road, Hamilton	**No.:** HA03
Location:	2.5 m east of north-eastern corner of proposed house.	**Date:** 15.03.22
Co-ordinates:	1800609mE, 5811284mN	**Logged By:** MM
Elevation:	Ground	**Checked By:** BK

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Topsoil	TOPSOIL; dark blackish brown. Dry; trace rootlets.	0.2		5, 4, 3		Groundwater Not Encountered
Hinuera Formation	SAND, with minor silt; light brown. Medium dense to dense; dry; poorly graded; sand, fine to medium.	0.4, 0.6, 0.8		5, 8, 11, 9, 7		
	SAND; light brown. Medium dense to dense; dry to moist; well graded; sand, fine to coarse.	1.0, 1.2, 1.4		7, 6, 5, 3, 3, 5, 10		
	SAND, with minor gravel; reddish brown. Dense; moist; well graded; sand, fine to coarse; gravel, fine, subrounded. 2.0 m: becomes medium dense.	1.6, 1.8, 2.0, 2.2		9, 10, 10, 8, 8, 3, 5, 3		
	SAND; greyish brown. Medium dense; moist; well graded; sand, fine to coarse.	2.4, 2.6, 2.8		4, 4, 3, 3, 4, 5		
	EOH: 3.00 m	3.0		6		

Scala Penetrometer scale: 2, 4, 6, 8, 10, 12, 14, 16, 18

Vane Shear Strength scale: 50, 100, 150, 200, 250

Photo

Remarks

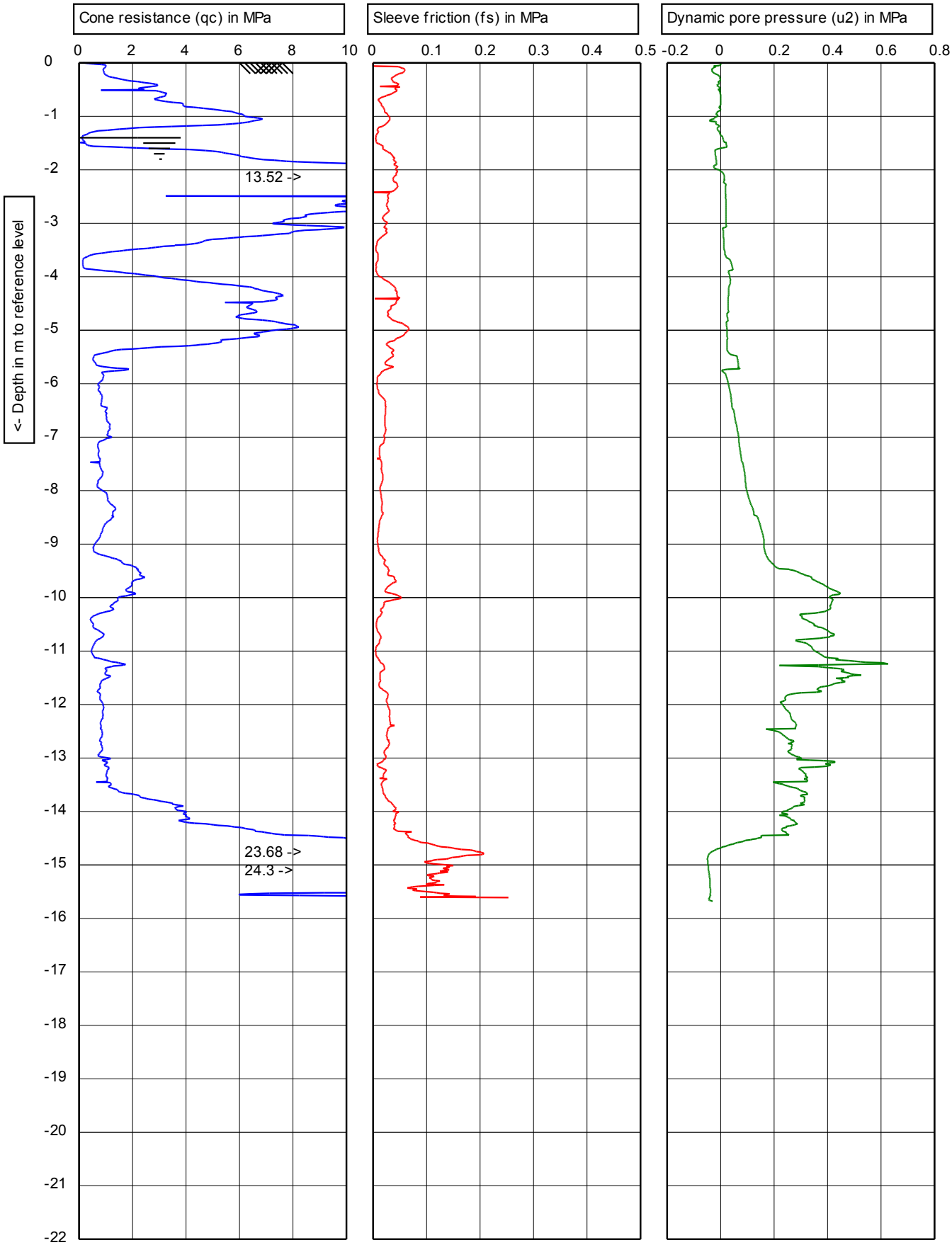
End of log at 3 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Generated with CORE-GS by Geroc - 15/03/2022 2:51:09 PM



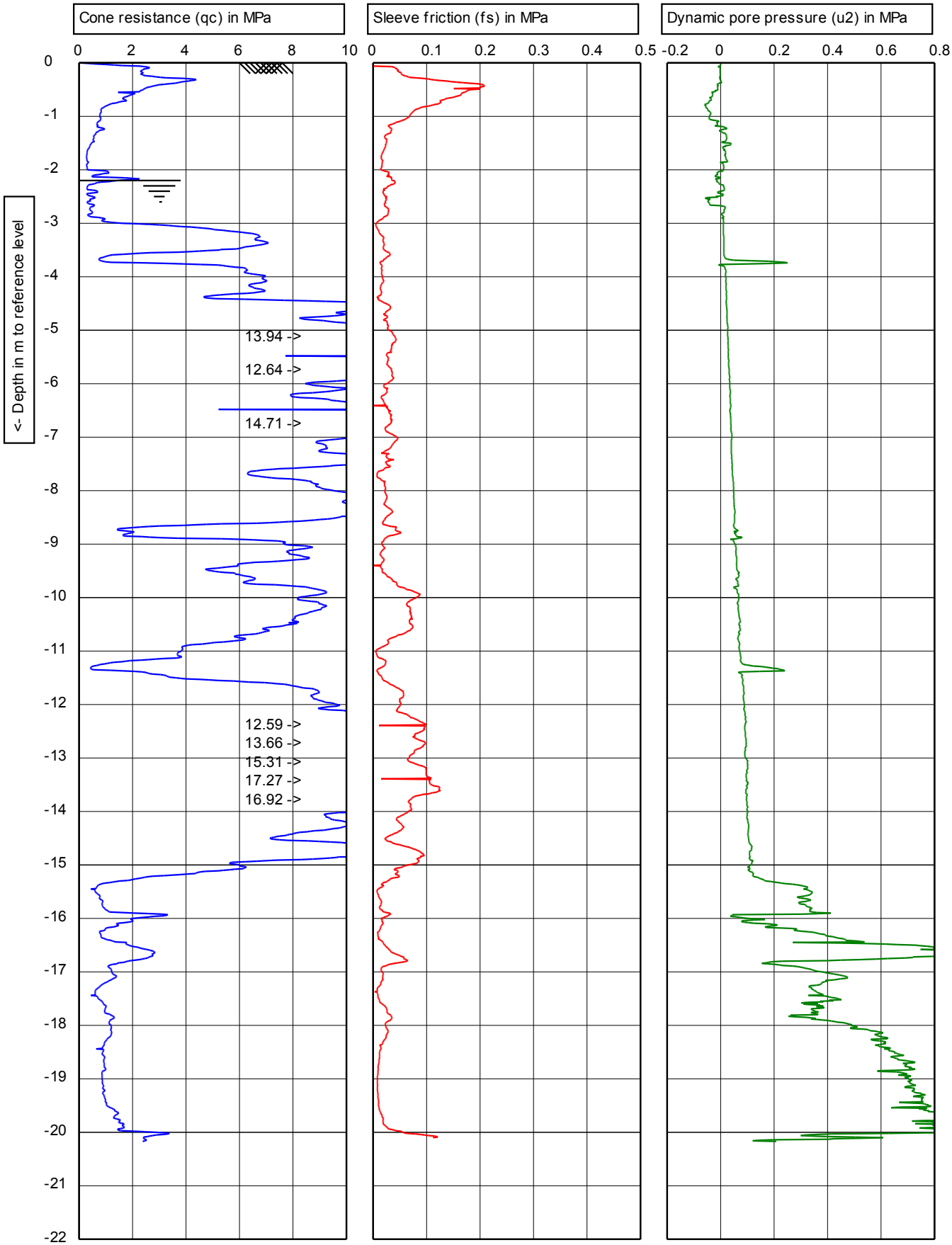
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

1.45

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	**0.00 m Predrilled**
	G.L.: **0.00 m MSL** W.L.: **-1.40 m**	Date:	**8/11/2016**
Project:	**60525520/06.00**	Cone no.:	**C10CFIIP.C14434**
Location:	**Houchen/ Saxby Road - Hamilton**	Project no.:	**2-68200.16_HA703**
Position:	**1800974, 5810938 NZTM**	CPT no.:	**01** 1/6



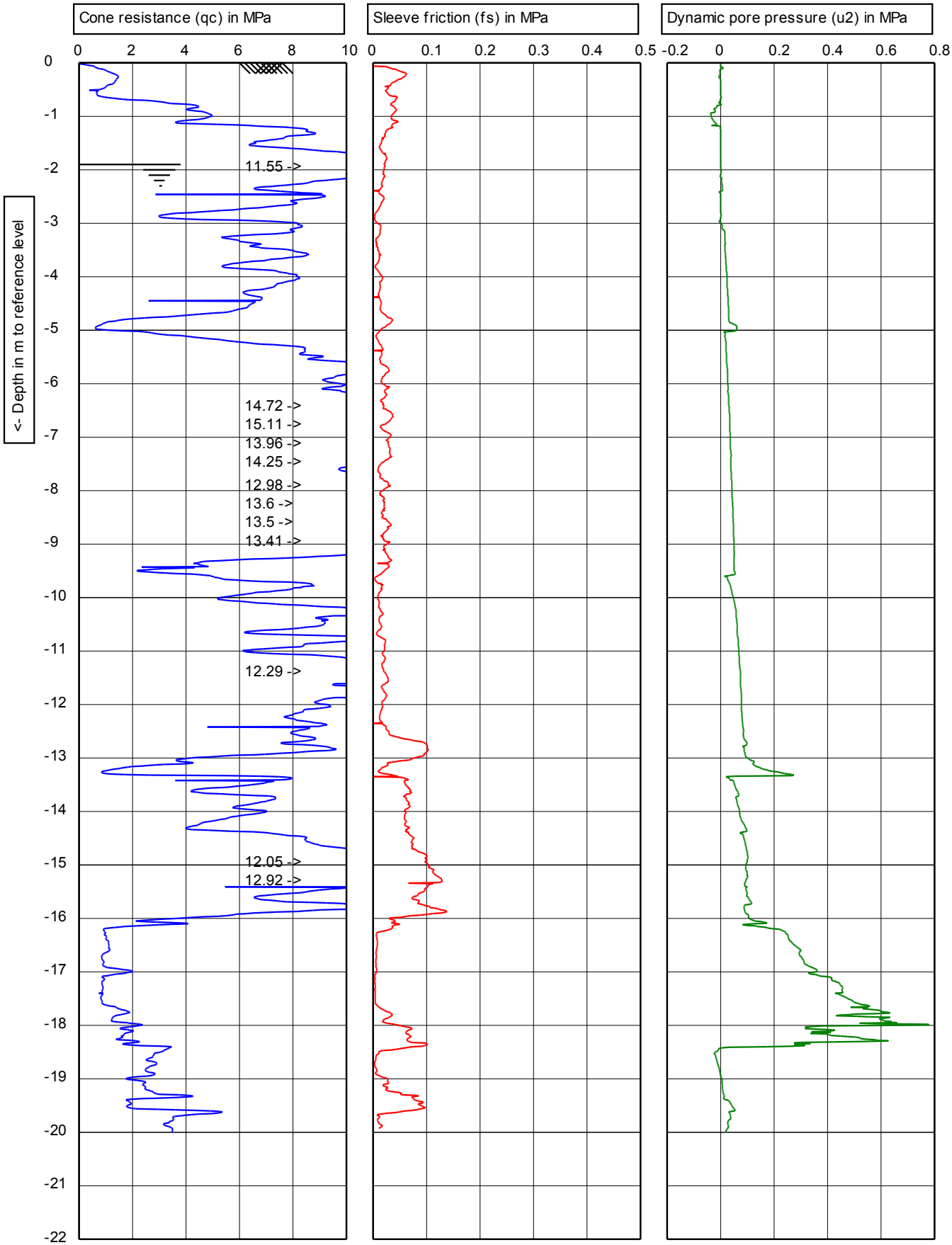
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

1.45

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -2.20 m	Date:	9/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800577, 5811135 NZTM	CPT no.:	02 — 1/6



Target Depth

EOH - Dipped - GWL @ 1.9m

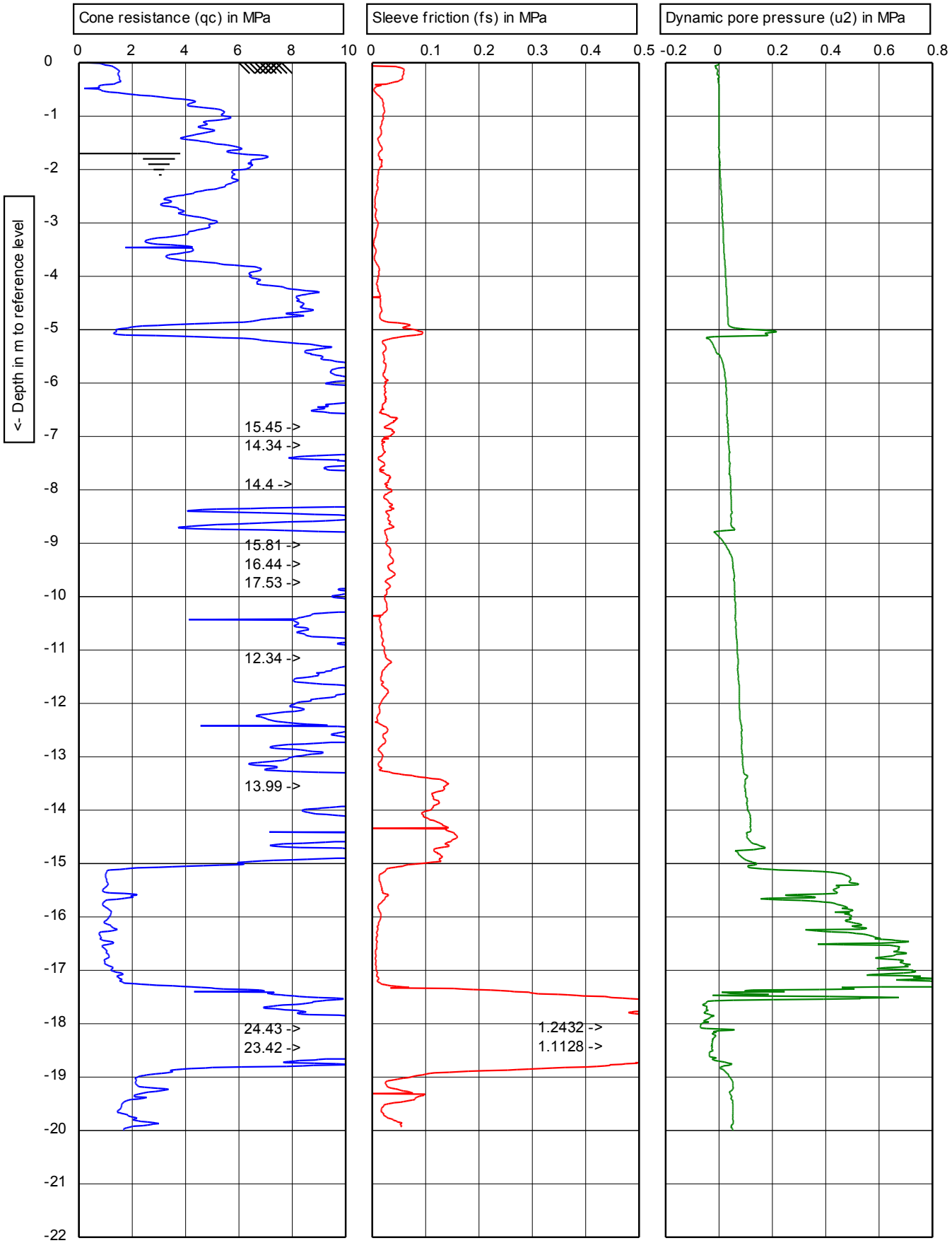
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

1.45

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.90 m	Date:	8/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800693, 5810914 NZTM	CPT no.:	03



Target Depth

EOH - Dipped - GWL @ 1.7m

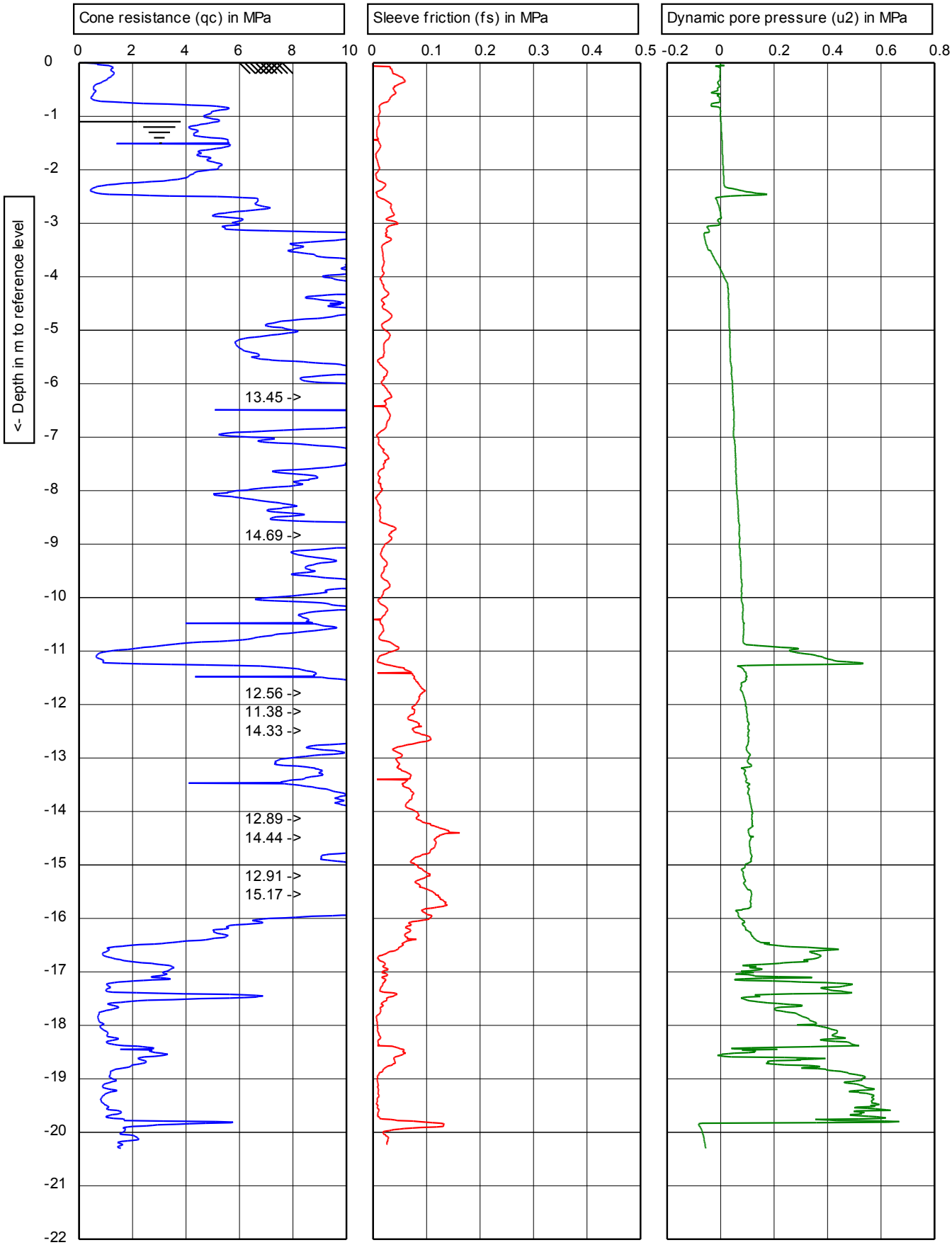
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

Test according ASTM D5778-12 & ISO 22476-1:2012		Predrill:	0.00 m Predrilled
G.L.: 0.00 m MSL	W.L.: -1.70 m	Date:	8/11/2016
Project: 60525520/06.00		Cone no.:	C10CFIIP.C14434
Location: Houchen/ Saxby Road - Hamilton		Project no.:	2-68200.16_HA703
Position: 1800839, 5810651 NZTM		CPT no.:	04 1/6

1.45



OPUS

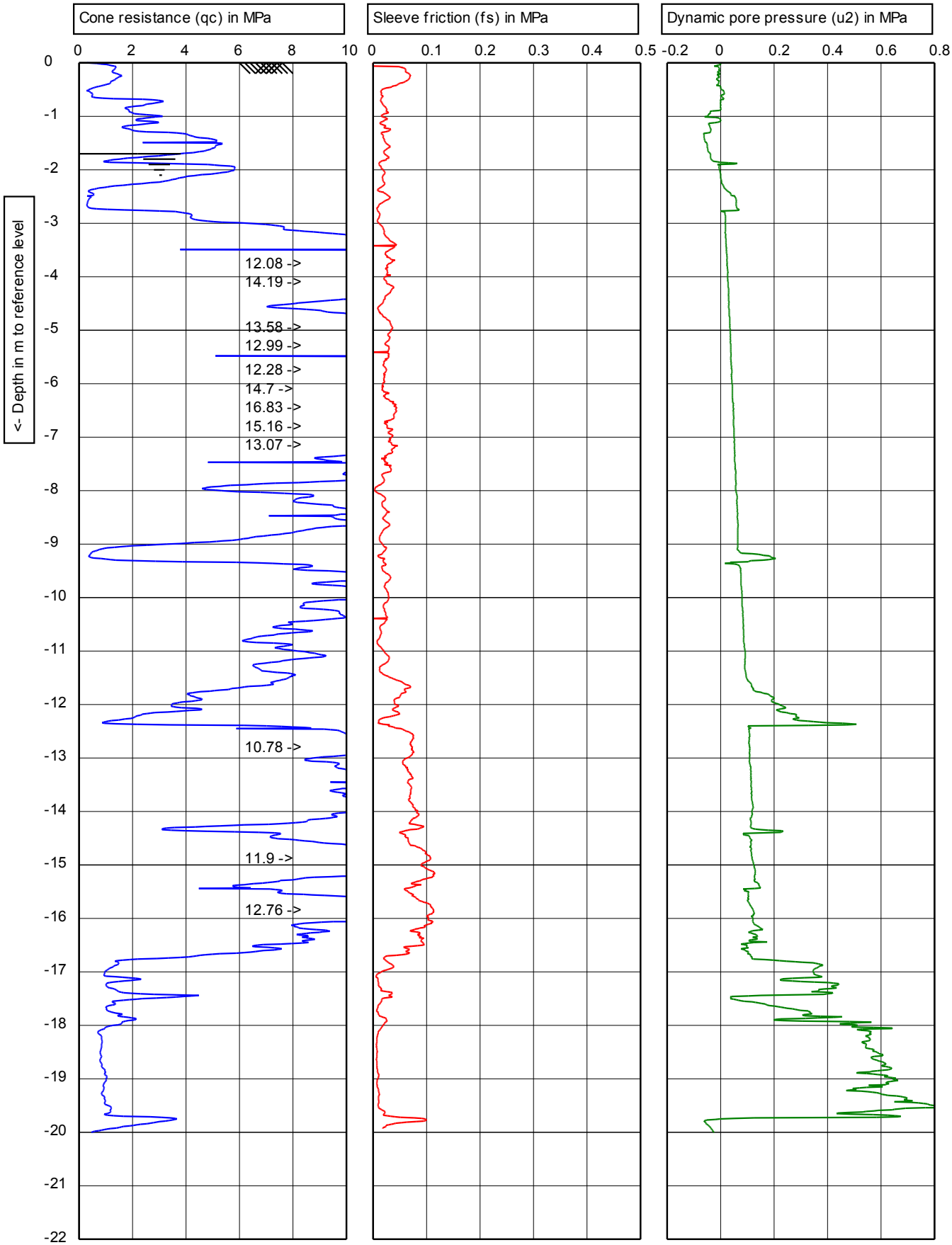
IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.10 m	Date:	9/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800468, 5810994 NZTM	CPT no.:	05

1/6

1.45



Target Depth

EOH - Dipped - GWL @ 1.7m

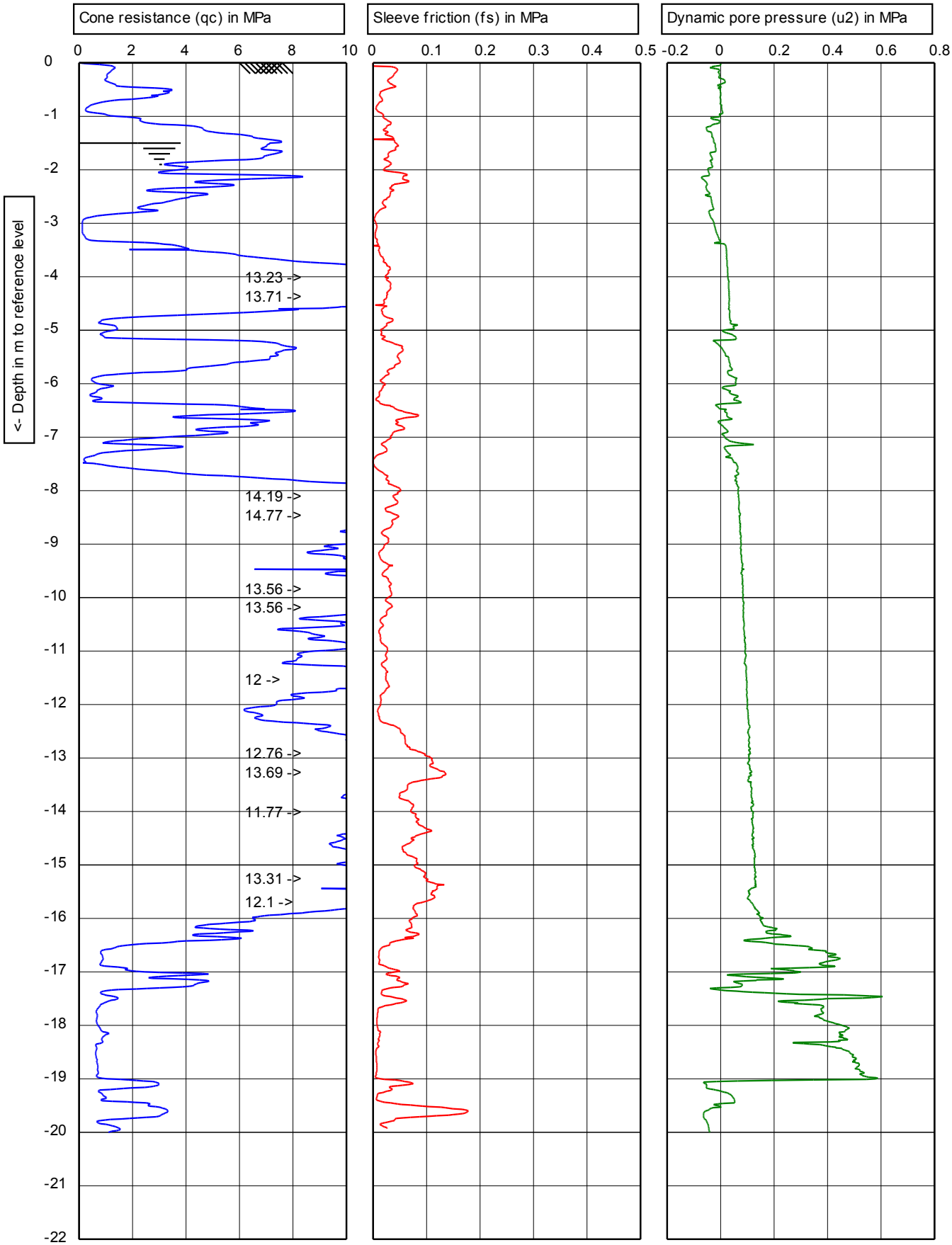
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.70 m	Date:	9/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800589, 5810834 NZTM	CPT no.:	06 1/6

1.45



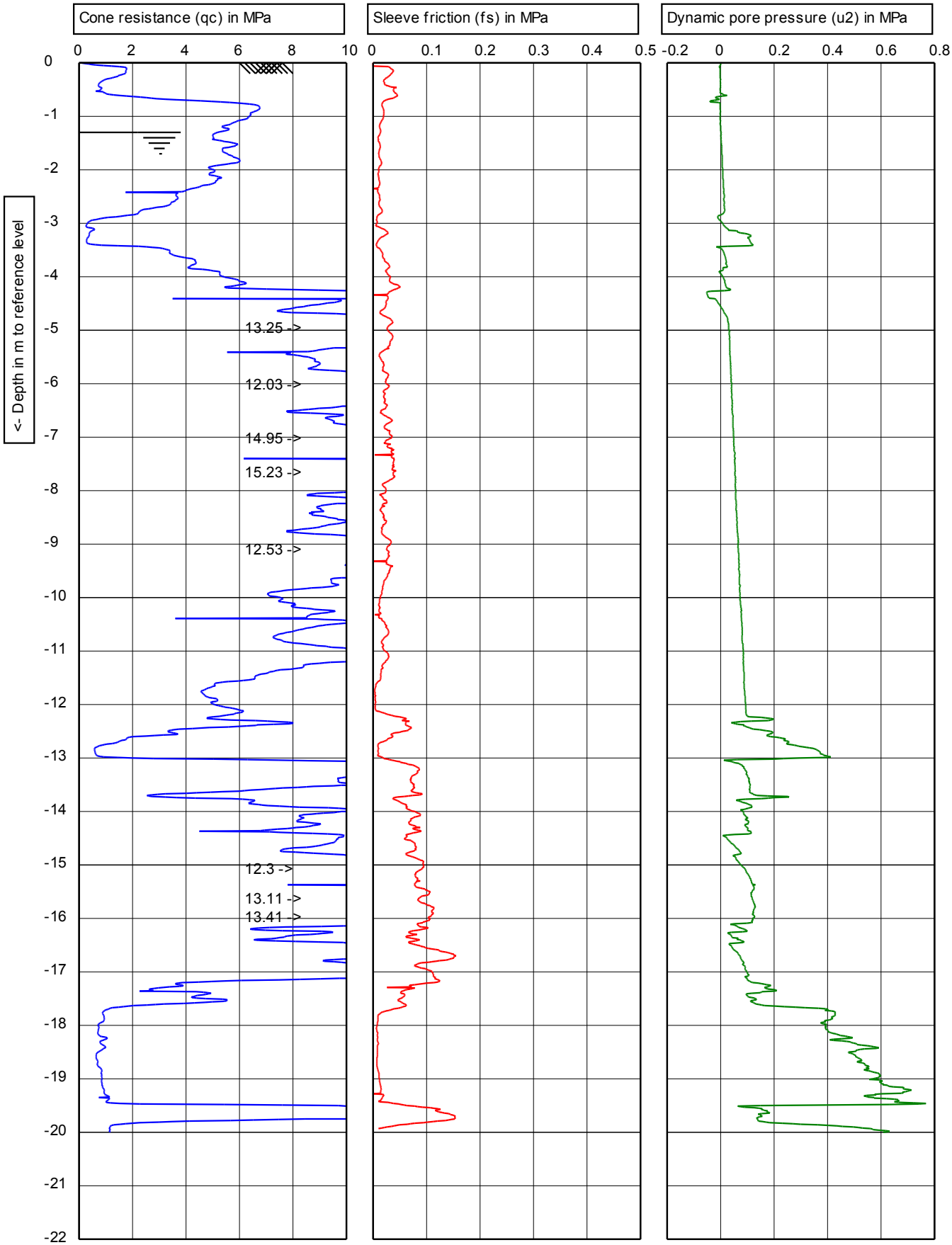
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.50 m	Date:	8/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800623, 5810550 NZTM	CPT no.:	07 — 1/6

1.45



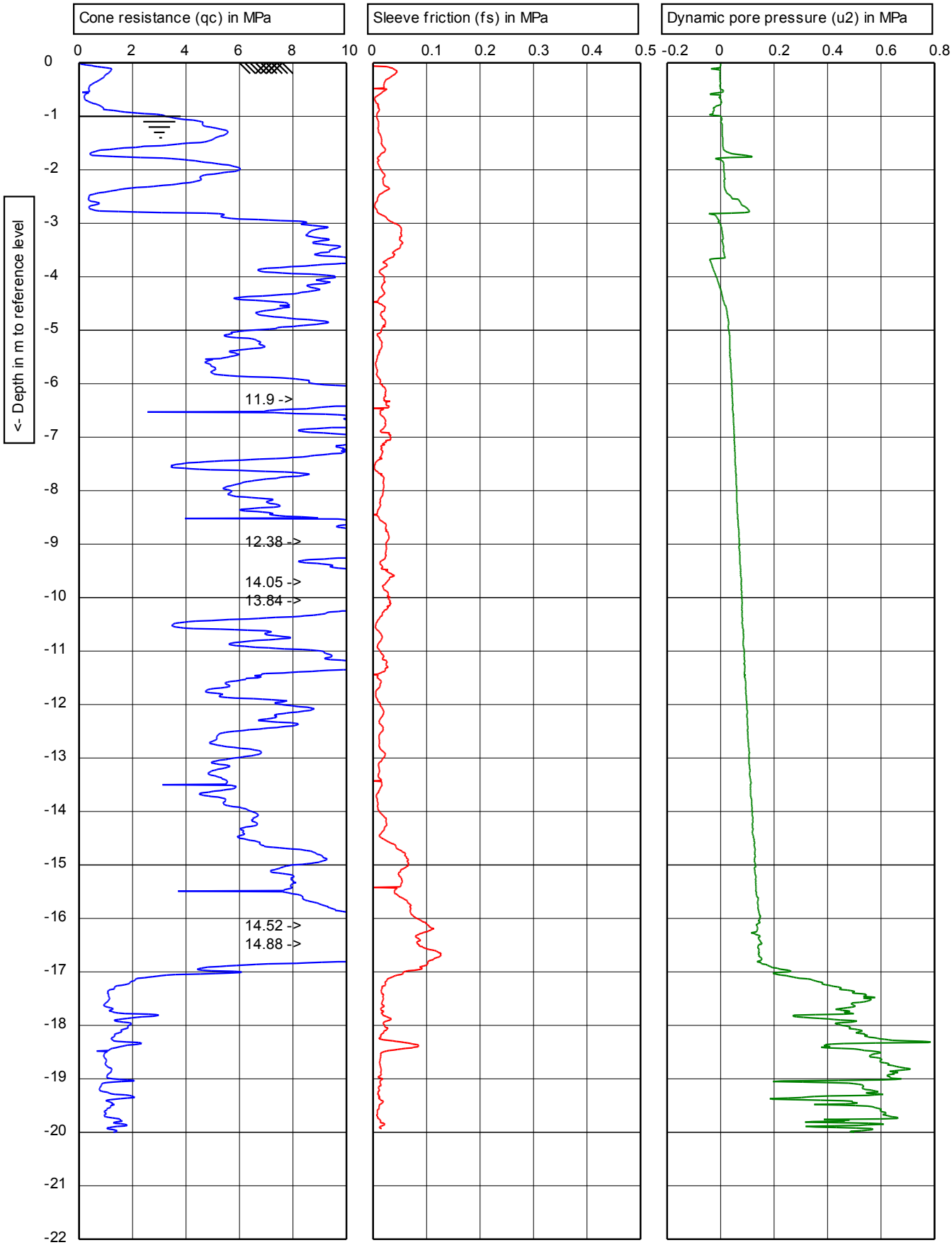
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.30 m	Date:	9/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800307, 5810806 NZTM	CPT no.:	09 — 1/6

1.45



Target Depth

EOH - Dipped - GWL @ 1.0m

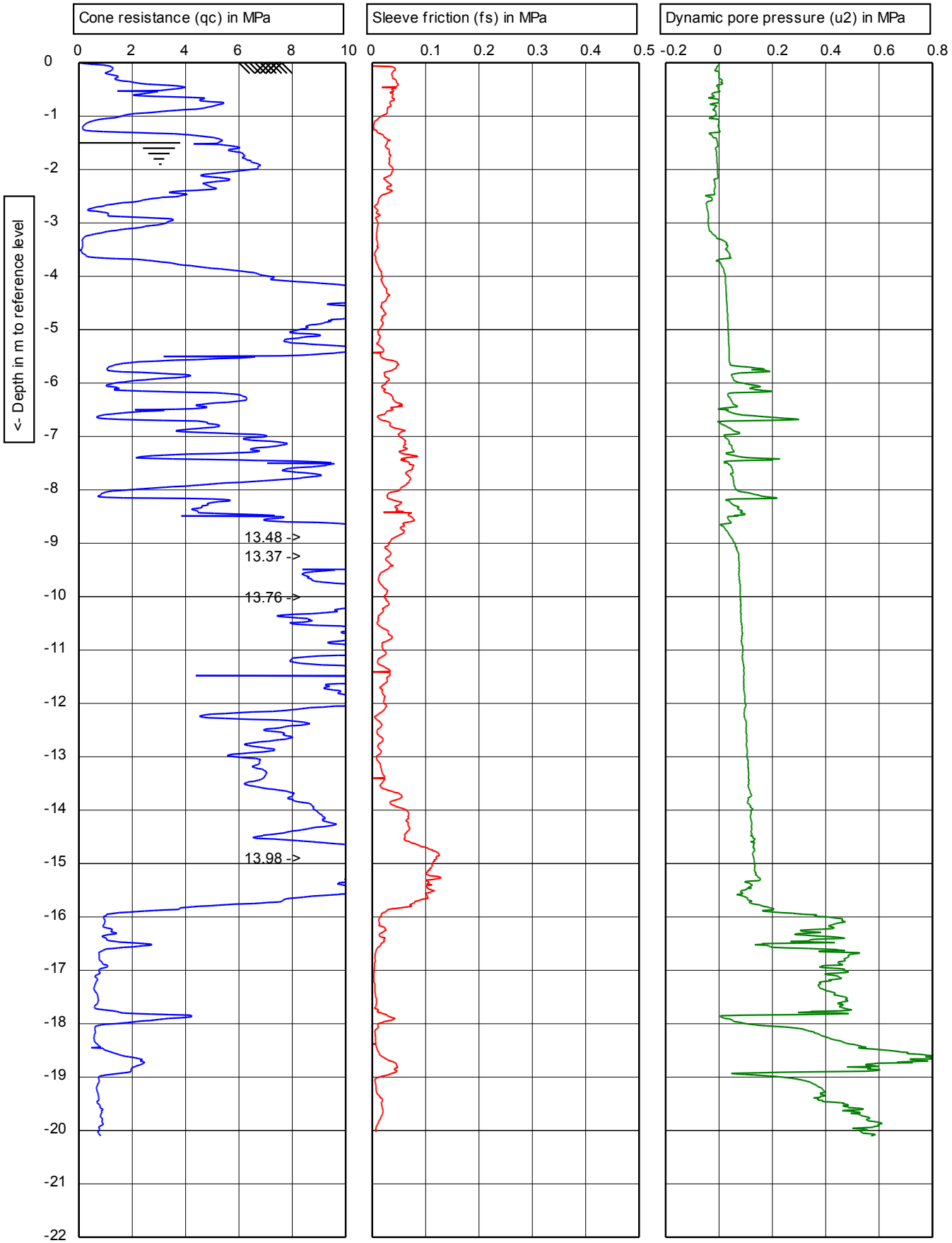
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.00 m	Date:	9/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800449, 5810574 NZTM	CPT no.:	10 — 1/6

1.45



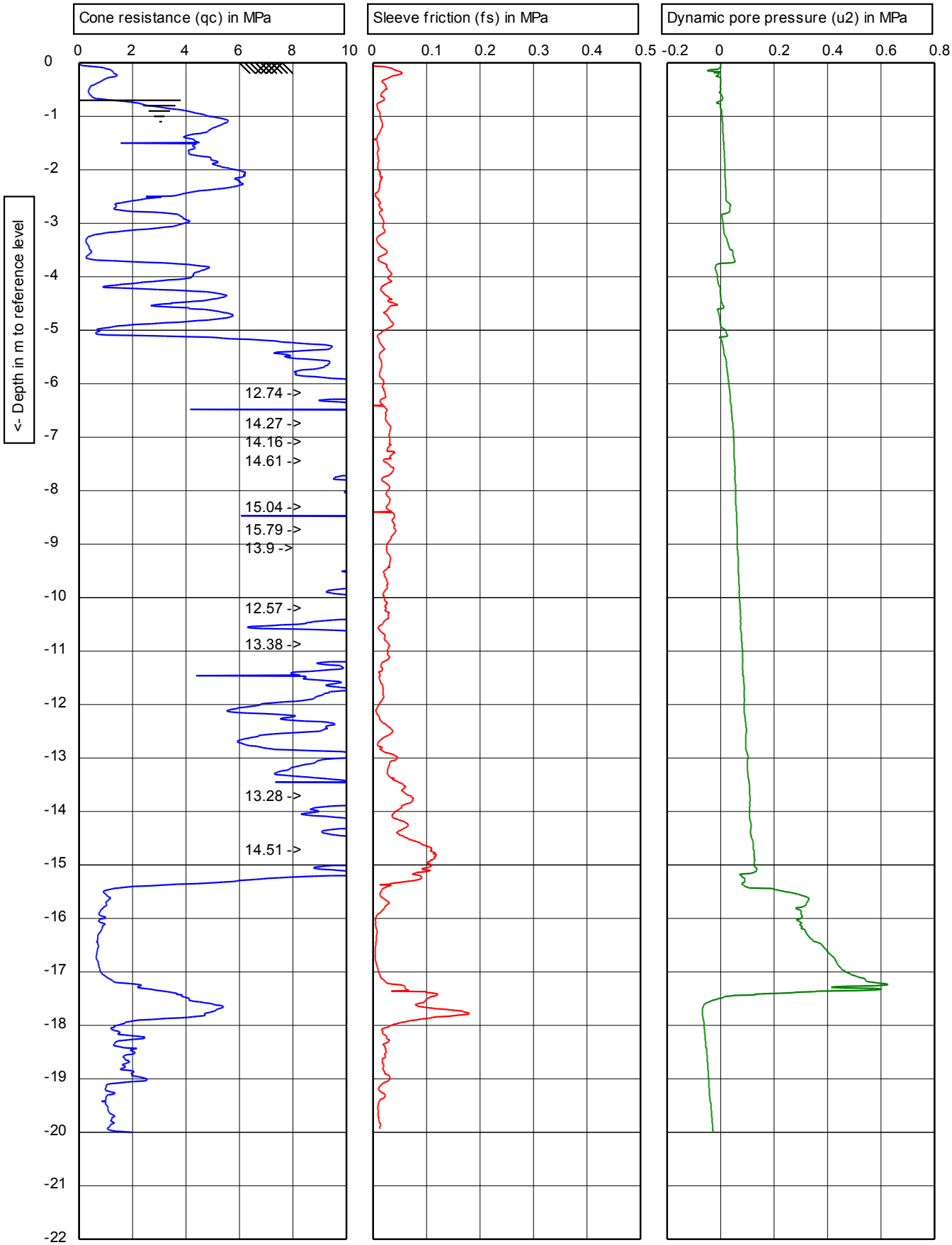
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.50 m	Date:	8/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800640, 5810356 NZTM	CPT no.:	11 — 1/6

1.45



Target Depth

EOH - Dipped - GWL @ 0.7m

OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²

Test according ASTM D5778-12 & ISO 22476-1:2012

G.L.: **0.00 m MSL** W.L.: **-0.70 m**

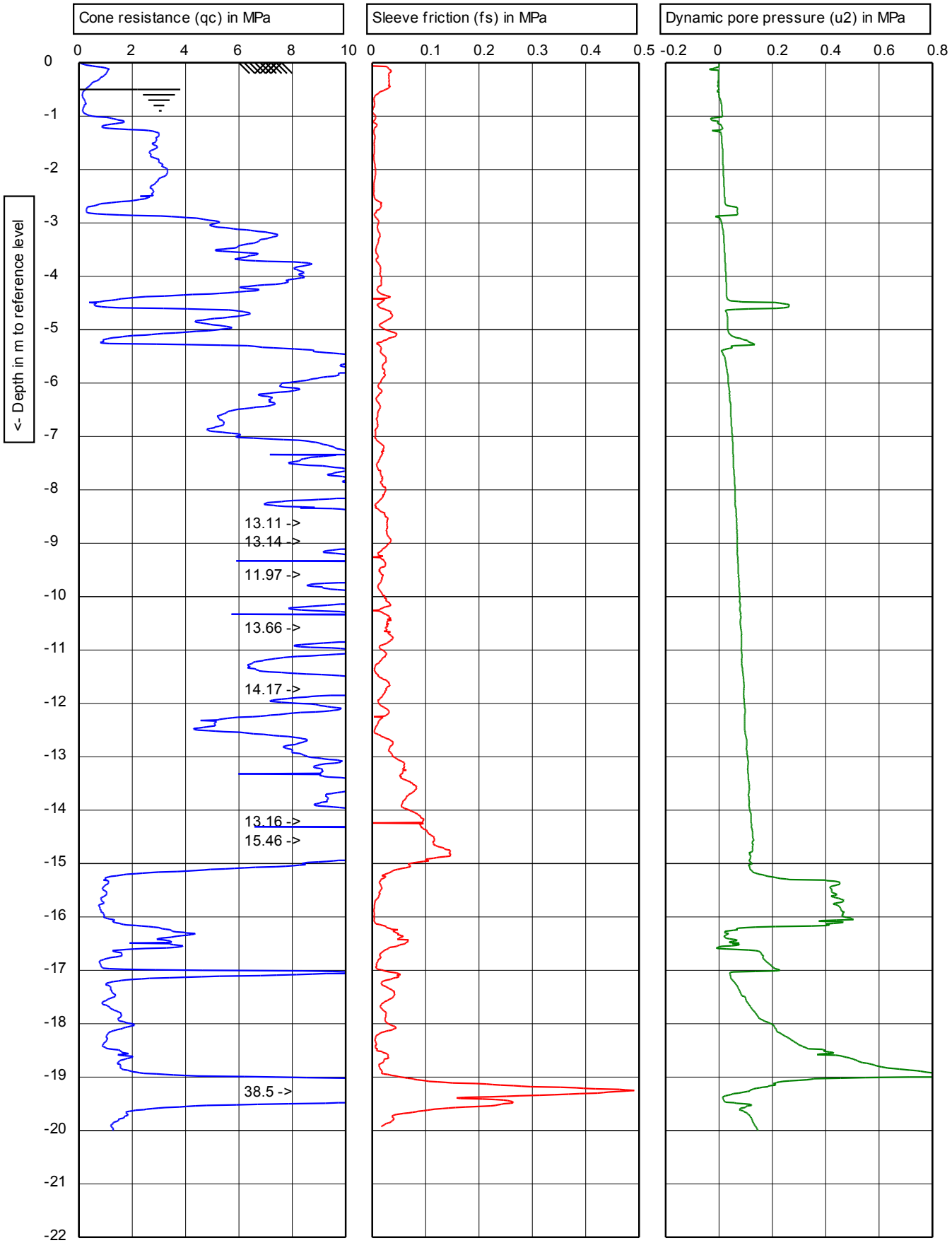
Project: **60525520/06.00**

Location: **Houchen/ Saxby Road - Hamilton**

Position: **1800175, 5810475 NZTM**

Predrill:	**0.00 m Predrilled**
Date:	**9/11/2016**
Cone no.:	**C10CFIIP.C14434**
Project no.:	**2-68200.16_HA703**
CPT no.:	**14**

1.45



OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²

Test according ASTM D5778-12 & ISO 22476-1:2012

G.L.: **0.00 m MSL** W.L.: **-0.50 m**

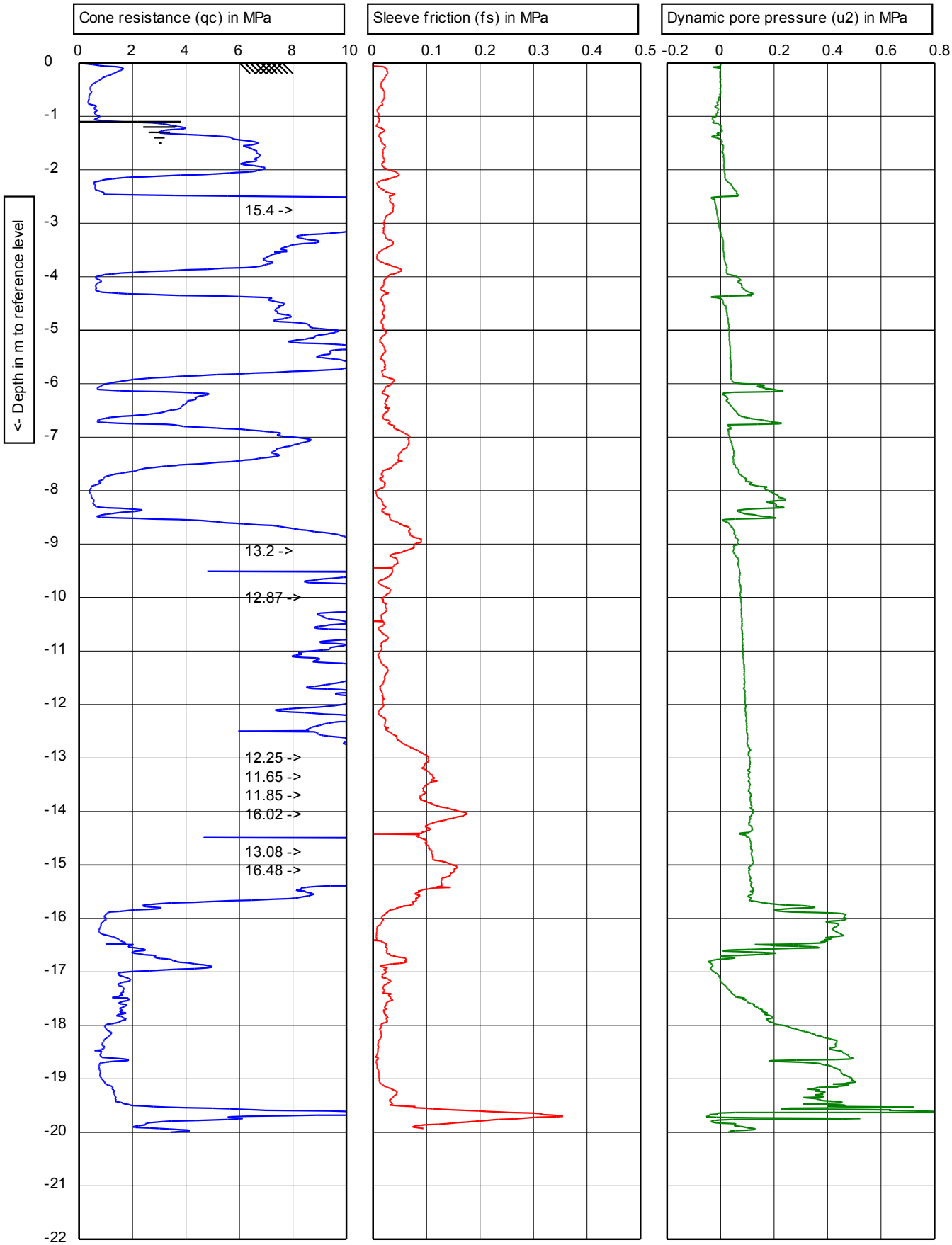
Project: **60525520/06.00**

Location: **Houchen/ Saxby Road - Hamilton**

Position: **1800326, 5810303 NZTM**

Predrill:	**0.00 m Predrilled**
Date:	**9/11/2016**
Cone no.:	**C10CFIIP.C14434**
Project no.:	**2-68200.16_HA703**
CPT no.:	**15**

1.45



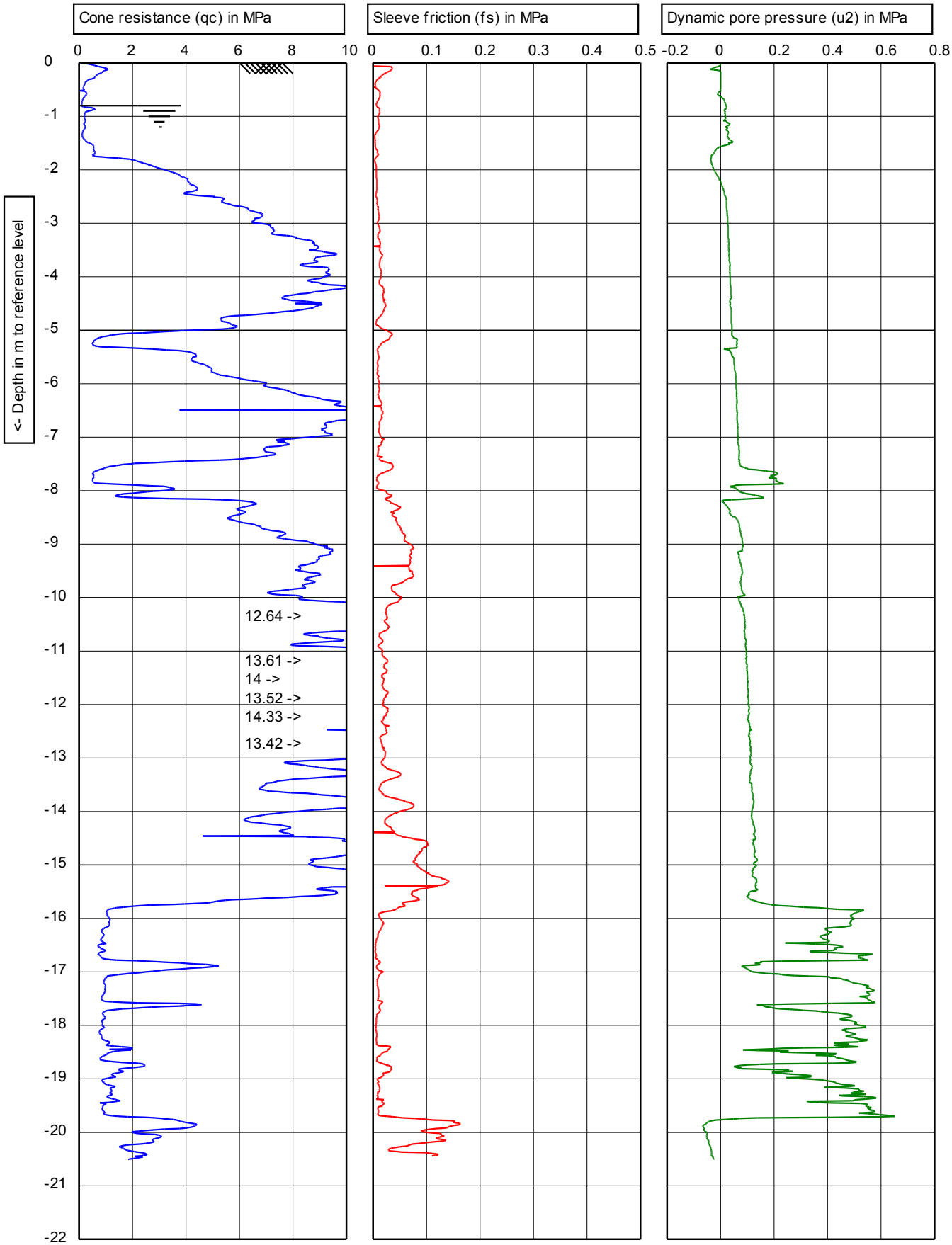
OPUS

IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -1.10 m	Date:	8/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1800657, 5810072 NZTM	CPT no.:	16

1.45



OPUS

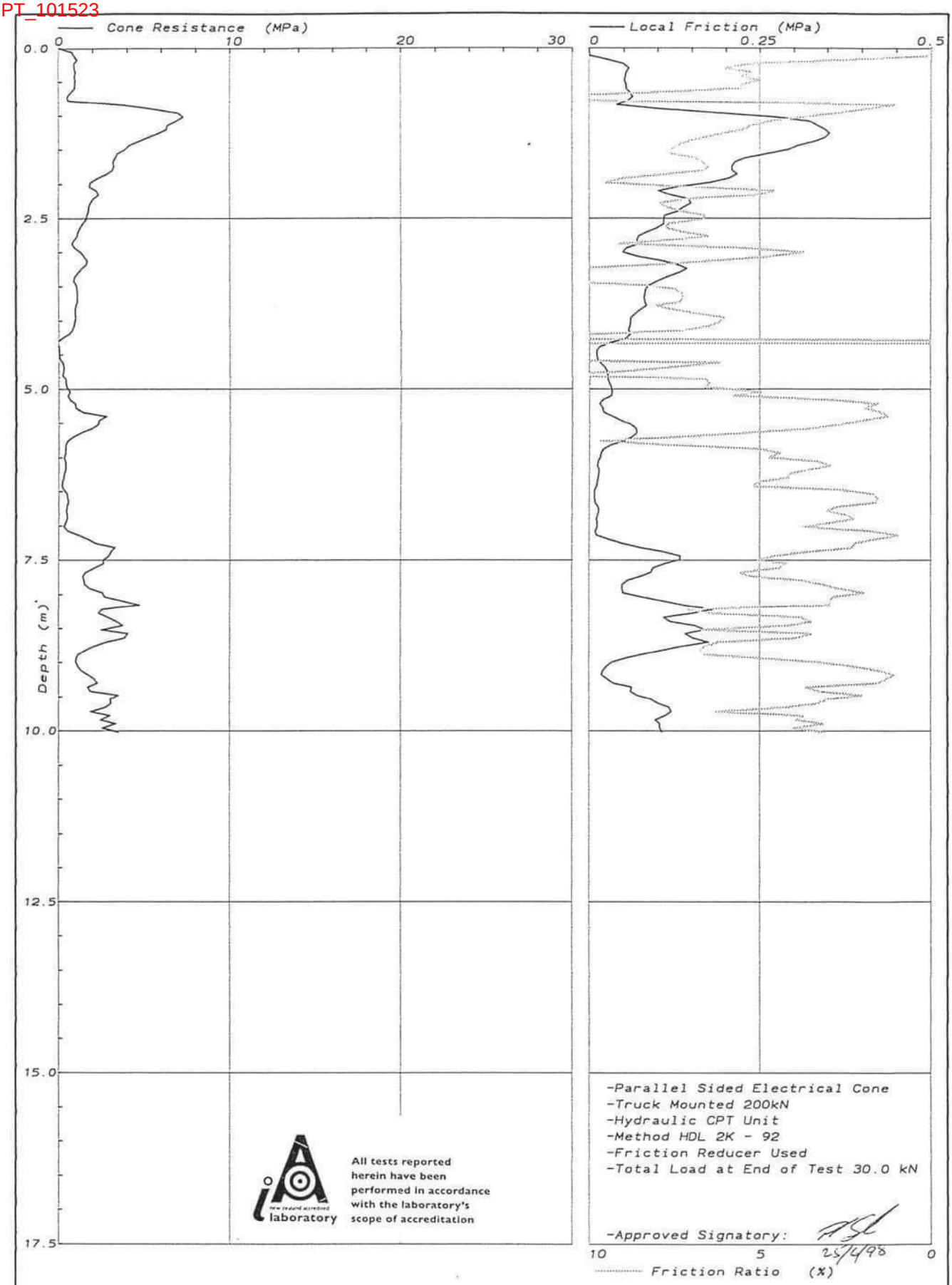
IANZ ACCREDITED LABORATORY

Graphs indicated as not accredited are outside the scope of the laboratory's accreditation

u2 150 cm² 10 cm²	Test according ASTM D5778-12 & ISO 22476-1:2012	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m MSL / W.L.: -0.80 m	Date:	8/11/2016
Project:	60525520/06.00	Cone no.:	C10CFIIP.C14434
Location:	Houchen/ Saxby Road - Hamilton	Project no.:	2-68200.16_HA703
Position:	1801006, 5809882 NZTM	CPT no.:	17 — 1/6

1.45

NZGD ID: CPT_101523



-Parallel Sided Electrical Cone
-Truck Mounted 200kN
-Hydraulic CPT Unit
-Method HDL 2K - 92
-Friction Reducer Used
-Total Load at End of Test 30.0 kN

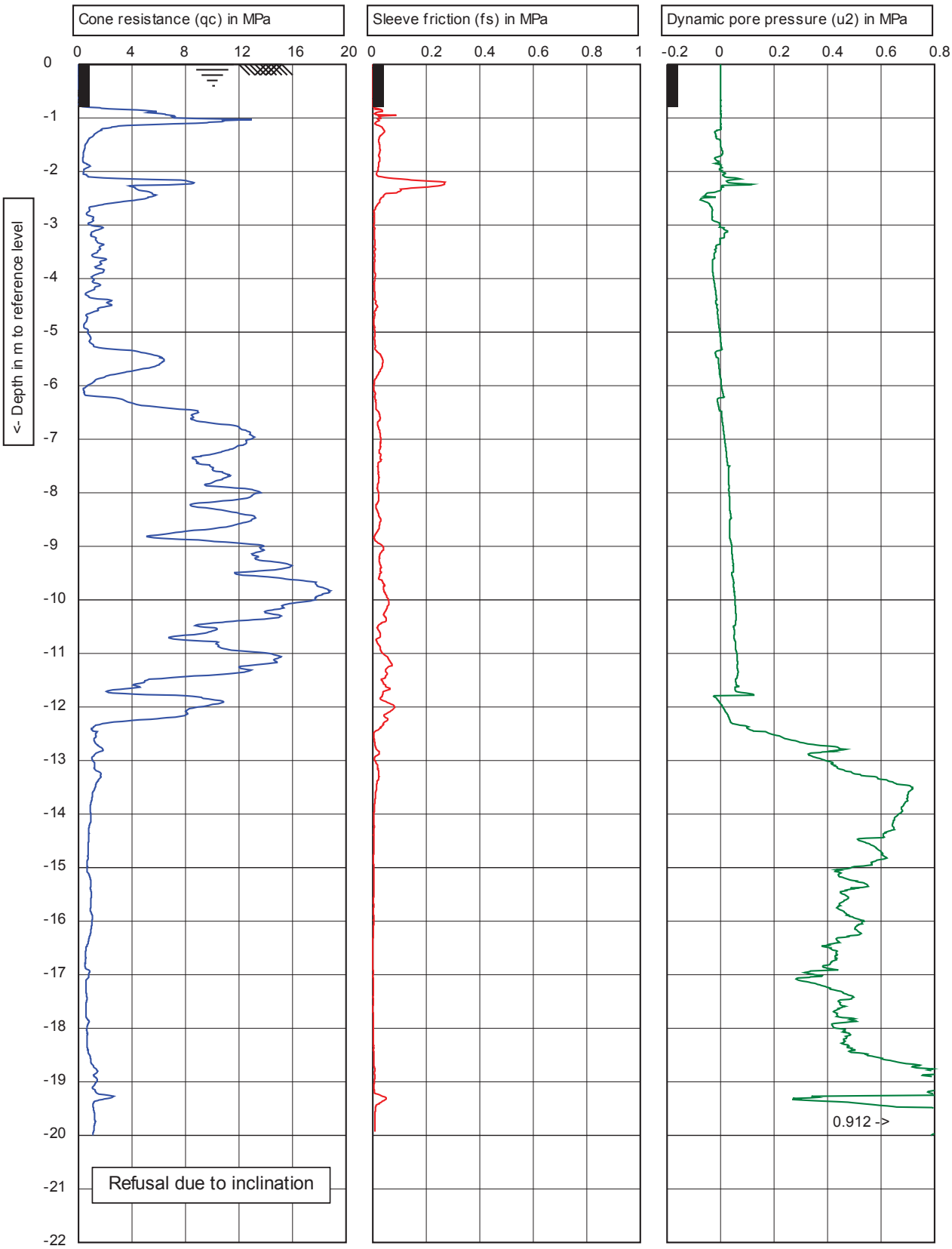
-Approved Signatory: 25/6/98

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

OPUS	OPUS HAMILTON SAFE 73 CHINAMANS HILL REALIGN.	2-61443.00	LR98/343/001
		25/6/1998	G E BAIRD
		Sheet of	CPT 12A.

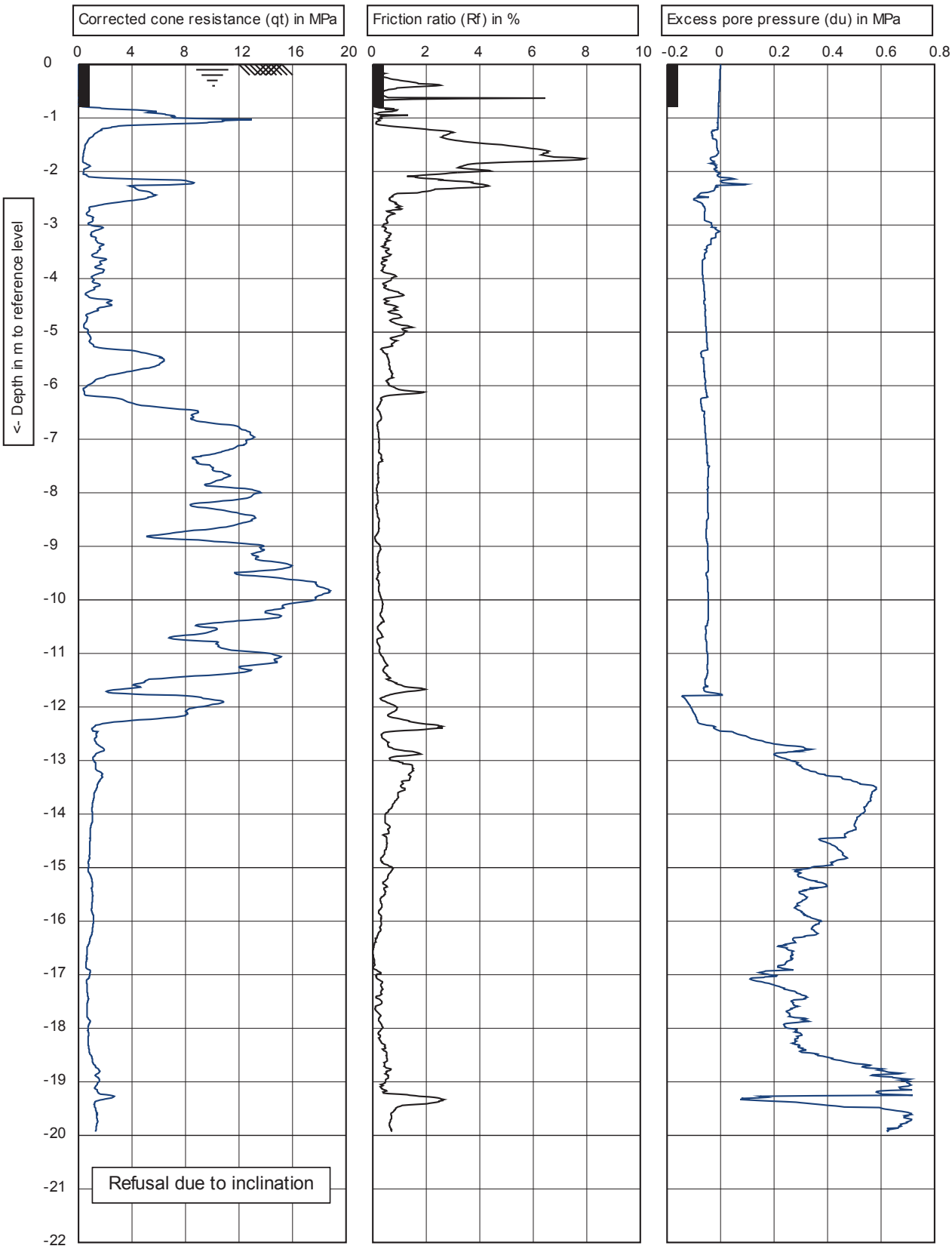
Opus International Consultants Limited
Hamilton Laboratory
Quality Management Systems Certified to ISO 9001
Fox Street
Private Bag 3057
Hamilton, New Zealand
Telephone: +64 7 856 2870
Facsimile: +64 7 856 2673
Web site: www.opus.co.nz
Formerly Works Consultancy Services Limited

NZGD ID: CPT_101523



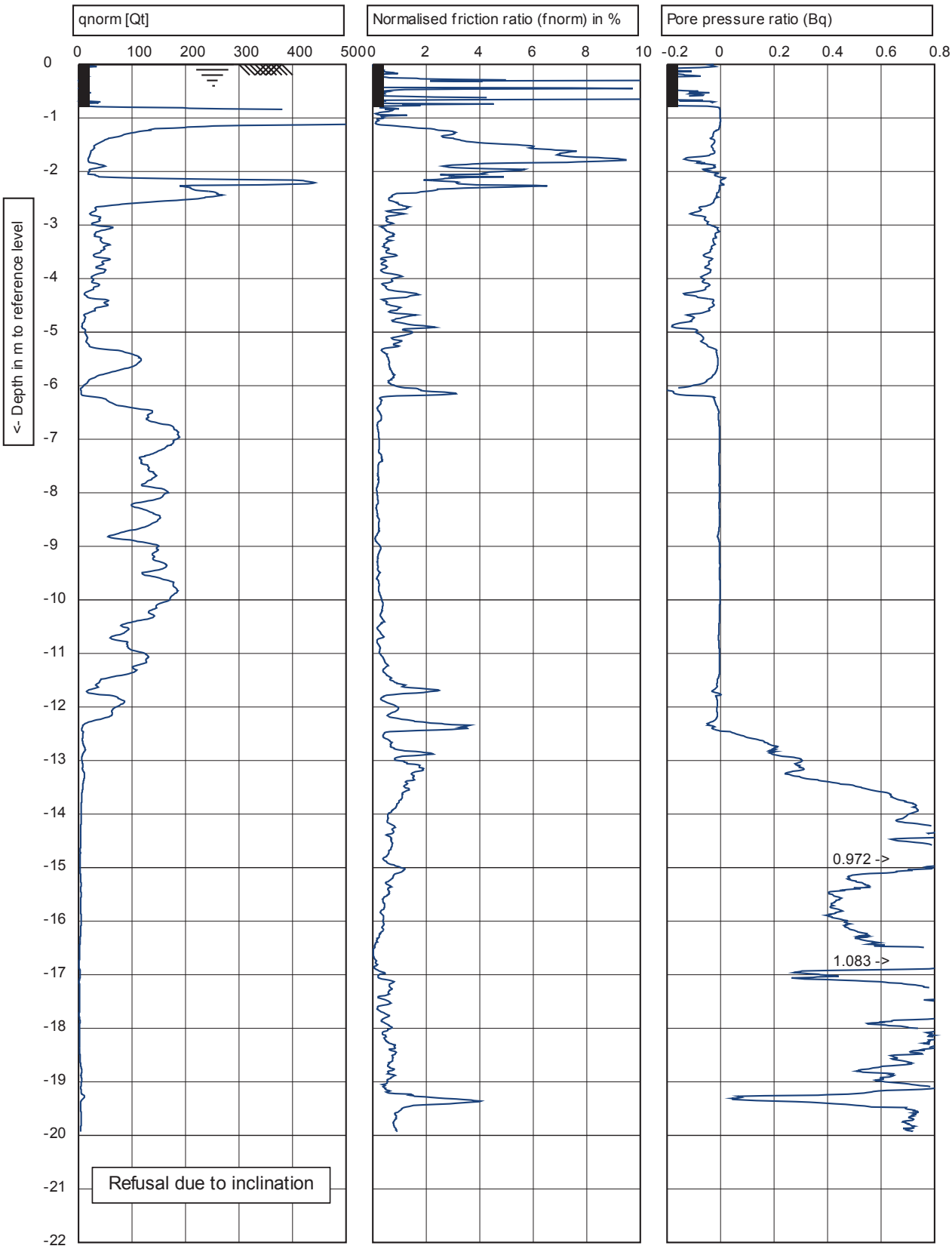
OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0.8
	G.L. 0 / W.L.: 0	Date:	18/02/2011
Project:	Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2709209 N6374723	Project no.:	2-31653.00
Position:		CPT no.:	CPT01 1/6

CPTask V1.20



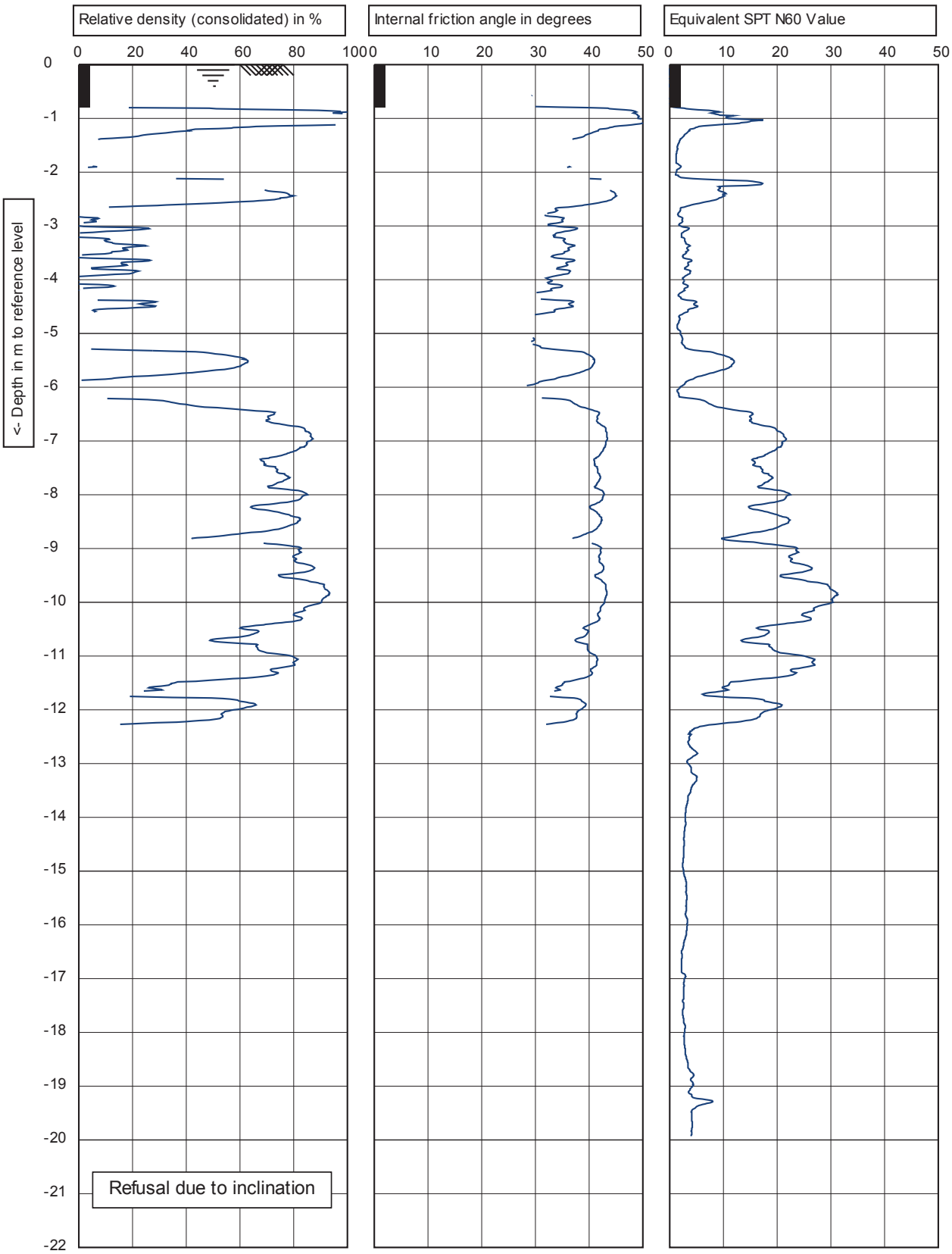
OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0.8
	G.L. 0 / W.L.: 0	Date:	18/02/2011
Project:	Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2709209 N6374723	Project no.:	2-31653.00
Position:		CPT no.:	CPT01 2/6

CPTask V1.20



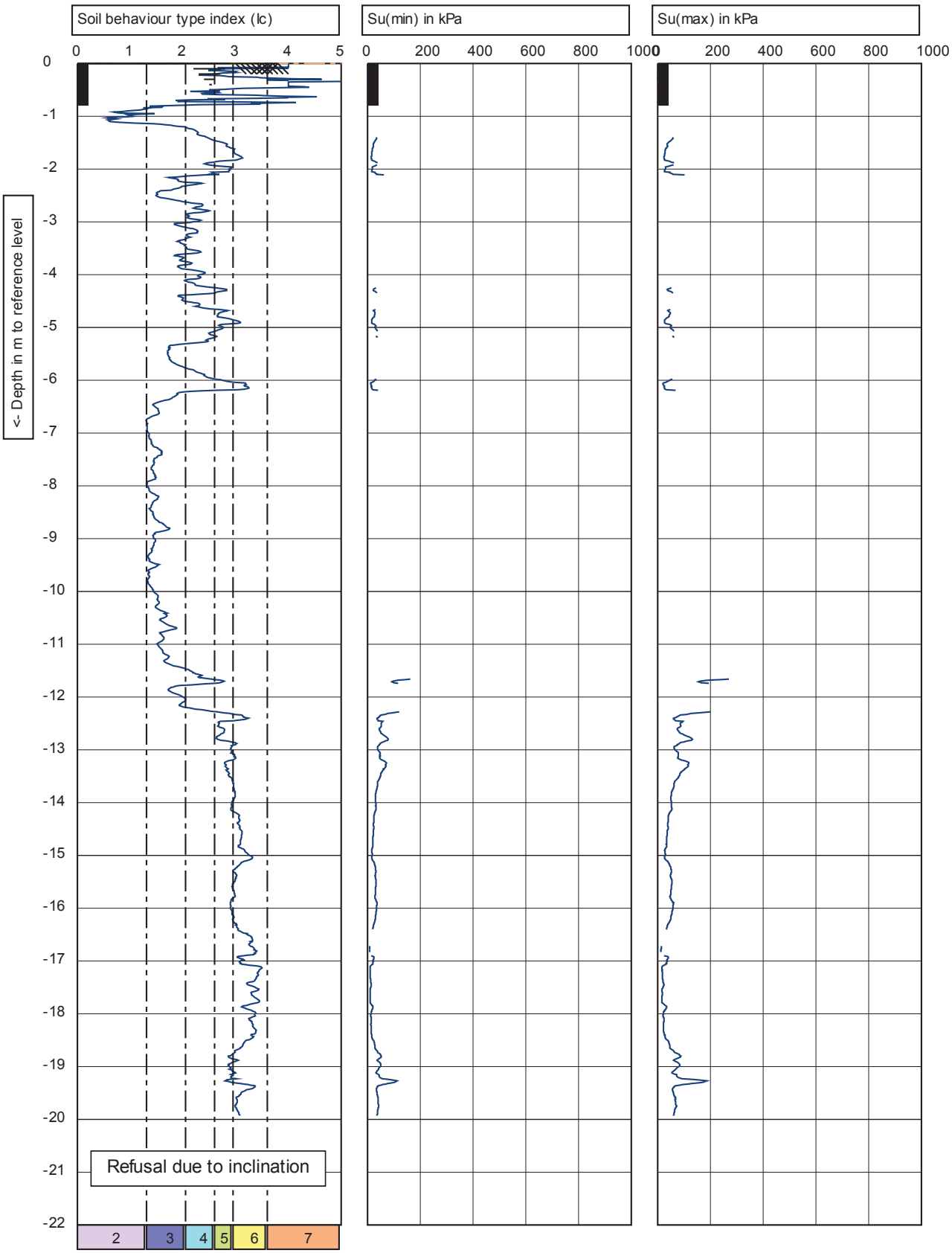
OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0.8
	G.L. 0 / W.L.: 0	Date:	18/02/2011
Project:	Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2709209 N6374723	Project no.:	2-31653.00
Position:		CPT no.:	CPT01 3/6

CPTask V1.20



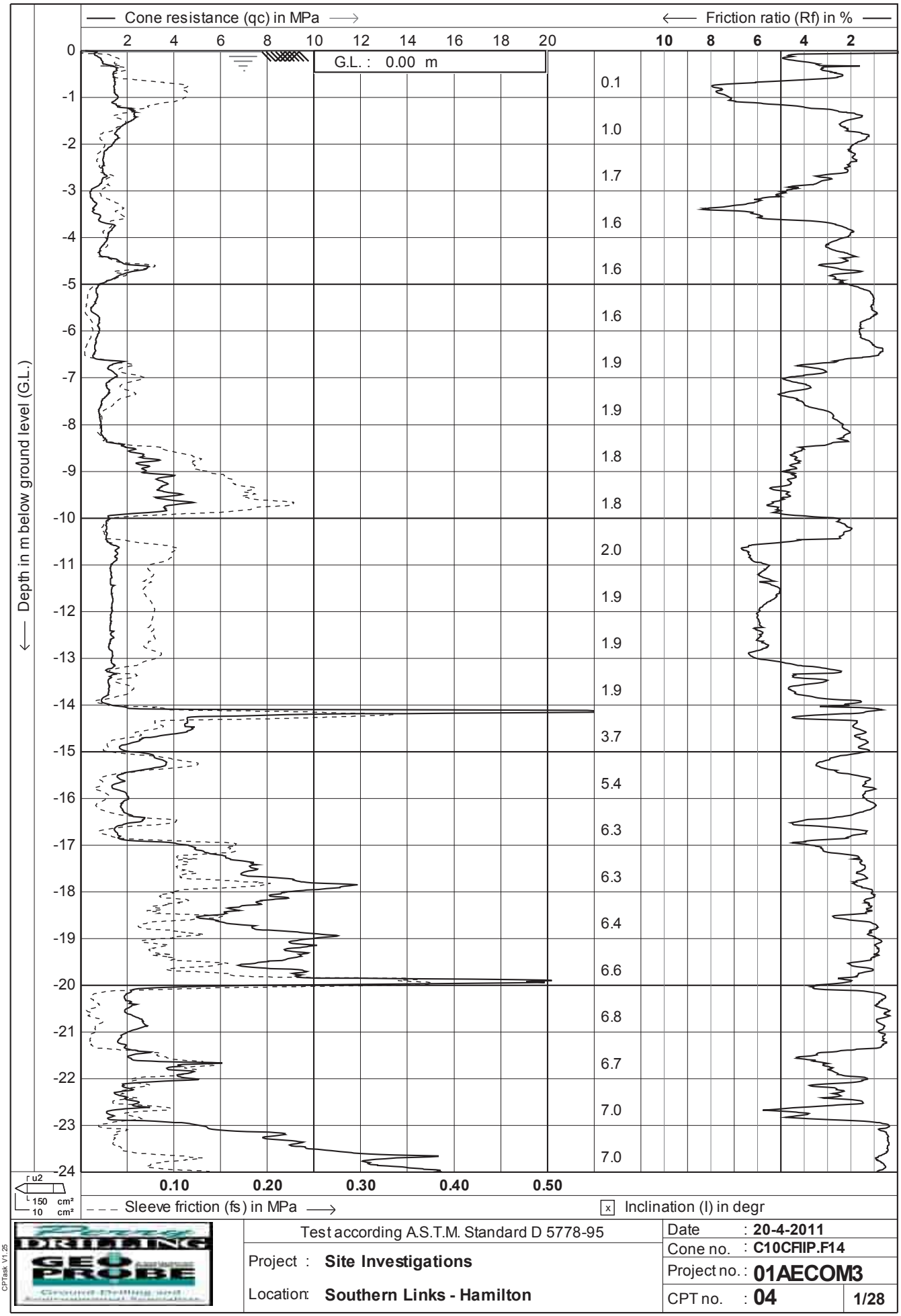
OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0.8
	G.L. 0 / W.L.: 0	Date:	18/02/2011
Project: Southern Links		Cone no.:	C10CFIIP.E09
Location: GPS: E2709209 N6374723		Project no.:	2-31653.00
Position:		CPT no.:	CPT01 5/6

CPTask V1.20



OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0.8
	G.L. 0 / W.L.: 0	Date:	18/02/2011
Project:	Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2709209 N6374723	Project no.:	2-31653.00
Position:		CPT no.:	CPT01 6/6

CPTask V1.20



Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date : **20-4-2011**

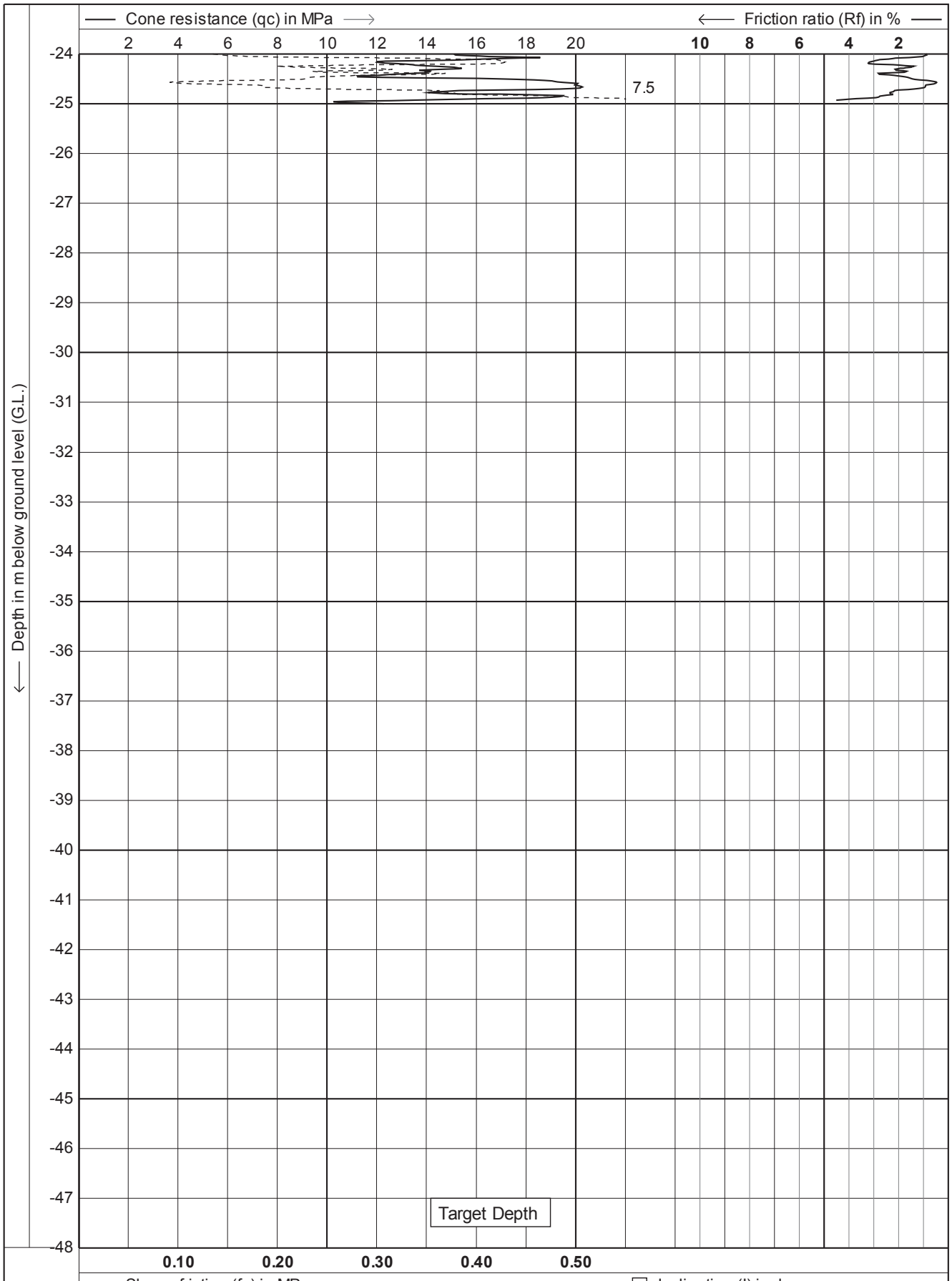
Cone no. : **C10CFIIP.F14**

Project no. : **01AECOM3**

CPT no. : **04**

1/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

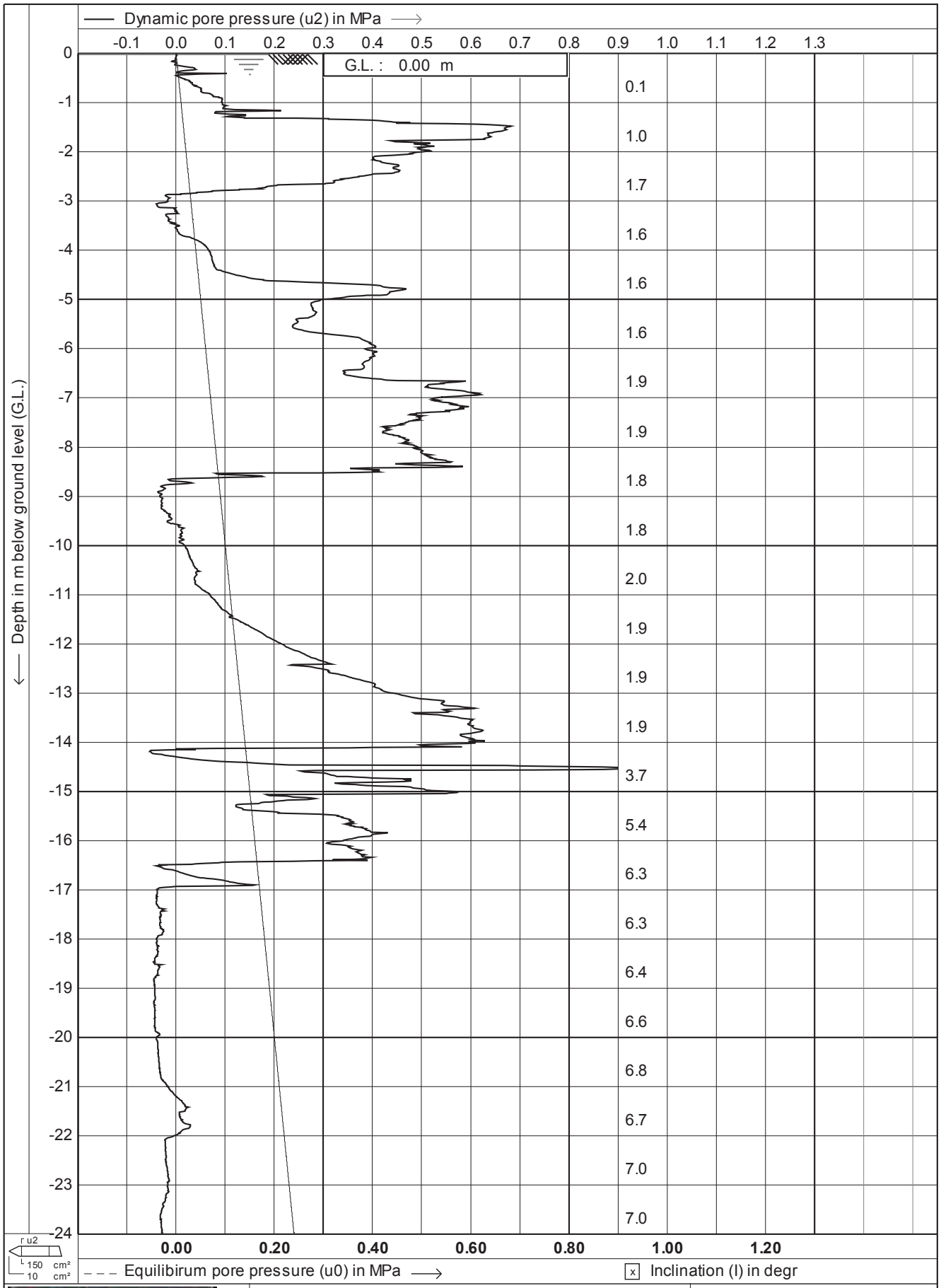
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

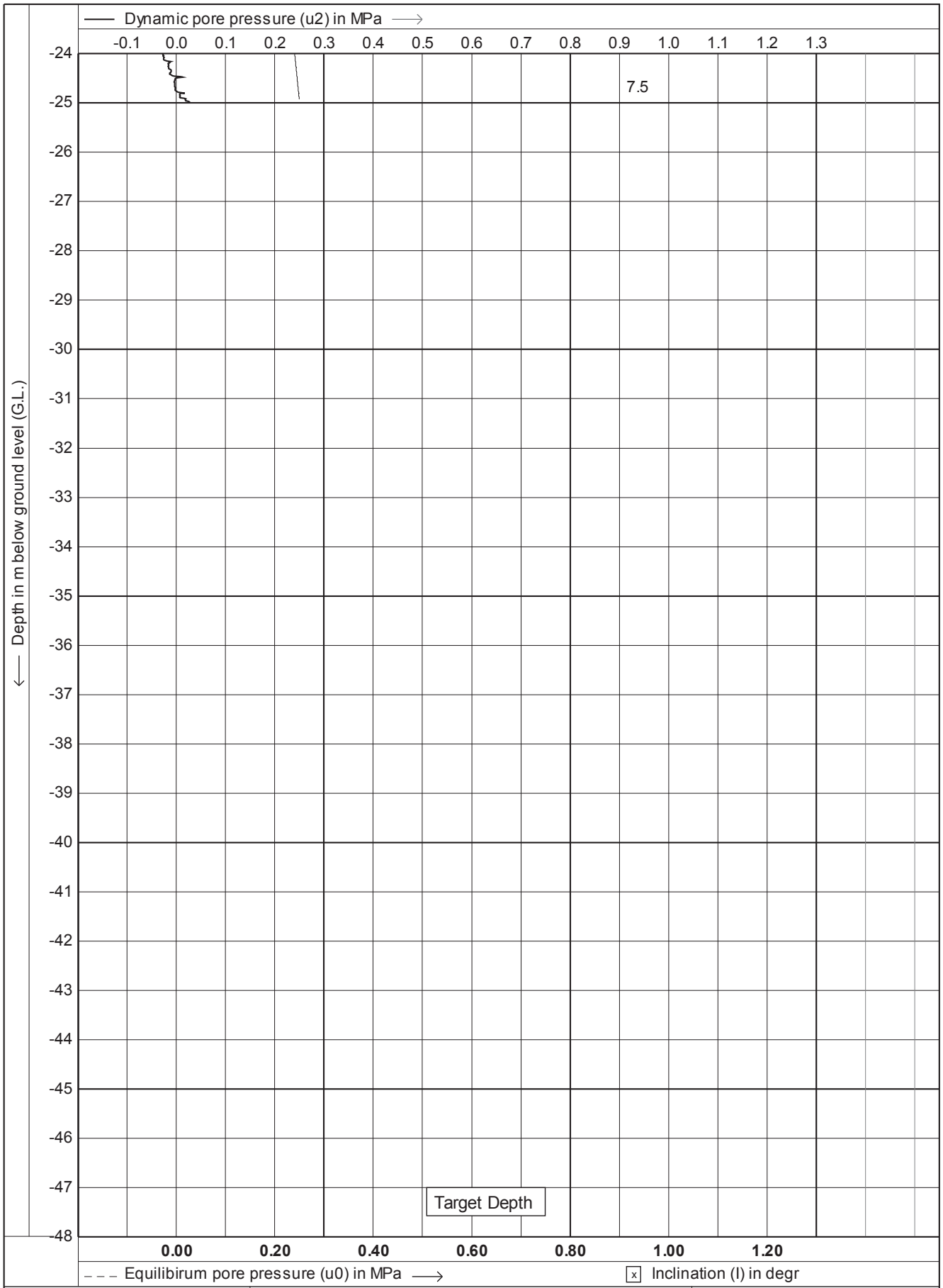
2/28

CPTask V1.25



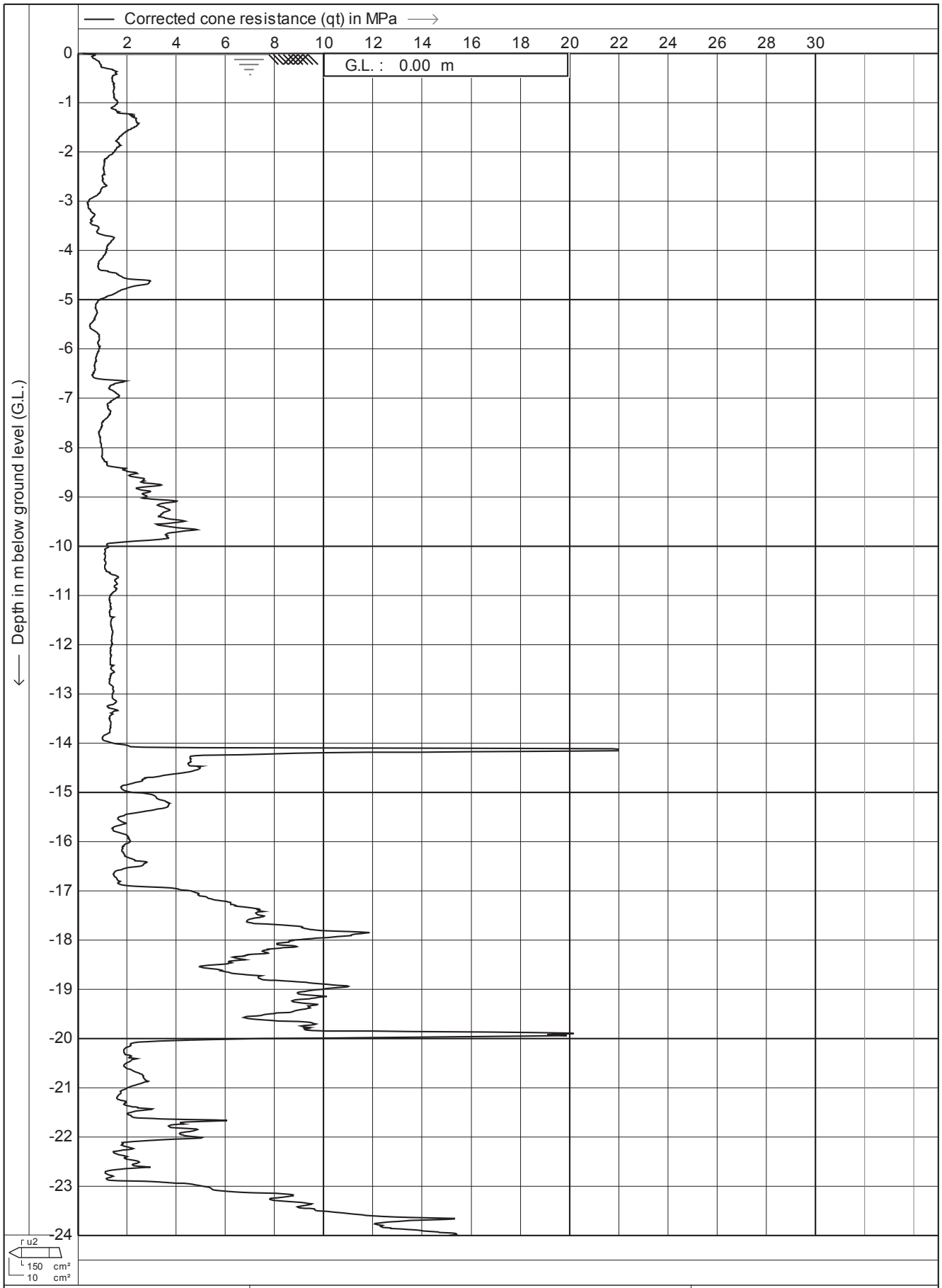
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **04**	**3/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **04**	**4/28**

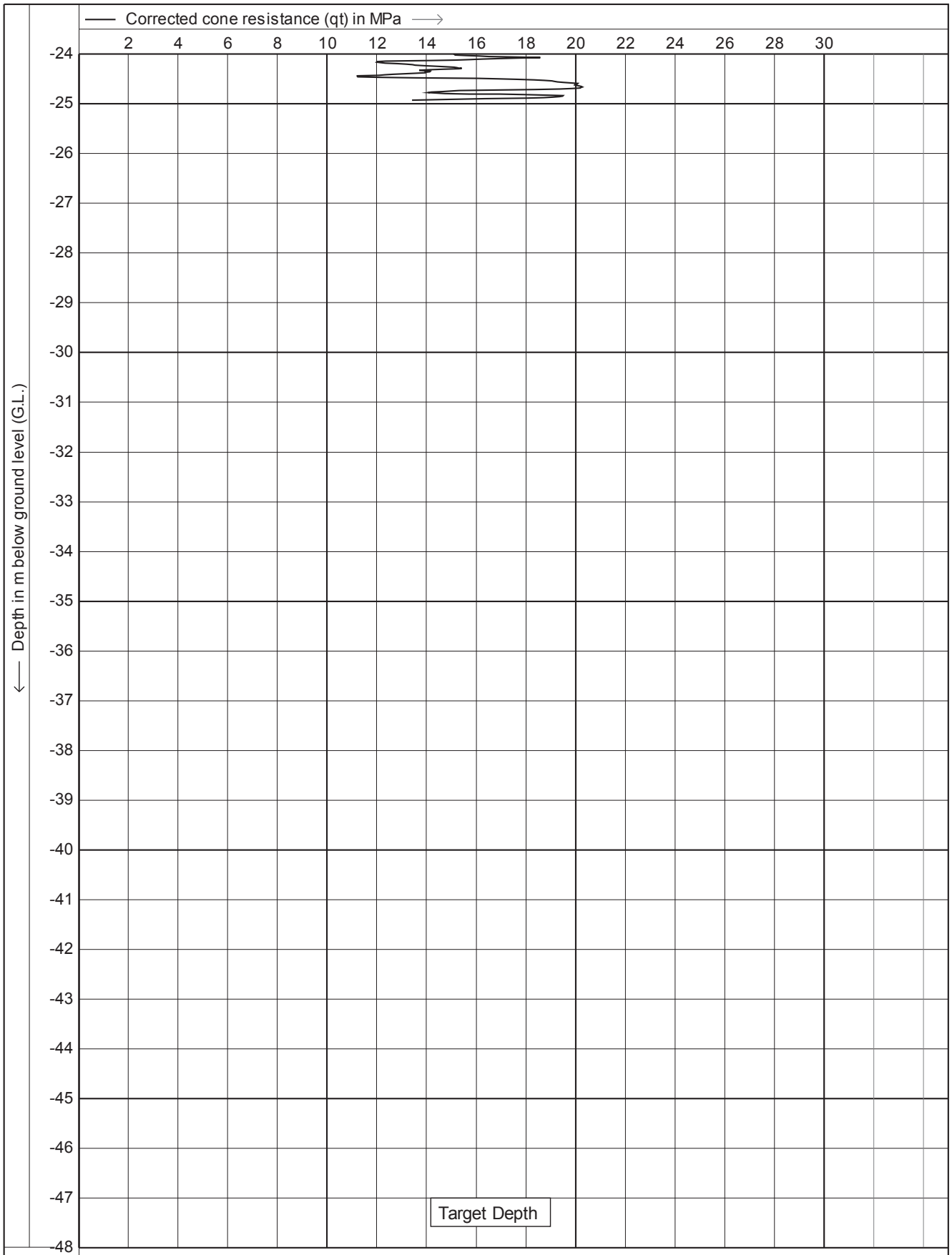
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no.	: **01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **04**

5/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

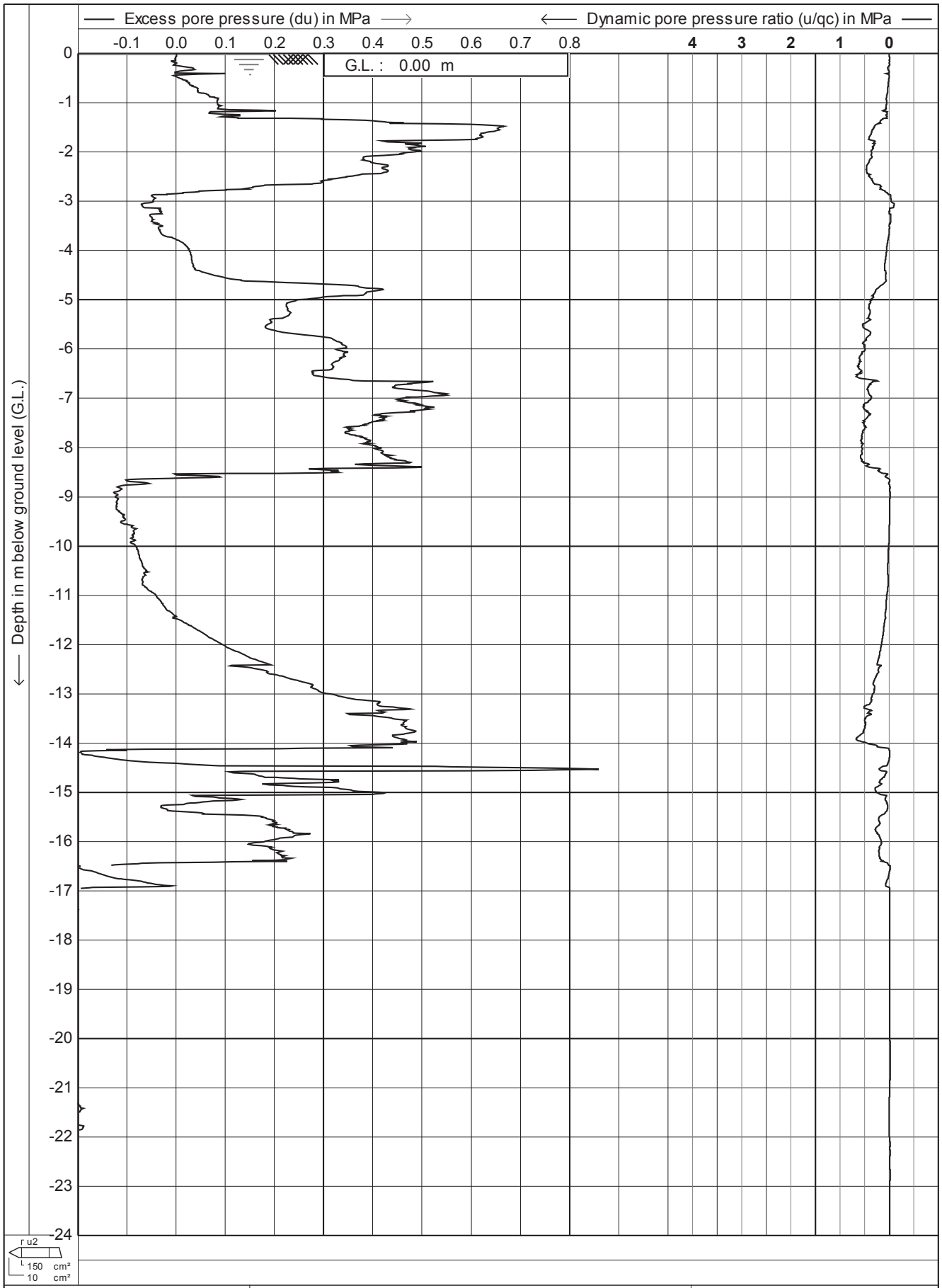
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

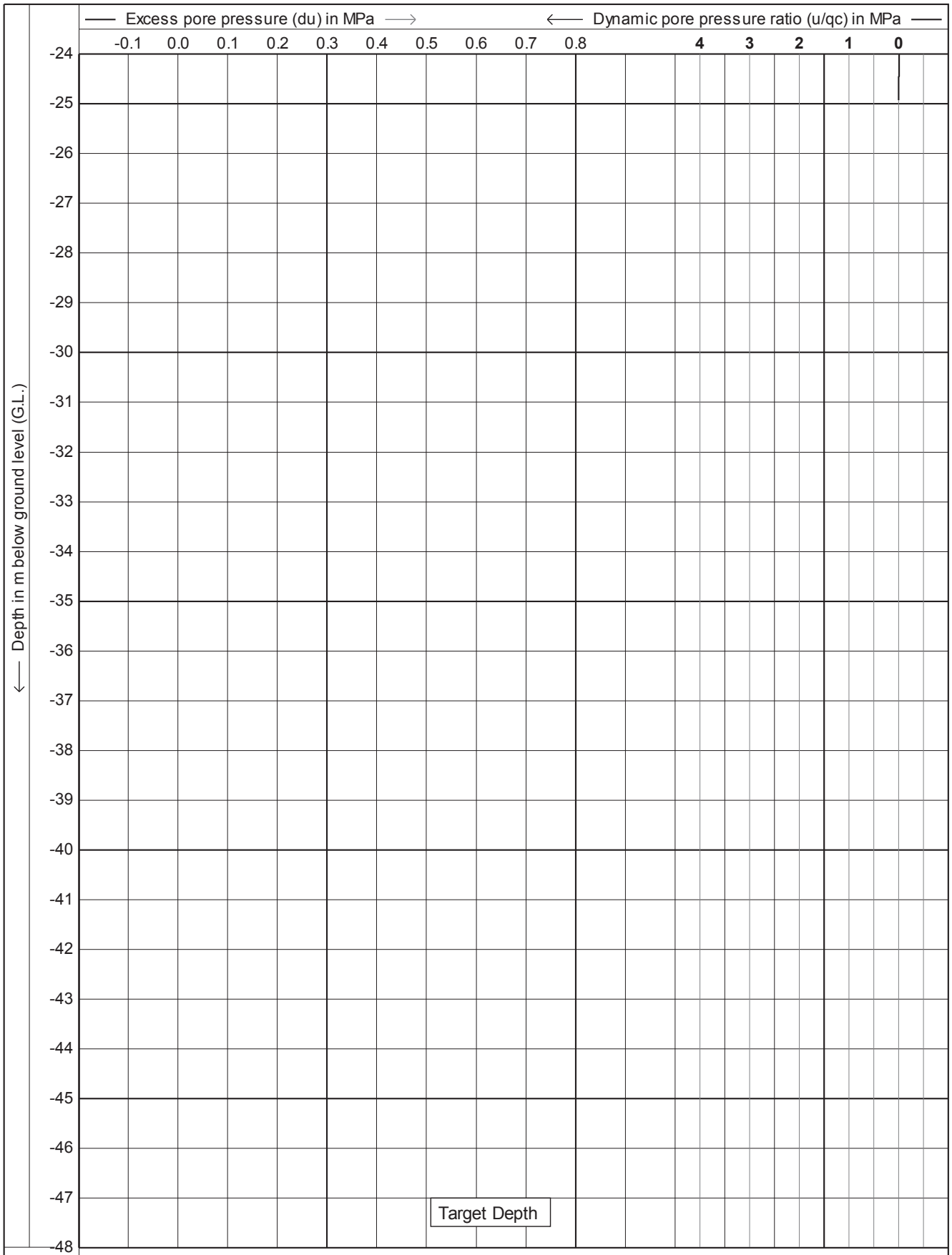
6/28

CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **01AECOM3**	
	Location: **Southern Links - Hamilton**	CPT no. : **04**	**7/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

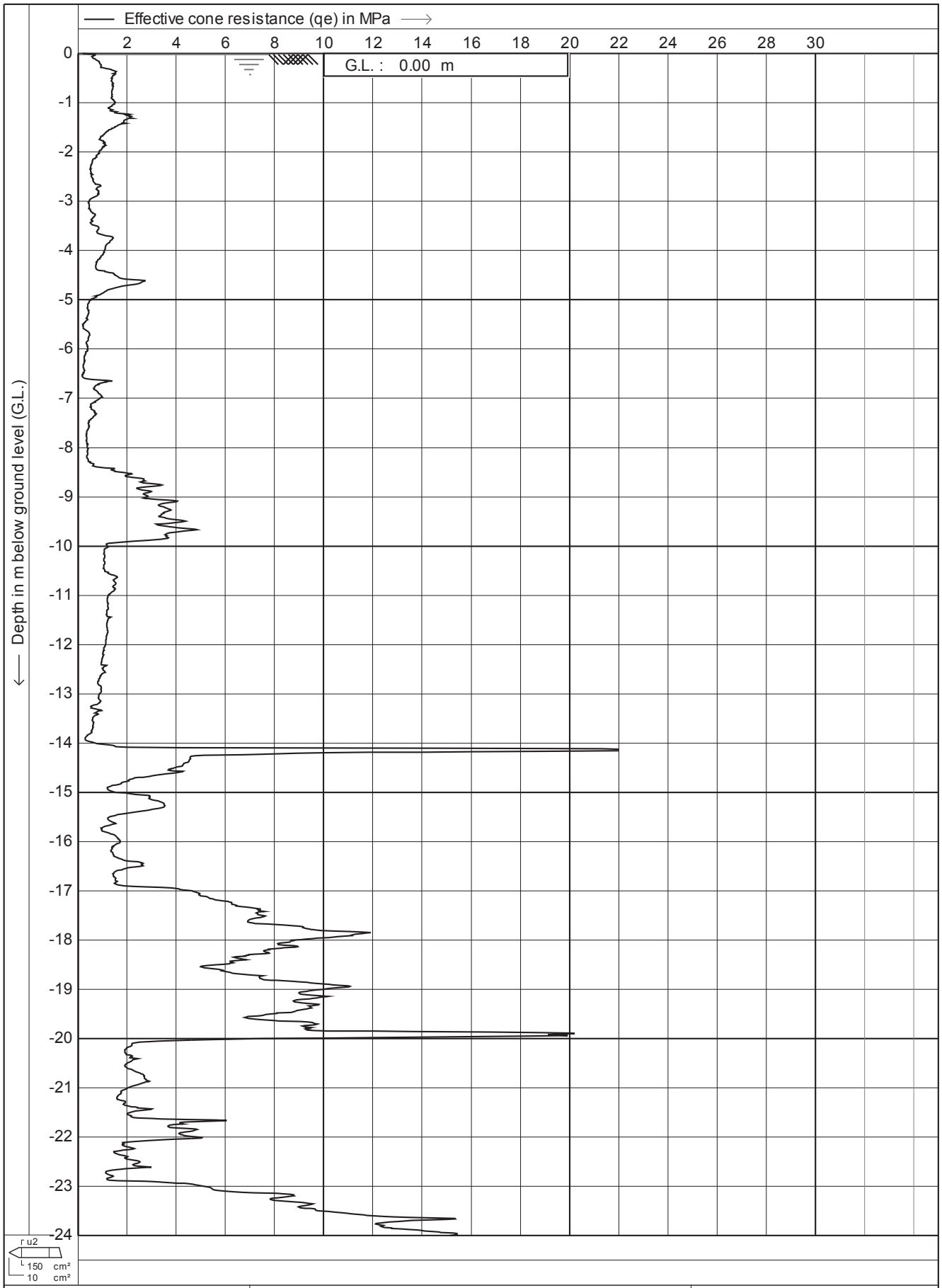
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

8/28

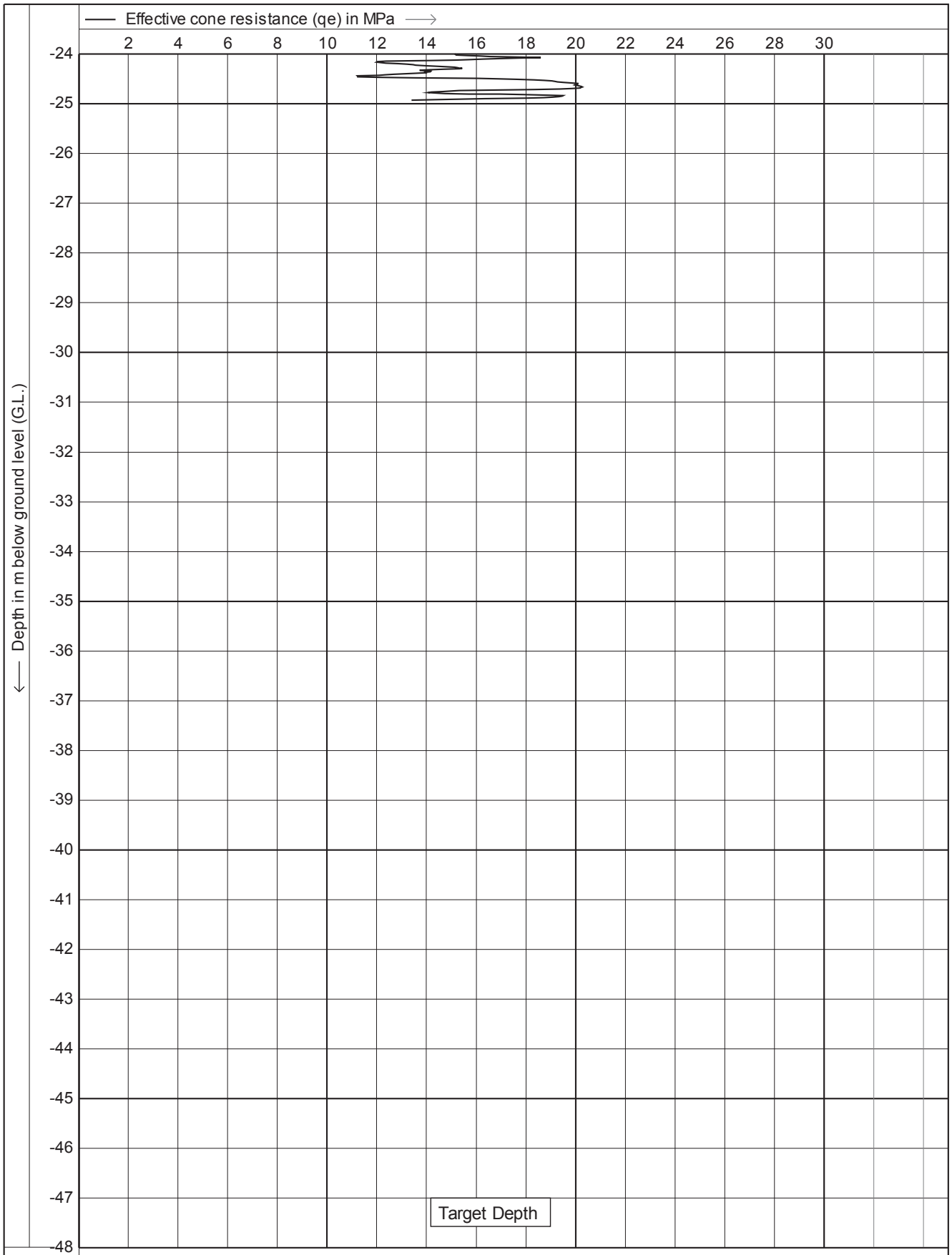
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no. :	**01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **04**

9/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

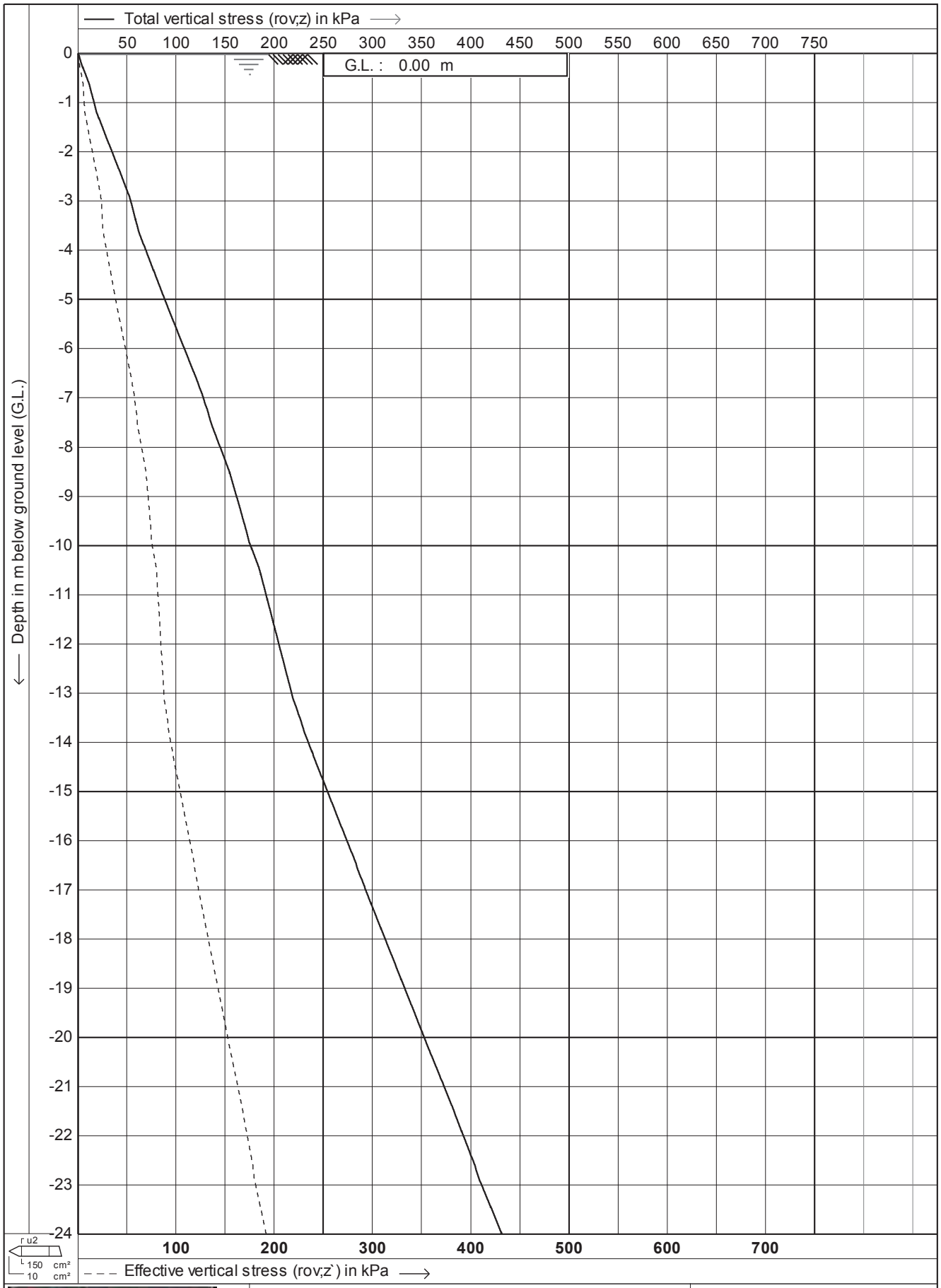
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

10/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

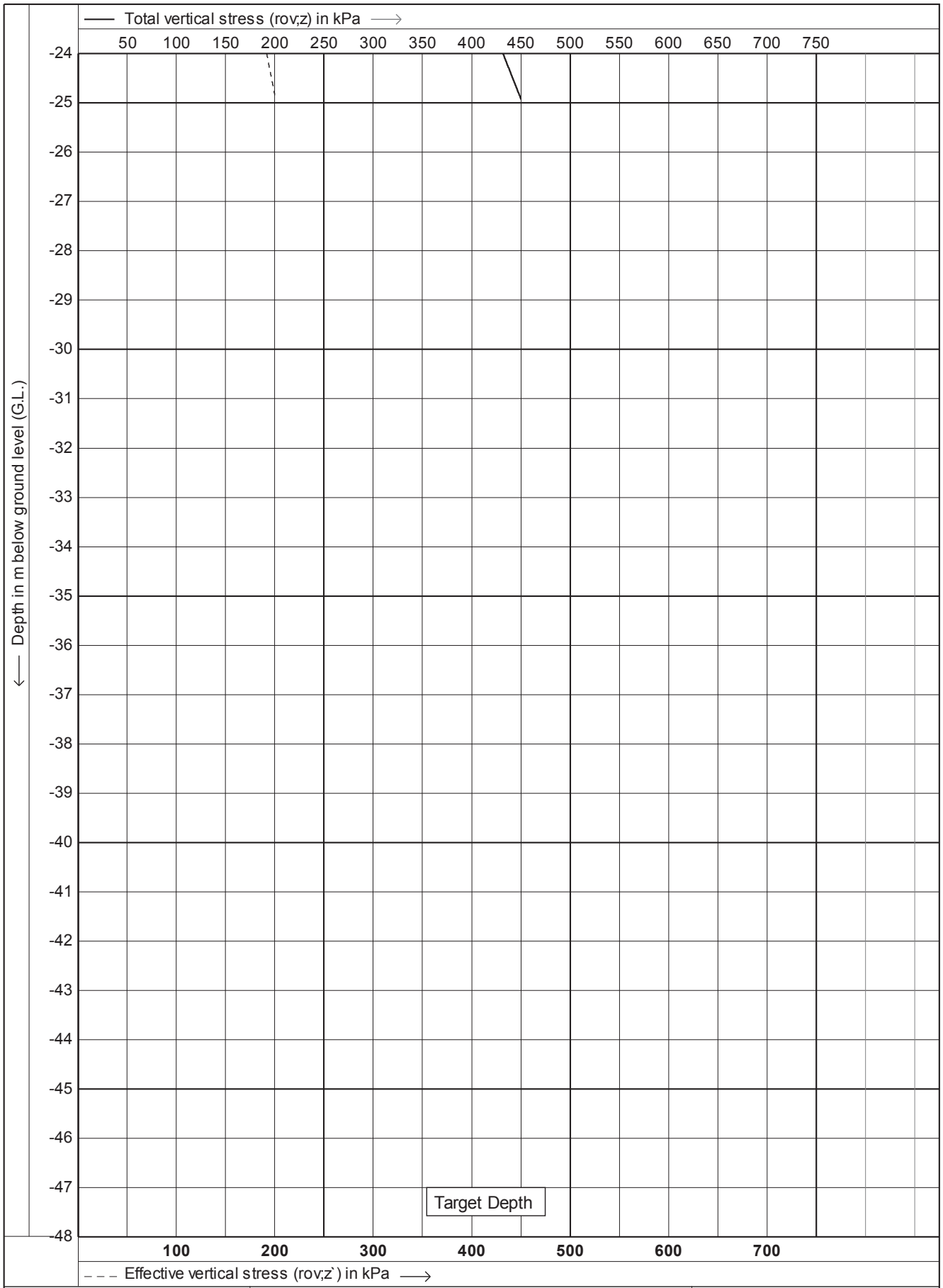
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

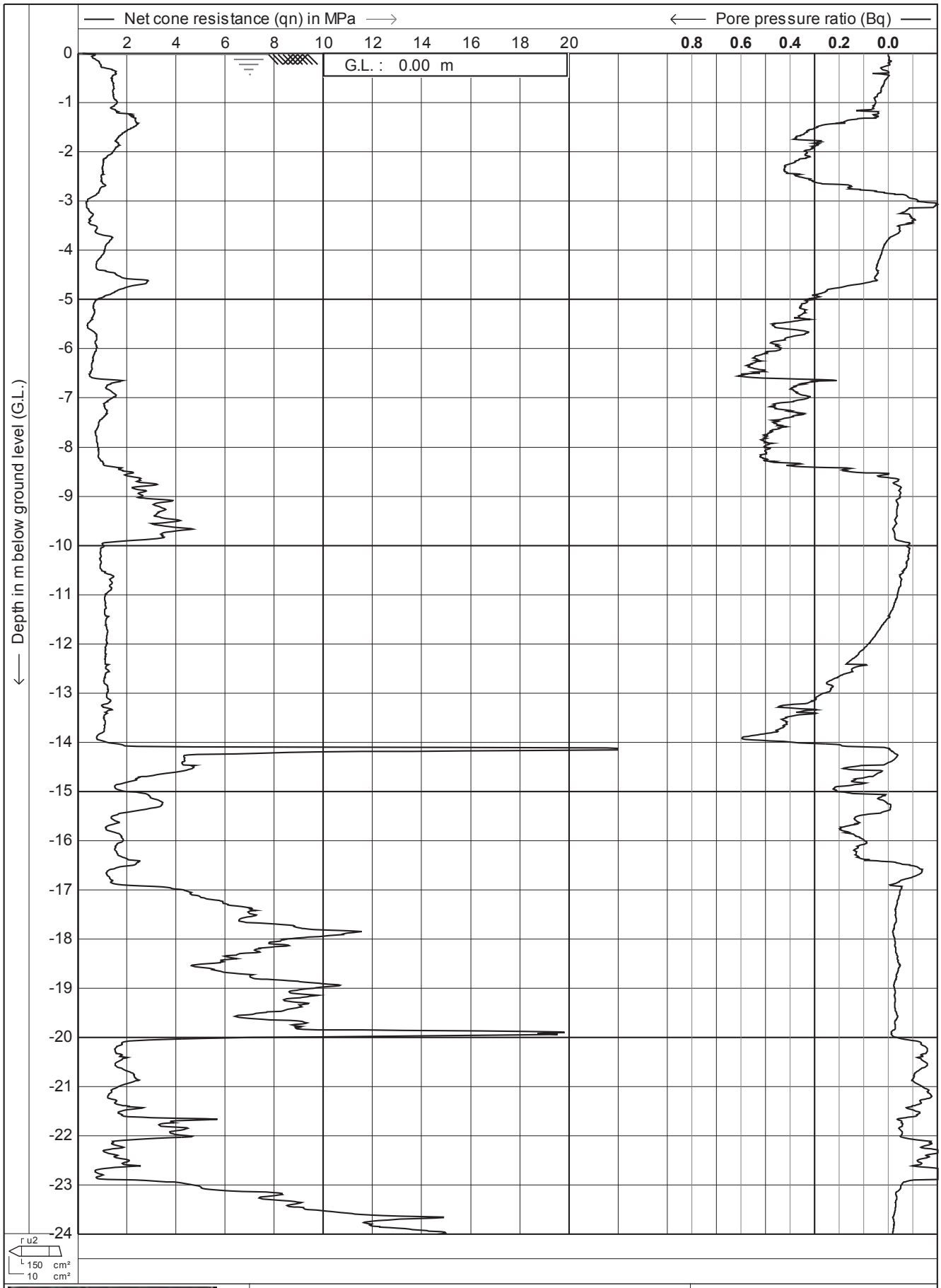
Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

11/28

CPTask V1.25



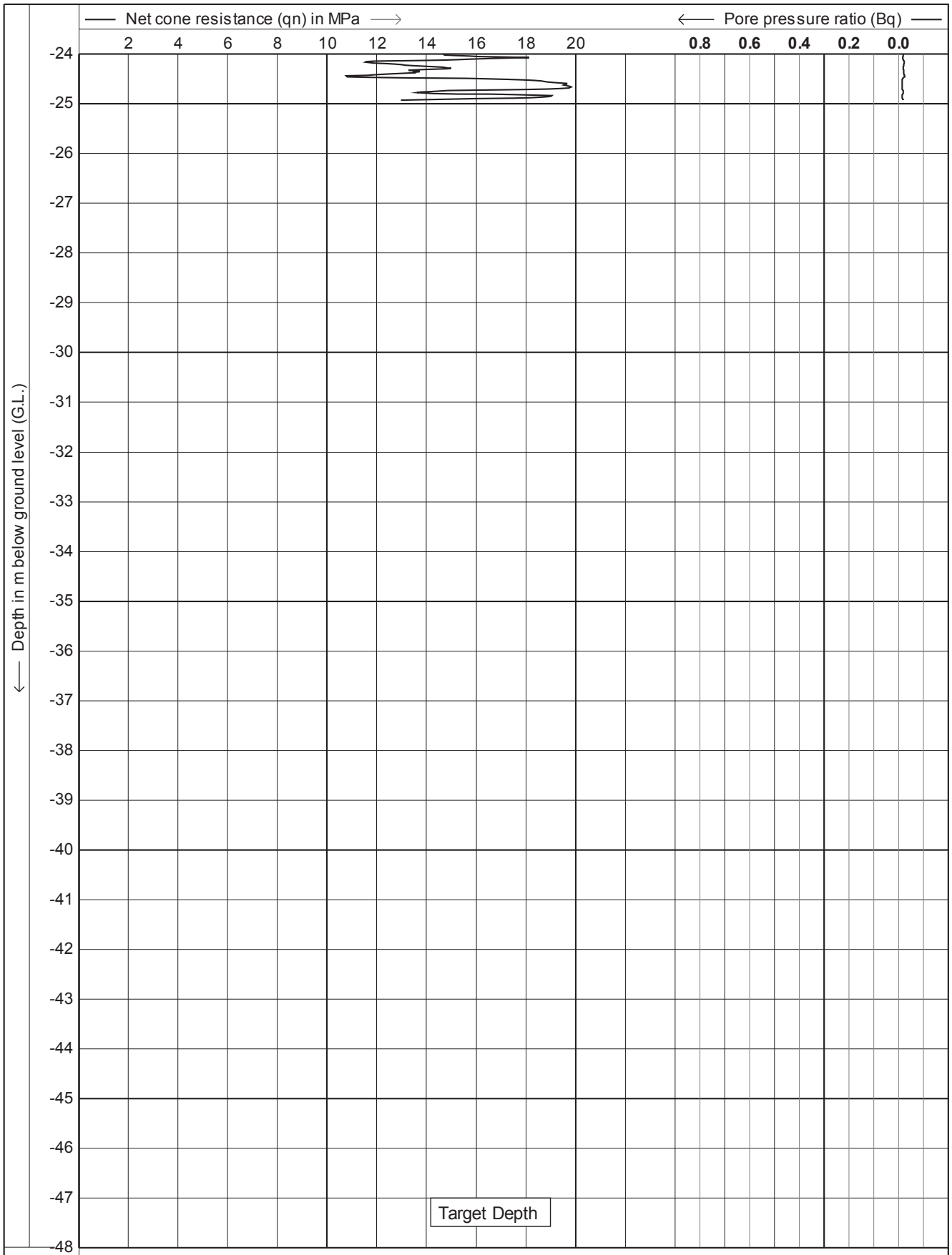
CPTask V1.25	Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 04 — 12/28



Test according A.S.T.M. Standard D 5778-95		Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
Project :	Site Investigations	Project no. :	01AECOM3
Location:	Southern Links - Hamilton	CPT no.	: 04

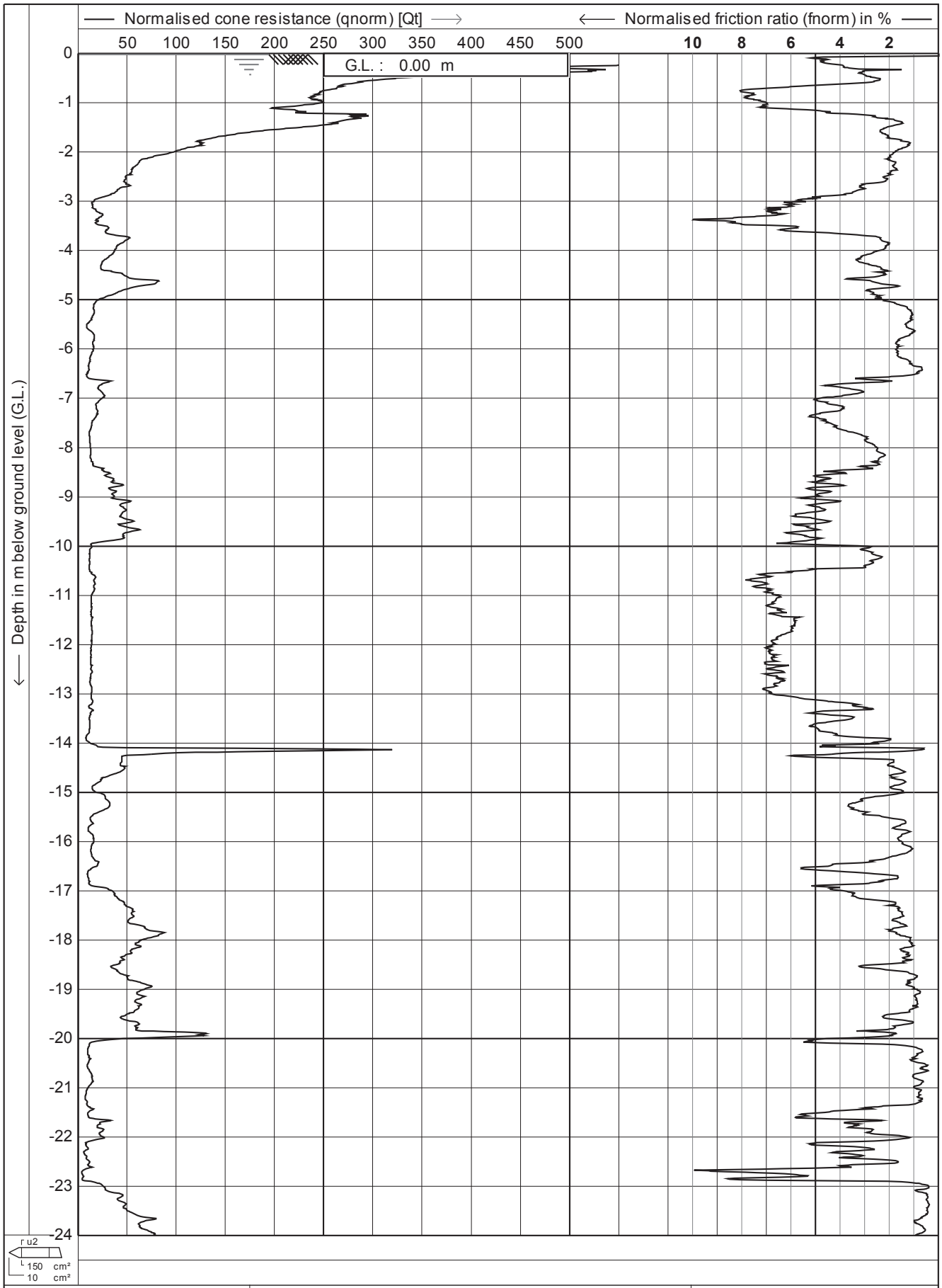
13/28

CPTask V1.25



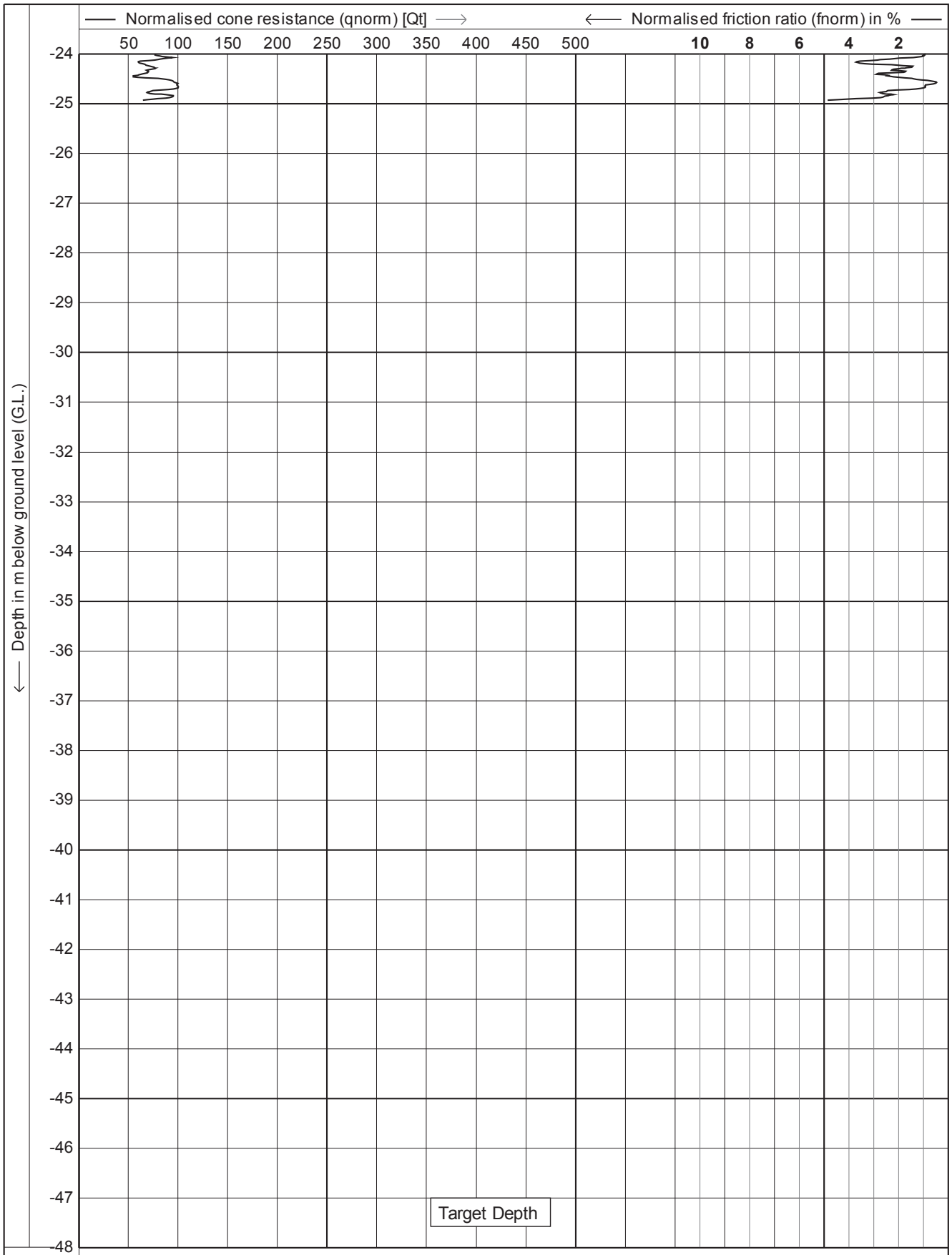
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : Site Investigations	Project no.	: 01AECOM3
	Location: Southern Links - Hamilton	CPT no.	: 04

CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 04

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

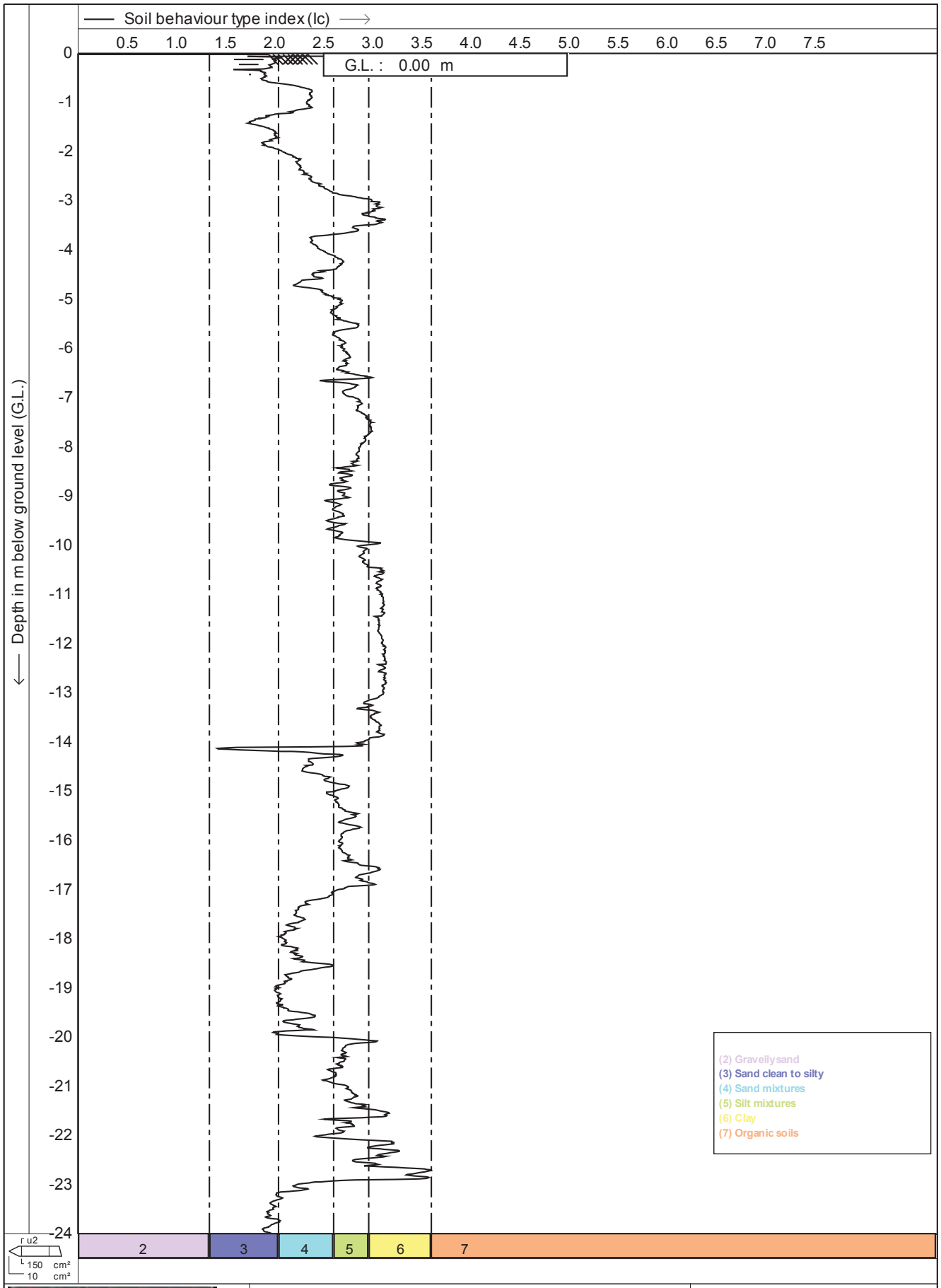
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

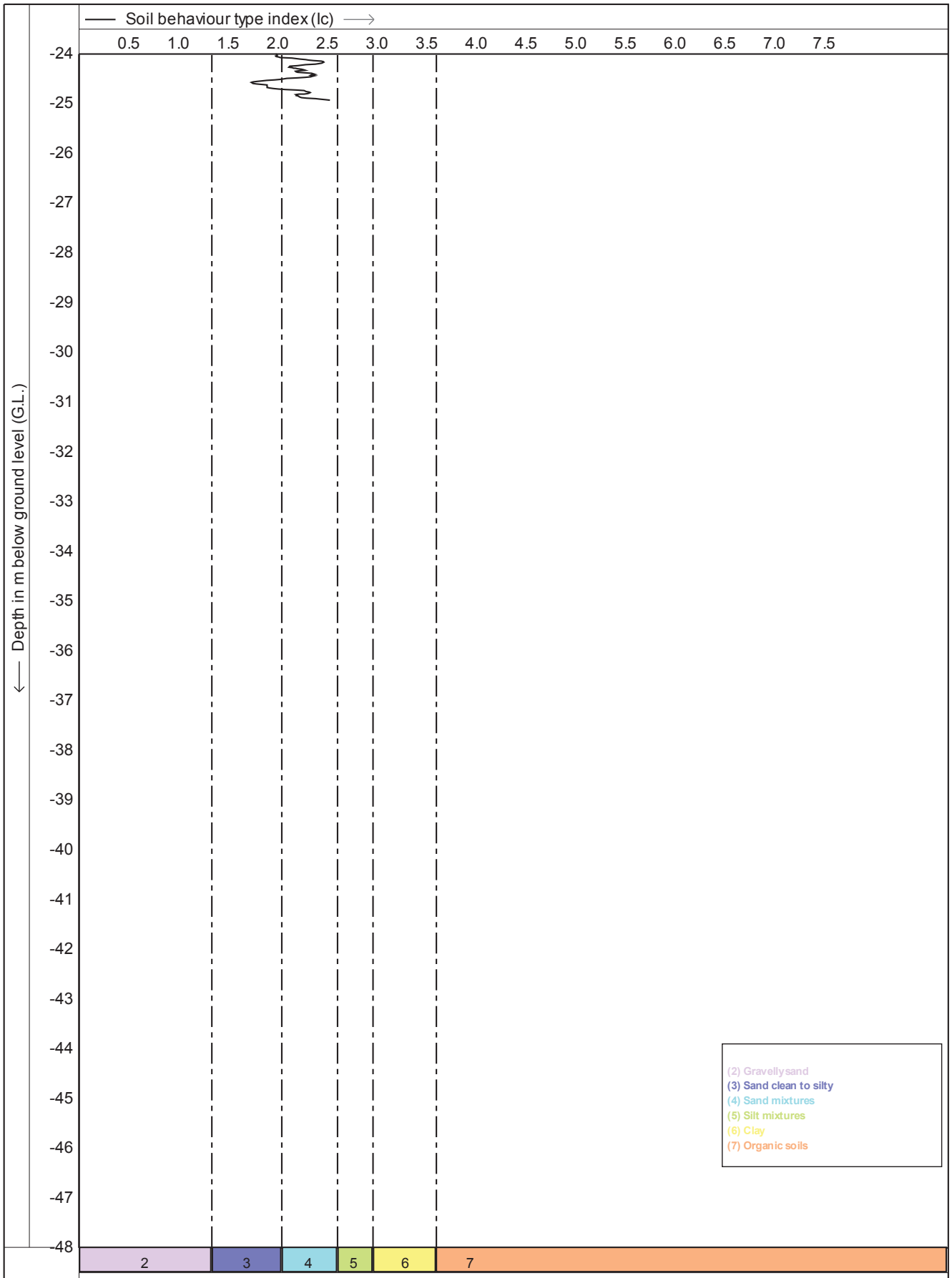
16/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **04**	**17/28**

CPTask V1.25



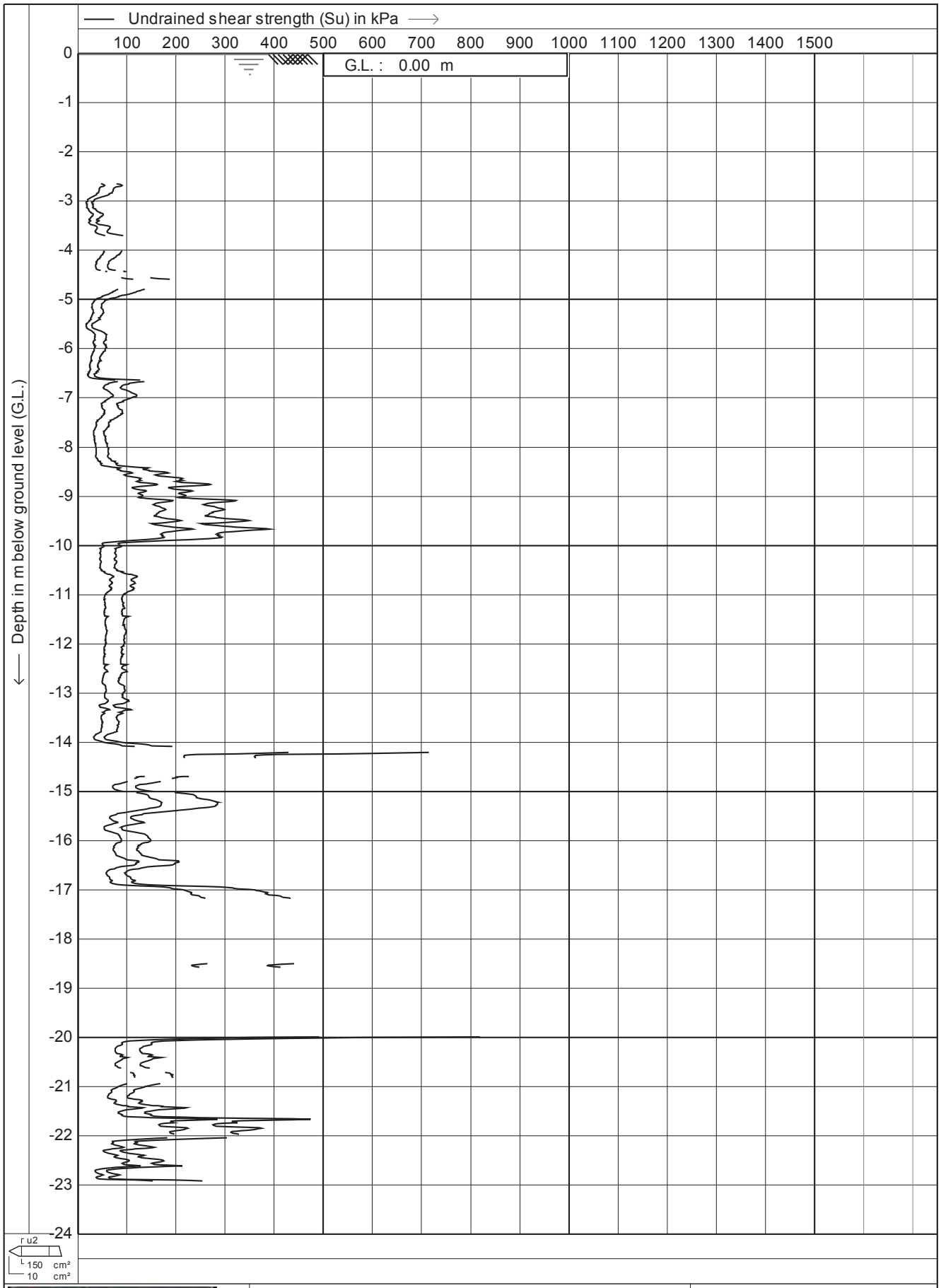
CPTask V1.25

Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

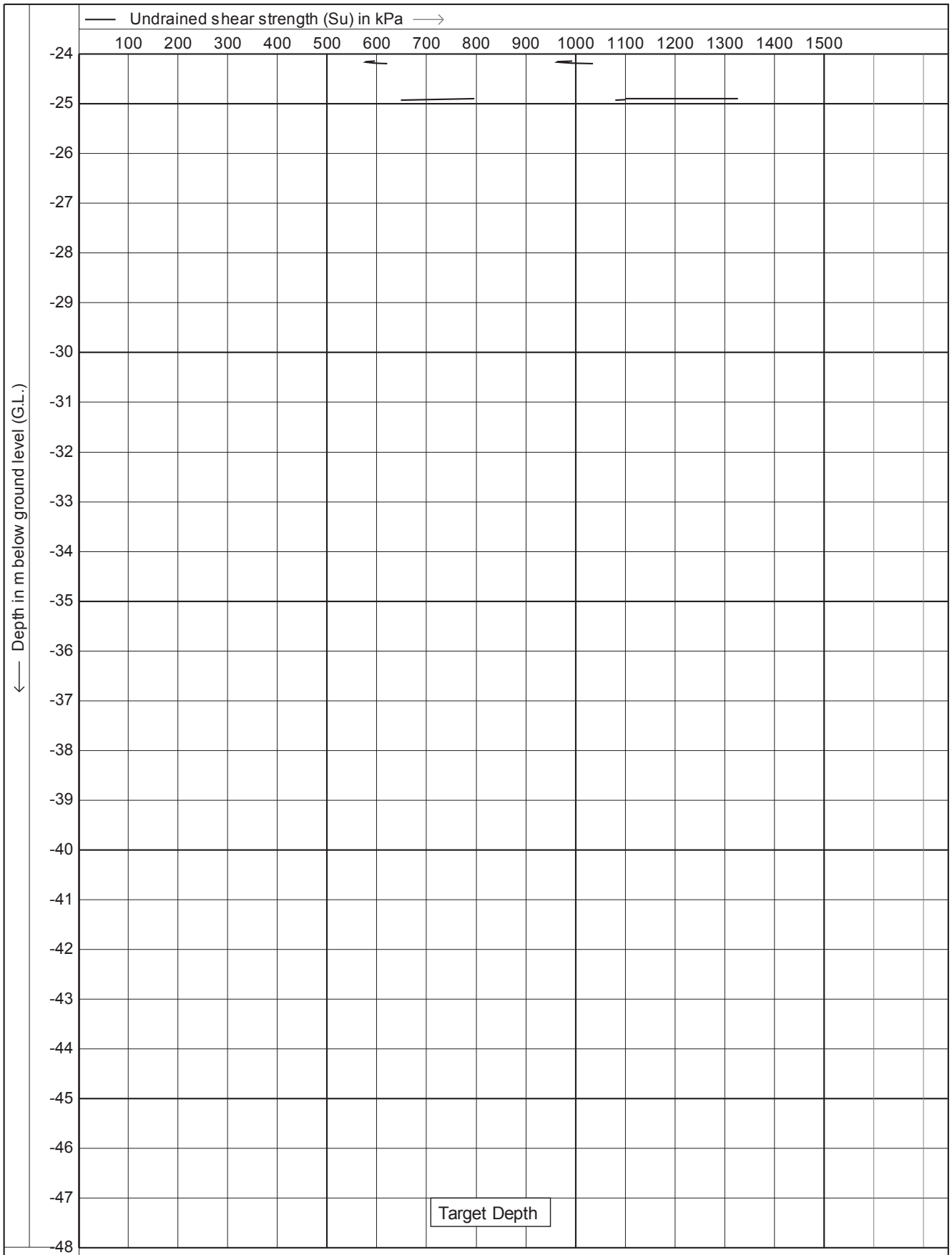
Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**



Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no. :	**01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **04** 19/28

CPTask V1.25



CPTask V1.25

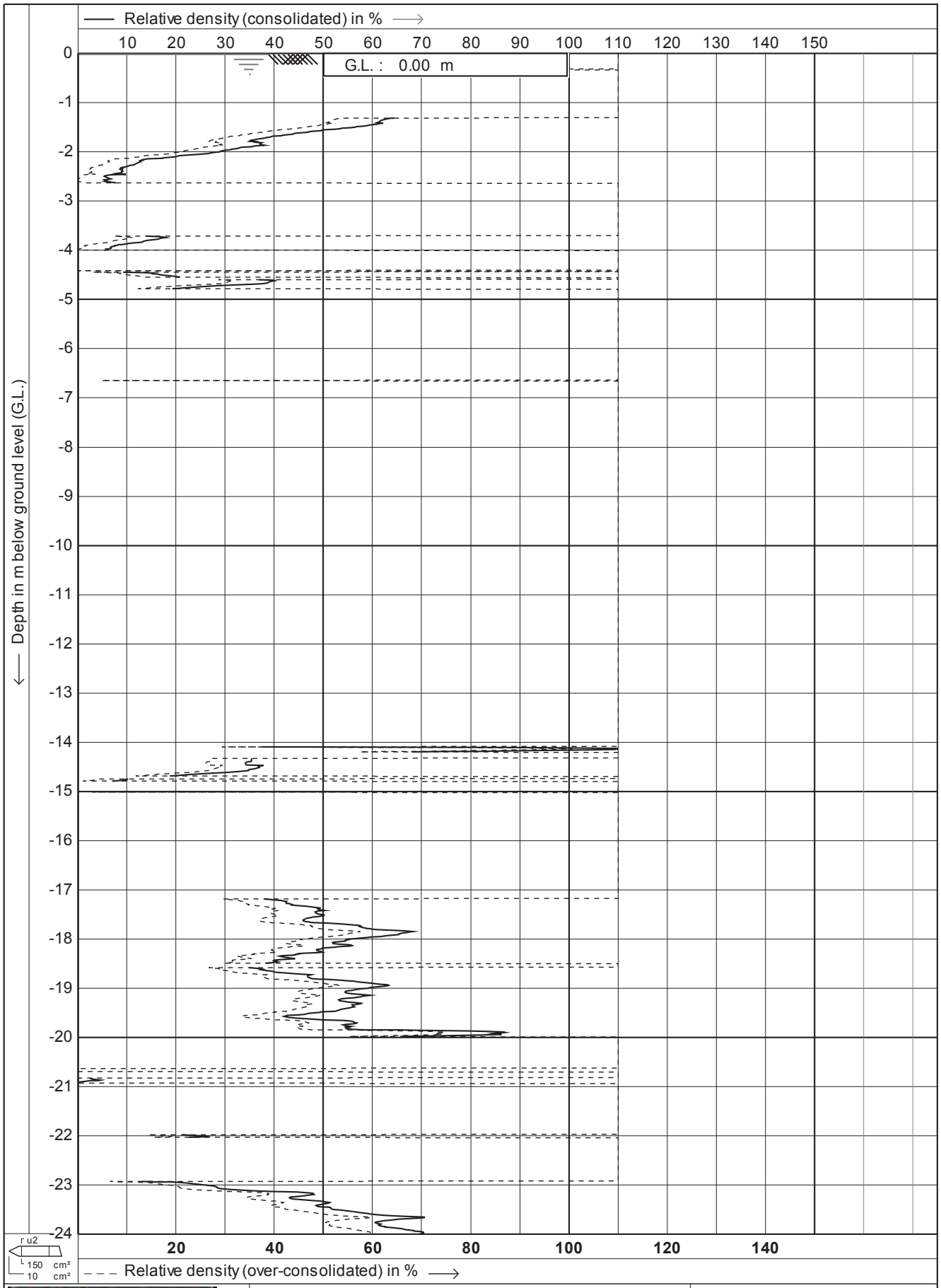
Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

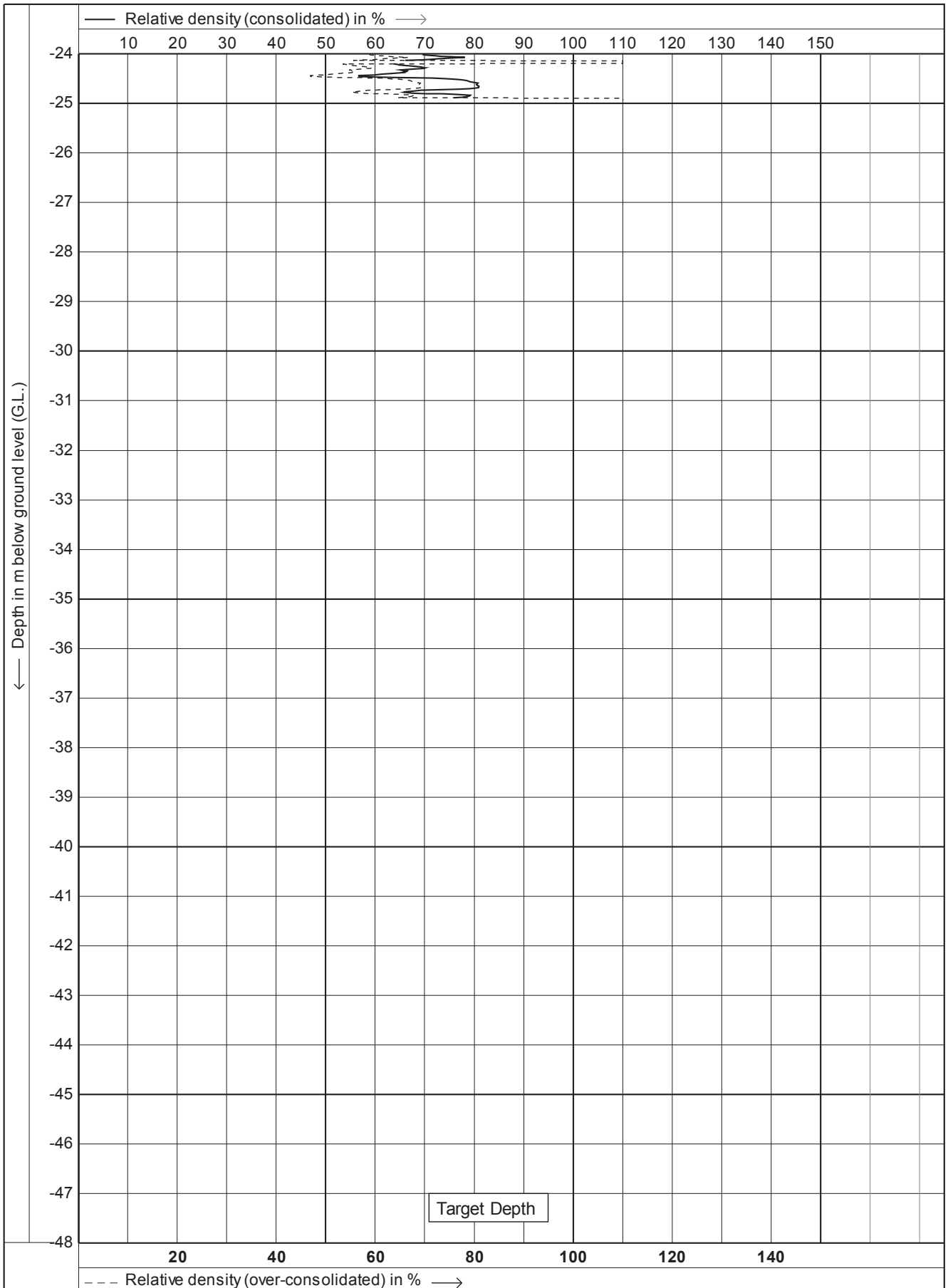
Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

20/28



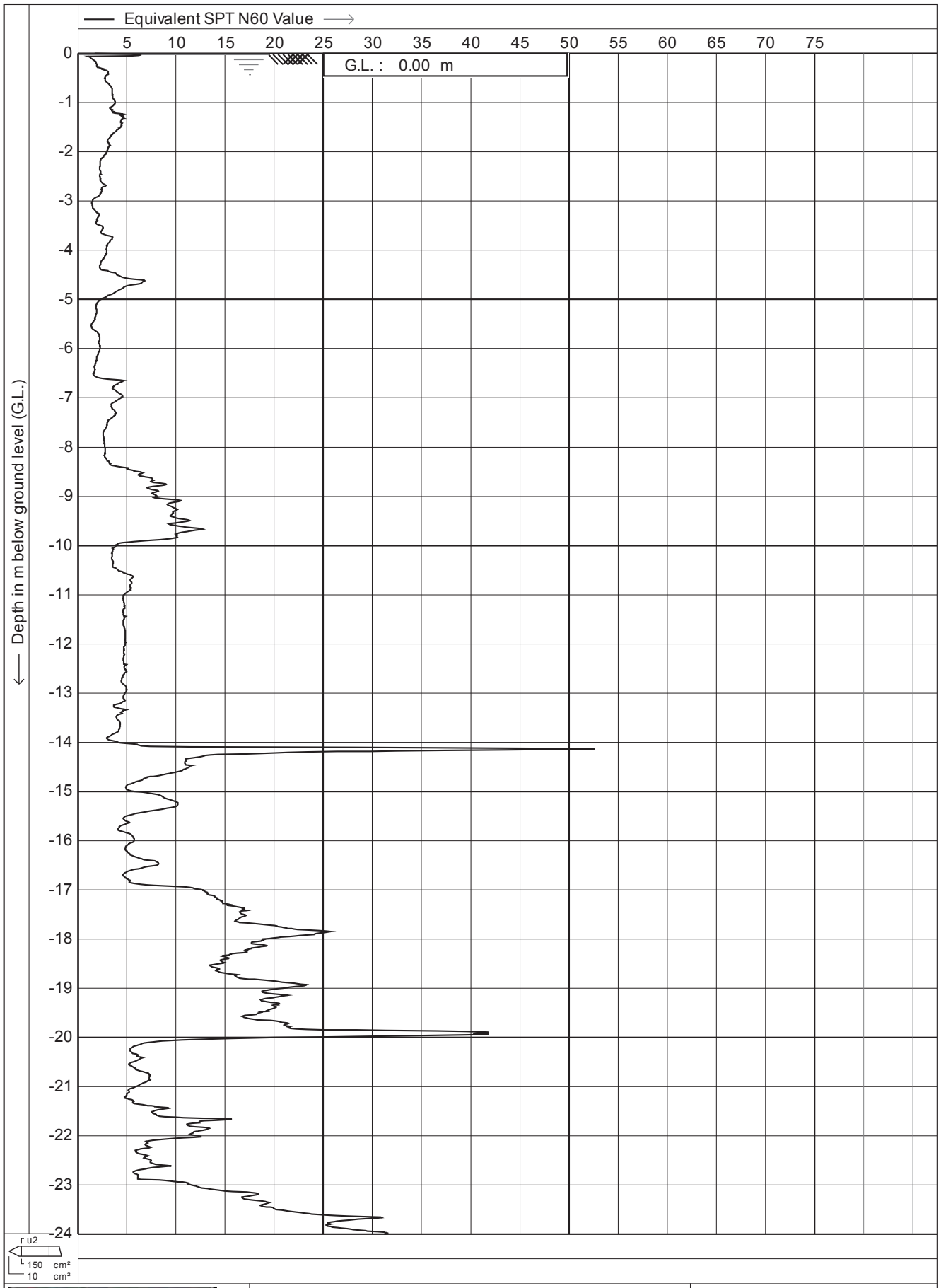
CPTask V1.25	Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **01AECOM3**	
	Location: **Southern Links - Hamilton**	CPT no. : **04**	**21/28**



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 04

22/28

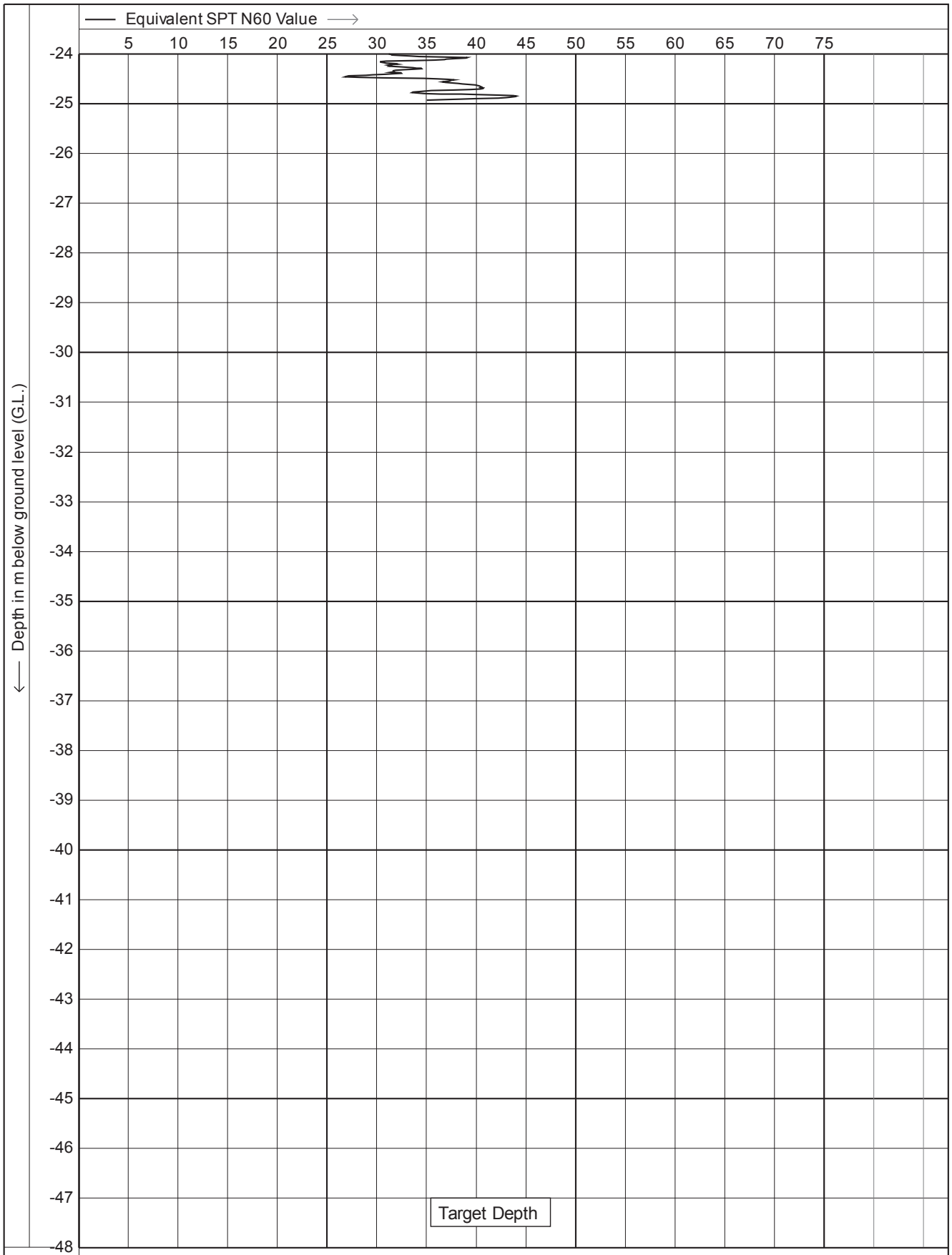
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no.	: **01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **04**

23/28

CPTask V1.25



CPTask V1.25

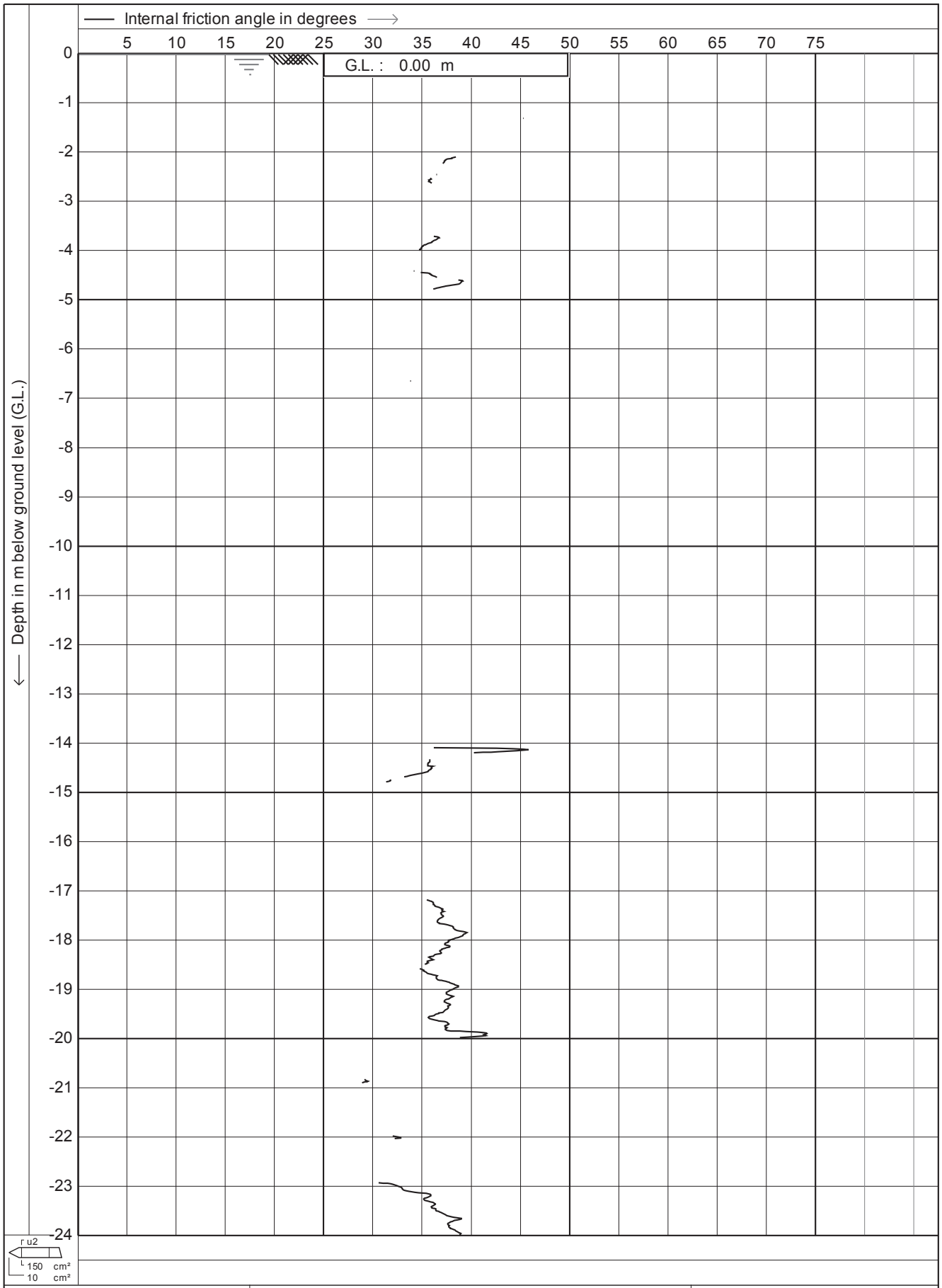
Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

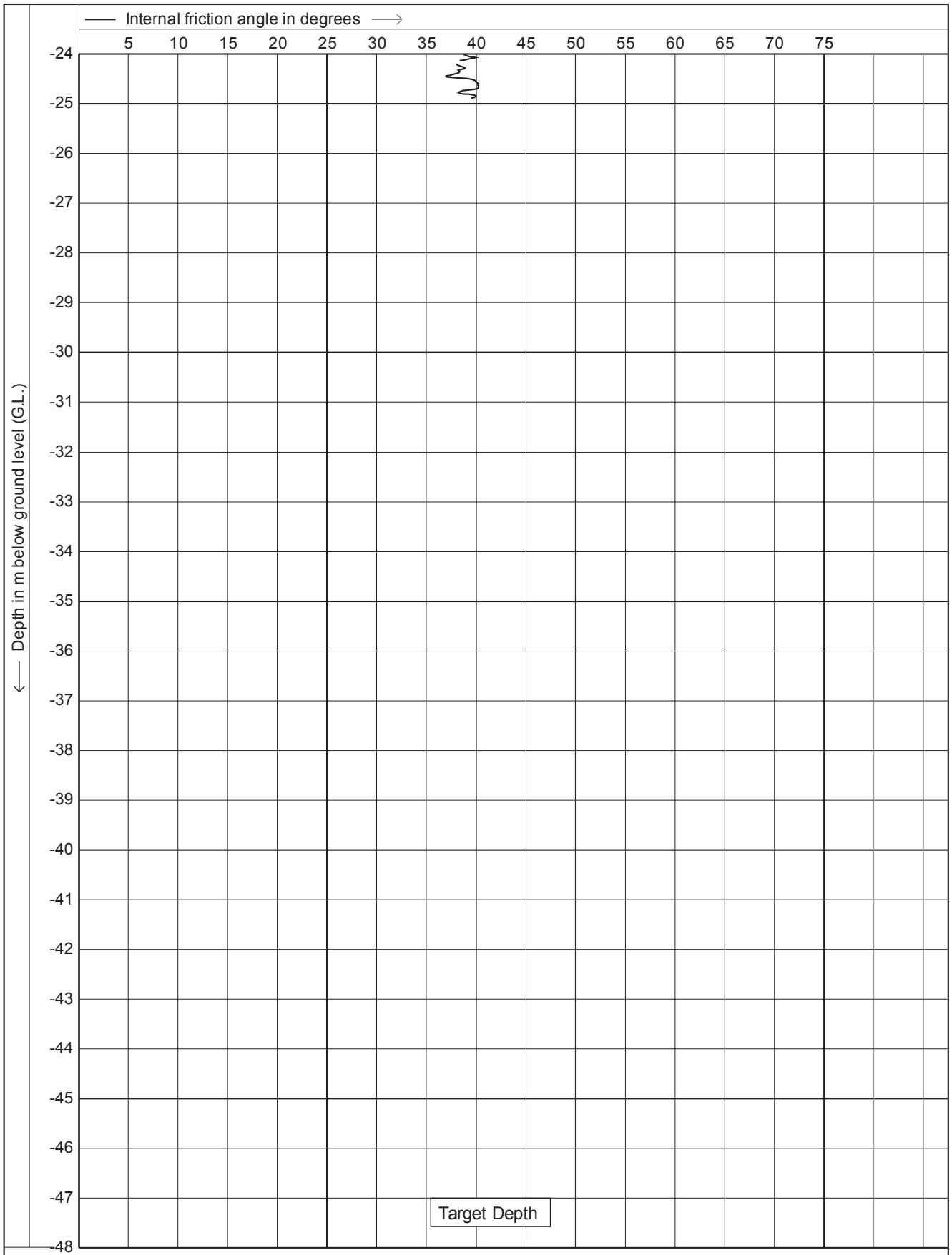
24/28



Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no. :	**01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **04**

27/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

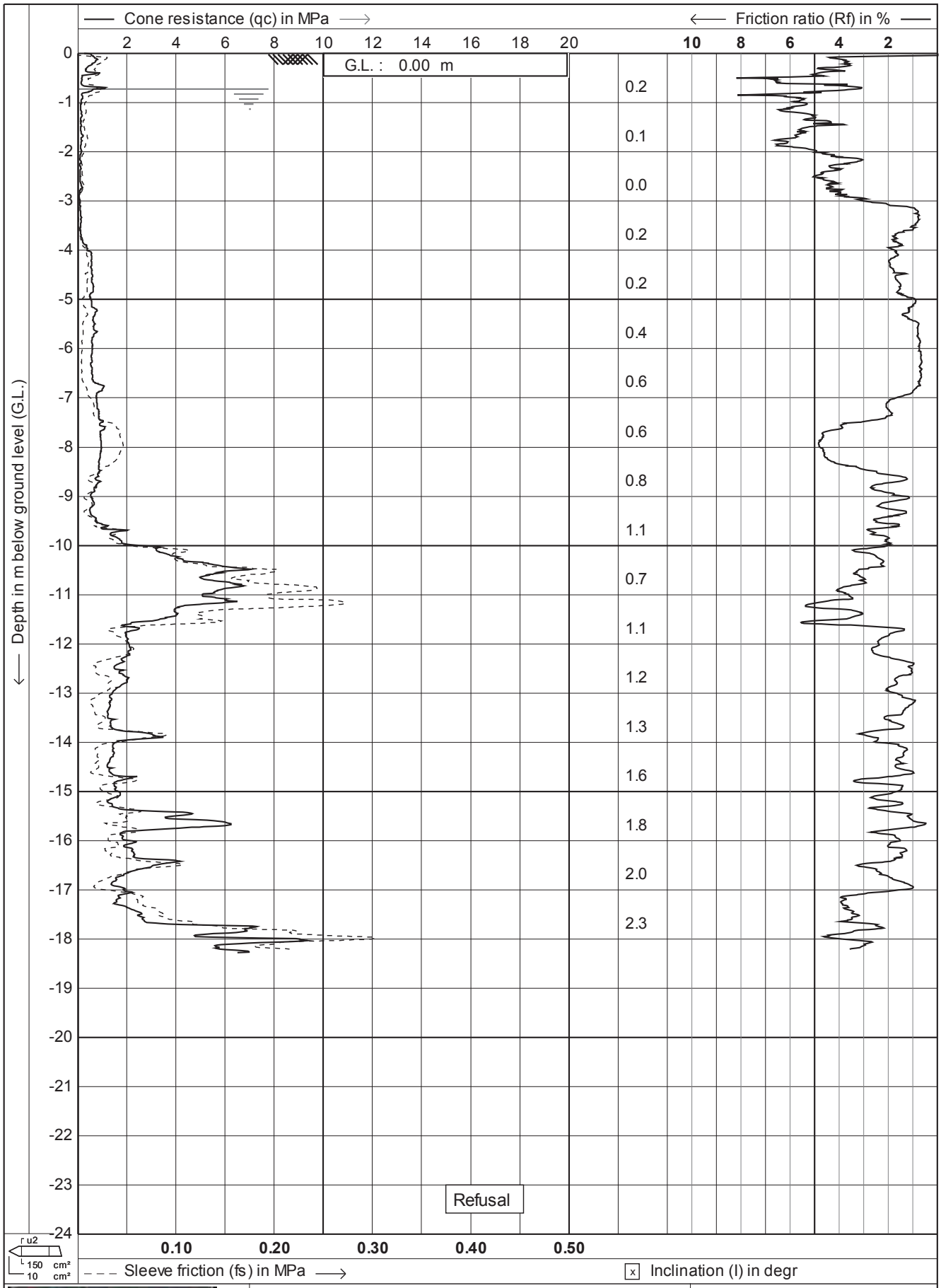
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **04**

28/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-07

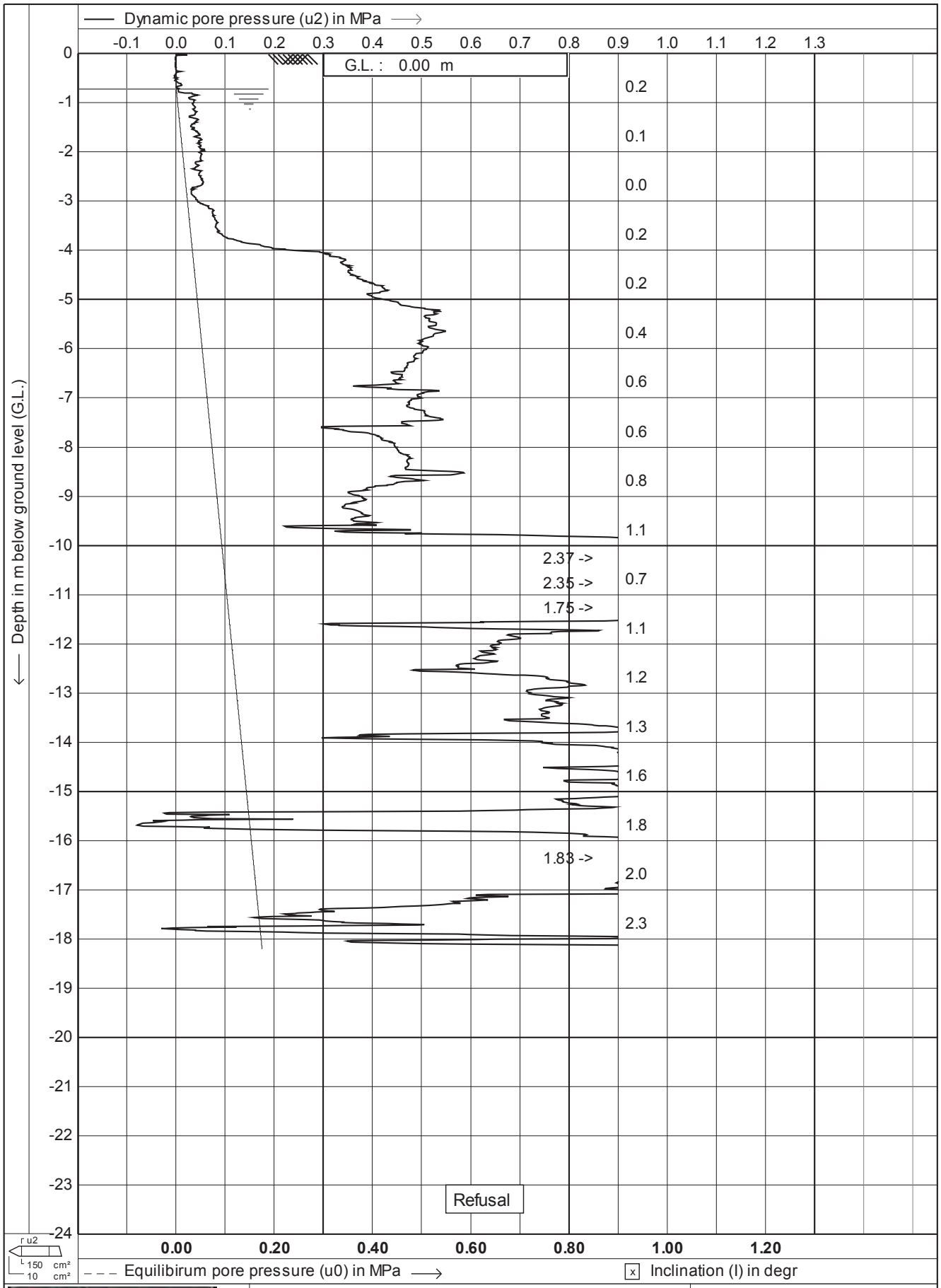
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **05**

1/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-07

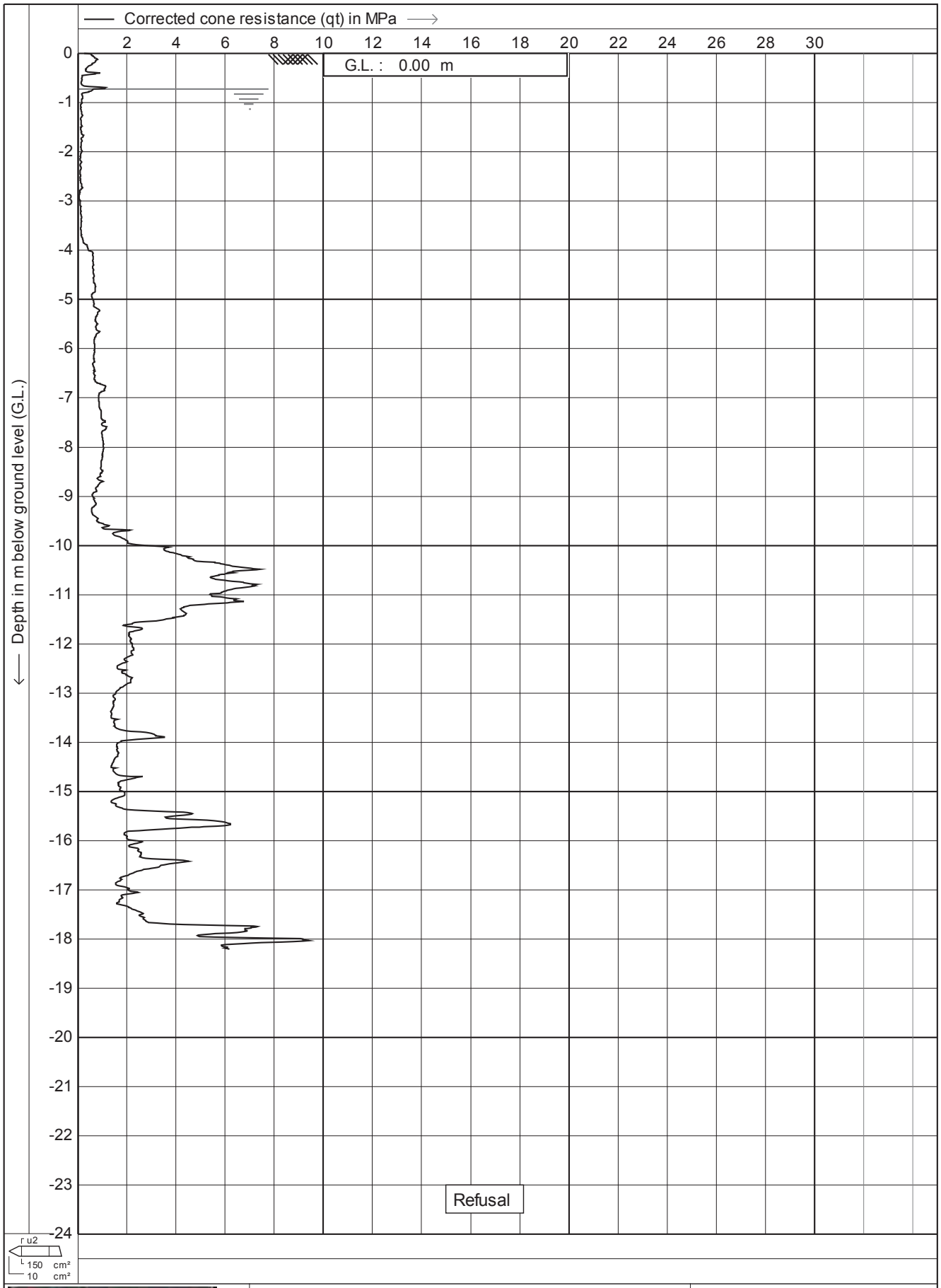
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **05**

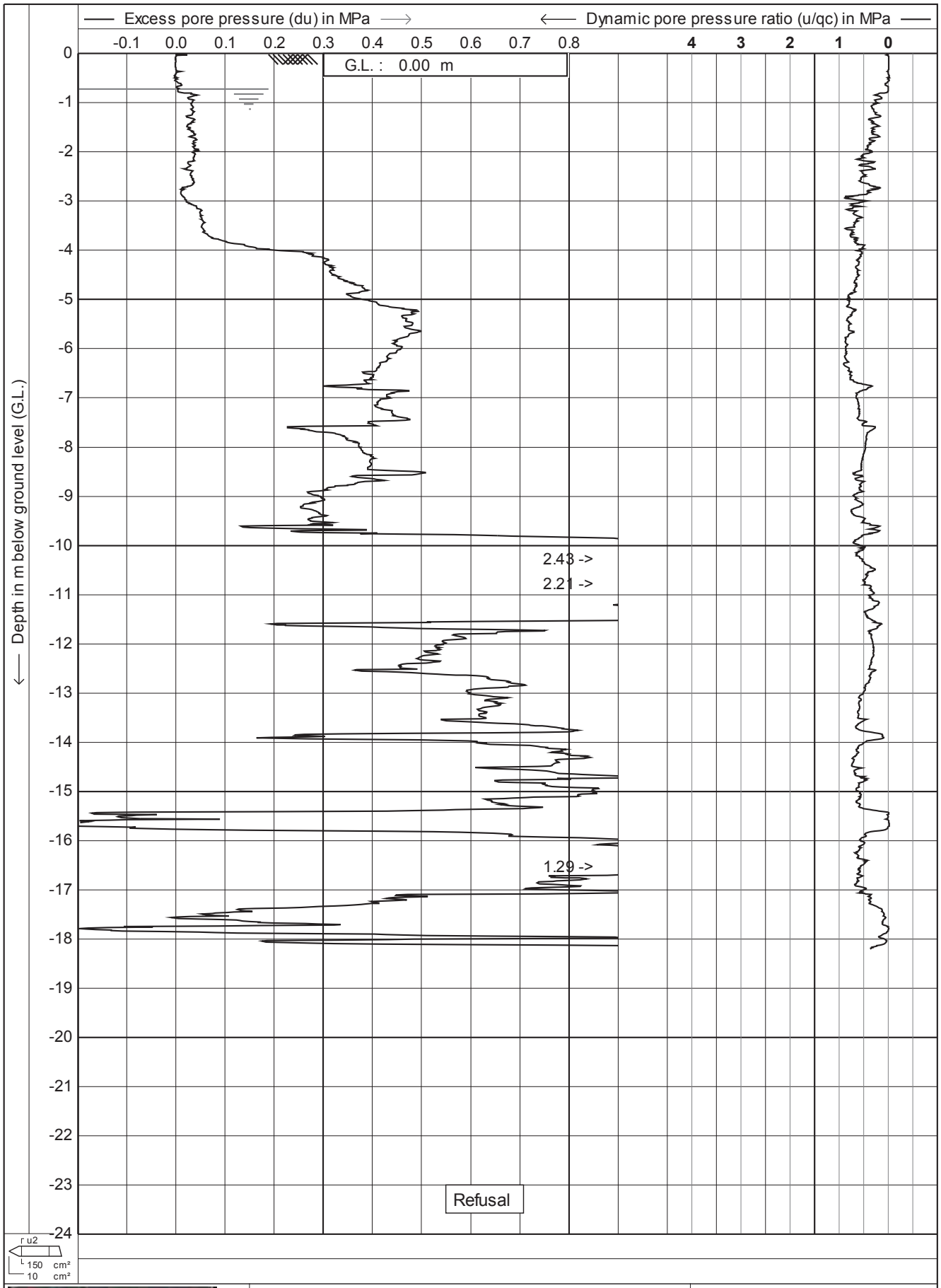
2/14

CPTask V1.25



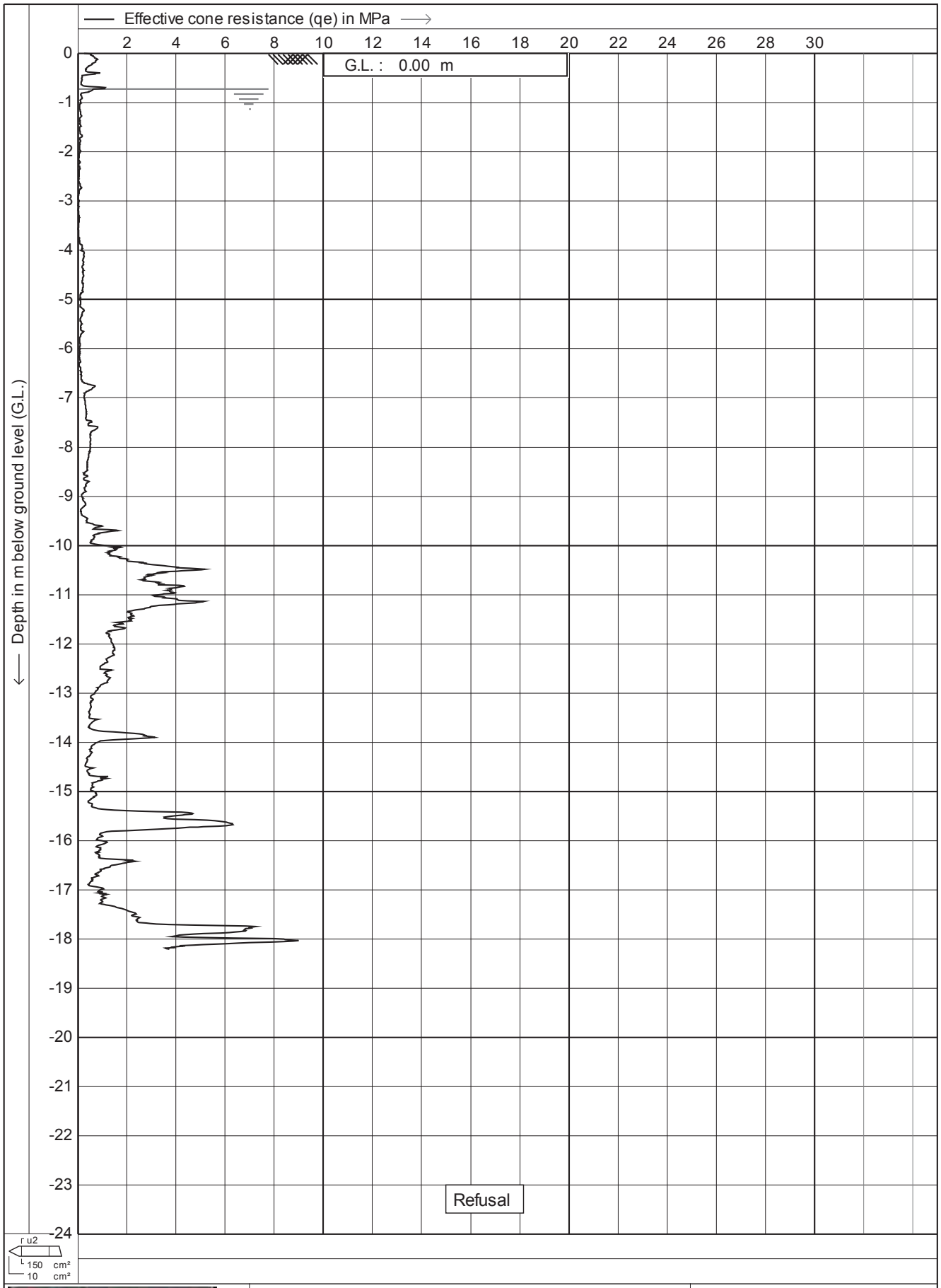
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**3/14**

CPTask V1.25



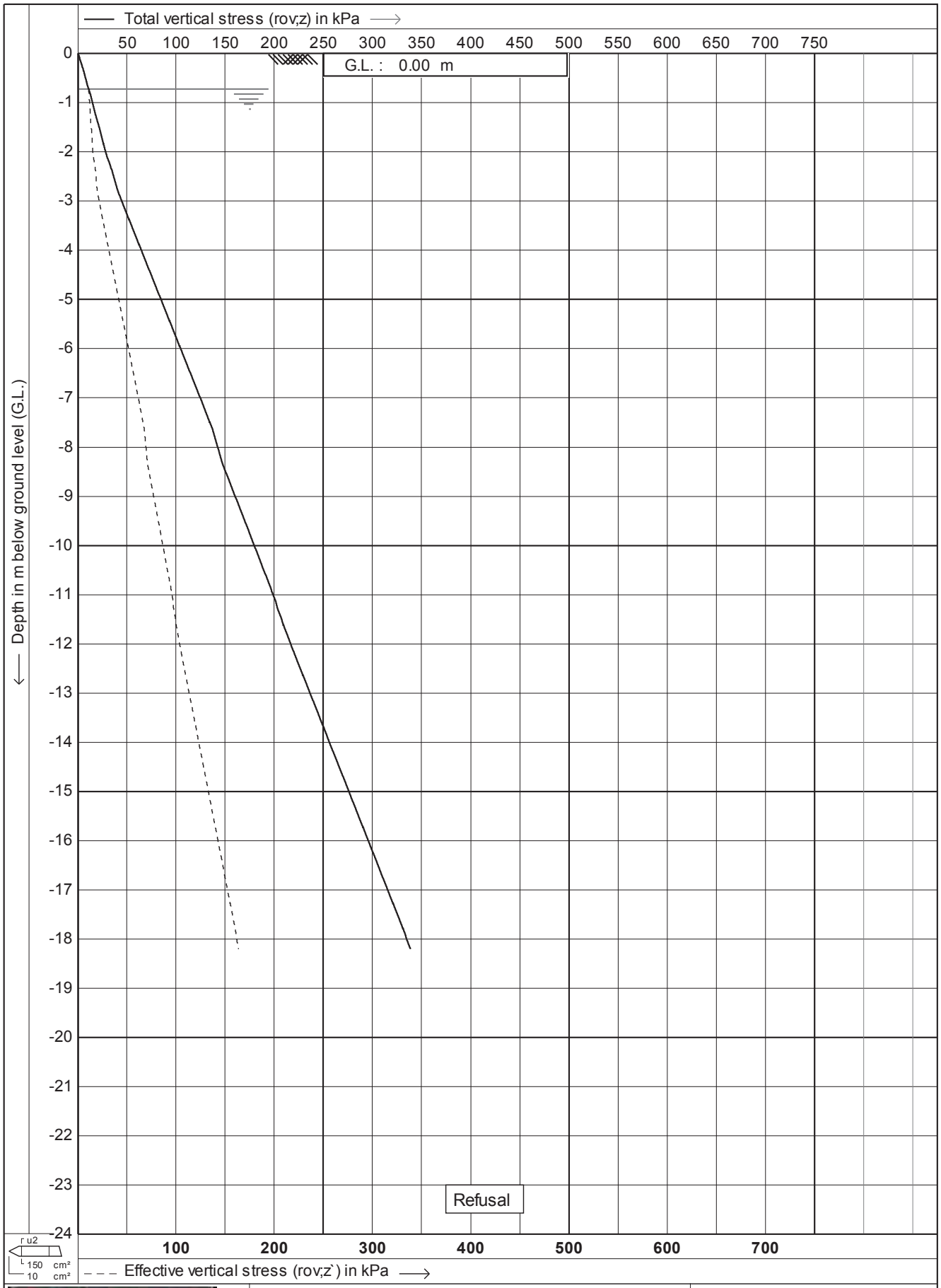
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**4/14**

CPTask V1.25



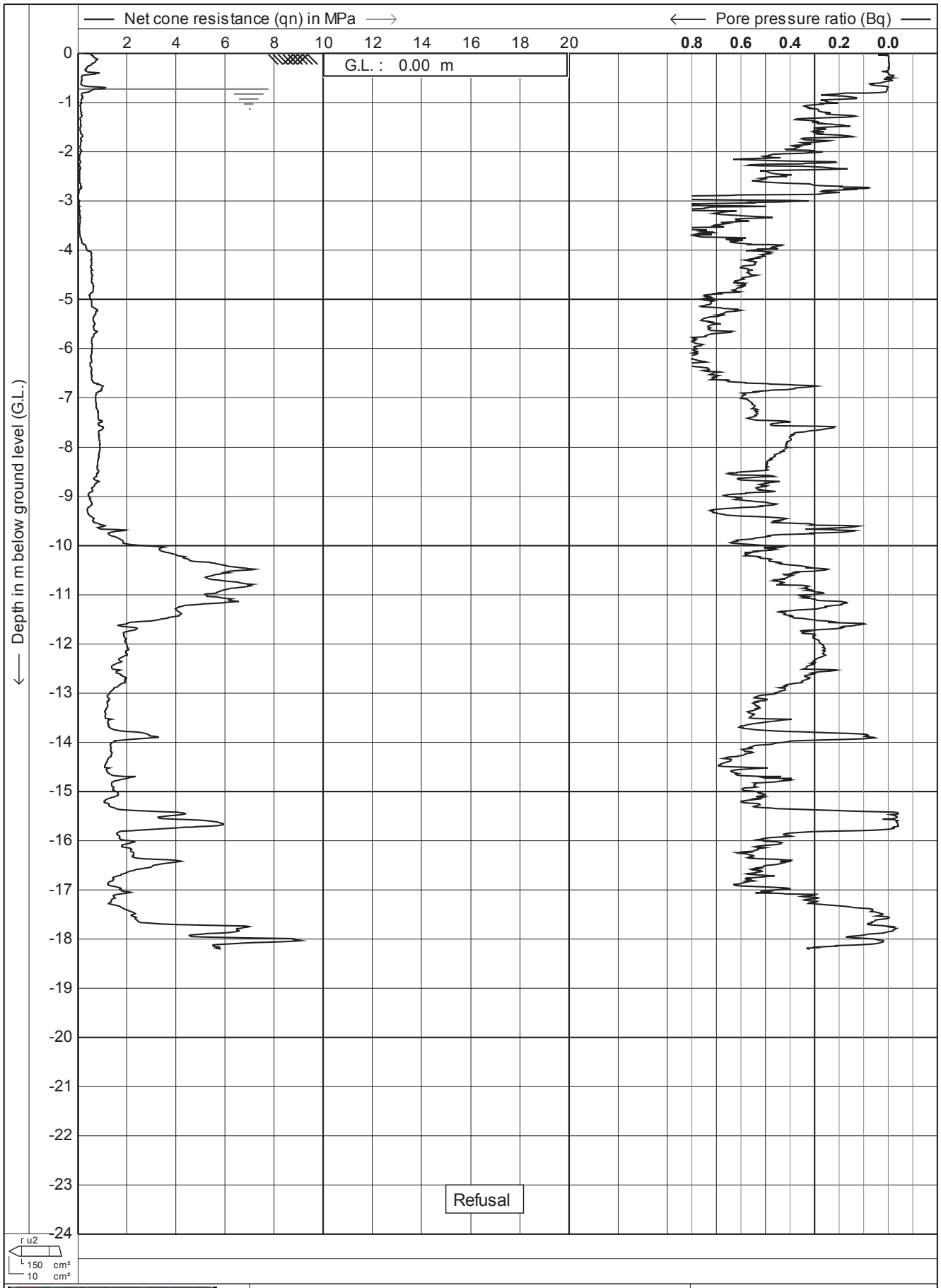
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**5/14**

CPTask V1.25



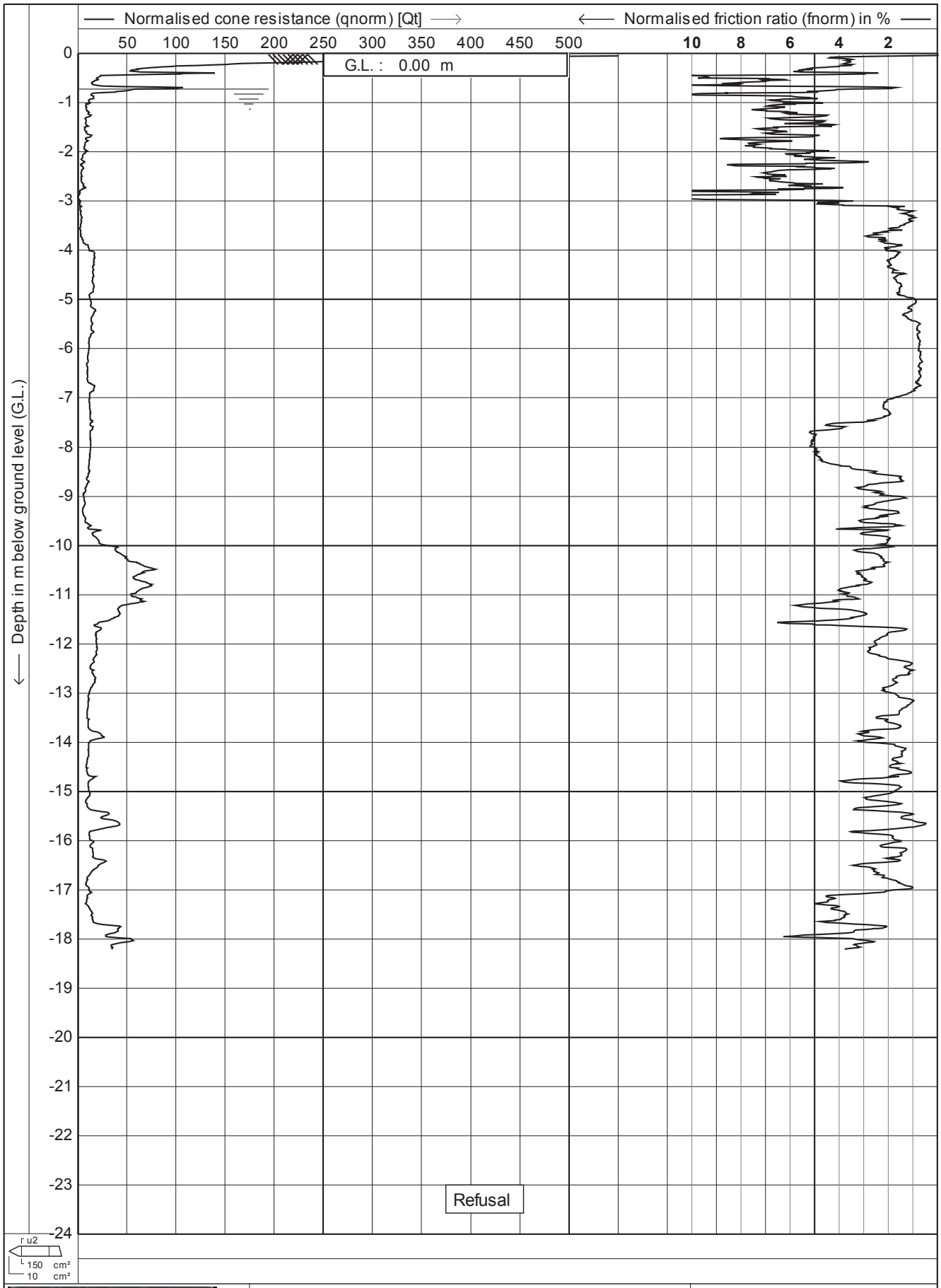
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 05 — 6/14

CPTask V1.25



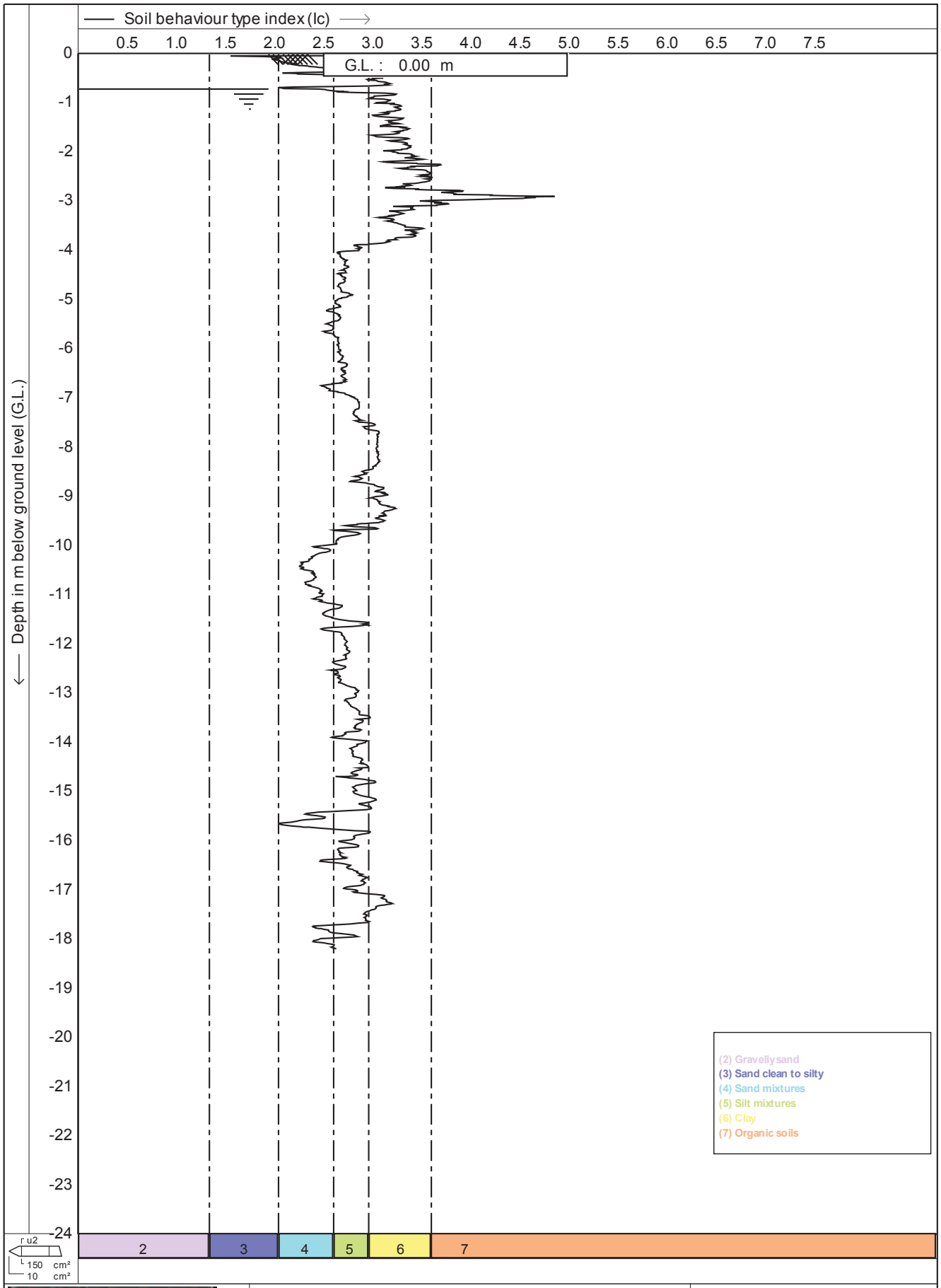
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**7/14**

CPTask V1.25



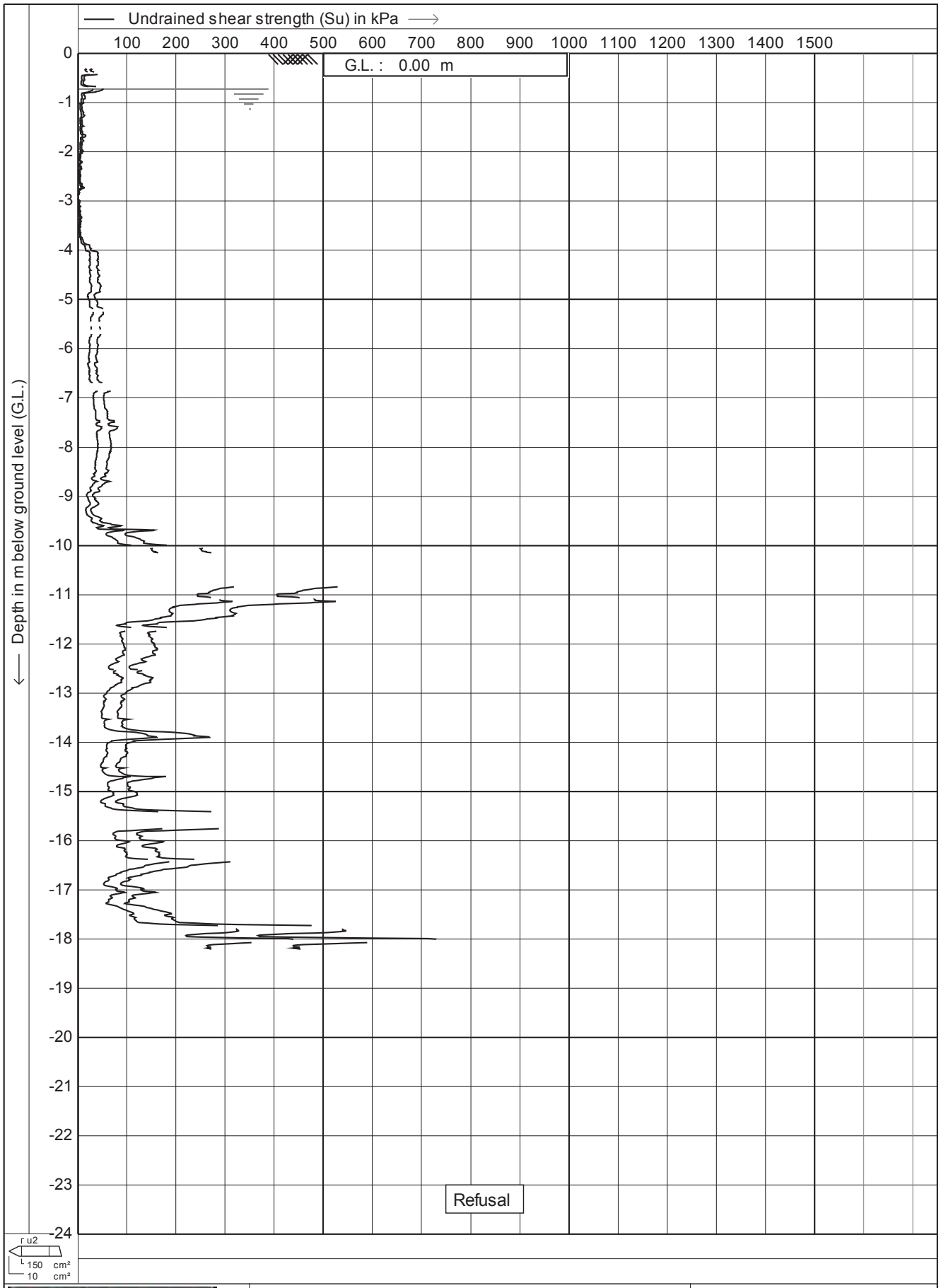
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**8/14**

CPTask V1.25



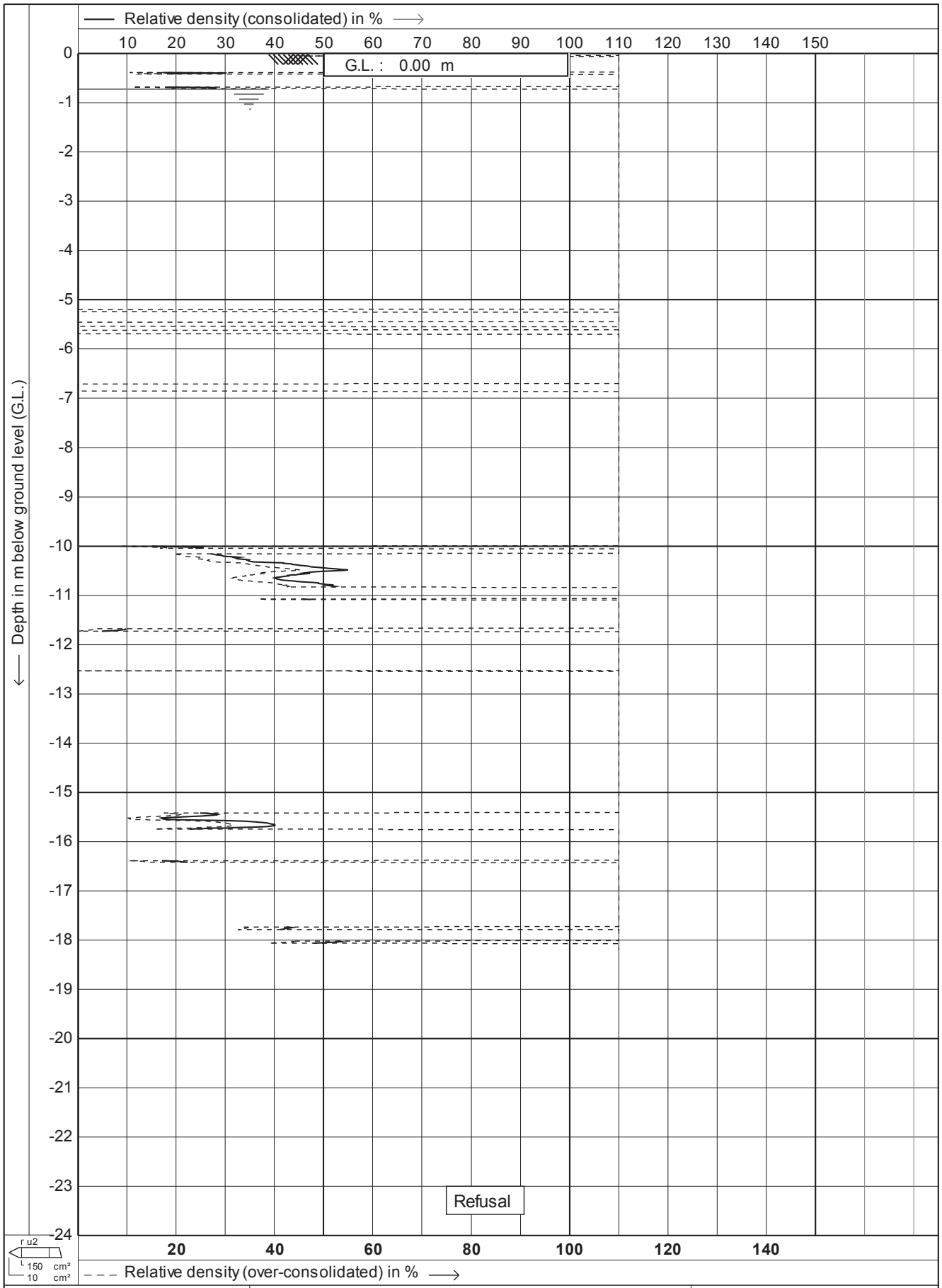
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**
		Project no. : **01AECOM3**
	Location: **Southern Links - Hamilton**	CPT no. : **05** 9/14

CPTask V1.25



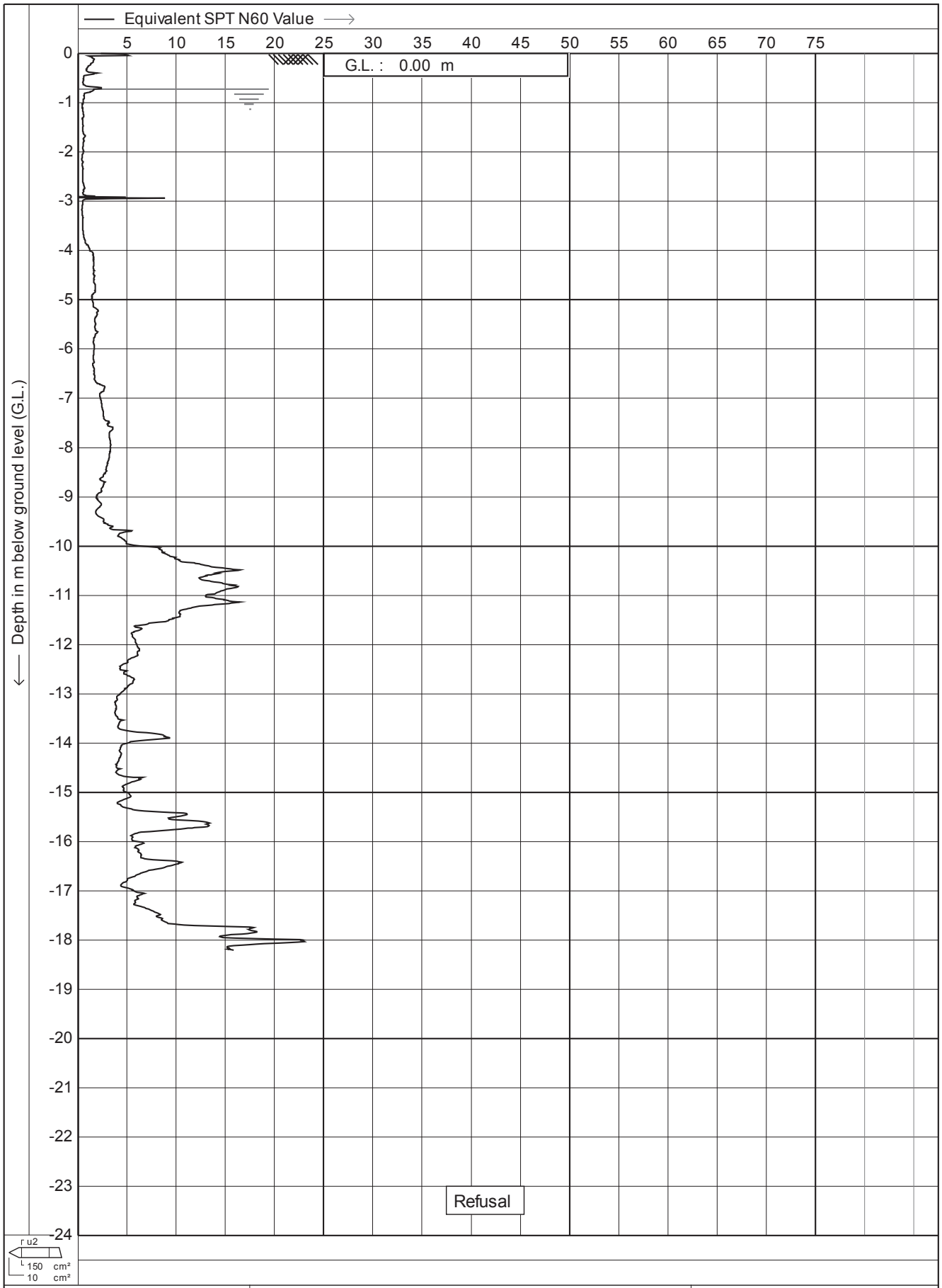
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**10/14**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-07	Date	: **20-4-2011**
	Cone no.	: **C10CFIIP.F14**
Project : **Site Investigations**	Project no.	: **01AECOM3**
Location: **Southern Links - Hamilton**	CPT no.	: **05** 11/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-07

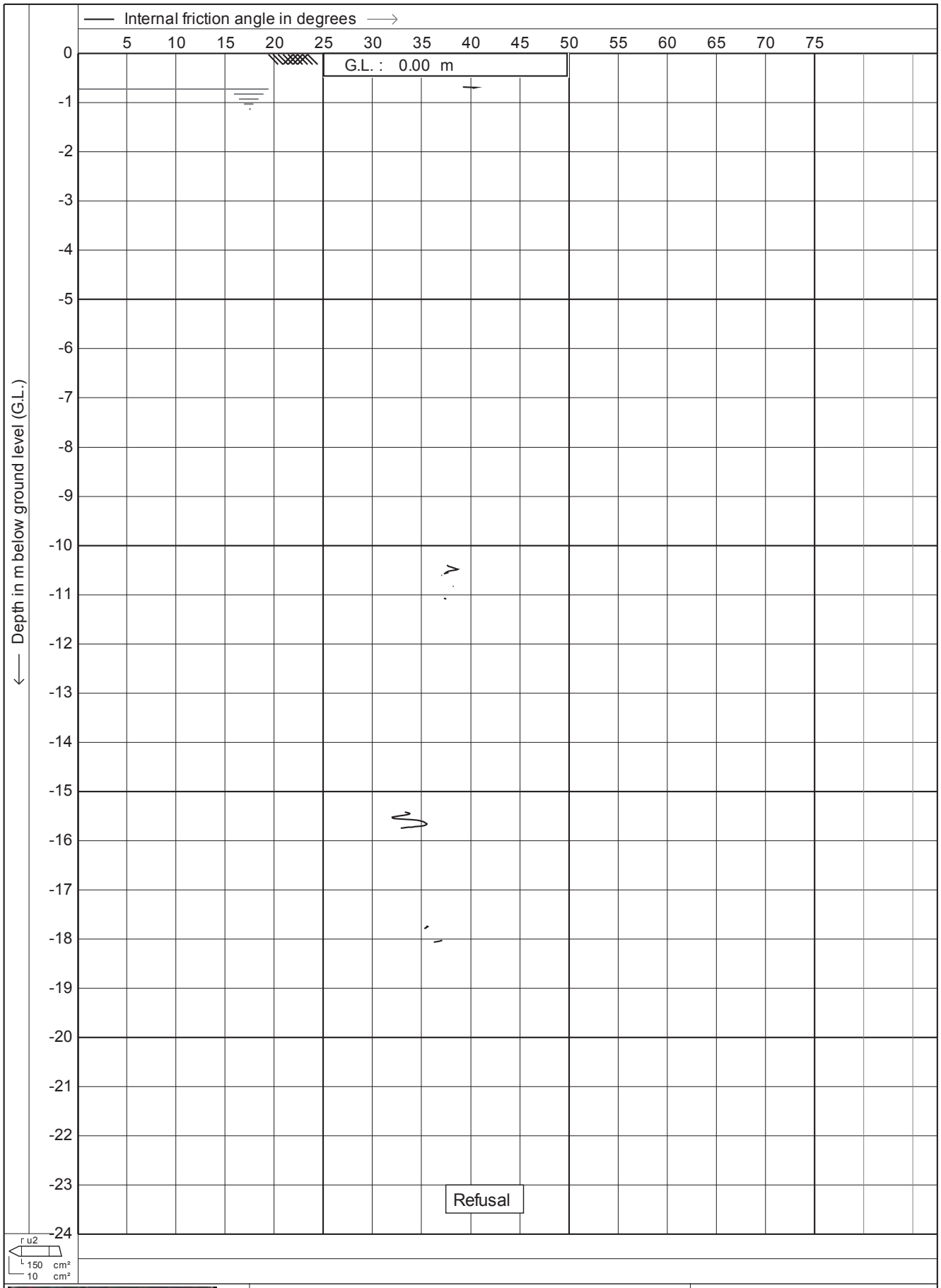
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **05**

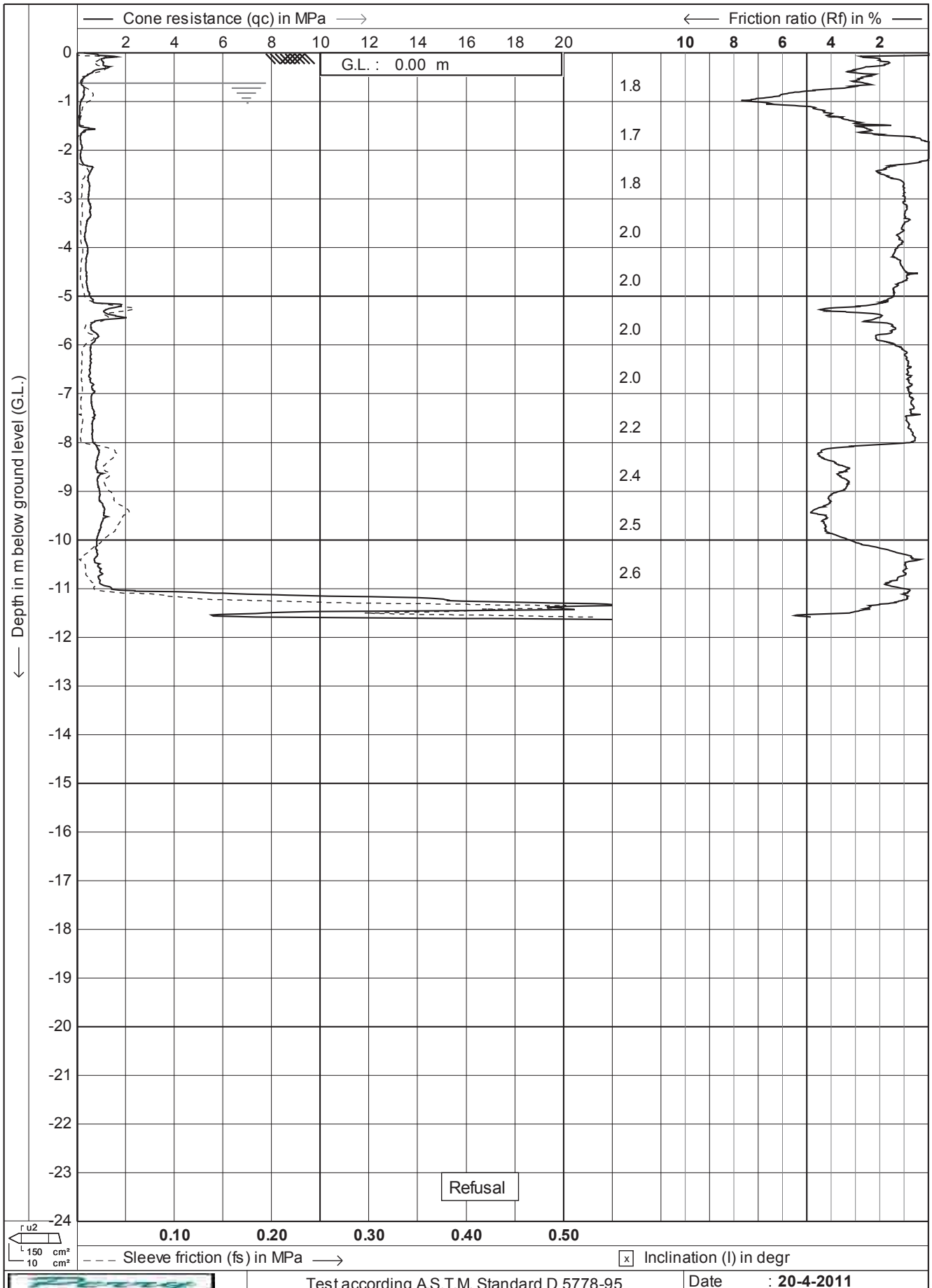
12/14

CPTask V1.25



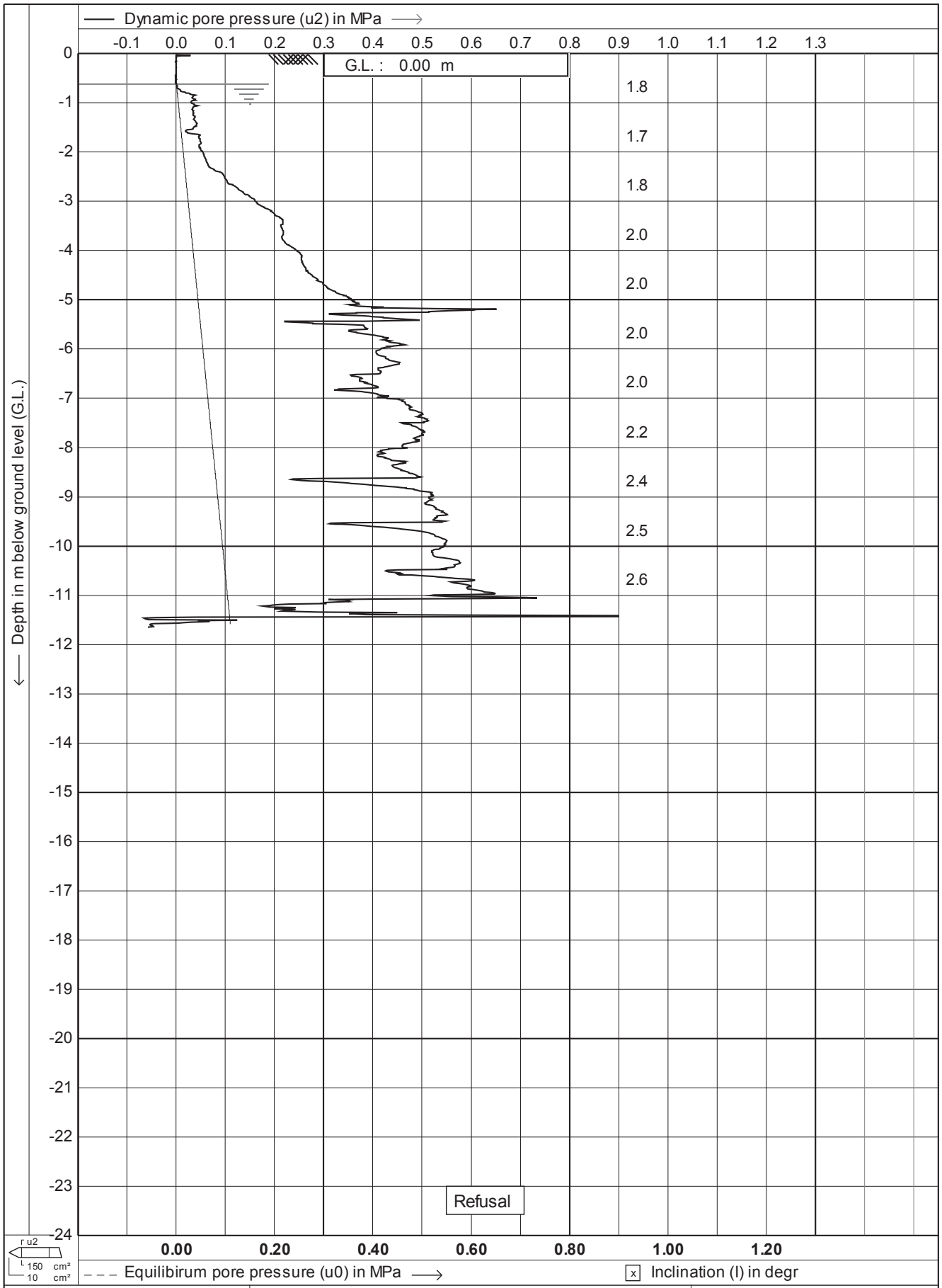
Test according A.S.T.M. Standard D 5778-07	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **05**	**14/14**

CPTask V1.25



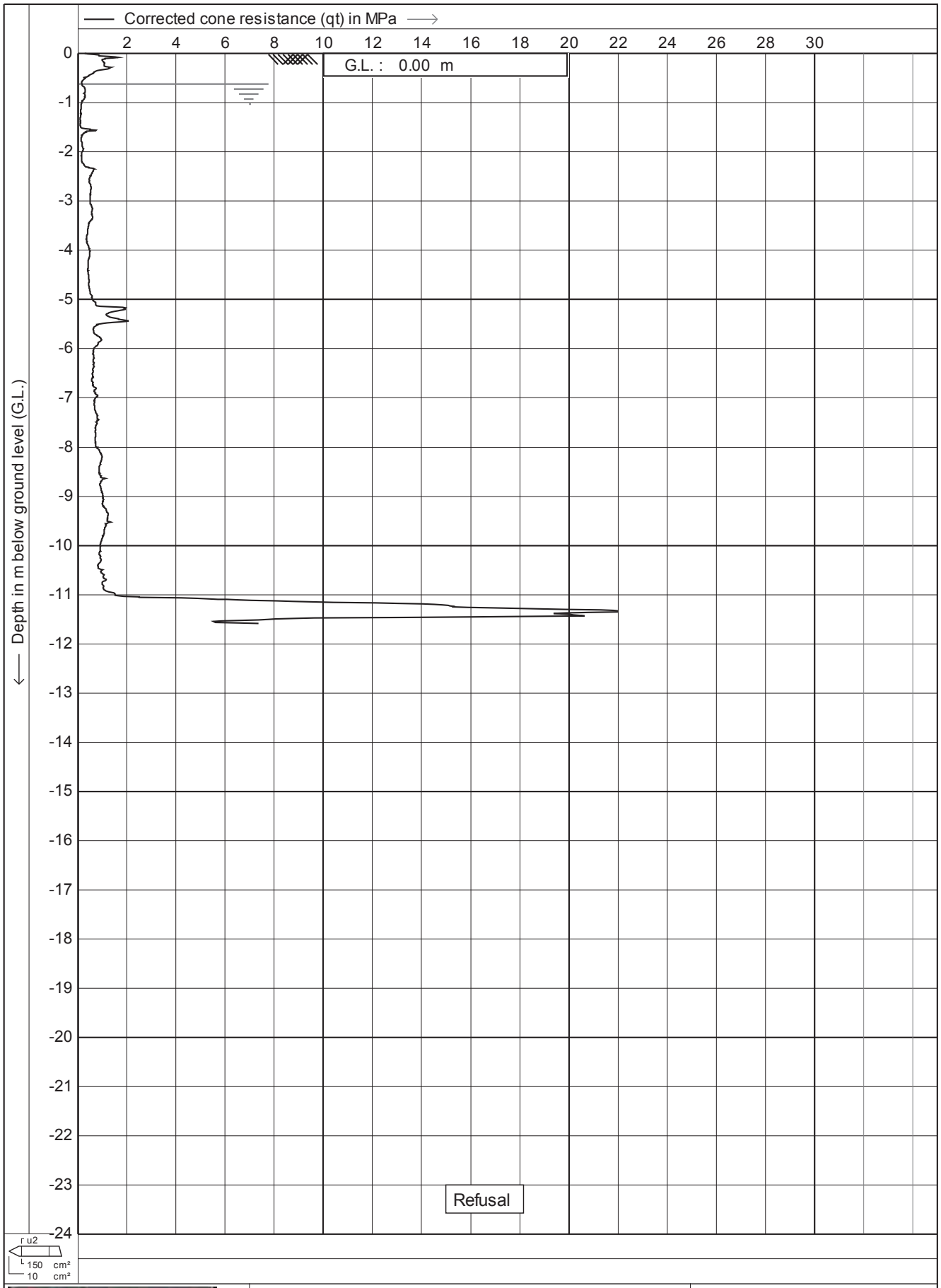
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**1/14**

CPTask V1.25



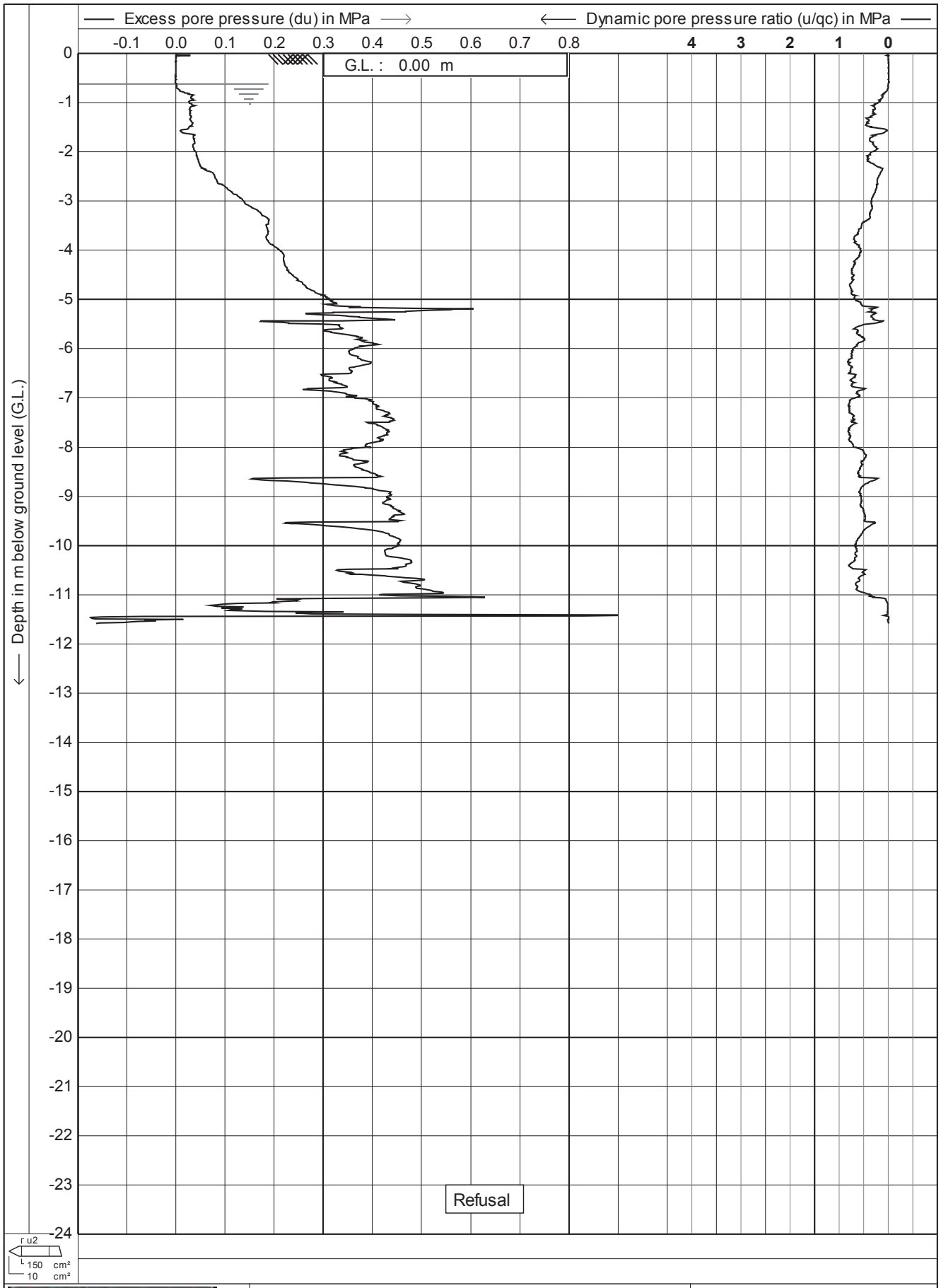
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**2/14**

CPTask V1.25



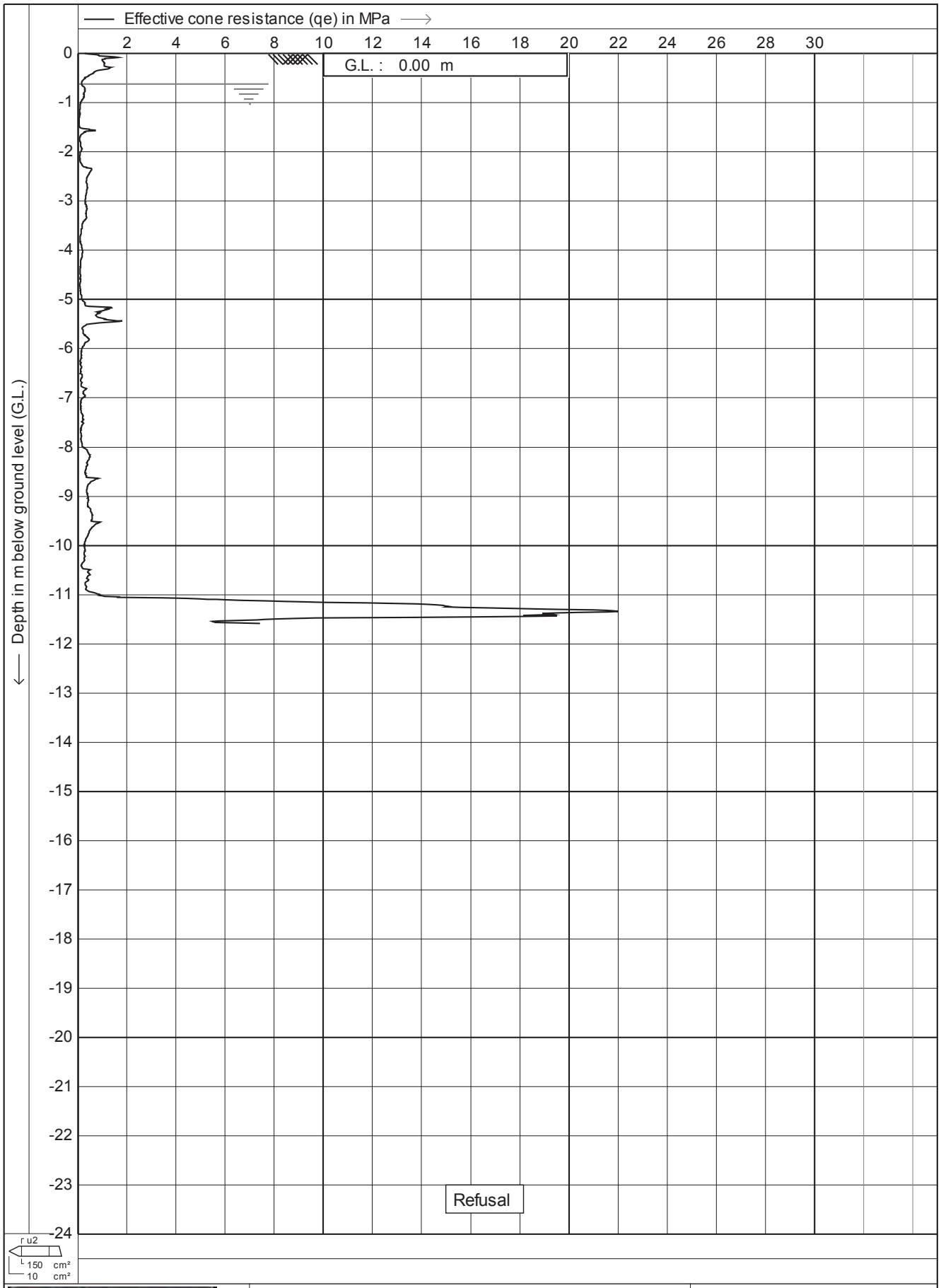
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**3/14**

CPTask V1.25



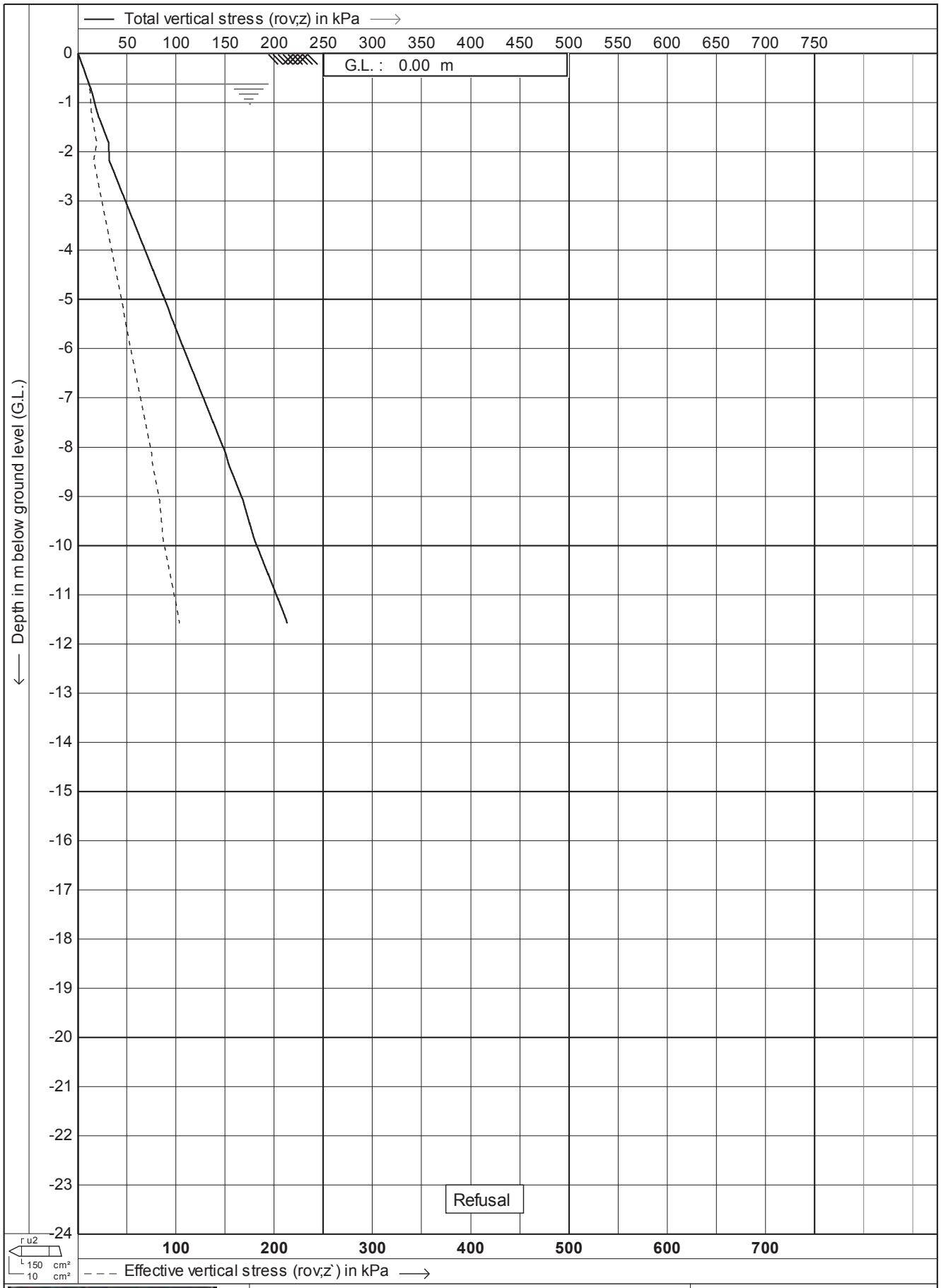
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**4/14**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**5/14**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

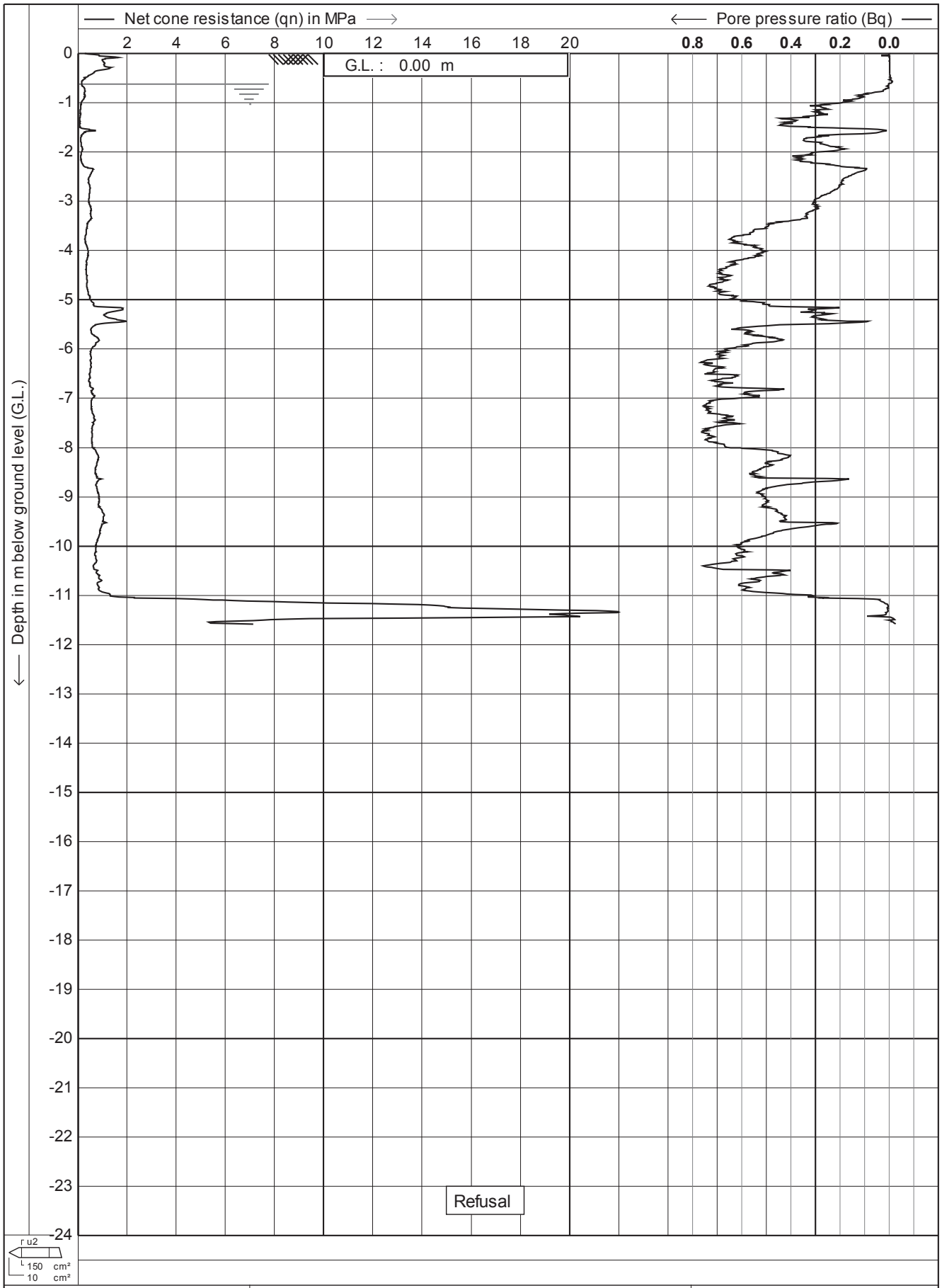
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **11**

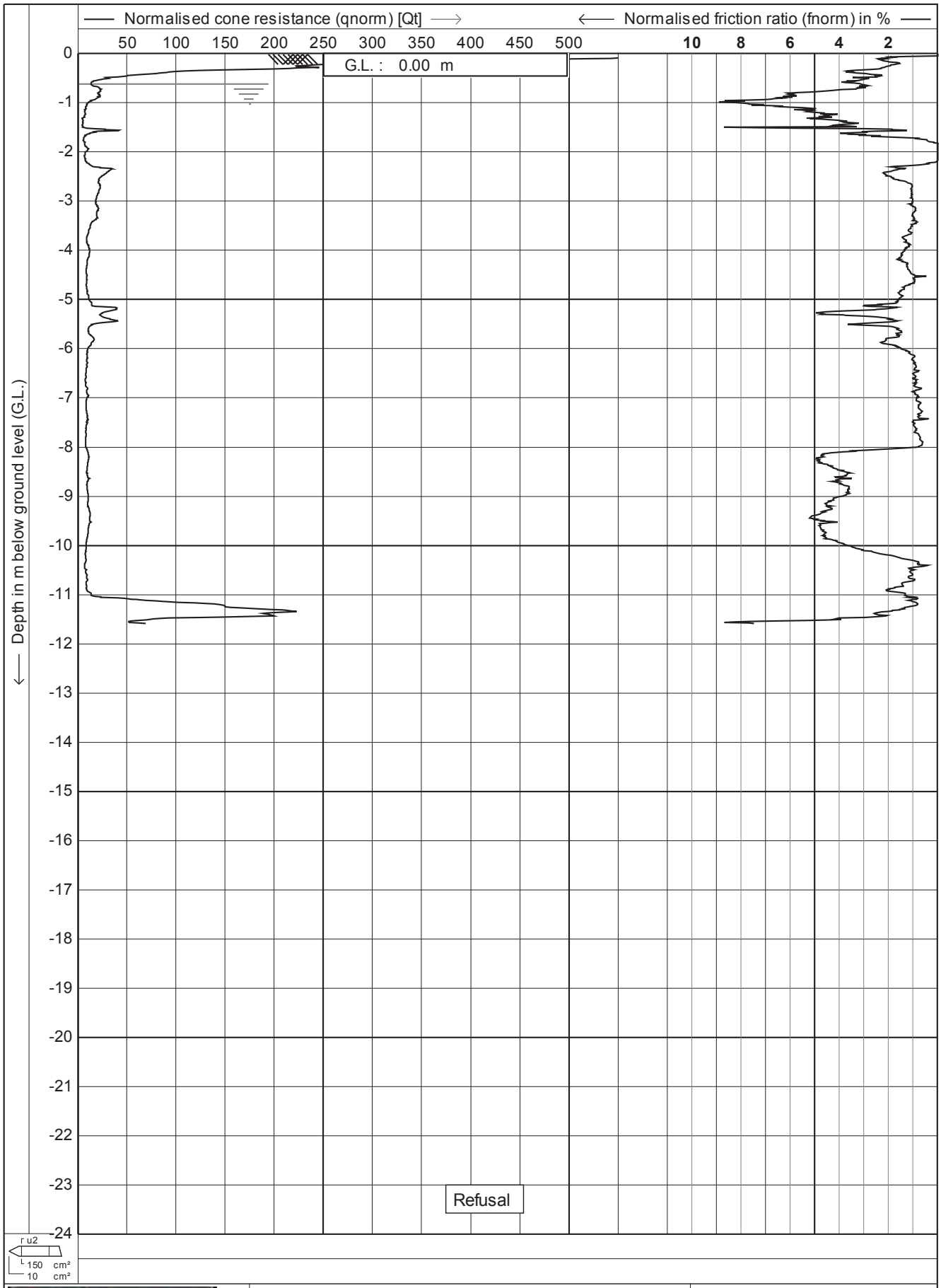
6/14

CPTask V1.25



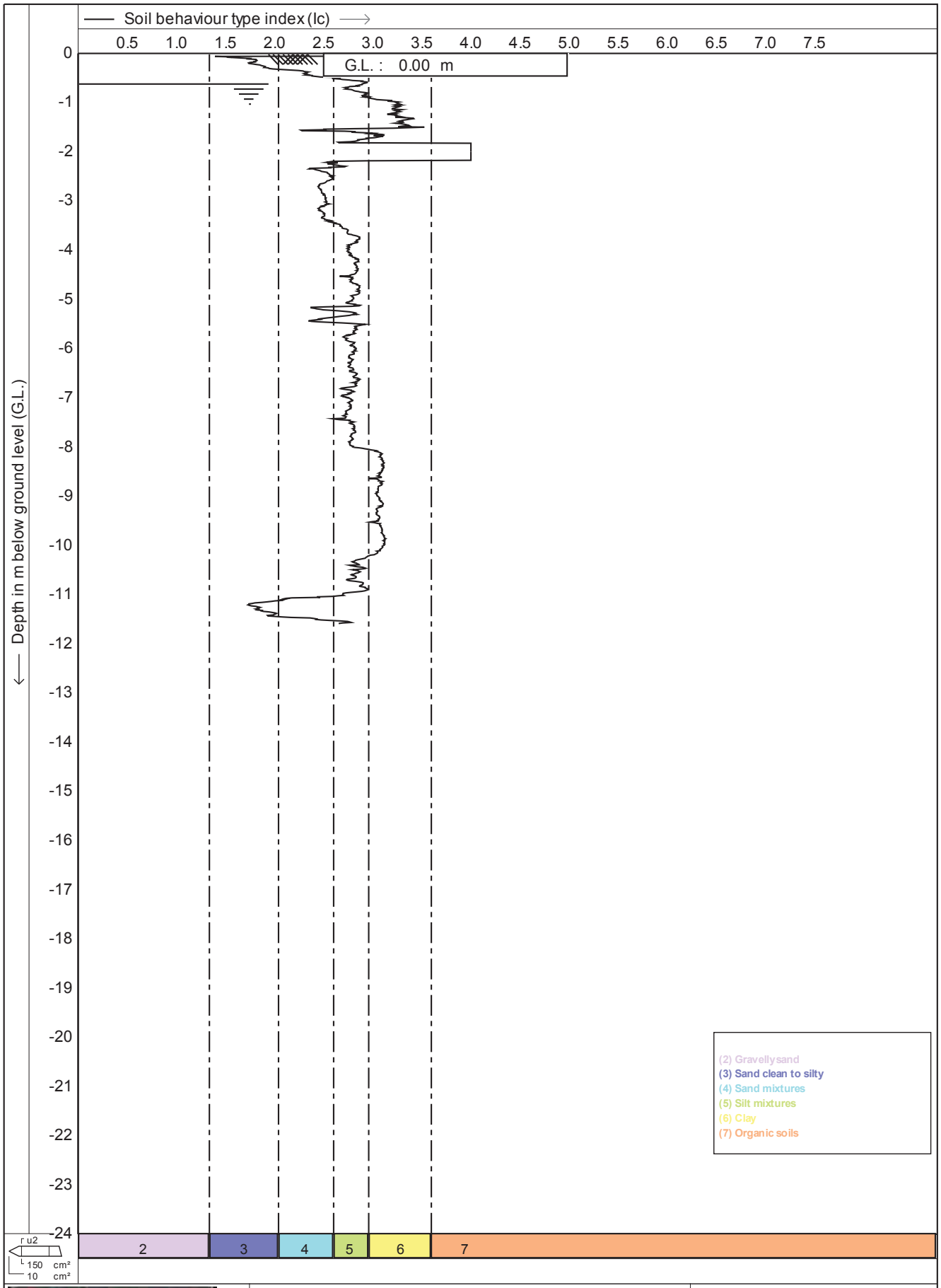
Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **11**	**7/14**

CPTask V1.25



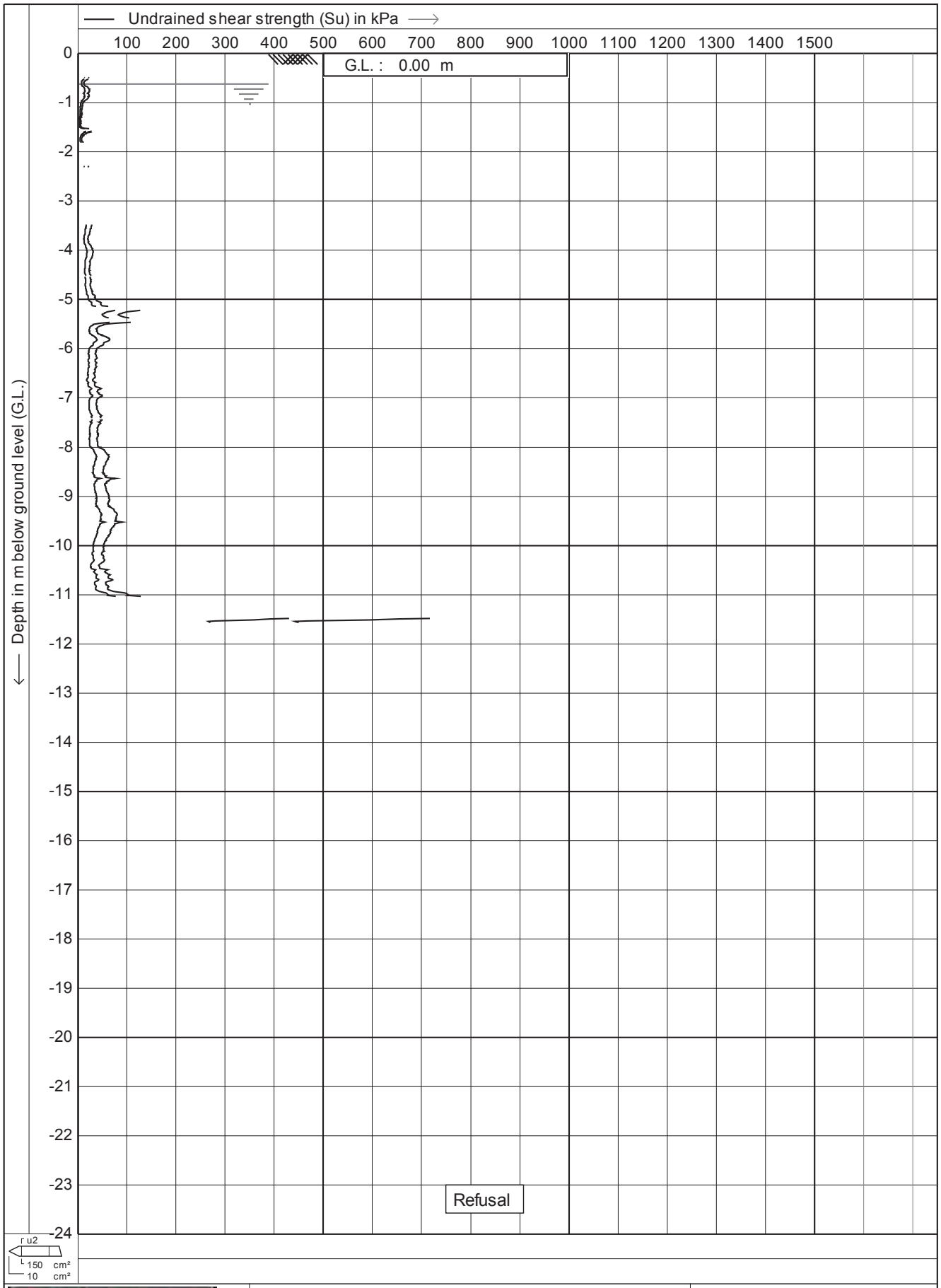
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **01AECOM3**	
	Location: **Southern Links - Hamilton**	CPT no. : **11**	**8/14**

CPTask V1.25



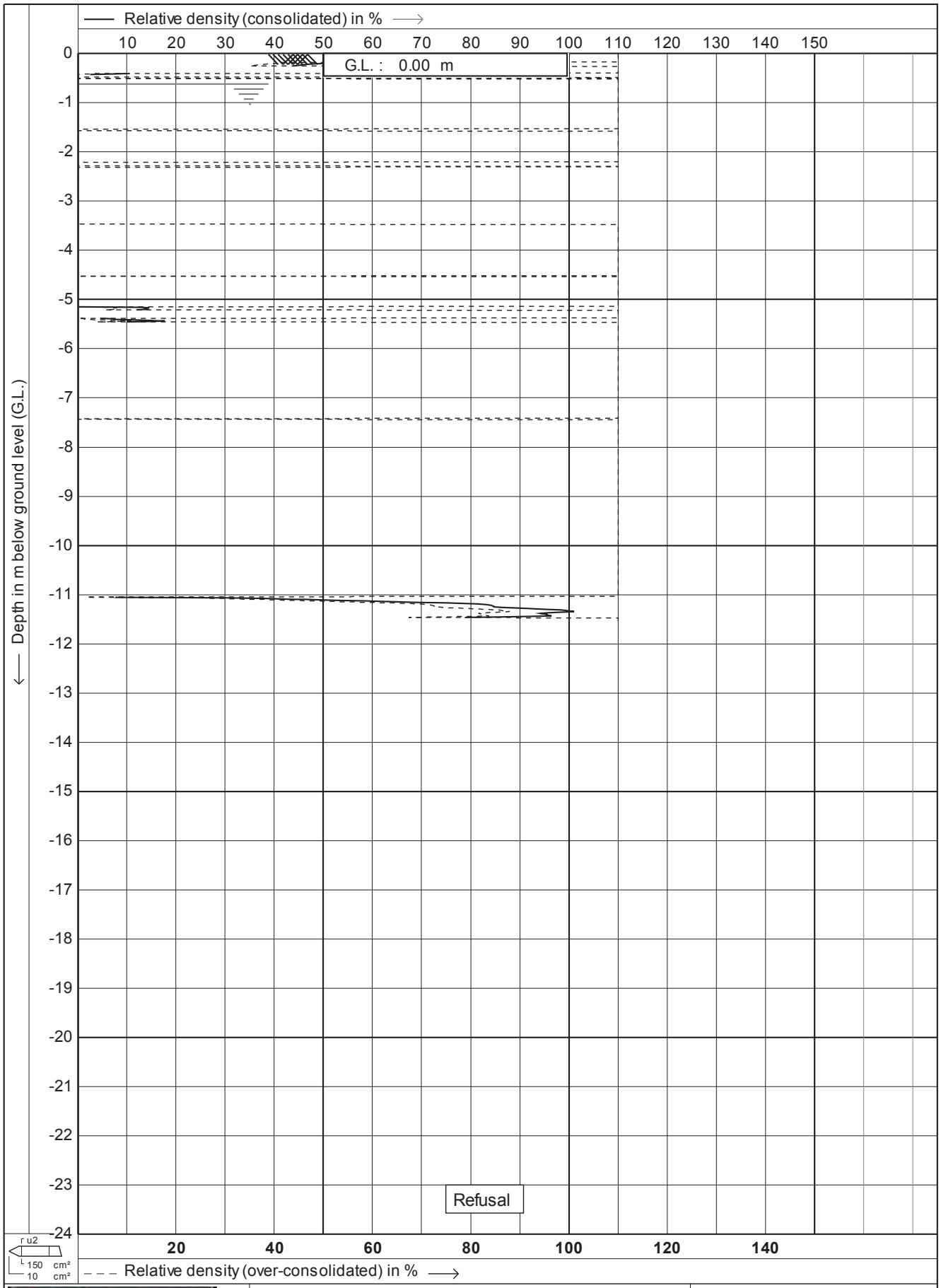
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : 20-4-2011
	Project : Site Investigations	Cone no. : C10CFIIP.F14
		Project no. : 01AECOM3
	Location: Southern Links - Hamilton	CPT no. : 11 — 9/14

CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **01AECOM3**	
	Location: **Southern Links - Hamilton**	CPT no. : **11**	**10/14**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

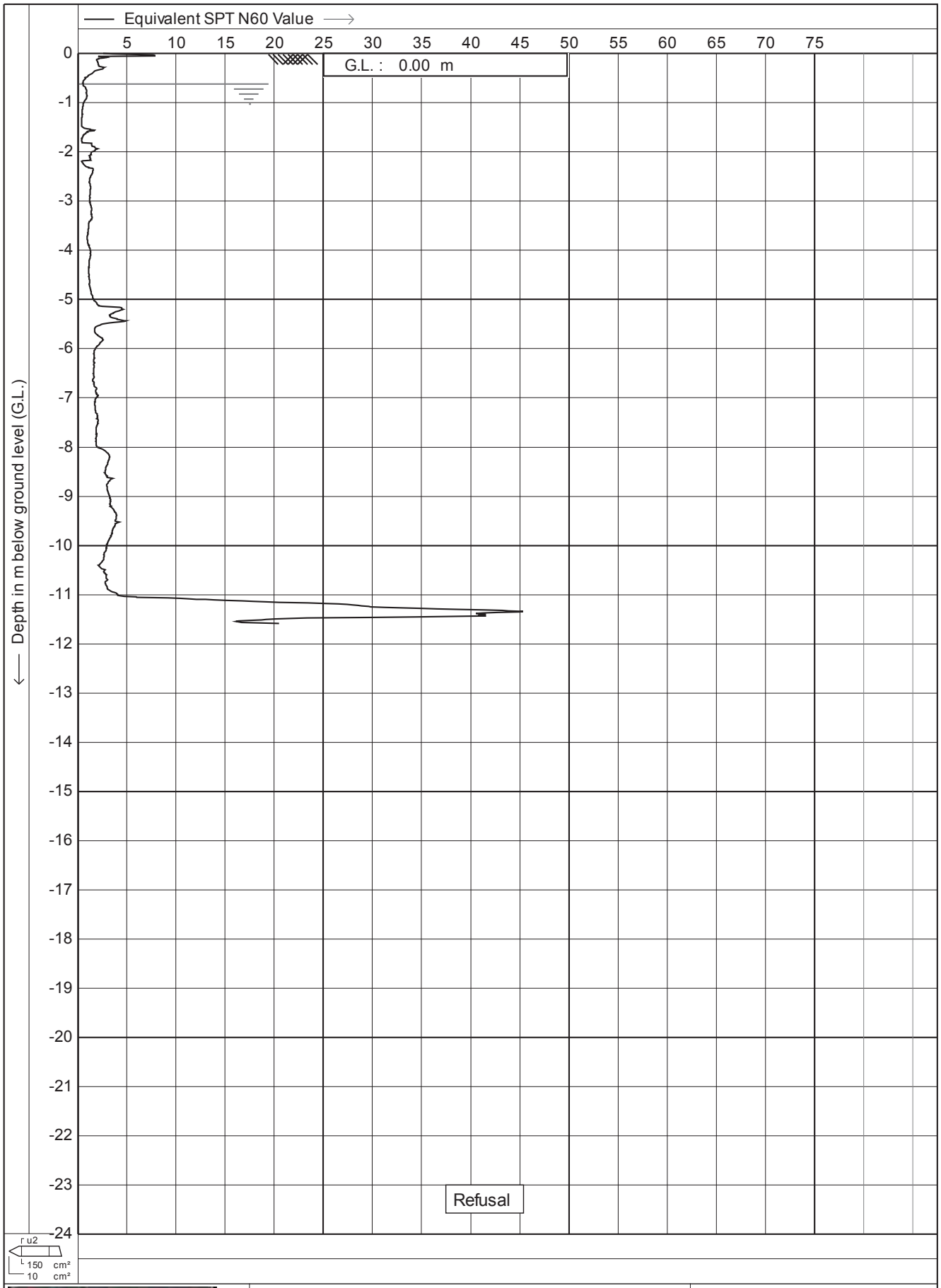
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **11**

11/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

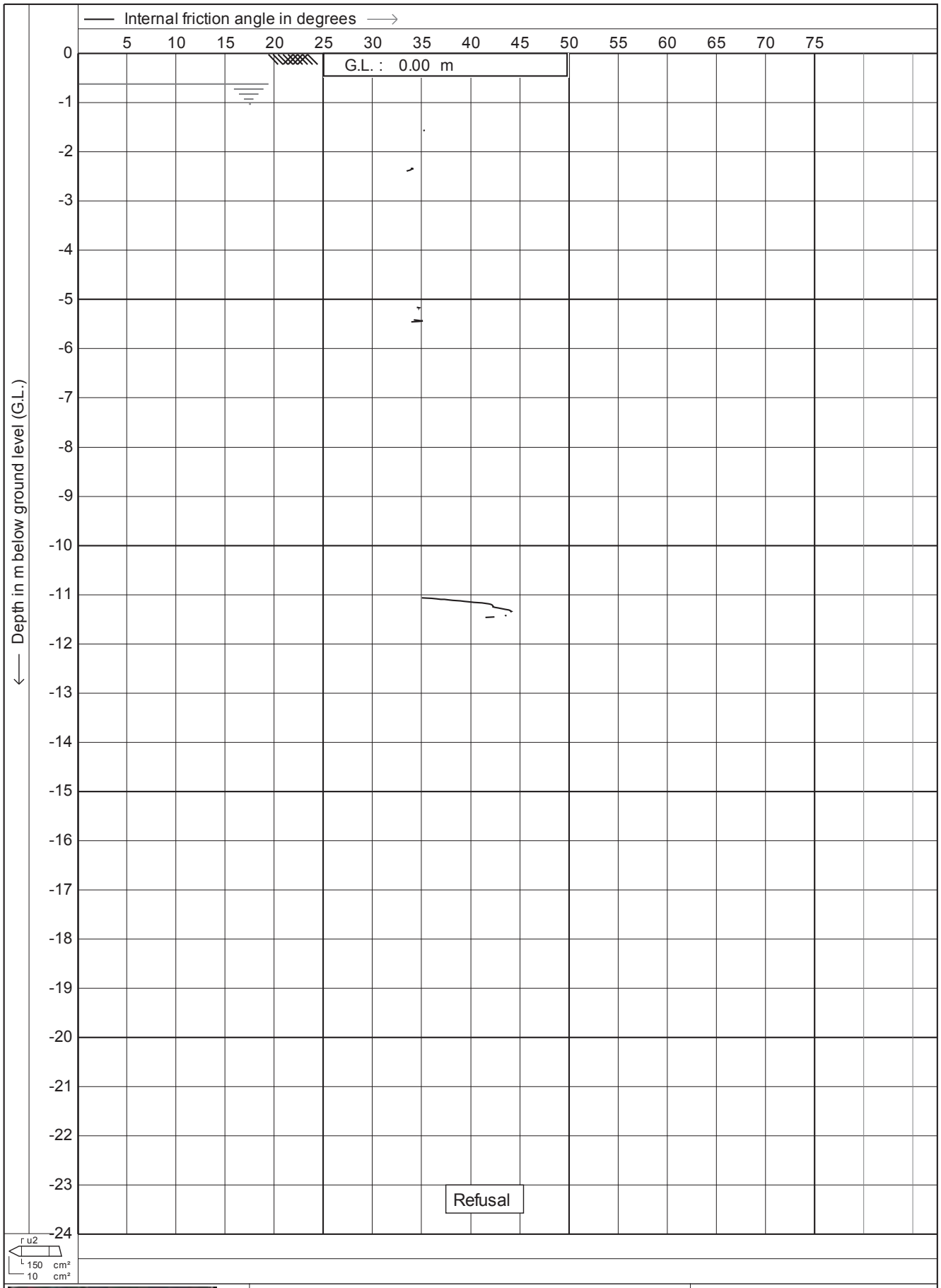
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **11**

12/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

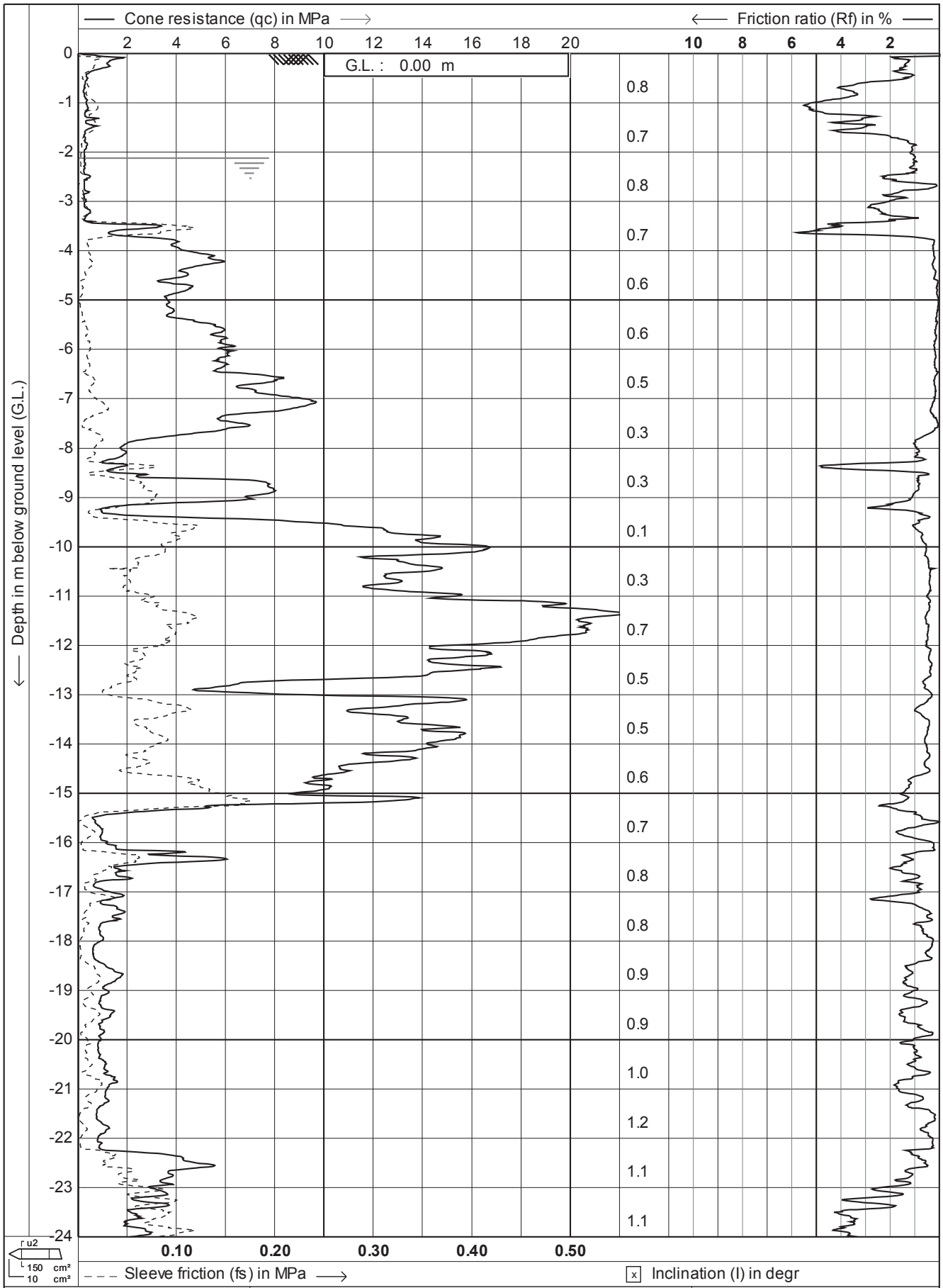
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **11**

14/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

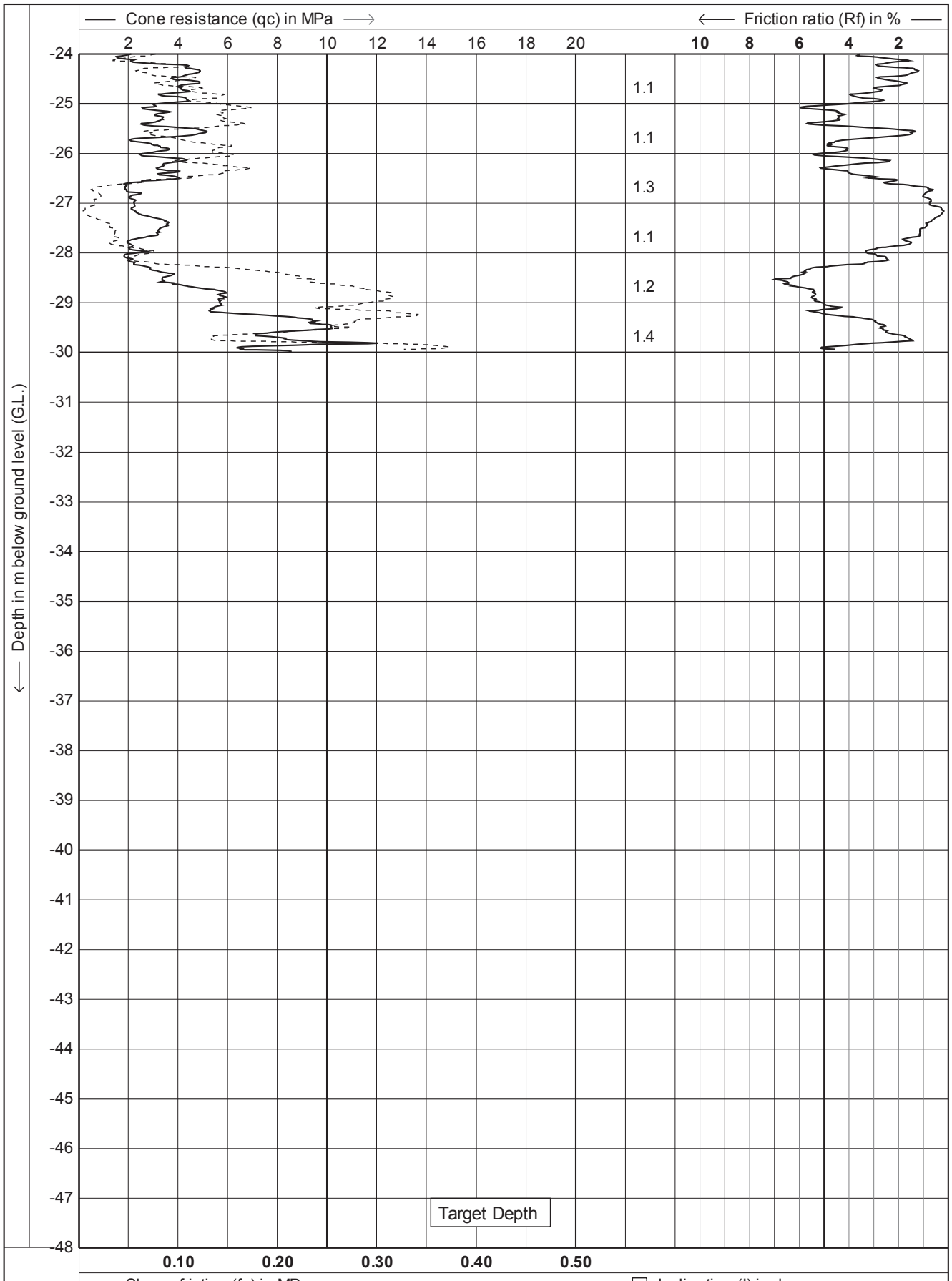
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

1/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

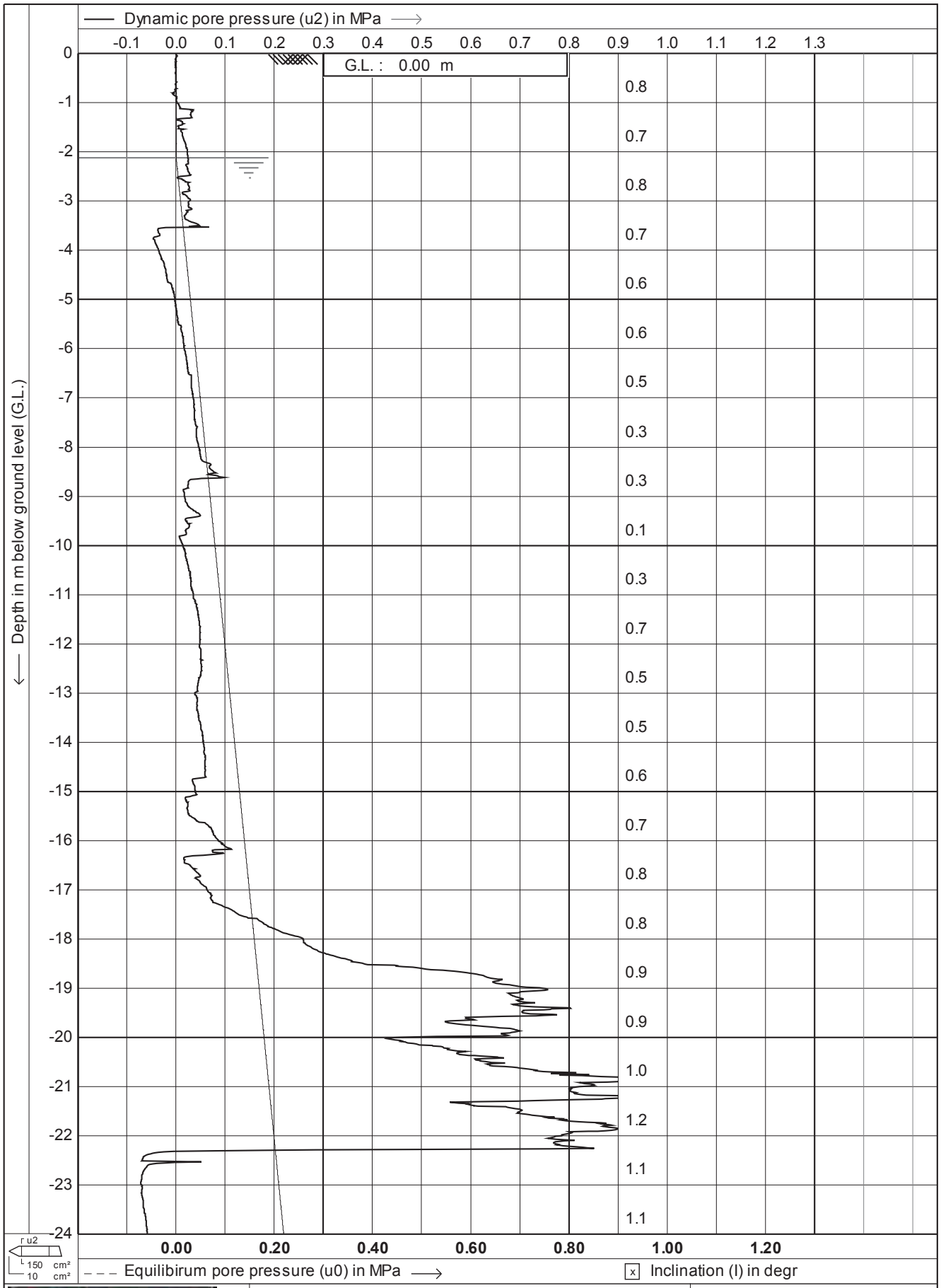
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

2/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

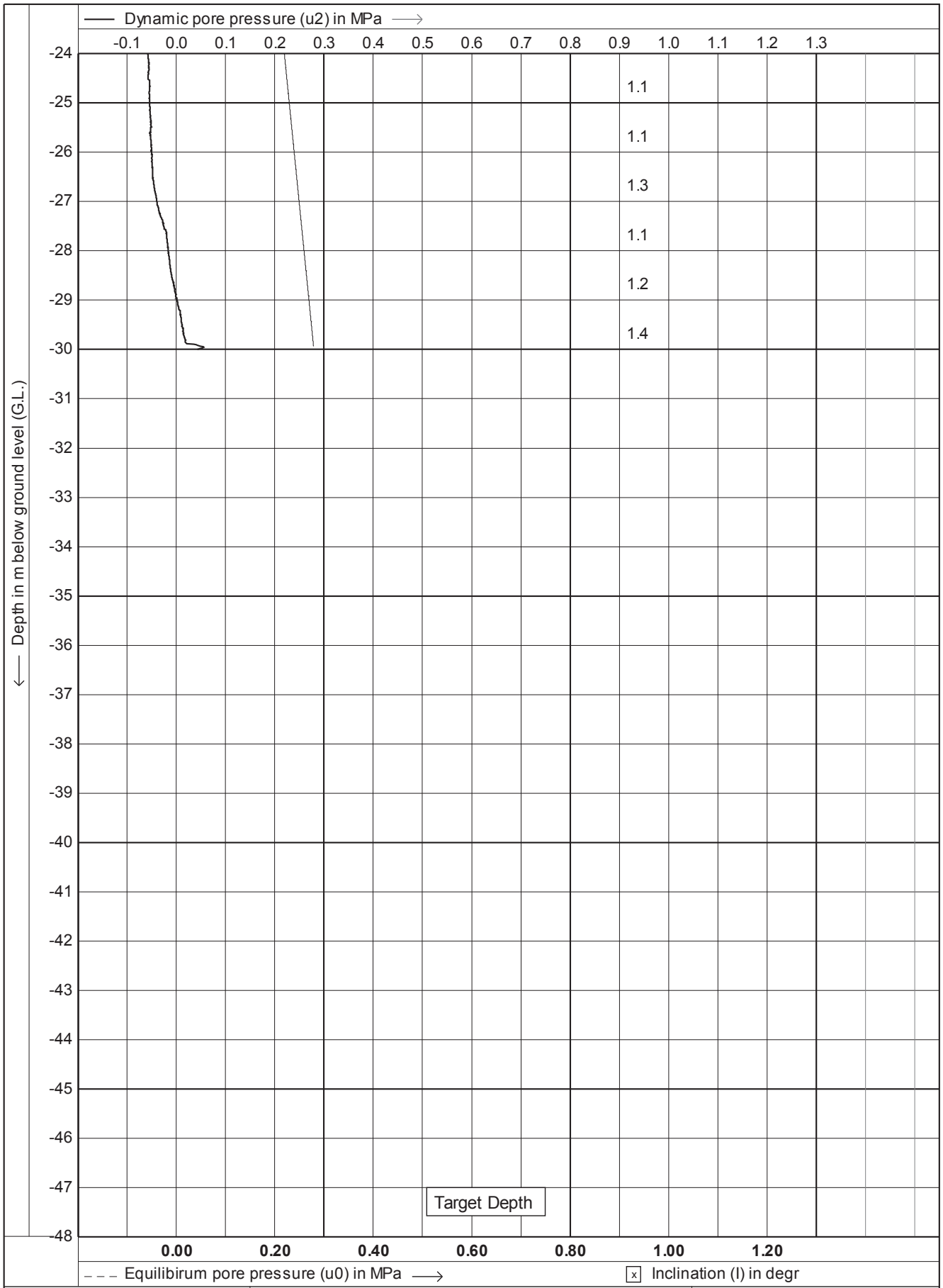
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

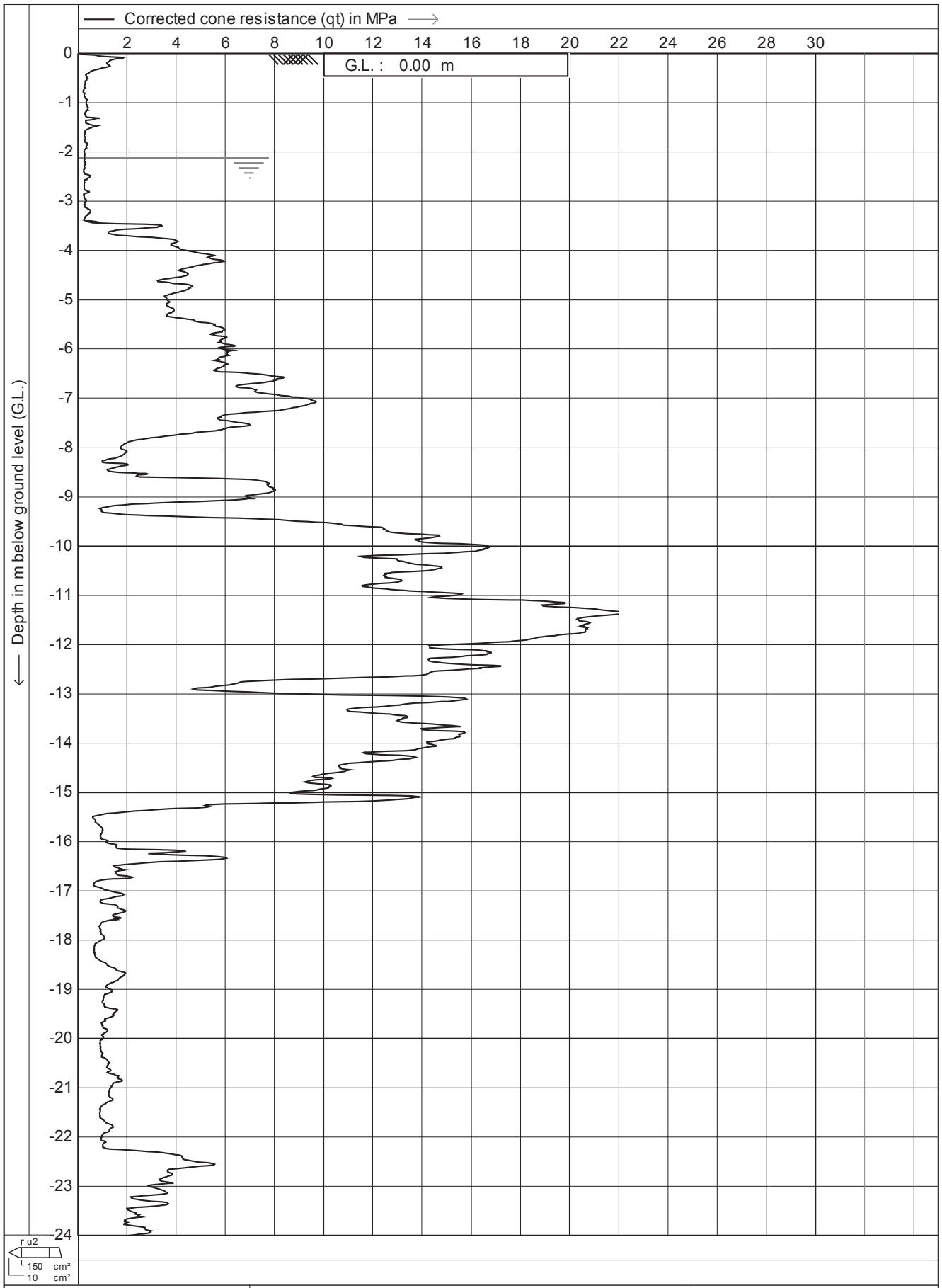
3/28

CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

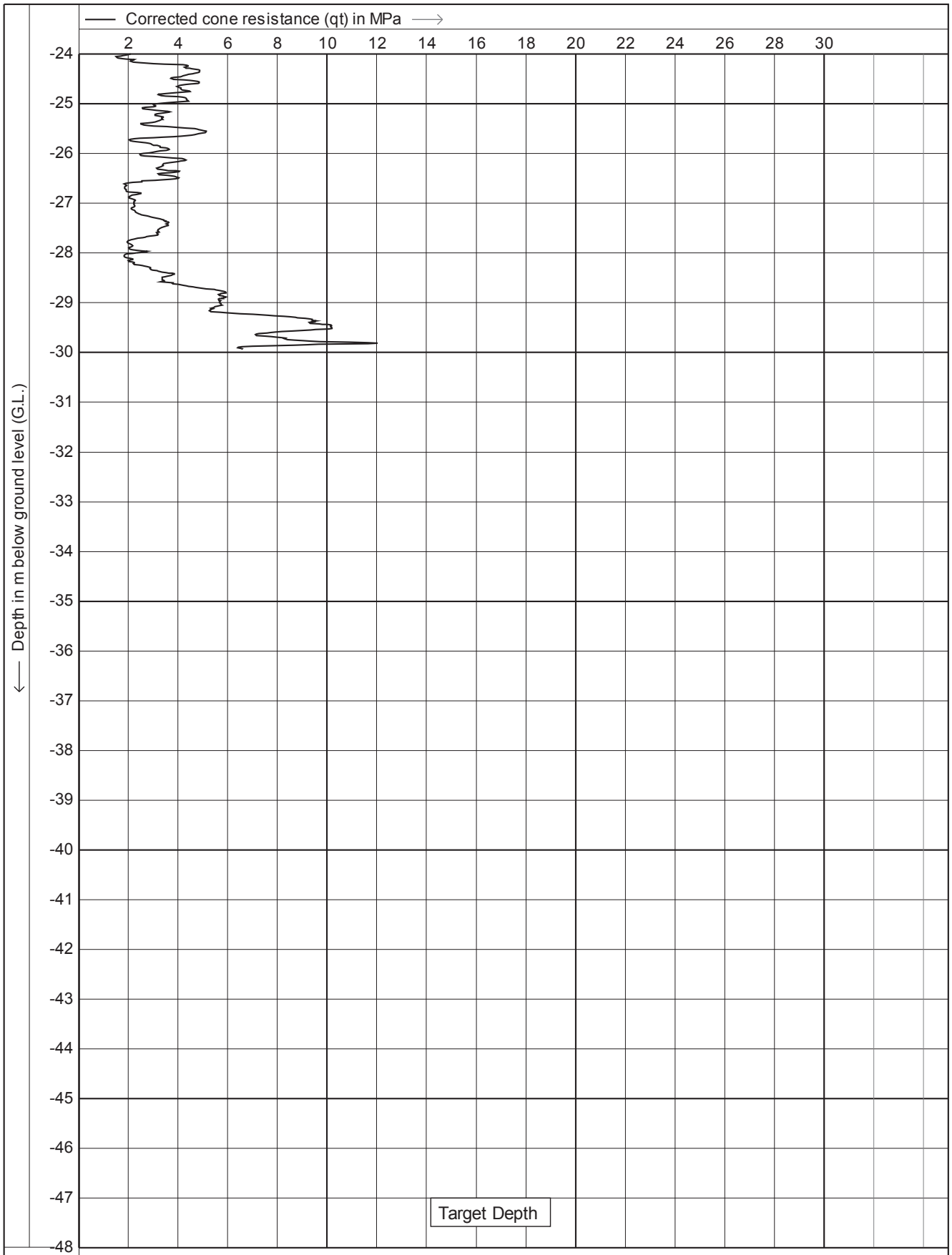
CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

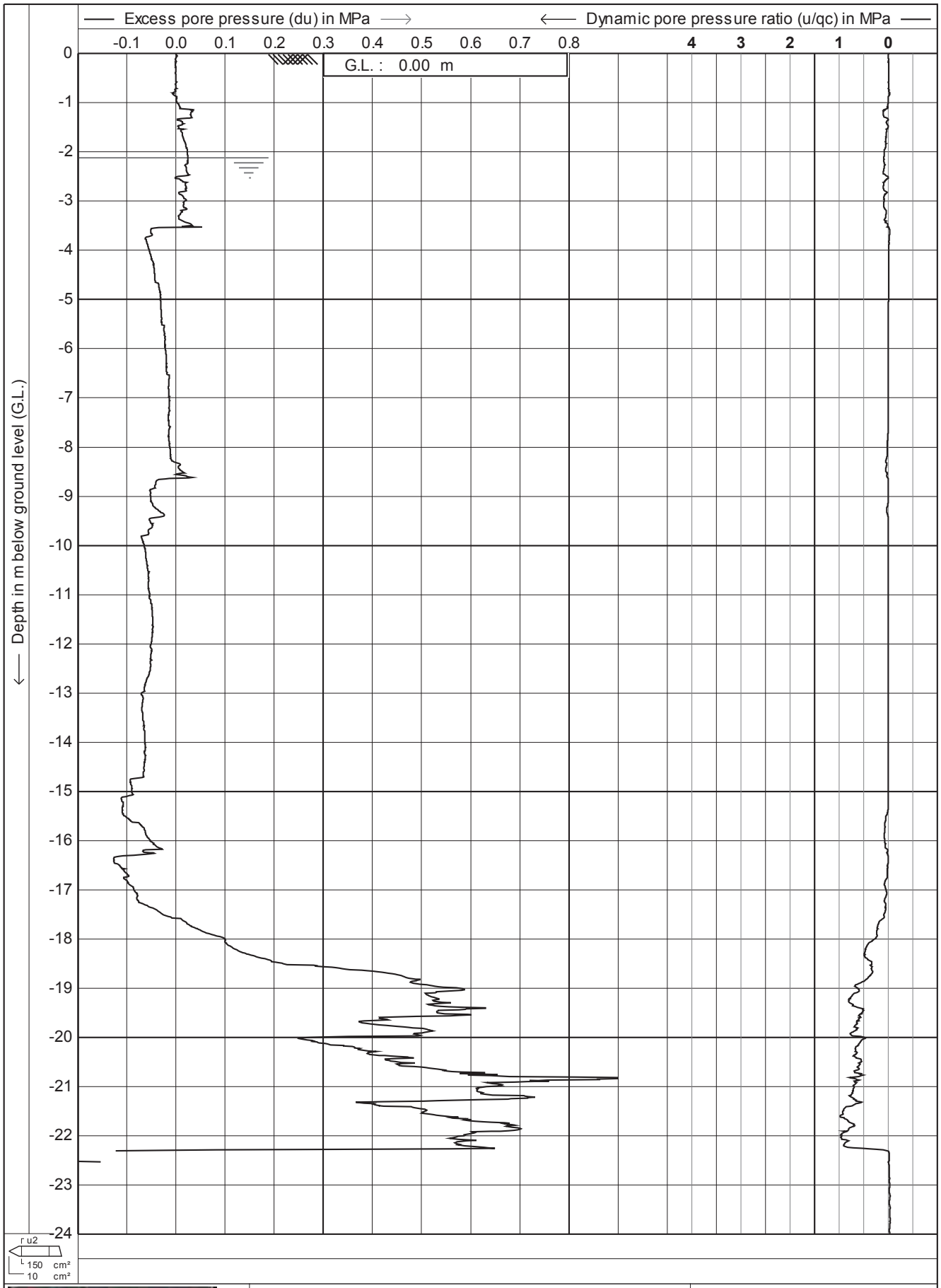
5/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **12**	**6/28**

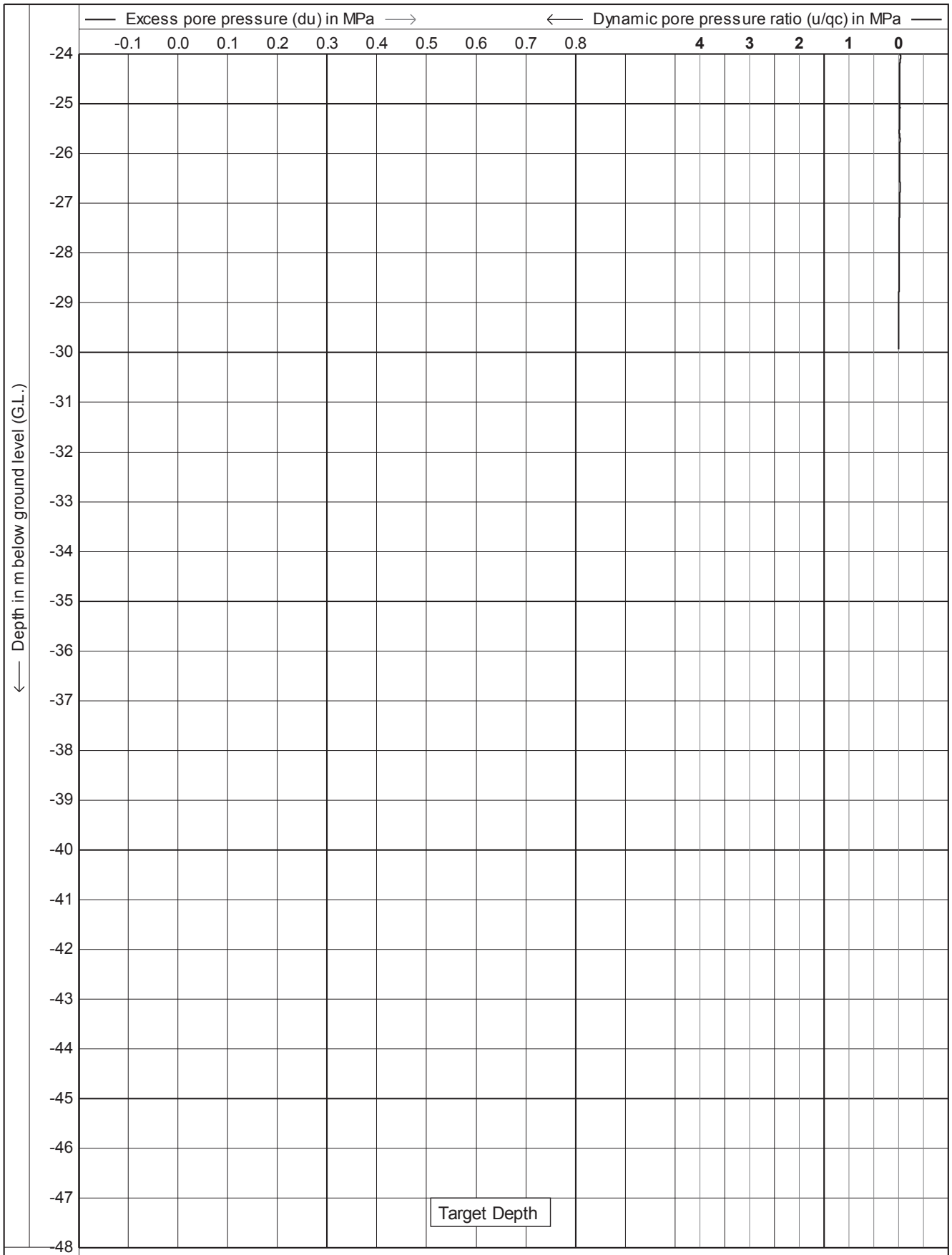
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **12**	**7/28**

CPTask V1.25

NZGD ID: CPT_108372



Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

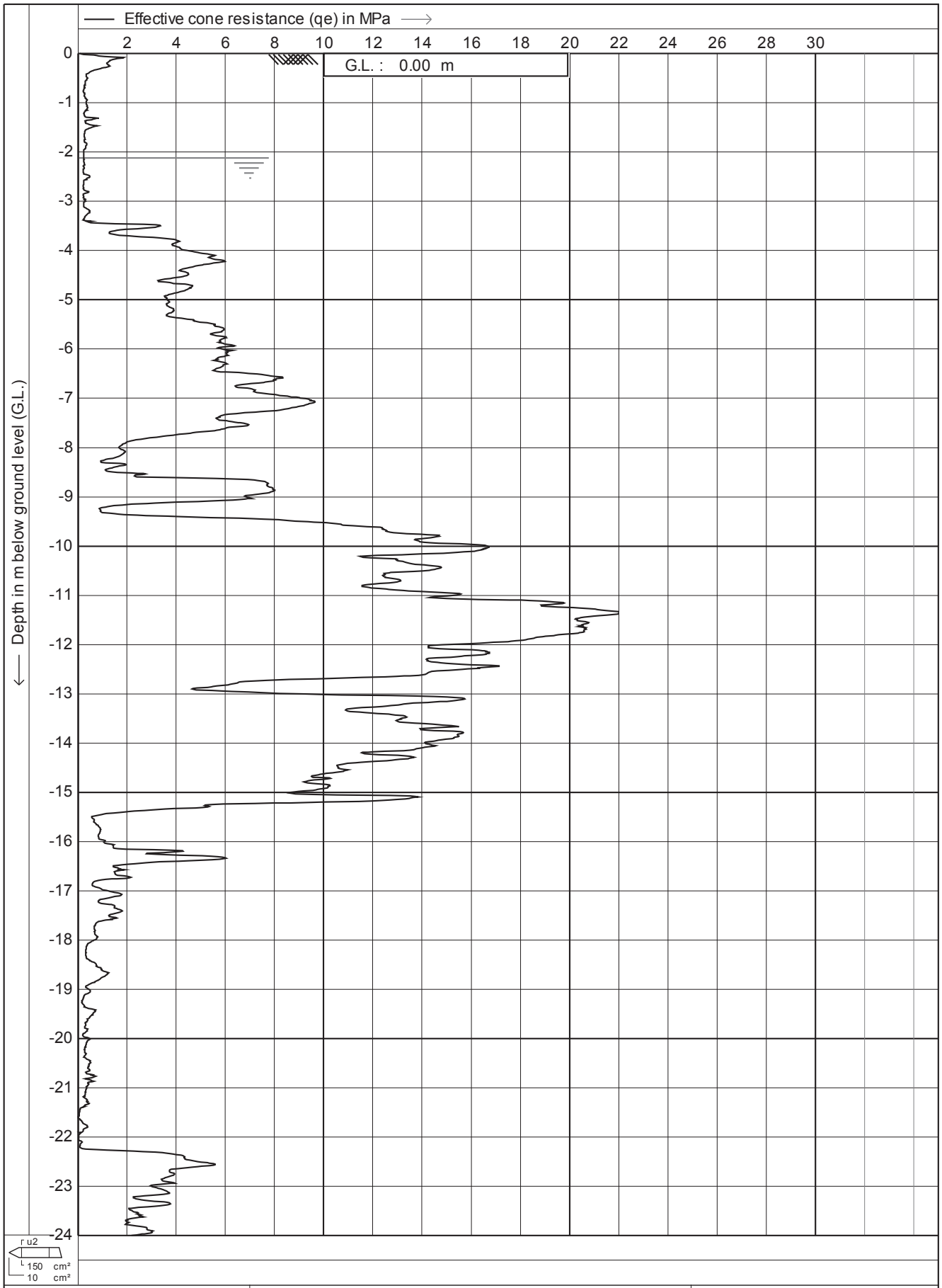
Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

8/28

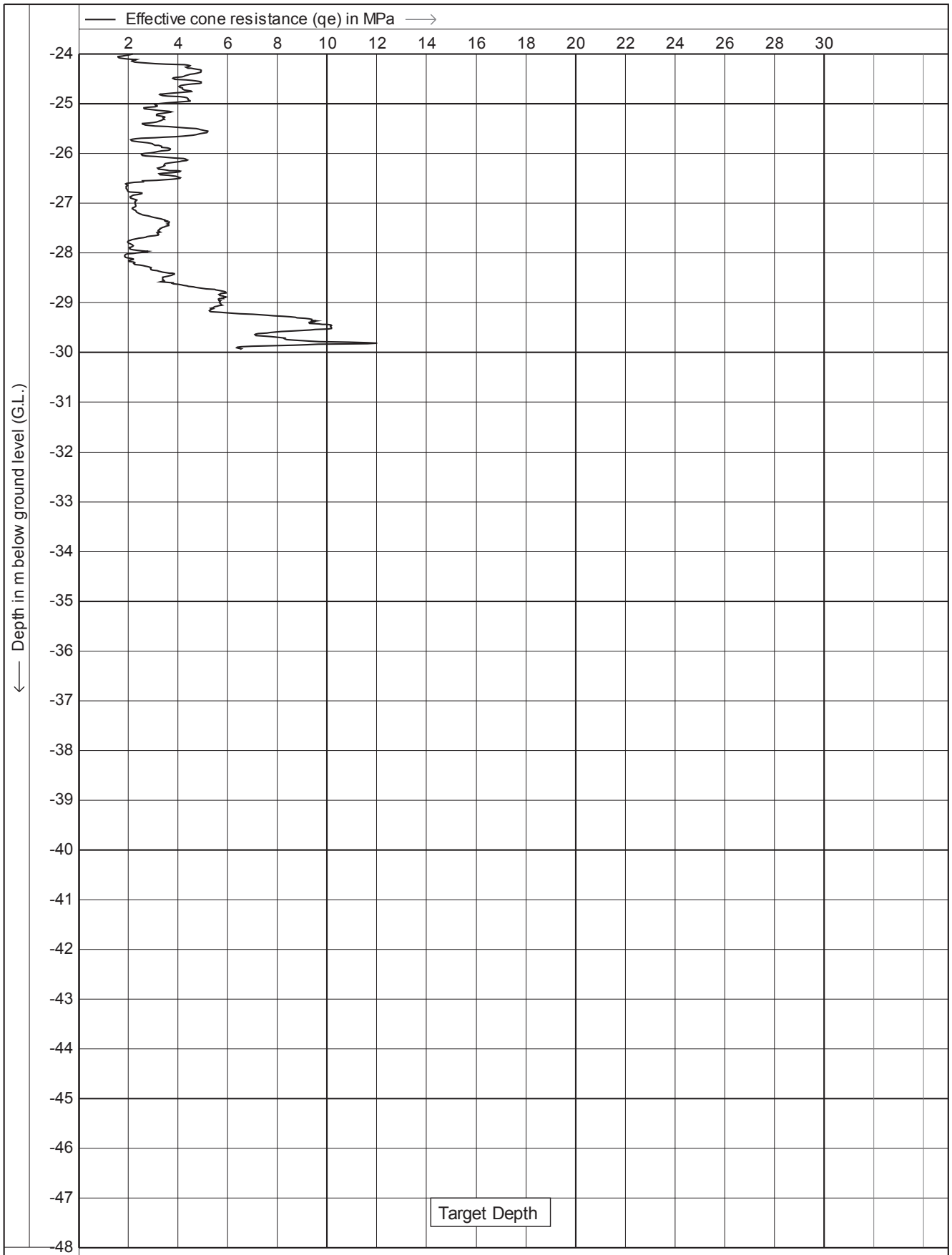
CPTask V1.25

NZGD ID: CPT_108372



Test according A.S.T.M. Standard D 5778-95		Date	: 21-4-2011
Project :	Site Investigations	Cone no.	: C10CFIIP.F14
		Project no.	: 01AECOM3
Location:	Southern Links - Hamilton	CPT no.	: 12 9/28

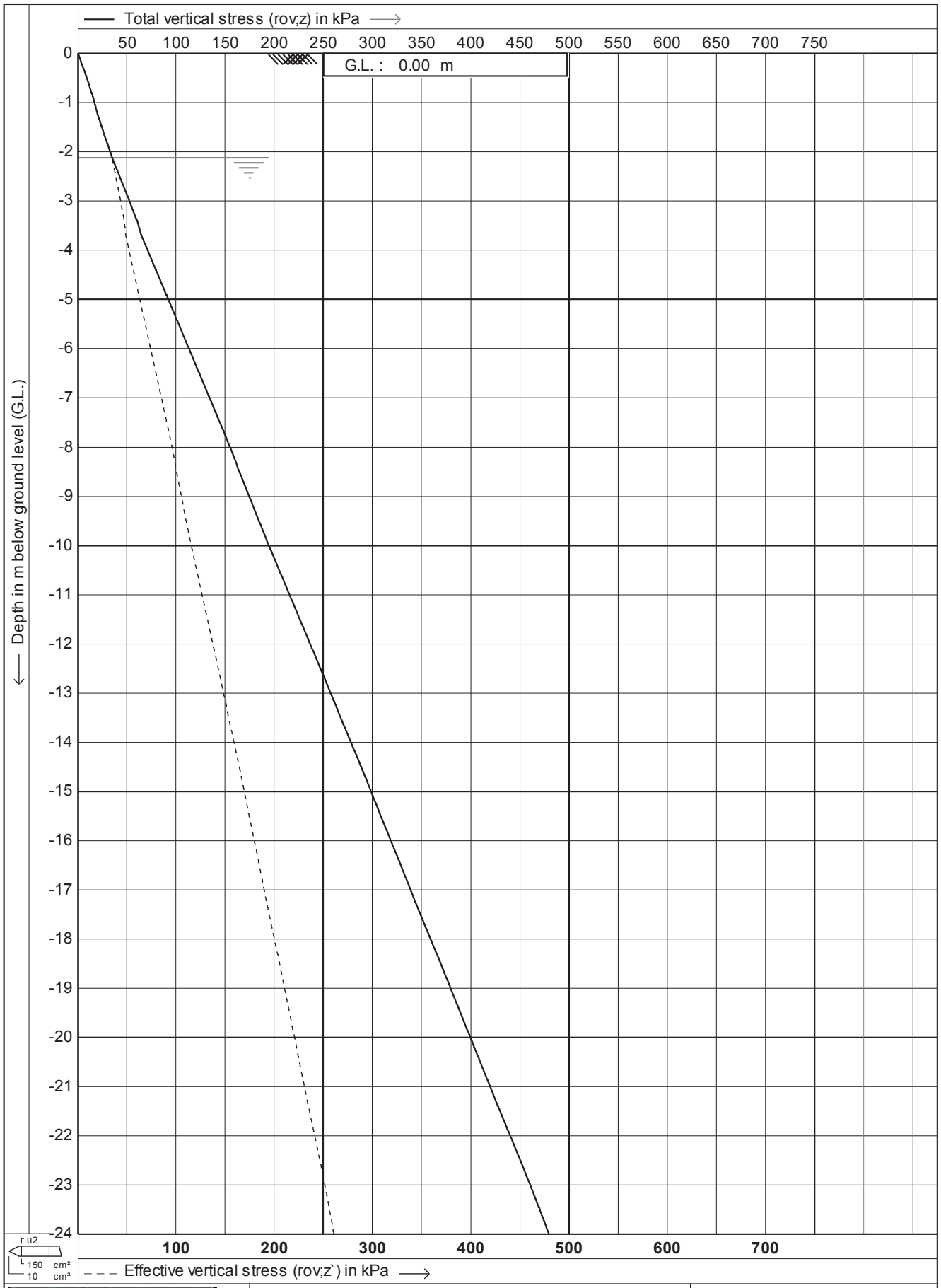
CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

CPTask V1.25

10/28



Test according A.S.T.M. Standard D 5778-95

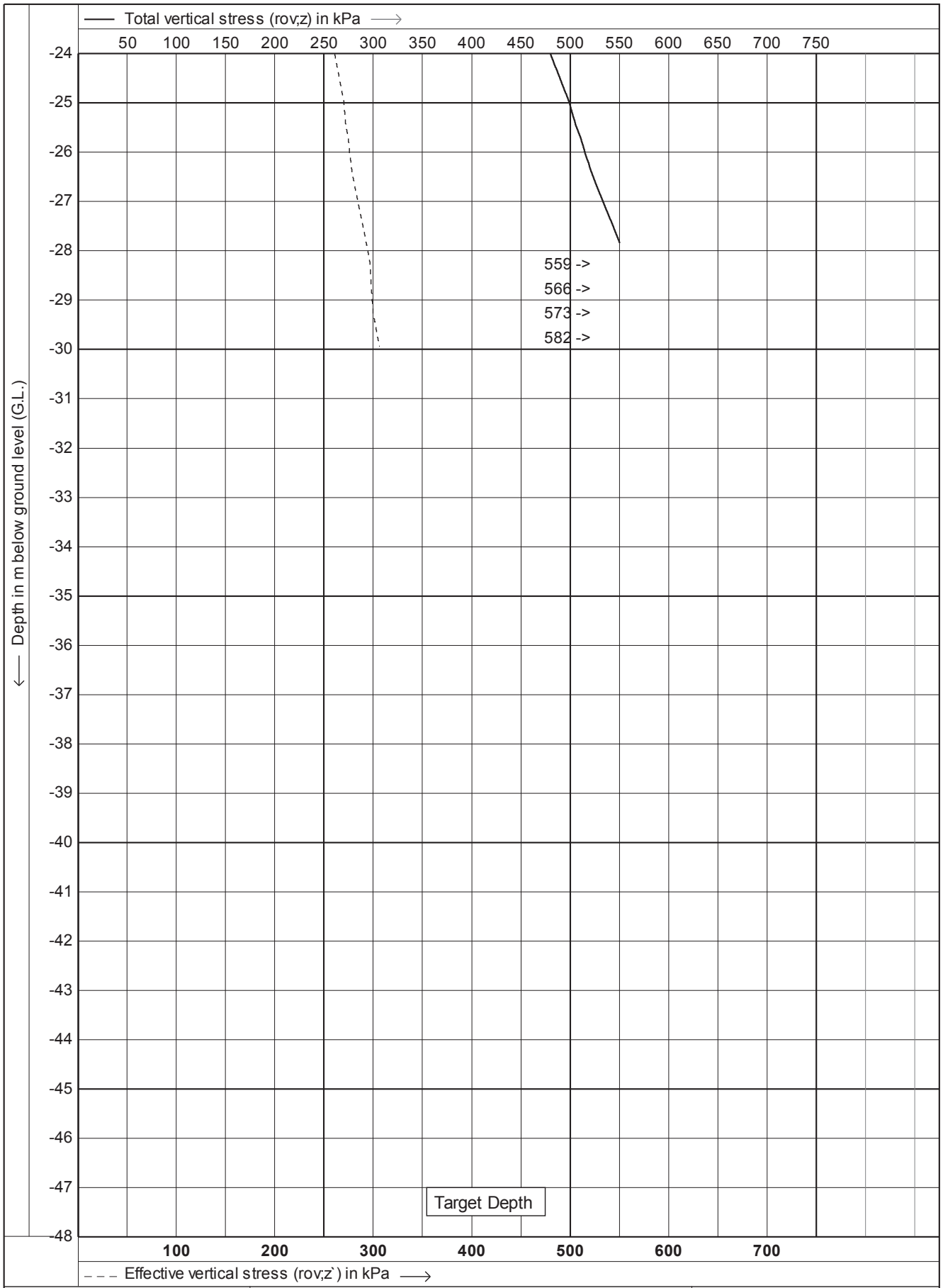
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

11/28

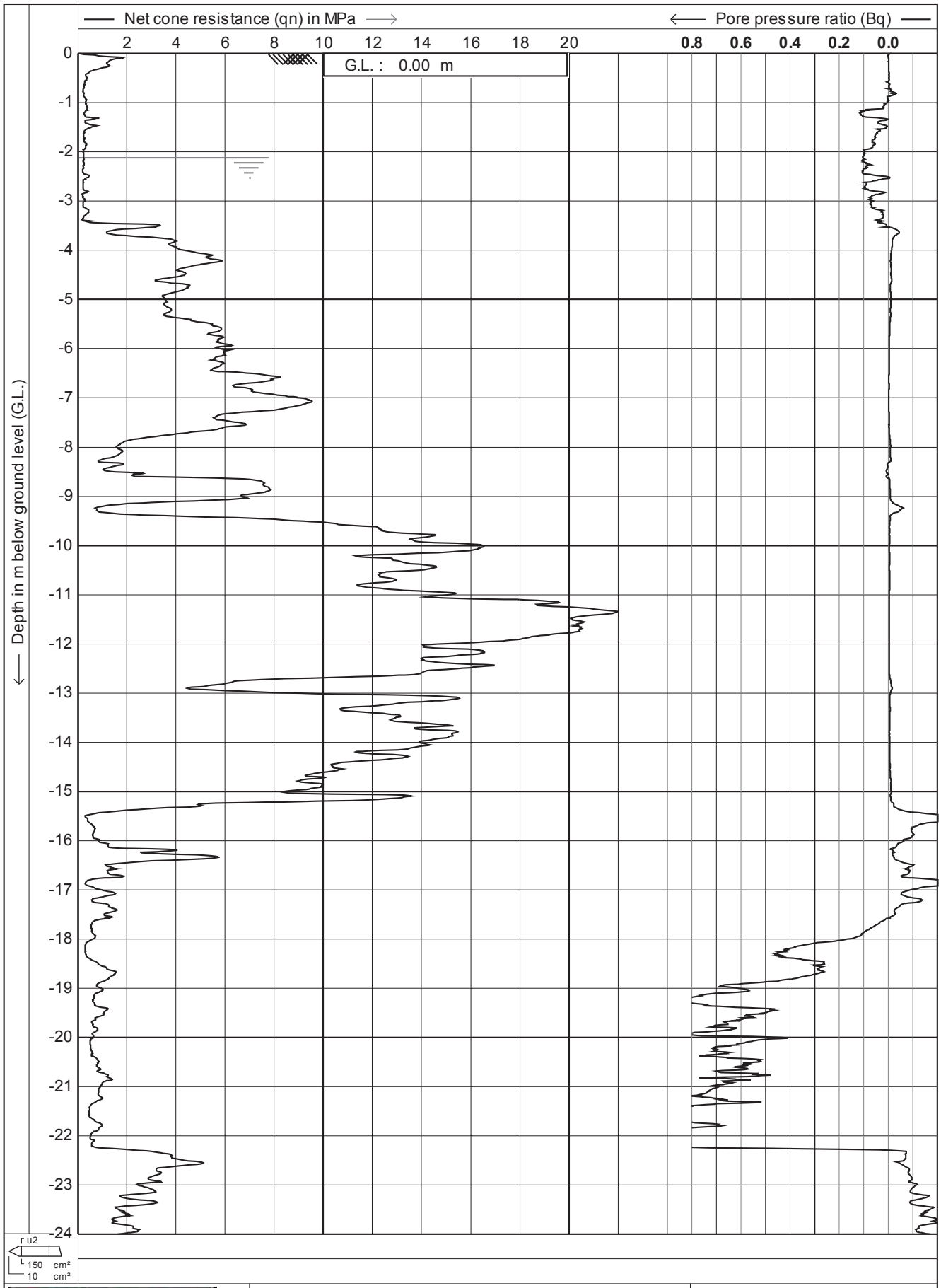
CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

CPTask V1.25

12/28



Test according A.S.T.M. Standard D 5778-95

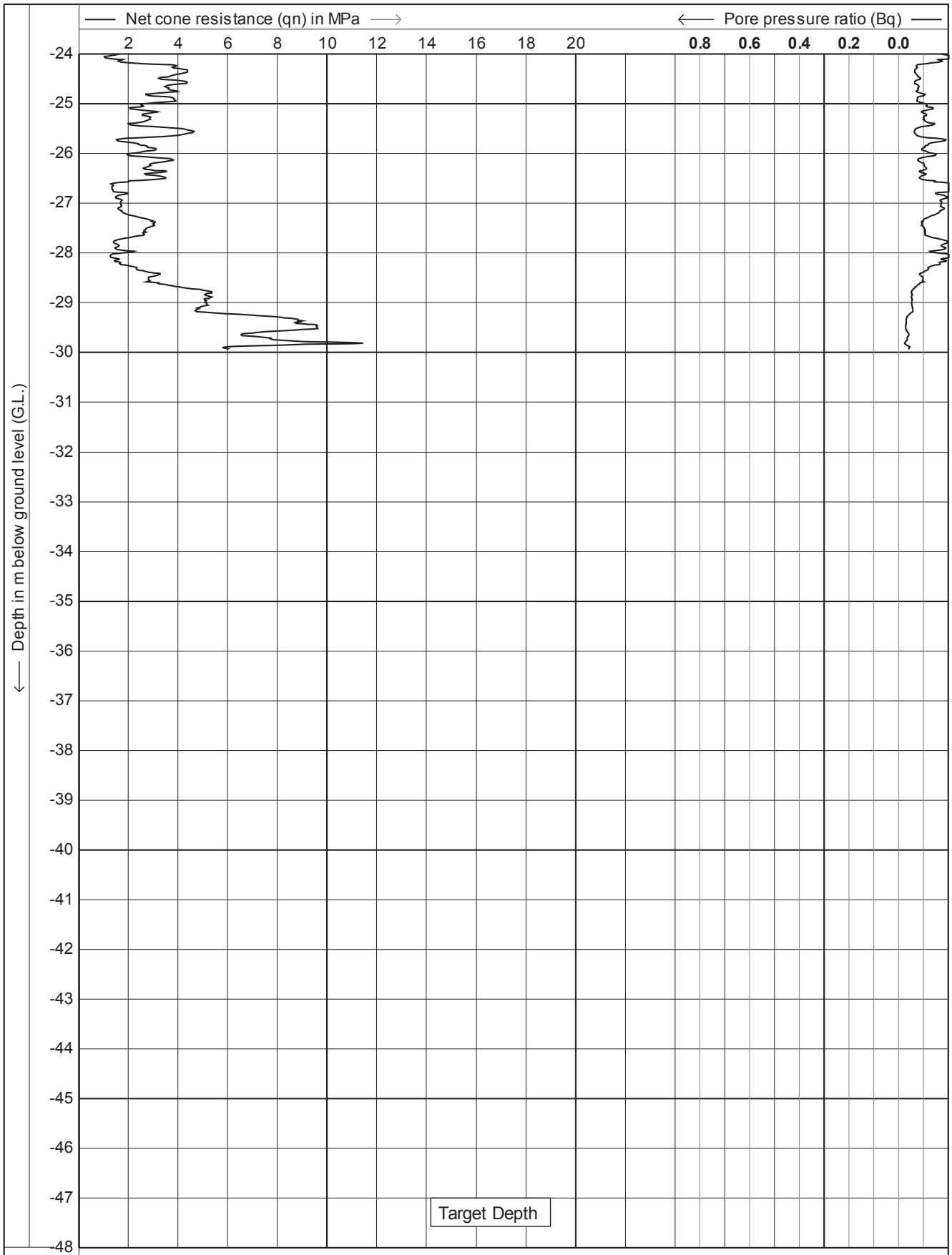
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

13/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

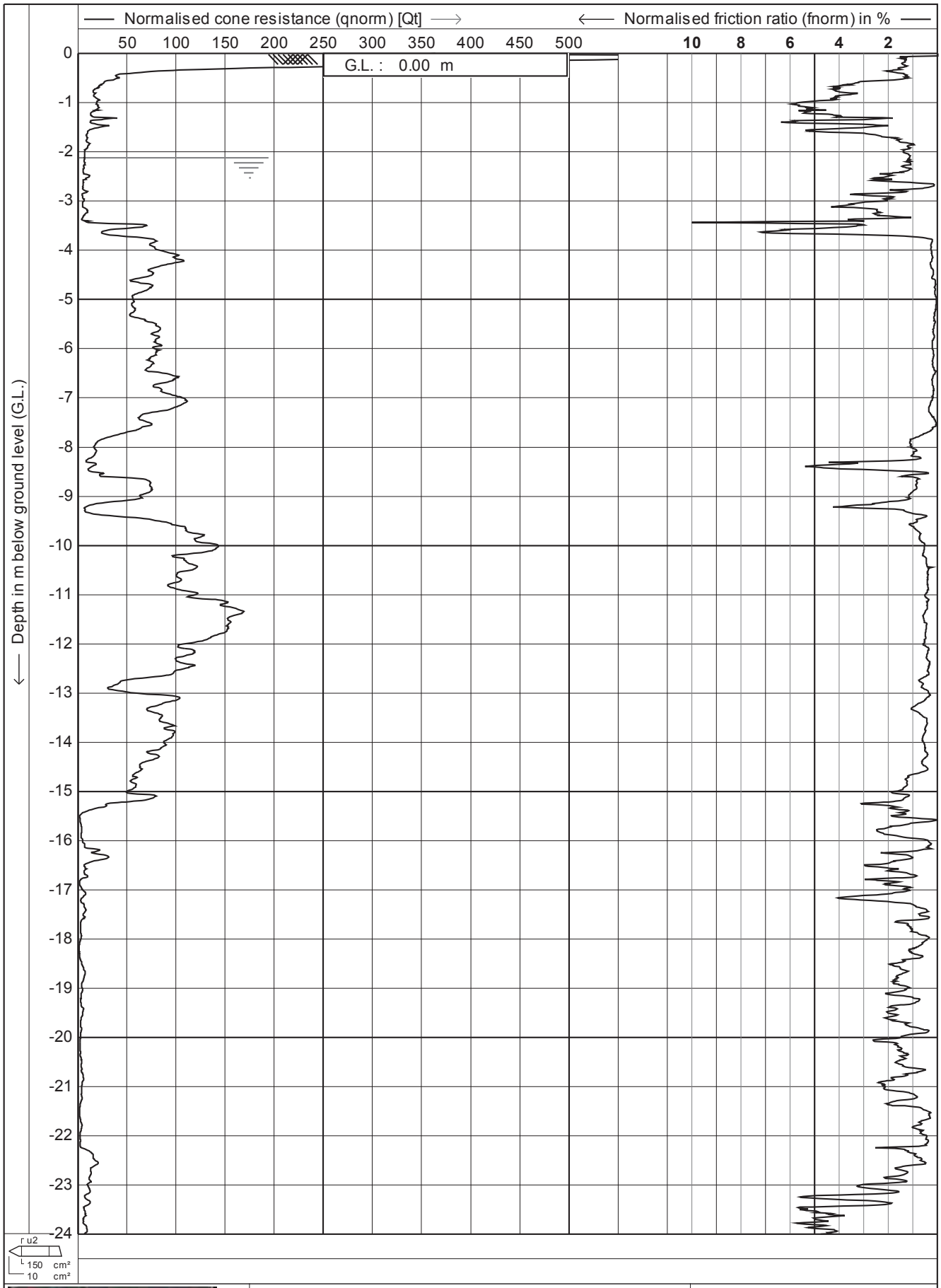
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

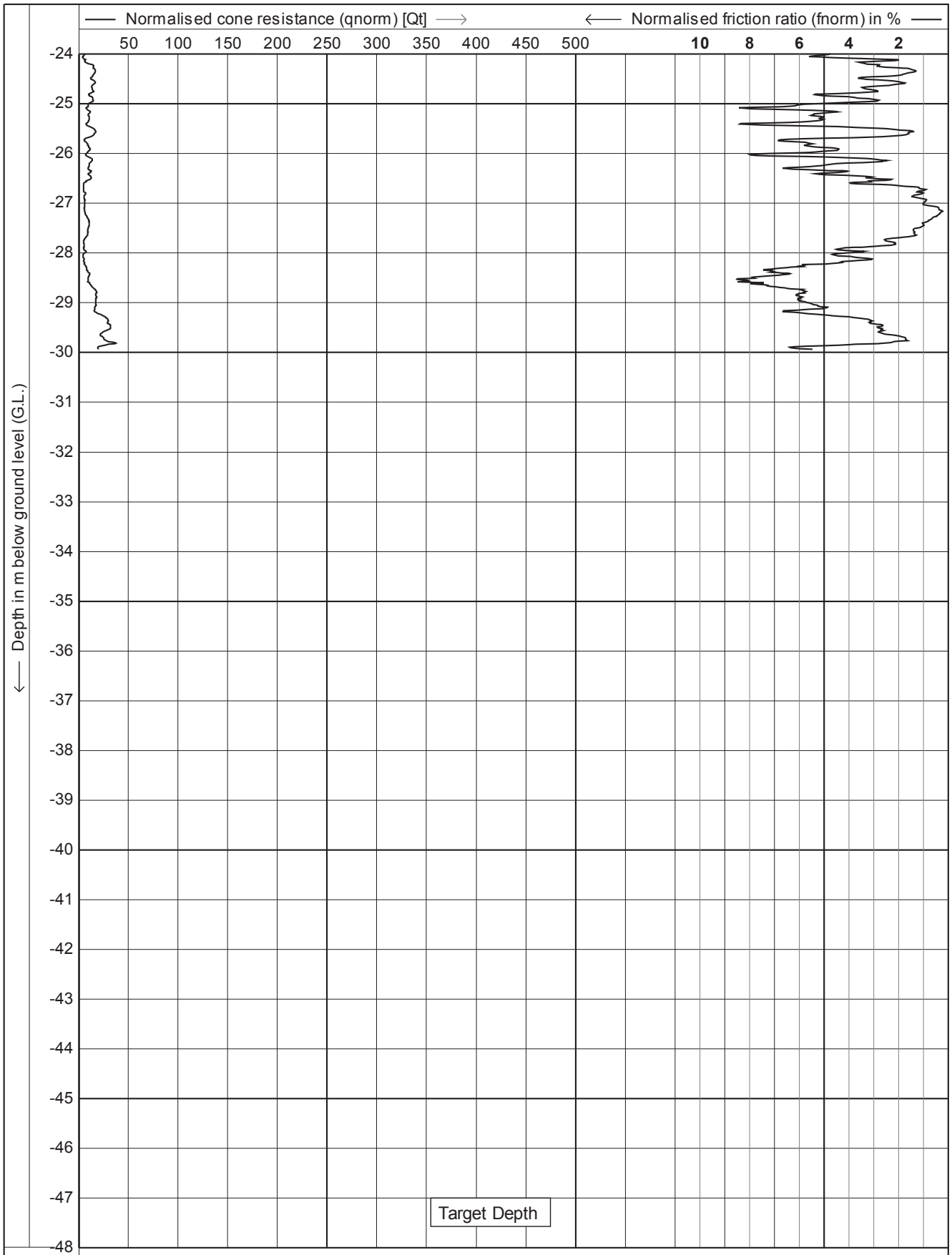
14/28

CPTask V1.25



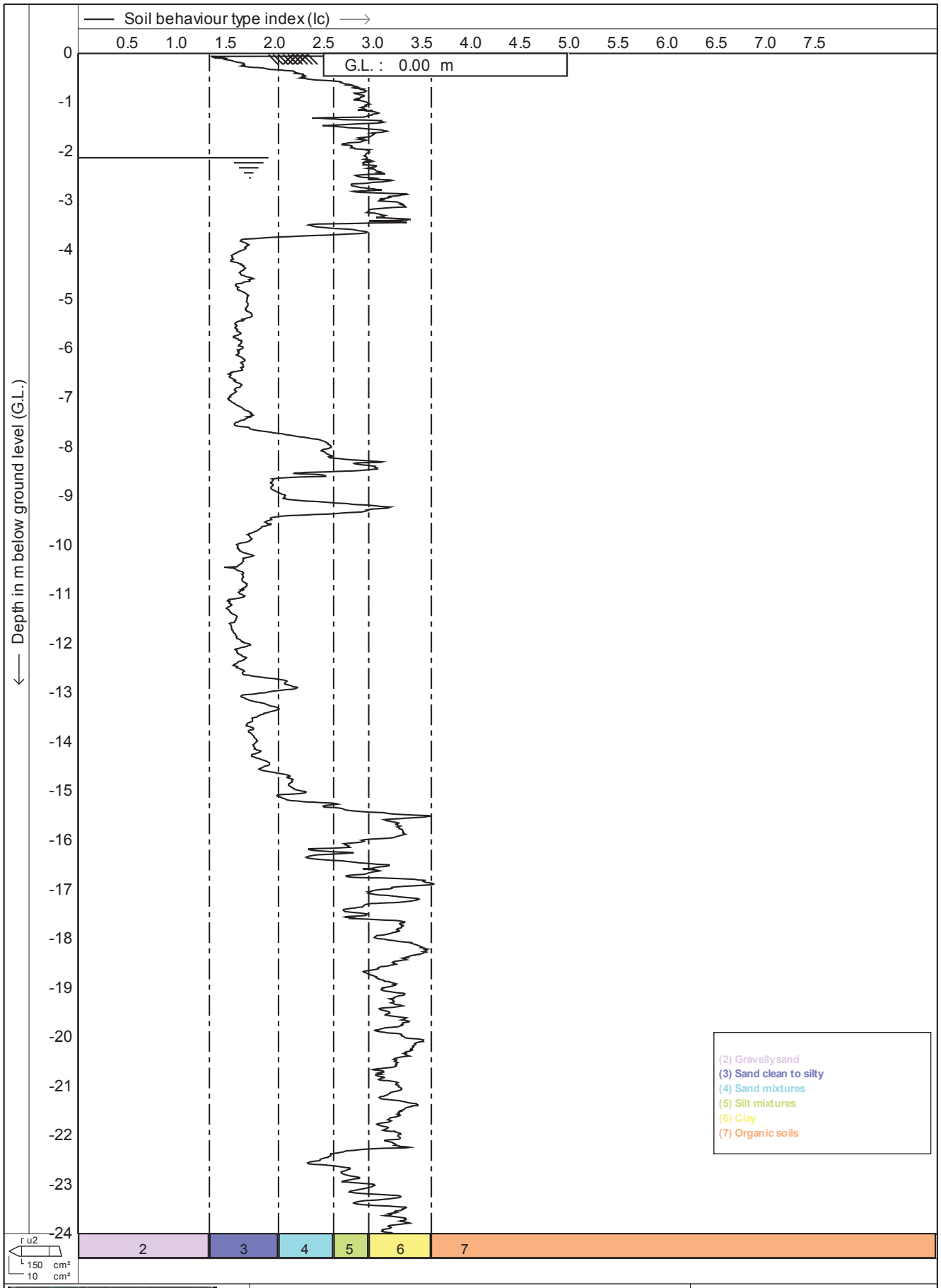
Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
	Cone no.	: C10CFIIP.F14
Project : **Site Investigations**	Project no.	: 01AECOM3
Location: **Southern Links - Hamilton**	CPT no.	: 12 — 15/28

CPTask V1.25



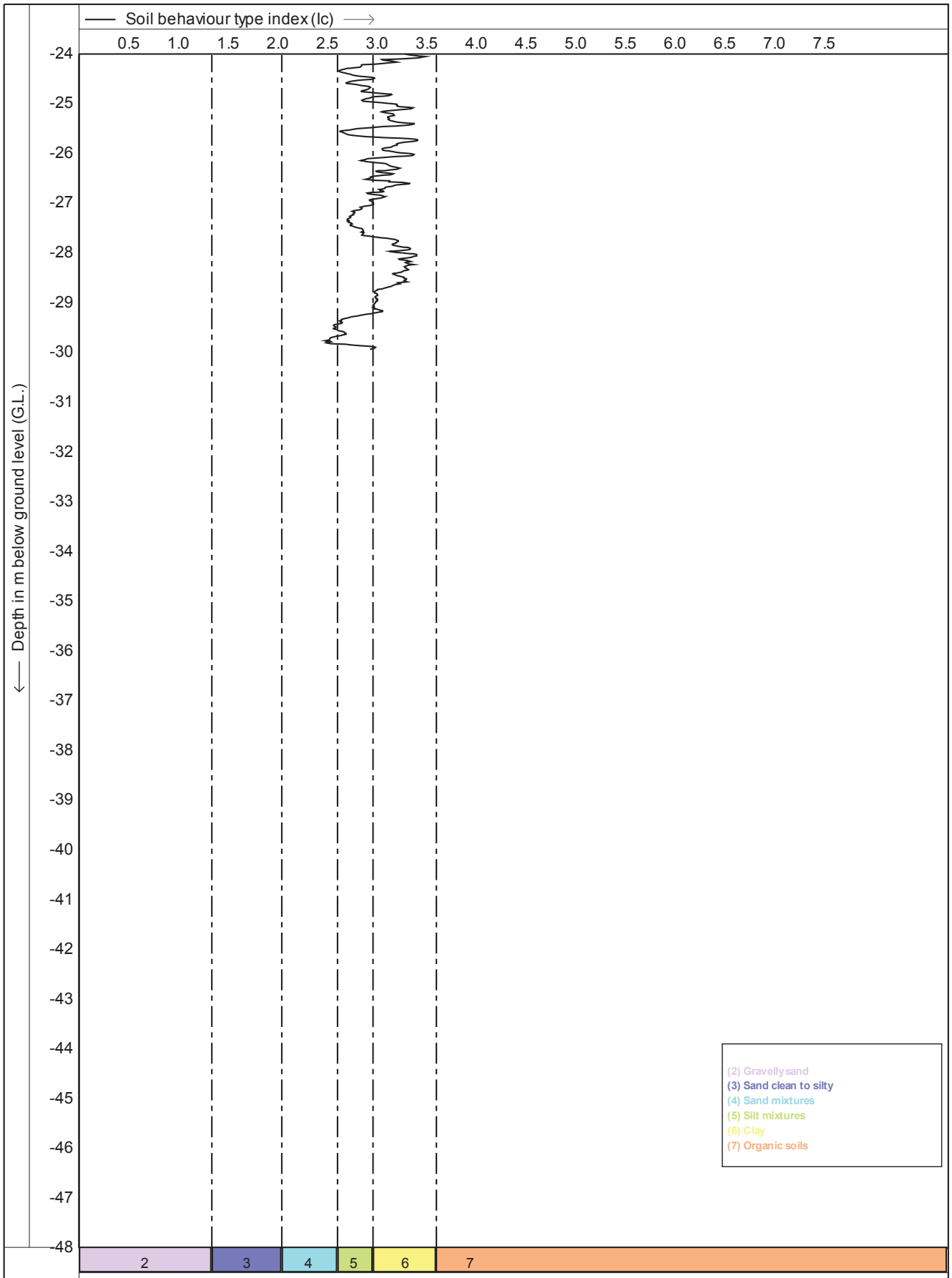
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : 21-4-2011	
Project : Site Investigations	Cone no. : C10CFIIP.F14	
	Project no. : 01AECOM3	
Location: Southern Links - Hamilton	CPT no. : 12	17/28

CPTask V1.25



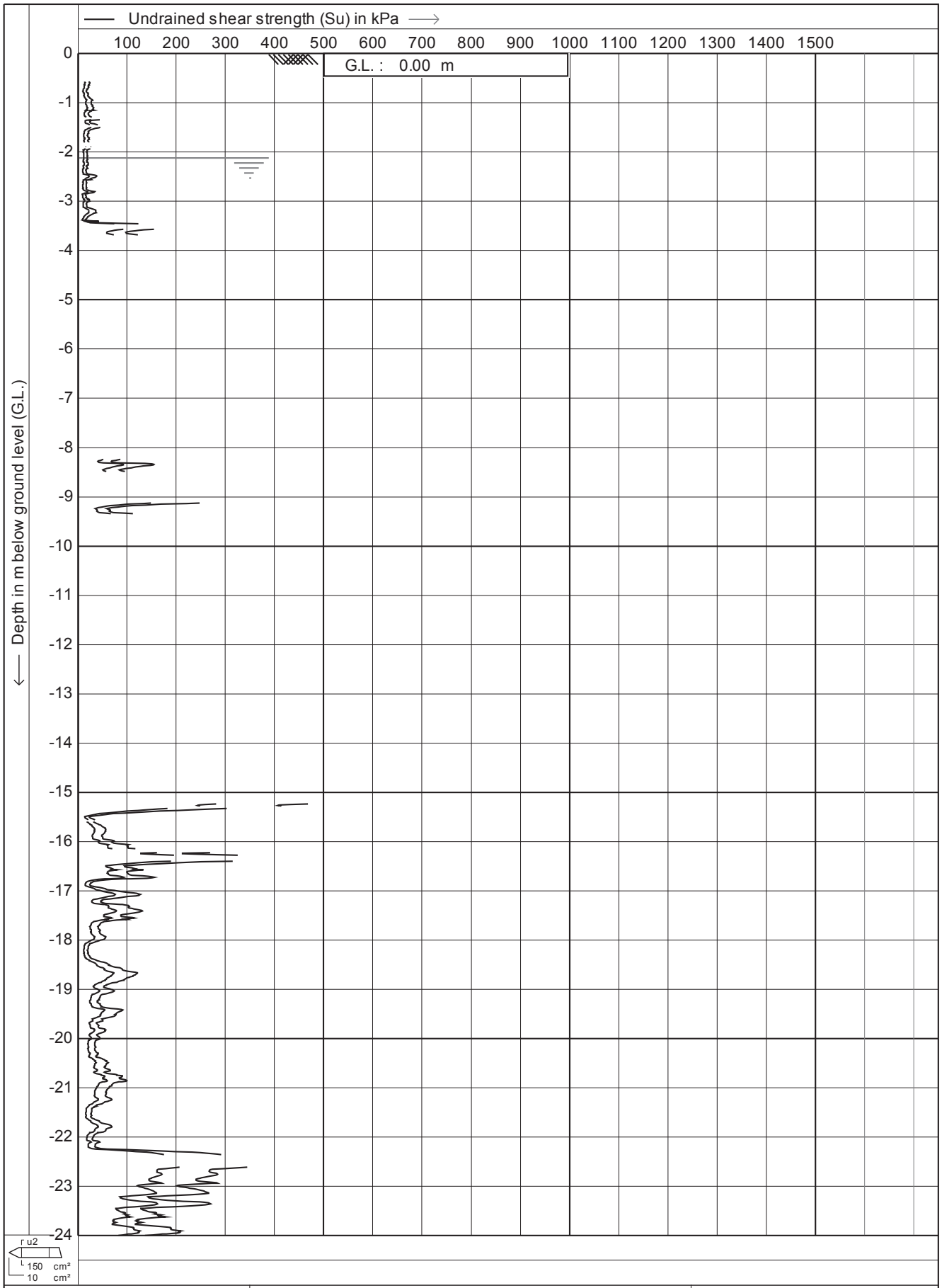
CPTask V1.25

Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

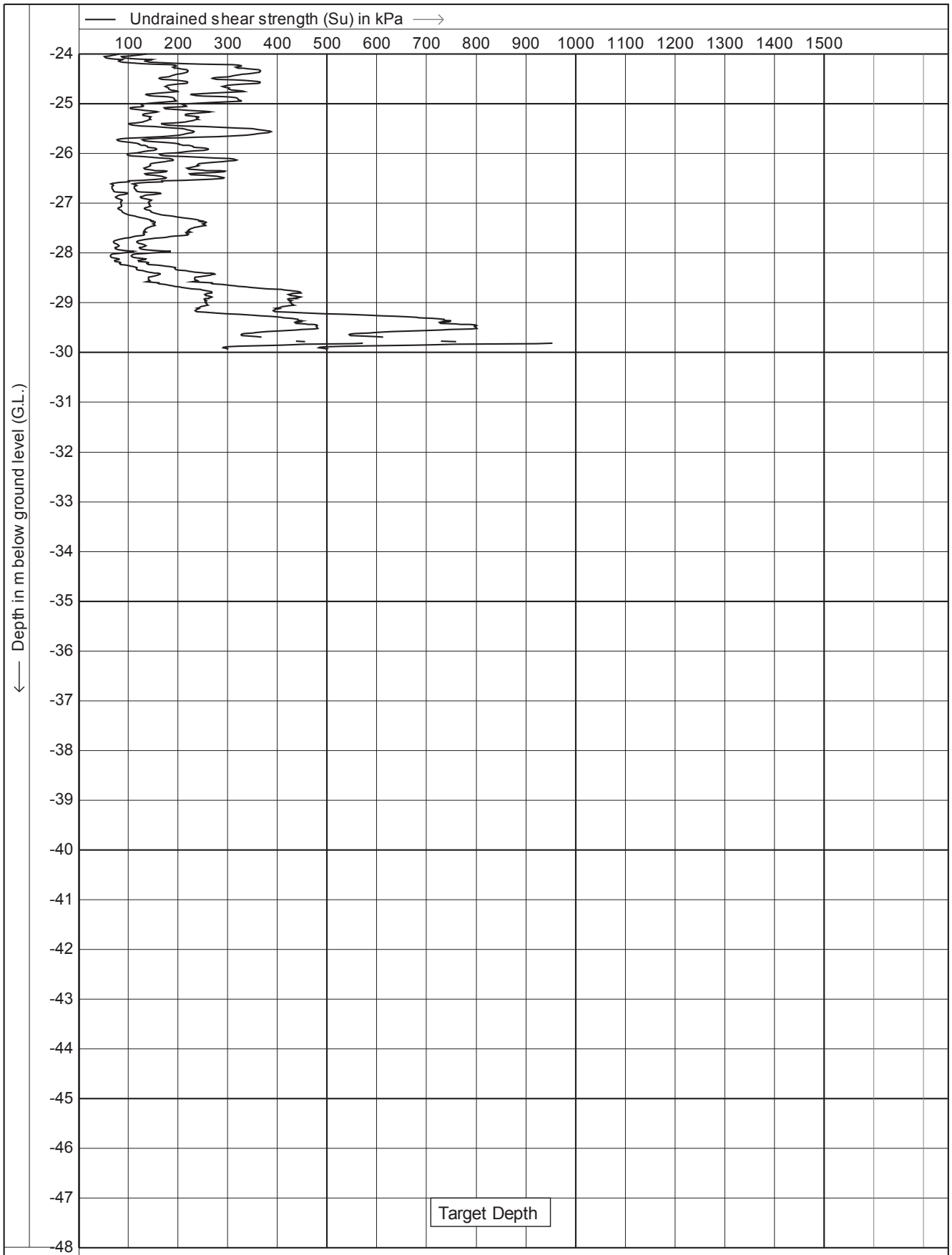
Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**



Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **12**	**19/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

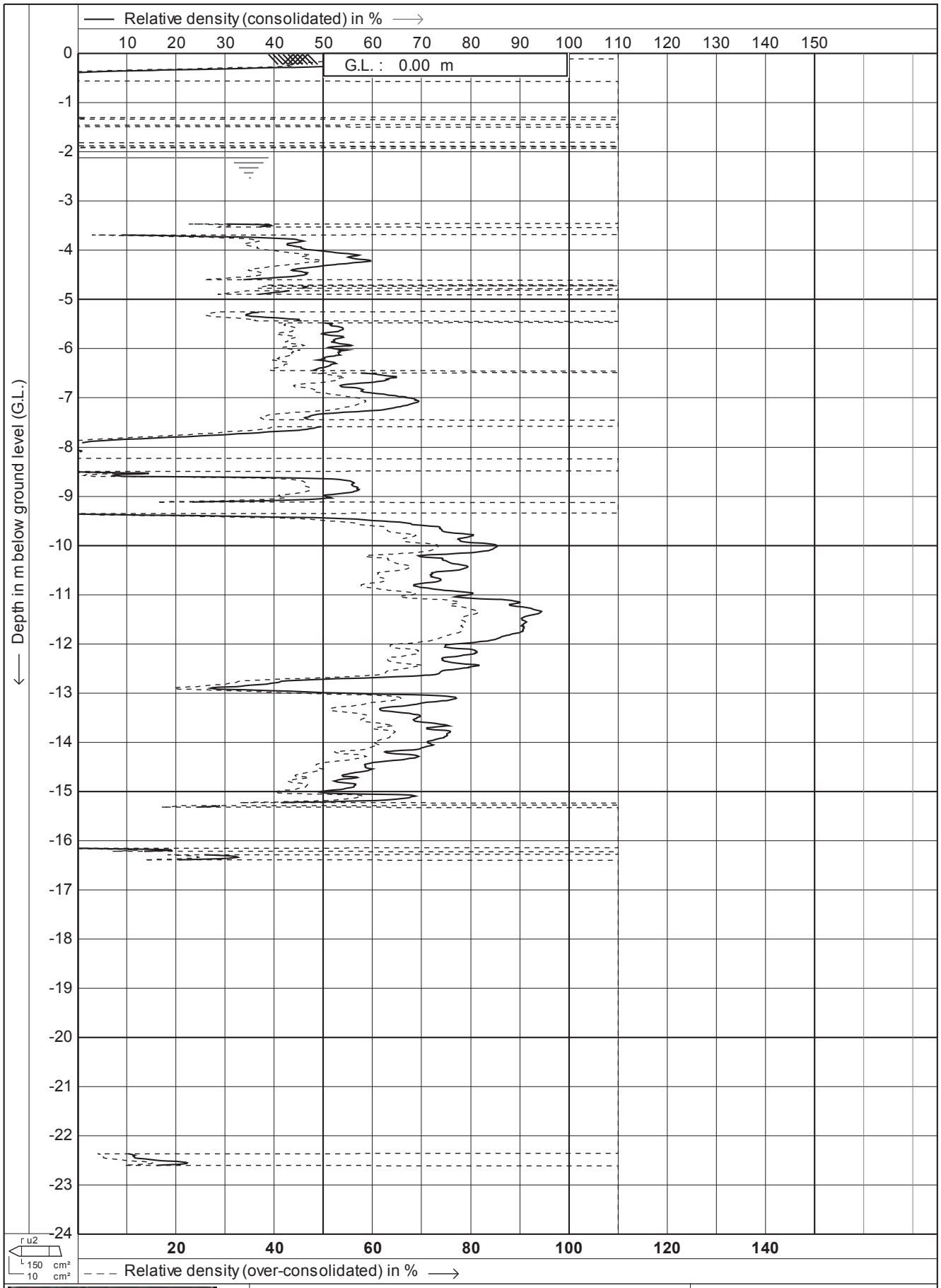
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

20/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

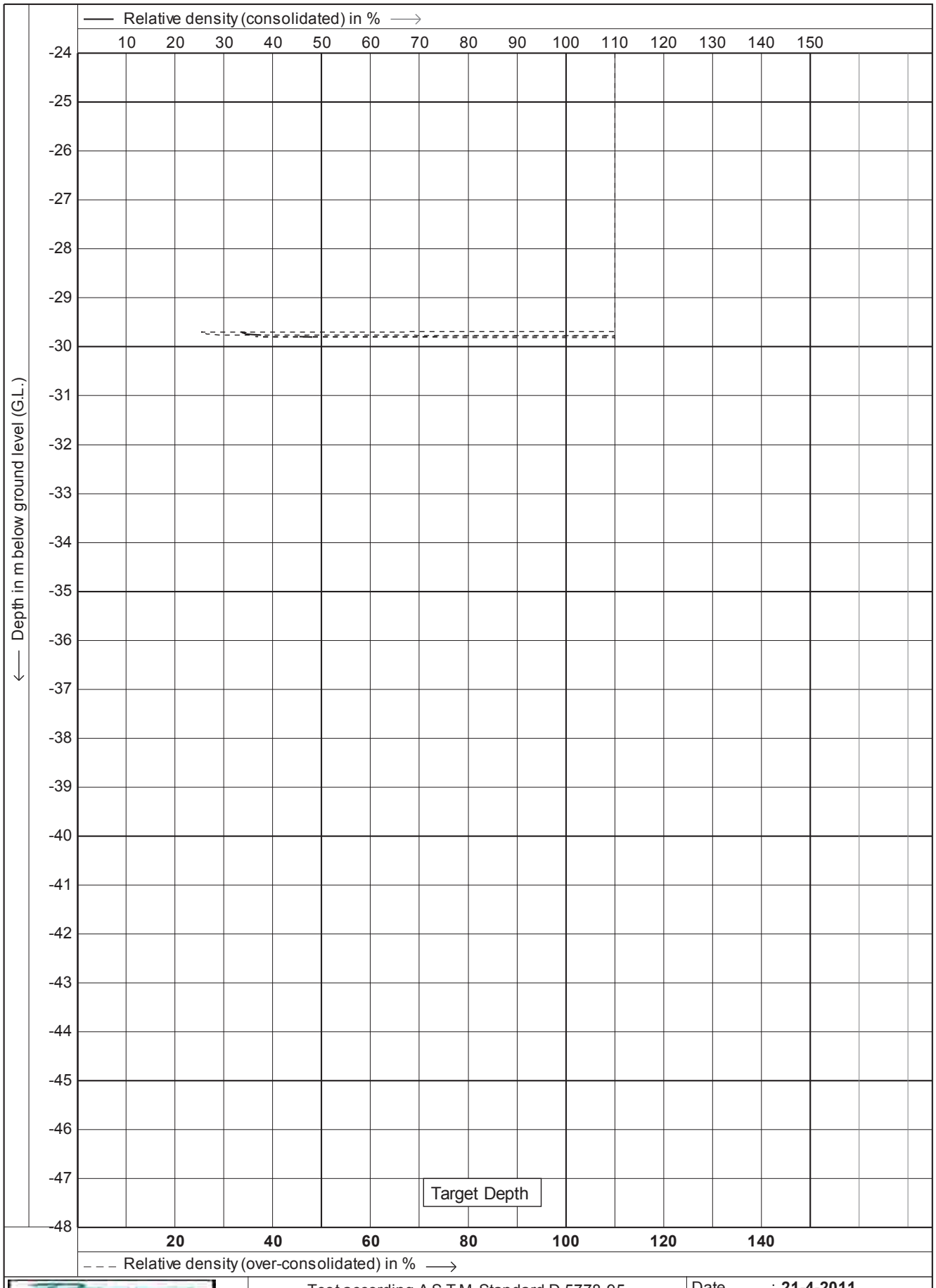
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

21/28

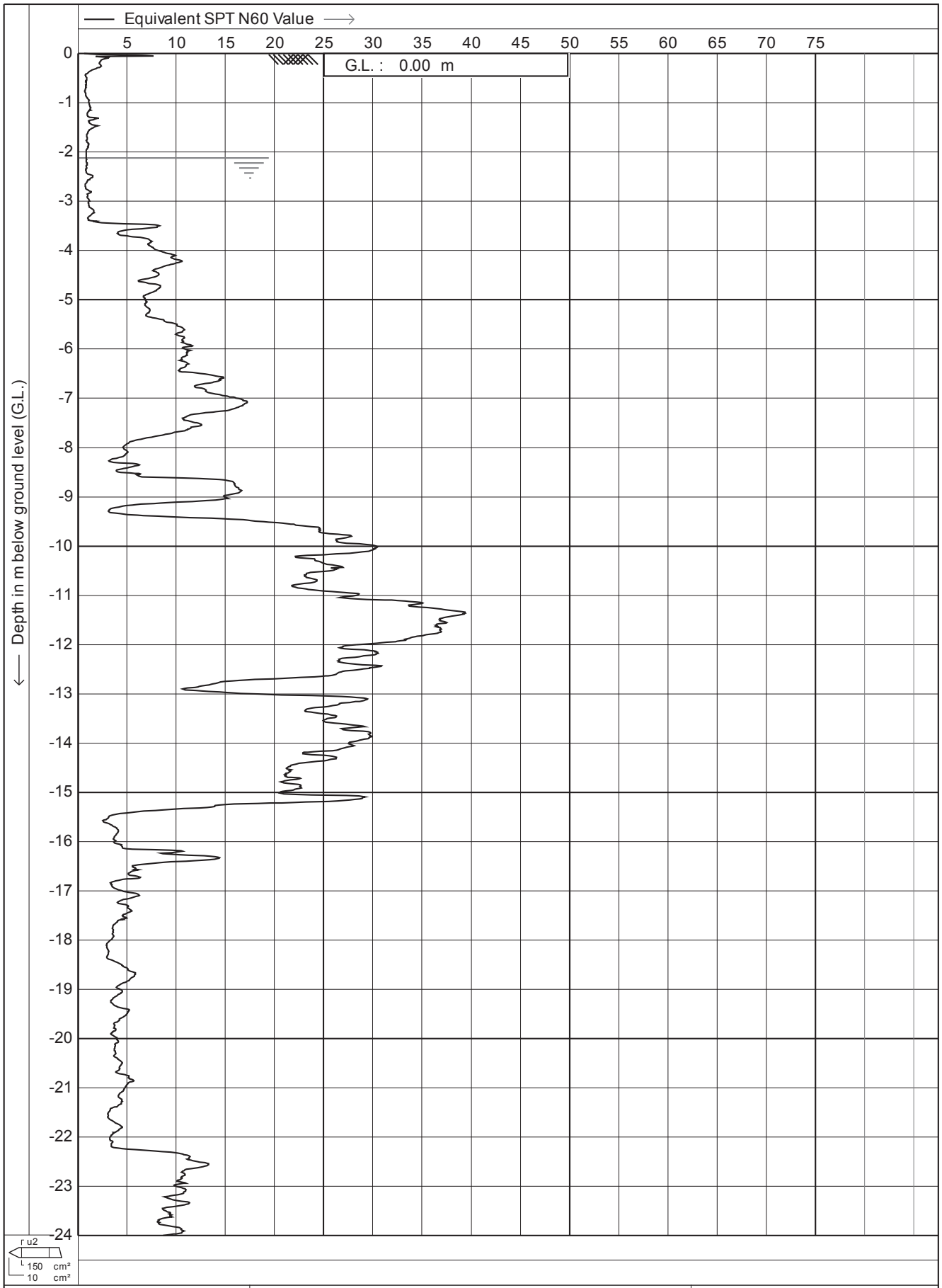
CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 12

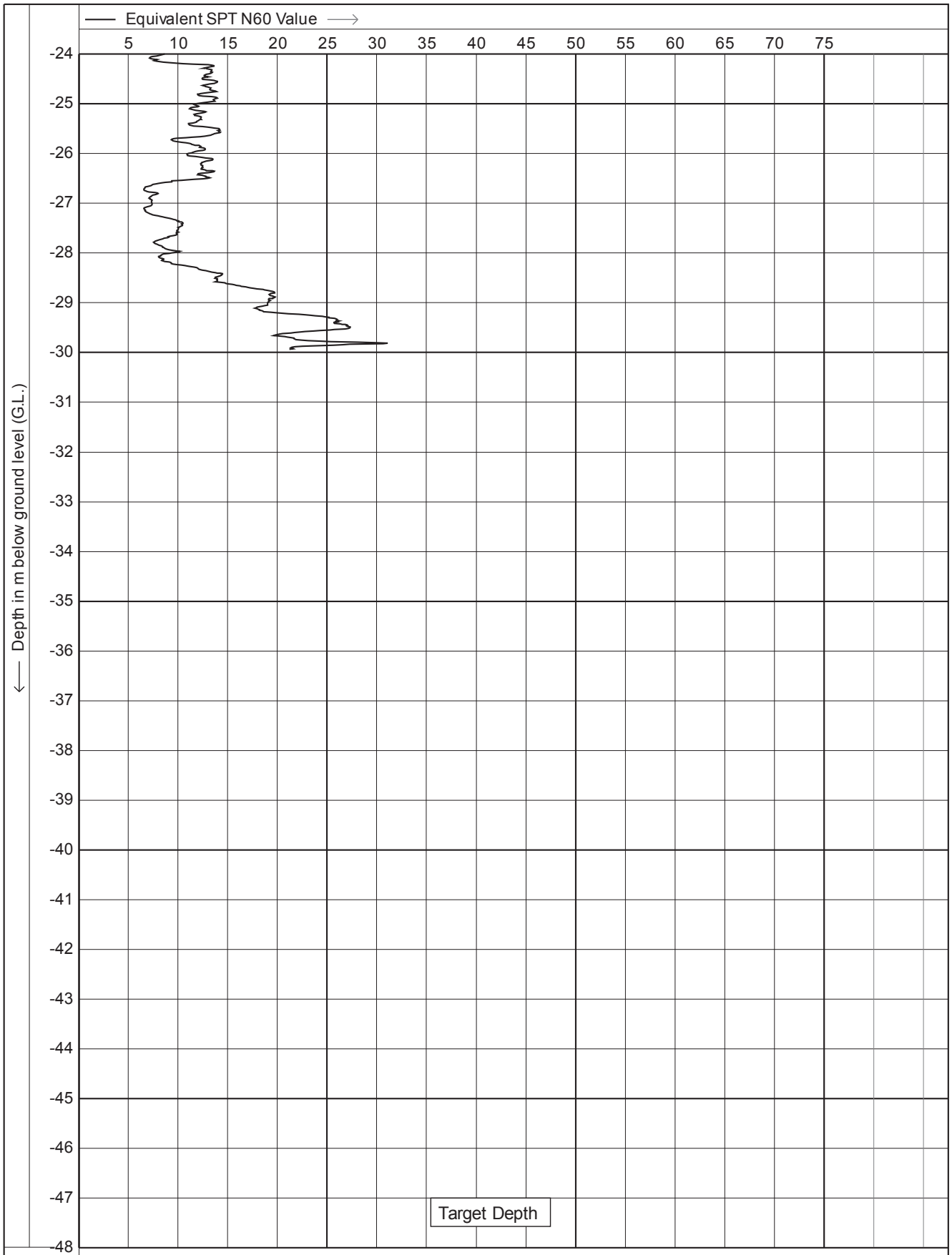
22/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **12**	**23/28**

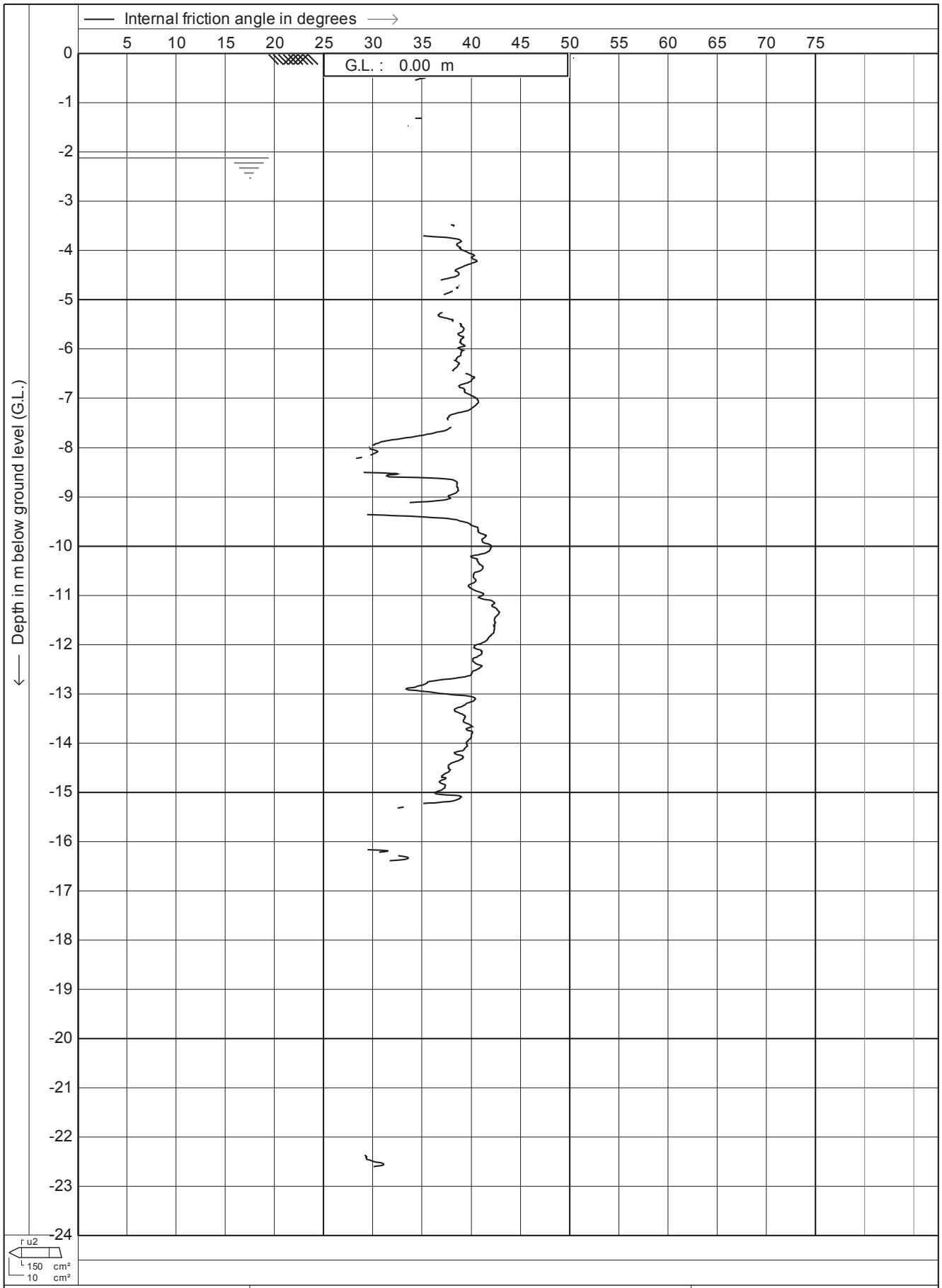
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95		Date	: 21-4-2011
Project :	Site Investigations	Cone no.	: C10CFIIP.F14
		Project no.	: 01AECOM3
Location:	Southern Links - Hamilton	CPT no.	: 12

24/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

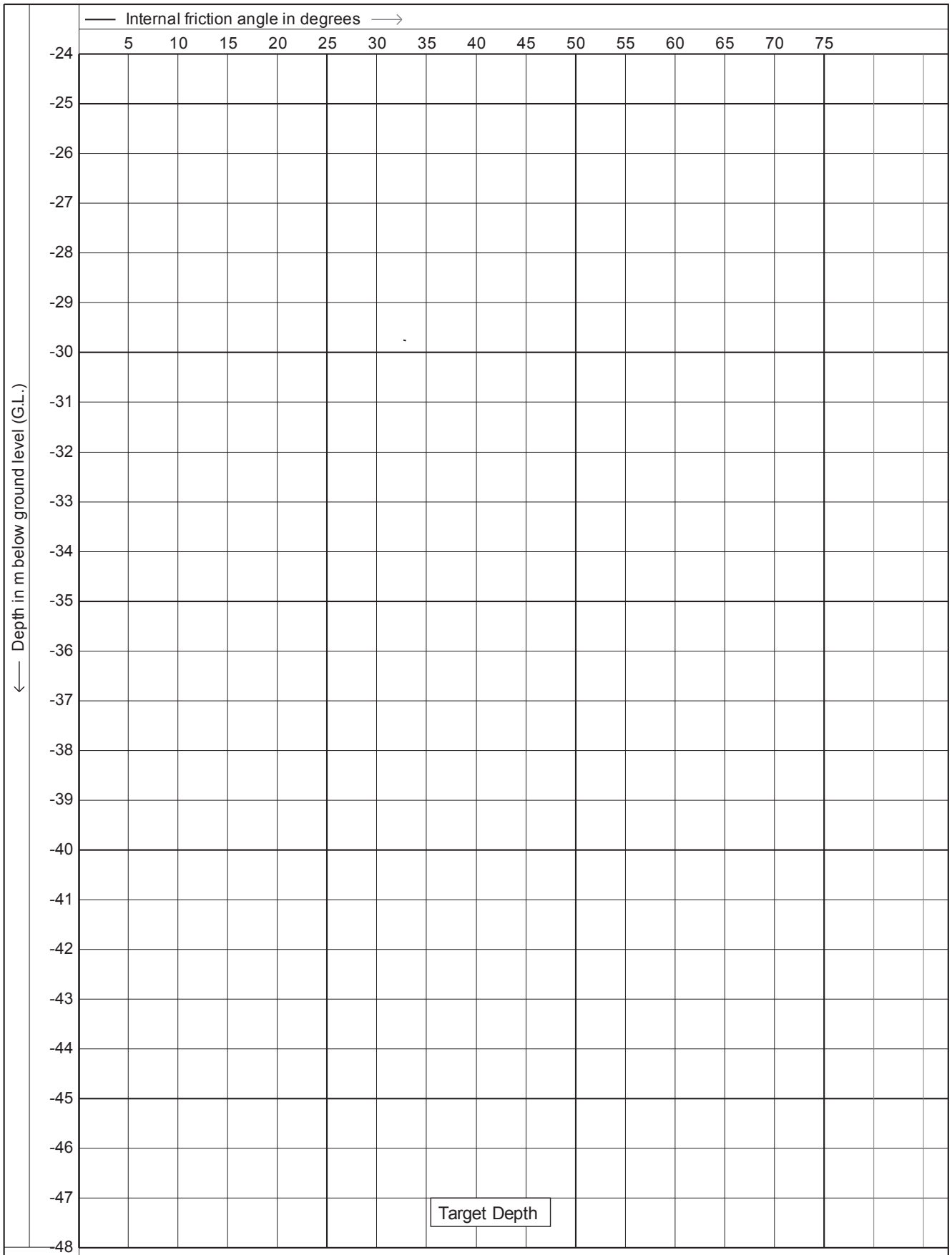
Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

27/28

CPTask V1.25

NZGD ID: CPT_108372



CPTask V1.25

Test according A.S.T.M. Standard D 5778-95

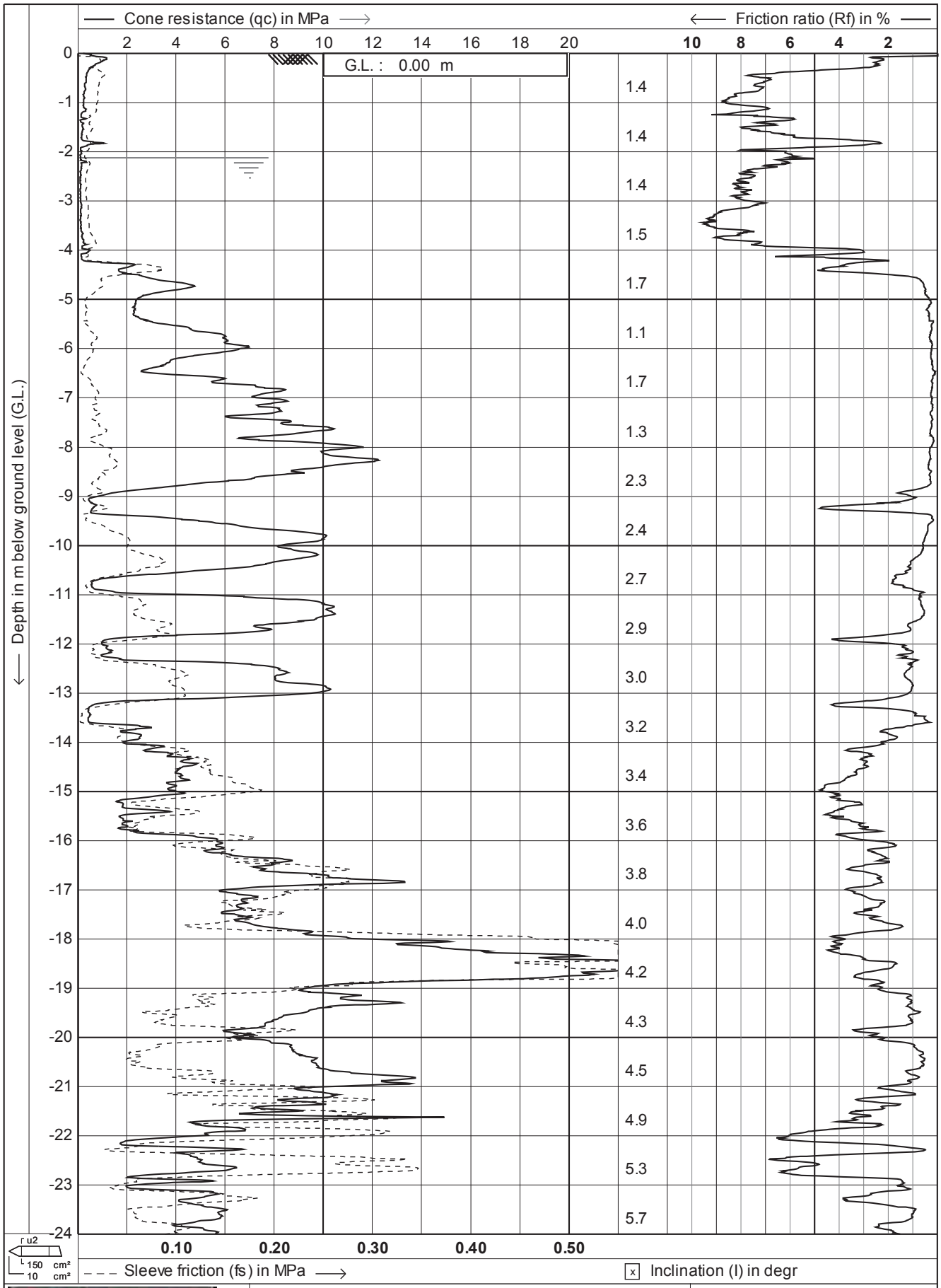
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **12**

28/28

NZGD ID: CPT_108372



Test according A.S.T.M. Standard D 5778-95

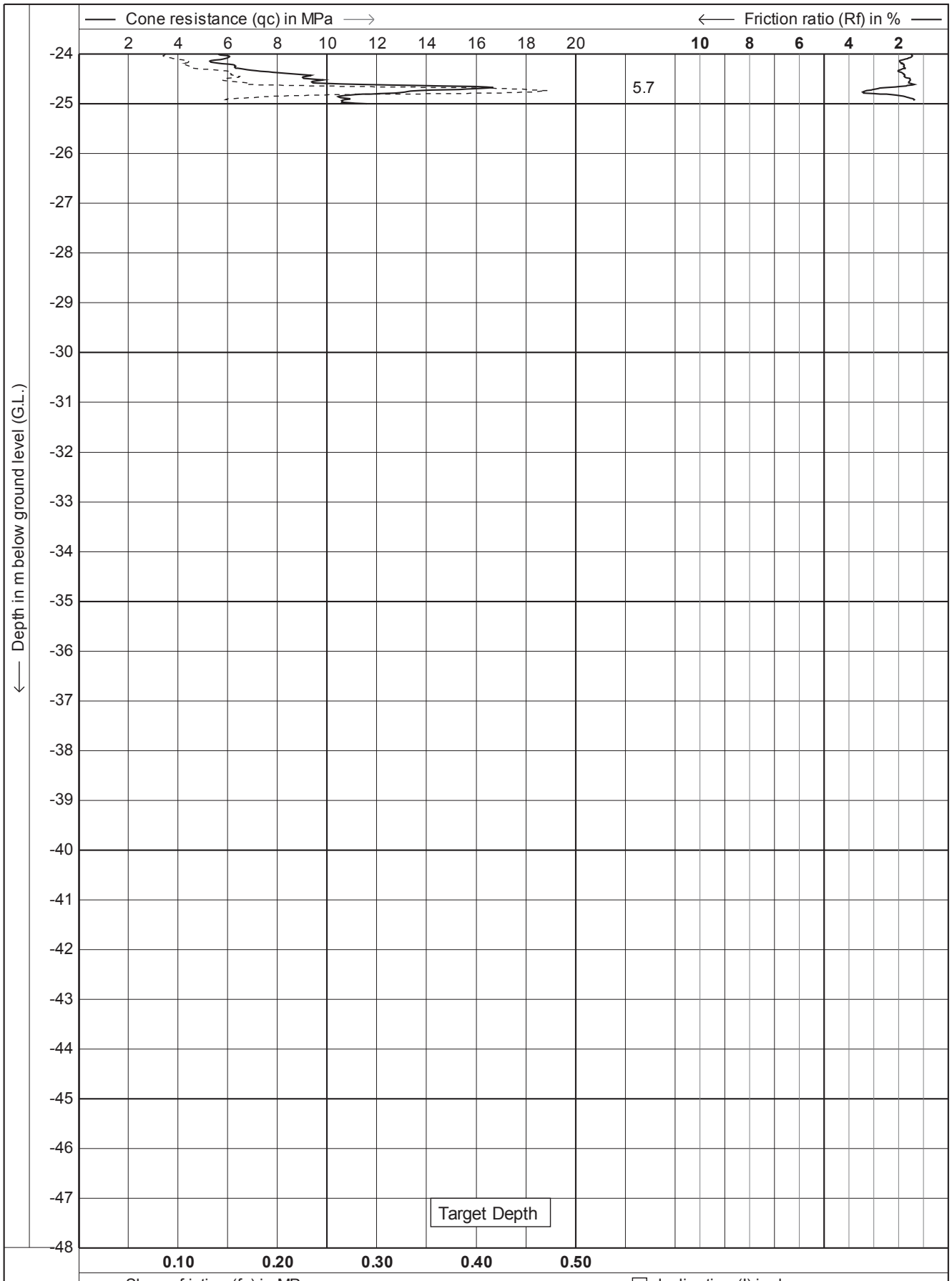
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

1/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

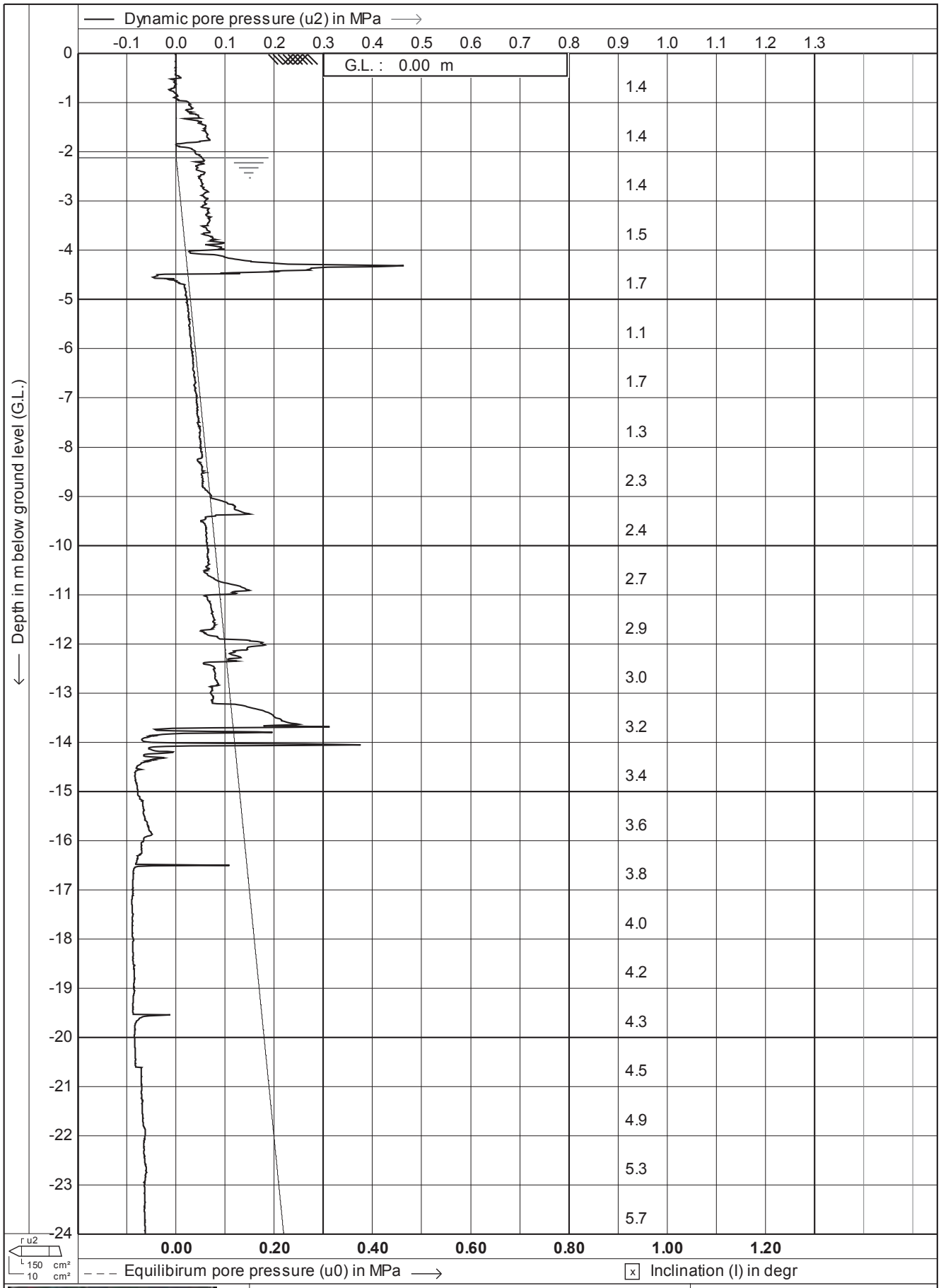
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

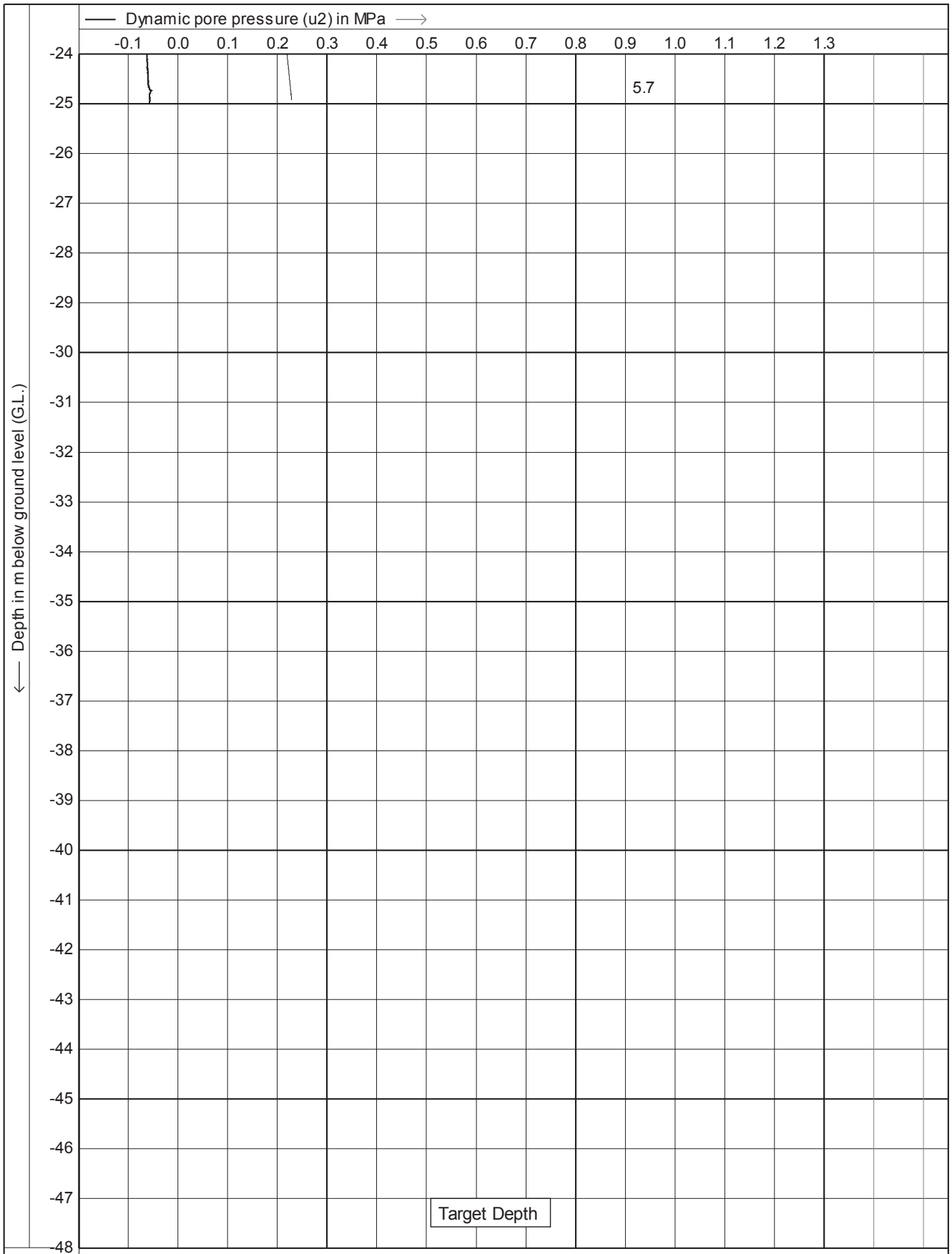
2/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**3/28**

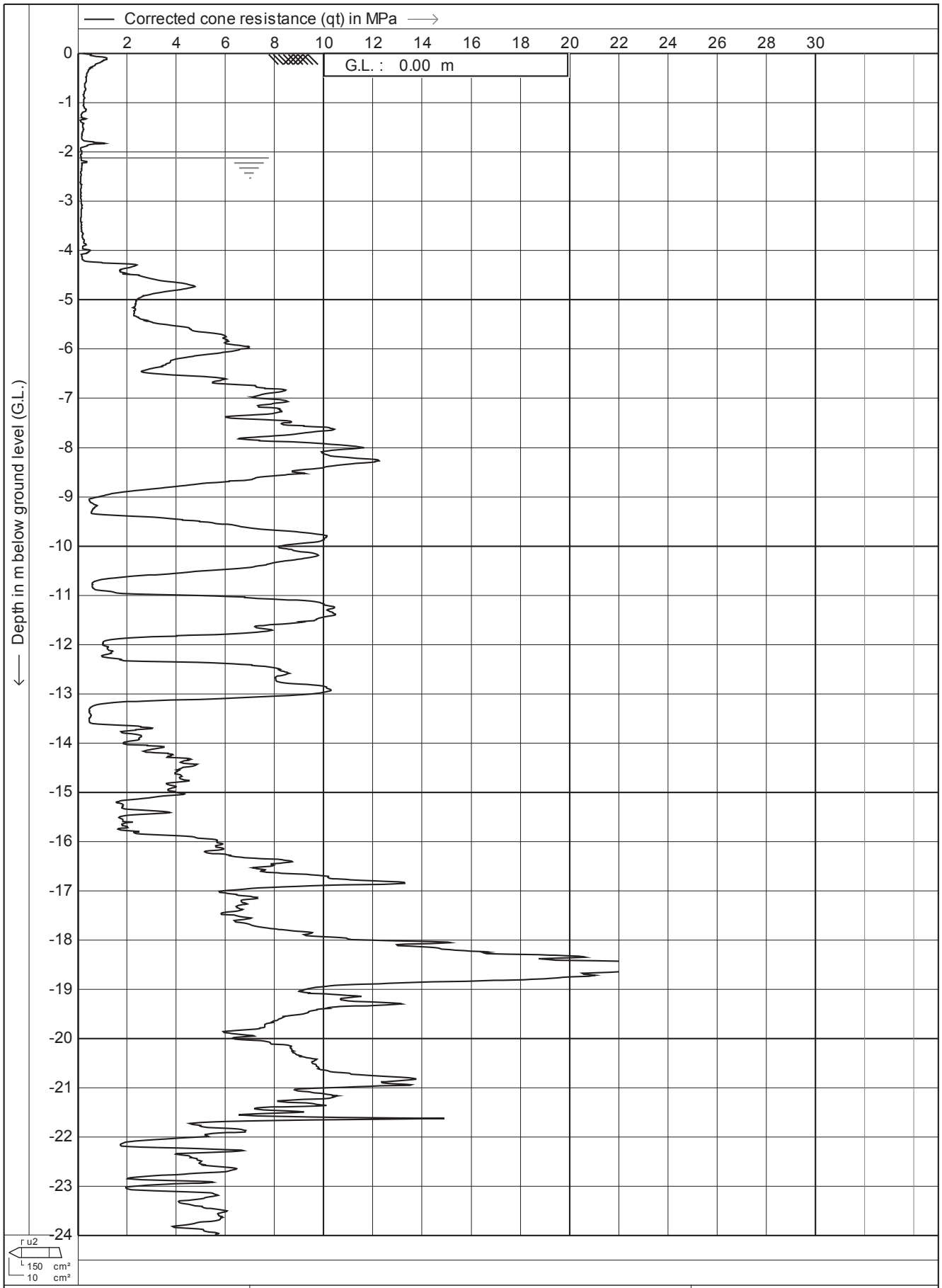
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95		Date	: 20-4-2011
Project :	Site Investigations	Cone no.	: C10CFIIP.F14
		Project no.	: 01AECOM3
Location:	Southern Links - Hamilton	CPT no.	: 13

4/28

CPTask V1.25

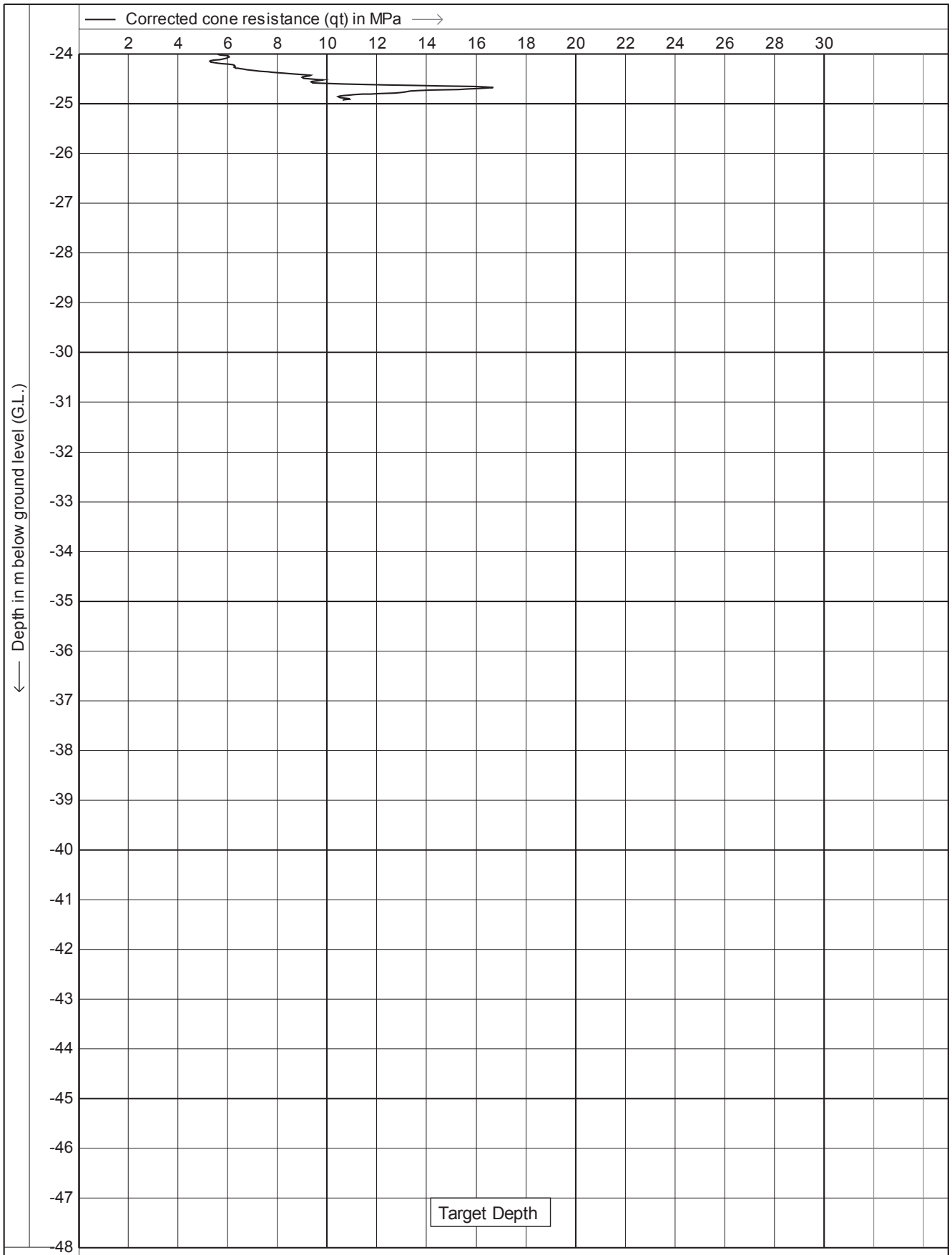


Test according A.S.T.M. Standard D 5778-95		Date	: **20-4-2011**
		Cone no.	: **C10CFIIP.F14**
Project :	**Site Investigations**	Project no. :	**01AECOM3**
Location:	**Southern Links - Hamilton**	CPT no.	: **13**

5/28

CPTask V1.25

NZGD ID: CPT_108373



Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

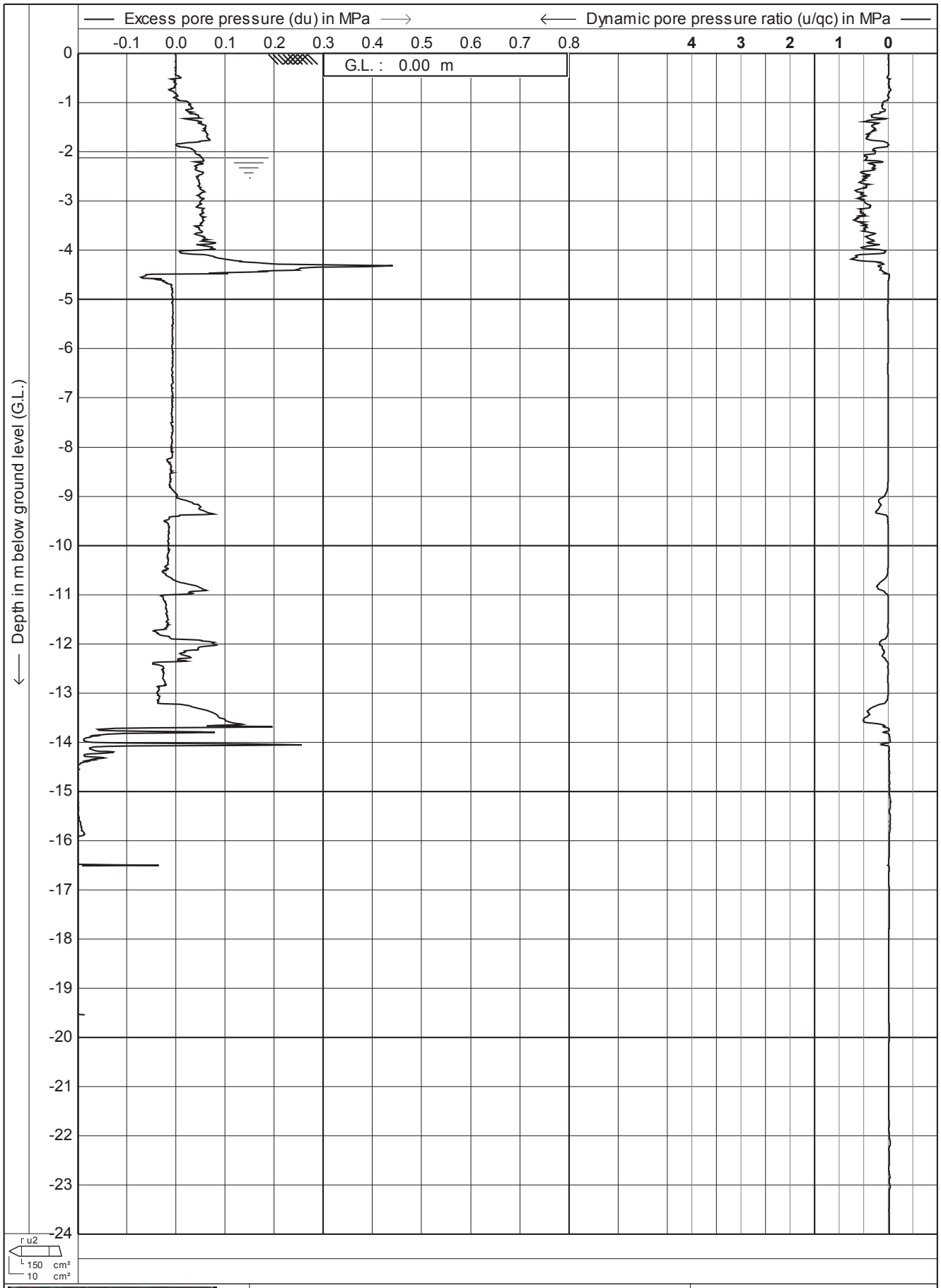
Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

6/28

CPTask V1.25

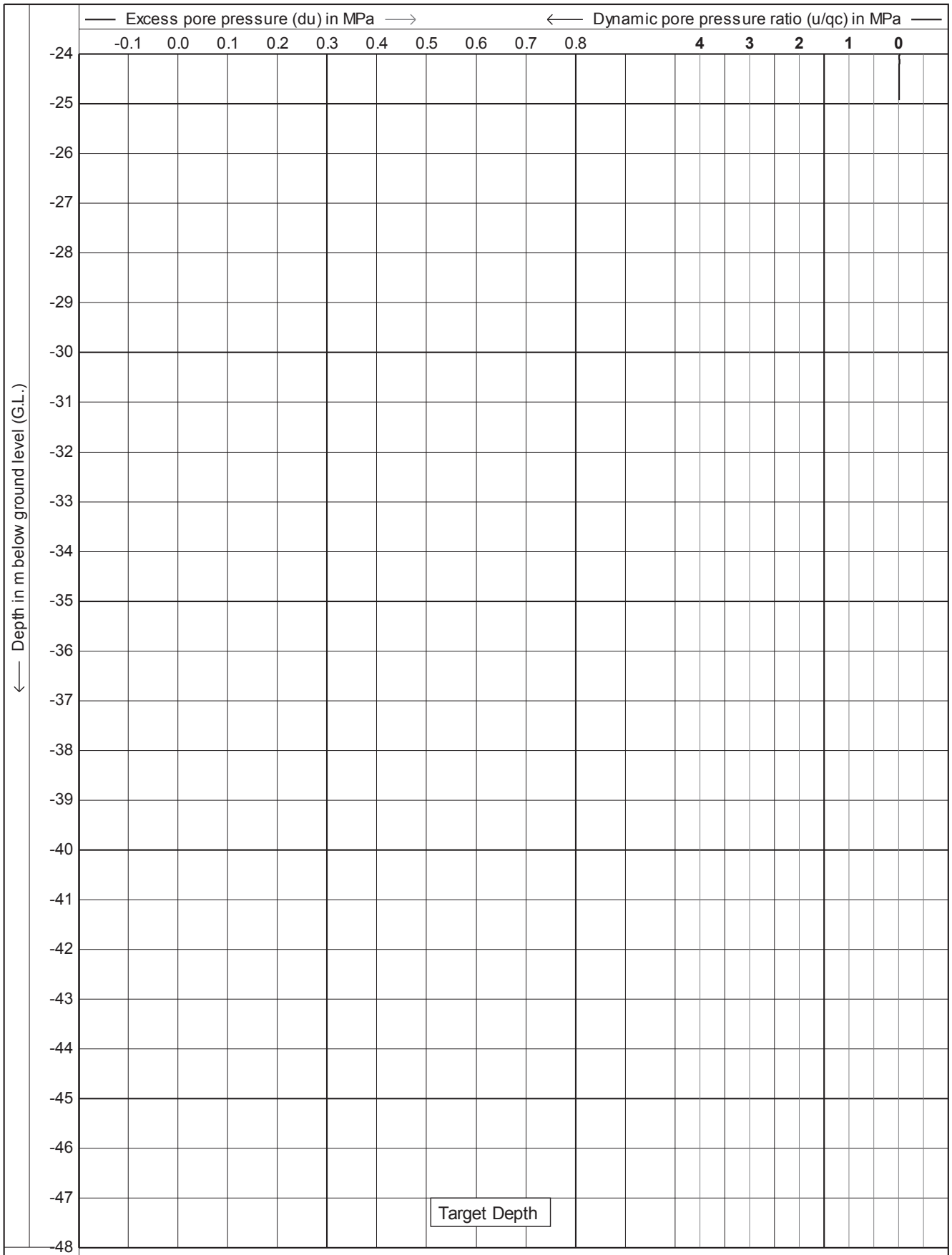
NZGD ID: CPT_108373



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**7/28**

CPTask V1.25

NZGD ID: CPT_108373



Test according A.S.T.M. Standard D 5778-95

Project : **Site Investigations**

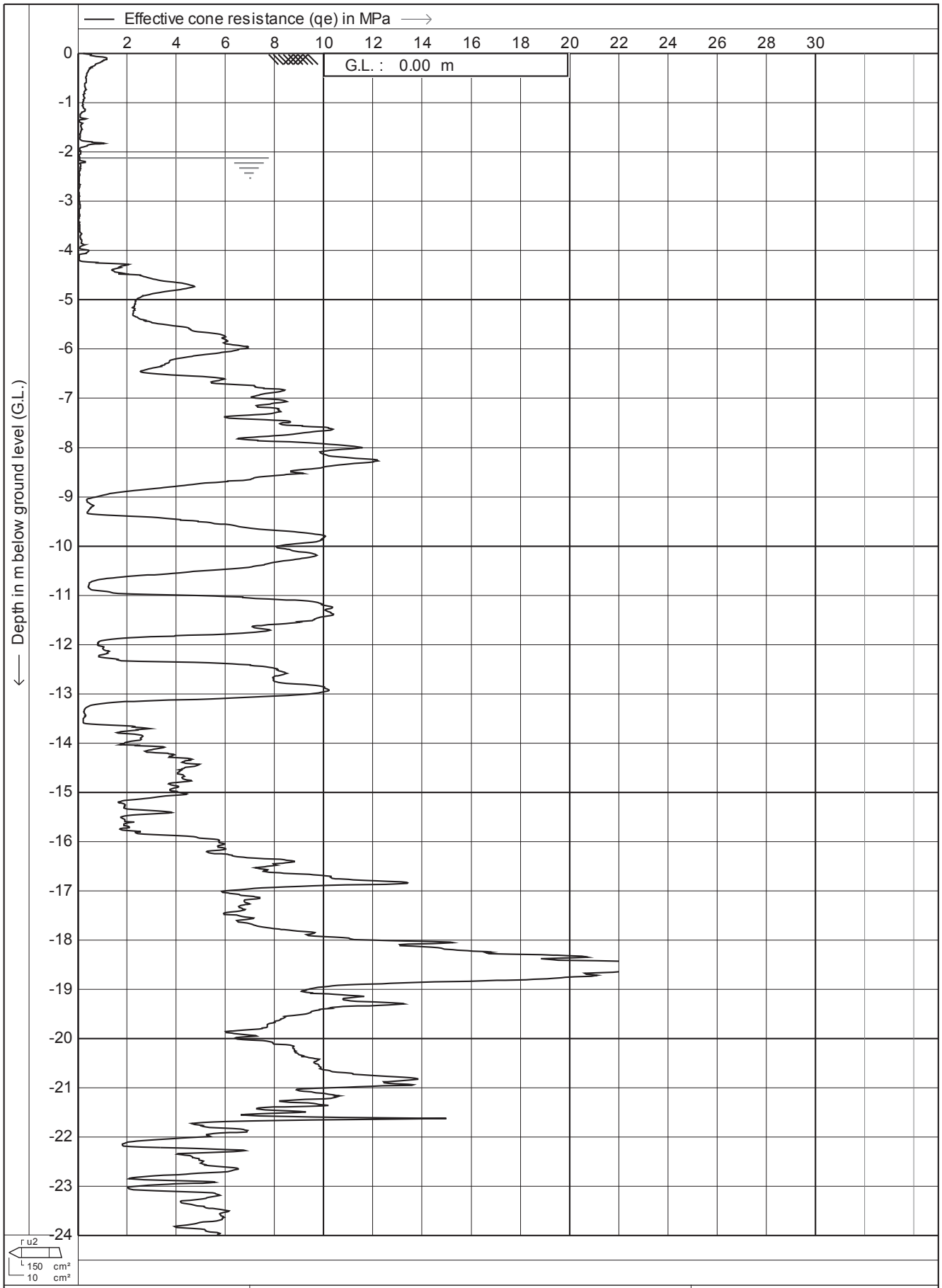
Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

8/28

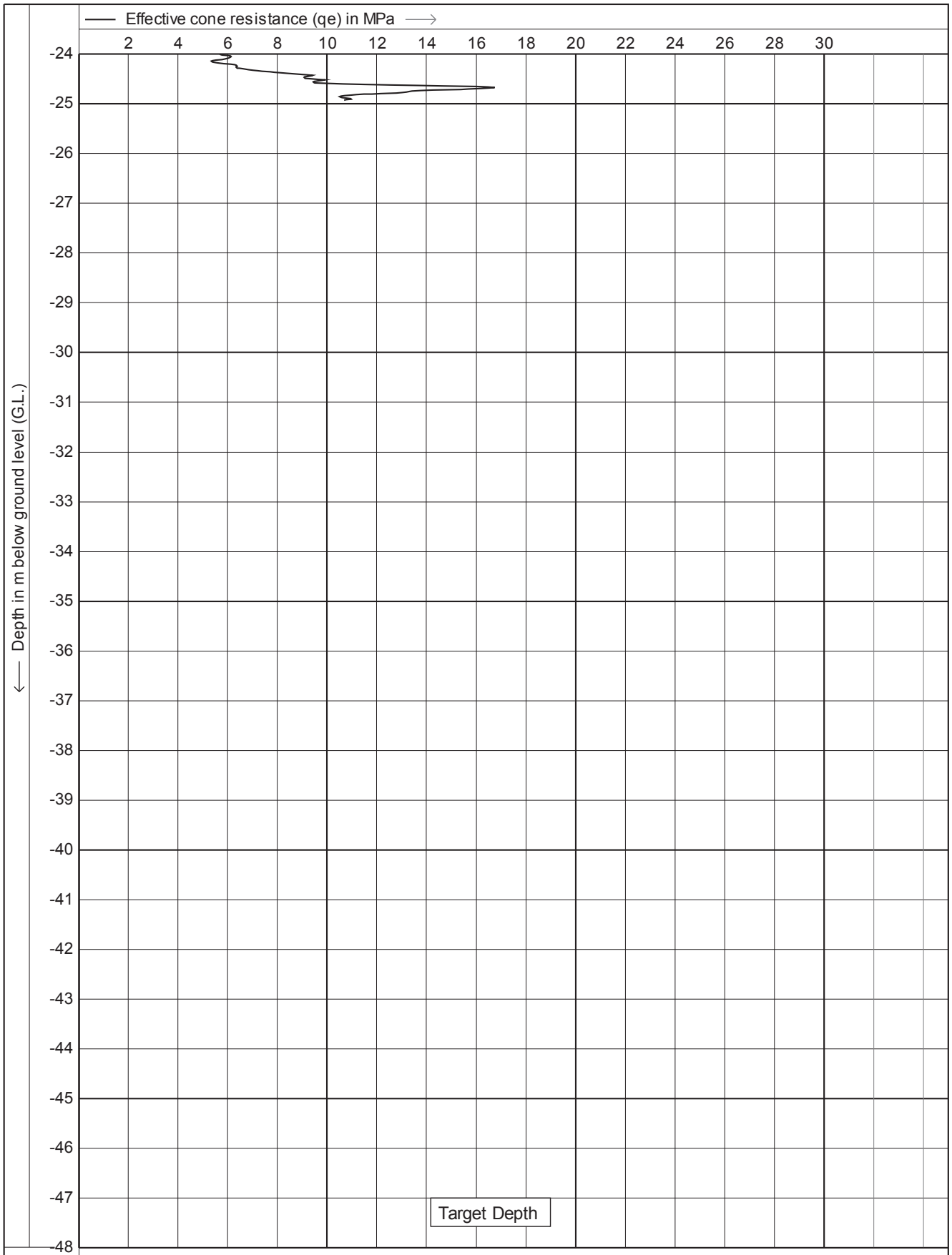
CPTask V1.25

NZGD ID: CPT_108373



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**9/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

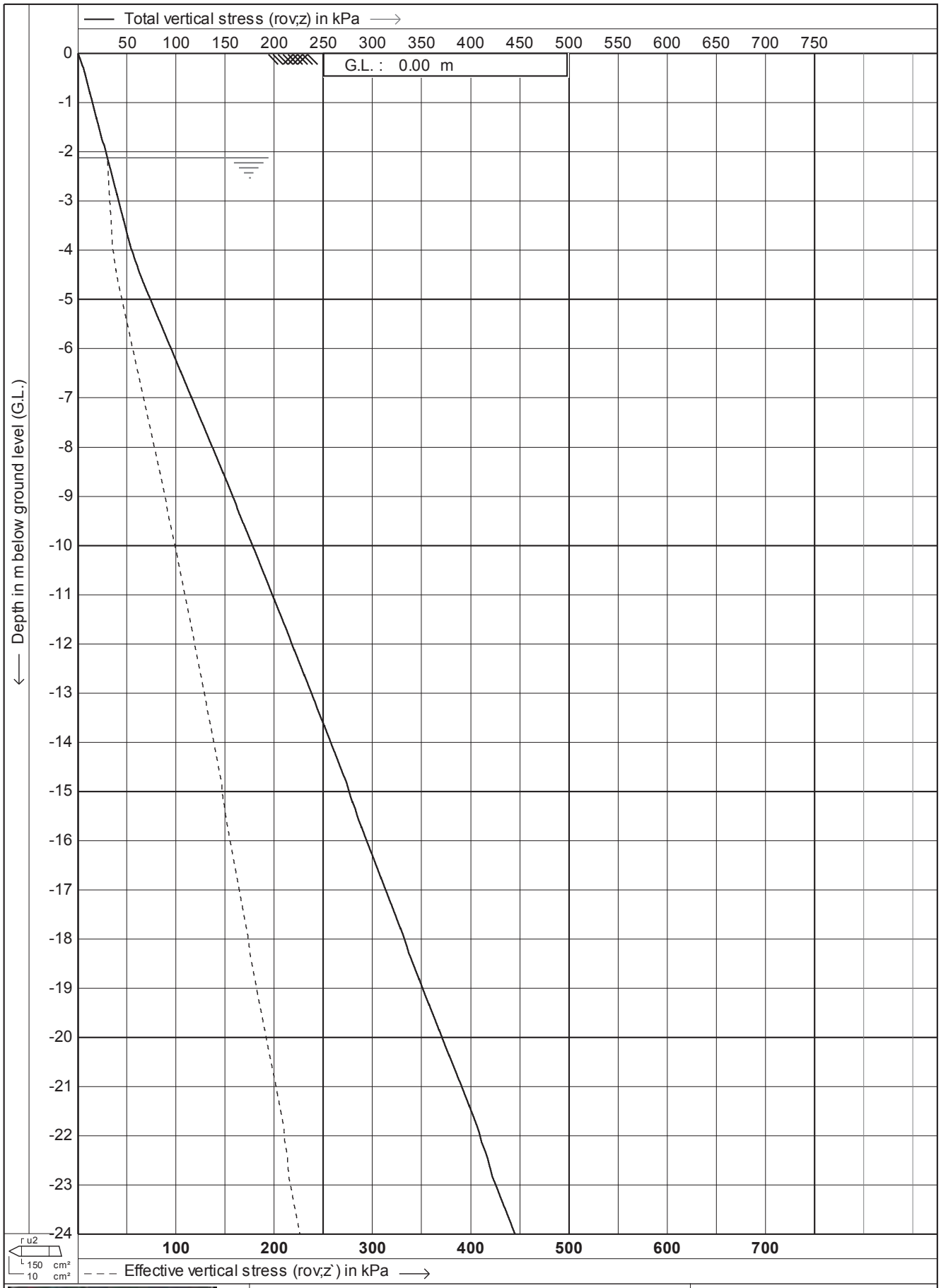
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

10/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

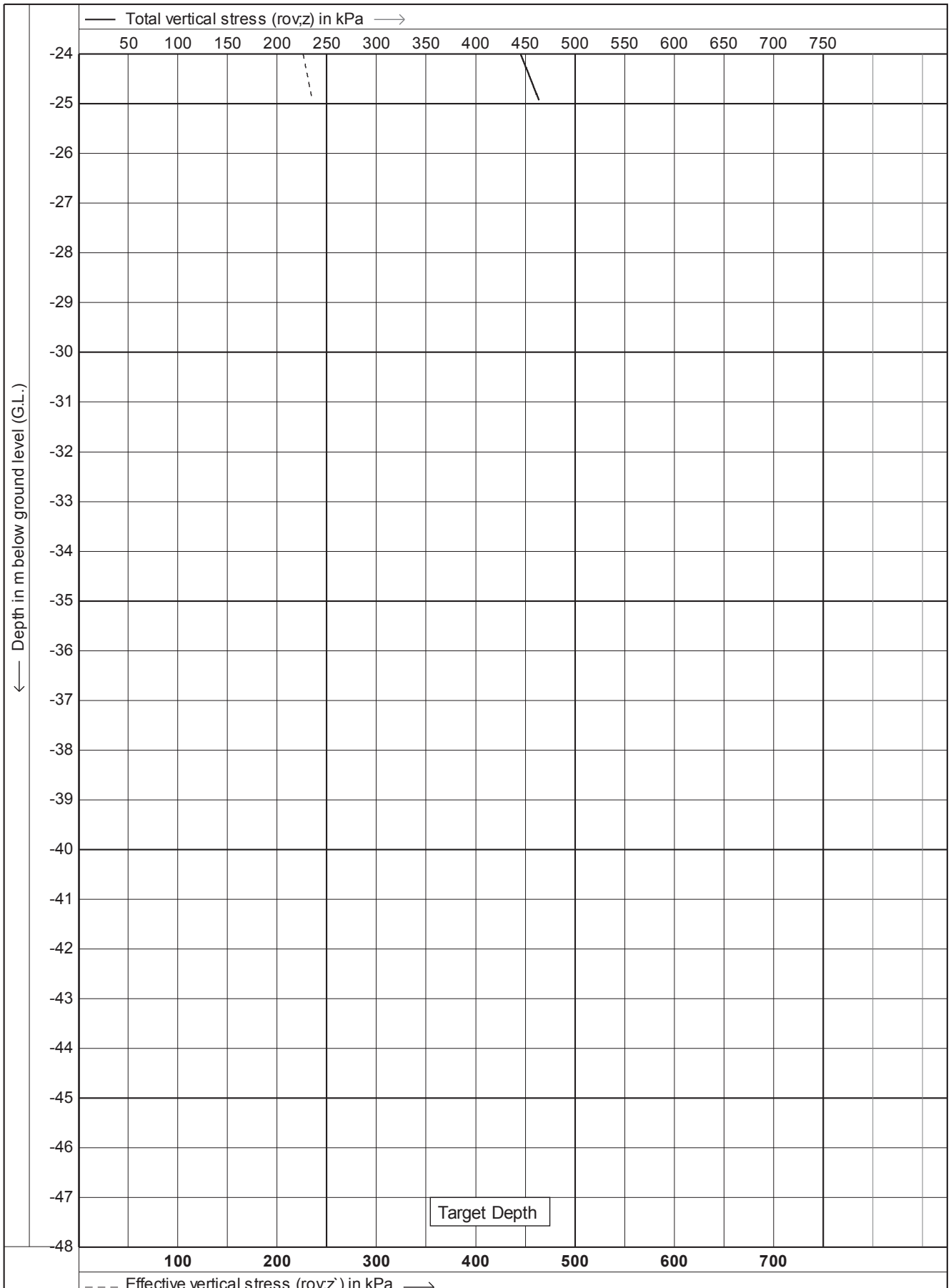
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

11/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

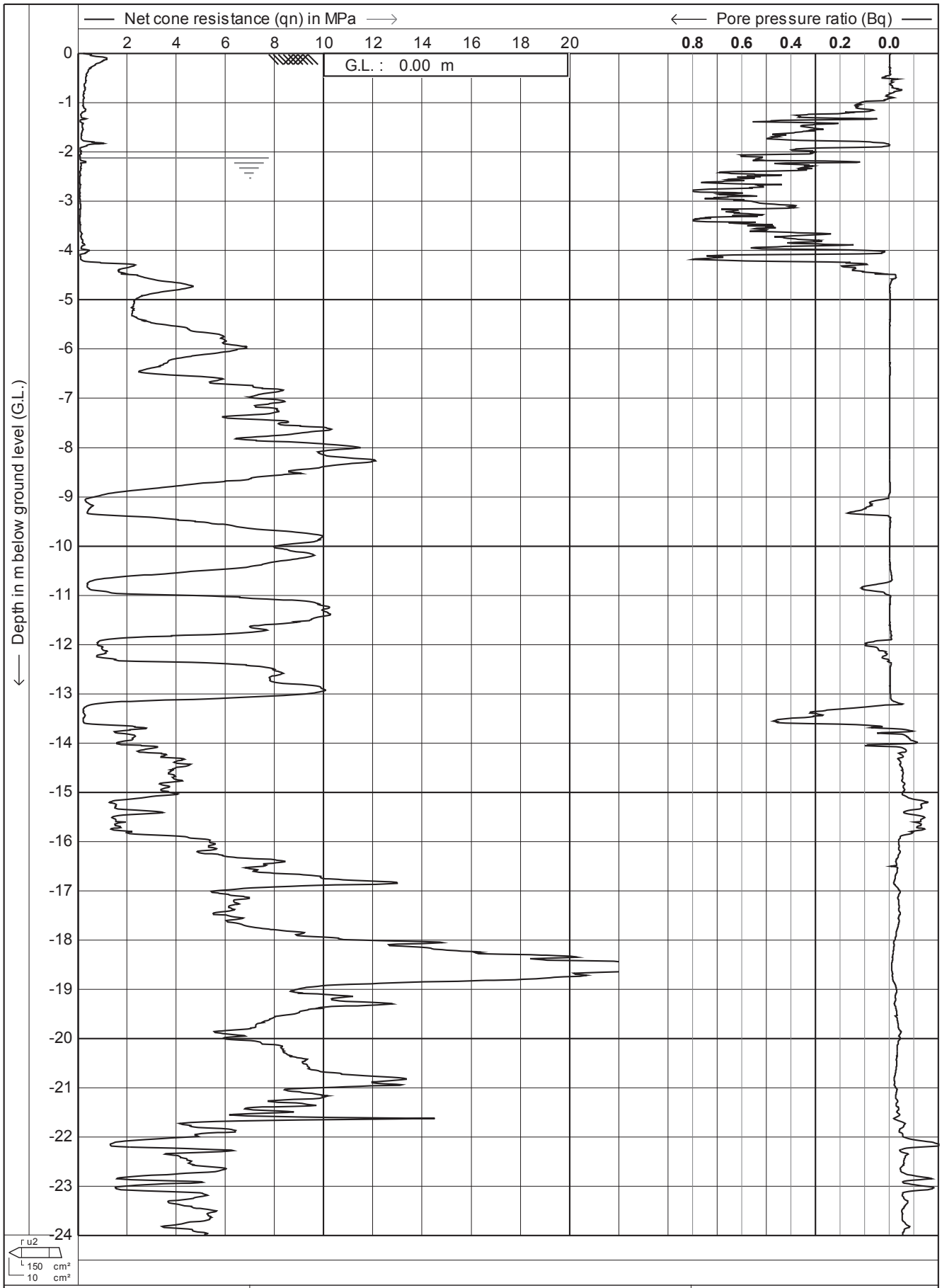
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

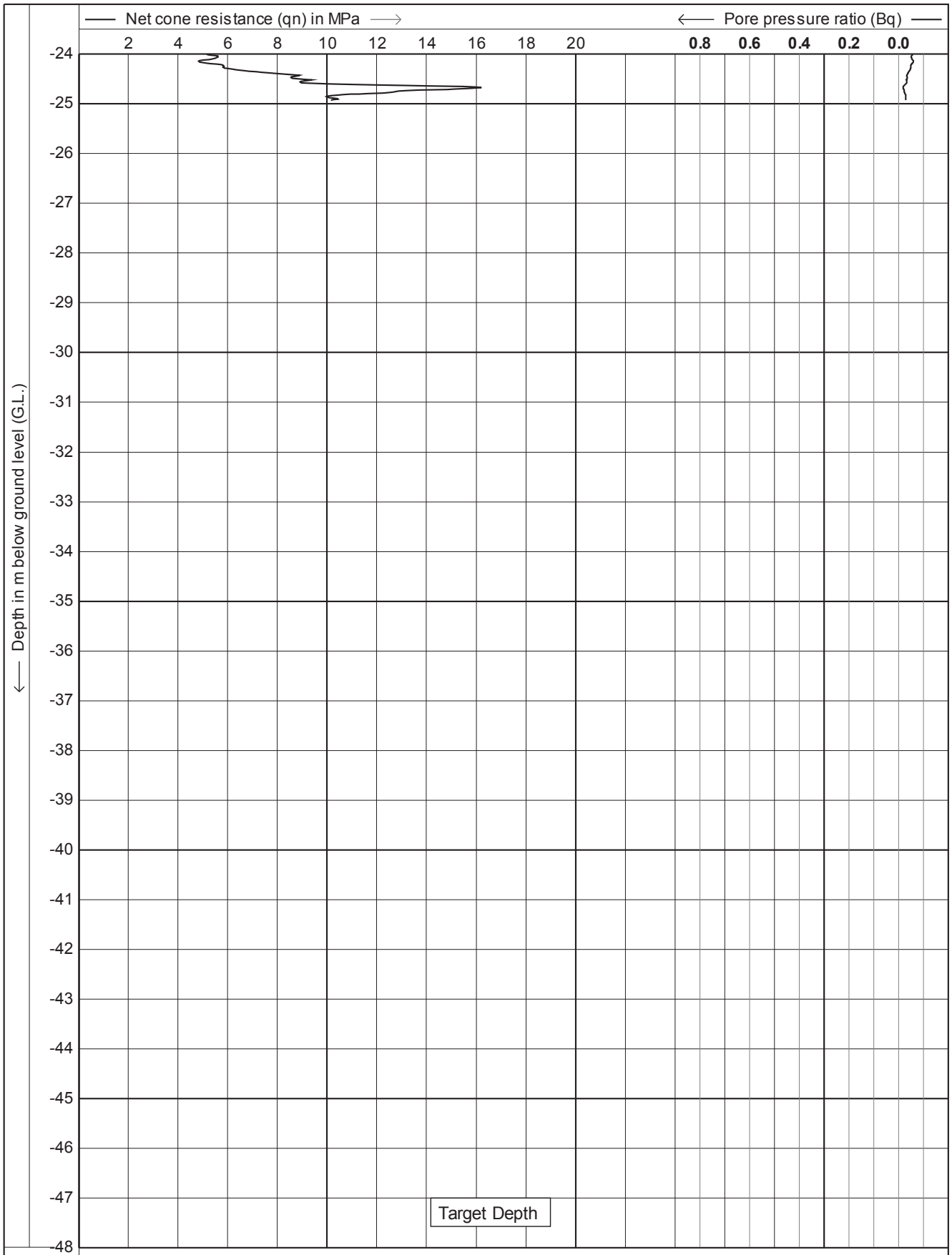
12/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**13/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

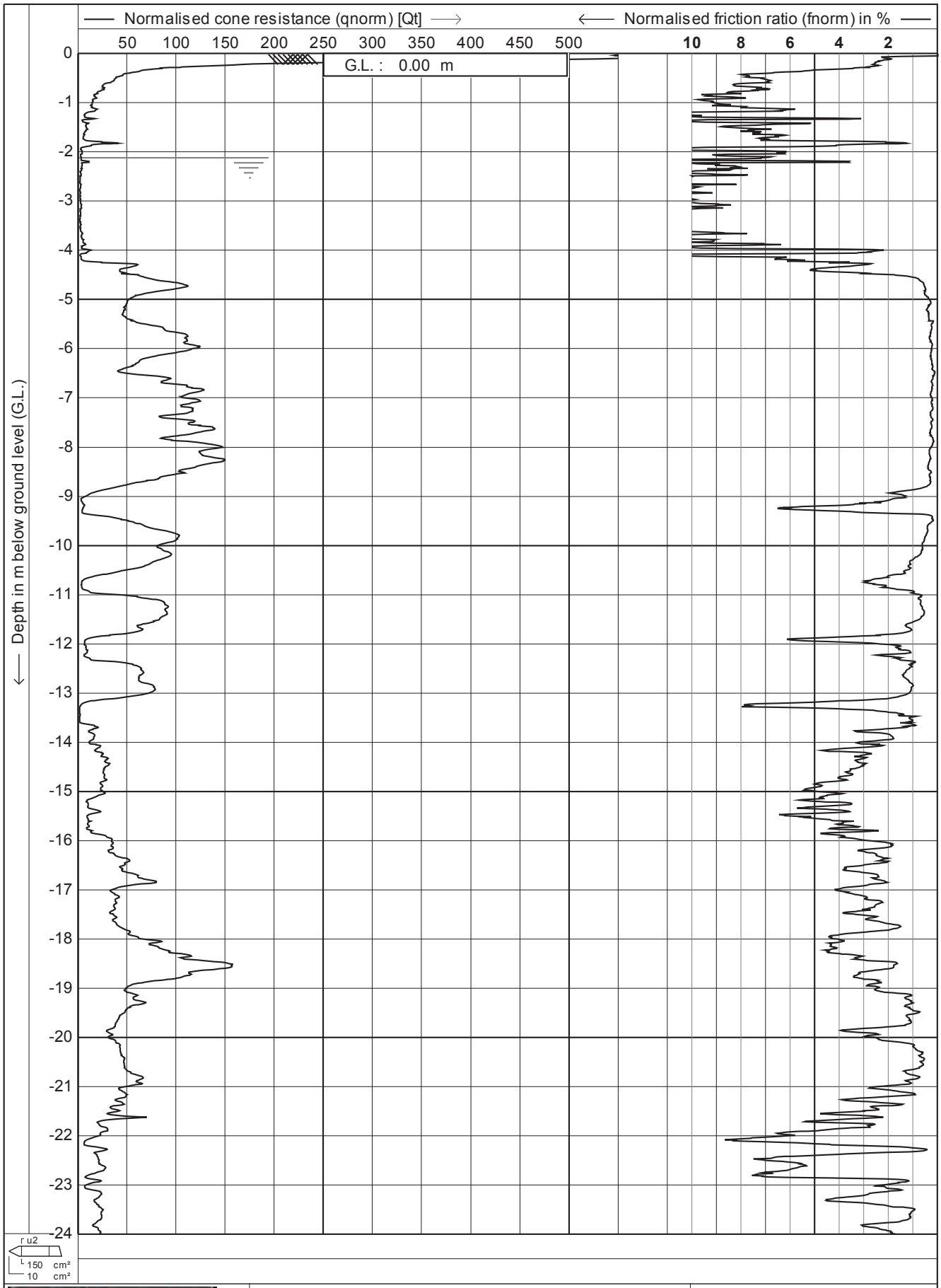
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

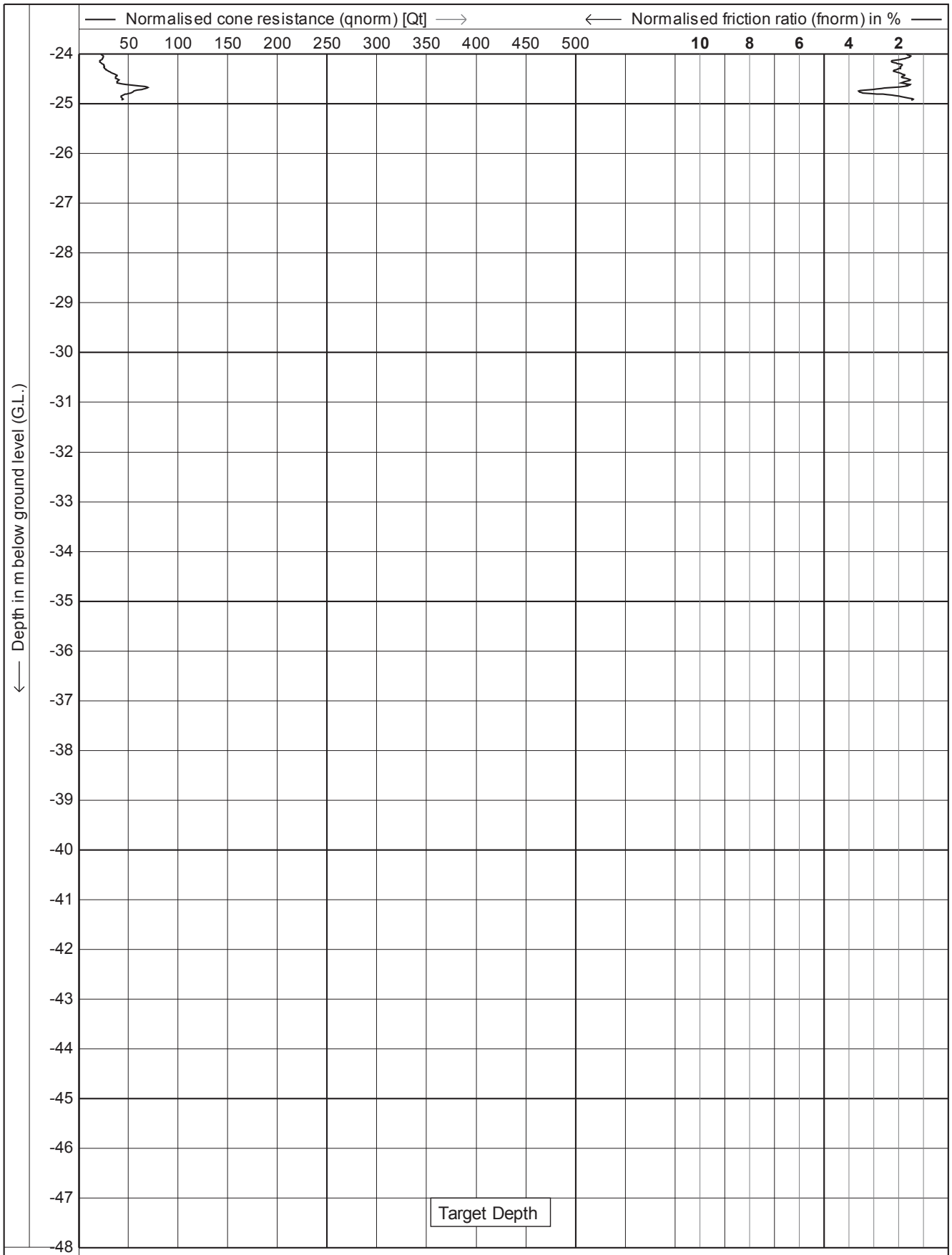
14/28

CPTask V1.25



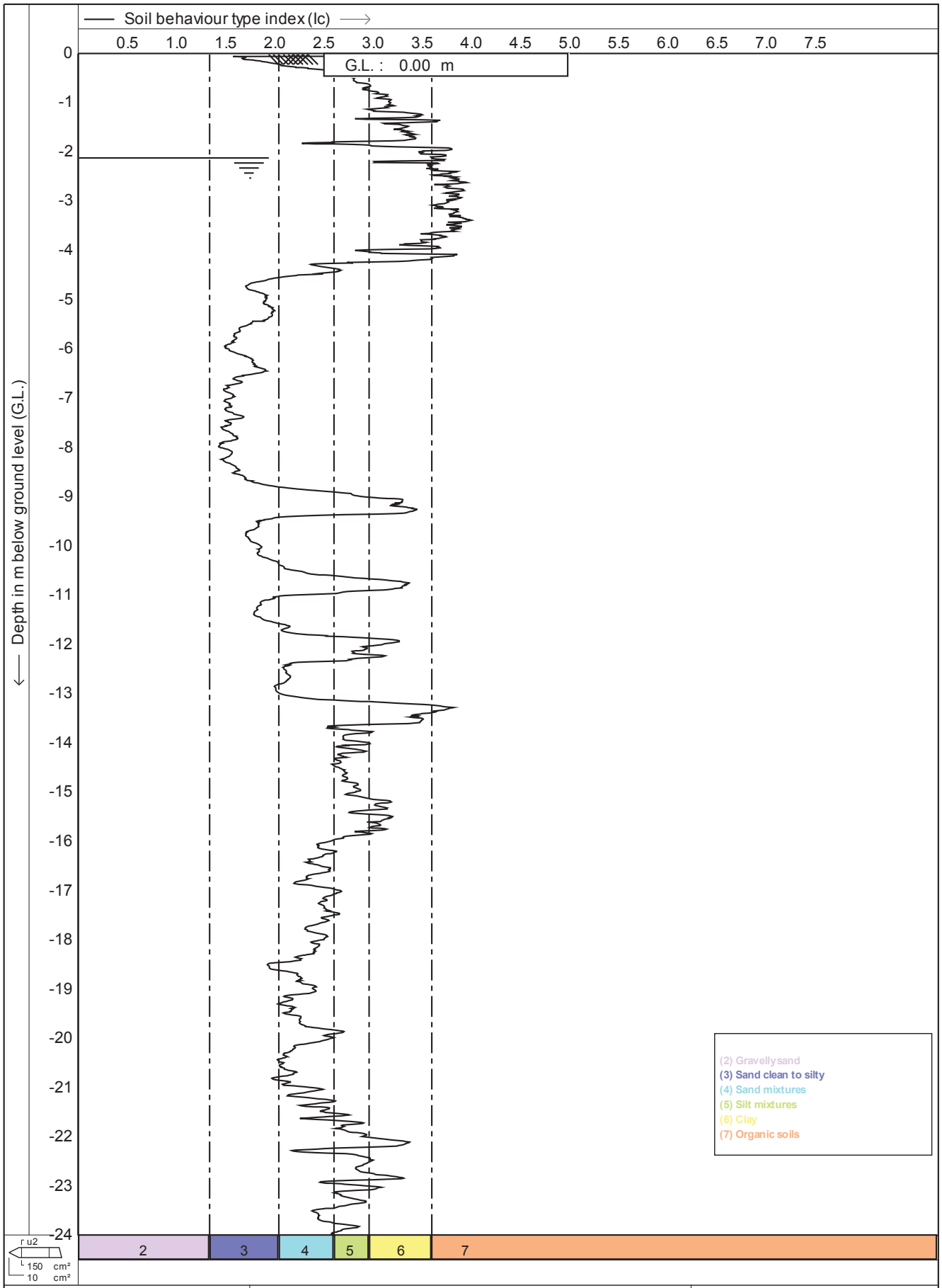
Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
	Cone no.	: C10CFIIP.F14
Project : **Site Investigations**	Project no.	: 01AECOM3
Location: **Southern Links - Hamilton**	CPT no.	: 13 — 15/28

CPTask V1.25



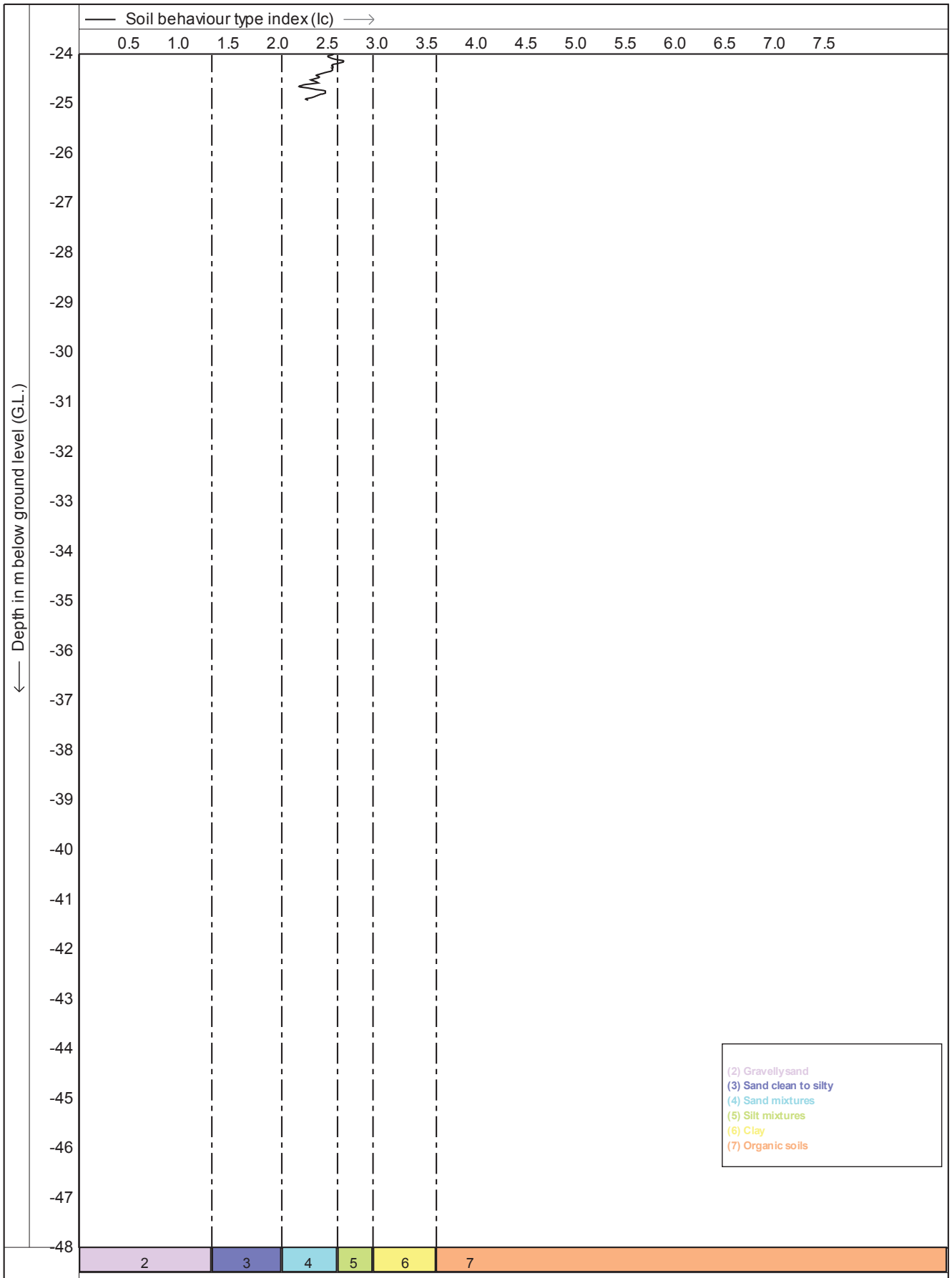
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**
		Project no. : **01AECOM3**
	Location: **Southern Links - Hamilton**	CPT no. : **13** 16/28

CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : 20-4-2011	
	Project : Site Investigations	Cone no. : C10CFIIP.F14	
		Project no. : 01AECOM3	
	Location: Southern Links - Hamilton	CPT no. : 13	17/28

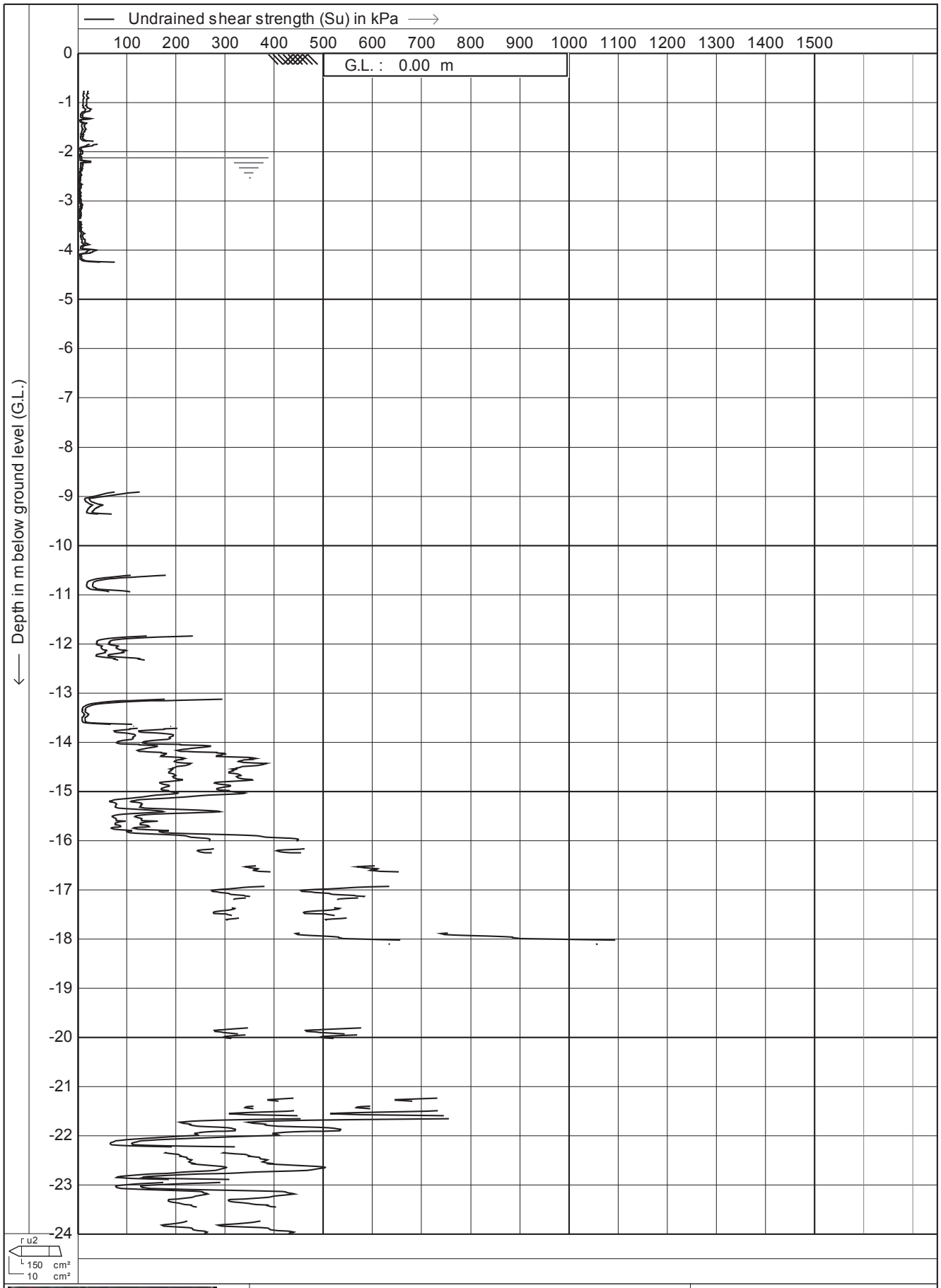
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
	Cone no.	: C10CFIIP.F14
Project : Site Investigations	Project no.	: 01AECOM3
Location: Southern Links - Hamilton	CPT no.	: 13

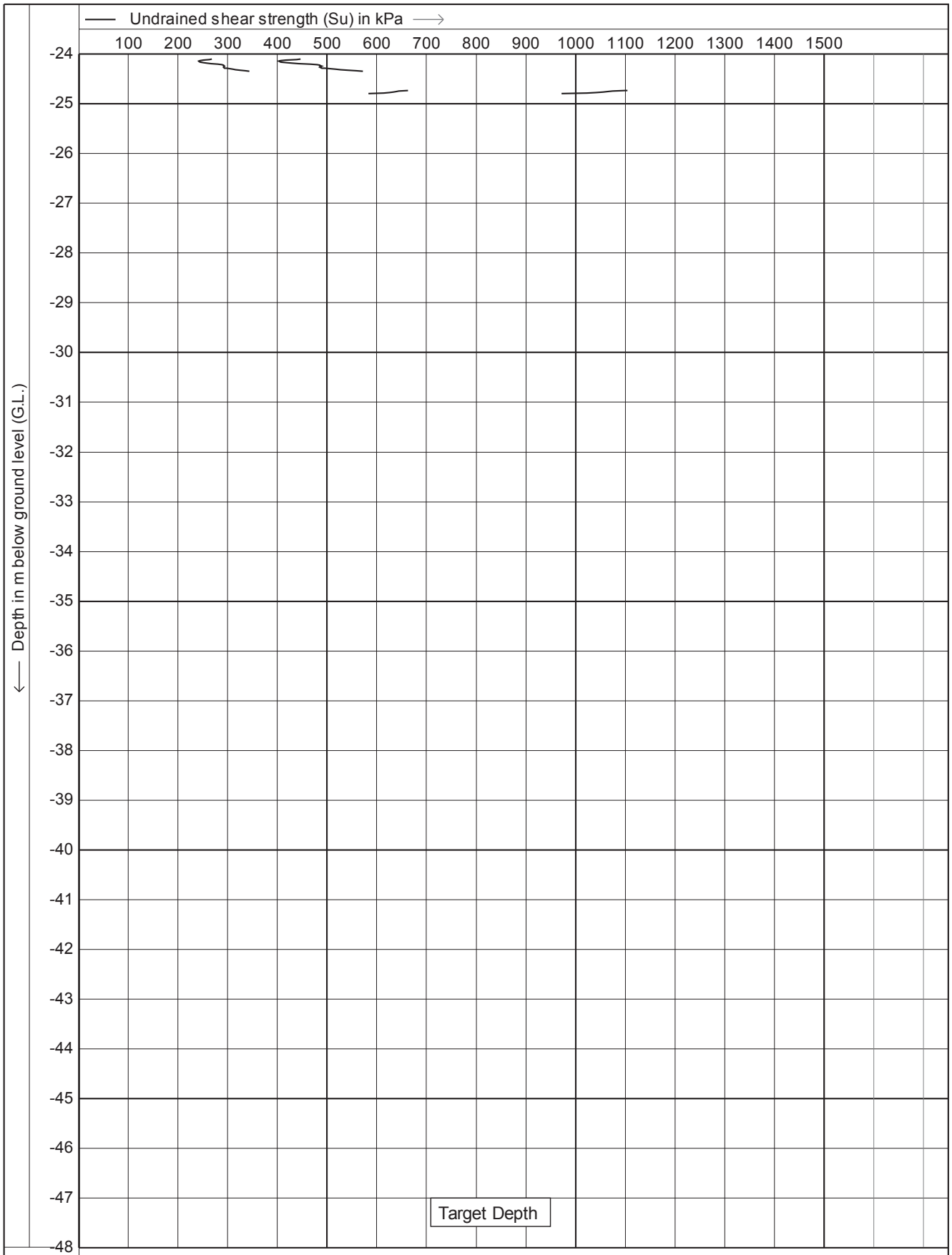
18/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**19/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

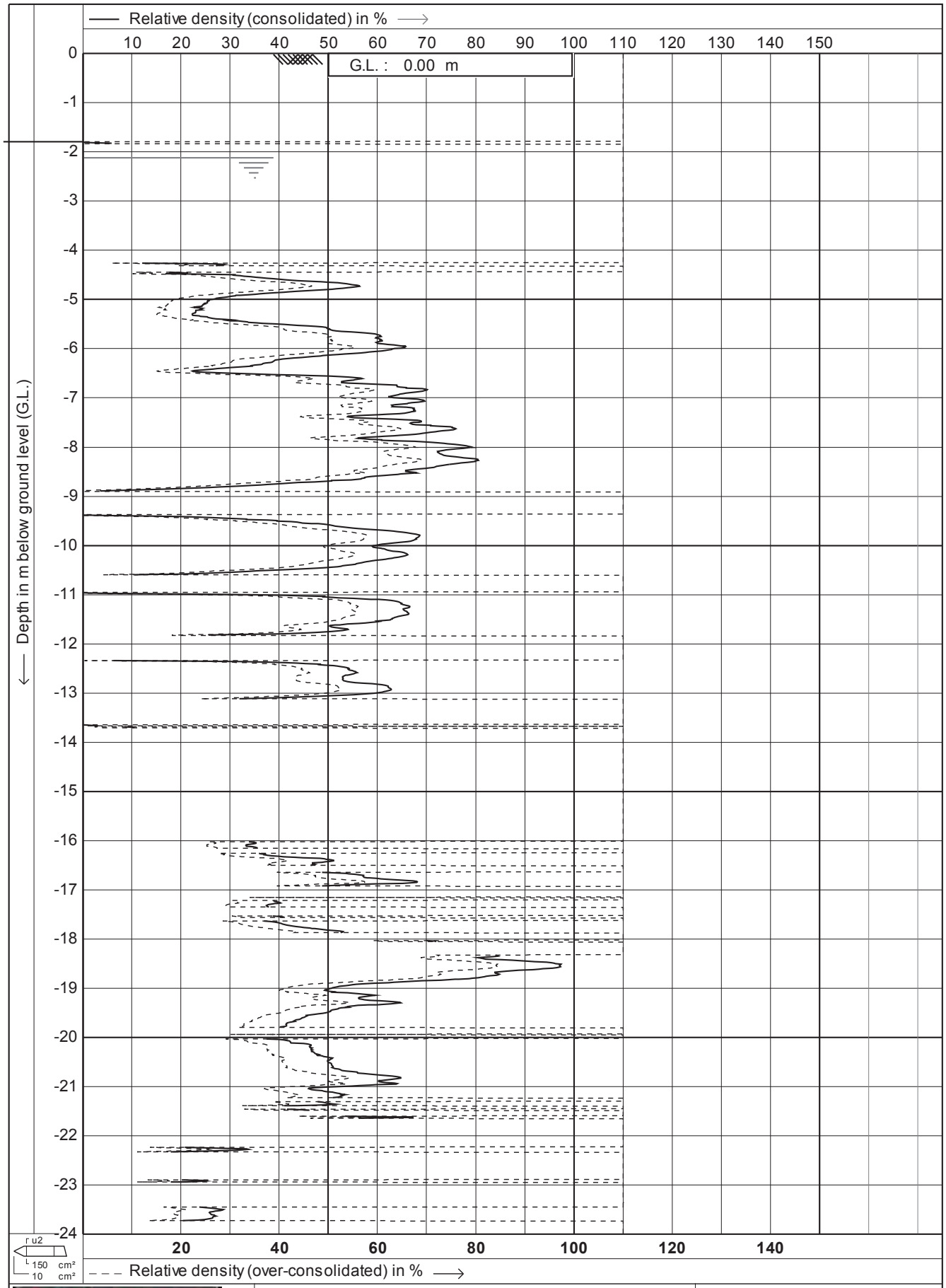
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

20/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

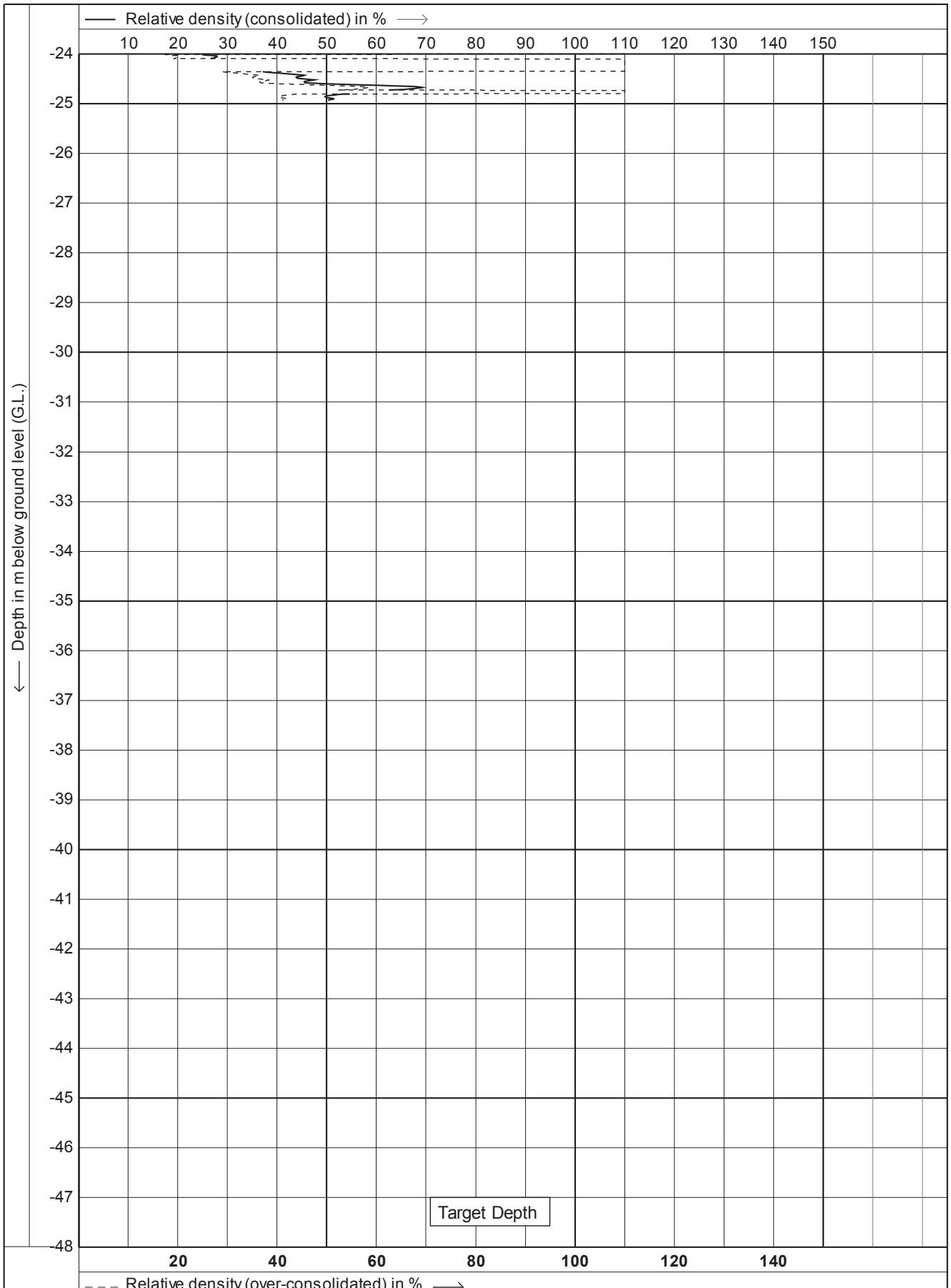
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

21/28

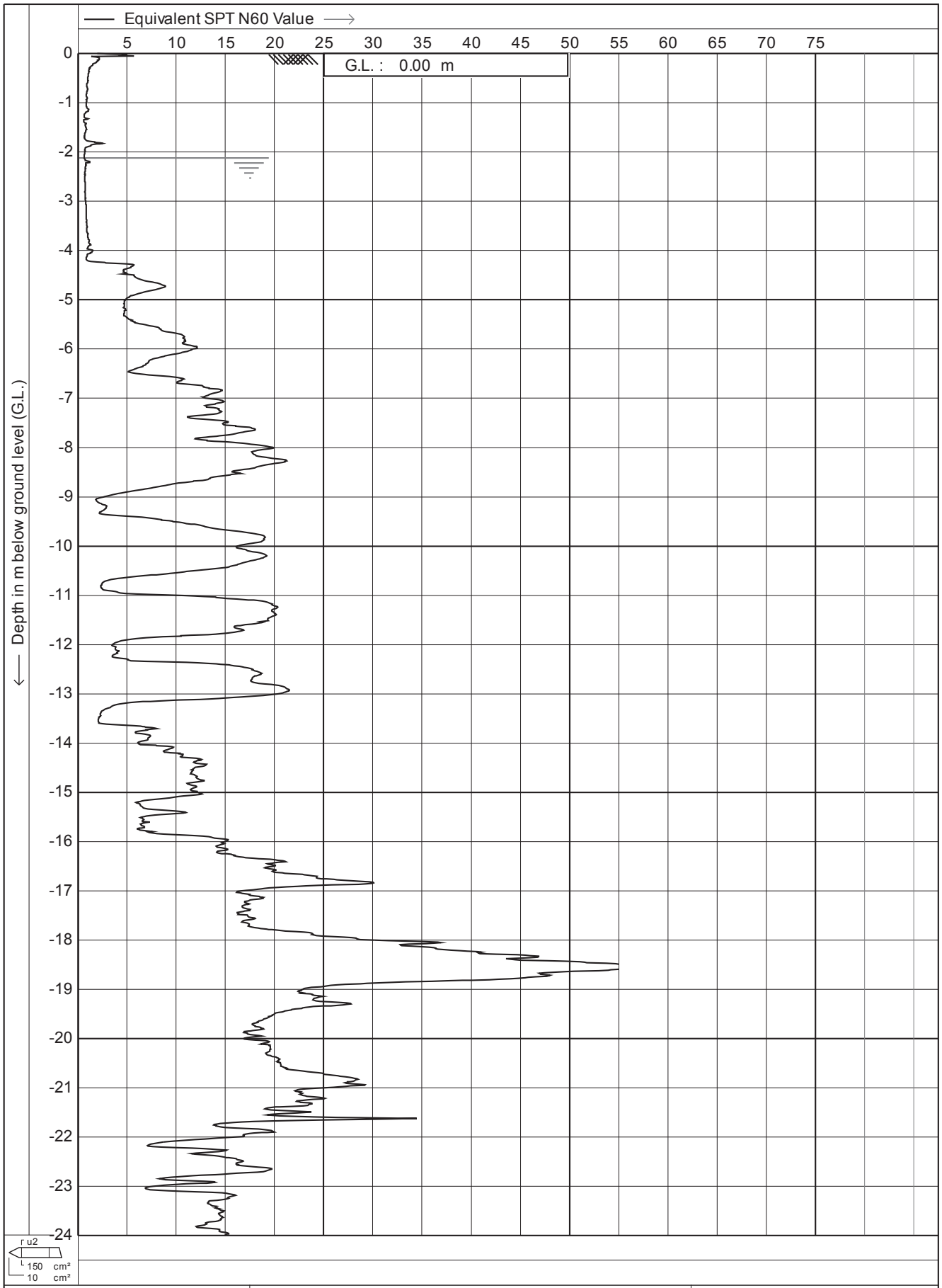
CPTask V1.25



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 20-4-2011
		Cone no.	: C10CFIIP.F14
	Project : Site Investigations	Project no.	: 01AECOM3
	Location: Southern Links - Hamilton	CPT no.	: 13

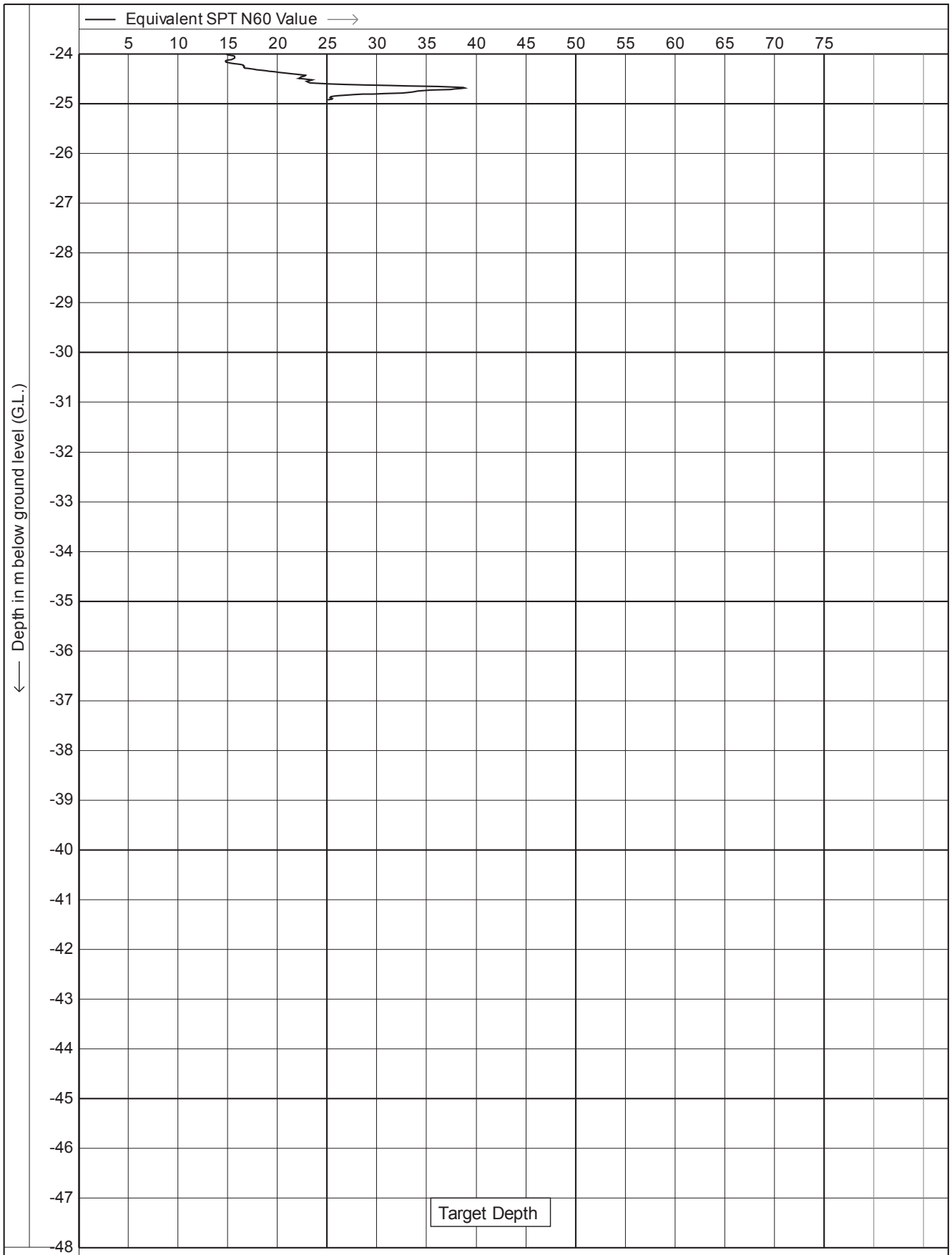
22/28

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**23/28**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

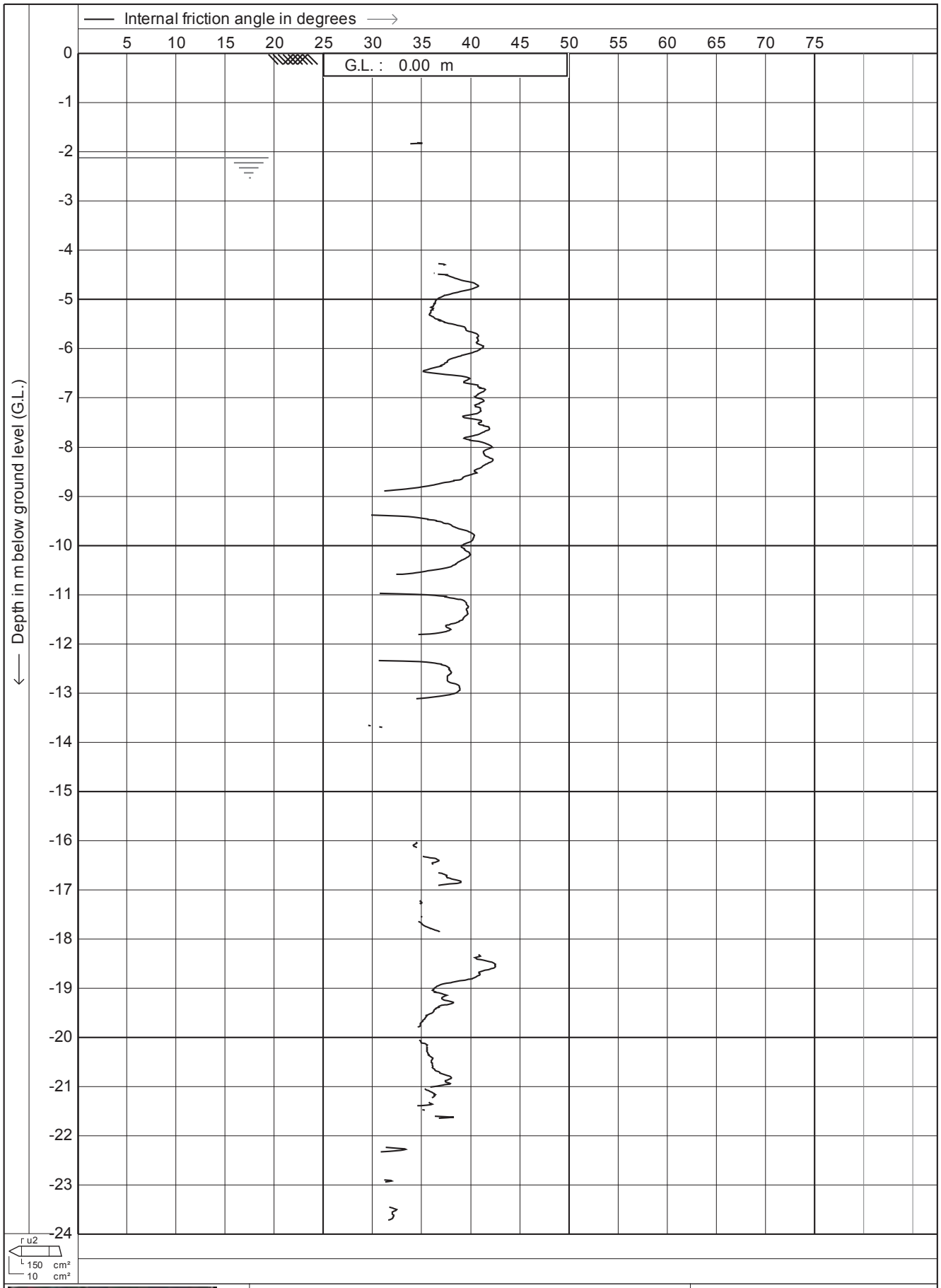
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

24/28

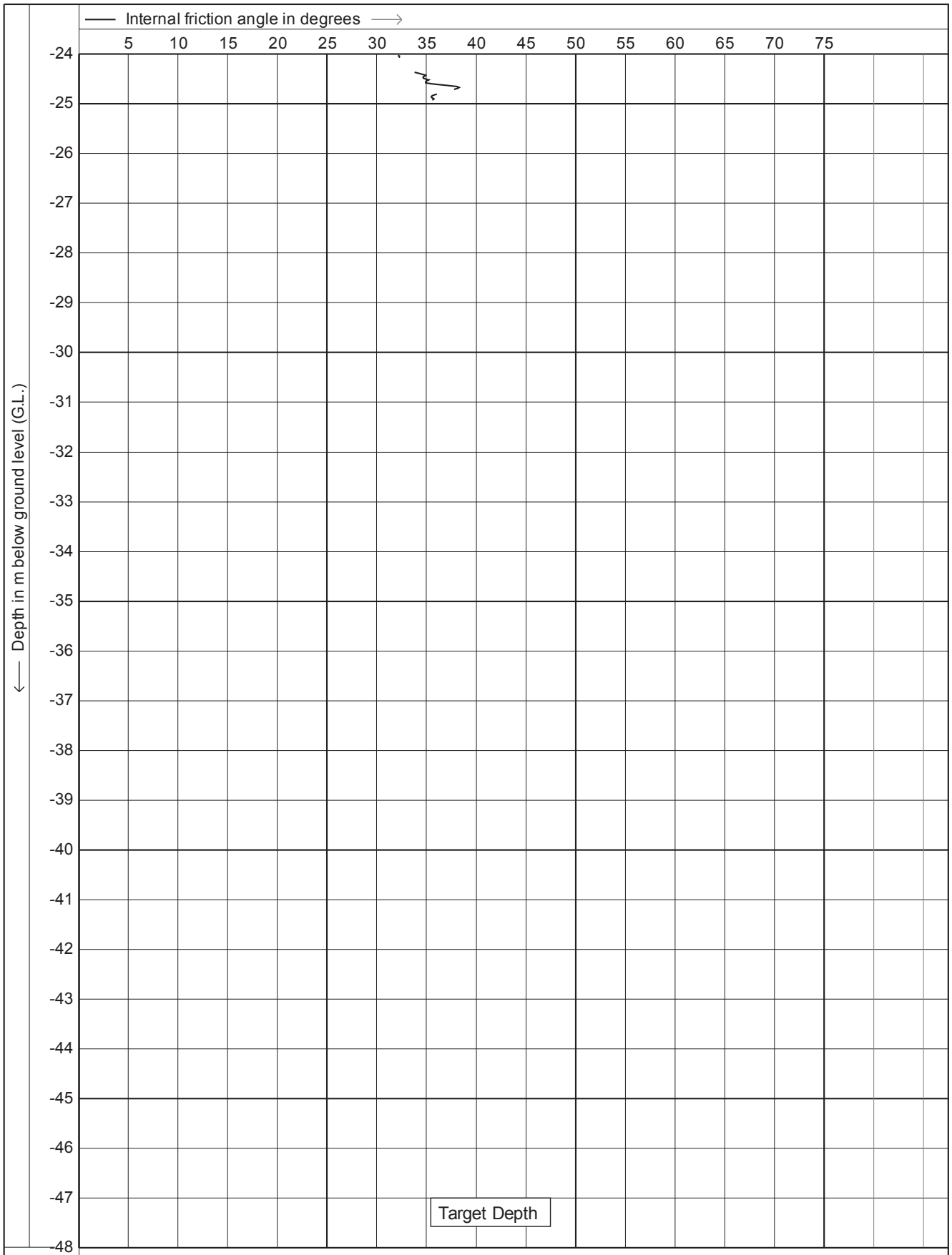
CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **20-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **13**	**27/28**

CPTask V1.25

NZGD ID: CPT_108373



CPTask V1.25

Test according A.S.T.M. Standard D 5778-95

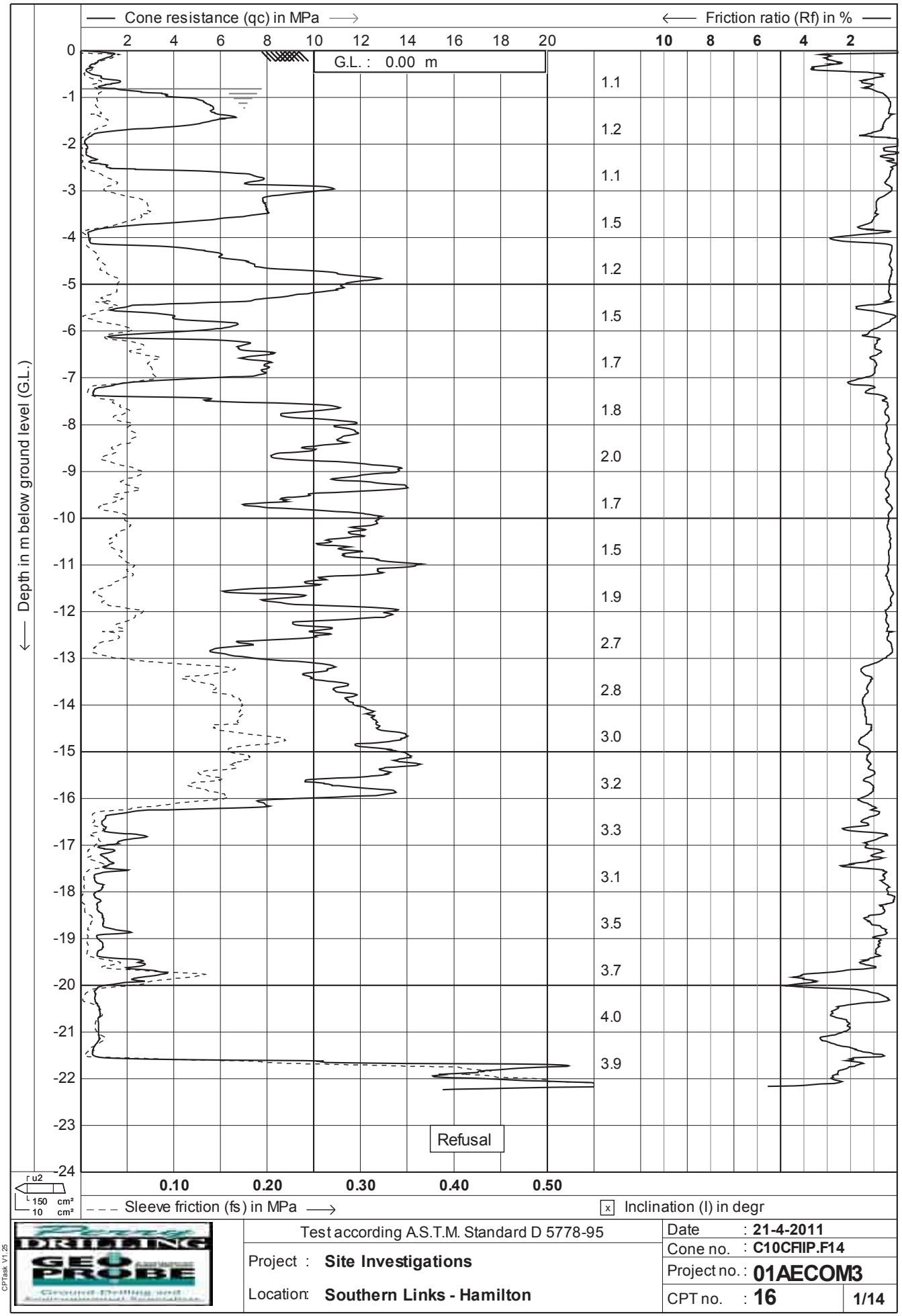
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **20-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **13**

28/28

NZGD ID: CPT_108373



Test according A.S.T.M. Standard D 5778-95

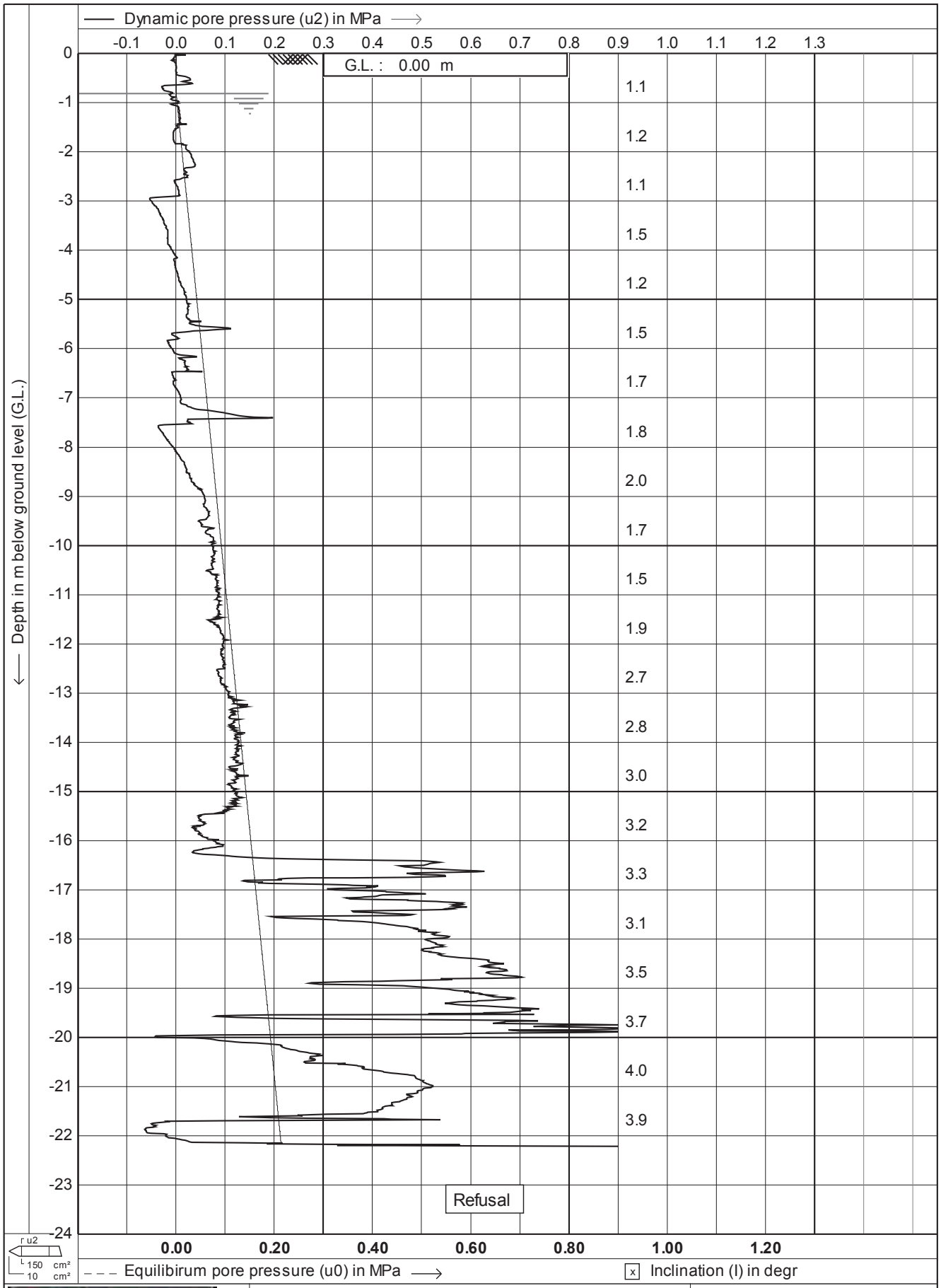
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **16**

1/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

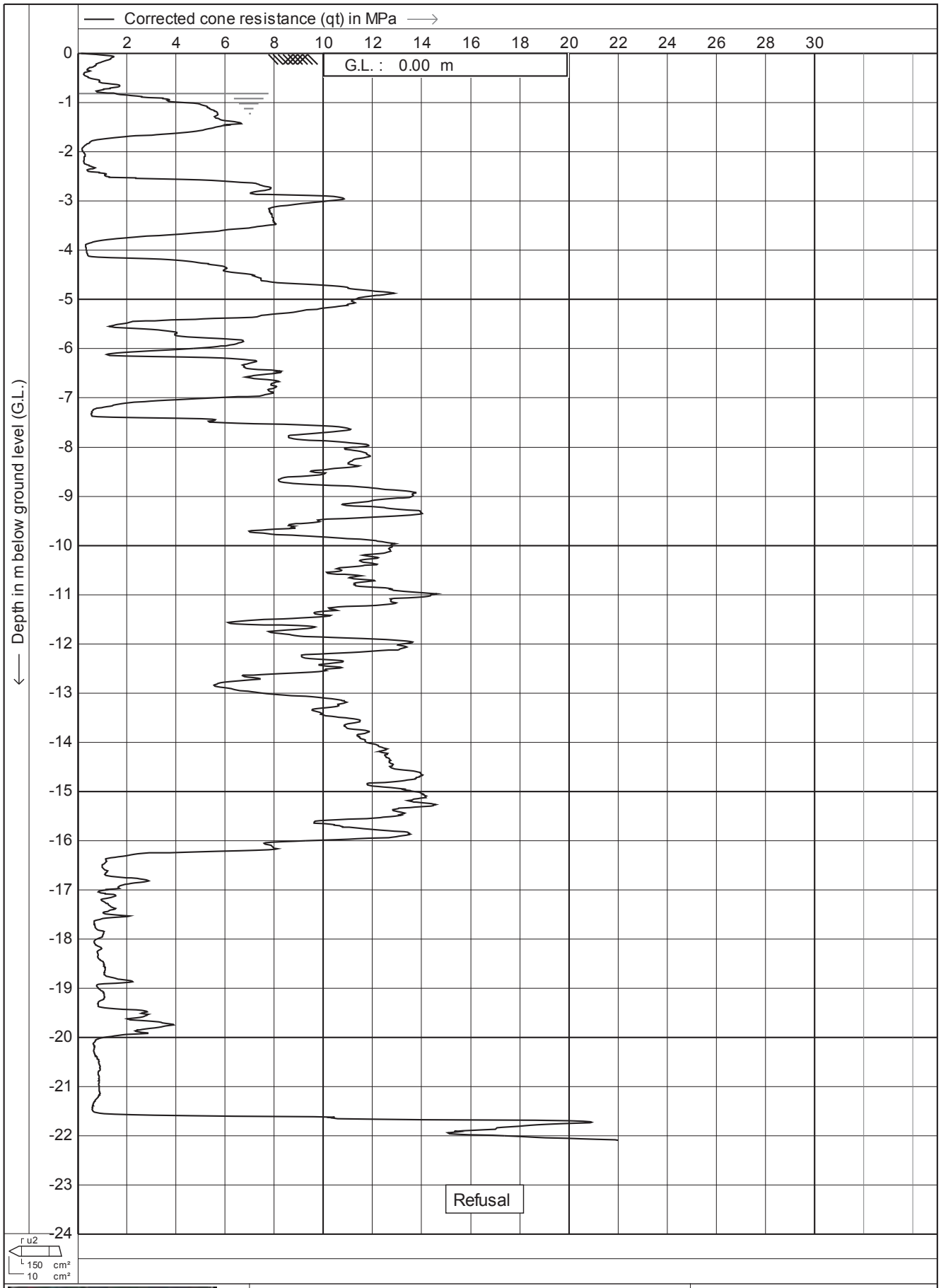
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **16**

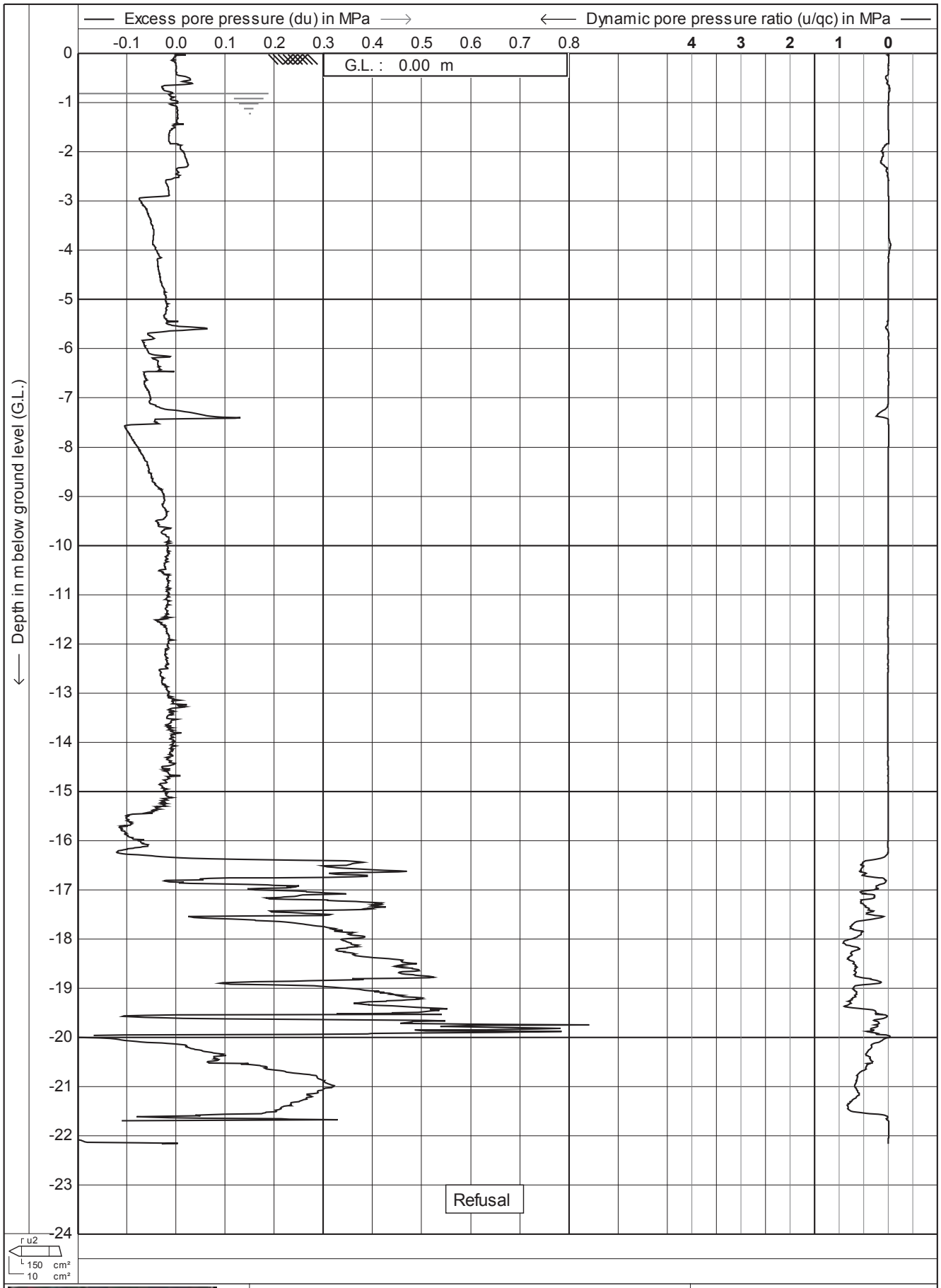
2/14

CPTask V1.25



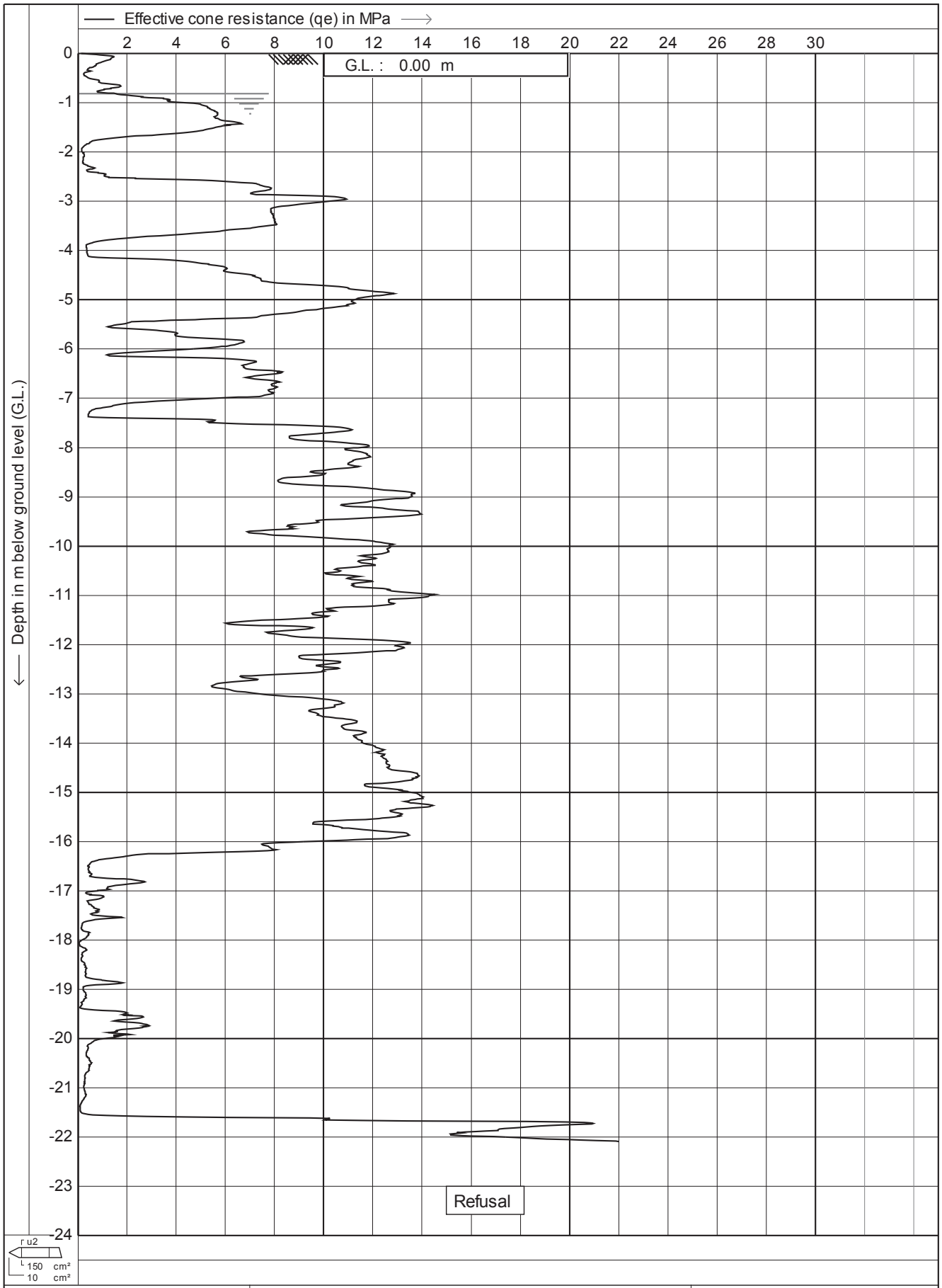
Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**3/14**

CPTask V1.25



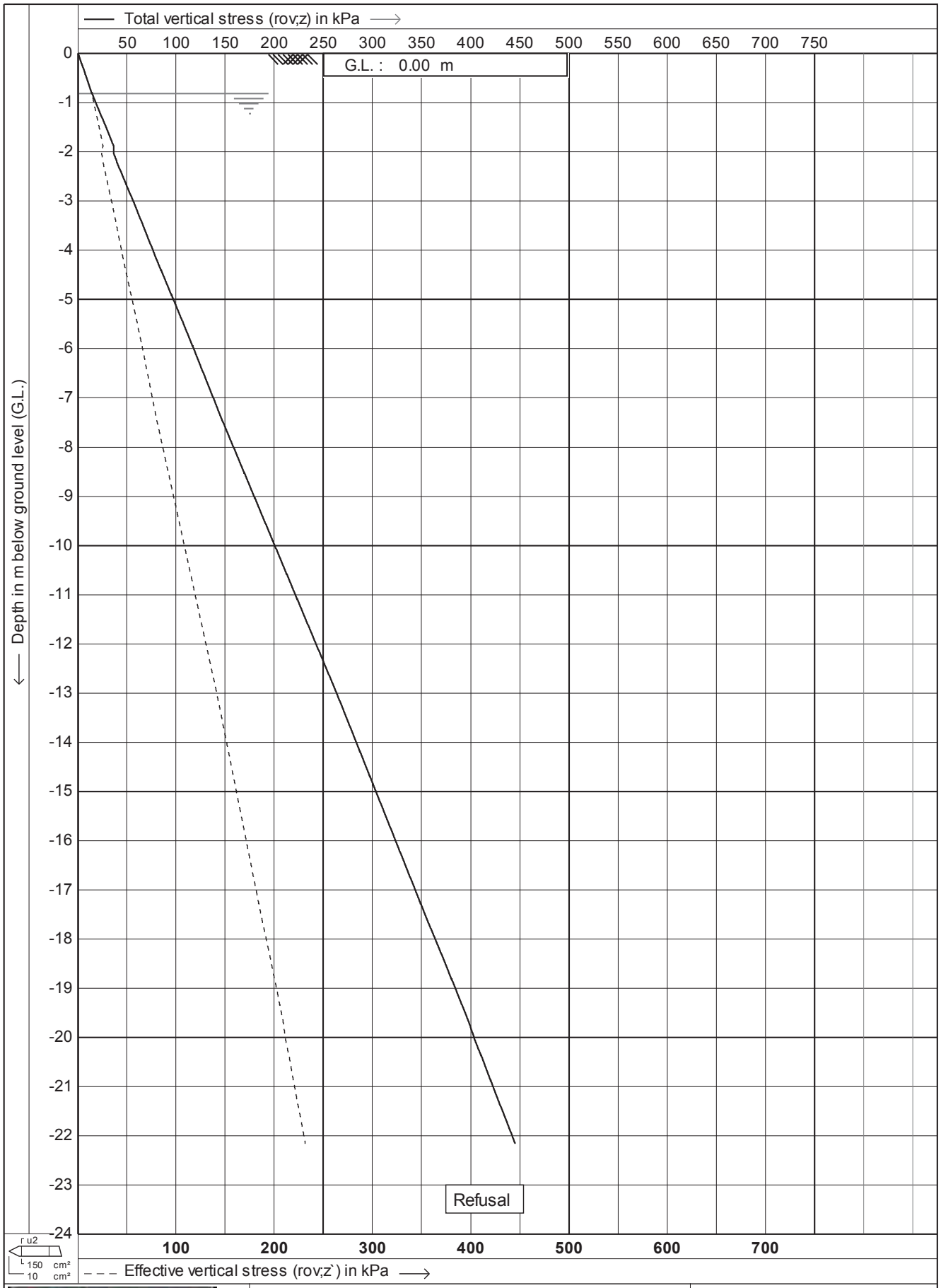
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 16 4/14

CPTask V1.25



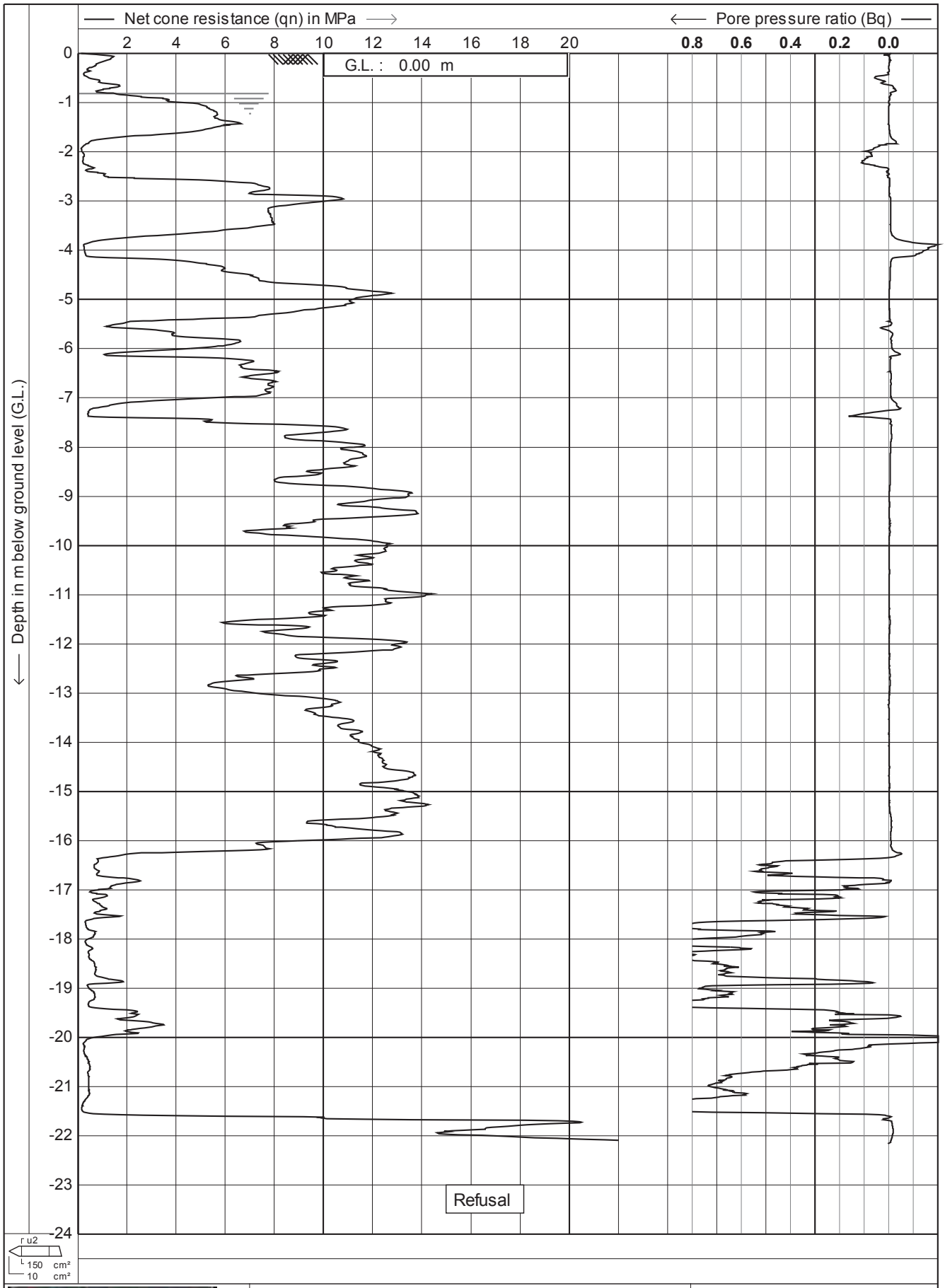
Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**5/14**

CPTask V1.25



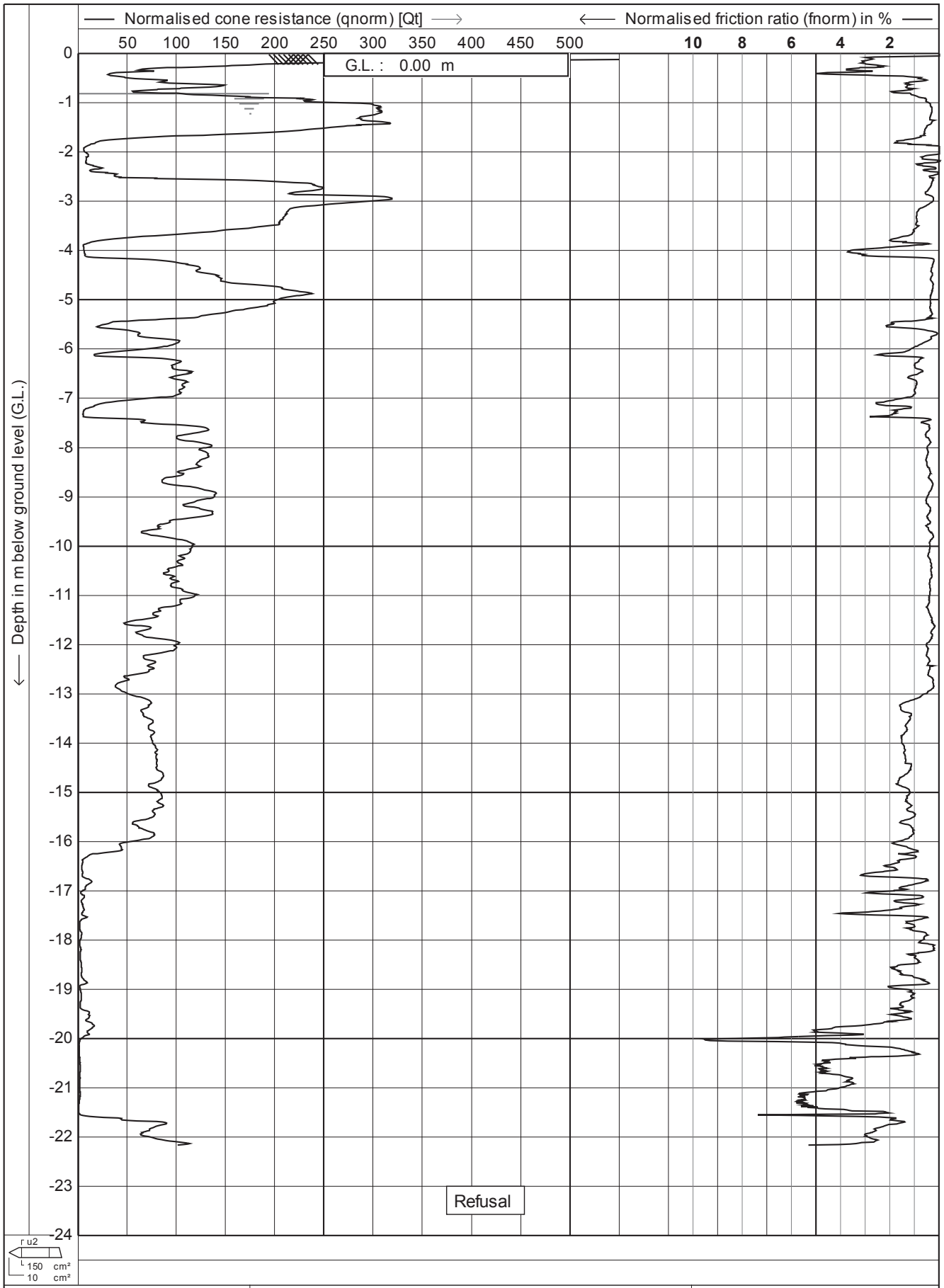
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date	: 21-4-2011
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 01AECOM3
	Location: **Southern Links - Hamilton**	CPT no.	: 16

CPTask V1.25



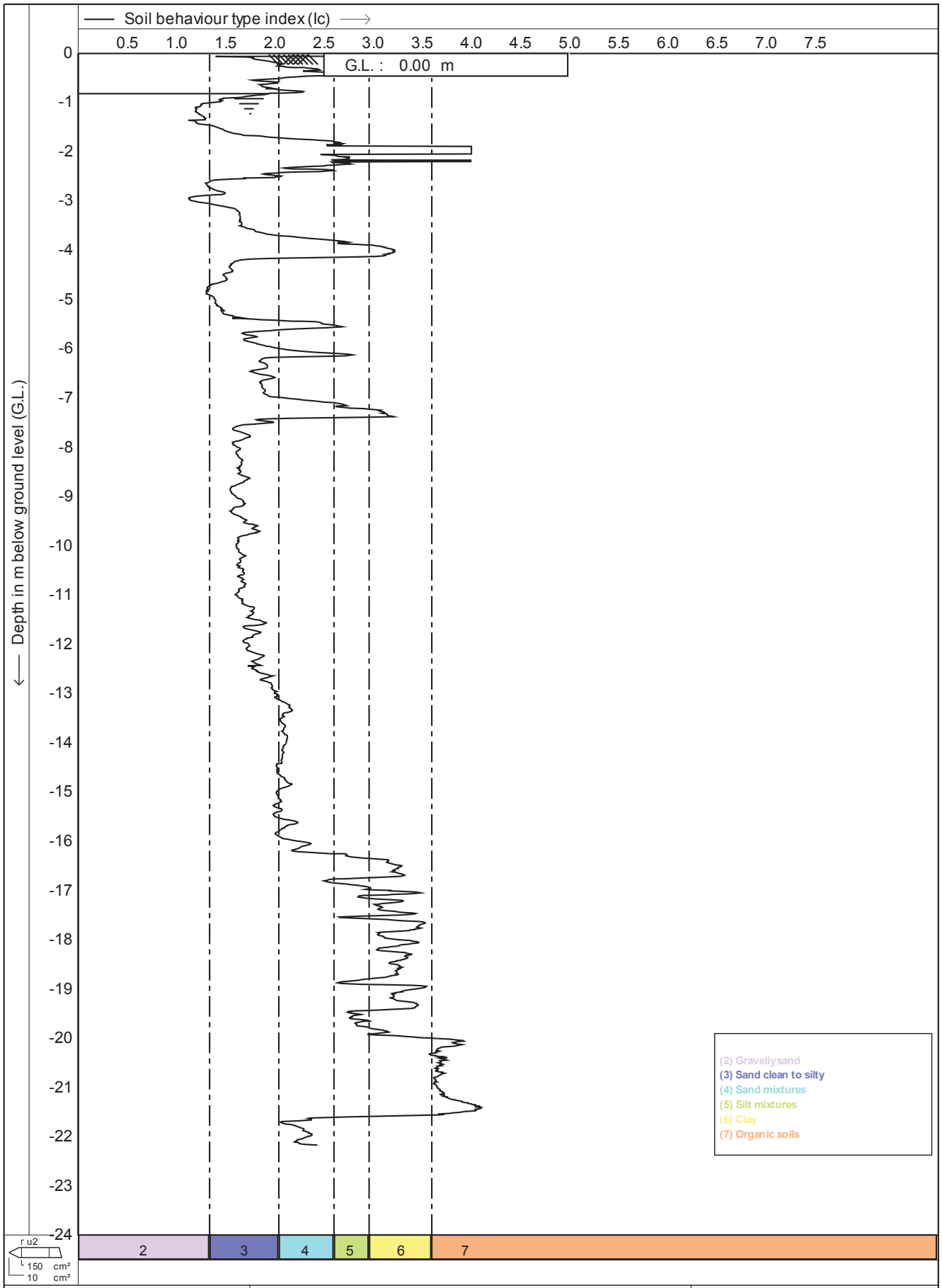
Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**7/14**

CPTask V1.25



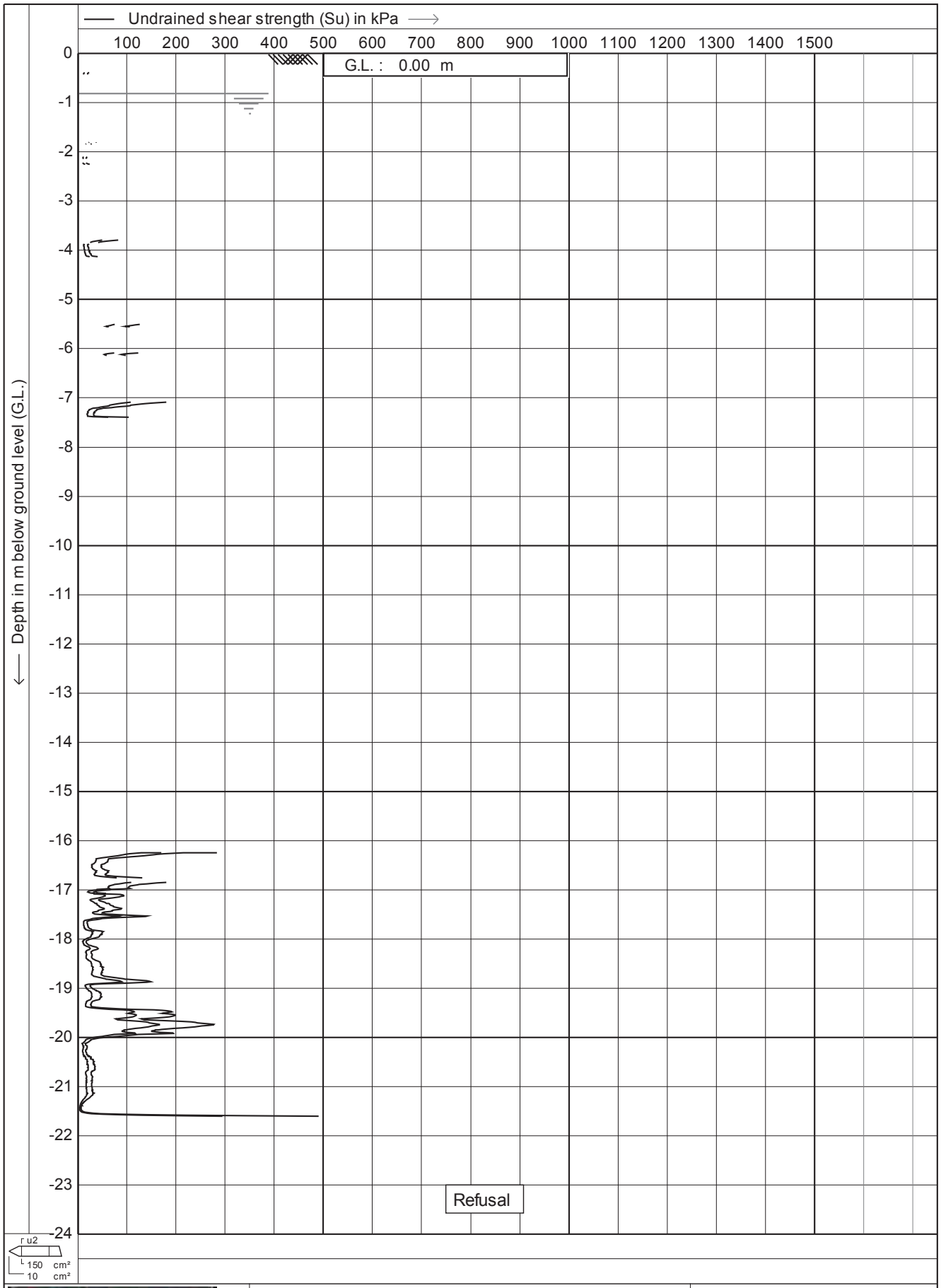
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **01AECOM3**	
	Location: **Southern Links - Hamilton**	CPT no. : **16**	**8/14**

CPTask V1.25



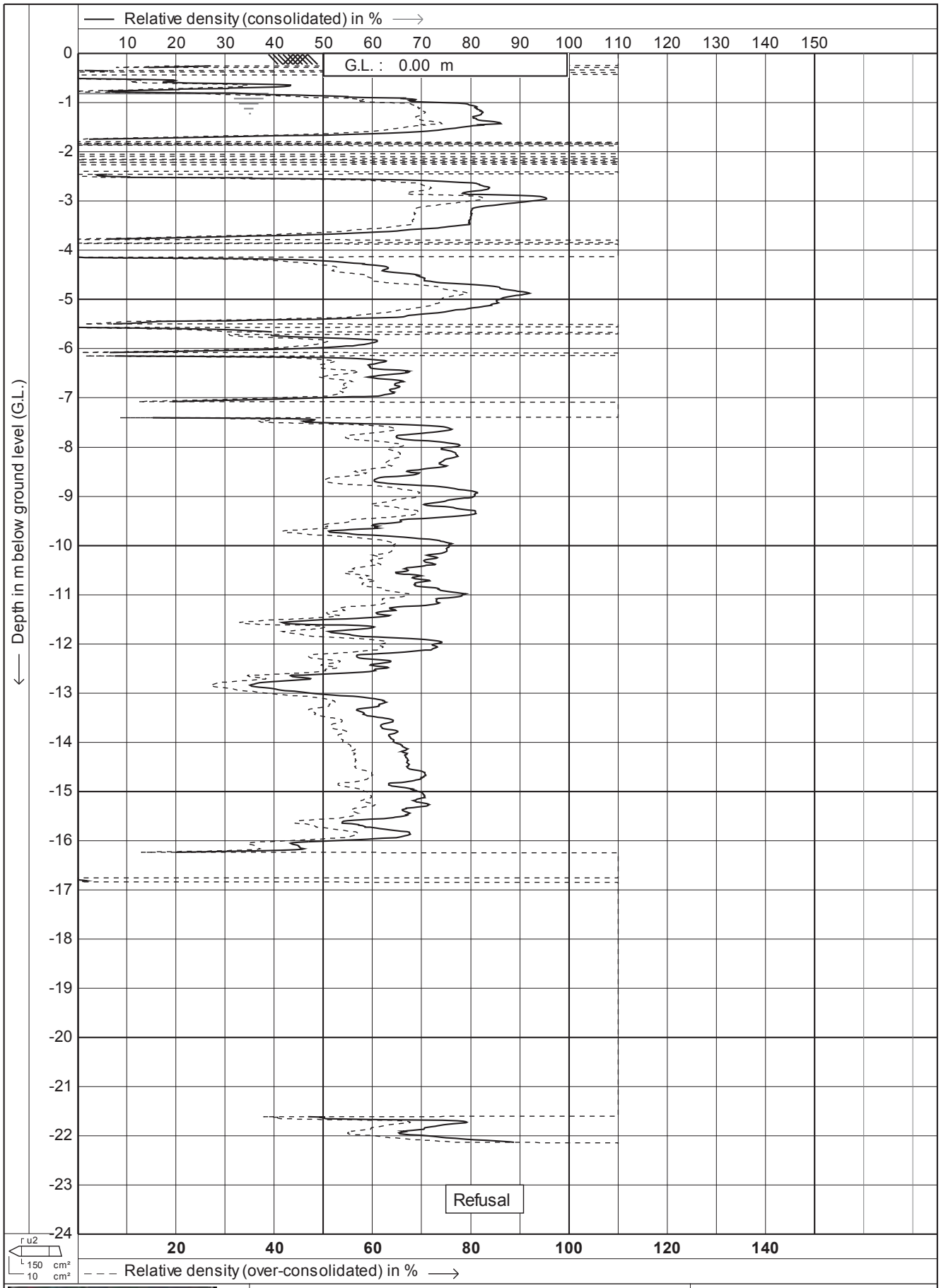
Test according A.S.T.M. Standard D 5778-95		Date	: 21-4-2011
Project :	Site Investigations	Cone no.	: C10CFIIP.F14
		Project no.	: 01AECOM3
Location:	Southern Links - Hamilton	CPT no.	: 16 9/14

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**10/14**

CPTask V1.25



Test according A.S.T.M. Standard D 5778-95

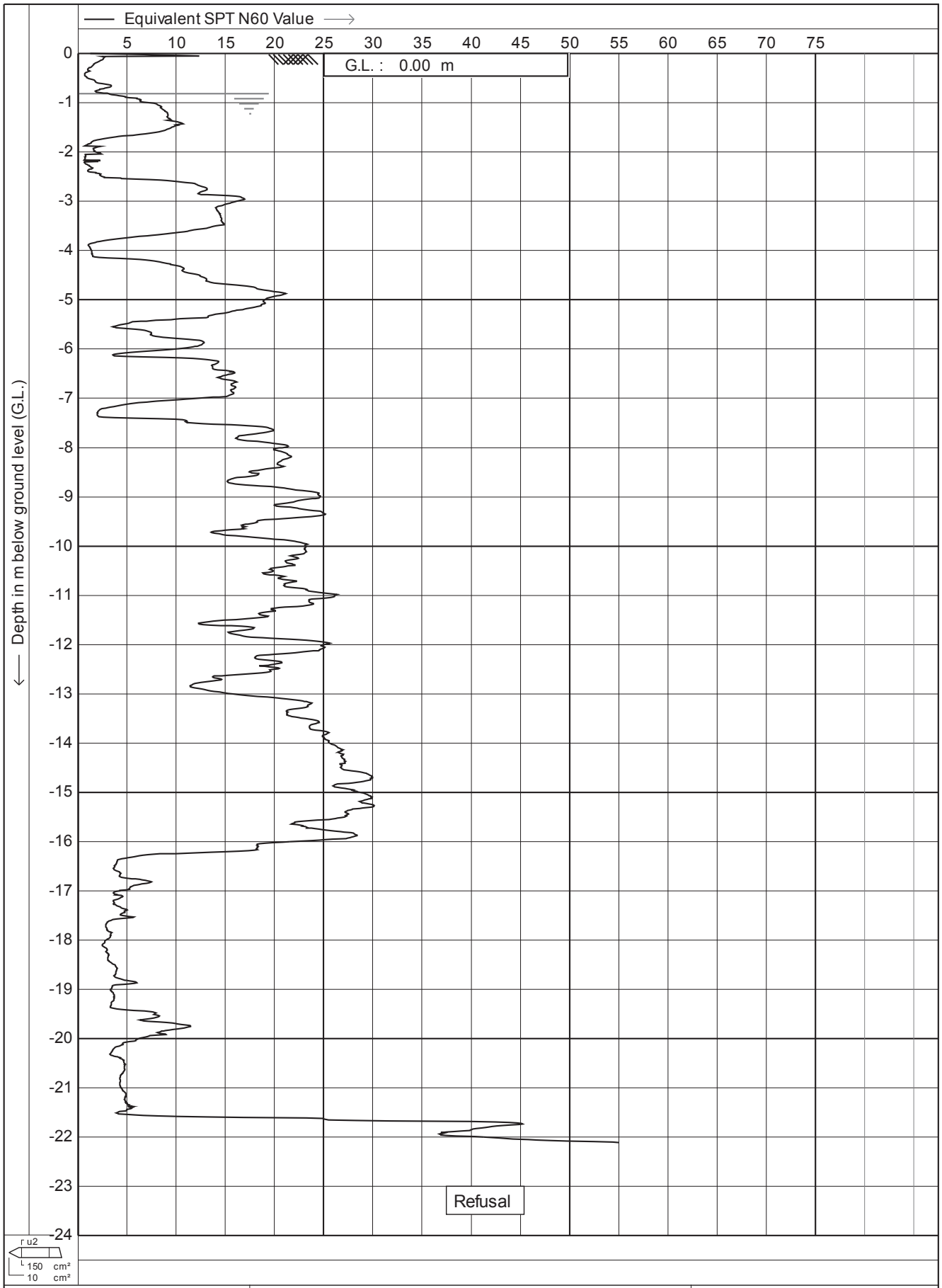
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **21-4-2011**
Cone no.	: **C10CFIIP.F14**
Project no.	: **01AECOM3**
CPT no.	: **16**

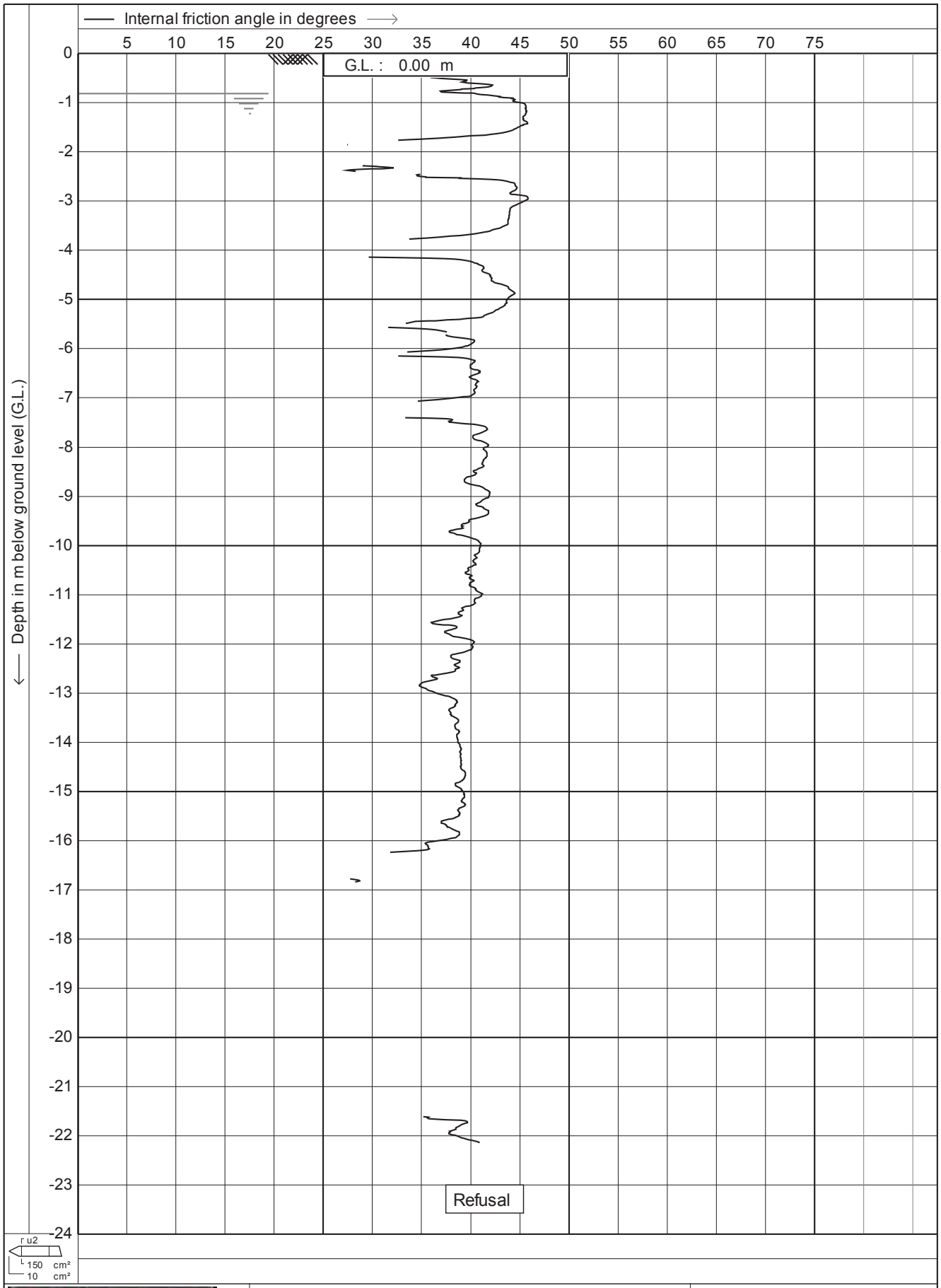
11/14

CPTask V1.25



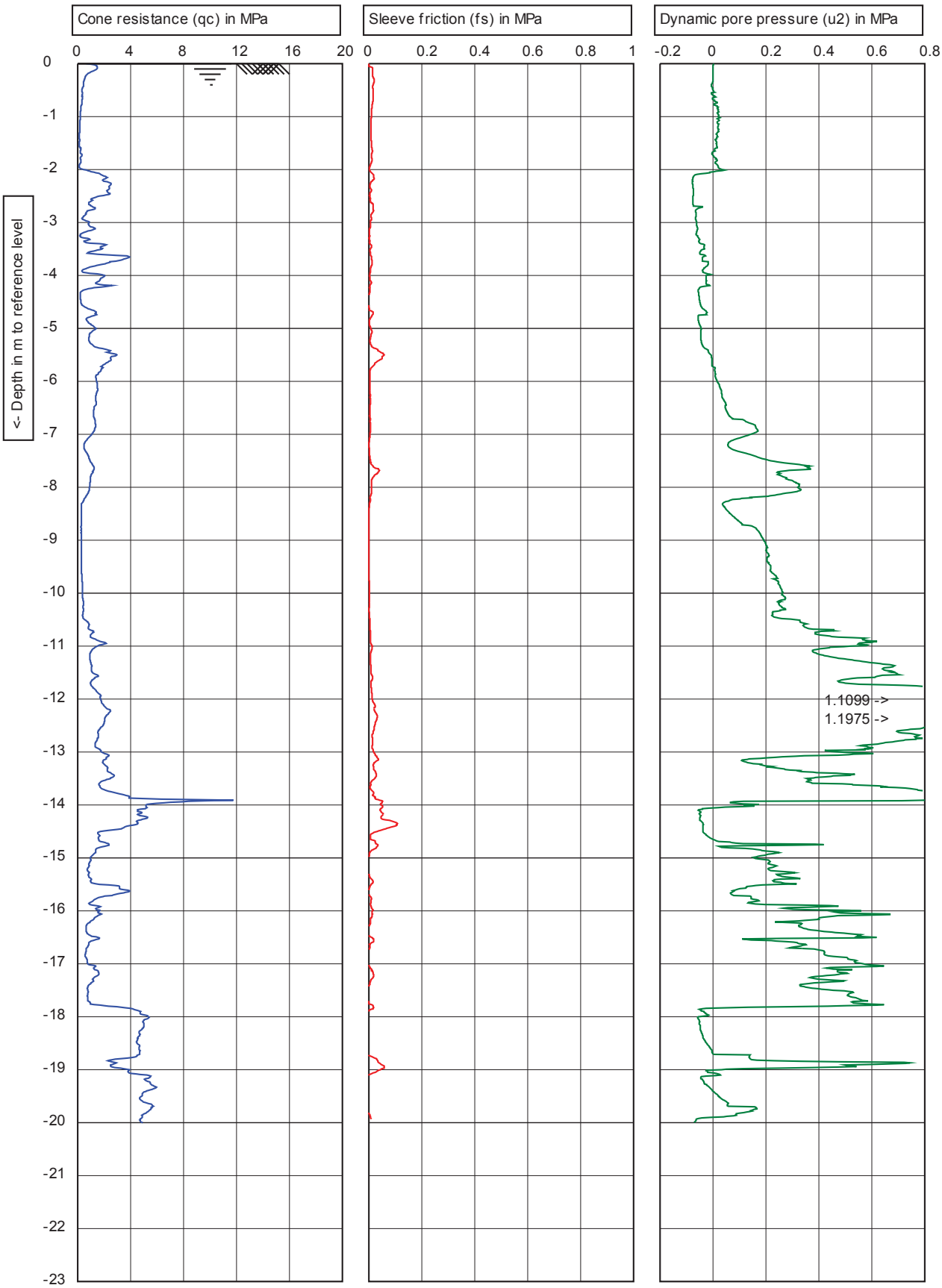
Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**12/14**

CPTask V1.25



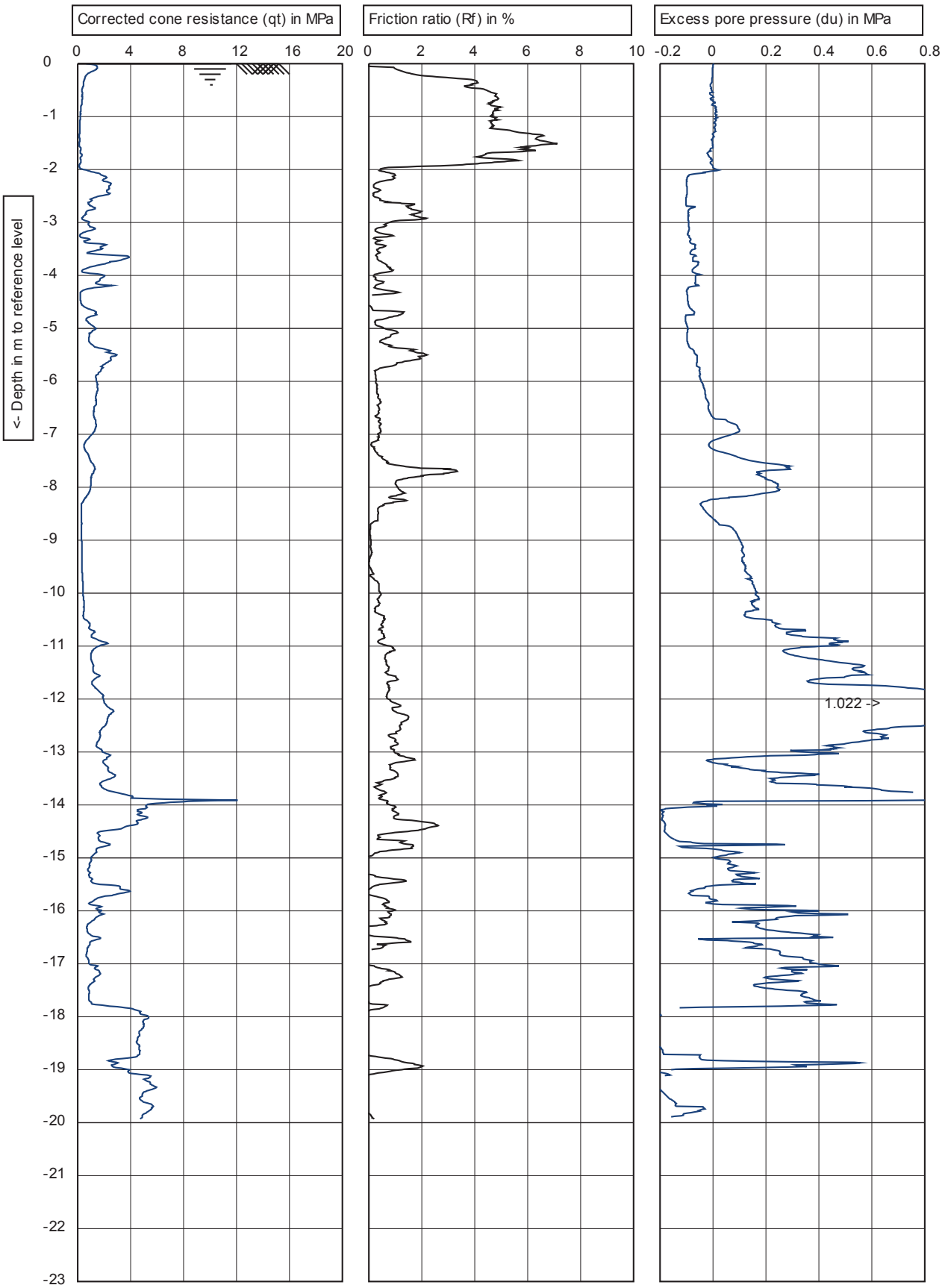
Test according A.S.T.M. Standard D 5778-95	Date : **21-4-2011**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **01AECOM3**	
Location: **Southern Links - Hamilton**	CPT no. : **16**	**14/14**

CPTask V1.25



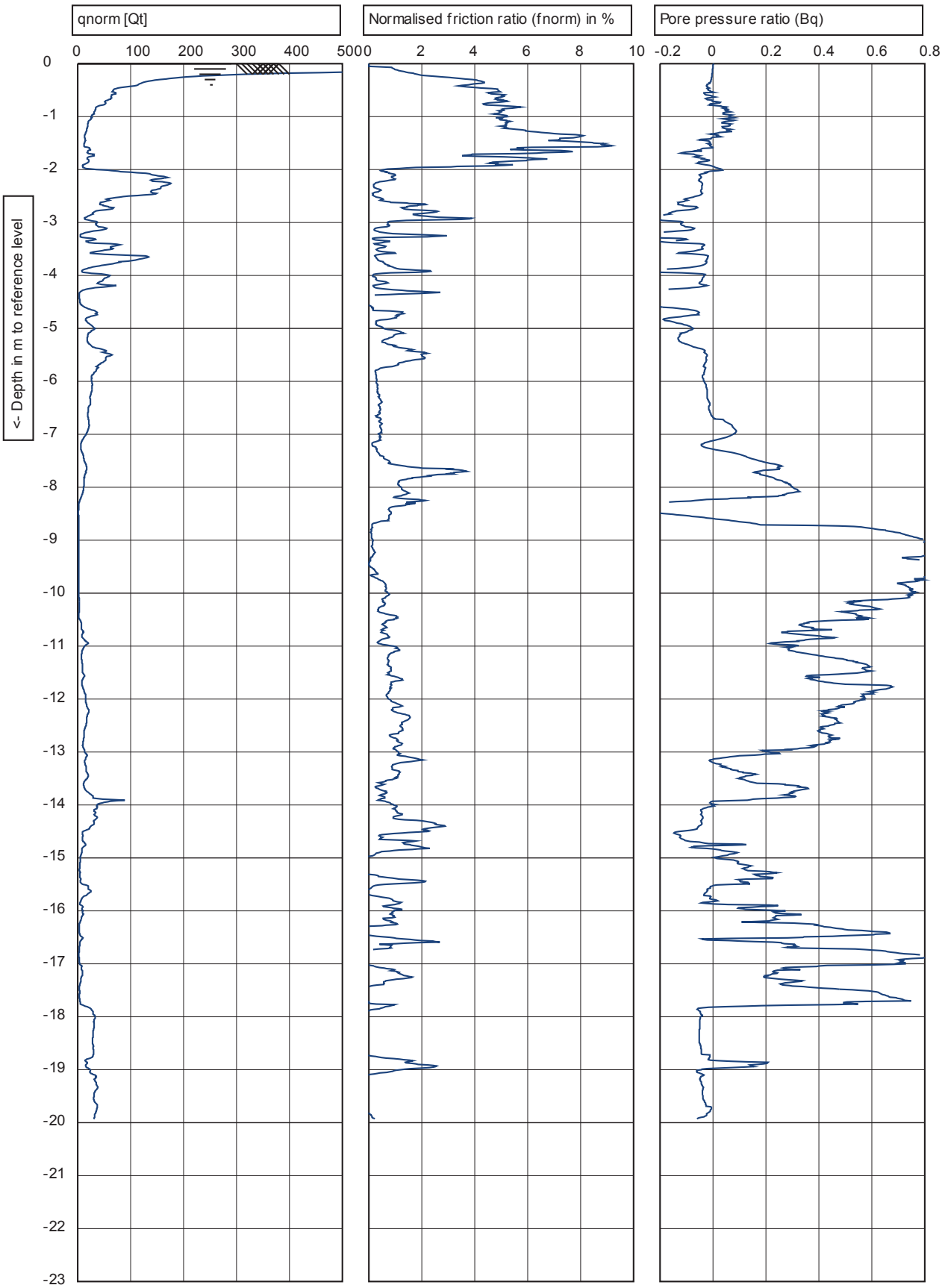
OPUS HAMILTON LABORATORIES	Test according to A.S.T.M. Standard D-5778-95	Predrill :	0
	G.L. 0 / W.L.: 0	Date:	15/02/2011
Project:	Hamilton Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2708866 N6374132	Project no.:	2-31653.00
Position:		CPT no.:	CPT017 1/6

CPTask V1.20



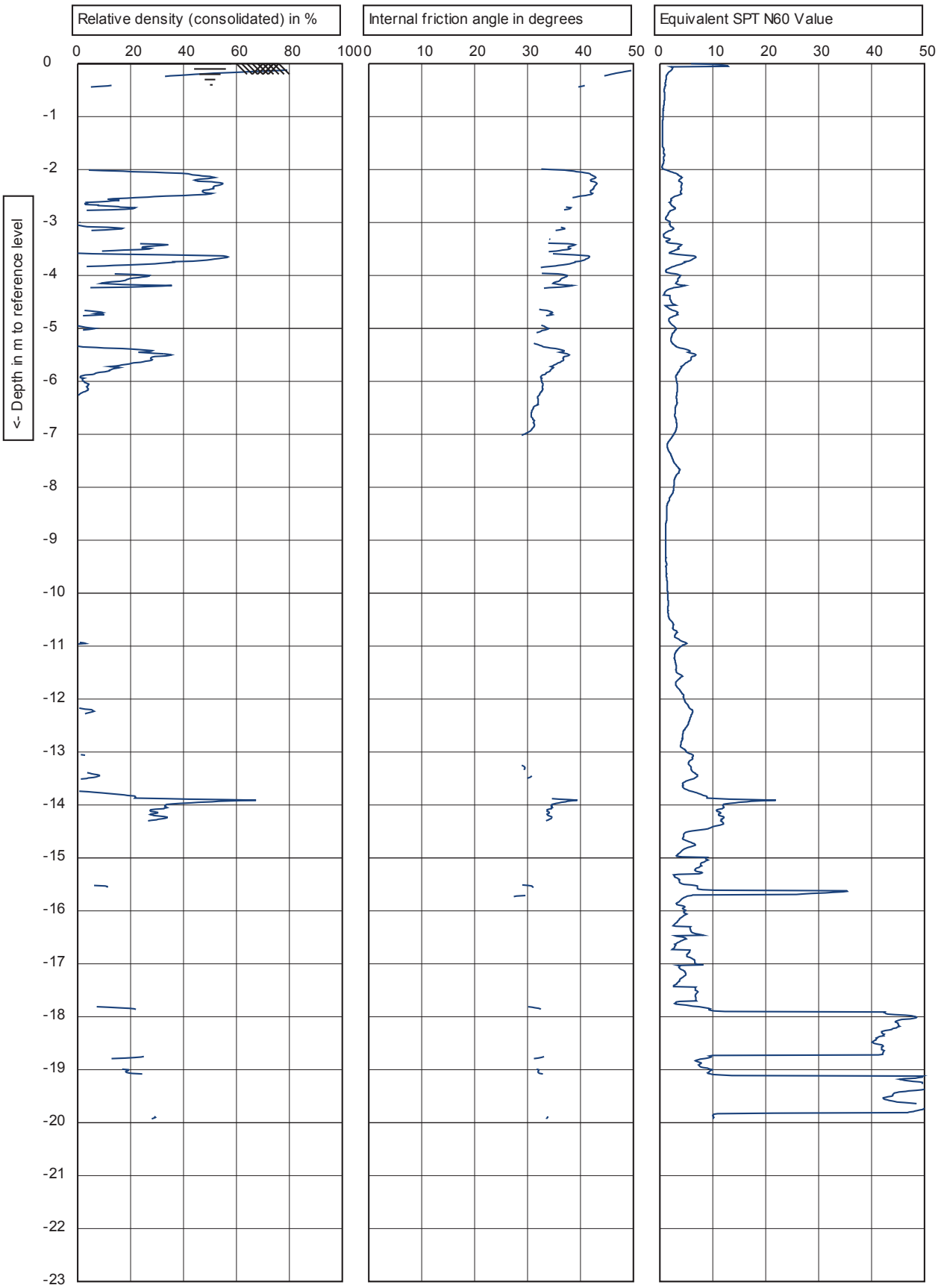
OPUS HAMILTON LABORATORIES	Test according to A.S.T.M. Standard D-5778-95	Predrill :	0
	G.L. 0 W.L.: 0	Date:	15/02/2011
Project:	Hamilton Southern Links	Cone no.:	C10CFIIP.E09
Location:	GPS: E2708866 N6374132	Project no.:	2-31653.00
Position:		CPT no.:	CPT017 2/6

CPTask V1.20



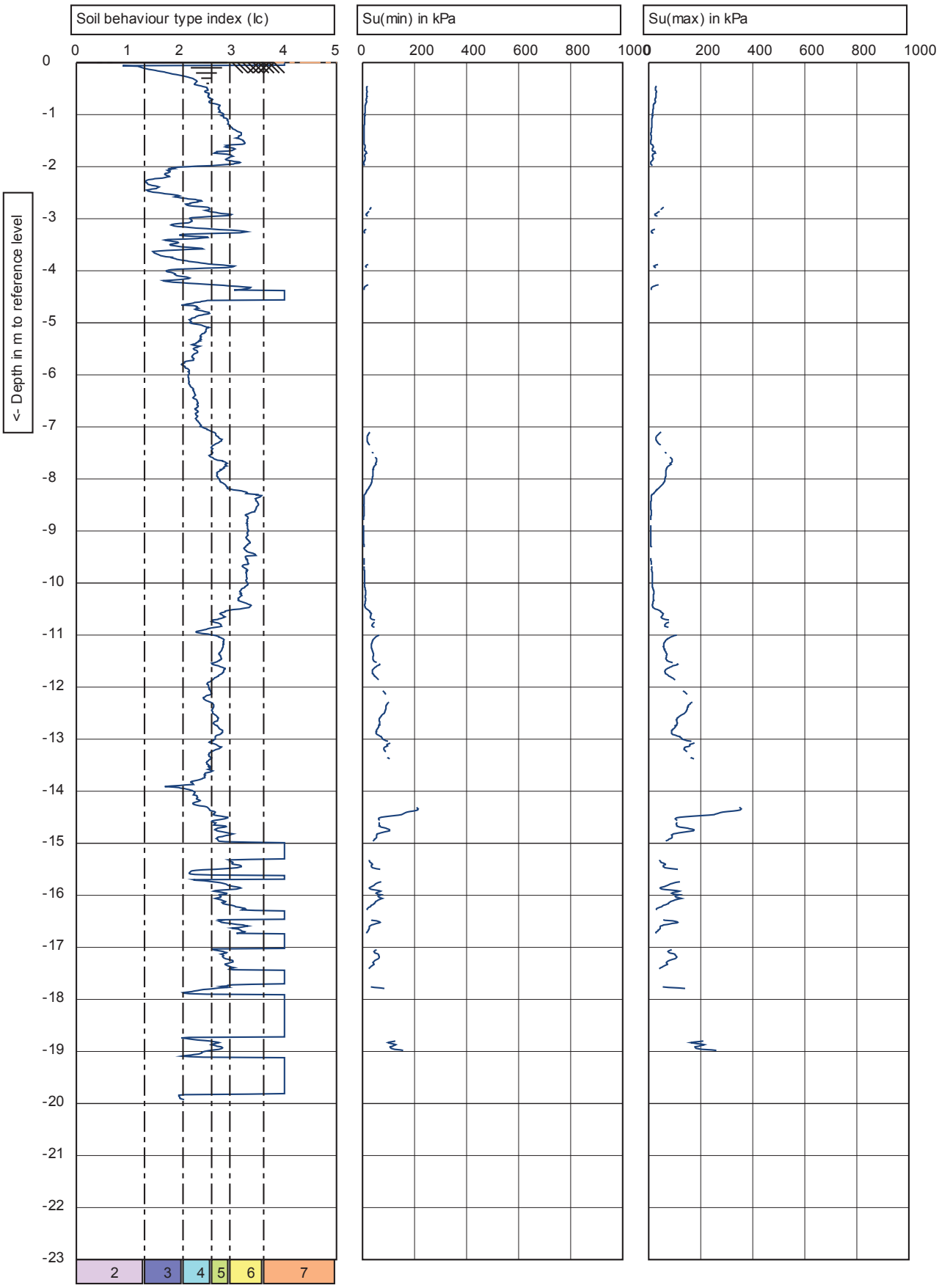
OPUS HAMILTON LABORATORIES	u2 150 cm² 10 cm²	Test according to A.S.T.M. Standard D-5778-95	Predrill : 0
		G.L. 0 W.L.: 0	Date: 15/02/2011
	Project:	Hamilton Southern Links	Cone no.: C10CFIIP.E09
	Location:	GPS: E2708866 N6374132	Project no.: 2-31653.00
	Position:		CPT no.: CPT017 3/6

CPTask V1.20



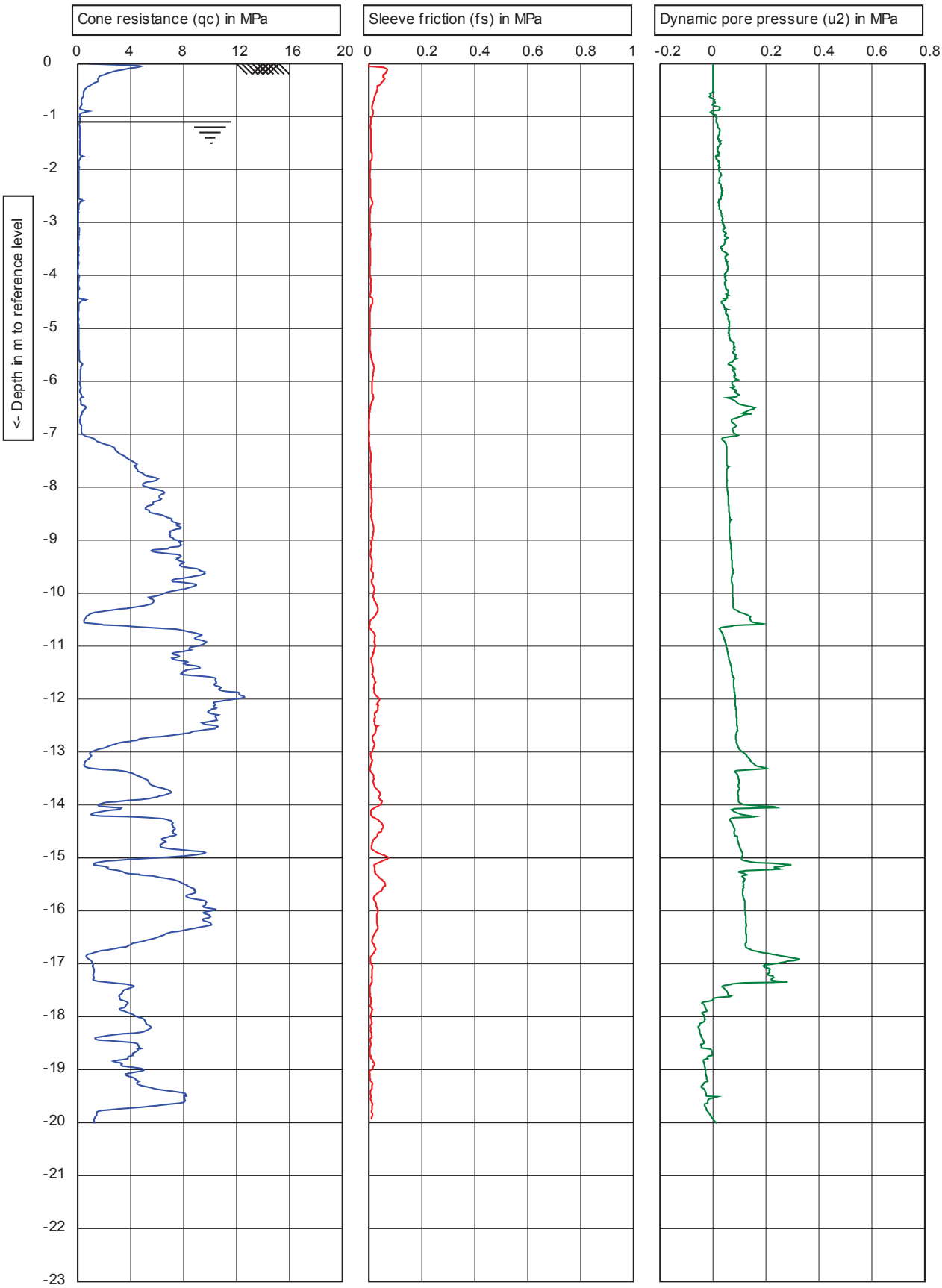
OPUS HAMILTON LABORATORIES	u2 150 cm² 10 cm²	Test according to A.S.T.M. Standard D-5778-95	Predrill : 0
		G.L. 0 W.L.: 0	Date: 15/02/2011
	Project:	Hamilton Southern Links	Cone no.: C10CFIIP.E09
	Location:	GPS: E2708866 N6374132	Project no.: 2-31653.00
	Position:		CPT no.: CPT017 5/6

CPTask V1.20



OPUS HAMILTON LABORATORIES	u2 150 cm² 10 cm²	Test according to A.S.T.M. Standard D-5778-95	Predrill : 0
		G.L. 0 / W.L.: 0	Date: 15/02/2011
	Project:	Hamilton Southern Links	Cone no.: C10CFIIP.E09
	Location:	GPS: E2708866 N6374132	Project no.: 2-31653.00
	Position:		CPT no.: CPT017 6/6

CPTask V1.20



OPUS HAMILTON LABORATORY

CPTask V1.20

u2 150 cm² 10 cm²

Test according to A.S.T.M standard D-5778-95

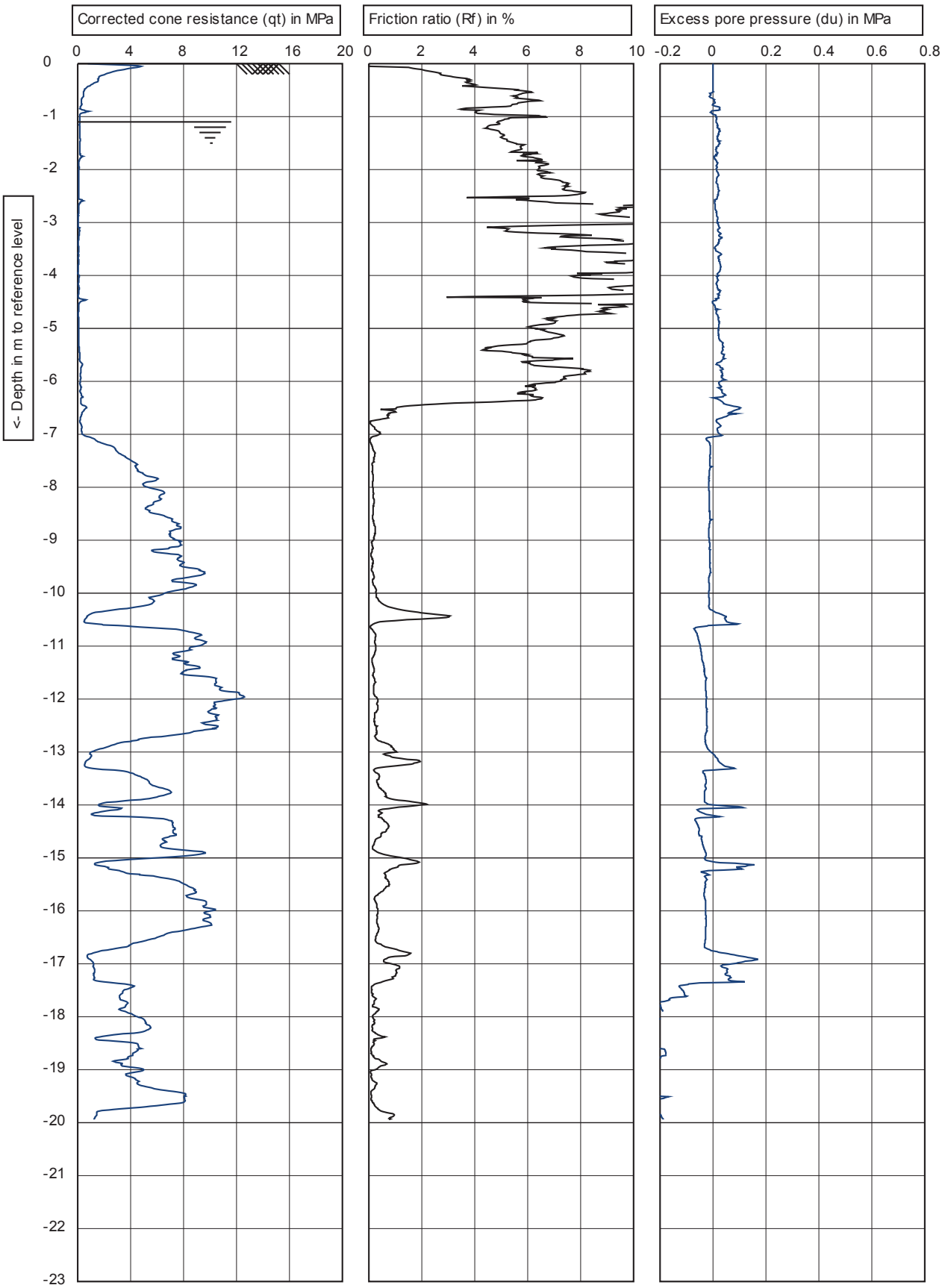
G.L. **0** W.L.: **-1.1**

Project: **Southern Links**

Location: **GPS: E2711888 N6370529**

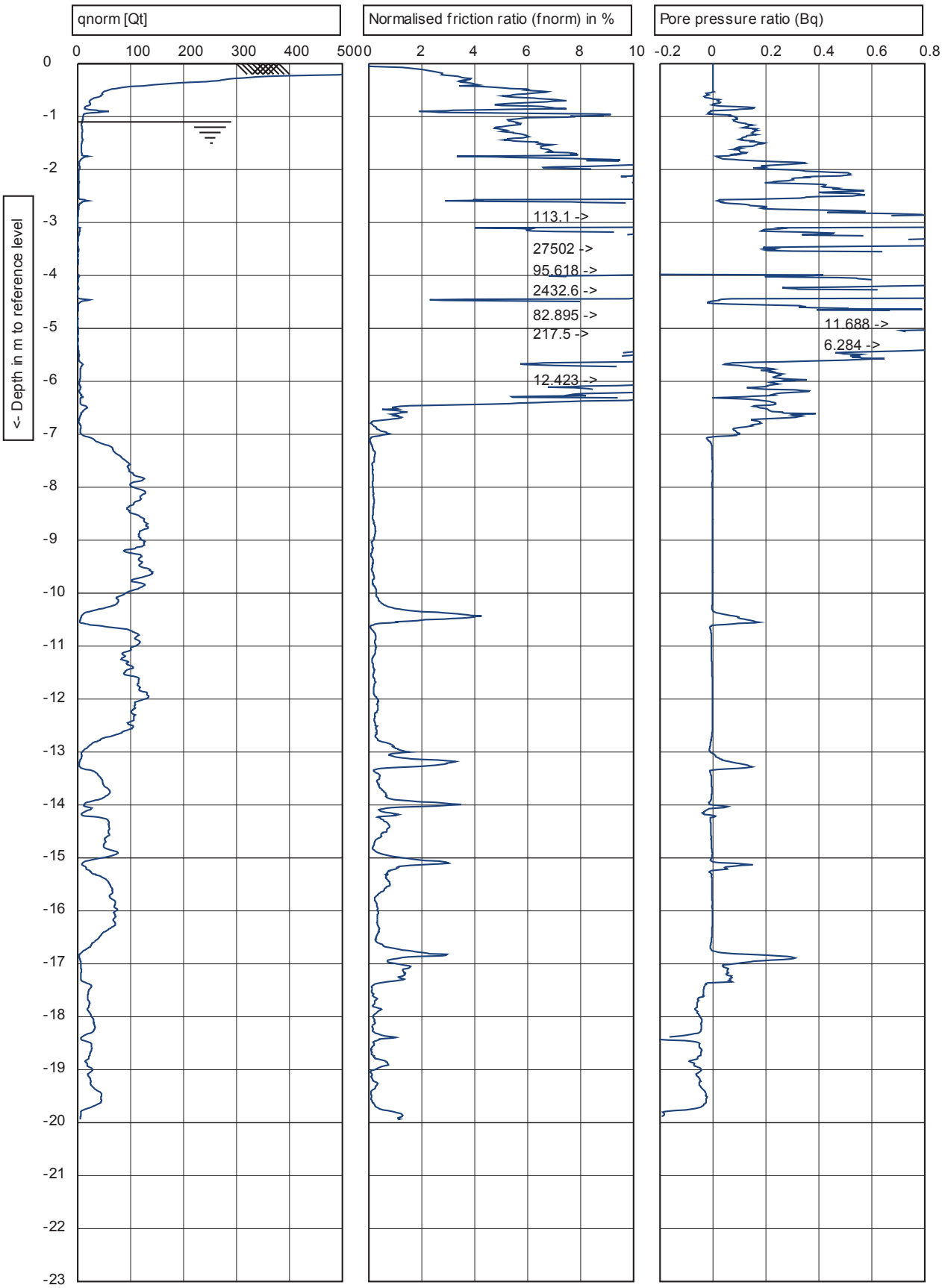
Position:

Predrill :	**0**
Date:	**18/02/2011**
Cone no.:	**C10CFIIP.E09**
Project no.:	**2-31653.00**
CPT no.:	**CPT18** 1/6



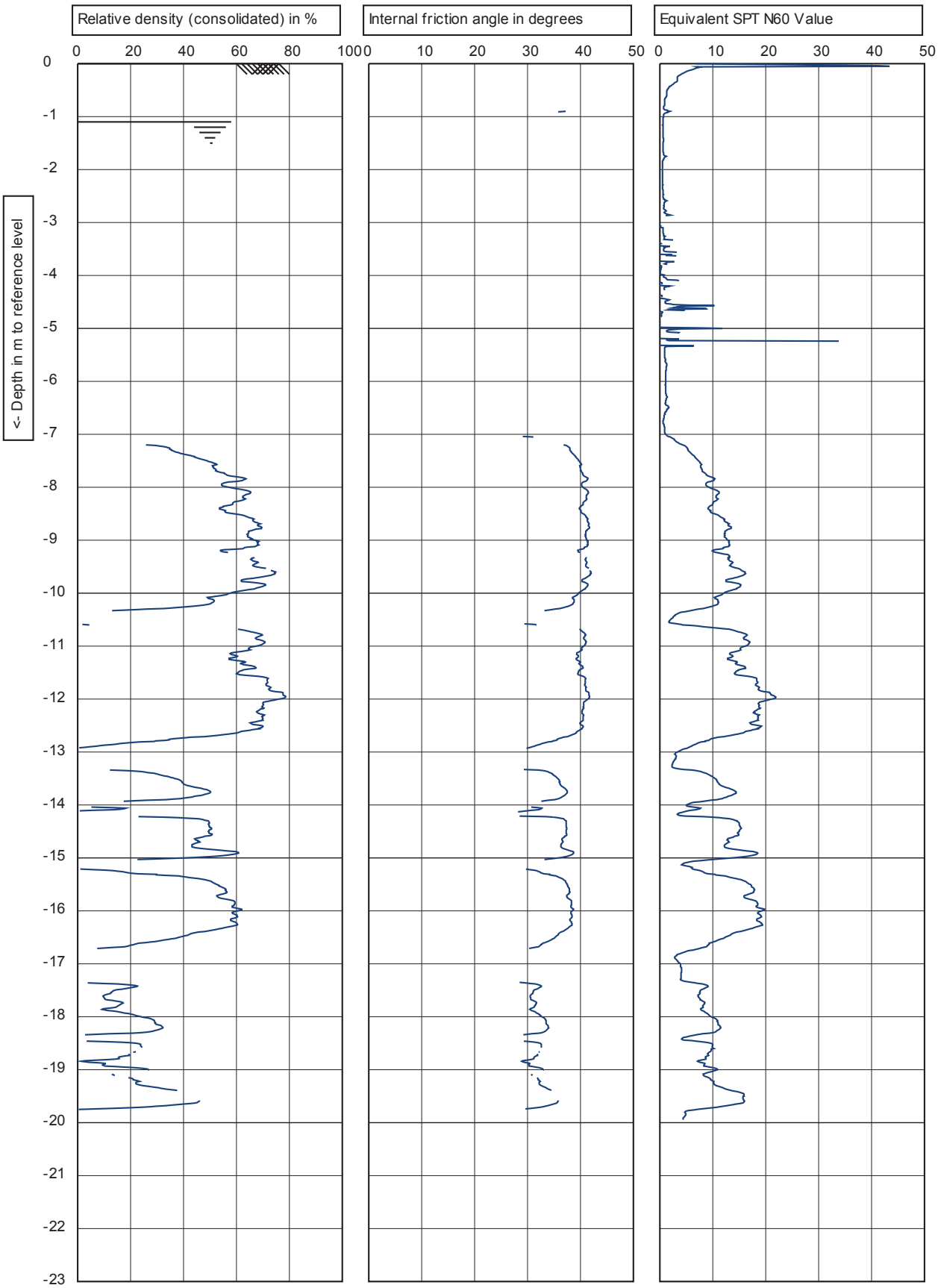
OPUS HAMILTON LABORATORY	u2 150 cm² 10 cm²	Test according to A.S.T.M standard D-5778-95	Predrill : 0
		G.L. 0 W.L.: -1.1	Date: 18/02/2011
	Project: Southern Links		Cone no.: C10CFIIP.E09
	Location: GPS: E2711888 N6370529		Project no.: 2-31653.00
	Position:		CPT no.: CPT18 2/6

CPTask V1.20



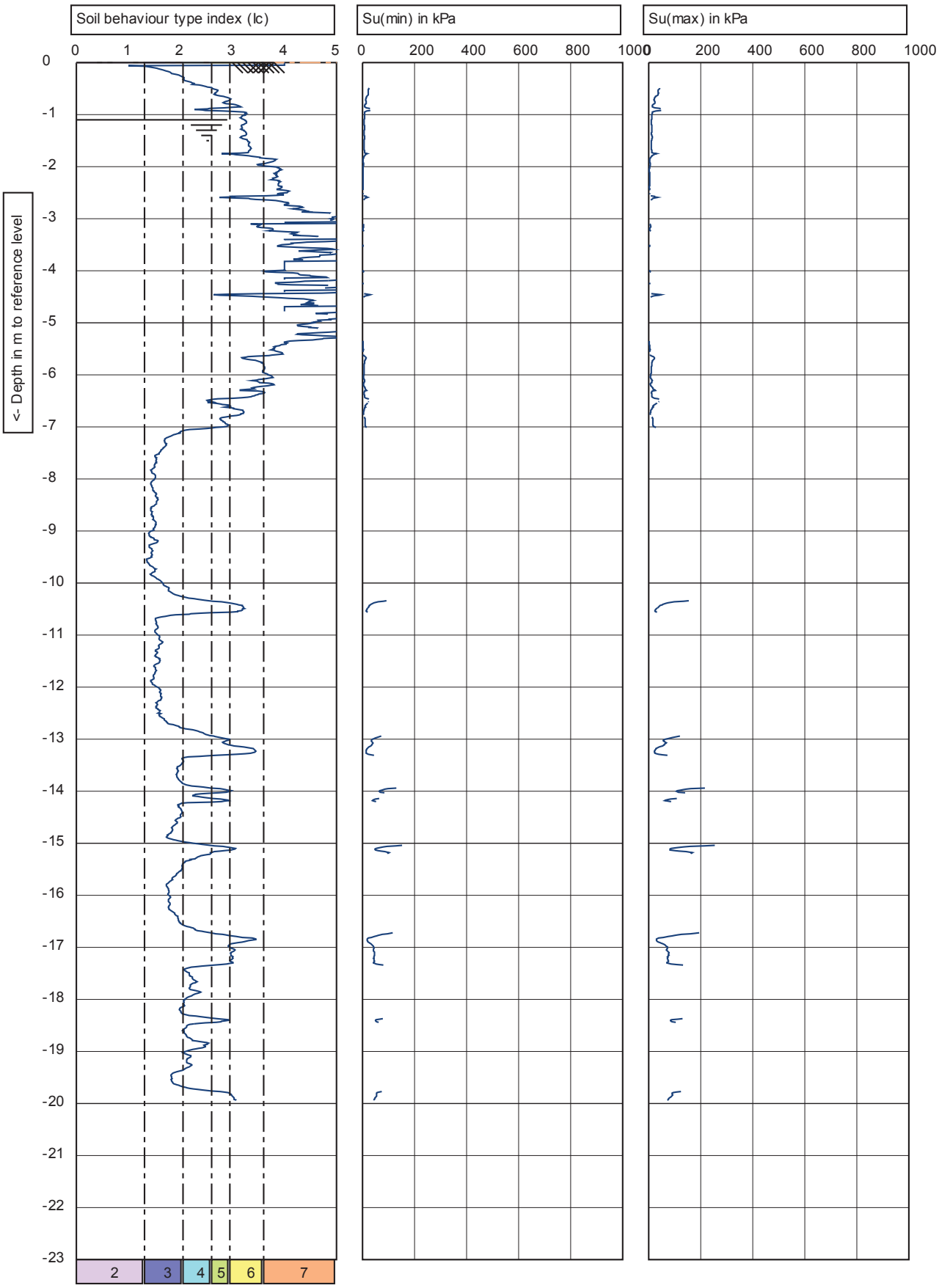
OPUS HAMILTON LABORATORY	Test according to A.S.T.M standard D-5778-95	Predrill :	0
	G.L. 0 / W.L.: -1.1	Date:	18/02/2011
Project: Southern Links		Cone no.:	C10CFIIP.E09
Location: GPS: E2711888 N6370529		Project no.:	2-31653.00
Position:		CPT no.:	CPT18 3/6

CPTask V1.20



OPUS HAMILTON LABORATORY	u2 150 cm² 10 cm²	Test according to A.S.T.M standard D-5778-95	Predrill : 0
		G.L. 0 / W.L.: -1.1	Date: 18/02/2011
	Project: Southern Links		Cone no.: C10CFIIP.E09
	Location: GPS: E2711888 N6370529		Project no.: 2-31653.00
	Position:		CPT no.: CPT18 5/6

CPTask V1.20



OPUS HAMILTON LABORATORY

CPTask V1.20

u2 150 cm² 10 cm²

Test according to A.S.T.M standard D-5778-95

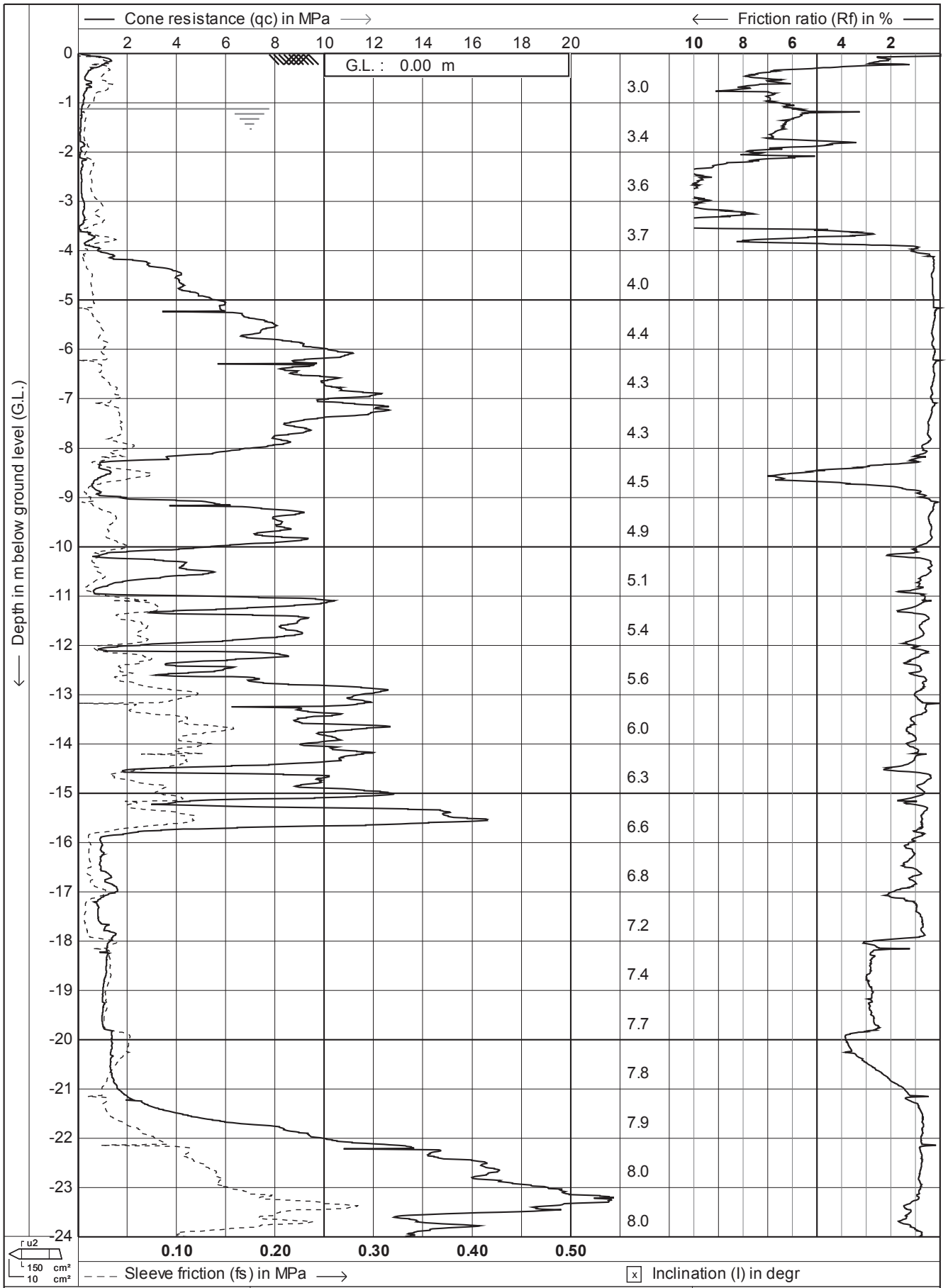
G.L. **0** W.L.: **-1.1**

Project: **Southern Links**

Location: **GPS: E2711888 N6370529**

Position:

Predrill :	**0**
Date:	**18/02/2011**
Cone no.:	**C10CFIIP.E09**
Project no.:	**2-31653.00**
CPT no.:	**CPT18** 6/6



Test according A.S.T.M. Standard D 5778-07

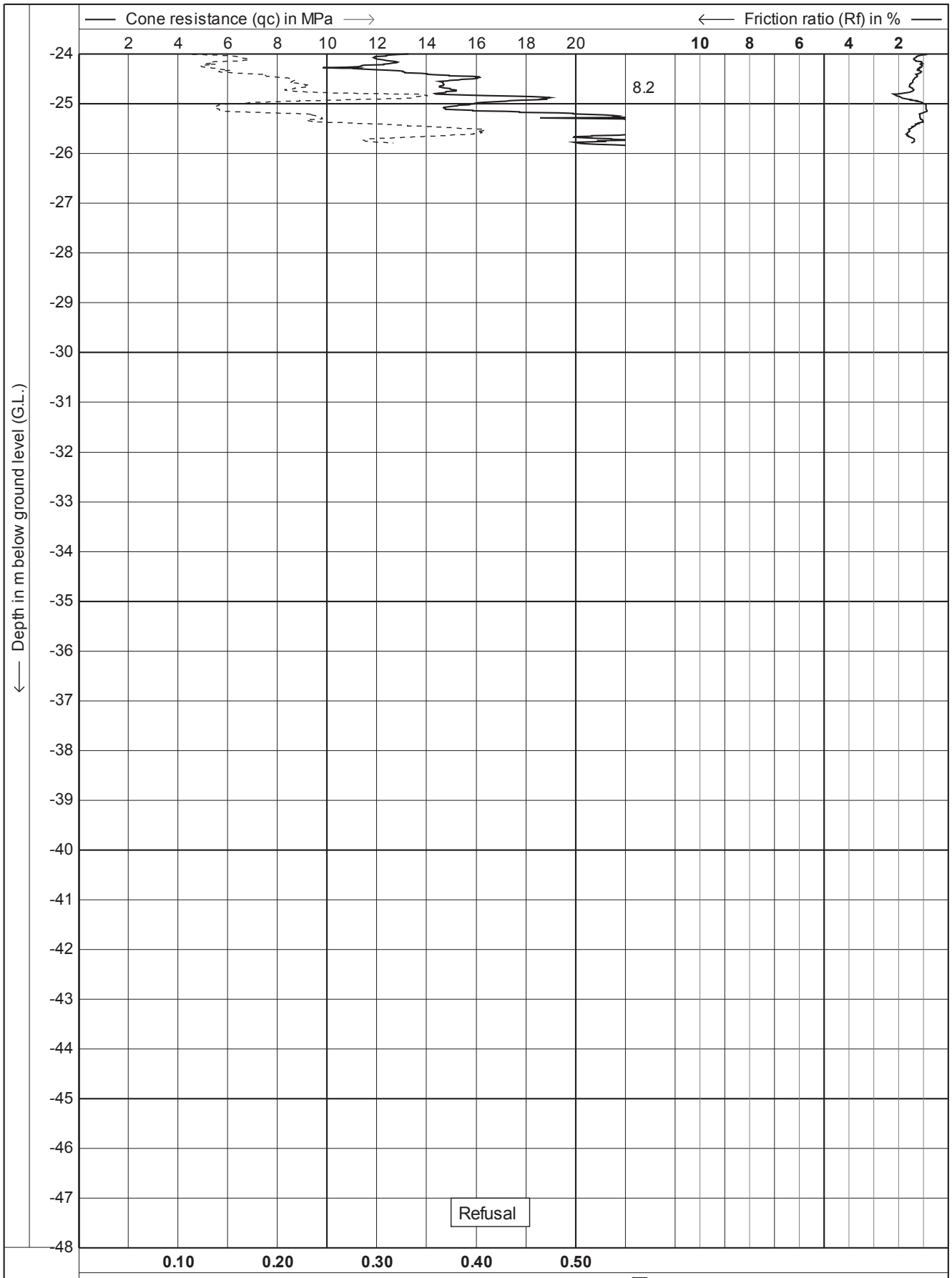
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

1/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

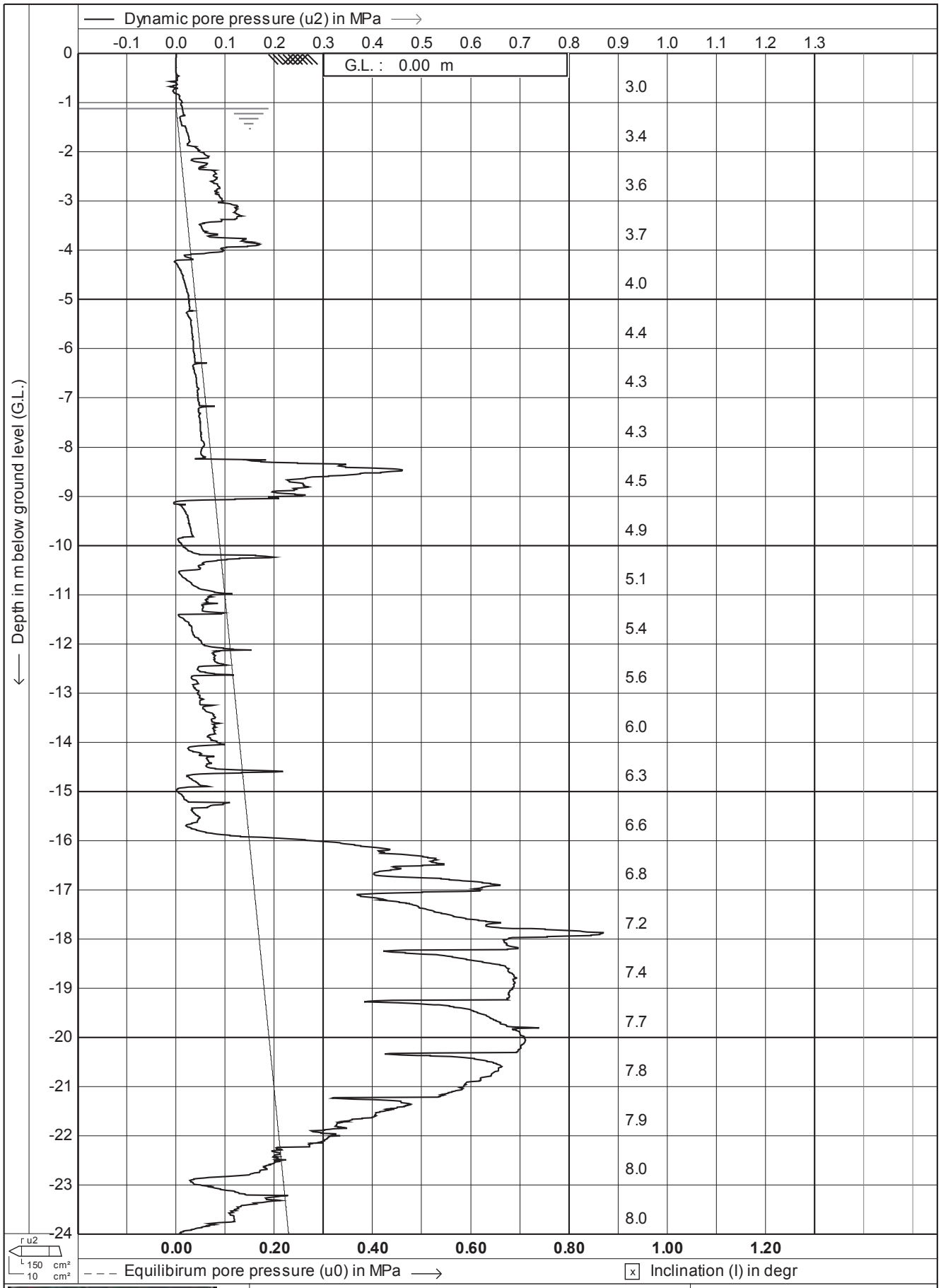
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

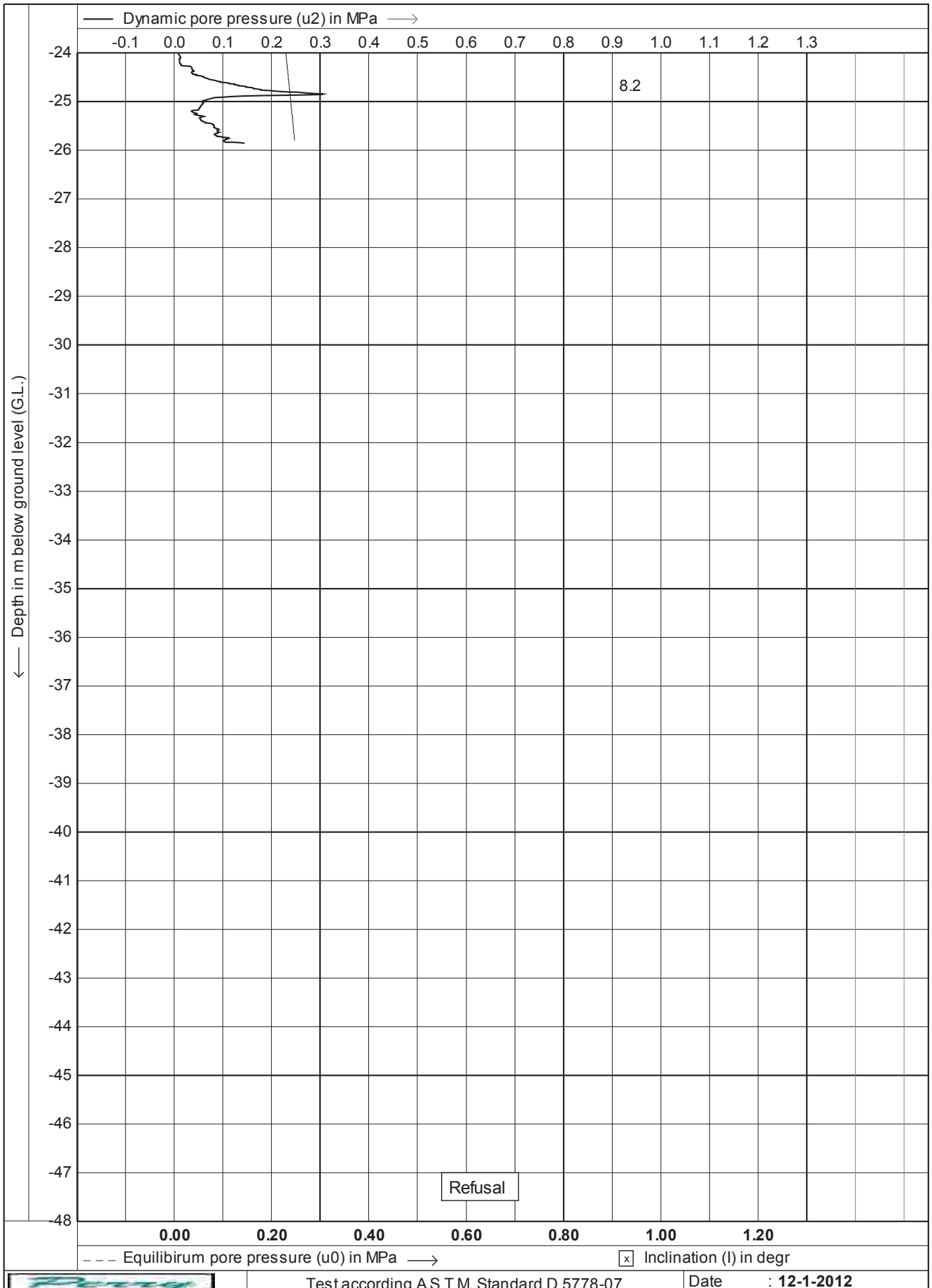
2/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **102**	3/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

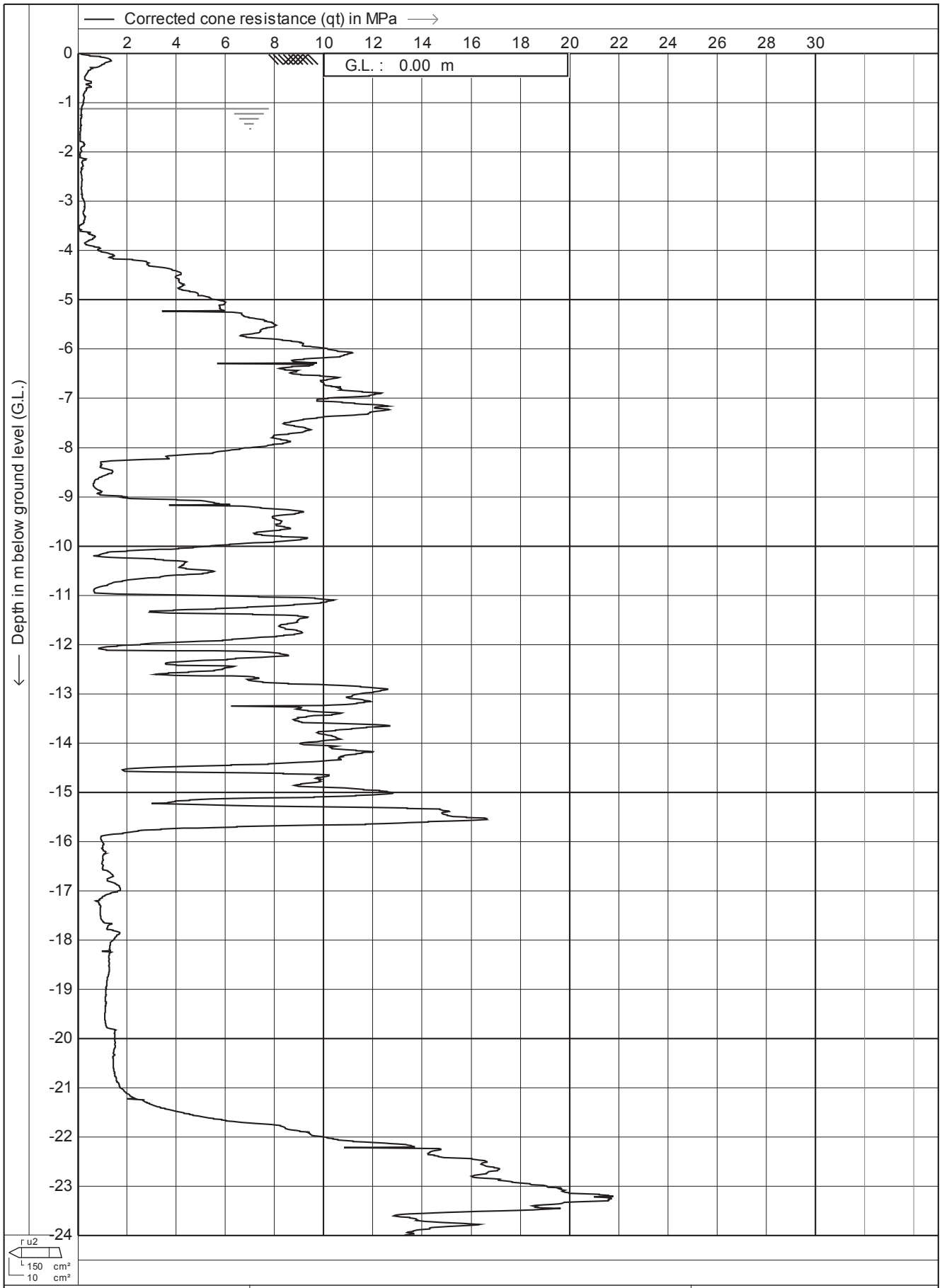
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

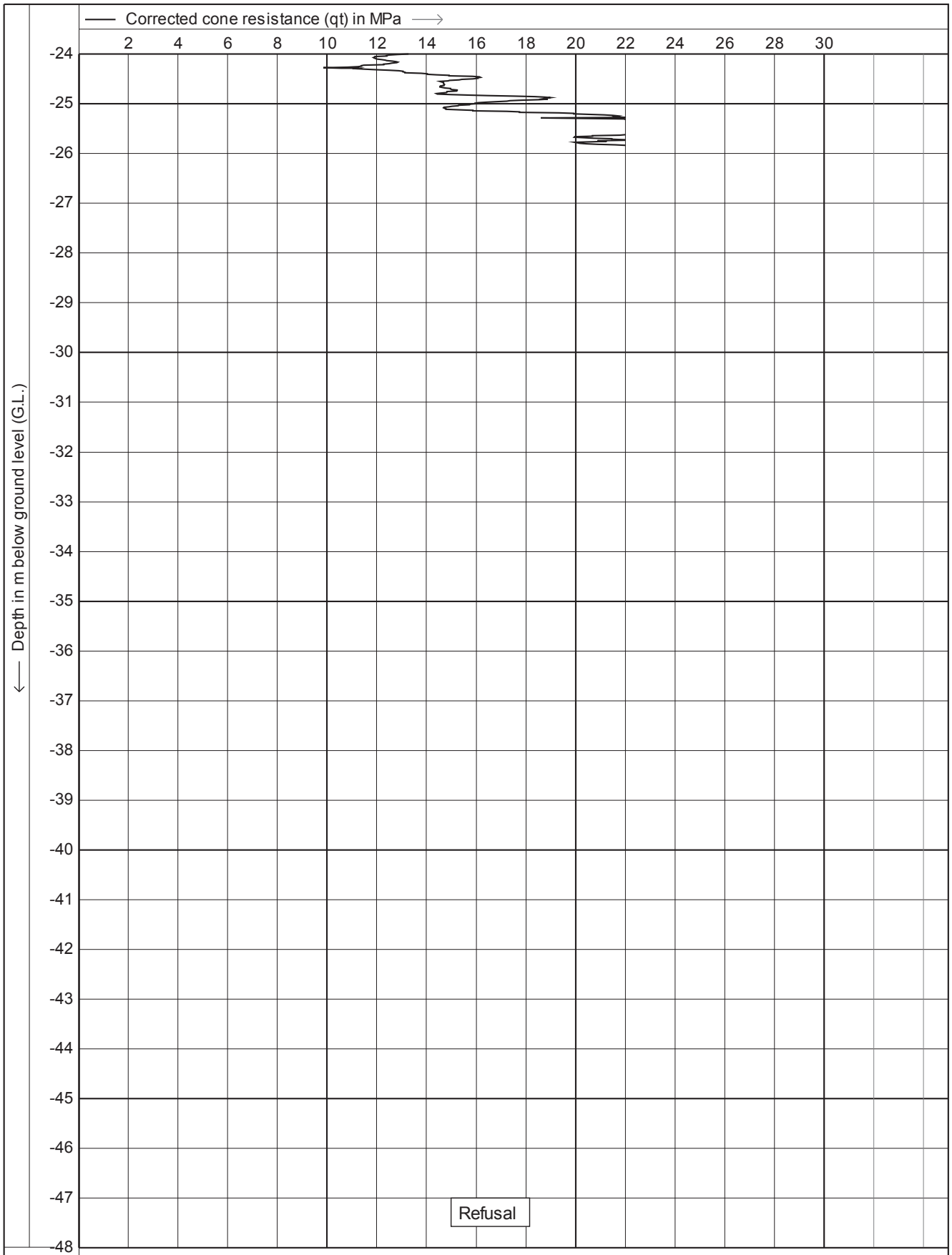
4/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
Project : Site Investigations	Cone no. : C10CFIIP.F14	
Location: Southern Links - Hamilton	Project no. : 02AECOM2	
	CPT no. : 102	5/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

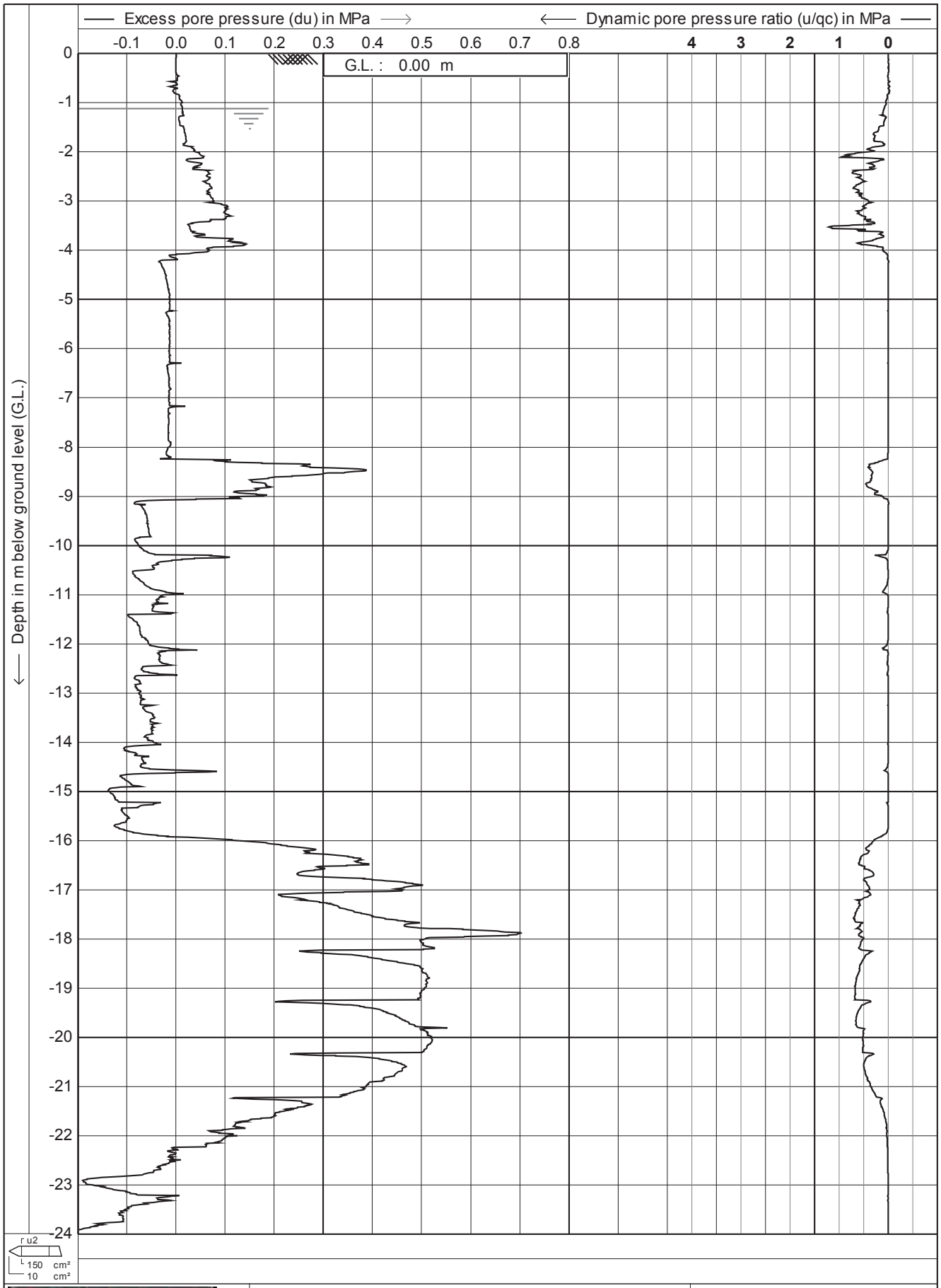
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

6/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

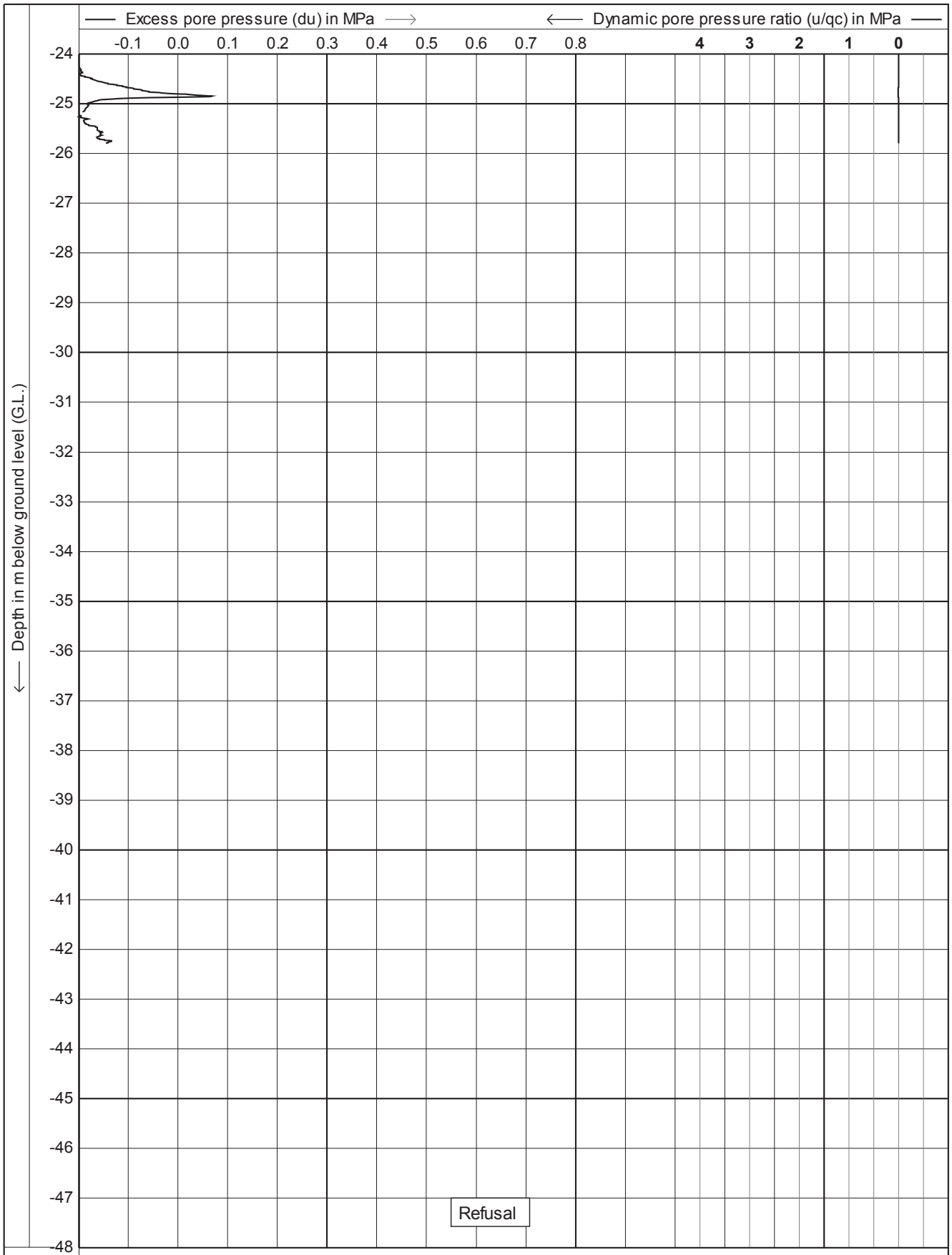
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

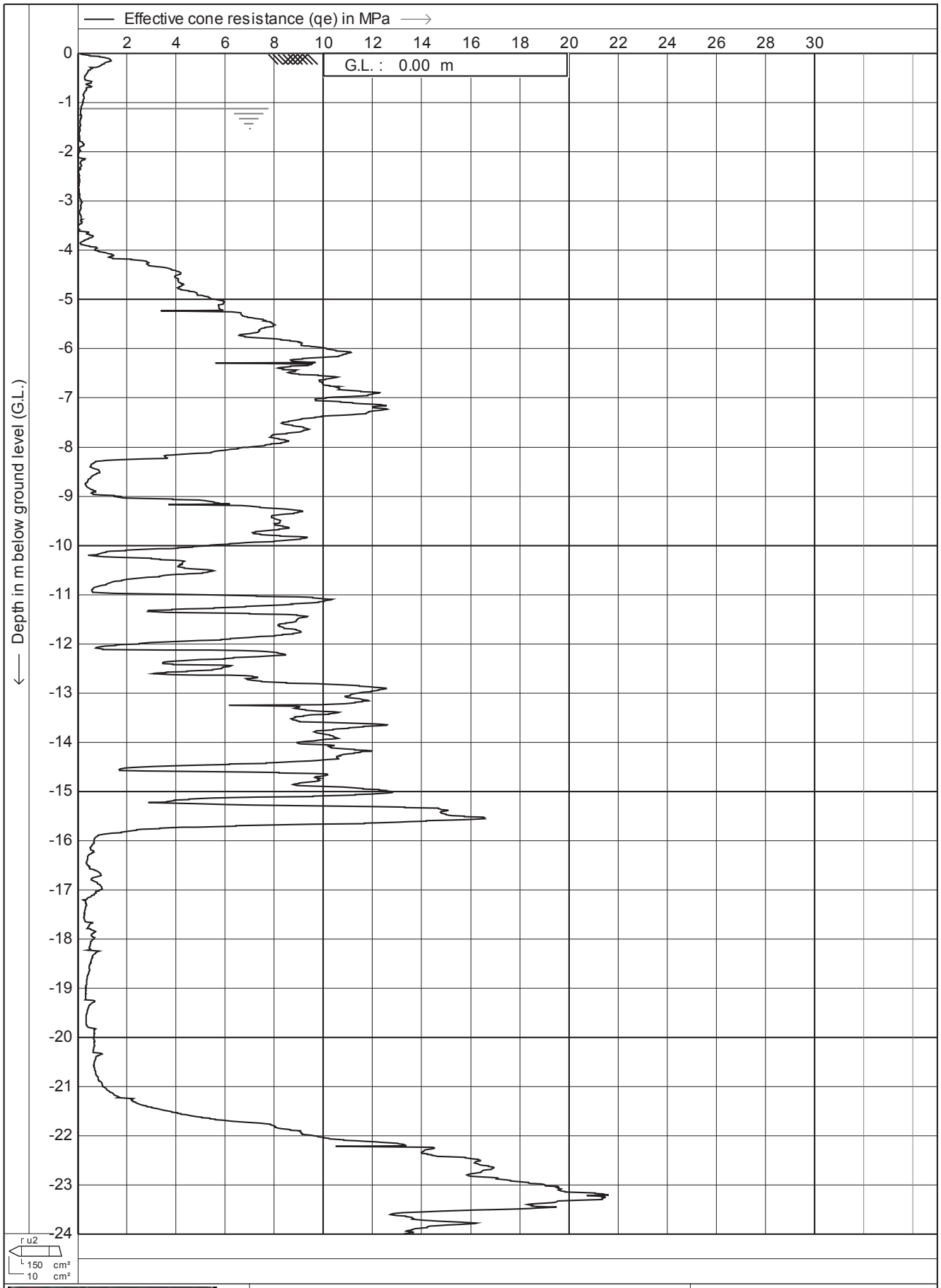
7/28

CPTask V1.31



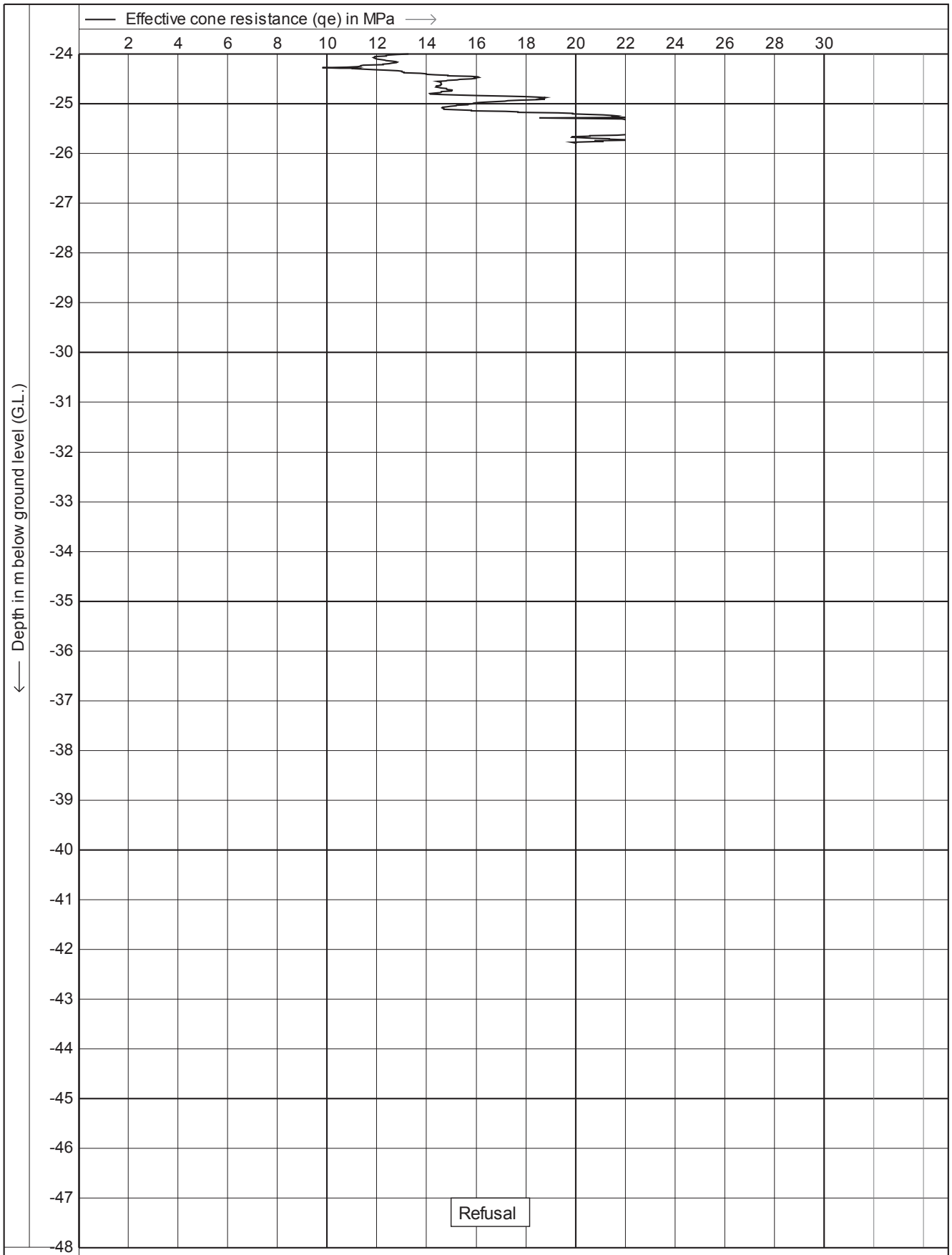
Test according A.S.T.M. Standard D 5778-07		Date	: 12-1-2012
Project :	Site Investigations	Cone no.	: C10CFIIP.F14
Location:	Southern Links - Hamilton	Project no.	: 02AECOM2
		CPT no.	: 102 8/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **102**	**9/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

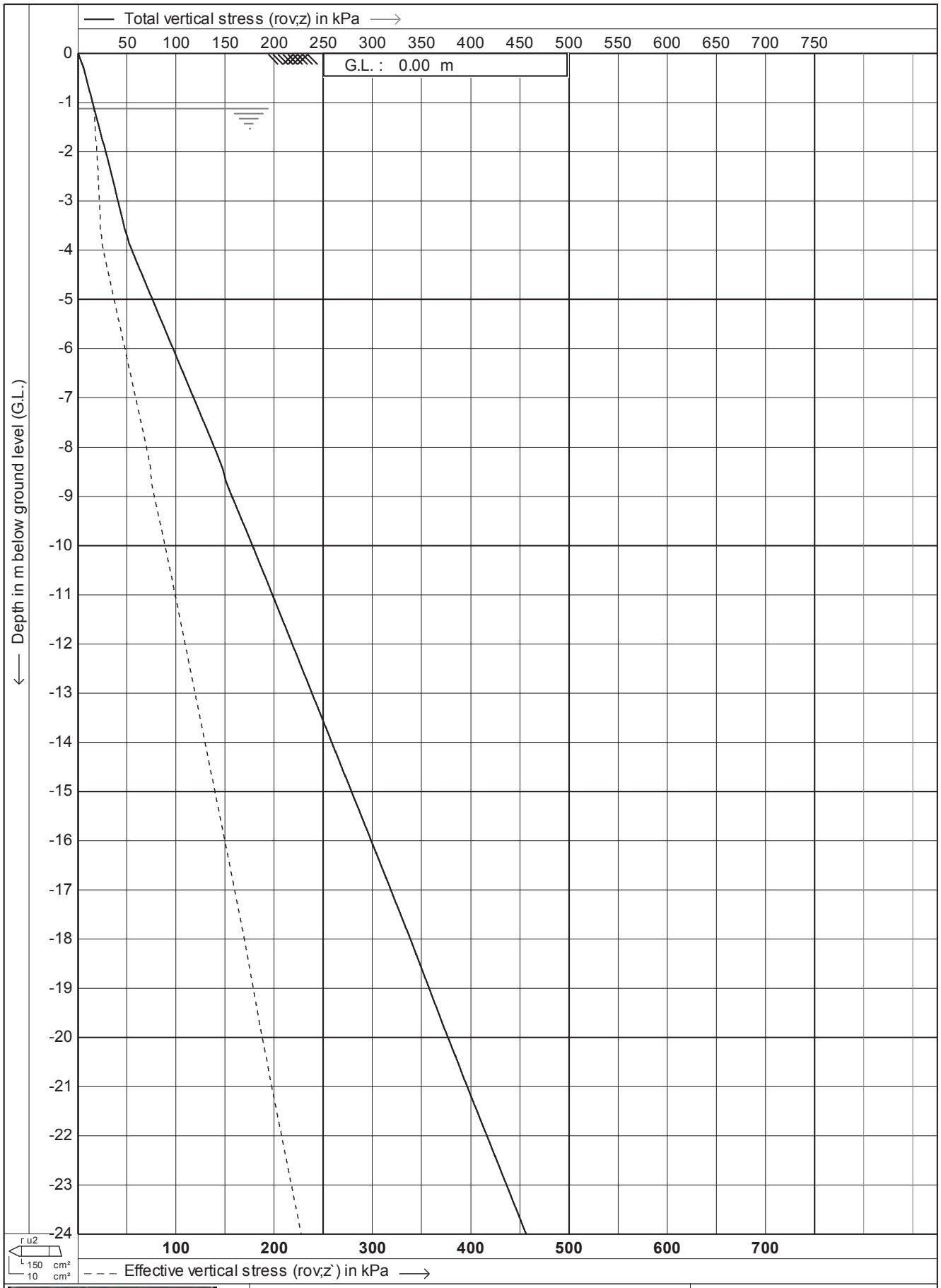
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

10/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

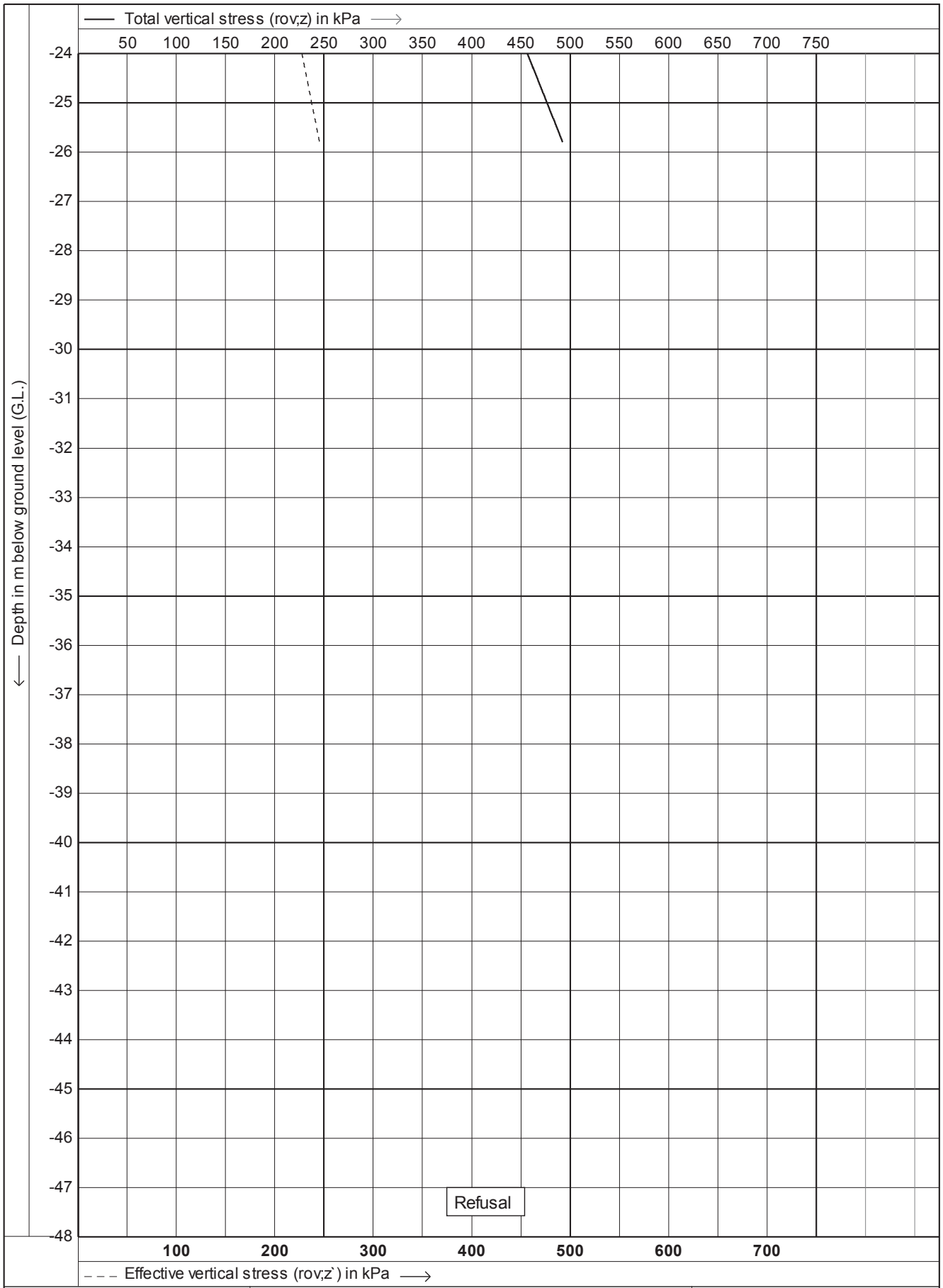
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

11/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

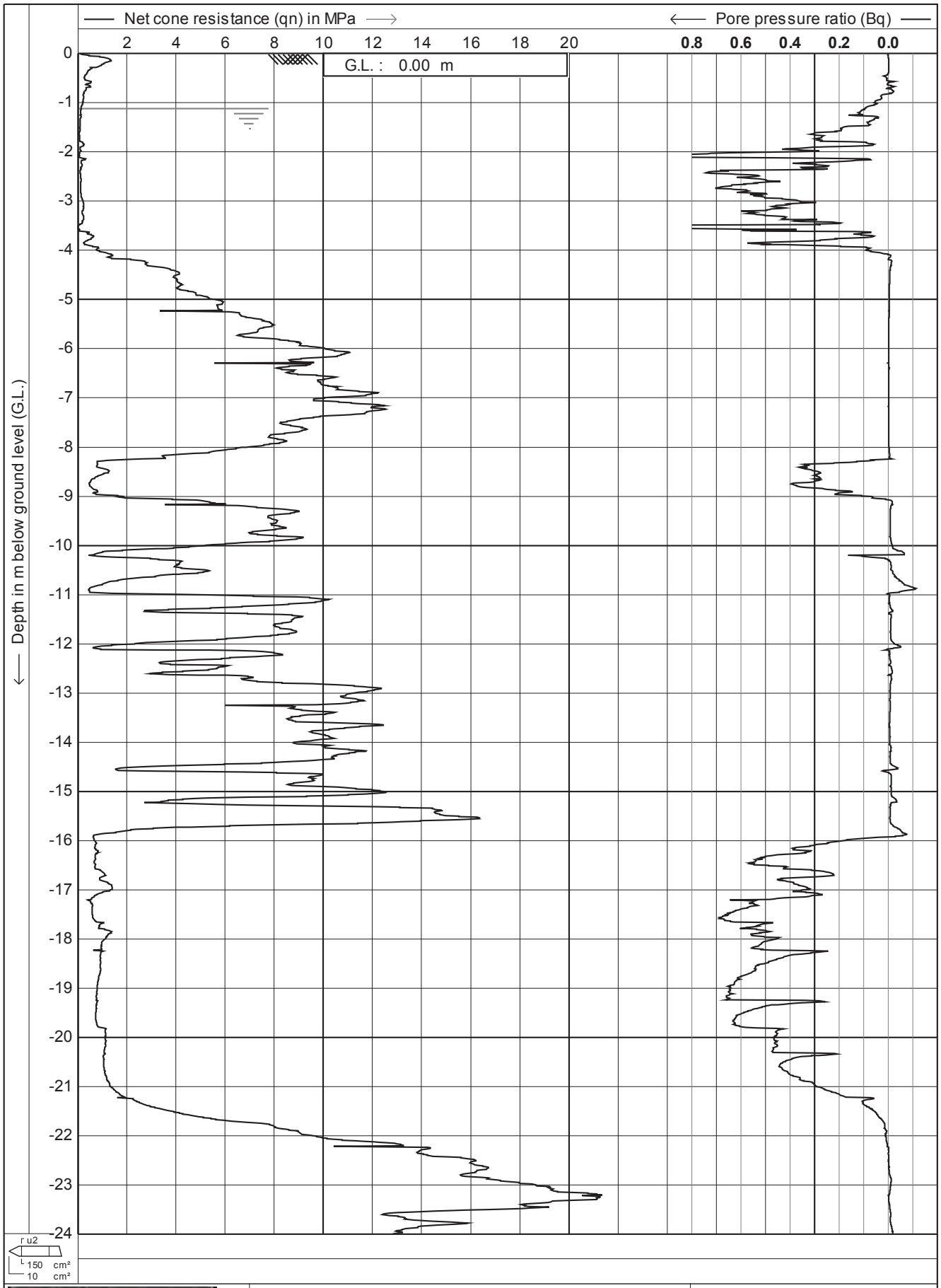
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

12/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

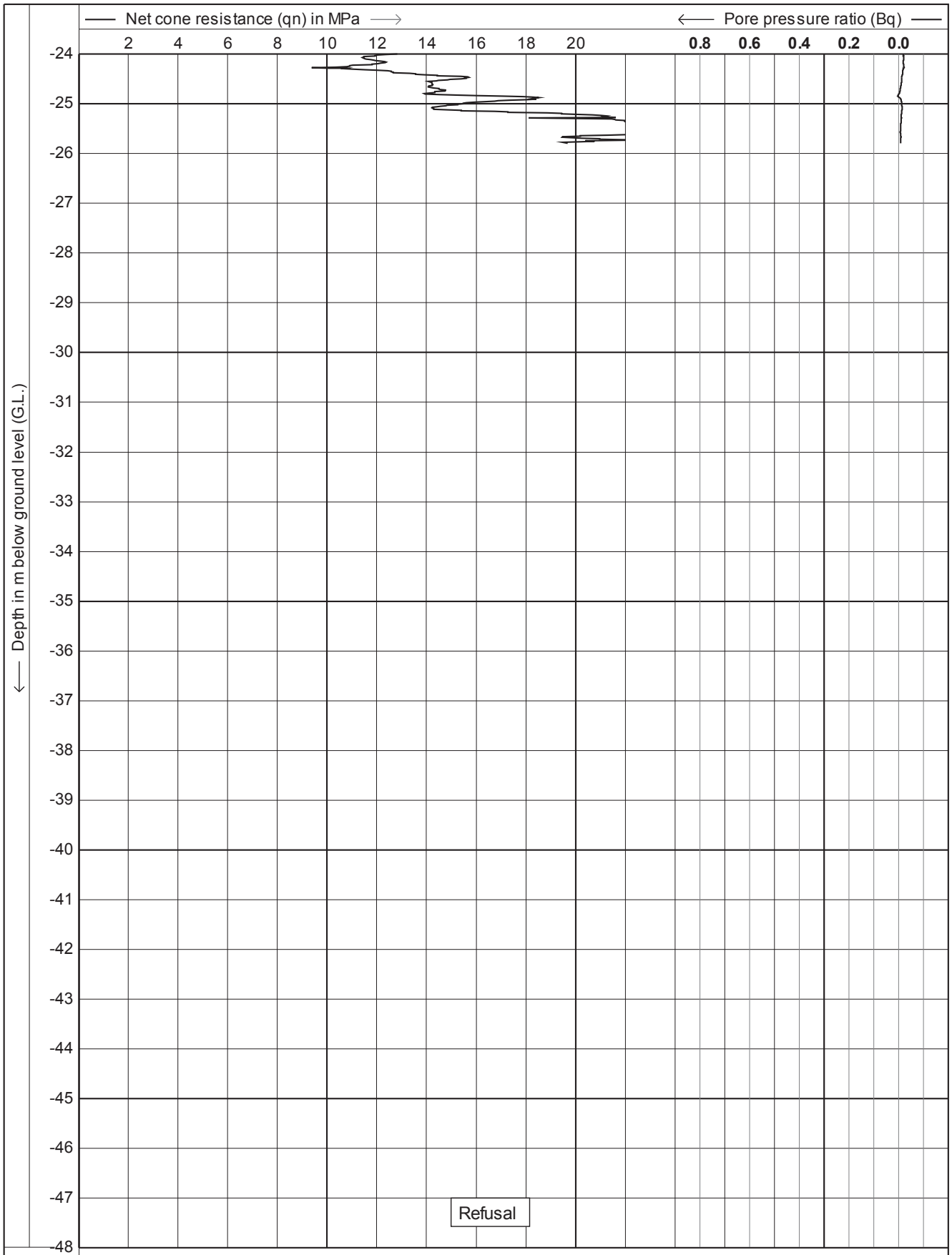
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

13/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

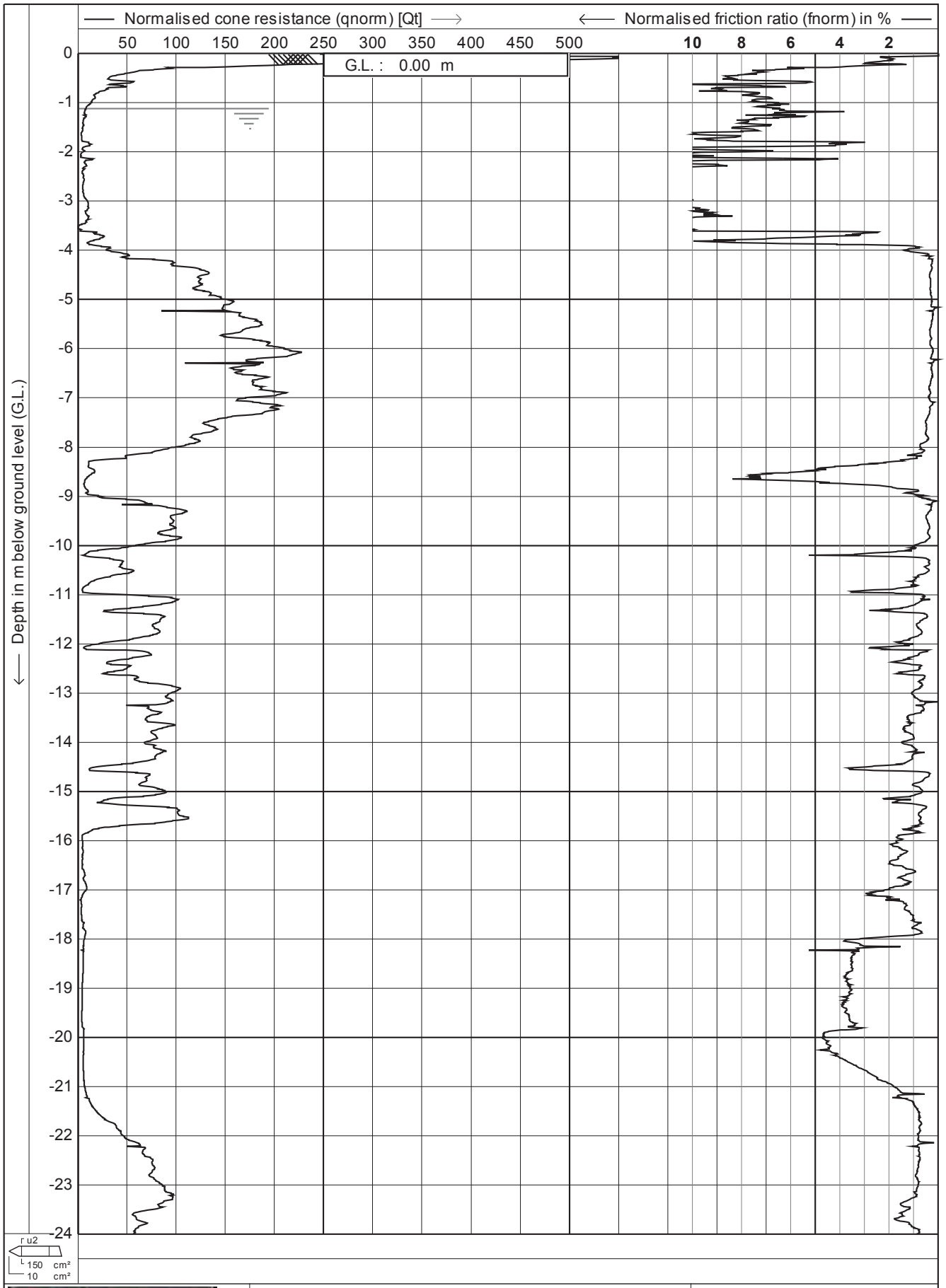
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

14/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

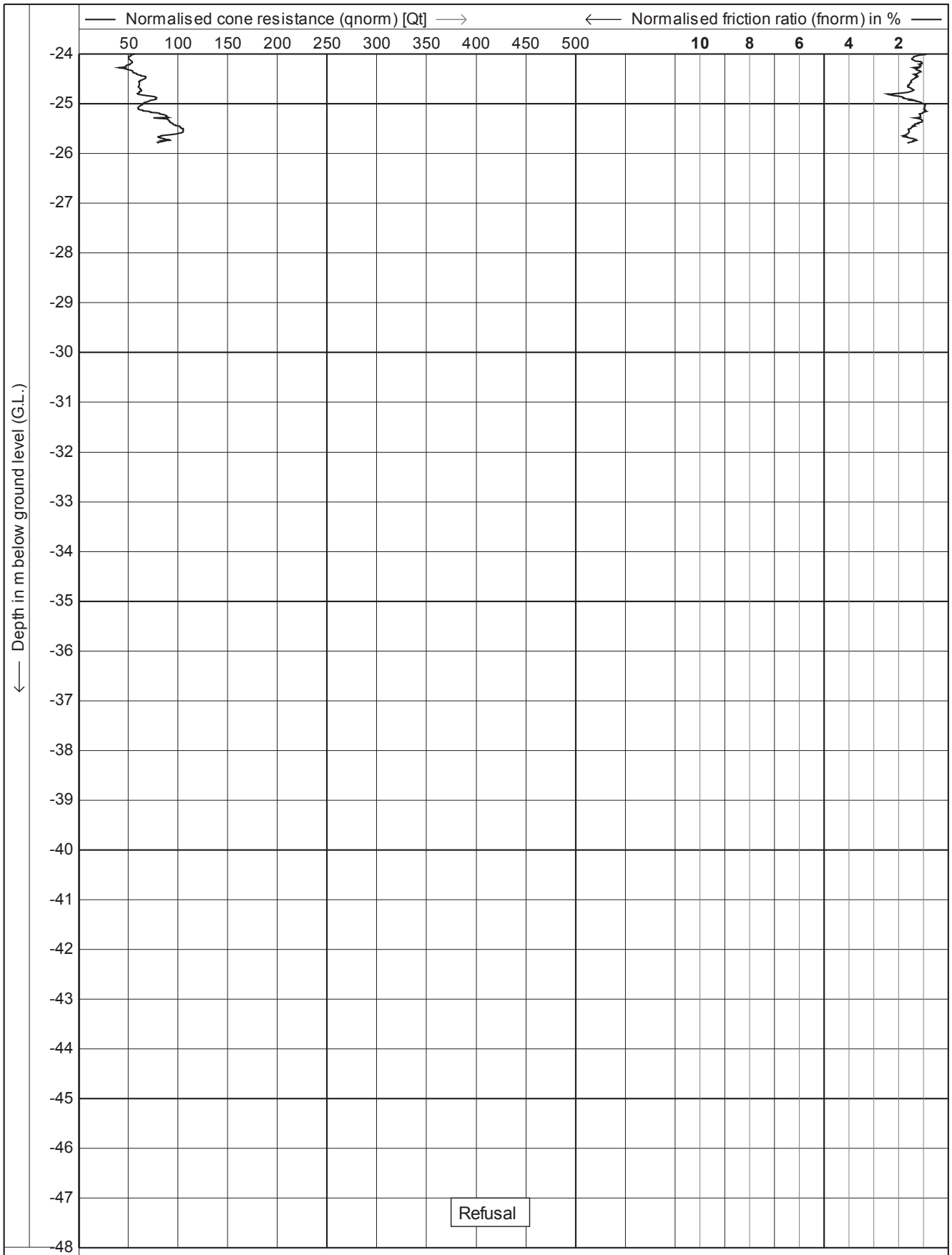
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

15/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

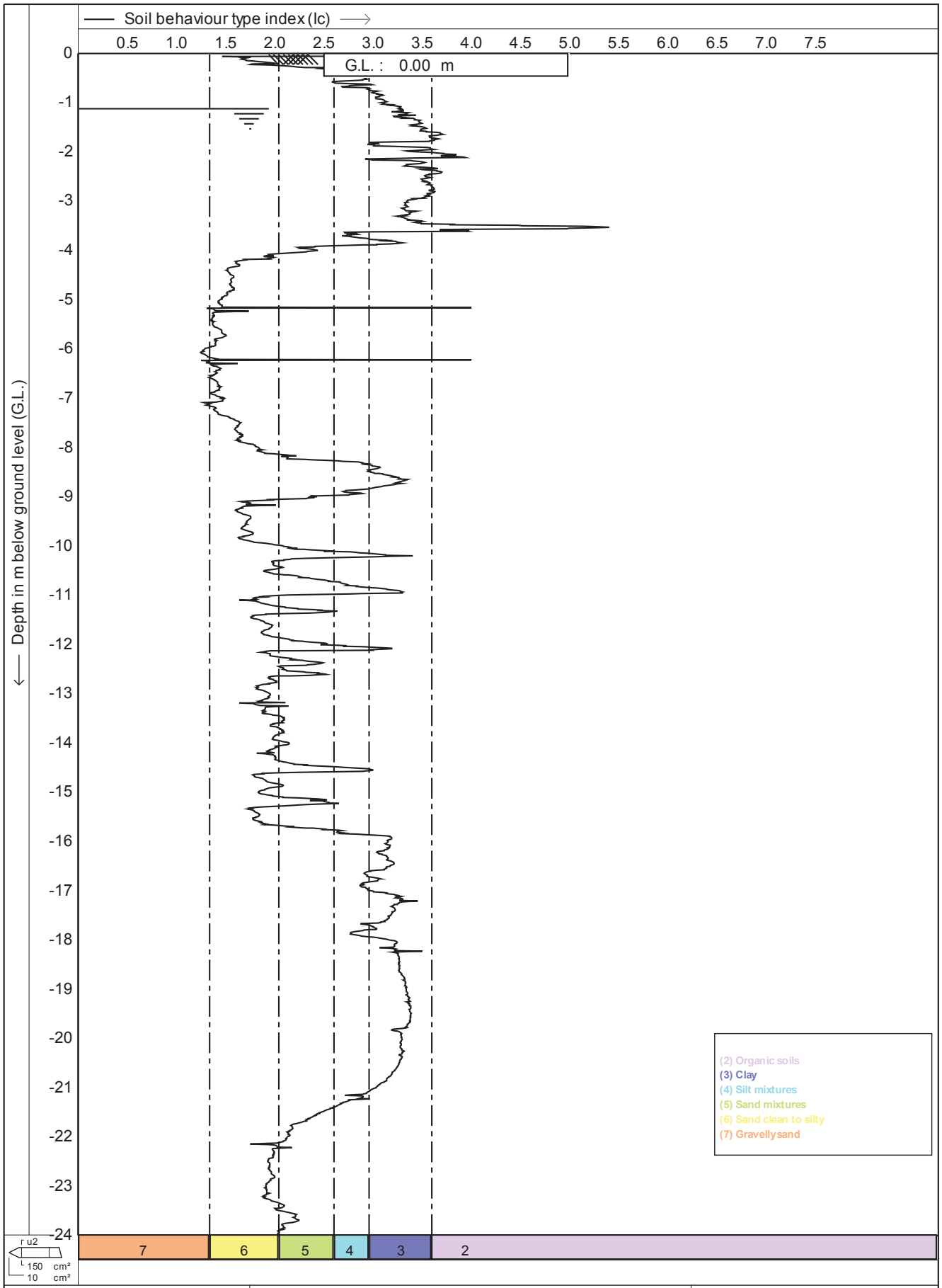
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

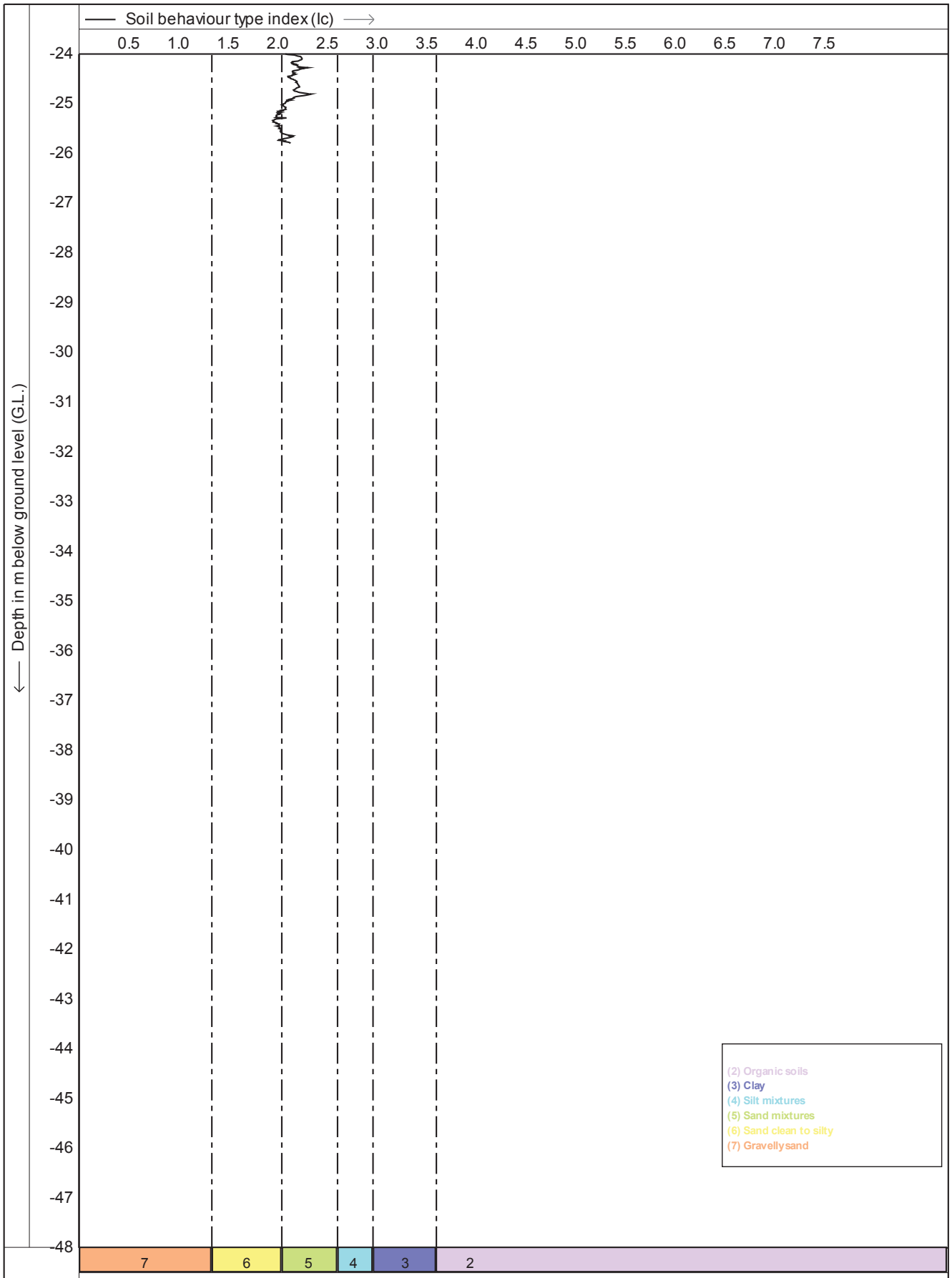
16/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
	Project : Site Investigations	Cone no. : C10CFIIP.F14	
		Project no. : 02AECOM2	
	Location: Southern Links - Hamilton	CPT no. : 102	17/28

CPTask V1.31



CPTask V1.31

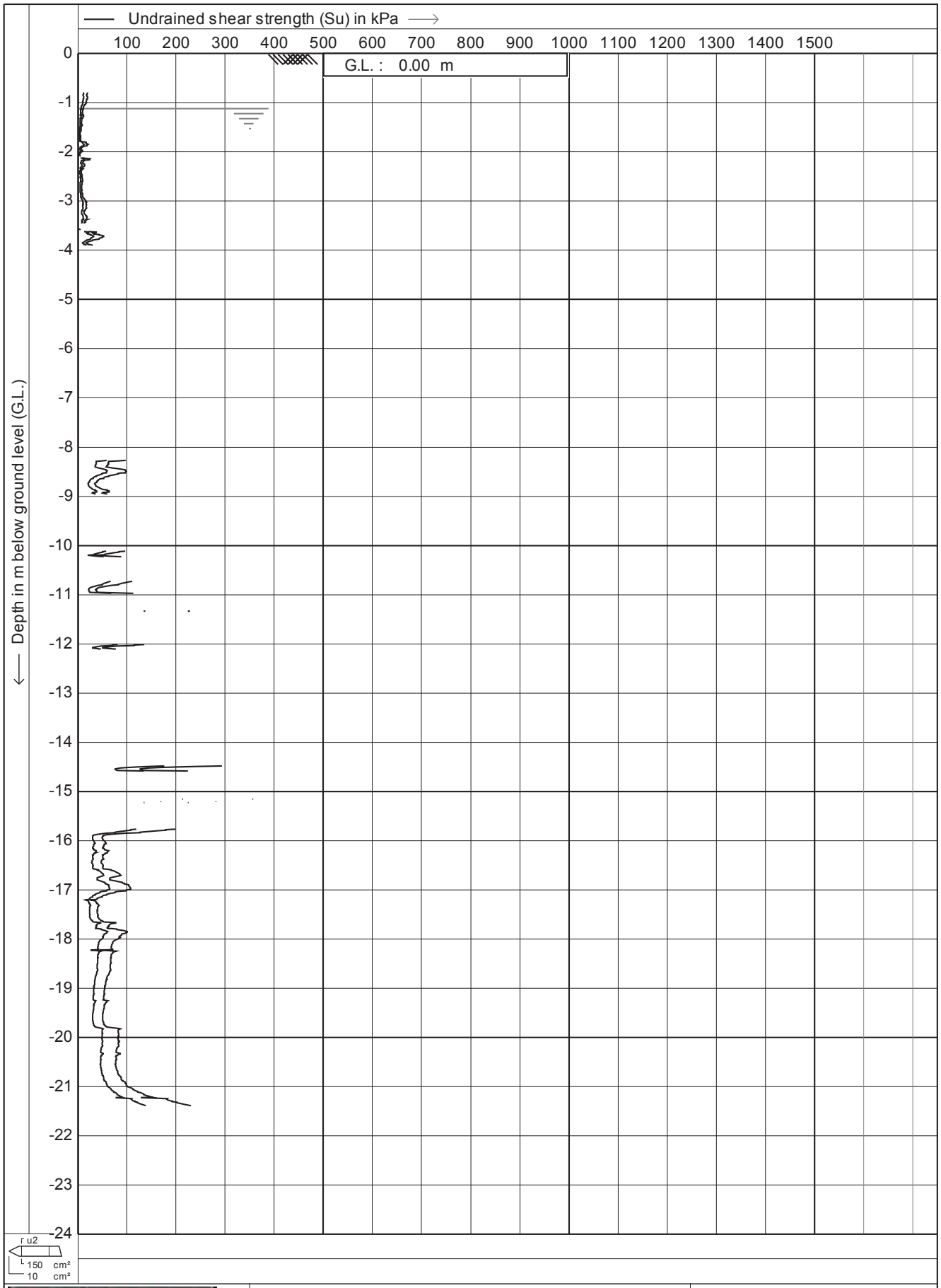
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

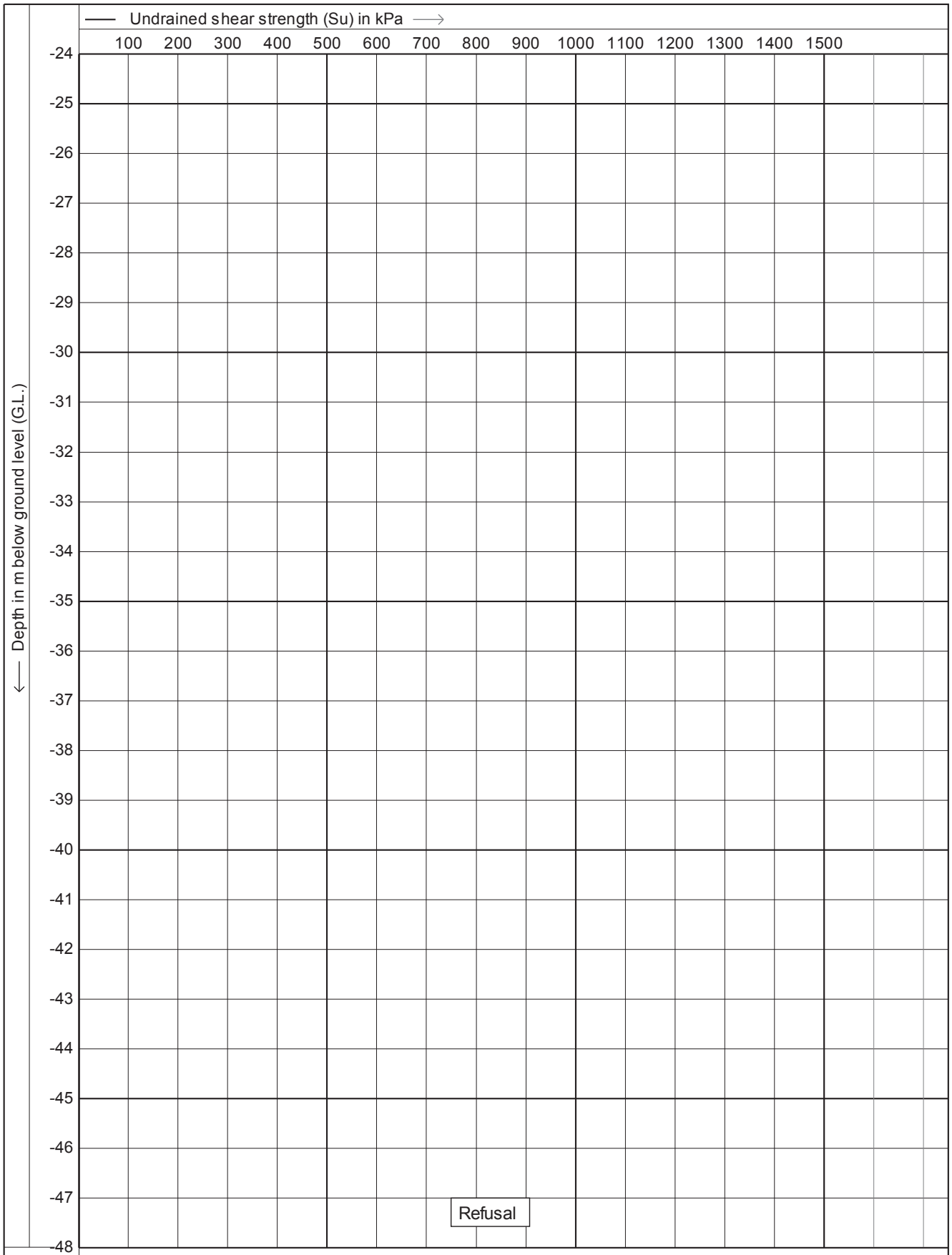
Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

18/28



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **102**	**19/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

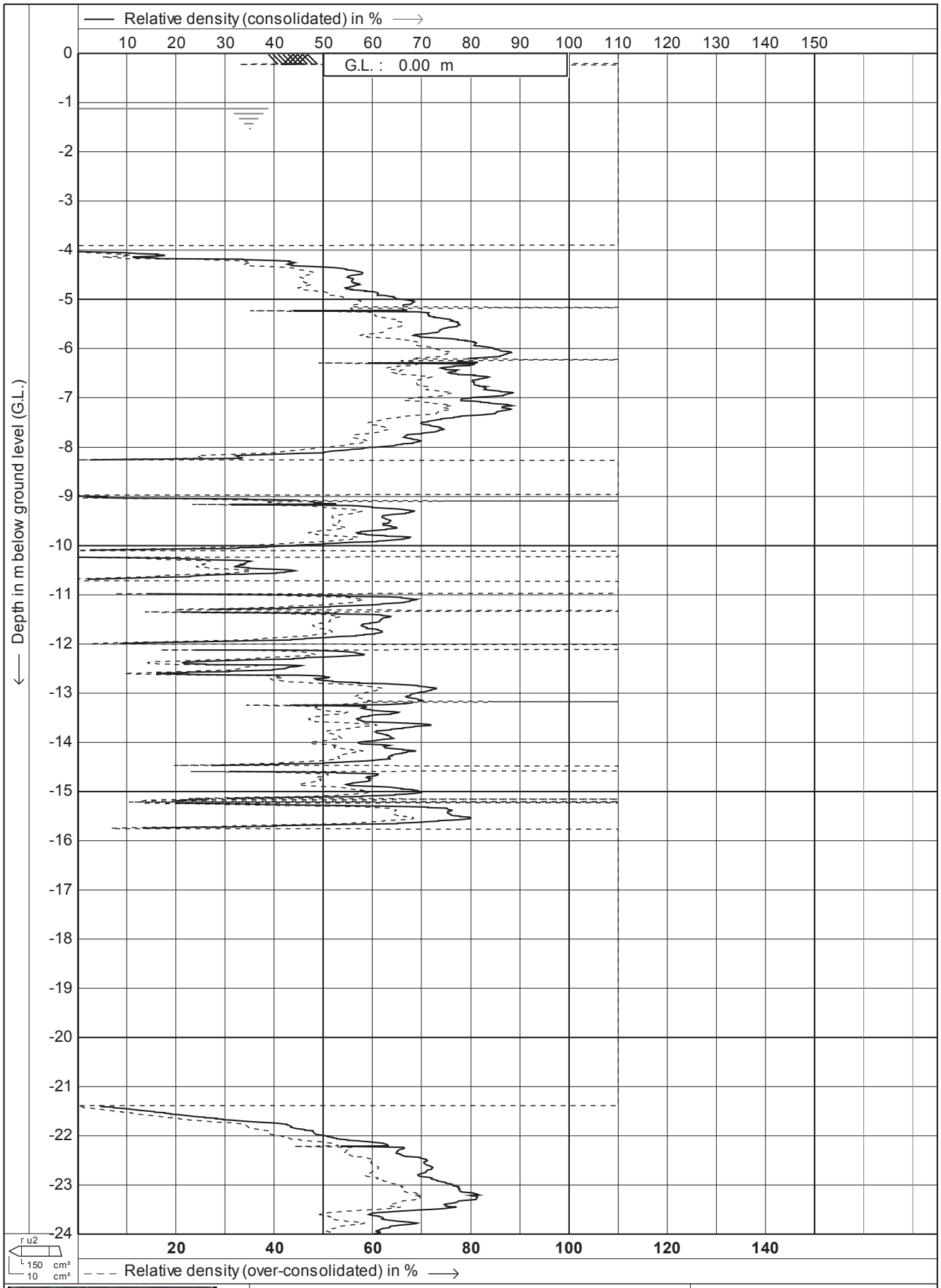
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

20/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

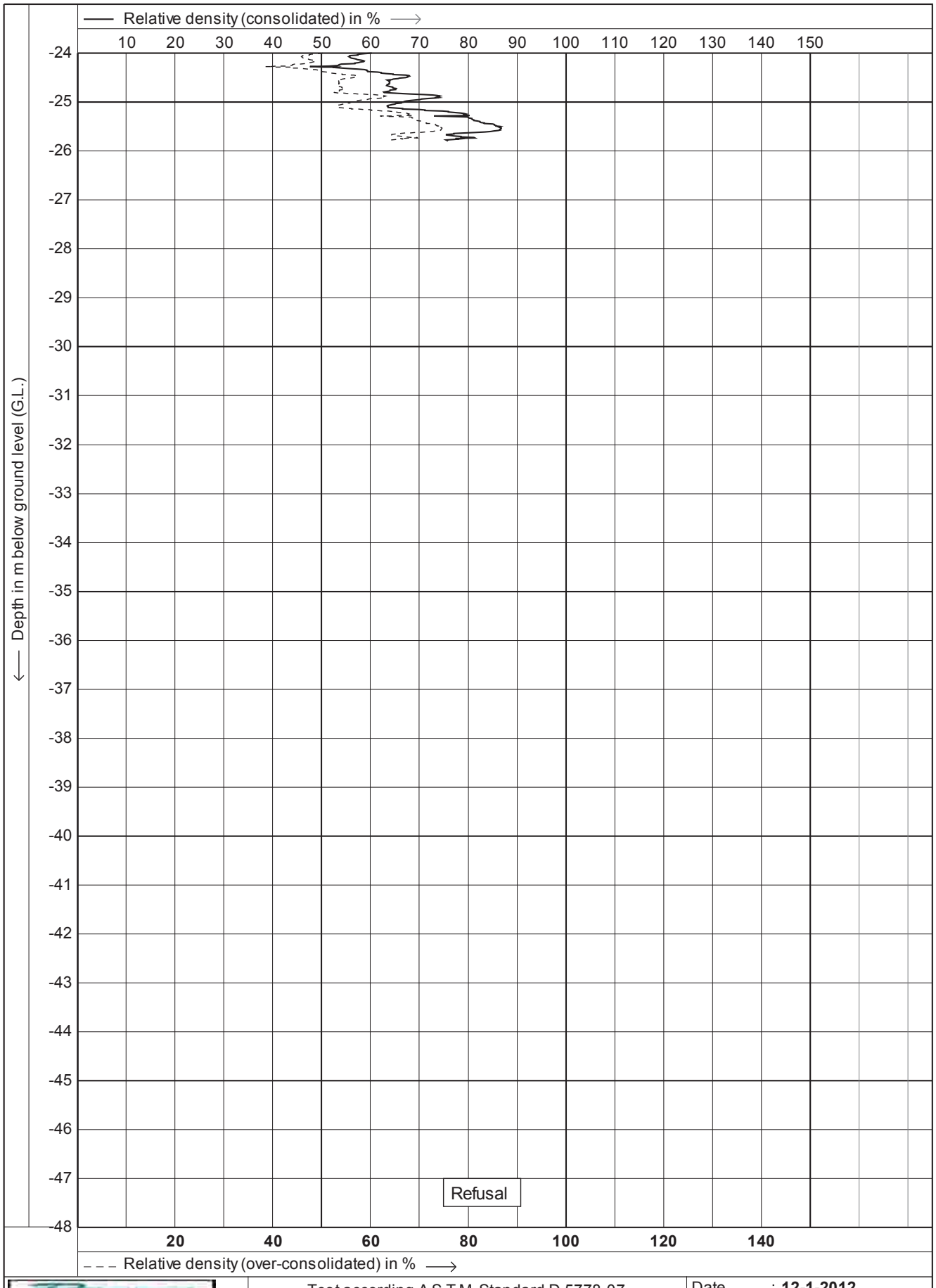
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

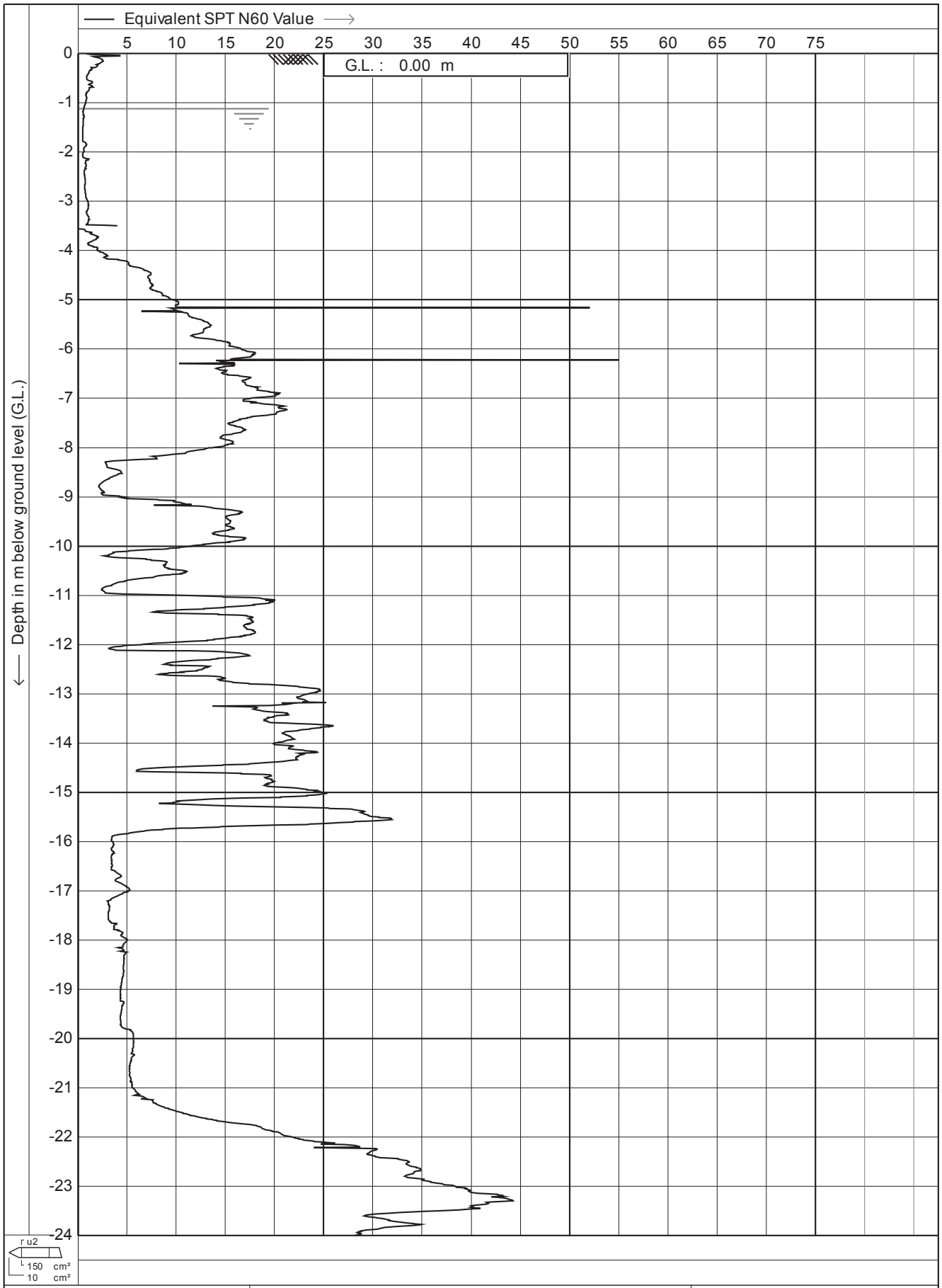
21/28

CPTask V1.31



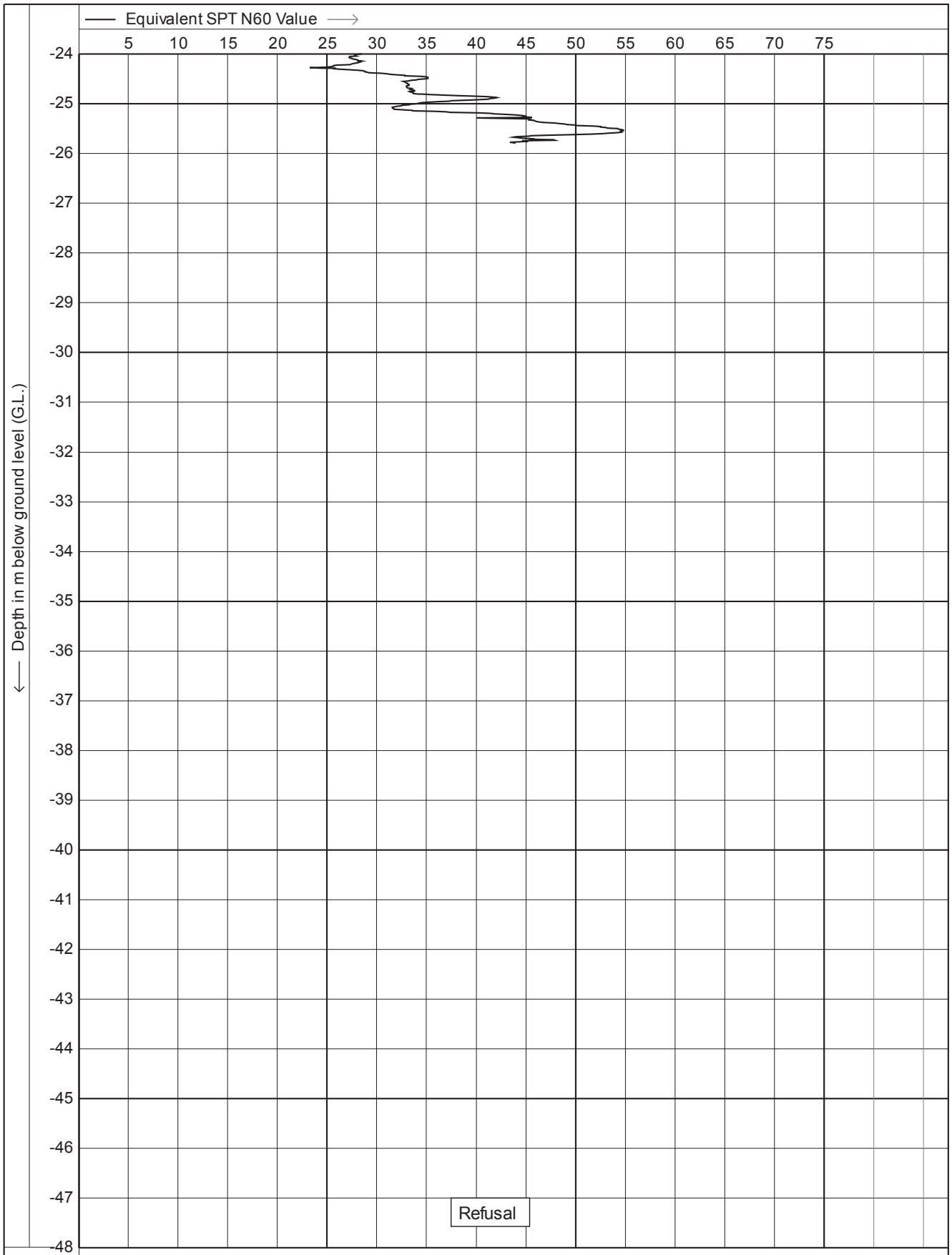
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 12-1-2012
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 102 22/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **102**	**23/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

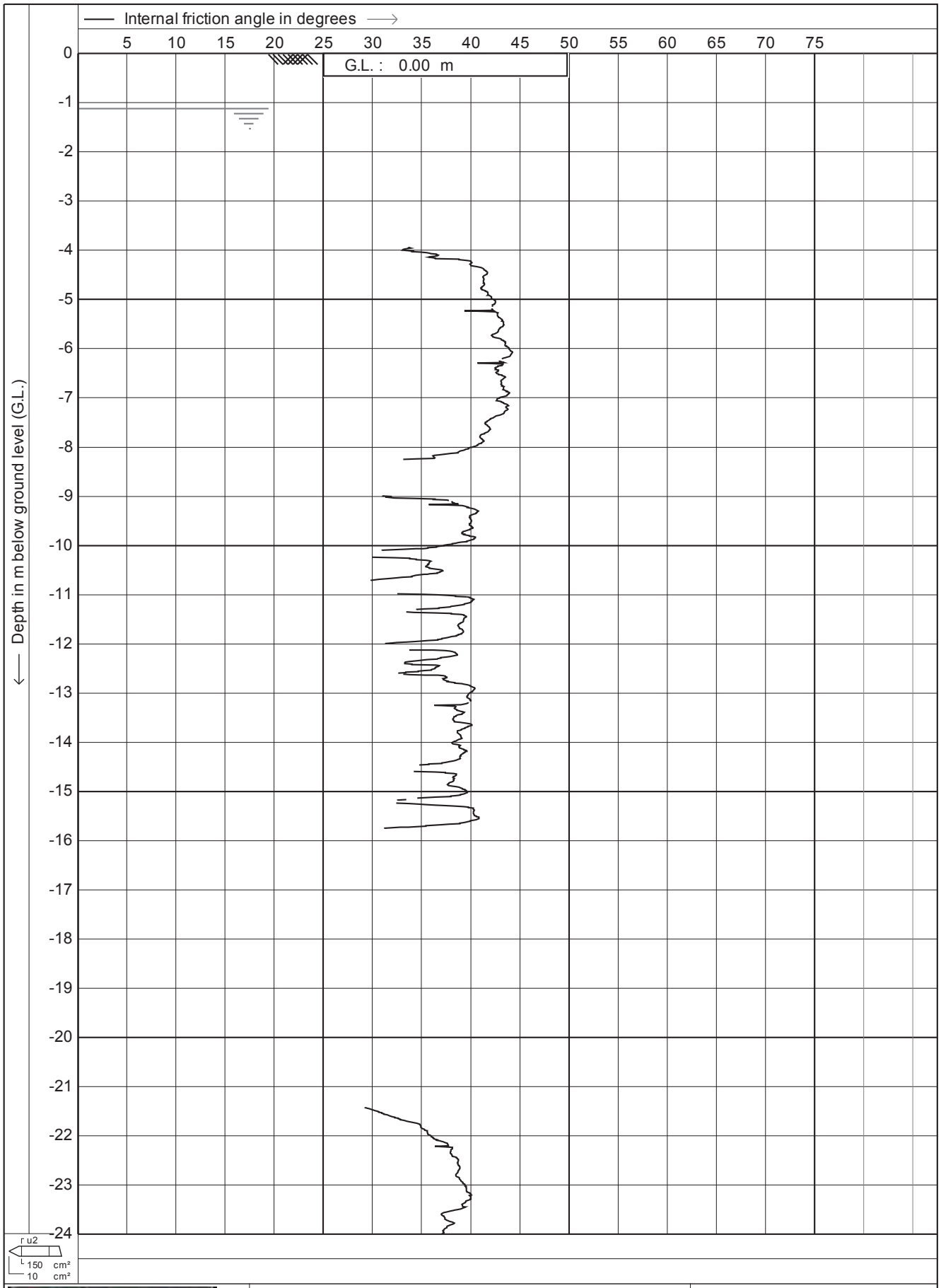
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

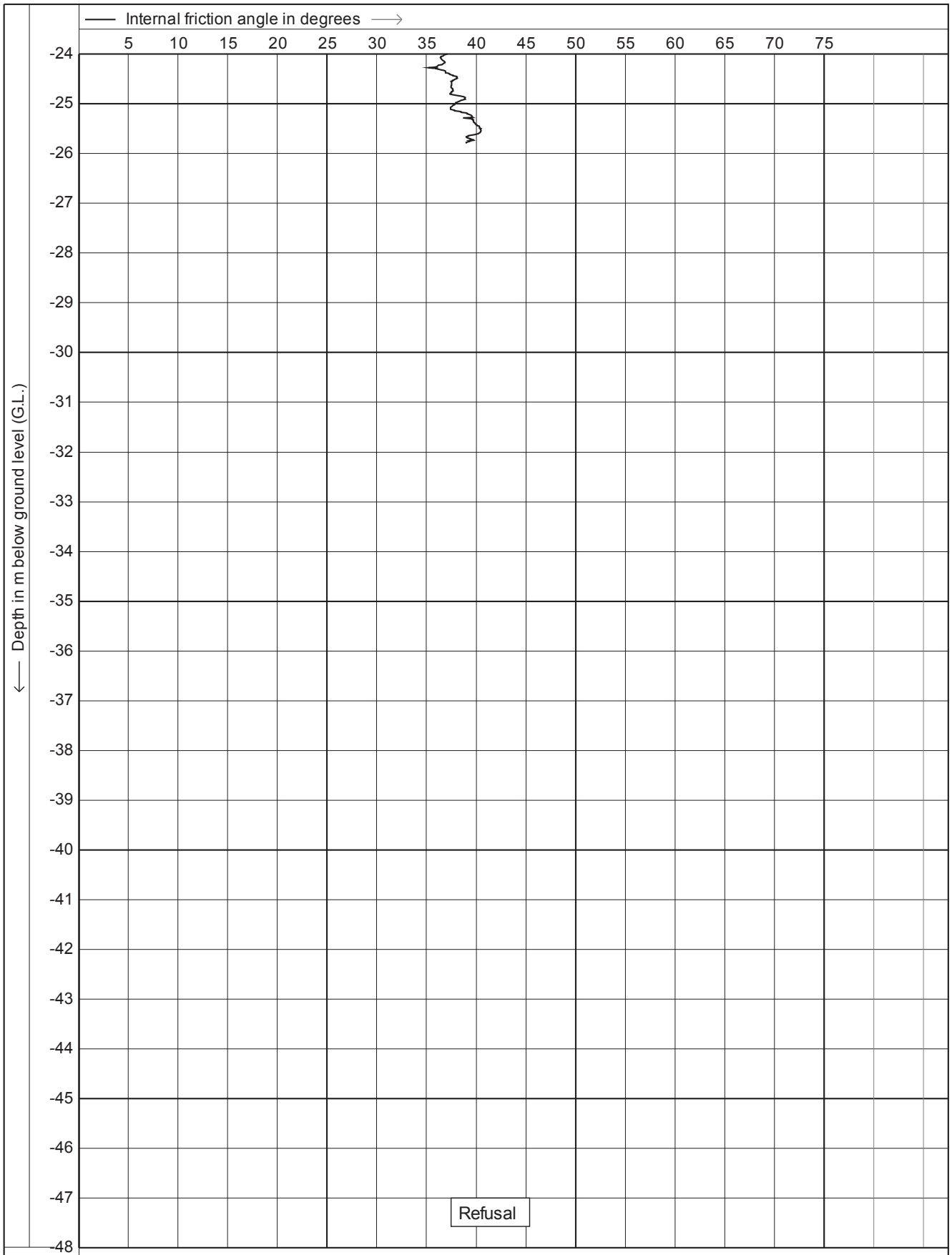
24/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **102**	**27/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

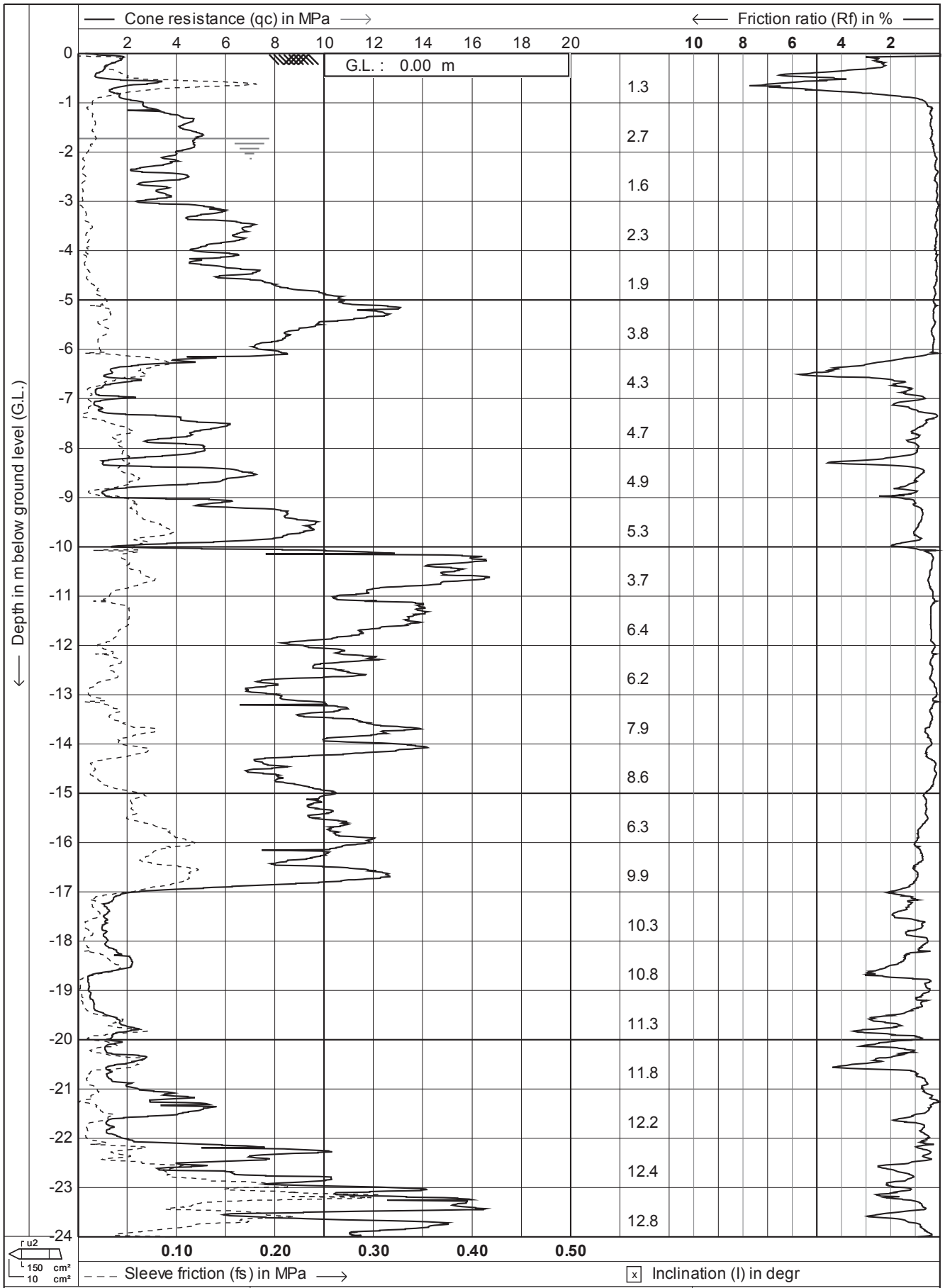
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **102**

28/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

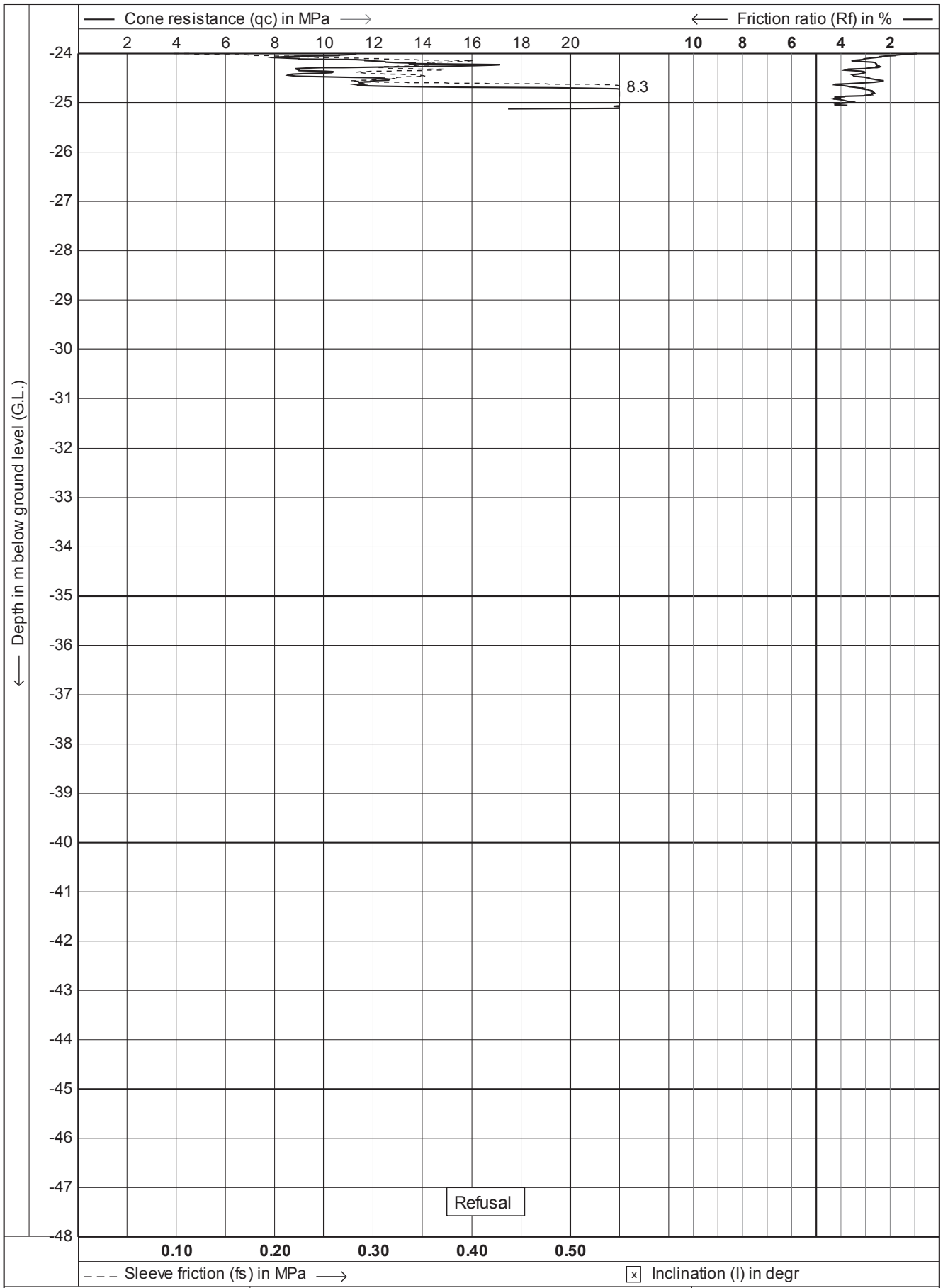
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

1/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

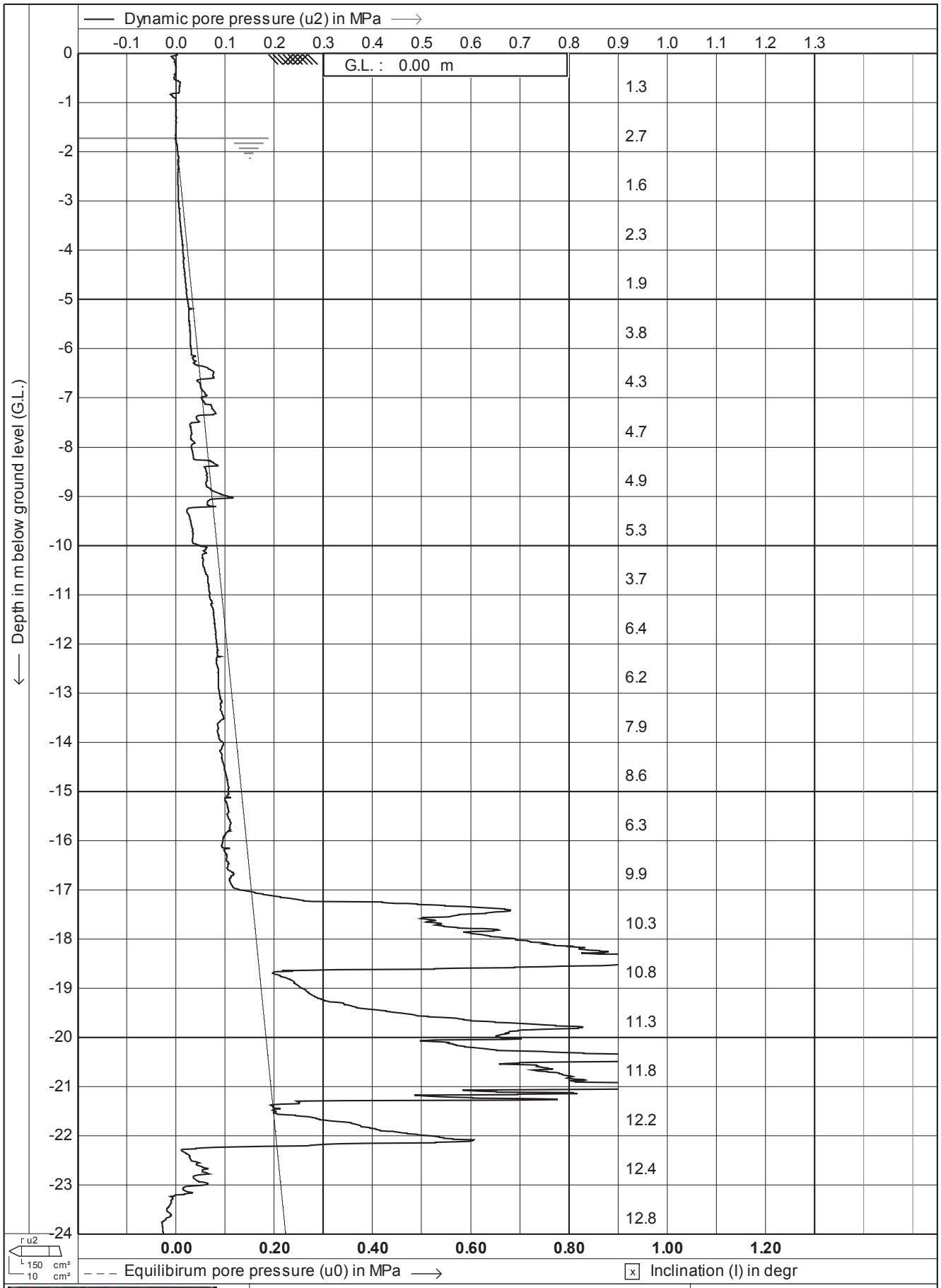
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

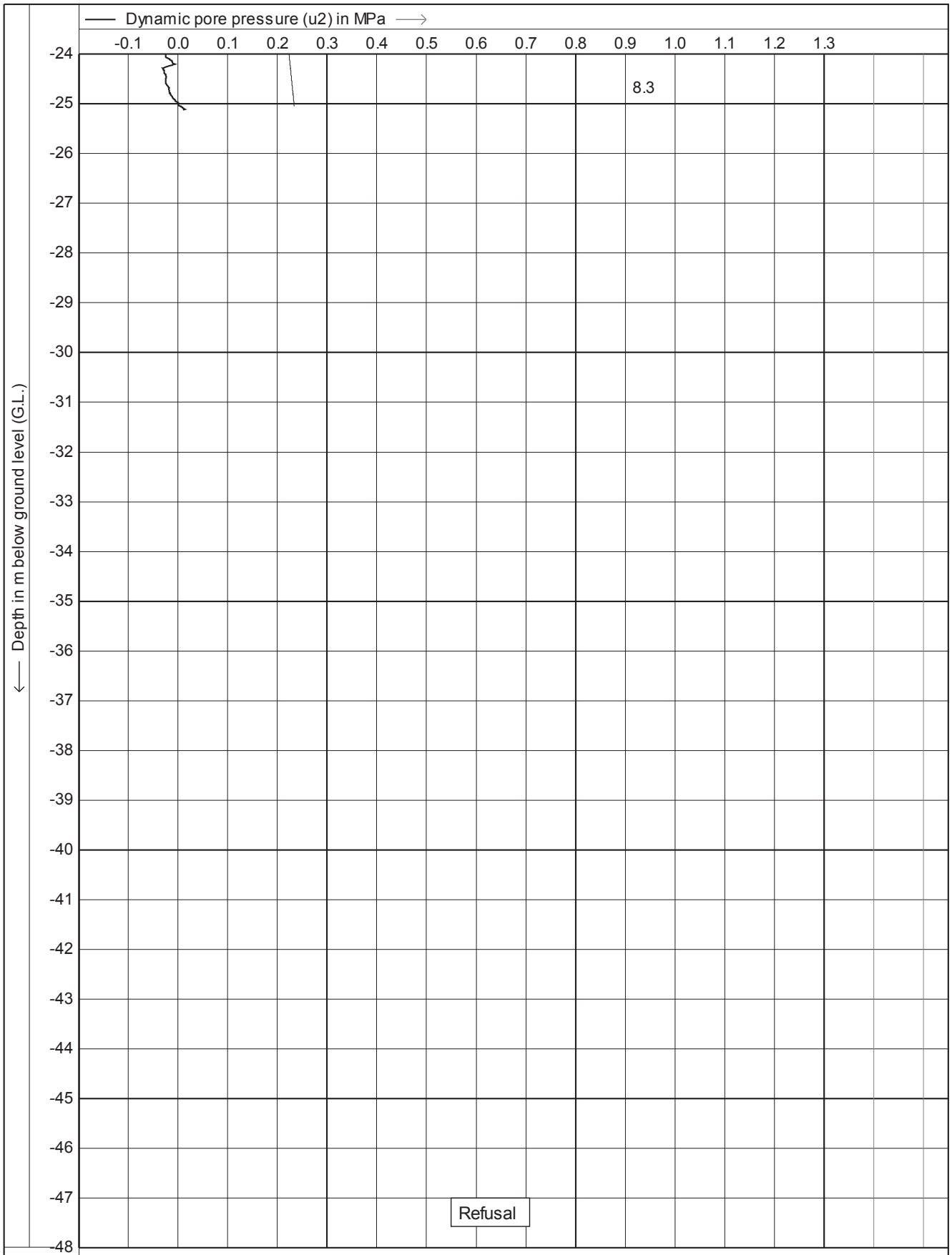
2/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **103**	**3/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

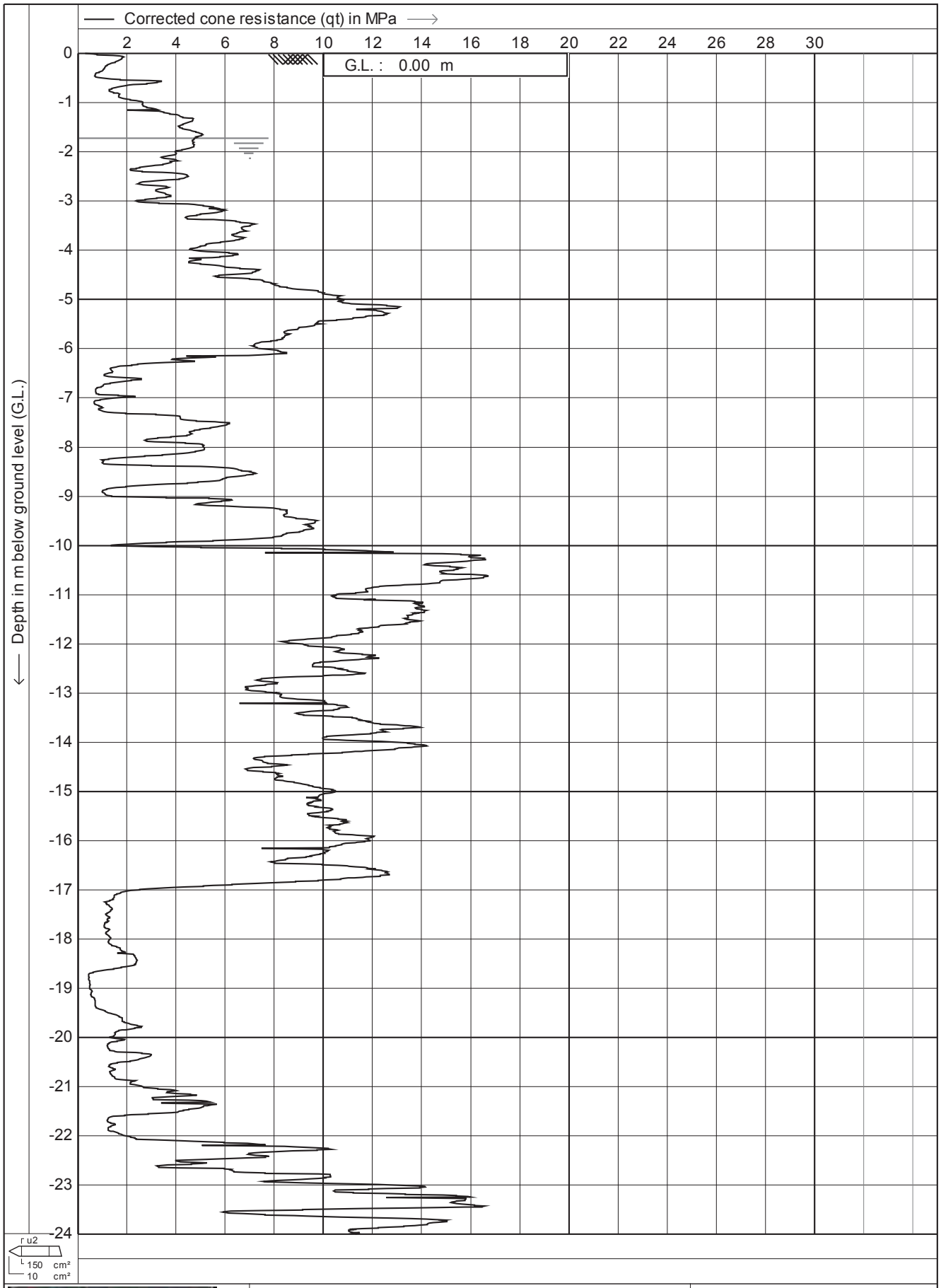
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

4/28

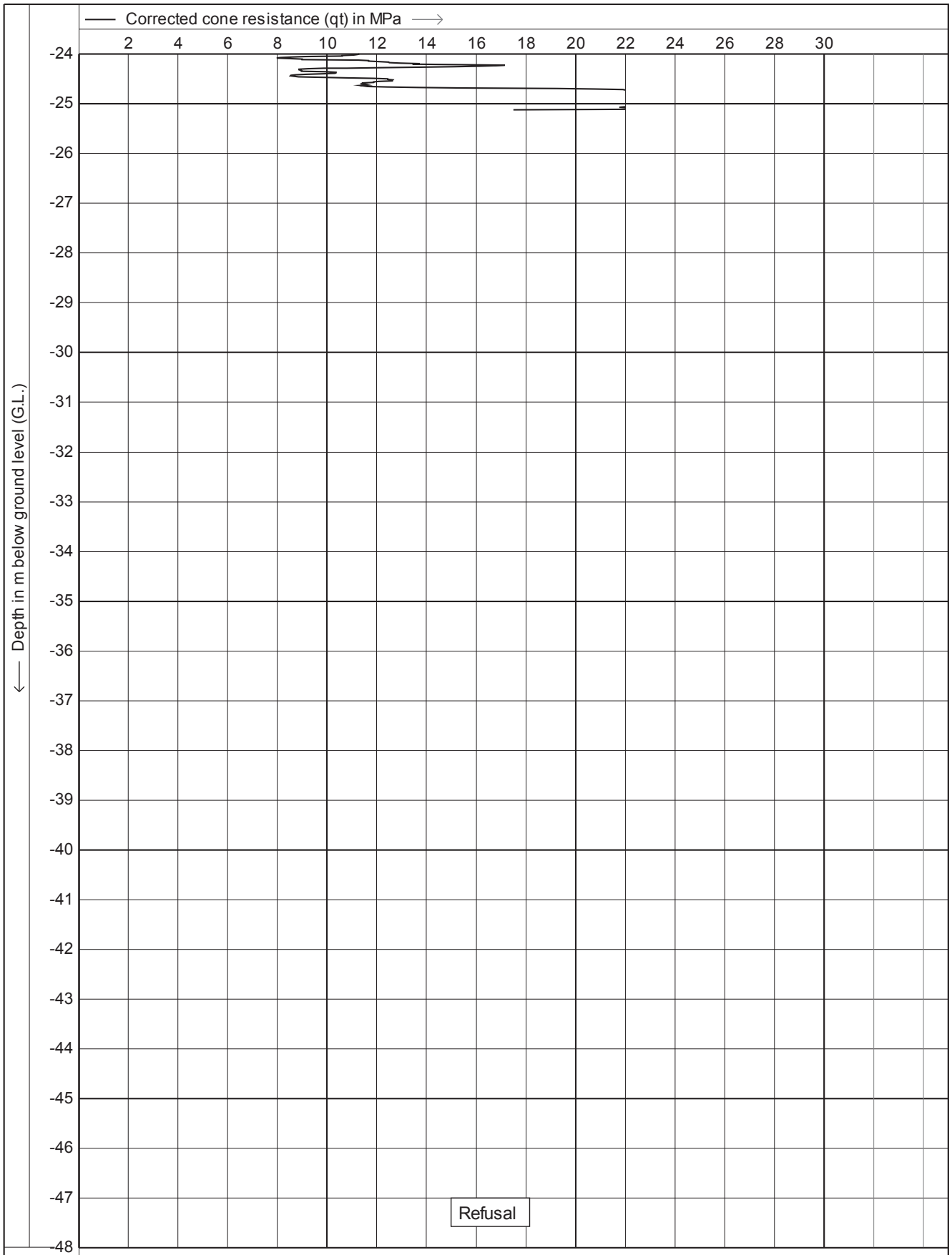
CPTask V1.31



Test according A.S.T.M. Standard D 5778-07		Date	: 16-1-2012
Project :	Site Investigations	Cone no.	: C10CFIIP.F57
		Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 103

5/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

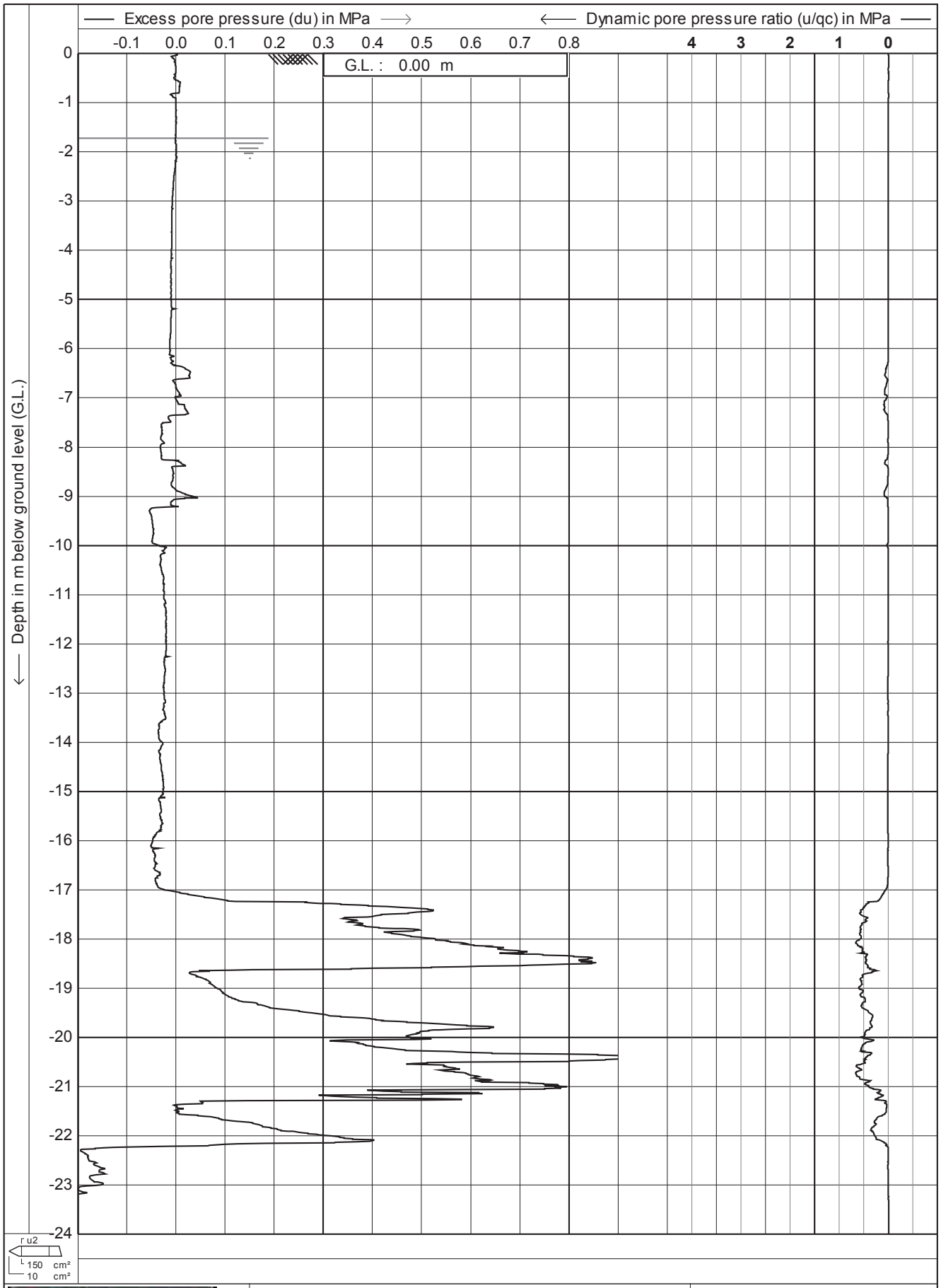
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

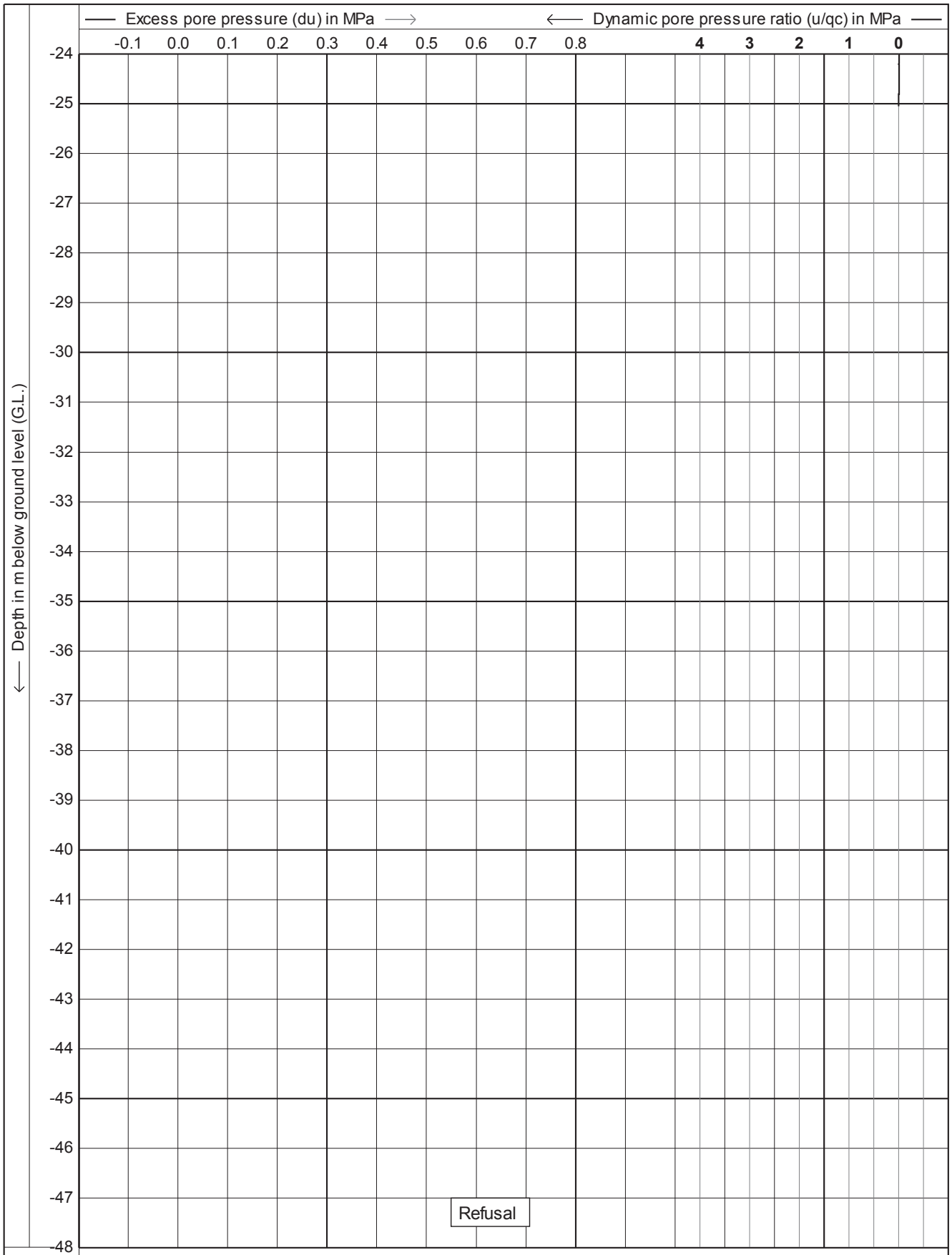
6/28

CPTask V1.31



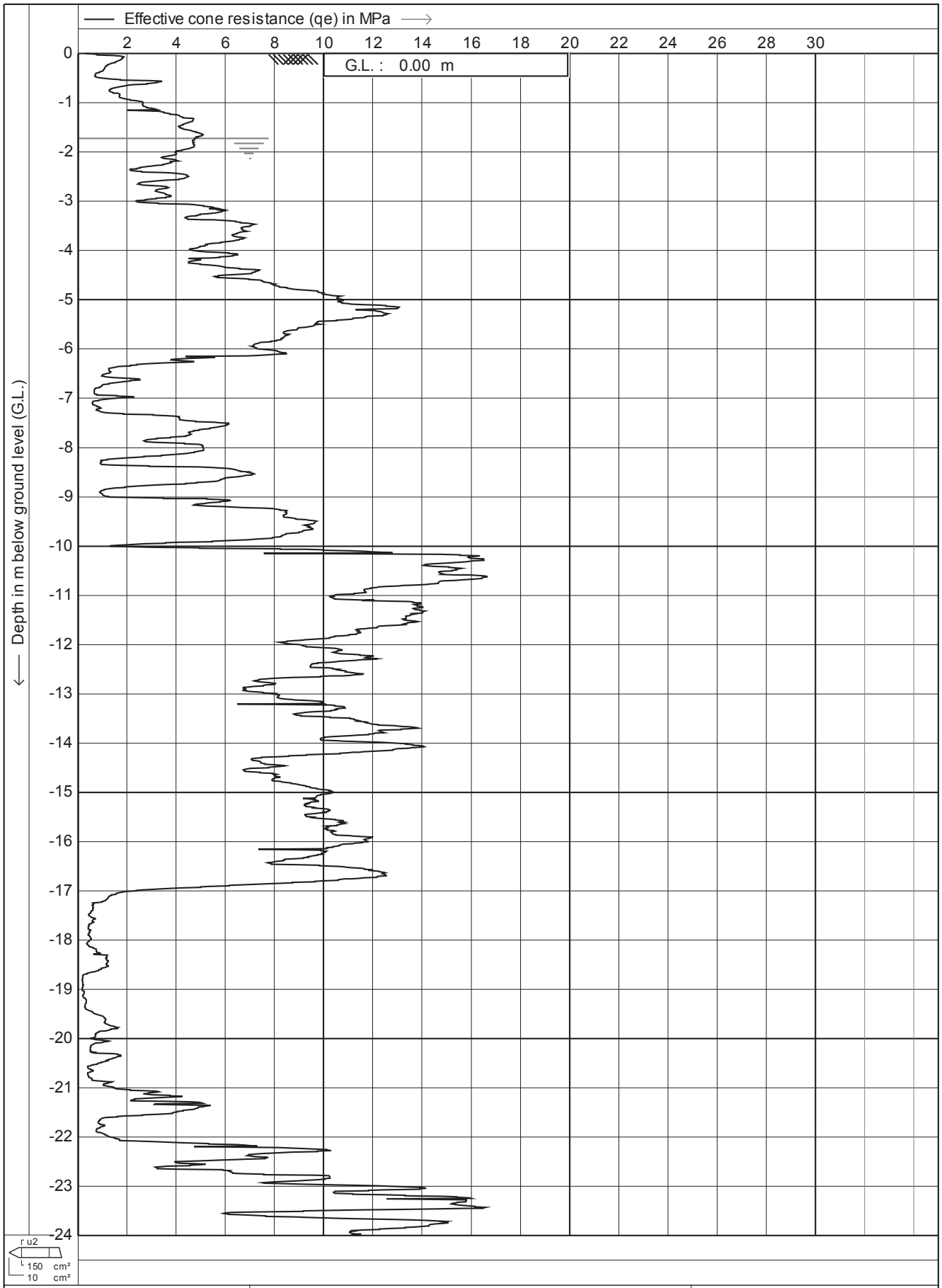
Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **103**	**7/28**

CPTask V1.31



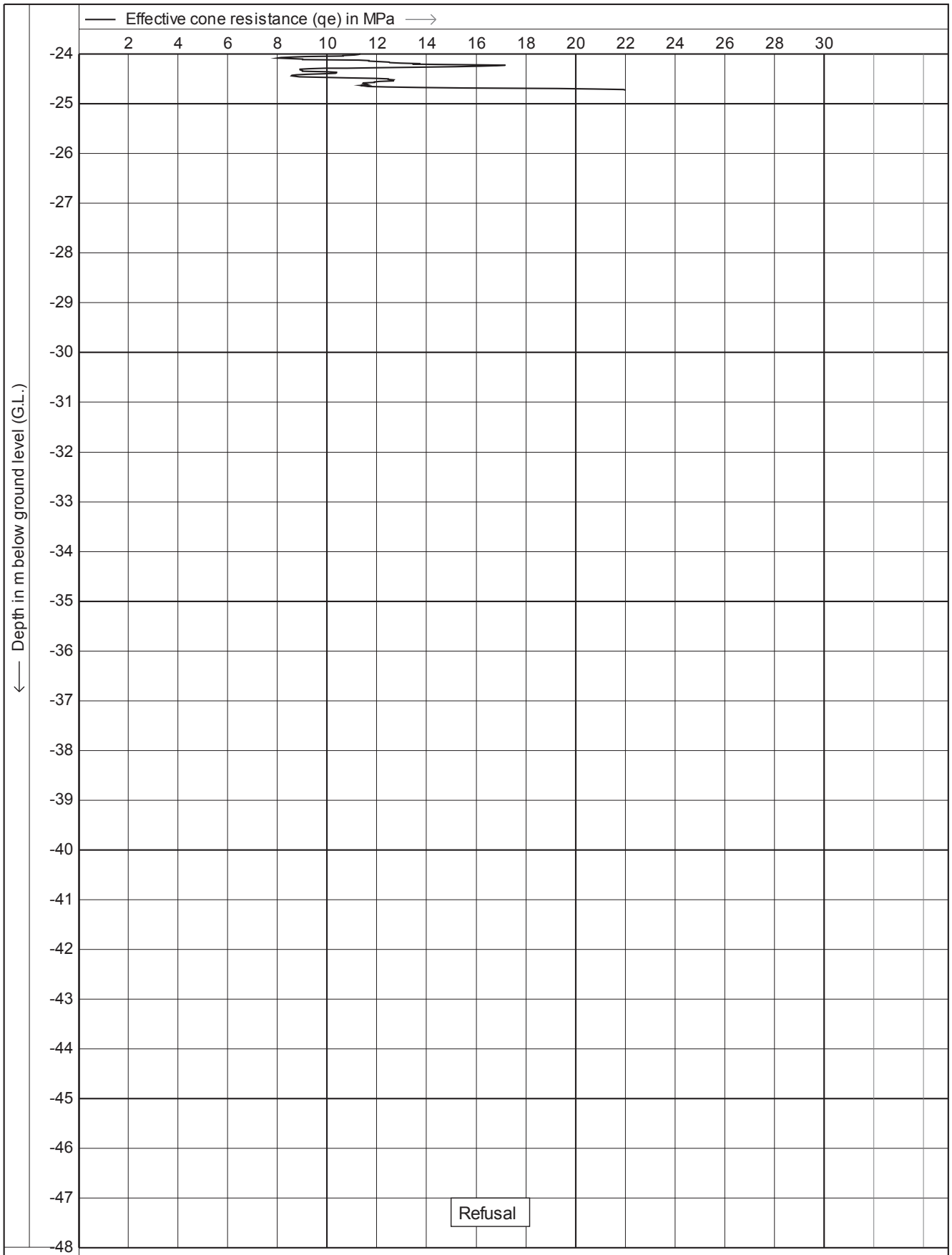
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
	Project : Site Investigations	Project no.	: 02AECOM2
	Location: Southern Links - Hamilton	CPT no.	: 103 8/28

CPTask V1.31



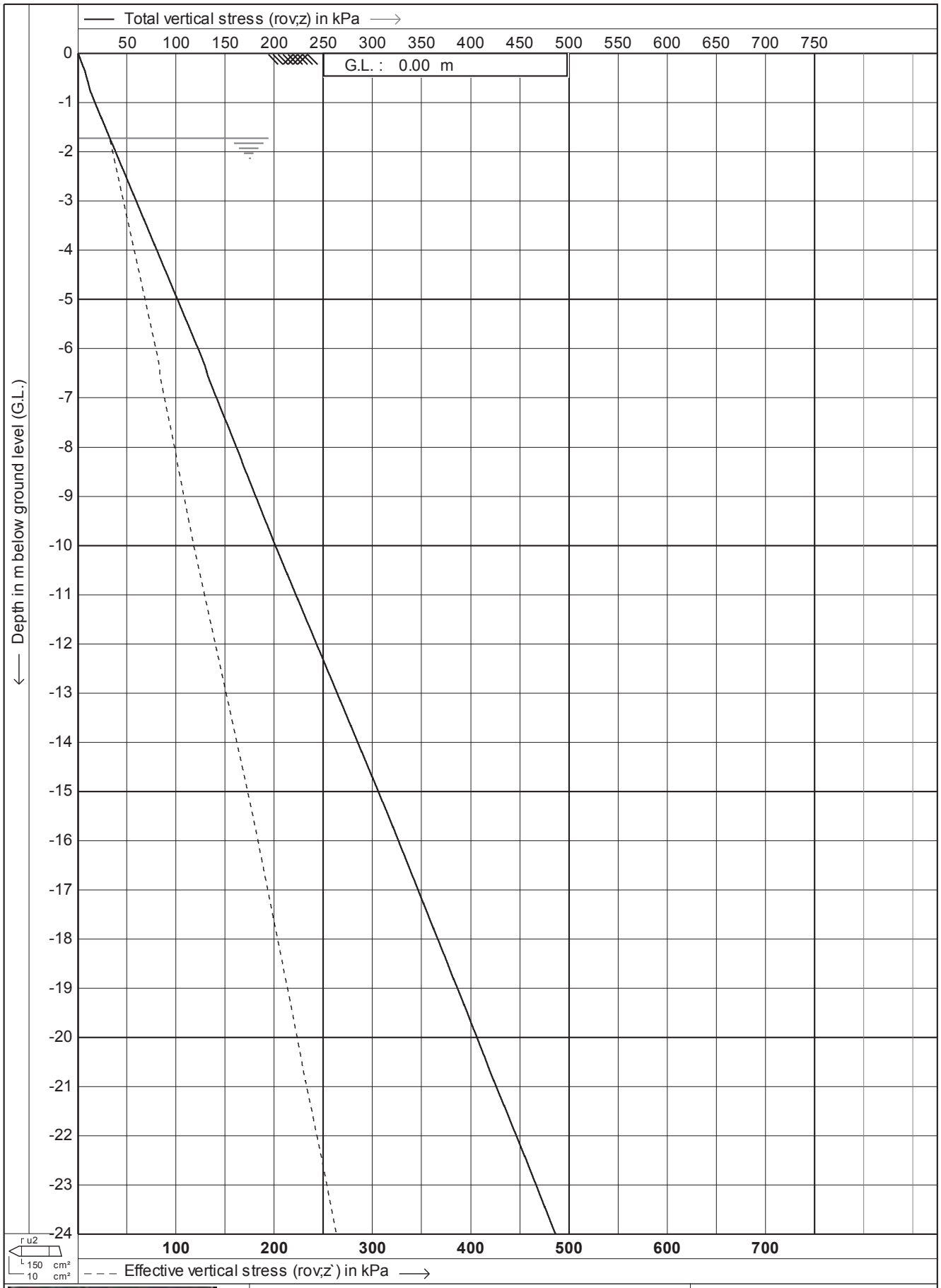
Test according A.S.T.M. Standard D 5778-07		Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
Project :	Site Investigations	Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 103 9/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
	Project : Site Investigations	Project no.	: 02AECOM2
	Location: Southern Links - Hamilton	CPT no.	: 103 10/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

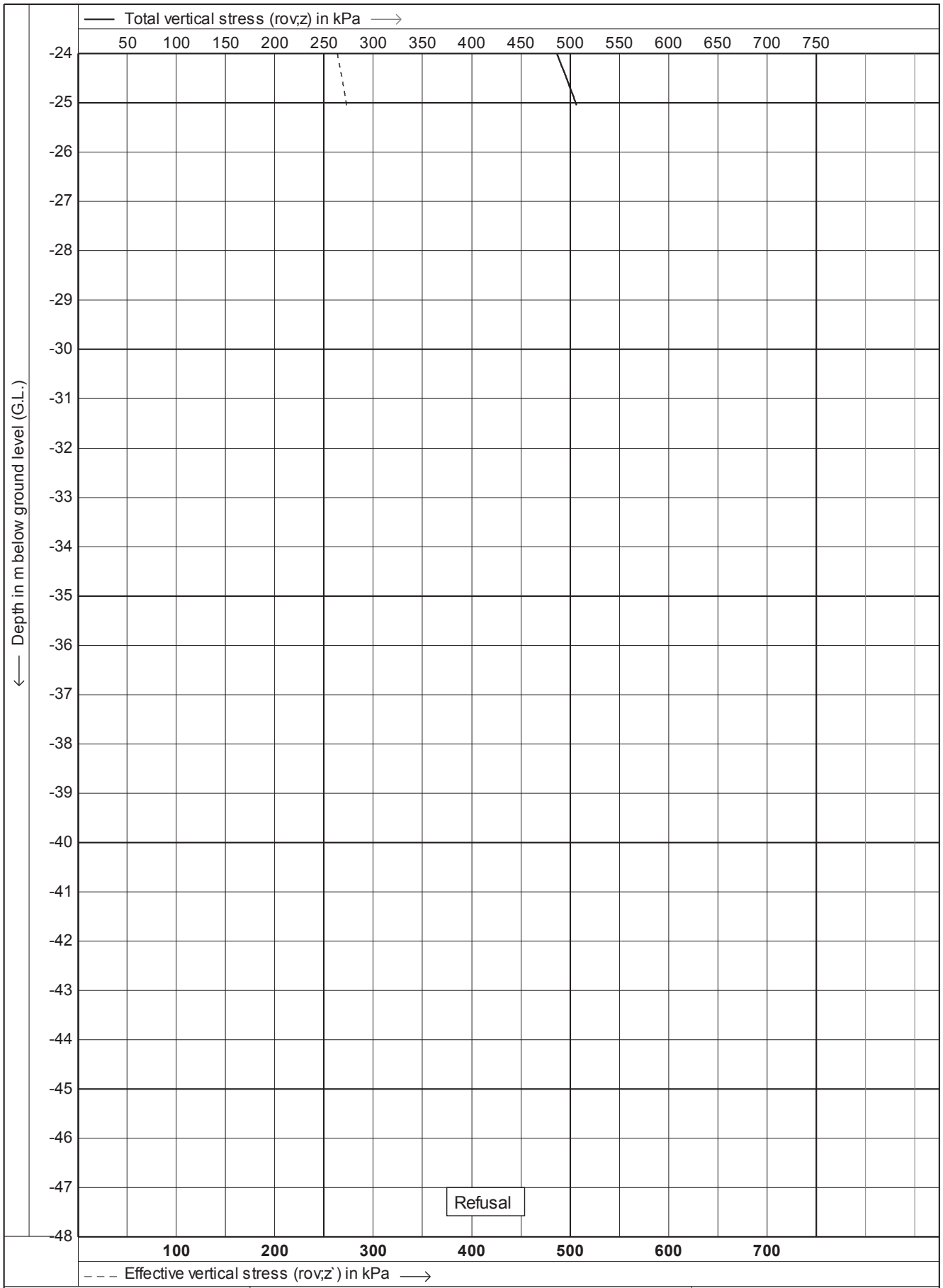
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

11/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

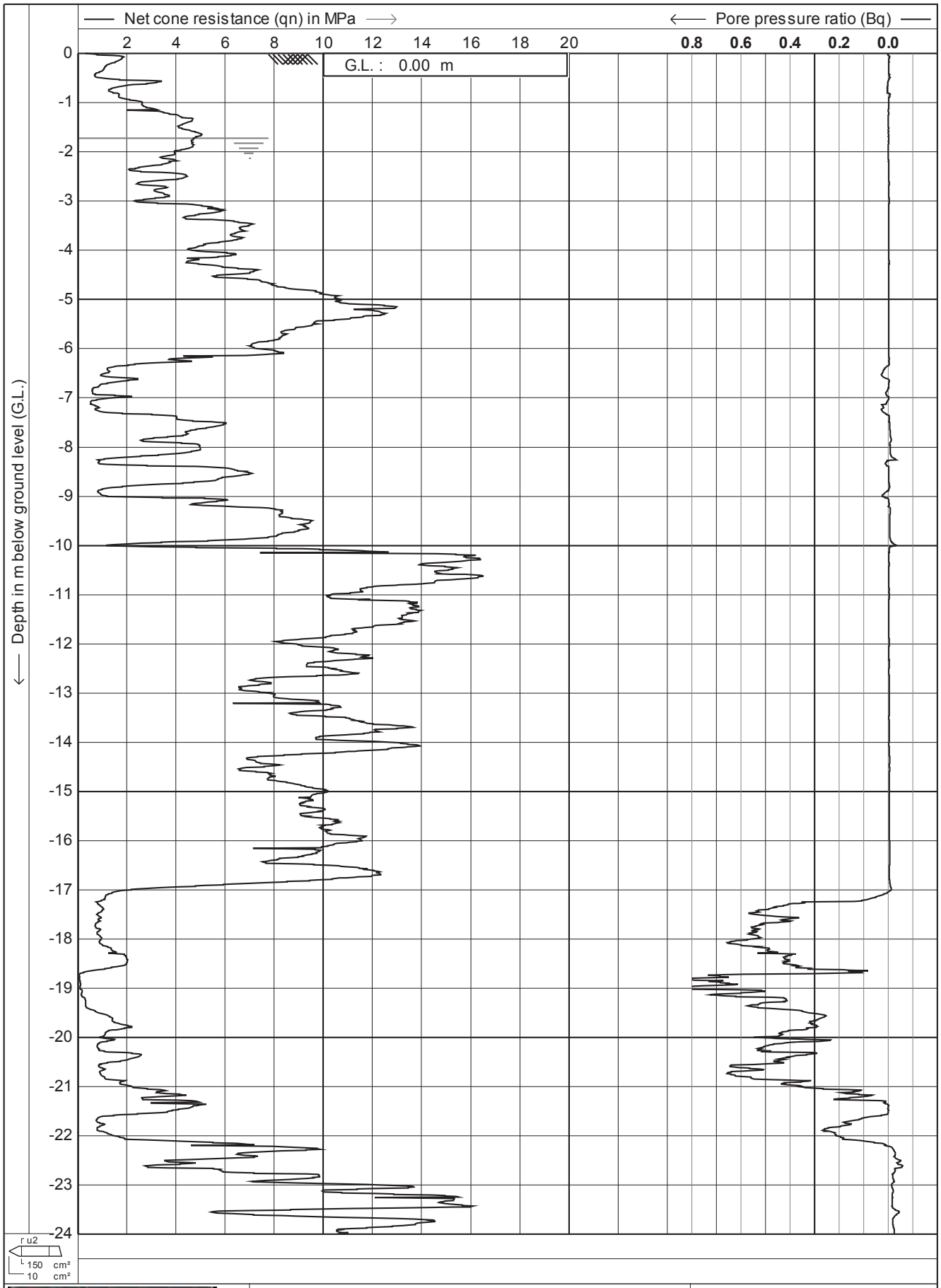
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

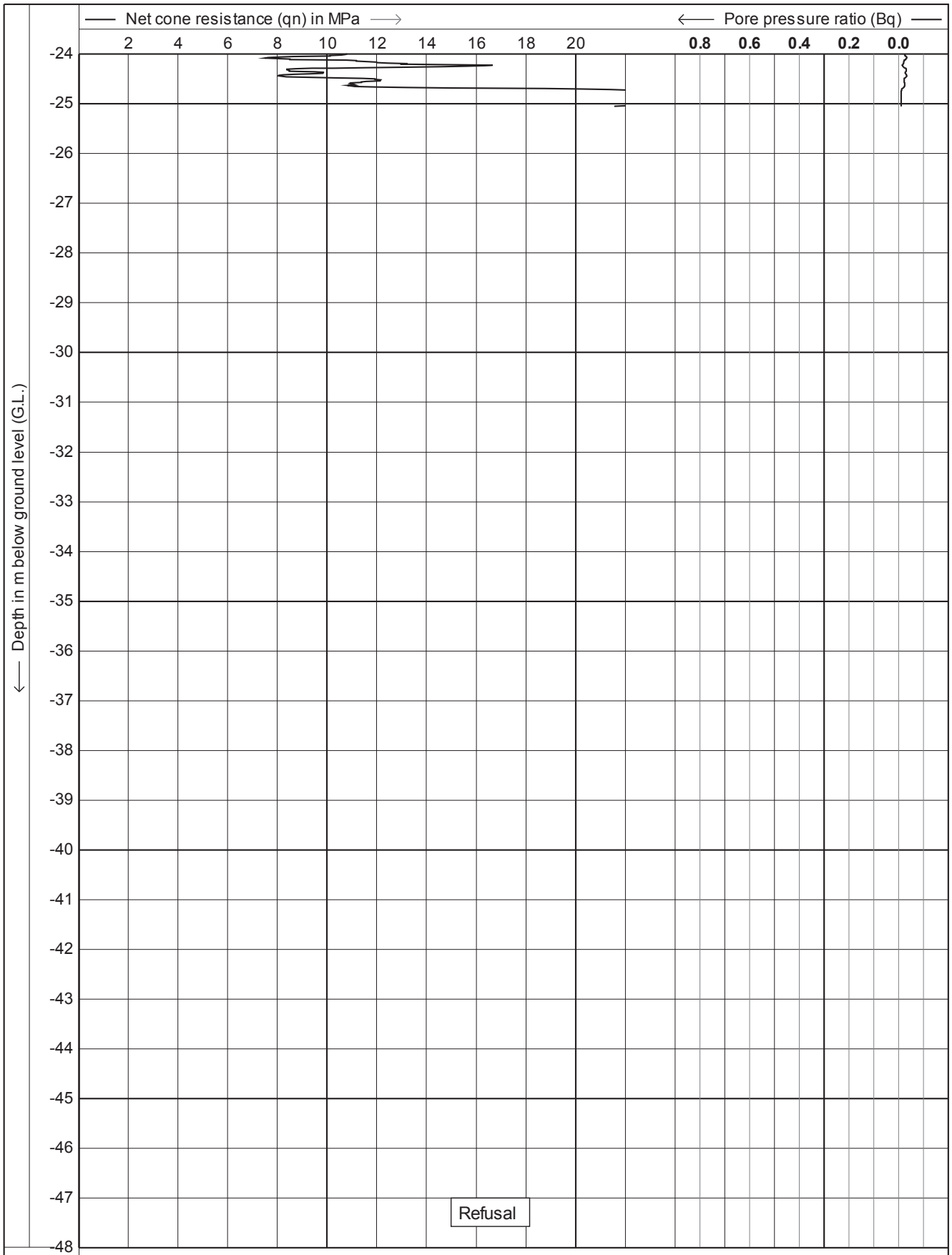
12/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **103**	**13/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

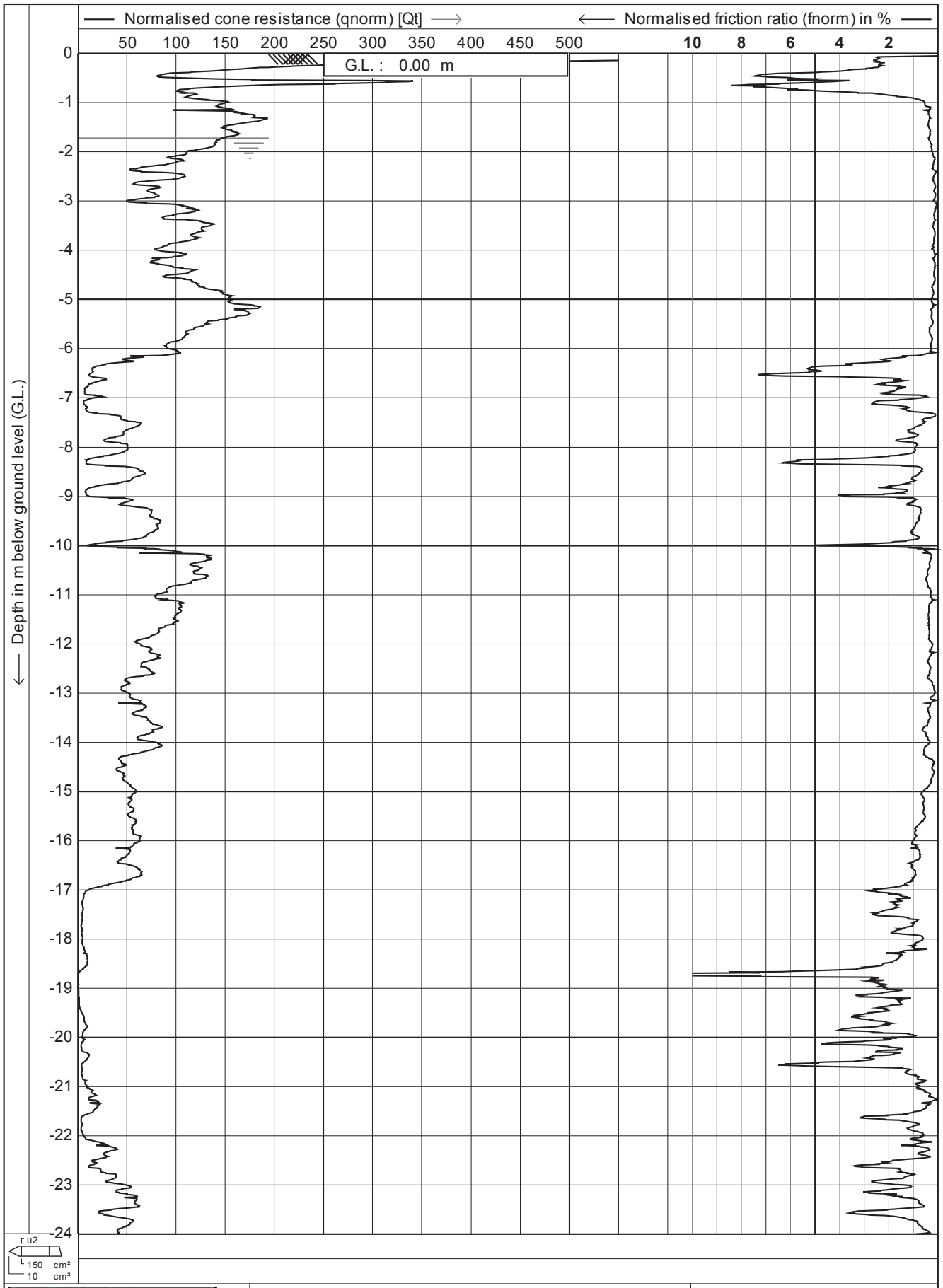
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

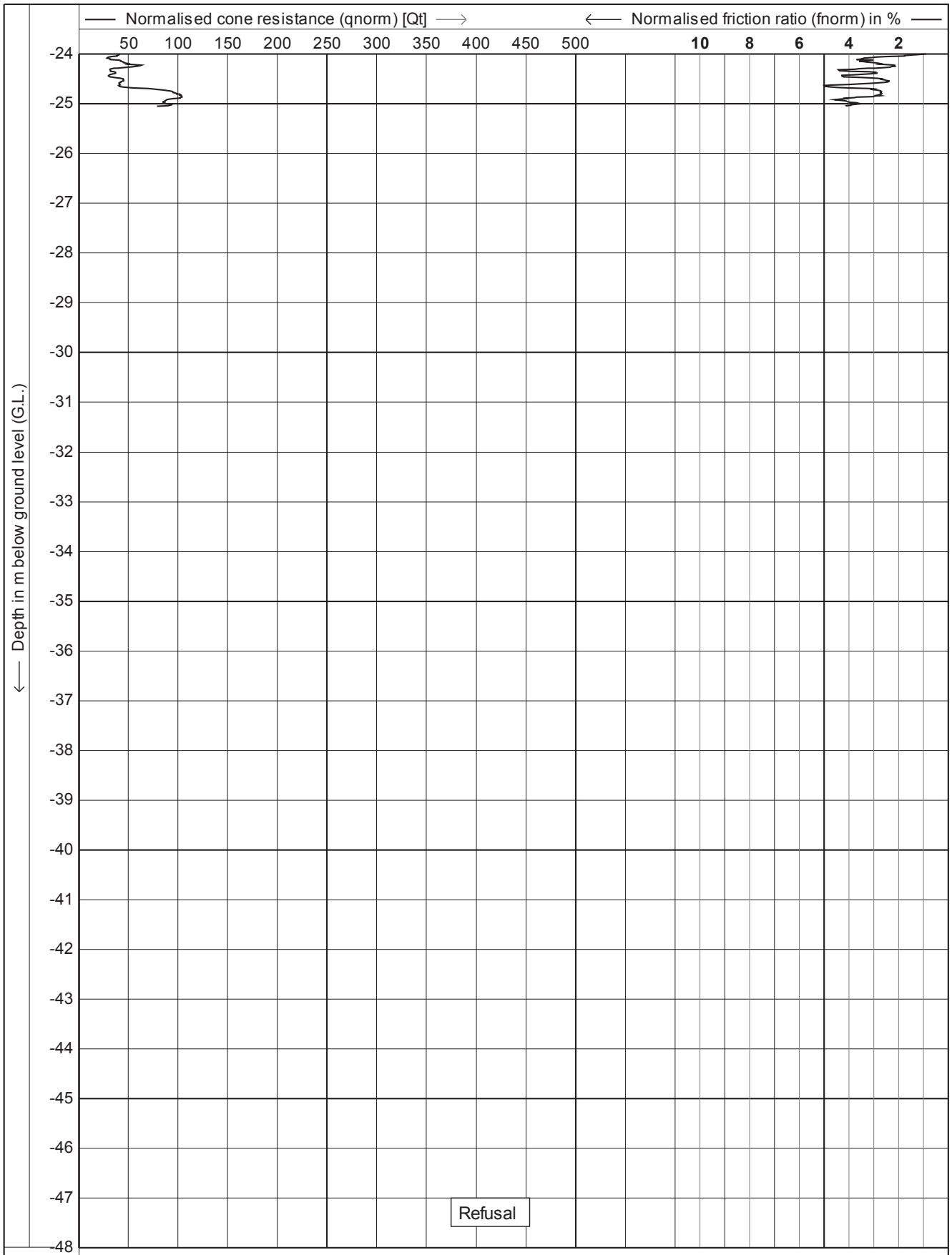
14/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **103**	**15/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

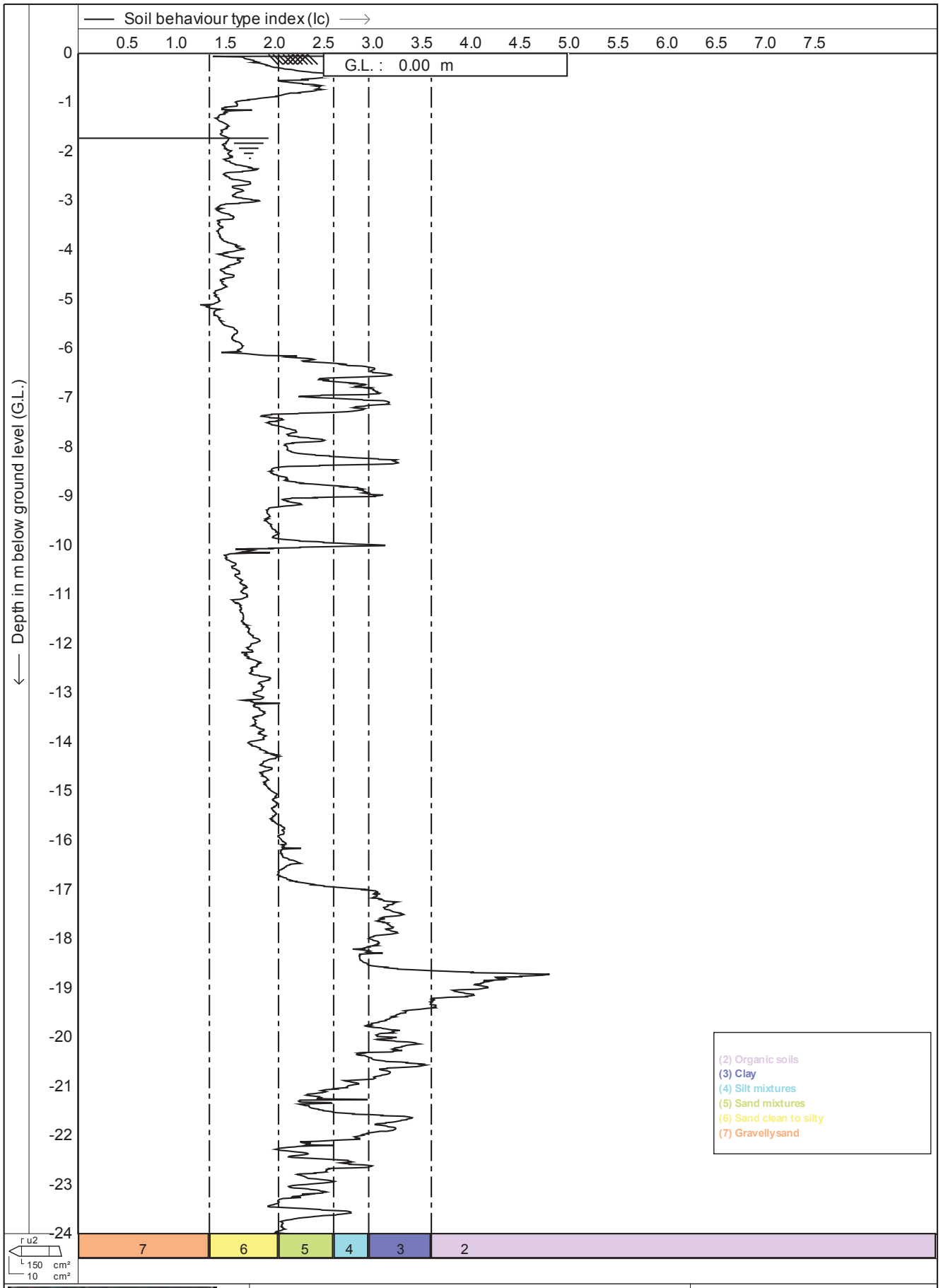
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

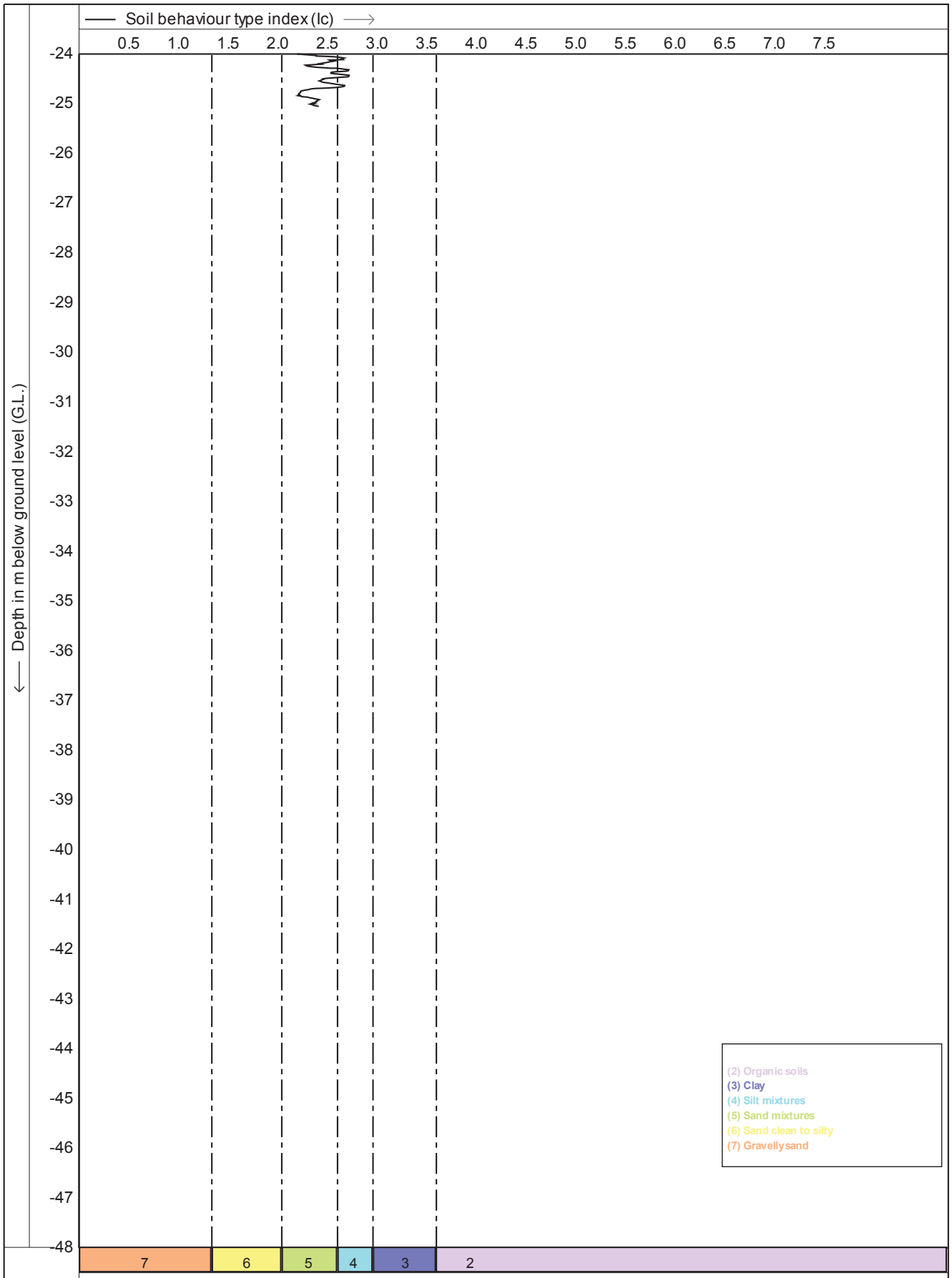
16/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**
		Project no. : **02AECOM2**
	Location: **Southern Links - Hamilton**	CPT no. : **103** 17/28

CPTask V1.31



CPTask V1.31

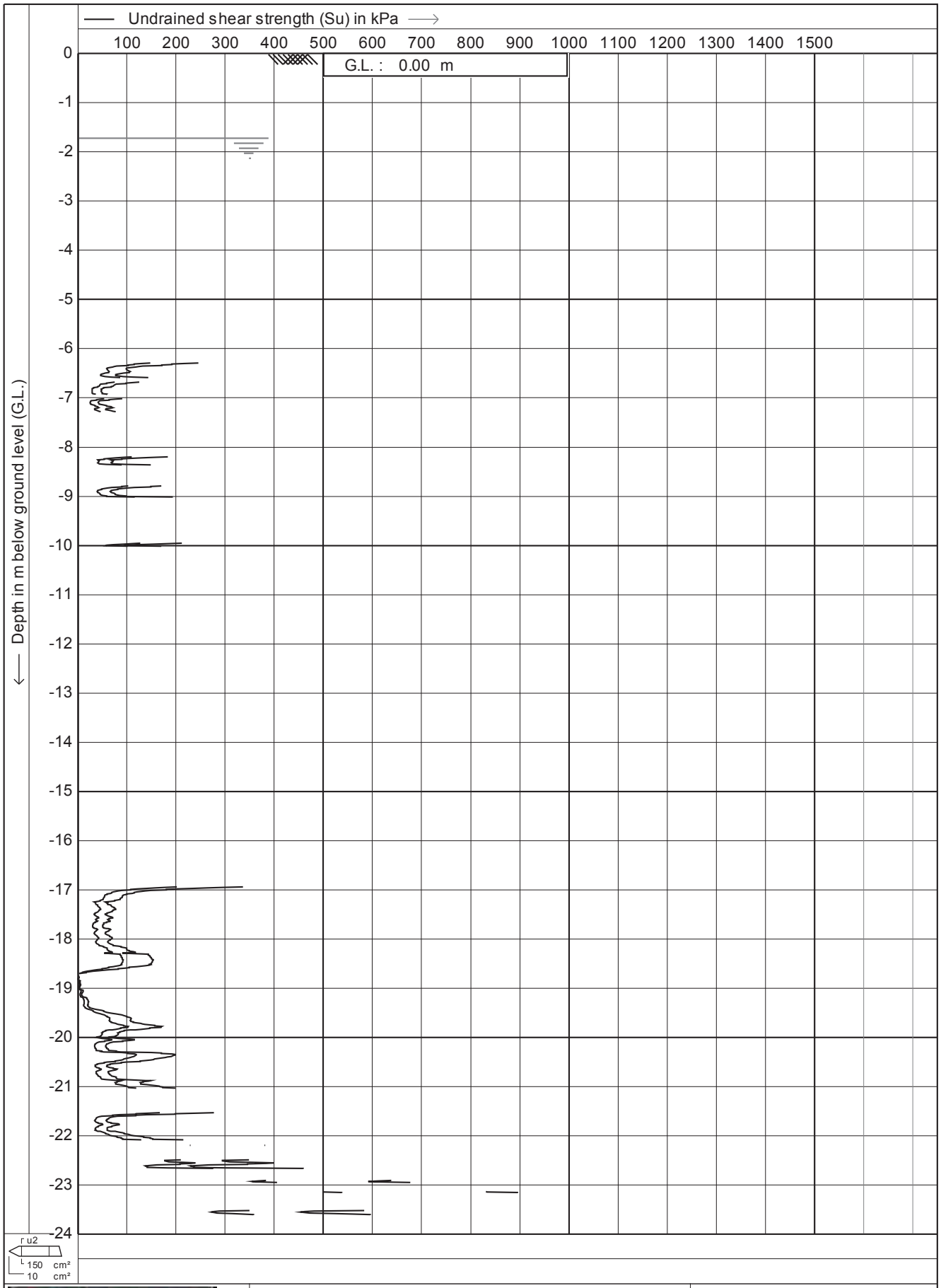
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

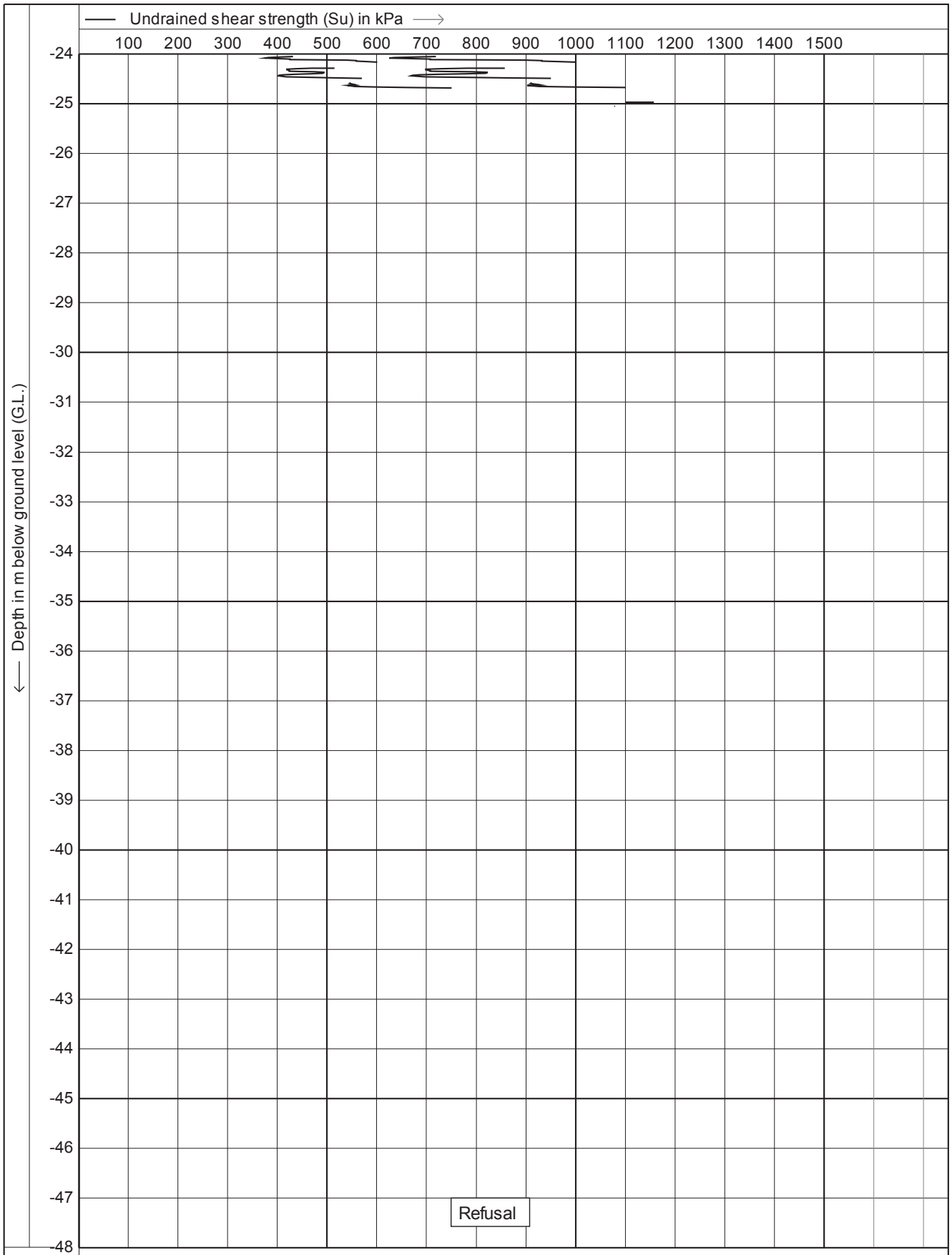
Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

18/28



Test according A.S.T.M. Standard D 5778-07		Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
Project :	Site Investigations	Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 103

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

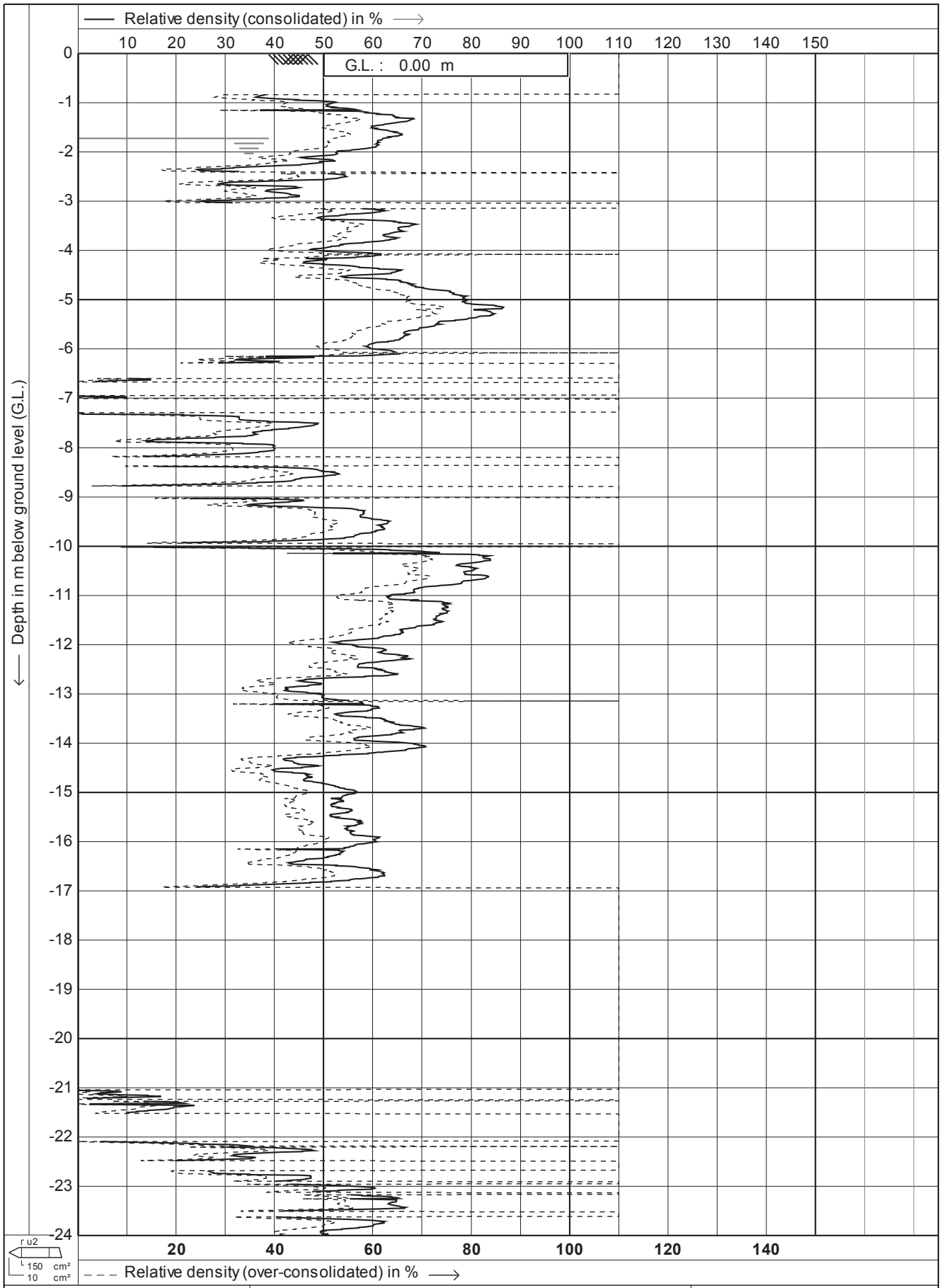
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

20/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

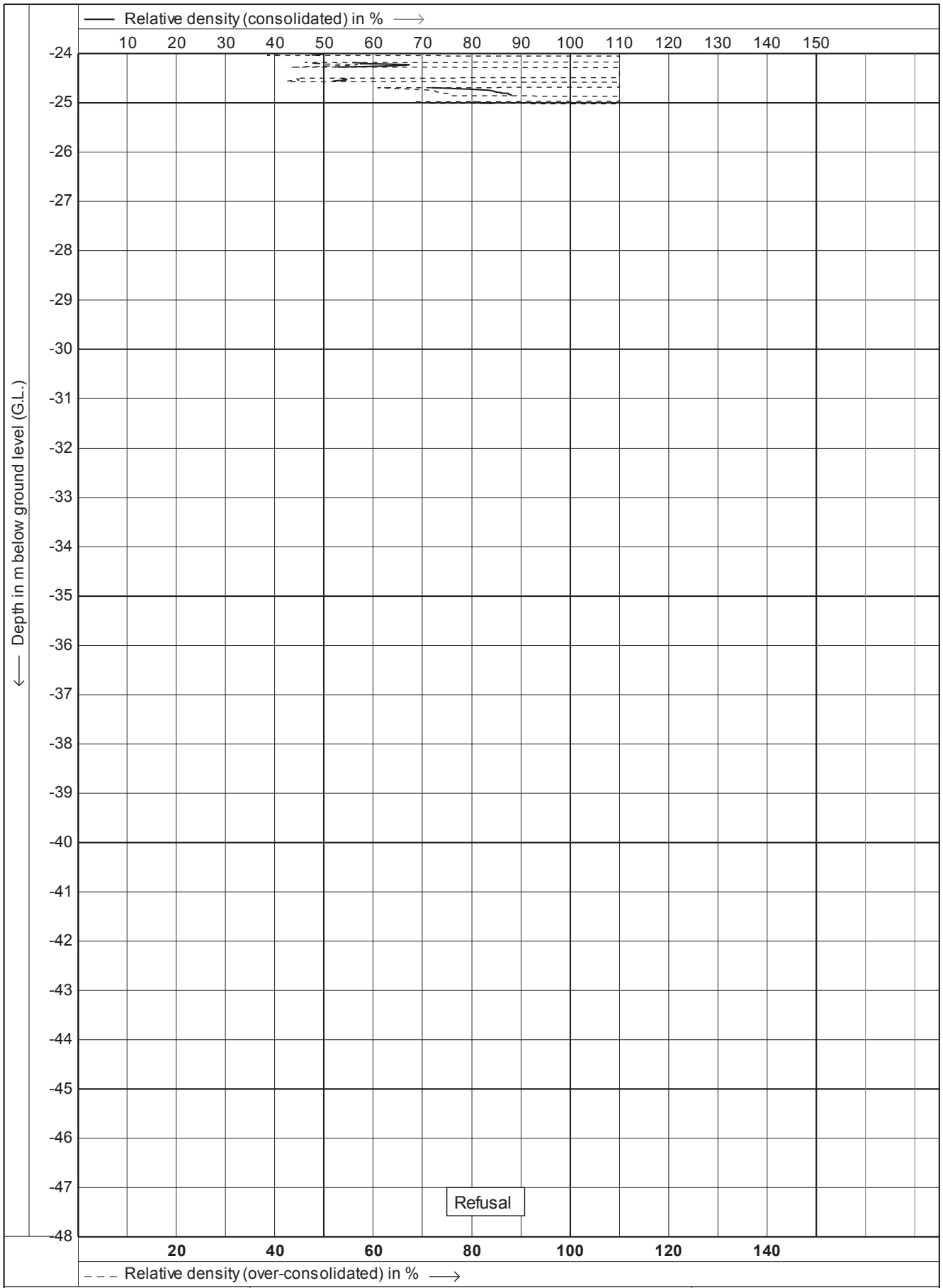
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

21/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

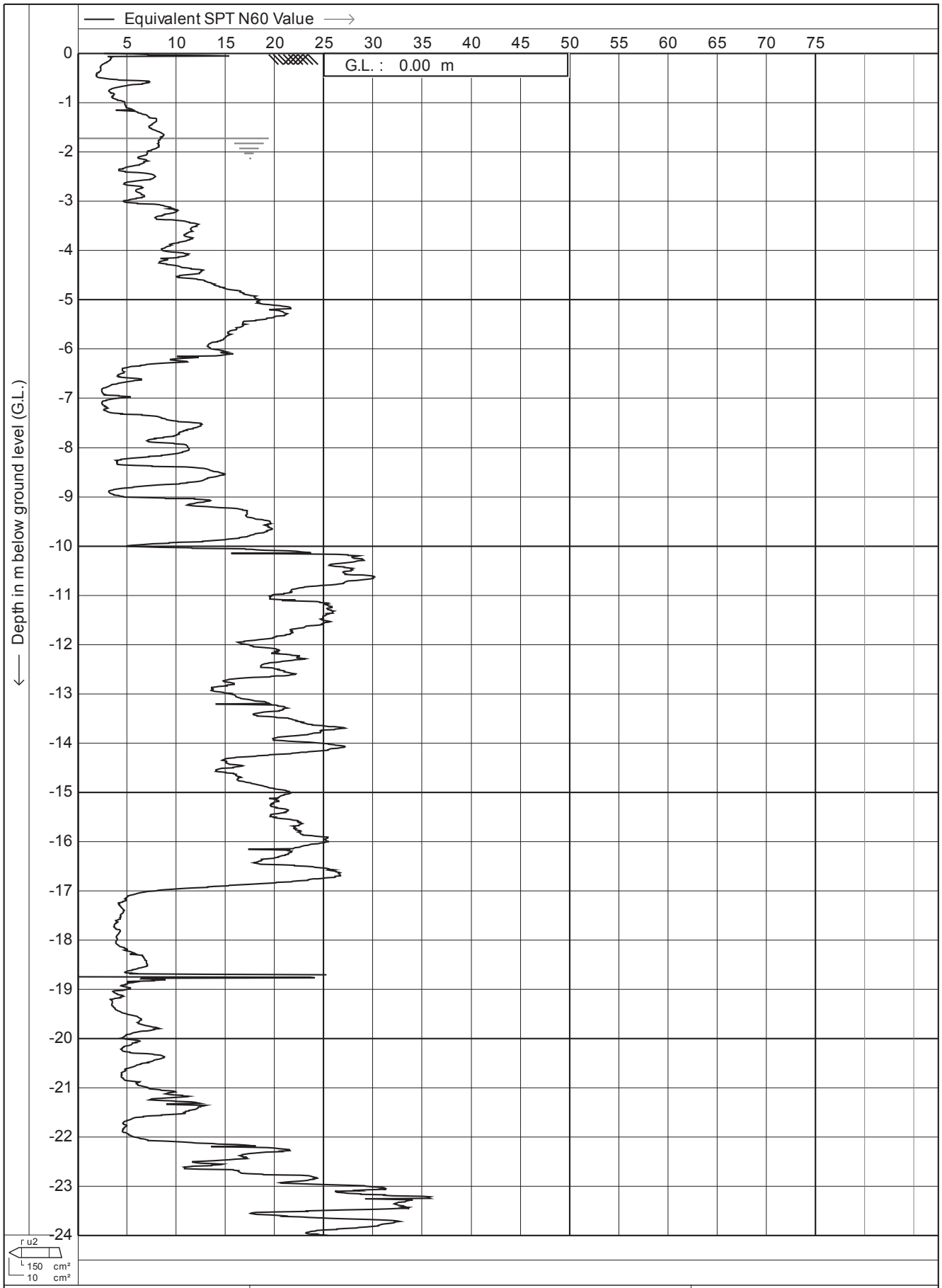
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

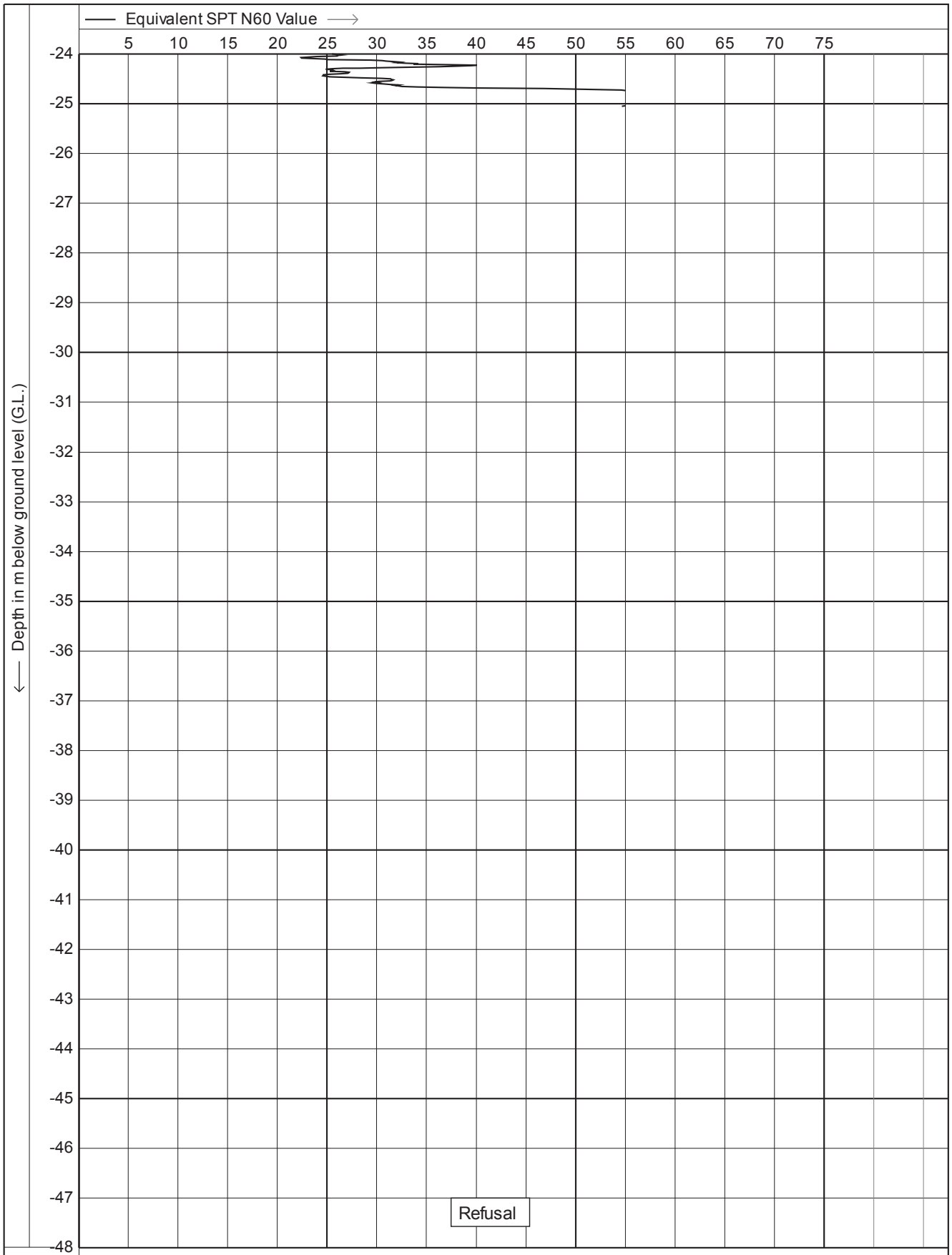
22/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07		Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
Project :	Site Investigations	Project no. :	02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 103 23/28

CPTask V1.31



CPTask V1.31

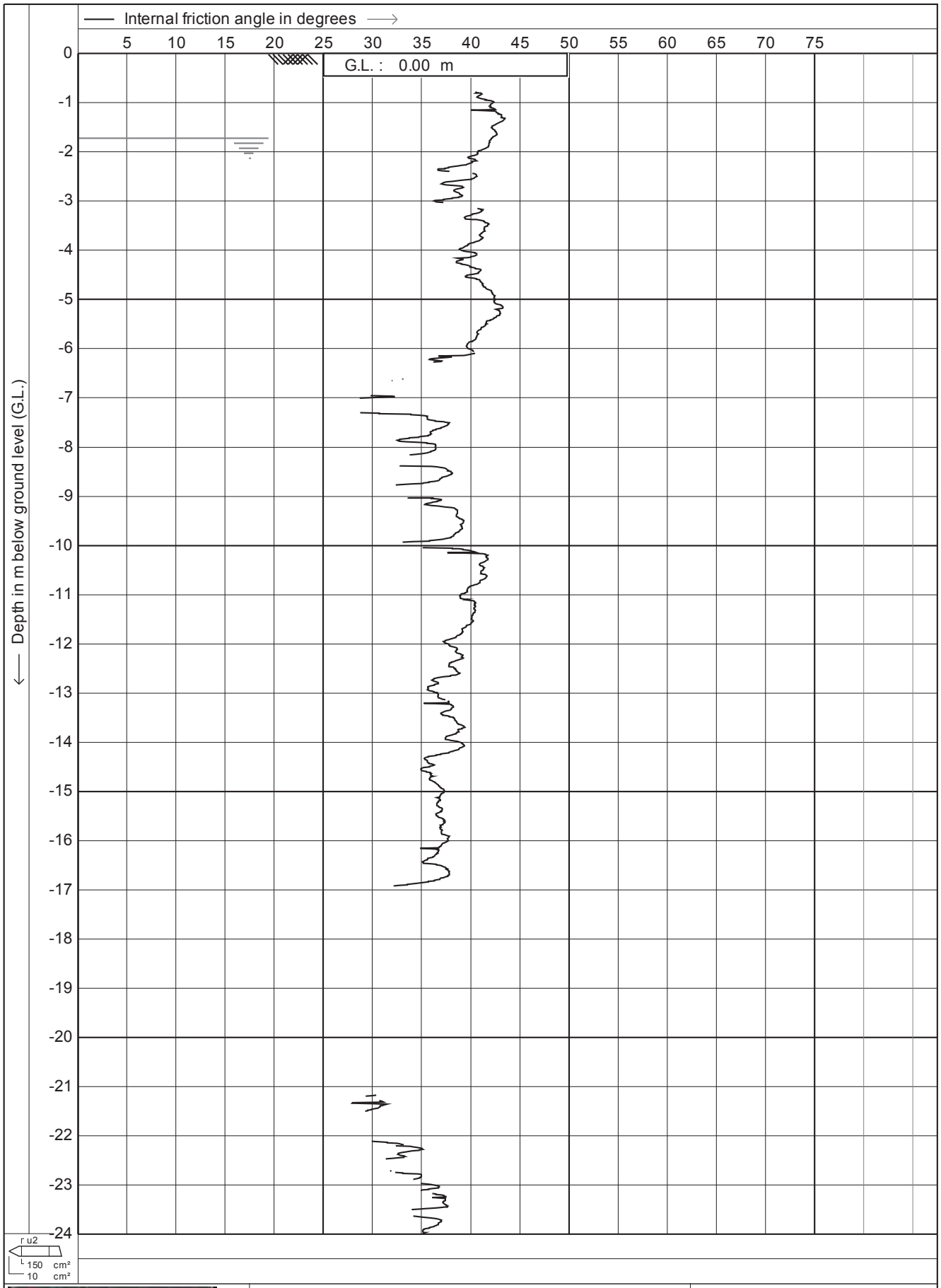
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

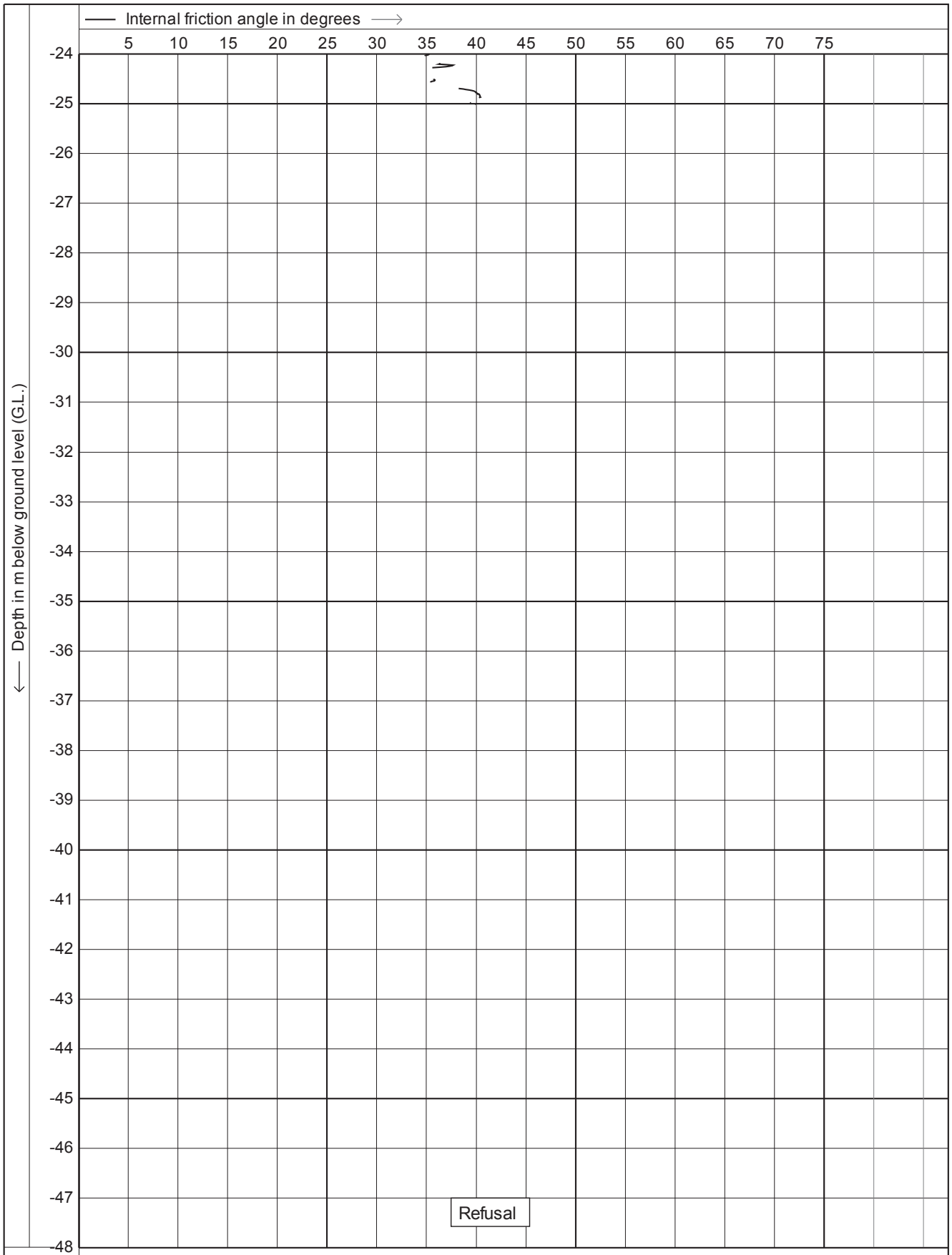
Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

24/28



Test according A.S.T.M. Standard D 5778-07		Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
Project :	Site Investigations	Project no. :	02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 103 27/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

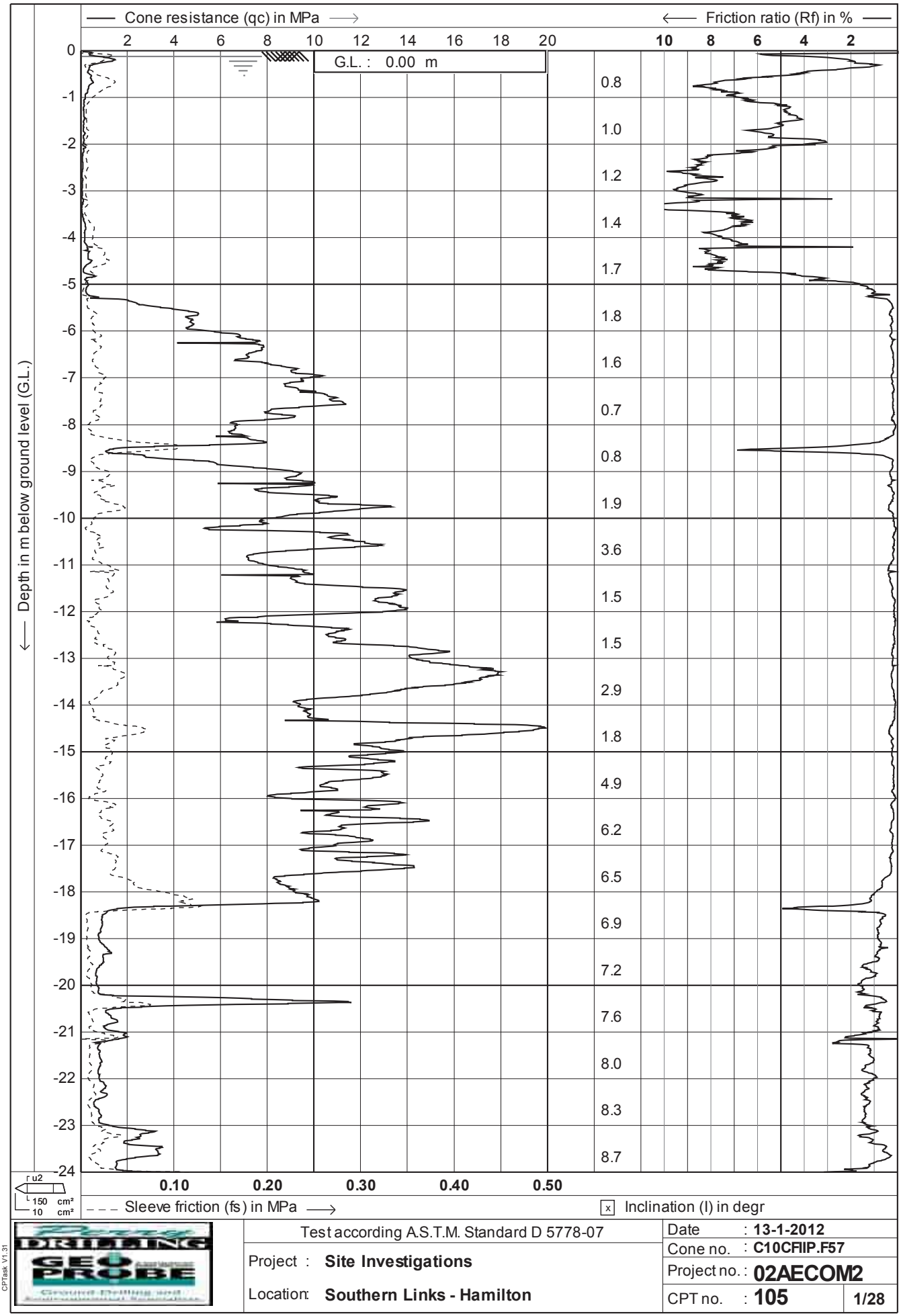
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **103**

28/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

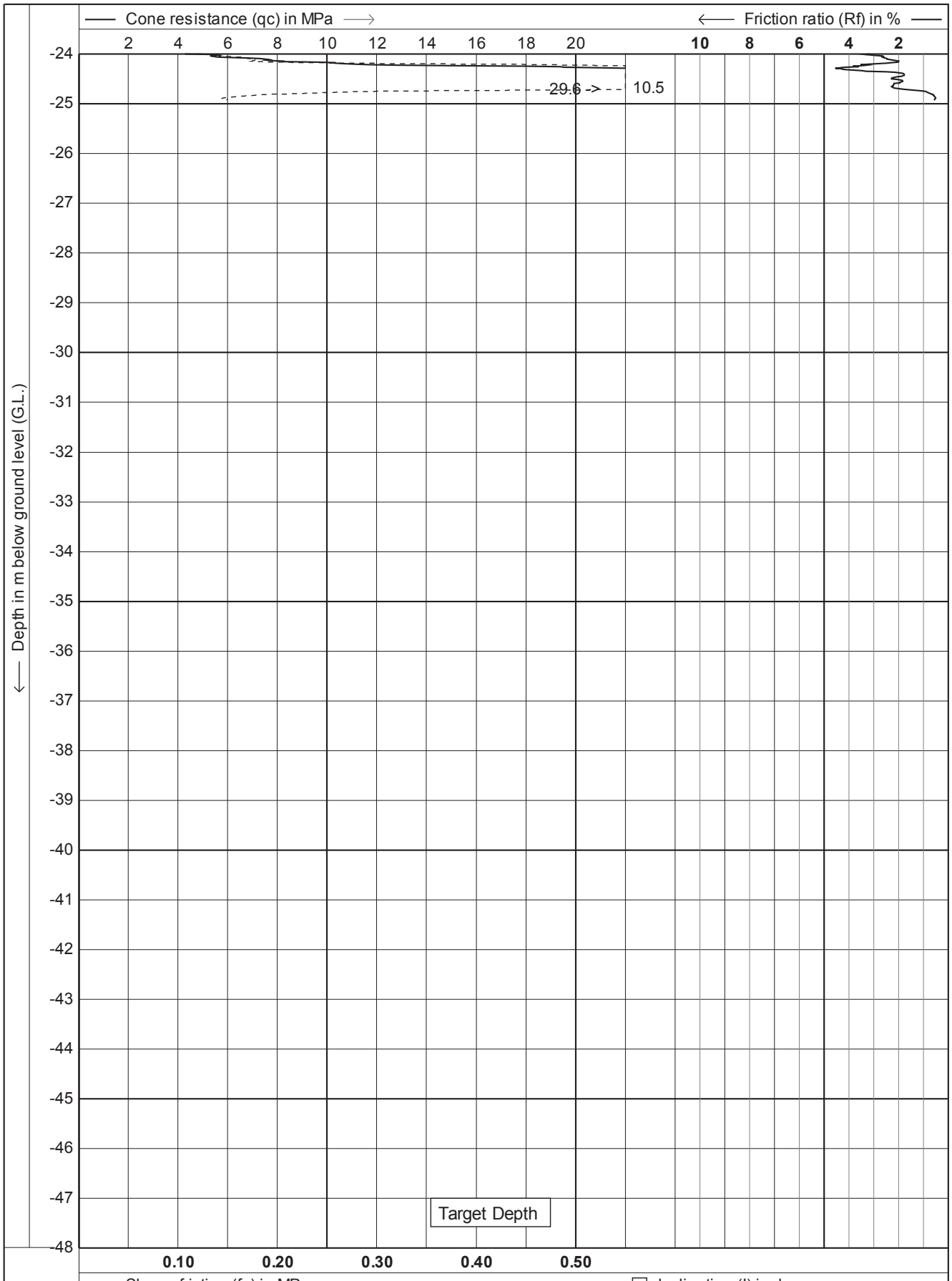
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

1/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

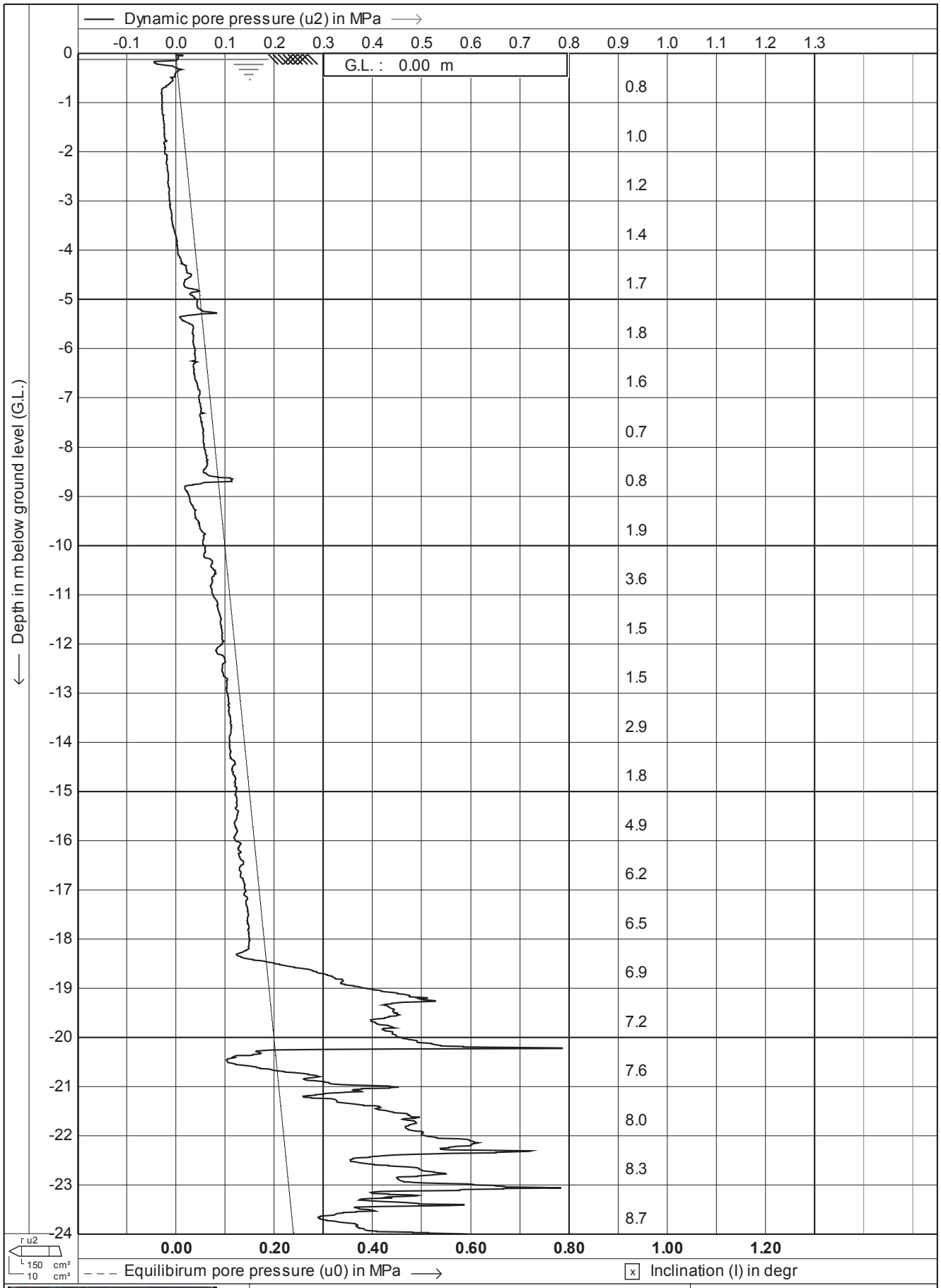
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

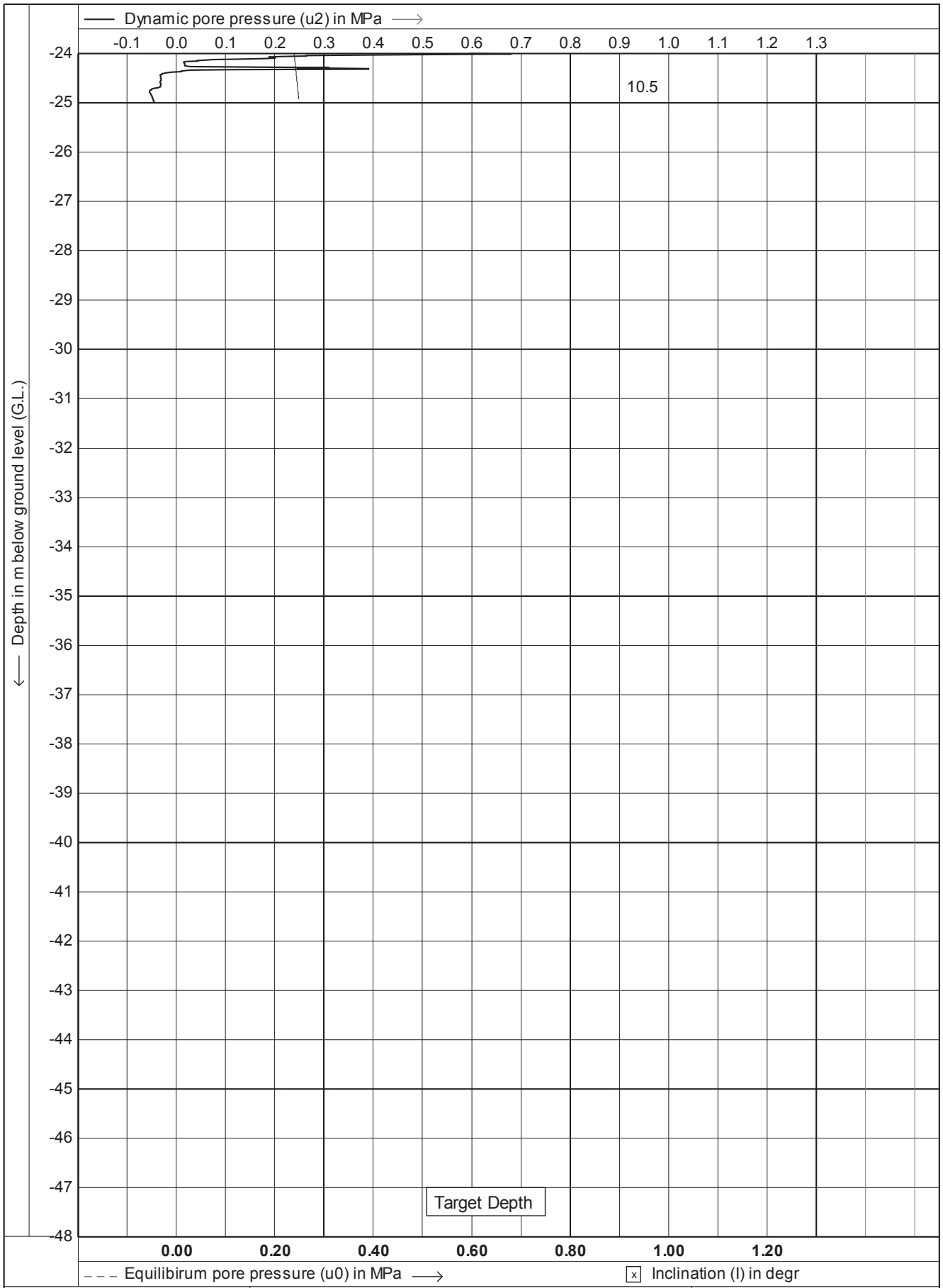
2/28

CPTask V1.31



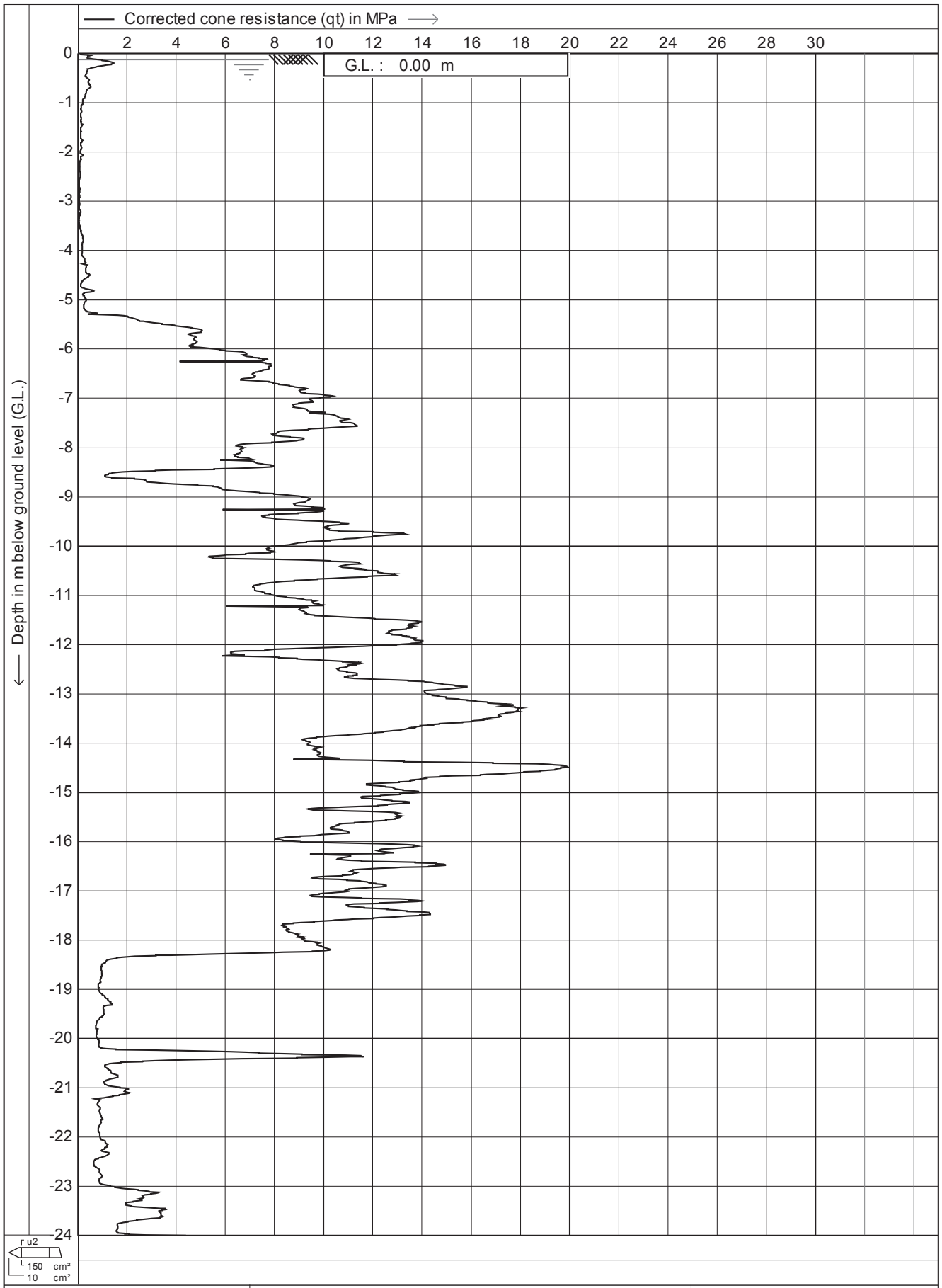
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **105**	**3/28**

CPTask V1.31



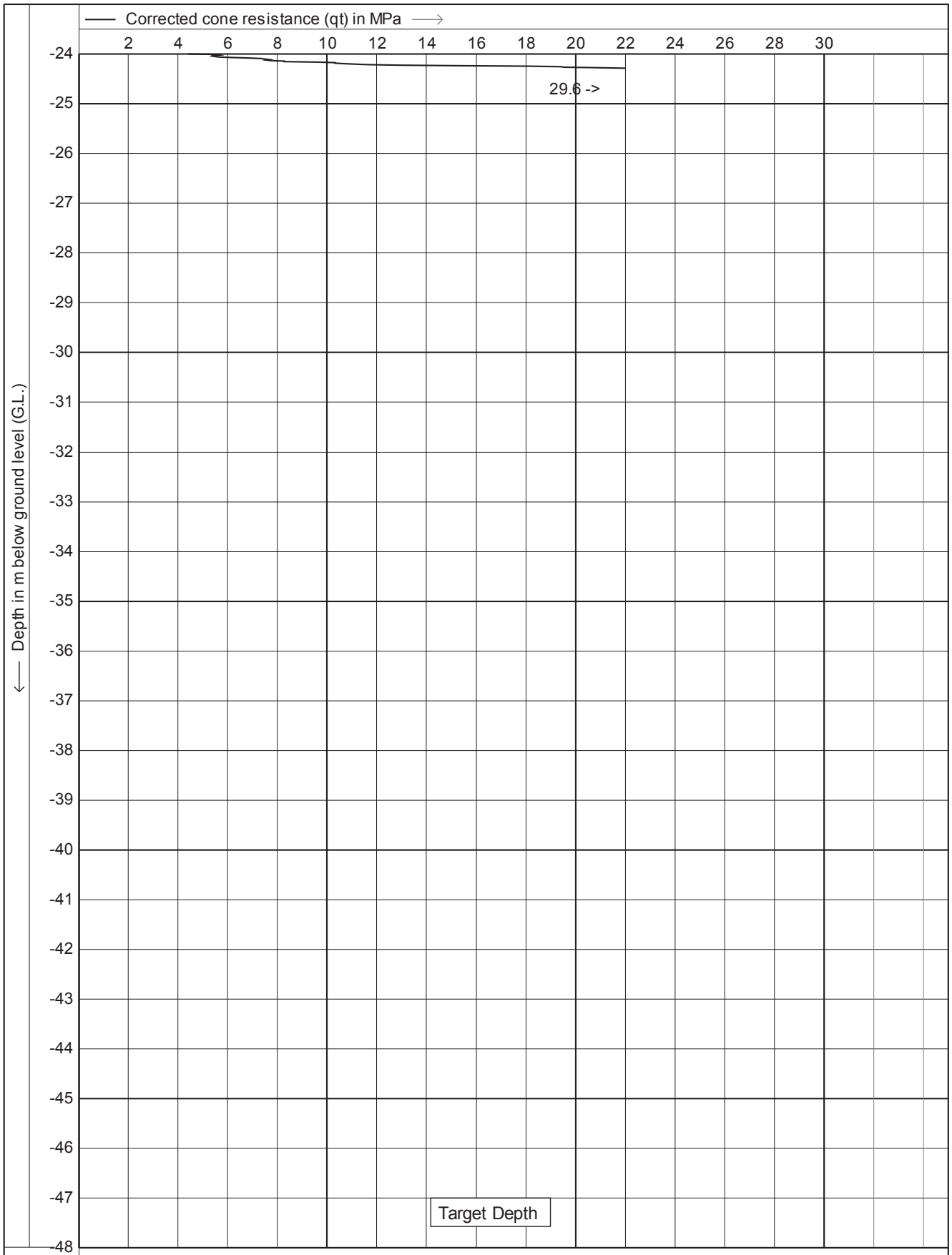
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **105**	**4/28**

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **105**	**5/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

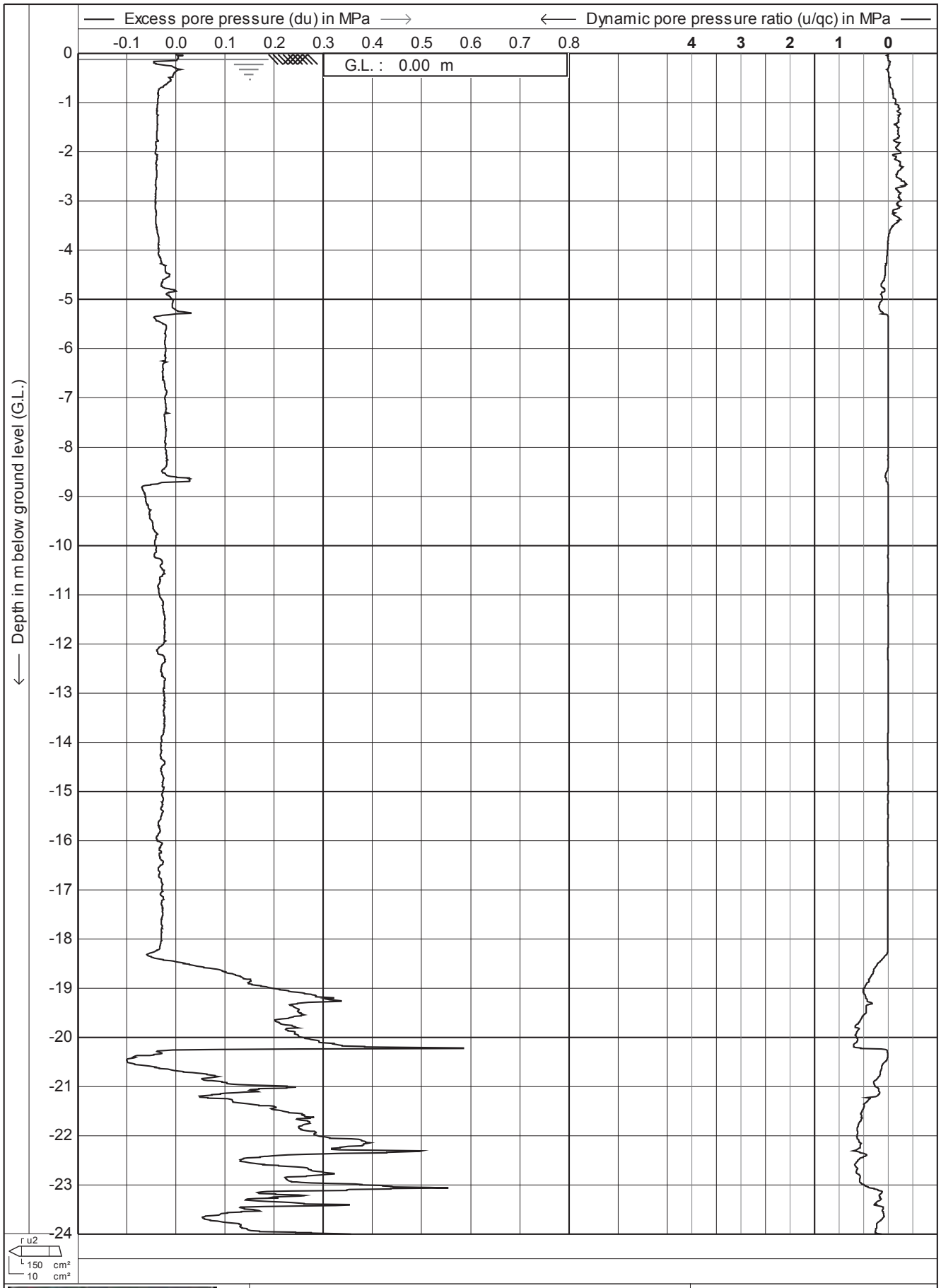
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

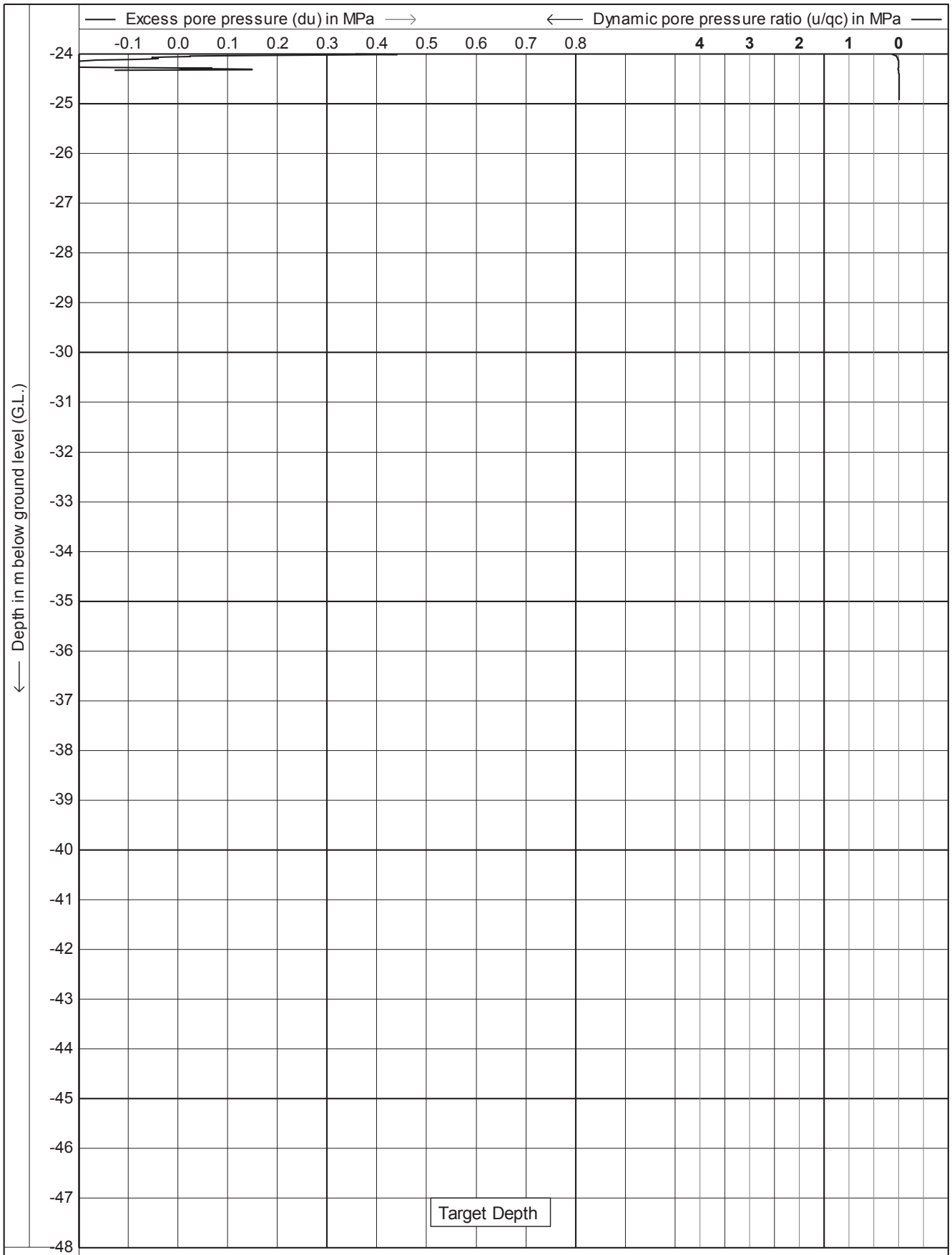
6/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **105**	7/28

CPTask V1.31



CPTask V1.31

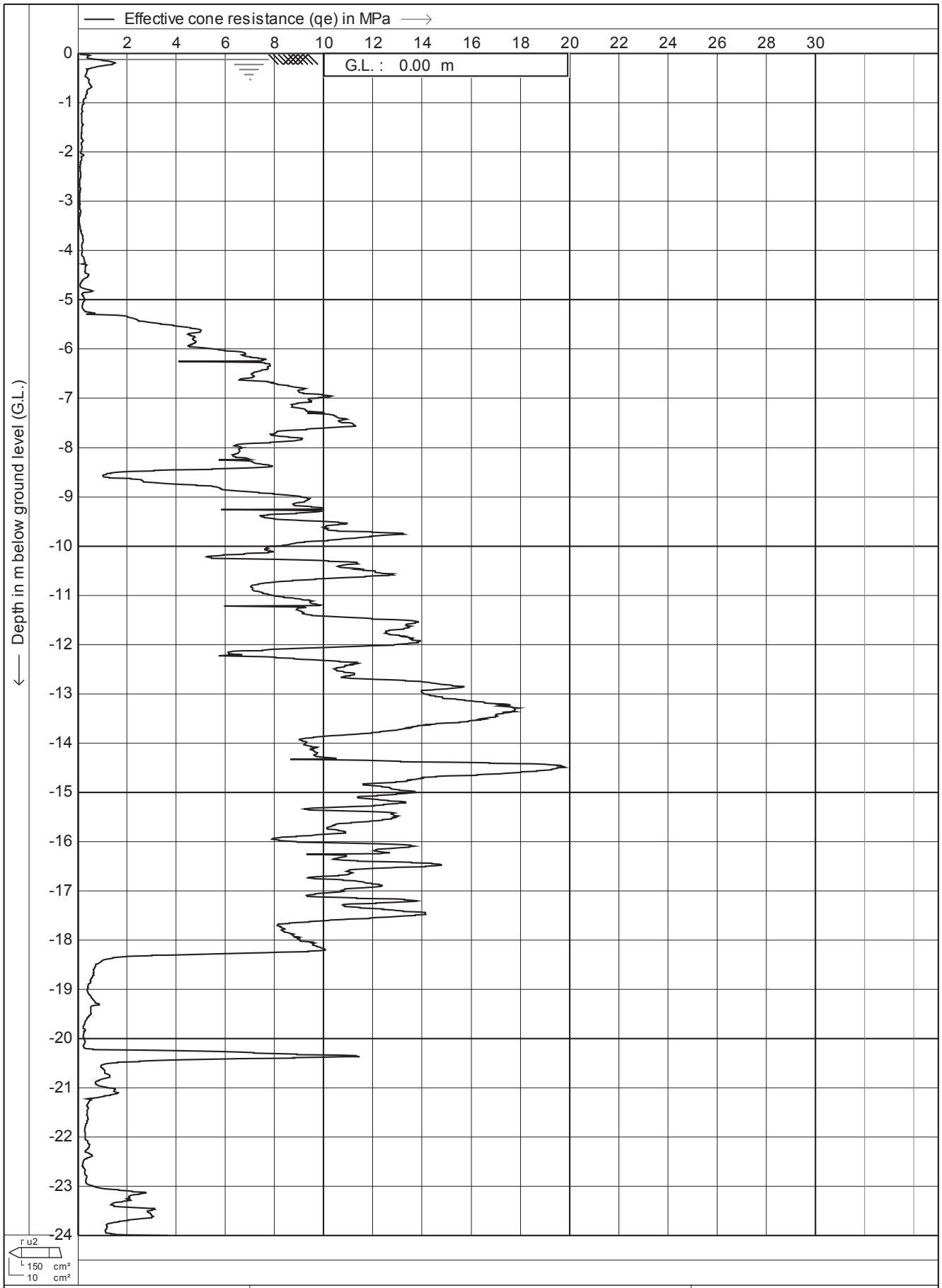
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

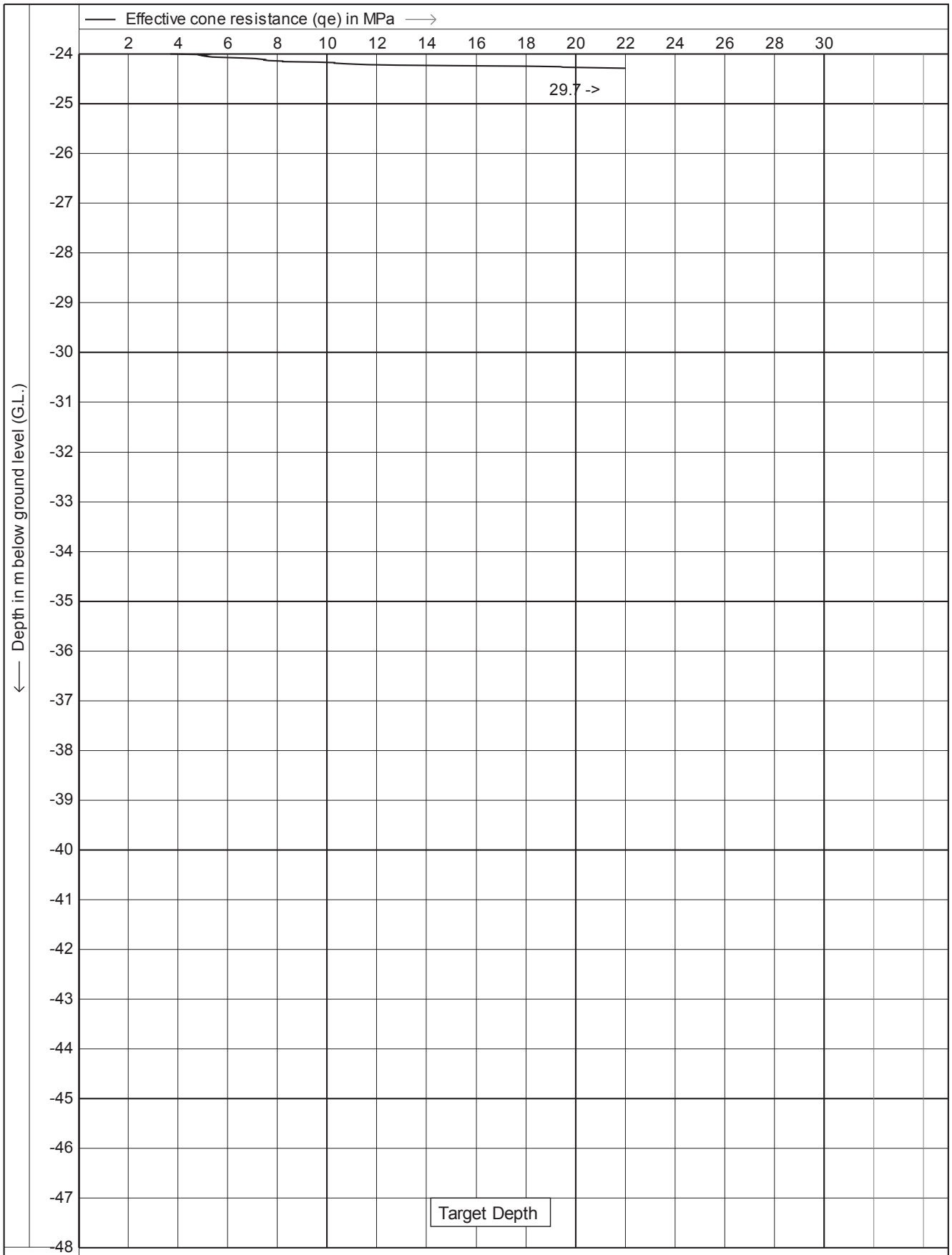
Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

8/28



Test according A.S.T.M. Standard D 5778-07		Date	: 13-1-2012
		Cone no.	: C10CFIIP.F57
Project :	Site Investigations	Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 105 9/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

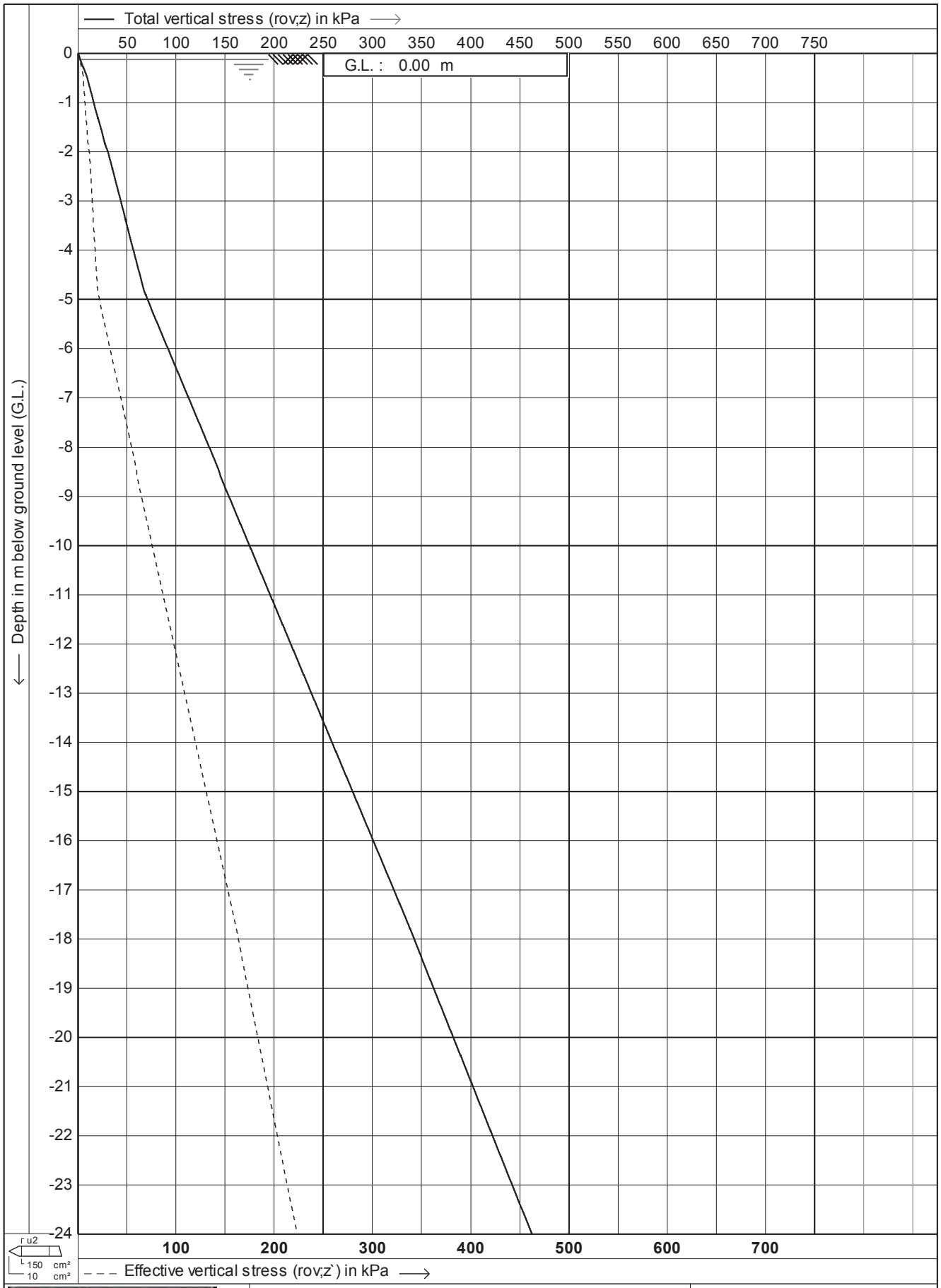
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

10/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

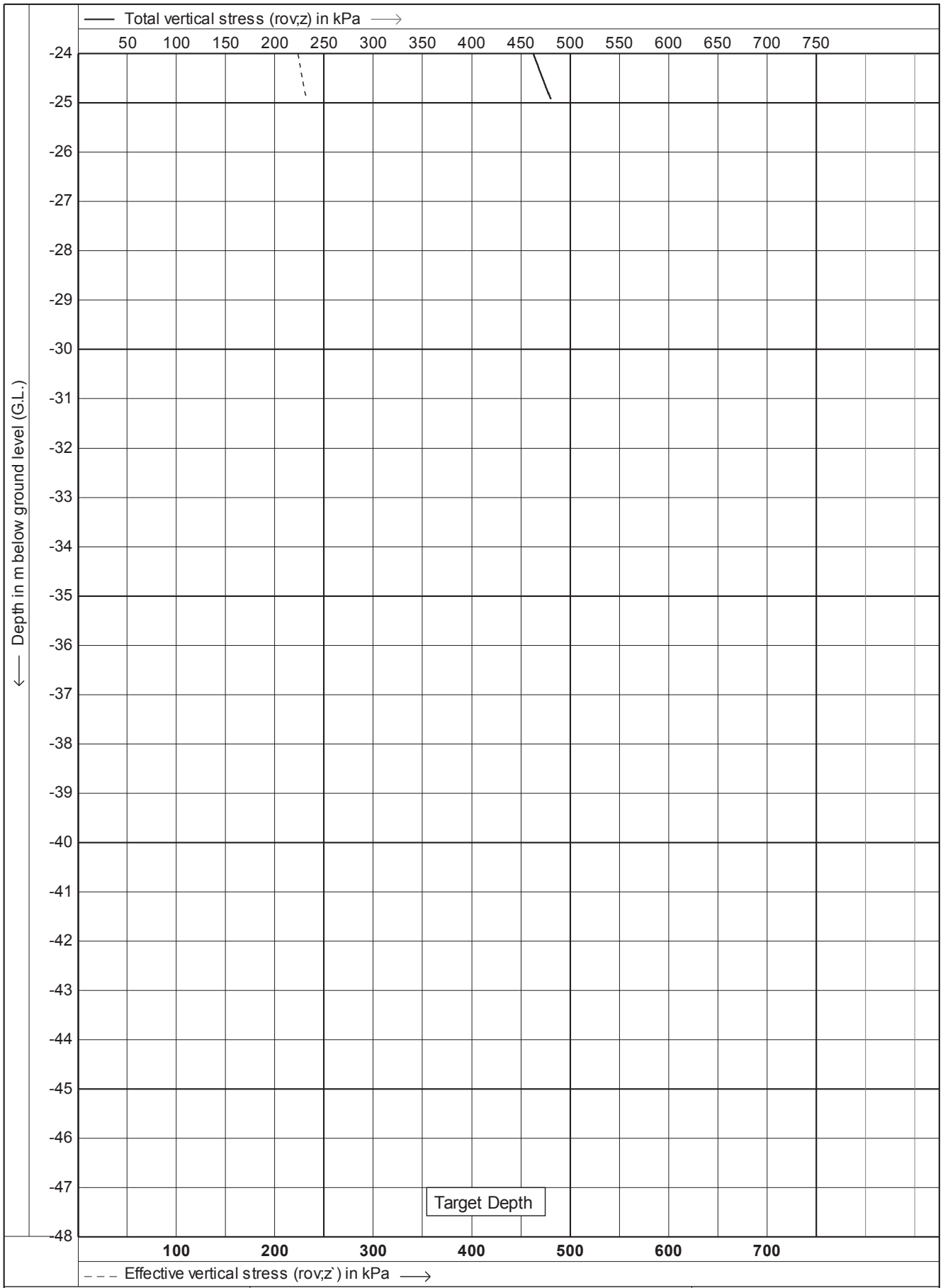
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

11/28

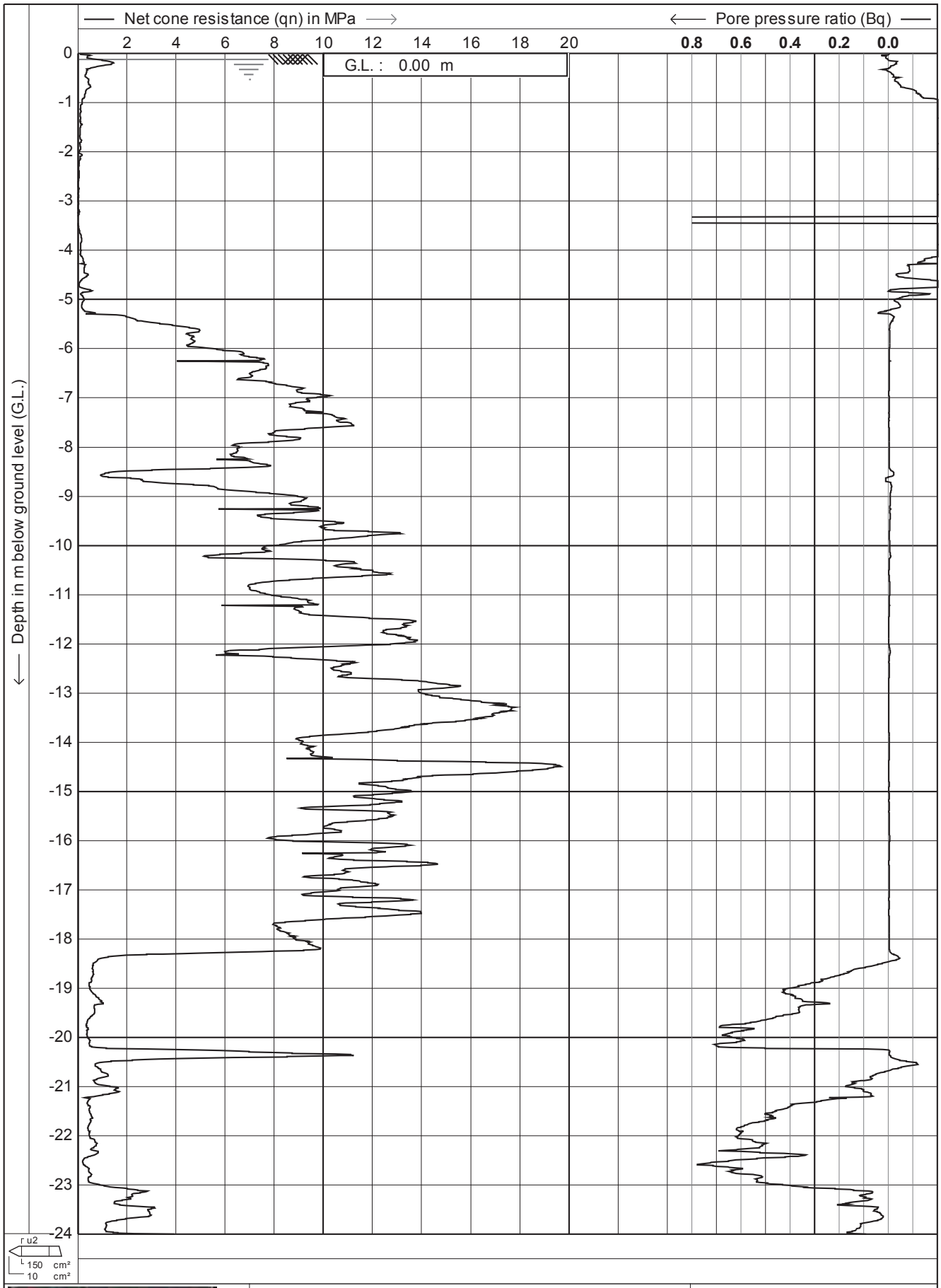
CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 13-1-2012
		Cone no.	: C10CFIIP.F57
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 105

12/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

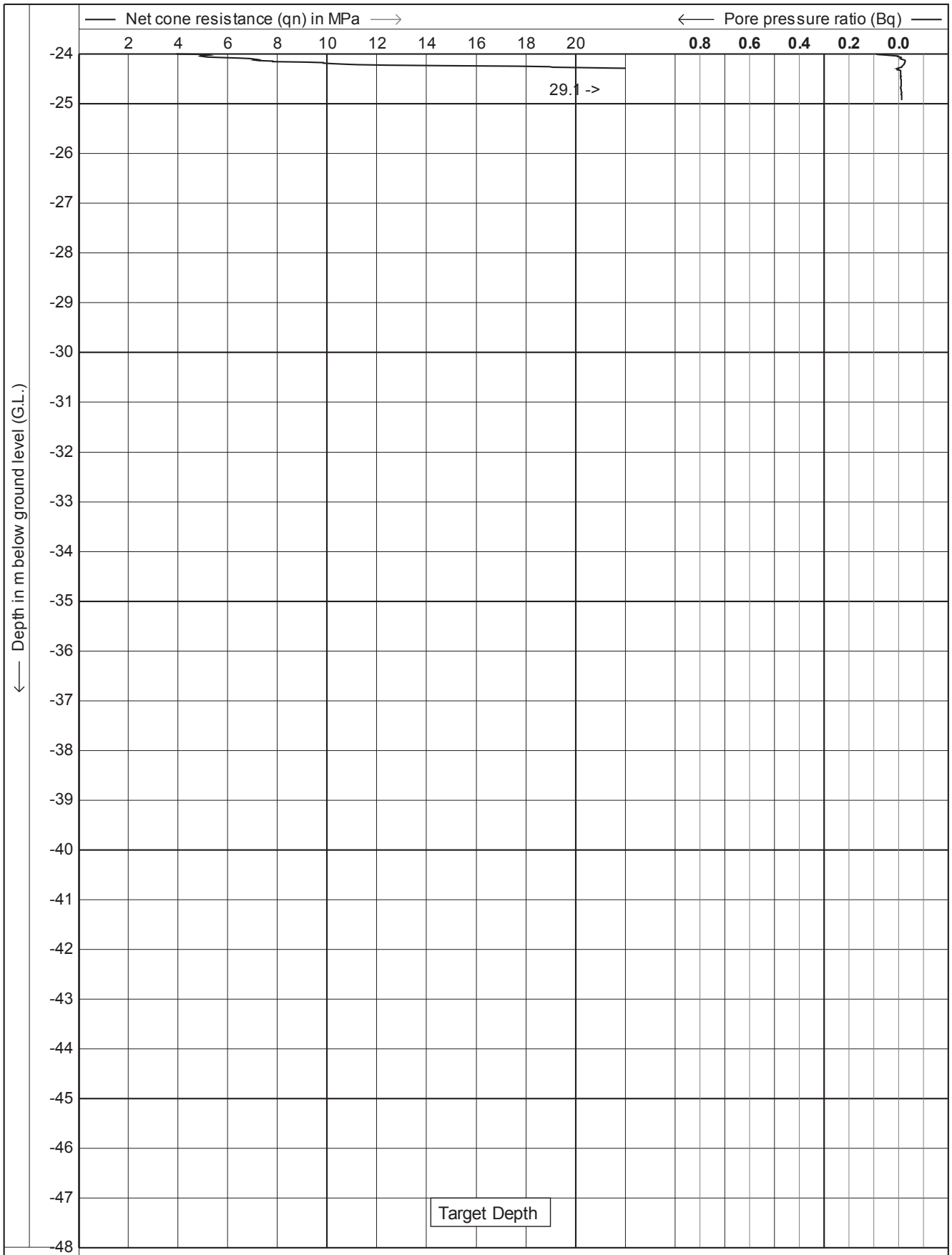
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

13/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

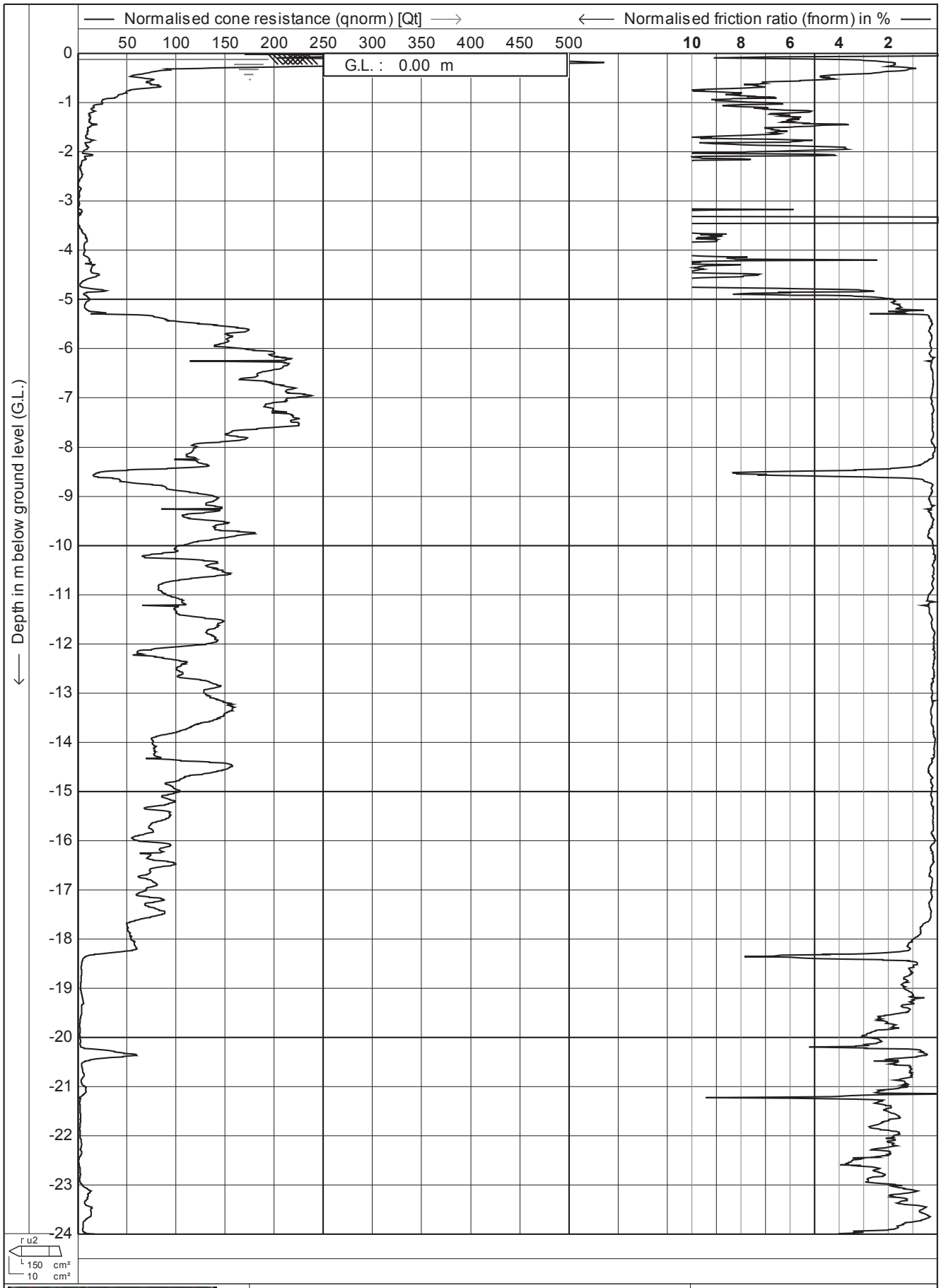
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

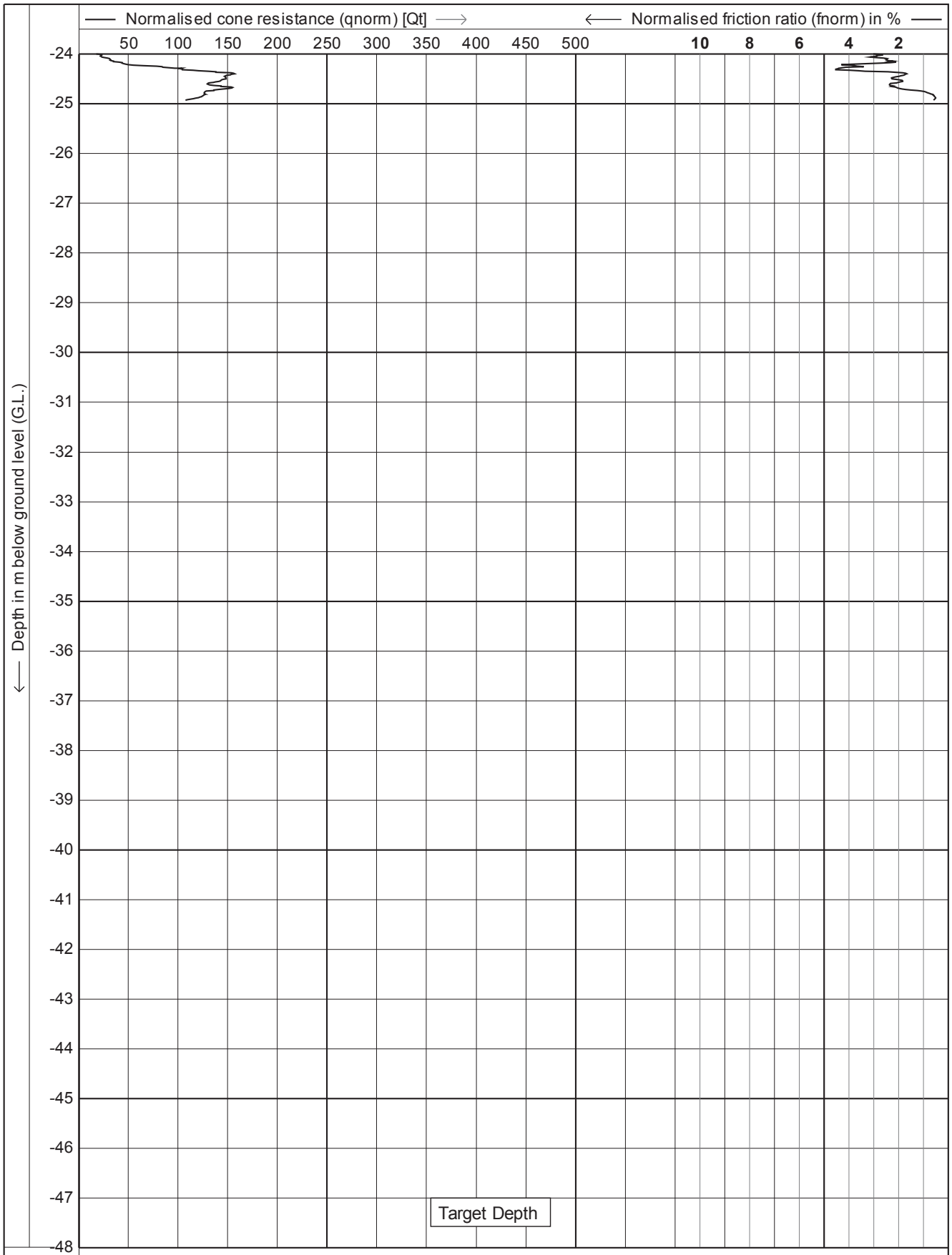
14/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **105**	**15/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

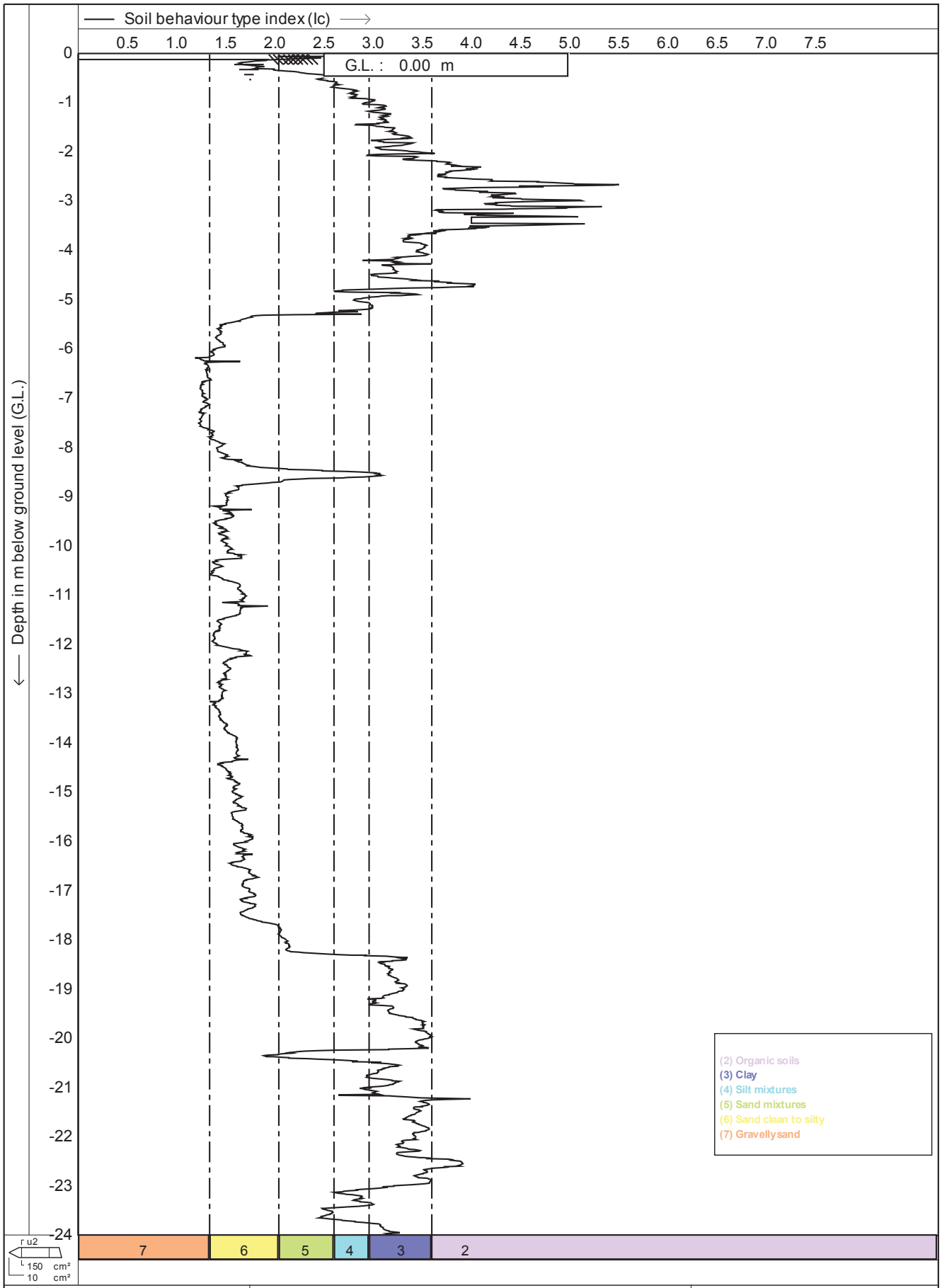
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

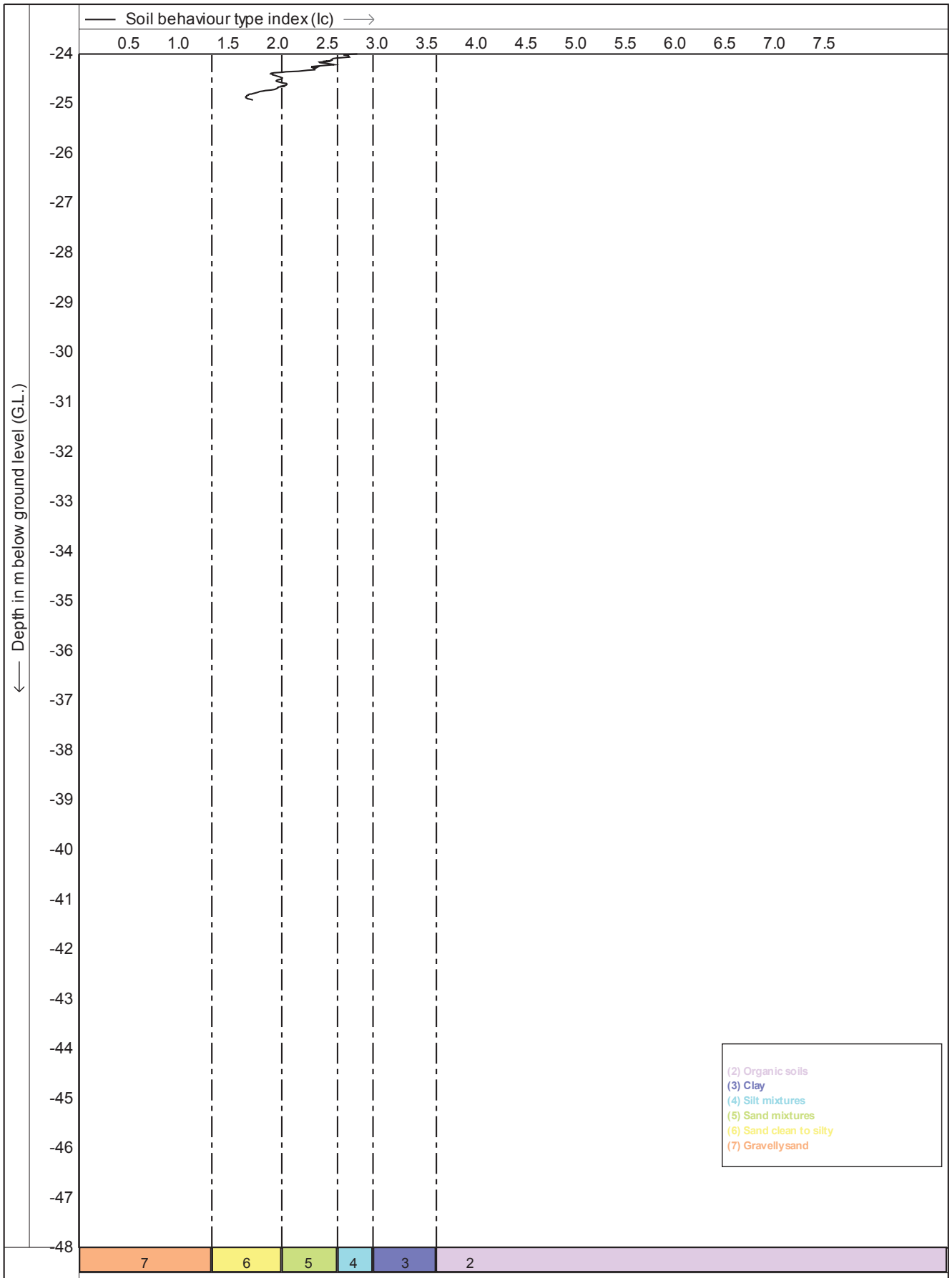
16/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **105**	**17/28**

CPTask V1.31



CPTask V1.31

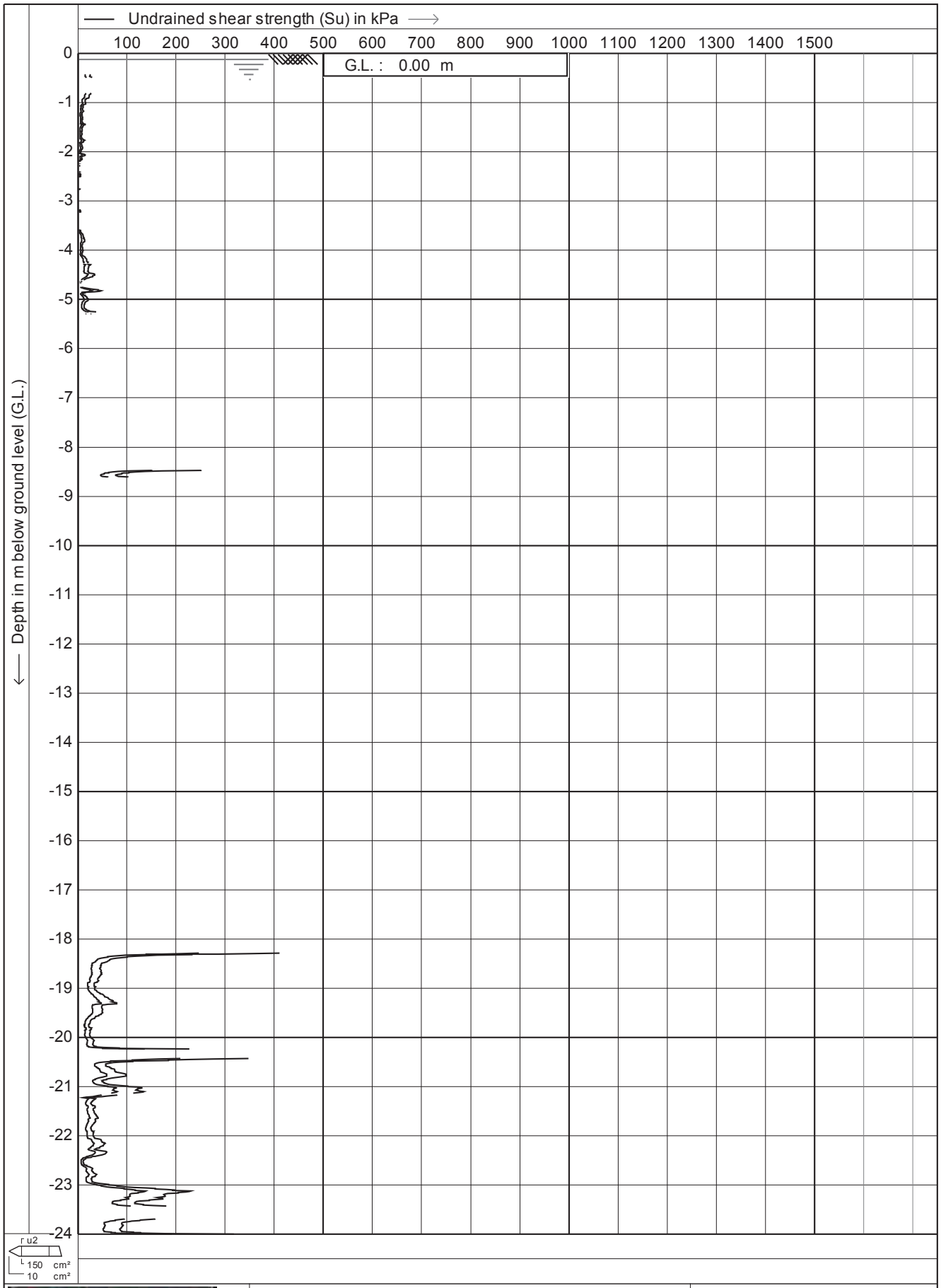
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

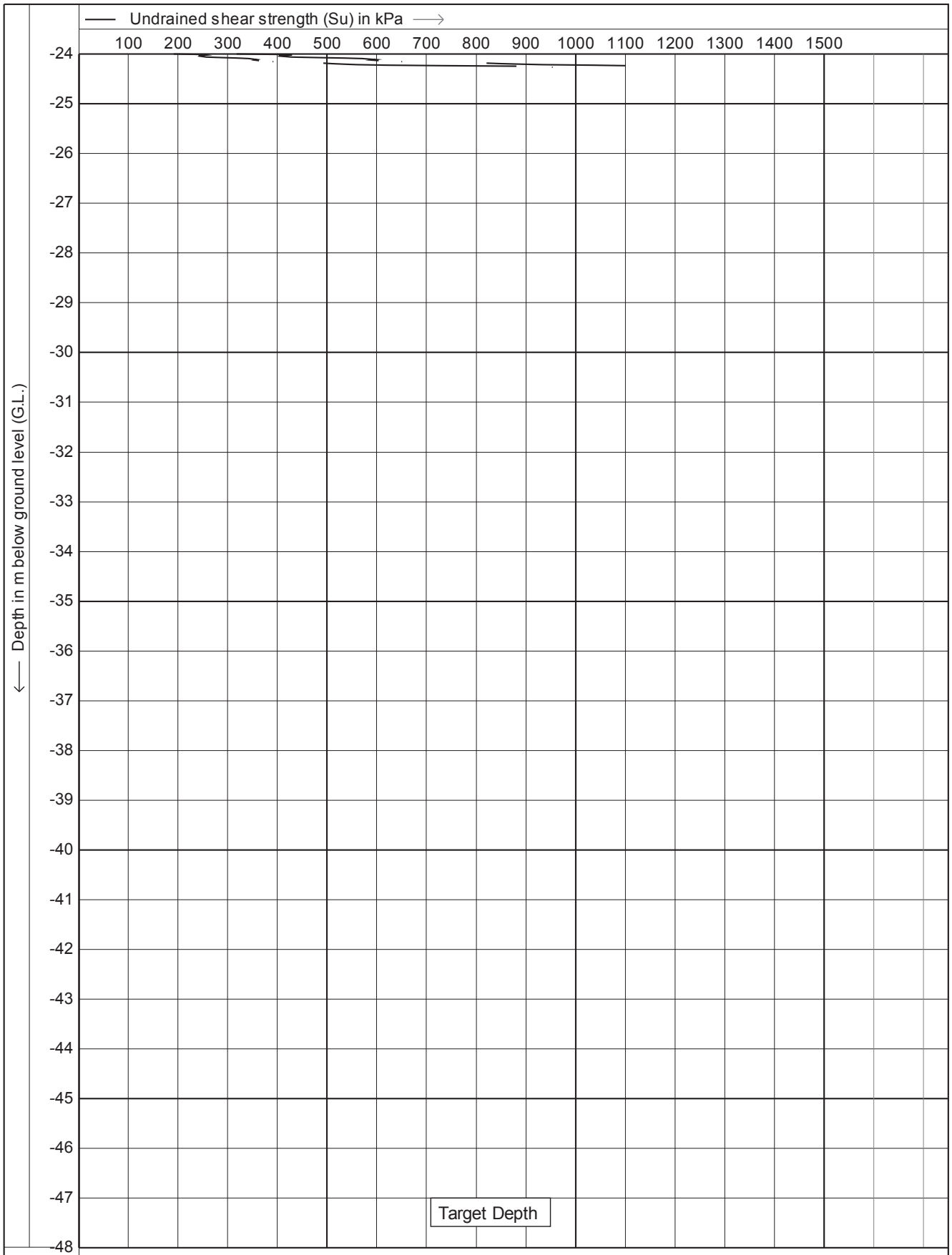
Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

18/28



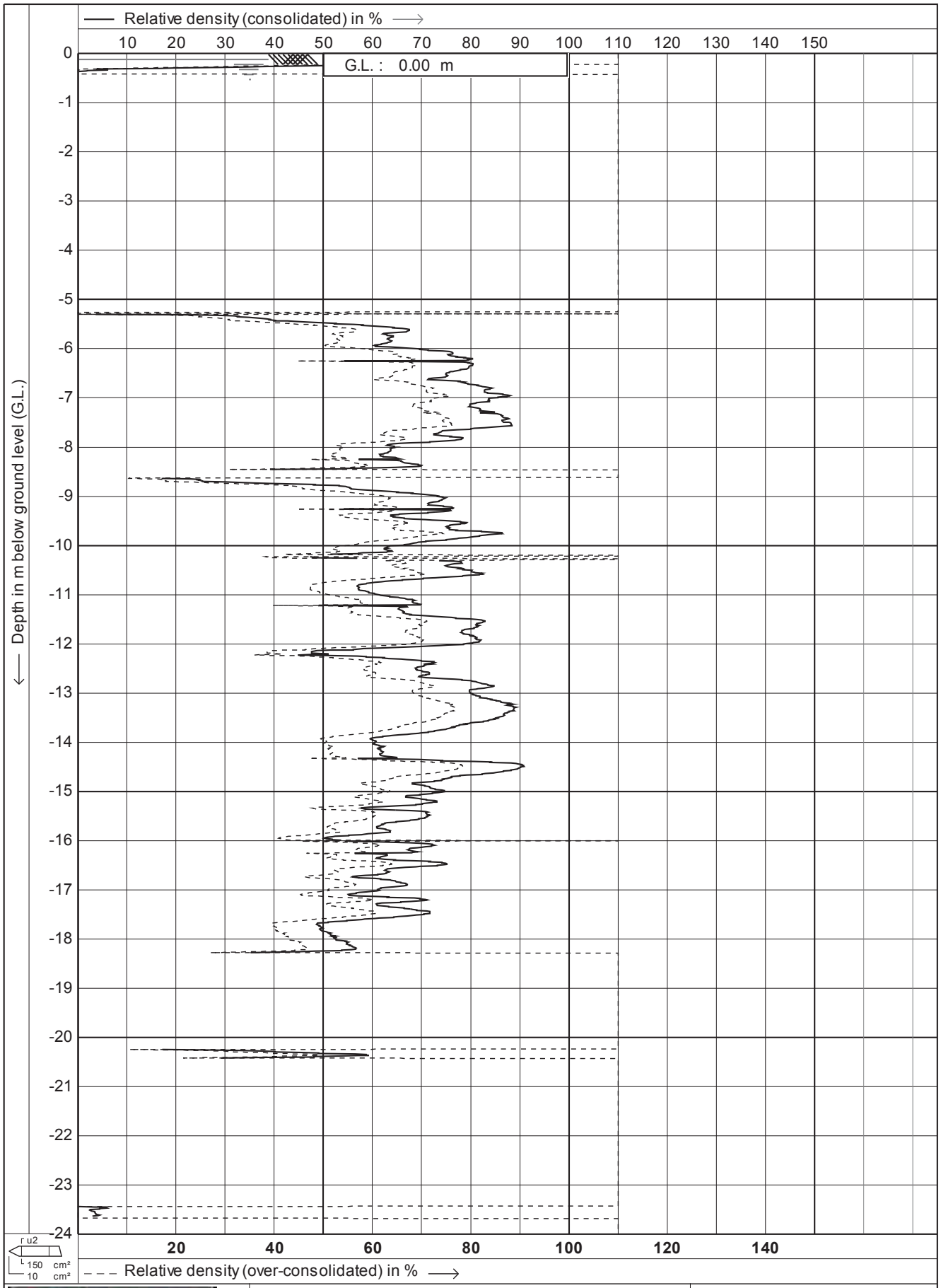
Test according A.S.T.M. Standard D 5778-07		Date	: 13-1-2012
Project :	Site Investigations	Cone no.	: C10CFIIP.F57
		Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 105

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07		Date	: 13-1-2012
Project :	Site Investigations	Cone no.	: C10CFIIP.F57
		Project no.	: 02AECOM2
Location:	Southern Links - Hamilton	CPT no.	: 105 20/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

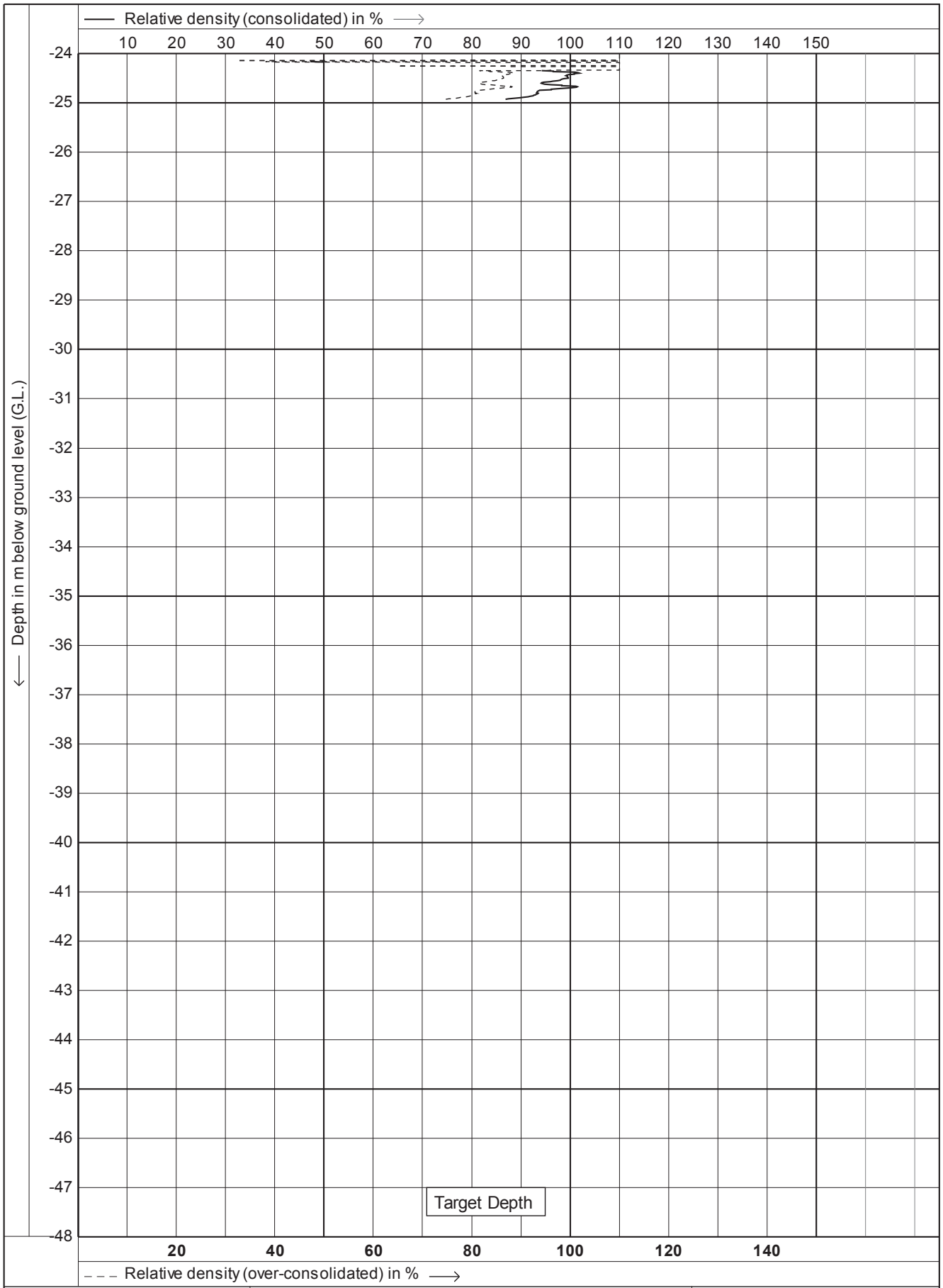
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

21/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

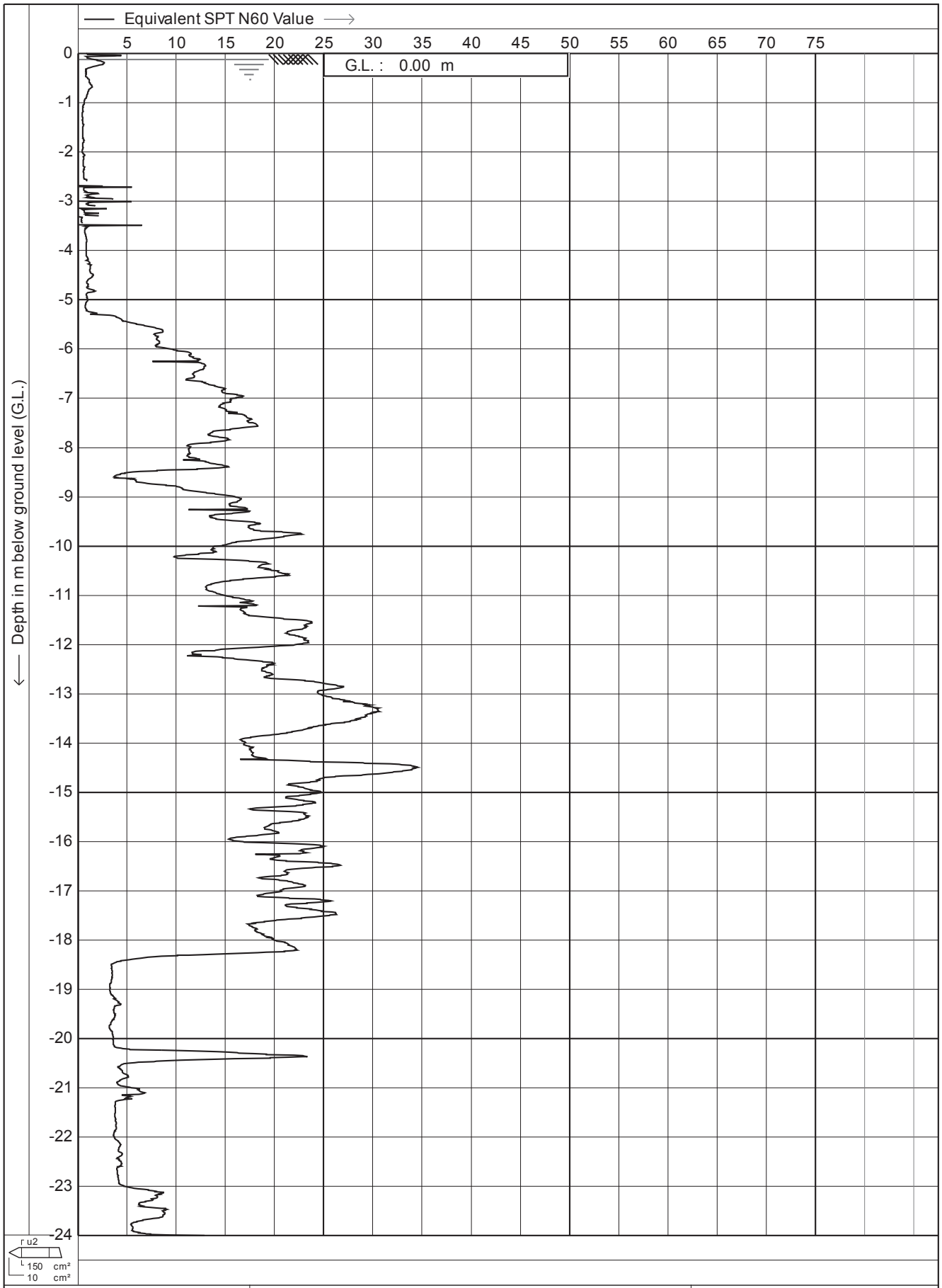
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

22/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

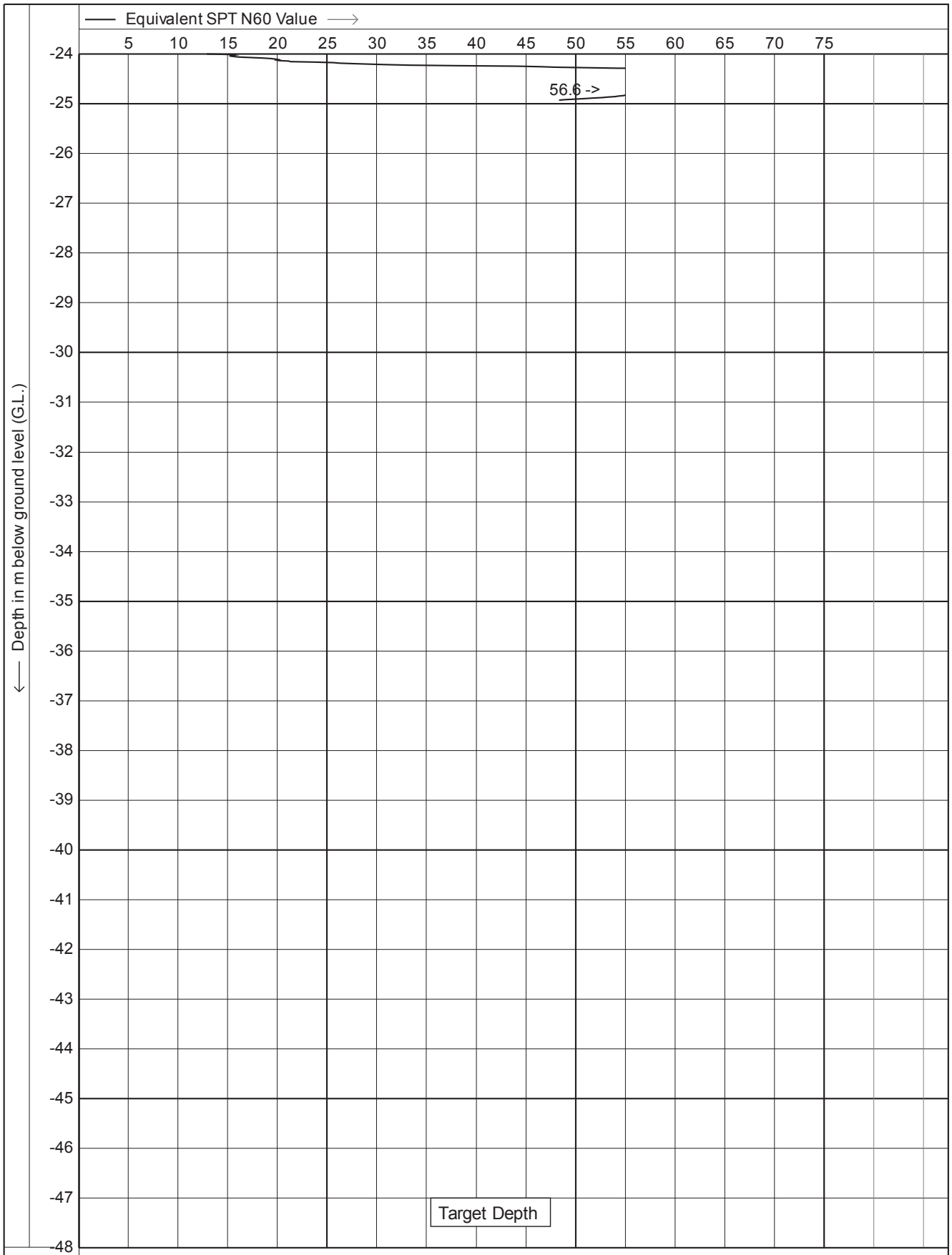
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

23/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

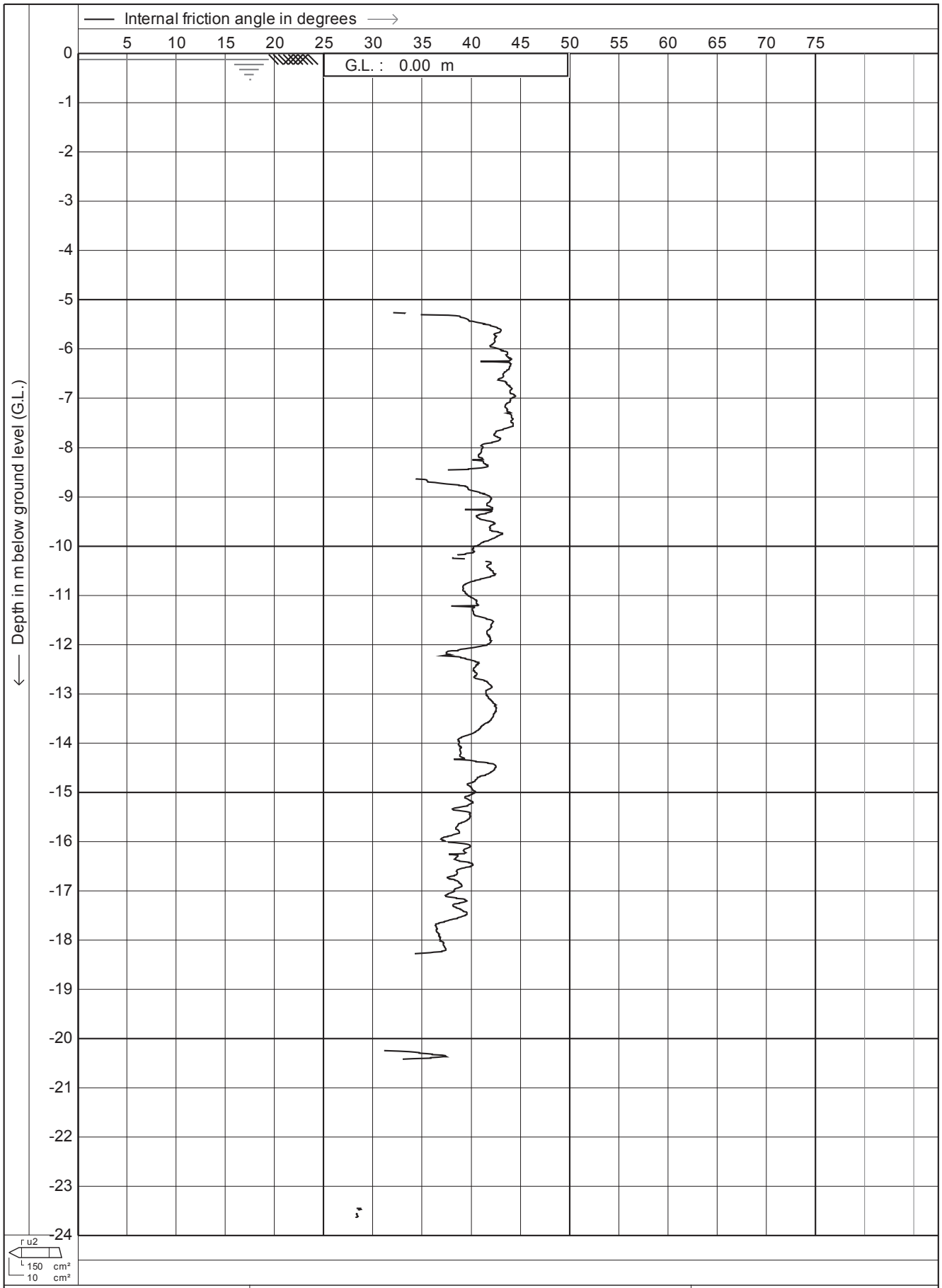
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

24/28

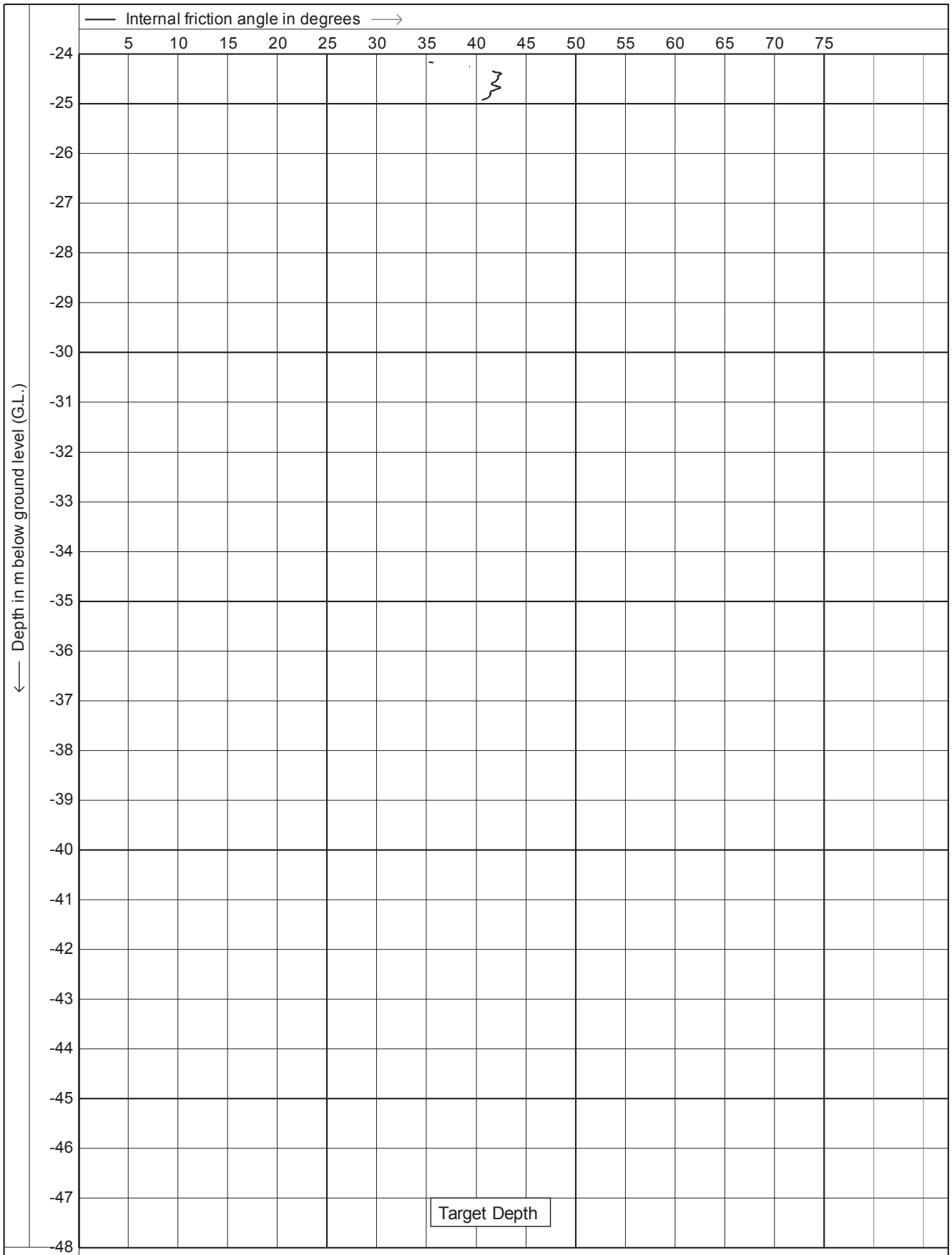
CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date	: 13-1-2012
	Cone no.	: C10CFIIP.F57
Project : Site Investigations	Project no.	: 02AECOM2
Location: Southern Links - Hamilton	CPT no.	: 105

27/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

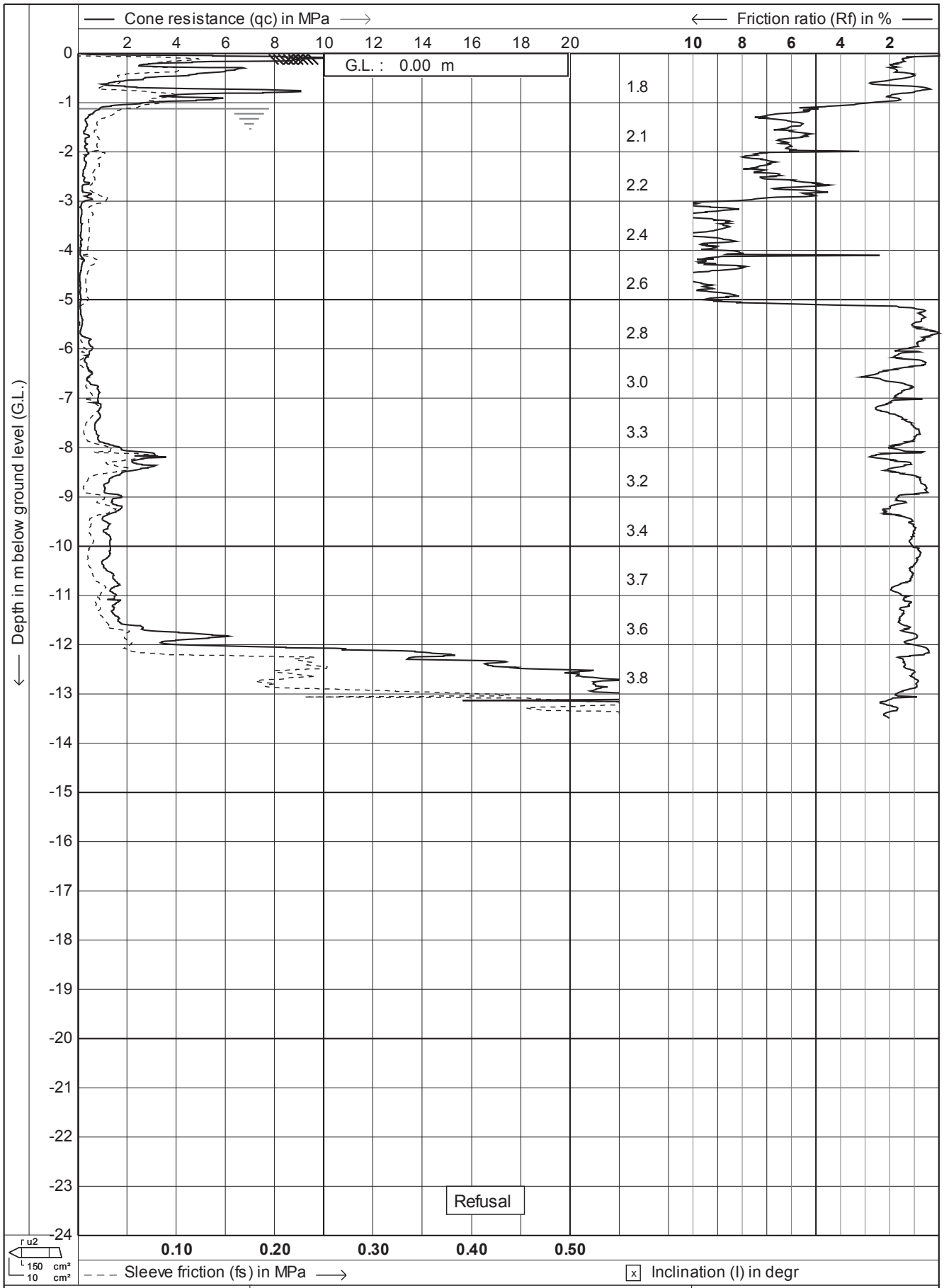
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **105**

28/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

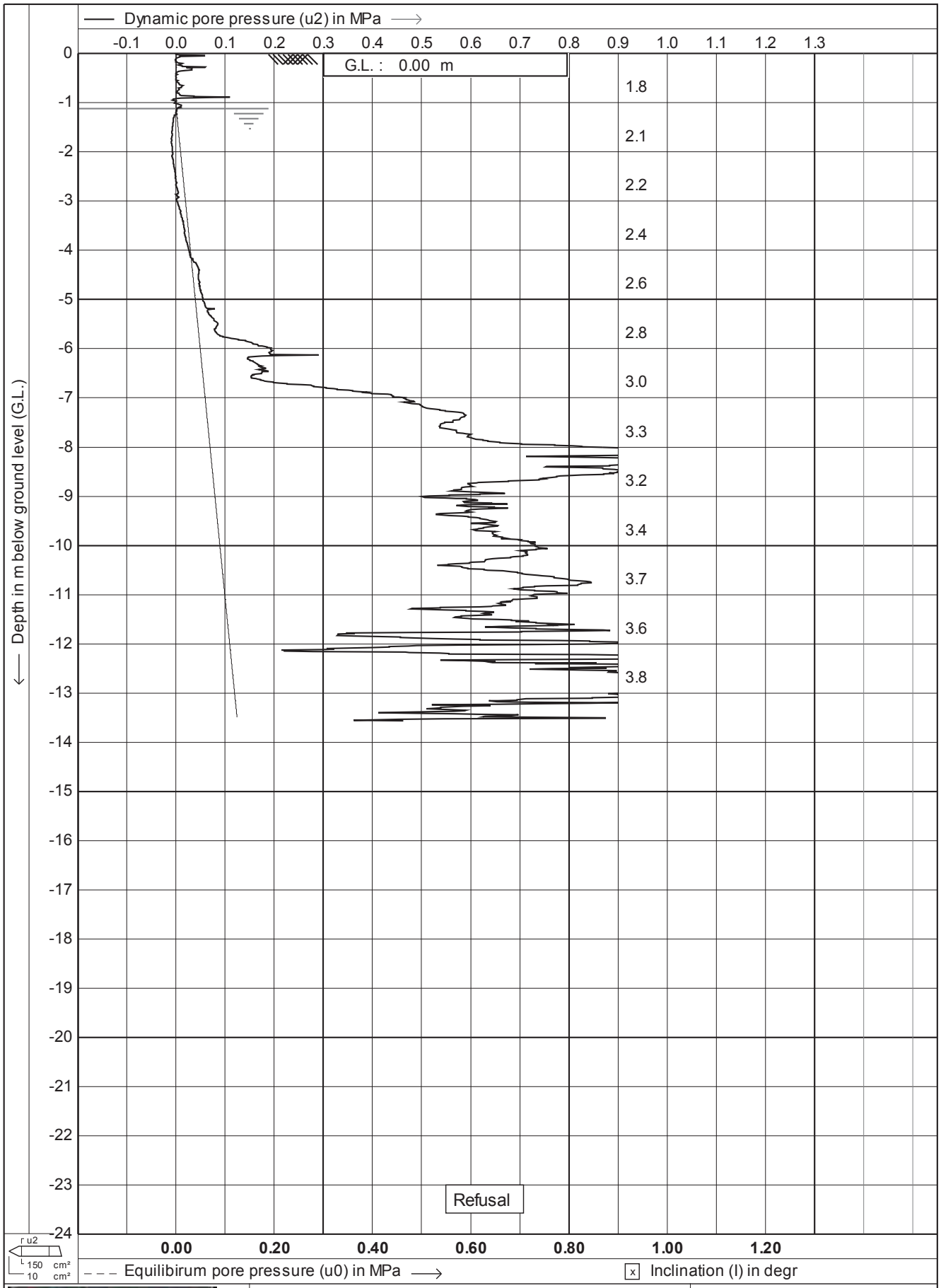
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **106**

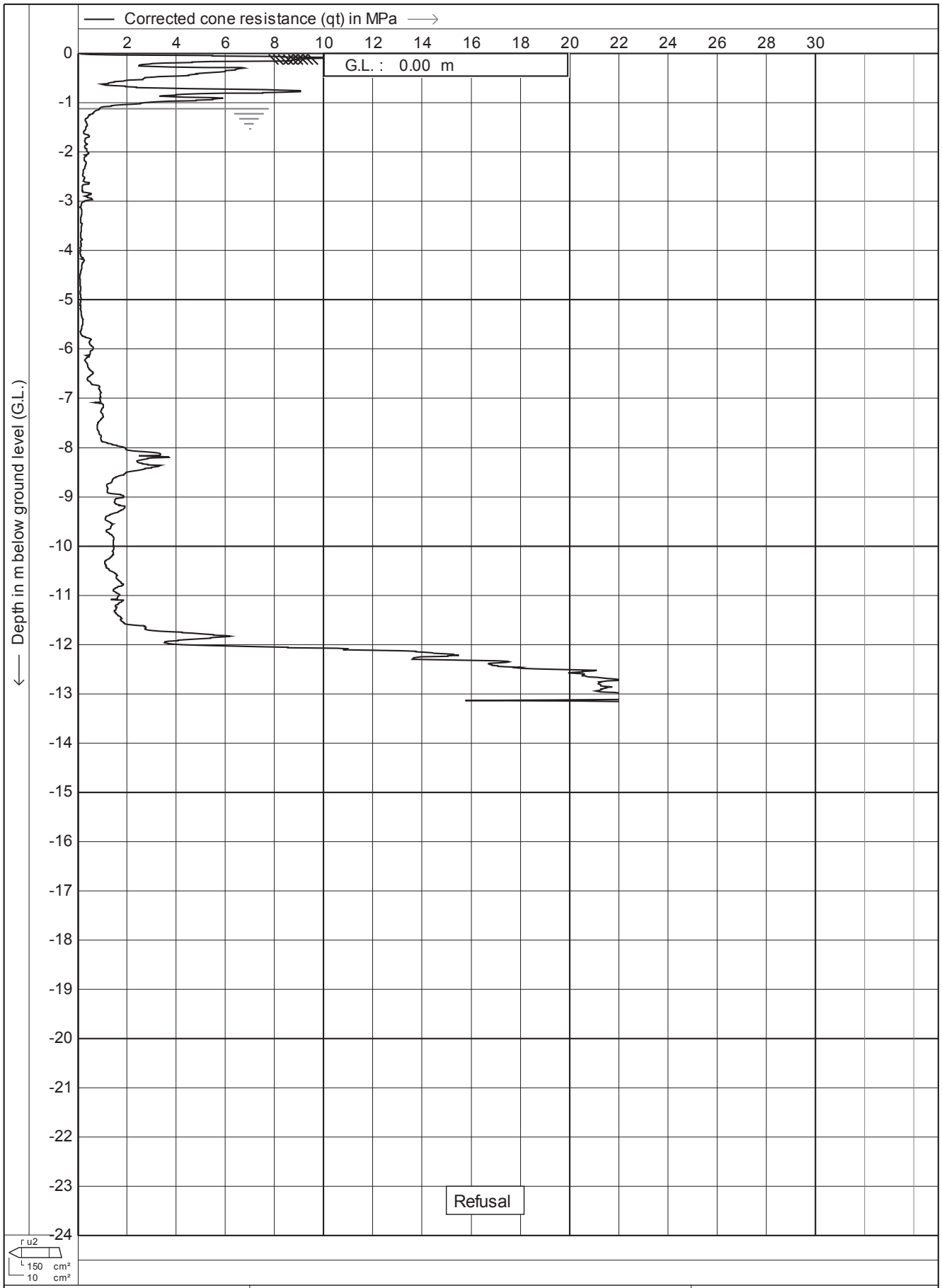
1/14

CPTask V1.31



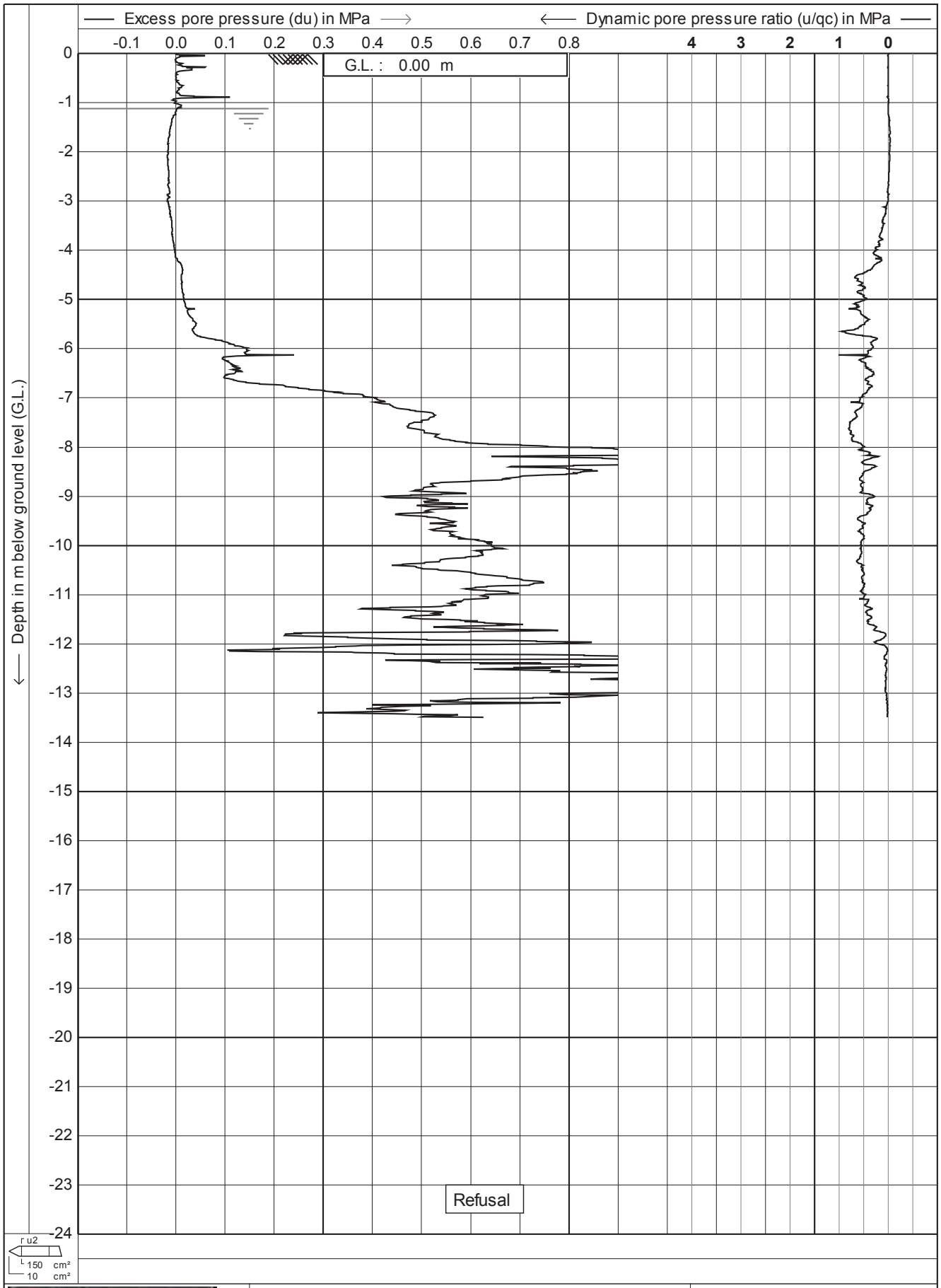
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**2/14**

CPTask V1.31



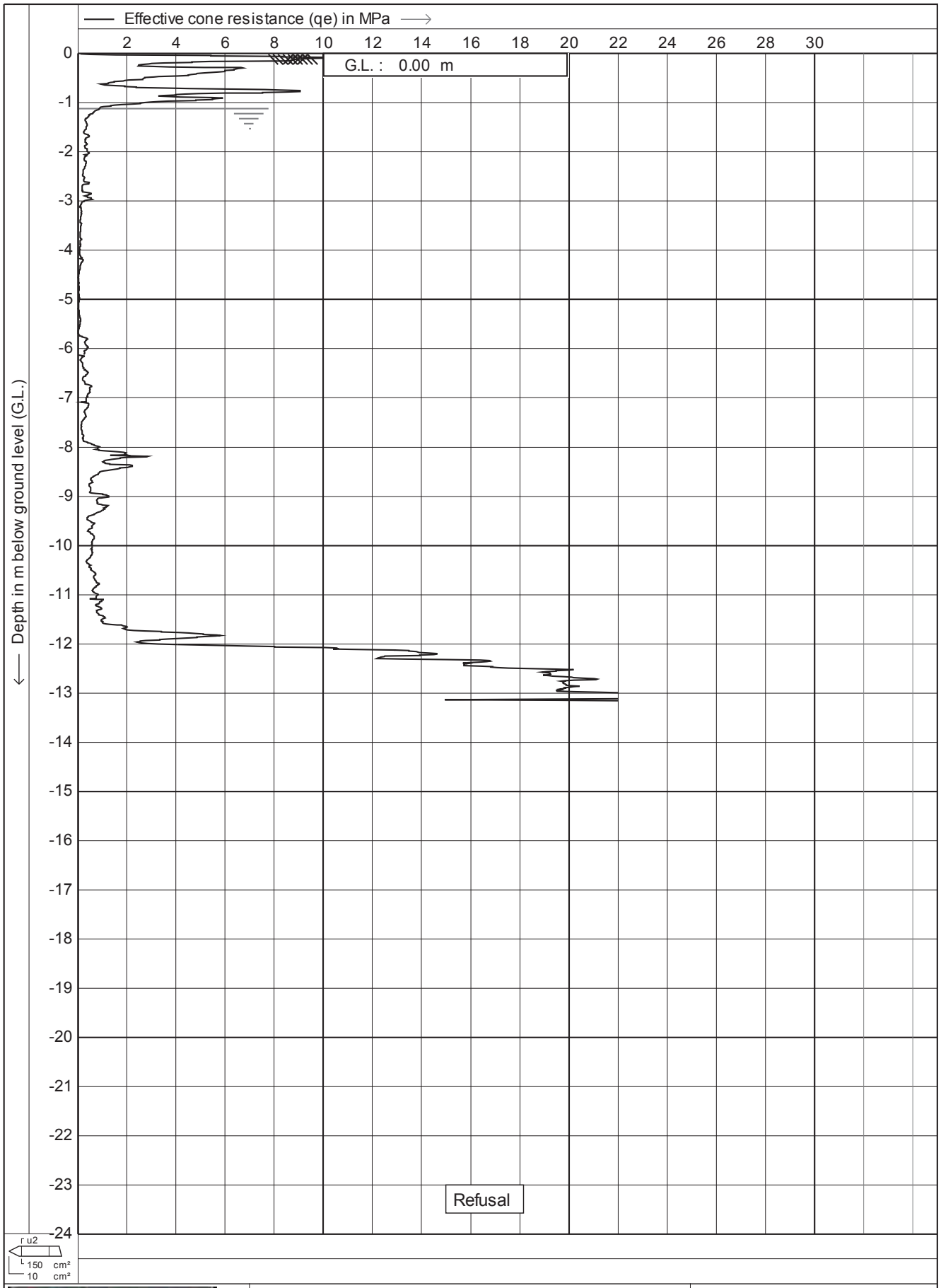
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**3/14**

CPTask V1.31



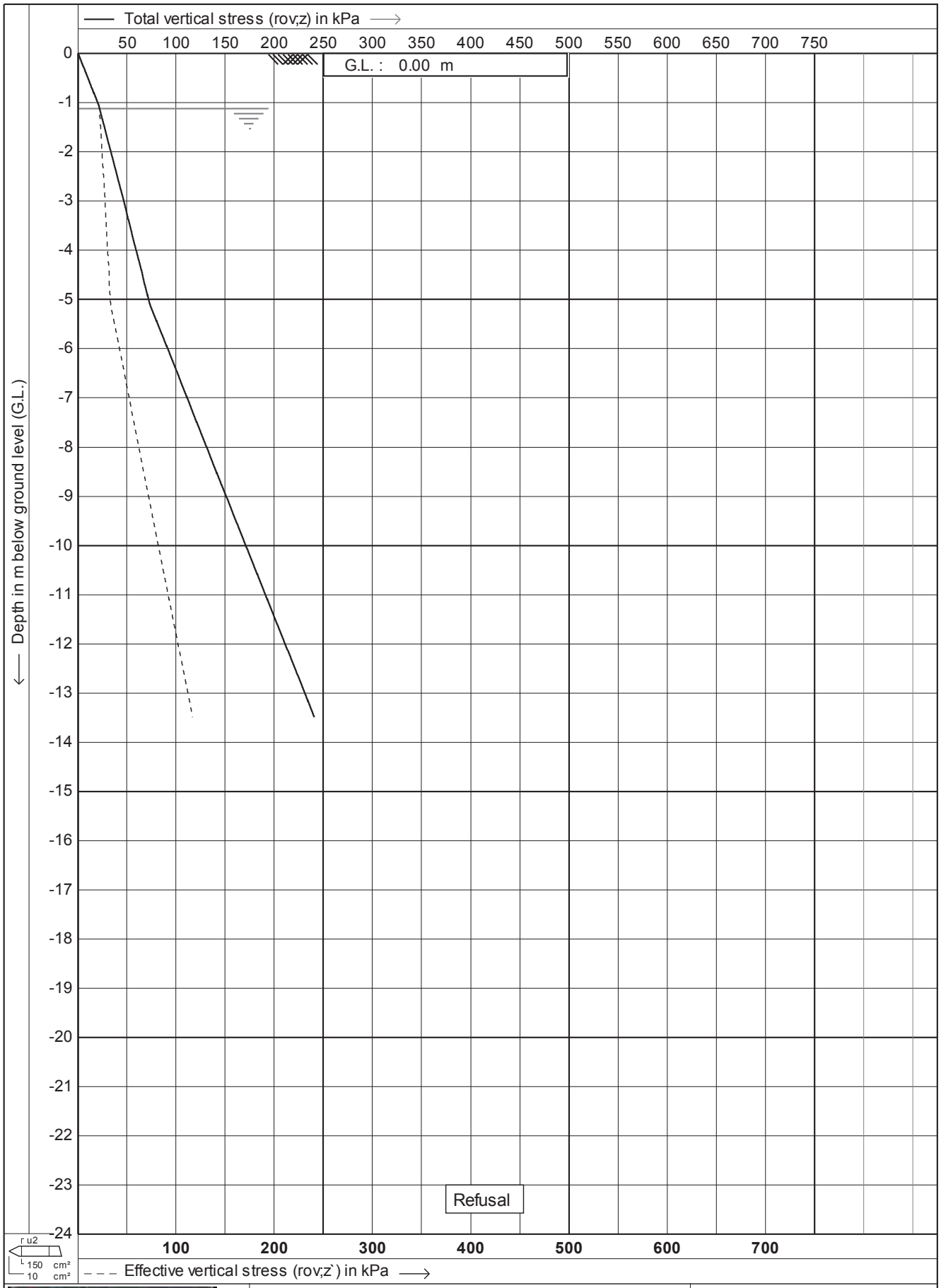
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**4/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**5/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

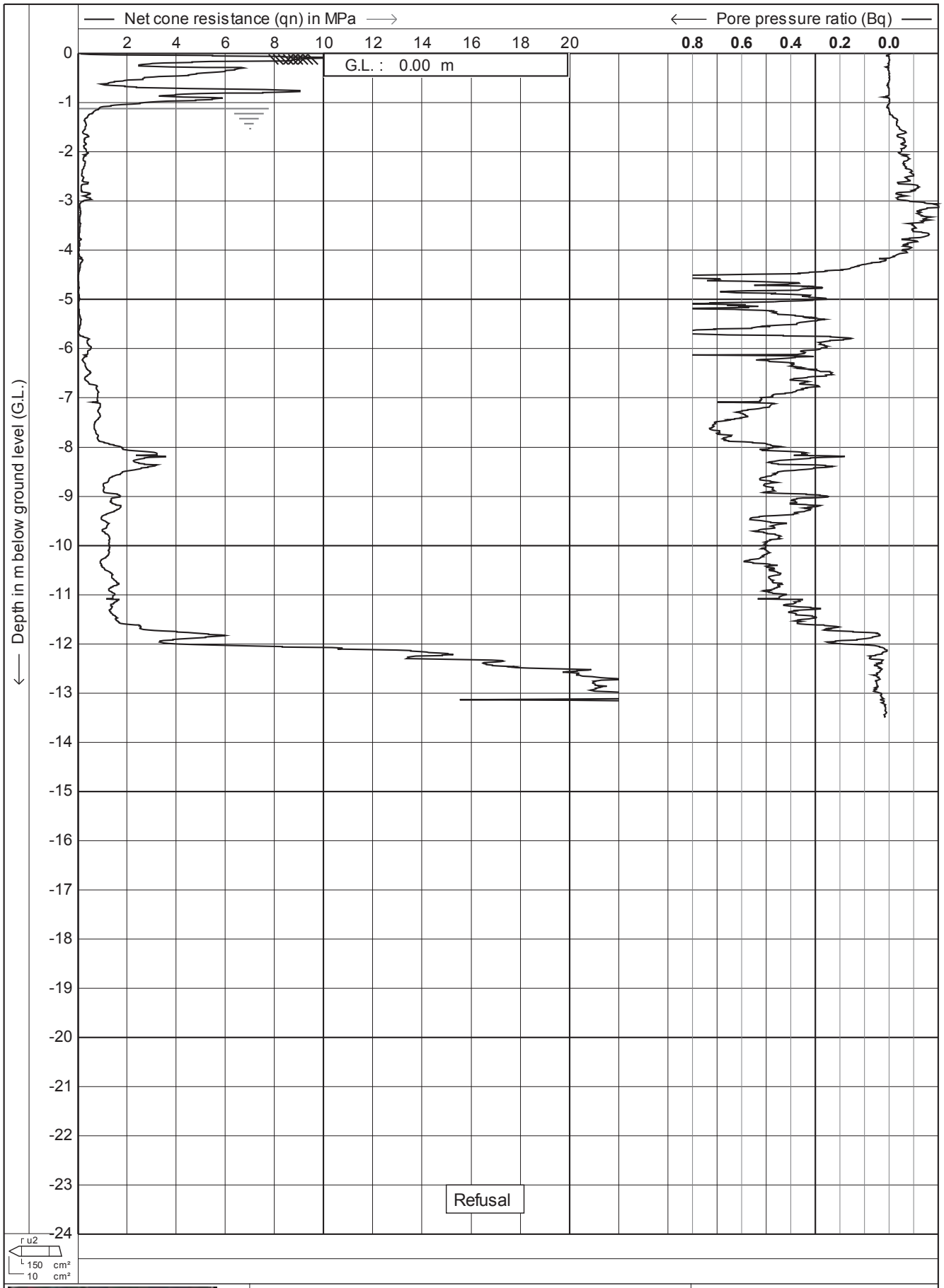
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **106**

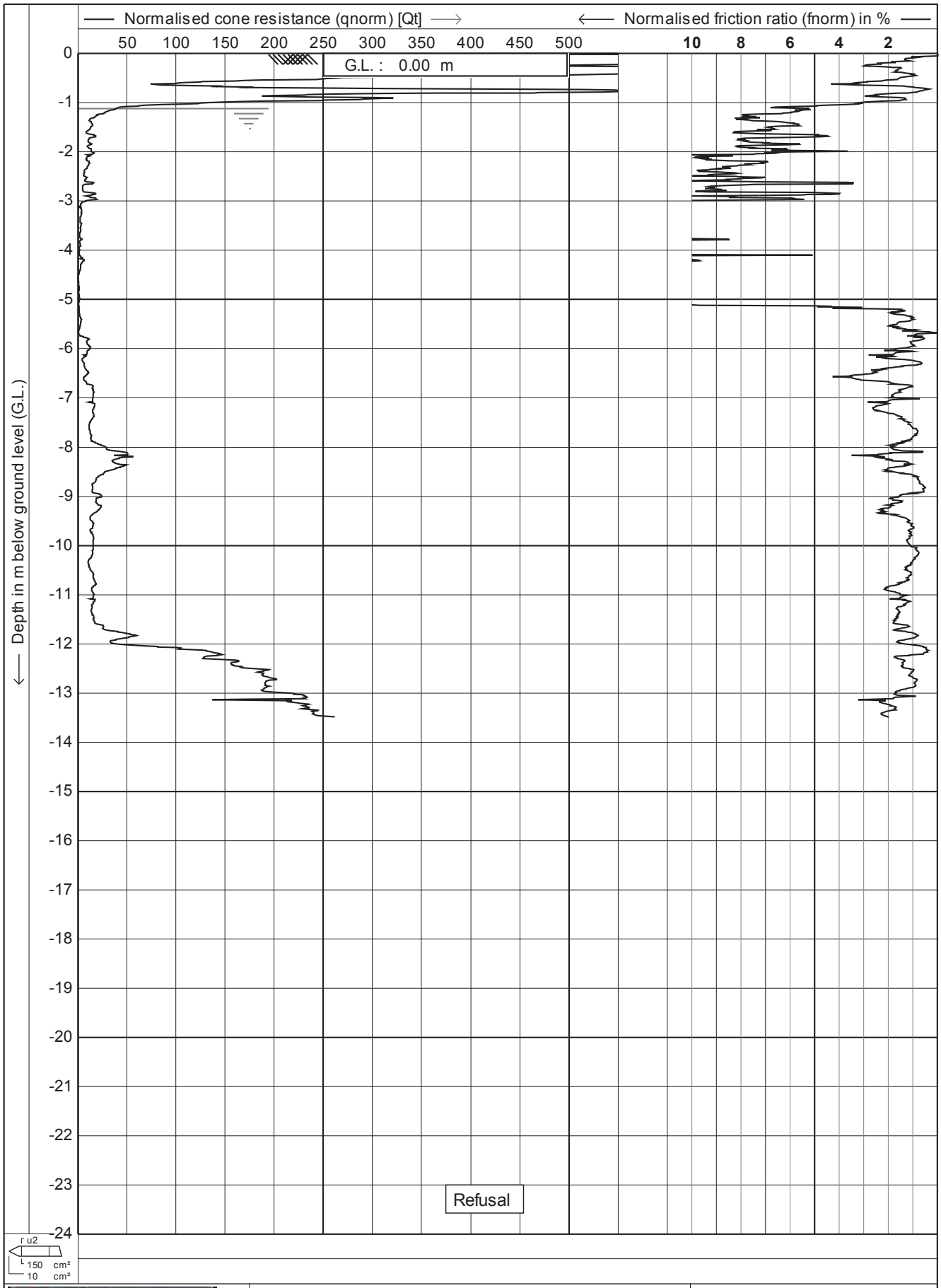
6/14

CPTask V1.31



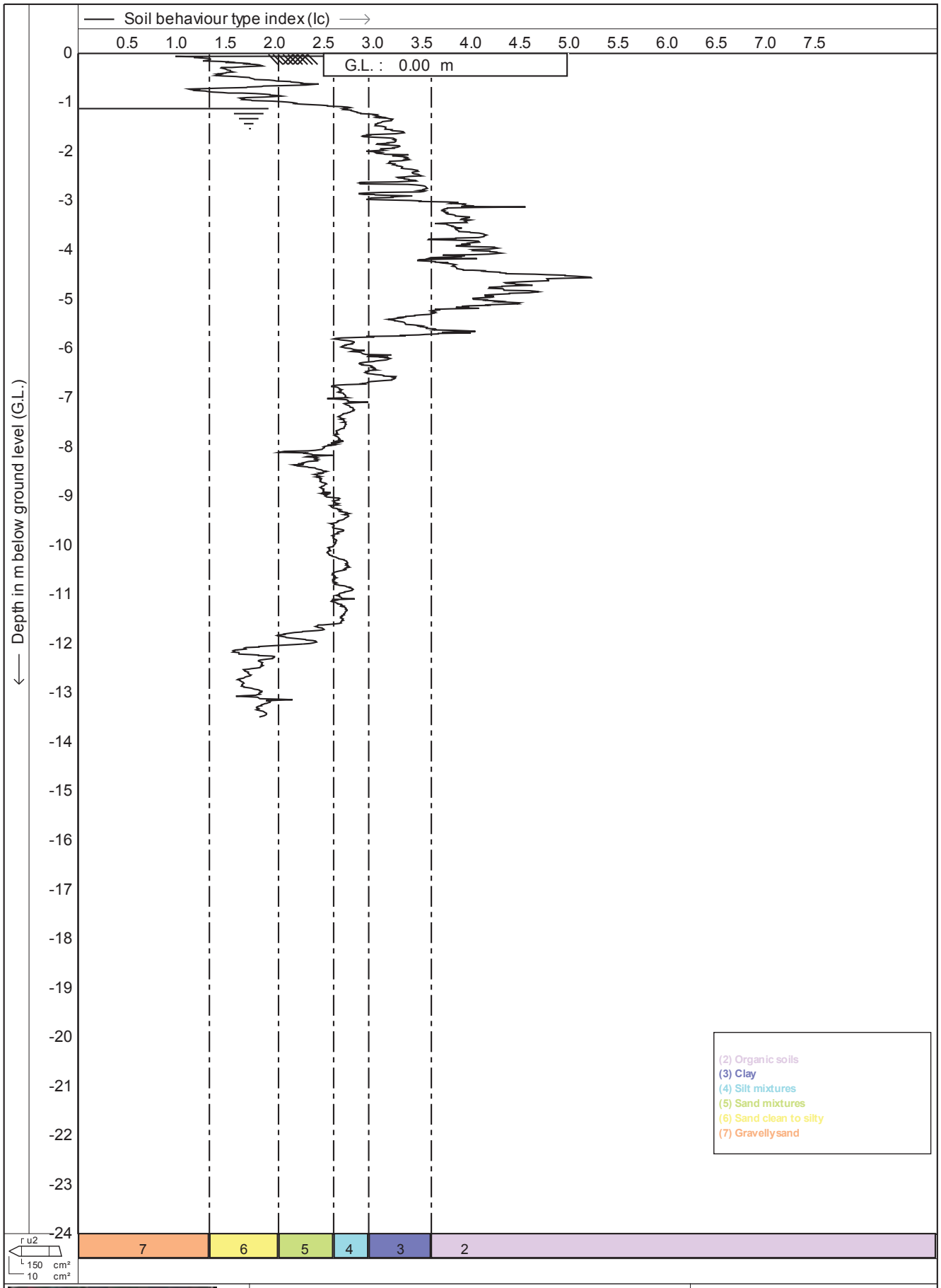
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**7/14**

CPTask V1.31



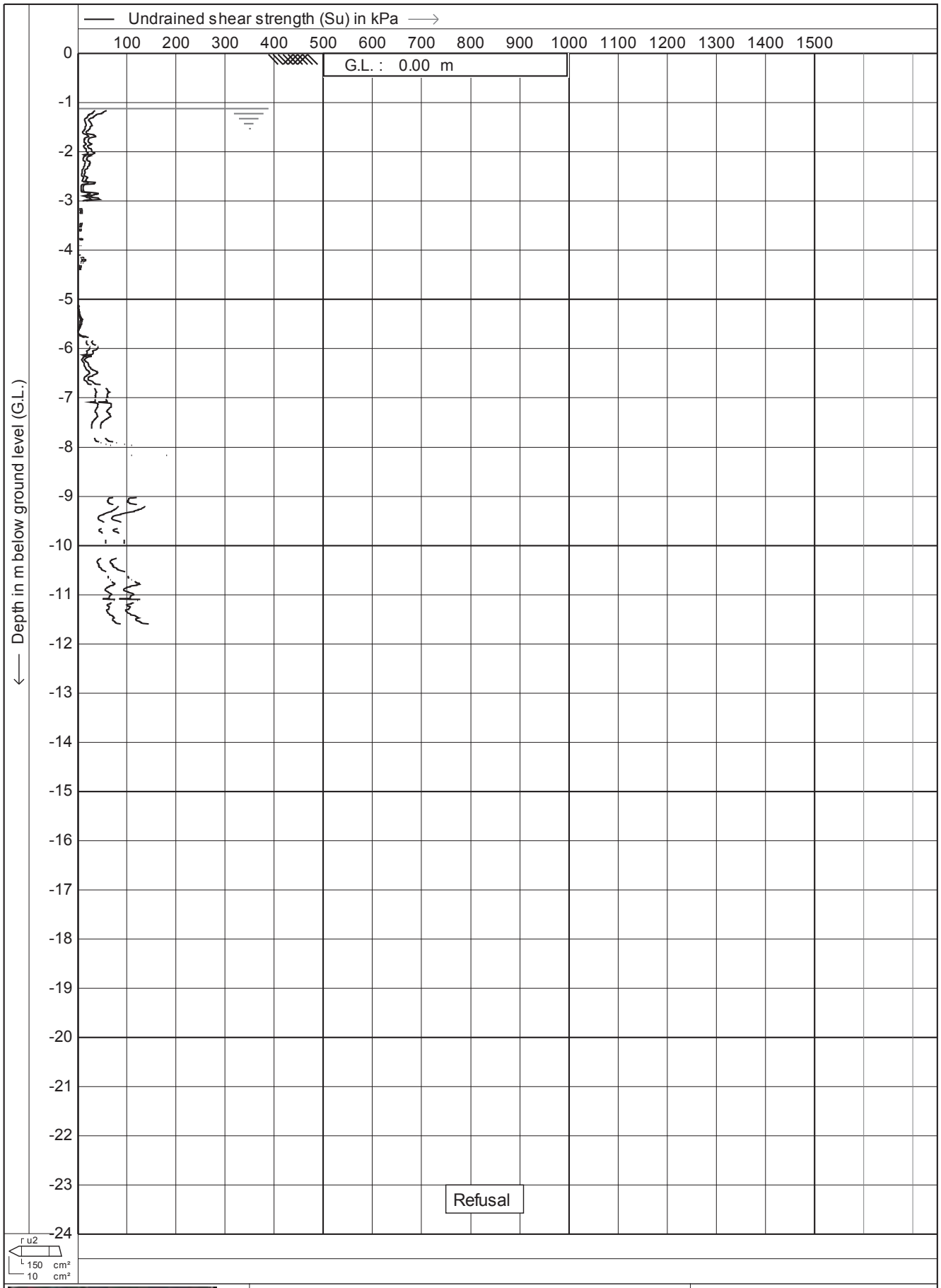
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **106**	**8/14**

CPTask V1.31



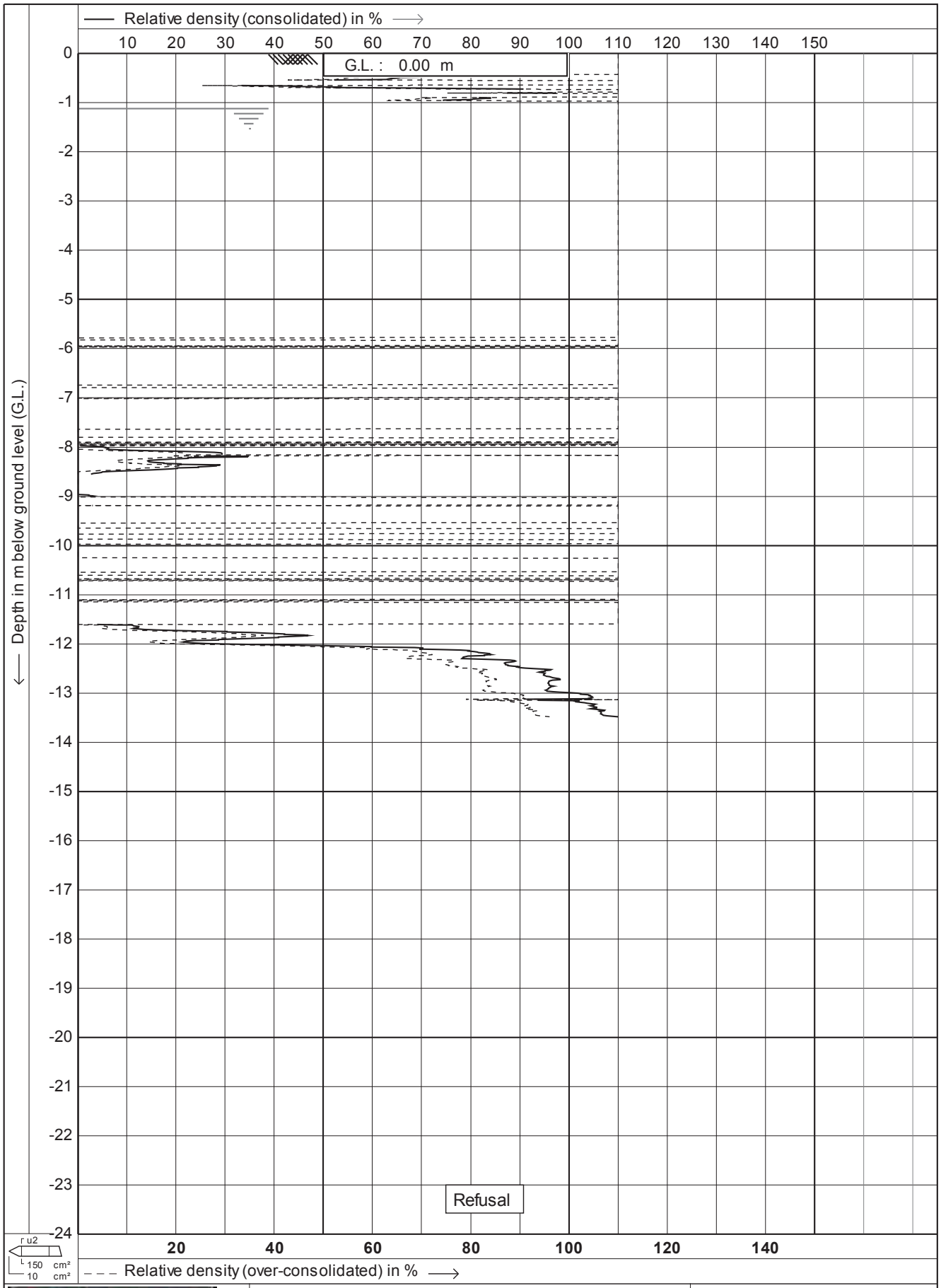
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **106**	**9/14**

CPTask V1.31



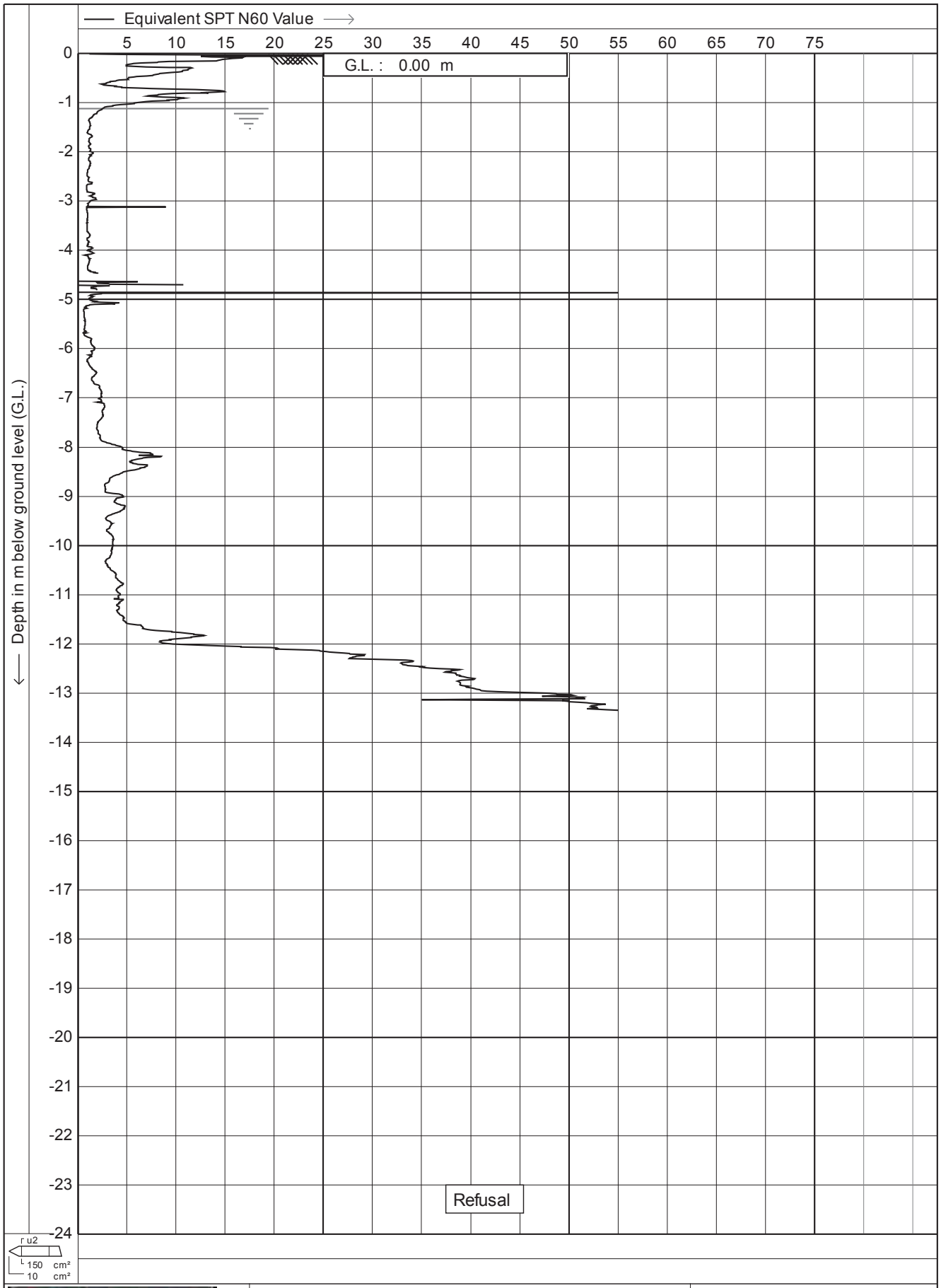
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**10/14**

CPTask V1.31



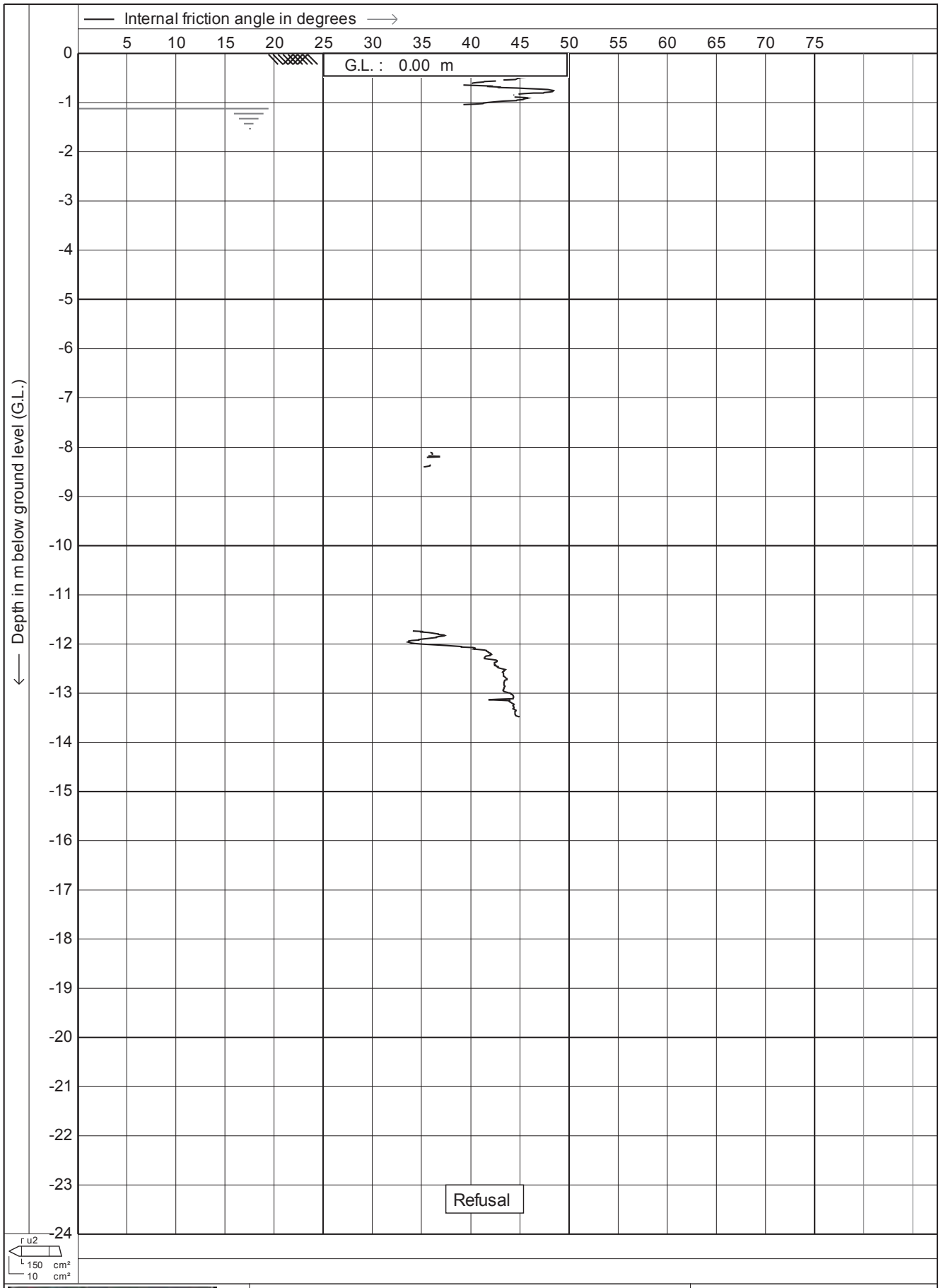
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**
		Cone no. : **C10CFIIP.F14**
	Project : **Site Investigations**	Project no. : **02AECOM2**
	Location: **Southern Links - Hamilton**	CPT no. : **106** 11/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **106**	**12/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

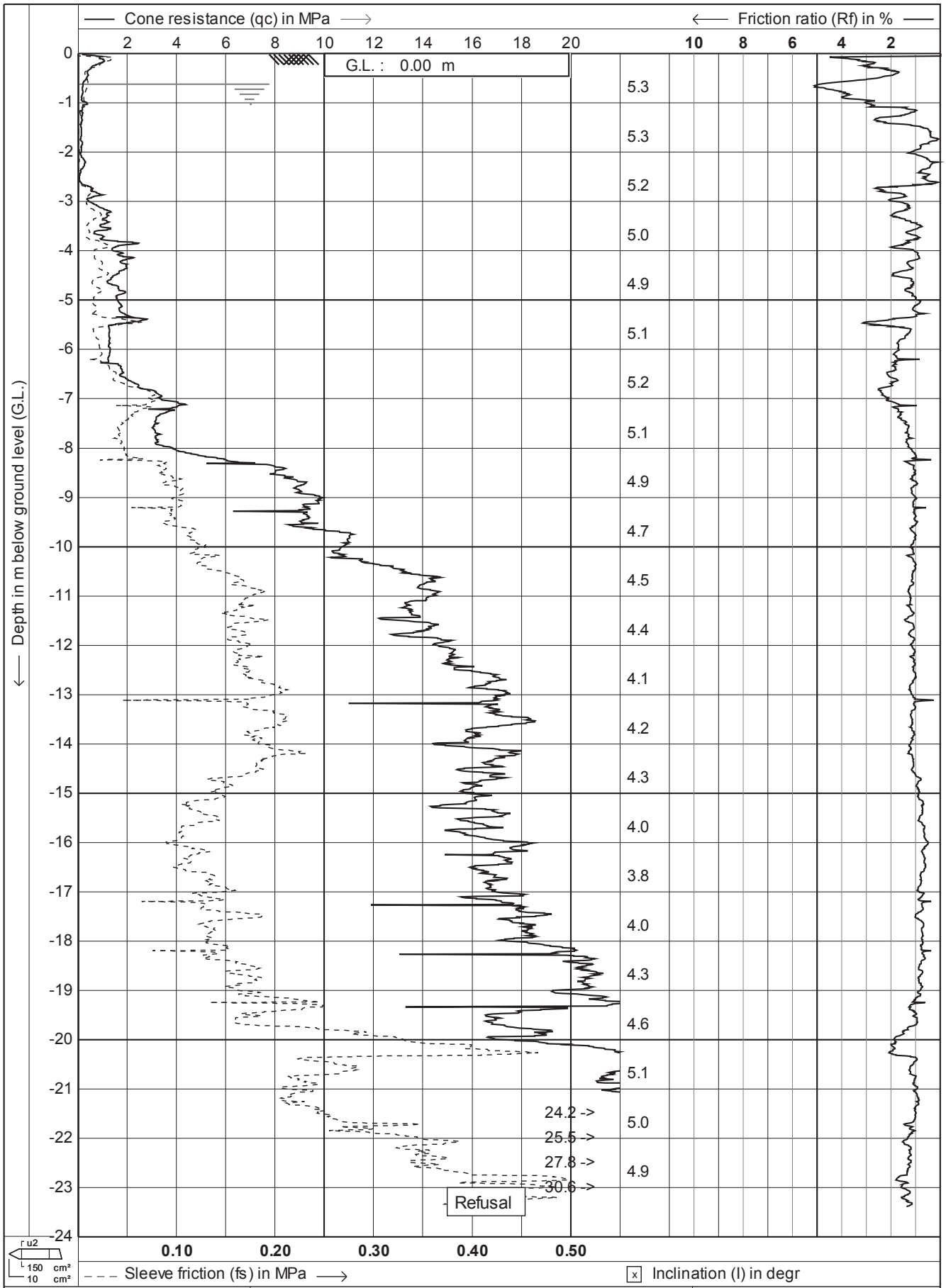
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **106**

14/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

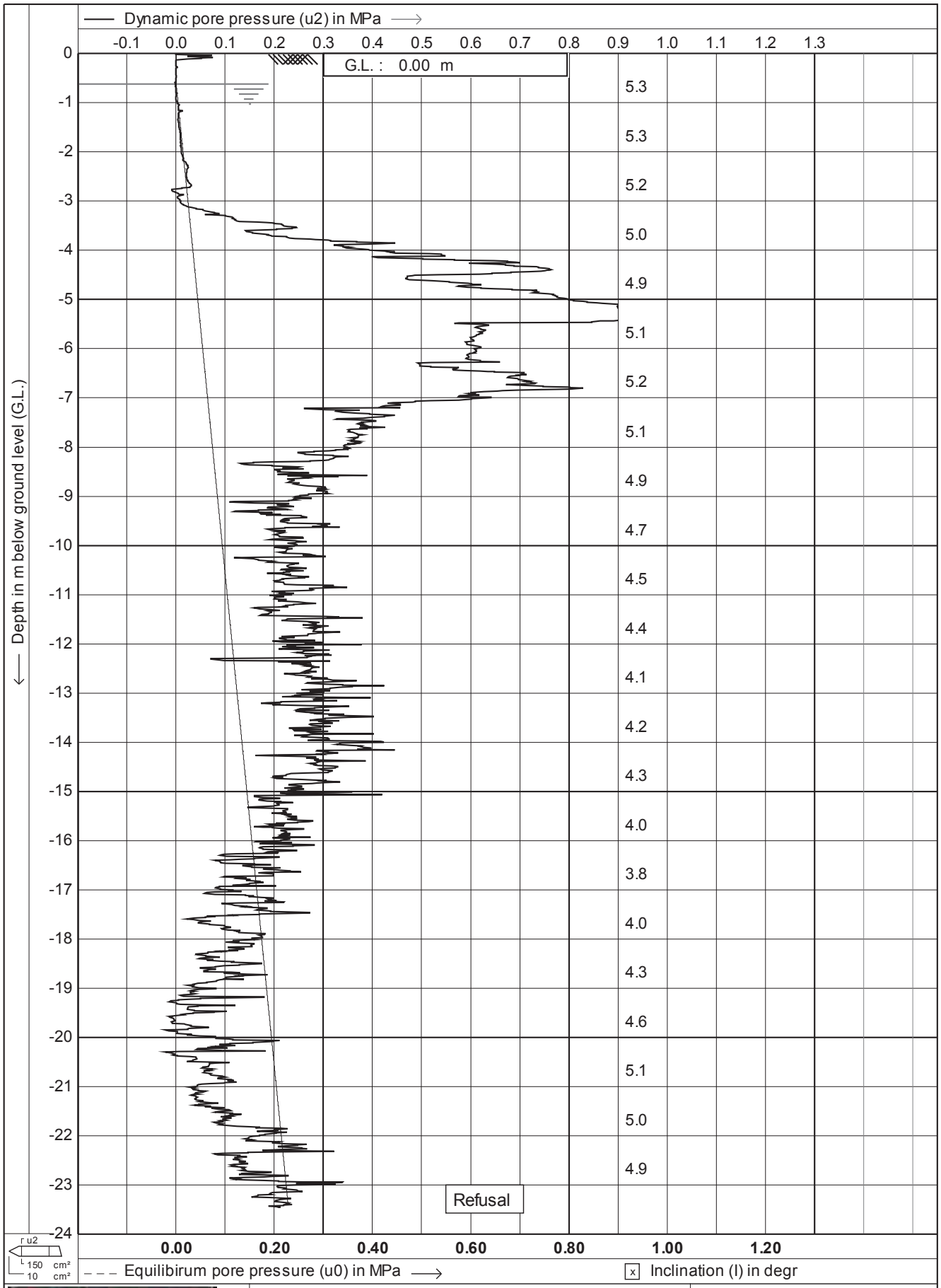
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **107**

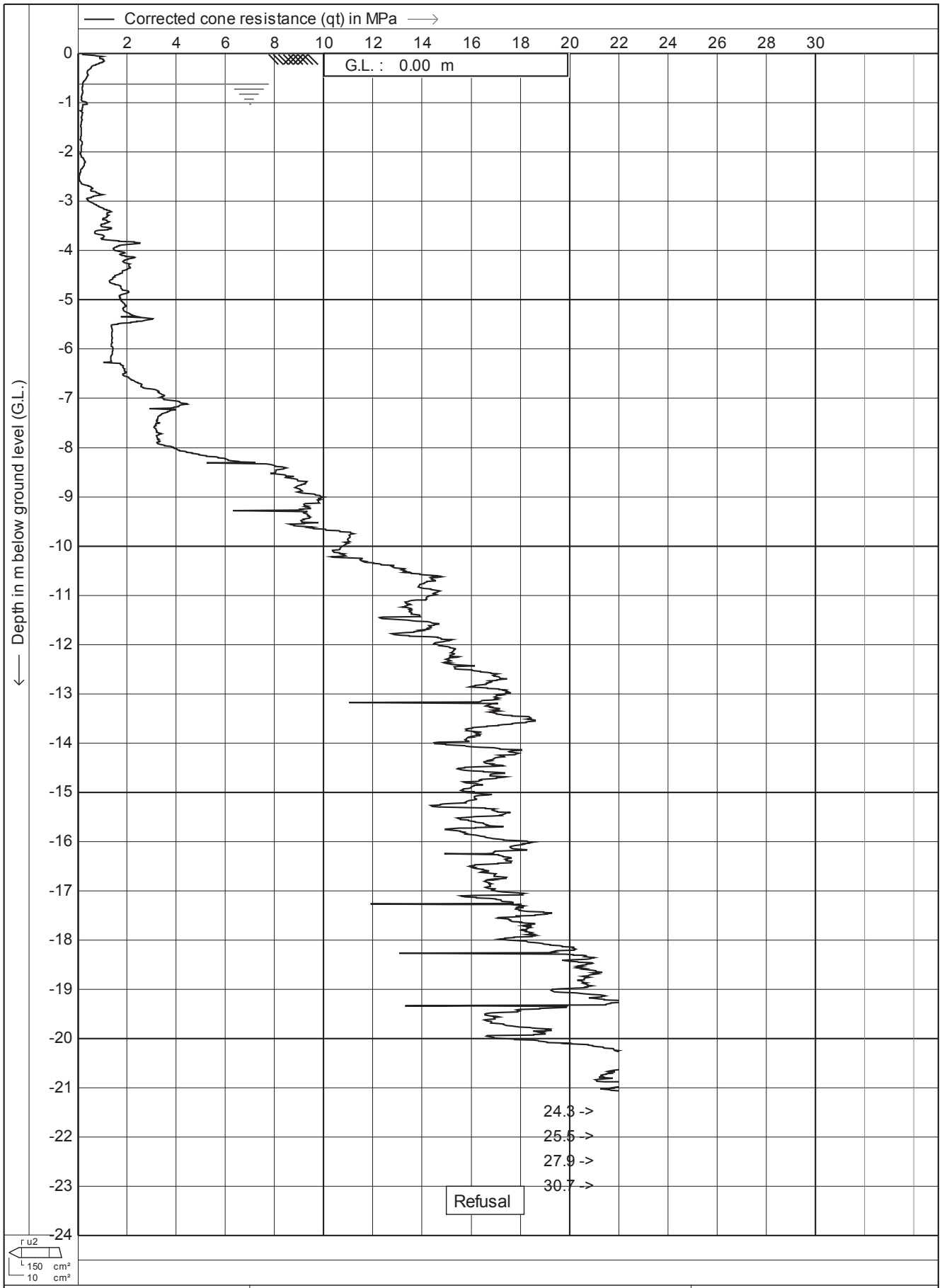
1/14

CPTask V1.31



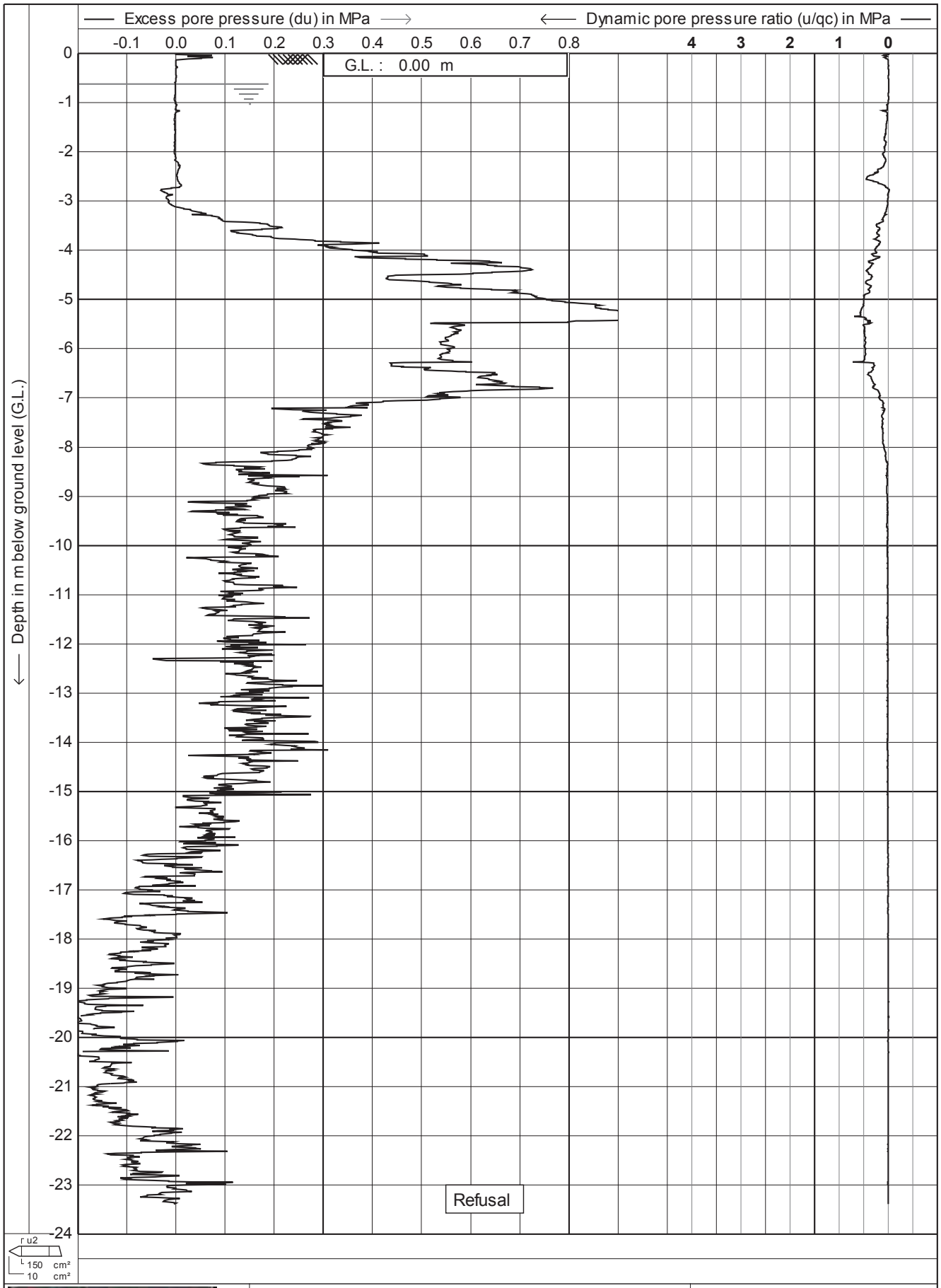
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **107**	**2/14**

CPTask V1.31



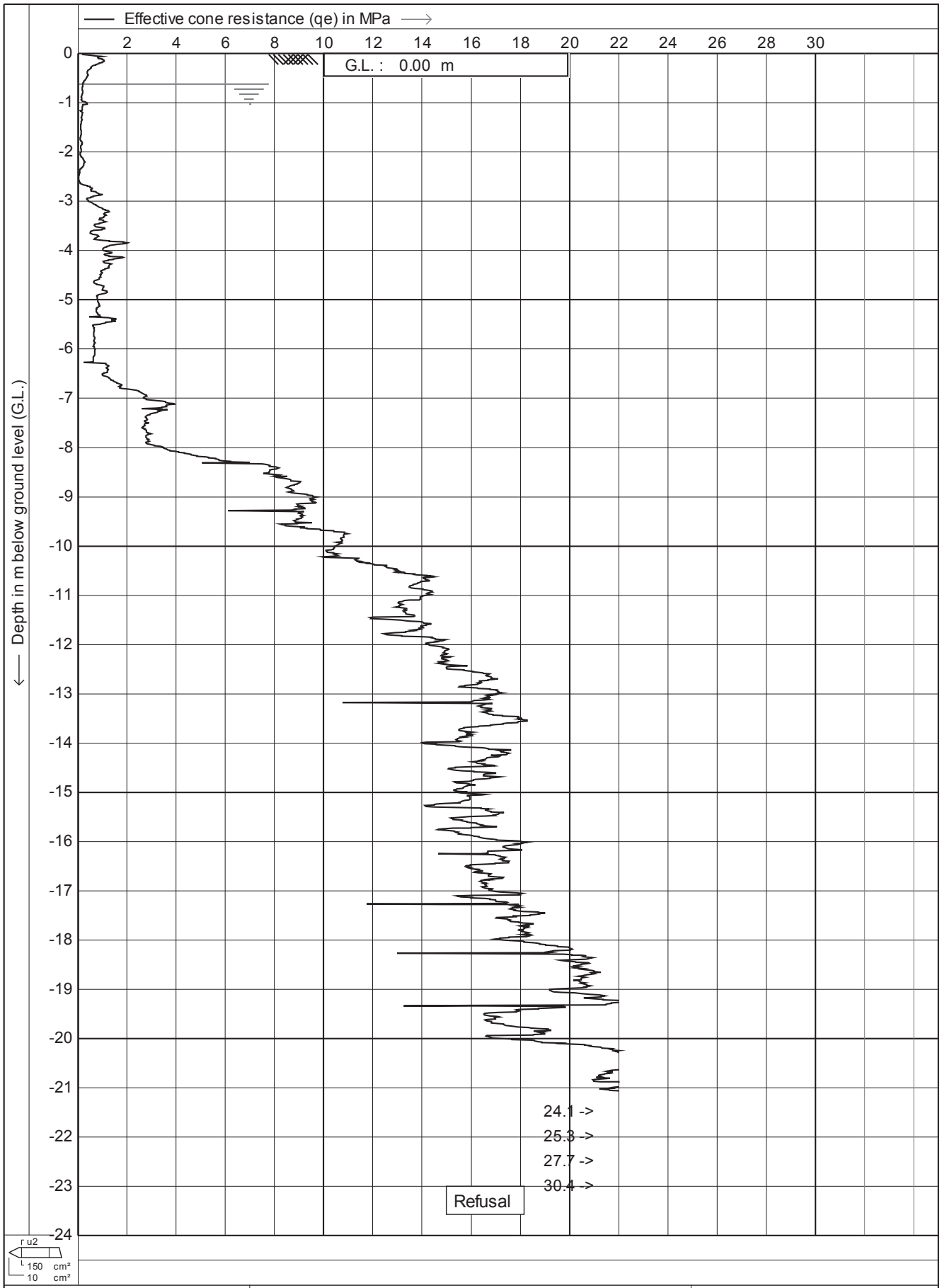
Test according A.S.T.M. Standard D 5778-07		Date	: 12-1-2012
		Cone no.	: C10CFIIP.F14
Project :	Site Investigations	Project no. :	02AECOM2
Location:	Southern Links - Hamilton	CPT no. : 107	3/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **107**	4/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

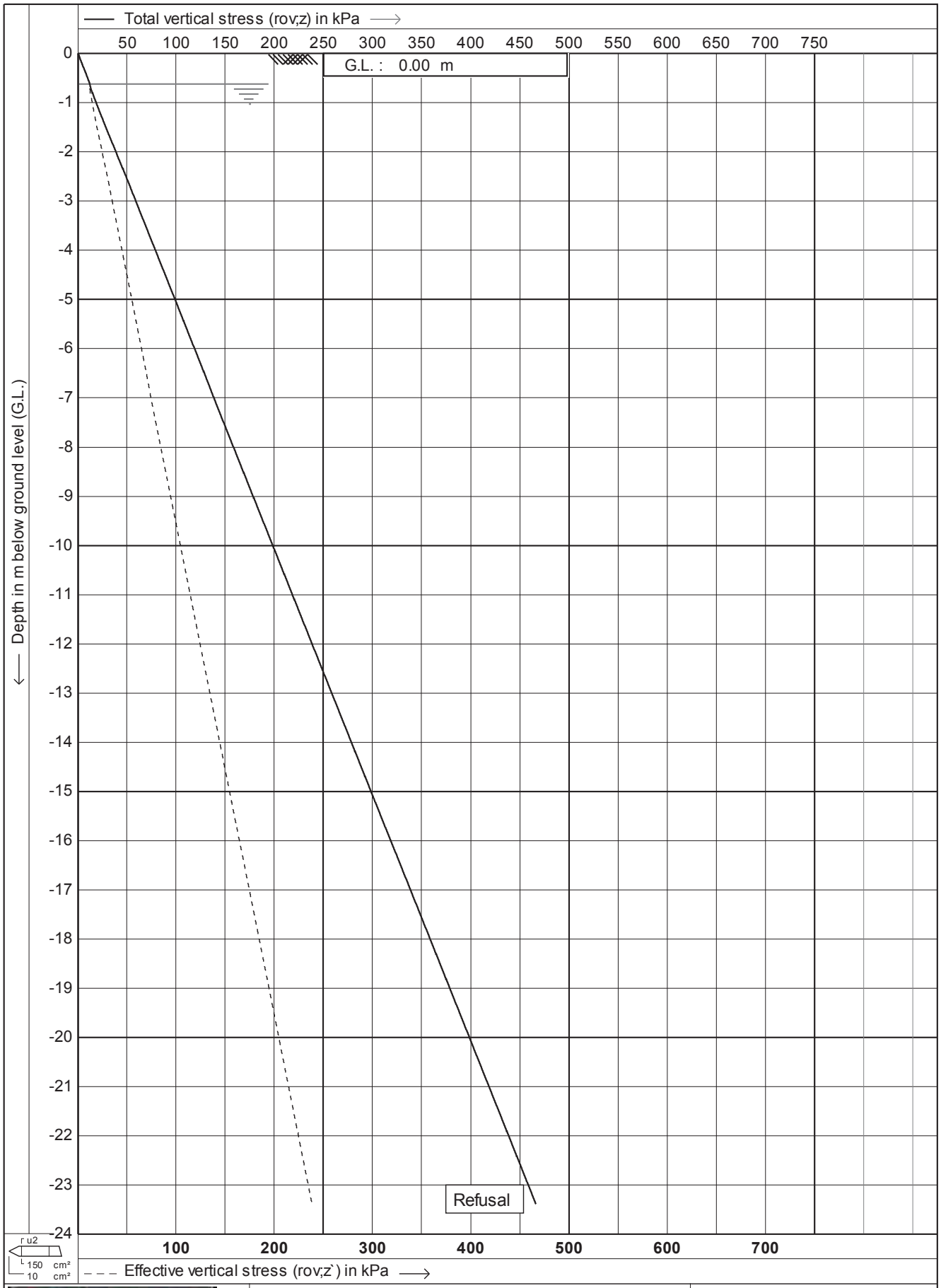
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **107**

5/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

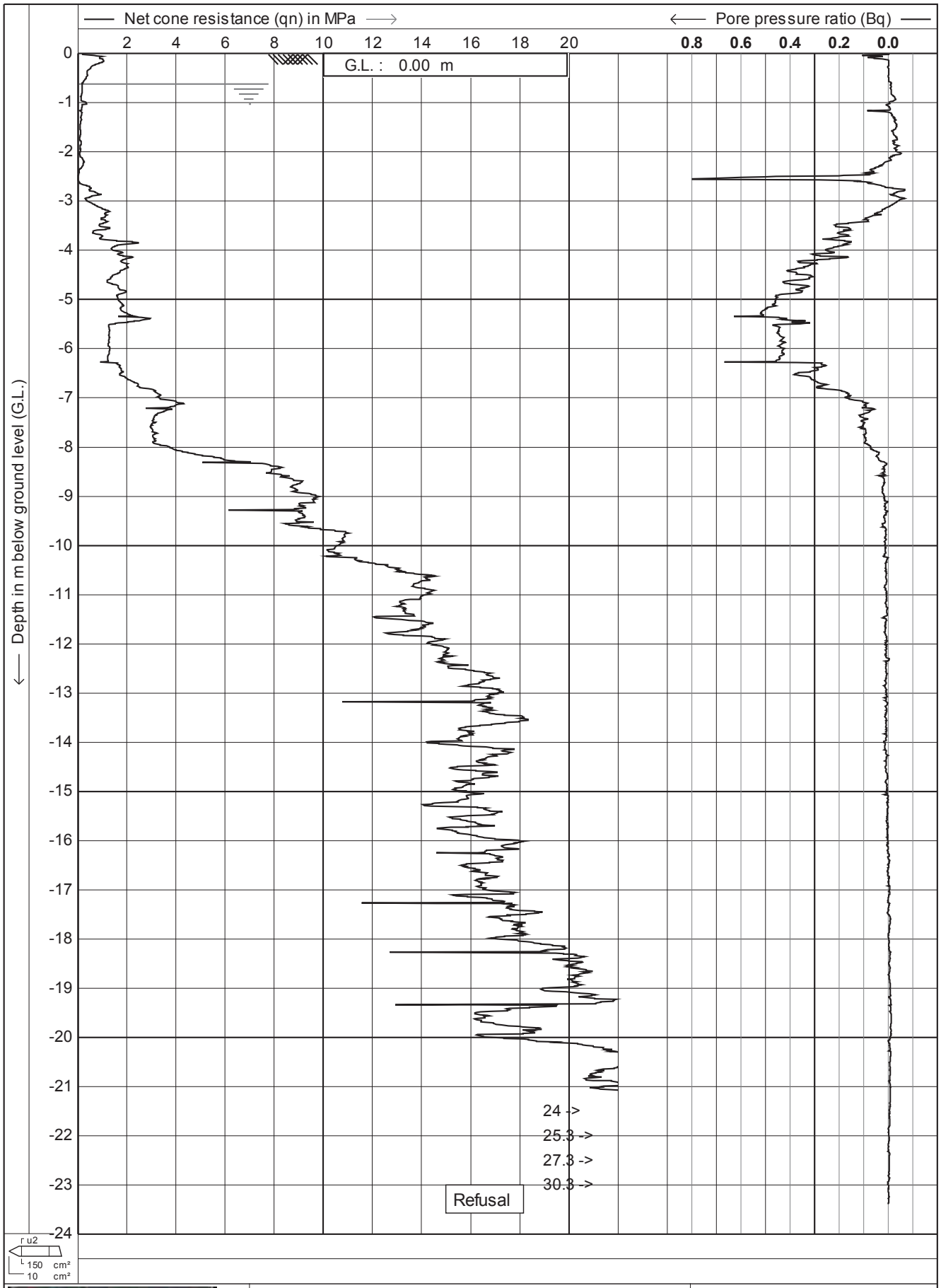
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **107**

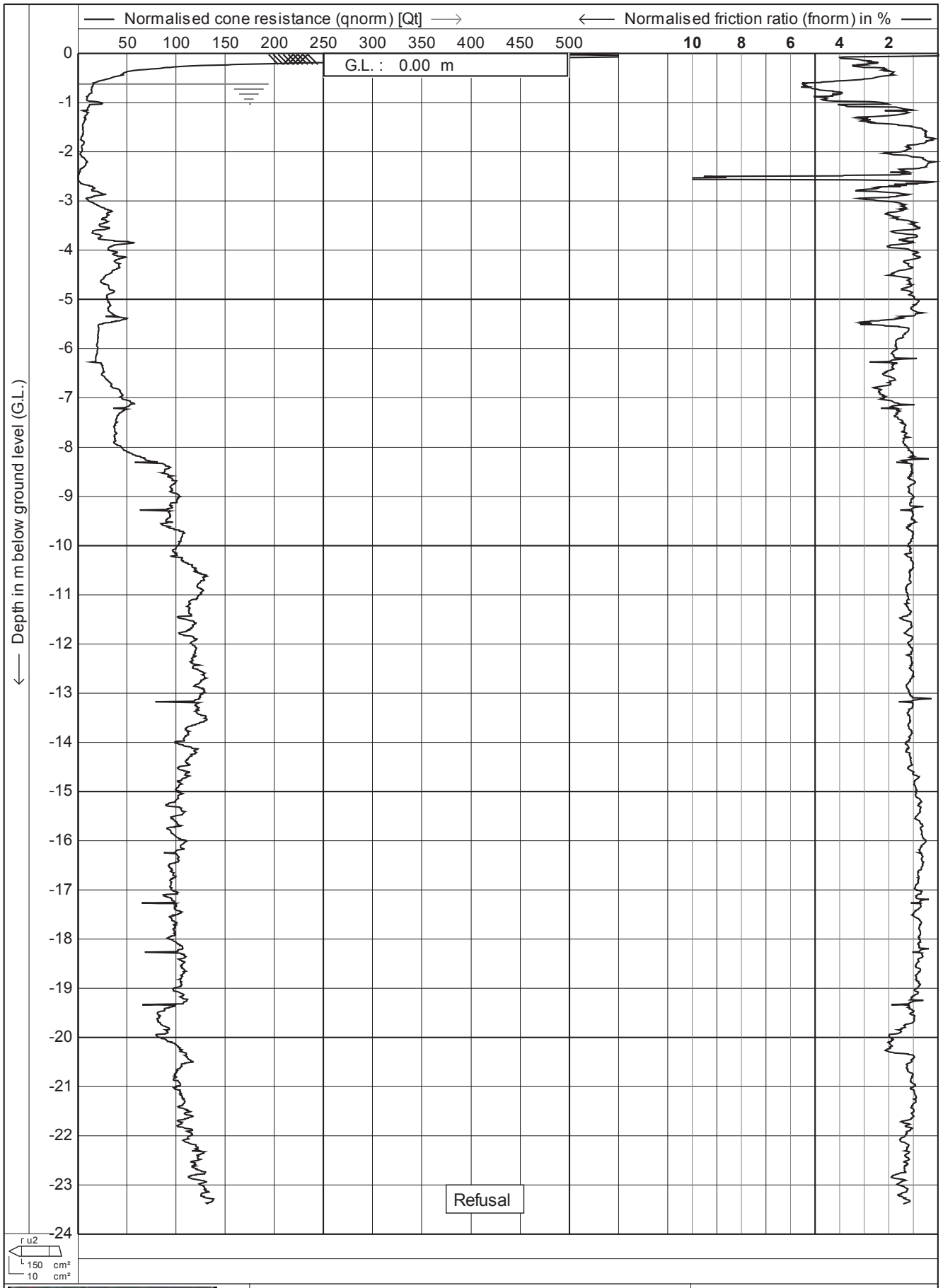
6/14

CPTask V1.31



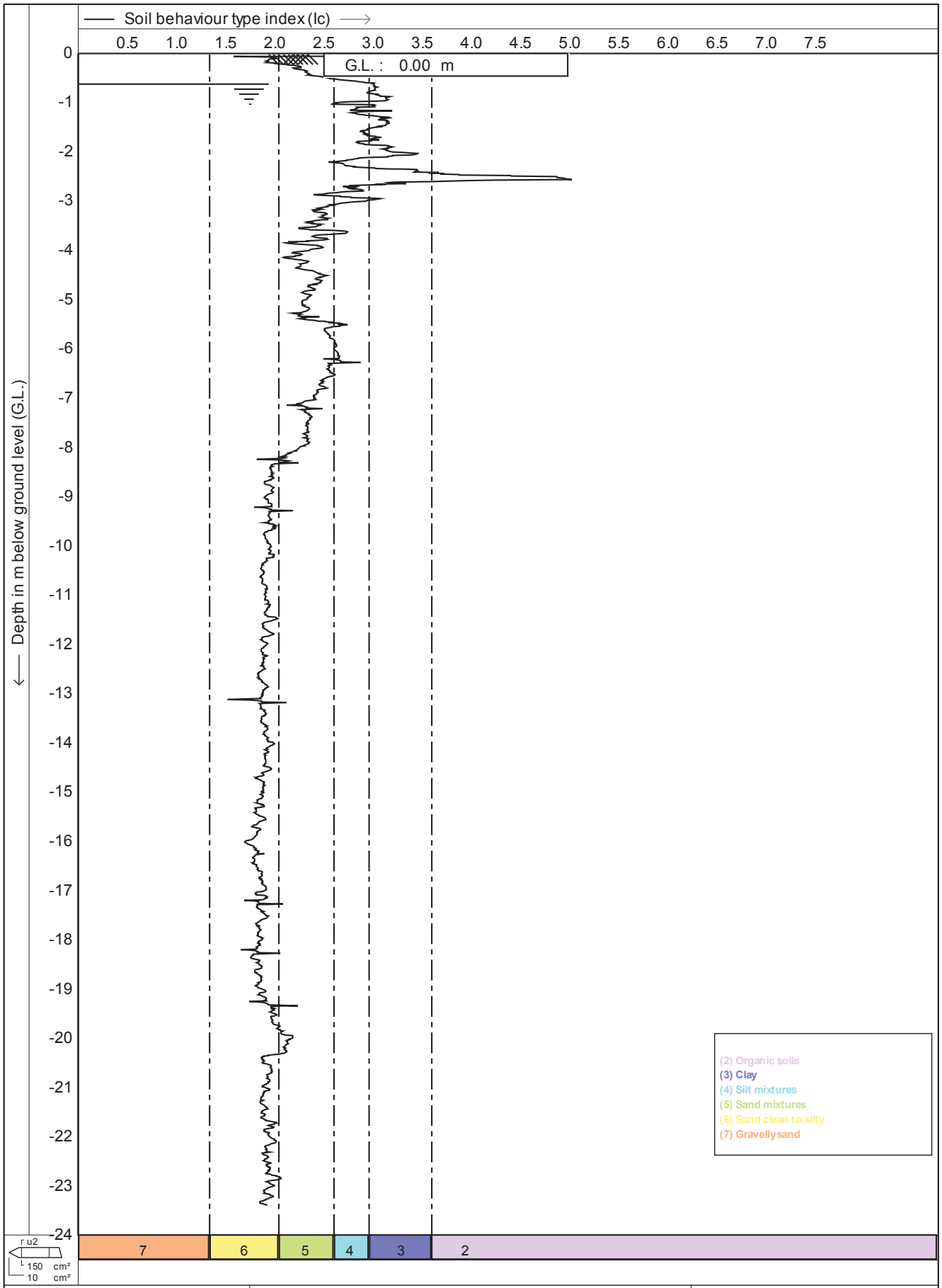
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 12-1-2012
		Cone no.	: C10CFIIP.F14
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 107 7/14

CPTask V1.31



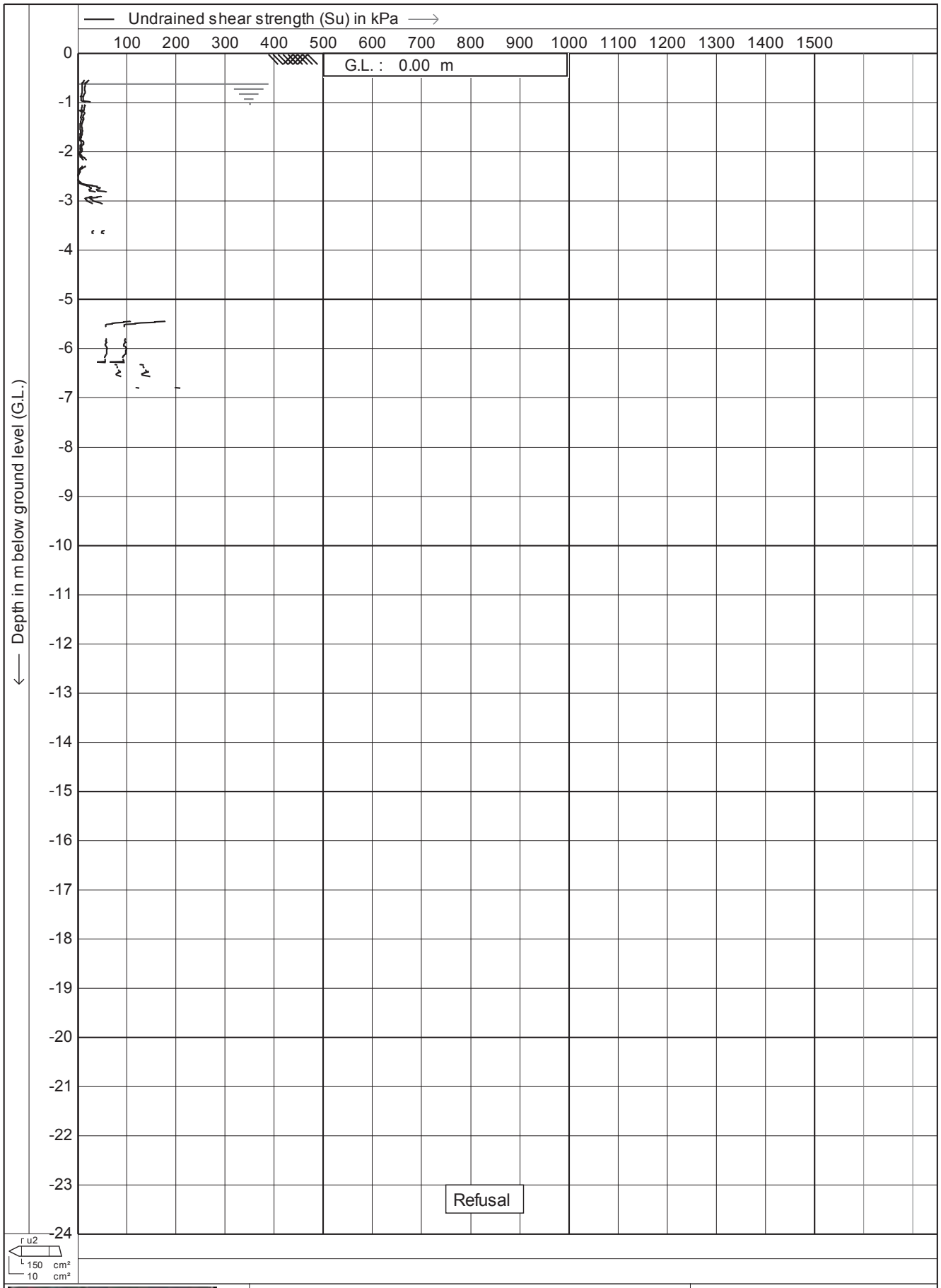
Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **107**	**8/14**

CPTask V1.31



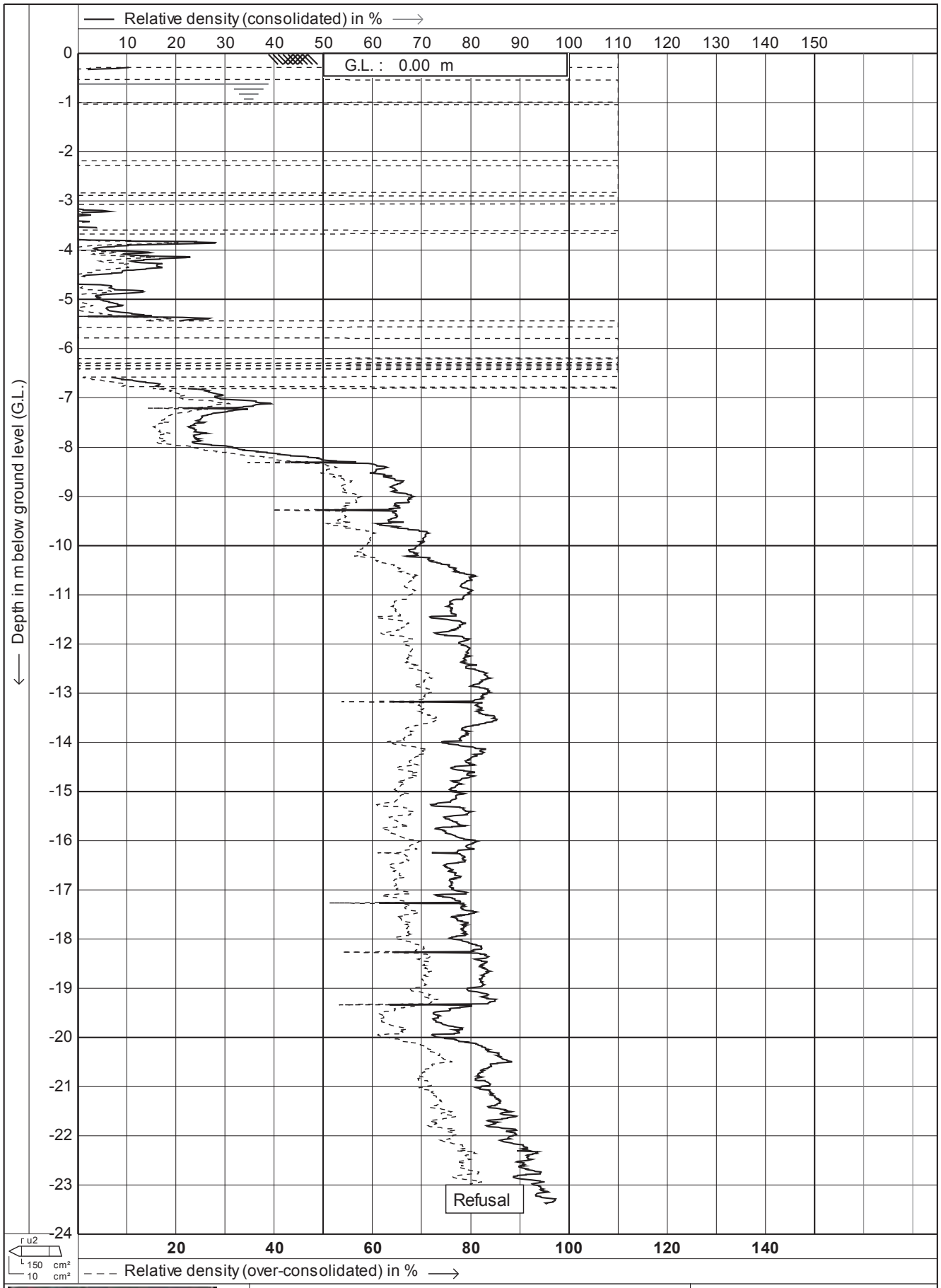
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 12-1-2012	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **107**	**9/14**

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **12-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F14**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **107**	**10/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

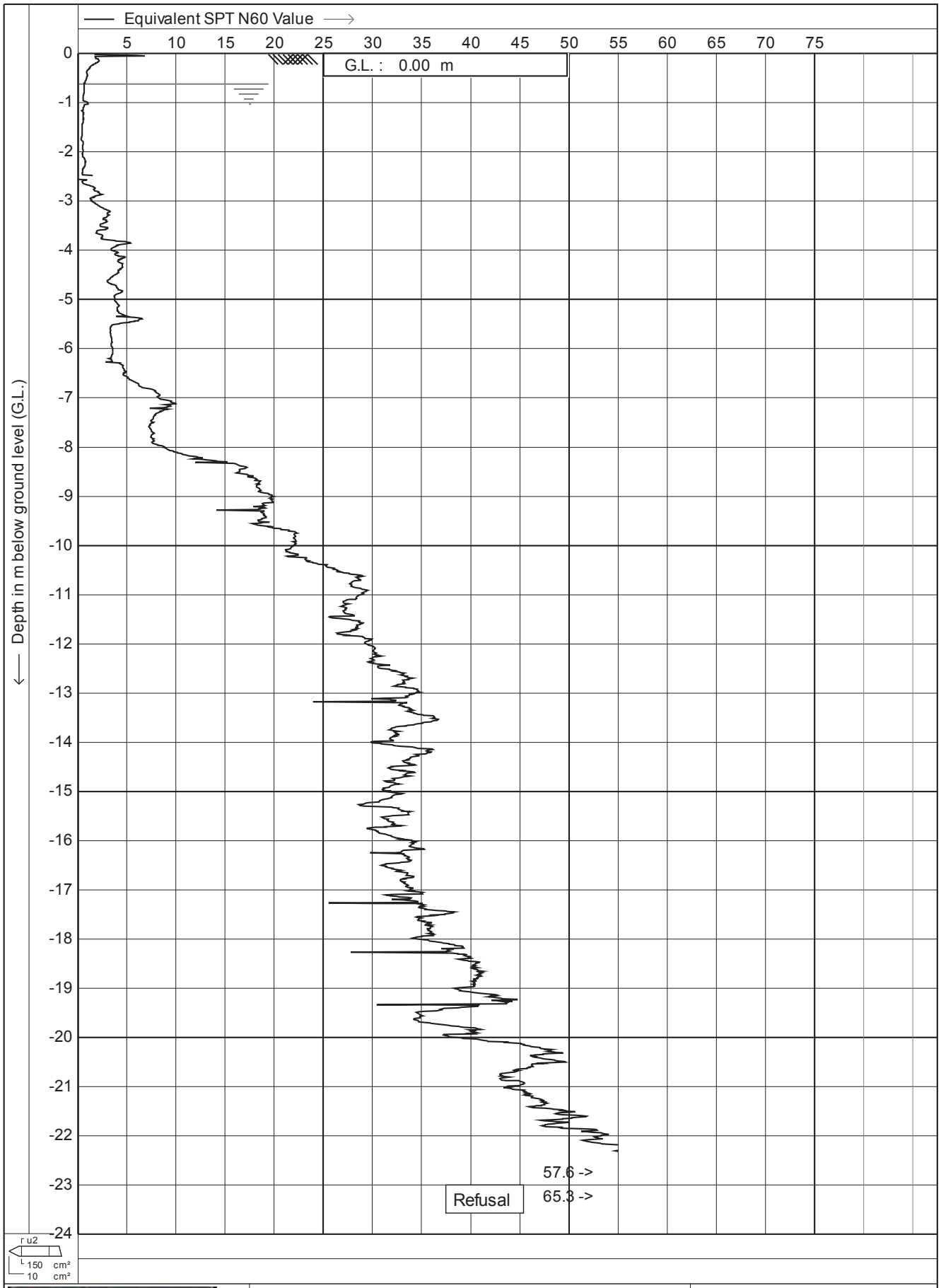
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **107**

11/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

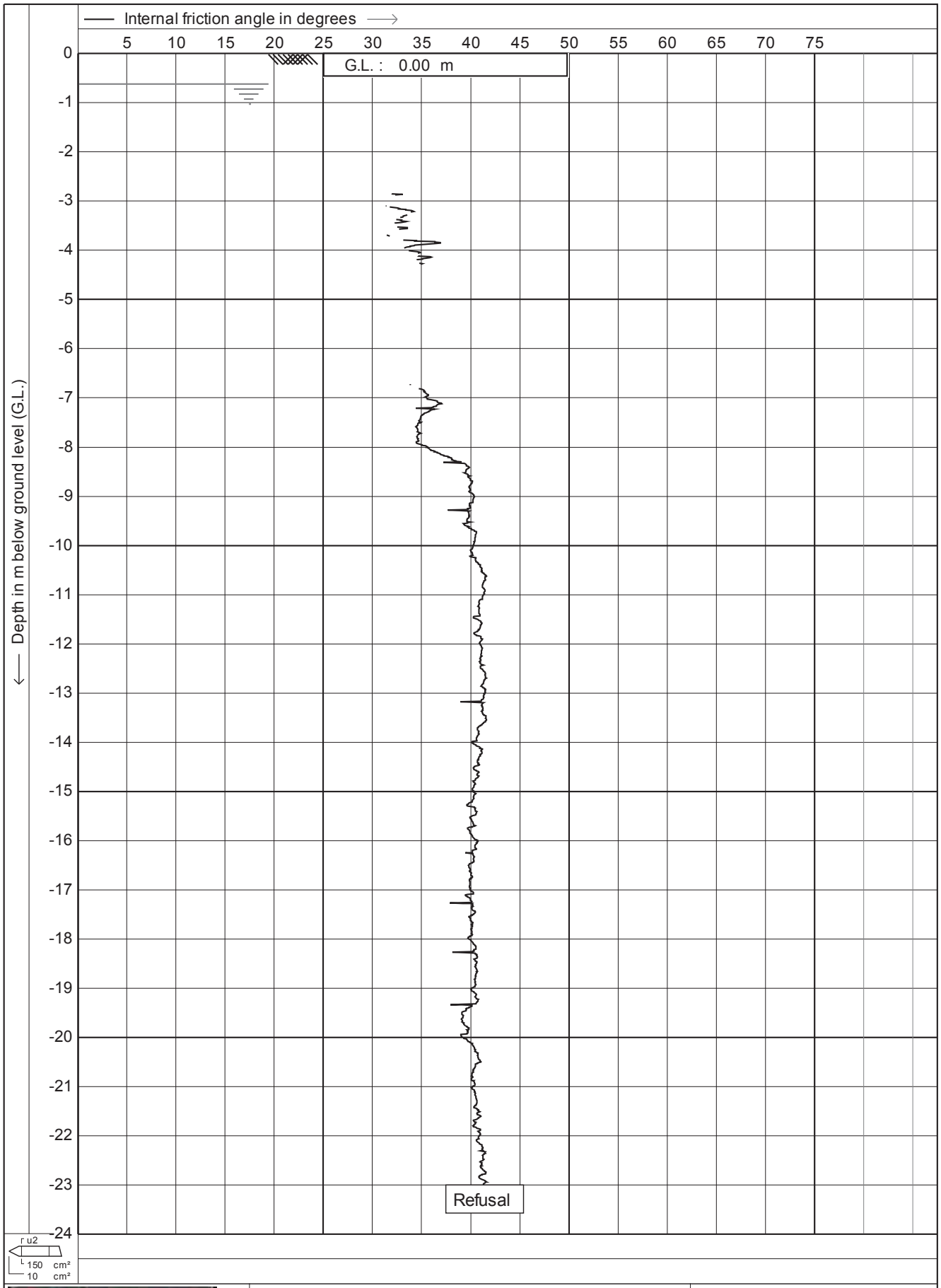
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **12-1-2012**
Cone no.	: **C10CFIIP.F14**
Project no.	: **02AECOM2**
CPT no.	: **107**

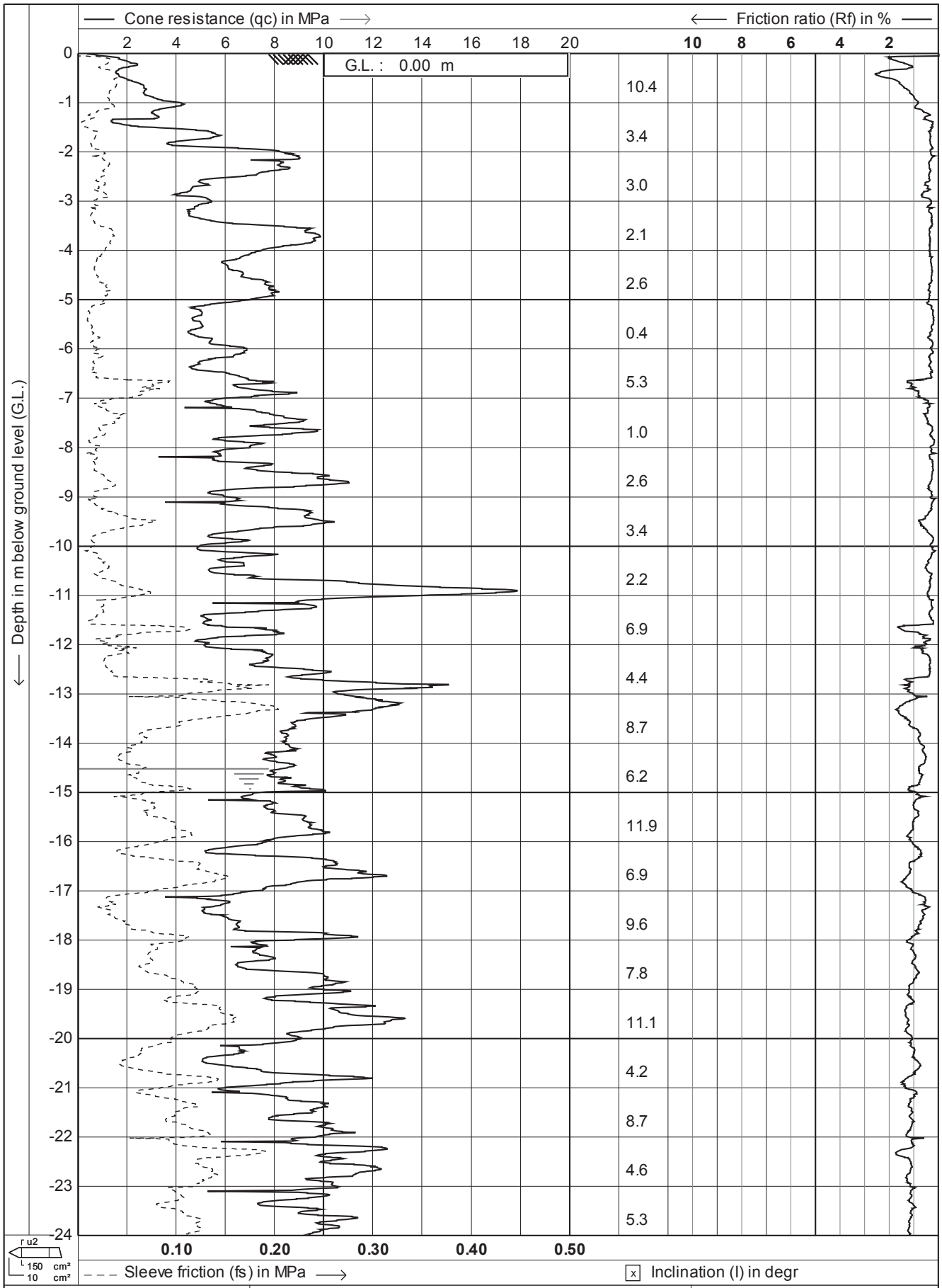
12/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date	: 12-1-2012
	Cone no.	: C10CFIIP.F14
Project : **Site Investigations**	Project no.	: 02AECOM2
Location: **Southern Links - Hamilton**	CPT no.	: 107 14/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

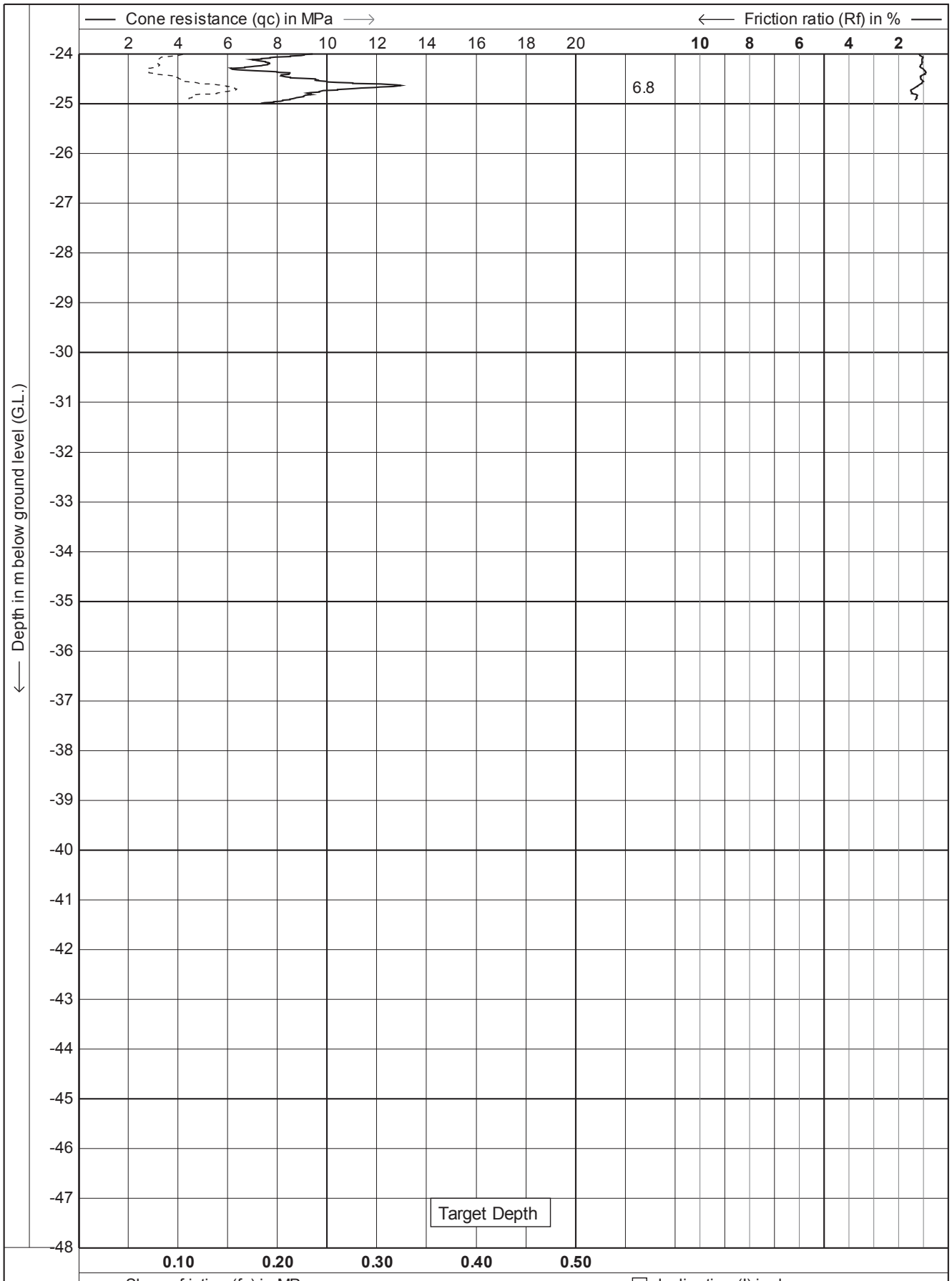
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

1/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

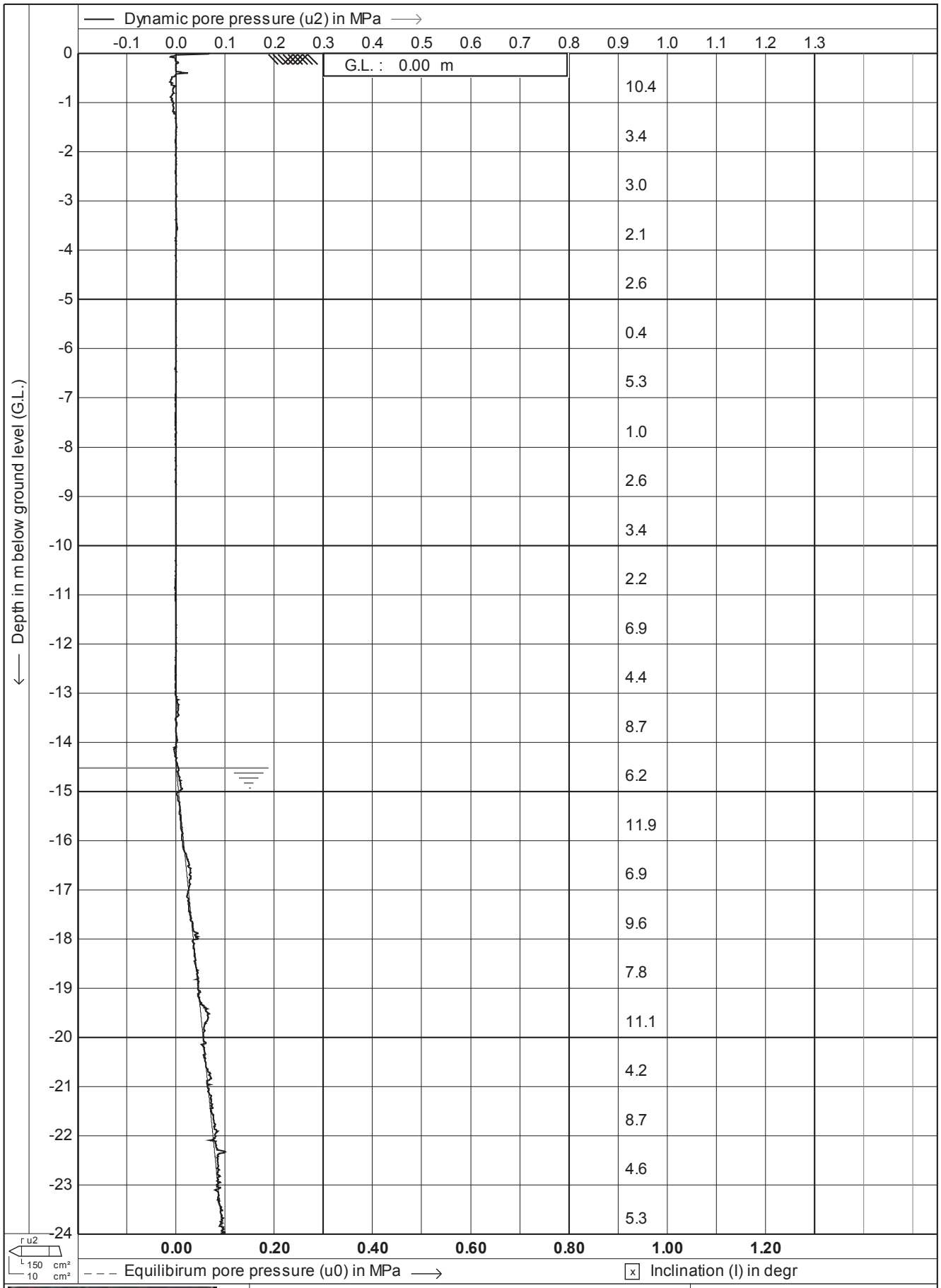
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

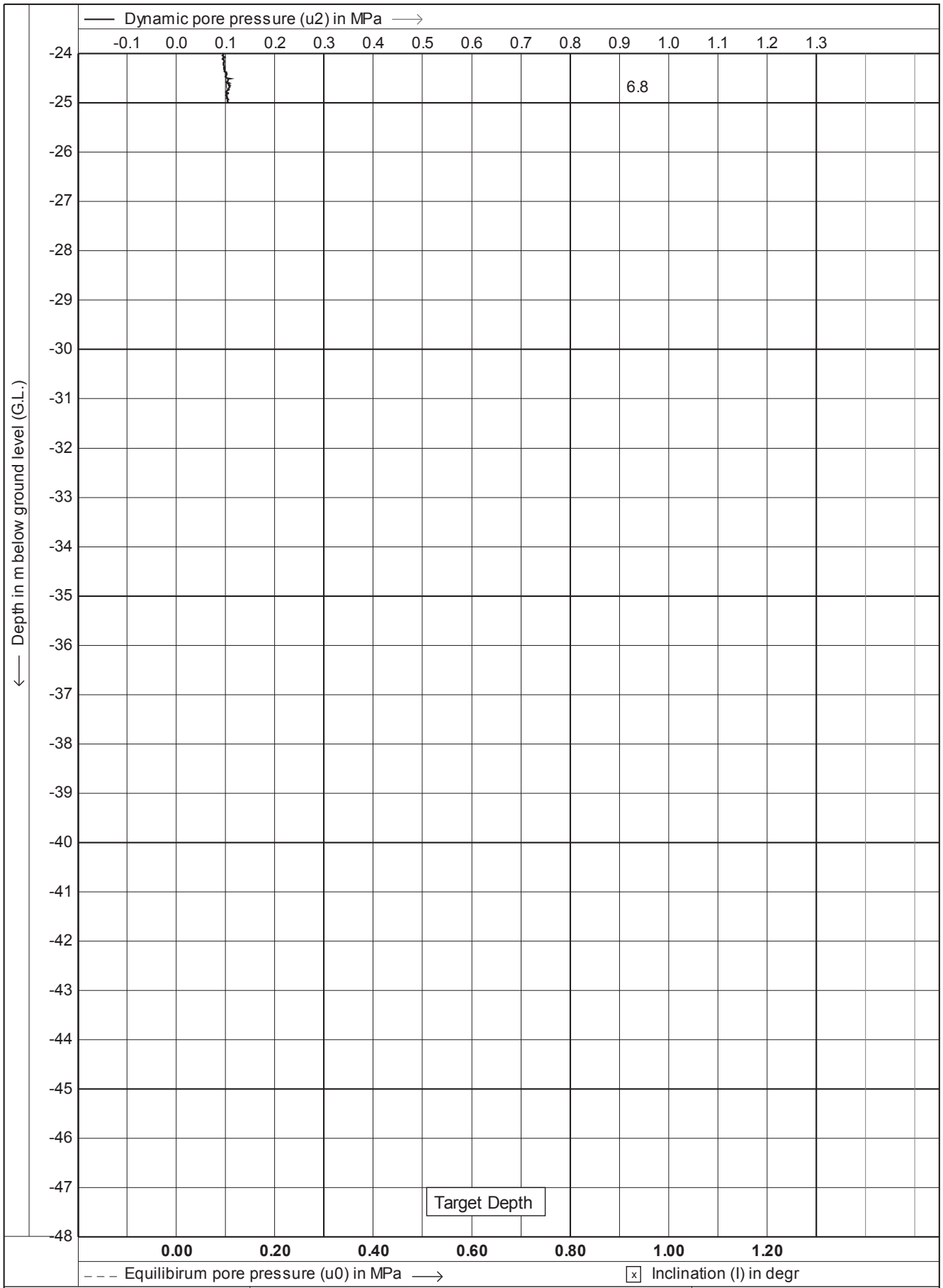
2/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **110**	**3/28**

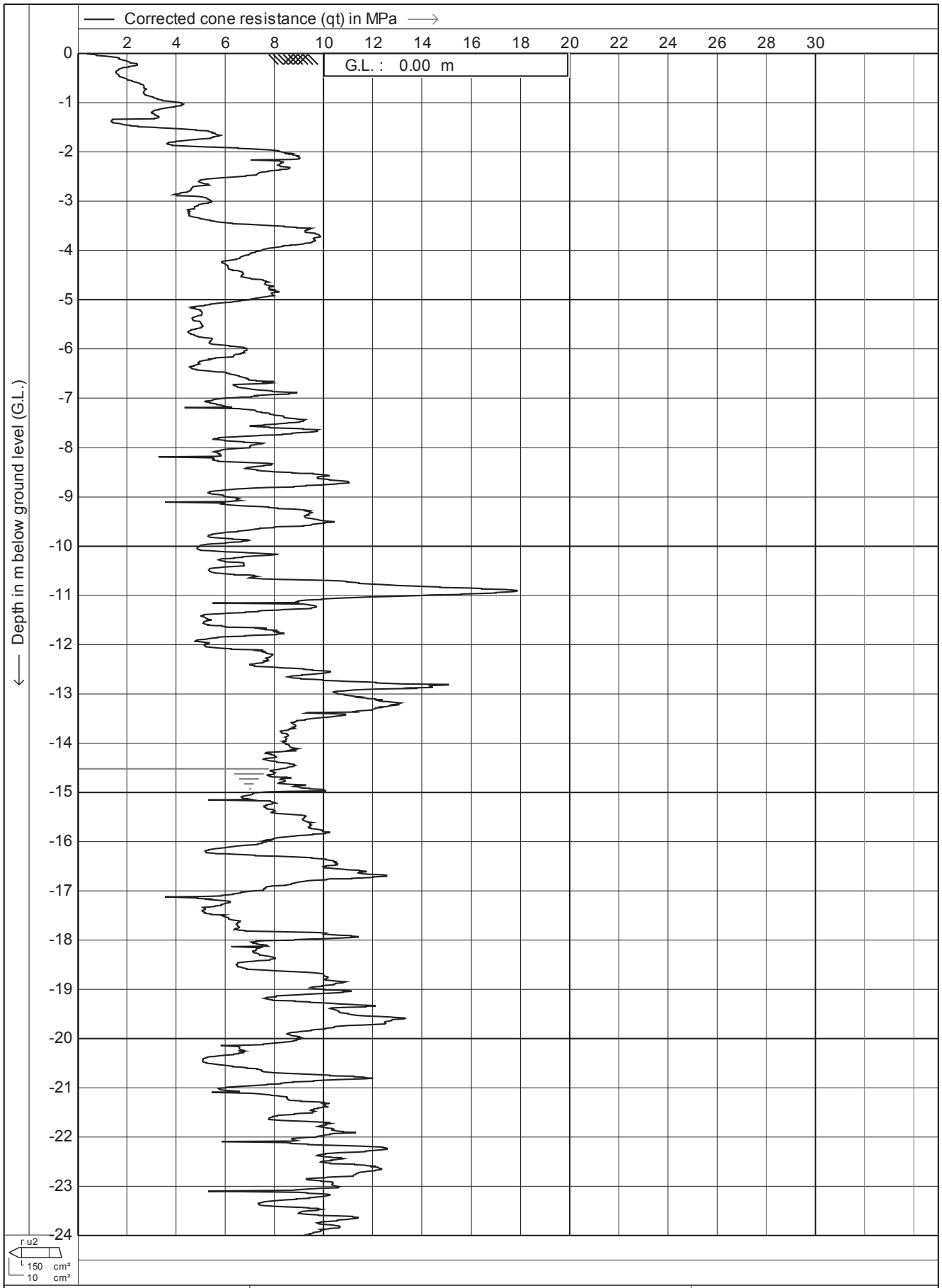
CPTask V1.31



Test according A.S.T.M. Standard D 5778-07		Date	: **16-1-2012**
Project : **Site Investigations**		Cone no.	: **C10CFIIP.F57**
		Project no.	: **02AECOM2**
Location: **Southern Links - Hamilton**		CPT no.	: **110**

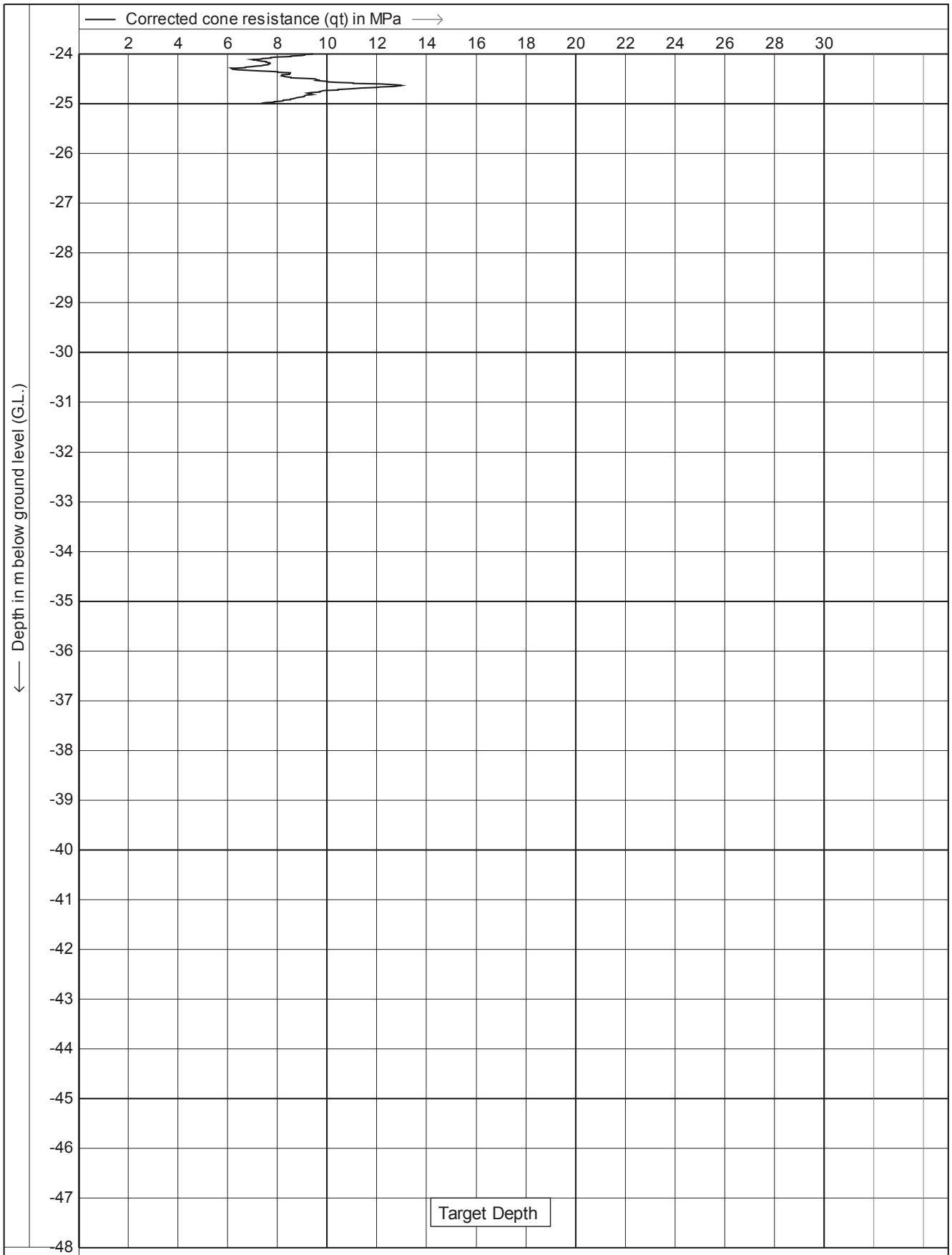
4/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **110**	**5/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

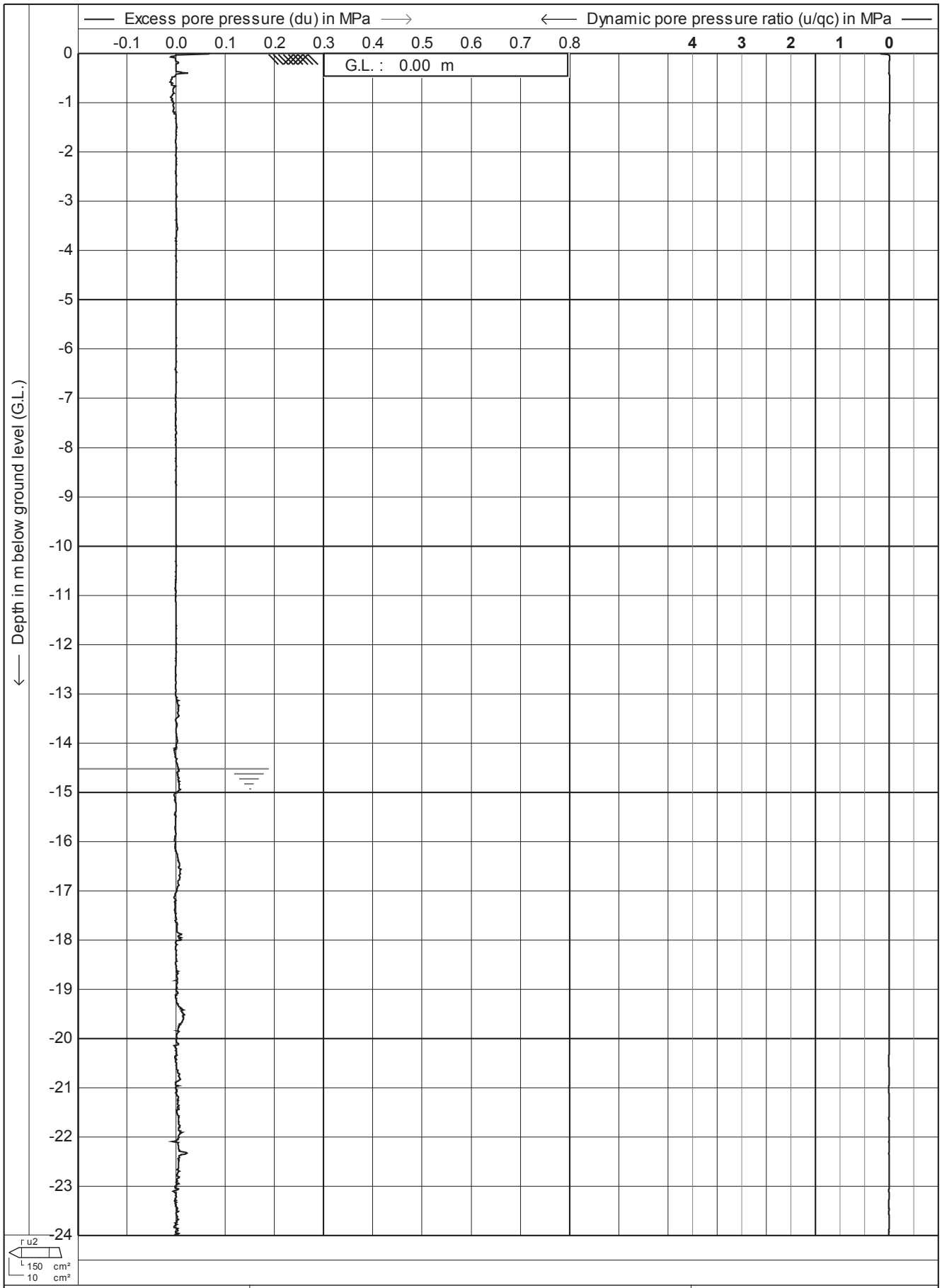
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

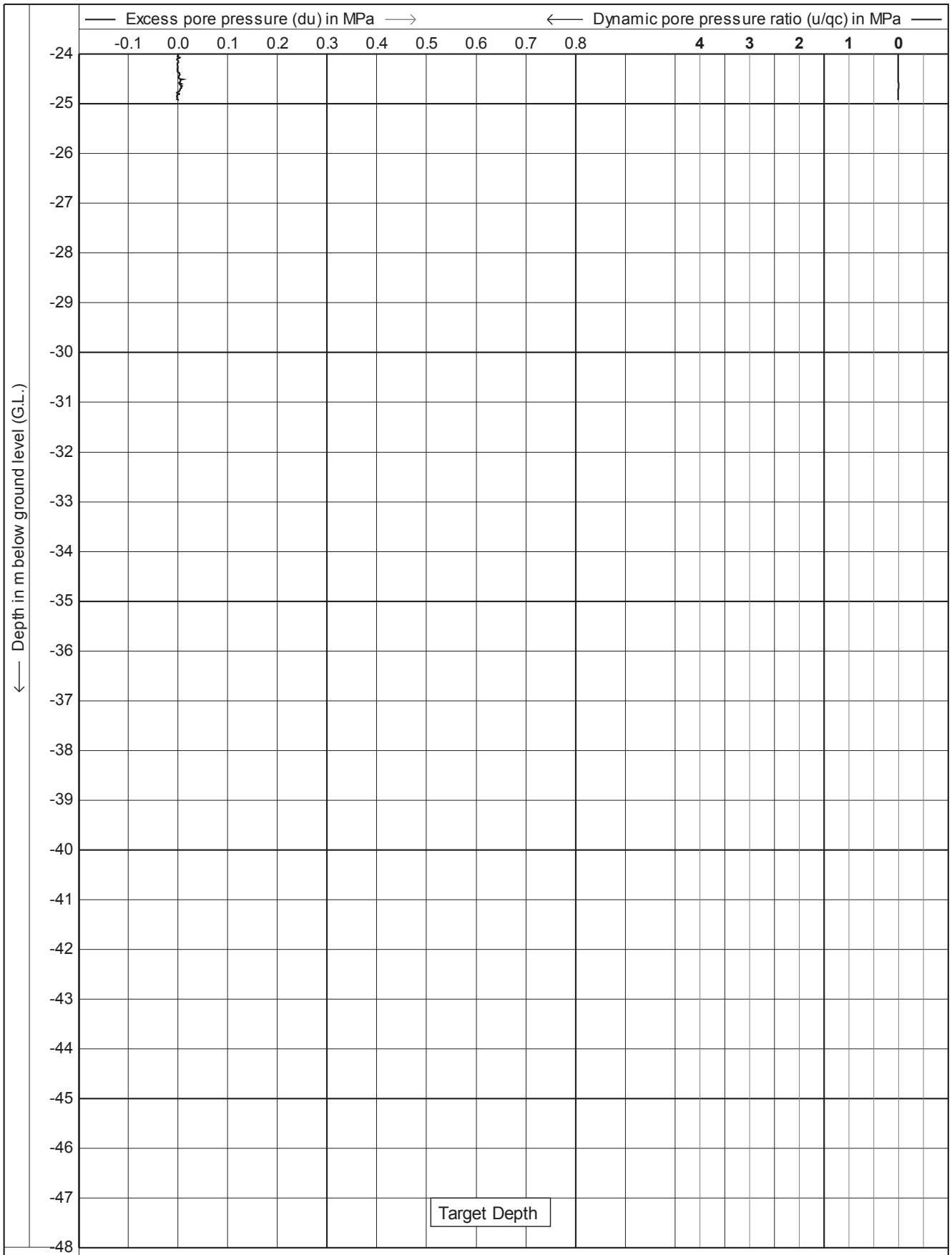
6/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **110**	**7/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

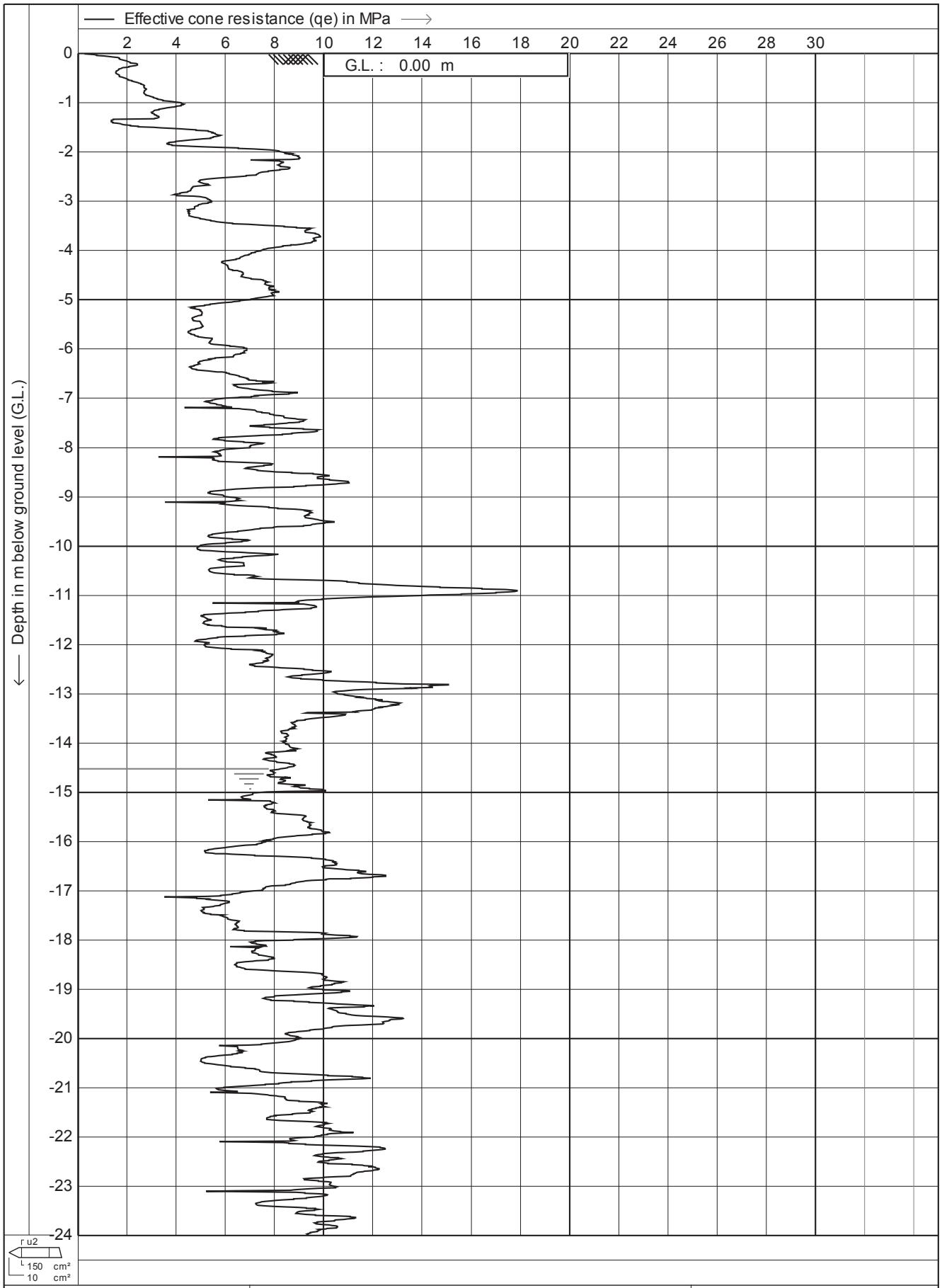
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

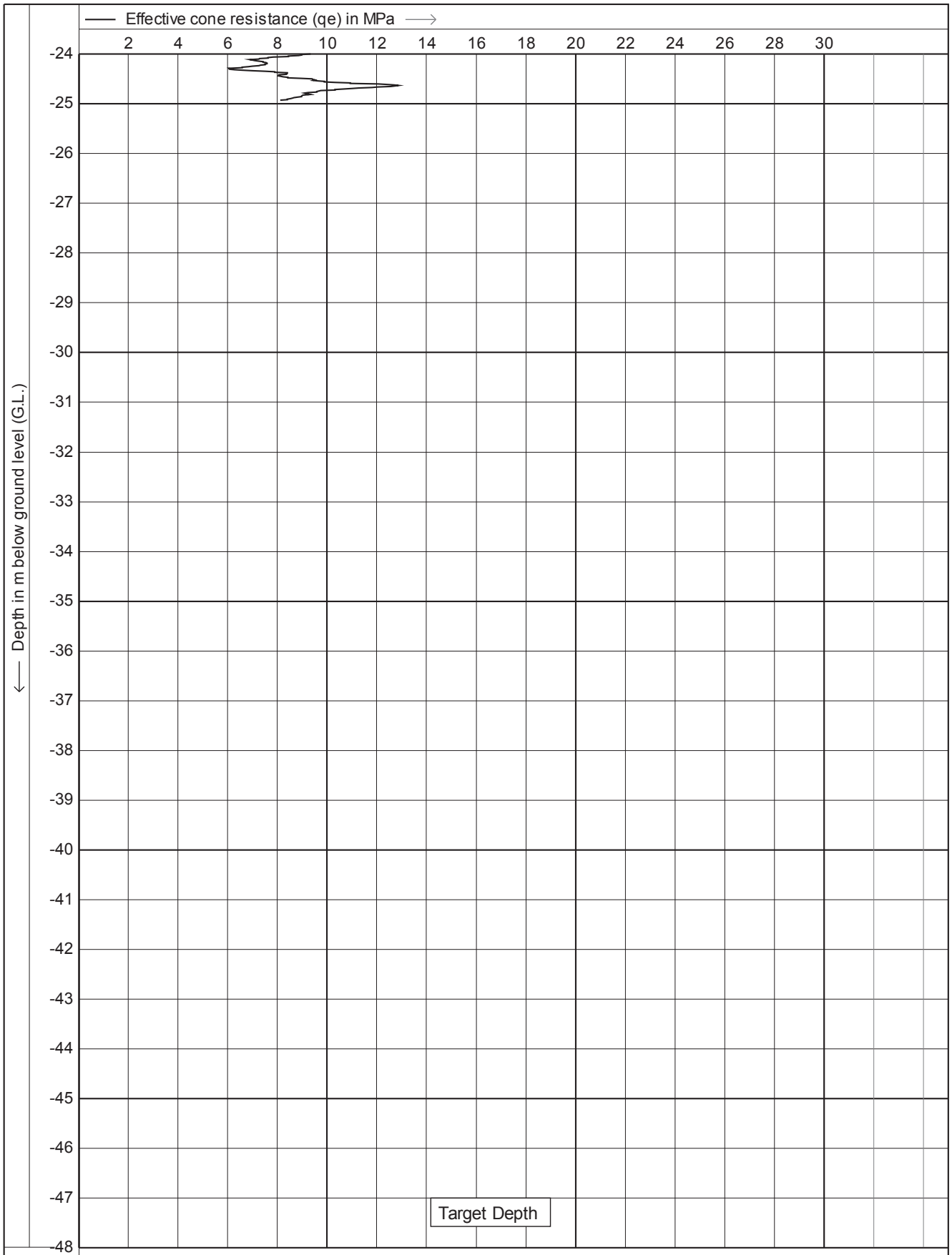
8/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
		Project no. : **02AECOM2**	
	Location: **Southern Links - Hamilton**	CPT no. : **110**	**9/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

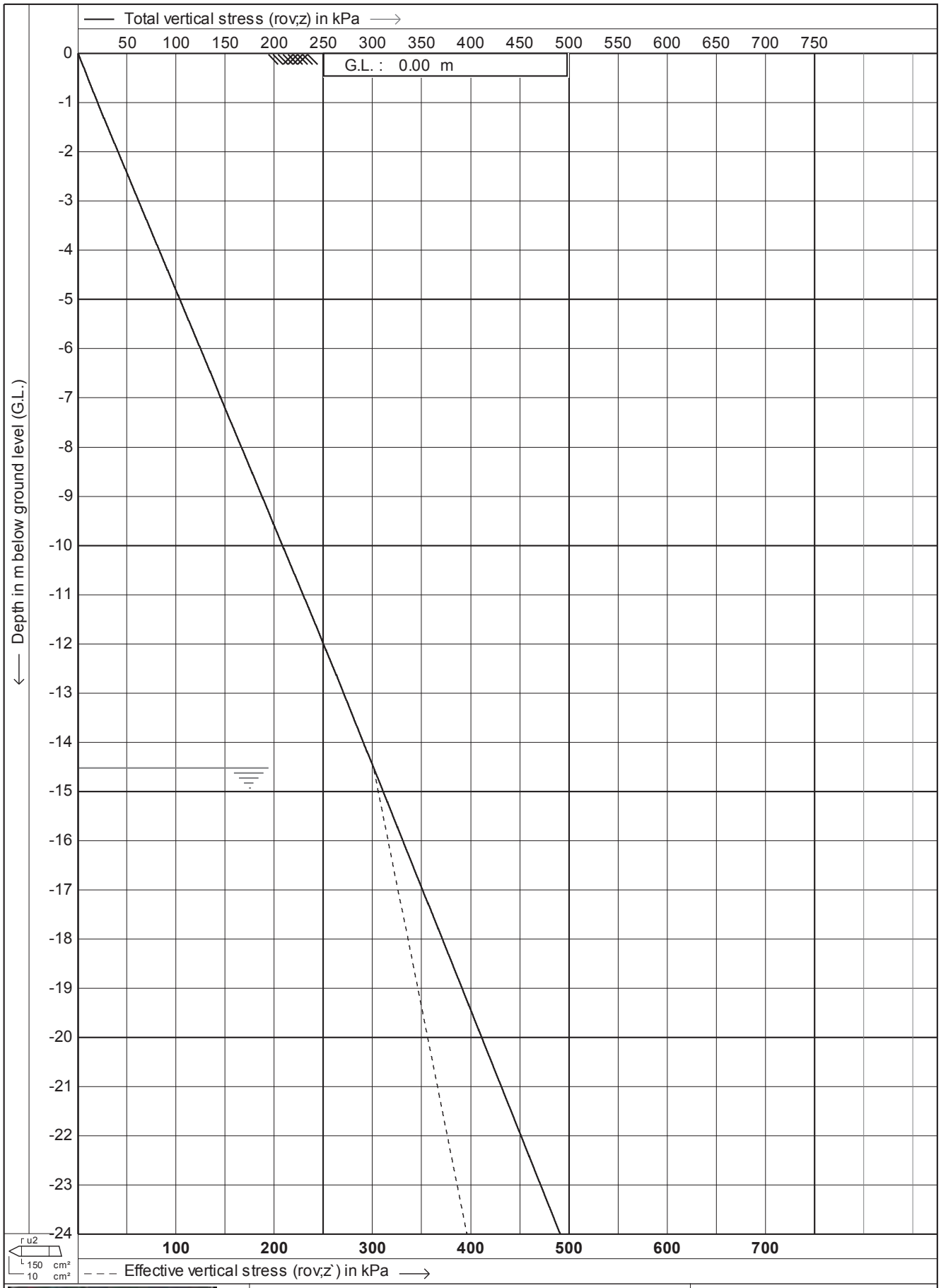
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

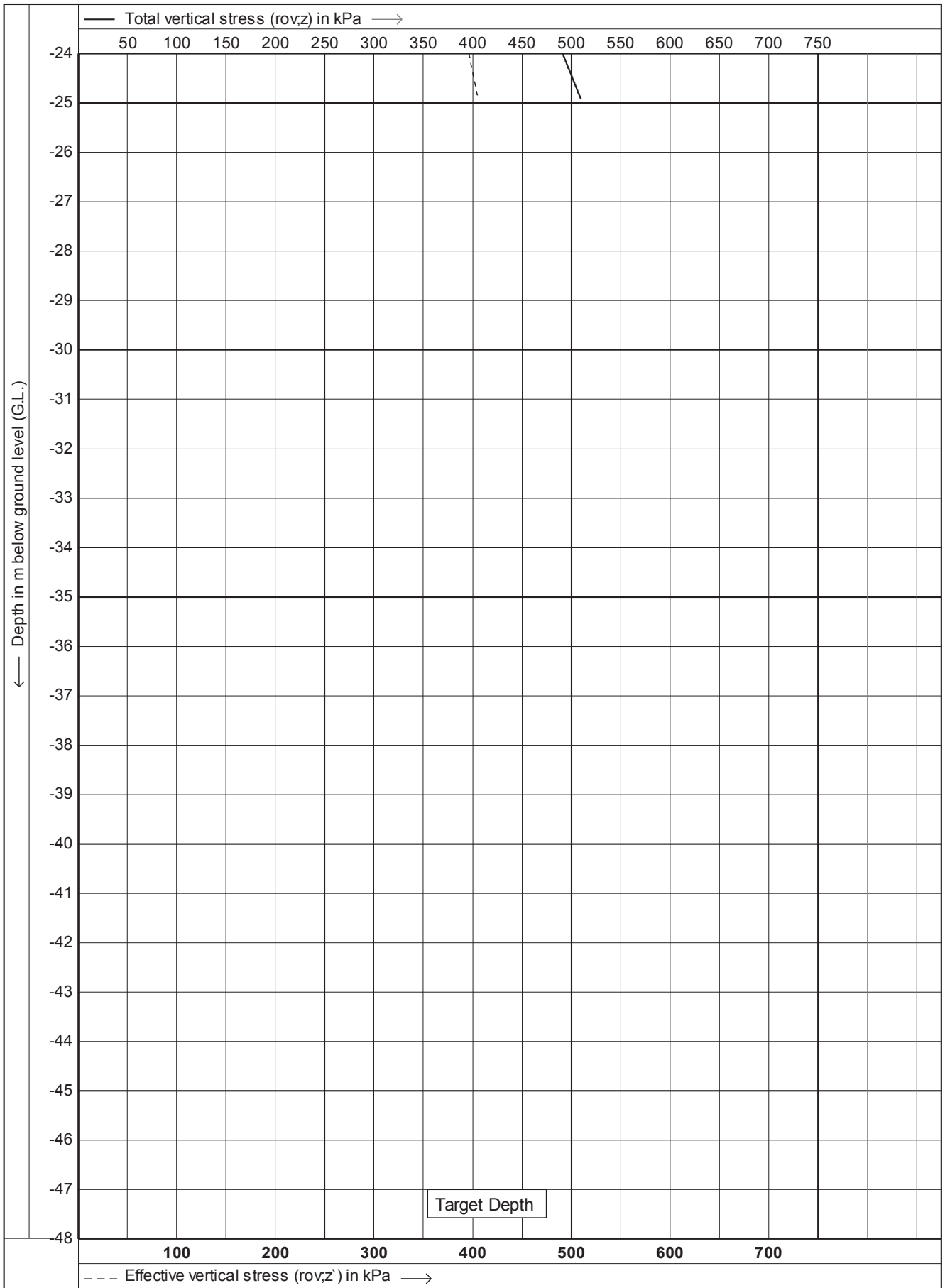
10/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
	Project : Site Investigations	Project no.	: 02AECOM2
	Location: Southern Links - Hamilton	CPT no.	: 110

CPTask V1.31



CPTask V1.31

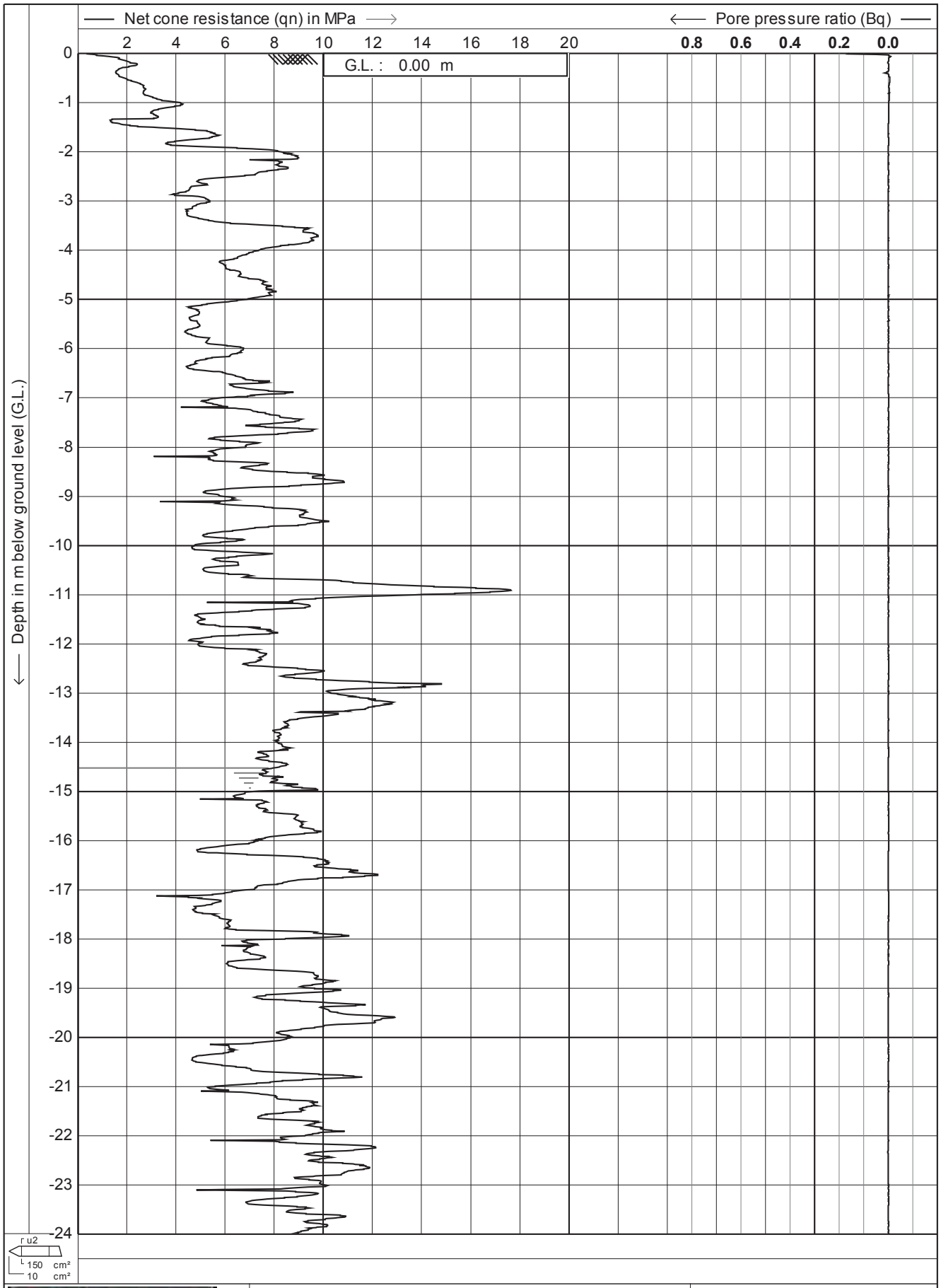
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

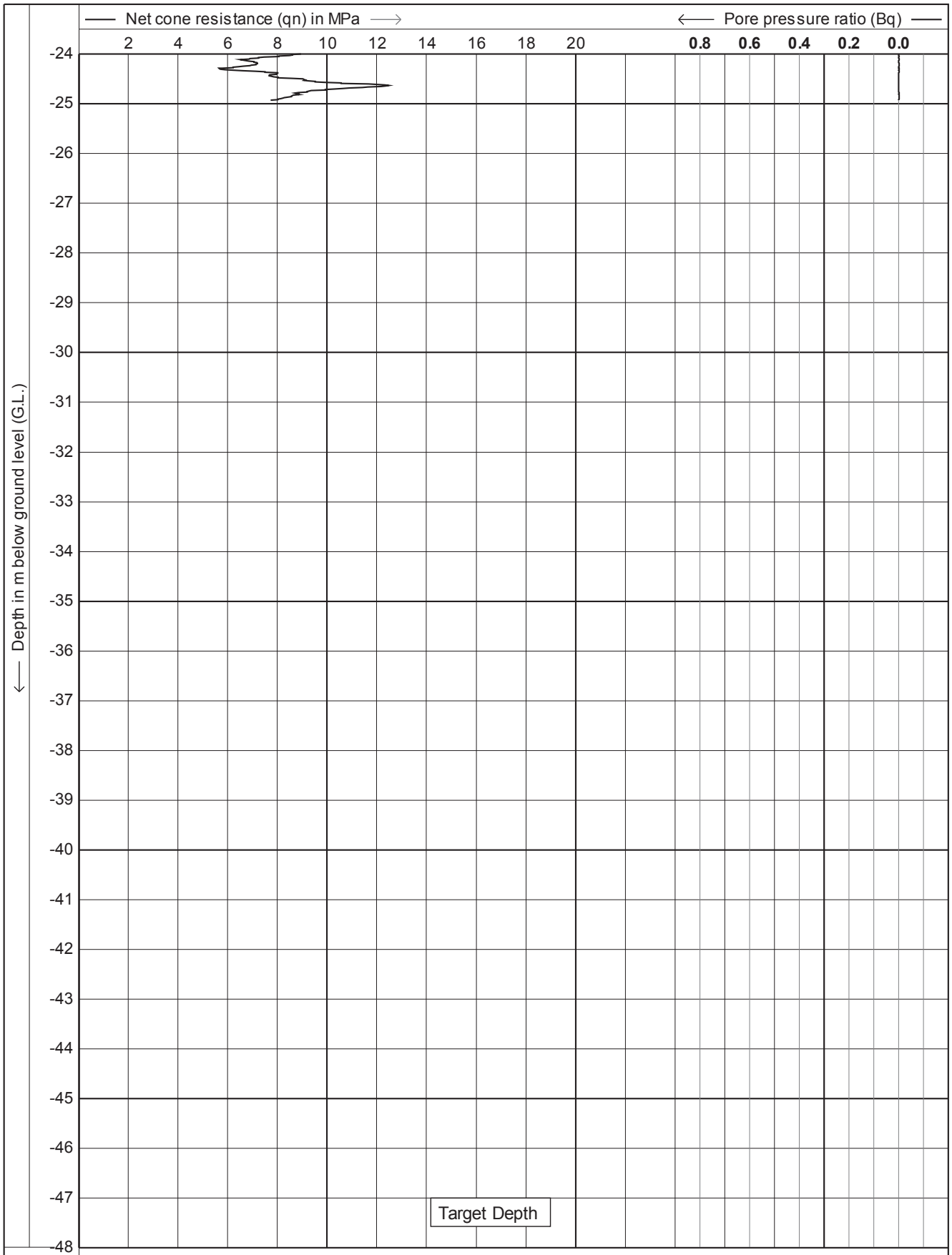
Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

12/28



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **110**	**13/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

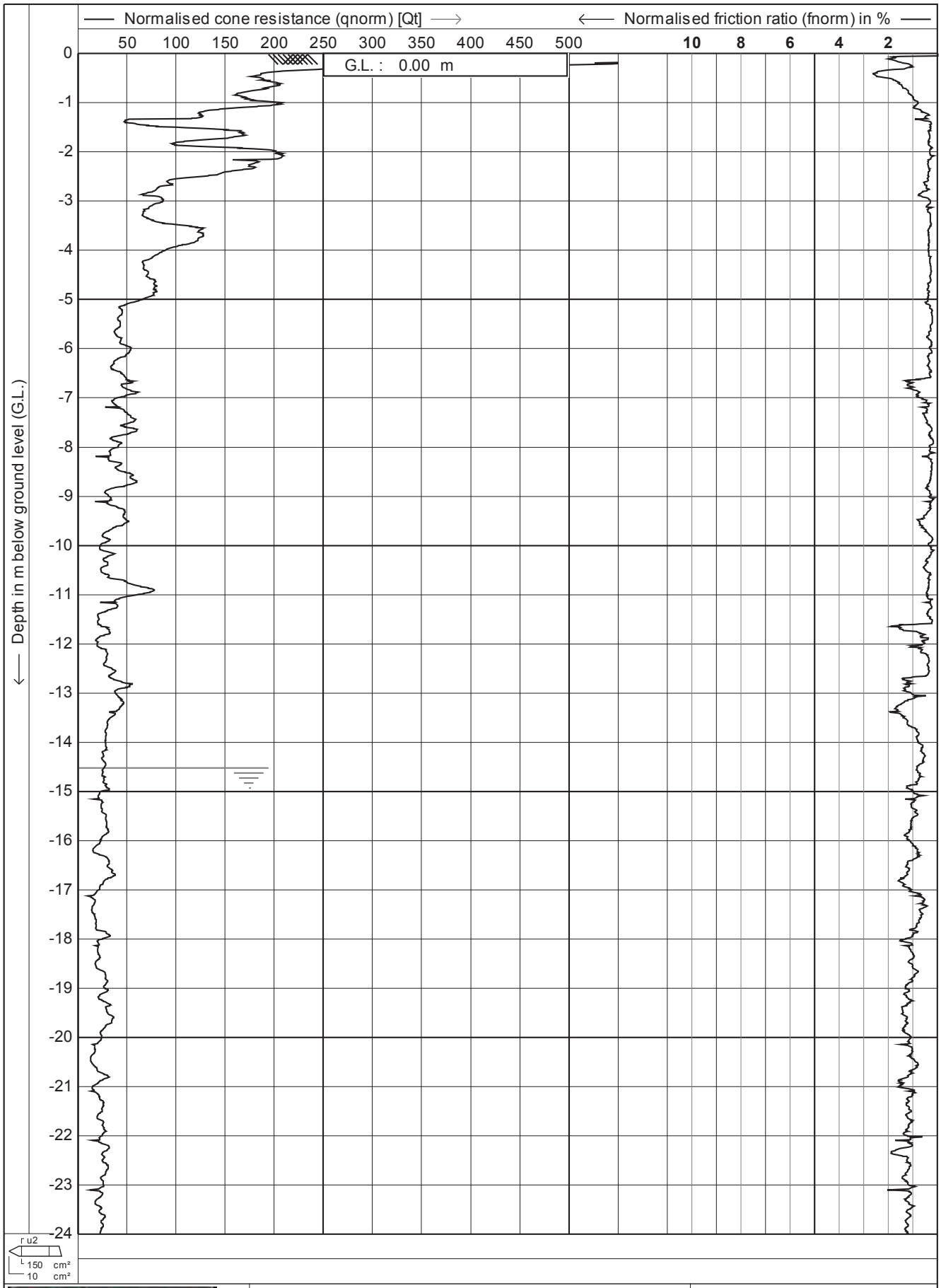
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

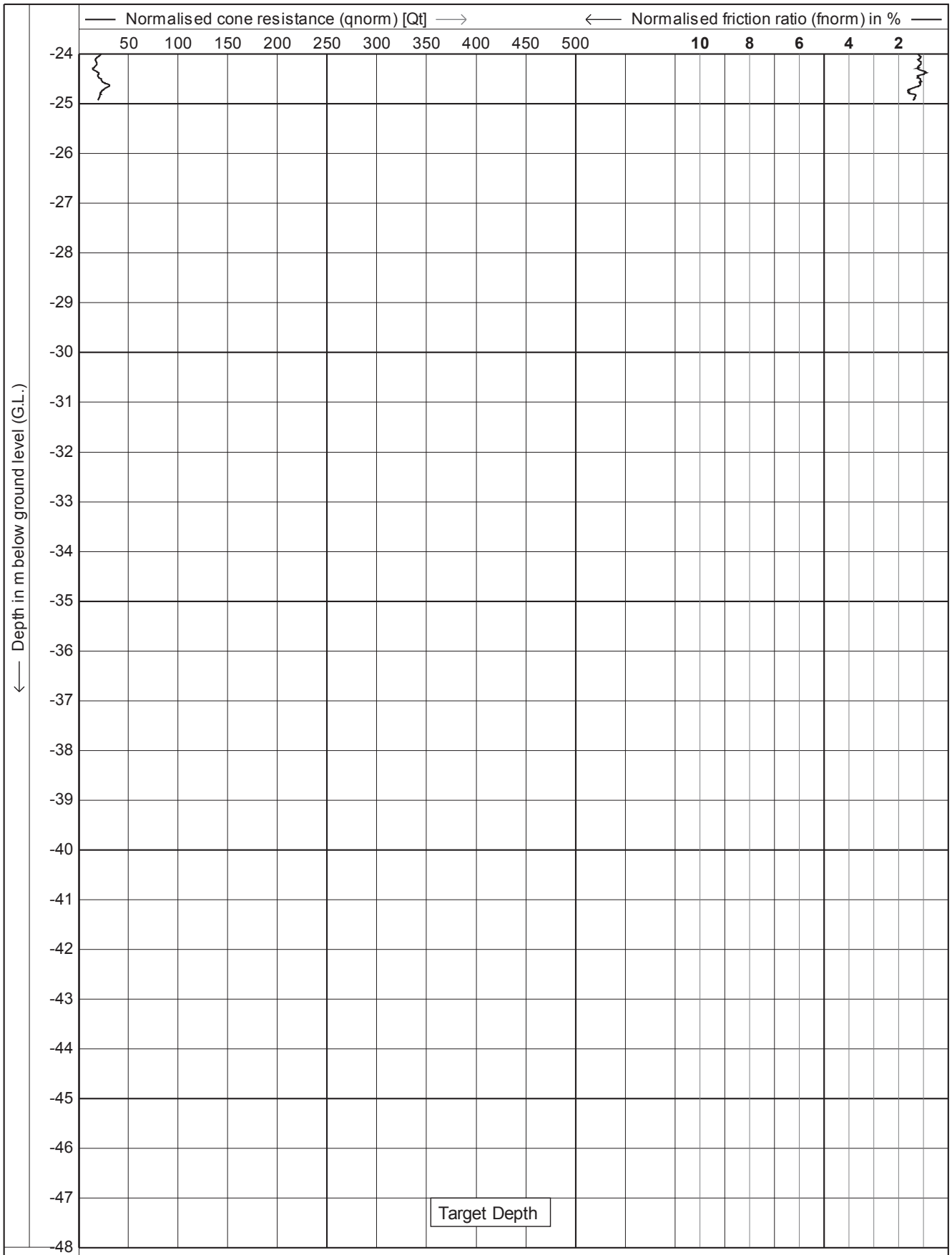
14/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **110**	**15/28**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

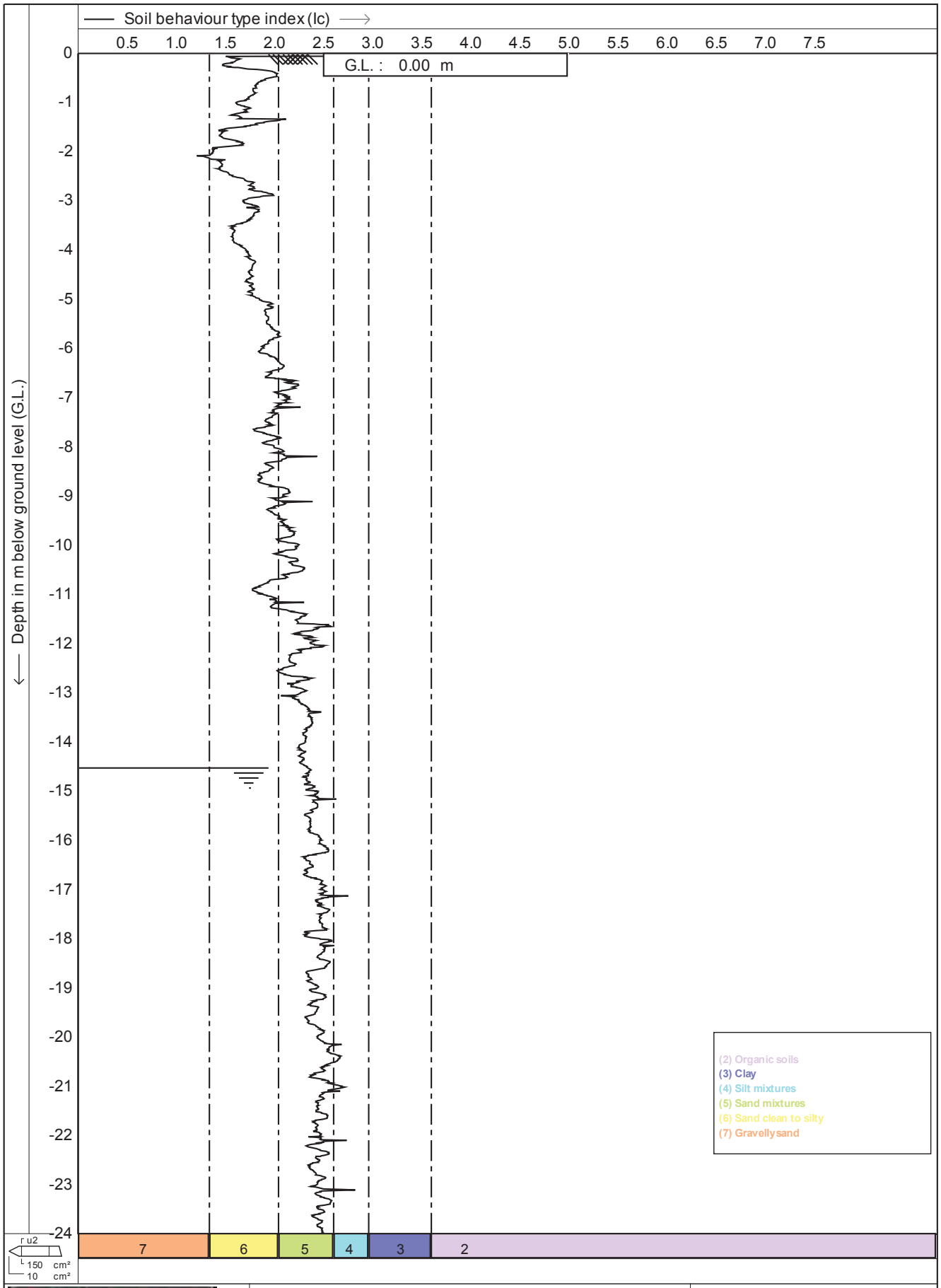
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

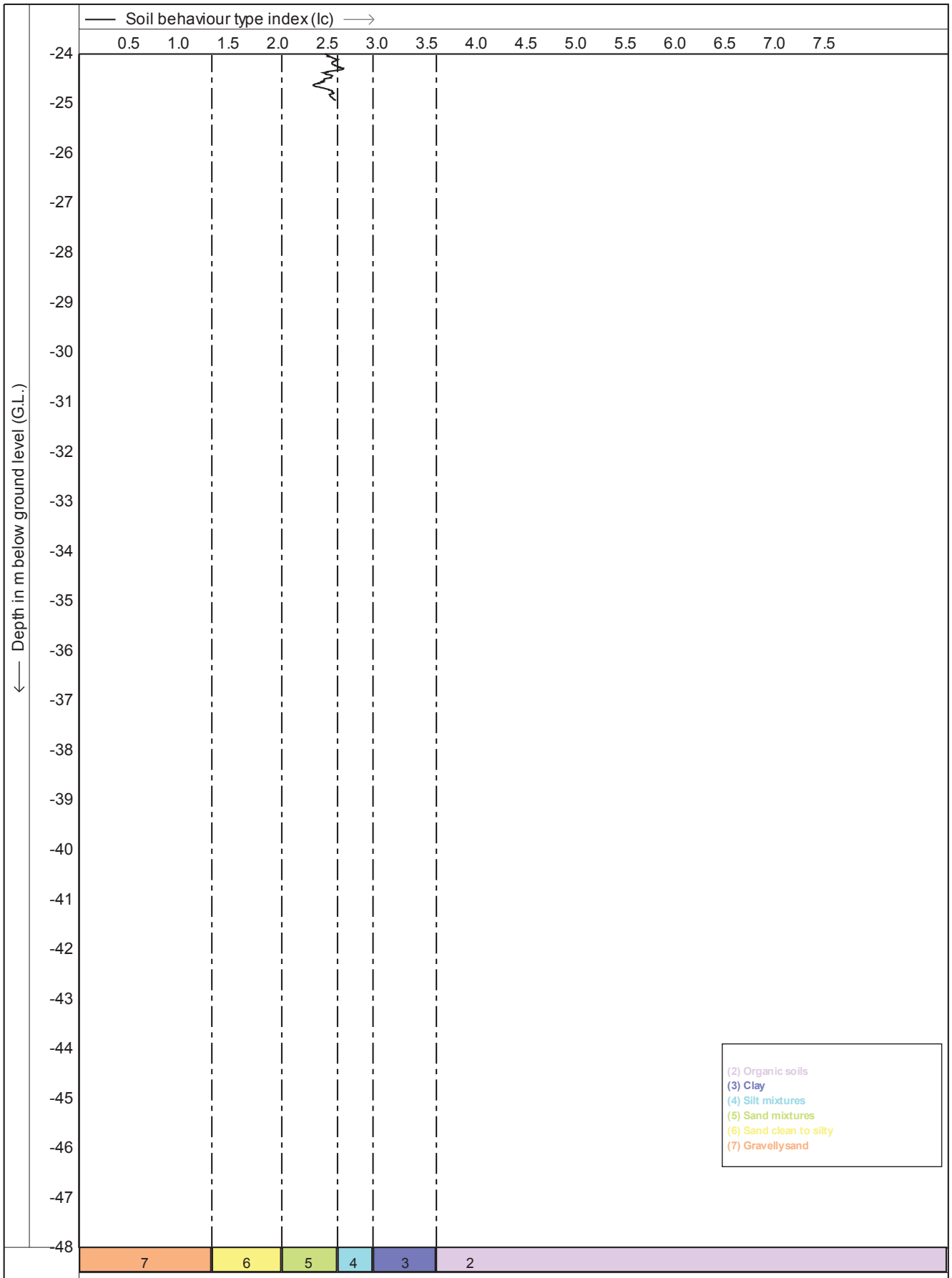
16/28

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**
		Project no. : **02AECOM2**
	Location: **Southern Links - Hamilton**	CPT no. : **110** 17/28

CPTask V1.31



CPTask V1.31

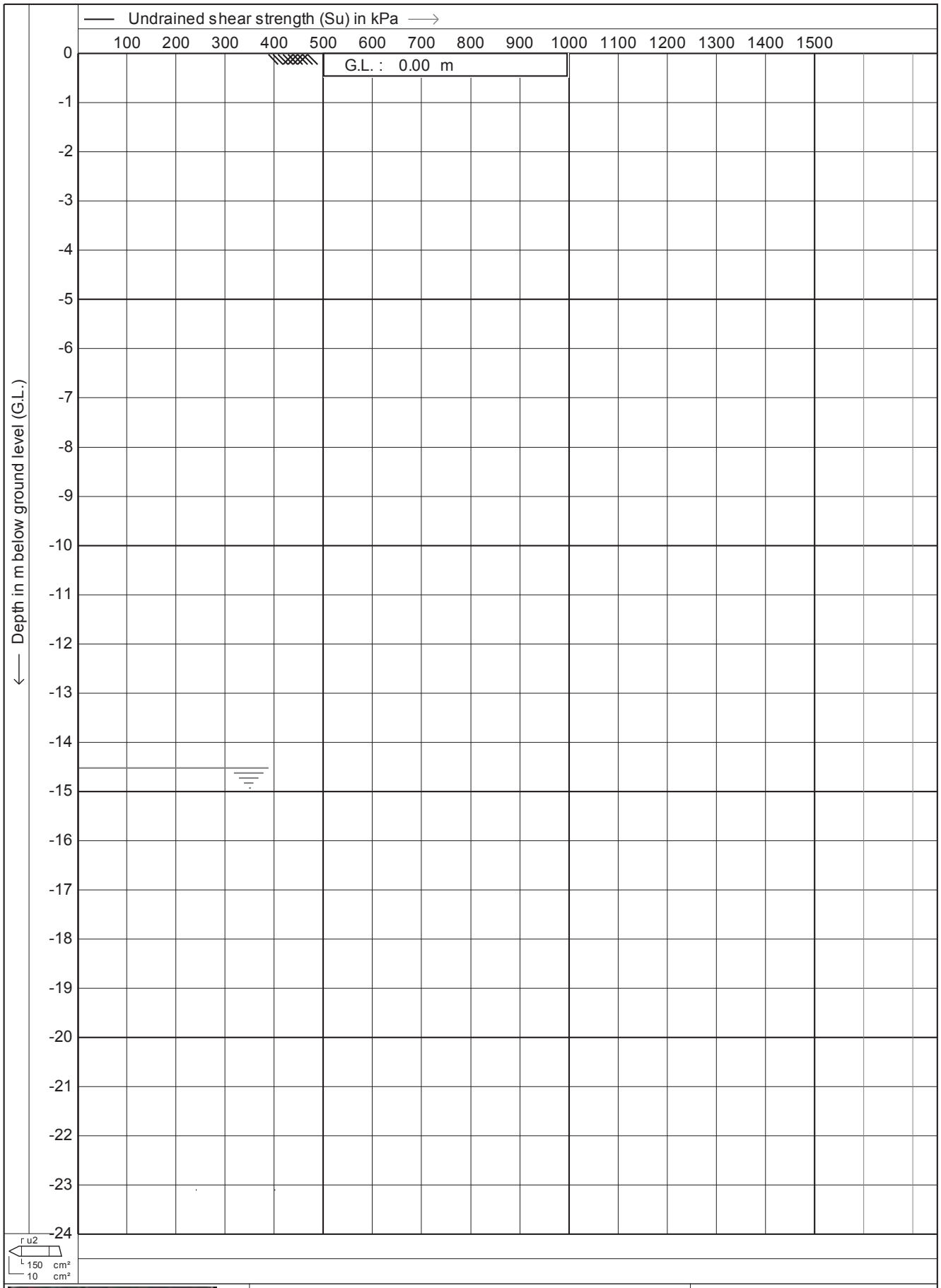
Test according A.S.T.M. Standard D 5778-07

Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

18/28



Test according A.S.T.M. Standard D 5778-07

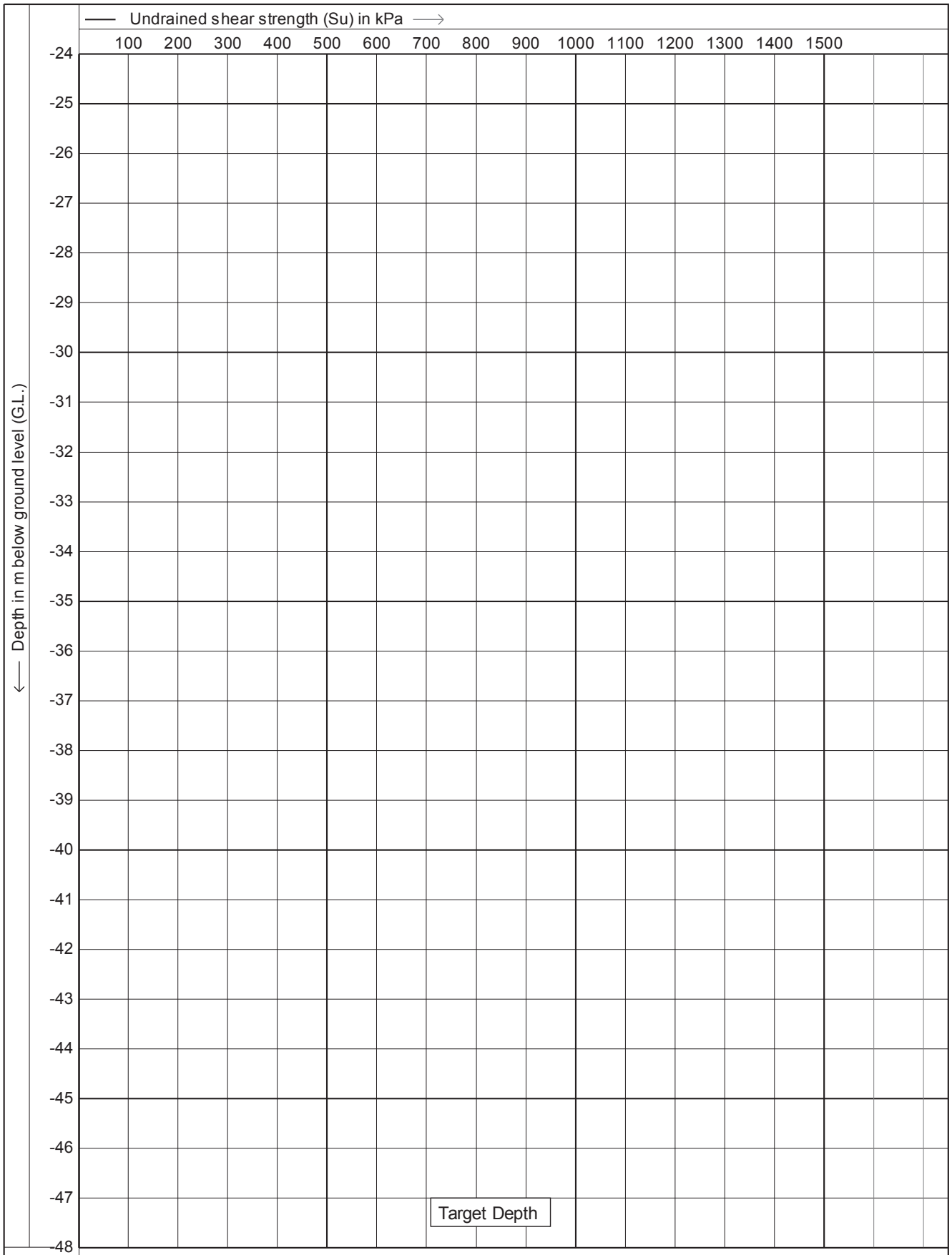
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

19/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

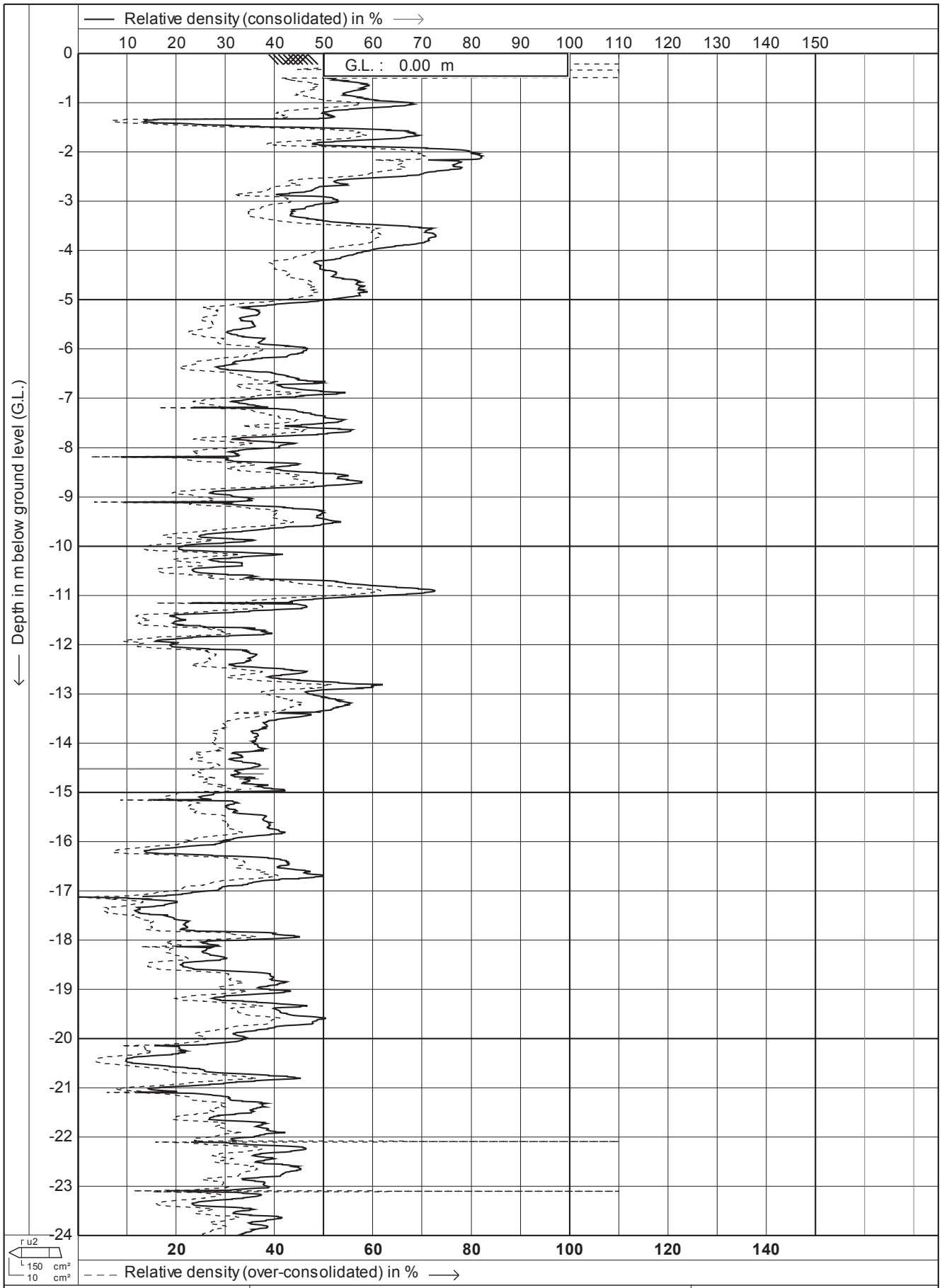
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

20/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

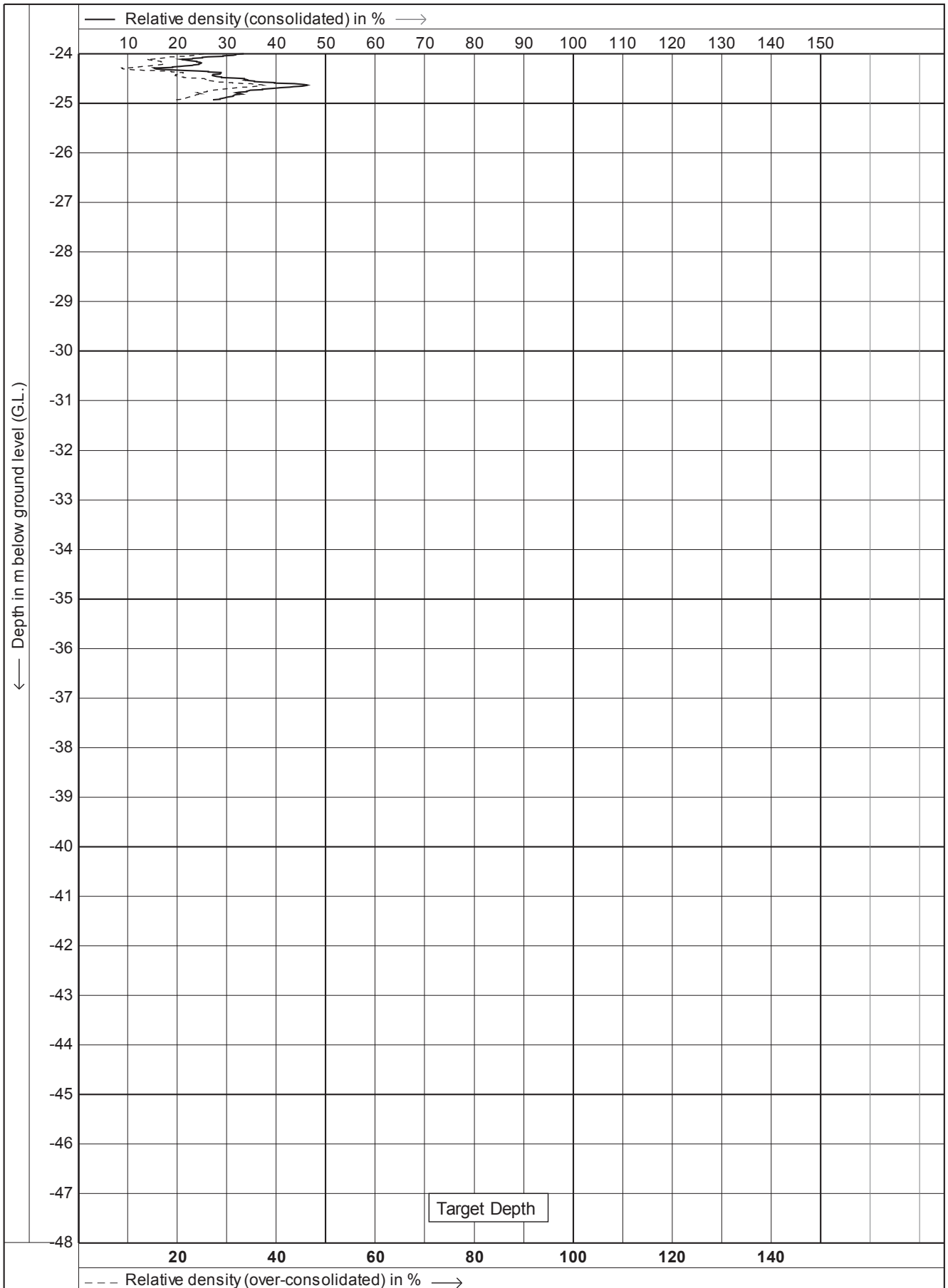
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

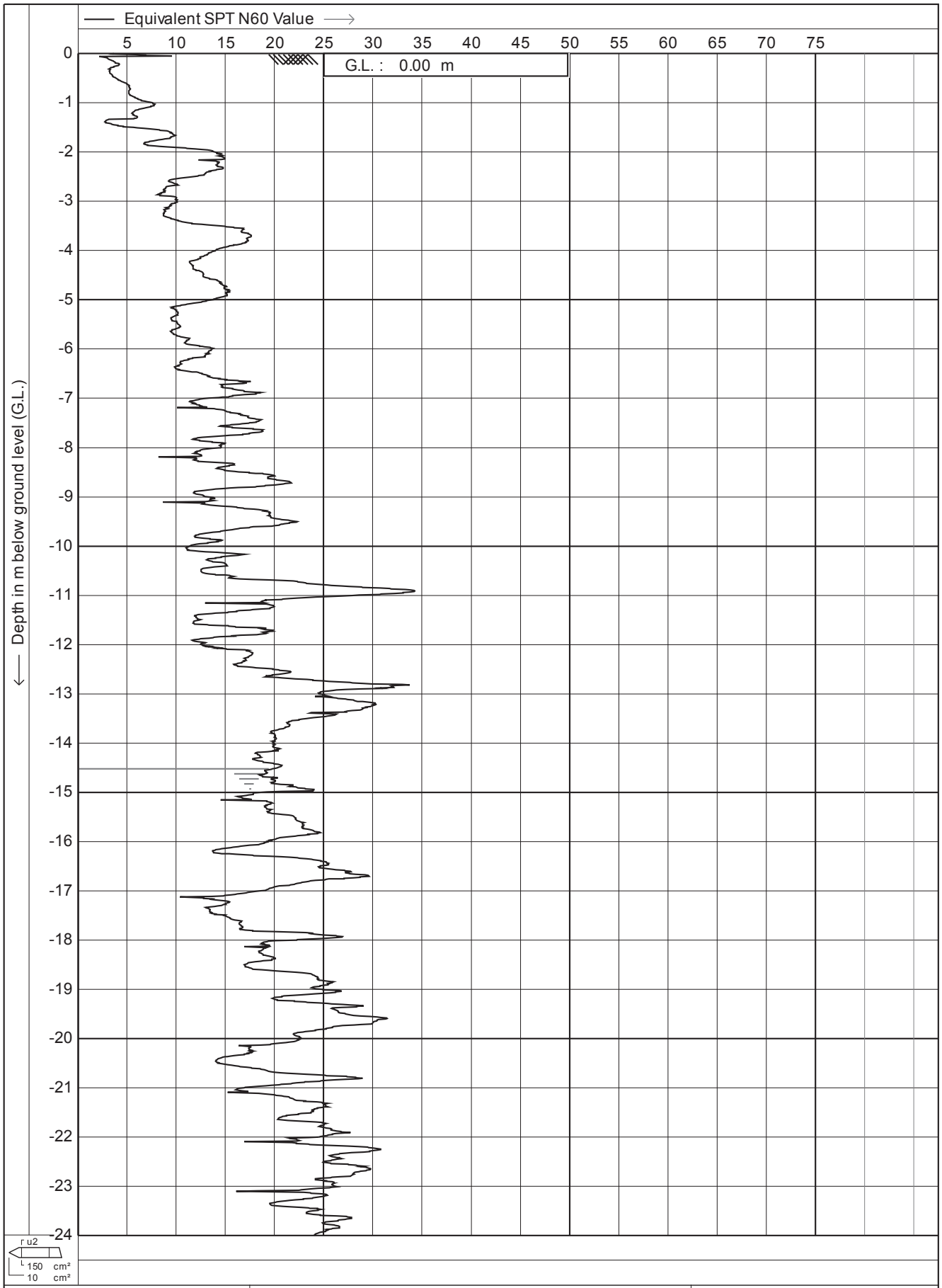
21/28

CPTask V1.31



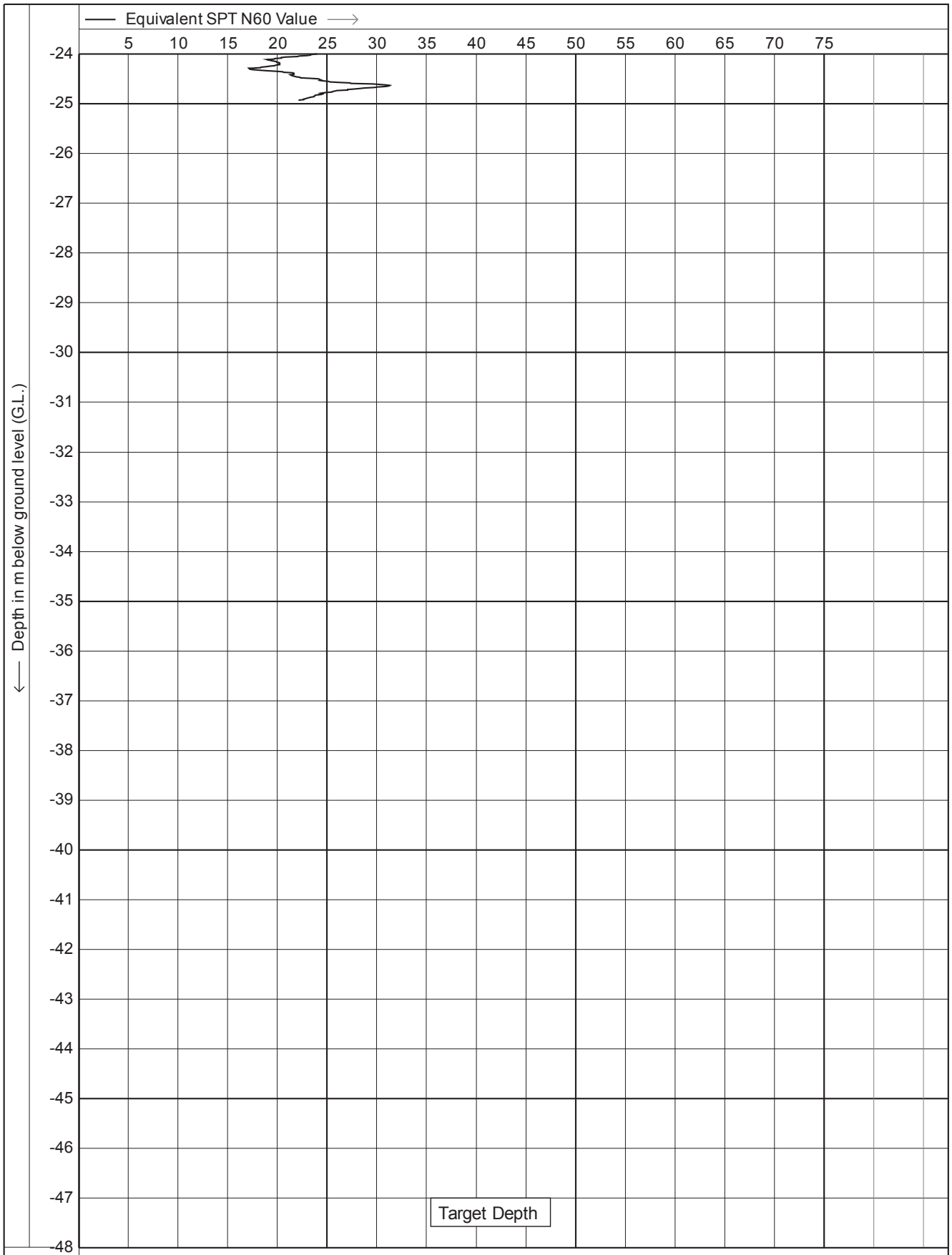
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 110

CPTask V1.31



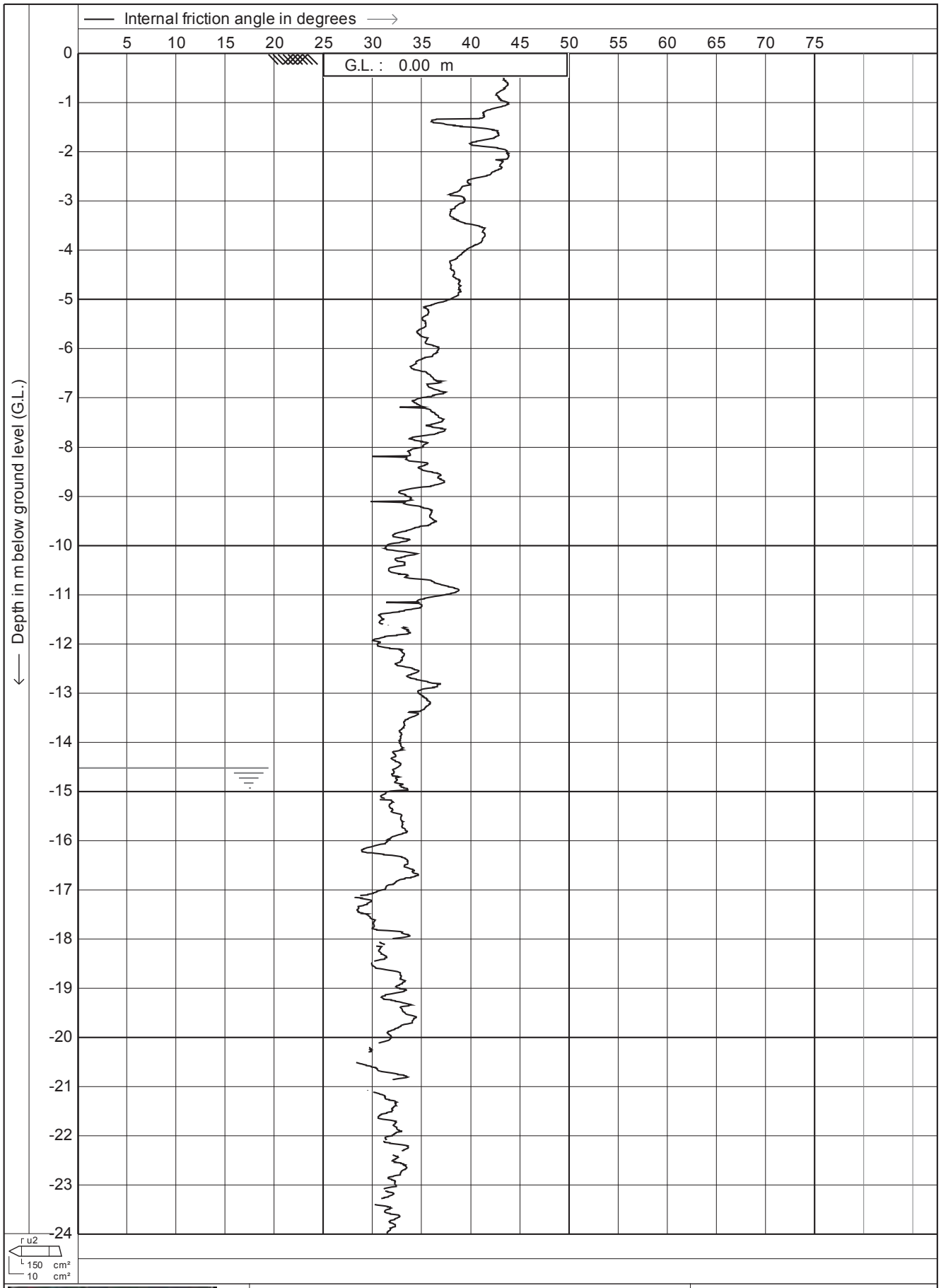
Test according A.S.T.M. Standard D 5778-07	Date : **16-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **110**	**23/28**

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 16-1-2012
		Cone no.	: C10CFIIP.F57
	Project : Site Investigations	Project no.	: 02AECOM2
	Location: Southern Links - Hamilton	CPT no.	: 110 24/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

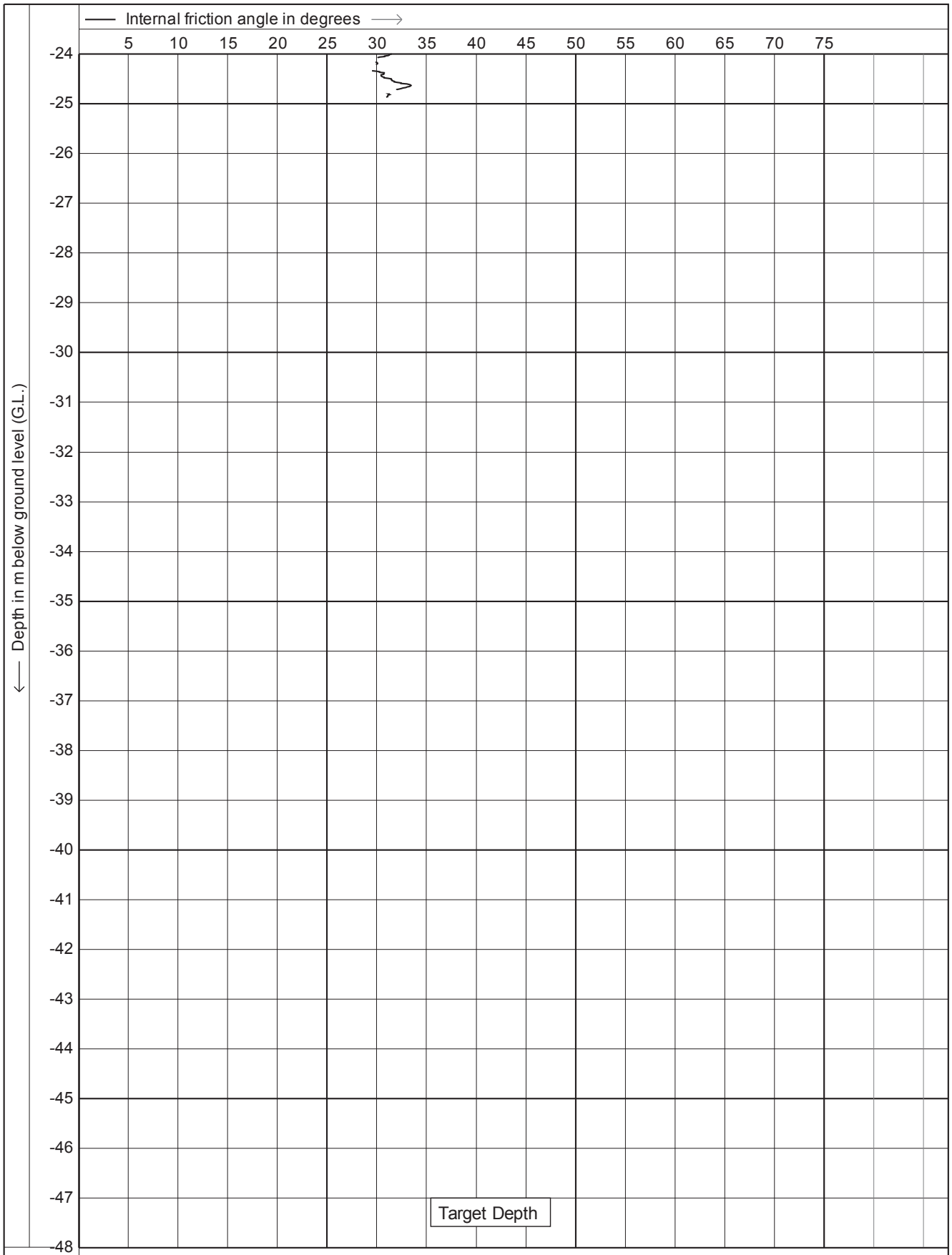
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

27/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

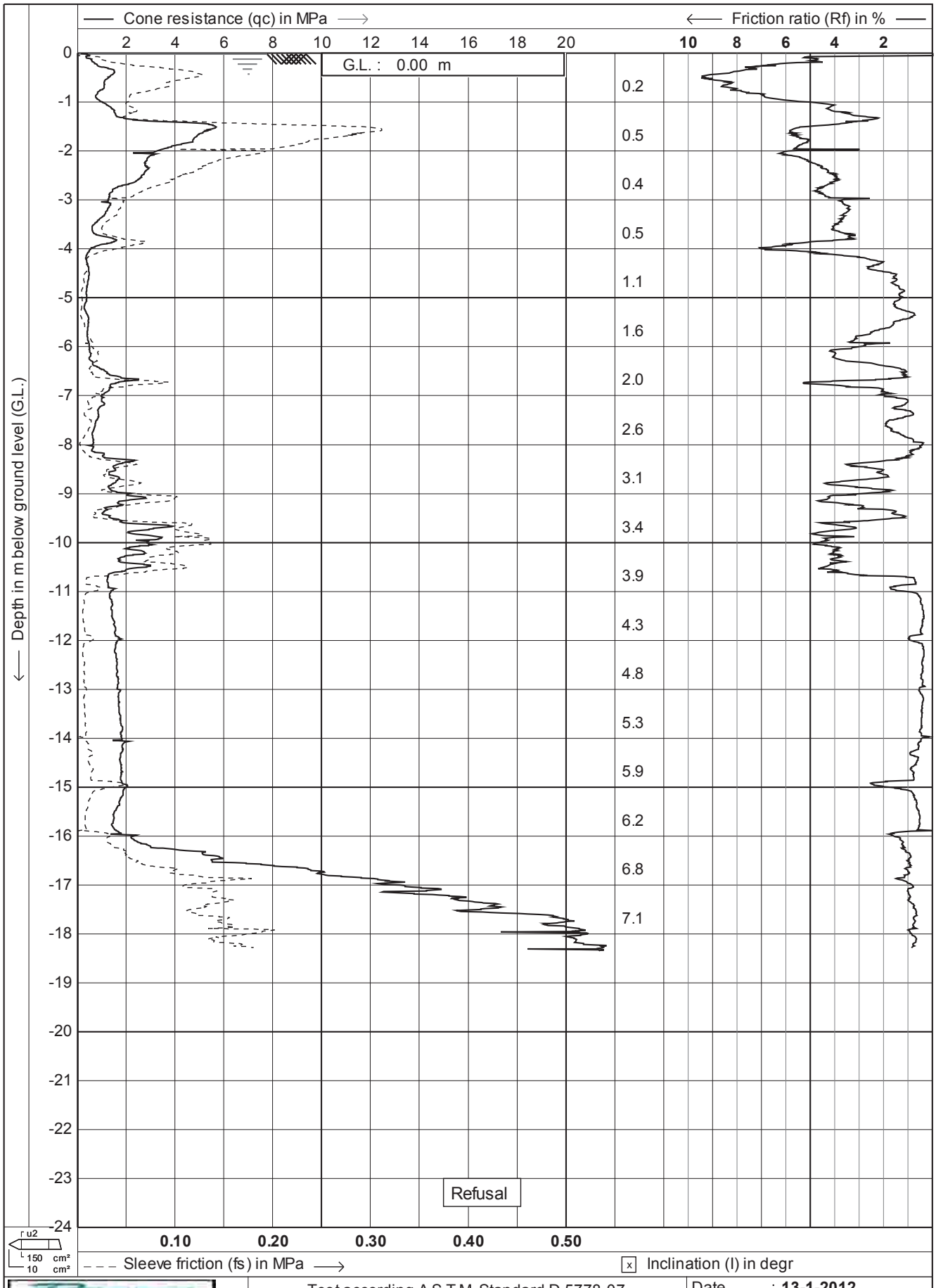
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **16-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **110**

28/28

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

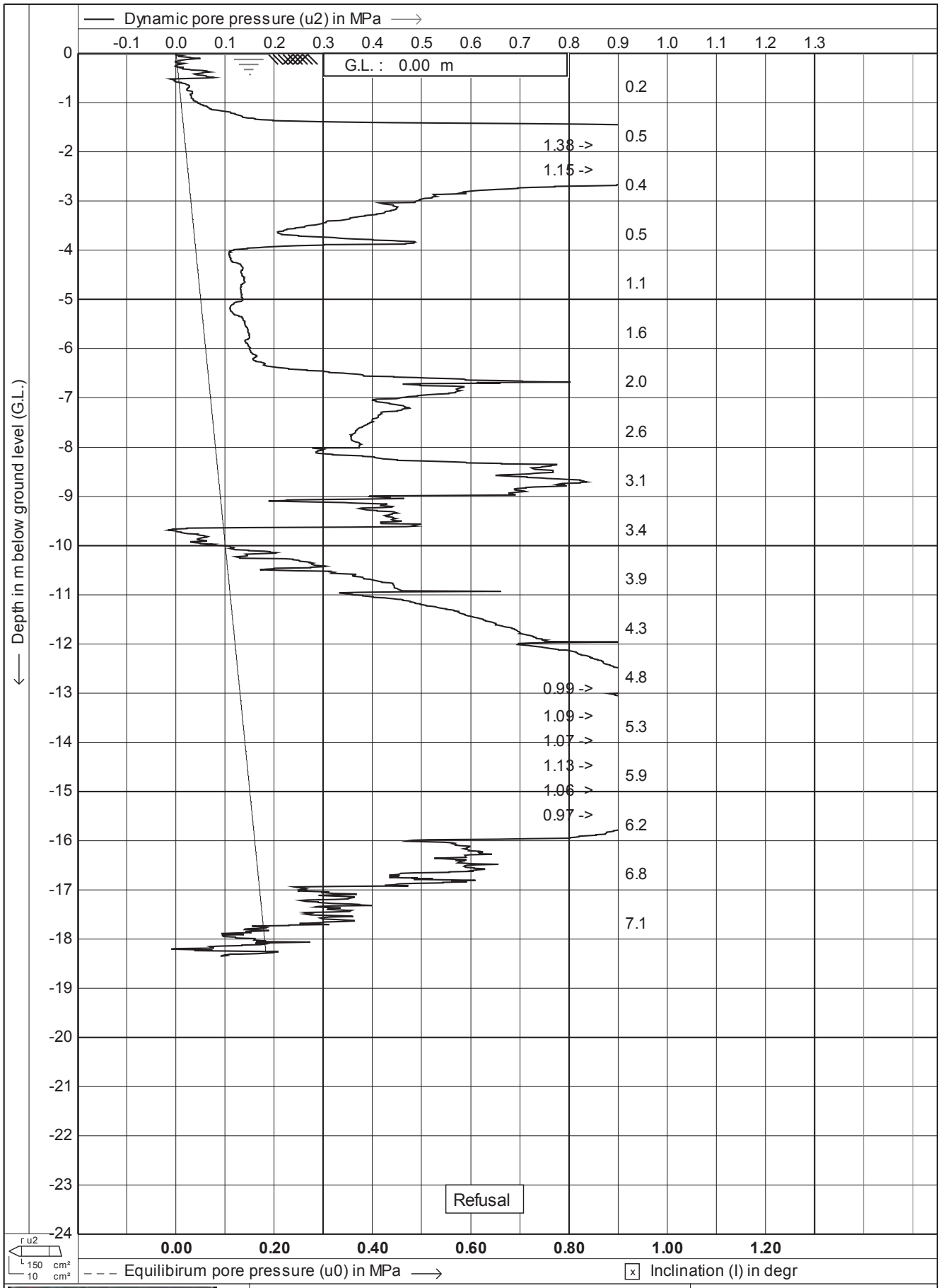
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **118**

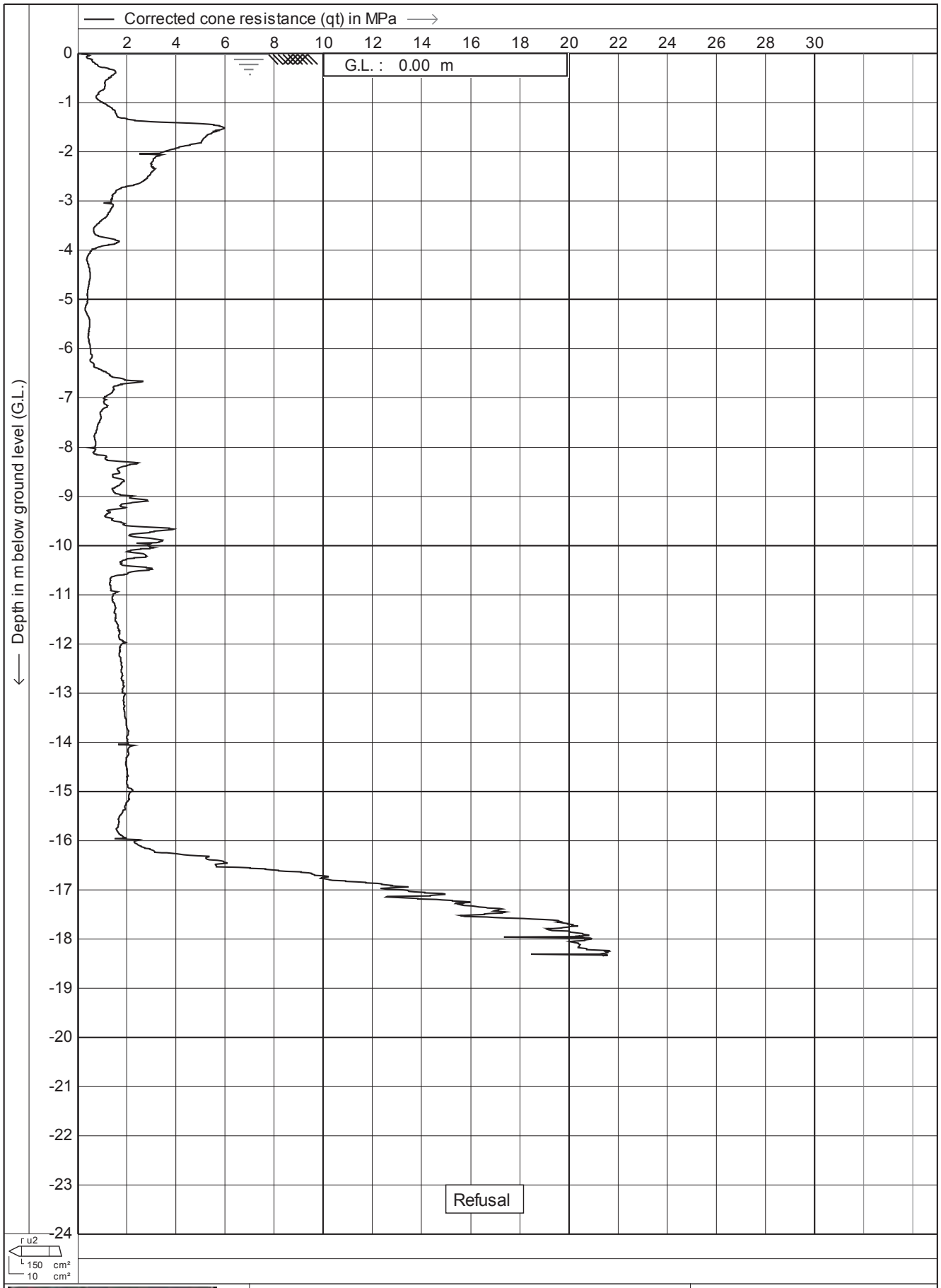
1/14

CPTask V1.31



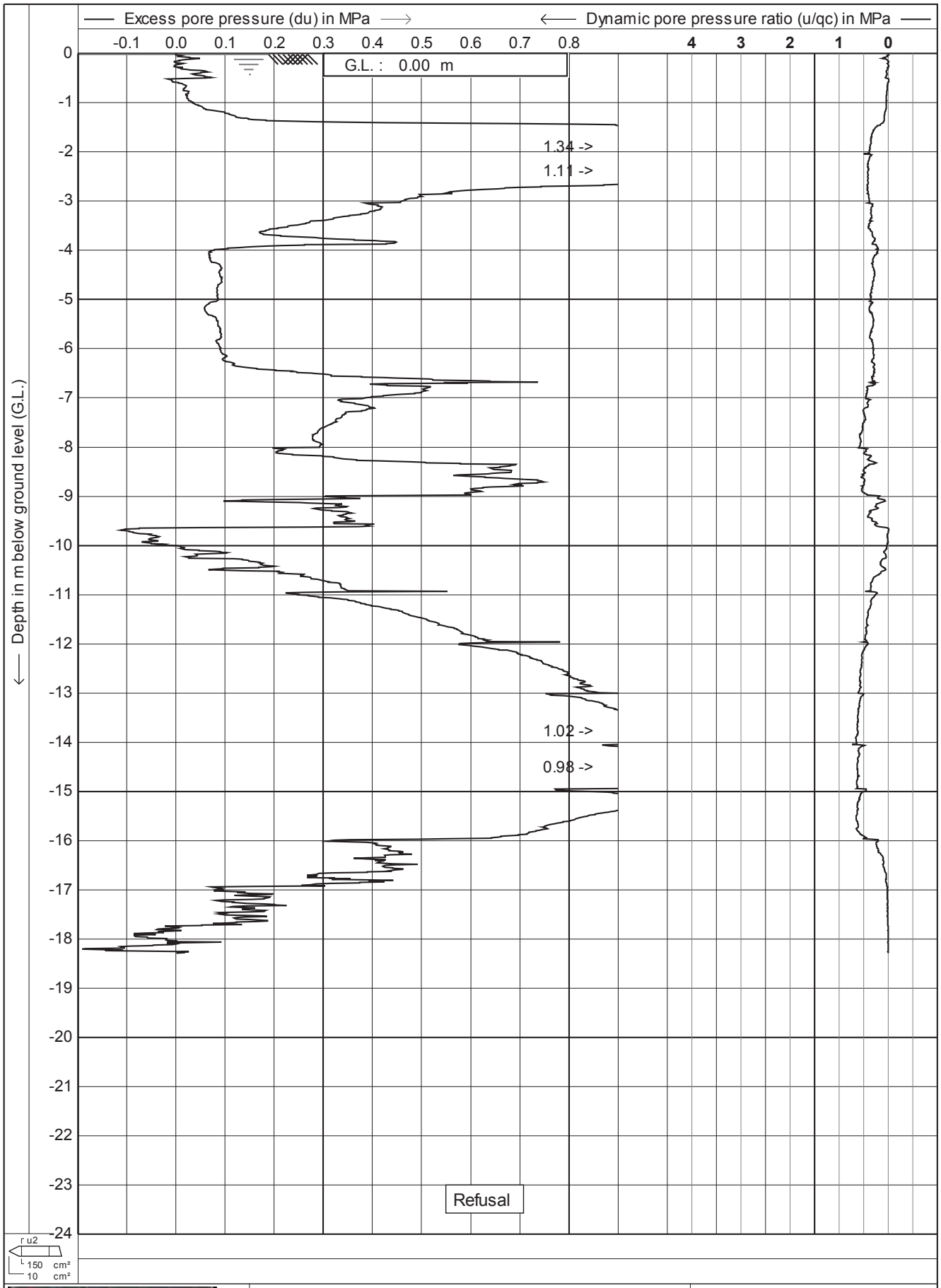
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**2/14**

CPTask V1.31



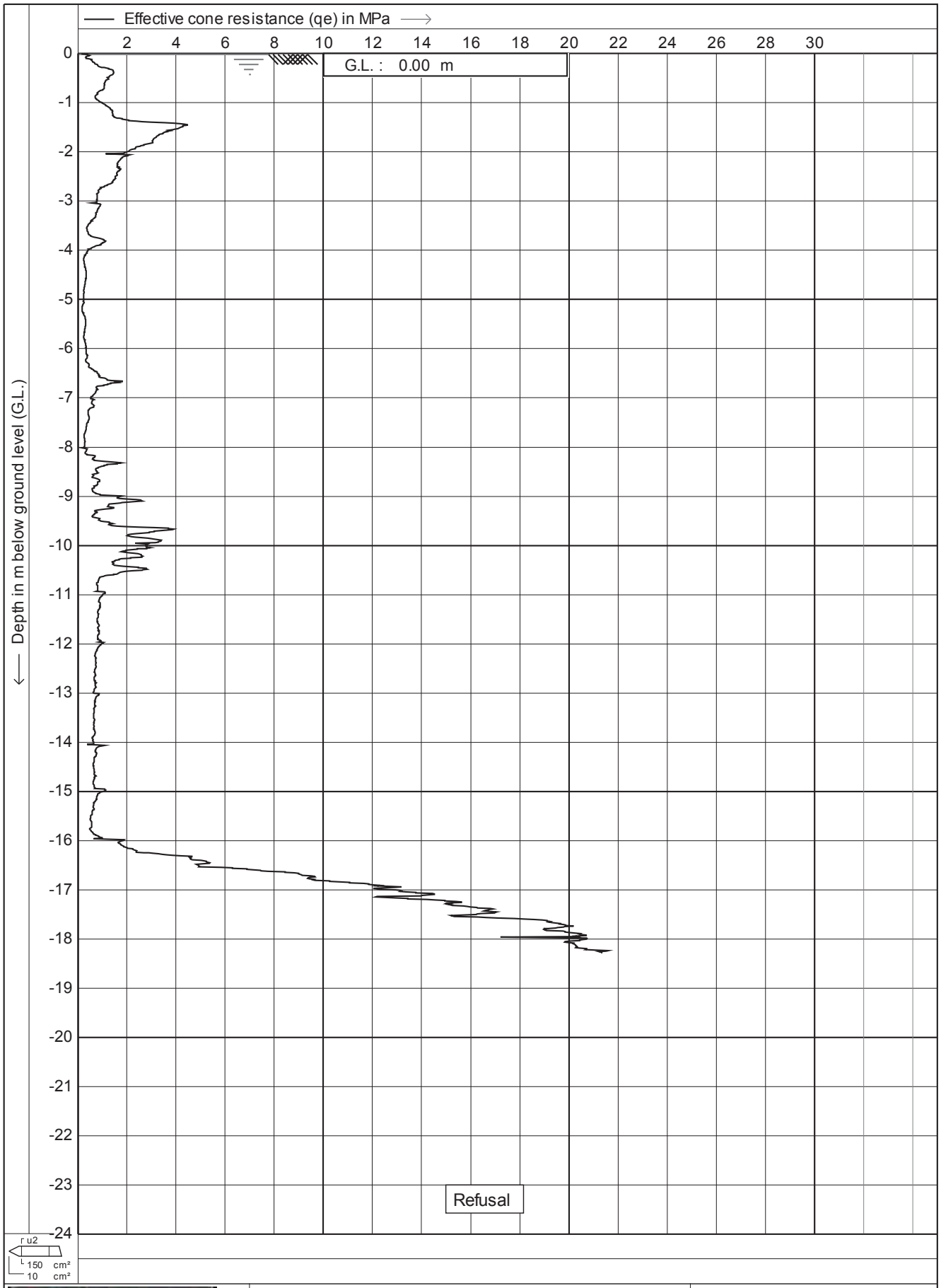
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**3/14**

CPTask V1.31



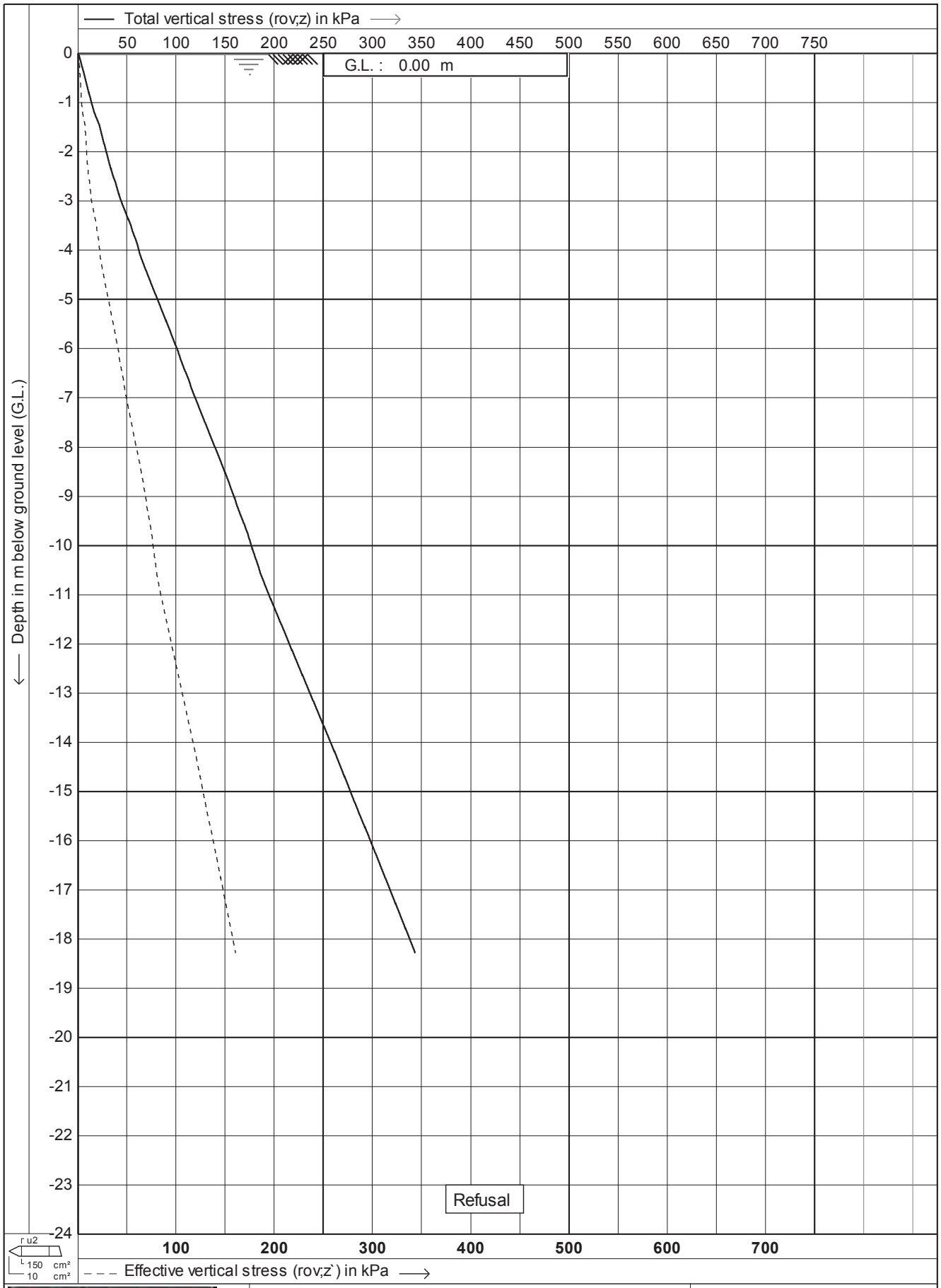
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**4/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**5/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

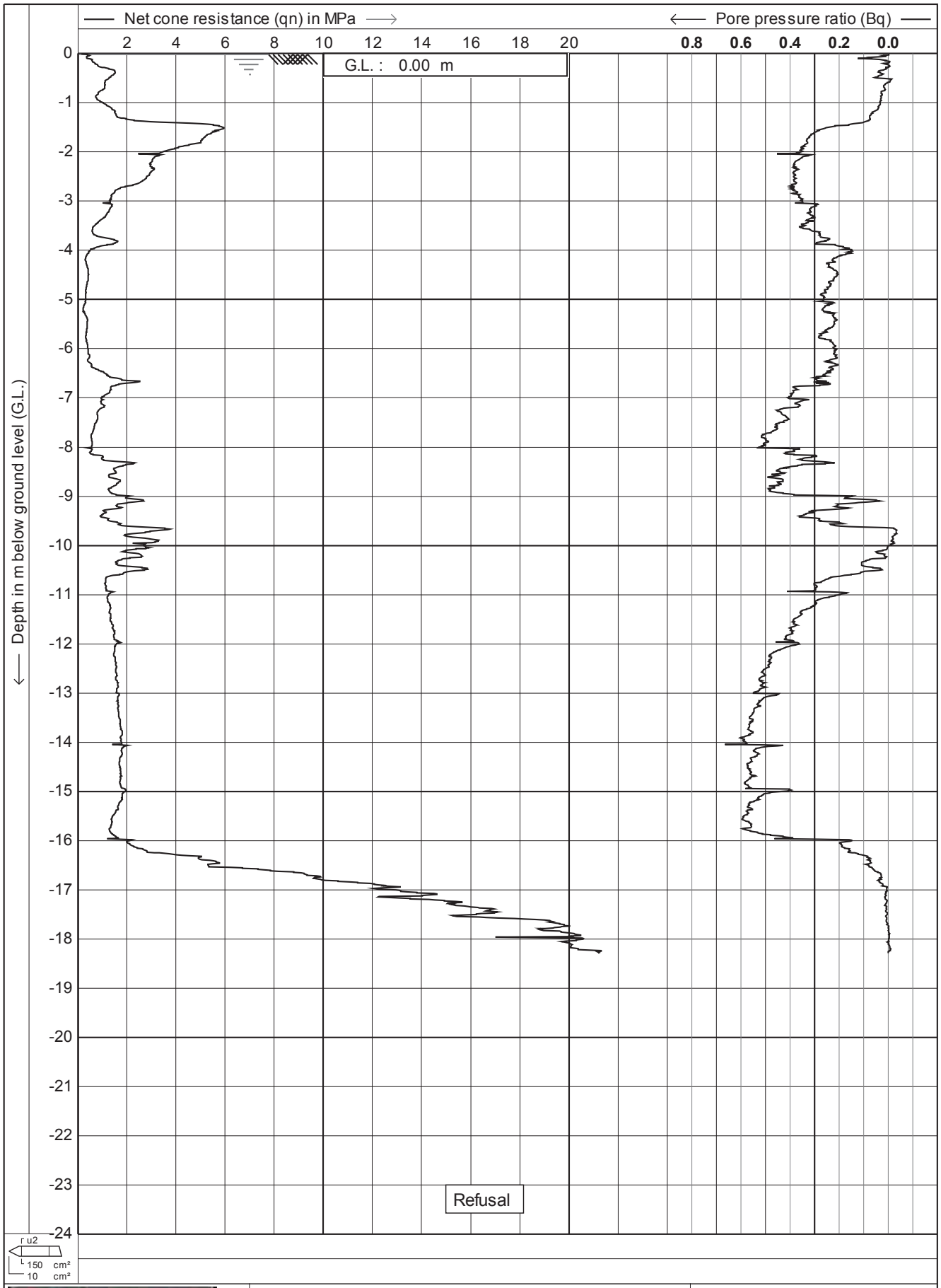
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **118**

6/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

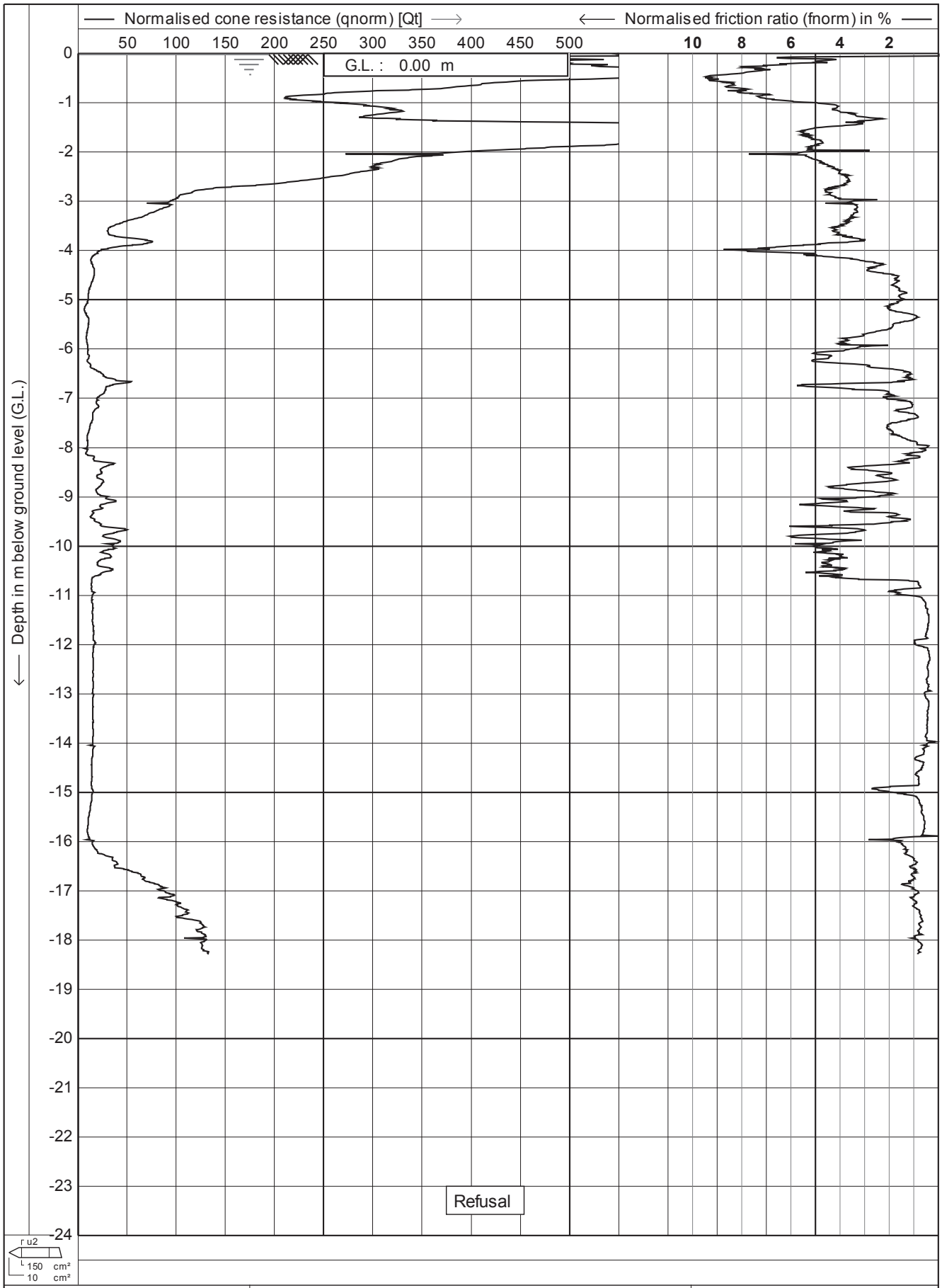
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **118**

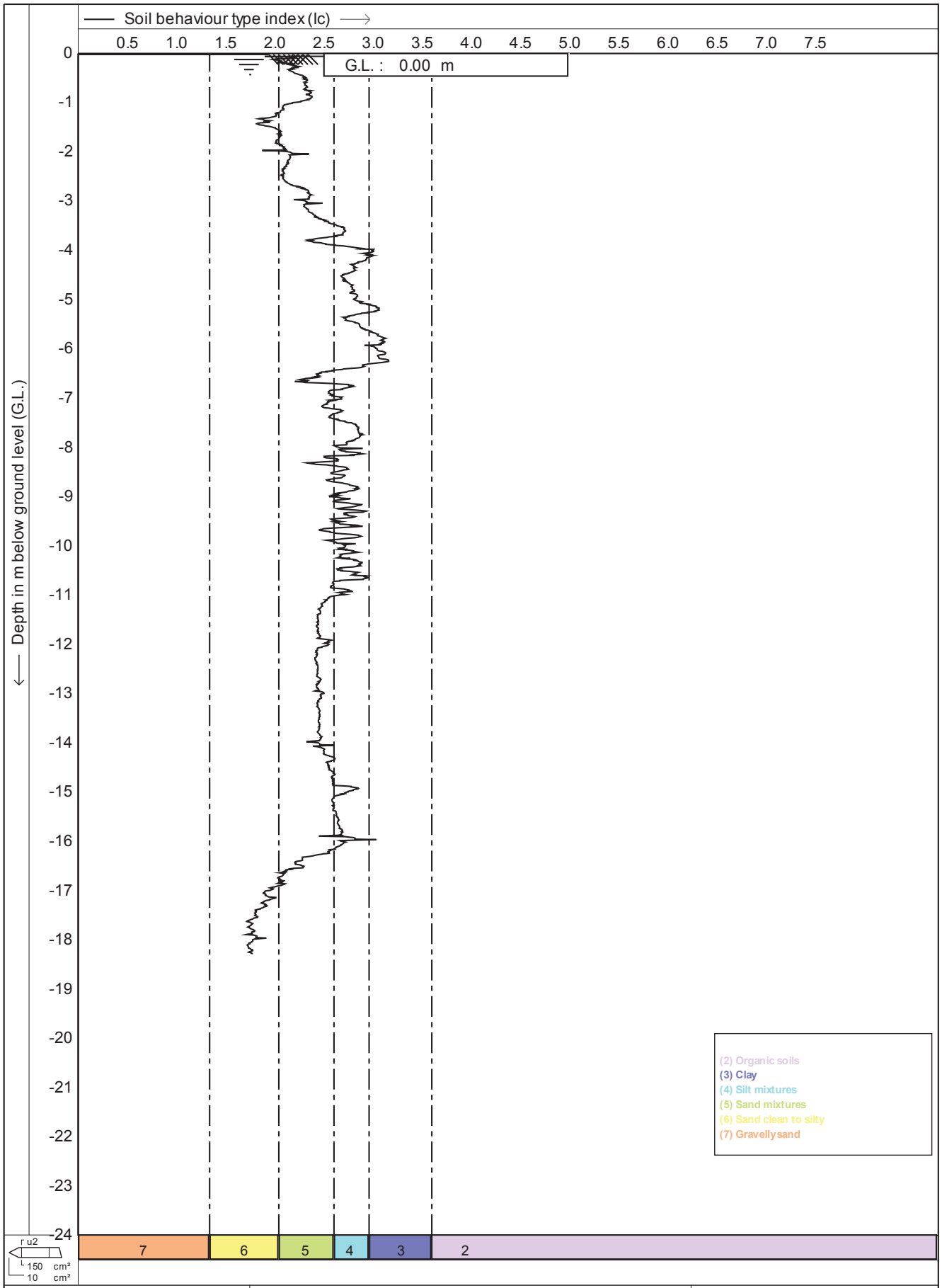
7/14

CPTask V1.31



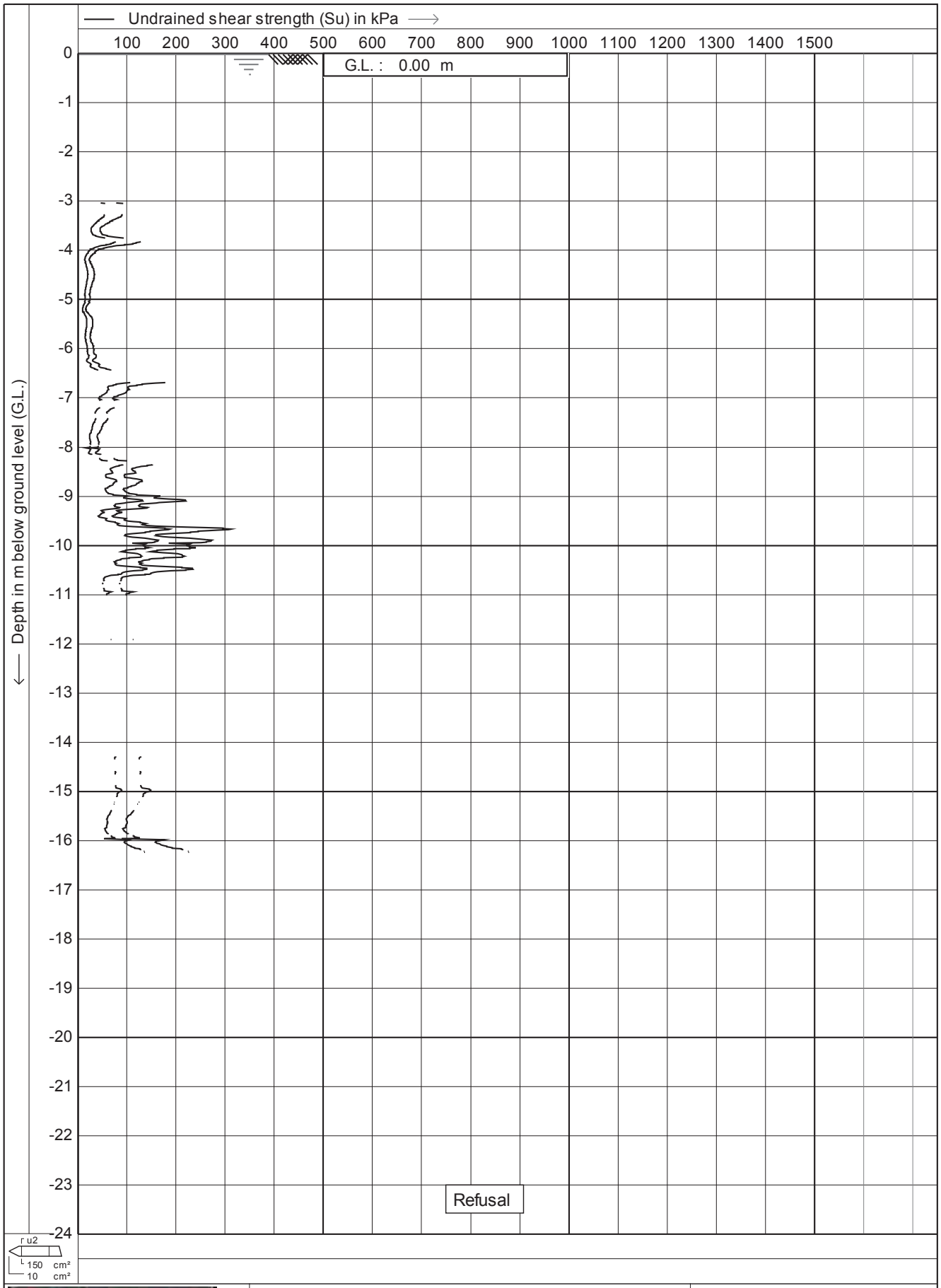
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**8/14**

CPTask V1.31



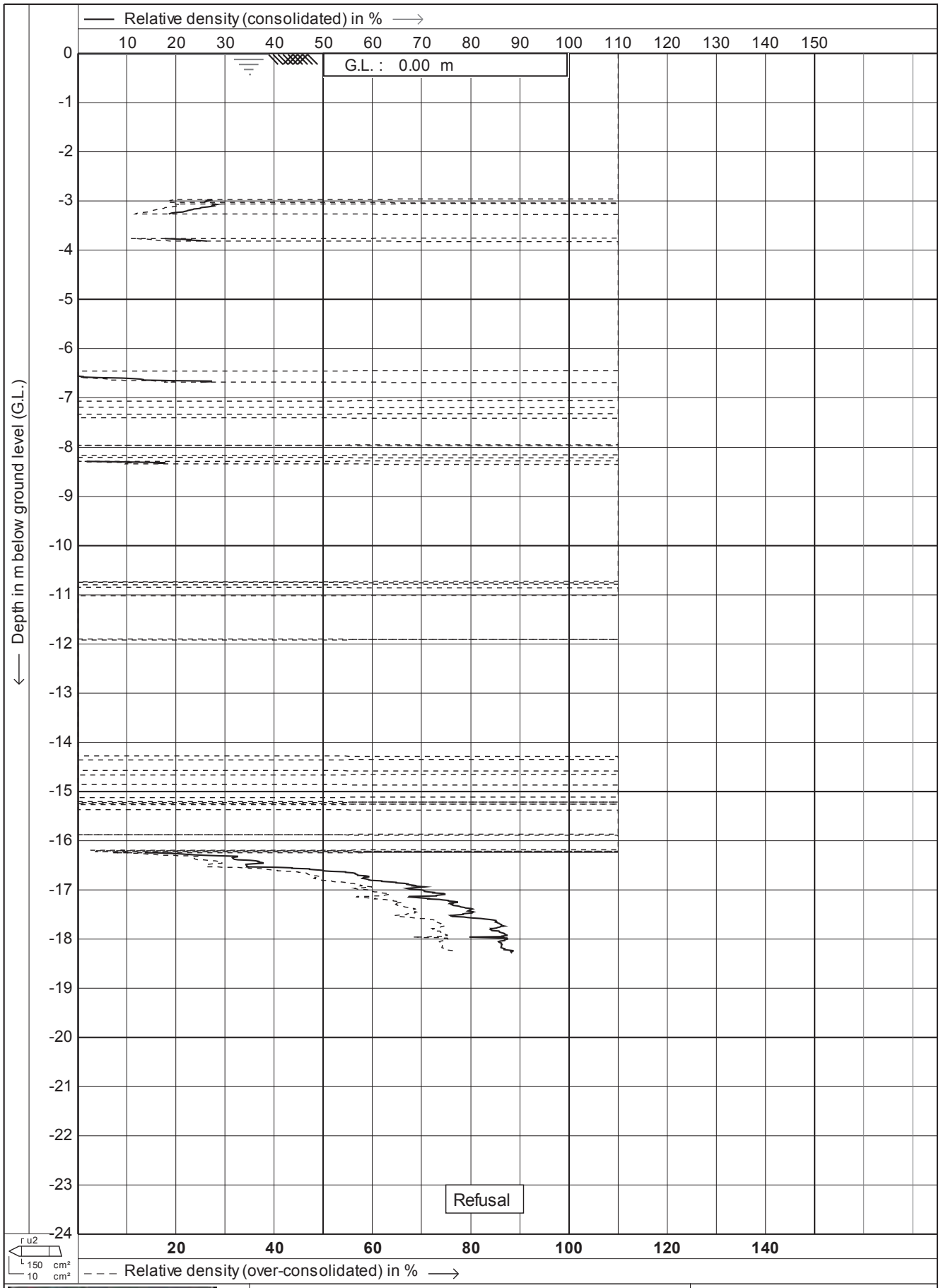
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012
	Project : Site Investigations	Cone no. : C10CFIIP.F57
		Project no. : 02AECOM2
	Location: Southern Links - Hamilton	CPT no. : 118 9/14

CPTask V1.31



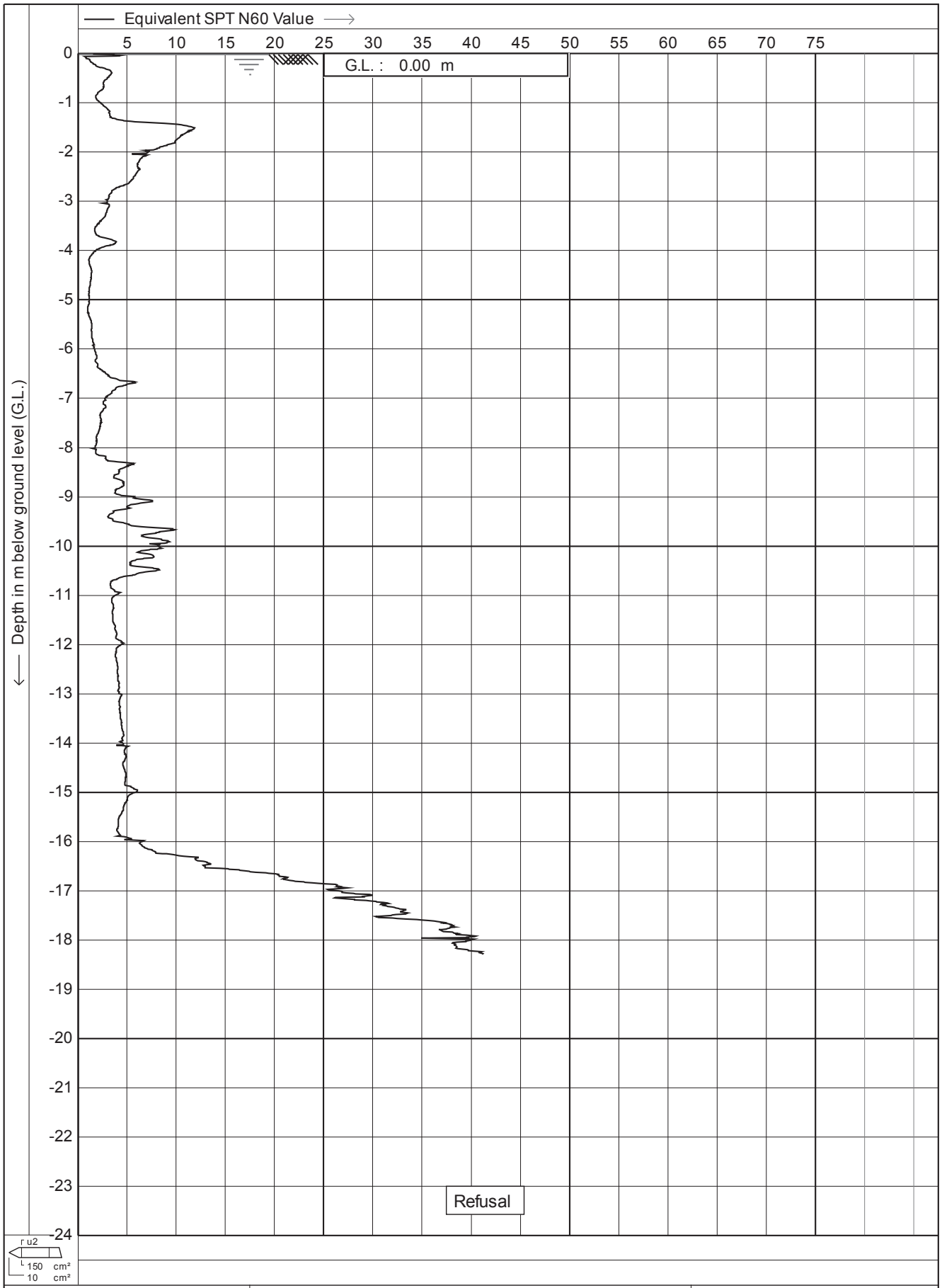
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **118**	**10/14**

CPTask V1.31



DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 13-1-2012
		Cone no.	: C10CFIIP.F57
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 118

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

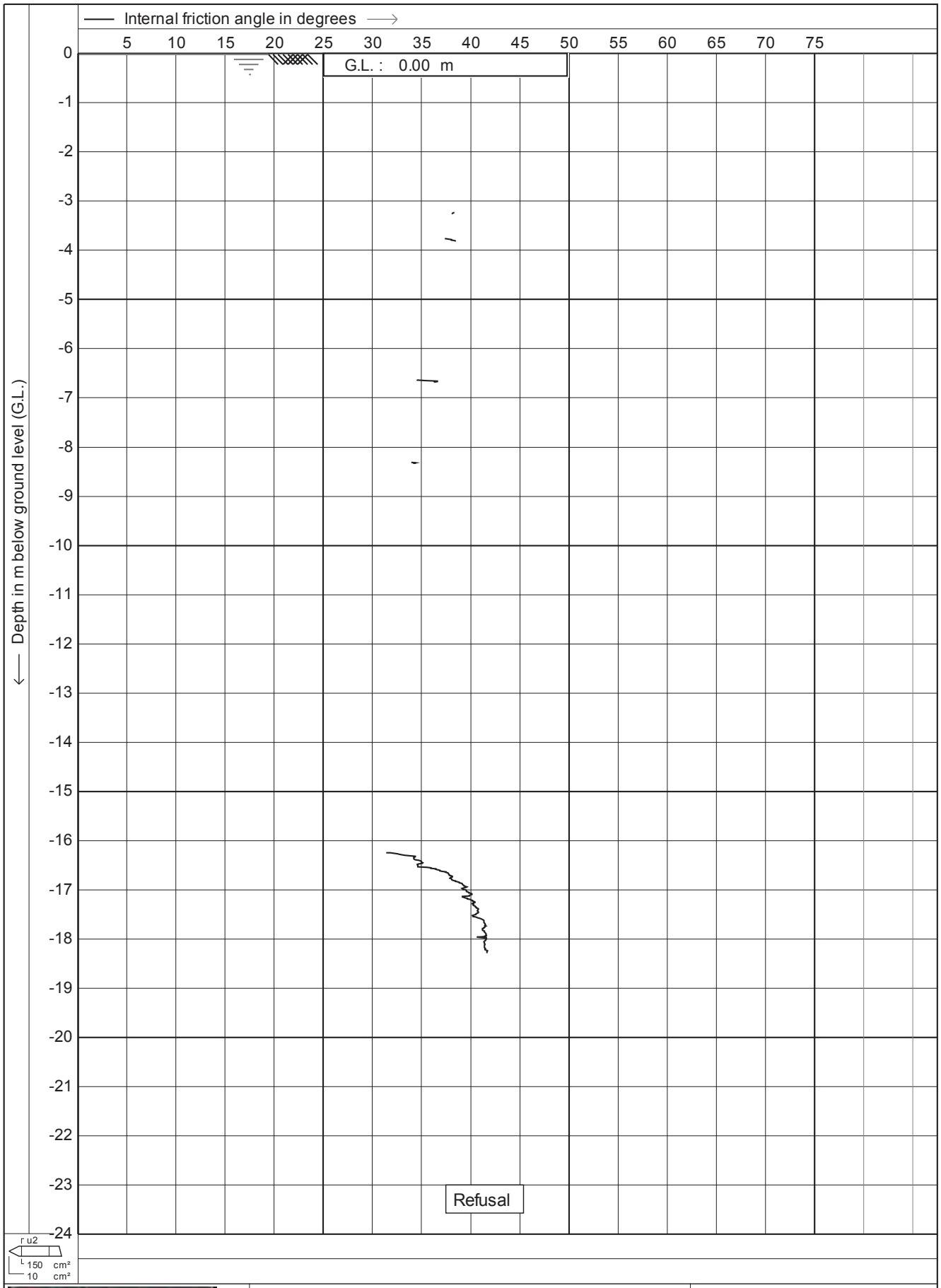
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **118**

12/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

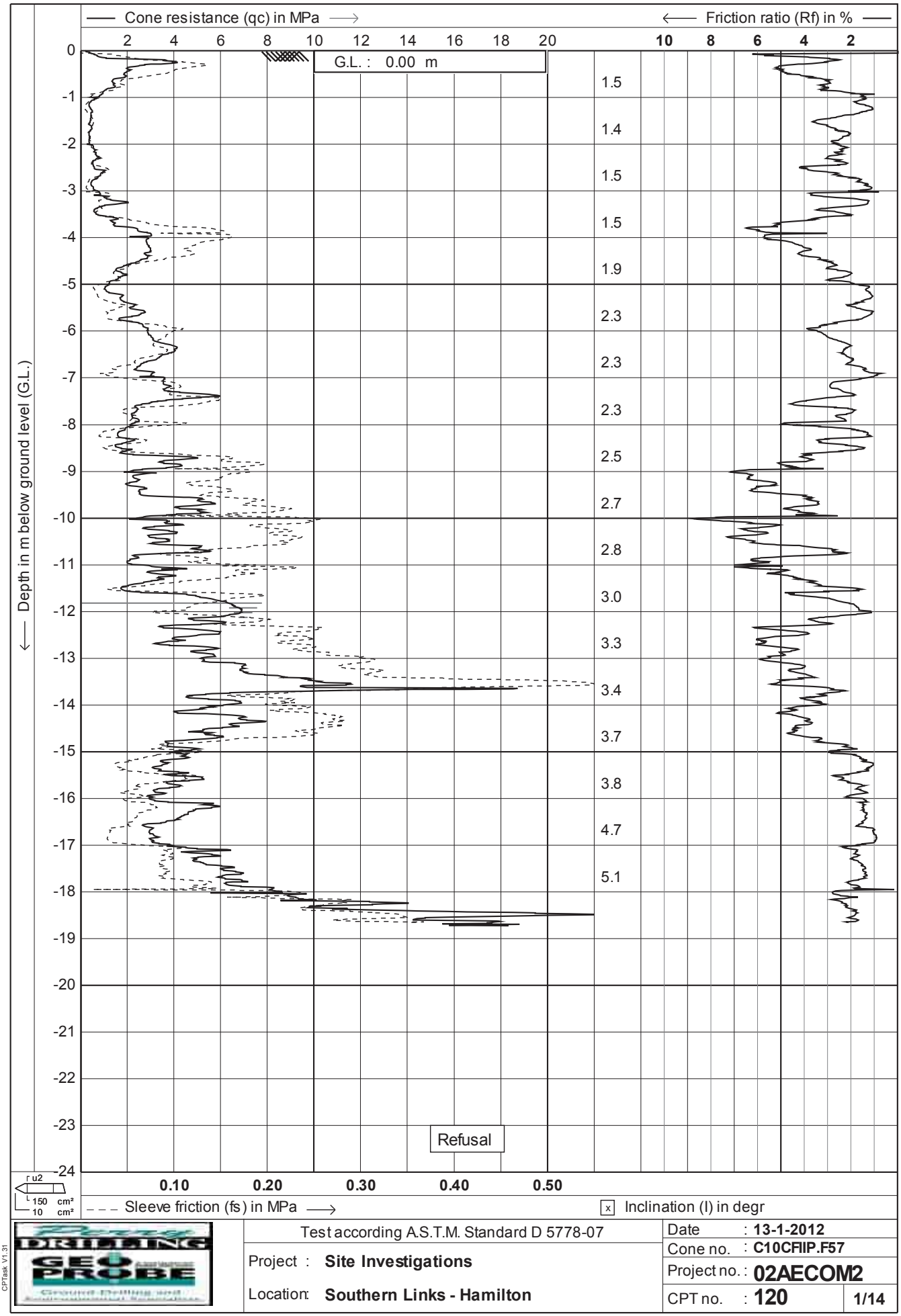
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **118**

14/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

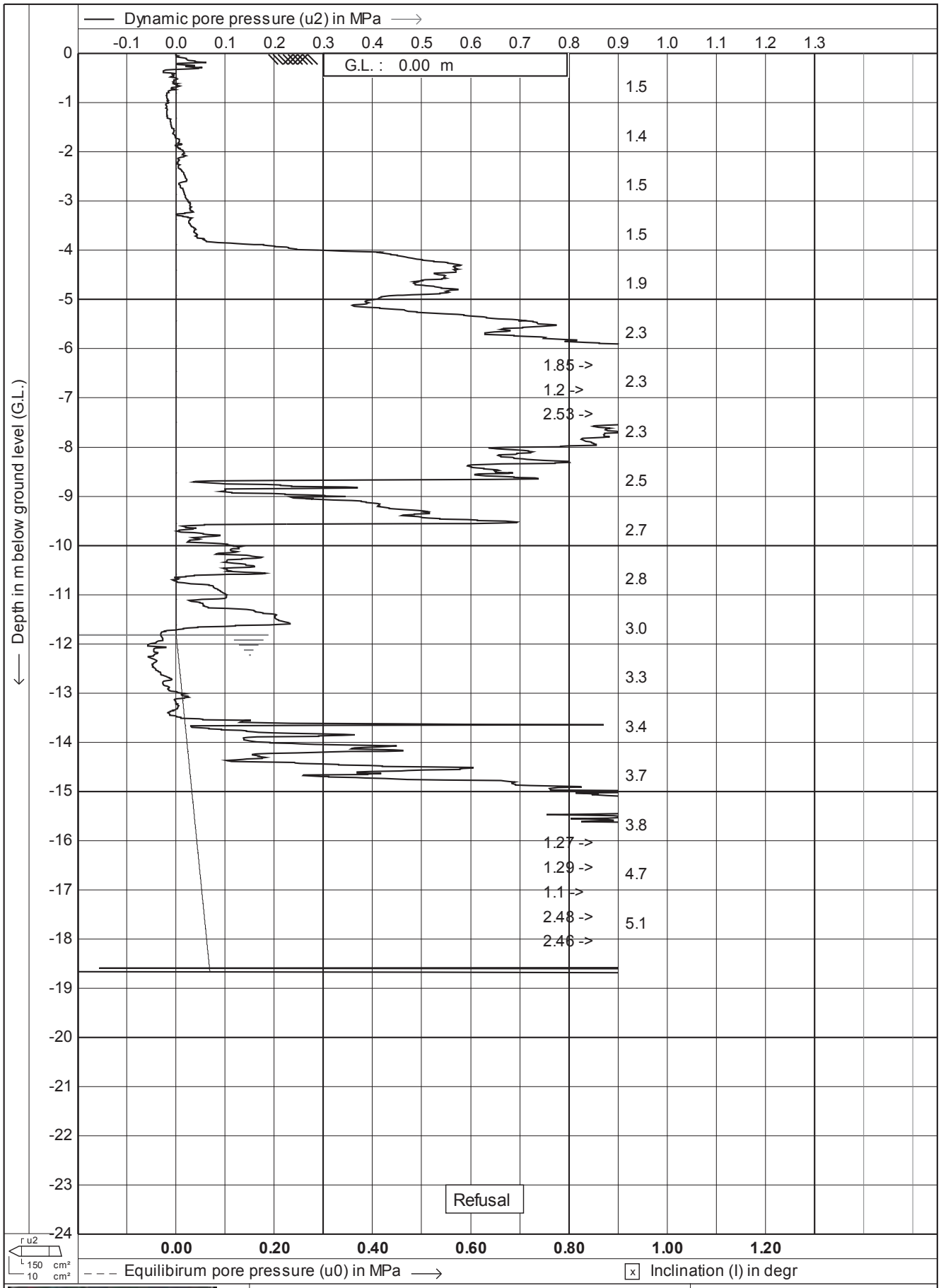
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **120**

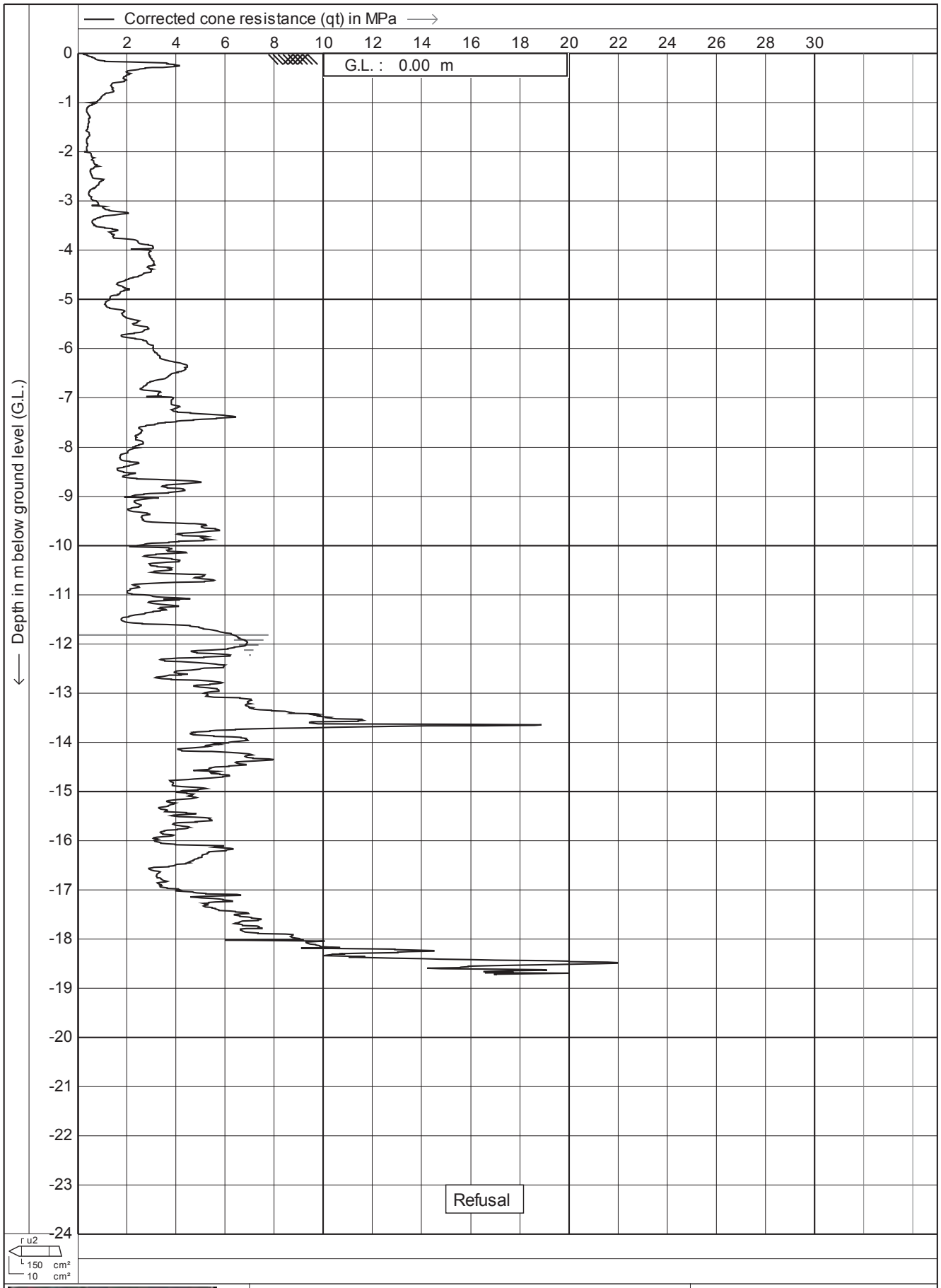
1/14

CPTask V1.31



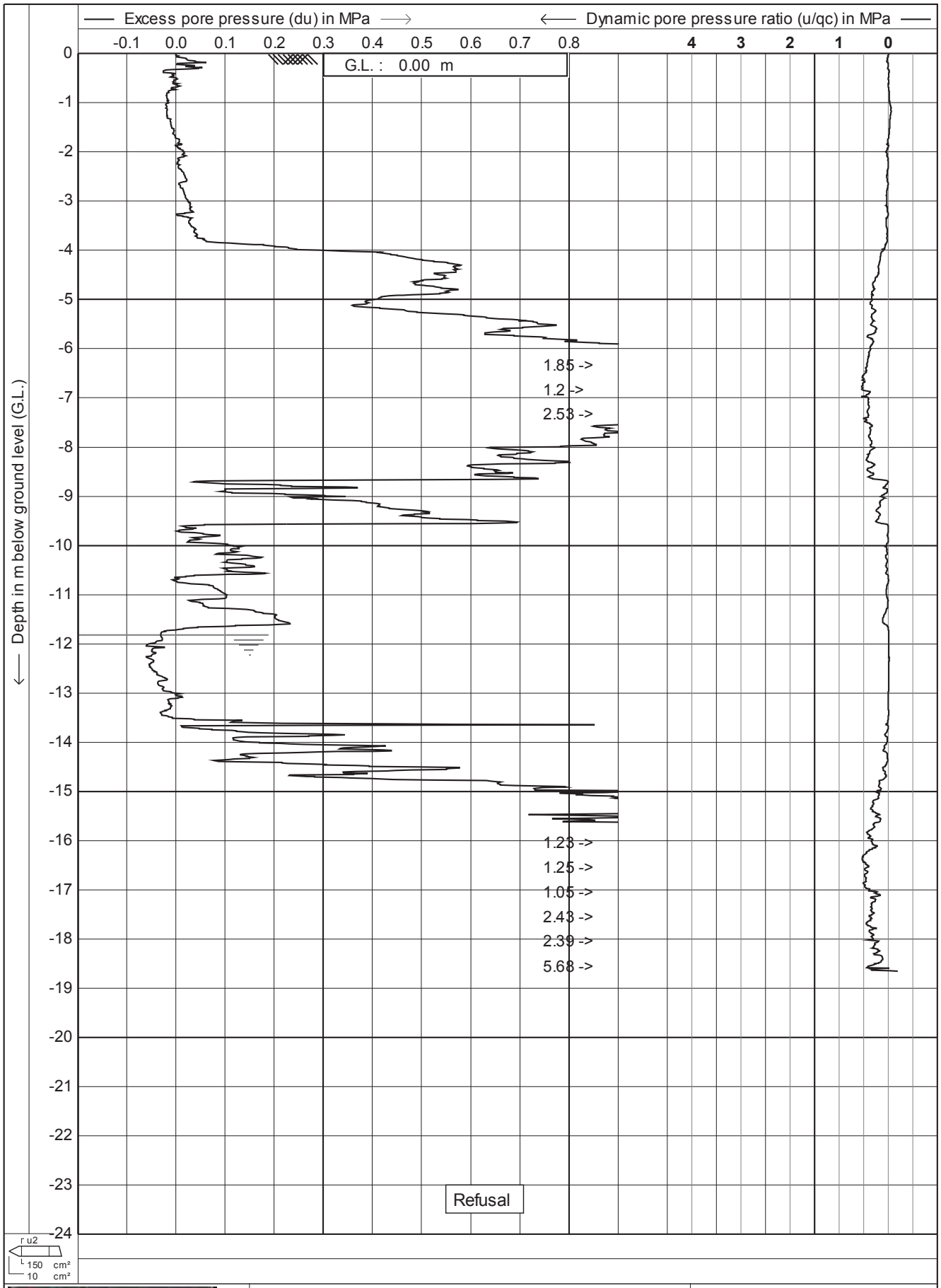
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**2/14**

CPTask V1.31



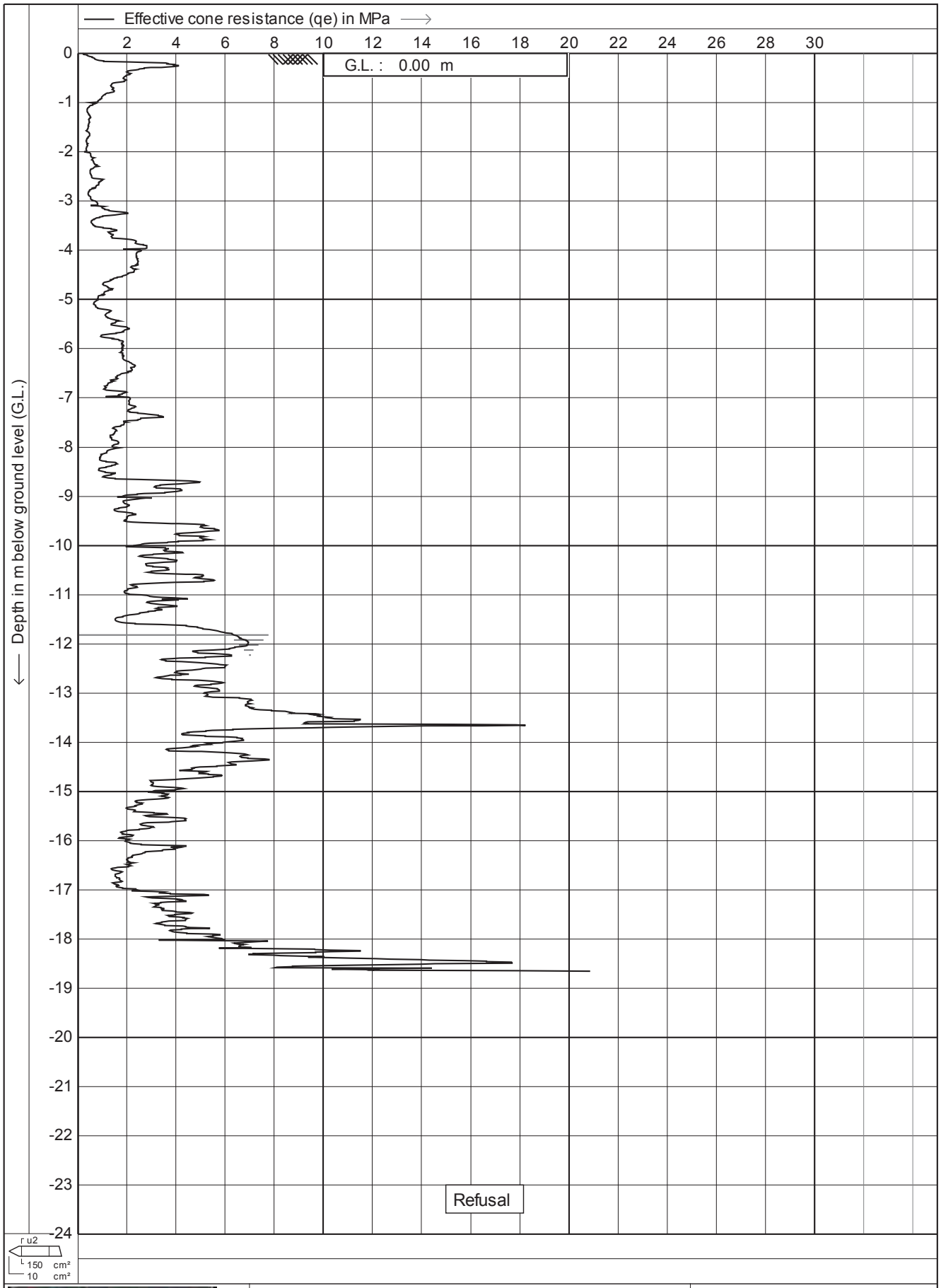
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**3/14**

CPTask V1.31



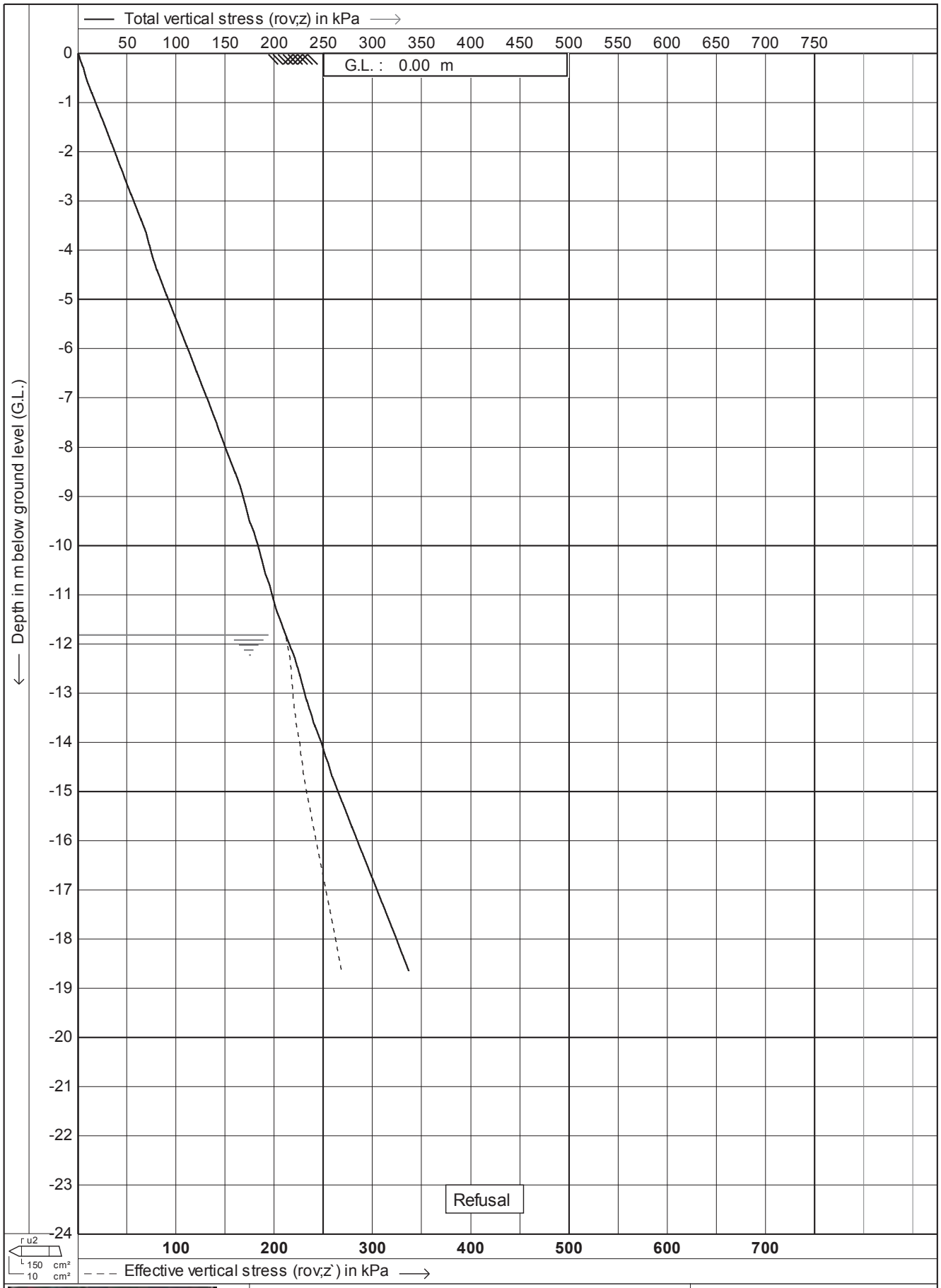
Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	4/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**5/14**

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07

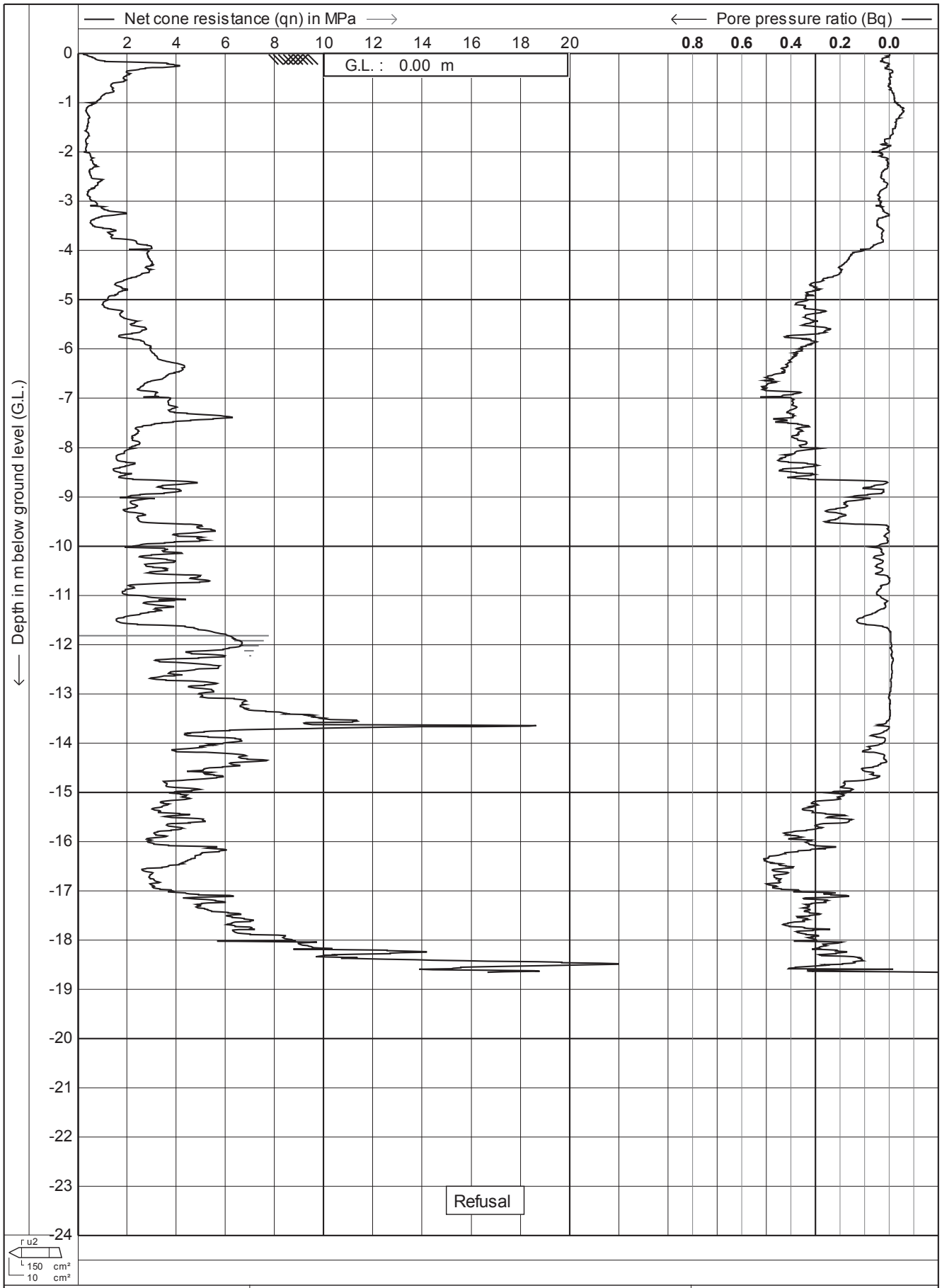
Project : **Site Investigations**

Location: **Southern Links - Hamilton**

Date	: **13-1-2012**
Cone no.	: **C10CFIIP.F57**
Project no.	: **02AECOM2**
CPT no.	: **120**

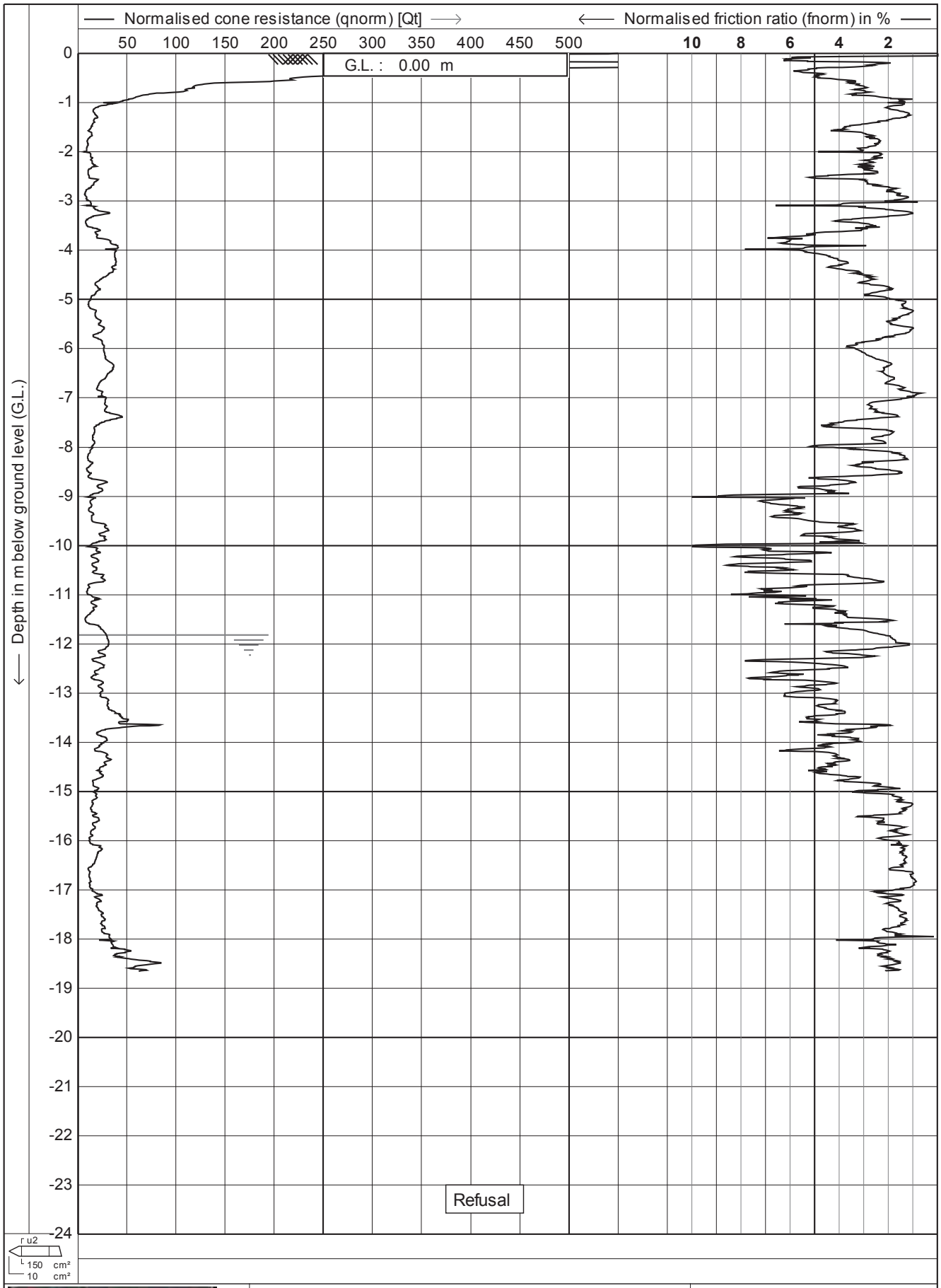
6/14

CPTask V1.31



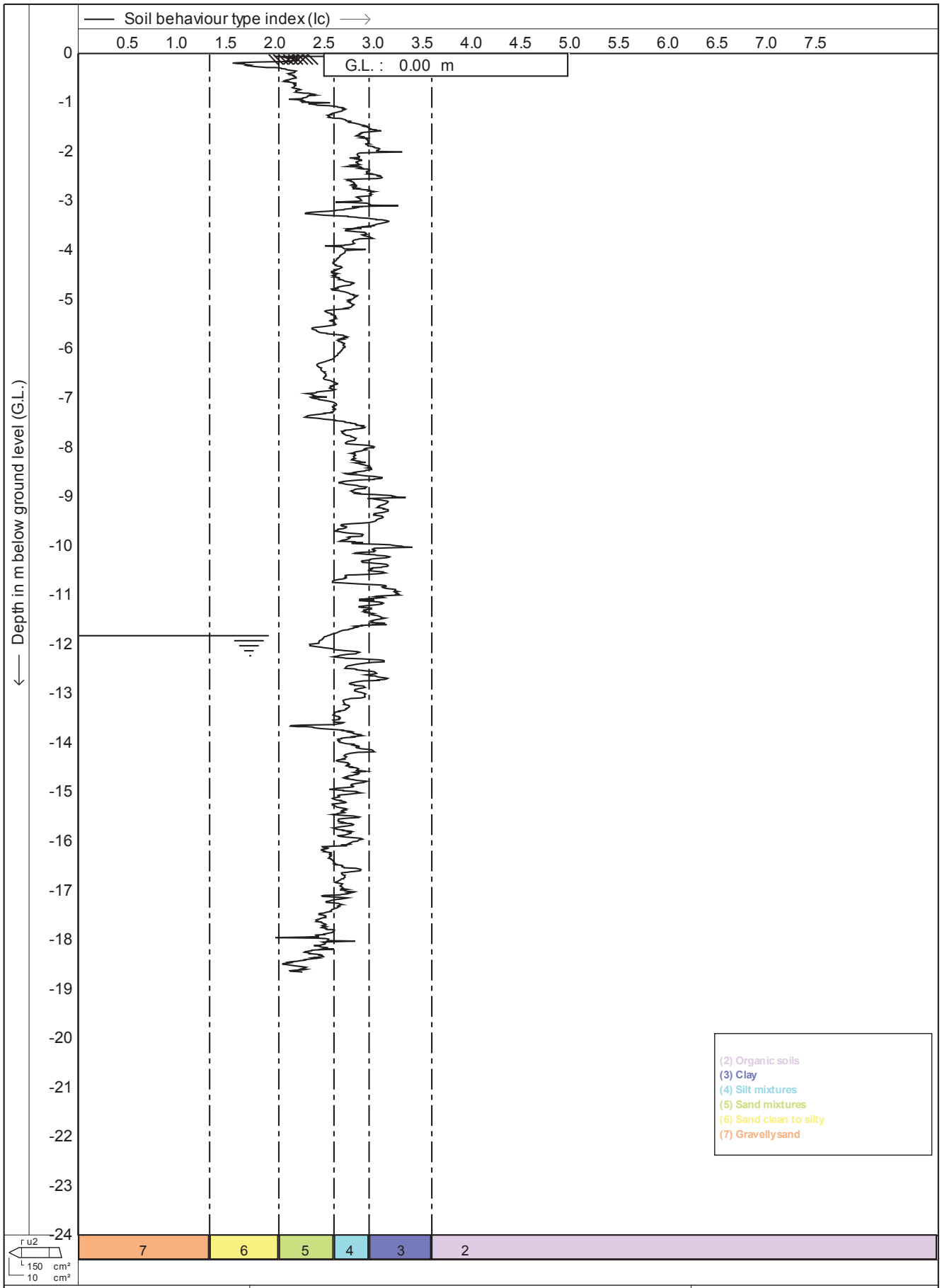
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**7/14**

CPTask V1.31



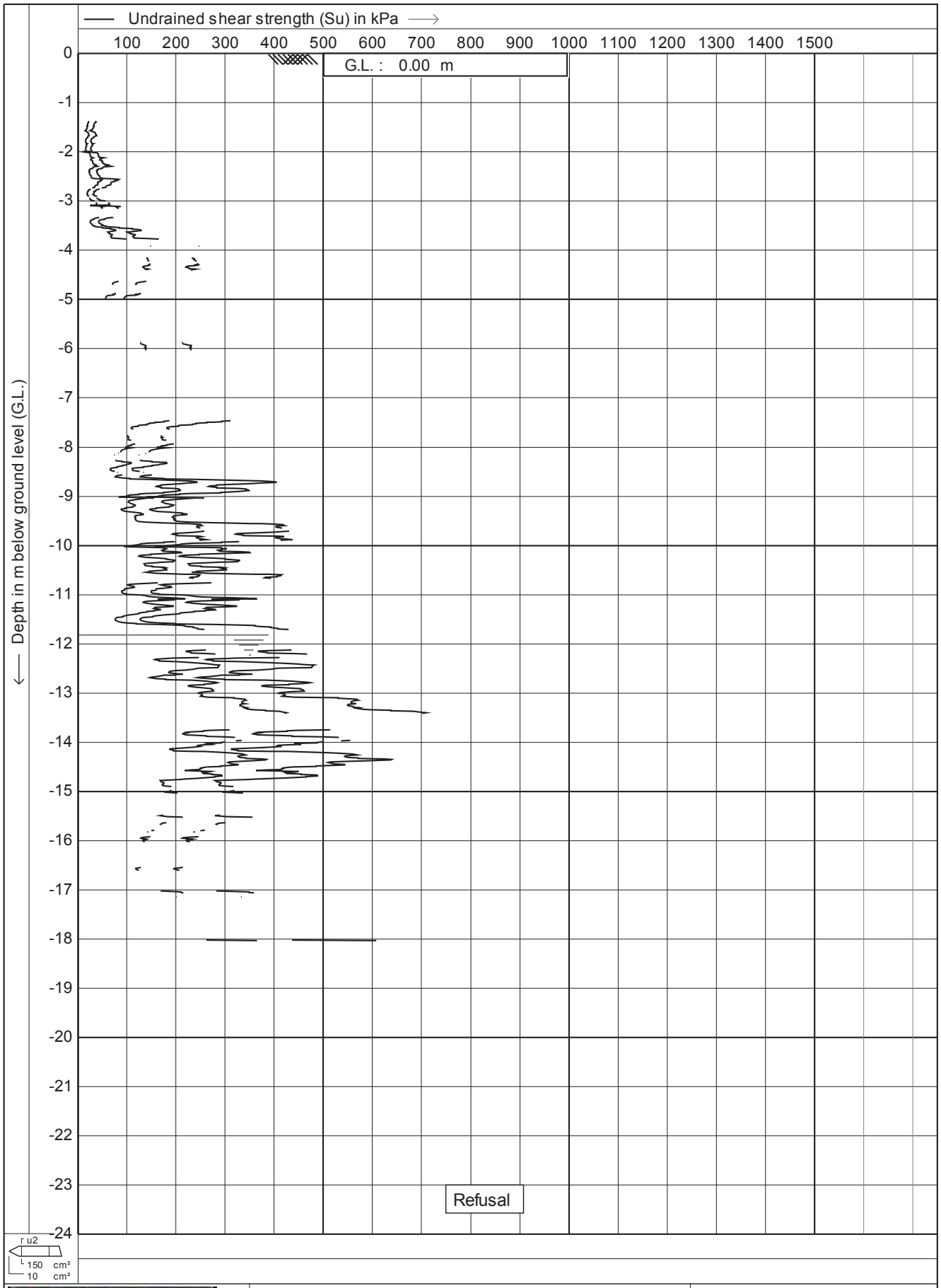
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**8/14**

CPTask V1.31



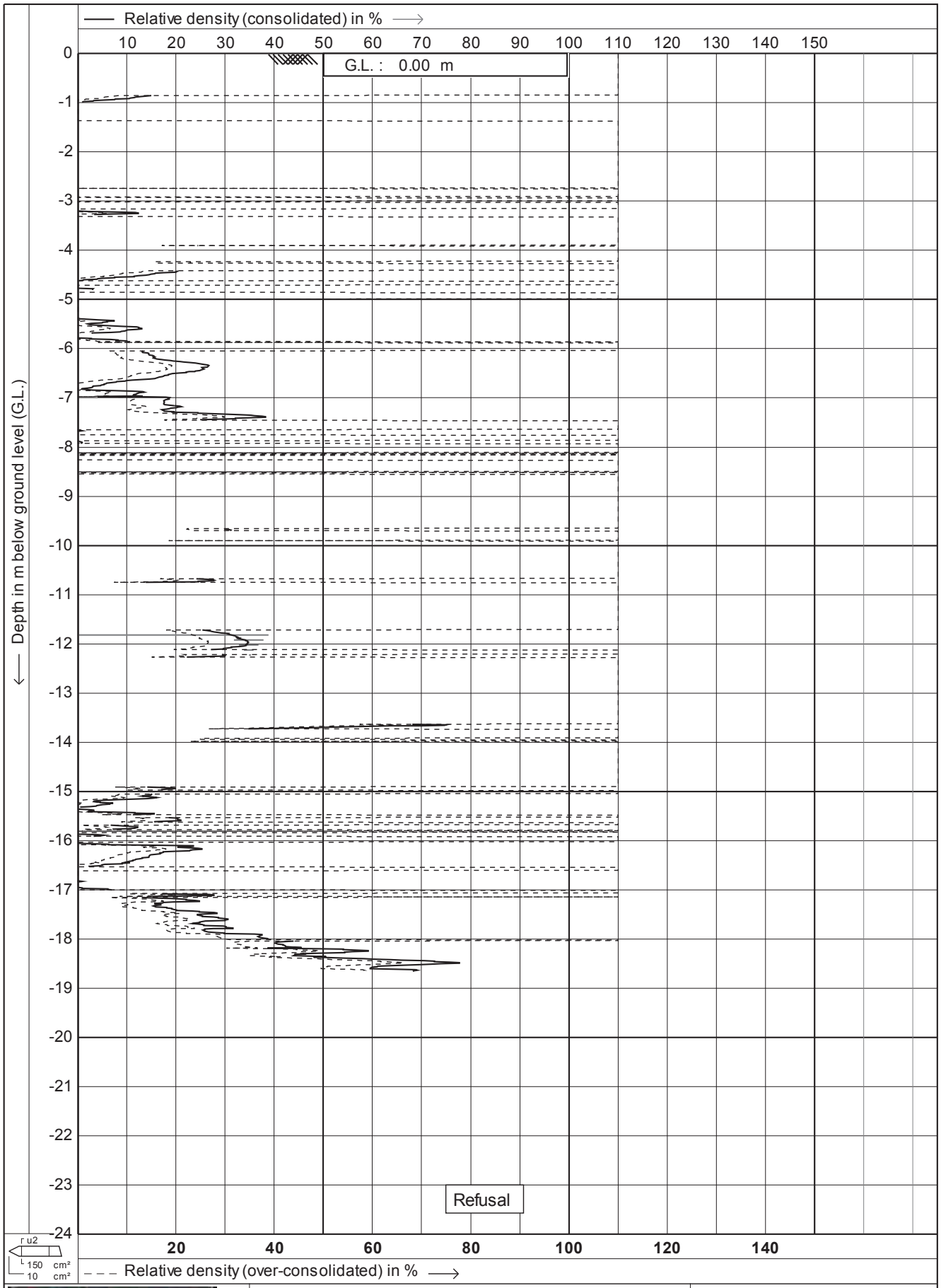
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : 13-1-2012	
	Project : Site Investigations	Cone no. : C10CFIIP.F57	
		Project no. : 02AECOM2	
	Location: Southern Links - Hamilton	CPT no. : 120	9/14

CPTask V1.31



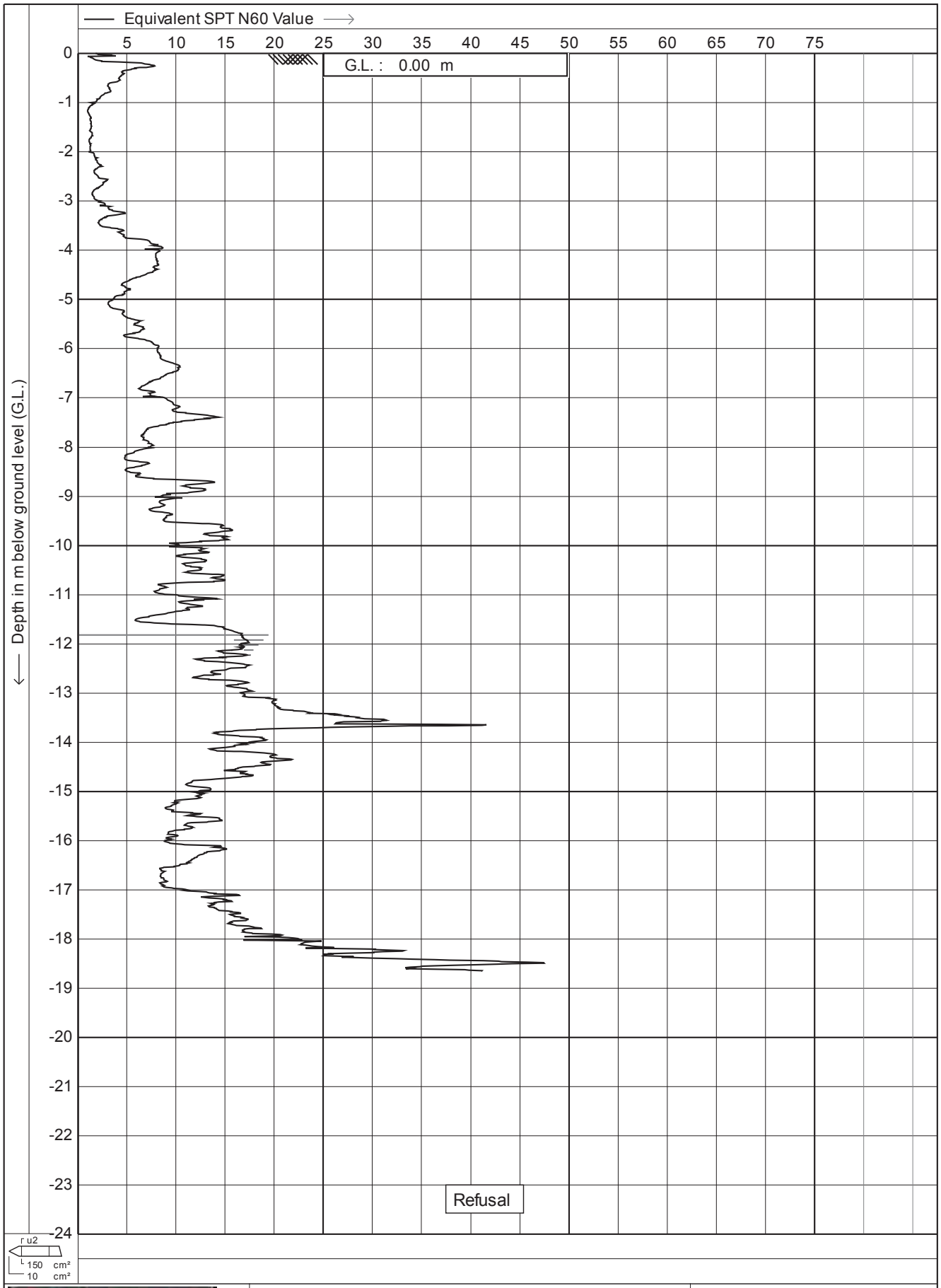
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**
		Project no. : **02AECOM2**
	Location: **Southern Links - Hamilton**	CPT no. : **120** 10/14

CPTask V1.31



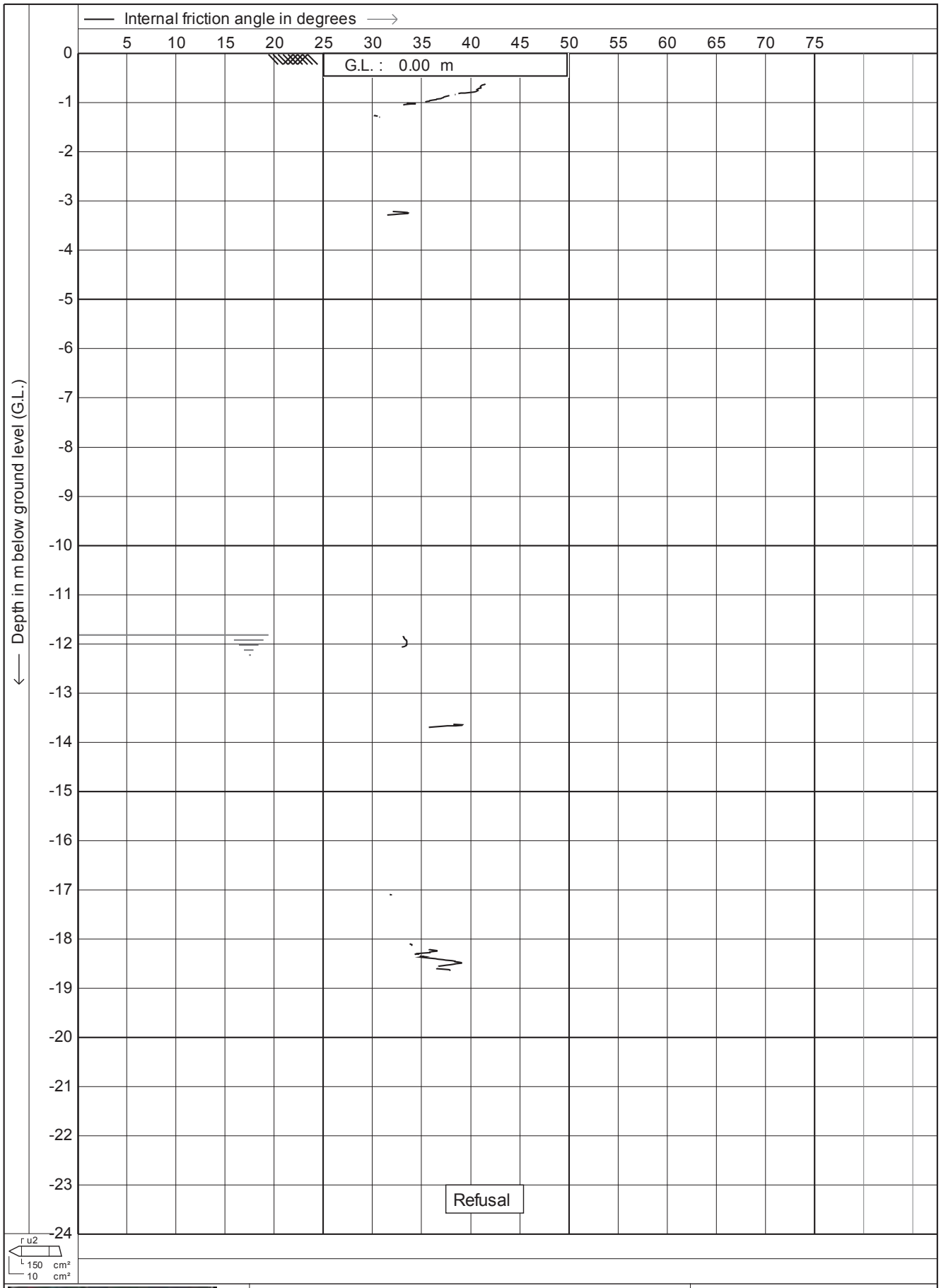
DRILLING GEO PROBE	Test according A.S.T.M. Standard D 5778-07	Date	: 13-1-2012
		Cone no.	: C10CFIIP.F57
	Project : **Site Investigations**	Project no.	: 02AECOM2
	Location: **Southern Links - Hamilton**	CPT no.	: 120 — 11/14

CPTask V1.31



Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**12/14**

CPTask V1.31



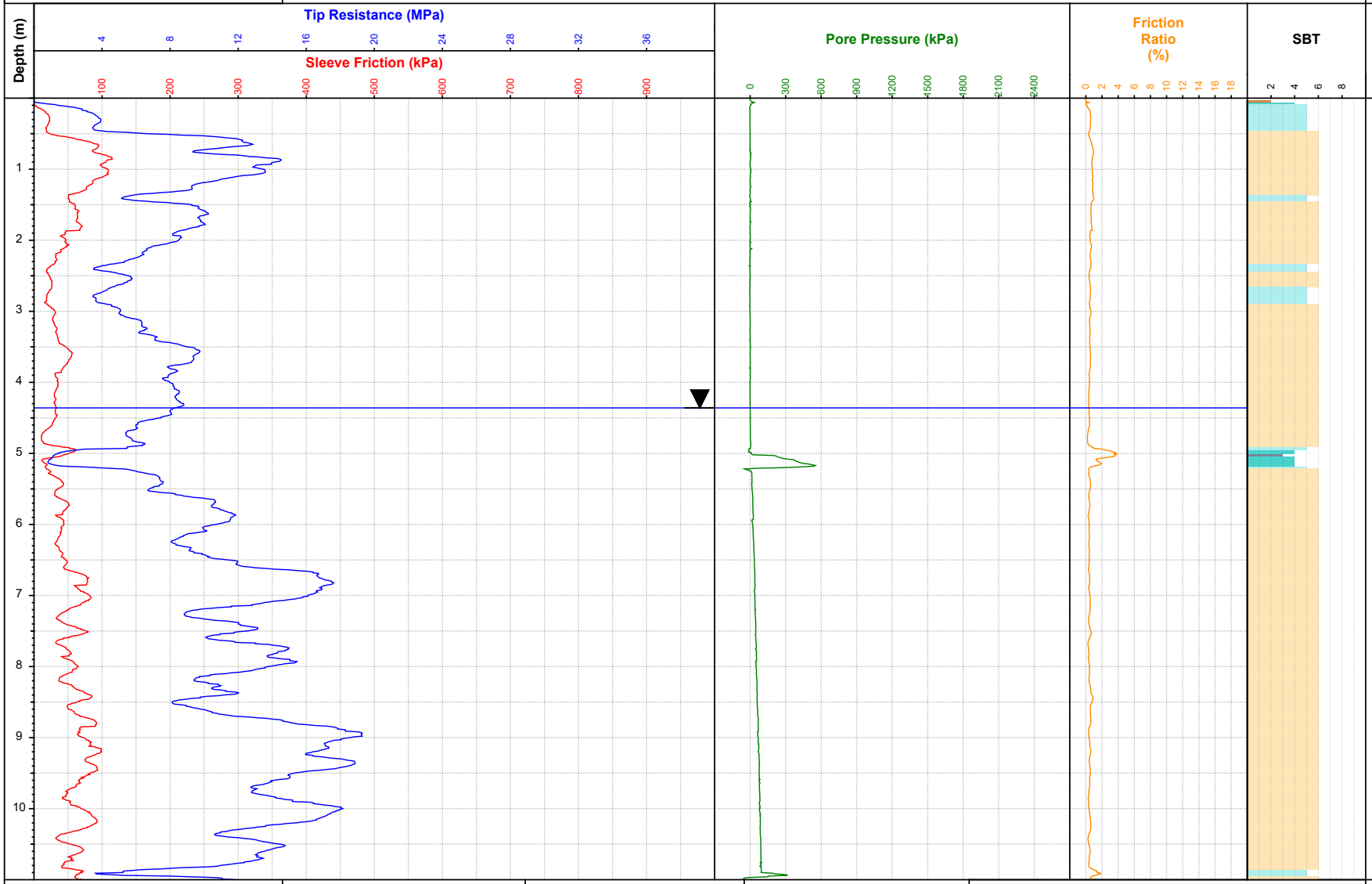
Test according A.S.T.M. Standard D 5778-07	Date : **13-1-2012**	
Project : **Site Investigations**	Cone no. : **C10CFIIP.F57**	
	Project no. : **02AECOM2**	
Location: **Southern Links - Hamilton**	CPT no. : **120**	**14/14**

CPTask V1.31

Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT01
Client Ref.: HD2291



SBT Description (filtered)

Sand mixtures: silty sand to sandy silt

Sands: clean sands to silty sands

Sands: clean sands to silty sands

Sands: clean sands to silty sands
Sand mixtures: silty sand to sandy silt

Sands: clean sands to silty sands

Sands: clean sands to silty sands

Depth (m): -1 -2 -3 -4 -5 -6 -7 -8 -9 -10

Client: HD GEO
Project: CPT Investigations
Location: 37A Saxbys Road, Hamilton
Contractor: Topdrill Ltd

Remarks:
Hole collapsed wet when dipped at 4.36m

Termination Reason:
Refusal on tip

Northing:	5811276.56
Easting:	1800597.23
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT01
Topdrill Ref.:	TD20356
Client Ref.:	HD2291
Depth (m):	17.97
Date:	16/03/2022

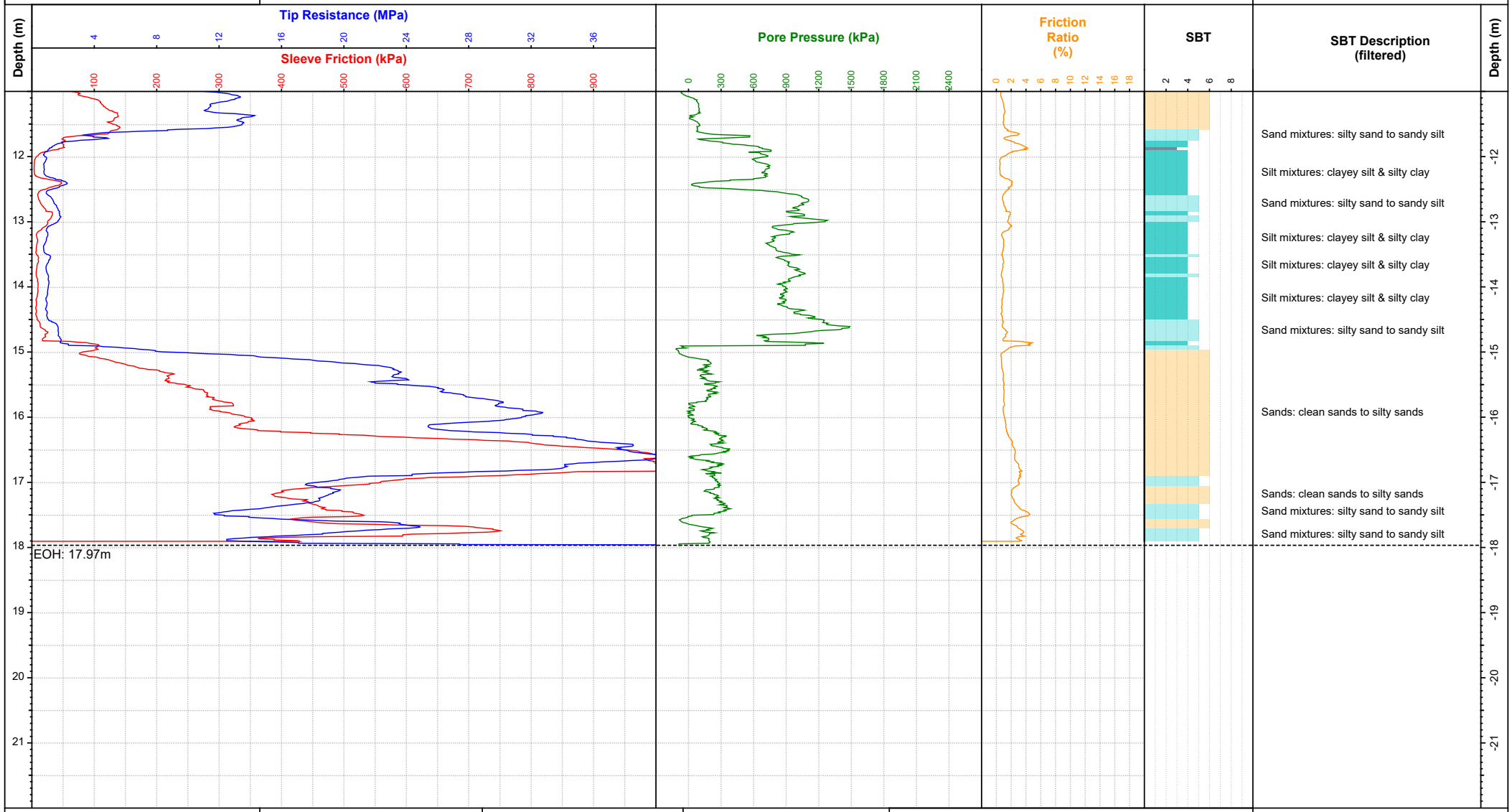
SHEET 1 OF 3

Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:05:35 PM

CONE PENETRATION TEST LOG

Topdrill Geotech

Test No: CPT01
Client Ref.: HD2291



Client: HD GEO
Project: CPT Investigations
Location: 37A Saxbys Road, Hamilton
Contractor: Topdrill Ltd

Remarks: Hole collapsed wet when dipped at 4.36m
Termination Reason: Refusal on tip

Northing:	5811276.56
Easting:	1800597.23
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT01
Topdrill Ref.:	TD20356
Client Ref.:	HD2291
Depth (m):	17.97
Date:	16/03/2022

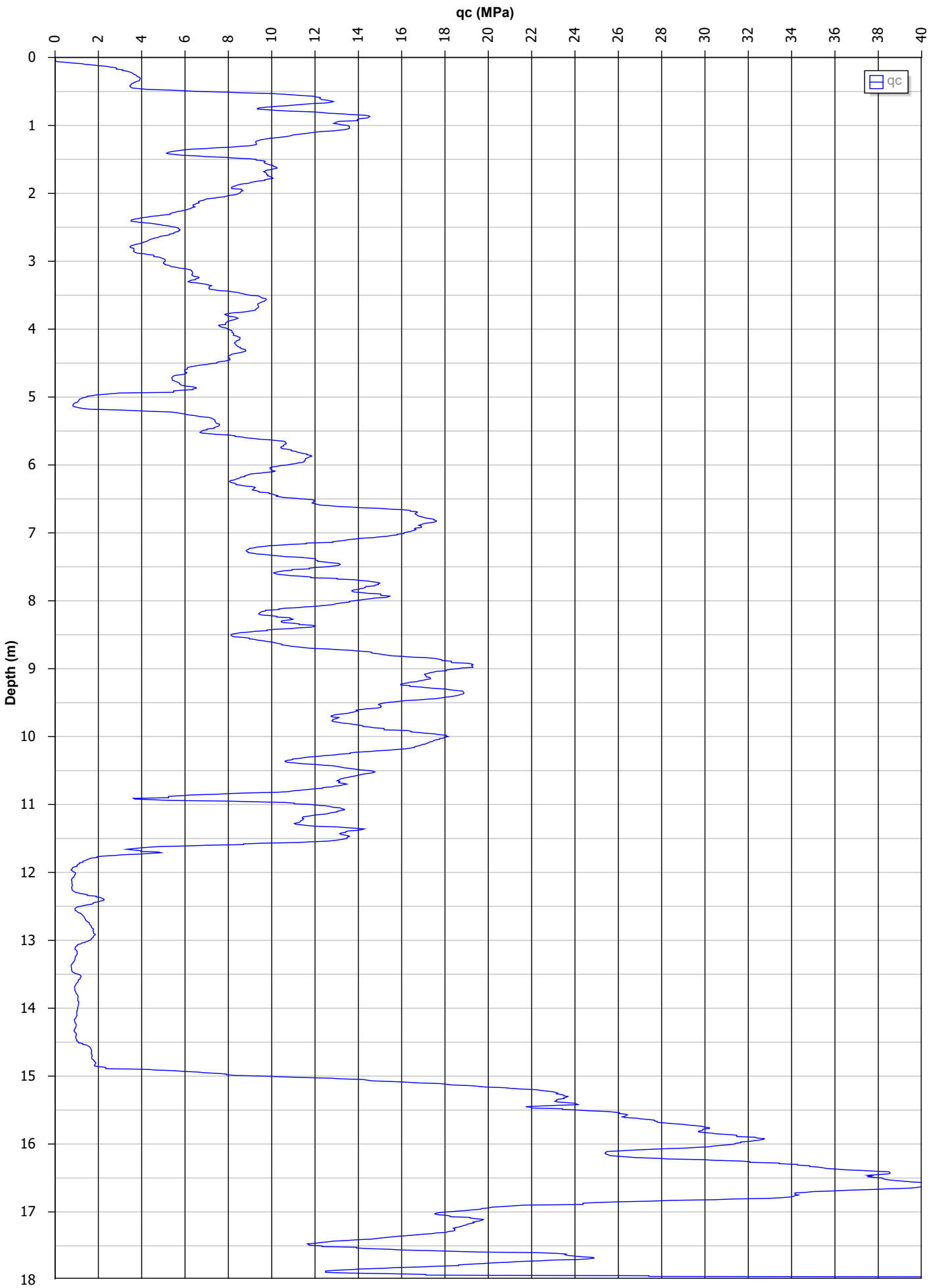
SHEET 2 OF 3

Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:05:36 PM

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT01
Client Ref.:	HD2291

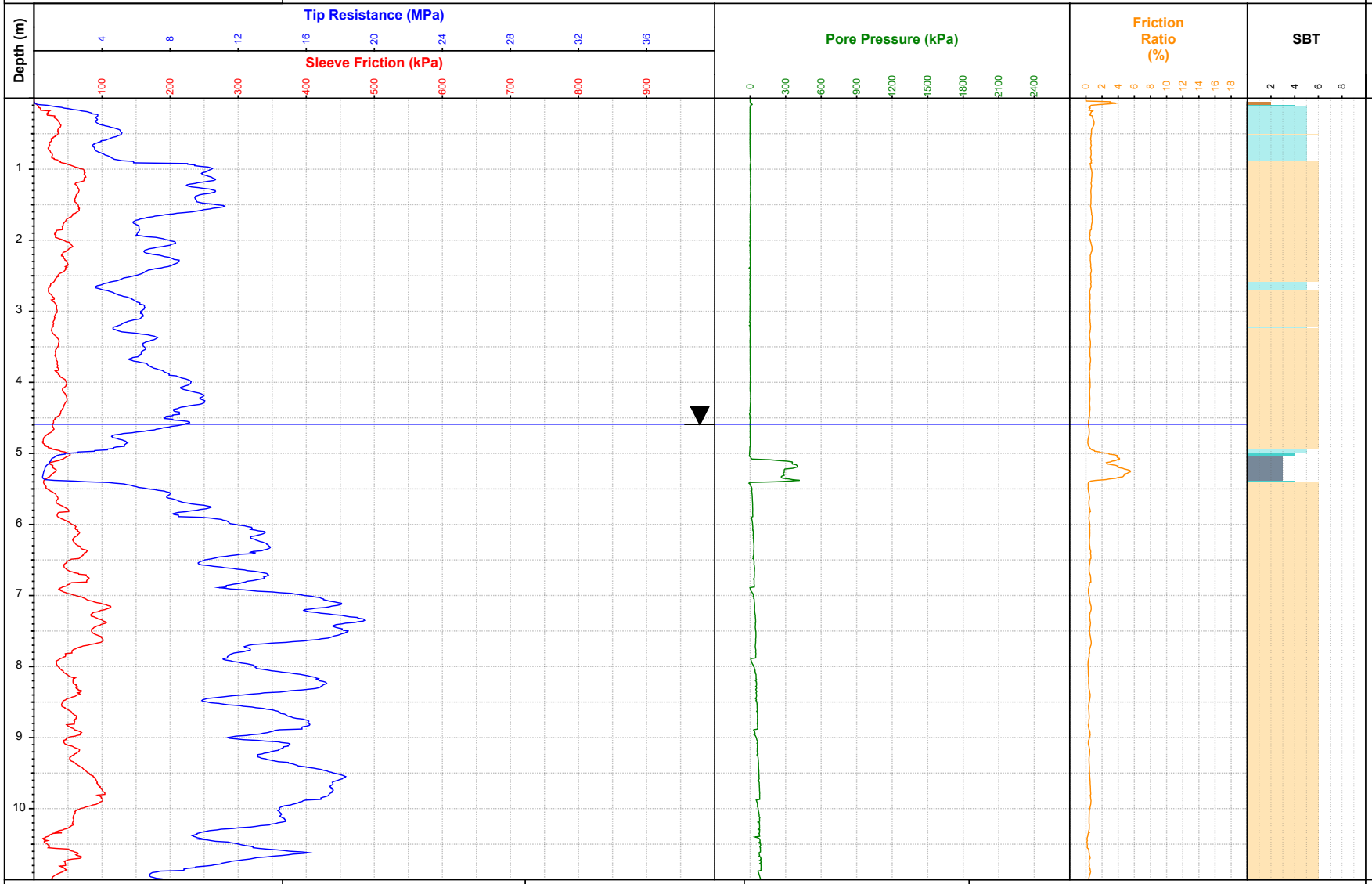


Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:05:36 PM

Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT02
Client Ref.: HD2291



SBT Description (filtered)

- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sands: clean sands to silty sands
- Sands: clean sands to silty sands
- Sands: clean sands to silty sands
- Clays: clay to silty clay
- Sands: clean sands to silty sands

Client: HD GEO
Project: CPT Investigations
Location: 37A Saxbys Road, Hamilton
Contractor: Topdrill Ltd

Remarks: Hole collapsed wet when dipped at 4.59m

Termination Reason: Refusal on tip

Northing:	5811279.51
Easting:	1800612.78
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm^2
Sleeve Area:	150cm^2
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

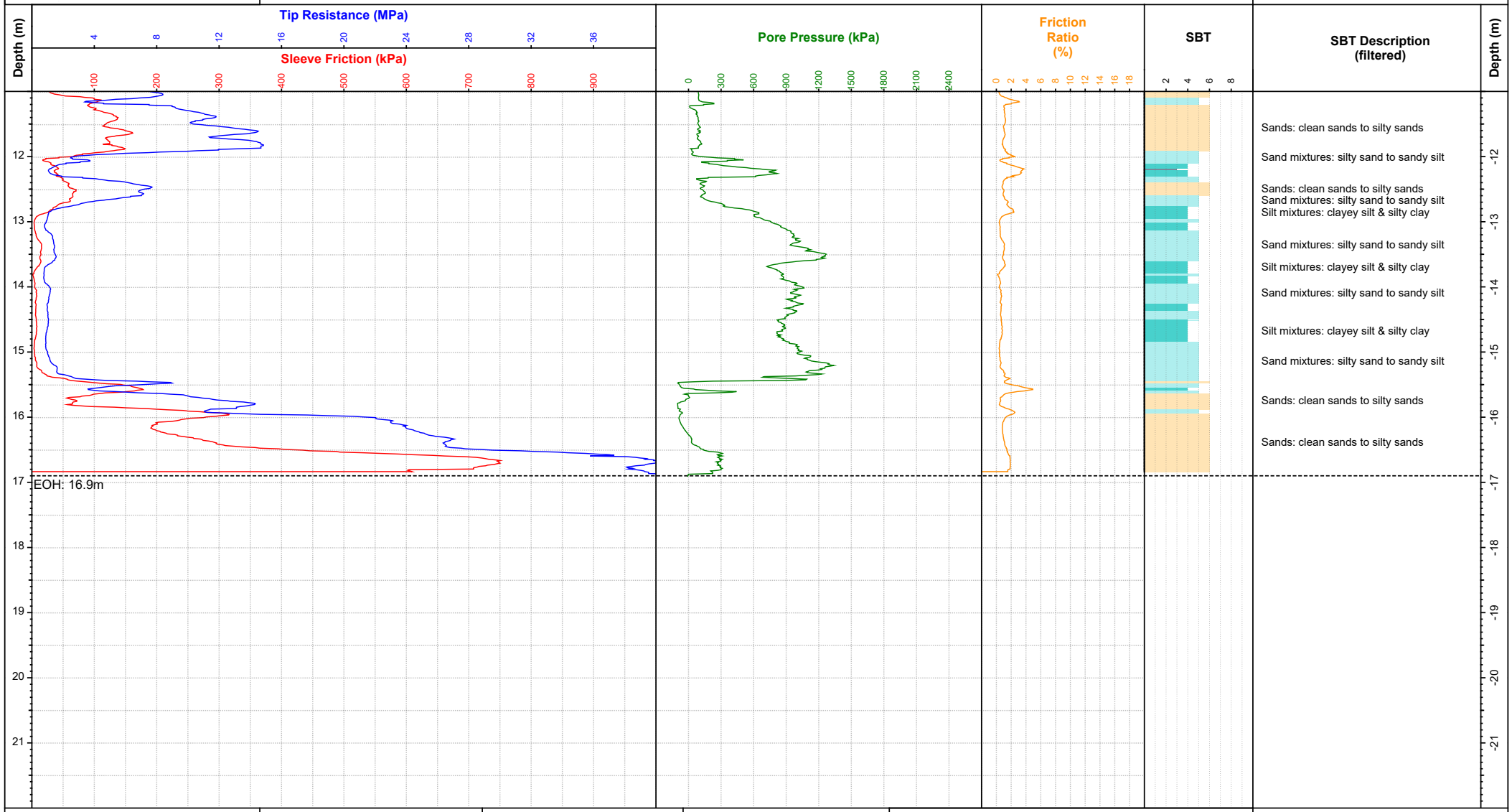
Test No:	CPT02
Topdrill Ref.:	TD20356
Client Ref.:	HD2291
Depth (m):	16.9
Date:	16/03/2022

Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:04:57 PM

Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT02
Client Ref.: HD2291



Client: HD GEO
Project: CPT Investigations
Location: 37A Saxbys Road, Hamilton
Contractor: Topdrill Ltd

Remarks: Hole collapsed wet when dipped at 4.59m
Termination Reason: Refusal on tip

Northing:	5811279.51
Easting:	1800612.78
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT02
Topdrill Ref.:	TD20356
Client Ref.:	HD2291
Depth (m):	16.9
Date:	16/03/2022

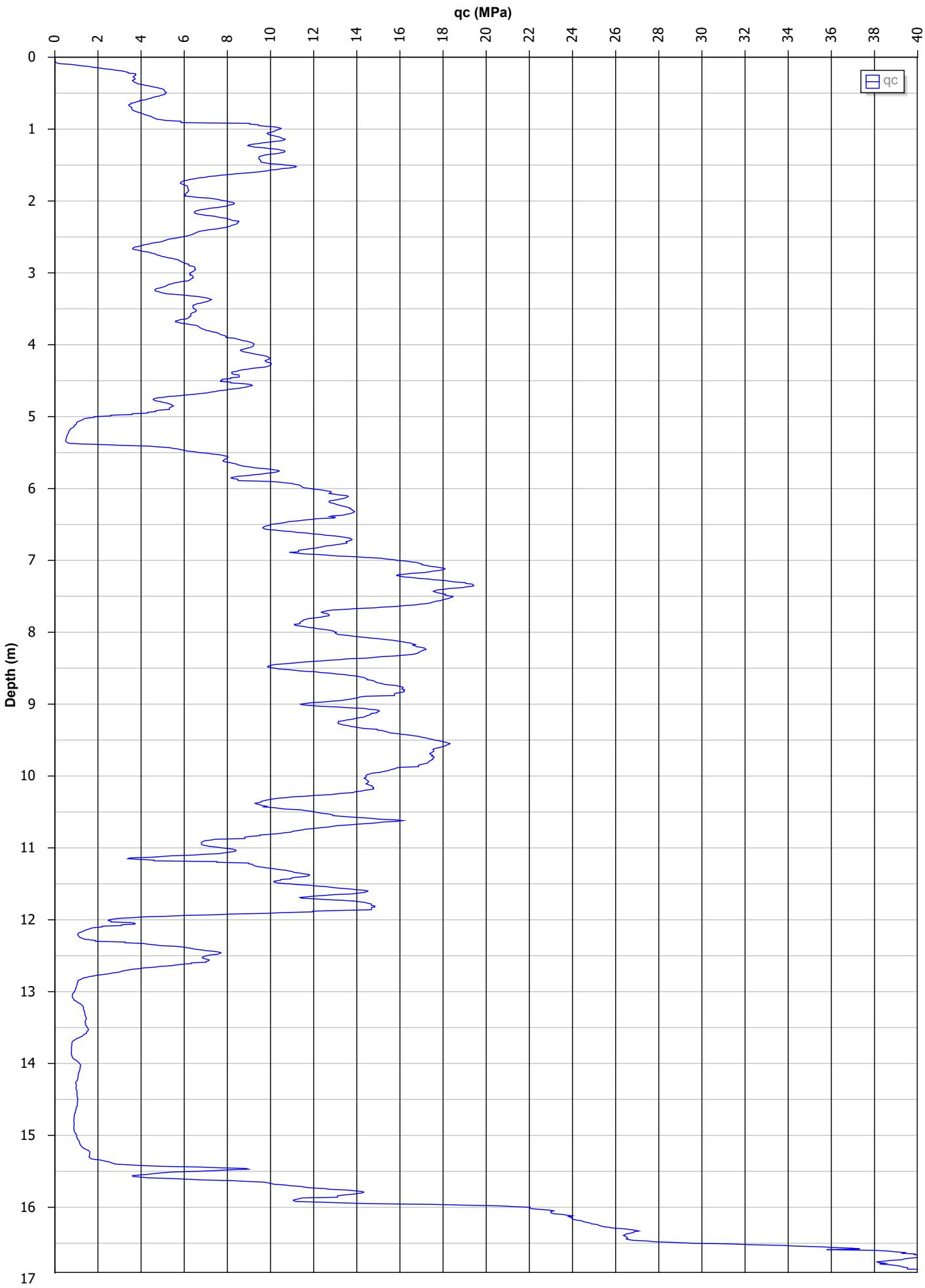
SHEET 2 OF 3

Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:04:57 PM

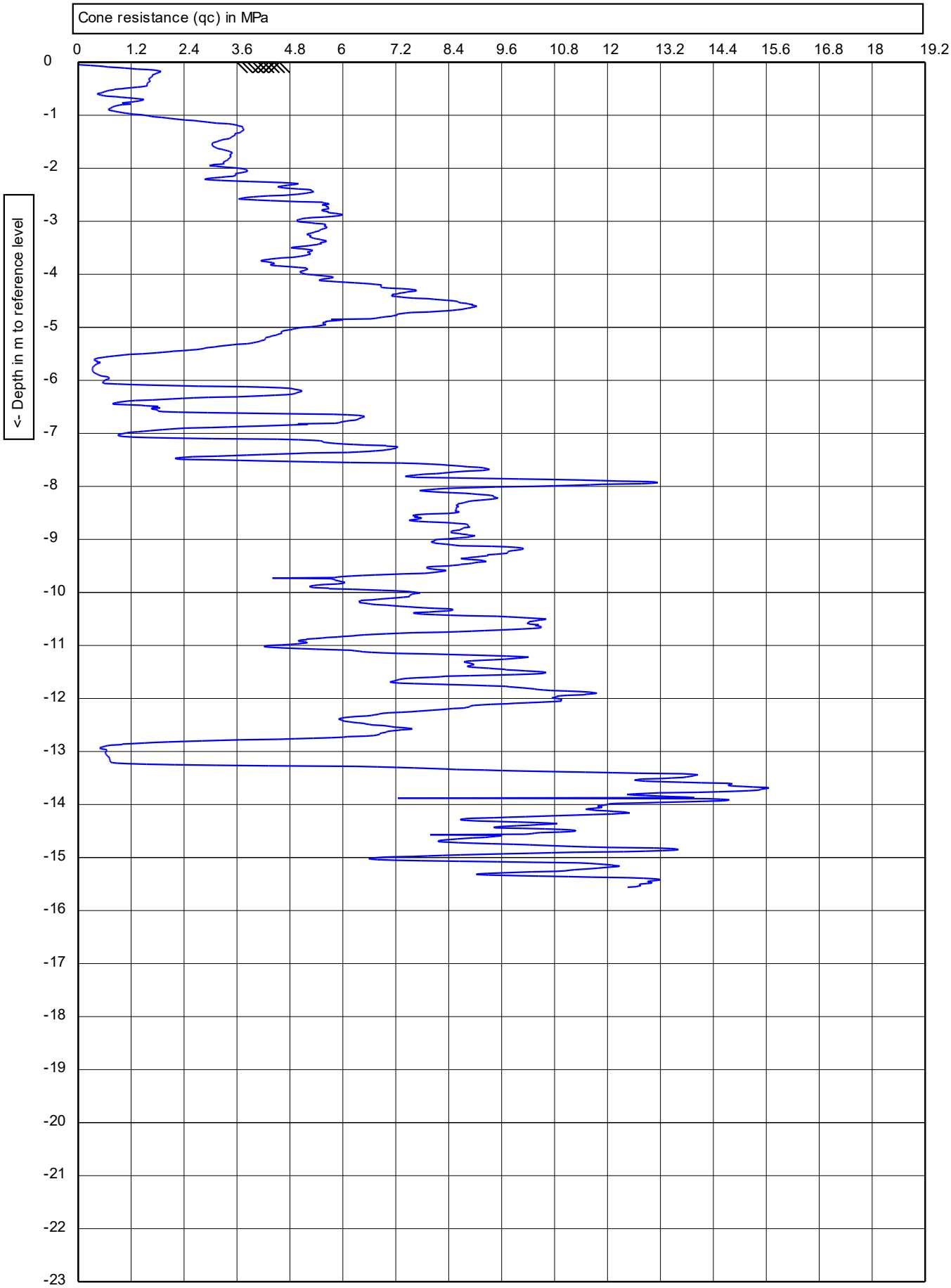
Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT02
Client Ref.:	HD2291

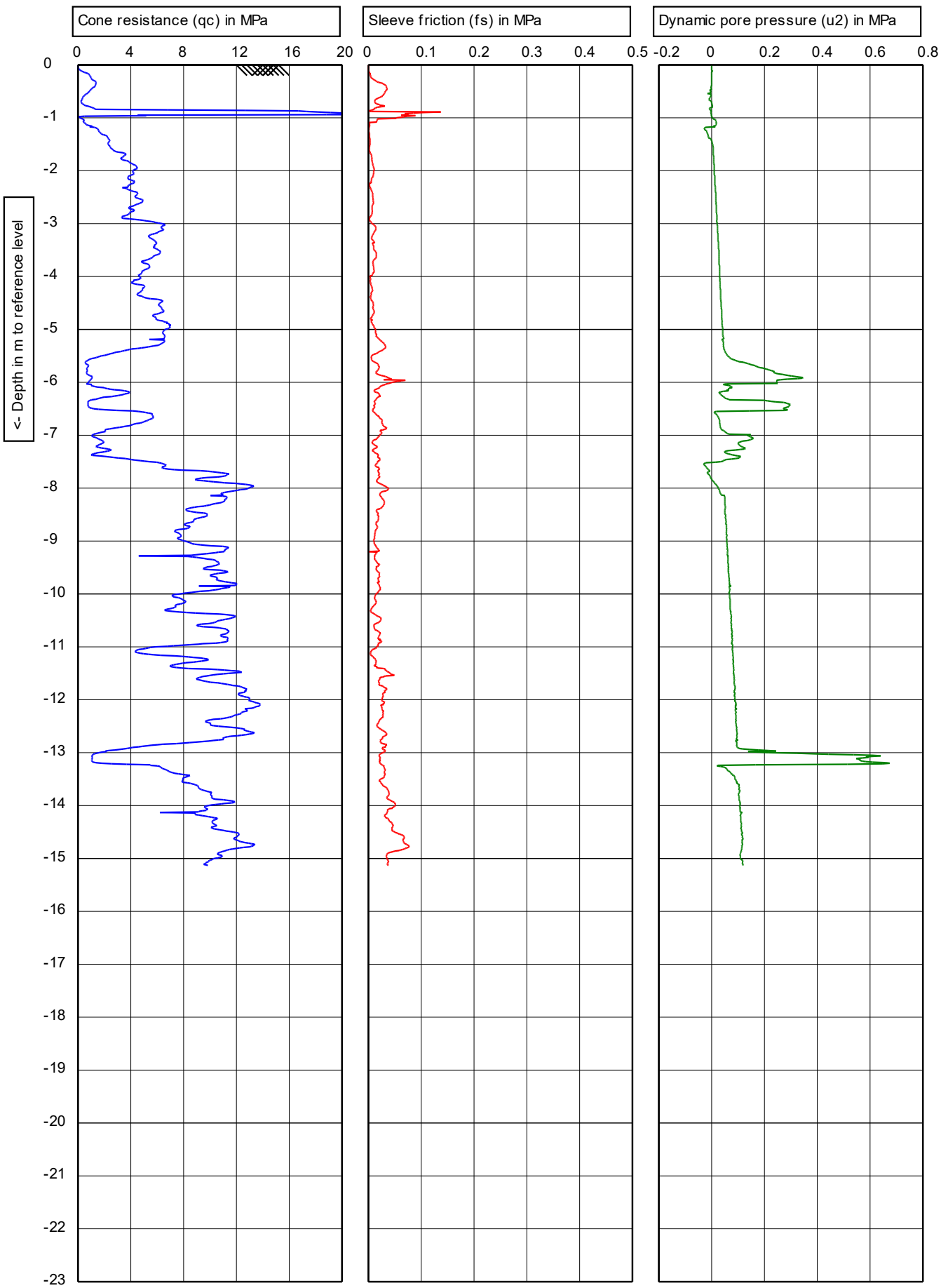


Generated with CORE-GS by Geroc - CPT - TopDrill MPa Dynamic-New - 16/03/2022 1:04:57 PM



u2 150 cm² 10 cm²	Test according NEN 5140 class 1	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m NAP / W.L.: 1.20 m	Date:	7/07/2022
Project:	132 Saxbys Road	Cone no.:	C10CFIIP.C13282
Location:	37°49'25.92"S, 175°16'15.00"E	Project no.:	190067.01
Position:	0, 0 RD	CPT no.:	CPT 01 — 1/1

1.49



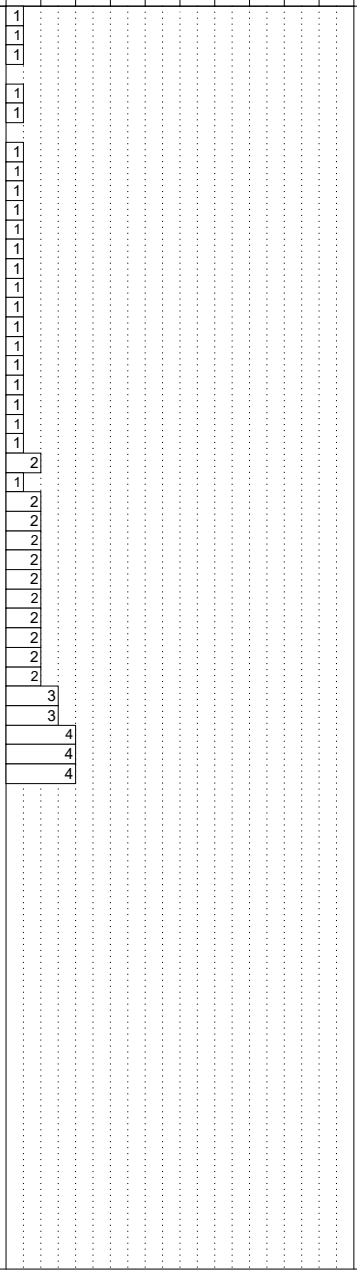
u2 150 cm² 10 cm²	Test according NEN 5140 class 1	Predrill:	0.00 m Predrilled
	G.L.: 0.00 m NAP / W.L.: 1.20 m	Date:	7/07/2022
Project:	132 Saxbys Road	Cone no.:	C10CFIIP.C13282
Location:	37°49'25.92"S, 175°16'15.00"E	Project no.:	Saxby Rd
Position:	0, 0 RD	CPT no.:	02 1/1

1.49

INVESTIGATION LOG

Job No.:	HD769		
Client:	Southpark Agri Developments Ltd	**No.:**	DCP01
Project:	16 Wickham Street, Hamilton		
Location:	NE corner of site	**Date:**	05.11.18
Co-ordinates:	-	**Logged By:**	GP
Elevation:	Ground	**Checked By:**	JB

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
		0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4				Groundwater Not Encountered



Photo

Remarks

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 9/11/2018 1:12:17 PM

INVESTIGATION LOG

Job No.:	HD769
No.:	DCP02
Client:	Southpark Agri Developments Ltd
Project:	16 Wickham Street, Hamilton
Location:	South - site centre
Co-ordinates:	-
Elevation:	Ground
Date:	05.11.18
Logged By:	GP
Checked By:	JB

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
		0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4		1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 2, 2, 1, 3, 2, 2, 3, 2, 3, 3, 3, 4, 3, 3, 3		Groundwater Not Encountered

Photo

Remarks

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

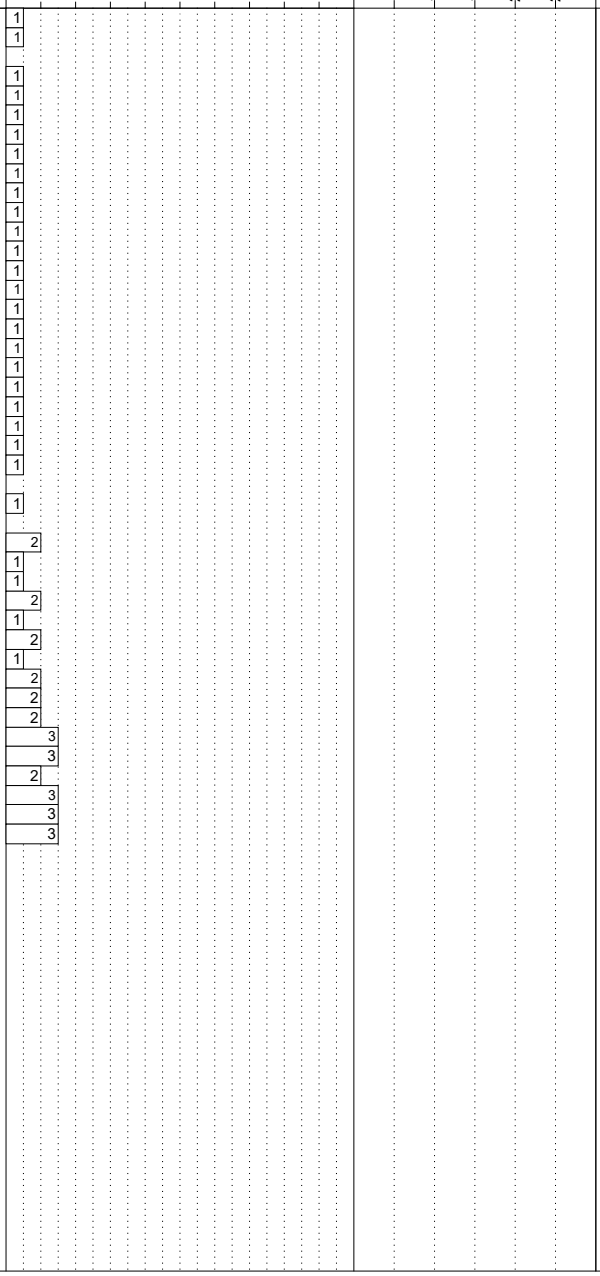
Generated with CORE-GS by Geroc - 9/11/2018 1:12:18 PM

NZGD ID: DCP_135571

INVESTIGATION LOG

Job No.:	HD769
No.:	DCP03
Client:	Southpark Agri Developments Ltd
Project:	16 Wickham Street, Hamilton
Location:	South boundary
Co-ordinates:	-
Elevation:	Ground
Date:	05.11.18
Logged By:	GP
Checked By:	JB

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
		0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4				Groundwater Not Encountered



Photo

Remarks

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

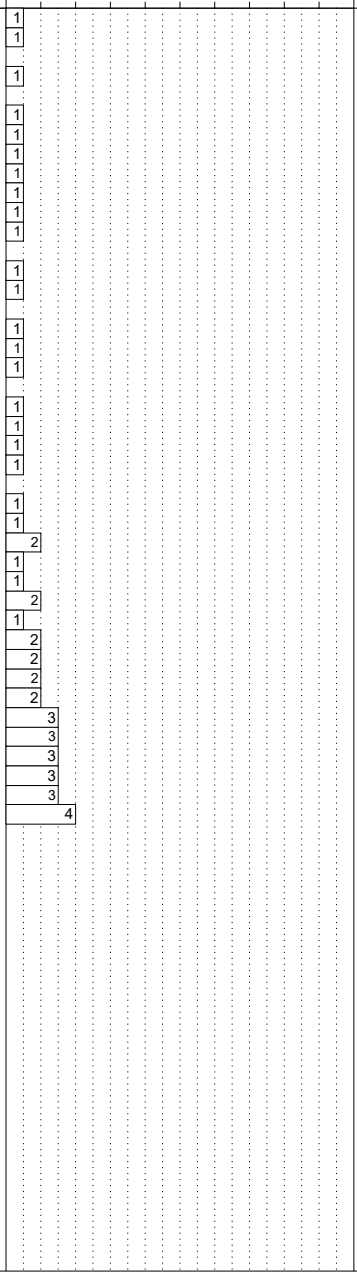
Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 9/11/2018 1:12:19 PM

INVESTIGATION LOG

Job No.:	HD769		
Client:	Southpark Agri Developments Ltd	**No.:**	DCP04
Project:	16 Wickham Street, Hamilton		
Location:	North - site centre	**Date:**	05.11.18
Co-ordinates:	-	**Logged By:**	GP
Elevation:	Ground	**Checked By:**	JB

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
		0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4				Groundwater Not Encountered



Photo

Remarks

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 9/11/2018 1:12:20 PM

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	P03
Location:	Stage 3B	**Date:**	18.11.20
Co-ordinates:	1798565mE, 5812427mN	**Logged By:**	BK/AM
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (PLASTIC) (PT); dark brownish black. Wet; rootlets.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
	PEAT (FIBROUS) (PT); black. Wet.	2.0				
	PEAT (FIBROUS) (PT); black. Wet.	2.2, 2.4, 2.6				
	EOH: 2.70 m					
		2.8				

Photo

Remarks

End of log at 2.7 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 13/01/2021 2:52:20 pm

INVESTIGATION LOG

Client: Les Harrison Group of Companies		**Job No.:** HD1389
Project: 160 Higgins St, Hamilton		**No.:** P04
Location: Stage 1A		**Date:** 18.11.20
Co-ordinates: 1799328mE, 5812455mN		**Logged By:** BK/AM
Elevation: Ground		**Checked By:**

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
	PEAT (PLASTIC) (PT); black. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
	EOH: 1.50 m	1.6				

Photo

Remarks

End of log at 1.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole ✓

Generated with CORE-GS by Geroc - 13/01/2021 2:52:22 pm

NZGD ID: BH_102027

BORE HOLE LOG

BORE HOLE NO: 5

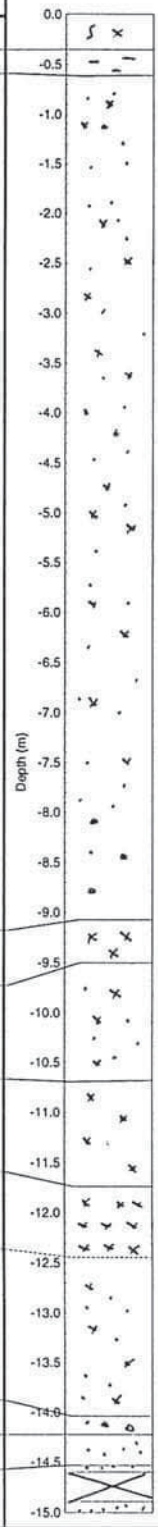
PROJECT: SAFE 73
RL GROUND(m) :
DATUM (m) :

LOCATION : CHINAMANS HILL REALIGNMENT
CO - ORDINATES :

PROJECT NO: 261443.00
LAB REF NO: 98/343/001

CORE DESCRIPTION *Rock or Soil Type, Colour, Strength, Structure, Particle Size, Weathering Lithological Features, (bedding, foliation, texture, mineralogy, etc)*	Depth (m)	ROCK DEFECTS / COMMENTS *Joints, bedding, seams, shear and crush Zones etc*	Water Level (Date)	Shear Strength (kPa)	SPT Values
Dark brown TOPSOIL	0.32				
Dark yellowish brown firm CLAY, plastic, moist	0.58				
Interbeded HW gravelly SILT / silty SAND banded light grey / yellowish brown / brown soft - firm, sensitive, very moist beds subhorizontal 50 - 300mm thick gravels HW soft subrounded upto 25mm ø occasional light grey sensitive SILT beds		Sand particles break down wet when remouldede			
Predominantly HW - CW silty SAND with lesser gravelly SILT and SILT beds banded orange brown / lt grey	9.07	Copper Ring Sample form 6.00 - 7.5m Copper Ring Sample form 9.0 - 10.5m			
Light grey homogenous SILT, some clay soft, sensitive, very moist	9.50				
Light grey HW pumiceous silty SAND sand medium - coarse some fine gravel	10.70				
Light grey homogenous SILT some clay, soft, very moist, sl plastic	11.75				
Light grey laminated SILT some fine sand, dilatant, non plastic	12.45				
Light grey pumiceous silty fine SAND loose, uniform, dilatant trace of silt occasional large pumice gravel inclusions	14.05				
Grey pumiceous sandy GRAVEL	14.22				
Grey pumiceous SAND fine - medium sand	14.55	Lost Core 14.55 - 14.90m			

Graphic Log



Driller : Drillwell
Started : 9/06/98
Finished : 10/06/98

OPUS INTERNATIONAL CONSULTANTS

Hamilton Laboratory
Fox Street
Private Bag 3057,
Hamilton, New Zealand
Ph: +64 7 856 2870
Fax: +64 7 856 2873

Comments

Logged by : P Smith	Checked	Date 6/98

NZGD ID: BH_102027

NZGD ID: BH_102027

BORE HOLE LOG

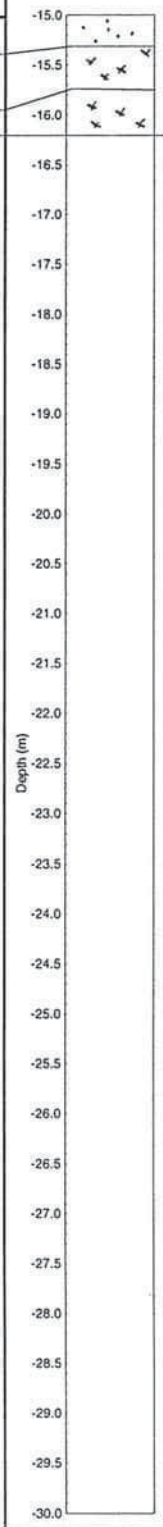
BORE HOLE NO: 5

PROJECT: SAFE 73
RL GROUND(m) :
DATUM (m) :

LOCATION : CHINAMANS HILL REALIGNMENT
CO - ORDINATES :

PROJECT NO: 261443.00
LAB REF NO: 98/343/001

CORE DESCRIPTION *Rock or Soil Type, Colour, Strength, Structure, Particle Size, Weathering Lithological Features, (bedding, foliation, texture, mineralogy, etc)*	Depth (m)	Graphic Log	ROCK DEFECTS / COMMENTS *Joints, bedding, seams, shear and crush Zones etc*	Water Level (Date)	Shear Strength (kPa)	SPT Values
Olive grey fine - medium SAND	15.30					
Light yellow soft highly sensitive SILT some fine sand	15.25					
White soft highly sensitive SILT, pumiceous	16.20		E.O.Bore 16.2m			



Driller : Drillwell
Started : 9/06/98
Finished : 10/06/98

OPUS
INTERNATIONAL CONSULTANTS

Hamilton Laboratory
Fox Street
Private Bag 3057,
Hamilton, New Zealand
Ph: +64 7 856 2870
Fax: +64 7 856 2873

Comments

Logged by:	P Smith	Checked	Date 6/98

NZGD ID: BH_102027

NZGD ID: BH_102028

BORE HOLE LOG

BORE HOLE NO: 6

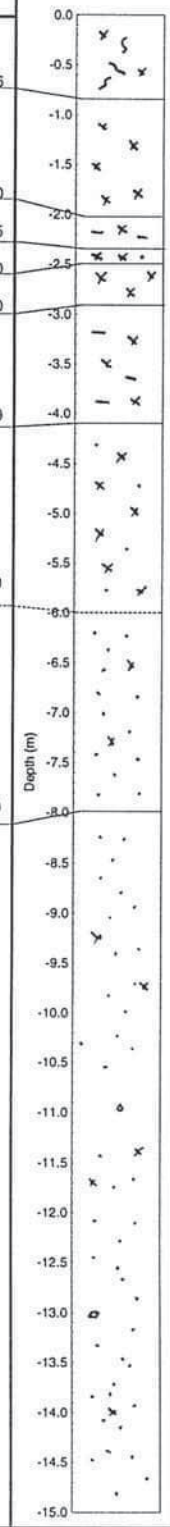
PROJECT: SAFE 73
RL GROUND(m) :
DATUM (m) :

LOCATION : CHINAMANS HILL REALIGNMENT
CO - ORDINATES :

PROJECT NO: 261443.00
LAB REF NO: 98/343/001

CORE DESCRIPTION *Rock or Soil Type, Colour, Strength, Structure, Particle Size, Weathering Lithological Features, (bedding, foliation, texture, mineralogy, etc)*	Depth (m)	ROCK DEFECTS / COMMENTS *Joints, bedding, seams, shear and crush Zones etc*	Water Level (Date)	Shear Strength (kPa)	SPT Values
Dark brown organic SILT soft, traces of peat, wet	0.85				
Brownish grey SILT some clay,initially soft becoming firm slightly plastic, occasioanl organic inclusions	2.00				
Dark greyish brown silty CLAY plastic, very sticky	2.35				
Light grey HW soft sandy SILT	2.50				
Brownish grey SILT soft, sensitive, very moist , sl organic	2.90				
Greyish brown clay SILT firm, some fine sand, very moist some organic fibres	4.10	Highly disturbed core from 3.6 - 4.0m			
Light bluish grey HW - CW sandy SILT soft, sensitive, some clay initially from 4 - 6m	6.00	Copper Ring Sample 4.0 - 5.7m			
Light bluish grey HW - CW silty fine SAND pumiceous, sand fine - medium, sensitive wet when remoulded	8.00				
Light blue MW homogenous gravelly fine - medium SAND loose - medium dense, trace of silt some pumice gravel upto 40mm ø generally < 10mm ø very moist		Copper Ring sample 8.7 - 10.3m			
Light bluish grey SW - MW homogenous gravelly SAND medium dense, fine - medium SAND gravels upto 50mm ø generally <15mm ø pumiceous, subrouneded					

Graphic Log



Driller : Drillwell
Started : 8/6/98
Finished : 9/06/98

OPUS
INTERNATIONAL CONSULTANTS

Hamilton Laboratory
Fox Street
Private Bag 3057,
Hamilton, New Zealand
Ph: +64 7 856 2870
Fax: +64 7 856 2873

Comments

Logged by :	P Smith	Checked	Date 6/98

NZGD ID: BH_102028

NZGD ID: BH_102028

BORE HOLE LOG

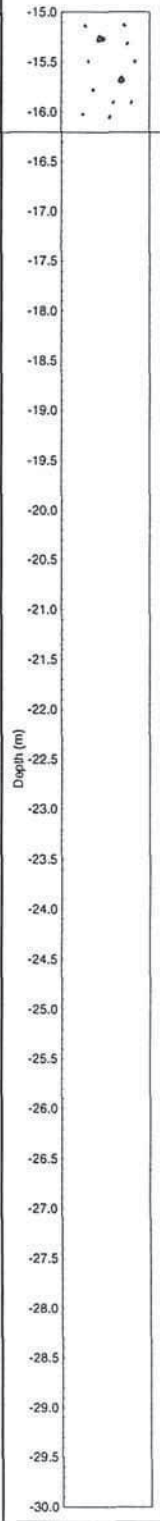
BORE HOLE NO: 6

PROJECT: SAFE 73
RL GROUND(m) :
DATUM (m) :

LOCATION : CHINAMANS HILL REALIGNMENT
CO - ORDINATES :

PROJECT NO: 261443.00
LAB REF NO: 98/343/001

CORE DESCRIPTION *Rock or Soil Type, Colour, Strength, Structure, Particle Size, Weathering Lithological Features, (bedding, foliation, texture, mineralogy, etc)*	Depth (m)	Graphic Log	ROCK DEFECTS / COMMENTS *Joints, bedding, seams, shear and crush Zones etc*	Water Level (Date)	Shear Strength (kPa)	SPT Values
Light bluish grey SW - MW gravelly SAND medium dense	16.20					
			E.O.Bore 16.2m			



Driller : Drillwell
Started : 8/06/98
Finished : 9/06/98

OPUS
INTERNATIONAL CONSULTANTS

Hamilton Laboratory
Fox Street
Private Bag 3057,
Hamilton, New Zealand
Ph: +64 7 856 2870
Fax: +64 7 856 2873

Comments

		Checked	Date
Logged by :	P Smith		6/98

NZGD ID: BH_102028

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH05

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE	5810281.764mN	
Orientation	-90°	Elevation	44.82m
Location	South Hamilton		
Feature	Ground conditions for potential bridge over NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
RECENT ALLUVIAL DEPOSITS: 0m to 0.2m: Fibrous peaty topsoil; dark blackish brown.							PEAT; dark brownish black. Very soft, fibrous, moist to wet, moderately strong to strong decomposition, H8 to H6, some undecomposed plant remains, brown to dark brown liquid when squeezed.	
0.2m to 1.5m: Recent swamp deposits; dark blackish brown. Peat, very soft, typically moderately strongly decomposed plant remains.			HQWL		1		CORE LOSS 1100mm - Driller notes wood stuck in the end of the core barrel.	A
1.5m to 6.8m: Recent alluvial deposits; grey to brownish grey. Typically sand and organic silt.		ss 1,0,0 N=0	SPT				Sandy SILT; grey. Very soft, moist to wet; sand, fine.	
					2		1.85m:150mm piece of decomposed wood.	
							Fine to medium SAND, trace silt; grey. Very loose; moist to wet; dilatant.	
			HQWL				SILT, trace sand; grey. Very soft, moist to wet; sand, fine.	
					3		2.9m:Brownish grey.	
			PT				3m:Tube pushed in the full 600mm but only 300mm of sample recovered.	
		ss 1,1,0 N=1	SPT				Organic SILT; dark brownish grey. Very soft, moist, slight organic odour.	
					4			
			HQWL					B
		ss 1,1,0 N=1	SPT					
					5		5m:Brownish grey, streaked black.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
0.91m	A		27/03/2012
1.02m	A		2/02/2012
4.58m	B		2/02/2012
4.67m	B		27/03/2012

Date logged	7/03/2011
Logged	KJB
Checked	DMM

Remarks
- DH located in farmland near Collins Rd and NIMTR
- Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.

Driller	Started
Perry	7/03/2011
Drill Rig: John Deere	Finished: 8/03/2011
Core Boxes	8

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane

Vane number | Blade | Factor

vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE 5810281.764mN
Orientation	-90° Elevation 44.82m
Location	South Hamilton
Feature	Ground conditions for potential bridge over NIMTR

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
RECENT ALLUVIAL DEPOSITS: 1.5m to 6.8m: Recent alluvial deposits; grey to brownish grey. Typically sand and organic silt.		ss 0,0,0 N=0 SUOW	HQWL		6		CORE LOSS 400mm - Driller notes very soft material possibly pushed to the side during drilling.	
			SPT				Organic SILT; light brownish grey. Very soft, moist, slight organic odour.	
Hinuera Formation: 6.8m to 19.4m: Current bedded alluvial sand, silt and gravel; grey to brownish grey. Typically fine to coarse sand with fine to medium gravel; locally bedded with 0.3 to 1.5m beds of fine sand and silt and occasional clay; imperivous zone of silt and clay from 6.8 directly below peat.			HQWL		7		SILT; grey. Very soft, moist. 7.2m:Light brownish grey. 7.4m:100mm bed of sandy silt, grey, speckled black, sand, medium.	
		ss 0,1,0 N=1	SPT					
			HQWL		8			
		ss 0,0,0 N=0 SUOW	SPT		9		Clayey SILT; light grey, streaked orange. Very soft, moist.	
			HQWL		10		Silty fine to medium SAND; grey, mottled black, orange, greenish brown, speckled black. Dense; moist; minor organic odour; breaks down to clay and releases water when worked.	
							CORE LOSS 200mm - Driller notes very soft soil possibly compressed in the core barrel during drilling.	
			PT				10.5m:Driller notes tube only pushed in 500mm.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date

Date logged	7/03/2011
Logged	KJB
Checked	DMM

Remarks

- DH located in farmland near Collins Rd and NIMTR
- Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.

Driller	Started
Perry	7/03/2011
Drill Rig	Finished
John Deere	8/03/2011
Core Boxes	8

Casing Details

Depth	Diameter	Remarks
11m	115mm	First drillhole.

Hand held Shear Vane

Vane number Blade Factor

vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE 5810281.764mN
Orientation	-90° Elevation 44.82m
Location	South Hamilton
Feature	Ground conditions for potential bridge over NIMTR

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 6.8m to 19.4m: Current bedded alluvial sand, silt and gravel; grey to brownish grey. Typically fine to coarse sand with fine to medium gravel; locally bedded with 0.3 to 1.5m beds of fine sand and silt and occasional clay; imperivous zone of silt and clay from 6.8 directly below peat.	ss 12,9,10 N=19	SPT					
		HQWL				Clayey SILT; grey, speckled and streaked orange. Hard, moist.	
	ss 3,4,3 N=7	SPT		12			
		HQWL		13		Clayey SILT; light brown, streaked grey. Stiff, moist. 12.7m:Trace medium sand, releases water when worked, brownish grey, speckled orange. 13.4m:Mottled brown, speckled black.	
	ss 2,1,3 N=4	SPT		14		13.9m:Yellowish brownish grey.	
		HQWL				Silty fine to medium SAND; grey blue. Dense; moist; well graded; breaks down and releases water when worked. Silty CLAY; streaked grey, orange, light brown and black. Hard, moist. Clayey SILT; grey streaked orange, light brown and black. Firm, moist, dilatant. 14.8m:20mm layer of silty fine to medium sand.	
	ss 2,3,6 N=9	SPT		15		Silty fine to medium SAND; dark brown. Loose; moist; pumiceous; breaks down and releases water when worked.	
		HQWL		16		Clayey SILT, trace fine sand; bluish grey. Hard, moist; sand, fine, mica flecks. SILT; light grey. Firm, moist.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date

Date logged	7/03/2011
Logged	KJB
Checked	DMM

Remarks
- DH located in farmland near Collins Rd and NIMTR
- Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.

Driller	Started
Perry	7/03/2011
Drill Rig: John Deere	Finished: 8/03/2011
Core Boxes	8

Casing Details

Depth	Diameter	Remarks
12m	115mm	Second drillhole (wash drilled to 16.5m).

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE 5810281.764mN
Orientation	-90° Elevation 44.82m
Location	South Hamilton
Feature	Ground conditions for potential bridge over NIMTR

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
Hinuera Formation: 6.8m to 19.4m: Current bedded alluvial sand, silt and gravel; grey to brownish grey. Typically fine to coarse sand with fine to medium gravel; locally bedded with 0.3 to 1.5m beds of fine sand and silt and occasional clay; imperivous zone of silt and clay from 6.8 directly below peat.			PT		17		SILT; light grey. Firm, moist.	
		ss 1,2,2 N=4	SPT				SILT; light grey. Firm, moist.	
			HQWL				17.8m:Grades to light brown.	
		ss 0,0,0 N=0 SUOW	SPT		18		18.2m:Trace fine sand, light grey.	
			HQWL		19		Sandy SILT; grey blue and brownish black. Firm, moist, sand, fine.	
							SILT; light grey. Firm, moist, sand, fine. 19m:Some fine sand. 19.1m:No sand. 19.15m:10mm bands of grey silt and greenish grey fine sandy silt.	
19.4m to 30.45m: Alluvial sand, silt and gravel; greenish grey to grey. Typically fine to medium sand and fine to medium gravel.		ss 4,6,9 N=15	SPT				Silty fine to medium SAND; dark green. Medium dense; moist; well graded; releases water when worked.	
			HQWL		20			
		ss 4,4,4 N=8	SPT		21			
			HQWL				Fine to medium SAND, minor silt; dark greenish grey. Dense; moist to wet.	

GROUNDWATER OBSERVATIONS
Depth Piezometer Reading Date

Date logged 7/03/2011
Logged KJB
Checked DMM

Remarks
- DH located in farmland near Collins Rd and NIMTR
- Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.

Driller Perry
Started 7/03/2011
Drill Rig John Deere
Finished 8/03/2011
Core Boxes 8

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE 5810281.764mN
Orientation	-90° Elevation 44.82m
Location	South Hamilton
Feature	Ground conditions for potential bridge over NIMTR

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
19.4m to 30.45m: Alluvial sand, silt and gravel; greenish grey to grey. Typically fine to medium sand and fine to medium gravel.			HQWL				Fine to medium SAND, minor silt; dark greenish grey. Dense; moist to wet.	
		ss 13,18,26 N=44	SPT				22.2m:Moist, trace silt, has 5mm bands of light grey and dark greenish grey.	
					23		23m:10mm bands of light greenish grey and light grey.	
			HQWL					
		ss 18,22,27 N=49	SPT		24		Fine SAND, trace silt; light grey. Dense; moist.	
			HQWL		25		24.5m:Fine to coarse sand, pumiceous.	
							25.3m:Gravel, fine to medium pumiceous.	
		ss 9,11,11 N=22	SPT					
					26			
			HQWL					
		ss 8,10,9 N=19	SPT		27		27m:Grades to yellowish grey, speckled black.	

Hinuera Formation

GROUNDWATER OBSERVATIONS				Remarks	Driller	Started
Depth	Piezometer	Reading	Date	- DH located in farmland near Collins Rd and NIMTR - Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.	Perry	7/03/2011
					Drill Rig: John Deere	Finished: 8/03/2011
					Core Boxes	8

Date logged	7/03/2011
Logged	KJB
Checked	DMM

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108646

NZGD ID: BH_108646

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH05**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799867.59mE 5810281.764mN
Orientation	-90° Elevation 44.82m
Location	South Hamilton
Feature	Ground conditions for potential bridge over NIMTR

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
19.4m to 30.45m: Alluvial sand, silt and gravel; greenish grey to grey. Typically fine to medium sand and fine to medium gravel. (Hinuera Formation)			HQWL		28		Fine SAND, trace silt; light grey. Dense; moist.	
		ss 10,12,12 N=24	SPT					
			HQWL		29		29.3m:Some medium gravel sized pumice. 29.4m:Dark grey with dark orange bedding.	
		ss 11,16,18 N=34	SPT		30		29.9m:Dense with minor coarse gravel sized pumice.	
					31		DH05 terminated at 30.45m Target Depth	
					32			

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	7/03/2011
Logged	KJB
Checked	DMM

Remarks
- DH located in farmland near Collins Rd and NIMTR
- Lost the push tube down the hole at 13.45m. Moved the drillhole location 1m and wash drilled to 16.5m.

Driller	Started
Perry	7/03/2011
Drill Rig: John Deere	Finished: 8/03/2011
Core Boxes	8

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108646

NZGD ID: BH_108648

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH08**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801259.27mE 5809301mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Road embankment foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
RECENT ALLUVIAL DEPOSITS: 0m to 5.1m: Swamp deposits; dark blackish brown. Very soft peat, typically moderately strongly decomposed plant remains; 0m to 0.1m has fibrous undecomposed plant remains and rootlets.							PEAT; dark brownish black. Very soft, wet, recognizable plant remains, moderately highly decomposed, 30% amorphous material released when squeezed (H6).	
			HQWL		1		CORE LOSS 800mm - drill barrel pushing through very soft peat.	
		ss 0,0,0 N=0 SUOW	SPT					
			HQWL		2		CORE LOSS 1050mm - drill barrel pushing through very soft peat.	
			PT		3		3m:Moderately highly decomposed, indistinct plant structure that when squeezed works to amorphus material.	
		ss 0,0,0 N=0 SUOW	SPT					
			HQWL		4			
		-/0	PT		5		CORE LOSS 600mm - push tube material lost/dropped out of tube, probably sensitive silt.	
			SPT				SILT; light grey. Very soft, wet, low plasticity.	

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date

Date logged	7/03/2011
Logged	DMM
Checked	AJB

Remarks
- Drillhole situated in drained peat farmland off Houchens Road.
- Shear vane test attempted at 4.5m material but to soft to register with 19mm vane blade.

Driller	Started
Perry	7/03/2011
Drill Rig	Finished
John Deere	7/03/2011
Core Boxes	4

Casing Details

Depth	Diameter	Remarks
3m	115mm	

Hand held Shear Vane
Vane number DR1870 Blade 19mm Factor 1.94(-7.72)
vane shear strength per NZGS guideline

Page 1 of 4

Date Printed: 25/06/2012

NZGD ID: BH_108648

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH08**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801259.27mE 5809301mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Road embankment foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 5.1m to 19.95m: Unweathered, current bedded alluvial sand, silt and gravel; light grey to brownish grey. Typically fine to coarse sand and fine to medium gravel, volcanogenic; locally bedded, laminated to thin, subhorizontal and very closely spaced, beds of fine sand and silt.		ss 1,2,3 N=5	HQWL				SILT; light grey. Very soft, wet, low plasticity.	
	UTP		PT		6		Fine to medium SAND, trace gravel; brownish grey. Medium dense; wet, gap graded; predominantly pumiceous with approximately 40% lithic clasts; gravel, fine, subangular to subrounded. 6m:Pushtube to be logged when extracted.	
		ss 4,5,7 N=12	SPT		7		Medium to coarse sand, minor gravel; brown and dark grey. Loose to medium dense; wet; gap graded through fine sand; predominantly lithic material i.e. quartz with <20% pumice; gravel, fine; subangular to angular.	
	UTP		HQWL				7.25m:Closely spaced beds of light grey pumiceous sand. Beds very thin to thin (20mm to 60mm) and subhorizontal.	
		ss 3,3,6 N=9	SPT				7.5m:Loose.	
			HQWL		8		8m:Gravel grades to fine to medium up to 15mm, moderatley widely spaced beds of fine sand, 20 to 60mm thick and subhorizontal.	
							CORE LOSS 700mm - saturated loose sand.	
		ss 1,2,4 N=6	SPT		9			
			HQWL		10		CORE LOSS 500mm - Saturated loose sand.	
		ss 7,9,11 N=20	SPT				Gravelly fine to medium SAND; dark grey. Medium dense; moist; gap graded; gravel, fine to coarse; subangular to rounded; clasts of andesite, rhyolite and other volcaniclastic material. 10.95m:100mm zone below SPT recovered as gravel only, fines probably washed out by drilling.	

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date

Date logged	7/03/2011
Logged	DMM
Checked	AJB

Remarks
- Drillhole situated in drained peat farmland off Houchens Road.
- Shear vane test attempted at 4.5m material but to soft to register with 19mm vane blade.

Driller	Started
Perry	7/03/2011
Drill Rig	Finished
John Deere	7/03/2011
Core Boxes	4

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR1870 Blade 19mm Factor 1.94(-7.72)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108648

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH08**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801259.27mE 5809301mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Road embankment foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation 5.1m to 19.95m: Unweathered, current bedded alluvial sand, silt and gravel; light grey to brownish grey. Typically fine to coarse sand and fine to medium gravel, volcanogenic; locally bedded, laminated to thin, subhorizontal and very closely spaced, beds of fine sand and silt.			HQWL				Gravelly fine to medium SAND; dark grey. Medium dense; moist; gap graded; gravel, fine to coarse; subangular to rounded; clasts of andesite, rhyolite and other volcaniclastic material. 11m:Drillers comment: gravels becoming core bound, starting split runs. 11.5m:Sand grades to fine to coarse.	
		ss 1,5,8 N=13	SPT		12		11.85m:100mm subhorizontal bed of dark grey, fine to medium sand.	
			HQWL		13		12.45m:Zones at the end of each run recovered as medium to coarse gravel only as fines are being washed out by drilling.	
							CORE LOSS 450mm - Saturated loose sand and gravel.	
		ss 5,9,15 N=24	SPT		14		Fine to coarse SAND, some gravel; dark grey. Medium dense; wet; well graded; predominantly lithic clasts; gravel, fine to medium; rounded to subangular.	
			HQWL				CORE LOSS 450mm - Loose sand and gravel.	
15.2m: 15.2m to 19.95m Silt content increases, typically bedded with fine to medium sand, colour grades to greenish grey and grey.		ss 0,0,0 N=0 SUOW	PT		15		Sandy SILT; dark grey. Very soft, moist to wet, sensitive, non plastic.	
			SPT		16			
			HQWL				Silty fine to medium SAND; dark grey. Very loose; moist to wet; gap graded; silt, slightly sensitive.	

GROUNDWATER OBSERVATIONS
Depth Piezometer Reading Date

Date logged 7/03/2011
Logged DMM
Checked AJB

Remarks
- Drillhole situated in drained peat farmland off Houchens Road.
- Shear vane test attempted at 4.5m material but to soft to register with 19mm vane blade.

Driller	Perry
Started	7/03/2011
Drill Rig	John Deere
Finished	7/03/2011
Core Boxes	4

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR1870 Blade 19mm Factor 1.94(-7.72)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108648

NZGD ID: BH_108648

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH08**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801259.27mE 5809301mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Road embankment foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 5.1m to 19.95m: Unweathered, current bedded alluvial sand, silt and gravel; light grey to brownish grey. Typically fine to coarse sand and fine to medium gravel, volcanogenic; locally bedded, laminated to thin, subhorizontal and very closely spaced, beds of fine sand and silt.	ss 1,1,1 N=2	SPT				Silty fine to medium SAND; dark grey. Very loose; moist to wet; gap graded; silt, slightly sensitive.	
	109/31	HQWL		17		SILT, some sand, some clay; greenish grey. Stiff, moist, plastic; sand, fine; localised zones/beds with no sand, 100 to 200mm thick.	
	ss 1,2,3 N=5	SPT		18		Sandy SILT; greenish grey. Soft to firm, moist, sensitive, releases moisture when worked; sand, fine to medium.	
	UTP	HQWL		19			
	ss 0,0,0 N=0 SUOW	SPT				SILT; light grey. Very soft, moist, slightly plastic.	
				20		DH08 terminated at 19.95m Target Depth	
				21			

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 7/03/2011	Remarks	Driller Perry	Started 7/03/2011
	Logged DMM	- Drillhole situated in drained peat farmland off Houchens Road. - Shear vane test attempted at 4.5m material but to soft to register with 19mm vane blade.	Drill Rig John Deere	Finished 7/03/2011
	Checked AJB		Core Boxes 4	
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number DR1870 Blade 19mm Factor 1.94(-7.72) *vane shear strength per NZGS guideline*	Page 4 of 4	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108648

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH101

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE	5810770mN	
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)
RECENT ALLUVIAL DEPOSITS: 0m to 0.3m: Peaty topsoil.	SILT; dark brown. Firm, moist to dry, minor fine rootlets. 0.15m:Grades to reddish brown.
RECENT ALLUVIAL DEPOSITS: 0.3m to 2m: Swamp deposits; dark blackish brown. Typically soft and cohesive; plant remains moderately strongly decomposed, small portion of material slightly decomposed and identifiable.	PEAT; blackish brown. Soft, wet, slightly sensitive, fibrous, organic material is typically moderatly strongly decomposed, approximately 5% is very slightly decomposed and plant structure is recognisable; when squeezed water is muddy.
	CORE LOSS 800mm - Finer material becomes core bound.
	Organic SILT; light grey, brown. Soft, wet, sensitive; organic material typically moderatly strongly decomposed with recognisable plant structure.
Hinuera Formation: 2m to 16m: Alluvial sand, silt and gravel; grey, light blue and brown. Zones 0.5m to 1.0m thick of varying grain size; typically a mix of pumice and other volcanogenic clasts.	Fine to coarse SAND; grey and light blue. Medium dense, moist, well graded; Lithic clasts prominent, quartz sandstone, rhyolite.
	3.1m:Some fine subrounded to subangular pumiceous gravel.
	CORE LOSS 150mm

Test Records: Shear Vane residual - peak 0 - 200 kPa; N Values 0 - 50

Drilling Method / Casing remarks: HQWL, SPT, HQWL, SPT, HQWL, SPT

Core Loss/Lift: 0 - 100%

Depth: 1, 2, 3, 4

Graphic Log

Instrumentation: A, B; 2 A; B, B

Test	Depth	N
SS	1.0	1
SS	3.0	12
SS	4.6	10

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
1.395m	A		2/02/2012
2.4m	A	2	27/03/2012
3.81m	B		2/02/2012
3.9m			29/11/2011
3.94m	B		27/03/2012
4.1m			30/11/2011

Date logged 29/11/2011
Logged DMM
Checked AJB

Remarks
- DH101 located in farmland off Collins Road adjacent to NIMTR.

Driller Perry
Started 29/11/2011
Drill Rig Morooka MST800
Finished 30/11/2011
Core Boxes 8

Casing Details

Depth	Diameter	Remarks
4m	83mm	

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH101

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE		5810770mN
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
Hinuera Formation: 2m to 16m: Alluvial sand, silt and gravel; grey, light blue and brown. Zones 0.5m to 1.0m thick of varying grain size; typically a mix of pumice and other volcanogenic clasts.			HQWL				Fine to medium SAND; grey and dark grey. Medium dense, moist; poorly graded; lithic and pumiceous clasts.	
6m: Organic rich zone 1m thick. Plant remains within silt are strongly decomposed.		ss 0,1,1 N=2	SPT		6		Organic SILT; dark brown. Soft, moist, organic odour, organic material amorphus.	
			PT					
7m: Composition is predominantly lithic.			HQWL		7		Fine to coarse SAND; dark grey. Loose to medium dense; moist; gap graded; predominantly fine to medium lithic clasts.	
		ss 5,8,5 N=13	SPT				Fine sandy SILT; greenish brown. Firm, moist, sensitive.	
			HQWL		8		8m:50mm zone of SILT; dark brown.	
							Fine SAND with some silt; grey to greenish grey. Loose; wet; poorly graded; locally silt content is higher and organic streaks common.	
							CORE LOSS 250mm - Loose material densifying.	
		ss 3,4,7 N=11	SPT		9		Silty fine SAND; brownish grey. Medium dense, moist; uniform grading.	
							9.45m:Closely spaced sub horizontal beds of SILT/ SAND and silty SAND, contacts are plannar and sharp.	
			HQWL				Fine to medium SAND; dark grey. Medium dense, wet; poorly graded; lithics.	

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date

Date logged	29/11/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland off Collins Road adjacent to NIMTR.

Driller	Started
Perry	29/11/2011
Drill Rig: Morooka MST800	Finished: 30/11/2011
Core Boxes	8

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH101**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE		5810770mN
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
Hinuera Formation: 2m to 16m: Alluvial sand, silt and gravel; grey, light blue and brown. Zones 0.5m to 1.0m thick of varying grain size; typically a mix of pumice and other volcanogenic clasts.			HQWL				Fine to medium SAND; dark grey. Medium dense, wet; poorly graded; lithics.	
							CORE LOSS 300mm - Soft material compacting.	
10.5m: Sand and gravel is almost entirely pumiceous.		ss 8,9,6 N=15	SPT				Fine to coarse SAND; dark grey and white. Medium dense, wet; well graded; predominantly pumiceous.	
			HQWL		11			
		ss 5,6,5 N=11	SPT		12			
							Silty fine SAND; grey, bedded. Dense; wet: uniform grading; bedding, closely spaced beds of fine to medium sand and fine sandy silt, 5-100mm thick, subhorizontal, sharp contacts.	
			HQWL		13		Fine SAND; grey. Medium dense; wet; poorly graded; pumiceous.	
		ss 15,14,18 N=32	SPT					
			HQWL		14		14.5m:Some silt.	

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date	Date logged 29/11/2011	Remarks - DH101 located in farmland off Collins Road adjacent to NIMTR.	Driller Perry	Started 29/11/2011
				Logged DMM		Drill Rig Morooka MST800	Finished 30/11/2011
				Checked AJB		Core Boxes 8	
Casing Details Depth	Diameter	Remarks			Hand held Shear Vane Vane number DR2257 Blade 19mm Factor 1.51(-2.96) *vane shear strength per NZGS guideline*	Page 3 of 6	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108663

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH101**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE		5810770mN
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 2m to 16m: Alluvial sand, silt and gravel; grey, light blue and brown. Zones 0.5m to 1.0m thick of varying grain size; typically a mix of pumice and other volcanogenic clasts. 15.5m: Colour change to green and brown.		SS 5,16,11 N=27	SPT				Fine SAND; grey. Medium dense; wet; poorly graded; pumiceous.	
			HQWL		16		Sandy SILT; greenish brown. Soft; wet; non plastic; sensitive. CORE LOSS 650mm - Material collapsing from further up hole and contaminating SPT sample (core lost from top 0.65m).	
16m to 21m: Alluvial silt and clay with some sand; brownish grey and green. Possible period of low energy conditions.	33/12	SS 1,1,3 N=4	SPT				SILT; brownish grey and green. Soft, wet, non plastic, sensitive; organic odour.	
			PT		17		Push Tube	
			HQWL				Silty CLAY, some sand; greenish brown. Firm, moist, low plasticity; sand, fine to medium and locally coarse.	
	45/18	SS 0,0,0 N=0 SUOW	SPT		18			
			HQWL		19		18.7m:No sand. Light grey stained black and orange.	
	42/12	SS 0,1,2 N=3	SPT				Fine to medium SAND, trace gravel; greenish grey. Medium dense; moist; poorly graded; gravel, fine; lithic clasts common.	

GROUNDWATER OBSERVATIONS
Depth Piezometer Reading Date

Date logged	29/11/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland off Collins Road adjacent to NIMTR.

Driller	Perry
Started	29/11/2011
Drill Rig	Morooka MST800
Finished	30/11/2011
Core Boxes	8

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH101**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE		5810770mN
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 16m to 21m: Alluvial silt and clay with some sand; brownish grey and green. Possible period of low energy conditions.			HQWL				Silty fine to medium SAND; light greenish grey. Medium dense; moist; poorly graded; sensitive; sub horizontal dark grey and grey stained zones.	
							Fine to coarse SAND with some gravel; dark brownish grey. Medium dense, moist; gravel, fine to coarse; well graded; pumiceous and lithic clasts. 20.8m:50mm zone of heavy dark green staining; siltstone gravel with a diameter of up to 15mm, pumiceous clasts with diameters of up to 60mm.	
21m to 27.45m: Slightly weathered, sand and gravel; grey to light grey. Massive, poorly sorted, dense, fine to medium sand and gravel (Puketoka formation distal ignimbrite?).		ss 20,28,22 for 95mm N>50	SPT		21		Fine to medium SAND with minor gravel; brownish grey. Dense to very dense, moist; well graded; predominantly pumiceous with 10% lithics.	
			HQWL		22			
		ss 17,30,20 for 110mm N>50	SPT					
			HQWL		23			
		ss 12,17,25 N=42	SPT		24			
			HQWL					

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	29/11/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland off Collins Road adjacent to NIMTR.

Driller	Perry
Drill Rig	Morooka MST800
Core Boxes	8
Started	29/11/2011
Finished	30/11/2011

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108663

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH101

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799734mE		5810770mN
Orientation	-90°	Elevation	43.09m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
21m to 27.45m: Slightly weathered, sand and gravel; grey to light grey. Massive, poorly sorted, dense, fine to medium sand and gravel (Puketoka formation distal ignimbrite?).		ss 12,32,18 for 30mm N>50	HQWL SPT HQWL SPT		26 27		Fine to medium SAND with minor gravel; brownish grey. Dense to very dense, moist; well graded; predominantly pumiceous with 10% lithics.	
		ss 5,9,16 N=25						
					28 29		DH101 terminated at 27.45m Target Depth	

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date

Date logged	29/11/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland off Collins Road adjacent to NIMTR.

Driller	Started
Perry	29/11/2011
Drill Rig: Morooka MST800	Finished: 30/11/2011
Core Boxes	8

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108663

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH102**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE		5810563mN
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
0m to 0.6m: Organic rich topsoil.							SILT; dark brown. Firm, moist, non plastic; undecomposed rootlets common.	
							Organic SILT; reddish brown. Firm, moist, slightly sensitive; organic material is generally very slightly decomposed roots, 10% of organic material is moderatly to strongly decomposed.	
0.6m to 1.3m: Alluvial silt with minor organic streaking and staining; brown to light brownish grey.			HQWL		1		Clayey SILT; light brownish grey. Firm, moist, low plasticity, non sensitive, manganese stained.	
							Sandy SILT; light brownish grey. Firm, moist, low plasticity; sand, fine to medium.	
1.3m to 15.6m: Alluvial sand and gravel; light brown to grey. Loose to medium dense; coarse sand and fine gravel is prominent.		42/5 ss 2,3,5 N=8	SPT		2		Medium to coarse SAND; light brown. Loose to medium dense; wet; poorly graded; quartz prominent. 1.5m:Trace fine gravel; dark brown. Predominantly pumice.	
			HQWL				CORE LOSS 650mm - Loose gravel.	
		ss 4,4,5 N=9	SPT		3		Fine to coarse SAND with minor gravel; grey speckled black. Medium dense; moist; well graded; predominantly quartz; gravel, pumice, ignimbrite and rhyolite.	
			HQWL		4			
		ss 1,3,8 N=11	SPT					
			HQWL		5		CORE LOSS 400mm - Catcher malfunction and core after SPT lost.	

Hinuera Formation

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date
2.18m			2/02/2012
3.45m			2/02/2012

Date logged	8/12/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.

Driller	Started
Perry	8/12/2011
Drill Rig	Finished
Morooka MST800	9/12/2011
Core Boxes	7

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108664

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH102

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE	5810563mN	
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 1.3m to 15.6m: Alluvial sand and gravel; light brown to grey. Loose to medium dense; coarse sand and fine gravel is prominent. 5.8m: Local organic rich silt zones, organic material is well decomposed.		ss 3,2,2 N=4	HQWL				Fine to medium SAND; grey. Medium dense; wet; poorly graded.	
							Silty fine SAND; grey. Medium dense; moist; uniformly graded; silt, non plastic.	
					6		Organic SILT; blackish brown. Firm, moist, organic material almost entirely decomposed, low plasticity.	
			SPT				Fine SAND; light brown. Medium dense; moist; uniform grading; <5% medium to coarse pumice.	
		54/12					SILT; light greenish brown. Firm; moist; releases moisture and loses strength when worked.	
			HQWL		7		Fine SAND with some silt; grey, bedded. Medium dense; moist; uniform grading; bedding, closely spaced beds with some silt, 50mm thick, subhorizontal.	
		ss 5,2,8 N=10	SPT					
					8			
8.4m: 1.5m zone where grainsize grading finer with beds of silty fine sand and silt moderately widely spaced and 20 to 30mm thick.			HQWL				SILT; light grey. Firm; moist; releases moisture when worked. 8.55m:Dark brown.	
							Fine SAND with some silt; grey, bedded. Medium dense; moist; uniform grading; bedding, closely spaced beds with some silt, 50mm thick, subhorizontal.	
		ss 5,7,7 N=14	SPT		9		Sandy SILT; greenish grey. Firm, moist, non plastic, non sensitive; sand is fine.	
			HQWL		10		Fine to coarse SAND; dark grey, speckled white. Medium dense, moist, well graded; equal proportions of pumice and lithic material. 10m:Closely spaced beds of fine sand, 50mm thick, sub horizontal. 10.4m:Closely spaced beds of coarse sand and fine gravel, 20 to 50mm thick, sub horizontal; gravel, pumiceous.	
		ss 7,10,12 N=22	SPT					

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	8/12/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.

Driller	Started
Perry	8/12/2011
Drill Rig: Morooka MST800	Finished: 9/12/2011
Core Boxes	7

Casing Details

Depth	Diameter	Remarks
6m	83mm	

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH102**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE		5810563mN
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 1.3m to 15.6m: Alluvial sand and gravel; light brown to grey. Loose to medium dense; coarse sand and fine gravel is prominent.			HQWL				Fine to coarse SAND; dark grey, speckled white. Medium dense, moist, well graded; equal proportions of pumice and lithic material.	
		ss 5,9,9 N=18	SPT		12		12m:Beds of fine sand and silt. Fine sand beds are 20 to 30mm thick.	
			HQWL		13			
		ss 6,6,8 N=14	SPT		14			
			HQWL				Fine SAND; grey. Medium dense, wet, uniformly graded.	
			PT		15		Silty fine SAND; grey. Medium dense; moist; uniformly graded; silt, non plastic. 15m:Push tube to be logged when extracted.	
15.6m to 22.5m: Moderately weathered lacustrine and alluvial deposits; dark grey and brown. Typically clay, silty clay and silt; some sand breaks down when worked and is intermixed with clay and silt, locally bedded in zones 50 to 100mm thick.			HQWL		16		SILT; dark grey. Firm, moist, moderate plasticity, non sensitive. CORE LOSS 250mm - Over hit SPT.	

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	8/12/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.

Driller	Started
Perry	8/12/2011
Drill Rig	Finished
Morooka MST800	9/12/2011
Core Boxes	7

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH102**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE	5810563mN	
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
Hinuera Formation: 15.6m to 22.5m: Moderately weathered lacustrine and alluvial deposits; dark grey and brown. Typically clay, silty clay and silt; some sand breaks down when worked and is intermixed with clay and silt, locally bedded in zones 50 to 100mm thick.		ss 0,1,2 N=3	SPT				Clayey SILT; grey. Firm, moist, low plasticity.	
	42/27		HQWL		17			
							CORE LOSS 400mm - Core barrell pushing soft material out of way.	
	73/42		PT		18			
		ss 0,1,3 N=4	SPT				SILT with some clay; light grey. Soft, moist, sensitive, releases moisture when worked; less than 5% fine sand.	
			HQWL		19		Fine to medium SAND; green and grey. Loose to medium dense; moist; poorly sorted; pumiceous; 15mm bed of silty clay within sand; dark green; hard.	
		ss 1,0,0 N=0	SPT				Silty CLAY; light brown. Firm to stiff, moist, plastic.	
			HQWL		20		20m:Trace fine to medium sand; light greenish grey.	
							Sandy silty CLAY; greenish grey. Stiff, moist, plastic; sand, fine to medium, mica, muscovite, quartz; zones with higher sand content 20 to 50mm thick.	
							Silty SAND; greenish grey. Medium dense, moist, poorly graded; silt, slightly plastic; trace organic streaks.	
		ss 2,1,5 N=6	SPT		21		Clayey SILT; light grey, bedded. Firm, moist, plastic; interbedded with fine to coarse SAND, brown; loose; well graded; pumiceous; bedding close to very closely spaced, 50 to 100mm thick.	
			HQWL					

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date

Date logged	8/12/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.

Driller	Started
Perry	8/12/2011
Drill Rig: Morooka MST800	Finished: 9/12/2011
Core Boxes	7

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH102**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE		5810563mN
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
			HQWL				Clayey SILT; light grey, bedded. Firm, moist, plastic; interbedded with fine to coarse SAND, brown; loose; well graded; pumiceous; bedding close to very closely spaced, 50 to 100mm thick. 22.15m:Sharp change to dark brown.	
22.5m to 30m: Alluvial sand and gravel; dark green and greenish grey. Gravel is fine to medium and rounded to subrounded (Puketoka Formation).		ss 12,22,23 N=45	SPT				Fine to medum SAND; dark grey and green. Dense; moist; poorly graded; pumiceous; stained green.	
			HQWL		23			
		ss 8,15,28 N=43	SPT		24		Fine SAND; grey. Dense; moist; uniform grading; pumiceous.	
			HQWL		25		Fine to coarse SAND; greenish grey. Dense; well graded; pumiceous. Coarse SAND with some gravel; dark greenish grey. Dense; wet; poorly graded; mixed pumice, quartz and ignimbrite; clasts rounded to sub-rounded.	
		ss 13,20,21 N=41	SPT					
			HQWL		26			
		ss 11,14,12 N=26	SPT		27			

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	8/12/2011
Logged	DMM
Checked	AJB

Remarks
- DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.

Driller	Started
Perry	8/12/2011
Drill Rig	Finished
Morooka MST800	9/12/2011
Core Boxes	7

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number DR2257 Blade 19mm Factor 1.51(-2.96)
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108664

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH102**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799895mE		5810563mN
Orientation	-90°	Elevation	42.0m
Location	South Hamilton		
Feature	Bridge NIMTR		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
22.5m to 30m: Alluvial sand and gravel; dark green and greenish grey. Gravel is fine to medium and rounded to subrounded (Puketoka Formation).			HQWL		28		Fine to coarse SAND with some gravel; dark greenish grey. Dense; wet; well graded; pumice lithic mix; gravel is fine; pumice.	
		ss 10,20,24 N=44	SPT				CORE LOSS 0.3m	
			HQWL		29			
					30		DH102 terminated at 30m Target Depth	
					31			
					32			

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date	Date logged 8/12/2011	Remarks - DH101 located in farmland accessed from Houchens Road adjacent to NIMTR.	Driller Perry	Started 8/12/2011
				Logged DMM		Drill Rig Morooka MST800	Finished 9/12/2011
				Checked AJB		Core Boxes 7	
Casing Details Depth	Diameter	Remarks			Hand held Shear Vane Vane number DR2257 Blade 19mm Factor 1.51(-2.96) *vane shear strength per NZGS guideline*	Page 6 of 6	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108664

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH103**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801146.366mE 5809622.397mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge foundations and road embankment

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
FILL: 0m to 0.7m: Mixed clay and gravel fill associated with road construction.		DUG				CLAY with trace gravel; dark brown. Very soft to firm; dry; low plasticity. Gravel is fine to medium; subangular to angular sandstone.	A
RECENT ALLUVIAL DEPOSITS: 0.7m to 3.4m: Swamp/peat deposits; black. Highly compressible peat.	ss 0,0,0 N=0 SUOW	HQWL, SPT, HQWL, PT		1, 2, 3		PEAT; dark brown to black. Very soft; moist; high plasticity; fibrous to amorphous; some plant remains moderately decomposed and recognisable, muddy water when squeezed (H5). 2.8m:Graded to dark brown. 3m:Push tube fail.	A
Hinuera Formation: 3.4m to 20.75m: Alluvium; brownish to bluish grey. Cohesive materials are firm, granular materials are medium dense to dense; very thinly to laminated bedding.	ss 3,5,4 N=9; ss 3,5,5 N=10	SPT, HQWL, SPT, HQWL		4, 5		SILT; light brownish grey. Very soft; moist; medium to high plasticity. Silty fine SAND; light brownish grey. Loose; moist to wet; highly dilatant. Fine to coarse SAND with trace silt; light brownish grey. Medium dense; wet; pumiceous and quartzitic. 4.5m:Grades to light grey.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
0.35m			27/03/2012
1.42m	A		2/02/2012

Date logged	2/12/2011
Logged	AJB
Checked	DMM

Remarks
- DH103 located in road verge along Houchens Road

Driller	Started
Perry	2/12/2011
Drill Rig	Finished
Morooka MST800	2/12/2011
Core Boxes	6

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH103**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801146.366mE 5809622.397mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge foundations and road embankment

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
Hinuera Formation: 3.4m to 20.75m: Alluvium; brownish to bluish grey. Cohesive materials are firm, granular materials are medium dense to dense; very thinly to laminated bedding.	ss 4,4,3 N=7	HQWL		6		Fine to coarse SAND with trace silt; light brownish grey. Medium dense; wet; pumiceous and quartzitic. 5.5m:Fine rounded pumiceous gravel.	A
		SPT					
		HQWL		7		Silty fine to coarse SAND with some peat; dark brownish grey. Loose; moist; pumiceous and quartzitic, coarse sand is rounded pumice. Fine to coarse SAND with trace gravel; grey. Medium dense; moist; quartzitic and pumiceous; gravel, fine to medium; subangular to subrounded pumice and various igneous lithologies.	
	ss 5,7,9 N=16	SPT					
		HQWL		8		8m:Trace fine gravel, subrounded to rounded pumice and green sandstone.	
	ss 7,5,5 N=10	SPT		9		Gravelly fine to coarse SAND. Medium dense; moist; gravel, fine to medium, subrounded to subangular pumice, sandstone and mixed igneous lithologies.	
		HQWL		10			
	ss 5,6,9 N=15	SPT					

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 2/12/2011	Remarks - DH103 located in road verge along Houchens Road	Driller Perry	Started 2/12/2011
	Logged AJB		Drill Rig Morooka MST800	Finished 2/12/2011
	Checked DMM		Core Boxes 6	
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 2 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108665

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH103

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801146.366mE 5809622.397mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge foundations and road embankment

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak 0 - 200 kPa	Test Records: N Values 0 - 50	Drilling Method / Casing remarks	Core Loss/Lift 0 - 100%	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A
Hinuera Formation: 3.4m to 20.75m: Alluvium; brownish to bluish grey. Cohesive materials are firm, granular materials are medium dense to dense; very thinly to laminated bedding.		ss 7,15,22 N=37	HQWL		12		Gravelly fine to coarse SAND. Medium dense; moist; gravel, fine to medium, subrounded to subangular pumice, sandstone and mixed igneous lithologies.	
			SPT					
			HQWL		13			
		ss 4,5,10 N=15	SPT					
			HQWL		14			
		ss 5,6,10 N=16	SPT		15			
			HQWL		16		16m:No gravel and sand grading to fine.	
							Clayey SILT with trace sand; light bluish grey. Very soft to soft; moist; high plasticity; sand, fine.	

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 2/12/2011	Remarks - DH103 located in road verge along Houchens Road	Driller Perry	Started 2/12/2011
	Logged AJB		Drill Rig Morooka MST800	Finished 2/12/2011
	Checked DMM		Core Boxes 6	
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 3 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108665

NZGD ID: BH_108665

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH103**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801146.366mE 5809622.397mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge foundations and road embankment

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
Hinuera Formation: 3.4m to 20.75m: Alluvium; brownish to bluish grey. Cohesive materials are firm, granular materials are medium dense to dense; very thinly to laminated bedding.		ss 0,1,0 N=1	SPT				Clayey SILT with trace sand; light bluish grey. Very soft to soft; moist; high plasticity; sand, fine.	A
			HQWL		17		17.6m:Grades to fine to coarse pumiceous sand.	
		ss 1,3,1 N=4	SPT		18		17.8m:30mm organic rich layer.	
			HQWL		19		Silty SAND with trace gravel; brownish grey. Medium dense; moist; quartzitic and micaceous. 18.5m:20mm band of light grey silt.	
		ss 4,7,11 N=18	SPT		20			
			HQWL					
20.75m to 22.55m: Lacustrine deposits; greyish brown; very soft to firm.		ss 3,3,3 N=6	SPT		21		Silty CLAY with trace sand; greyish brown. Very soft to firm; moist; high plasticity.	
			HQWL					

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	2/12/2011
Logged	AJB
Checked	DMM

Remarks
- DH103 located in road verge along Houchens Road

Driller	Perry
Started	2/12/2011
Drill Rig	Morooka MST800
Finished	2/12/2011
Core Boxes	6

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108665

NZGD ID: BH_108665

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH103**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1801146.366mE 5809622.397mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge foundations and road embankment

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
20.75m to 22.55m: Lacustrine deposits; greyish brown; very soft to firm. (Hinuera Formation)			HQWL				Sandy clayey SILT; blueish grey. Soft; moist; low plasticity. Sand is fine. 21.98m:Organic rich layer.	A
22.55m to 25.95m: Alluvial sand silt and gravel; brownish to bluish grey. Cohesive materials are firm, granular materials are loose to dense.		ss 7,12,8 N=20	SPT				Fine to medium SAND with trace silt; brownish grey. Medium dense; moist.	
			HQWL		23		Fine to coarse SAND with trace gravel; dark greyish green. Medium dense; moist; sand is quartzitic and pumiceous; gravel is subrounded to rounded pumice.	
		ss 8,11,16 N=27	SPT		24			
			HQWL		25			
		ss 15,19,31 for 145mm N>50	SPT					
					26		DH103 terminated at 25.95m Target Depth	
					27			

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	2/12/2011
Logged	AJB
Checked	DMM

Remarks
- DH103 located in road verge along Houchens Road

Driller	Started
Perry	2/12/2011
Drill Rig	Finished
Morooka MST800	2/12/2011
Core Boxes	6

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108665

NZGD ID: BH_108667

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH105

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802772.716mE	5808684.754mN	
Orientation	-90°	Elevation	52.59m
Location	South Hamilton		
Feature	Ground conditions for cutting		

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
RECENT ALLUVIAL DEPOSITS 0m to 3m: Swamp and lacustrine deposits; dark blackish brown. Soft amorphous material with nearly completely decomposed plant remains.		ss 0,0,0 N=0 SUOW	HQWL SPT		1		PEAT; blackish brown. Soft, wet, dilatant, >50% of organic material is completely decomposed, unrecognisable and smears when worked, water is brown when sample squeezed, recognisable organic material is moderately decomposed and retains strength.	A B
			HQWL PT		2		Organic Clayey SILT; light brown. Soft, wet, dilatant; organic material is roots up to 5mm diameter, very slight decomposition.	
3m to 4m: Possible weathered ash colluvium accumulating at the base of slope.		ss 0,0,0 N=0 SUOW	SPT HQWL		3		Silty CLAY; light brown. Moist, stiff, plastic.	
4m to 6m: Alluvial sand, silt and clay; light greenish grey. Sand is pumice and rhyolite mix, pumiceous sand is weathered and breaks down when worked.		ss 0,1,1 N=2	SPT HQWL		4 5		Sandy clayey SILT; light greenish grey. Stiff, moist, low plasticity, non sensitive; sand, fine to medium, some breaks down to clayey silt when worked.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
0m	A		2/02/2012
0.5m			18/01/2012
0.85m	B		27/03/2012

Date logged	17/01/2012
Logged	DMM
Checked	AJB

Remarks

- DH105 located in farmland base of slope west of SH3 and DH104.
- Water pressure increased when drilling through pumice zone at 9.8m. End of drilling 17/01/2012 artesian water flow from DH rods observed.

Driller	Started
Perry	17/01/2012
Drill Rig	Finished
Morooka MST800	18/01/2012
Core Boxes	6

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane

Vane number Blade Factor

vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108667

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH105

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802772.716mE 5808684.754mN
Orientation	-90° Elevation 52.59m
Location	South Hamilton
Feature	Ground conditions for cutting

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
RECENT ALLUVIAL DEPOSITS: 4m to 6m: Alluvial sand, silt and clay; light greenish grey. Sand is pumice and rhyolite mix, pumiceous sand is weathered and breaks down when worked.		HQWL				Sandy clayey SILT; light greenish grey. Stiff, moist, low plasticity, non sensitive; sand, fine to medium, some breaks down to clayey silt when worked.	
6m to 8.4m: Slightly weathered alluvial sand; Dark green. Loose and well graded.	ss 1,1,2 N=3	SPT		6		Fine to coarse SAND; dark green. Loose to very loose; moist; well graded; equal proportions of lithic and pumice clasts; approximately 10% of material breaks down to grey silt when worked.	
		HQWL		7		CORE LOSS 0.5m	
	ss 1,3,4 N=7	SPT		8			
PUKETOKA FORMATION: 8.4m to 9.5m: Alluvial and lacustine clay and silt; grey and greenish brown, soft.		HQWL				Silty CLAY; light grey and green. Stiff, moist, low plasticity; sub-horizontal to gently inclined green staining.	
	ss 0,1,2 N=3	SPT		9			
9.5m to 23m: Slightly weathered un-welded pumiceous ignimbrite; light greenish grey. Fine to medium, angular pumice clasts within dense pumice sand.		HQWL		10		Sandy clayey SILT; greenish grey. Stiff, moist, moderate plasticity, contains <5% weathered pumiceous gravel that works to clay.	2 A
						Gravelly fine to coarse SAND; light greeenish grey. Dense; moist; well graded; sand is almost entirely pumiceous; gravel, fine to medium, angular to subrounded; pumice with less than 10% lithic clasts.	
	ss 8,14,18 N=32	SPT					B

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
10m	A	2	27/03/2012
10.85m	B		2/02/2012

Date logged	17/01/2012
Logged	DMM
Checked	AJB

Remarks

- DH105 located in farmland base of slope west of SH3 and DH104.
- Water pressure increased when drilling through pumice zone at 9.8m. End of drilling 17/01/2012 artesian water flow from DH rods observed.

Driller	Perry
Started	17/01/2012
Drill Rig	Morooka MST800
Finished	18/01/2012
Core Boxes	6

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane

Vane number Blade Factor

vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108667

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH105**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802772.716mE 5808684.754mN
Orientation	-90° Elevation 52.59m
Location	South Hamilton
Feature	Ground conditions for cutting

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 9.5m to 23m: Slightly weathered un-welded pumiceous ignimbrite; light greenish grey. Fine to medium, angular pumice clasts within dense pumice sand.			HQWL				Gravelly fine to coarse SAND; light greeenish grey. Dense; moist; well graded; sand is almost entirely pumiceous; gravel, fine to medium, angular to subrounded; pumice with less than 10% lithic clasts.	
		ss 4,11,15 N=26	SPT		12		12m:Medium dense.	
			HQWL		13			
		ss 5,13,17 N=30	SPT				13.5m:SPT sample lost.	
			HQWL		14			
		ss 10,15,22 N=37	SPT		15		15m:Dense and cemented by weathering of iron minerals, difficult to scrape with knife.	
			HQWL		16			

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date	Date logged 17/01/2012 Logged DMM Checked AJB	Remarks - DH105 located in farmland base of slope west of SH3 and DH104. - Water pressure increased when drilling through pumice zone at 9.8m. End of drilling 17/01/2012 artesian water flow from DH rods observed.	Driller Perry Drill Rig Morooka MST800 Core Boxes 6	Started 17/01/2012 Finished 18/01/2012
Casing Details Depth	Diameter	Remarks			Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*		Page 3 of 5

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108667

NZGD ID: BH_108667

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH105**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802772.716mE 5808684.754mN
Orientation	-90° Elevation 52.59m
Location	South Hamilton
Feature	Ground conditions for cutting

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 9.5m to 23m: Slightly weathered un-welded pumiceous ignimbrite; light greenish grey. Fine to medium, angular pumice clasts within dense pumice sand.		ss 10,17,29 N=46	SPT				Gravelly fine to coarse SAND; light greeenish grey. Dense; moist; well graded; sand is almost entirely pumiceous; gravel, fine to medium, angular to subrounded; pumice with less than 10% lithic clasts.	
			HQWL		17			
		ss 15,22,28 for 80mm N>50	SPT		18		18m:Very dense.	
			HQWL		19		19m:Pumice gravel is weathered and smears with finger pressure.	
		ss 28,37 N=65	SPT		20			
			HQWL				20.5m:Sand is mostly fine to medium, mica common, charcoal fragments up to 15mm diameter can be plucked from core with fingers.	
		ss 13,30,20 for 5mm N>50	SPT		21			
			HQWL					

GROUNDWATER OBSERVATIONS Depth	Piezometer	Reading	Date	Date logged 17/01/2012	Remarks	Driller Perry	Started 17/01/2012
				Logged DMM	- DH105 located in farmland base of slope west of SH3 and DH104. - Water pressure increased when drilling through pumice zone at 9.8m. End of drilling 17/01/2012 artesian water flow from DH rods observed.	Drill Rig Morooka MST800	Finished 18/01/2012
				Checked AJB		Core Boxes 6	
Casing Details Depth	Diameter	Remarks			Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 4 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108667

NZGD ID: BH_108667

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH105**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1802772.716mE 5808684.754mN
Orientation	-90° Elevation 52.59m
Location	South Hamilton
Feature	Ground conditions for cutting

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane residual - peak 0 - 200 kPa	Test Records: N Values 0 - 50	Drilling Method / Casing remarks	Core Loss/Lift 0 - 100%	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 9.5m to 23m: Slightly weathered un-welded pumiceous ignimbrite; light greenish grey. Fine to medium, angular pumice clasts within dense pumice sand.		ss 23,31,19 for 40mm N>50	HQWL SPT				Gravelly fine to coarse SAND; light greeenish grey. Dense; moist; well graded; sand is almost entirely pumiceous; gravel, fine to medium, angular to subrounded; pumice with less than 10% lithic clasts.	
23m to 25.95m: Unweathered pumiceous ignimbrite; light greenish grey. Poorly sorted angular to sub rounded pumice gravel and sand.		ss 17,34,16 for 40mm N>50 ss 21,35,15 for 35mm N>50	HQWL SPT HQWL SPT		23 24 25		23m:Gravel is medium to coarse and unweathered.	
					26 27		DH105 terminated at 25.95m Target Depth	

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 17/01/2012 Logged DMM Checked AJB	Remarks - DH105 located in farmland base of slope west of SH3 and DH104. - Water pressure increased when drilling through pumice zone at 9.8m. End of drilling 17/01/2012 artesian water flow from DH rods observed.	Driller Perry Started 17/01/2012 Drill Rig Morooka MST800 Finished 18/01/2012 Core Boxes 6
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 5 of 5

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108667

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH115**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799000.655mE 5811149.951mN
Orientation	-90° Elevation 56m
Location	South Hamilton
Feature	Cutting and bridge foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
0m to 0.1m: Topsoil						Silty CLAY; dark brown. Soft; dry to moist; low plastcity.	
HAMILTON ASH: 0.1m to 1.6m: Completely weathered rhyolitic airfall tephra; brownish orange.		DUG		1		Sandy CLAY; brownish orange. Soft to firm; dry to moist; low plasticity; sand, fine to coarse pumice.	
PUKETOKA FORMATION: 1.6m to 16.5m: Completely to moderately weathered unwelded pumiceous ignimbrite; light brownish grey and black. Recovered as soft sensitve sandy silt, zones of light grey clayey silt up to 0.5m thick (Possible ash units between flows?).	ss 1,2,2 N=4	SPT				Sandy SILT; light grey. Soft; moist; sensitive; trace fine to coarse sand sized maganese fragments.	
		HQWL		2			
	ss 1,0,1 N=1	SPT		3			
		HQWL		4		Clayey SILT with trace sand; light grey. Very soft to soft; moist; high plastcity; sand sized particles are manganese. 3.72m:30mm bed of silty SAND; light greyish orange.	
		PT					
	ss 3,2,2 N=4	SPT		5		Silty SAND; grey mottled orange. Loose; moist; sand, quartzitic.	

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 6/12/2011	Remarks - DH115 located at crest of hill in Raynes Road verge.	Driller Perry	Started 6/12/2011
	Logged AJB		Drill Rig Morooka MST800	Finished 6/12/2011
	Checked DMM		Core Boxes 6	
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 1 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH115

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799000.655mE 5811149.951mN
Orientation	-90° Elevation 56m
Location	South Hamilton
Feature	Cutting and bridge foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak 0 - 200 kPa	Test Records: N Values 0 - 50	Drilling Method / Casing remarks	Core Loss/Lift 0 - 100%	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
PUKETOKA FORMATION 1.6m to 16.5m: Completely to moderately weathered unwelded pumiceous ignimbrite; light brownish grey and black. Recovered as soft sensitve sandy silt, zones of light grey clayey silt up to 0.5m thick (Possible ash units between flows?).		ss 3,2,2 N=4	HQWL				Silty SAND; grey mottled orange. Loose; moist; sand, quartzitic.	
			SPT		6			
			HQWL					A
					7		Sandy SILT; light grey. Very soft to soft; moist; medium plasticity; dilatant; sand, fine to coarse, pumiceous, quartzitic and micaceous (biotite); some coarser sand content breaks down into silt.	
		ss 0,0,0 N=0 SUOW	SPT				SILT; light grey. Very soft to soft; moist; medium plasticity; dilatant.	
					8			
			HQWL					
		ss 1,1,0 N=1	SPT		9		Sandy SILT; light grey. Very soft to soft; moist; medium plasticity; dilatant; sand, fine to coarse, pumiceous, quartzitic and micaceous (biotite); some coarser sand content breaks down into silt. 9m:Pumiceous, highly dilatant.	
			HQWL					
					10			
			PT					B
		ss 0,0,0 N=0 SUOW	SPT					A

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date
6.7m	A		6/12/2011
10.4m	B		2/02/2012
10.91m	A		27/03/2012

Date logged	6/12/2011
Logged	AJB
Checked	DMM

Remarks
- DH115 located at crest of hill in Raynes Road verge.

Driller	Perry
Started	6/12/2011
Drill Rig	Morooka MST800
Finished	6/12/2011
Core Boxes	6

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH115**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799000.655mE 5811149.951mN
Orientation	-90° Elevation 56m
Location	South Hamilton
Feature	Cutting and bridge foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
PUKETOKA FORMATION 1.6m to 16.5m: Completely to moderately weathered unwelded pumiceous ignimbrite; light brownish grey and black. Recovered as soft sensitve sandy silt, zones of light grey clayey silt up to 0.5m thick (Possible ash units between flows?).		ss 0,0,0 N=0 SUOW	HQWL		12		CORE LOSS 700mm	
			SPT					
			HQWL		13			
		ss 0,0,0 N=0 SUOW					CORE LOSS 100mm	
			SPT		14			
			HQWL				CORE LOSS 400mm	
		ss 0,0,0 N=0 SUOW	SPT		15		15.2m:Sand content increasing.	
			HQWL		16			

GROUNDWATER OBSERVATIONS				Remarks
Depth	Piezometer	Reading	Date	- DH115 located at crest of hill in Raynes Road verge.

Date logged	6/12/2011
Logged	AJB
Checked	DMM

Casing Details		
Depth	Diameter	Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Driller	Started
Perry	6/12/2011
Drill Rig	Finished
Morooka MST800	6/12/2011
Core Boxes	6

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

NZGD ID: BH_108674

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH115**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799000.655mE 5811149.951mN
Orientation	-90° Elevation 56m
Location	South Hamilton
Feature	Cutting and bridge foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	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	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
PUKETOKA FORMATION 16.5m to 25.95m: Slightly weathered pumiceous ignimbrite; light grey and greenish grey. Dense, gravelly sand. Clasts of pumice up to 50mm diameter supported within a fine to coarse sand matrix.	ss 4,7,10 N=17	SPT				Silty fine to coarse SAND; light grey. Medium dense; moist; sand, quartzitic, pumiceous and micaceous (biotite).	
		HQWL		17		Gravelly, silty fine to coarse SAND; light grey. Medium dense; moist; sand, quartzitic, pumiceous and micaceous (biotite); gravel, fine to coarse, subrounded to rounded, pumiceous; pumice has low volume of vesicles.	
						CORE LOSS 150mm	
	ss 13,17,21 N=38	SPT		18			
		HQWL		19			
	ss 5,15,15 N=30	SPT					
		HQWL		20			
	ss 8,12,15 N=27	SPT		21			
		HQWL					

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 6/12/2011 Logged AJB Checked DMM	Remarks - DH115 located at crest of hill in Raynes Road verge.	Driller Perry Started 6/12/2011 Drill Rig Morooka MST800 Finished 6/12/2011 Core Boxes 6
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 4 of 5

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108674

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION	DH115

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799000.655mE 5811149.951mN
Orientation	-90° Elevation 56m
Location	South Hamilton
Feature	Cutting and bridge foundations

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation
PUKETOKA FORMATION 16.5m to 25.95m: Slightly weathered pumiceous ignimbrite; light grey and greenish grey. Dense, gravelly sand. Clasts of pumice up to 50mm diameter supported within a fine to coarse sand matrix.		ss 10,13,17 N=30	HQWL SPT		23			
		ss 10,14,17 N=31	HQWL SPT		24		24m:Becoming dense.	
		ss 17,20,24 N=44	HQWL SPT		25			
					26		DH115 terminated at 25.95m	
					27			

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 6/12/2011 Logged AJB Checked DMM	Remarks - DH115 located at crest of hill in Raynes Road verge.	Driller Perry Drill Rig Morooka MST800 Core Boxes 6	Started 6/12/2011 Finished 6/12/2011
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 5 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108674

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH120**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799492.349mE 5811363.349mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge over Collins Road

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
RECENT ALLUVIAL DEPOSITS: 0m to 3.1m: Swamp/peat deposits; black. Very soft; highly compressible.			HQWL		1		PEAT; black. Very soft; moist; high plasticity; rootlets and plant remains present but mostly decomposed (von post degree H6).	
		ss 0,1,0 N=1	PT / SPT		2			A
			HQWL					B
		ss 1,1,1 N=2	SPT		3		2.9m:Grades to dark brown to black and sandy.	A
RECENT ALLUVIAL DEPOSITS: 3.1m to 4.6m: Recent alluvial sand and gravel; grey. Fine to medium sand, very loose.			HQWL		4		Fine to medium SAND; grey. Very loose; moist; generally lithic i.e. quartz. 4.2m:Grades to gravelly SAND. Gravels are fine, sub-angular to angular pumice.	
PUKETOKA FORMATION: 4.6m to 5.15m: Reworked weathered ash; grey to brownish grey. Stiff, moist silty clay.		ss 0,0,1 N=1	SPT		5		Silty CLAY; grey. Stiff to hard; dry to moist; high plasticity.	
PUKETOKA FORMATION: 5.15m to 5.45m: Completely weathered airfall tephra; light brownish grey. Recovered as silty clay with minor sand. Sand			HQWL				Silty CLAY with trace sand; light grey. Soft to firm; moist; medium plasticity; sand is fine, quartz and micaceous.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
1.81m	A		27/03/2012
2.52m	B		27/03/2012
3.1m	A		1/12/2011

Date logged	30/11/2011
Logged	AJB
Checked	DMM

Remarks
- DH120 located in farmland off Collins Road adjacent to NIMTR.

Driller	Perry
Started	30/11/2011
Drill Rig	Morooka MST800
Finished	1/12/2011
Core Boxes	6

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

Date Printed: 25/06/2012

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH120**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799492.349mE 5811363.349mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge over Collins Road

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation (A B)
PUKETOKA FORMATION is mica like indicating possible base (H1) of Hamilton ash beds. 5.45m to 8m: Residual to completely weathered ash (paleosol); dark brown. 3m zone of dark brown to brownish orange silty clay (Kauroa ash?).		ss 1,0,0 N=0	HQWL SPT		6		Silty CLAY; dark brown. Soft to firm; moist; high plasticity. 6.1m:Grades to grey and losses organic content.	
			HQWL PT		7		Silty CLAY; greyish brown. Very soft; moist to wet; high plasticity.	
8m to 18.4m: Completely weathered distal pumiceous ignimbrite; brownish grey to orange. Typically soft, sensitive clayey silt and silty clay; pumiceous sand commonly breaks down to clayey silt.		ss 0,1,1 N=2	SPT		8		Silty sandy CLAY; grey, mottled light brown. Soft; moist; low plasticity; sand is predominantly quartz. 8.5m:Sand is fine to coarse.	B
		ss 0,0,1 N=1	HQWL SPT		9		8.8m:Mottled orange; sand is fine.	
			HQWL SPT		10		Silty CLAY with trace sand; light grey, mottled brown and orange. Moist; low plasticity; sand is fine to medium. 10.2m:Sand is fine to coarse; sand sized manganese clasts. 10.9m:Grades to yellowish grey, mottled orange.	

GROUNDWATER OBSERVATIONS

Depth	Piezometer	Reading	Date
8.5m	B		1/12/2011

Date logged	30/11/2011
Logged	AJB
Checked	DMM

Remarks
- DH120 located in farmland off Collins Road adjacent to NIMTR.

Driller	Perry
Started	30/11/2011
Drill Rig	Morooka MST800
Finished	1/12/2011
Core Boxes	6

Casing Details

Depth	Diameter	Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108678

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH120**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799492.349mE 5811363.349mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge over Collins Road

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane (residual - peak, 0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method (Casing remarks)	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 8m to 18.4m: Completely weathered distal pumiceous ignimbrite; brownish grey to orange. Typically soft, sensitive clayey silt and silty clay; pumiceous sand commonly breaks down to clayey silt.		ss 1,0,0 N=0	HQWL		12		Clayey SILT with trace sand and gravel; light yellow. Very soft to soft; moist; low plasticity; sand is fine quartz; coarse sand to fine gravel size manganese clasts.	
			SPT					
			HQWL		13			
			PT		14			
			HQWL					
		ss 1,0,0 N=0	SPT		15			
			HQWL		16			

GROUNDWATER OBSERVATIONS			
Depth	Piezometer	Reading	Date

Date logged	30/11/2011
Logged	AJB
Checked	DMM

Remarks
- DH120 located in farmland off Collins Road adjacent to NIMTR.

Driller	Perry
Started	30/11/2011
Drill Rig	Morooka MST800
Finished	1/12/2011
Core Boxes	6

Casing Details
Depth Diameter Remarks

Hand held Shear Vane
Vane number Blade Factor
vane shear strength per NZGS guideline

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108678

NZGD ID: BH_108678

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH120**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799492.349mE 5811363.349mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge over Collins Road

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features, Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 8m to 18.4m: Completely weathered distal pumiceous ignimbrite; brownish grey to orange. Typically soft, sensitive clayey silt and silty clay; pumiceous sand commonly breaks down to clayey silt.		ss 1,0,0 N=0	SPT				Clayey SILT with trace sand and gravel; light yellow. Very soft to soft; moist; low plasticity; sand is fine quartz; coarse sand to fine gravel size manganese clasts.	
					17			
			HQWL				17.5m:Grades to sandy, sand is fine.	
		ss 1,0,0 N=0			18			
			SPT					
18.4m to 25.95m: Moderately to slightly weathered distal ignimbrite; brownish grey to light grey.							Silty fine SAND; light grey. Medium dense; moist; sand is pumiceous; occasional manganese clasts.	
			HQWL		19			
		ss 7,12,17 N=29	SPT					
					20			
			HQWL				Fine to medium SAND; light grey. Medium dense to dense; moist; very thin to laminated light orange layers.	
		ss 7,12,16 N=28	SPT		21			
			HQWL					

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 30/11/2011 Logged AJB Checked DMM	Remarks - DH120 located in farmland off Collins Road adjacent to NIMTR.	Driller Perry Drill Rig Morooka MST800 Core Boxes 6	Started 30/11/2011 Finished 1/12/2011
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 4 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108678

NZGD ID: BH_108678

AECOM

LOG OF DRILLHOLE

HOLE IDENTIFICATION **DH120**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1799492.349mE 5811363.349mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Ground conditions for bridge over Collins Road

GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Lithological Features Stratigraphic Unit)	Test Records: Shear Vane residual - peak (0 - 200 kPa)	Test Records: N Values (0 - 50)	Drilling Method / Casing remarks	Core Loss/Lift (0 - 100%)	Depth	Graphic Log	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc)	Instrumentation A B
PUKETOKA FORMATION 18.4m to 25.95m: Moderately to slightly weathered distal ignimbrite; brownish grey to light grey.		ss 7,13,18 N=31	HQWL SPT		23		Fine to medium SAND; light grey. Medium dense to dense; moist; very thin to laminated light orange layers.	
		ss 10,16,25 N=41	HQWL SPT		24			
		ss 5,12,12 N=24	HQWL SPT		25		Silty SAND; light grey, mottled orange. Medium dense; moist; occasional 2 to 4mm diameter spheroids of silty sand.	
					26 27		DH120 terminated at 25.95m Target Depth	

GROUNDWATER OBSERVATIONS Depth Piezometer Reading Date	Date logged 30/11/2011 Logged AJB Checked DMM	Remarks - DH120 located in farmland off Collins Road adjacent to NIMTR.	Driller Perry Drill Rig Morooka MST800 Core Boxes 6	Started 30/11/2011 Finished 1/12/2011
Casing Details Depth Diameter Remarks		Hand held Shear Vane Vane number Blade Factor *vane shear strength per NZGS guideline*	Page 5 of 5	

DRILLHOLE LOG SOIL SLINKS MASTER 24-04-2012.GPJ BASE.GDT 25/06/12

Date Printed: 25/06/2012

NZGD ID: BH_108678

NZGD ID: Other_152668

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA01
Location:	Stage 5A	**Date:**	28.09.20
Co-ordinates:	1798384mE, 5812980mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Plako Subgroup	Clayey SILT; grey. Saturated; low plasticity. EOH: 6.00 m	5.6, 5.8, 6.0				

Photo

Remarks

End of log at 6.0 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:22

NZGD ID: Other_152668

NZGD ID: Other_152669

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA02
Location:	Stage 4B	**Date:**	28.09.20
Co-ordinates:	1798916mE, 5813046mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet. 1.1 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.1 m
Plako Subgroup	Silty SAND; brown. Saturated; poorly graded; sand, fine to medium. Clayey SILT; brown. Saturated; moderate plasticity. EOH: 3.50 m	2.4, 2.6, 2.8, 3.0, 3.2, 3.4				

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:23

NZGD ID: Other_152669

NZGD ID: Other_152670

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA03
Location:	Stage 4B	**Date:**	28.09.20
Co-ordinates:	1798865mE, 5812872mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet. 1.1 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.1 m
Plako Subgroup	Silty SAND; brown. Saturated; poorly graded; sand, fine to medium. EOH: 3.50 m	3.2, 3.4				

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:24

NZGD ID: Other_152670

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA04
Location:	Stage 5A	**Date:**	28.09.20
Co-ordinates:	1798720mE, 5812804mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (FIBROUS); dark brown. Moist.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Silty SAND; bluish grey. Moist to wet; uniformly graded; sand, fine. EOH: 5.00 m	4.8, 5.0				

Photo

Remarks

End of log at 5.0 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:25

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA05
Location:	Stage 2A	**Date:**	28.09.20
Co-ordinates:	1798986mE, 5812708mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (FIBROUS); dark brown. Wet. 1.1 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.1 m
Piako Subgroup	Clayey SILT; brown. Saturated; moderate plasticity. EOH: 3.50 m	3.4				

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:26

NZGD ID: Other_152673

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA06
Location:	Stage 1A	**Date:**	28.09.20
Co-ordinates:	1799154mE, 5812659mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (FIBROUS); dark brown. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Clayey SILT; brown. Wet; moderate plasticity.	2.2, 2.4				
	Silty SAND; brown. Wet to saturated; uniformly graded; sand, fine.	2.6, 2.8, 3.0, 3.2, 3.4				
	EOH: 3.50 m					

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:27

NZGD ID: Other_152673

NZGD ID: Other_152674

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA07
Location:	Stage 1A	**Date:**	28.09.20
Co-ordinates:	1799357mE, 5812585mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (FIBROUS); dark brown. Wet. 1.5 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.5 m
Plako Subgroup	Silty SAND; brown. Saturated; uniformly graded; sand, fine. EOH: 3.50 m	3.2, 3.4				

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:28

NZGD ID: Other_152674

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA08
Location:	Stage 3B	**Date:**	28.09.20
Co-ordinates:	1798767mE, 5812591mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (FIBROUS); dark brown. Wet. 1.0 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Plako Subgroup	SILT; grey. Saturated. EOH: 5.50 m	4.6, 4.8, 5.0, 5.2, 5.4				

Photo

Remarks

End of log at 5.5 m - target depth, hole collapse at 1.0 m after drilling.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:29

NZGD ID: Other_152676

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA09
Location:	Stage 2B	**Date:**	28.09.20
Co-ordinates:	1798957mE, 5812504mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (AMORPHOUS); dark brown. Wet. 0.8 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2		2 4 6 8 10 12 14 16 18	50 100 150 200 250	0.8 m
Piako Subgroup	SILT, with some clay, with trace sand; grey. Saturated; sand, fine. EOH: 2.70 m	2.4, 2.6				

Photo

Remarks

End of log at 2.7 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:31

NZGD ID: Other_152676

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA10
Location:	Stage 1B	**Date:**	28.09.20
Co-ordinates:	1799148mE, 5812495mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet. 1.4 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.4 m
Plako Subgroup	Silty SAND; brown. Saturated; uniformly graded; sand, fine. EOH: 4.50 m	3.6, 3.8, 4.0, 4.2, 4.4				

Photo

Remarks

End of log at 4.5 m - target depth.

Shear Vanes	Water	Investigation Type
Peak	Standing Water Level	Hand Auger
Remoulded	Out flow	Investigation Pit
	In flow	Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:32

NZGD ID: Other_152678

INVESTIGATION LOG

Client: Les Harrison Group of Companies		**Job No.:** HD1389
Project: 160 Higgins St, Hamilton		**No.:** FA11
Location: Stage 1B		**Date:** 28.09.20
Co-ordinates: 1799356mE, 5812378mN		**Logged By:** BS
Elevation: Ground		**Checked By:**

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Clayey SILT; orangish brown. Wet.	2.2				
	Silty SAND; brown. Moist; uniformly graded; sand, fine.	2.4				
	EOH: 2.50 m					

Photo

Remarks

End of log at 2.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:33

NZGD ID: Other_152678

NZGD ID: Other_152679

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA12
Location:	Stage 3B	**Date:**	28.09.20
Co-ordinates:	1798583mE, 5812444mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (AMORPHOUS); dark brown. Wet. 1.0 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	SILT; grey. Saturated. EOH: 7.00 m	6.6, 6.8, 7.0				

Photo

Remarks

End of log at 7.0 m - target depth, hole collapse at 1.0 m after drilling.

Shear Vanes	Water	Investigation Type
Peak	Standing Water Level	Hand Auger
Remoulded	Out flow	Investigation Pit
	In flow	Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:34

NZGD ID: Other_152679

NZGD ID: Other_152680

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA13
Location:	Stage 2B	**Date:**	28.09.20
Co-ordinates:	1798991mE, 5812327mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet. 1.7 m: becoming saturated.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8		2 4 6 8 10 12 14 16 18	50 100 150 200 250	1.7 m
Piako Subgroup	SAND; grey. Saturated; uniformly graded; sand, fine. EOH: 3.50 m	3.0, 3.2, 3.4				

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:35

NZGD ID: Other_152680

NZGD ID: Other_152681

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA14
Location:	Stage 1B	**Date:**	28.09.20
Co-ordinates:	1799222mE, 5812253mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Clayey SILT; orangish brown. Wet to saturated.	2.6, 2.8, 3.0				
	Silty SAND; brown. Saturated.	3.2, 3.4				
	EOH: 3.50 m					

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:36

NZGD ID: Other_152681

NZGD ID: Other_152683

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA15
Location:	Stage 1B	**Date:**	28.09.20
Co-ordinates:	1799391mE, 5812199mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (SPONGY AND FIBROUS); dark brown. Moist.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Clayey SILT; orangish brown. Moist.	1.8				
	SAND; brown. Moist; poorly graded; sand, fine to medium.	2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4				
	EOH: 3.50 m					

Photo

Remarks

End of log at 3.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:37

NZGD ID: Other_152683

NZGD ID: Other_152684

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA16
Location:	West of Stage 5A	**Date:**	28.09.20
Co-ordinates:	1798342mE, 5812990mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (AMORPHOUS); dark brown. Wet.					Groundwater Not Encountered
Plak o Subg roun	Clayey SILT; grey. Saturated.	5.4				
	Silty SAND; bluish grey. Saturated; sand, fine.					
	EOH: 5.50 m					

Scala Penetrometer scale: 2, 4, 6, 8, 10, 12, 14, 16, 18

Vane Shear Strength scale: 50, 100, 150, 200, 250

Depth (m): 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8

Photo

Remarks

End of log at 5.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:38

NZGD ID: Other_152684

NZGD ID: Other_152685

INVESTIGATION LOG

Client:	Les Harrison Group of Companies	**Job No.:**	HD1389
Project:	160 Higgins St, Hamilton	**No.:**	FA17
Location:	West of Stage 5A	**Date:**	28.09.20
Co-ordinates:	1798385mE, 5813105mN	**Logged By:**	BS
Elevation:	Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (AMORPHOUS); dark brown. Wet.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
Piako Subgroup	Clayey SILT; grey. Saturated.	4.2				
	Silty SAND; grey. Saturated; poorly graded; sand, fine to medium.	4.4				
	EOH: 4.50 m	4.6				

Photo

Remarks

End of log at 4.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole

Generated with CORE-GS by Geroc - 12/10/2020 16:22:39

NZGD ID: Other_152685

INVESTIGATION LOG

Client: Les Harrison Group of Companies	**Job No.:** HD1389	
Project: 160 Higgins St, Hamilton	**No.:** P01	
Location: Stage 5A	**Date:** 18.11.20	
Co-ordinates: 1798363mE, 5812922mN	**Logged By:** BK/AM	
Elevation: Ground	**Checked By:**	

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm) 2 4 6 8 10 12 14 16 18	Vane Shear Strength (kPa) Vane: 50 100 150 200 250	Water
Holocene Swamp Deposits	PEAT (PLASTIC) (PT); black. Wet; rootlets.	0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4				0.8 m
	0.8 m: becomes saturated.					
	EOH: 1.50 m	1.6				

Photo

Remarks

End of log at 1.5 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole ✓

Generated with CORE-GS by Geroc - 13/01/2021 2:52:17 pm

INVESTIGATION LOG

Client: Les Harrison Group of Companies		**Job No.:** HD1389
Project: 160 Higgins St, Hamilton		**No.:** P02
Location: Stage 4B		**Date:** 18.11.20
Co-ordinates: 1798895mE, 5813091mN		**Logged By:** BK/AM
Elevation: Ground		**Checked By:**

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane:	Water
Holocene Swamp Deposits	PEAT (PLASTIC) (PT); dark brownish black. Wet; rootlets.	0.2		2 4 6 8 10 12 14 16 18	50 100 150 200 250	Groundwater Not Encountered
	PEAT (PLASTIC) (PT); black. Saturated.	0.4				
		0.6				
		0.8				
		1.0				
		1.2				
	EOH: 1.30 m	1.4				

Photo

Remarks

End of log at 1.3 m - target depth.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- Hand Auger
- Investigation Pit
- Machine Borehole ✓

Generated with CORE-GS by Geroc - 13/01/2021 2:52:19 pm

TEST PIT LOG - TP13

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342670.8mE; 596646.7mN | Projection: Mount Eden | Pit Dimensions: 3.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
						OL: Organic SILT: black.				
	0.5	Peak = 102kPa Residual = 65kPa				Pt: Silty Amorphous PEAT: with trace wood; dark brown. Low plasticity, insensitive; wood >50mm diameter.		VSt		0.8m: Water level in nearby drain.
	1.0	Peak = 111kPa Residual = 65kPa		1			W			
	1.6	Peak = 68kPa Residual = 23kPa				ML: SILT: with minor fine to coarse sand; grey mottled green. Low plasticity, moderately sensitive.		St		
▼				2						2.0m: Slow seepage from silt.
						SM: Silty Fine SAND: light grey mottled orange. Poorly graded, subrounded, moderately thickly bedded, Inter-bedded with silt.		L to MD		2.5m: Moderate groundwater seepage from sand.
	2.7	Peak = 96kPa Residual = 40kPa				ML: SILT: grey. Low plasticity, insensitive.	S	St		
				3		SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.		MD		
	3.5	Peak = 77kPa Residual = 31kPa				ML: SILT: dark brown. Low plasticity.		St		
						ML: SILT: grey. Low plasticity.	W			
				4				VSt		
	4.2	Peak = 108kPa Residual = 45kPa				Test pit terminated at 4.20 m				
				5						

Termination Reason: Limit of investigation
Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

NZGD ID: TP_102020

TEST PIT INVESTIGATION
TEST REPORT

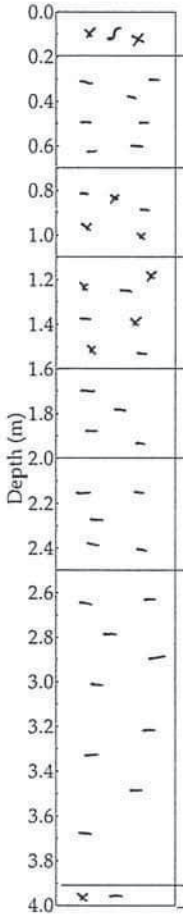
OPUS
INTERNATIONAL CONSULTANTS

Project : SAFE 73
Location : Chinamans Hill Realignment
Client : OPUS International Consultants
Contractor : NA
Test number : TP 5
Shear vane no : DR3712
shear vane corr : 1.49
Water level (m) : Not Encountered
Reduced level : NA

Project No :	2-61443.00
Lab Ref No :	98/343/001
Client Ref No :	210HL

Test Results

Graphic Log



Depth (m)	*Shear Strength (kPa)	Sample (m)	Material Description
0.20			Topsoil
0.70	167/46		Dark yellowish brown CLAY, firm - stiff, plastic, moist.
1.10	Refusal		Dark brown Clay SILT (paleosol), hard.
1.60	Refusal	Bulk 0 - 2.50	Yellowish brown homogenous Clay SILT, hard, moist, breaks out in slabs.
2.00	Refusal		Dark yellowish brown CLAY, firm to stiff.
2.50	89/24		Yellowish brown CLAY, soft to firm, plastic, very moist.
3.90	72/15	Bulk 2.50 - 4.00	Light yellowish brown homogenous CLAY, soft to firm, very moist, plastic, wet of OWC.
4.00			Greyish brown Silty CLAY, soft to firm, very moist, plastic.
			END OF TEST PIT 4.1m

Test Methods	Notes *
Field Description of Soils and Rocks in Engineering Use, NZ Geomechanic Society Shear strength using Pilcon Shear Vane, Manufacturers Notes (BS1372)	Shear Strength (kPa)= Peak / Remoulded

Date tested : 23/06/98

Date reported : 24/06/98

Approved By :

Designation : *Senior Civil Engineering Technician*

Date : 26/6/98

CSF 2061 (5/98)

Opus International Consultants Limited
Hamilton Laboratory
Quality Management Systems Certified to ISO 9001
Fox Street
Private Bag 3057
Hamilton, New Zealand
Telephone: +64 7 856 2870
Facsimile: +64 7 856 2873
Web site: www.opus.co.nz
Formerly Works Consultancy Services Limited

NZGD ID: TP_102020

TEST PIT INVESTIGATION
TEST REPORT

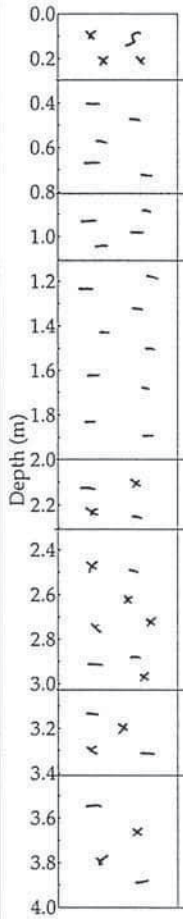
OPUS INTERNATIONAL CONSULTANTS

Project : SAFE 73
Location : Chinamans Hill Realignment
Client : OPUS International Consultants
Contractor : NA
Test number : TP 6
Shear vane no : DR3712
shear vane corr : 1.49
Water level (m) : Not Encountered
Reduced level : NA

Project No :	2-61443.00
Lab Ref No :	98/343/001
Client Ref No :	210HL

Test Results

Graphic Log



Depth (m)	*Shear Strength (kPa)	Sample (m)	Material Description
0.30			Topsoil
0.80	171/67		Mottled brown/yellow brown homogeneous CLAY, stiff, moderately plastic, approx OWC.
1.10	161/54		Dark brown CLAY (paleosol), hard to stiff.
2.00	Refusal Refusal	Bulk 0.30 - 2.00	Orange brown/brown homogeneous CLAY, stiff to hard, moist, plastic. Grey Clay veins throughout. Breaks out in slabs. Yellowish brown.
2.30	Refusal		Dark yellowish brown Clay SILT, hard, dry to moist, compact.
3.00		Bulk 2.30 - 4.00	Yellowish brown/light yellow brown Clay SILT, soft to firm, very moist, plastic, wet of OWC.
3.40			Light greyish brown Clay SILT, soft, very moist., slightly plastic, greasy, well wet of OWC.
4.00			Light yellow brown homogeneous Clay SILT, soft, sticky, very moist, well wet of OWC.
			END OF TEST PIT 4.0m

Test Methods	Notes *
Field Description of Soils and Rocks in Engineering Use, NZ Geomechanic Society Shear strength using Pilcon Shear Vane, Manufacturers Notes (BS1372)	Shear Strength (kPa)= Peak / Remoulded

Date tested : 23/06/98

Date reported : 24/06/98

Approved By :

Designation : *Senior Civil Engineering Technician*
Date : 26/6/98

CSF 2061 (5/98)

Opus International Consultants Limited
Hamilton Laboratory
Quality Management Systems Certified to ISO 9001
Fox Street
Private Bag 3057
Hamilton, New Zealand
Telephone: +64 7 856 2870
Facsimile: +64 7 856 2873
Web site: www.opus.co.nz
Formerly Works Consultancy Services Limited

NZGD ID: TP_102022

TEST PIT INVESTIGATION
TEST REPORT

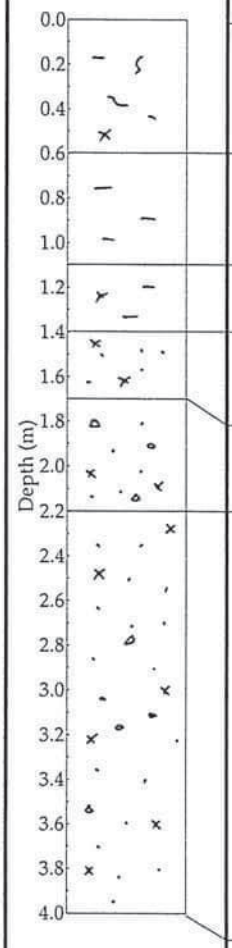
OPUS INTERNATIONAL CONSULTANTS

Project : SAFE 73
Location : Chinamans Hill Realignment
Client : OPUS International Consultants
Contractor : NA
Test number : TP 7
Shear vane no : DR3712
shear vane corr : 1.49
Water level (m) : 2.5m (in borehole)
Reduced level : NA

Project No :	2-61443.00
Lab Ref No :	98/343/001
Client Ref No :	210HL

Test Results

Graphic Log



Depth (m)	*Shear Strength (kPa)	Sample (m)	Material Description
0.60	101/30		Dark brown organic Clay SILT, Topsoil.
1.10	77/37	Pushtube 0.90	Yellow brown CLAY, soft to firm, moderately plastic, very moist.
1.40	110/30		Dark brown homogeneous Silty CLAY, firm, slightly dry.
1.70	171 201/12		Brown homogeneous Sandy SILT, firm to stiff. HW Gravels, ? , compact. CW Puketoka? Water seeping in at 1.3m - perched?
2.20			Mottled orange brown/yellow brown/light grey Gravelly Sandy SILT/Silty HW SAND, stiff. HW rounded Gravels up to 20 mm ø.
4.20			Mottled light pinkish brown/cream interbedded HW/CW Sandy SILT. Some CW Silty Gravelly Sand, occasional CW Gravelly bands. Firm, very moist, sensitive when remoulded. Occasional hard bands.
			END OF TEST PIT 4.2m

Test Methods	Notes *
Field Description of Soils and Rocks in Engineering Use, NZ Geomechanic Society Shear strength using Pilcon Shear Vane, Manufacturers Notes (BS1372)	Shear Strength (kPa)= Peak / Remoulded

Date tested : 23/06/98

Date reported : 24/06/98

Approved By :

Designation : *Senior Civil Engineering Technician*
Date : 26/6/98

CSF 2061 (5/98)

Opus International Consultants Limited
Hamilton Laboratory
Quality Management Systems Certified to ISO 9001
Fox Street
Private Bag 3057
Hamilton, New Zealand
Telephone: +64 7 856 2870
Facsimile: +64 7 856 2873
Web site: www.opus.co.nz
Formerly Works Consultancy Services Limited

NZGD ID: TP_102022

NZGD ID: TP_108746

AECOM

LOG OF INSPECTION PIT

INSPECTION PIT IDENTIFICATION **ITP 1**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1798808.303mE 5812338.175mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Peat Collins Road

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological Features (bedding, foliation, mineralogy, cement, etc) Stratigraphic Unit)	Test Records	Sampling	DCP (Blows per 100mm)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks / DEFECT DESCRIPTION (Joints, Bedding Seams, Shatter, Shear and Crush Zones, Foliation, Schistosity, Attitude, Spacing, continuity, roughness, infilling, etc.)	Graphic Log	Instrumentation
	Topsoil.			2, 1	SILT; dark brown. Loose; moist.		
	Alluvial pumice, sand gravel. (Hinuera Formation)			2, 1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 3	Fine SAND; light brown. Loose; moist. 0.4m:Grades to light brownish grey. 0.9m:Grades to light grey.		
1							
				4, 4, 4, 3, 3, 3, 3, 2	Fine to medium SAND; light grey. Medium dense; moist; pumiceous.		
2							
				2, 1, 1, 2, 1, 1, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 2	Fine SAND; light brownish grey. Loose; moist. 2.7m:50mm lense of fine to coarse pumiceous gravel.		
3							
4				1, 2, 3, 5, 5	ITP 1 terminated at 4m		
5							

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS

Number	Depth (m)	Date	Post strike observations

Miniature shear vane

Vane number Blade Factor

Vane shear strength per NZGS guideline

Length		Excavation Method	Hand Excavation
Width		Orientation	B
Stability	Stable		

Remarks

- Farmland adjacent to Collins Road.

Started 1/09/2011

Finished 1/09/2011

Date logged 7/03/2011

Logged GMP

Checked DMM

Page 1 of 1

12/04/2005

NZGD ID: TP_108746

NZGD ID: TP_108747

AECOM

LOG OF INSPECTION PIT

INSPECTION PIT IDENTIFICATION **ITP 2**

Client	NZTA and HCC
Project	Hamilton Southern Links
Project number	60164546

Co-ordinates	1798768.296mE 5811055.144mN
Orientation	-90° Elevation
Location	South Hamilton
Feature	Low hill adjacent to Collins Road

Depth	GEOLOGICAL DESCRIPTION (Weathering, Relative Strength, Colour, Name, Defect Type, Lithological Features (bedding, foliation, mineralogy, cement, etc) Stratigraphic Unit)	Test Records	Sampling	DCP (Blows per 100mm)	MATERIAL DESCRIPTION (consistency, relative density, water content, plasticity, grading, etc) / Depth Related Remarks	DEFECT DESCRIPTION (Joints, Bedding Seams, Shatter, Shear and Crush Zones, Foliation, Schistosity, Attitude, Spacing, continuity, roughness, infilling, etc.)	Graphic Log	Instrumentation
	Topsoil.				SILT; dark brown. Firm, moist.			
	HAMILTON ASH: Completely weathered, clay rich rhyolitic tephra beds.	UTP			Silty CLAY; brownish orange. Hard; moist.			
		UTP						
		UTP				0.8m:Grades to light brownish orange.		
1		200+kPa						
		200+kPa				1.3m:Streaked orange and slightly friable.		
		187/72				1.8m:Grades to brownish iorange		
2		173/43						
					Clayey SILT, minor sand; brownish orange, streaked reddish orange. Very stiff; moist; sand, fine, mica.			
	2.4m: Possible paleosol between Hamilton Ash and Kauroa ash beds.	158/37			Silty CLAY; light brownish grey, streaked black. Very stiff, moist.			
					Clayey SILT, minor sand; brownish orange, streaked reddish orange. Very stiff; moist; sand, fine, mica common.			
		UTP			Silty CLAY; reddish brown. Hard, moist.			
3		200+kPa				3m:Grades to brownish yellow, streaked light grey.		
		176/43						
		187/46				3.6m:Grades to light grey, streaked orange.		
		200+kPa						
4					ITP 2 terminated at 4m			
5								

For explanation of symbols and observations, see key sheet

GROUNDWATER OBSERVATIONS
Number Depth (m) Date Post strike observations

Miniature shear vane
Vane number GEOVANEBlade 19mm Factor 1.44
Vane shear strength per NZGS guideline

Length
Width
Stability Stable

Excavation Method Hand Excavation
Orientation B

Remarks
- Farmland adjacent to Collins Road.

Started 1/09/2011
Finished 1/09/2011
Date logged 7/03/2011
Logged GMP
Checked DMM

12/04/2005

NZGD ID: TP_108747

TEST PIT LOG - TP02

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 341980.9mE; 596753.3mN | Projection: Mount Eden | Pit Dimensions: 3.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: black.				
	0.5	Peak = 77kPa Residual = 34kPa				ML: SILT: with minor fine to coarse sand, trace fine gravel; dark brown mottled orange. Low plasticity, insensitive to moderately sensitive; Contains <100mm inclusions of brown sand.				
	1.0	Peak = 65kPa Residual = 37kPa		1			W	St		
	1.8	Peak = 60kPa Residual = 28kPa								
				2		ML: SILT: dark bluish green. Low plasticity, insensitive.				
	2.2	Peak = 57kPa Residual = 37kPa								
						SW: Fine to coarse SAND: with trace silt; grey. Well graded, subangular to subrounded.				
16-10-2020				3						3.0m: Hole collapse all 4 sides due to running sands.
							S	MD		
				4		Test pit terminated at 4.00 m				
				5						

Termination Reason: Limit of investigation
Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP03

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342099.5mE; 596884.3mN | Projection: Mount Eden | Pit Dimensions: 2.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: black.				
	0.2	Peak = 94kPa Residual = 34kPa				ML: SILT: orange mottled grey. Low plasticity.		St		
						OL: Organic SILT: black.				
	0.6	Peak = 37kPa Residual = 21kPa		1		ML: SILT: with minor fine to coarse sand, trace fine gravel; brown mottled orange. Low plasticity, insensitive to moderately sensitive; becoming sensitive when worked.	W	F to St		
	1.2	Peak = 57kPa Residual = 23kPa								
16-10-2020				2		SW: Fine to coarse SAND: with trace silt; grey. Well graded, subangular to subrounded.	W to S	MD		1.5m: slow water seep.
						Test pit terminated at 2.50 m				
				3						
				4						
				5						

Termination Reason: Hole collapse due to running sands.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP04

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342111.0mE; 596660.7mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: black.				
						ML: SILT: orange mottled grey. Low plasticity.				
	0.3	Peak = 105kPa Residual = 34kPa				OL: Organic SILT: black.				
	0.8	Peak = 57kPa Residual = 20kPa		1		ML: SILT: with minor fine to coarse sand, trace fine gravel; brown mottled orange. Low plasticity, moderately sensitive; becoming sensitive when worked.	W	St		
	1.3	Peak = 34kPa Residual = 26kPa				ML: SILT: greenish grey. Low plasticity, insensitive.		F		
						SW: Fine to coarse SAND: with trace silt; grey. Well graded, subangular to subrounded, Contains inclusion of clayey silt 400mm diameter.		MD		
16-10-2020	1.7	Peak = 28kPa Residual = 14kPa				ML: SILT: dark grey. Low plasticity, insensitive.		F		
				2		SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.	S	MD		
						Test pit terminated at 2.20 m				
				3						
				4						
				5						

Dynamic Cone Penetrometer (Blows/100mm): 5 10 15 20

Termination Reason: Hole collapse.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP05

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342192.3mE; 596795.3mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: black.				
						ML: SILT: orange mottled grey. Low plasticity.	M			
						OL: Organic SILT: black. Contains 50mm lenses of fine to coarse sand.				
	0.4	Peak = 43kPa Residual = 20kPa				ML: SILT: with minor fine to coarse sand; brown mottled orange. Low plasticity, insensitive; becoming sensitive when worked.				0.5m: Nearby farm drain water level.
	0.8	Peak = 23kPa Residual = 14kPa					W	S to F		
16-10-2020	1.1	Peak = 48kPa Residual = 31kPa		1		ML: SILT: light grey. Low plasticity, insensitive.				
						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.	S	F / MD		
						Test pit terminated at 1.50 m				
				2						
				3						
				4						
				5						

Termination Reason: Target depth
Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP06

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342232.2mE; 596637.5mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: black.	M			
	0.4	Peak = 99kPa Residual = 26kPa				ML: SILT: with minor fine to coarse sand; brown mottled orange. Low plasticity, moderately sensitive; becoming sensitive when worked.		St		
	0.8	Peak = 62kPa Residual = 34kPa		1		SP: Silty Fine SAND: light grey mottled orange. Poorly graded, subrounded, Contains 500mm inclusions of sandy silt.	W to S	L to MD		
						ML: SILT: dark brown. Low plasticity, insensitive.				1.8m: Slow seepage from base of silty sand.
	2.0	Peak = 43kPa Residual = 23kPa		2			W	F		
	2.3	Peak = 45kPa				ML: SILT: with minor clay; light grey. Low plasticity.				
▼						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.				2.5m: Fast groundwater flows.
				3			S	MD		
						Test pit terminated at 3.50 m				
				4						
				5						

Termination Reason: Hole collapse on all 4 sides.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP07

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342324.4mE; 596817.8mN | Projection: Mount Eden | Pit Dimensions: 3.0m by 2.0m

Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
16-10-2020						OL: Organic SILT: black mottled brown.	M to W			
						ML: SILT: with minor clay; light grey. Low plasticity.		F to…		0.5m: Water level in nearby drain.
						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.				
				1			S			
								MD		1.5m: Hole collapse; poor recovery and no strength data.
				2		OL: Organic SILT: black.		F		
						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.				
				3		MH: Clayey SILT: light grey. High plasticity.		St to VSt		
						Test pit terminated at 3.50 m				
				4						
				5						

Termination Reason: Hole collapse all 4 sides to 0.5m. Poor recovery.

Shear Vane No: | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP08

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342820.3mE; 596903.1mN | Projection: Mount Eden | Pit Dimensions: 3.0m by 2.0m

Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: with minor rootlets; black mottled brown.				
	0.4	Peak = 77kPa Residual = 26kPa				Pt: Silty Amorphous PEAT: with minor rootlets; dark brown. Low plasticity, moderately sensitive.	M to W			
	1.0	Peak = 71kPa Residual = 43kPa		1		ML: SILT: with minor fine to coarse sand; brown mottled orange. Low plasticity, insensitive.	W	St		
	1.8	Peak = 99kPa Residual = 40kPa				ML: SILT: with minor clay; light brownish grey. Low plasticity, moderately sensitive.				
16-10-2020				2		SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.	W to S	MD		
						ML: SILT: dark brown. Low plasticity.	W	F		2.8m: Hole collapse; no strength data below this depth.
				3		MH: Clayey SILT: light grey. High plasticity.		St		
						Test pit terminated at 3.40 m				
				4						
				5						

Termination Reason: Hole collapse.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP09

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342552.8mE; 596829.4mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
16-10-2020				1		Pt: Silty Amorphous PEAT: with minor rootlets; black mottled brown.	W	F to St		
	1.3	Peak = 88kPa Residual = 45kPa		2		ML: SILT: with minor clay; light grey. Low plasticity, insensitive.	S	St		
						SP: Fine to medium SAND: with some silt; grey. Poorly graded.		L to MD		2.5m: Hole collapse; no strength data below this depth.
				3		ML: SILT: dark brown. Low plasticity.		F		
						MH: Clayey SILT: light grey. High plasticity.		St		
						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.		MD		
				4		Test pit terminated at 4.00 m				
				5						

Dynamic Cone Penetrometer (Blows/100mm): 5 10 15 20

Termination Reason: Hole collapse.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP10

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342484.1mE; 597016.6mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
						OL: Organic SILT: with minor rootlets; black mottled brown.				
	0.5	Peak = 79kPa Residual = 14kPa				ML: SILT: with minor fine to coarse sand; brown mottled orange. Low plasticity, sensitive.		St		
				1		ML: SILT: grey. Low plasticity, moderately sensitive.	W			
	1.2	Peak = 77kPa Residual = 23kPa				SM: Silty Fine SAND: light grey mottled orange. Poorly graded, subrounded, moderately thickly bedded; Inter-bedded with silt.		L to MD		
▼				2		SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.		MD		2.2m: Fast groundwater flow.
	2.5	Peak = 62kPa				ML: SILT: dark brown. Low plasticity.	S	S		
						SP: Fine SAND: light grey. Poorly graded, subrounded.		MD		
				3		Test pit terminated at 3.00 m				
				4						
				5						

Termination Reason: Hole collapse.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP11

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342378.5mE; 596578.8mN | Projection: Mount Eden | Pit Dimensions: 4.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 20	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
16-10-2020	0.5	Peak = 54kPa Residual = 34kPa				Pt: Silty Amorphous PEAT: black. Low plasticity, insensitive.	W	St		
				1		*... at 1.00m, Contains minor roots 50mm diameter.*				
	1.2	Peak = 102kPa Residual = 34kPa				ML: SILT: with minor fine to coarse sand; brown mottled orange. Low plasticity, moderately sensitive.	S	VSt		
				2		SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.		MD		1.5m: Hole collapse; no strength data below this depth.
						ML: SILT: dark brown. Low plasticity.		F		
						Test pit terminated at 2.80 m				
				3						
				4						
				5						

Termination Reason: Hole collapse.

Shear Vane No: 2532 | DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

TEST PIT LOG - TP12

Client: Classics Development
Project: Rogerson Block Subdivision
Site Location: 185 Tuhikaramea Road, Hamilton
Project No.: HAM2020-0088
Date: 16/10/2020

PRELIMINARY

CMW Geosciences

Test Pit Location: Refer to Site Investigation Plan | Logged by: LK | Checked by: | Scale: 1:25 | Sheet 1 of 1

Position: 342593.5mE; 596503.1mN | Projection: Mount Eden | Pit Dimensions: 3.0m by 2.0m
Elevation: | Datum: | Survey Source: Handheld GPS

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)
	0.6	Peak = 91kPa Residual = 37kPa				Pt: Silty Amorphous PEAT: with trace wood; black. Low plasticity, moderately sensitive; wood, <50mm diameter.	W	St		
	1.2	Peak = 91kPa Residual = 28kPa		1						
						ML: SILT: with minor fine to coarse sand; grey mottled green. Low plasticity, moderately sensitive.				
	2.0	Peak = 77kPa Residual = 37kPa		2						
16-10-2020						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.	W to S	MD		2.5m: Hole collapse; no strength data below this depth.
				3						
						ML: SILT: dark brown. Low plasticity.	W	F to St		
						SW: Fine to coarse SAND: grey. Well graded, subangular to subrounded.		MD		
				4		Test pit terminated at 4.00 m				
				5						

Termination Reason: Limit of investigation
Shear Vane No: 2532 DCP No:

Remarks: Where no strength testing carried out consistency/relative density assessed by visual tactile observation and other results.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

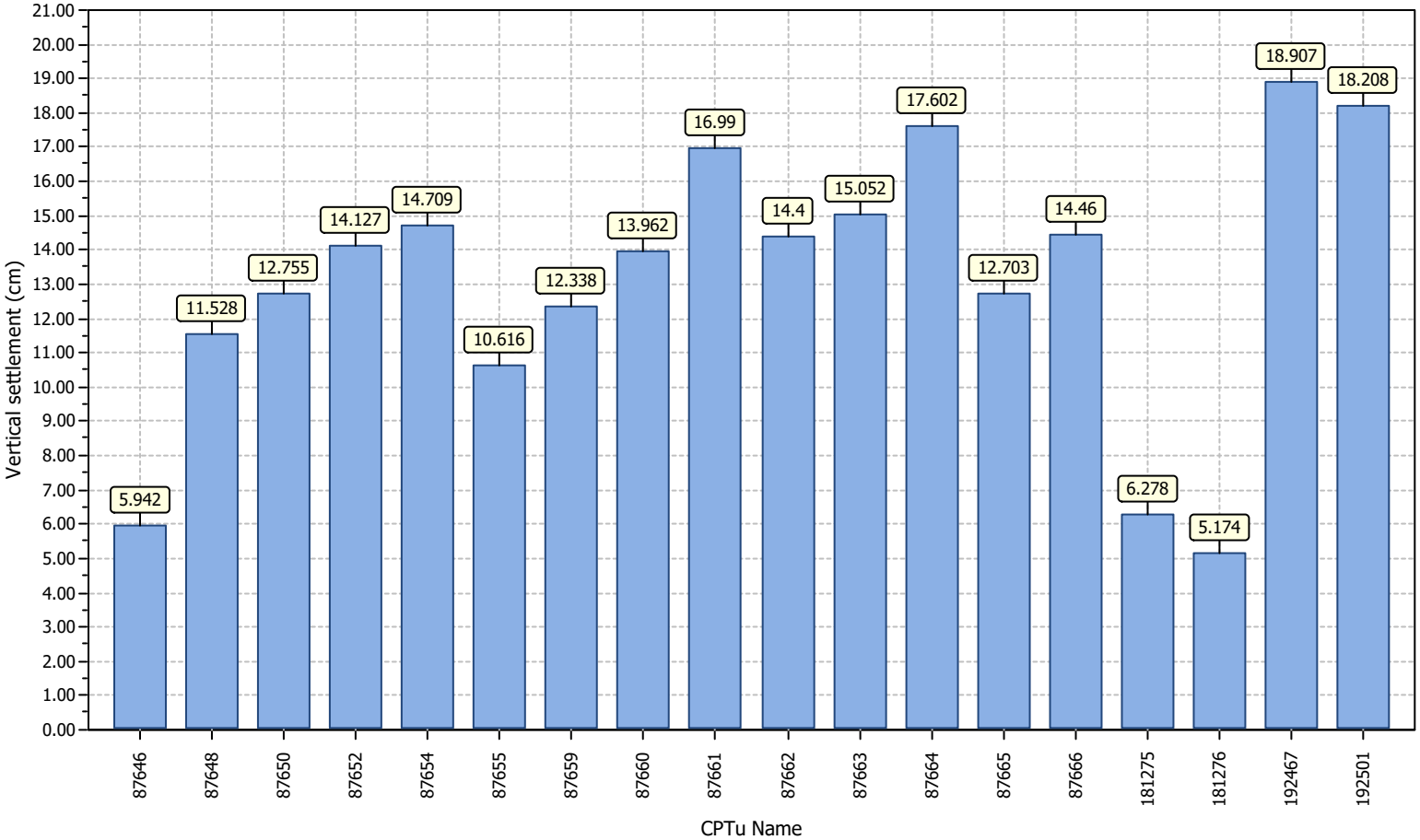
APPENDIX C: LIQUEFACTION ANALYSIS PLOTS

FULL DEPTH ANALYSIS RESULTS

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall vertical settlements report

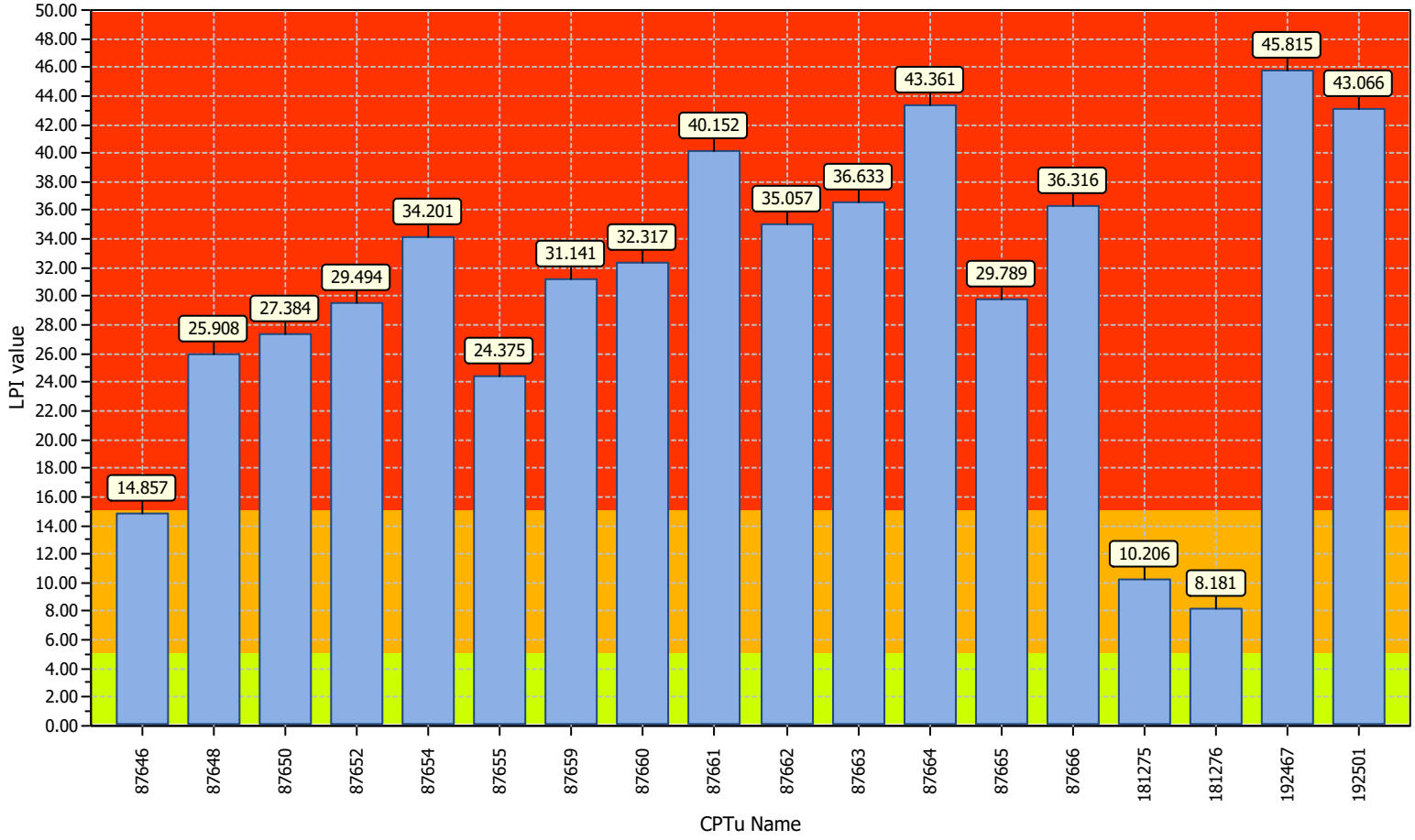


CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 18

0% low risk

17% high risk

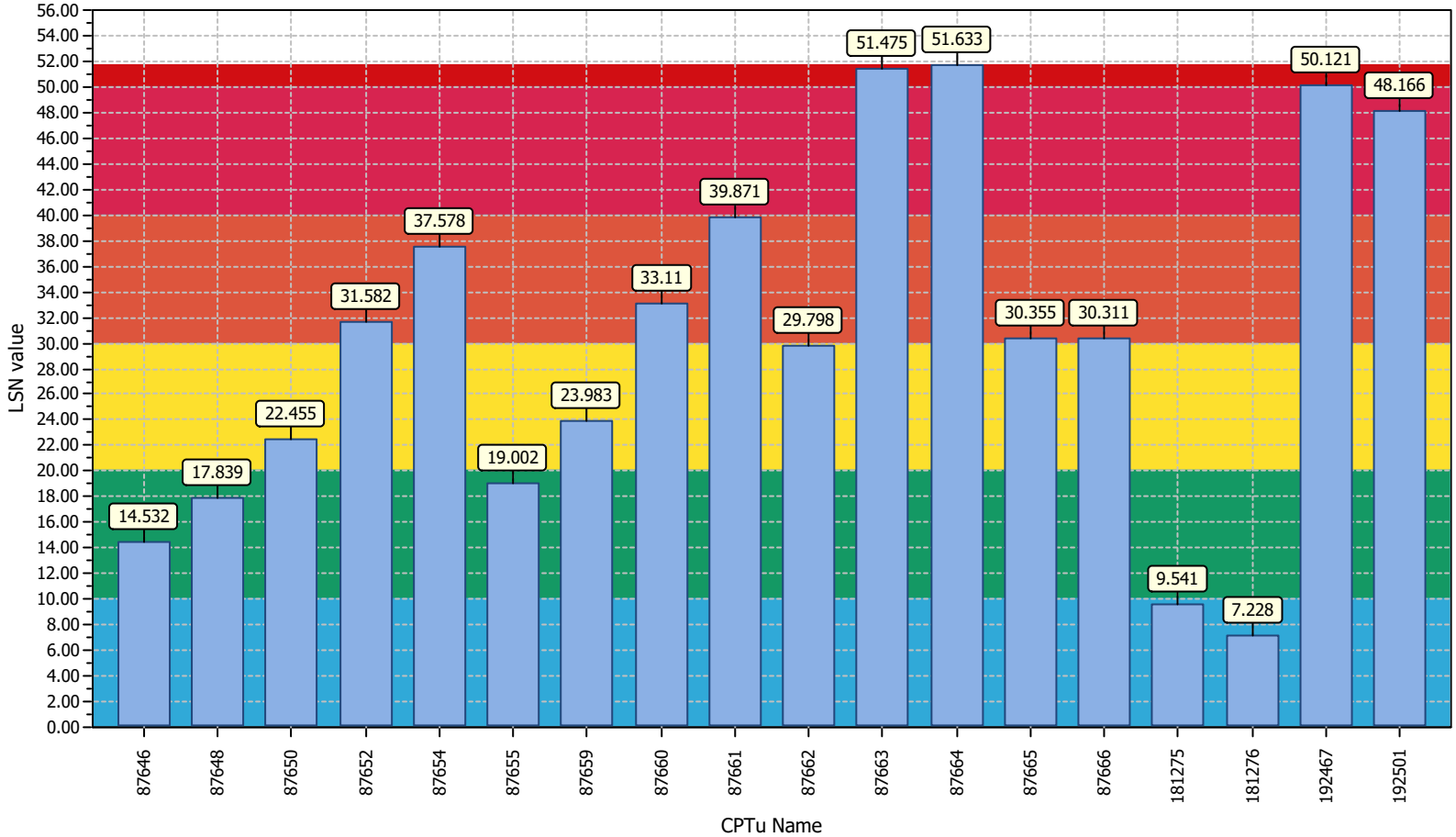
83% very high risk

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 18

11% little liquefaction

17% minor liquefaction

17% moderate liquefaction

33% moderate to major liquefaction

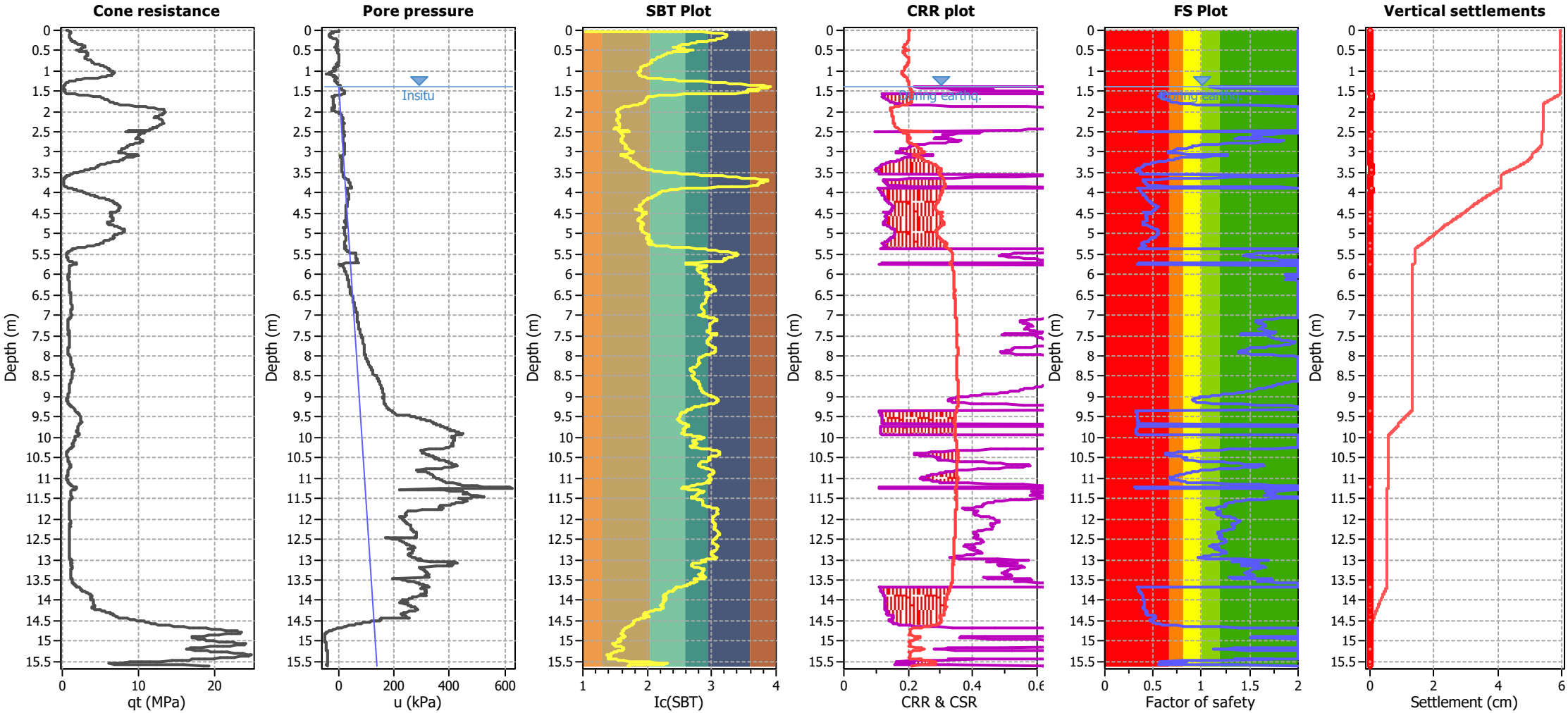
6% major liquefaction

17% severe liquefaction

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87646.00
Total depth: 15.61 m

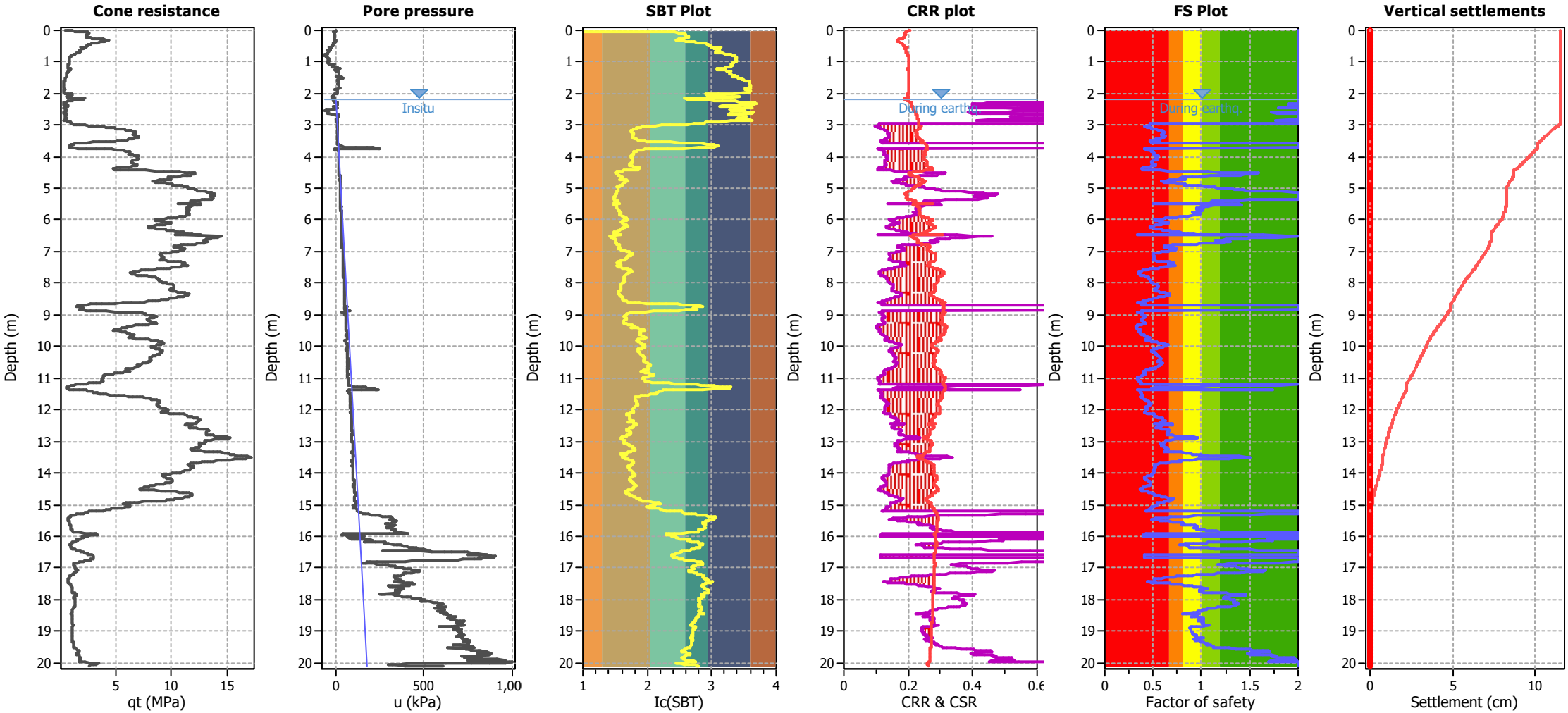


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87648.00
Total depth: 20.10 m

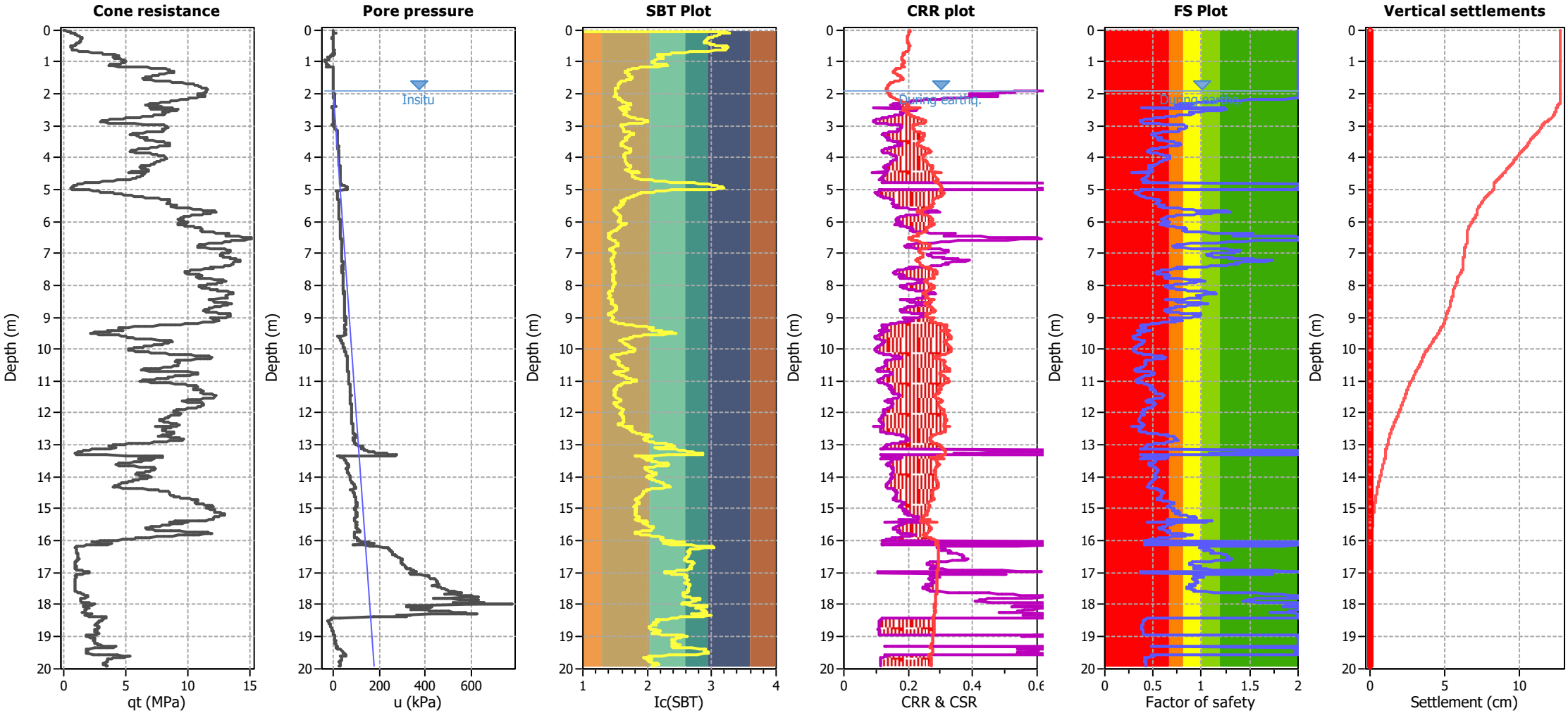


Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87650.00
Total depth: 19.93 m

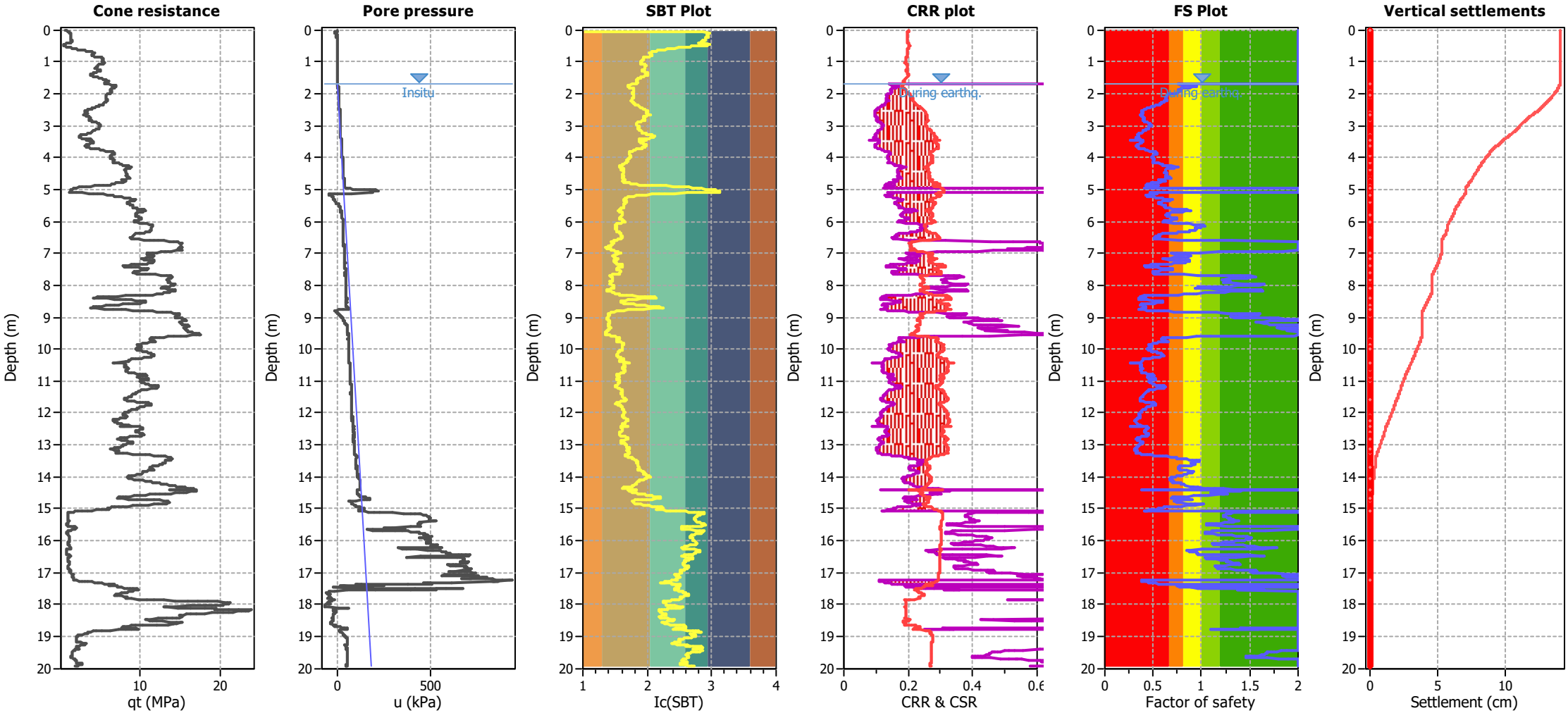


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.90 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.90 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87652.00
Total depth: 19.93 m

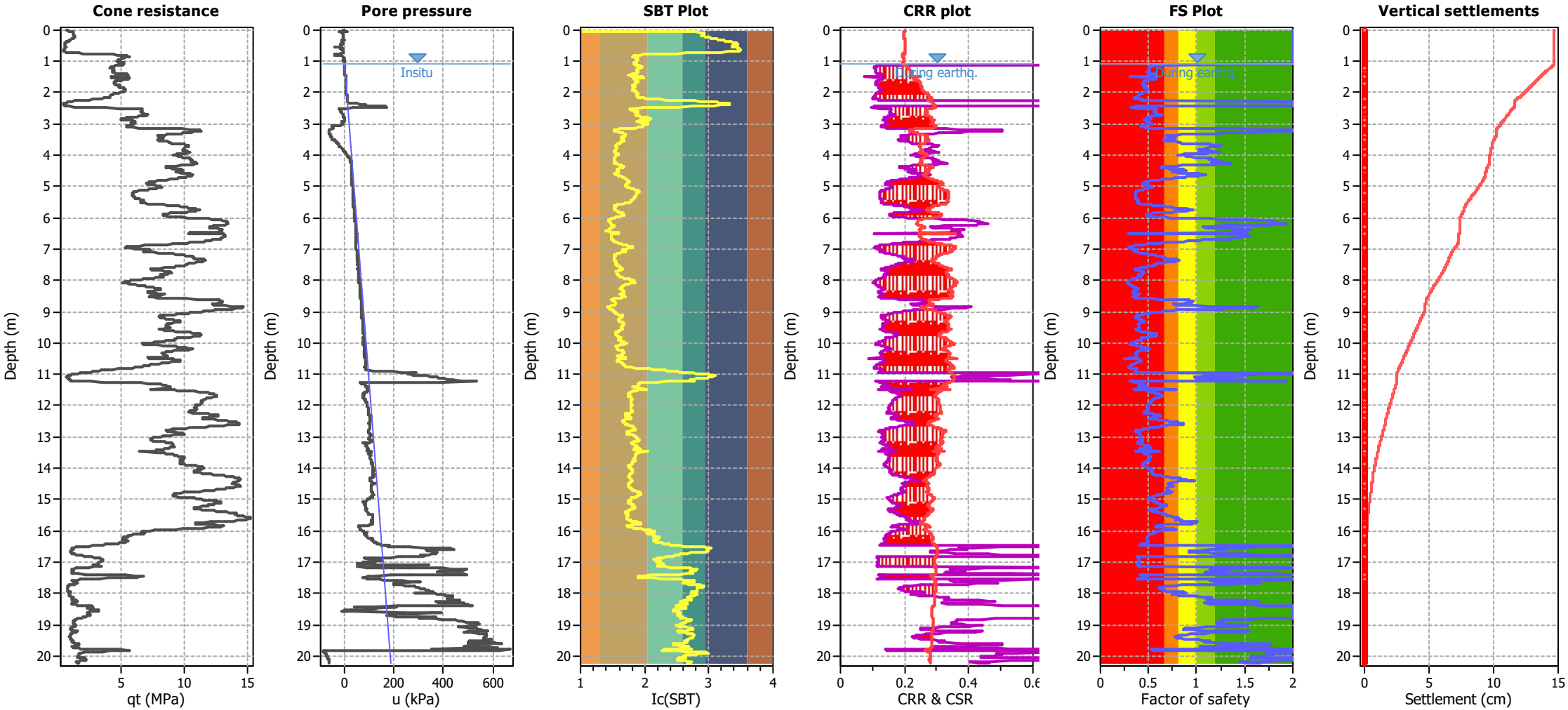


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87654.00
Total depth: 20.23 m

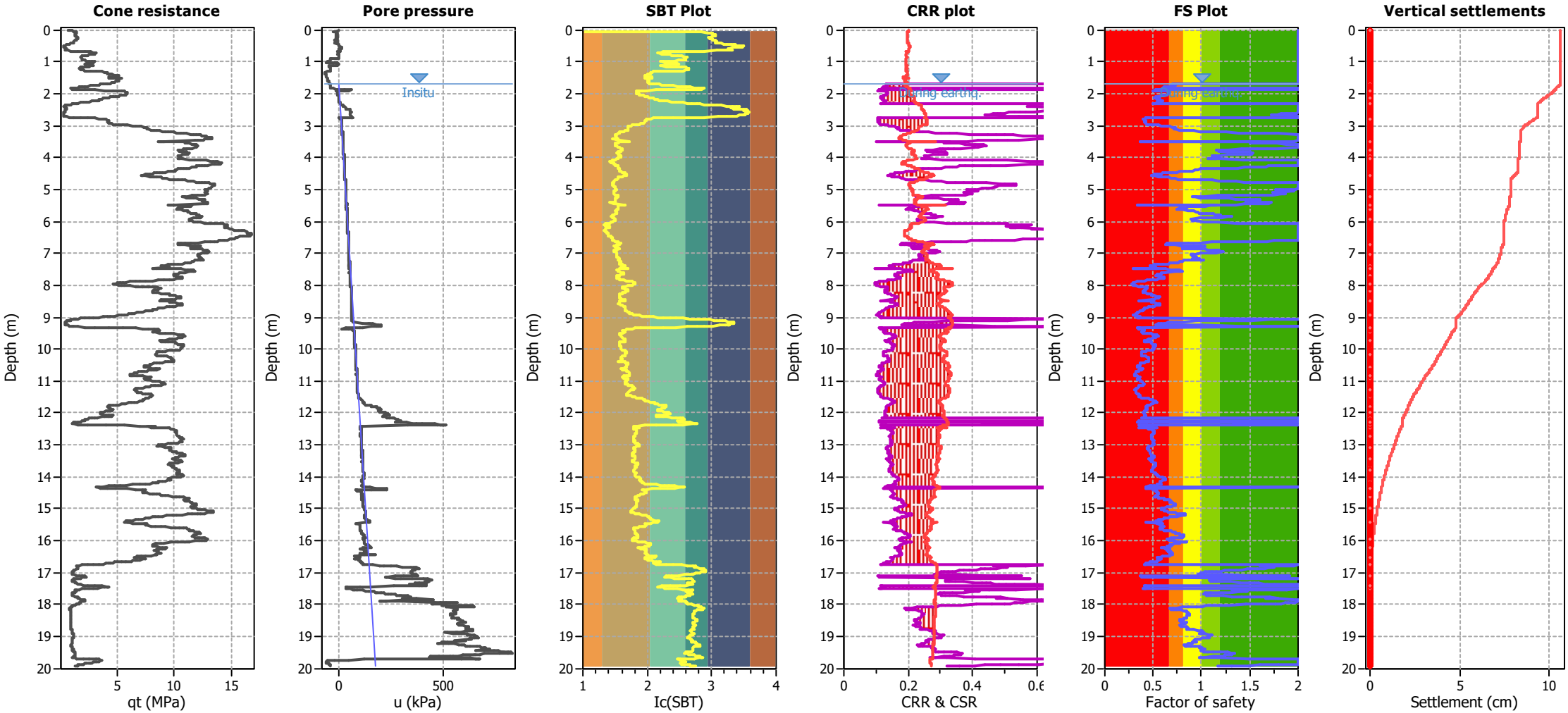


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87655.00
Total depth: 19.93 m

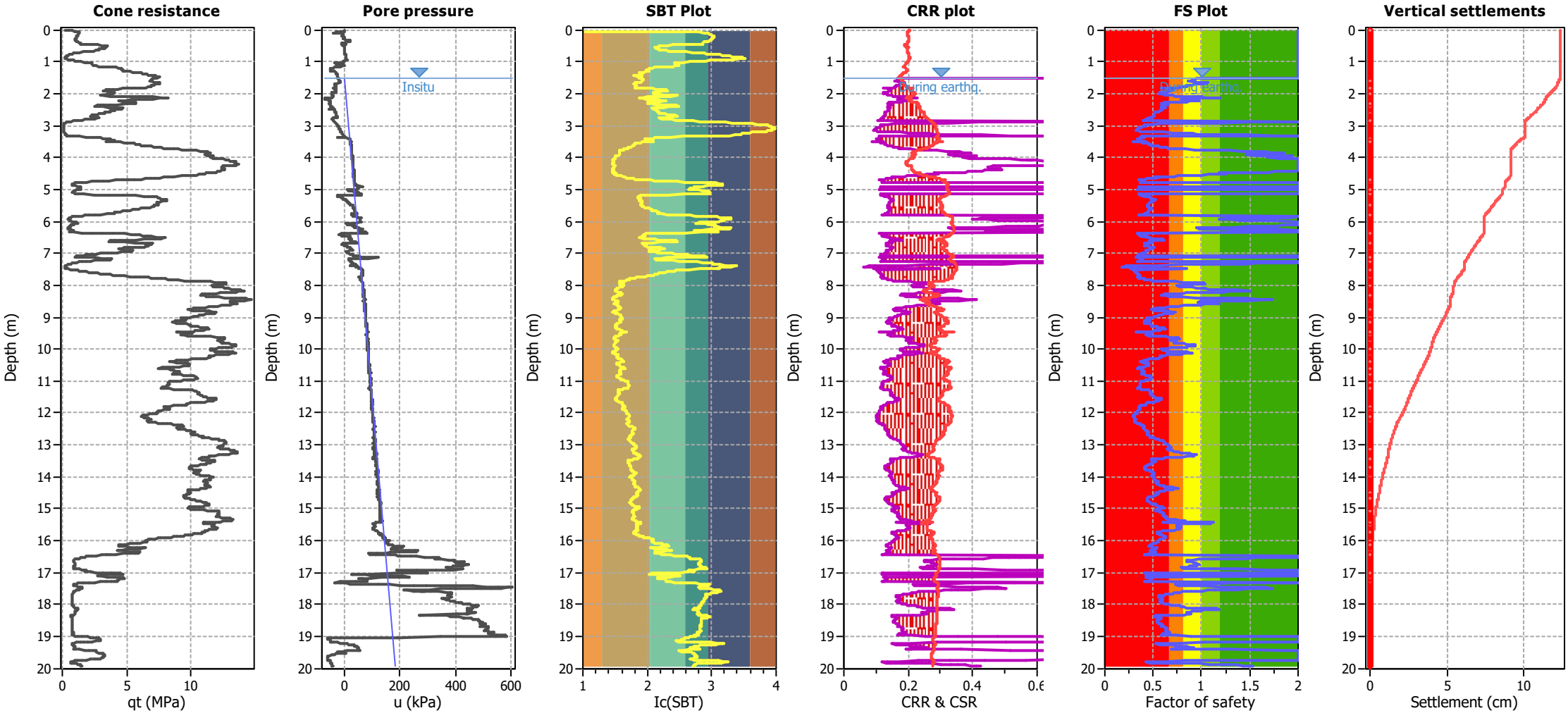


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87659.00
Total depth: 19.93 m

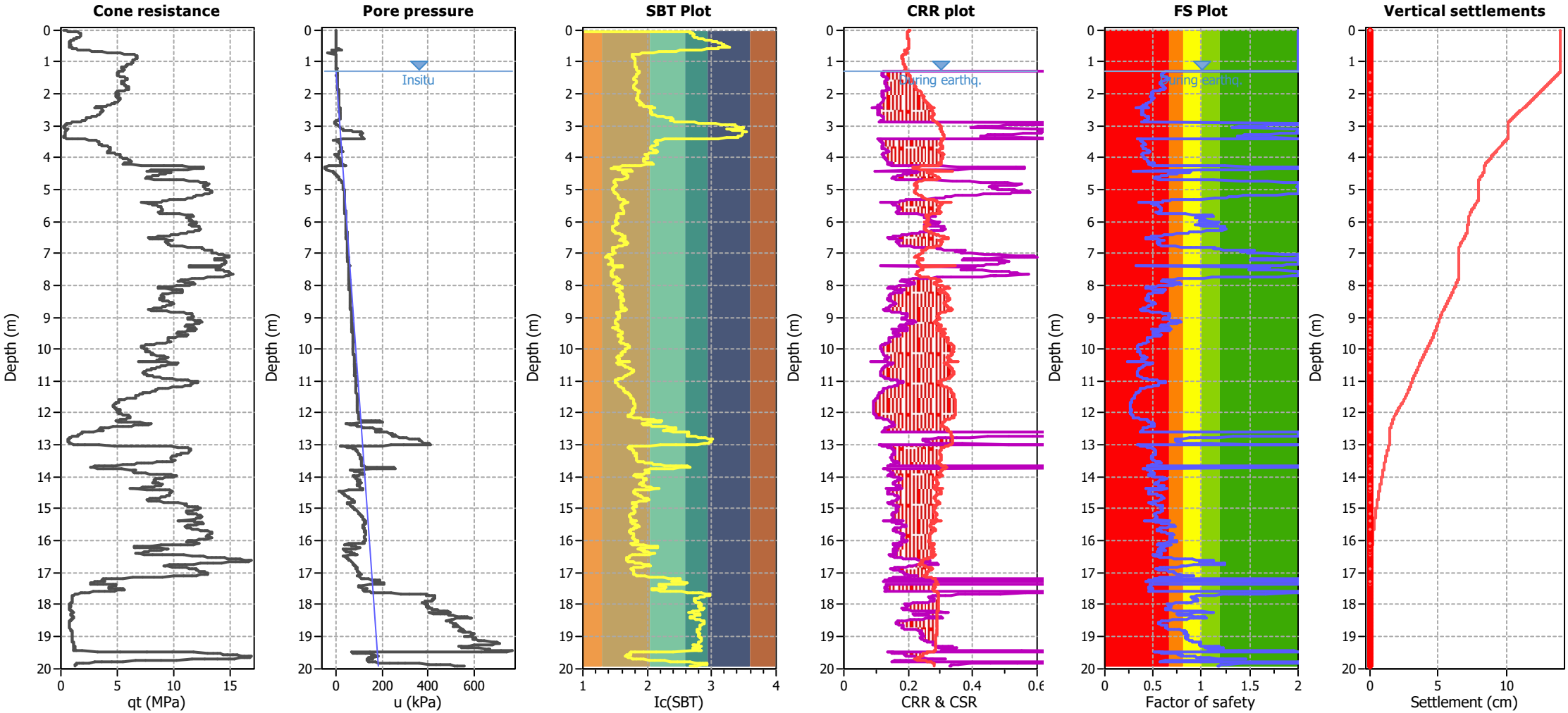


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87660.00
Total depth: 19.93 m

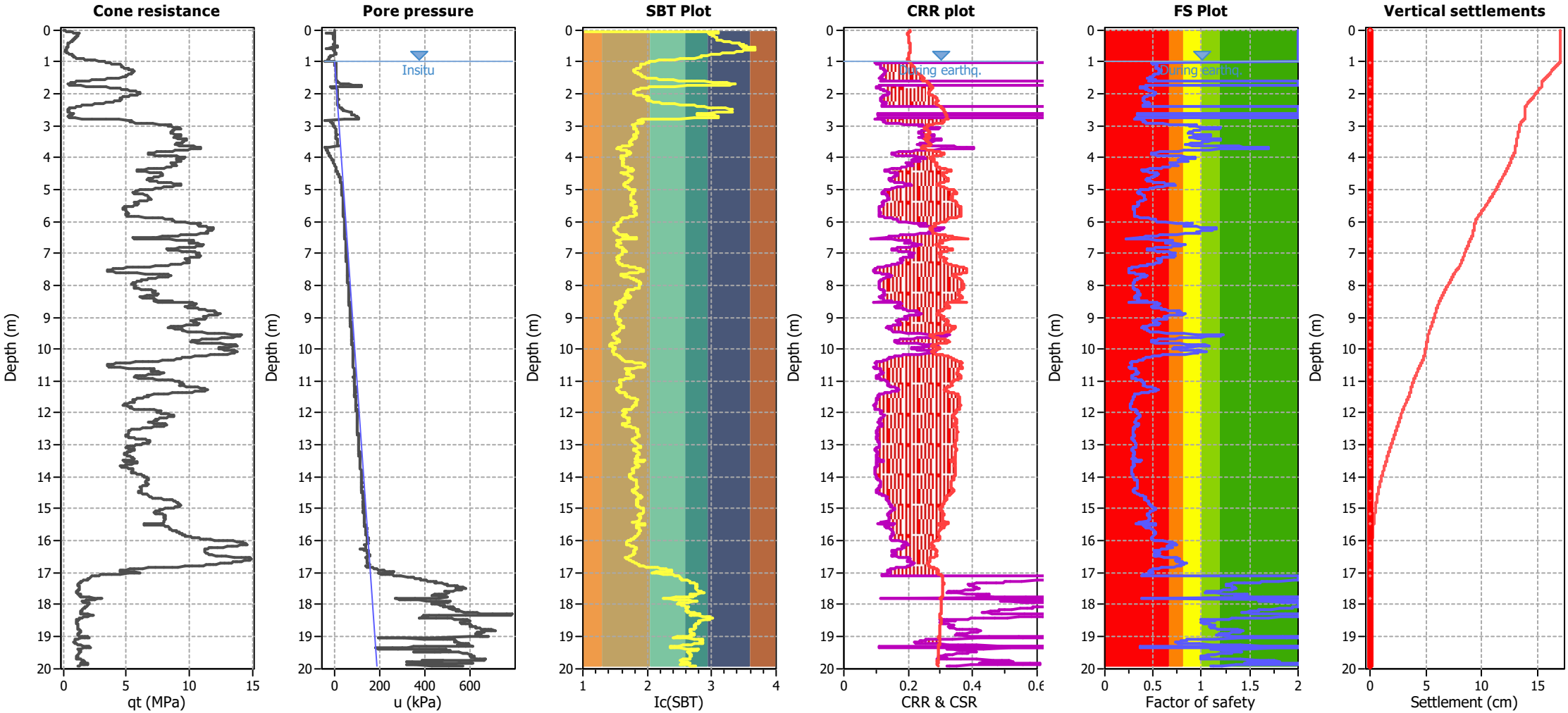


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.30 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87661.00
Total depth: 19.93 m

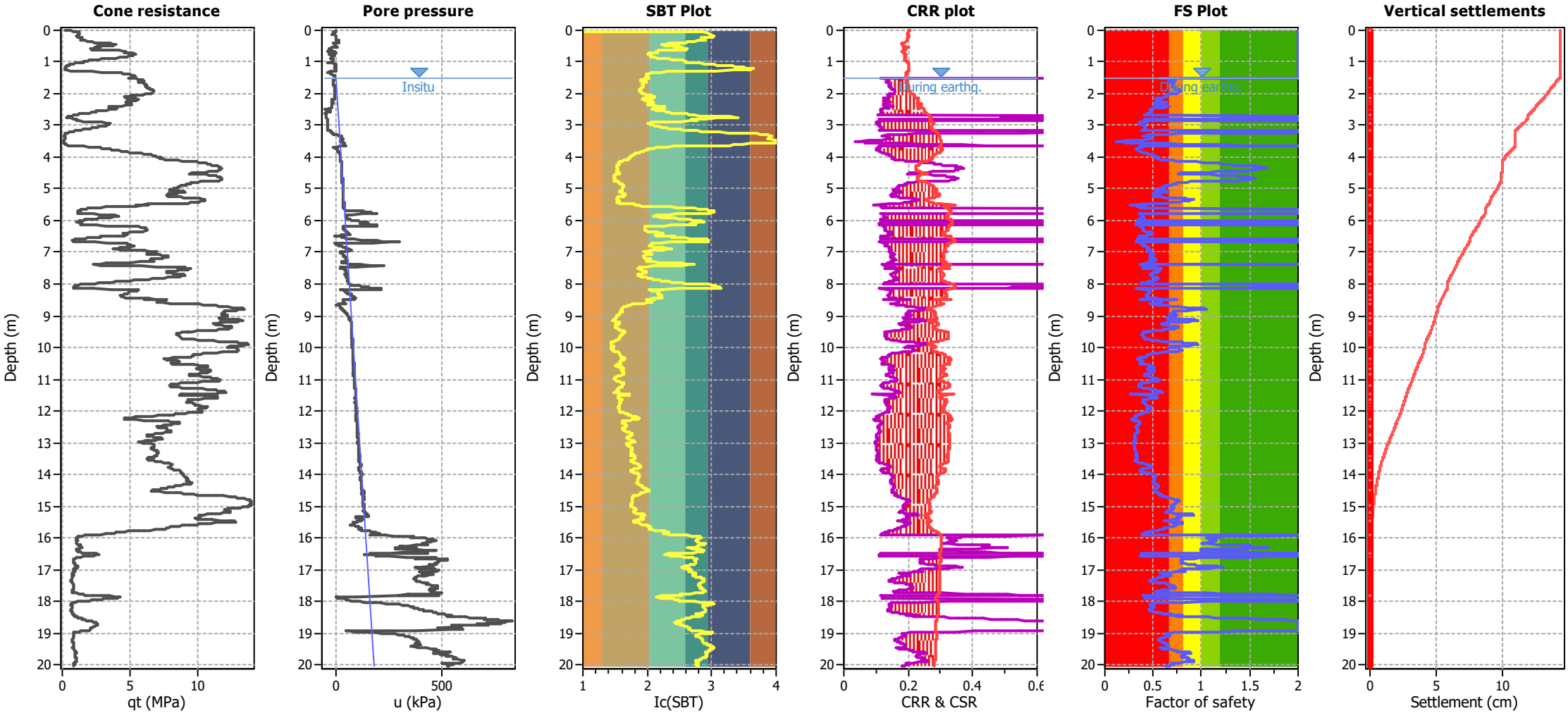


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87662.00
Total depth: 20.03 m

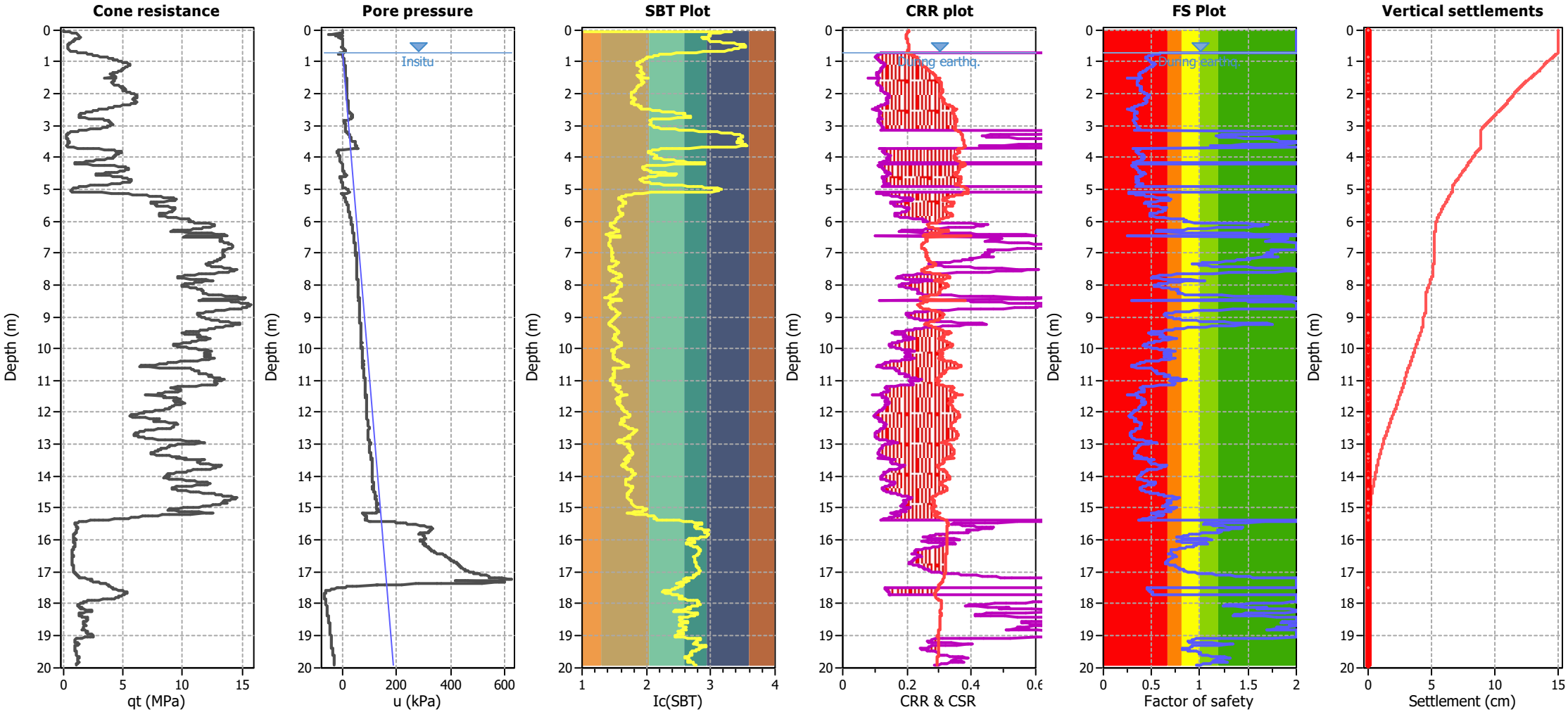


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87663.00
Total depth: 19.93 m

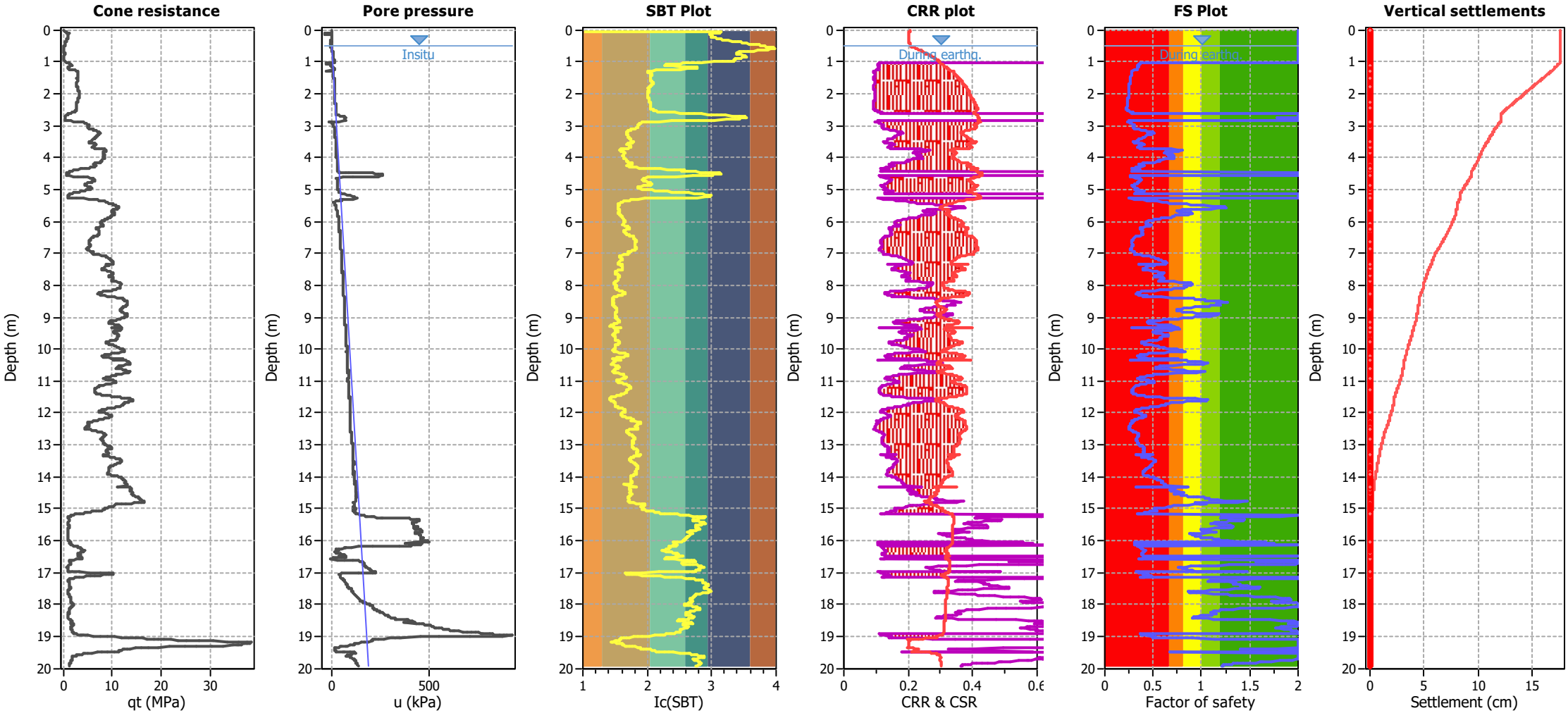


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.70 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87664.00
Total depth: 19.93 m

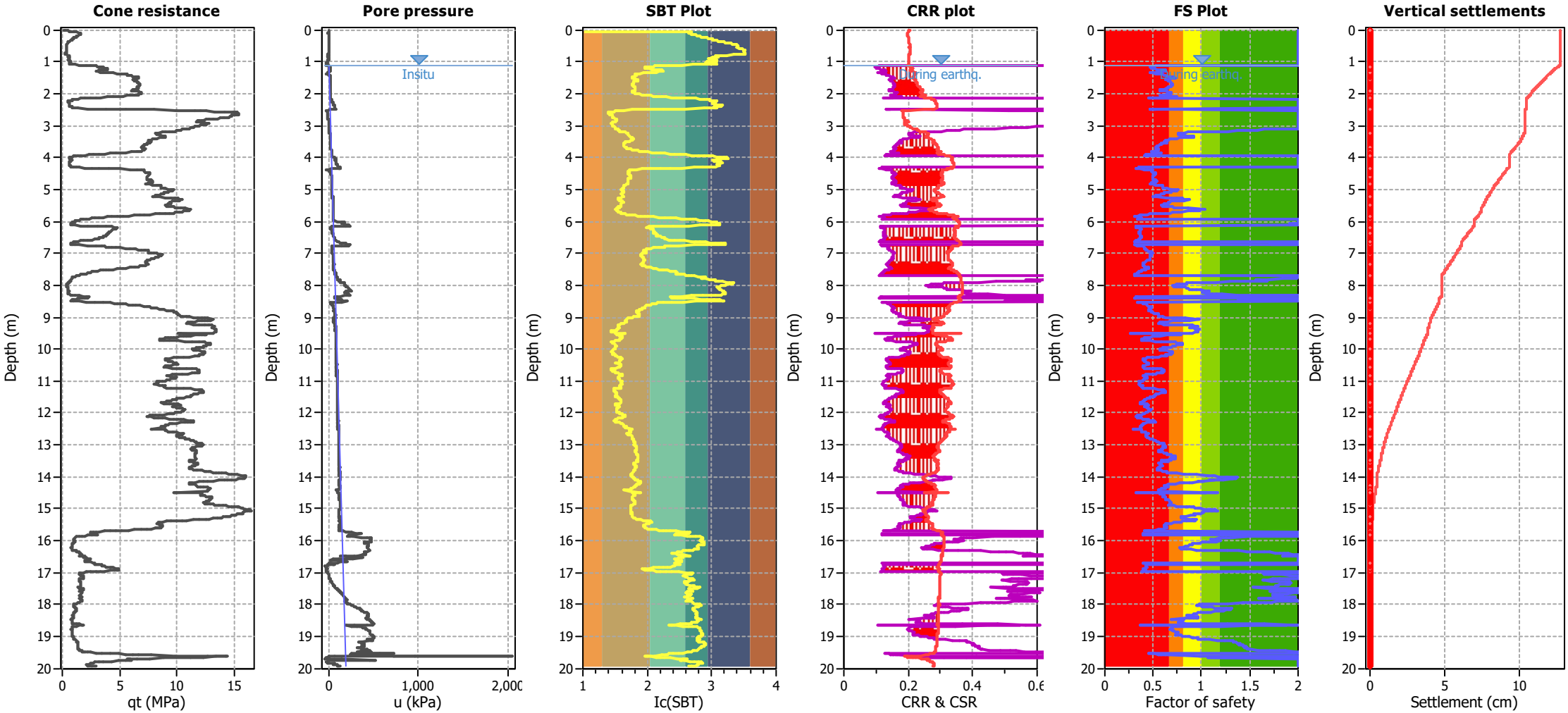


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87665.00
Total depth: 19.93 m

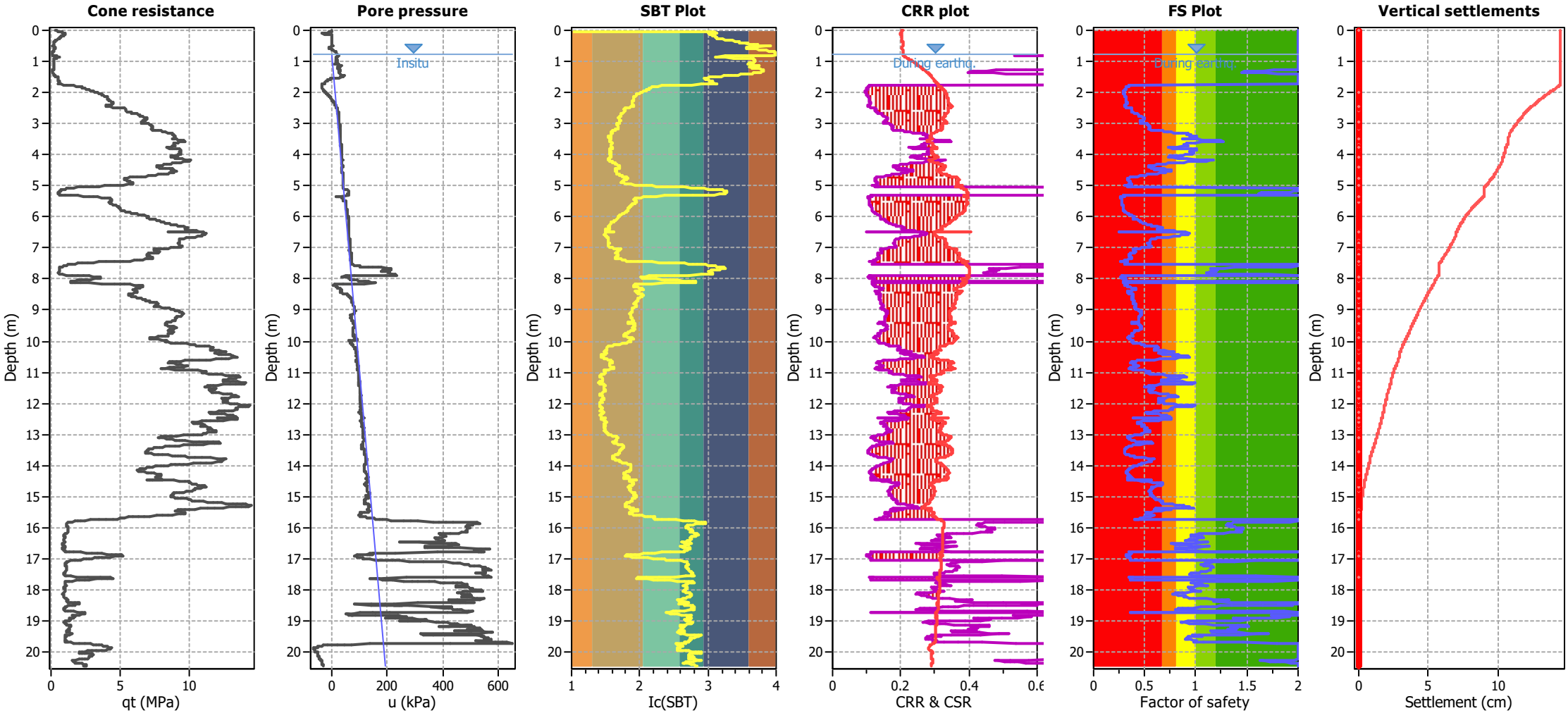


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87666.00
Total depth: 20.44 m

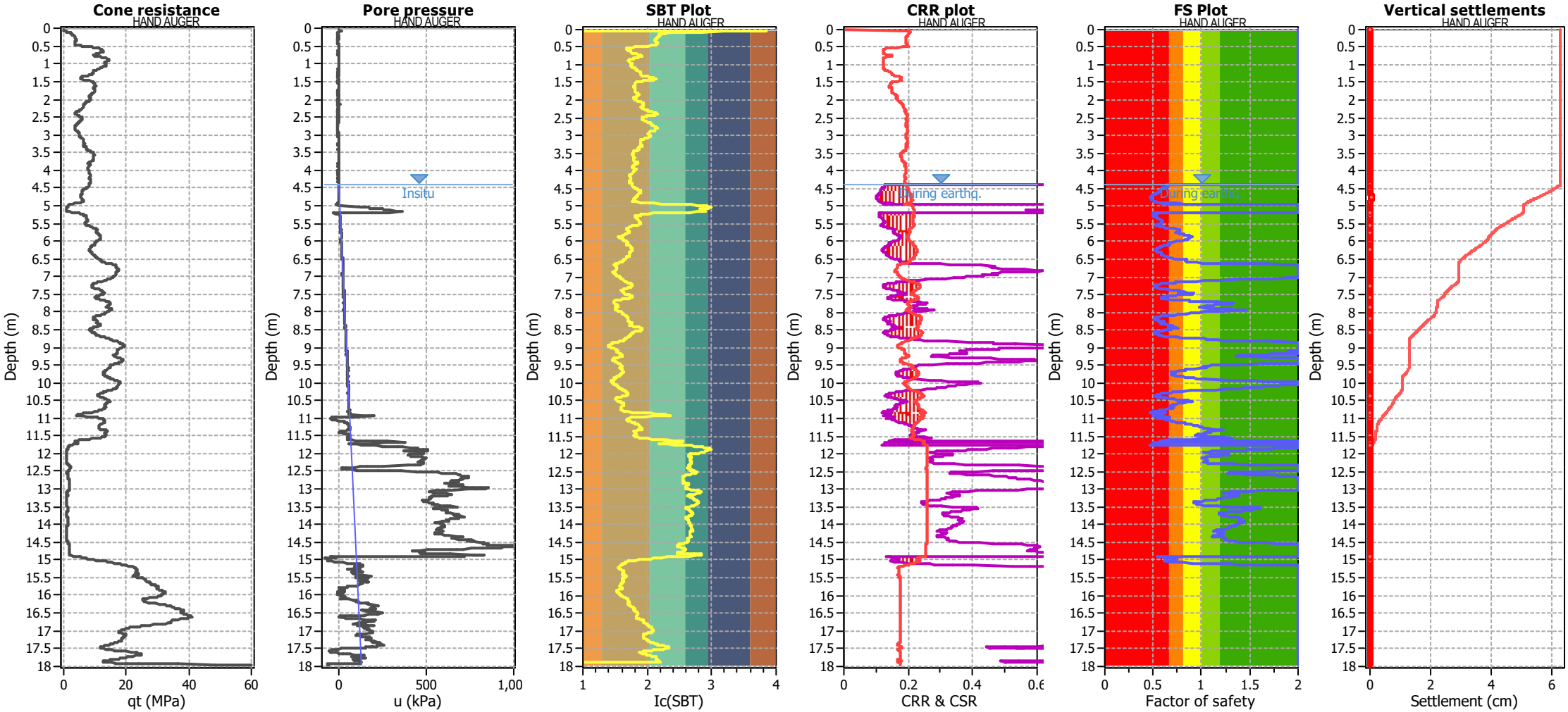


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 181275.00
Total depth: 17.97 m

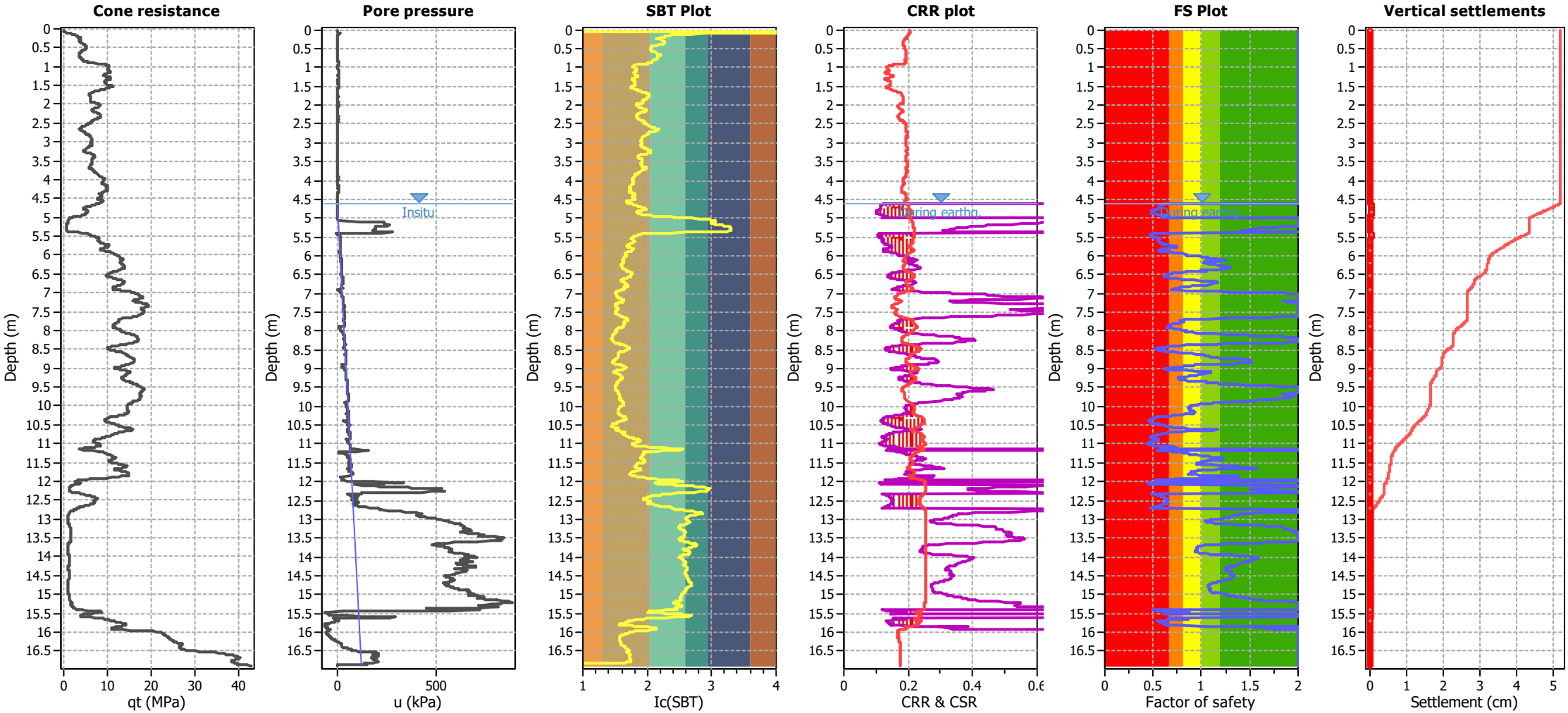


Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.40 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 181276.00
Total depth: 16.90 m

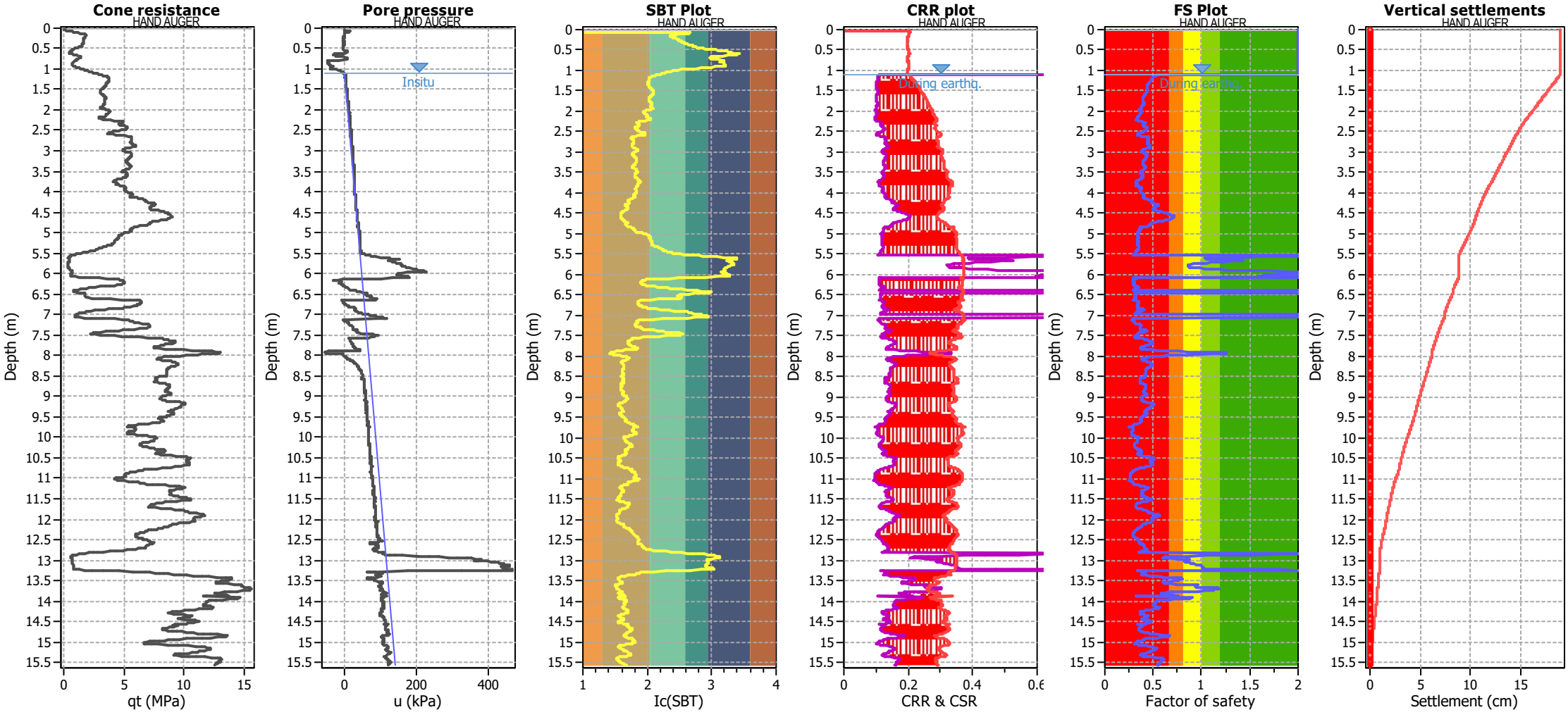


Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.60 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 192467.00
Total depth: 15.56 m

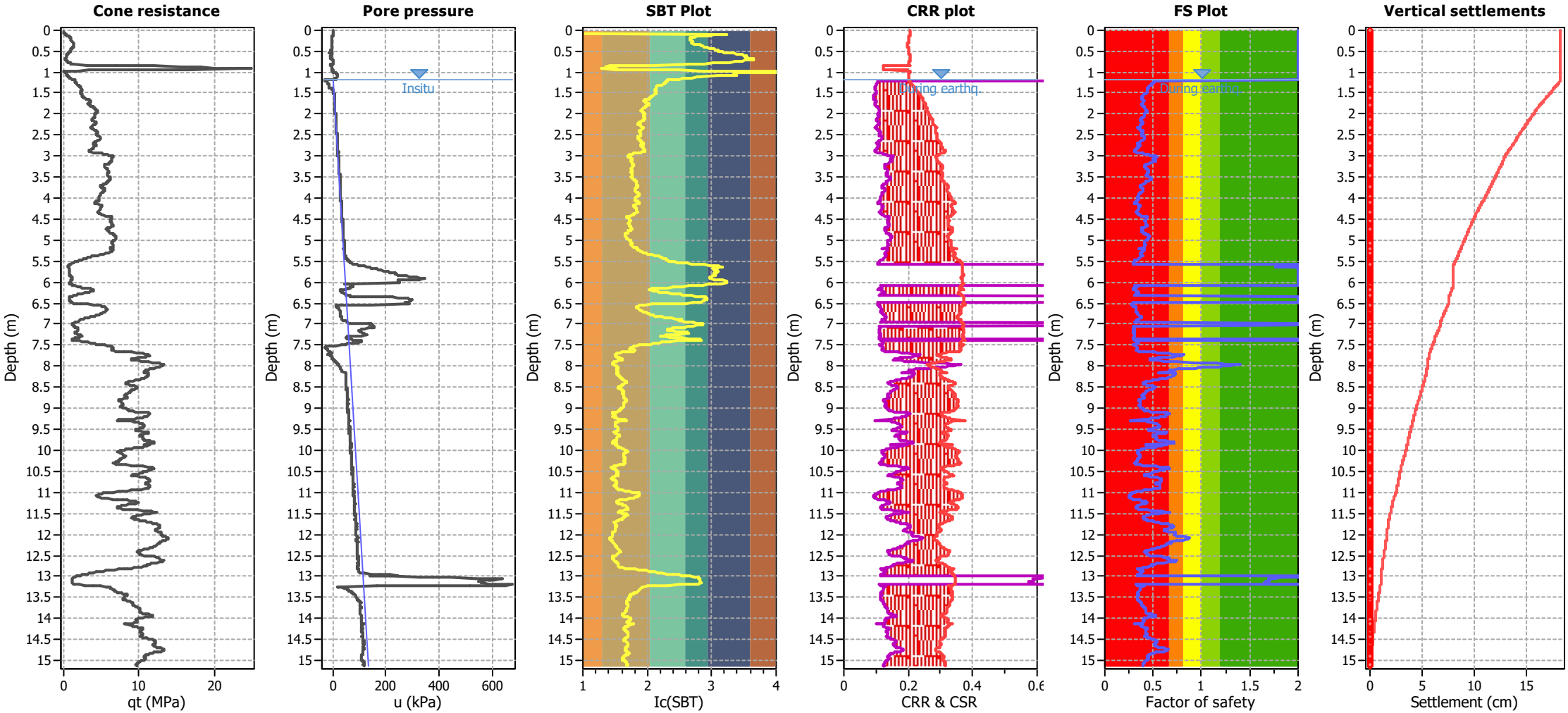


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 192501.00
Total depth: 15.13 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.20 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

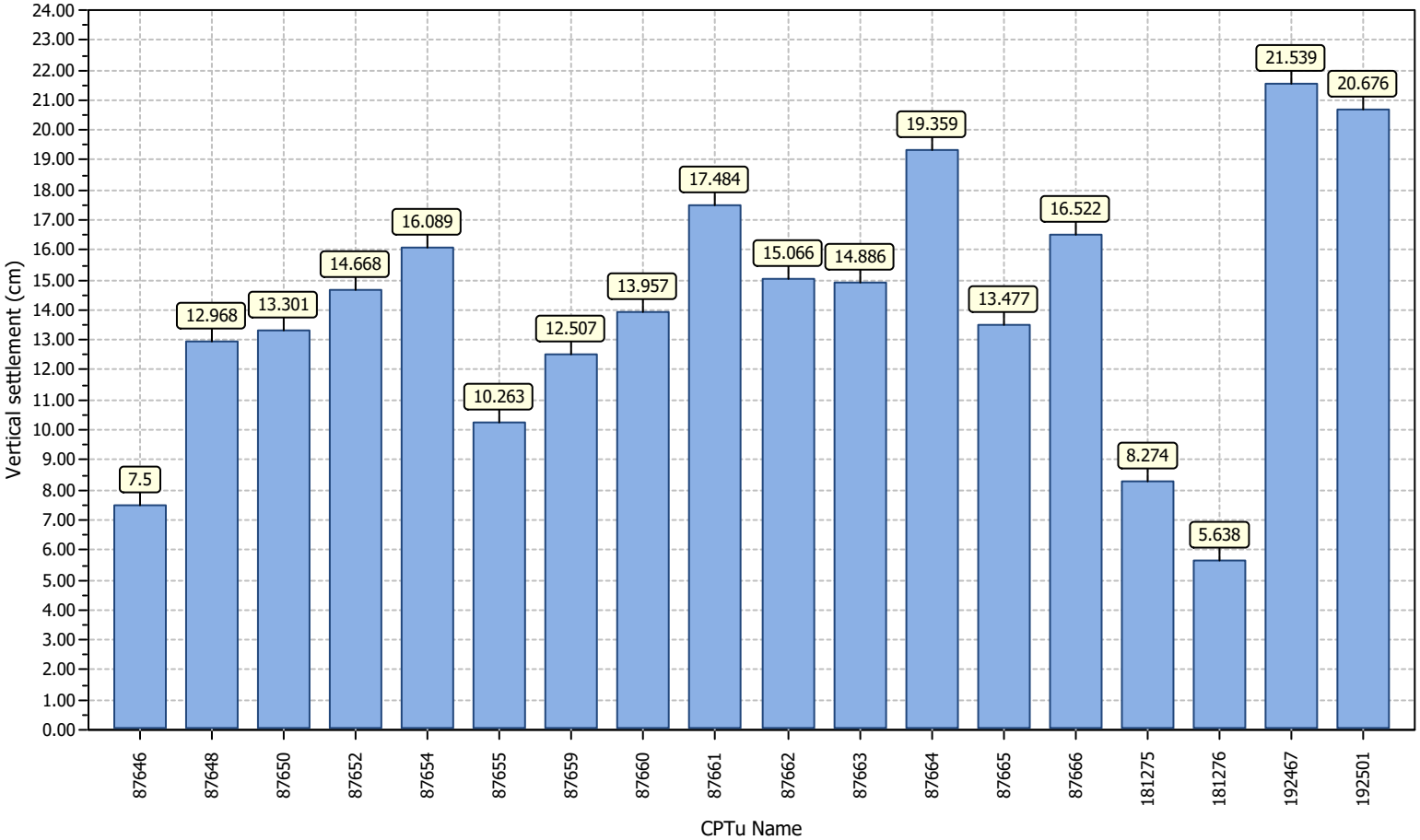
10M INDEX ANALYSIS RESULTS

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall vertical settlements report

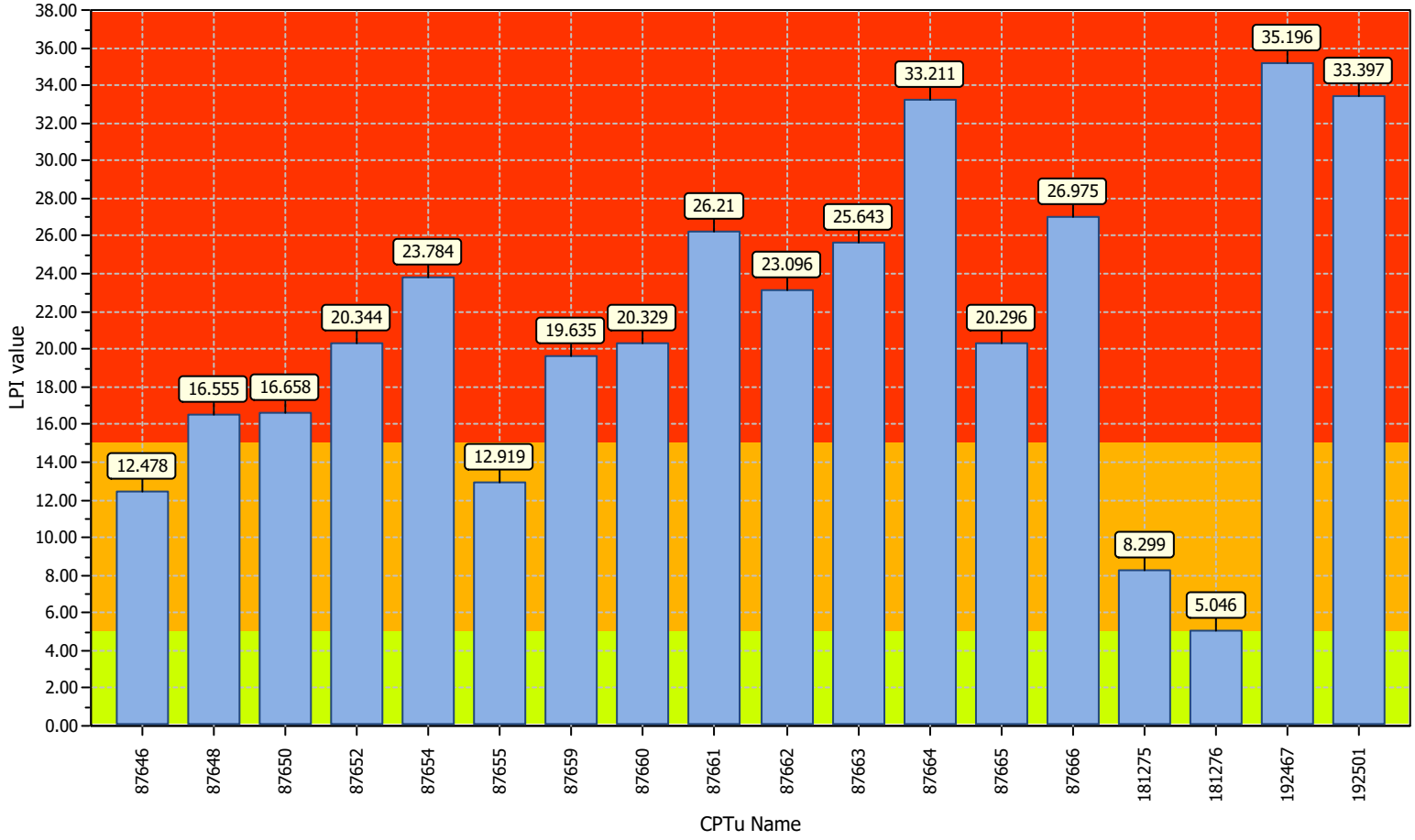


CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 18

0% low risk

22% high risk

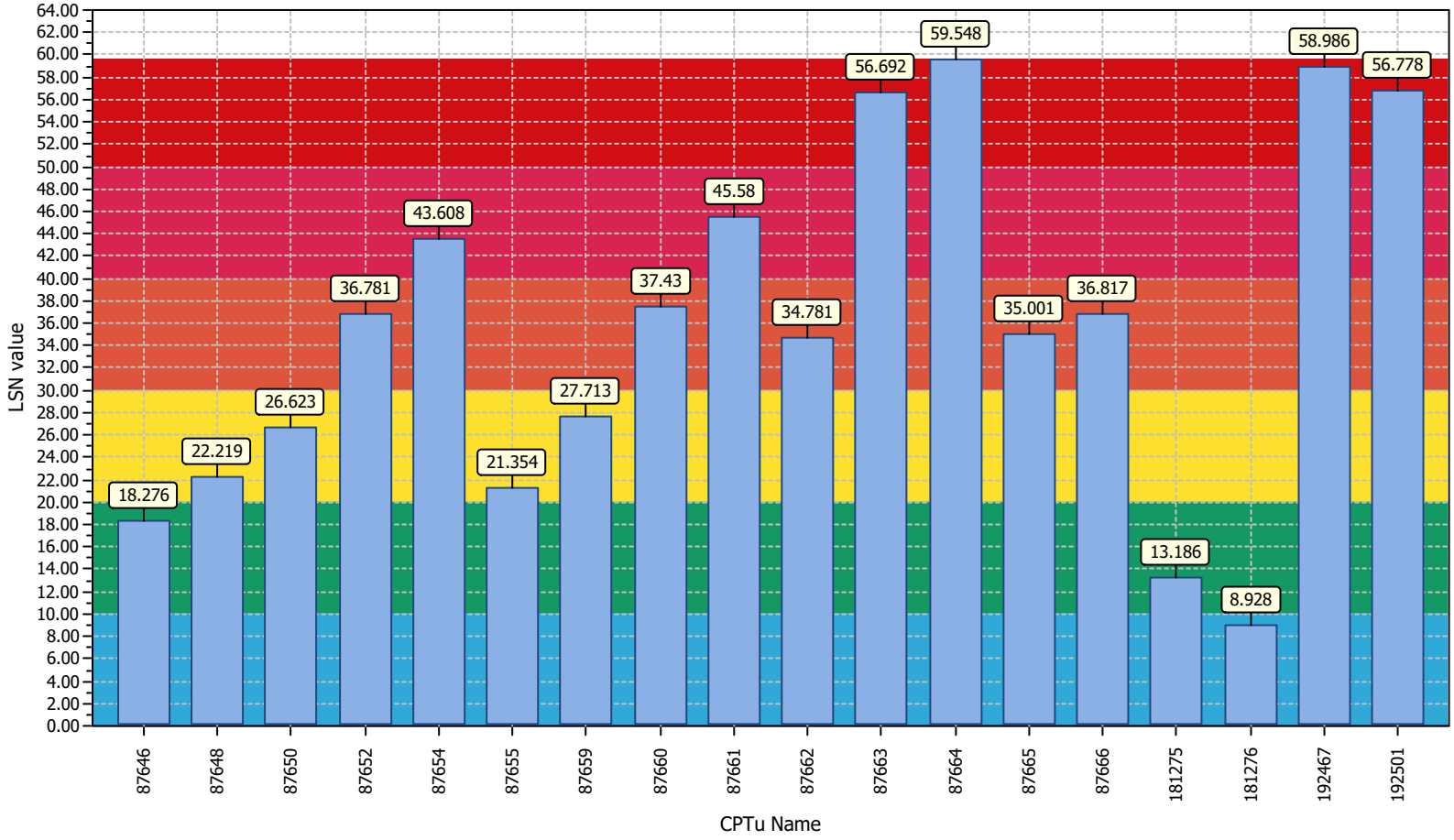
78% very high risk

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project title : HAM2024-0017

Location : SOuthern Links SL1

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 18

6% little liquefaction

11% minor liquefaction

22% moderate liquefaction

28% moderate to major liquefaction

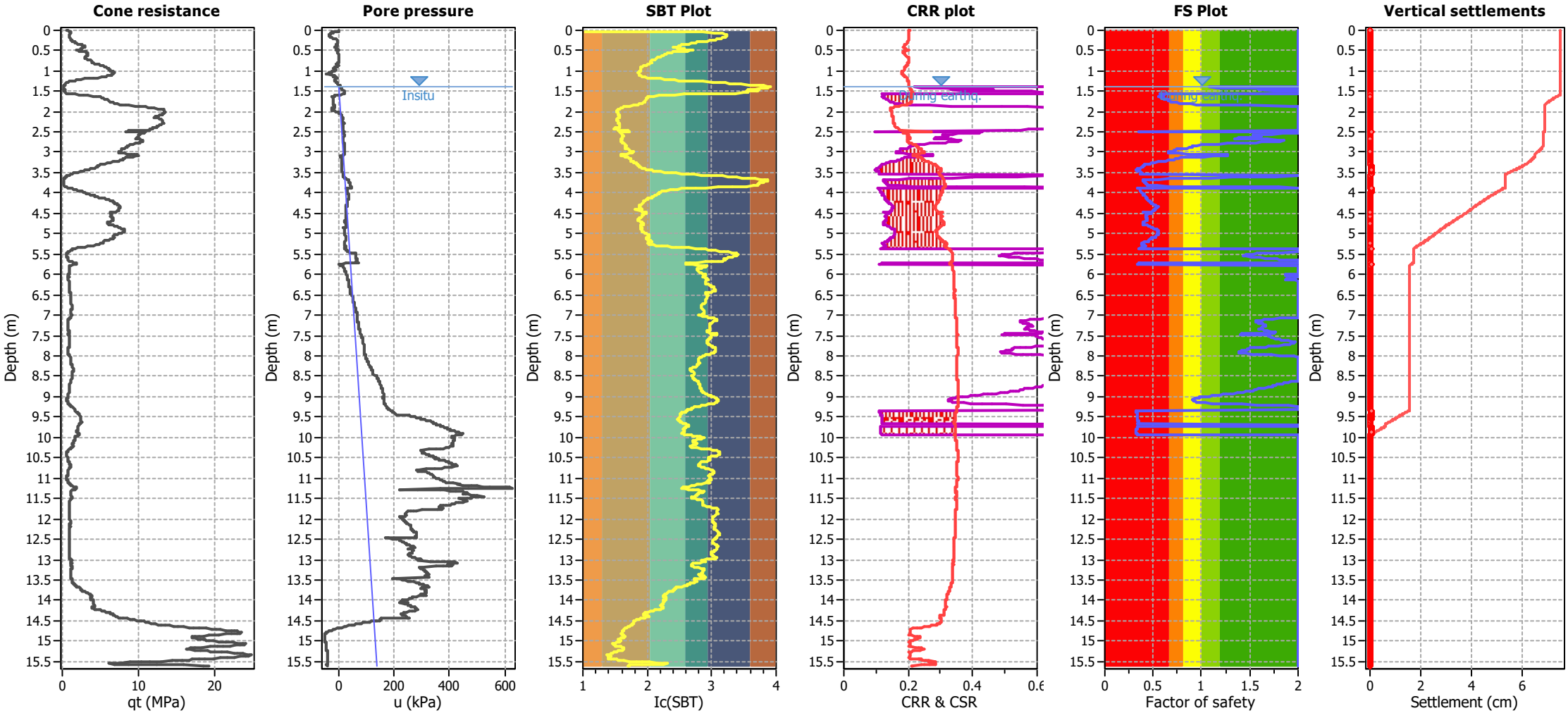
11% major liquefaction

22% severe liquefaction

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87646.00
Total depth: 15.61 m

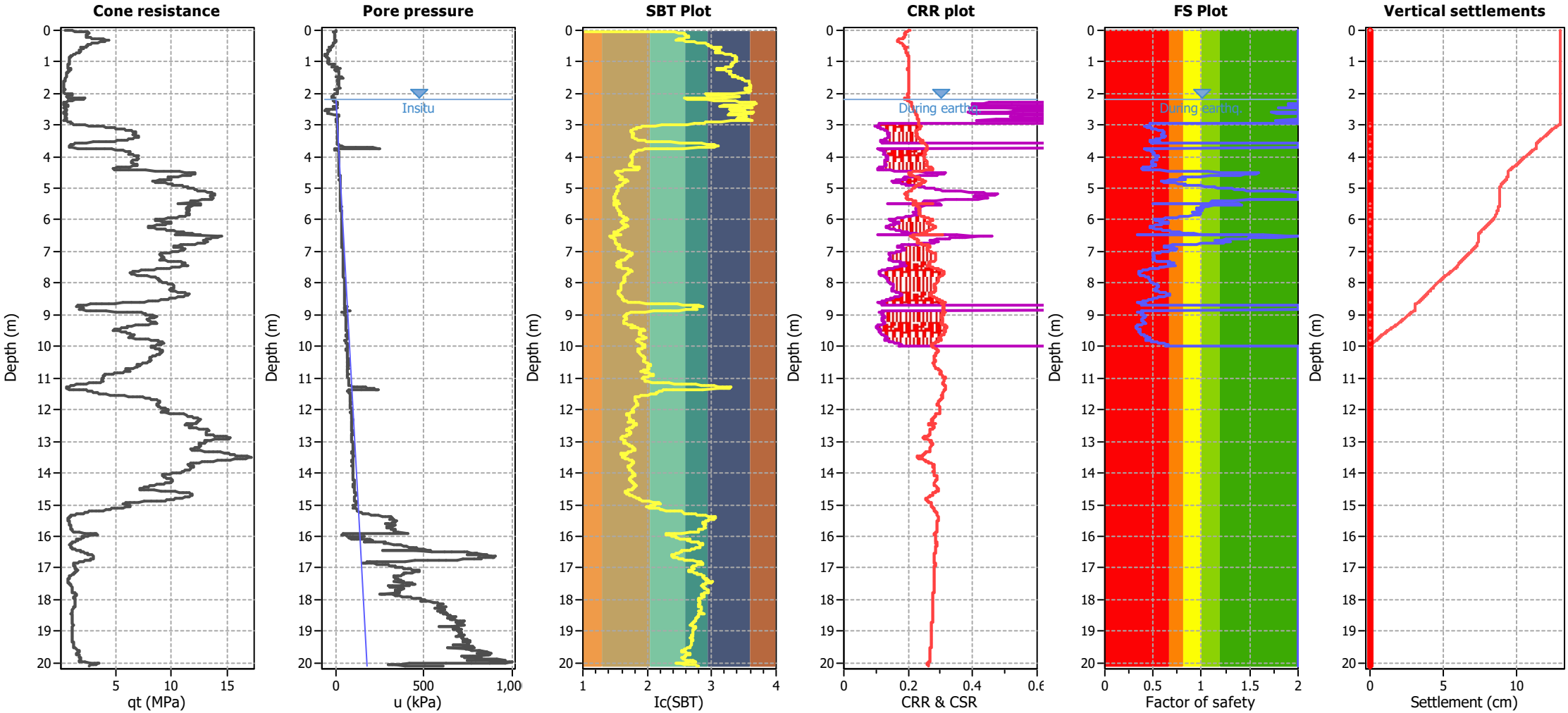


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87648.00
Total depth: 20.10 m

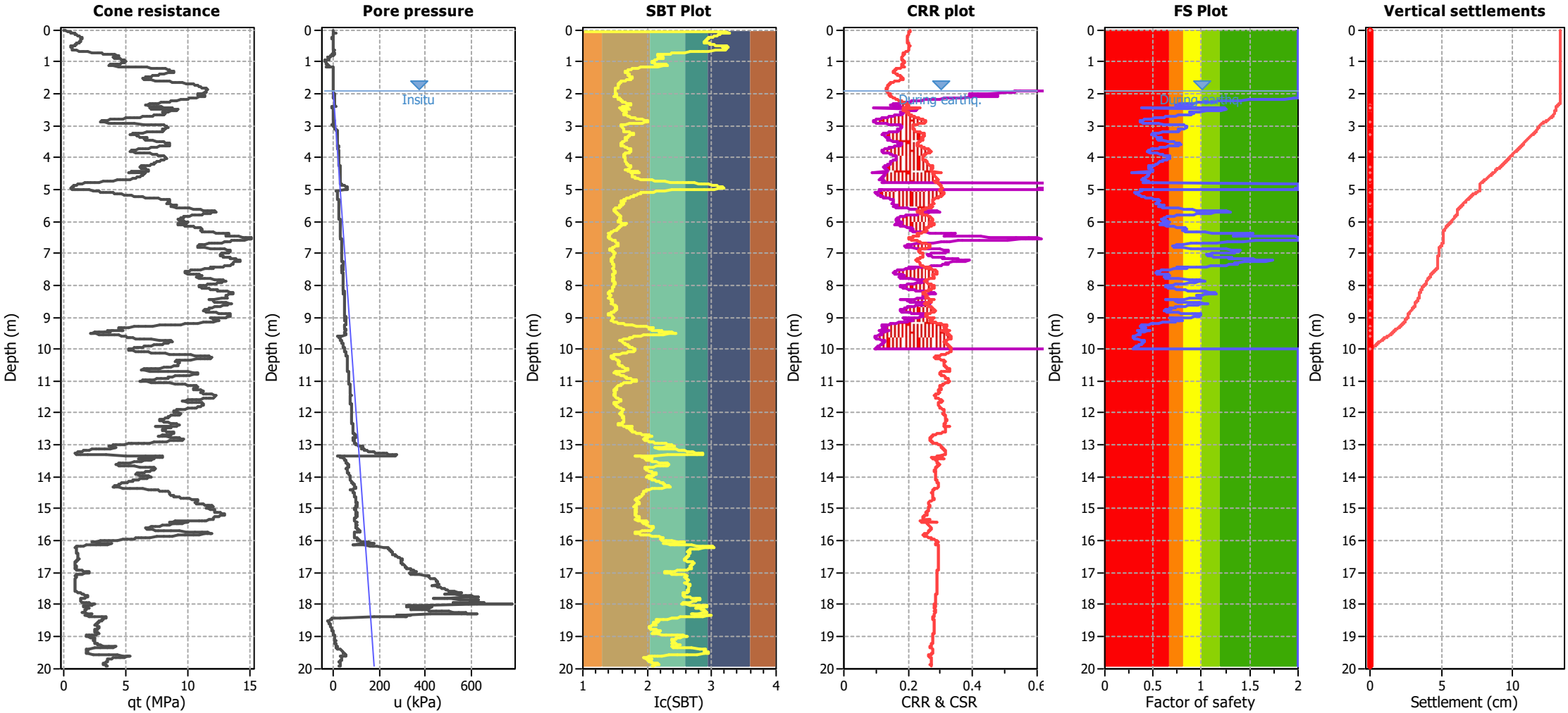


Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87650.00
Total depth: 19.93 m

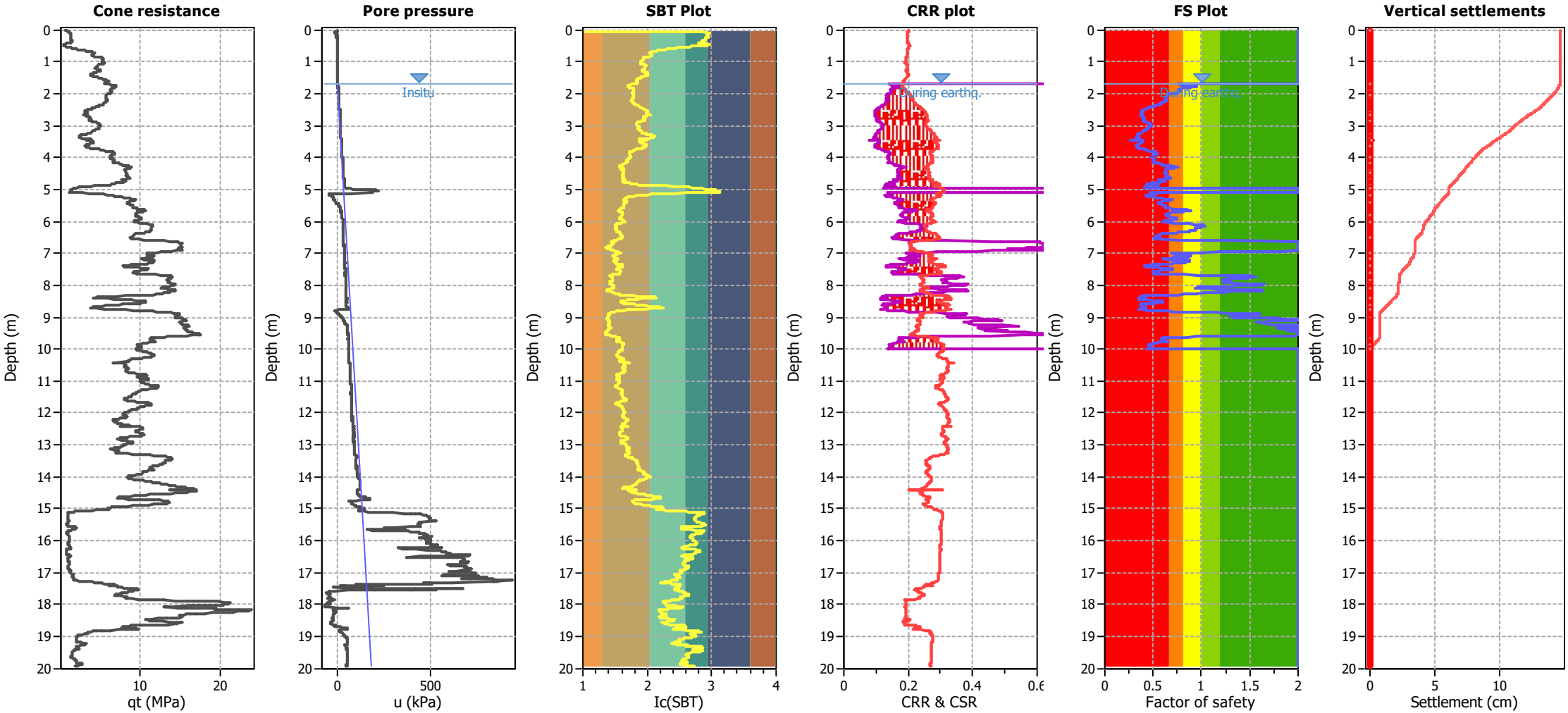


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.90 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.90 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87652.00
Total depth: 19.93 m

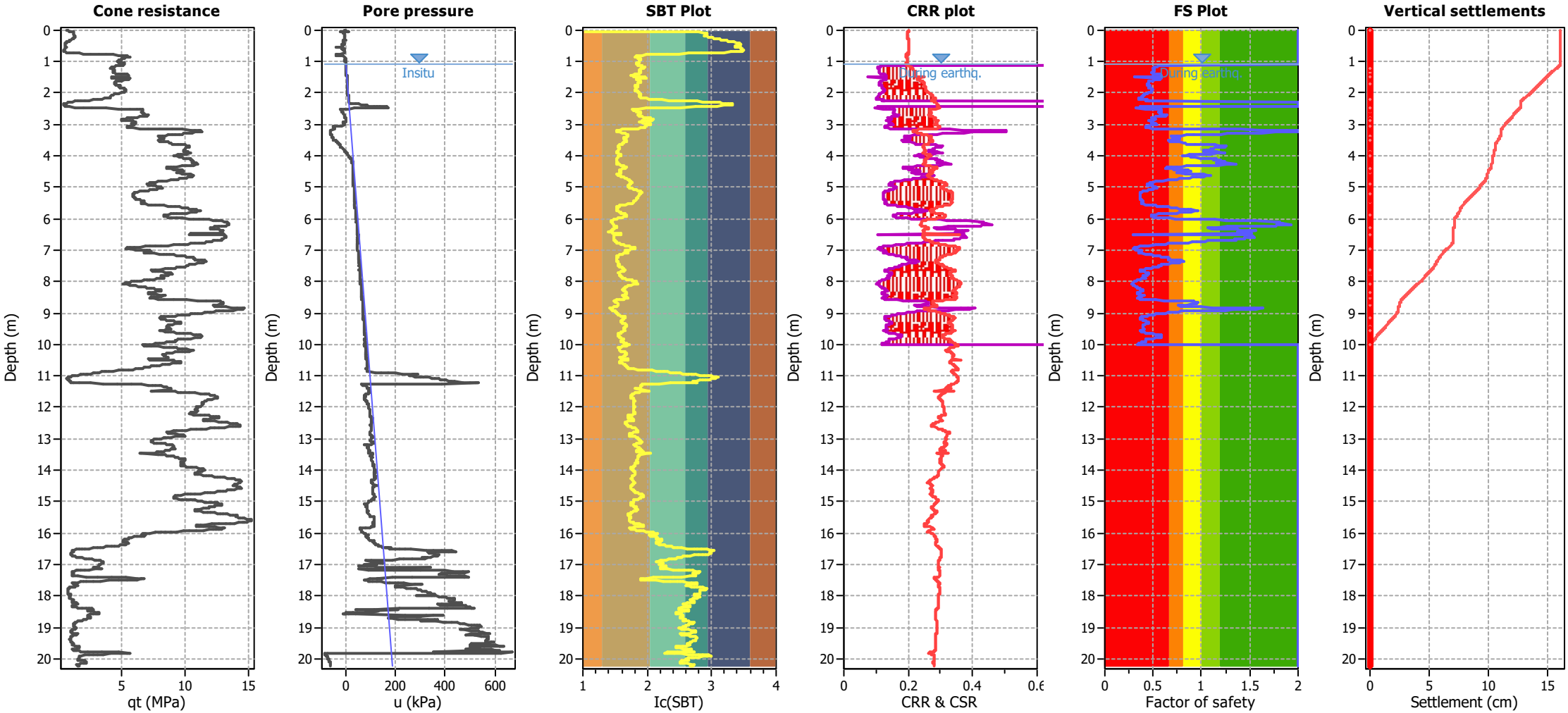


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87654.00
Total depth: 20.23 m

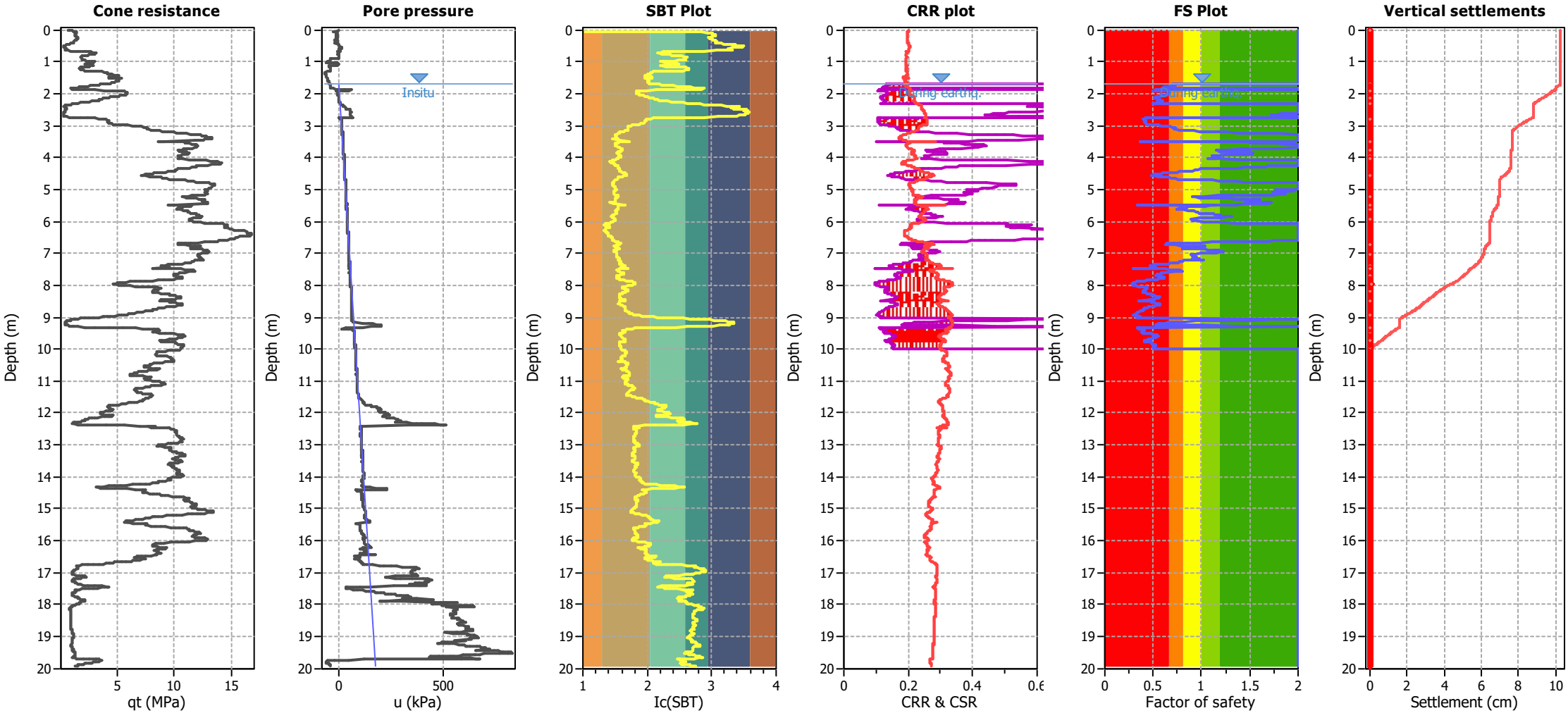


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87655.00
Total depth: 19.93 m

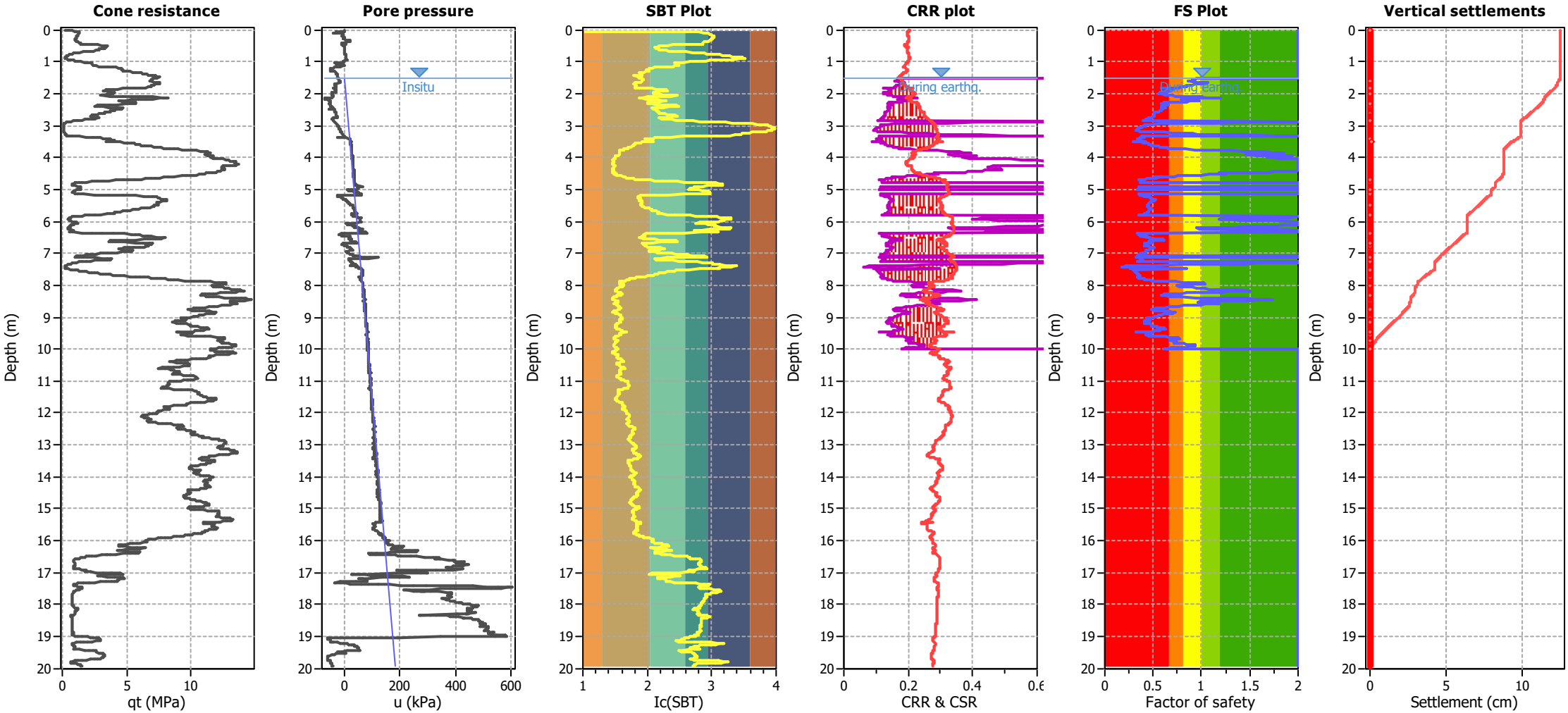


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87659.00
Total depth: 19.93 m

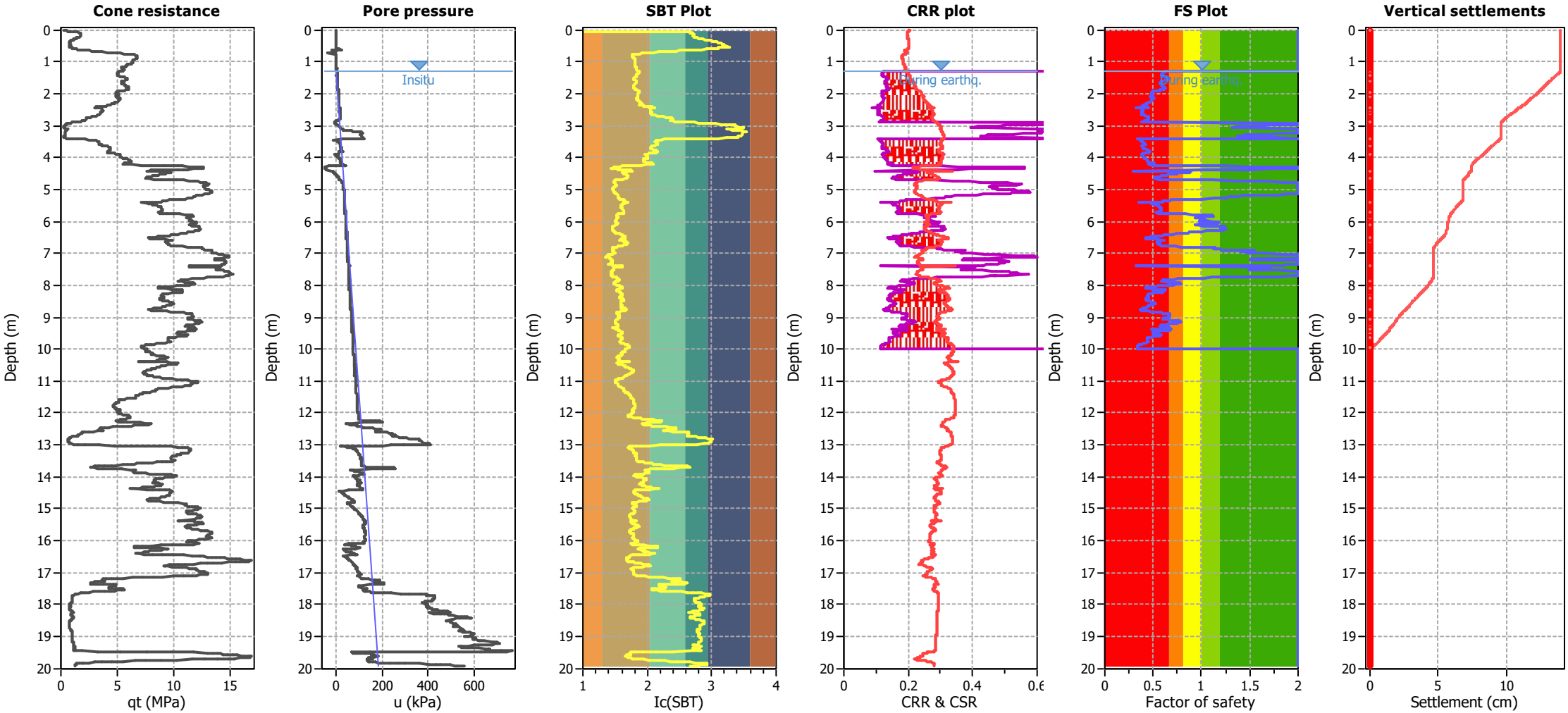


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87660.00
Total depth: 19.93 m

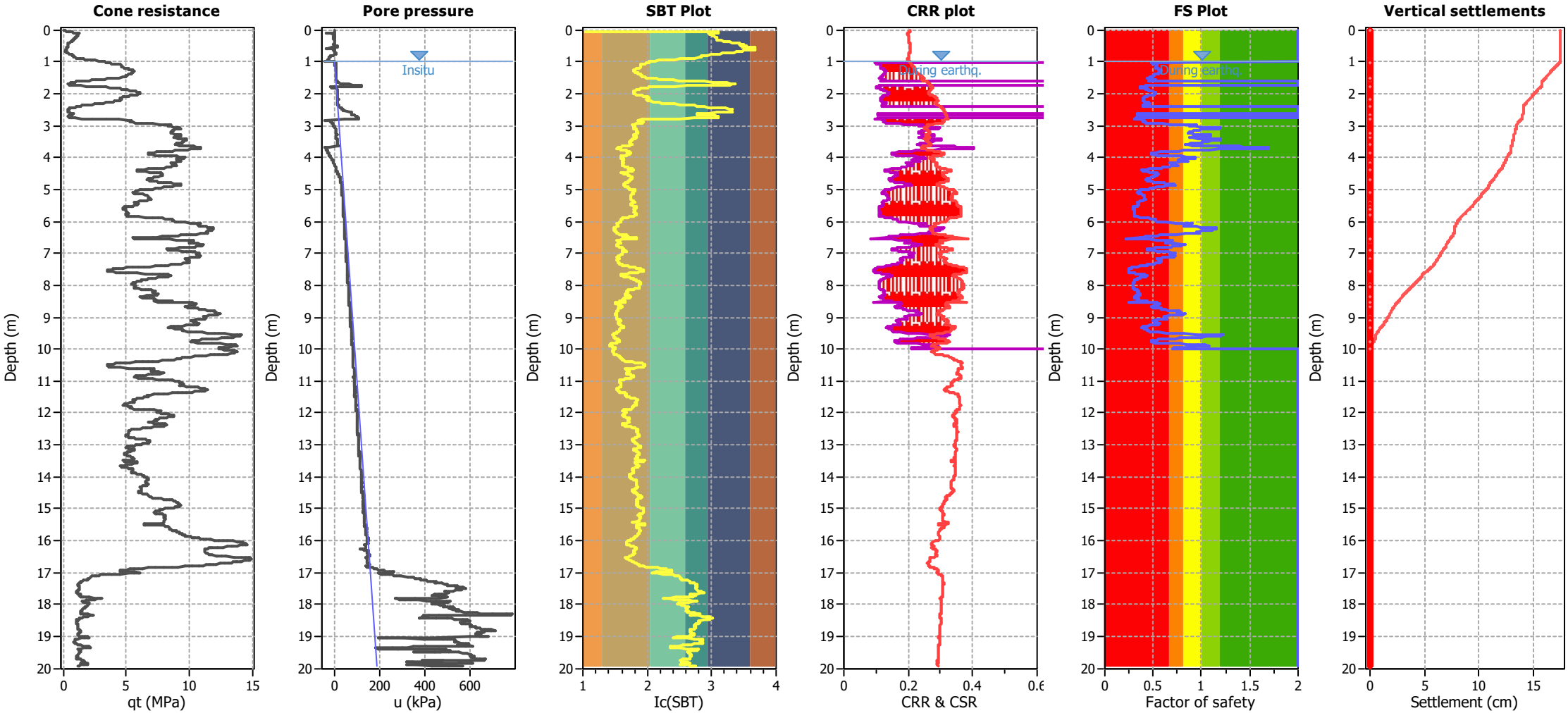


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.30 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87661.00
Total depth: 19.93 m

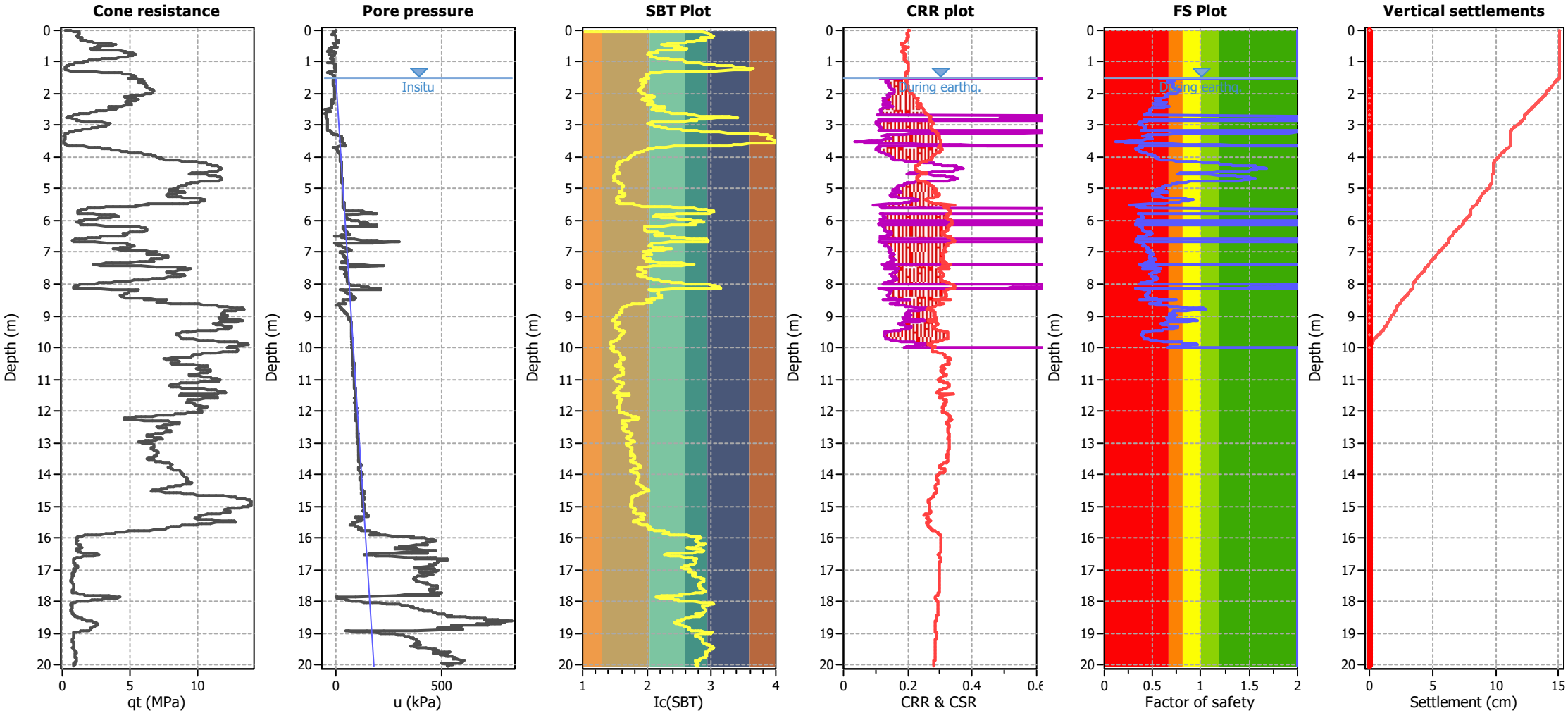


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87662.00
Total depth: 20.03 m

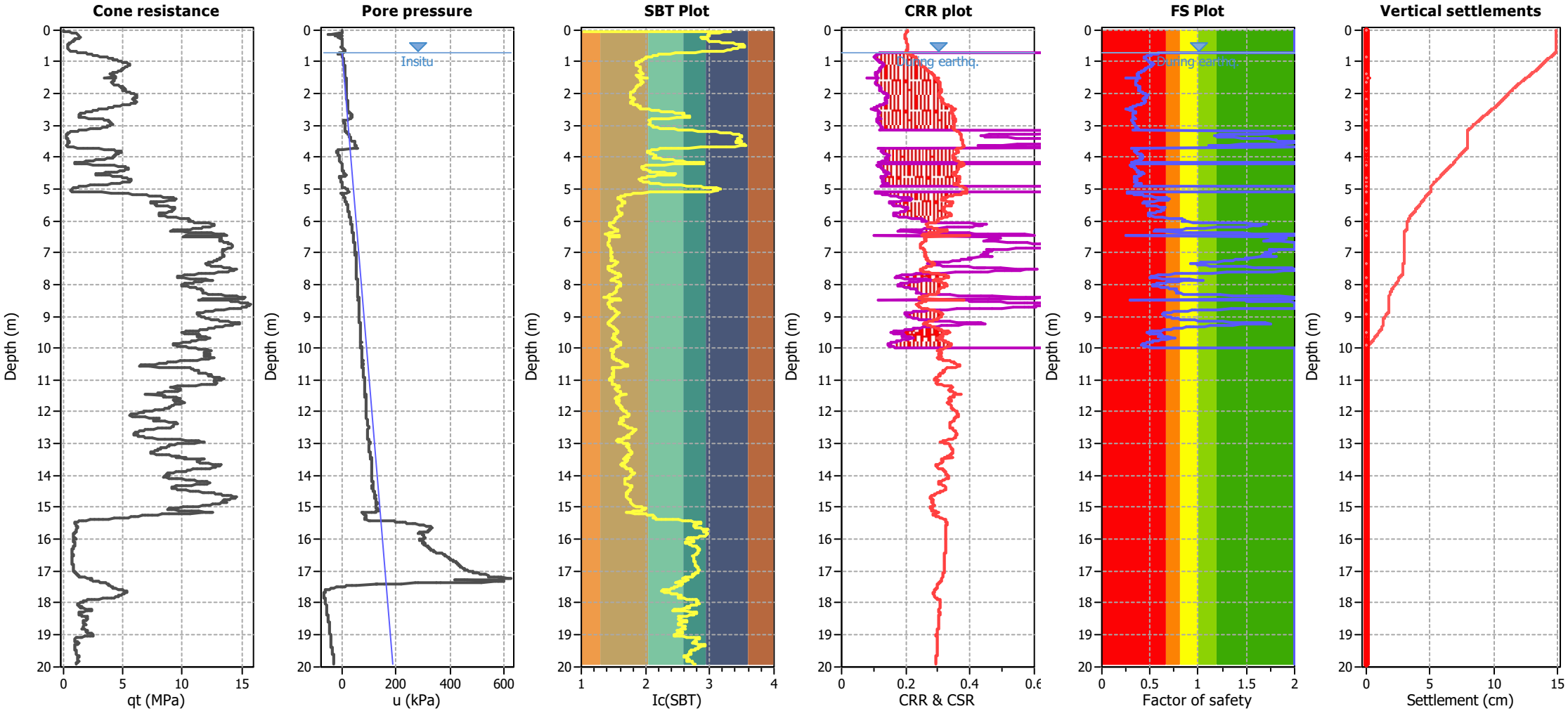


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87663.00
Total depth: 19.93 m

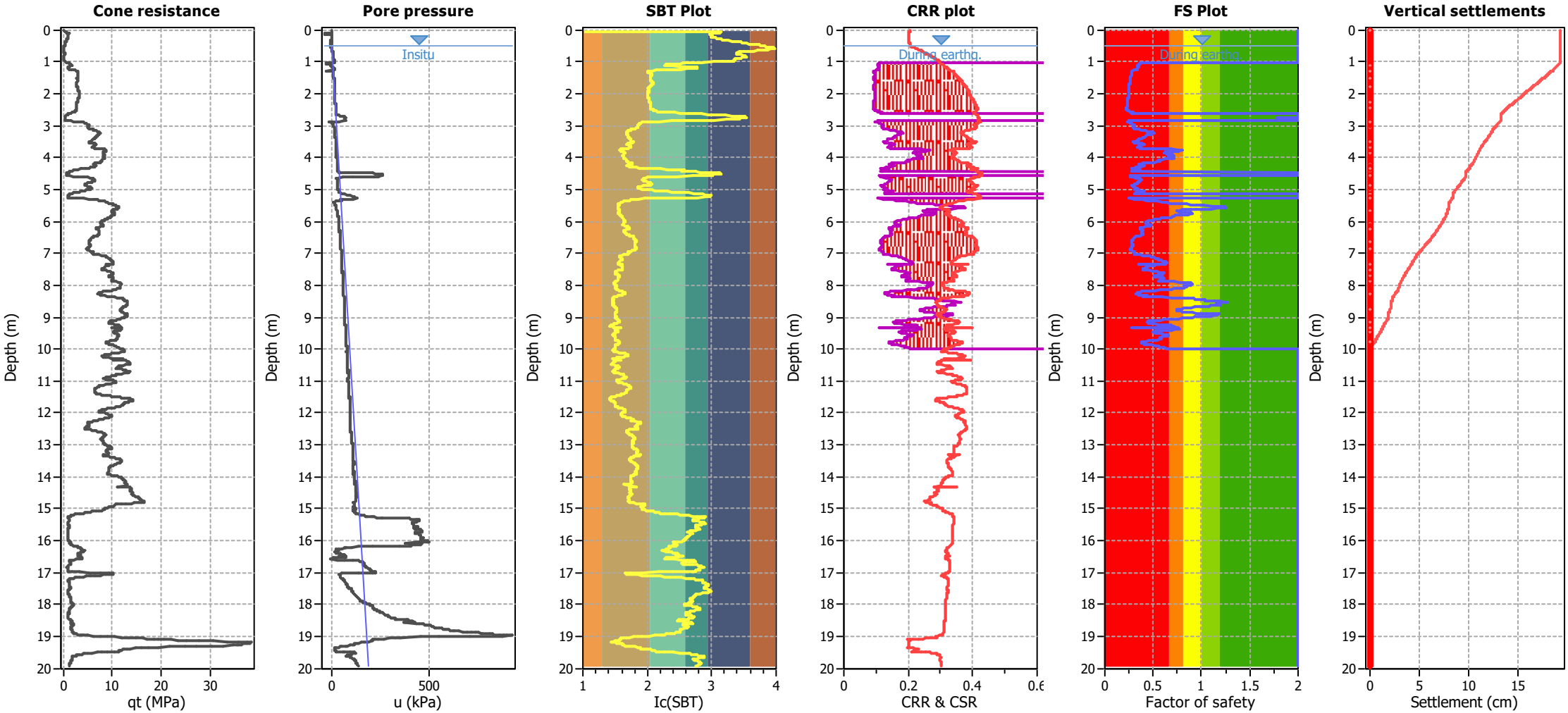


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.70 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.70 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87664.00
Total depth: 19.93 m

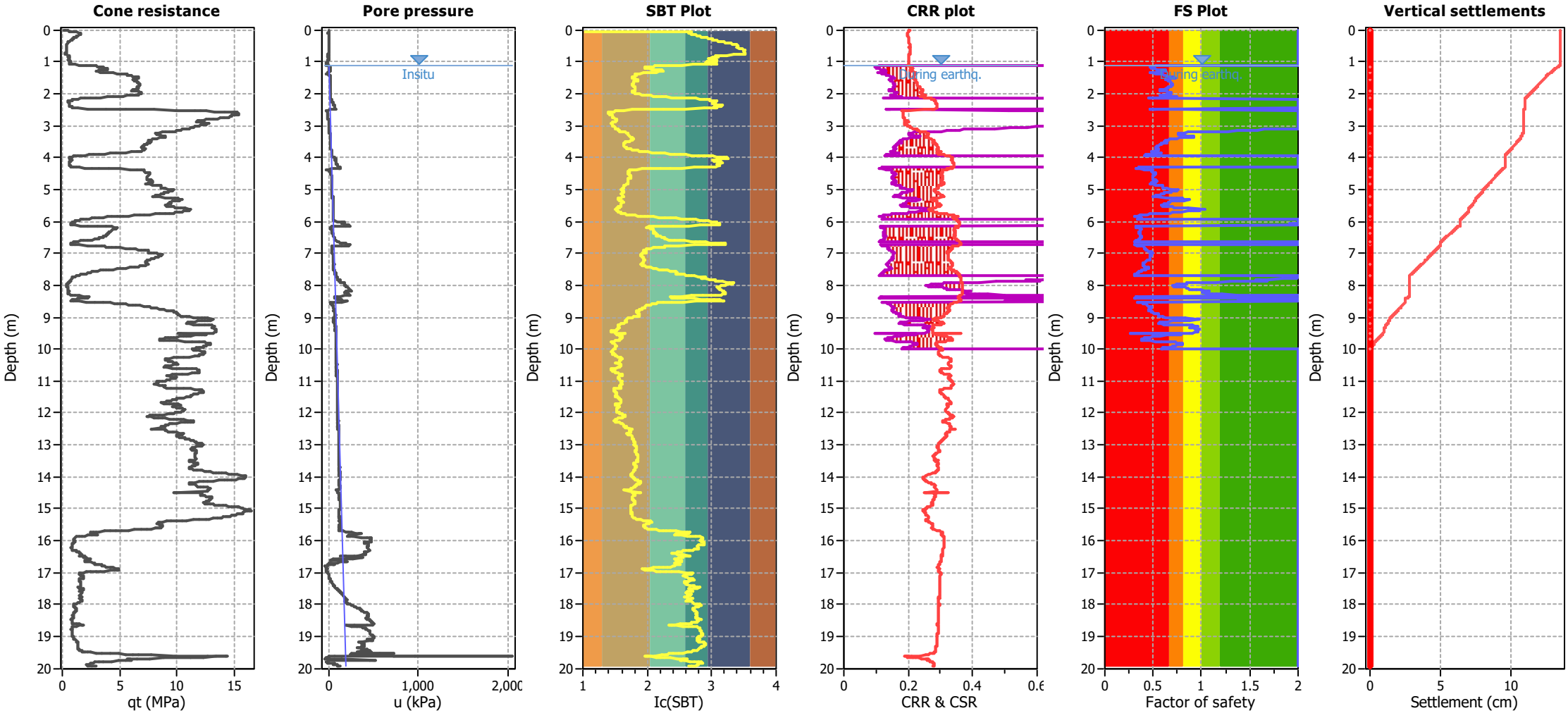


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87665.00
Total depth: 19.93 m

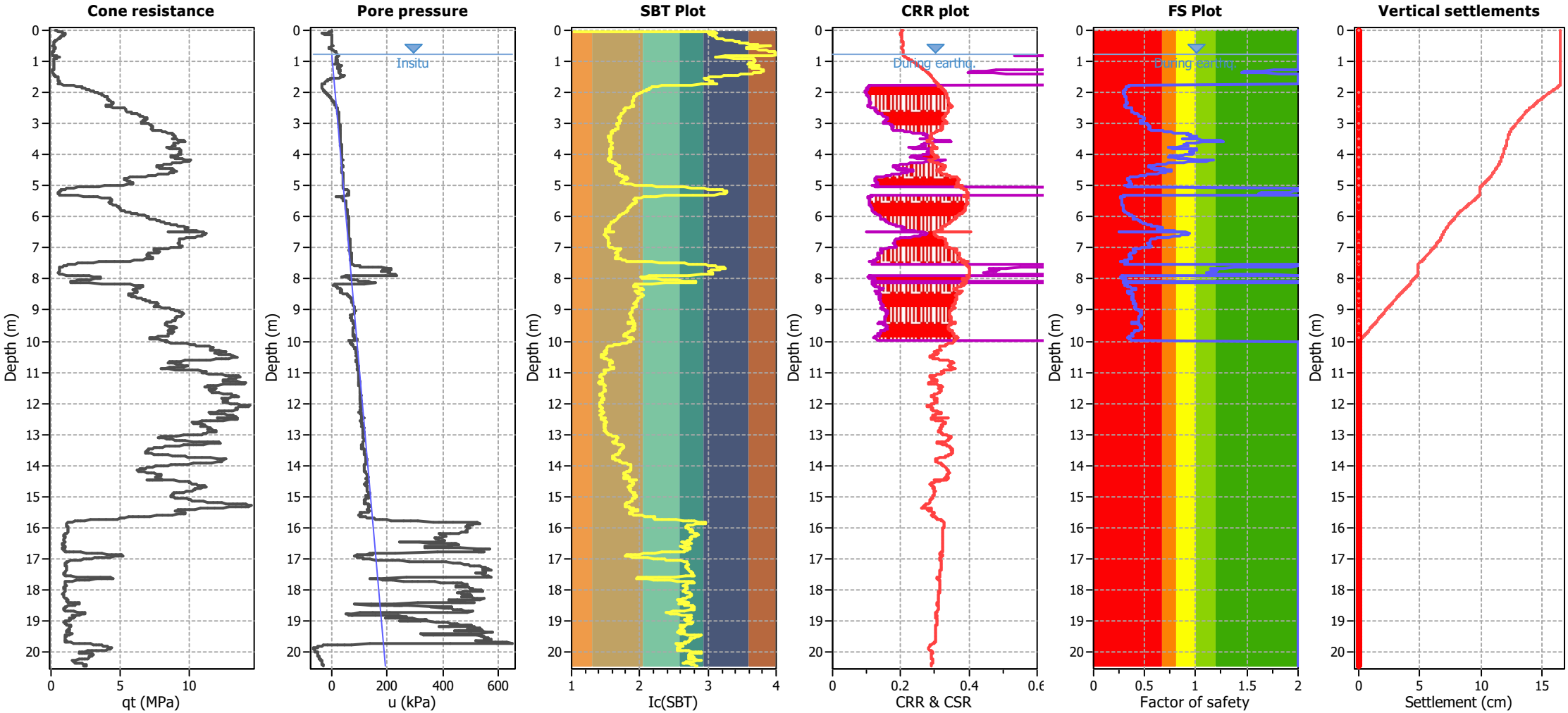


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 87666.00
Total depth: 20.44 m

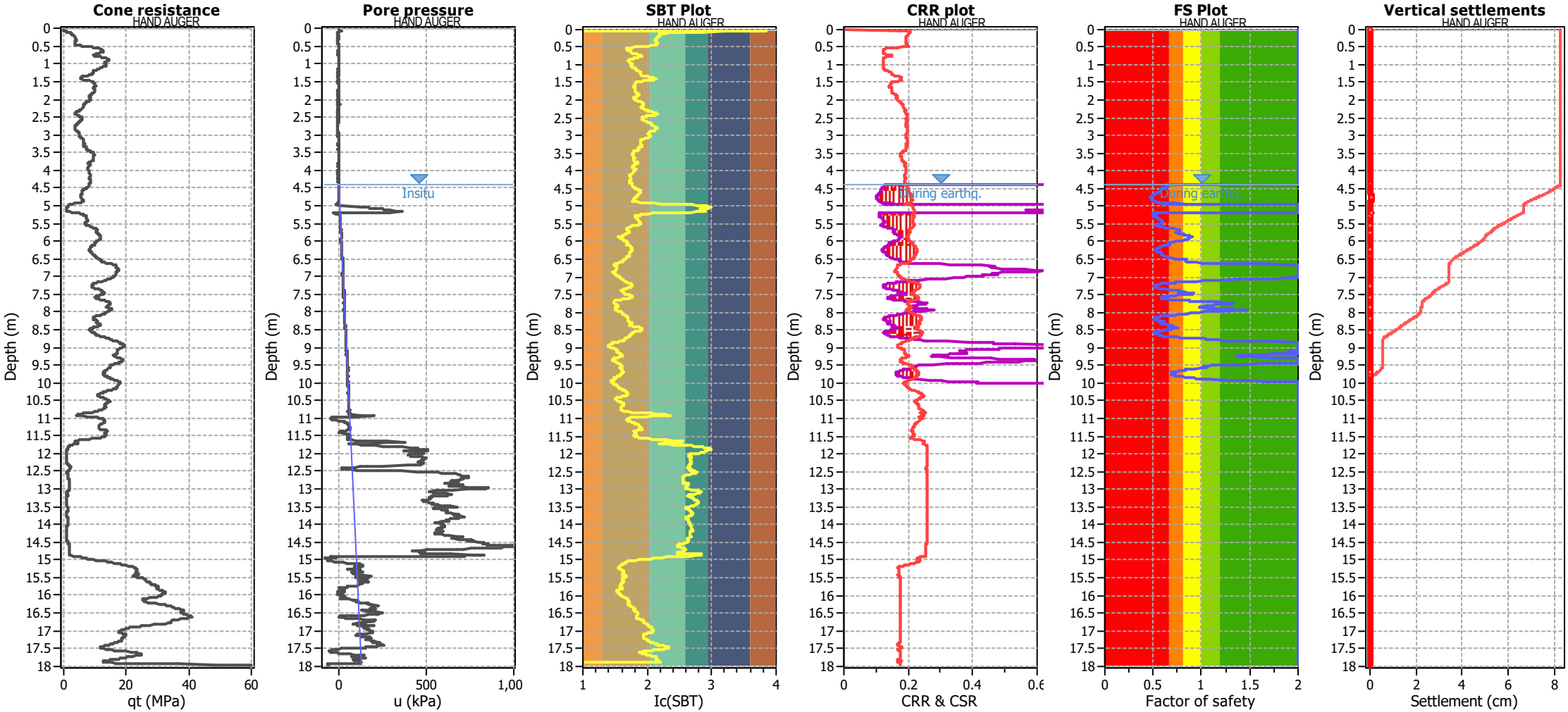


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: **HAM2024-0017**
Location: **SOuthern Links SL1**

CPT: 181275.00
Total depth: 17.97 m

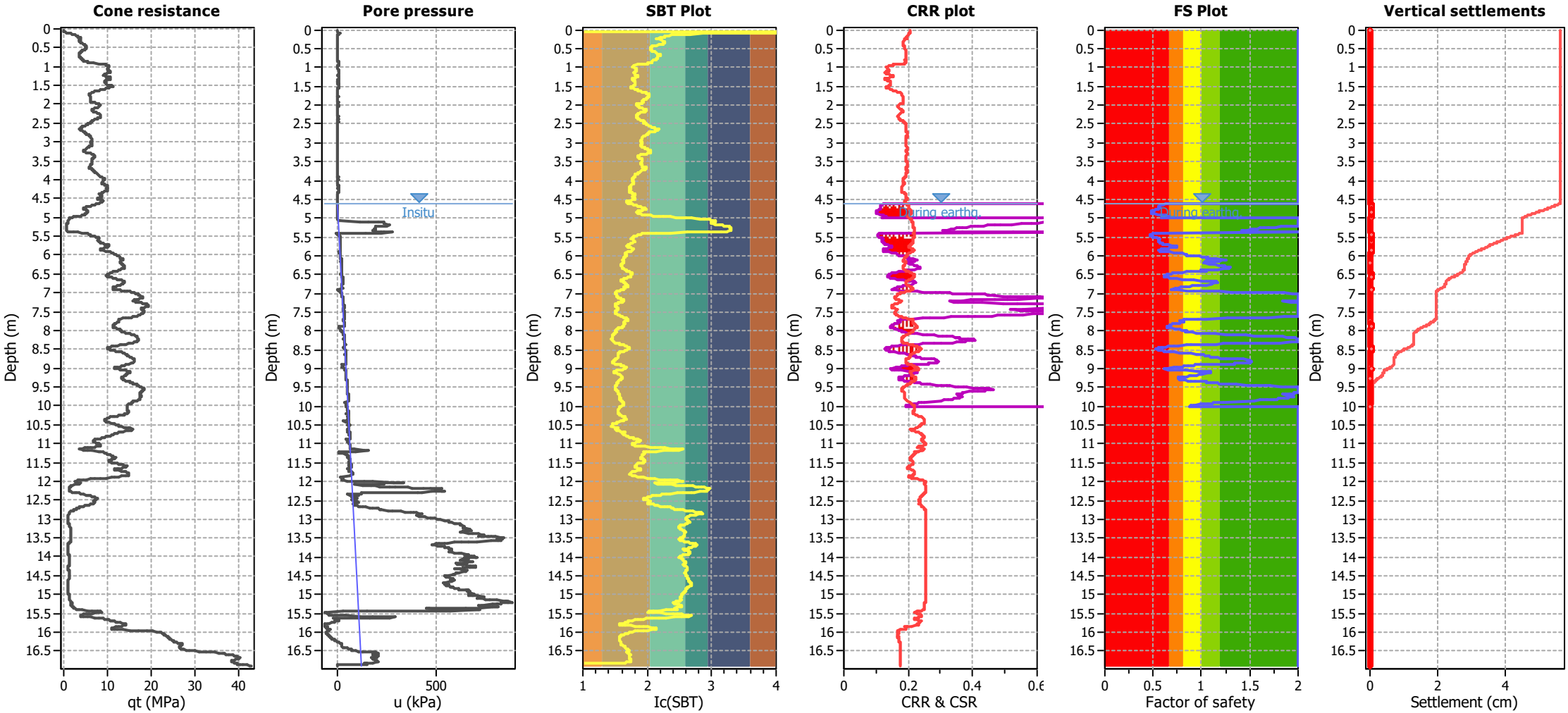


Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.40 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 181276.00
Total depth: 16.90 m

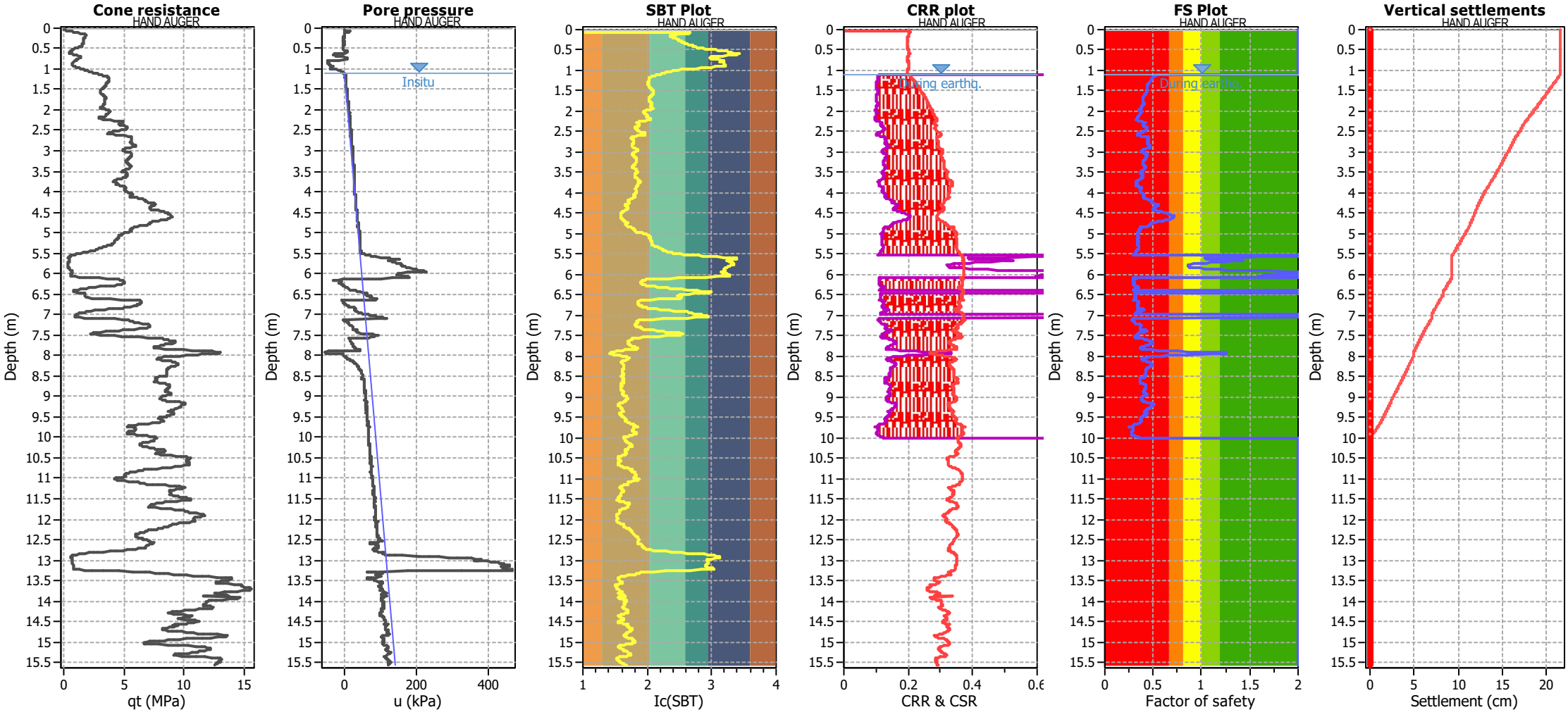


Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.60 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 192467.00
Total depth: 15.56 m

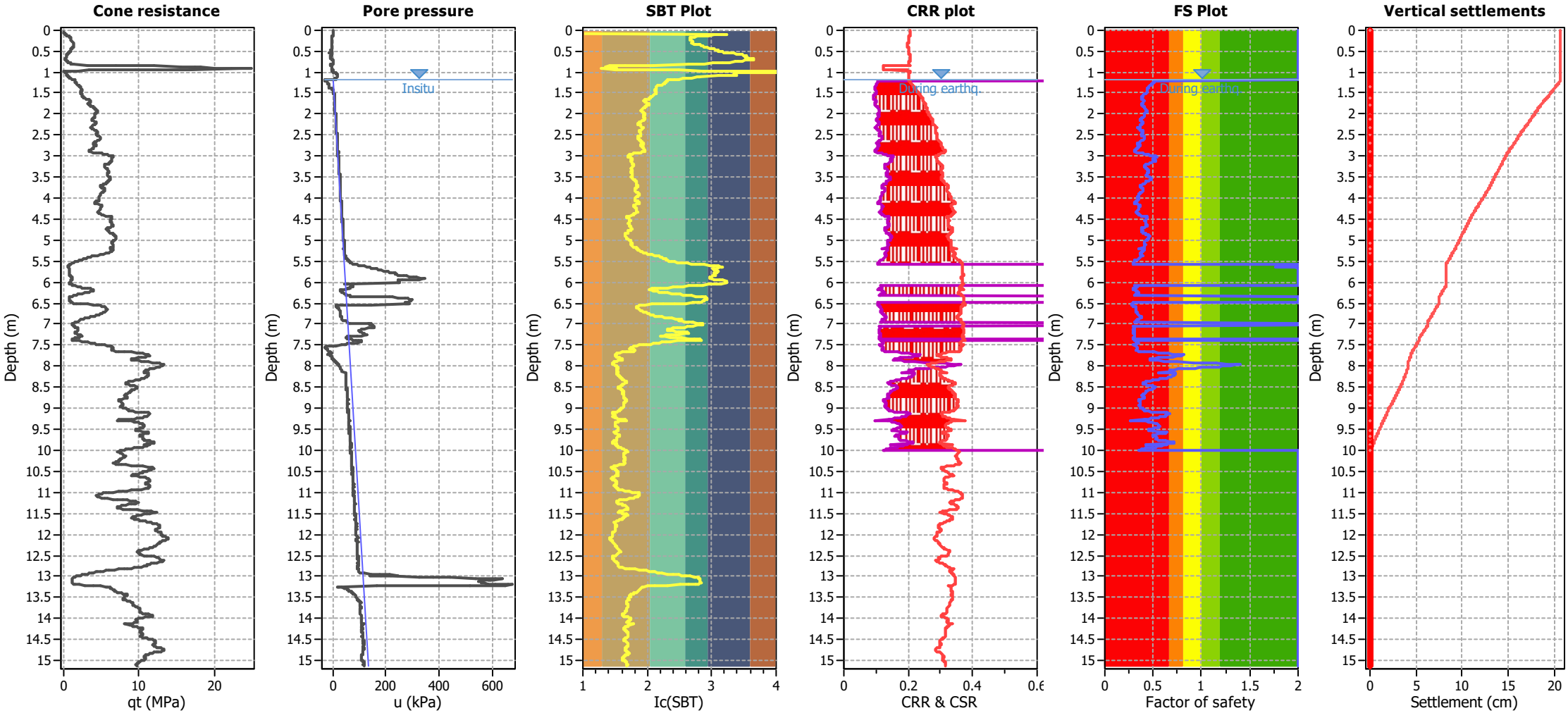


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Geotechnical Engineers
Level 3, Block C, 401 Grey Street, Hamilton
www.cmwgeo.com

Project: HAM2024-0017
Location: SOuthern Links SL1

CPT: 192501.00
Total depth: 15.13 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.20 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

APPENDIX D: STATIC SETTLEMENT RESULTS

CMW Geosciences	CLIENT: COLLIERS PROJECT LEADERS LTD	DESIGNER: KL
	PROJECT: SOUTHERN LINKS	CHECKED: DM
		REVISION: 0
	TITLE: Primary and Secondary Consolidation of Soft Soil Layers - Concept Design	DATE: 27/03/2023
		PROJECT: HAM2024-0017

1. Consolidation Settlement (Terzaghi)

Exist Fill Density:	16	kN/m3
Soft Soil Density (Saturated):	10.3	kN/m3
Surcharge Density:	16	kN/m3

Layer	Original Ground RL (mAHD)	Water Table RL (mAHD)	Surcharge Top RL (mAHD)	Exist Fill Thickness (m)	Soft Soil Thickness (m)	Base Fill RL (mAHD)	Base Soft Soil RL (mAHD)	Mid-Point Soft Soil RL (mAHD)	Surcharge Height (m)	Initial Eff Stress (kPa)	Applied Surcharge (kPa)	Comp Index C_c	Recomp. Index C_R	Initial Void Ratio e_0	Exist Over Consol. (kPa)	Δe	Consol Settlement (m)	t90 Consol (m)	creep S	cc/(1 + e0)
2m peat	38	38	41.6	0	2	38	36	37	3.6	0	57.6	2.4	0.05	11.4	0	-4.9774	0.803	0.72	0.080	0.19
4m peat	38	38	42.4	0	4	38	34	36	4.4	1	70.4	2.4	0.05	11.4	0	-4.4696	1.442	1.30	0.144	0.19
6m peat	38	38	43.1	0	6	38	32	35	5.1	1	81.6	2.4	0.05	11.4	0	-4.2051	2.035	1.83	0.203	0.19

2. Mesri Creep Settlement - (Mesri et al (1994) and Mesri & Ajlouni (2007))

Assumed C_α/C_c =	0.07	
Design Period, t =	50	yr
Future Load, Δσ =	5	kPa

	Final Ground RL (m)	Surc. Consol Achieved (%)	Original OCR	Original σ_{vi}' (kPa)	Preloaded σ_{vp}' (kPa)	New Surch Base RL (m AHD)	New Fill Base RL (m AHD)	Final centre Soft Soil RL (m AHD)	Final Grd σ_v' (kPa)	Total Final σ_{vf}' (kPa)	Final OCR	Rs'	$C_c/(1+e_0)$	$C_\alpha/(1+e_0)$	Mesri et al (1994), Mesri & Ajlouni (2007): t_{pr} (Yr)	t_l (Yr)	t/t_l	C_α''/C_α	$C_\alpha''/(1+e_0)$	Creep Settlement (mm)
2m peat	40.00	95%	1	0	47	37.2	37.2	36.6	37	42	1.12	0.12	0.194	0.0135	0.07	0.84	60	0.30	0.004	15
4m peat	40.00	95%	1	1	54	36.6	36.6	35.3	42	47	1.15	0.15	0.194	0.0135	0.07	1.08	46	0.20	0.003	18
6m peat	40.00	95%	1	1	59	36.0	36.0	34.0	46	51	1.17	0.17	0.194	0.0135	0.07	1.17	43	0.17	0.002	22