Geotechnical Assessment Report

Ararimu Road - proposed managed fill

Date: 24 September 2023

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Report prepared for: SB Civil Limited

BASELINE GEOTECHNICAL

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1 Introduction

SB Civil Limited (SBC) are proposing construction of a managed fill at Part Lot 2 DP 77813, No 1618 Ararimu Road, Auckland. We understand SBC have been granted access and usage rights to place managed fill on the neighbouring eastern property Lot 8 DP 369781. For clarity, this report refers to both land parcels as "the site".

Baseline Geotechnical Limited has been engaged to provide preliminary geotechnical design for the proposed managed fill and consider environmental effects related to long-term slope performance in the context of a resource consent application.

This geotechnical assessment has been requested to assess the landform stability once the proposed managed fill material is placed onto the existing topography.

Our scope of work was set out across three stages within offers of service dated 3 March 2023 and 28 June 2023. At the completion of the second stage, the neighbouring eastern property was included in the proposal and additional deeper investigations were also required based on our preliminary findings. The overall scope is summarised below:

<u>First stage</u>

1. Health and Safety, Inductions, Project management
2. Background information.
3. Initial walkover and field mapping.
    a. Attend site discuss an overview of the proposed managed fill area.
    b. Geological mapping in and around the managed fill

<u>Second stage</u>

4. Sub-surface Investigations.
    a. 5-6 No of test pit investigations up to 5m deep.
5. Preparation of field data including:
    a. Test pit logs.
    b. Ground model.
    c. Geological and investigation plan of site.

<u>Third Stage</u>

6. Project management, liaison with the civil and planning teams
7. Sub-surface Investigations.
    a. Additional Test Pit investigations.
    b. CPT investigations
8. Preparation of field data including:
    a. Test pit logs.
    b. CPT analysis
9. Update ground model, plans and sections.
10. Liquefaction analysis based on the CPT data.
11. Slope stability analyses under static, elevated ground water and seismic conditions.

12. Liaison with the project geometric designer.
13. Complete geotechnical assessment report.

2 Proposed managed fill

A design has been prepared by Civix Limited for the placement of managed fill. The proposed filling covers an area of approximately 100,000 m^2, a maximum filling depth of 45 m with heights ranging between RL 184 m to RL 198 m, a front face of 1V:3H (18° from horizontal), with an approximate volume of 1.56 Million m^3. The proposed fill plan is shown in Figure 3-1 below and is appended in Appendix A.

Following onsite meetings with SBC, we understand the proposed managed fill area includes three gullies (Photograph 1). The managed fill will broadly be constructed by developing the western gully (Stage 1), followed by felling the pine plantation and filing the central gully (Stage 2) before moving over to the eastern gully (Stage 3).

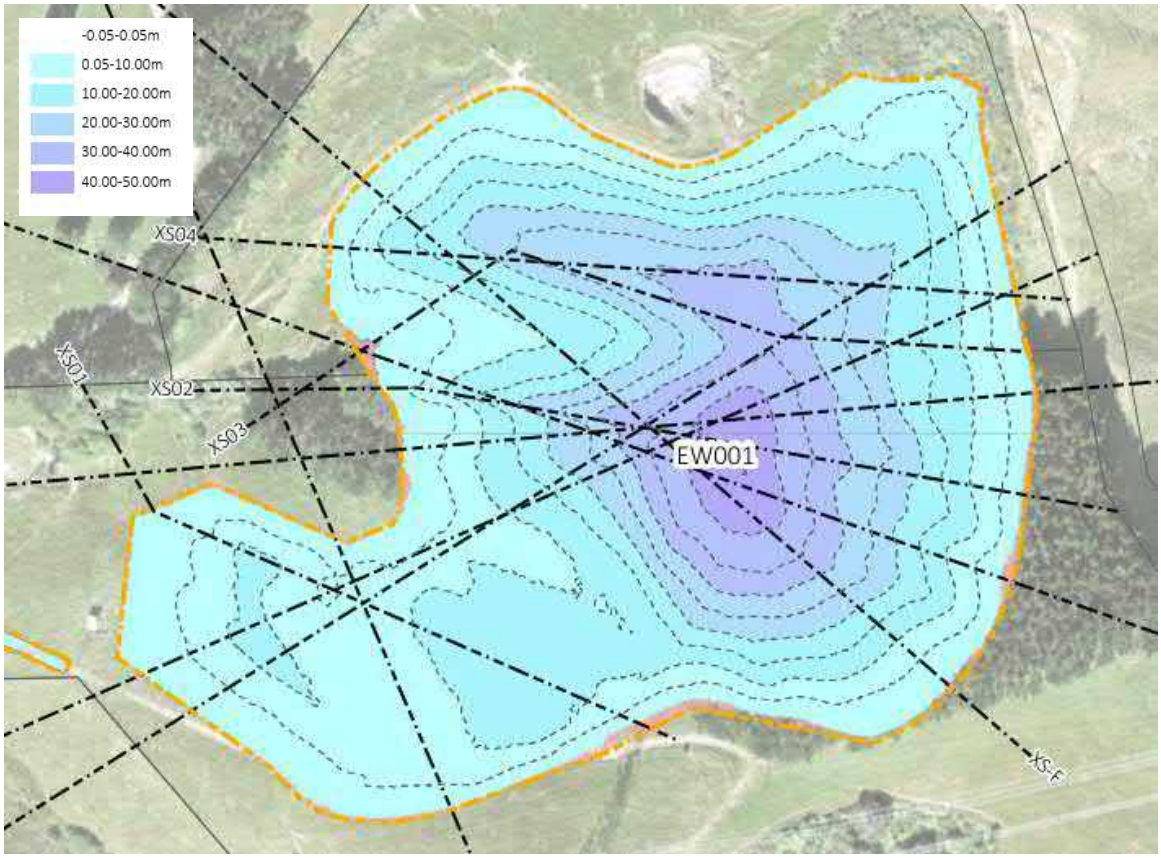
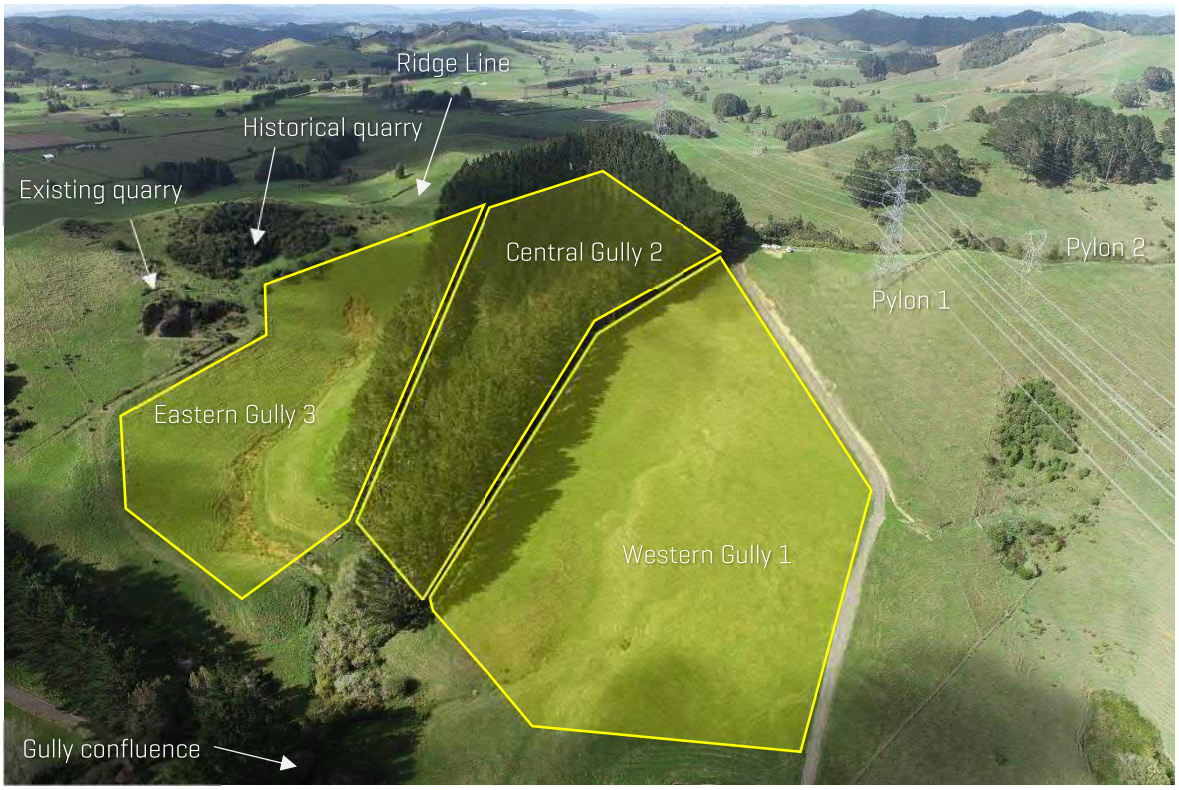


Figure 2-1: The proposed managed fill area. (Source: cut fill plan image from CIVIX, DWG 30000 dated 30/08/2023, Appendix A).



Photograph 1: Annotated oblique aerial photograph with indicative managed fill footprint of the three filling stages (BGL 22 March 2022).

3 Background information

3.1 Site description

The proposed site is on the southern side of Ararimu Road, Ararimu, located approximately 15 km south east of Papakura, Auckland (Figure 3-1). Existing contours are presented in Appendix A.

Upon entering the property, a 500 m long existing access track leads up to a working platform that we understand will support an office, parking and a weighbridge.

To the south and southeast of the working platform, three north facing gullies lead up to a ridge line. The ridge line generally trends west to east (Photograph 1). The ridge line is located along the southern perimeter of the proposed managed fill site. The ridgeline ranges from RL 185 m to RL 210 m. The gully floors converge at approximately RL 130 m just to the north of the proposed fill footprint.

We understand that the western and eastern gullies were previously used for grazing while the central gully has an established forestry block (Photograph 1).

Two electrical pylons are located within the property boundary, upslope of the western gully.

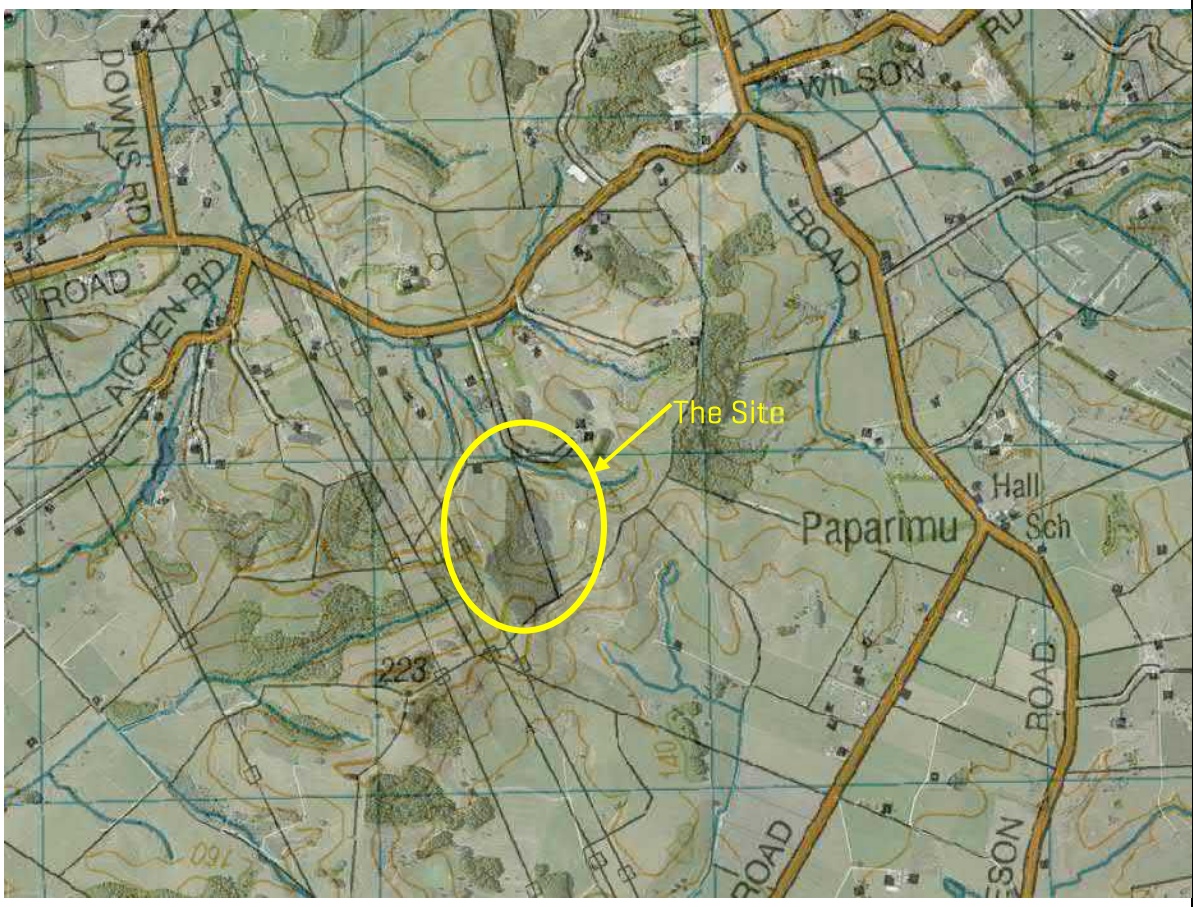


Figure 3-1: Topographic Map indicating the proposed managed fill area in yellow (excerpt from NZTopomaps.com).

3.2 Historical aerial imagery

An aerial photograph from 1961 (Figure 3-2) reveal the western, central and eastern gullies are well defined. We infer the majority of the land was used for grazing, with the gully inverts lined with vegetation.

The limited vegetation and scalloped shaped features at the head of the central gully are interpreted to be land instability features.

In general, the 1961 topographic surface within the three gullies appears to be broadly comparable to that observed on site. The 1961 image does however indicate a historical quarry at the termination of an access track. When compared to (Photograph 1) the historical quarry is overgrown and a more recent quarry is located 100 m further north.

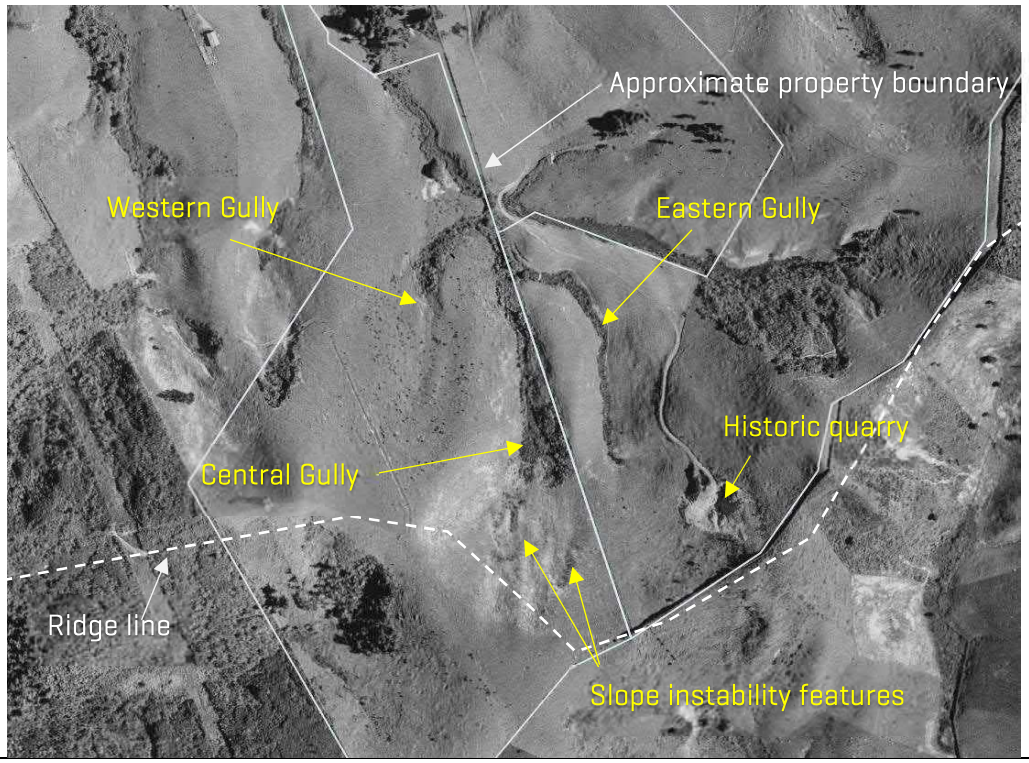


Figure 3-2: Aerial 1961 photograph of the site (Sourced from retrolens.co.nz on 27 March 2023). Approximate property boundary location for reference only.

3.3 Background geology

The published geological map for the area (Figure 3-3) indicates that the site is underlain by Triassic to Jurassic aged Waipapa Group greywacke, comprising massive to thin bedded, lithic volcaniclastic metasandstone and argillite, with tectonically enclosed spilite, chert and red and green argillite.

To the north of the site within the invert of the two gullies, the greywacke is shown to be overlain by Holocene Alluvium of the Tauranga Group comprising sand, silt mud and clay with local gravel and peat beds.

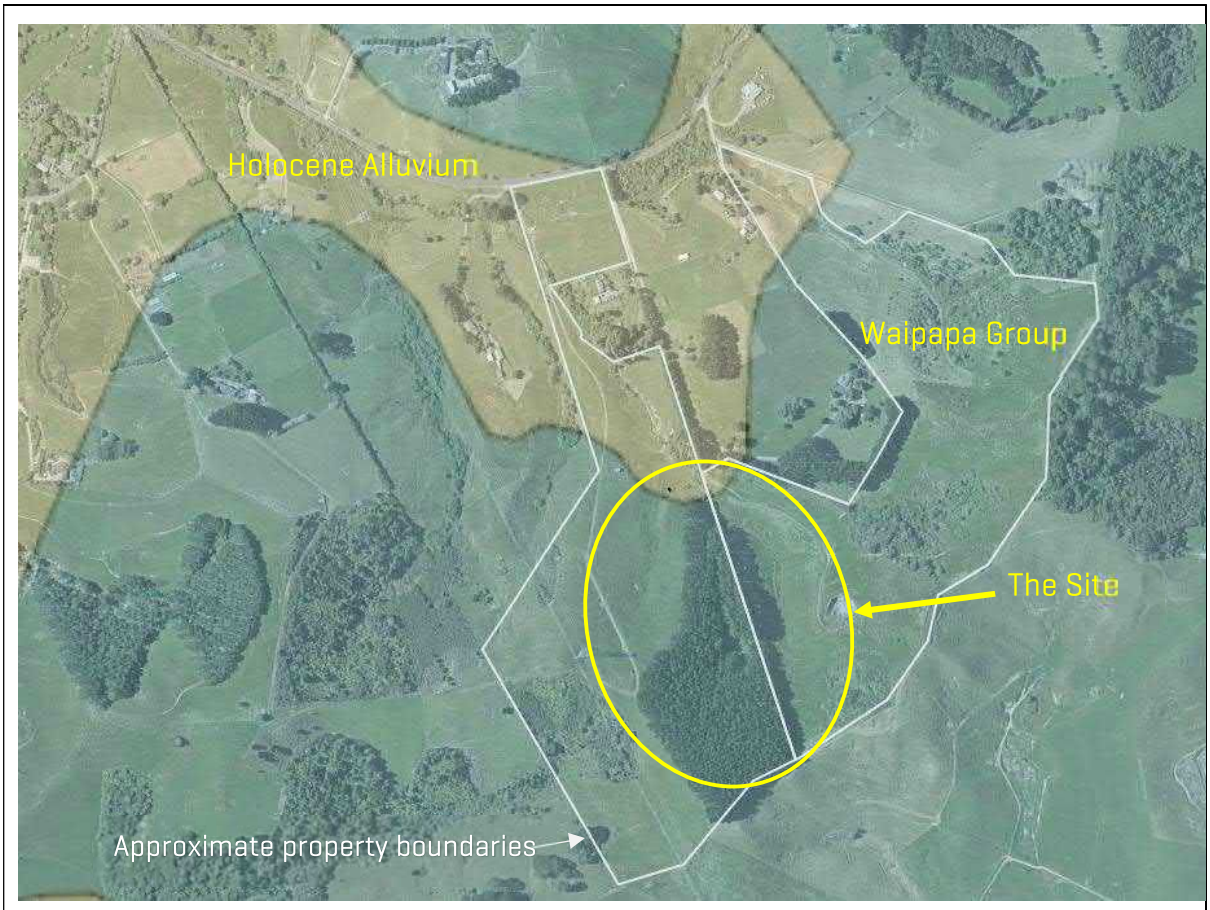


Figure 3-3: Published Geology (data.gns.cri.nz/geology/).

3.4 Managed fill geometry constraints

The client has engaged RMA Ecology Ltd (REL) to provide ecological input for this project. We understand the site includes wetland areas (email correspondence from REL 17 July 2023).

The ecological areas and associated setbacks defined by REL are illustrated within Appendix A. We have used these ecological boundaries to establish the managed fill set back distances as follows:

- A 10 m upslope set back distance from the wetland in the Western and Central gullies.
- No setback distance in the Eastern Gully. While the wetland extends throughout the gully floor, we understand SBC has decided to undertake ecological offsetting to mitigate the loss of the wetland area in this gully.

4 Field observations

BGL visited the site on Wednesday 22 March 2023 to undertake engineering geological mapping of the site. The points of interest and photograph locations are annotated onto the plan presented in Appendix B.

4.1 Geomorphology

The western, central and eastern gullies are separated by two muted north to south trending ridgelines with moderately inclined slopes. The muted ridgeline surfaces range between RL 135 and RL 150 m.

The western and eastern gully slopes have well-defined stock hoof tracks that have formed 0.3 to 0.5 m wide steps down each slope surface. The western gully slopes are gently inclined and undulating with two historic headscarp features aligned central to the gully axis with geomorphic evidence of debris runout/deposition lower on the slopes (Photograph 2).

In comparison to the western gully, the central and eastern gully inverts are similar in size and shape with defined gully floor elevations that increase from RL 132 m to RL 140 m along a 160 m gully length. Due to the mature forestry block and dense under canopy vegetation within the central gully, subtle instability features observed in the 1966 photograph (Figure 3-1) were unable to be identified in the field.

Photograph 2: Oblique aerial view of the Stage 1 western gully. Historic headscarp (red) and debris run out (white).

4.2 Western Gully

An access track straddles the western gully slopes and terminates at the ridgeline. An approximately 200 m long batter cut is located upslope of the access track. The height of the batter cut ranges from 0.4 m to 1.8 m (Photograph 3).

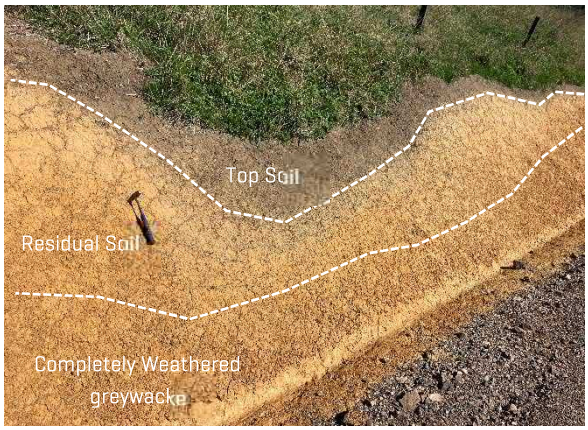
The soils exposed in the batter cut include the following:

- Topsoil: Approximately 0.4 m thick brown, soft, moist clayey silt with trace sand and rootlets (Photograph 4).
- Residual Soils: Approximately 0.8 m thick light brown, firm, moist clayey silt (Photograph 4).

- Completely Weathered Greywacke: Orange to reddish brown stiff wet silty clay and fine grained sand that extends down into the V-drain (Photograph 5). Very closely spaced relict defect sets were observed with dark grey to black staining to surfaces. These materials could be remoulded with finger pressure.

A farm stock trough is located approximately mid slope (Photograph 6) which has also exposed the topsoil and residual soils as per the above descriptions.

Photograph 3: Exposed soils within access track batter.



Photograph 4: Close up view of photograph 3.

Photograph 5: Exposed completely weathered materials in v-drain.

Photograph 6: Soils exposed upslope of drinking trough.

At the northern end of the western gully, the gully narrows to approximately 40 m wide with slope shoulders ranging from 8 m to 10 m high (Photograph 7). A slightly incised surface water channel is located along the gully invert that is approximately 0.8 m deep and has exposed an orange light brown, soft, wet clayey silt.

Photograph 7: Northwestern panoramic view of the western gully at approximate location of the proposed managed fill toe (yellow).

4.3 Central Gully

Due to the forestry block coverage, limited exposures of materials were observed along the slopes. However, material exposure included topsoil where the slope angle transitioned onto the gully floor. Materials exposed across the central gully floor included saturated clays and silts with decaying vegetation (Photograph 8).

The width of the gully floor ranged from 8 m in the north and narrowed to 2 m in the south. At the southern end, the gully invert splits into two subsidiary gullies, eventually terminating against the gully head.

Photograph 8: Soil exposed within the central gully.

4.4 Eastern Gully

The toe position of the managed fill in the eastern gully is accessed via an access track on both sides of the gully invert. The track has been cut into the slope to expose a 1 m high cut of brown, moist, firm clayey silt.

The gully floor is approximately 8 m wide and in places 1 m deep. The gully has recently been inundated with 0.1 m to 0.5 m of landslip debris derived from upslope (refer to Section 4.4.2). The debris includes saturated brown clays, silts and sand that are very soft to very loose. Reeds and young vegetation are observed to grow throughout the gully floor.

The eastern gully also includes two quarry pits and a recent landslip observed at the head of the gully. The historic quarry is overgrown (refer to Section 3.2), with the existing quarry discussed below.

4.4.1 Existing quarry

The quarry includes two batters with an overall height measuring 16 m (Photograph 9). The exposed materials typically include a slightly to moderately weathered, moderately strong sandstone and siltstone. The closely spaced defect sets range from moderately steep to very steeply inclined (Photograph 10). The three primary defect sets (dip/dip direction format) are summarised as follows:

- Set 1: 49°/122 – Lower batter, through going persistent feature.
- Set 2: 72°/082 – Upper batter, through going persistent feature. Moderately wide with dry sand infilling.
- Set 3: 42°/264 – Lower batter, cluster of joint sets daylighting out of the batter.

The depth of residual soil along the crest of the upper bench is 0.6 m.

Photograph 9: Exposed materials upslope of the eastern gully

Photograph 10: Rock and soil exposure from the upper batter.

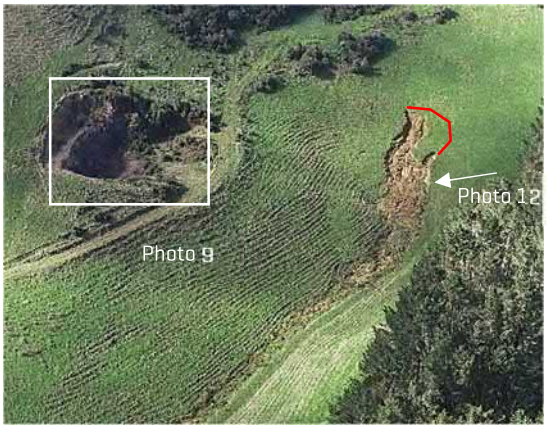
4.4.2 Eastern gully landslip

A recent landslip above the head of the gully has formed an asymmetric headscarp and a series of lateral scarps ranging from 1.0 m to 1.4 m high (Photograph 11 & Photograph 12). The materials exposed in the scarps include brown firm clayey silt with angular gravel clasts floating within a fine grained matrix. The gravels are slightly to moderately weathered weak light grey sandstone.

The landslip has exposed an underlying completely weathered extremely weak sandstone and siltstone. This material is undulating across the landslip surface.

A tension crack is aligned from the true left lateral scarp and can be traced approximately 50 m to the headscarp (Photograph 11). The 50 mm wide tension crack has a vertical offset of 100 mm.

Saturated evacuated silt and sand materials have inundated the gully floor for approximately 200 m.



Photograph 11: Recent slope instability on neighbouring property between the quarry and the forestry block. Red line indicates a 50mm tension crack.

Photograph 12: Materials exposed within the recent landslip upslope of the eastern gully.

4.5 Other exposures on site

A recent landslip feature was observed within the property boundary north of the proposed office, parking and weigh bridge area (Refer to Appendix B & Photograph 13). The instability is located mid slope between the access track and the gully invert. The toe of this feature has bulged into the stream channel forcing the stream to flow around it.

The soils exposed in the headscarp include 1.0 m to 1.2 m of residually weathered orange brown clayey firm silt. Beneath the silt, a lightly cemented whiteish light grey pumiceous silty sand is thinly laminated with bedding surfaces dipping towards the northeast at 35°/060.

This landslide is well to the north of the proposed toe of the managed fill area.

Photograph 13: Landslip north of the proposed office and parking area.

4.6 Groundwater

Groundwater flows are observed within the three gully inverts presented in the following three sections.

4.6.1 Western gully

At the northern extent of the western gully invert, within the vicinity of the proposed managed fill toe, surface water has incised a 1 m wide by 0.8 m deep open channel that is overgrown with grass and small shrubs. Flowing water was observed within the channel over a distance of approximately 40 m before the channel enters a wetland area. The channel water is estimated to have a flow rate of approximately 1 to 2 L/min.

Although water seepages were not observed across the higher slopes, the reed vegetation mid slope indicates seepages are likely to be present.

4.6.2 Central gully

The floor of the central gully is approximately 160 m long and increases in elevation by 10 m in elevation. Over this distance, the width of the gully ranges from 15 m at the northern extent and decreases to 5 m at the southern extent where it splits into two gullies and terminates.

The gully floor is primarily standing pooling water with saturated fine-grained materials forming damming features (Photograph 14). Seepage is observed at the northern extent to range from approximately 3 to 5 L/min where the gully enters a wet land.

Photograph 14: Water observed in the central gully.

4.6.3 Eastern gully

As discussed in Section 4.1, the size and shape of the eastern gully is comparable to the central gully, however water flow at the northern end of the gully ranges from approximately 5 to 10 L/min.

5 Site investigations

A total of seven test pits were excavated by a 20-tonne excavator on Thursday 6 April 2023 at locations presented in Appendix C & Photograph 15. A further three test pits were excavated by a 14-tonne excavator and a hand auger was completed on Thursday 29 June 2023 at locations in Appendix C and Photograph 16.

The test pit logs (Appendix C) provide guidance on shallow soil types, in situ strengths and groundwater inflow seepage depths.

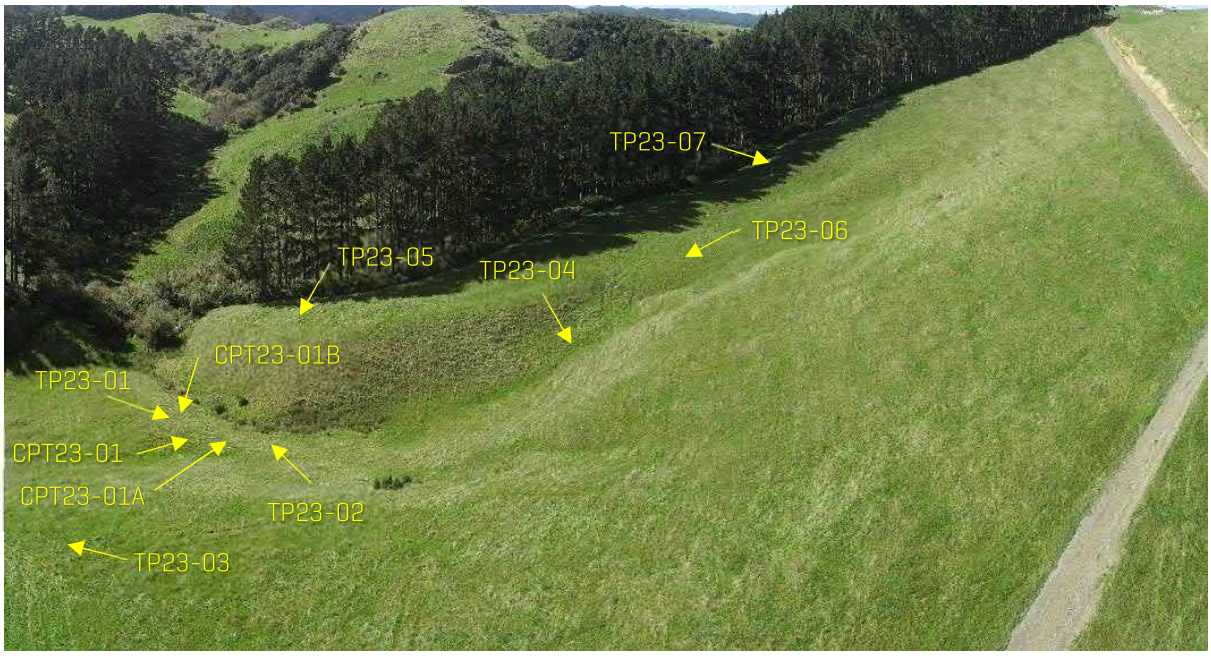
All test pits were extended to the maximum reach of the excavator (approx. 6.4 m), however TP23-07 was extended down to 7.7 m due to the sloping topography.

The hand auger was located on the true left side of the eastern gully in the general location of the proposed managed fill toe. The hand auger terminated at 4.2 m bgl and was continued with a scala penetrometer to 5.65m bgl. The hand auger was completed in an area that was not able to be accessed by the excavator.

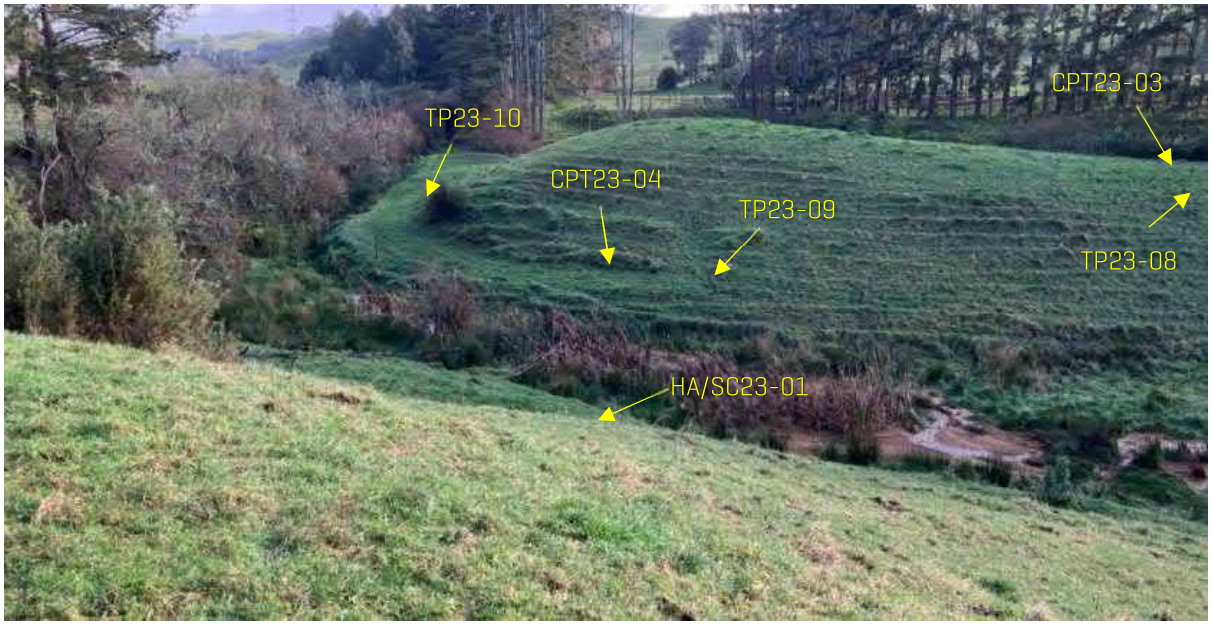
A total of seven cone penetrometer tests (CPT) were completed on Monday 10 July 2023 by Drill Force Ltd at locations illustrated in Appendix C and Photograph 15 & Photograph 16. Refer to Appendix D for the CPT results.

The CPT's terminated either due to the maximum forces on the instrumented tip, sleeve friction or penetration force reached that corelates to the maximum hydraulic push of the rig. Typically termination was due to sleeve friction, however CPT23-03 terminated due to rod friction and CPT23-04 terminated due to a combination of both rod friction and tip force.

CPT23-01 and CPT23-01A terminated at shallow depths resulting in CPT23-01B being offset and pushed to 16.71m.



Photograph 15: Summary of investigation locations within the western gully.



Photograph 16: Summary of investigation locations within the eastern gully.

5.1 Summary of investigations

5.1.1 Topsoil

Topsoil was encountered at all investigation locations. The topsoil depth ranged from 0.2 m to 0.3 m below ground level (bgl). These materials are typically a brown, moist, firm clayey silt with rootlets.

5.1.2 Reworked silts and clays (Colluvium)

Light brown and grey, moist, firm to stiff silty clay and clayey silt with orange mottling was encountered in TP23-01, TP23-02, TP23-04 (Photograph 17),TP23-09 typically down to 3 m bgl to 4 m bgl. These test pits are located within gully floors. The samples can be remoulded into a ball between thumb and forefinger.

Photograph 17: Orange brown silty clay recovered from TP23-04 at 3 m bgl.

5.1.3 Silts and clays (Puketoka Formation)

Orange brown moist stiff to very stiff silty clay and clayey silt with limonite staining was encountered in TP23-03 to 3.8 m bgl, TP23-05 to 6.3 m bgl (Photograph 18) and TP23-08 to 1.5m bgl. These test pits are located at similar elevation on the muted ridge lines between gullies.

Photograph 18: Orange brown silty clay recovered from TP23-05 at 3 m bgl.

5.1.4 Pumiceous silts and sands (Puketoka Formation)

Pumiceous deposits included light grey to white fine to coarse sandy silt and silty sand with fine to medium pumice gravels recovered from test pits located within the gully floors (TP23-01, TP23-02, TP23-03, TP23-05, TP23-06 and TP23-09) and in HA23-01. Orange-brown silt laminations were observed in these materials. When moist or dry, the silts were stiff to very stiff as observed in TP23-01 (Photograph 19). However, when saturated in thin beds with increased silt and clay ratios as observed in TP23-03 and TP23-05 located above the gully invert, the materials transitioned to soft (TP23-05) and very soft (TP23-03) and are easily indented with finger pressure (Photograph 20). The fine grained sand materials recovered from the hand auger were saturated.

Photograph 19: Floating pumice clasts within a grey moist sand matrix.

Photograph 20: Saturated clayey silt pumice derived materials TP23-03 at 6.0 m bgl.

5.1.5 Organic silts (Puketoka Formation)

Lenses of dark brown silt with fibrous organic matter were observed in test pits TP23-01 from 3.7 m to 4.0 m bgl, & TP23-02 from 2.7 m to 3.6 m bgl. These lenses pinch out or range in thickness across the test pit walls.

Brown organic silt was also recovered at the termination of TP23-02, TP23-09 and TP23-10 where the thickness of these deposits was unable to be confirmed by excavation.

The fibrous organic matter recovered from these test pits ranged from 20 mm to 50 mm in diameter, had a strong organic odour (Photograph 21) and expelled water when squeezed.

Photograph 21: Fibrous organics from TP23-01.

5.1.6 Weathered greywacke (Waipapa Group)

Completely weathered to highly weathered siltstone greywacke materials were recovered from TP23-07 below 2.2 m. Relict defect sets were closely spaced with surfaces weathered to clays (Photograph 22). The reddish orange brown siltstone is extremely weak and can be remoulded to a very stiff clayey silt under hand pressure.

Photograph 22: Completely weathered greywacke material from TP23-07.

6 Interpreted geological model

6.1 Geology

Based on the field observations and the existing sub-surface information, the upper slopes across the site are expected to be underlain by a weathered greywacke profile ranging from residual soil through to unweathered rock. Below approximately RL 150 m, the greywacke materials are locally overlain with alluvial deposits as follows.

With the exception of TP23-07, the test pit materials recovered from TP23-01 to TP23-10 do not align with the published geology summarised in Section 3.3.

The alluvium and organic silts are considered to be remnant mid to late Pleistocene river and hill slope deposits (Puketoka Formation), left as stranded terraces due to erosion. These materials are present in proximity to the site and at similar elevations on published geological maps. The remnant local terrace surface elevations range from approximately RL 130 to RL 150 m which align with the muted ridge lines that separate the three gullies on site.

For the eastern gully, we infer that refusal in CPT23-04 and HA23-01 occurred within the Puketoka Formation. We consider that CPT23-03 better reflects the deeper soil profile within the eastern gully.

Based on the termination depths of CPT23-01B and CPT23-03, highly to moderately weathered greywacke sandstone is inferred at a minimum of 18 m below ground level.

Localised shallow soil instability features exist across the side slopes and head of the three gullies. The soft soils in the floor of the three gullies are considered to be locally sourced reworked clay and silt materials that previously inundated the surface water channels, allowing for recent swamp environments to form upslope. A small scale version of this was observed on site, refer to Photograph 13.

Interpreted ground conditions are illustrated on our geological model in Appendix E.

We note that dense vegetation limited access to the central gully and we have inferred that similar ground conditions exist in this gully between the investigation data in the western and eastern gullies. This assumption will need to be verified prior to placement of managed fill materials into the central gully.

6.2 Groundwater

Based on the seepage observations at the head of each gully and surface water flow at the base of the gullies (refer to Section 4.6), we interpret a perched piezometric surface along the gully invert increasing in elevation towards the head of the gully where water seepage was observed.

7 Geotechnical considerations

7.1 General

We have based our assessment on limited point source information, and site observations. The nature and continuity of sub-surface materials away from the investigation locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

7.2 Site seismicity

For the purposes of this assessment, we have considered horizontal seismic loadings based on NZGS Module 1 [1].

[1] NZGS (November 2021) Earthquake Geotechnical Engineering Practice: Module 1 Overview of the guidelines, Appendix A – Pukekohe.

A key consideration for developing seismic loadings in this guidance document is the selection of importance level (IL) in accordance with NZS1170:0. We understand that once the fill placement is complete, the surface will be returned to stock grazing paddocks, with no buildings placed on the final surface.

We have adopted an IL1 for this site in accordance with NZS1170:0. This defines an Annual Exceedance Probability (AEP) of 1/100 years from which a peak ground acceleration of 0.09g and a magnitude of 5.9 can be derived.

7.3 Slope stability assessment

7.3.1 General

Our stability assessment has been undertaken using Slide2, a limit equilibrium software package that compares driving forces and resisting forces as a ratio, called a Factor of Safety (FoS). Where driving forces exceed resisting forces a factor of safety below 1 is calculated, indicating a slope failure condition.

The most recent topography for the existing surface is presented in Appendix A. Earthworks have not been undertaken within the three gullies since the survey was completed.

Four relevant cross sections have been selected to illustrate the interpreted ground model and these have been used as the basis of our slope stability assessment. Cross sections 1, 3 and 4 have been chosen to represent the locations of the deepest fill within the gully floors. Cross section 5 was selected to analyse loading of a muted ridgeline between the western and central gullies, where low strength pumiceous materials were observed (refer to Section 5.1.4).

7.3.2 Material parameters

We have based the managed fill material parameters on our experience at other managed fill sites with similar imported fill materials within the southern Auckland region.

The parameters adopted in this assessment are considered to broadly represent average conditions, based on our observations, but we recognise that some uncertainty remains with respect to the variability of the managed fill materials, in particular within the toe and front face areas. Our adopted material parameters are presented in Table 7-1 below.

Table 7-1: Material parameters for design

Material	Density [kN/m^3]	Effective Cohesion [c' – kPa]	Effective Friction Angle [ϕ' – degrees]	Undrained Shear Strength [S_u – kPa]
Bulk mixed managed fill	17	2	30	75
Undercut Backfill [Granular]	19	0	38	-
Alluvium 1 [Soft]	17	2	26	20
Alluvium 2 [Firm]	17	4	28	35
Alluvium 3 [Stiff to very stiff]	17	5	30	60
Alluvial lens [Very soft]	17	0	24	12
Completely weathered Greywacke	20	7	32	-
Highly to moderately weathered Greywacke	22	25	34	-

7.3.3 Groundwater conditions for design

For the purposes of the slope stability assessment and based on the information presented in Section 6.2 we have conservatively adopted a single piezometric surface for the alluvium and intact greywacke. This piezometric surface has been applied at or close to the pre-development ground surface and or adjusted to align with the groundwater observed during the investigations on Section 5.

For the purposes of design under static and seismic conditions, the fill material has been modelled with an Ru[2] of 0.15 [representing ~30% saturation of any analysed slip circle].

The Ru values adopted are broadly consistent with long term measured pore water pressures in an instrumented overburden and imported fill disposal site at a quarry in Auckland.

To model elevated groundwater conditions, the fill material has been modelled with an Ru of 0.30 [representing ~60% saturation of any slip circle]. This is to account for a potential build up in pore pressure during prolonged high intensity rainfall events or partial sub-soil drainage failure.

Separation of groundwater pressures in overburden materials and in-situ soil and rock is considered reasonable, provided that a robust sub-soil drainage network is constructed in the former gully system to pick up and discharge groundwater seepages [refer Section 8.2].

7.3.4 Design criteria

We have undertaken slope stability analysis on three geological sections through the centre of the gullies where investigations have been completed. We have adopted the minimum factor of safety

[2] Ru is defined as a ratio of normal stress to pore water pressure.

based on requirements for low risk parks, bush as described in the Auckland Code of Practice for Land Development and Subdivision[3]. This has been selected based on the following considerations:

- No structures will be built on the proposed fill area.
- The consequence of any land instability from the proposed fill slope is contained within the site.

Proposed minimum factor of safety for the analyses are:

- Static: FoS ≥ 1.2
- Elevated Groundwater: FoS ≥ 1.1
- Seismic Conditions: FoS ≥ 1.0 or displacement <200 mm.

7.3.5 Results

We have completed slope stability calculations for the managed fill design and the geological model using cross sections along the floor of the western and eastern gullies.

Stability analysis results are set out in Table 7-2 and analysis outputs are presented in Appendix F.

[3] Auckland Council (May 2023). The Auckland Code of Practice for Land Development and Subdivision, Chapter 2: Earthworks and Geotechnical Version 2.0.

Table 7-2: Proposed OBDA design slope stability analysis results.

Section Reference	Design Case	Factor of Safety (FoS)	Comment
Section 1: Western gully	Static	1.44	30% saturation
	Elevated Groundwater	1.23	60% saturation
	Seismic	1.01	1:100 AEP – PGA 0.09g
Section 3: Eastern gully	Static	1.46	30% saturation
	Elevated Groundwater	1.25	60% saturation
	Seismic	1.11	1:100 AEP – PGA 0.09g
Section 4: Eastern gully	Static	1.55	30% saturation
	Elevated Groundwater	1.26	60% saturation
	Seismic	1.17	1:100 AEP – PGA 0.09g
Section 5: Western Gully	Static	1.53	30% saturation
	Elevated Groundwater	1.24	60% saturation
	Seismic	1.17	1:100 AEP – PGA 0.09g
Section 5: Western Gully *	Static	1.81	30% saturation
	Elevated Groundwater	1.69	60% saturation
	Seismic	1.32	1:100 AEP – PGA 0.09g

* Failure surface specified through low strength alluvial bed.

7.3.6 Temporary stability during construction

We have completed a slope stability analysis using undrained parameters on Sections 1 and 3 that considers temporary stability during construction.

An important consideration of when to adopt undrained parameters is the rate of filling and how this influences the timing of when drained parameters can be adopted. We understand that a total volume of 1.6 M m^3 is proposed over a 15 year consent period with an annual fill volume estimated at 100,000 m^3 (pers comms Alistair McCourtie 18 April 2024).

Filling at this rate is expected to result in an average fill height increase of 4 to 5 m per annum. On this basis, by the completion of a second 4-5 m fill height increase, we would expect the previous 4-5 m layer of fill and foundation material to be acting in a drained fashion.

Undrained analyses outputs are included in Appendix G. The results illustrate the following:

- An acceptable level of stability (FoS >1.2) is available for fill an initial fill height of up to 14 m when adopting undrained parameters for the fill and the foundation materials.
- We have considered models that adopt further fill increases of up to 14 m and note that these can be accommodated for the undrained case, provided that previous fill material and foundation materials have started to drain and that excess foundation pore pressures do not exceed 6 m to 7.5 m above the pre-existing ground level.

Given that maximum fill thickness over an annual filling programme are not expected to exceed 4-5 m, we anticipate that acceptable levels of stability can be achieved in the temporary (undrained) case.

7.4 Liquefaction assessment

A liquefaction assessment for the site has been completed in general accordance with NZGS/MBIE Earthquake Geotechnical Engineering Practice – Module 3: Identification, assessment, and mitigation of liquefaction hazards. The Boulanger and Idriss (2014) triggering method has been adopted along with ground motion parameters calculated in Section 7.2. The liquefaction assessment was completed using the software analysis programme Cliq and the CPT test data and an assessed groundwater level set at the ground surface to reflect a worst case scenario.

The analysis does not indicate any liquefaction triggering under the ULS design case with the factor of safety (FoS) against liquefaction remaining above 1.5 (refer Appendix H).

7.5 Discussion

Acceptable levels of stability can be achieved provided that:

- Managed fill toe positions within each gully floor, and below the eastern ridge line, as indicated in Figure 7-1 (refer to Appendix I).
- The managed fill is constructed in general accordance with the following geometry
  - Minimum 10 m set back distance from the wetland (refer to Figure 7-1) in the western and central gullies.
  - Overall slope angle not to exceed 1V:3H (18° from horizontal). Individual batters and benches may be required to manage surface water and the associated risk of erosion of the front face.
  - If drainage benches are needed, these should be spaced no more than 10 m vertically. Associated individual batters not exceeding 10 m in height may be up to 1V:2.75H to accommodate these benches, but the overall slope angle shall not exceed 1V:3H as noted above.
  - Fill height of the western gully not to exceed RL 198 m.
  - Fill heights of the central and eastern gullies not to exceed RL 184 m.
  - Domed final surface profile to shed surface water. Refer to Appendix F.
- Foundation stripping is undertaken to undercut and remove soft alluvium from within the gully floor and replace with gravels/cobbles/crushed concrete (refer to Section 8.1 and 8.2).
- Subsoil drainage is provided along the gully axis, including any identified groundwater seepages from surrounding slopes (refer to Section 8.2).
- Imported fill material is placed in an appropriate manner (refer to Section 8.3).
- Excess porewater pressure generated during fill placement is managed (refer to Section 8.4).

- Completion of construction inspections by a qualified geotechnical specialist (refer to Section 8.6).
- Surface water management features as set out in Section 8.7 are incorporated into the design surface to minimise erosion/scour which could affect the stability of the slope.

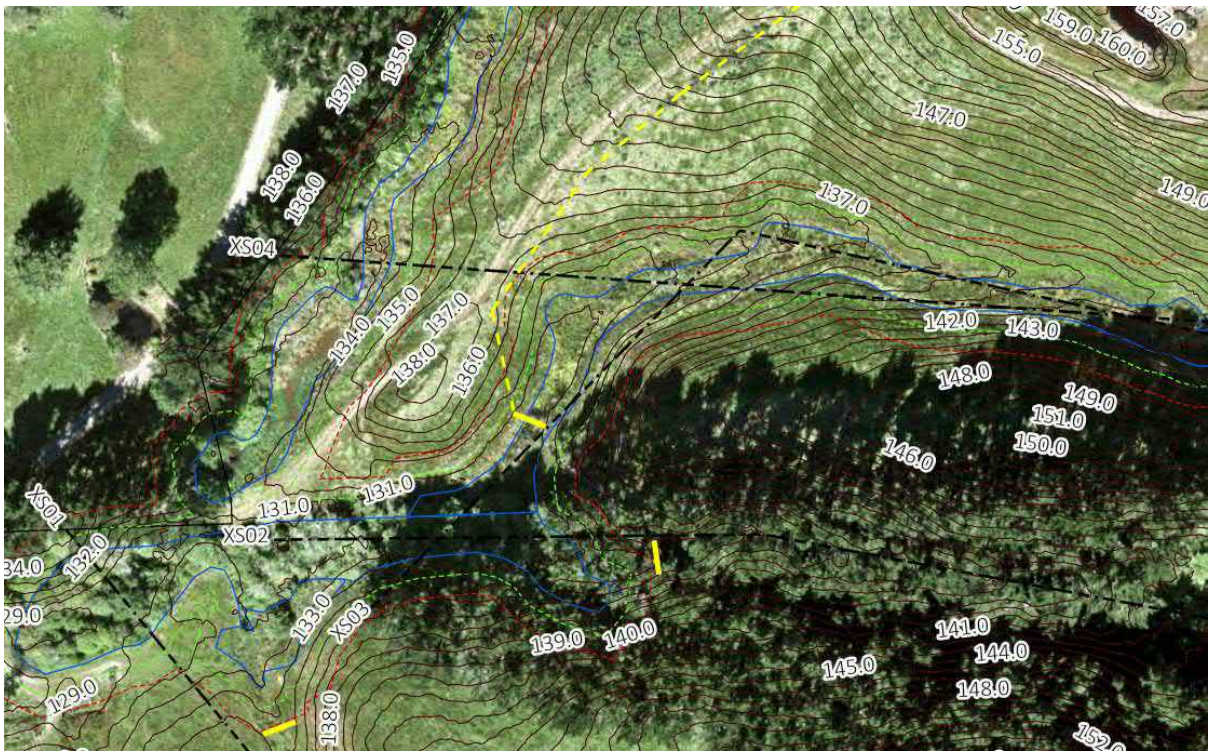


Figure 7-1: Three proposed toe positions (yellow lines) of the managed fill located in the gully floor analysed in this report (Annotated figure from Appendix A – DWG 22004 issued 07/08/2023). Yellow dashed line indicates toe location along eastern gully ridge line (refer to Appendix I).

8 Construction recommendations

8.1 Foundation preparation

We anticipate that foundation stripping will be required to remove soft and unsuitable soils along the gully floor of the three gullies. Strip down to the depth of firm soils (minimum soil strength 35 kPa).

As groundwater inflows from the natural ground into the fill are expected, initial filling within the gully floor shall include "free draining" gravels/cobbles/crushed concrete to act as a drainage blanket, rather than cohesive fill soils. Backfill materials are further discussed in Section 8.3.1.

Soils stripped during foundation preparation may be incorporated into the managed fill. This will require further assessment with consideration given to the staging of the works. We note that the soils onsite are sensitive in nature and reduce in strength when reworked and may result in a paste like consistency.

Stripping of topsoil and vegetation, including pine tree stumps from the Central gully, should be undertaken from the entire footprint of the managed fill slope. Sloping surfaces should be benched

prior to fill placement. Topsoil and vegetation should be stockpiled for final rehabilitation of the managed fill surface.

Existing areas of historical instability on the side slopes of the gullies (Refer to Photograph 2) will be buttressed by the fill long term. Foundation preparation in these areas should generally be undertaken from the top down to avoid destabilising these areas of instability during construction.

The most recent slip in Gully 3 (Photograph 11), should be monitored during construction and specific geotechnical advice sought in the event of further mobilization. Managing additional debris from this slip could be achieve by localised unload immediately below the observed tension crack or by forming a temporary catchment bund across the gully to limit the risk of debris inundation of the gully floor.

8.2 Sub-surface drainage

Formal underfill drainage will be required to manage groundwater pressures at the contact between the current ground surface and the managed fill.

Conceptually sub-soil drainage will include 110 mm to 160 mm diameter Nexus Hiway perforated pipe (or similar), in a filter sock, surrounded by drainage aggregate, wrapped in a geofabric throughout the gully floor. A concept layout plan and designs are illustrated in Appendix J.

Sub-surface drainage design should be modified as required during construction to ensure any specific groundwater seepage points are picked up by additional Type 2 drains. .

8.3 Fill placement

8.3.1 Backfill for foundation undercuts

A key part of the geotechnical design is undercutting soft material in the gully floor. This undercut is to be backfilled with free-draining gravel/cobbles/concrete cobbles or blocks. The gravels and cobbles can consist of GAP65 up to GAP100. Crushed concrete may also be considered if available provided particle sizes range between 100 to 200 mm. A geofabric separation layer may be required for backfill placement to ensure segregation.

Guidance on placement requirements and compaction control is set out in Table 8-1 below.

8.3.2 Bulk managed fill

Managed fill materials are expected to vary widely in composition and moisture content. However, these are expected to follow the recently updated Technical Guidelines for Disposal to Land[4] for managed fill as follows.

> *"Predominantly clean fill and controlled fill, which may also contain material with contaminant concentrations in excess of controlled fill limits."*

[4] WasteMINZ, 2022. Technical Guidelines for Disposal to Land, Revision 3.

"The fill material will not contain putrescible or reactive materials that when deposited that may result in generation of leachate or landfill gas."

We anticipate that the moisture content of received managed fill will vary seasonally depending on the weather conditions and the type of fill being imported.

Overly soft, organic rich or wet soils are to be separated into wet cell disposal areas discussed in Section 8.3.3.

8.3.3 Wet disposal material

We anticipate that wet disposal cells will need to be developed within the developing managed fill to allow for disposal of saturated site won and imported materials. Fill material will need to be placed in specific cells supported by interim bunds of better quality, compacted fill and then eventually be encapsulated within the managed fill.

The final landform is expected to be able to accommodate wet cells without unduly affecting final slope stability. However, specific geotechnical advice should be sought from a suitably qualified geotechnical professional prior to wet cell construction.

8.3.4 Temporary stockpiling

We anticipate that temporary stockpiling will occur during the delivery of various materials to the site. We recommend stockpiles do not exceed 5 m in height and be placed 25 m or more behind the active front face.

8.3.5 Summary

Guidance on placement requirements and compaction control is set out in Table 8-1 below.

Table 8-1: Summary of fill placement requirements

Material Type	Loose Layer Thickness (max)	Max Particle Size	Placement requirements	Testing & construction observation
Undercut backfill (Granular)	0.4 m	200 mm	Upper 1.5 m thickness of undercut backfill to be compacted. Minimum of 4 passes with a 12 tonne roller. Geofabric separation layer may be required depending on the insitu ground condition	Clegg Impact Value ≥18 average with no single value less than 15. No excessive weaving or deformation beneath the roller.
Bulk Managed Fill	0.4 m	200 mm	Bladed out into loose lifts by Dozer. Minimum of 4 passes with a 12 tonne padfoot roller*.	Single Test Minimum Corrected Shear Vane = 50 kPa Average Corrected Shear Vane = 75 kPa No warping or weaving evident under passage of laden trucks.

We understand SB Civil currently own a 12 tonne smooth drum roller. We recommend using a 12 tonne pad foot roller within the bulk managed fill materials, which are expected to be largely clay rich soils.

8.4 Rate of fill placement

As managed fill is being placed, the weight of fill will induce additional pressure on the underlying soil. In a fine-grained soil, this may lead to a temporary build-up of excess porewater pressure within the underlying natural soil matrix, which reduces the effective strength of the soil and may pose a temporary risk to slope stability during construction.

We recommend installing vibrating piezometers in each gully within the natural material to monitor the excess porewater pressure development during the filling operations.

Depending on the groundwater response, it may be necessary to either limit the rate of fill placement or install vertical or horizontal drains to speed up the dissipation of groundwater pore pressures.

8.5 Groundwater monitoring during construction

A minimum of one vibrating wire piezometer shall be installed into the foundation soils in each of the three gullies as set out in the plan included in Appendix K.

The purpose of the groundwater monitoring is to manage the risk of instability associated with excess pore pressures developing during fill placement.

8.5.1 Piezometer Alert & Alarm Levels

For the purposes of groundwater monitoring alert and alarm levels we have adopted the foundation pore pressures at which an FoS = 1.25 (Alert) or FoS 1.15 (Alarm) are modelled for the temporary stability case.

These correspond to:

- Alert Level: Equivalent groundwater level 6 m above pre-existing ground level.
- Alarm Level: Equivalent groundwater level 7.5 m above pre-existing ground level.

8.5.2 Contingency Plan

If an Alert Level is triggered for groundwater monitoring then the following actions are to be taken:

- Where possible, shift cleanfill placement into one of the adjacent gullies.
- No placement of fill within 25 m of the front face.

Under Alarm Level conditions the following actions are to be taken:

- Cease placement of fill in the individual gully until groundwater levels drop below Alarm levels.
- Fill can be placed in an adjacent gully if groundwater monitoring (Alert and Alarm) conditions allow.

- If groundwater Alarm levels are ever recorded in all three gullies at the same time, then placement of fill is to cease for the entire site until groundwater monitoring (Alert and Alarm) conditions allow.
- Mitigation measures such as wick drains may be considered to increase the rate of pore pressure dissipation.

8.5.3 Monitoring frequency

The monitoring includes the collection of VWP data and the fill height above each VWP.

1. VWP are installed with a telemetry box that transmits the information to an online portal where live data can be viewed via personal log in.
2. The fill height above each VWP is collected in the field by means of a survey with an accuracy of <0.1m at an interval not to exceed once monthly.

The recommended frequency of VWP monitoring is presented in Table 8-2.

Table 8-2: Summary of reviewing VWP data.

Status	Monitoring by Site Foreman	Reviewed by a qualified Geotechnical Professional
Normal operations	Weekly	Quarterly
Alert Level	Daily	Weekly
Alarm Level	Daily	Daily

8.6 Construction inspections

We anticipate that geotechnical inspections/assessments will be required intermittently during construction. This includes:

a Verify ground conditions, by way of geotechnical investigations, within Gully 2 following forestry clearance.

b Inspection of undercuts to verify foundation conditions in each of the three gully floors.

c Inspection of set out and first stages of sub-soil drainage construction.

d In-situ strength testing of early lifts of bulk managed fill material to verify that assumed strengths are being achieved by the placement methodology.

e Installation and monitoring of vibrating wire piezometers as set out in Section 8.5 above.

The purpose of inspection and testing is to verify ground conditions and placed fill strengths are in accordance with assumptions made in our design. The frequency of testing is expected to be substantially reduced from what may be normally expected for a civil earthworks project as long-term settlement is not a design consideration for this site.

8.7 Surface water drainage

Both interim and final surfaces should be gently graded so that surface water is unable to pond on the managed fill during rainfall events.

Specific surface water drainage channels may need to be provided in the final design to limit erosion into the managed fill where surface water flows are concentrated.

The managed fill surface should be rehabilitated as soon as practicable after individual stages of construction are completed to limit the volume of sediment laden water runoff during rainfall events.

We recommend that a civil engineer should assess the final landform with respect to surface water control and erosion.

8.8 Final surface settlement

The nature of the fill placement and overall height of the fill mean that long term settlements are expected to be significant and will be ongoing for a significant period post completion. The site is not expected to be suitable for the development of structures in the future.

9 Review of environmental effects

Environmental effects have been considered in relation to the geotechnical performance of the proposed managed fill.

The key area of potential environmental effects relates to the short and long term stability of the managed fill. In general, for environmental effects to be considered significant, there would need to be a risk of slope instability that could:

- Result in instability extending beyond the applicants' property boundaries.
- Result in debris from instability coming into contact with areas of high value ecology.
- Result in debris from instability coming into contact with streams and watercourses.

Based on the stability assessments undertaken, we consider that the risk of instability at the site is low based on the design criteria adopted and the location of the adjacent property boundaries in relation to the toe of the slope. In our opinion the potential for environmental effects related to geotechnical performance of the managed fill is therefore negligeable.

10 Summary and recommendations

SBC are proposing construction of a managed fill at 1618 Ararimu Road, Auckland. Baseline Geotechnical Limited (BGL) has been engaged to provide preliminary geotechnical design for the proposed managed fill and consider environmental effects related to long-term slope performance in the context of a resource consent application.

The proposed site is located on the southern side of Ararimu Road. There are three main gully systems that run in a south to north direction which defines the geomorphology of the site. The proposed managed fill consists of infilling the western, central and eastern gullies.

Our ground investigation incorporated engineering geological mapping of the site, logging of ten test pits, one hand auger and seven CPTs between 23 March 2023 and 10 July 2023.

The materials encountered during the investigation include topsoil, recent gully infill (colluvium), Puketoka Formation alluvium, and completely weathered to highly weathered greywacke rock. Groundwater is present at the ground surface along the three gully floors.

Our stability analyses indicate that the managed fill can achieve the adopted slope stability design criteria provided that:

- The managed fill is constructed with an overall slope angle not to exceed 1V:3H (18° from horizontal) to maximum elevations indicated in Section 7.5.
- Foundation stripping is undertaken to undercut and remove soft alluvium from within the gully floor and expose firm materials.
- Prior to placing fill within the Central gully, additional targeted investigation is undertaken to verify the materials assumed within the geology model.
- Sub-soil drainage is provided along the gully axis, including picking up any identified groundwater seepages.
- Surface water management features to be incorporated into the design surface to minimise erosion/scour which could affect the stability of the slope. This may include drainage benches.
- Excess porewater pressure generated during fill placement is monitored and managed.
- Fill material is placed in accordance with the recommendations set out in Section 8.

Periodic geotechnical inspections should be undertaken to verify the design assumptions during construction phase.

Based on the stability and liquefaction assessments undertaken, we consider that the risk of instability at the site is low based on the design criteria adopted and the location of the nearest property boundaries in relation to the toe of the slope (Figure 7-1). In our opinion the potential for environmental effects related to geotechnical performance of the managed fill is therefore negligeable.

11 Applicability

This report has been prepared for the exclusive use of our client SB Civil Limited with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

During construction it would be prudent for the site to be periodically inspected by a geotechnical specialist as set out in Section 8.6. We are available to provide that service and believe your project would benefit from the continuity we could provide. In any case if ground conditions exposed during construction vary from those described within this report we should be notified.

We trust that this report meets your present requirements. If you have any queries or wish to discuss any aspect, please contact the undersigned.

For and on behalf of Baseline Geotechnical Limited:

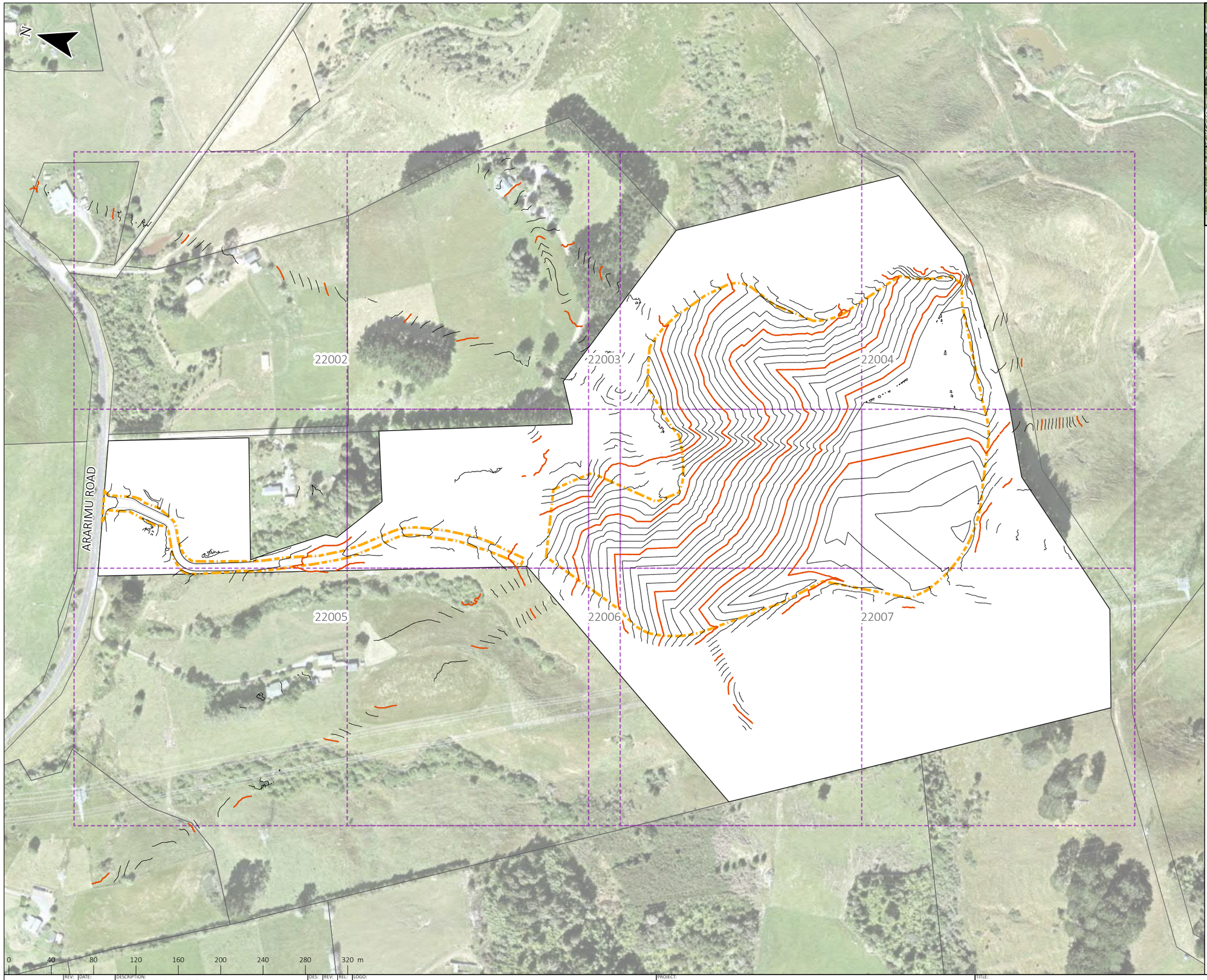
Stefan Cook

Engineering Geologist

Cameron Lines

Director

Appendix A – Existing contours and proposed managed fill plan



RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- BUILDINGS
- IMPERVIOUS
- NEW PARCELS
- EARTHWORKS EXTENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- MINOR CONTOURS (2m)
- MAJOR CONTOURS (10m)

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
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5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Auckland Council, Maxar, Auckland Council, Earthstar Geographics

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LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 22001

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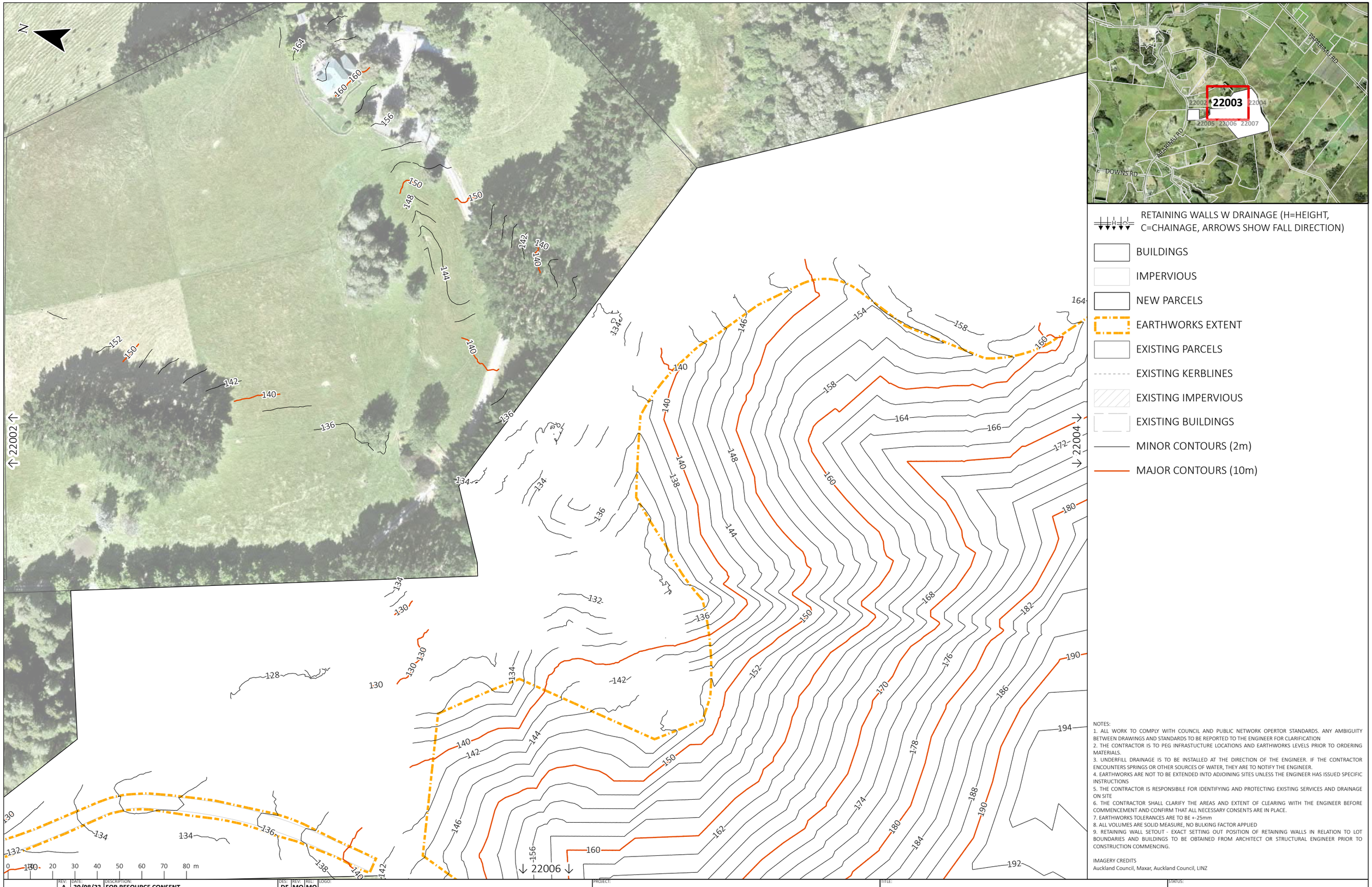

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IMPERVIOUS

NEW PARCELS

EARTHWORKS EXTENT

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RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

BUILDINGS

IMPERVIOUS

NEW PARCELS

EARTHWORKS EXTENT

EXISTING PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

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MAJOR CONTOURS (10m)

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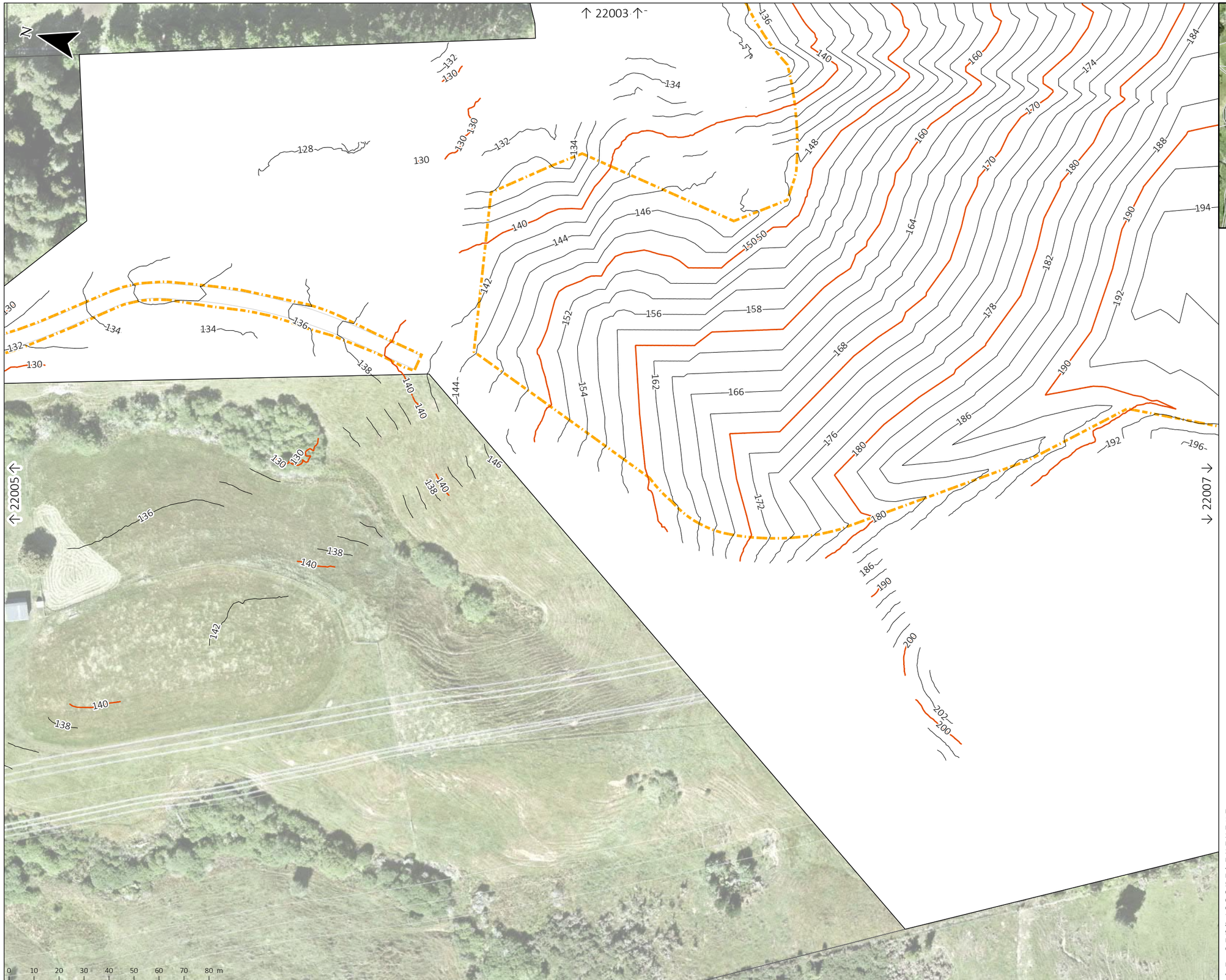

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SCALE:	SIZE:	REVISION:	DATE:
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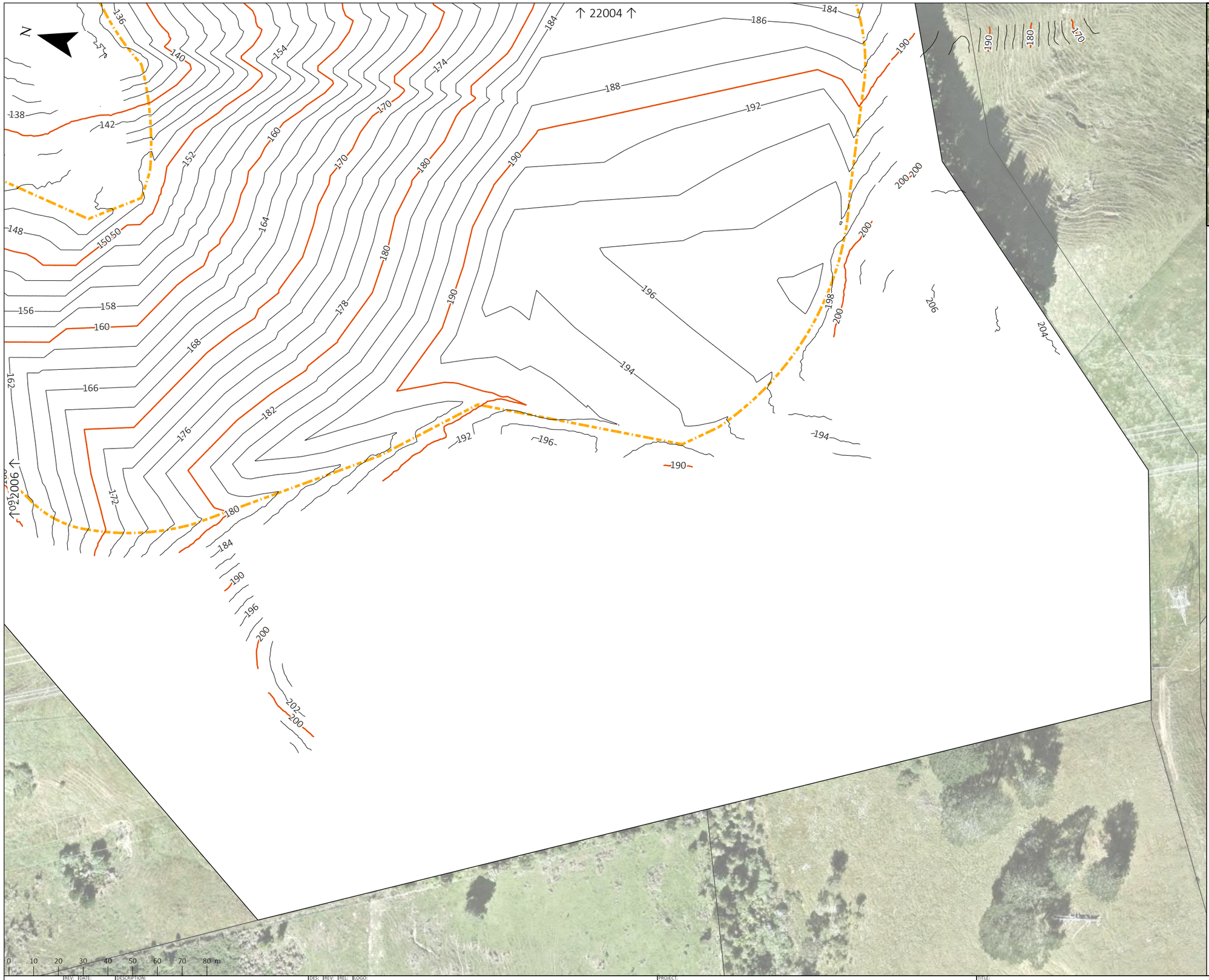


RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

BUILDINGS

IMPERVIOUS

NEW PARCELS

EARTHWORKS EXTENT

EXISTING PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

MINOR CONTOURS (2m)

MAJOR CONTOURS (10m)

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Auckland Council, Maxar, Auckland Council, LINZ

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO

LOGO: CIVIX

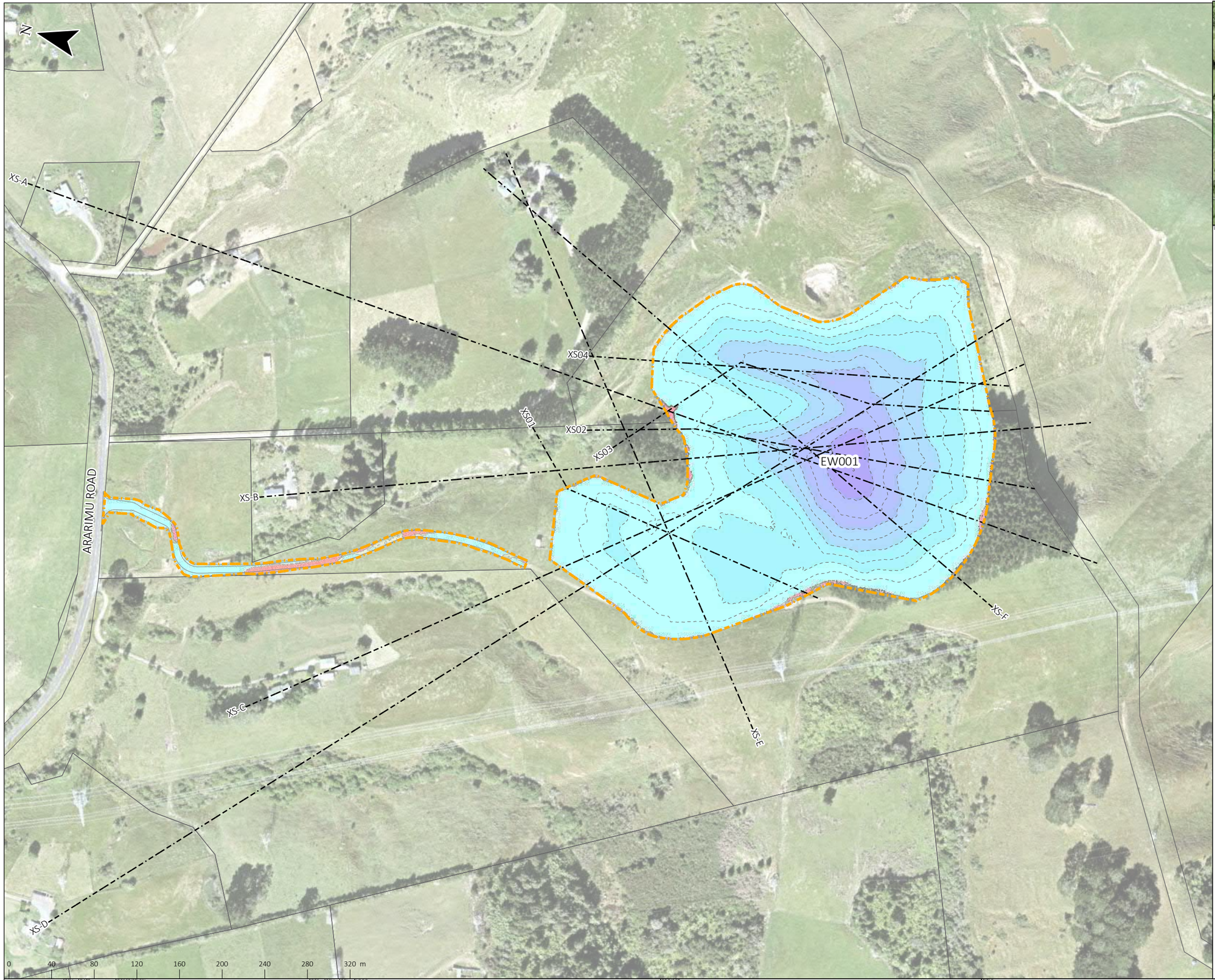
PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 22007

SCALE:	SIZE:	REVISION:	DATE:
1:1,500	A3	A	30/08/23



LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS EXTENT
- EARTHWORKS SECTIONS
- PAVEMENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- WETLAND
- WETLAND 5m OFFSET
- WETLAND 10m OFFSET

CUTFILL

CUTFILL

- -50.00--40.00m
- -40.00--30.00m
- -30.00--20.00m
- -20.00--10.00m
- -0.05--10.00m
- -0.05-0.05m
- 0.05-10.00m
- 10.00-20.00m
- 20.00-30.00m
- 30.00-40.00m
- 40.00-50.00m

EW ID	UNITS	EW001	EW002	TOTAL
AREA	**m²**	**95,946**	**4,127**	**100,073**
CUT	m³	147.1	330.4	477.5
BULK TOT. CUT	**m³**	**147.1**	**330.4**	**477.5**
MAX. CUT DEPTH	**m**	**1.4**	**1.7**	**1.7**
FILL	m³	1,352,971.4	2,347.8	1,355,319.2
FILL +15% BF.	m³	1,555,917.1	2,700.0	1,558,617.1
BULK TOT. FILL	**m³**	**1,555,917.1**	**2,700.0**	**1,558,617.1**
BULK CUT OFFSITE	m³	-	-	0.0
BULK CUT TO FILL	m³	-	-	477.5
BULK FILL IMPORT	m³	-	-	1,558,139.6
BULK TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
MAX. FILL HEIGHT	**m**	**45.2**	**3.5**	**45.2**
BULK TRUCKS	Trucks	-	-	259,690
TOPSOIL TOT. VOL.	**m³**	**0.0**	**0.0**	**0.0**
TOPSOIL TRUCKS	Trucks	-	-	0
EW TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
EW TOT. TRUCKS	Trucks	-	-	259,690

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:
1. ALL WORKS TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
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IMAGERY CREDITS
Auckland Council, Maxar, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:	LOGO:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO	

SCAN FOR 3D:

allsite.ai

CIVIX

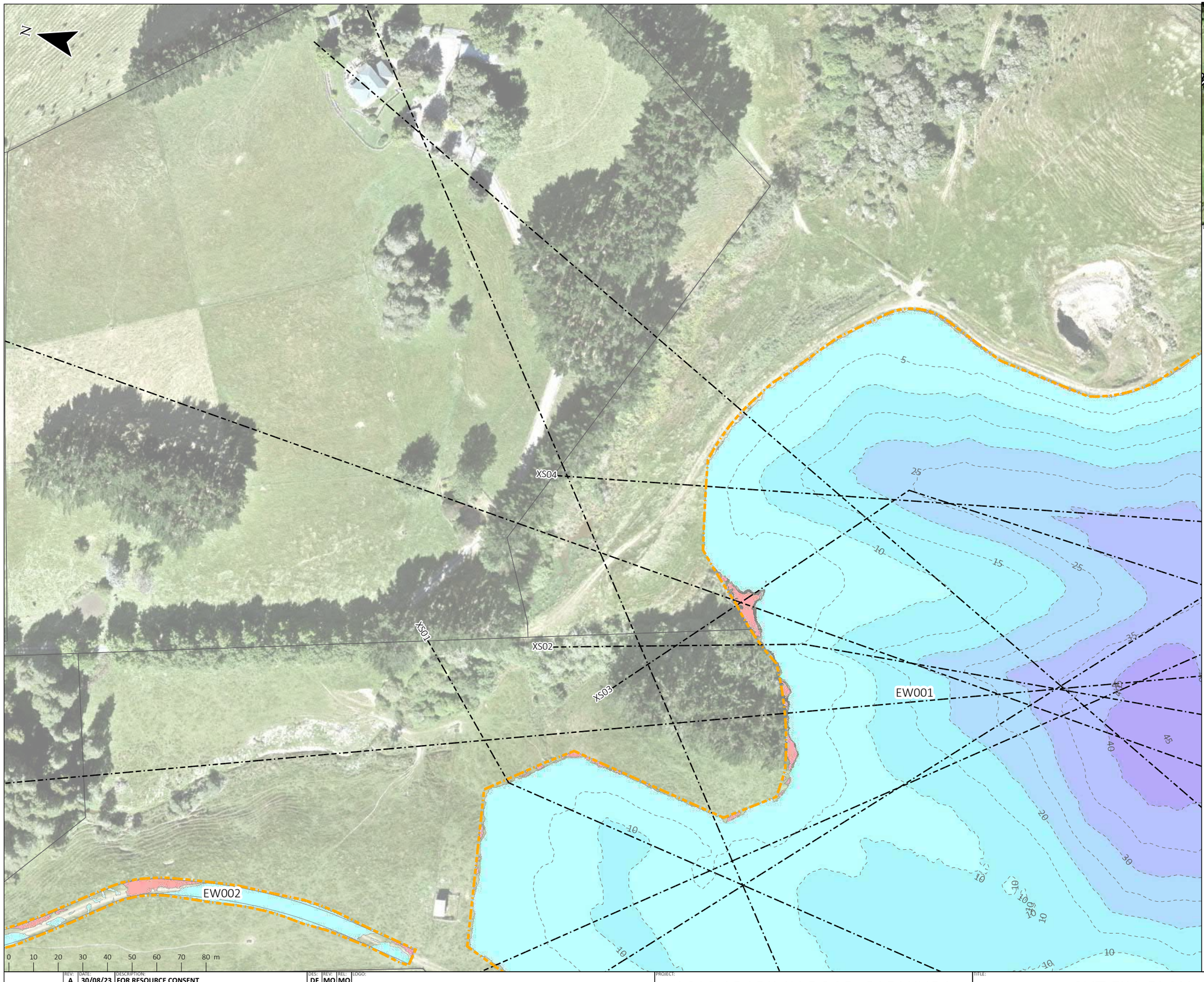
PROJECT:
1618 ARARIMU ROAD, PAPAKURA

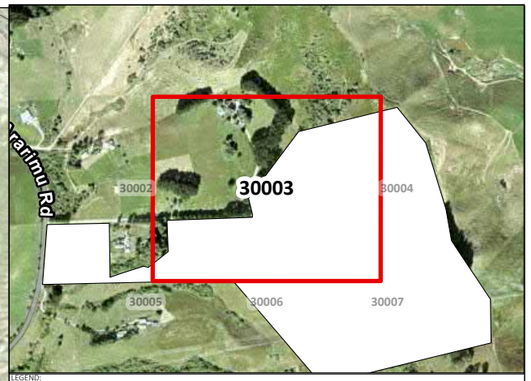
TITLE:
CUT FILL PLAN

STATUS:
FOR RESOURCE CONSENT

DRAWING NO:
30000

SCALE:	SIZE:	REVISION:	DATE:
1:3,500	A3	A	30/08/23





LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS EXTENT
- EARTHWORKS SECTIONS
- PAVEMENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- WETLAND
- WETLAND 5m OFFSET
- WETLAND 10m OFFSET

CUTFILL

- -40.00--30.00m
- -30.00--20.00m
- -20.00--10.00m
- -0.05--10.00m
- -0.05-0.05m
- 0.05-10.00m
- 10.00-20.00m
- 20.00-30.00m
- 30.00-40.00m
- 40.00-50.00m

CUTFILL

- -50.00--40.00m

EW ID	UNITS	EW001	EW002	TOTAL
AREA	**m²**	**95,946**	**4,127**	**100,073**
CUT	m³	147.1	330.4	477.5
BULK TOT. CUT	**m³**	**147.1**	**330.4**	**477.5**
MAX. CUT DEPTH	**m**	**1.4**	**1.7**	**1.7**
FILL	m³	1,352,971.4	2,347.8	1,355,319.2
FILL +15% BF.	m³	1,555,917.1	2,700.0	1,558,617.1
BULK TOT. FILL	**m³**	**1,555,917.1**	**2,700.0**	**1,558,617.1**
BULK CUT OFFSITE	m³	-	-	0.0
BULK CUT TO FILL	m³	-	-	477.5
BULK FILL IMPORT	m³	-	-	1,558,139.6
BULK TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
MAX. FILL HEIGHT	**m**	**45.2**	**3.5**	**45.2**
BULK TRUCKS	Trucks	-	-	259,690
TOPSOIL TOT. VOL.	**m³**	**0.0**	**0.0**	**0.0**
TOPSOIL TRUCKS	Trucks	-	-	0
EW TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
EW TOT. TRUCKS	Trucks	-	-	259,690

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:

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IMAGERY CREDITS

Auckland Council, Maxar, Auckland Council, LINZ, Esri Community Maps Contributors, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: CUT FILL PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 30003

SCALE:	SIZE:	REVISION:	DATE:
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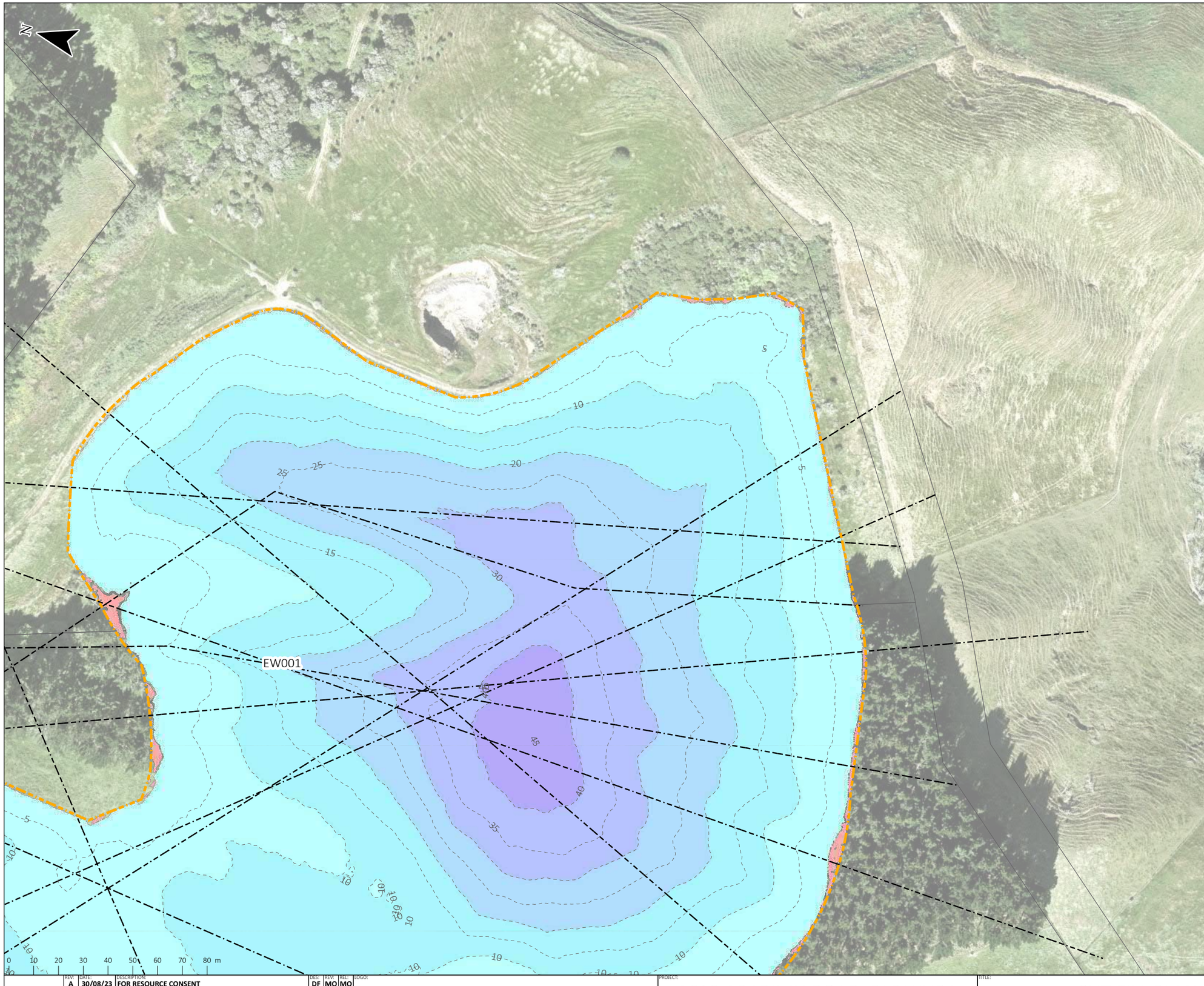

LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS EXTENT
- EARTHWORKS SECTIONS
- PAVEMENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- WETLAND
- WETLAND 5m OFFSET
- WETLAND 10m OFFSET

CUTFILL

CUTFILL

- -50.00--40.00m
- -40.00--30.00m
- -30.00--20.00m
- -20.00--10.00m
- -0.05--10.00m
- -0.05-0.05m
- 0.05-10.00m
- 10.00-20.00m
- 20.00-30.00m
- 30.00-40.00m
- 40.00-50.00m

EW ID	UNITS	EW001	EW002	TOTAL
AREA	**m²**	**95,946**	**4,127**	**100,073**
CUT	m³	147.1	330.4	477.5
BULK TOT. CUT	**m³**	**147.1**	**330.4**	**477.5**
MAX. CUT DEPTH	**m**	**1.4**	**1.7**	**1.7**
FILL	m³	1,352,971.4	2,347.8	1,355,319.2
FILL +15% BF.	m³	1,555,917.1	2,700.0	1,558,617.1
BULK TOT. FILL	**m³**	**1,555,917.1**	**2,700.0**	**1,558,617.1**
BULK CUT OFFSITE	m³	-	-	0.0
BULK CUT TO FILL	m³	-	-	477.5
BULK FILL IMPORT	m³	-	-	1,558,139.6
BULK TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
MAX. FILL HEIGHT	**m**	**45.2**	**3.5**	**45.2**
BULK TRUCKS	Trucks	-	-	259,690
TOPSOIL TOT. VOL.	**m³**	**0.0**	**0.0**	**0.0**
TOPSOIL TRUCKS	Trucks	-	-	0
EW TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
EW TOT. TRUCKS	Trucks	-	-	259,690

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:
1. ALL WORKS TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
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IMAGERY CREDITS
Auckland Council, Maxar, Auckland Council, LINZ, Esri Community Maps Contributors, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: CUT FILL PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 30004

SCALE:	SIZE:	REVISION:	DATE:
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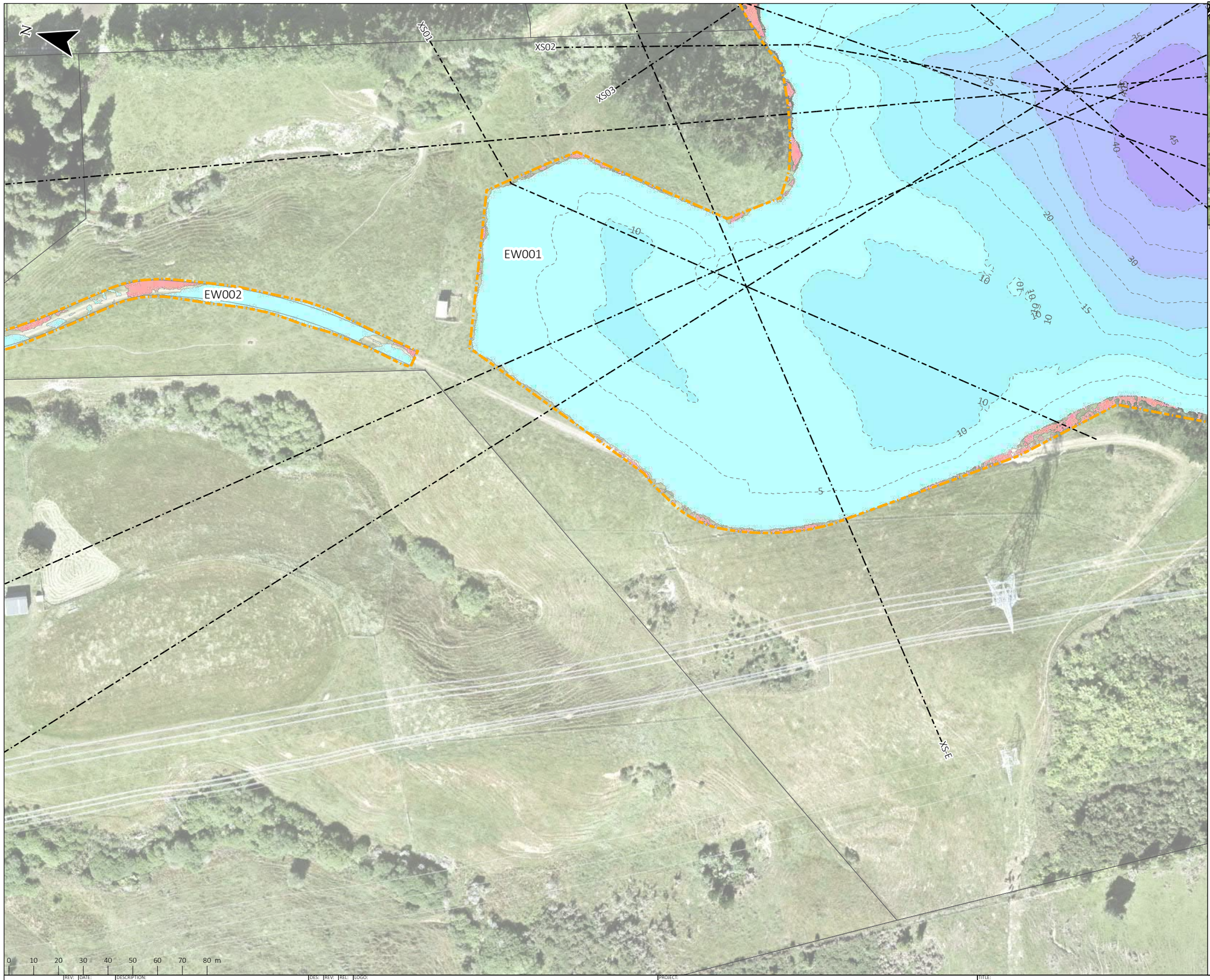

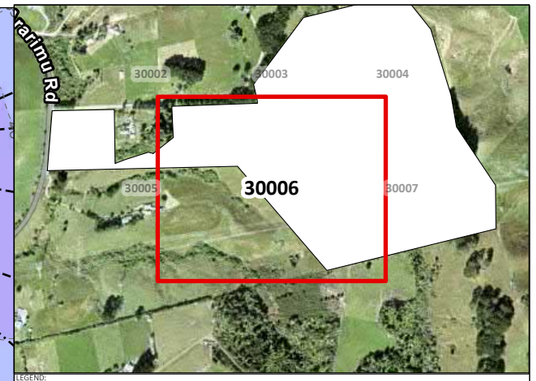

LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS EXTENT
- EARTHWORKS SECTIONS
- PAVEMENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- WETLAND
- WETLAND 5m OFFSET
- WETLAND 10m OFFSET

CUTFILL

- -40.00--30.00m
- -30.00--20.00m
- -20.00--10.00m
- -0.05--10.00m
- -0.05-0.05m
- 0.05-10.00m
- 10.00-20.00m
- 20.00-30.00m
- 30.00-40.00m
- 40.00-50.00m

CUTFILL

- -50.00--40.00m

EW ID	UNITS	EW001	EW002	TOTAL
AREA	**m²**	**95,946**	**4,127**	**100,073**
CUT	m³	147.1	330.4	477.5
BULK TOT. CUT	**m³**	**147.1**	**330.4**	**477.5**
MAX. CUT DEPTH	**m**	**1.4**	**1.7**	**1.7**
FILL	m³	1,352,971.4	2,347.8	1,355,319.2
FILL +15% BF.	m³	1,555,917.1	2,700.0	1,558,617.1
BULK TOT. FILL	**m³**	**1,555,917.1**	**2,700.0**	**1,558,617.1**
BULK CUT OFFSITE	m³	-	-	0.0
BULK CUT TO FILL	m³	-	-	477.5
BULK FILL IMPORT	m³	-	-	1,558,139.6
BULK TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
MAX. FILL HEIGHT	**m**	**45.2**	**3.5**	**45.2**
BULK TRUCKS	Trucks	-	-	259,690
TOPSOIL TOT. VOL.	**m³**	**0.0**	**0.0**	**0.0**
TOPSOIL TRUCKS	Trucks	-	-	0
EW TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
EW TOT. TRUCKS	Trucks	-	-	259,690

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:
1. ALL WORKS TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
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IMAGERY CREDITS
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SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO

LOGO: CIVIX

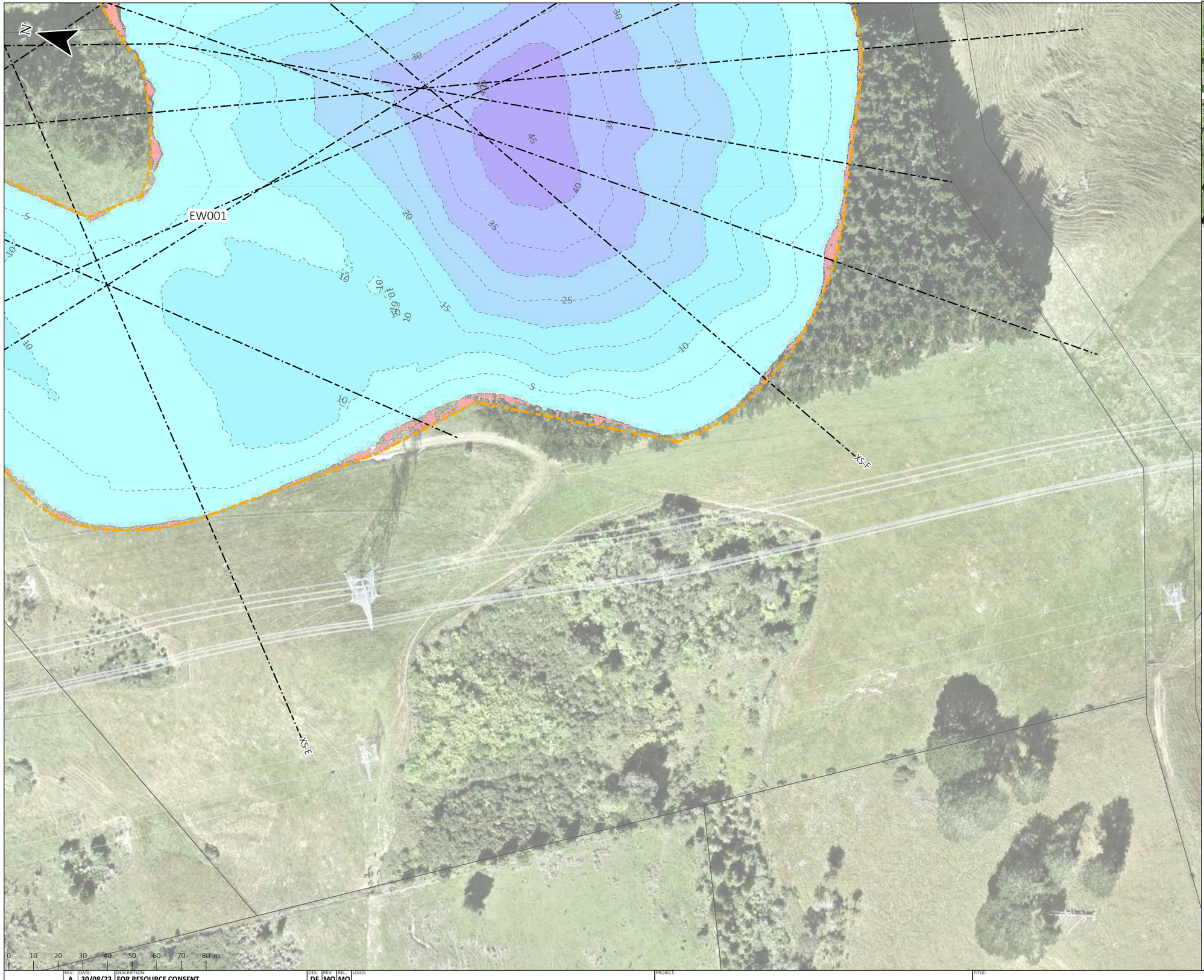
PROJECT: 1618 ARARIMU ROAD, PAPAKURA

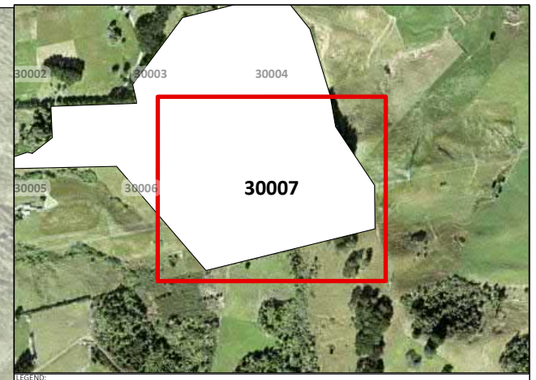
TITLE: CUT FILL PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 30006

SCALE:	SIZE:	REVISION:	DATE:
1:1,500	A3	A	30/08/23





LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS EXTENT
- EARTHWORKS SECTIONS
- PAVEMENT
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- WETLAND
- WETLAND 5m OFFSET
- WETLAND 10m OFFSET

CUTFILL

CUTFILL

- -50.00--40.00m
- -40.00--30.00m
- -30.00--20.00m
- -20.00--10.00m
- -0.05--10.00m
- -0.05-0.05m
- 0.05-10.00m
- 10.00-20.00m
- 20.00-30.00m
- 30.00-40.00m
- 40.00-50.00m

EW ID	UNITS	EW001	EW002	TOTAL
AREA	**m²**	**95,946**	**4,127**	**100,073**
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BULK TOT. CUT	**m³**	**147.1**	**330.4**	**477.5**
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BULK FILL IMPORT	m³	-	-	1,558,139.6
BULK TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
MAX. FILL HEIGHT	**m**	**45.2**	**3.5**	**45.2**
BULK TRUCKS	Trucks	-	-	259,690
TOPSOIL TOT. VOL.	**m³**	**0.0**	**0.0**	**0.0**
TOPSOIL TRUCKS	Trucks	-	-	0
EW TOT. VOL.	**m³**	**1,556,064.1**	**3,030.4**	**1,559,094.6**
EW TOT. TRUCKS	Trucks	-	-	259,690

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:
1. ALL WORKS TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS.
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE.
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm.
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED UNLESS OTHERWISE NOTED.
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Auckland Council, Maxar, Auckland Council, LINZ, Esri Community Maps Contributors, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	30/08/23	FOR RESOURCE CONSENT	DF	MO	MO

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

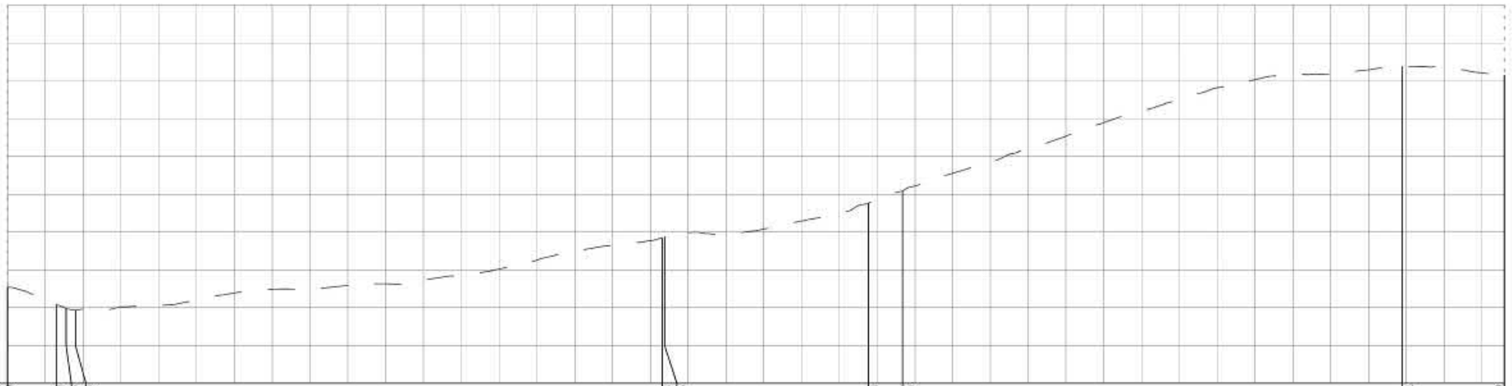
TITLE: CUT FILL PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 30007

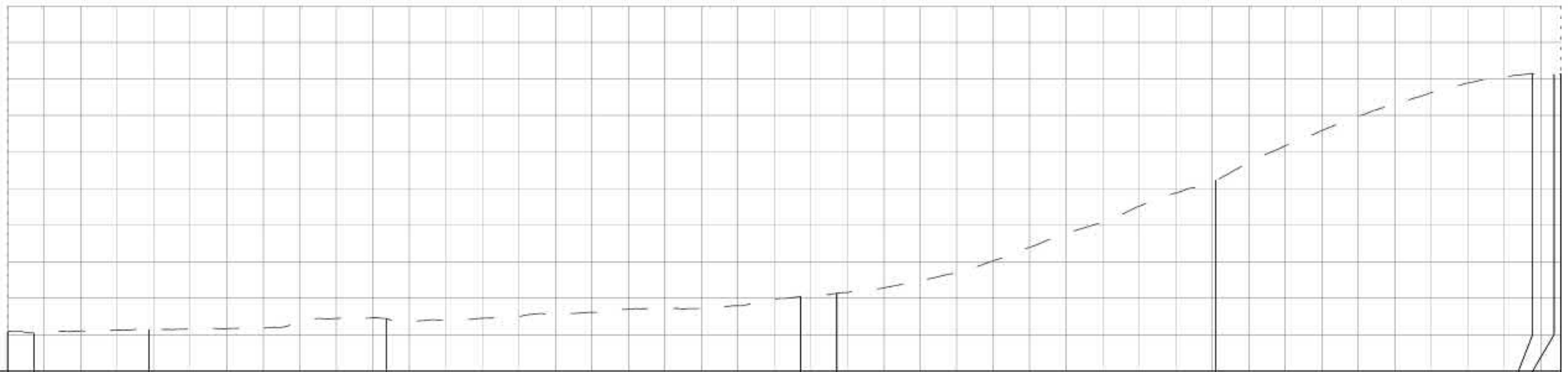
SCALE:	SIZE:	REVISION:	DATE:
1:1,500	A3	A	30/08/23

LEGEND:
EXISTING SURFACE — — —



CHAINAGE	0.00	13.00	15.48	17.96	173.13	173.75	227.66	236.65	368.94	395.90
DESIGN LEVEL	135.45	130.88	129.82	129.35	148.45	148.77	157.62	160.87	193.82	191.49
CUT(-) FILL(+) DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EXISTING LEVEL	135.45	130.88	129.82	129.35	148.45	148.77	157.62	160.87	193.82	191.49
DESCRIPTION										

XS01
SCALE H1:2000 V1:2000



CHAINAGE	0.00	7.12	38.70	103.73	217.15	227.07	330.91	417.69	423.58	425.44
DESIGN LEVEL	130.87	130.48	131.31	134.39	140.50	141.38	172.26	201.47	201.28	201.44
CUT(-) FILL(+) DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EXISTING LEVEL	130.87	130.48	131.31	134.39	140.50	141.38	172.26	201.47	201.28	201.44
DESCRIPTION										

XS02
SCALE H1:2000 V1:2000

SCAN FOR 3D:
allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	RE:	LOGO:

CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

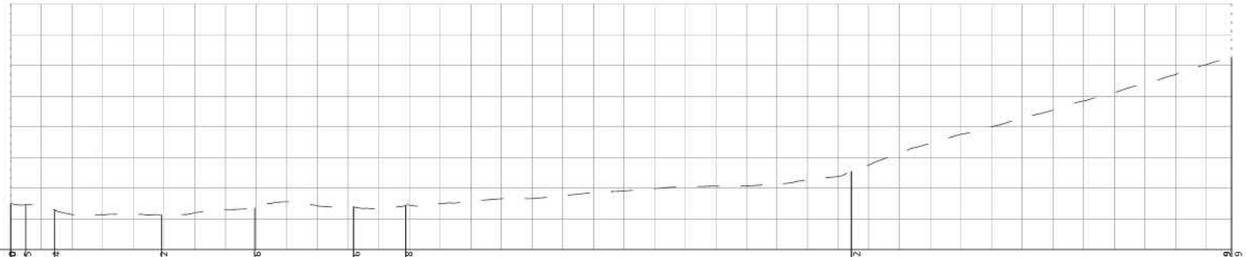
TITLE: EARTHWORKS SECTIONS

STATUS: FOR INFORMATION ONLY

DRAWING NO: 32000

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	21/07/23	21/07/23

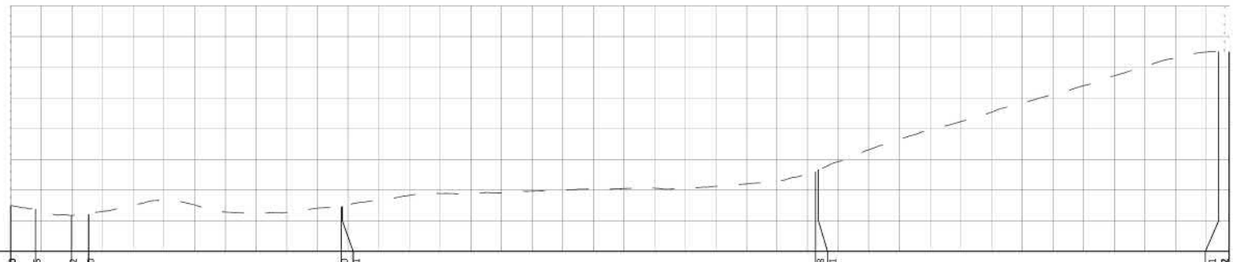
LEGEND:
EXISTING SURFACE — — —



CHAINAGE	0.00	4.95	14.24	49.22	79.56	111.76	128.78	274.32	398.19
DESIGN LEVEL	135.02	134.73	132.96	131.28	133.59	133.96	134.37	145.48	182.54
CUT(-) FILL(+) DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EXISTING LEVEL	135.02	134.73	132.96	131.28	133.59	133.96	134.37	145.48	182.54
DESCRIPTION									

XS03

SCALE H1:2000 V1:2000



CHAINAGE	0.00	8.05	19.82	25.40	107.80	108.11	262.68	263.61	394.01	397.42
DESIGN LEVEL	134.98	133.75	131.73	132.05	134.49	134.59	145.92	146.66	185.11	184.97
CUT(-) FILL(+) DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EXISTING LEVEL	134.98	133.75	131.73	132.05	134.49	134.59	145.92	146.66	185.11	184.97
DESCRIPTION										

XS04

SCALE H1:2000 V1:2000

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: EARTHWORKS SECTIONS

STATUS: FOR INFORMATION ONLY

DRAWING NO: 32001

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	21/07/23	21/07/23

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (1.0m)

NEW PARCELS

EXISTING PARCELS

Wetland

Wetland 5m offset

Wetland 10m offset

EARTHWORKS SECTIONS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
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5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Auckland Council, Maxar, Earthstar Geographics

DESIGNED ON:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

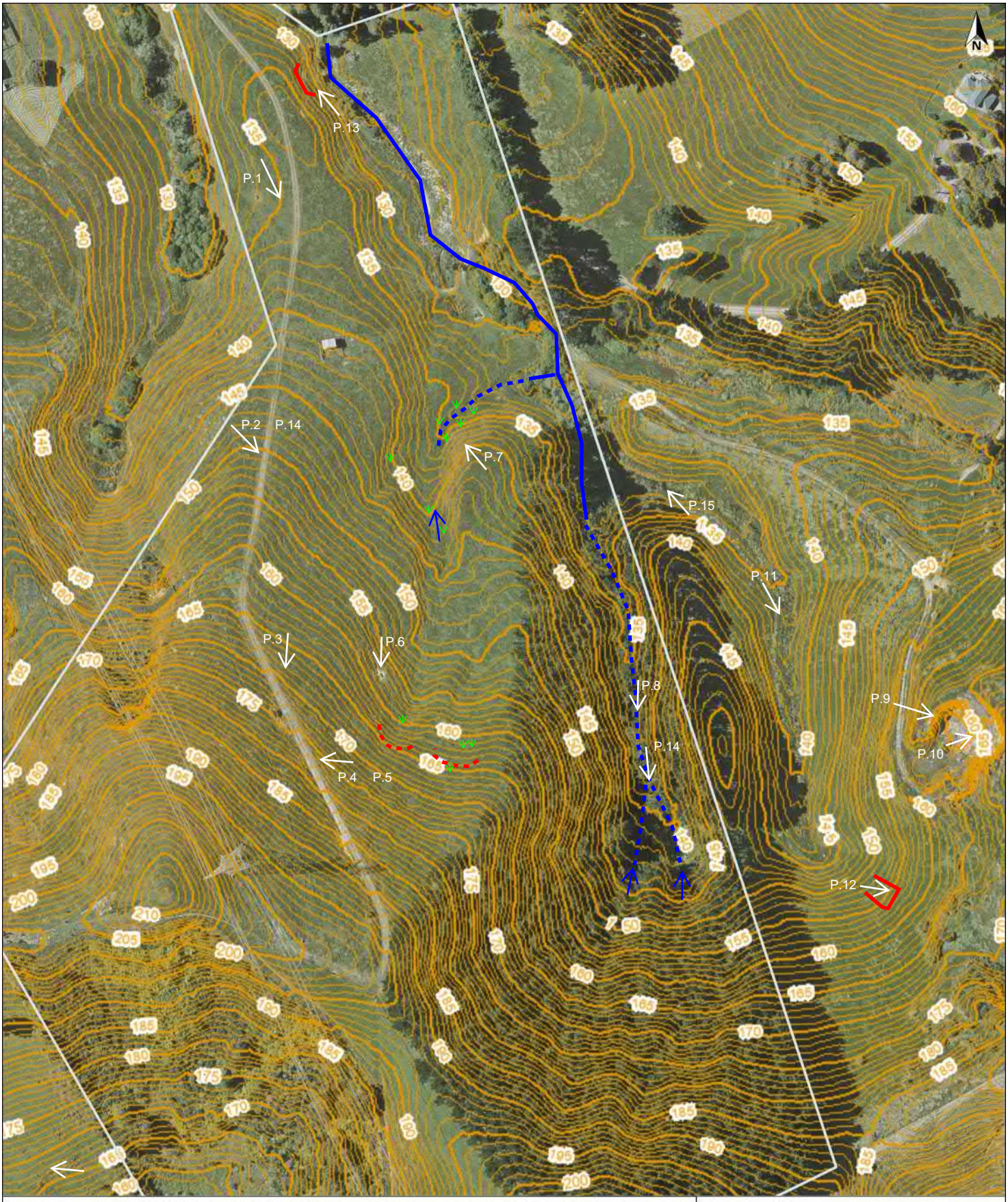
TITLE: EXISTING CONTOUR PLAN

STATUS: FOR RESOURCE CONSENT

DRAWING NO: 22004

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	07/08/23	07/08/23

Appendix B – Site observations map



Legend

- Property Boundary (LINZ)
- AKL Contours (2016)
- P.5 → Photo number direction
- Reed vegetation
- Permanent ater channel
- Intermittent ater channel
- Seepage exit point
- istoric headscarp
- Recent headscarp

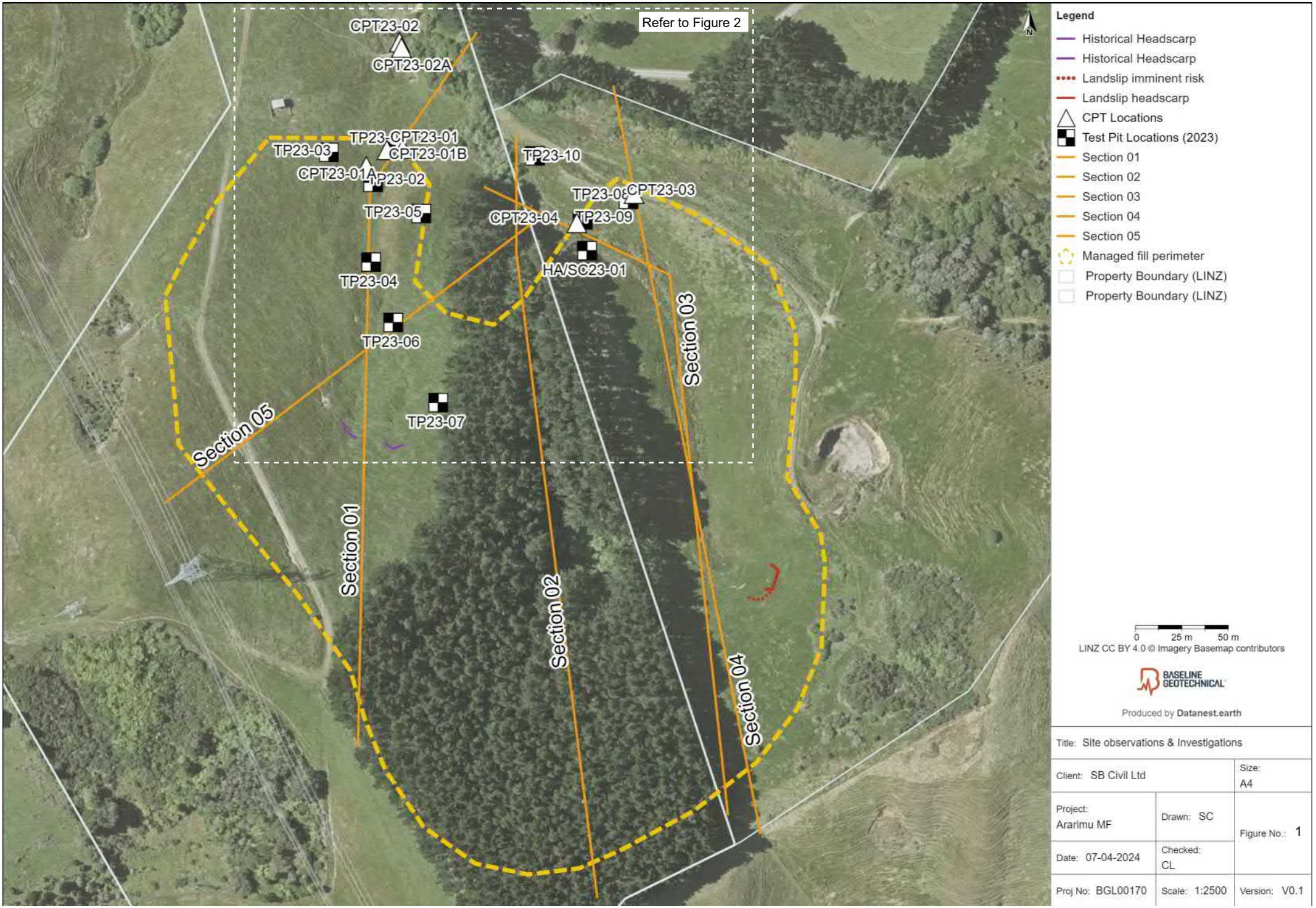
0 25 m 50 m
© Mapbox,

BASELINE GEOTECHNICAL

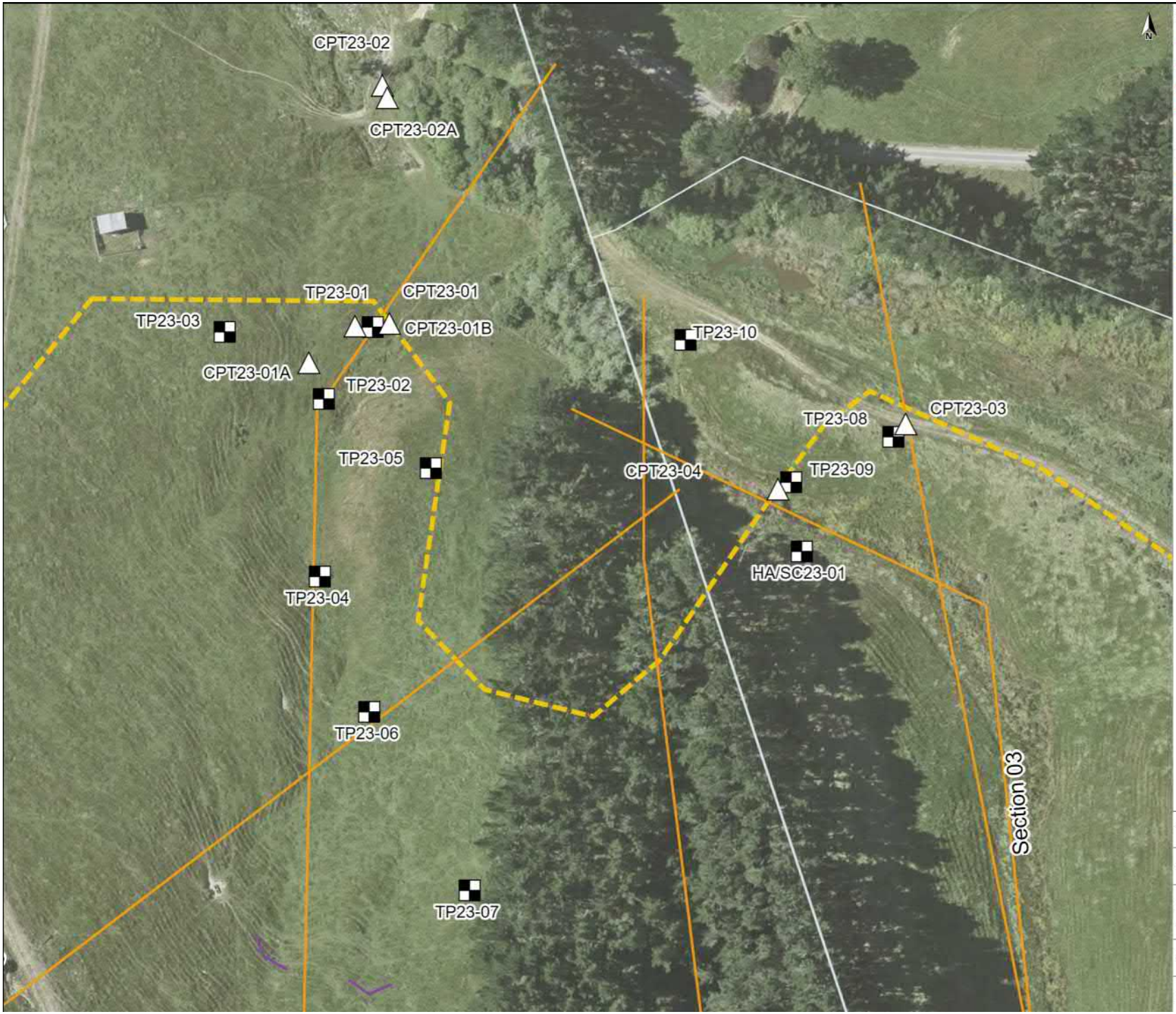
Produced by Datanest.earth

Title: Site observations		
Client: SB Civil Ltd		Figure No.:1 Size: A4
Project: Ararimu MF	Drawn: SC	
Date: 28-03-2023	Checked: CL	
Proj No.: BGL00170	Scale: 1:2500	Version: V0.1

Appendix C – Site investigations plan & logs



Title: Site observations & Investigations		
Client: SB Civil Ltd		Size: A4
Project: Ararimu MF	Drawn: SC	Figure No.: 1
Date: 07-04-2024	Checked: CL	
Proj No: BGL00170	Scale: 1:2500	Version: V0.1



Legend

- Historical Headscarp
- Historical Headscarp
- Landslip imminent risk
- Landslip headscarp
- CPT Locations
- Test Pit Locations (2023)
- Section 01
- Section 02
- Section 03
- Section 04
- Section 05
- Managed fill perimeter
- Property Boundary (LINZ)
- Property Boundary (LINZ)

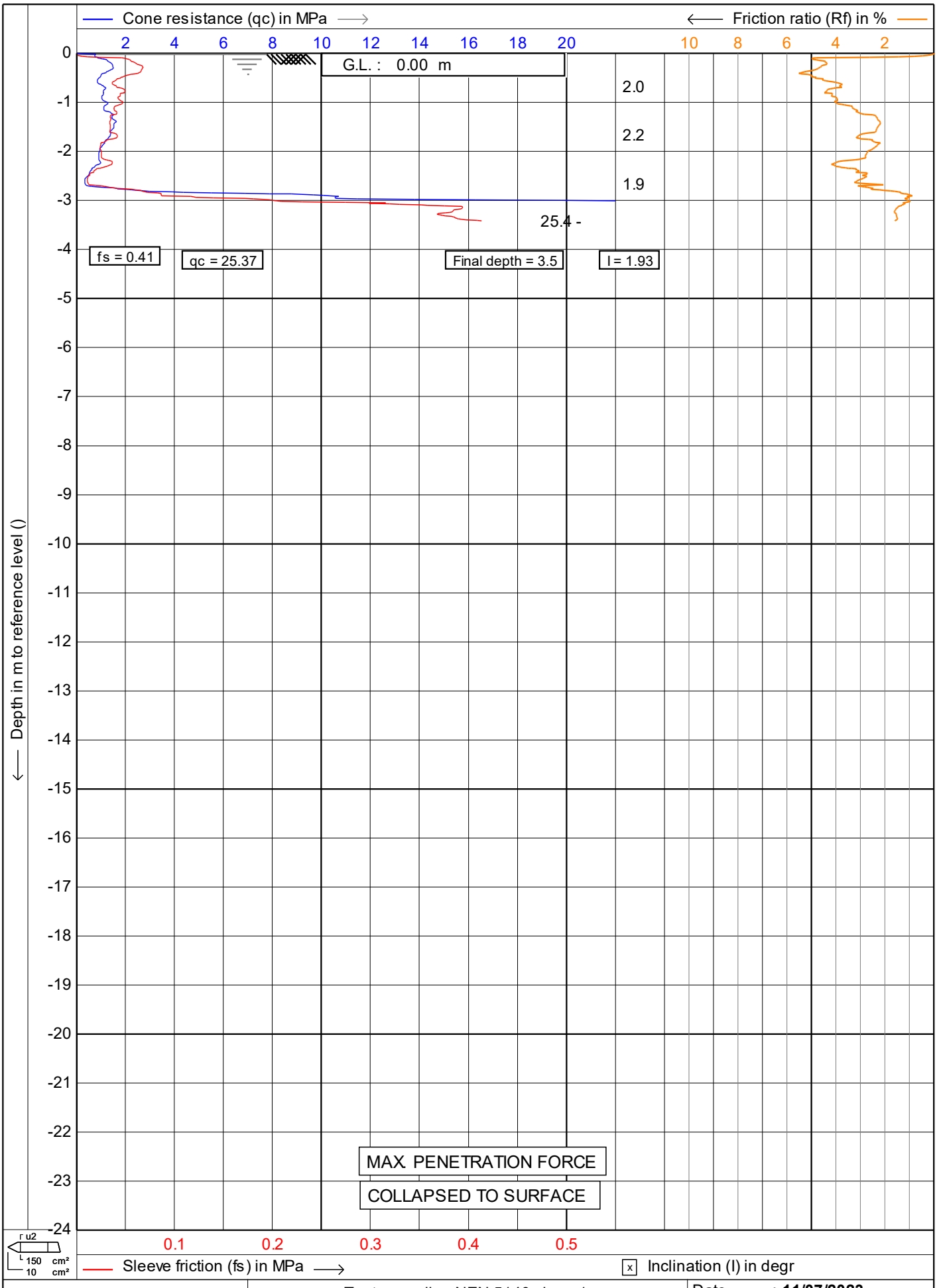
0 25 m 50 m

BASELINE GEOTECHNICAL

Produced by Datanest.earth

Title: Site observations & Investigations		
Client: SB Civil Ltd		Size: A4
Project: Ararimu MF	Drawn: SC	Figure No.: 2
Date: 07-04-2024	Checked: CL	
Proj No: BGL00170	Scale: 1:1250	Version: V0.1

Appendix D – CPT data from sub-contractor



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

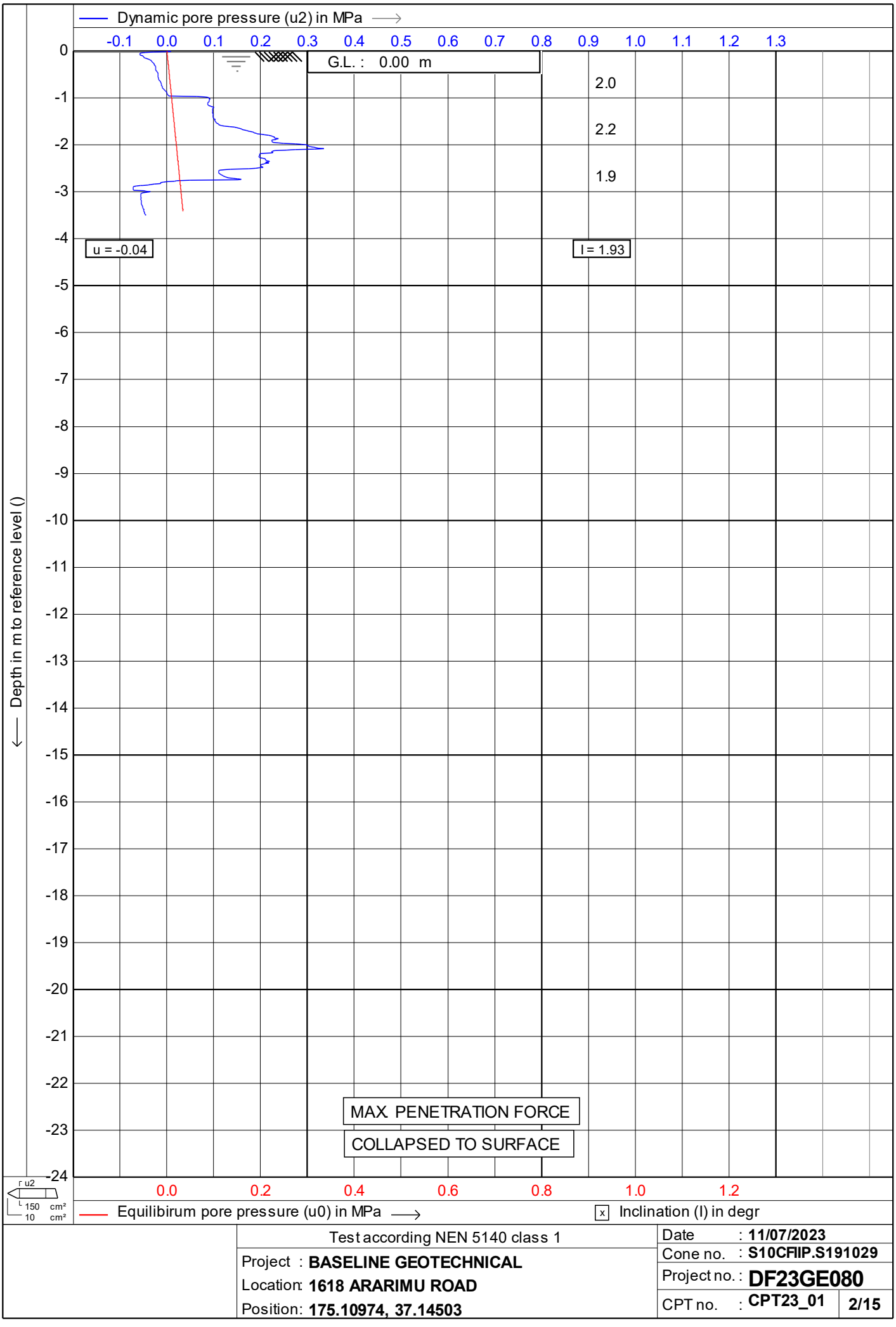
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **1/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

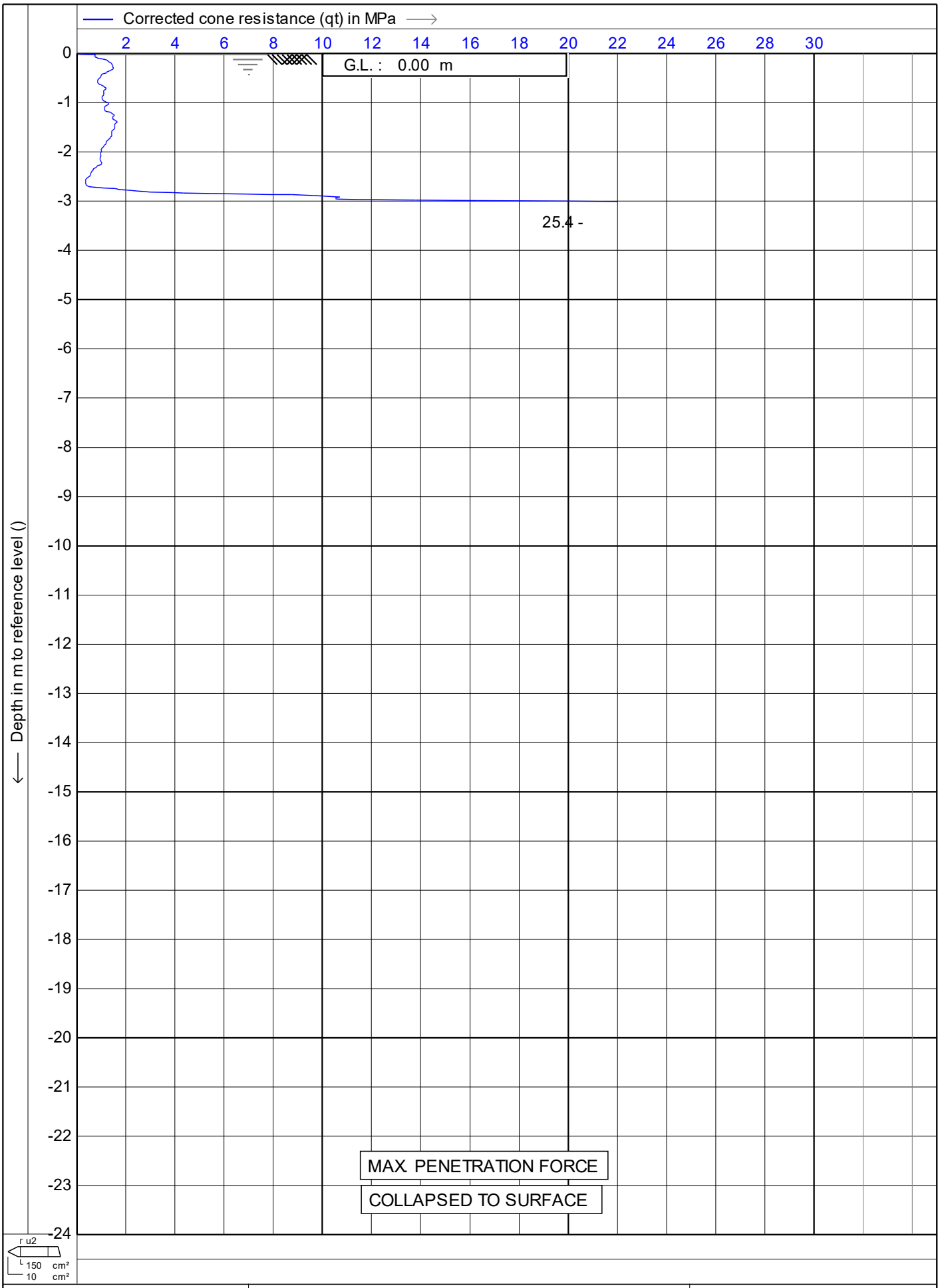
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **2/15**

1.49



Test according NEN 5140 class 1

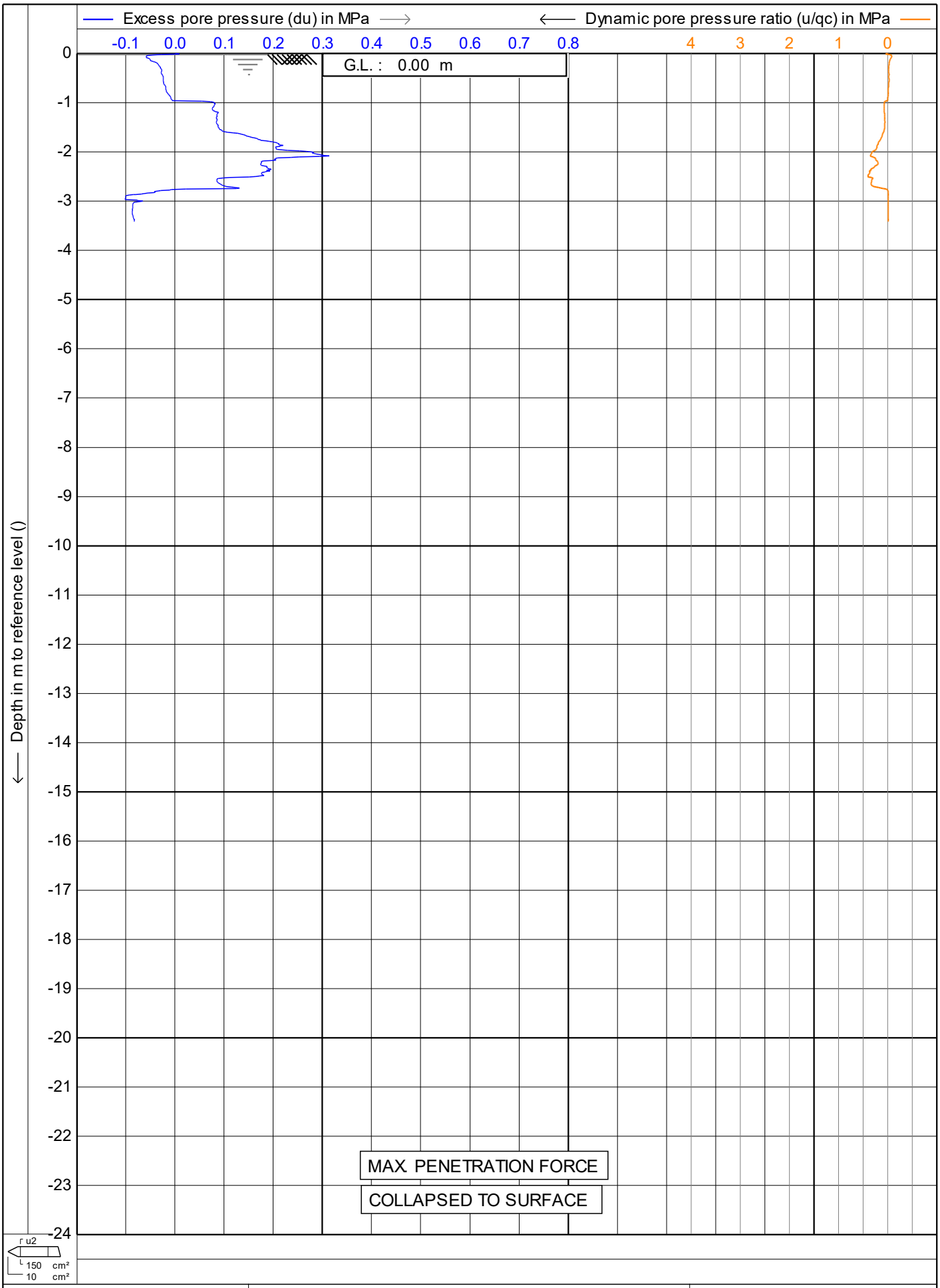
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01** **3/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

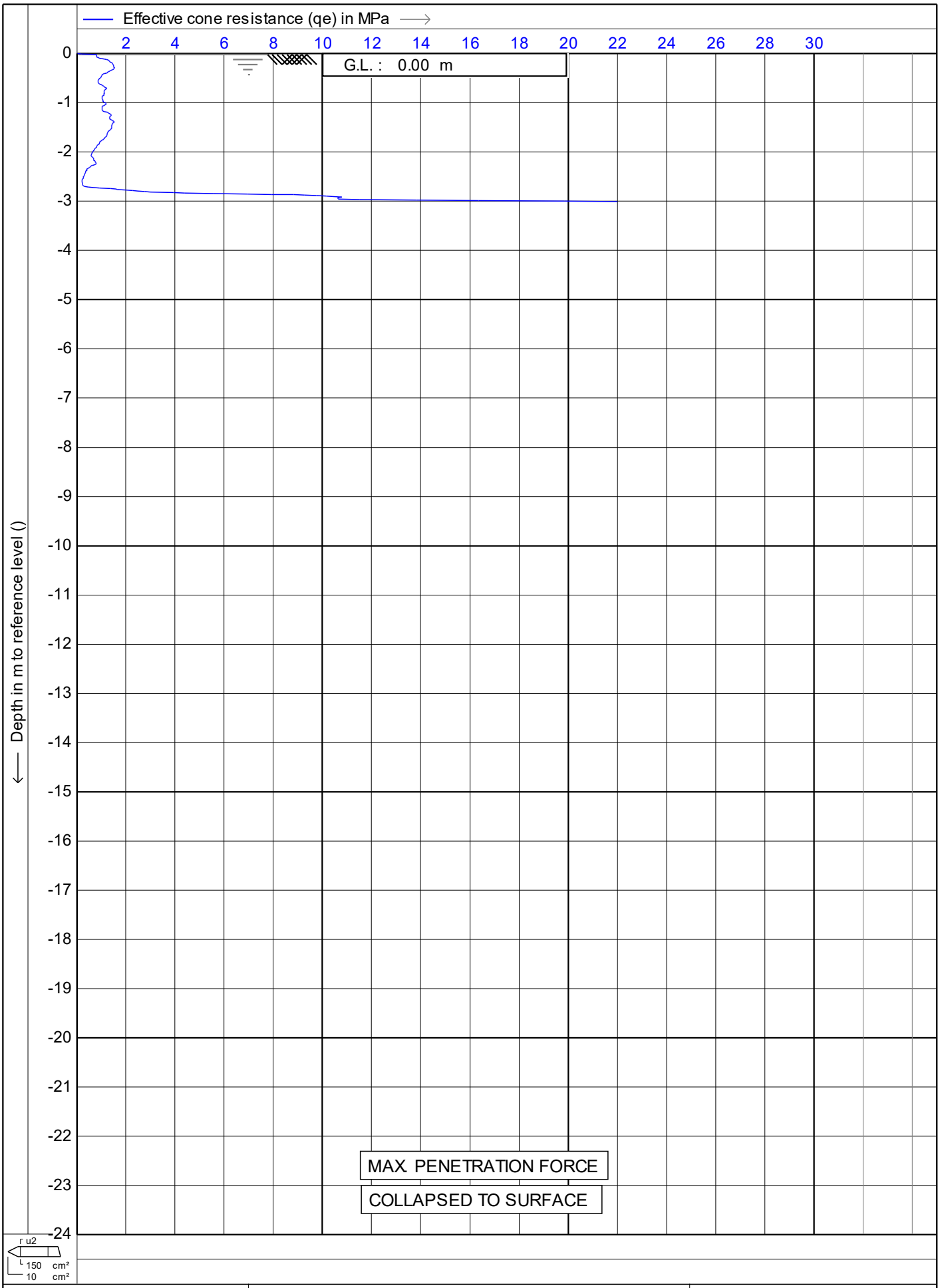
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **4/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

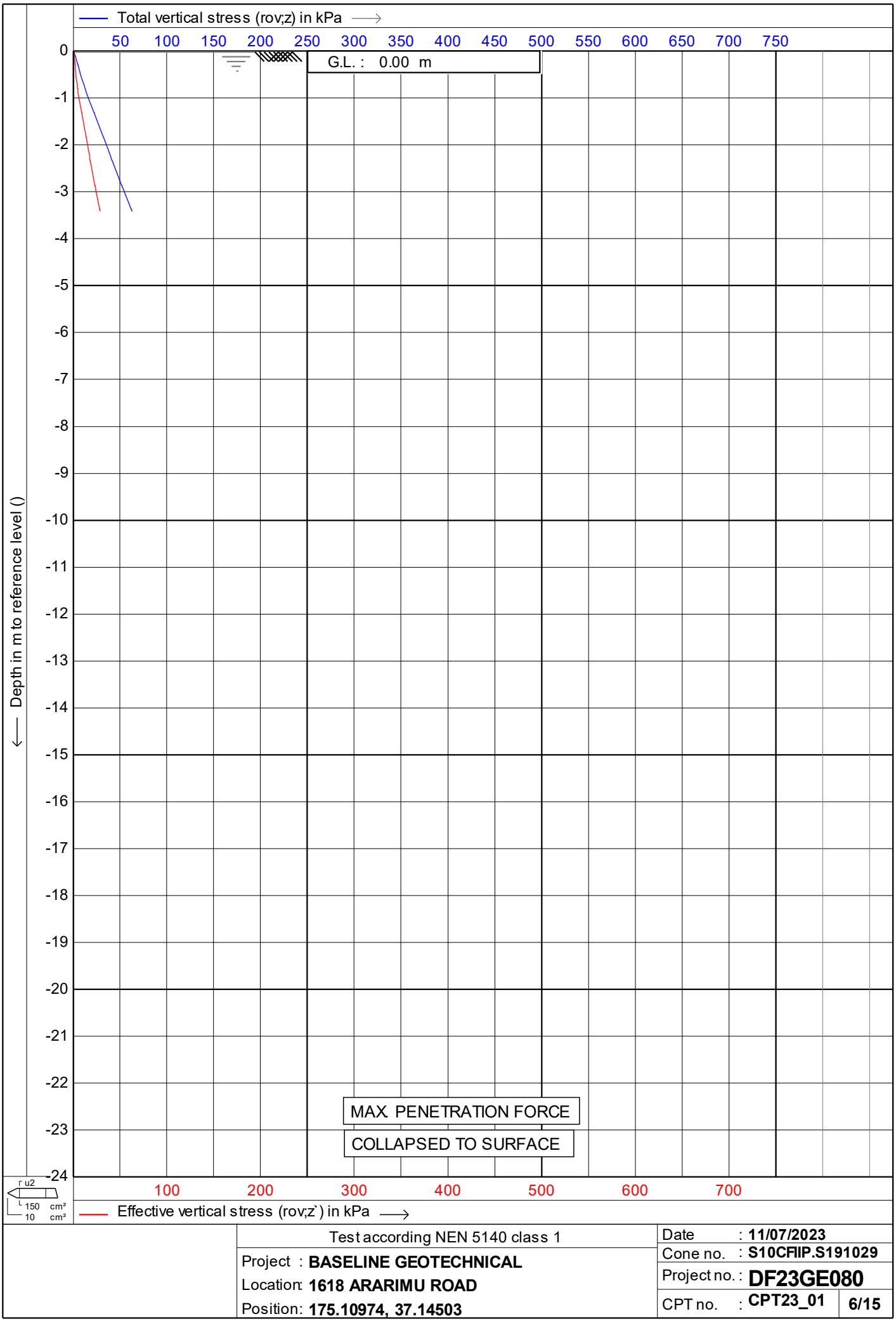
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

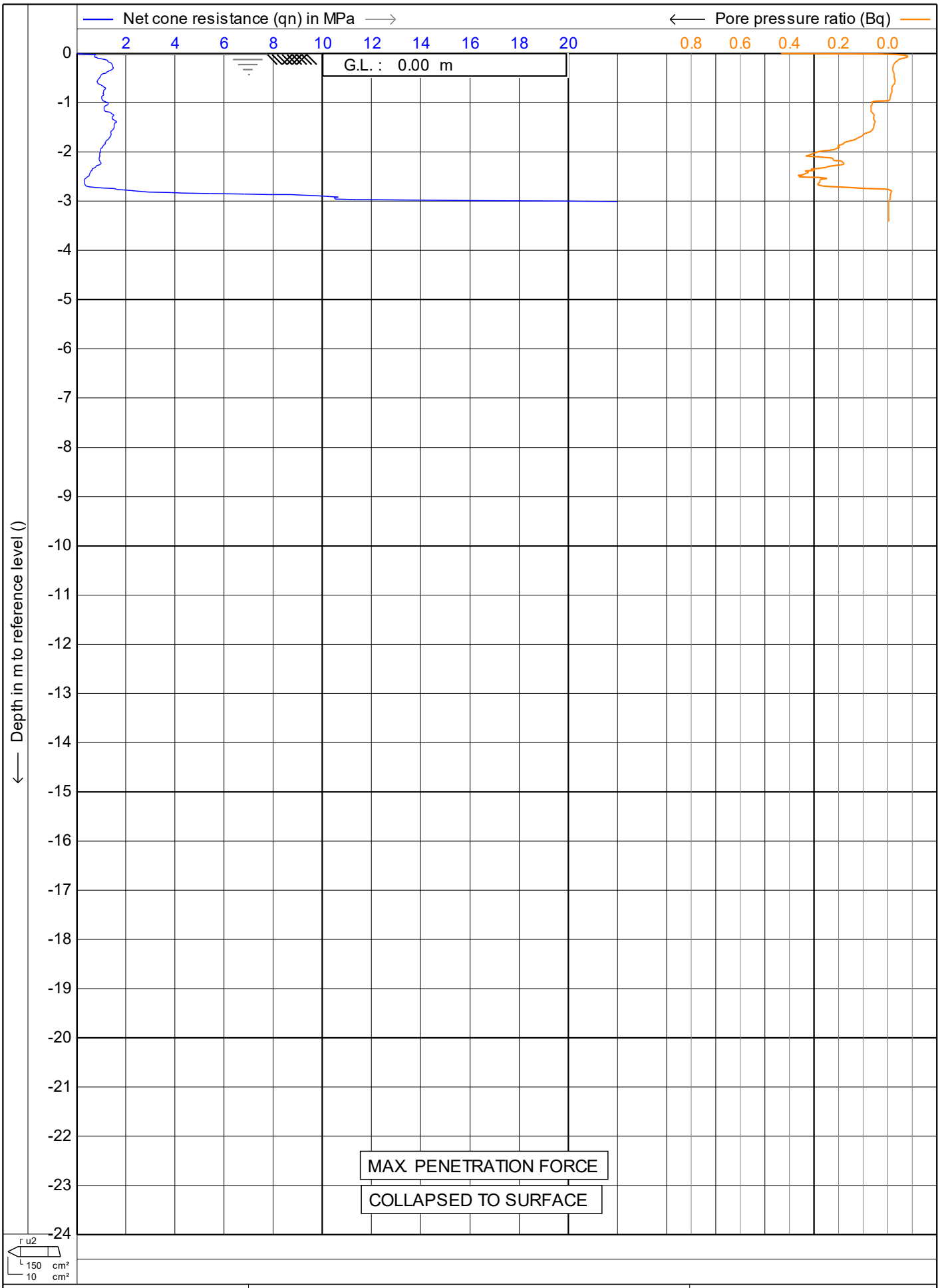
CPT no. : **CPT23_01** **5/15**

1.49



	Test according NEN 5140 class 1	Date : **11/07/2023**
	Project : **BASELINE GEOTECHNICAL**	Cone no. : **S10CFIIP.S191029**
	Location: **1618 ARARIMU ROAD**	Project no. : **DF23GE080**
	Position: **175.10974, 37.14503**	CPT no. : **CPT23_01** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

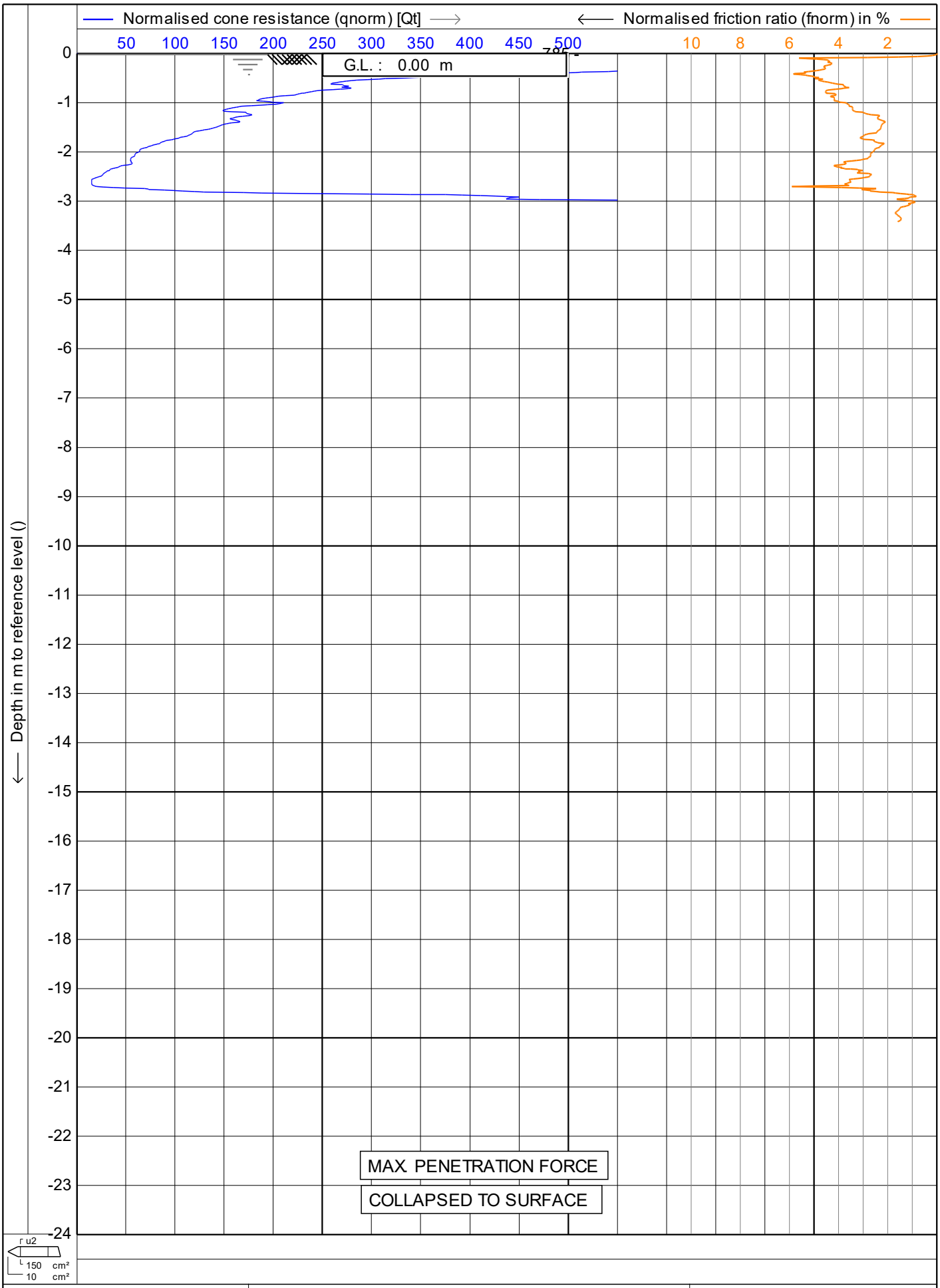
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **7/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

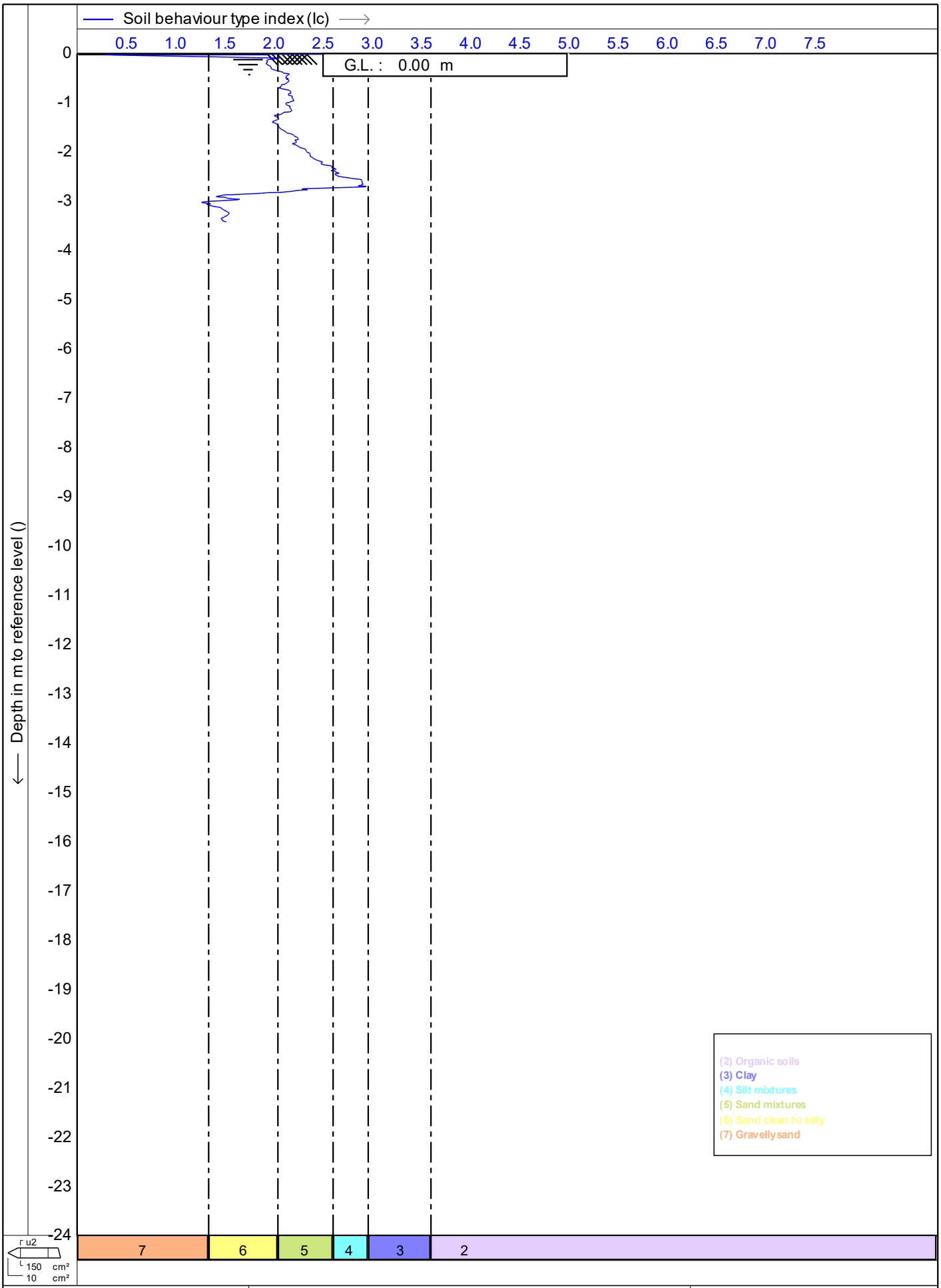
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **8/15**

1.49



Test according NEN 5140 class 1

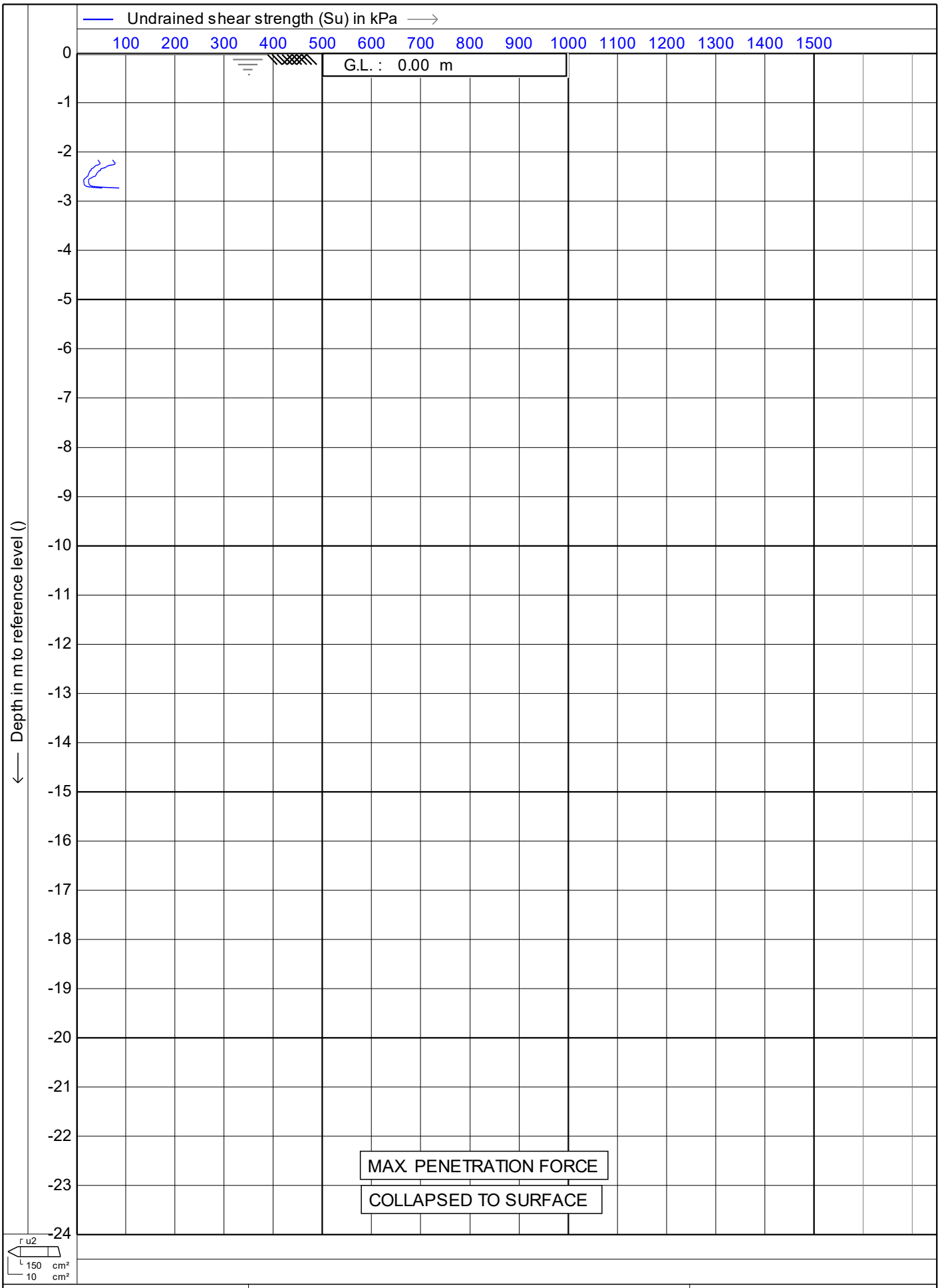
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01** **9/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

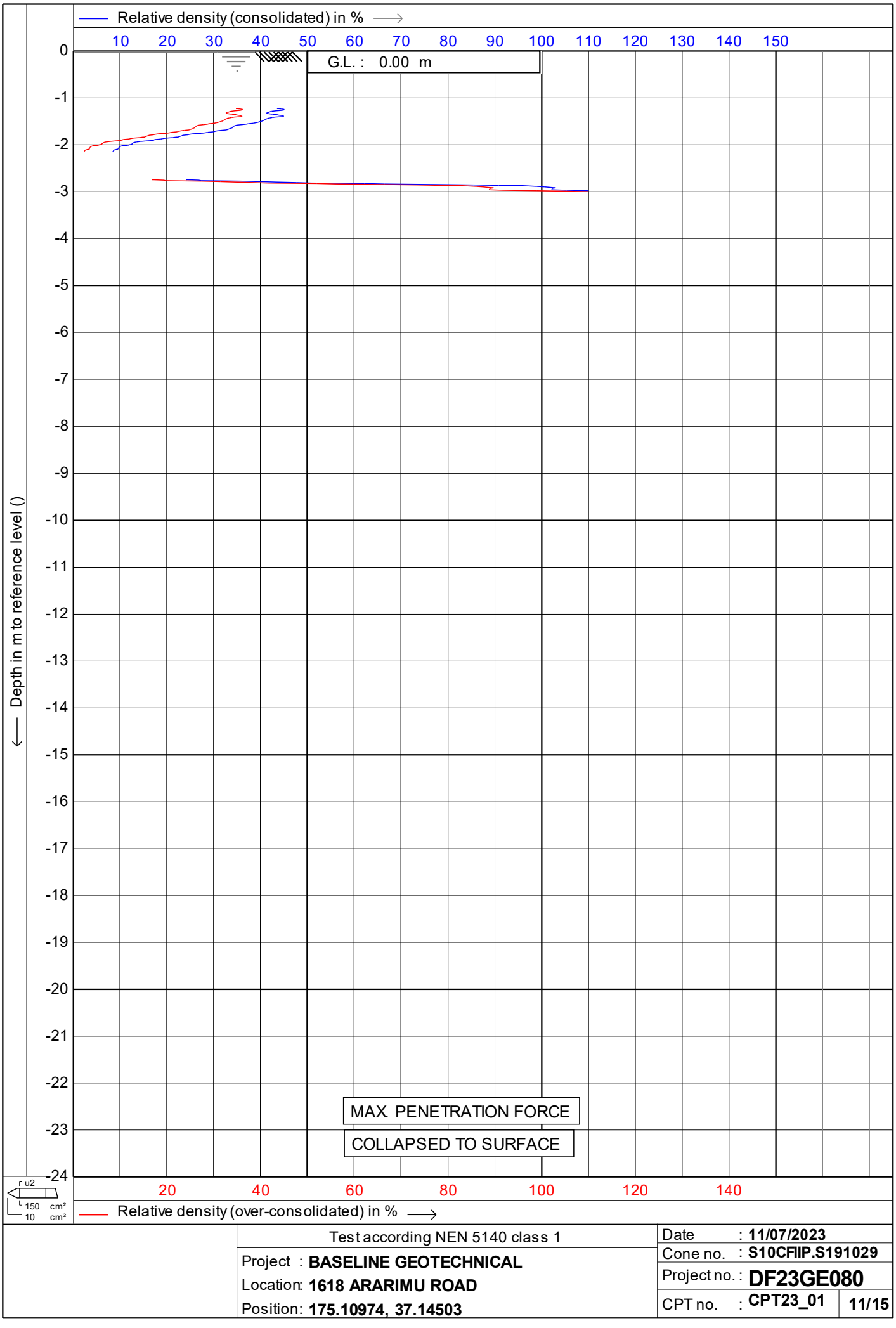
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **10/15**

1.49



Test according NEN 5140 class 1

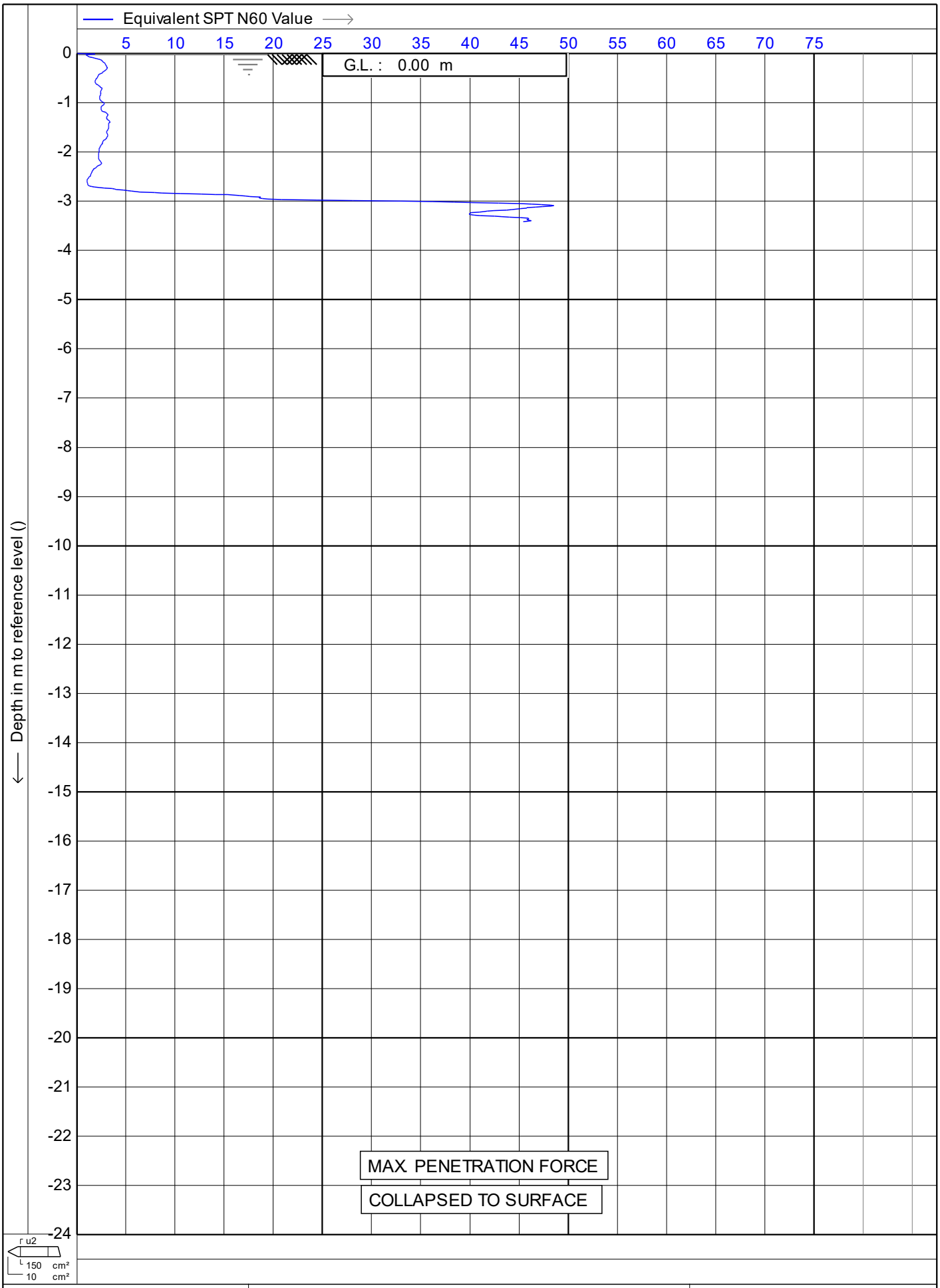
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

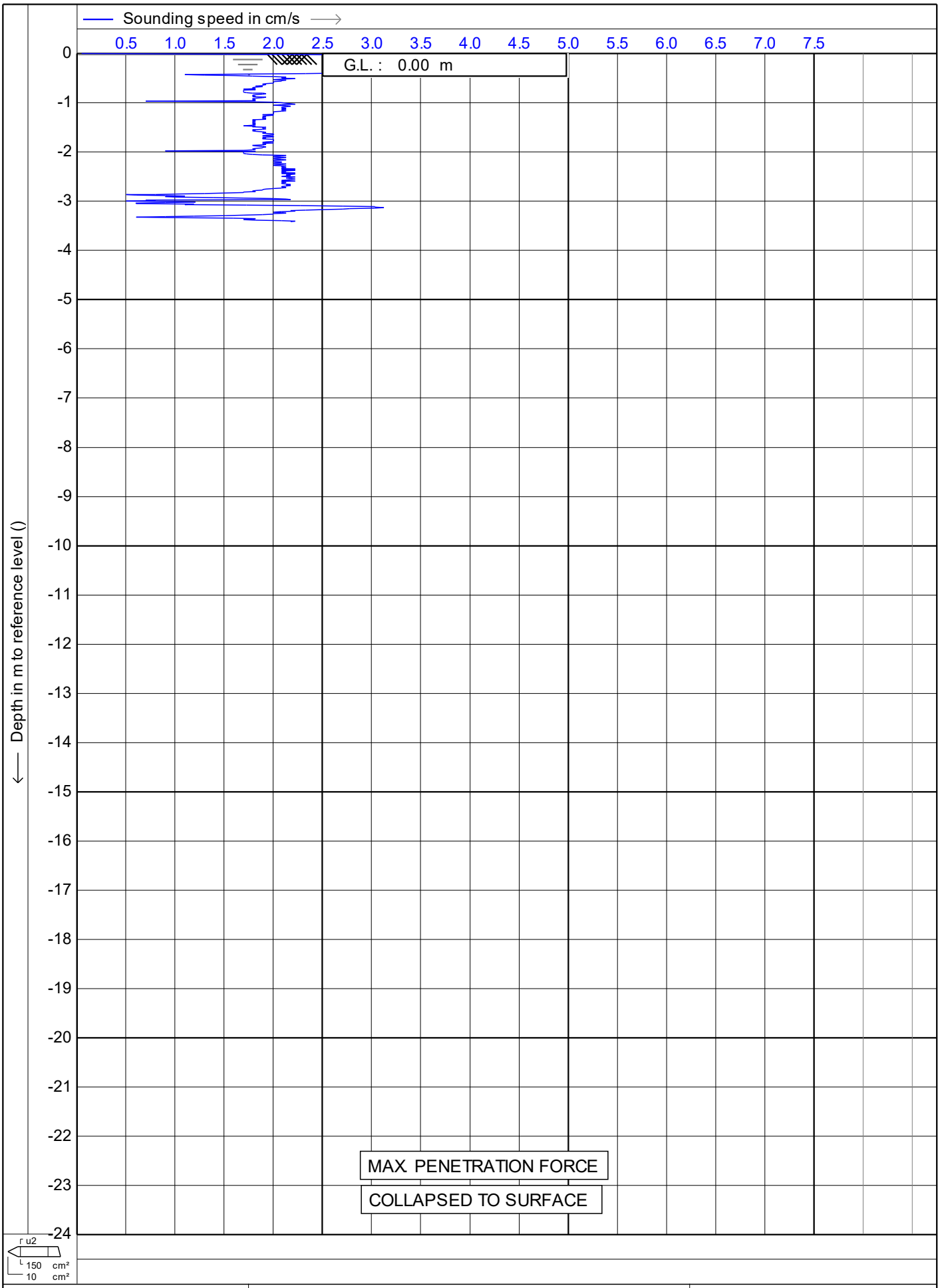
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **12/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

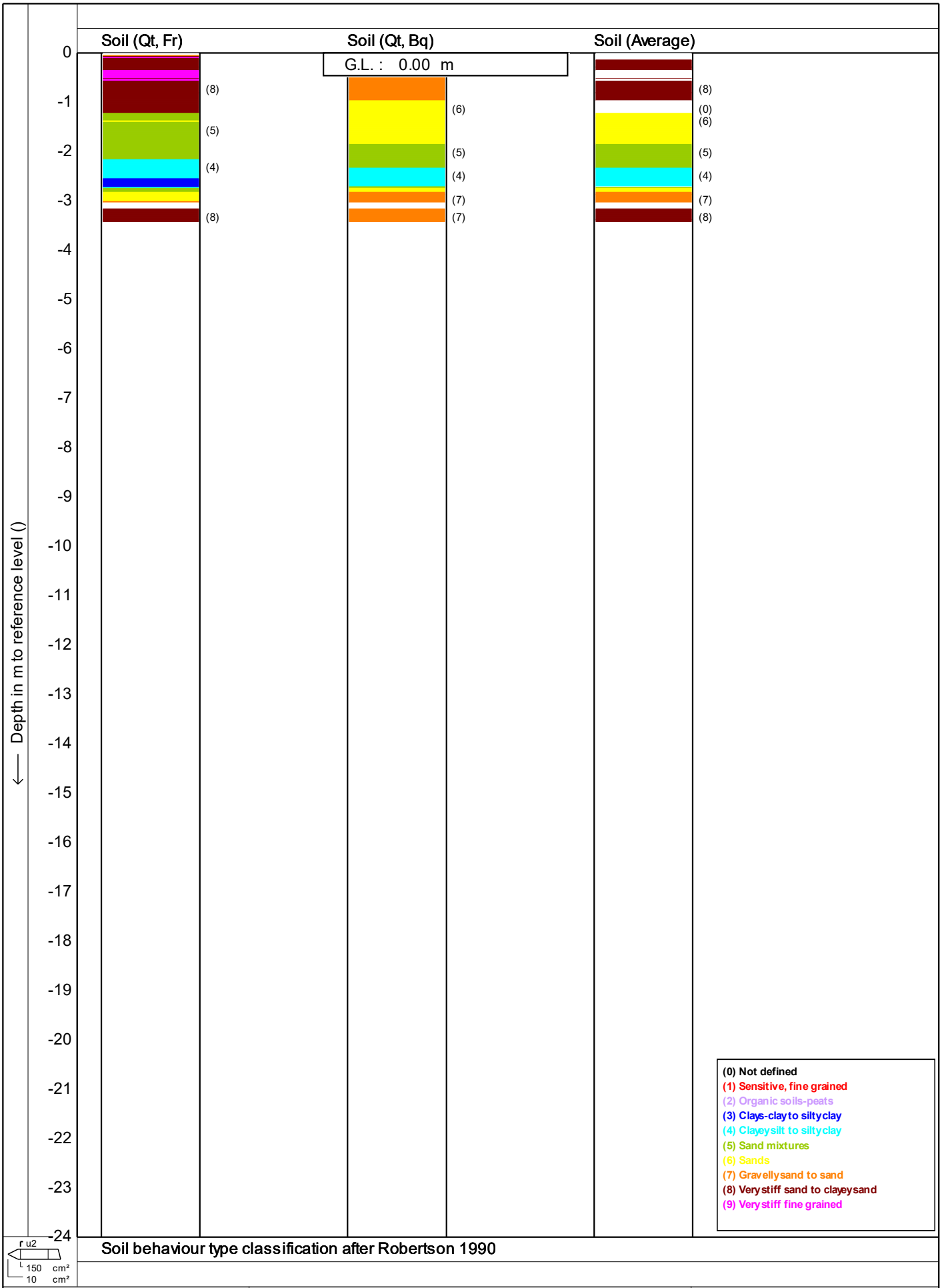
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **13/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

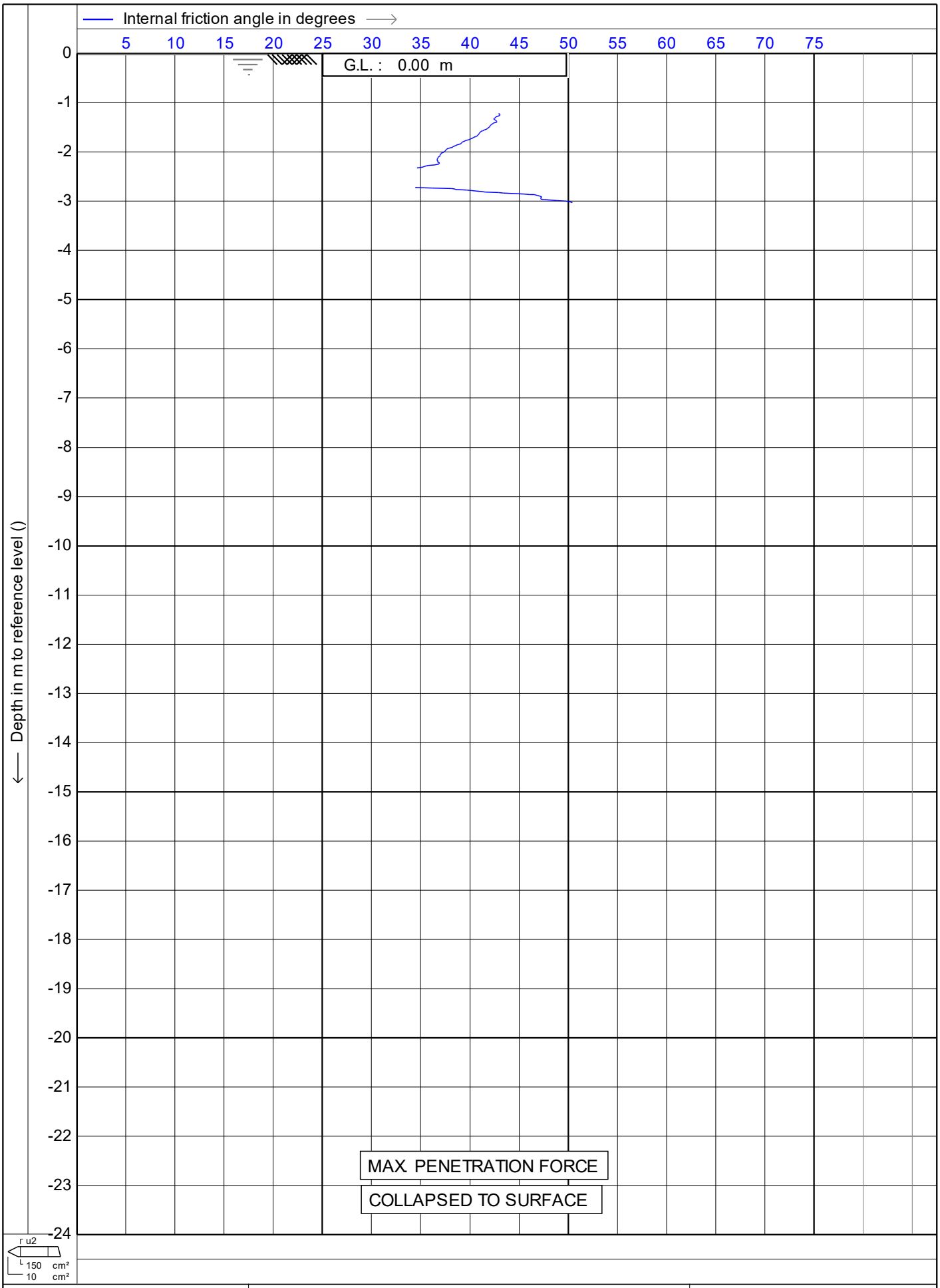
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **14/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10974, 37.14503**

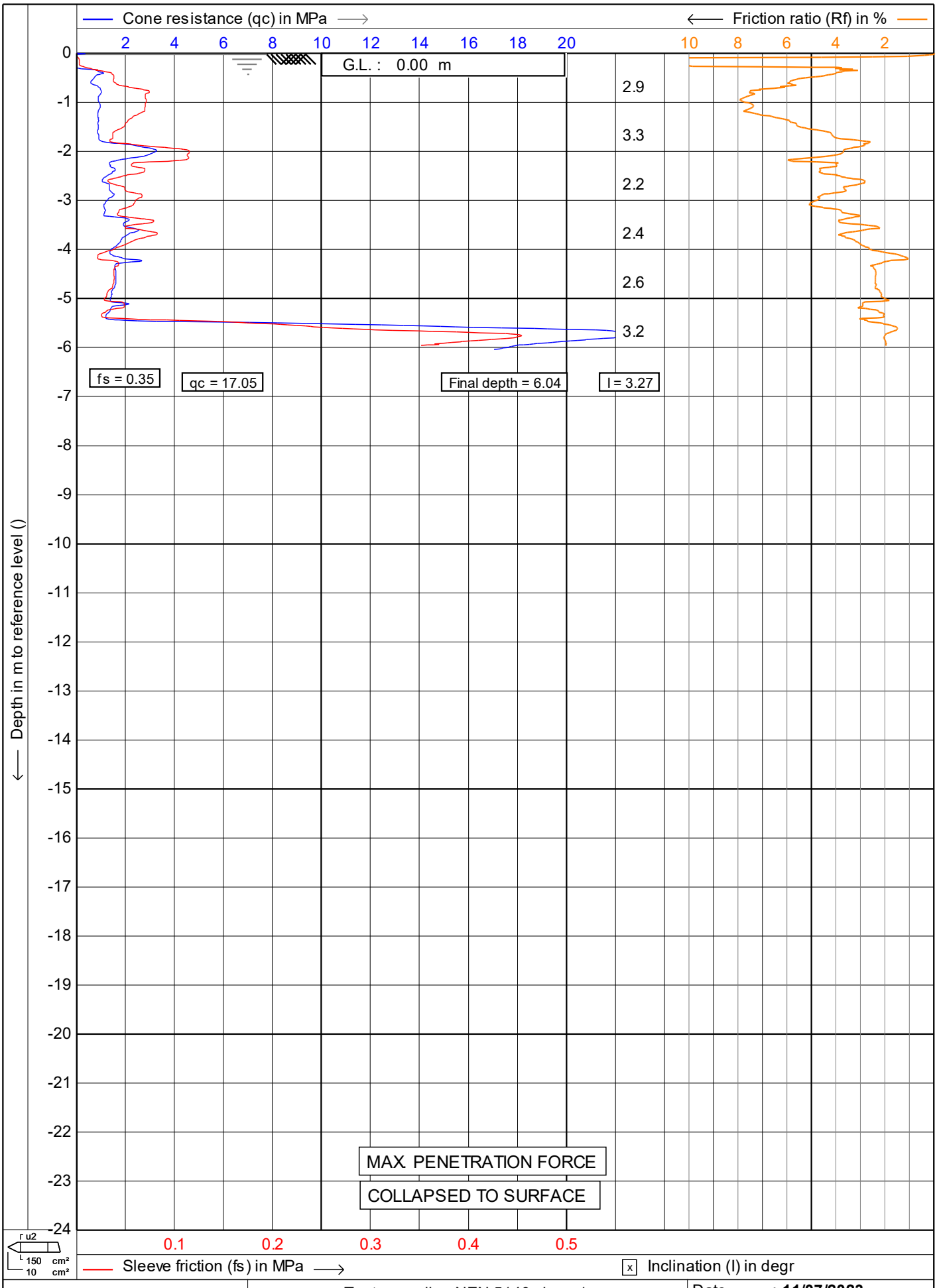
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01** **15/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

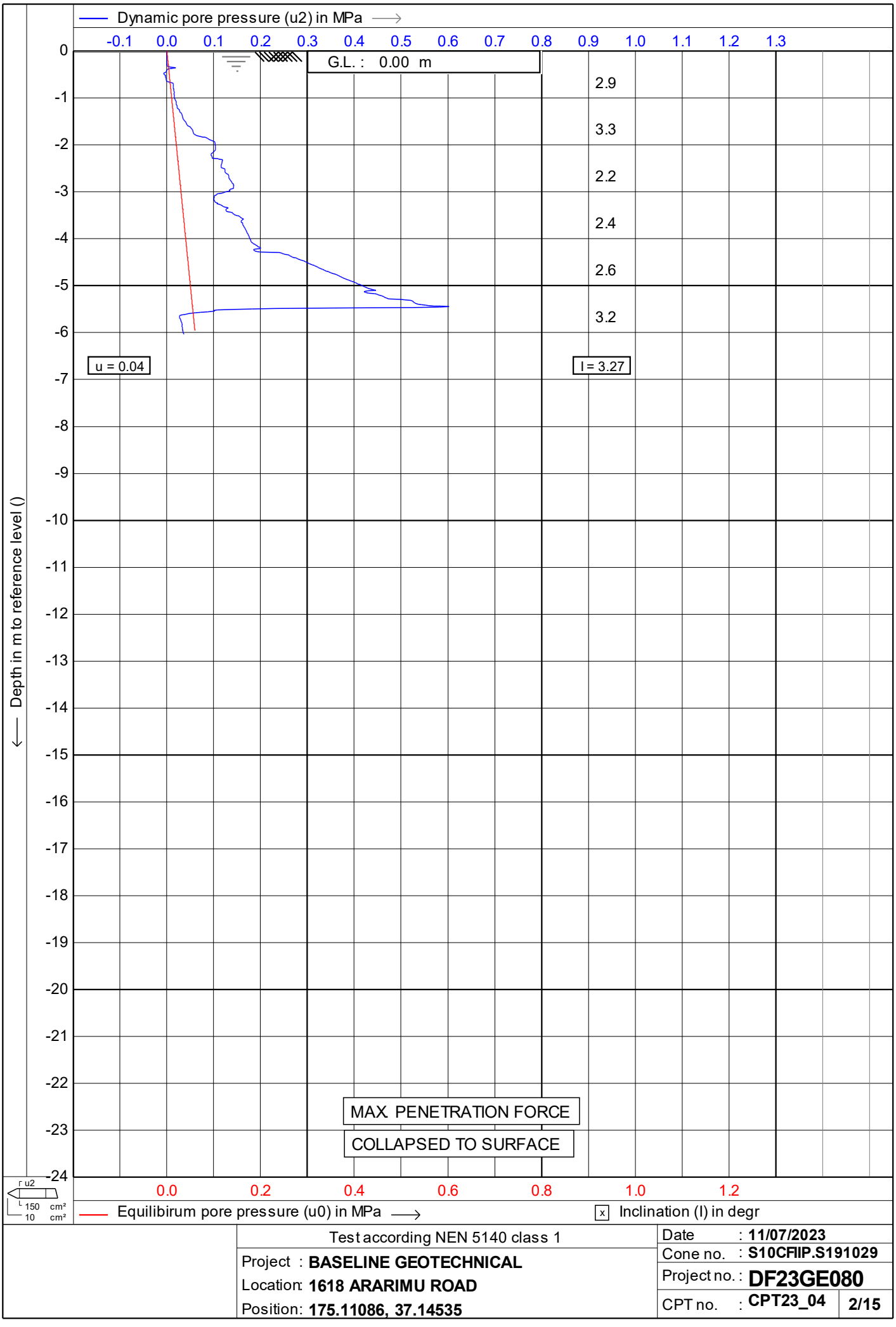
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **1/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

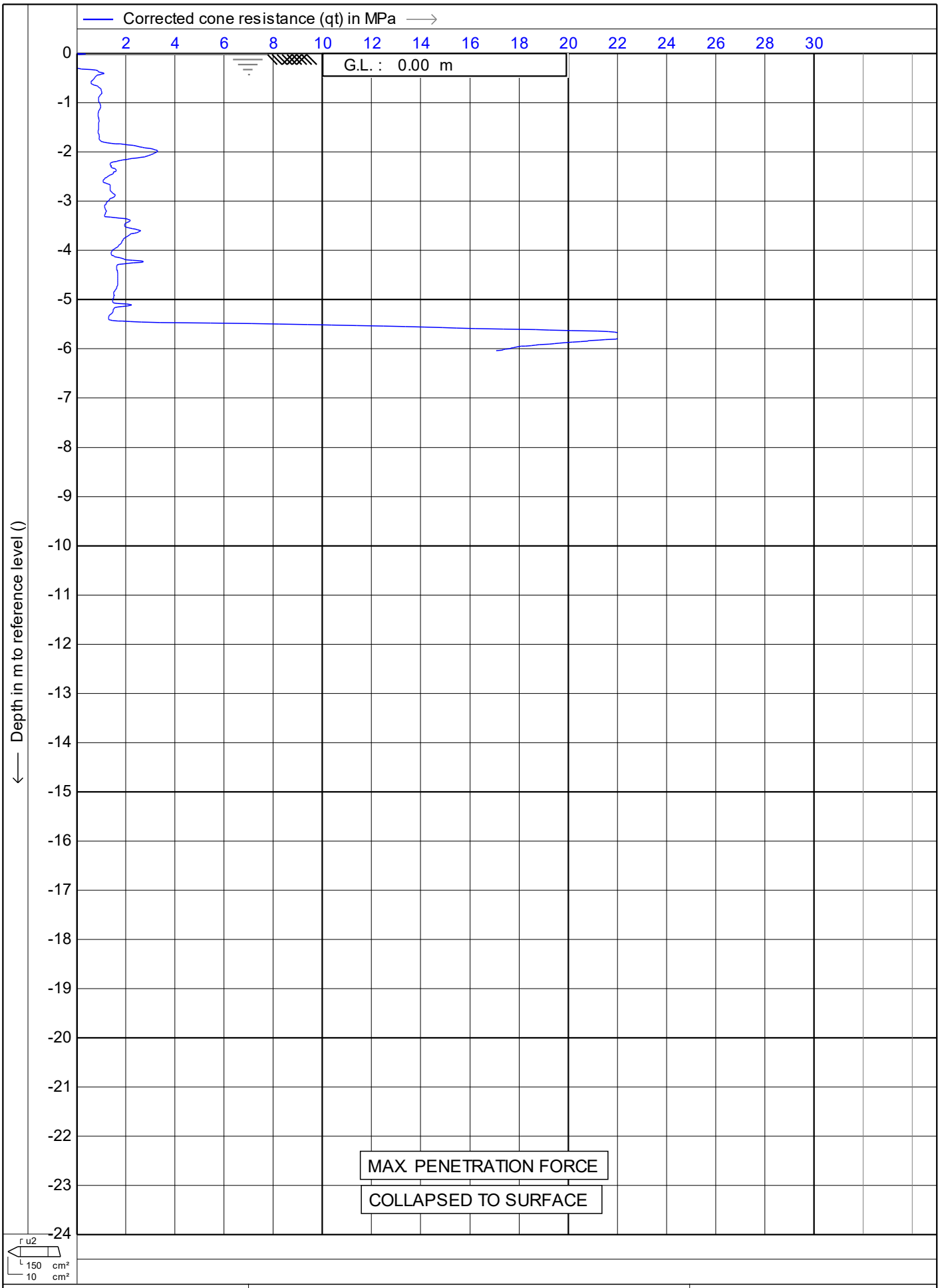
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **2/15**

1.49



Test according NEN 5140 class 1

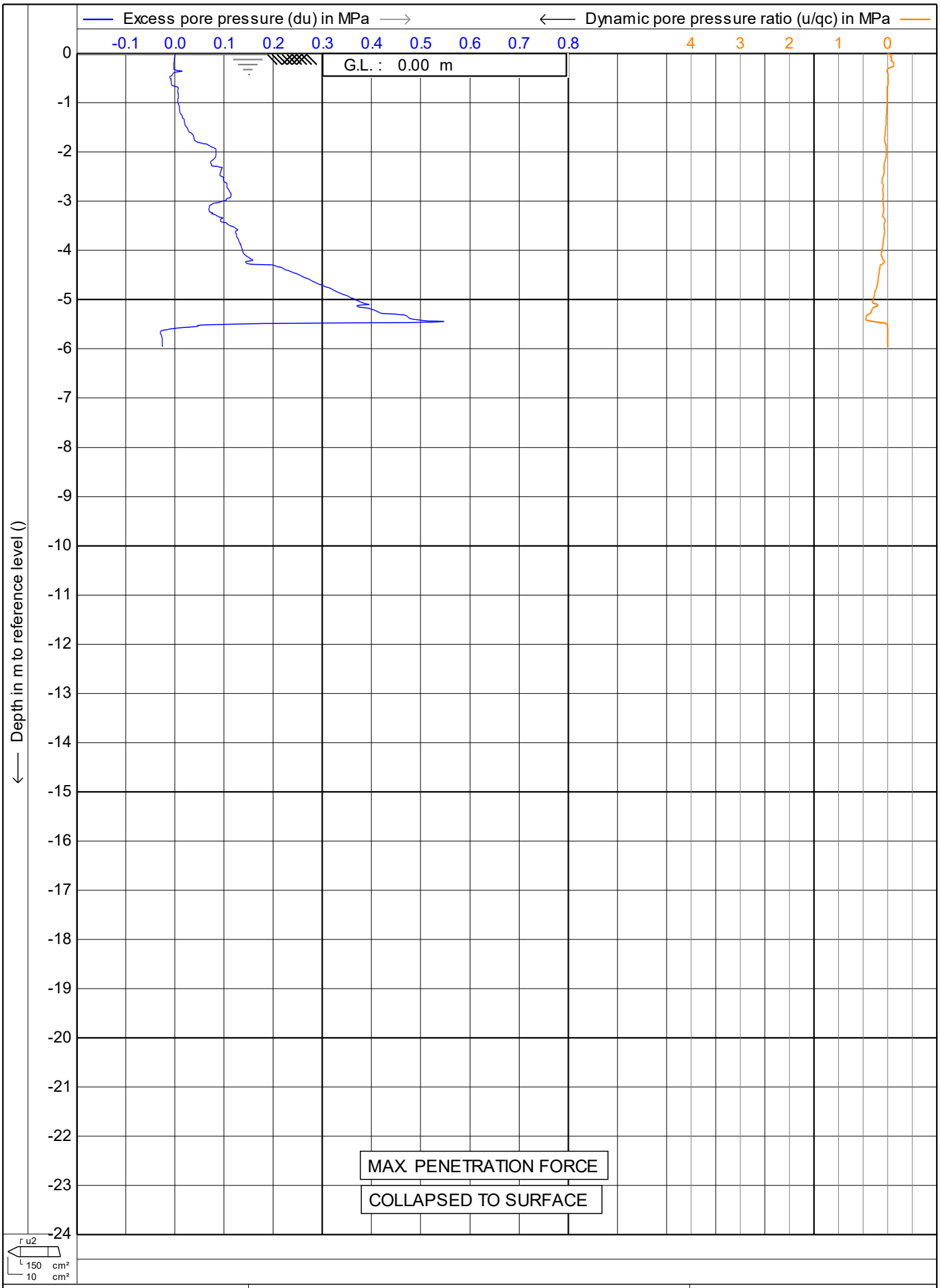
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **3/15**

1.49



Test according NEN 5140 class 1

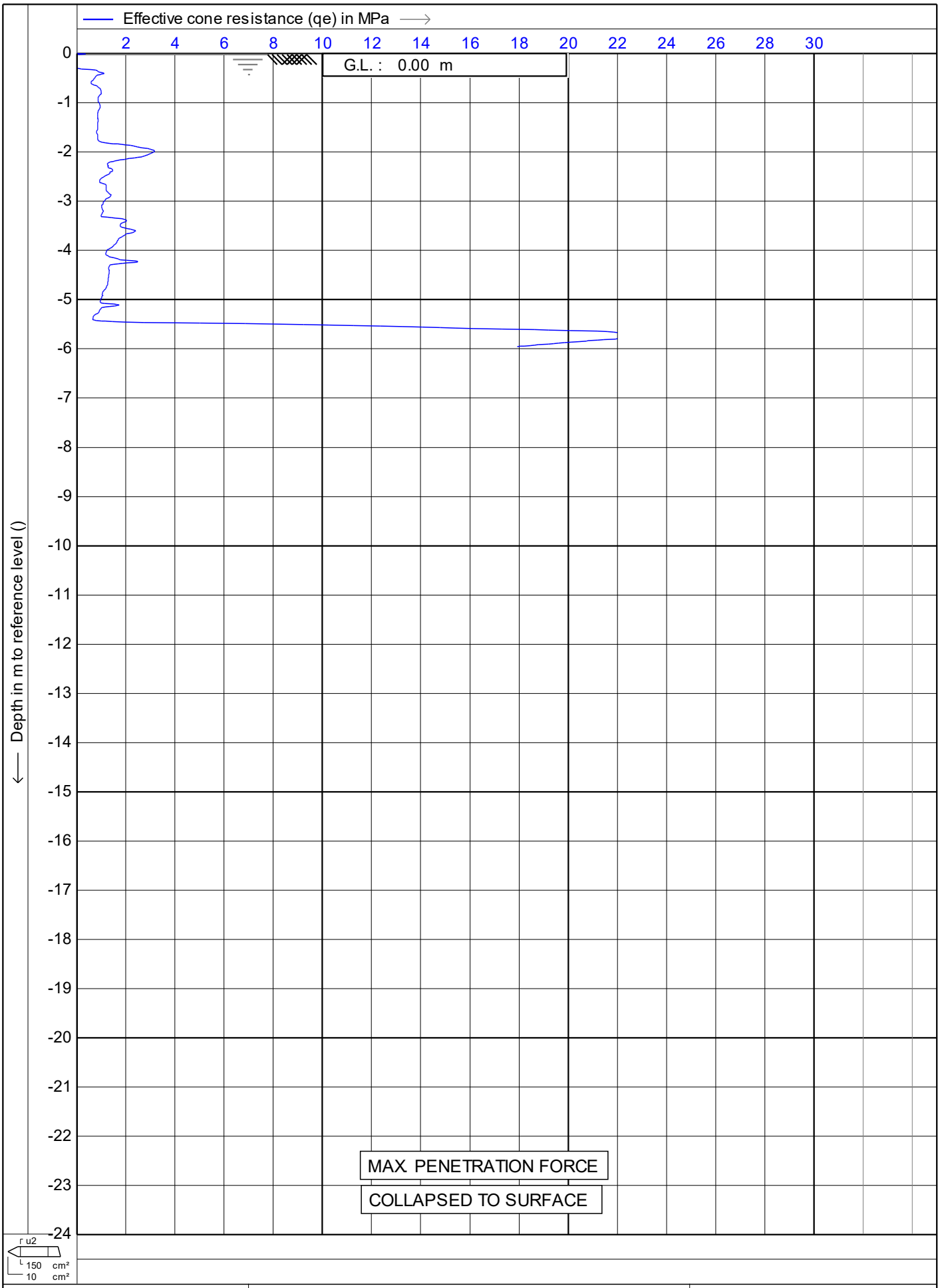
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **4/15**

1.49



Test according NEN 5140 class 1

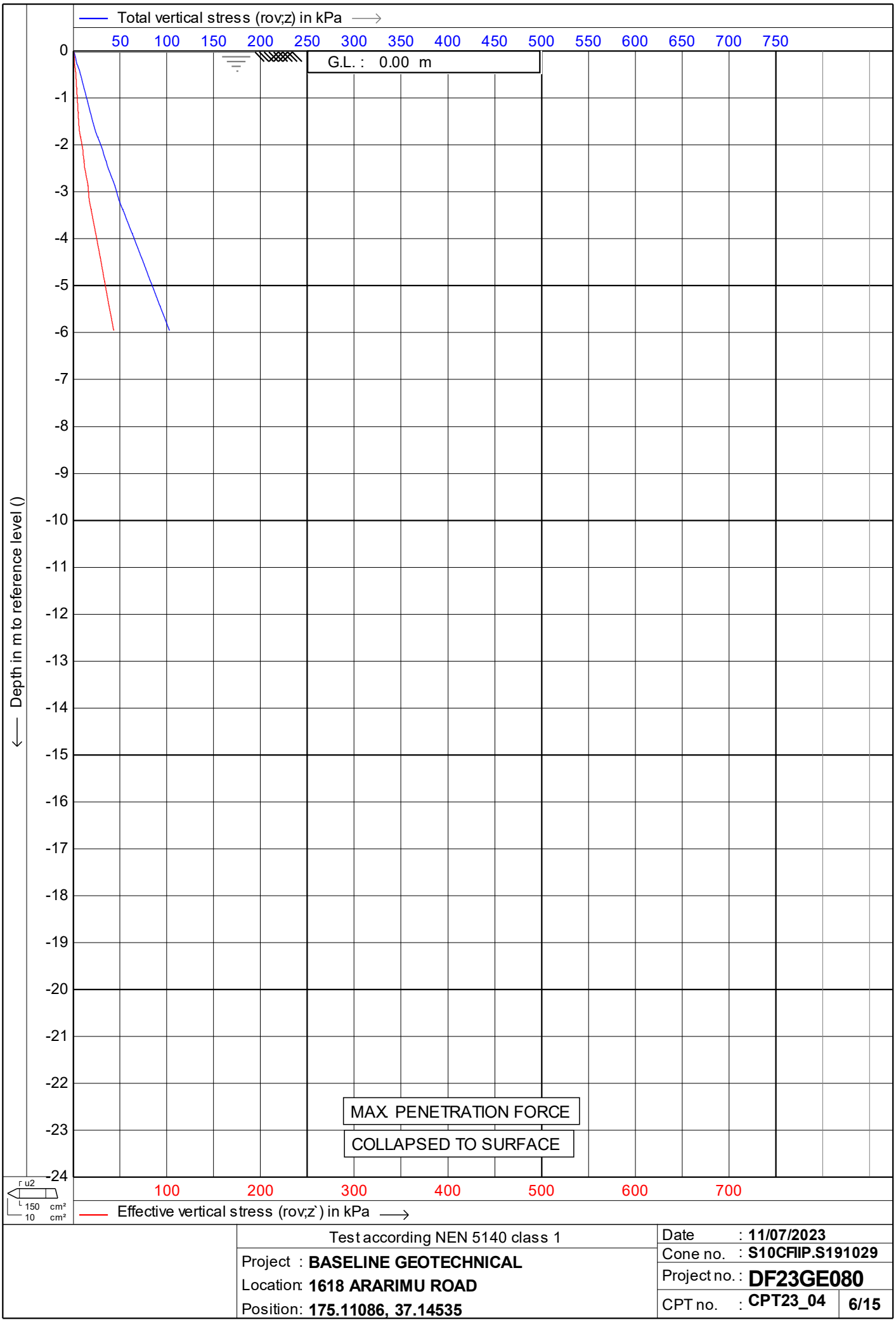
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **5/15**

1.49



Test according NEN 5140 class 1

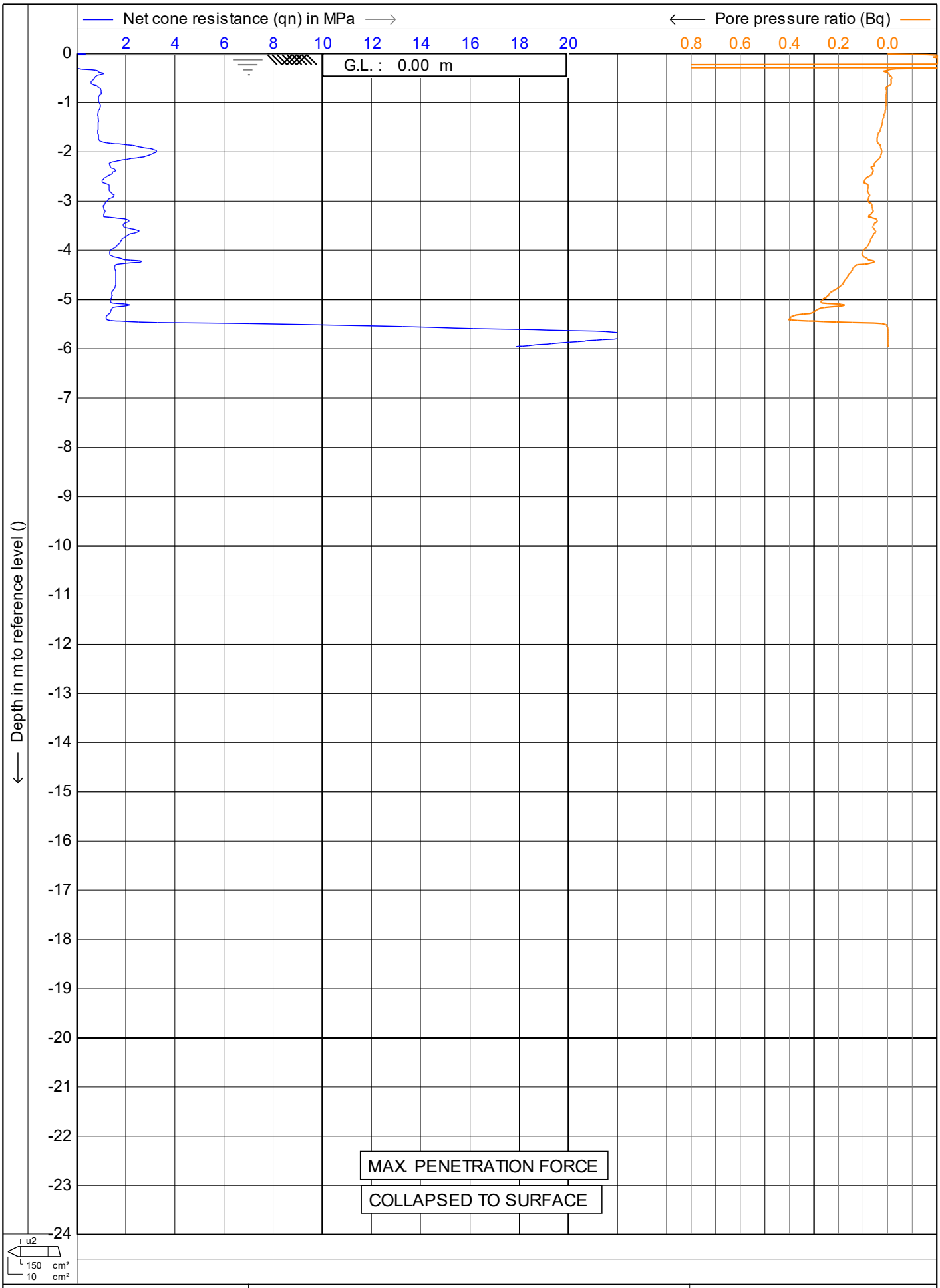
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

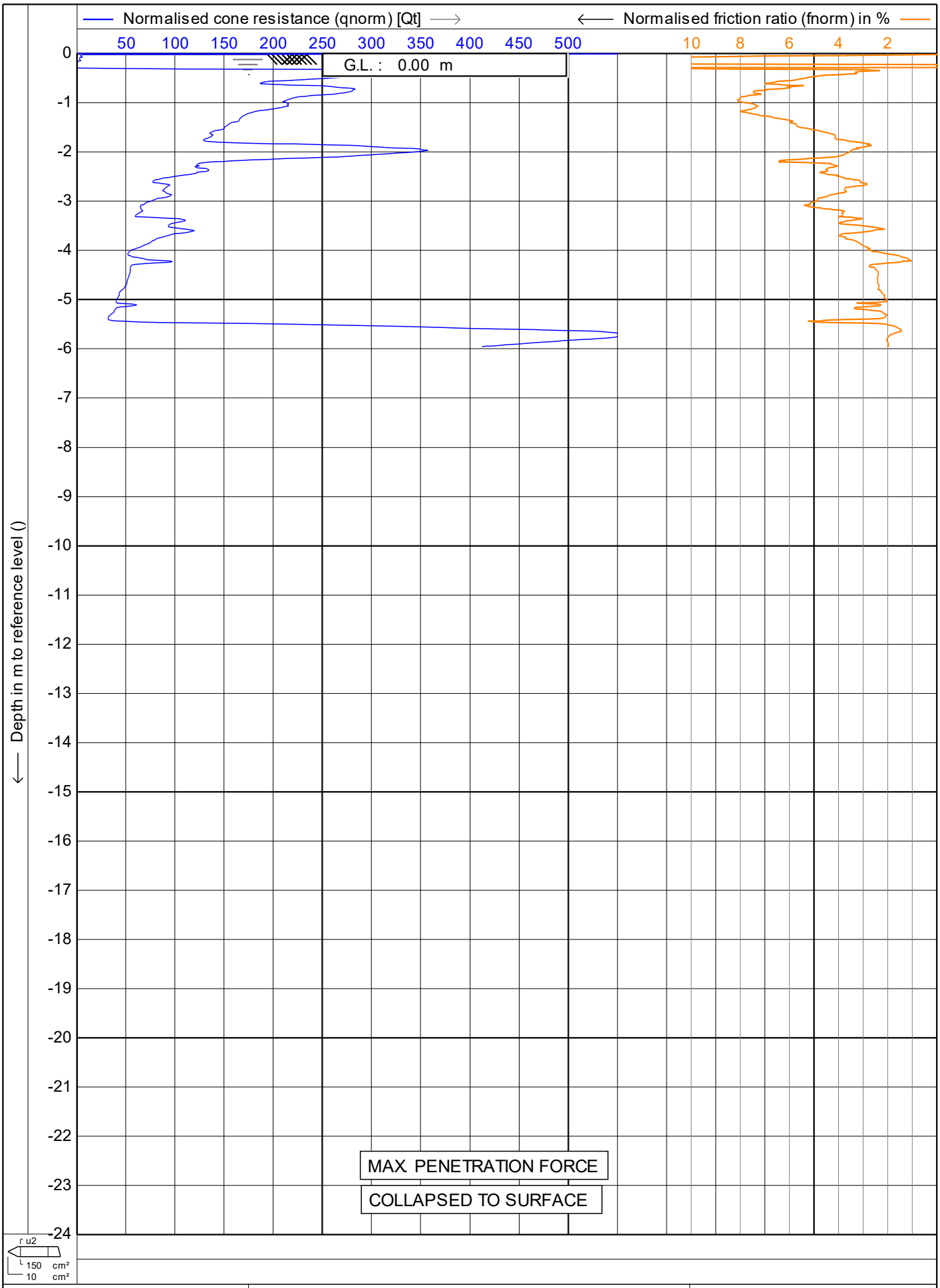
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **7/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

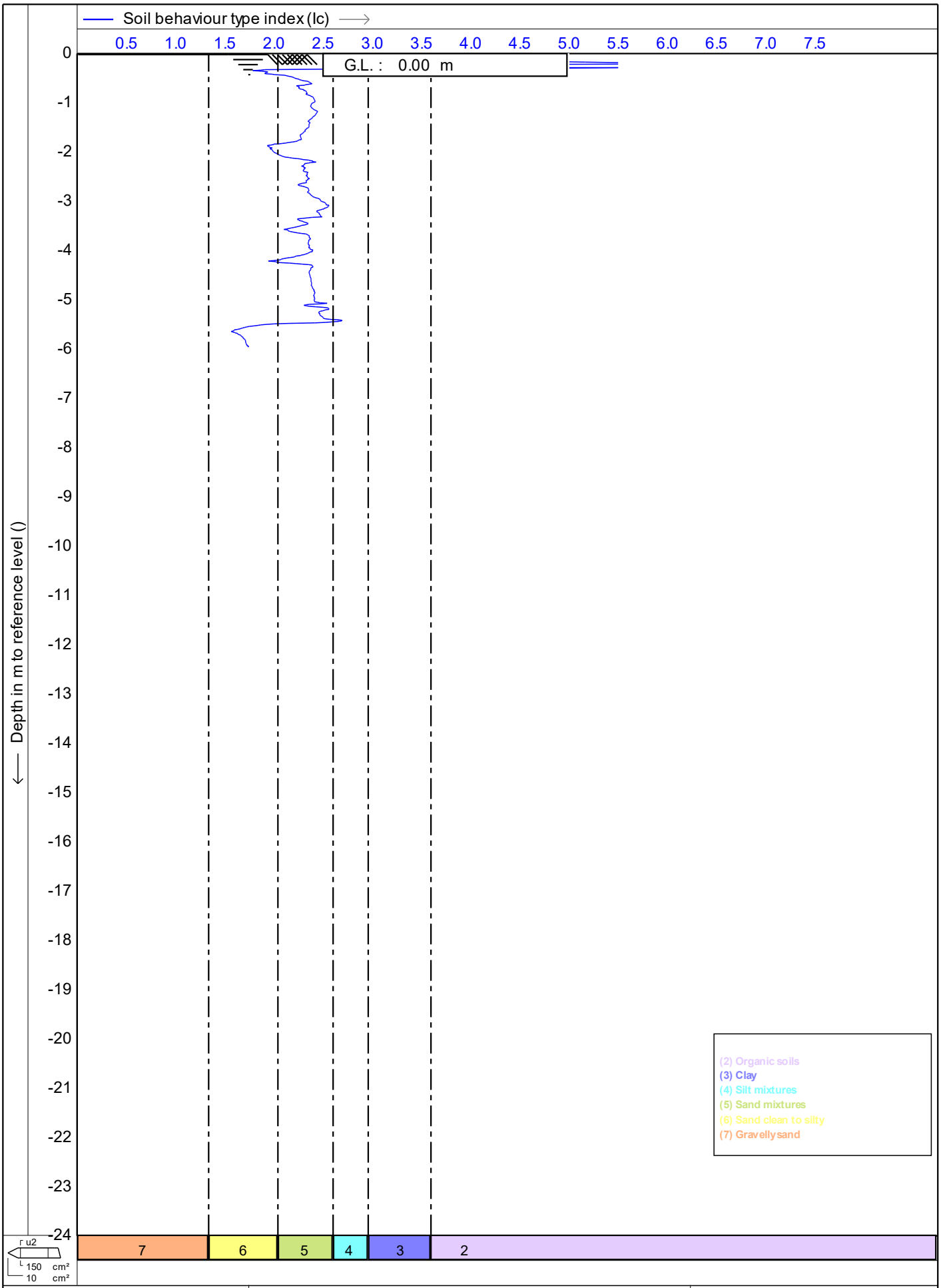
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **8/15**

1.49



Test according NEN 5140 class 1

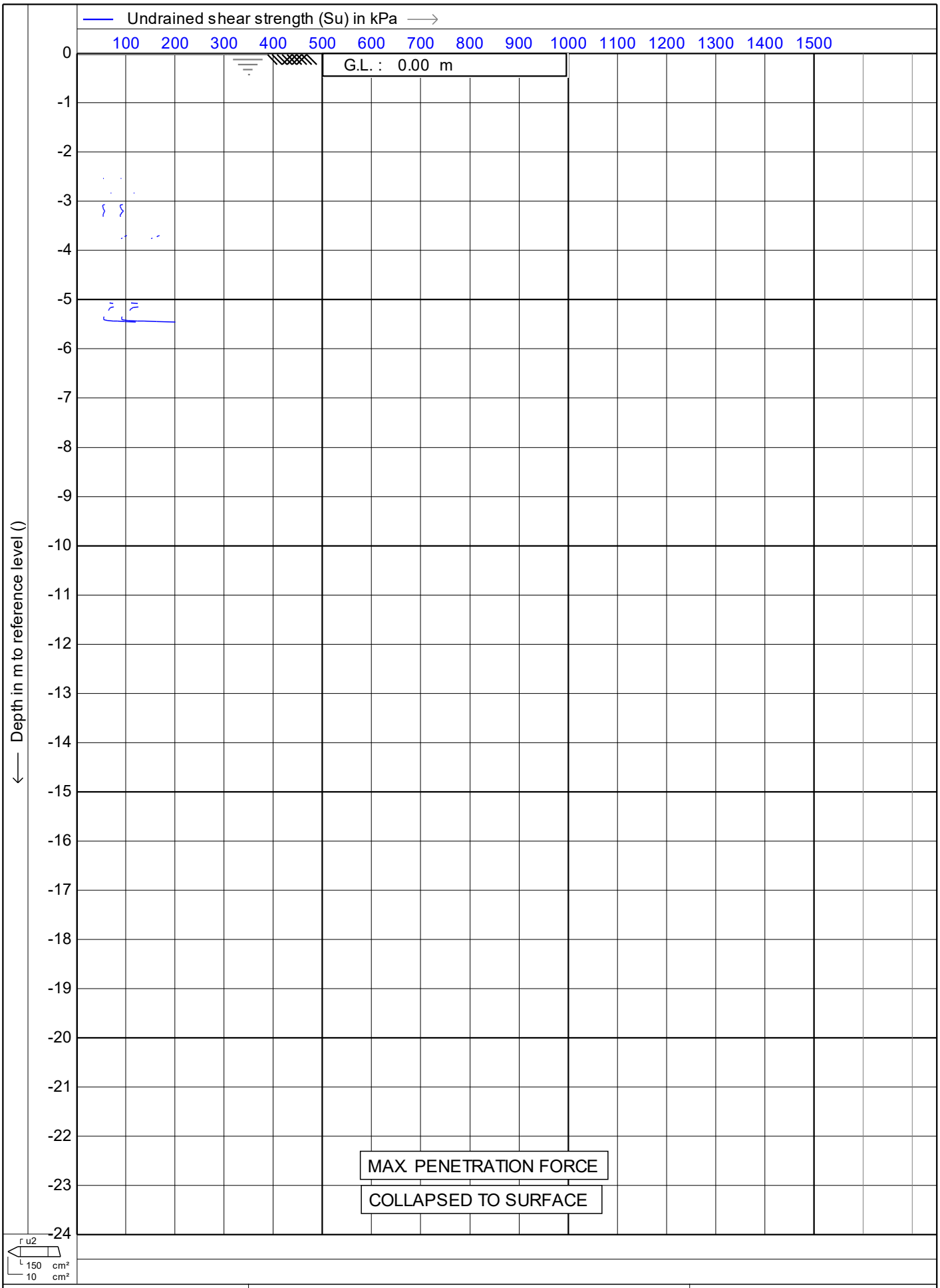
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **9/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

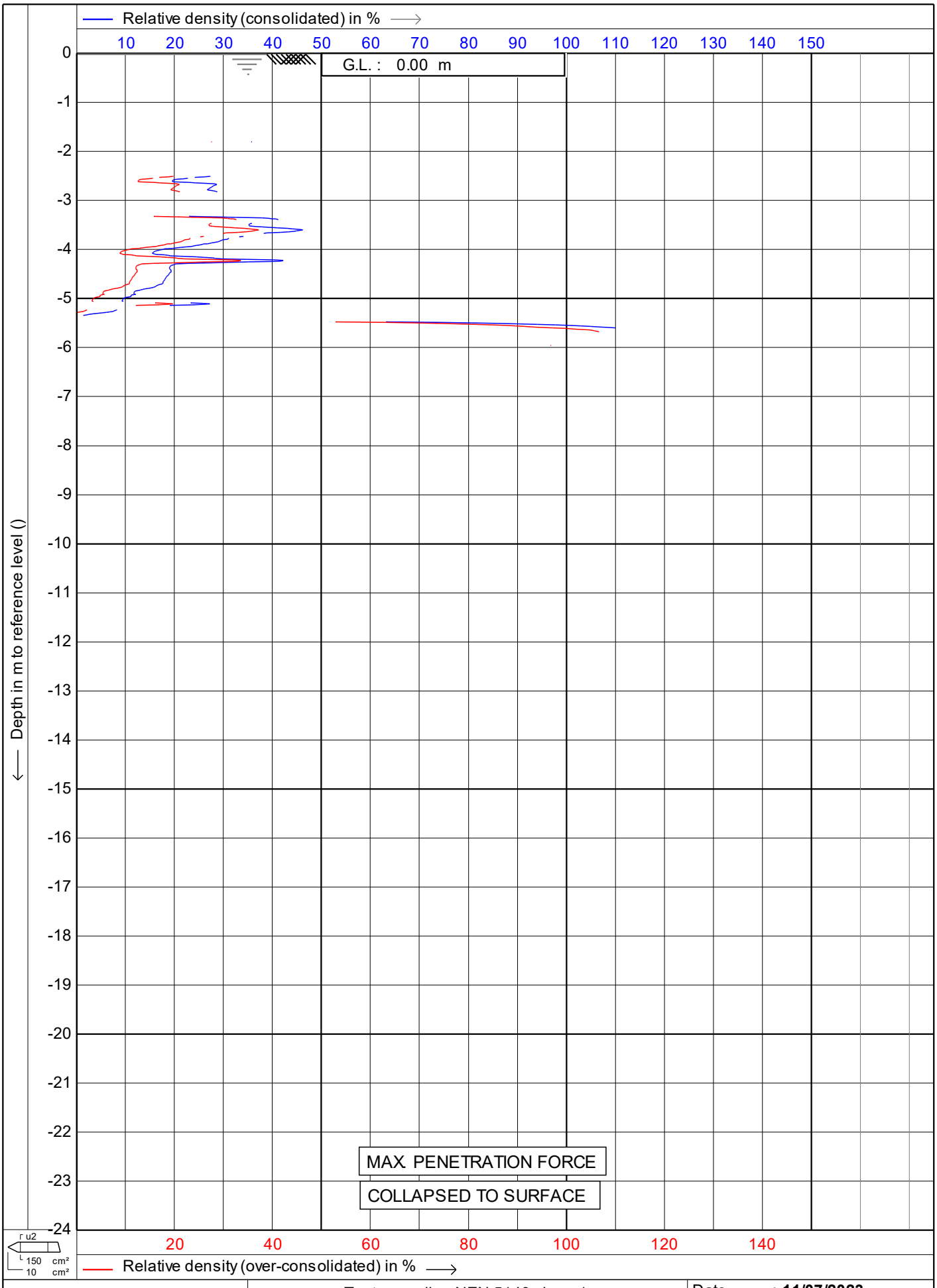
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **10/15**

1.49



Test according NEN 5140 class 1

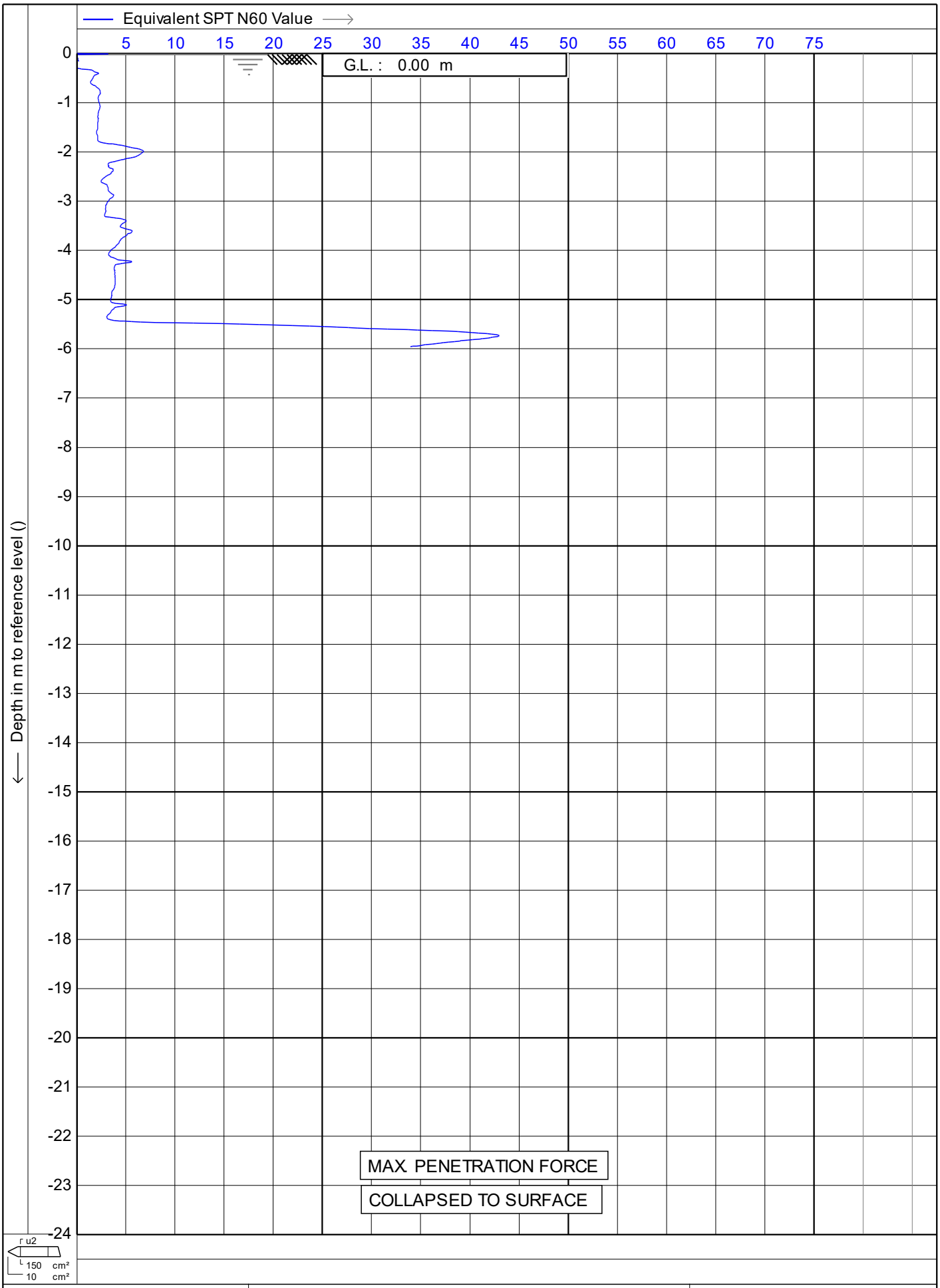
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

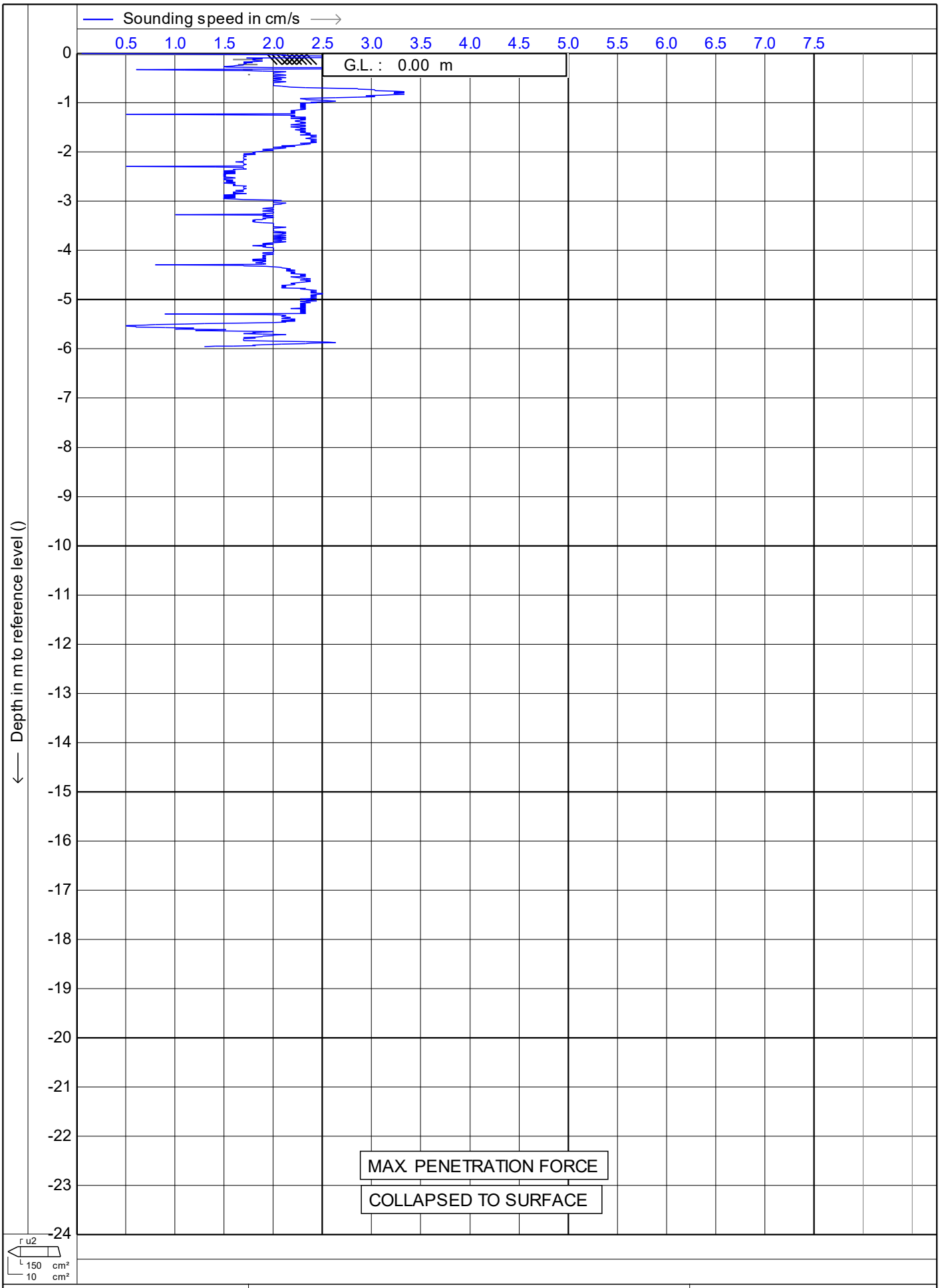
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **12/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

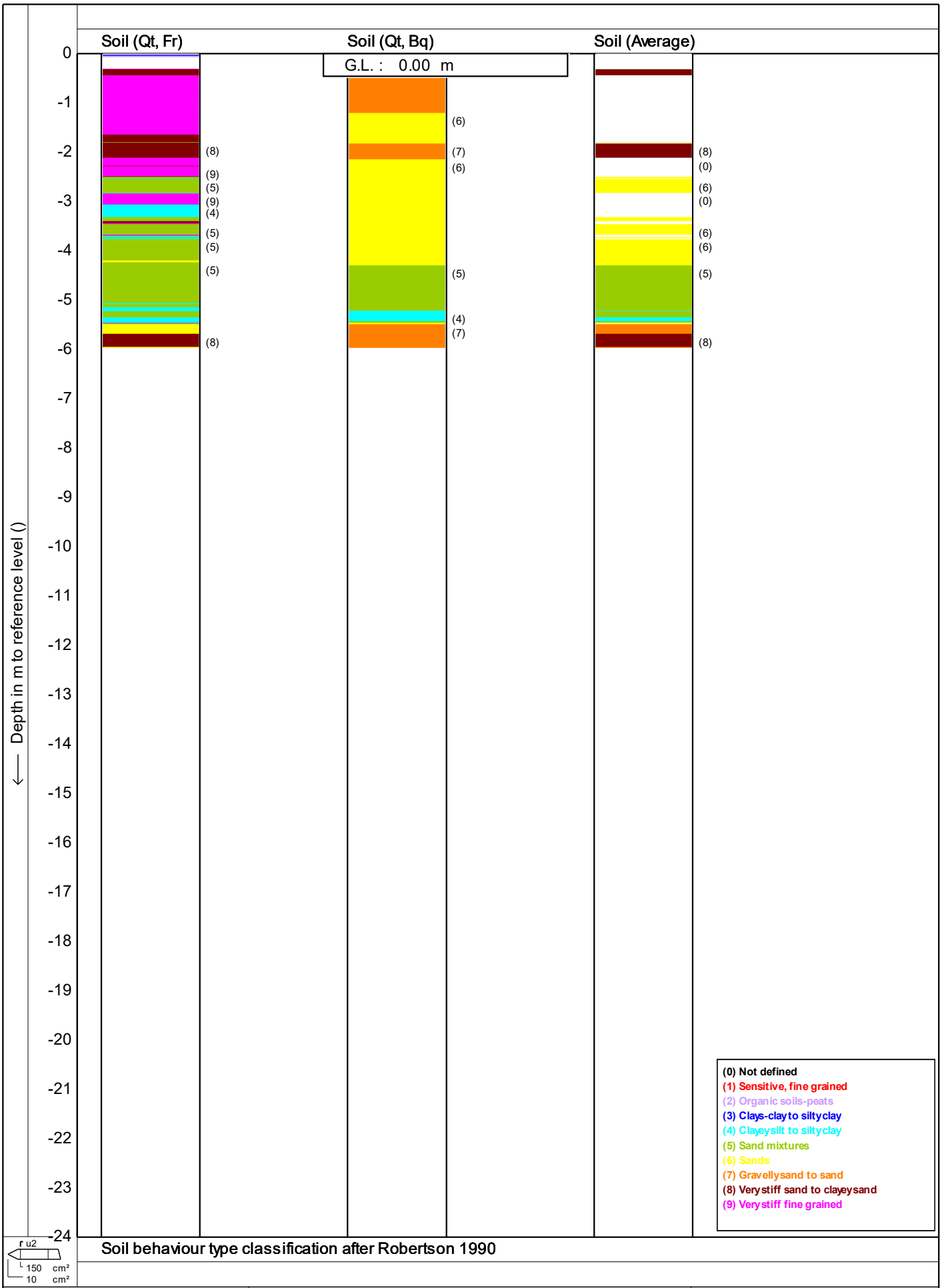
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **13/15**

1.49



Soil behaviour type classification after Robertson 1990

Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

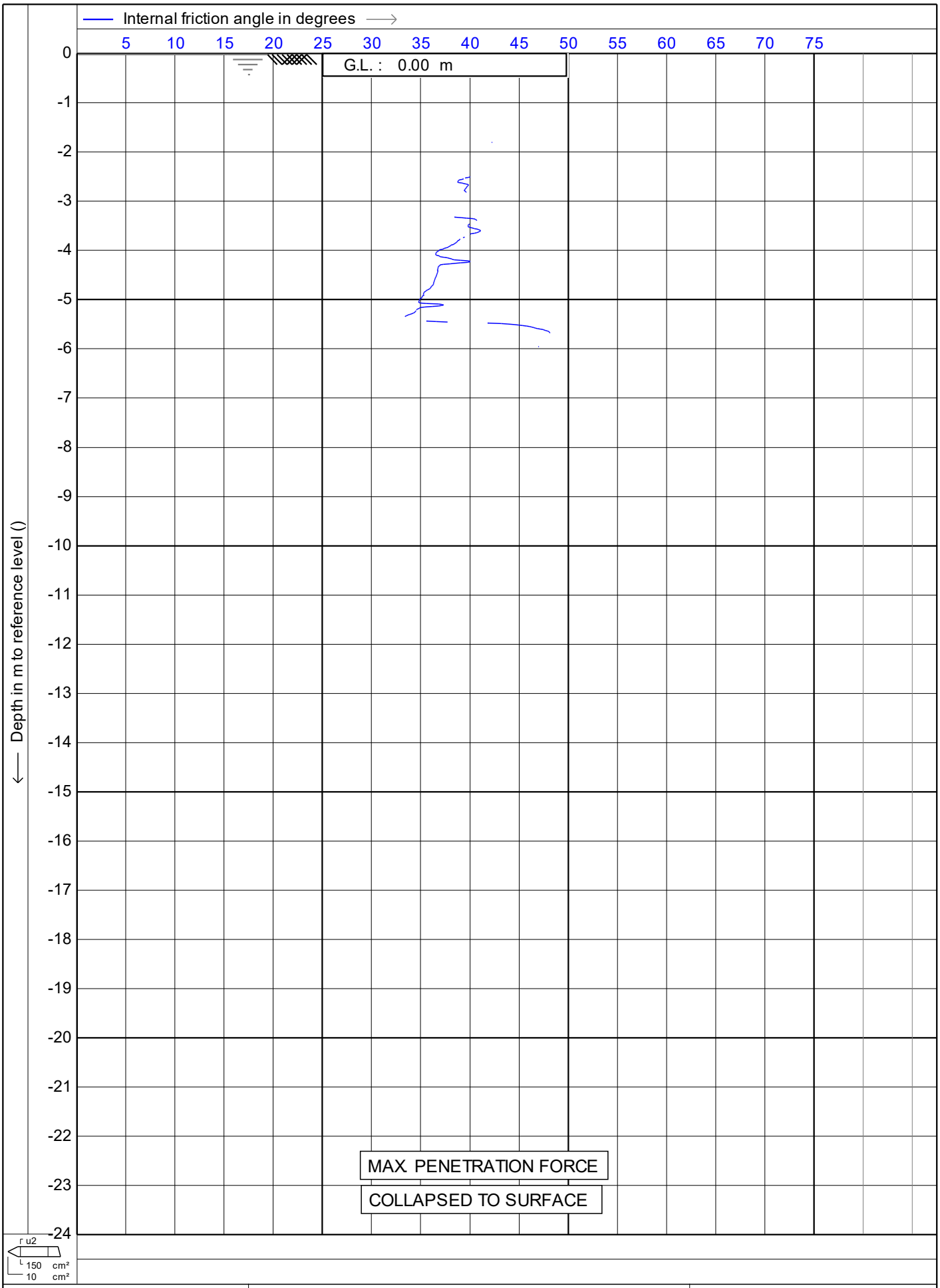
Date : **11/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_04** **14/15**

1.49



Test according NEN 5140 class 1

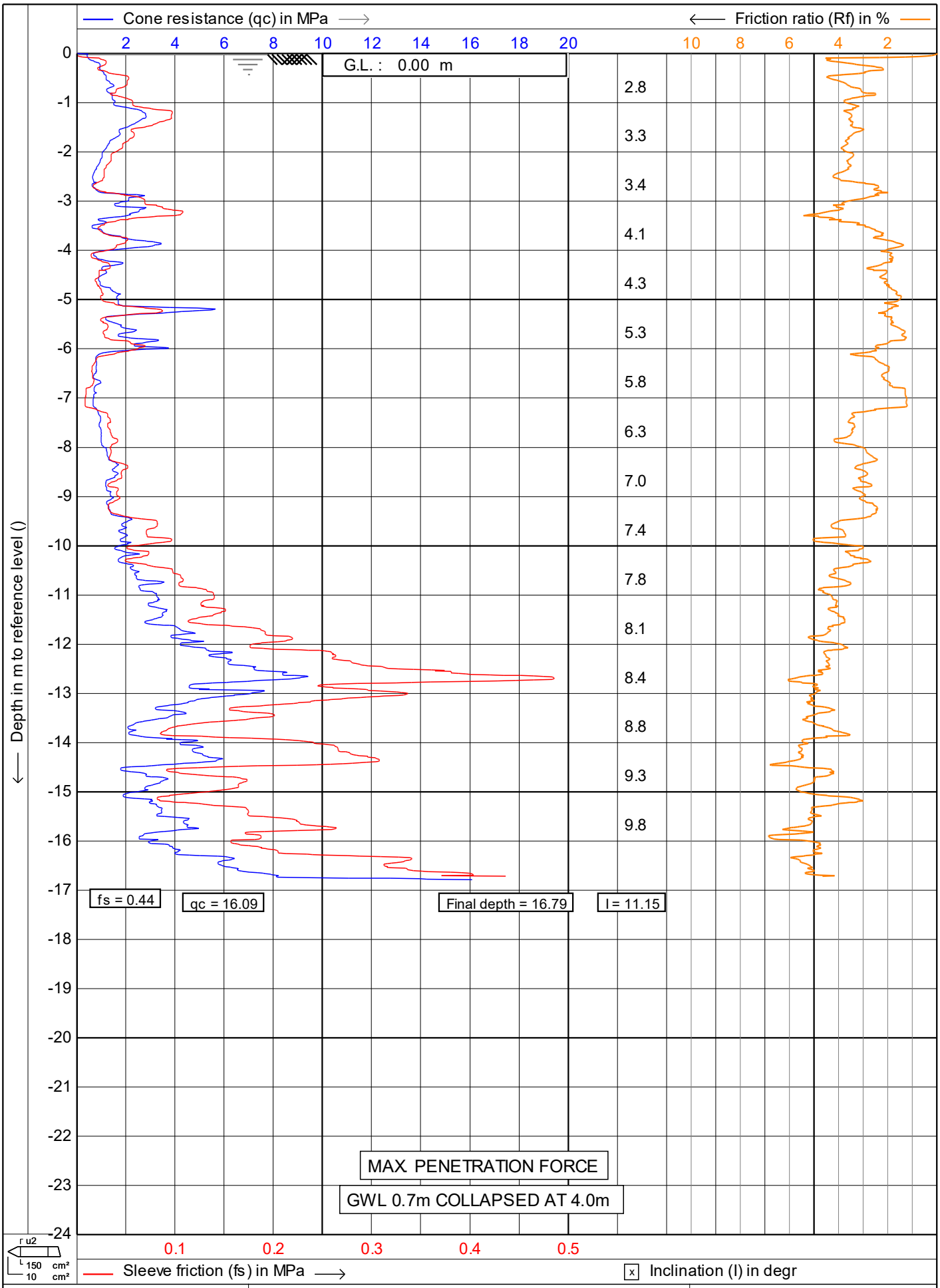
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11086, 37.14535**

Date	: **11/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_04** **15/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

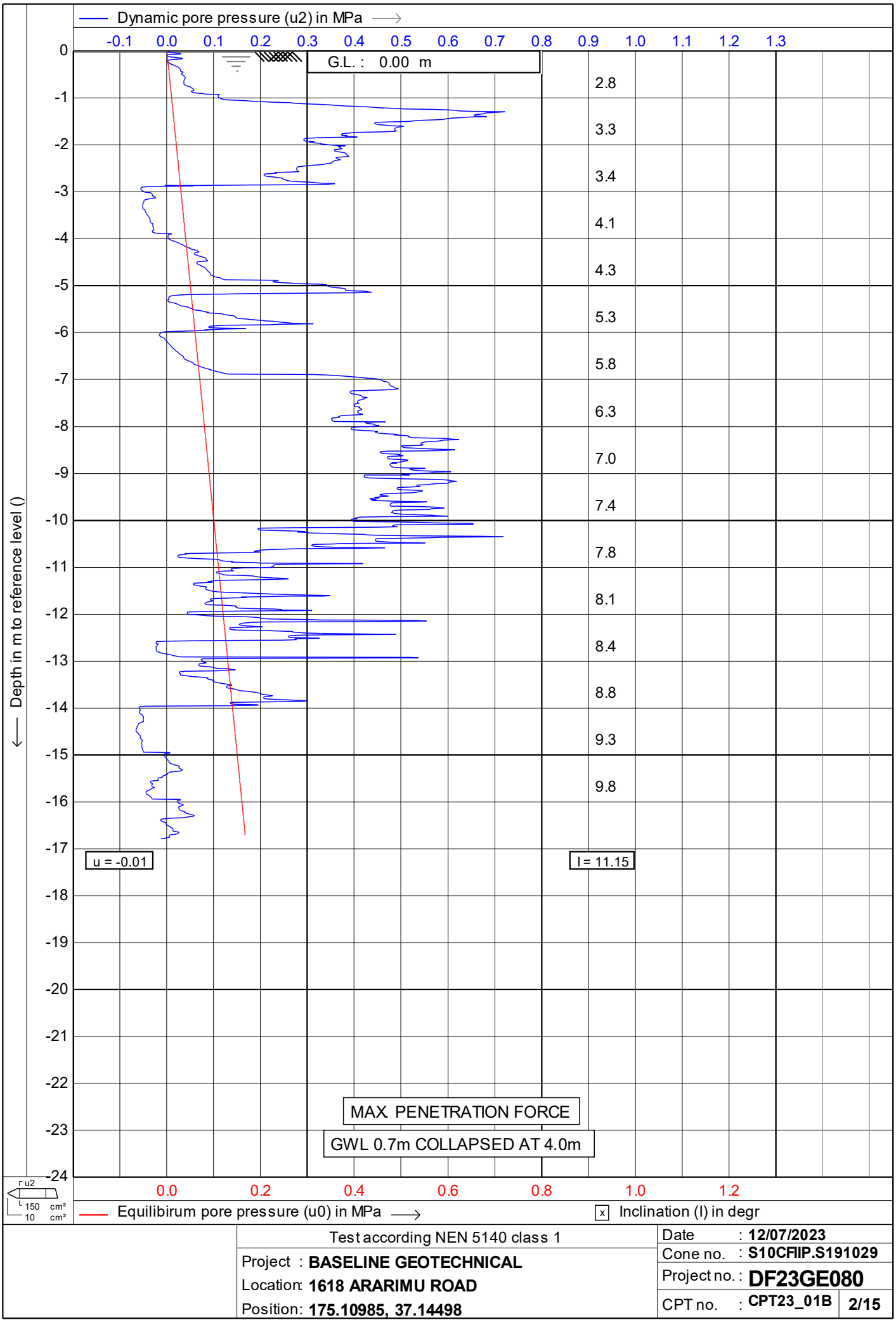
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **1/15**

1.49



Test according NEN 5140 class 1

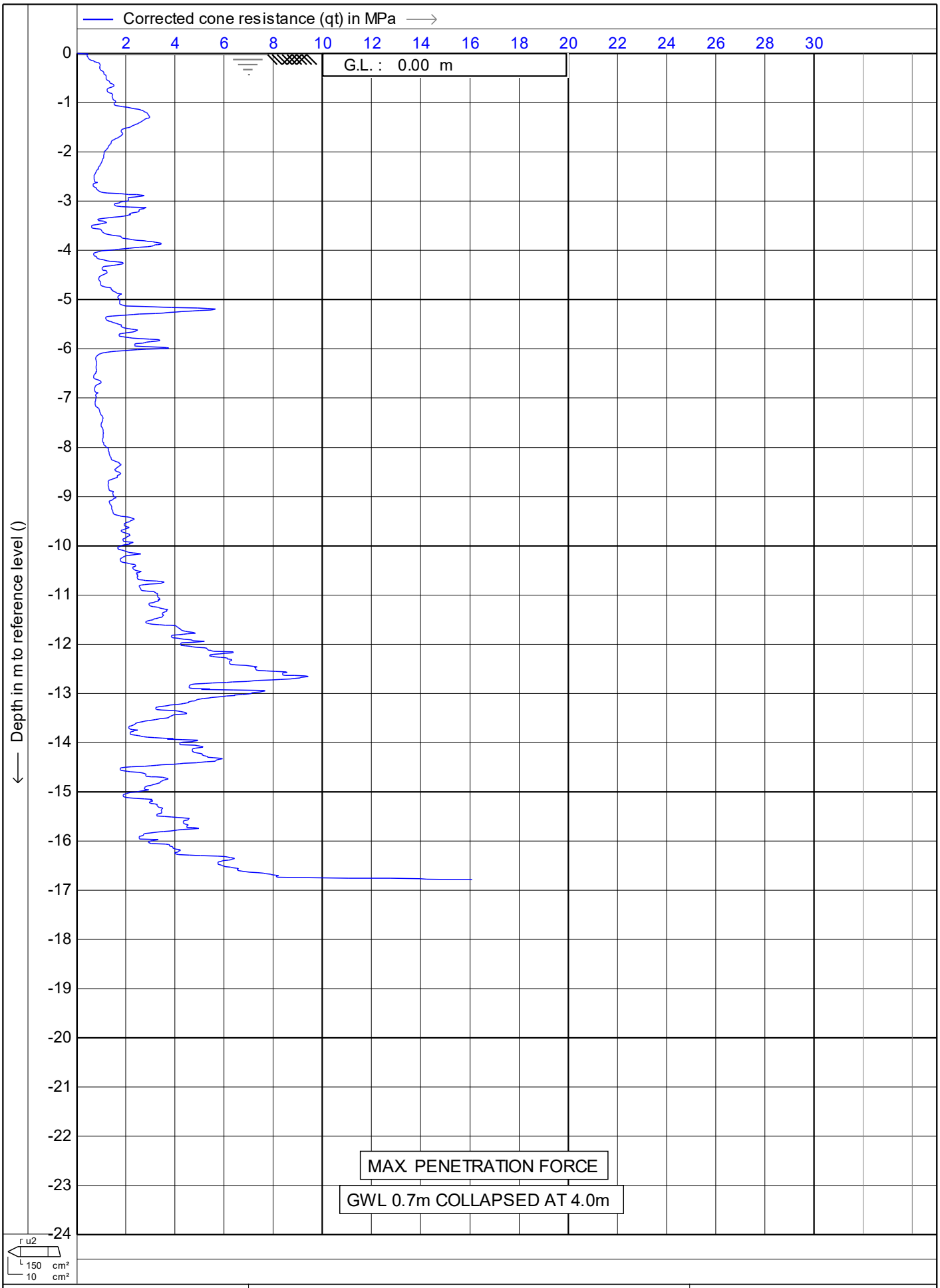
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **2/15**

1.49



Test according NEN 5140 class 1

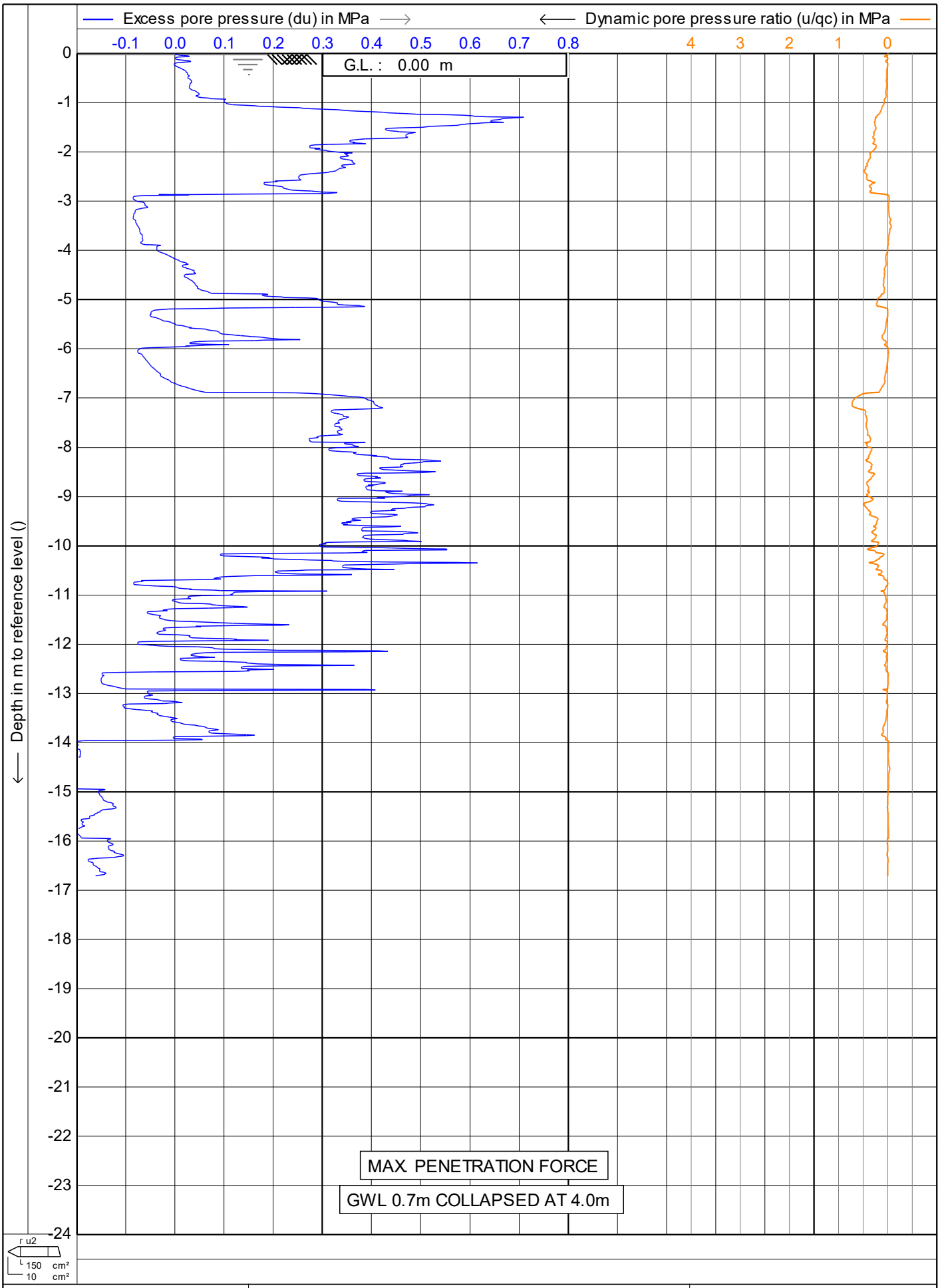
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **3/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

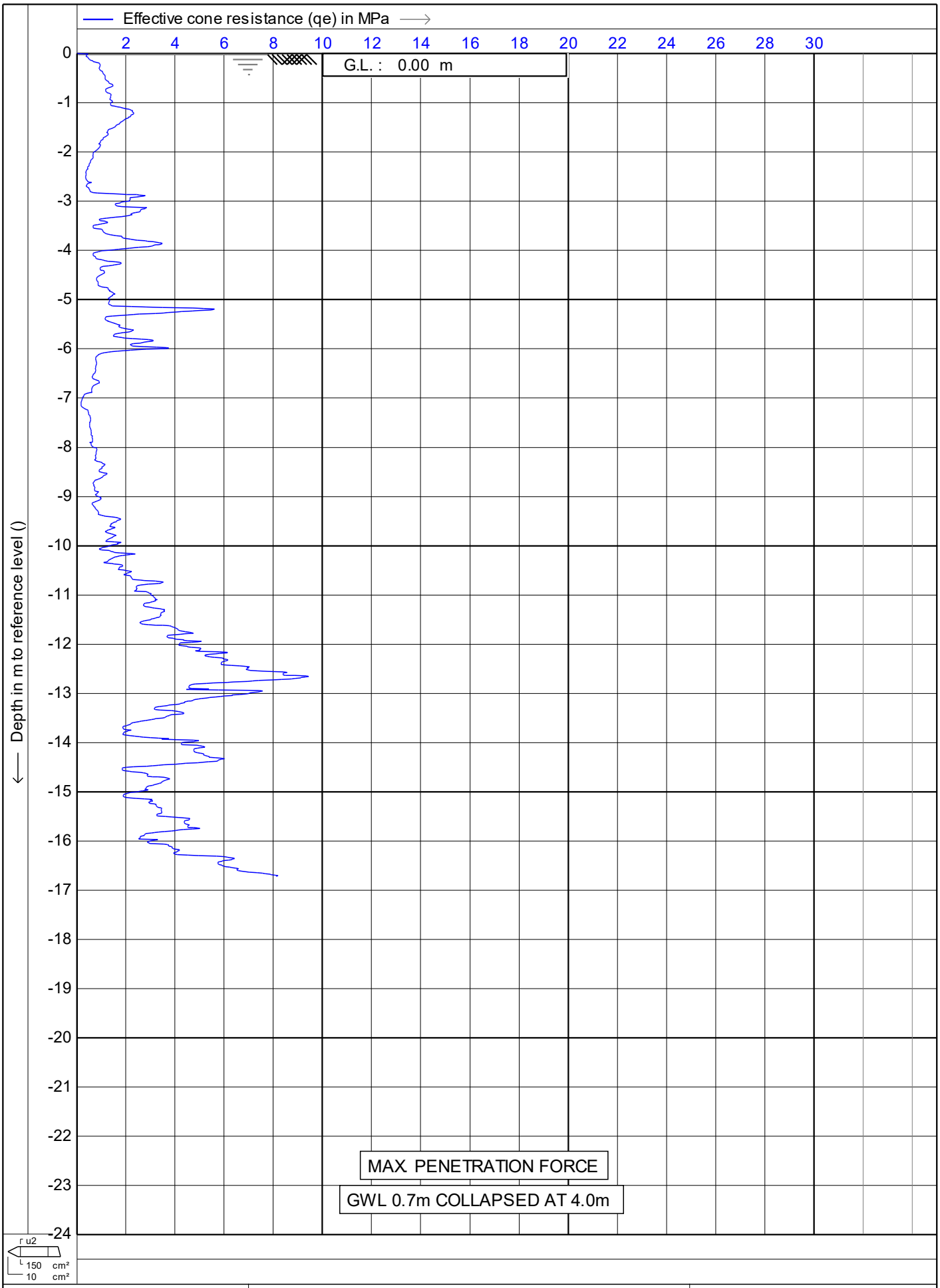
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **4/15**

1.49



Test according NEN 5140 class 1

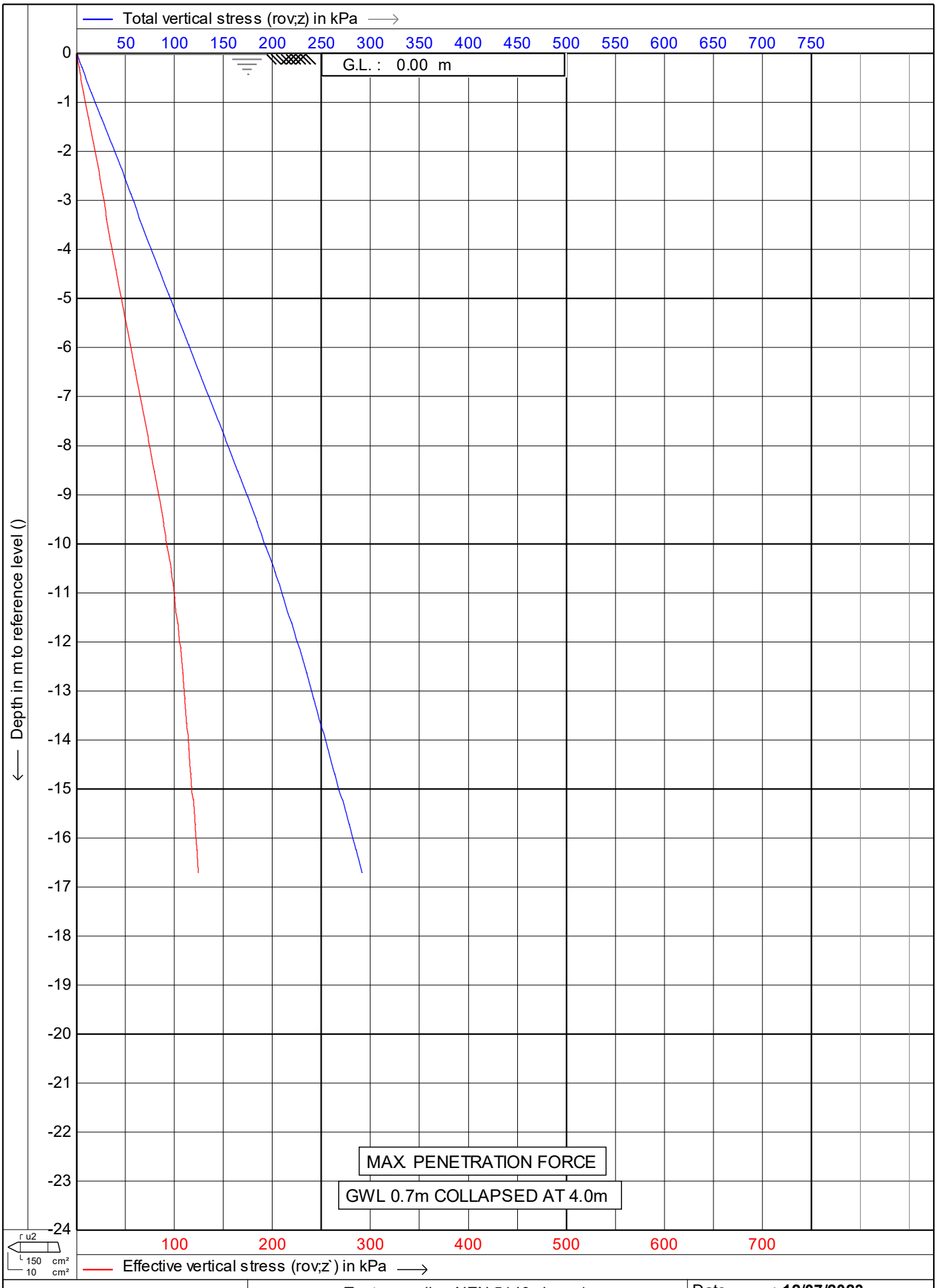
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **5/15**

1.49



Test according NEN 5140 class 1

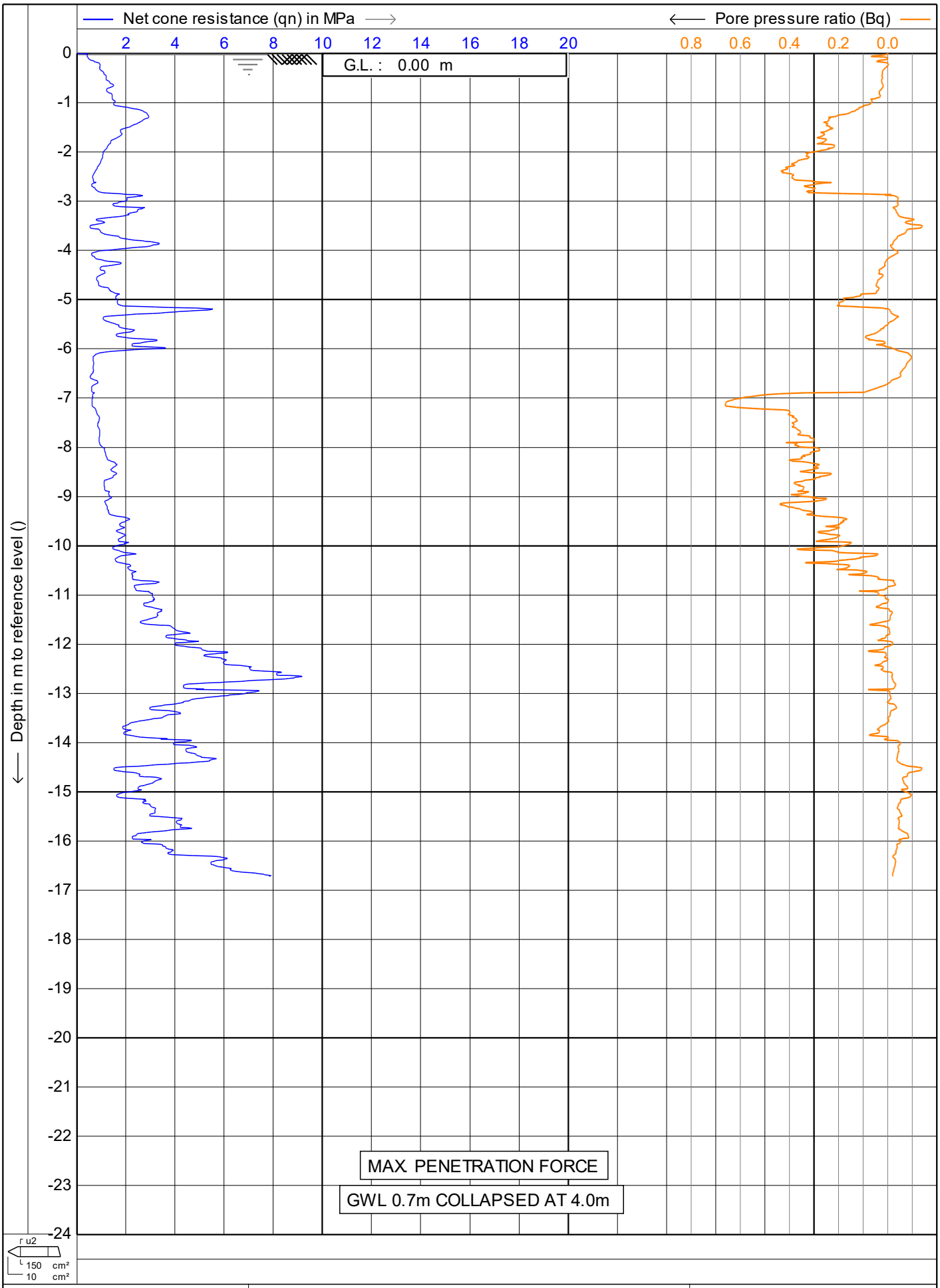
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

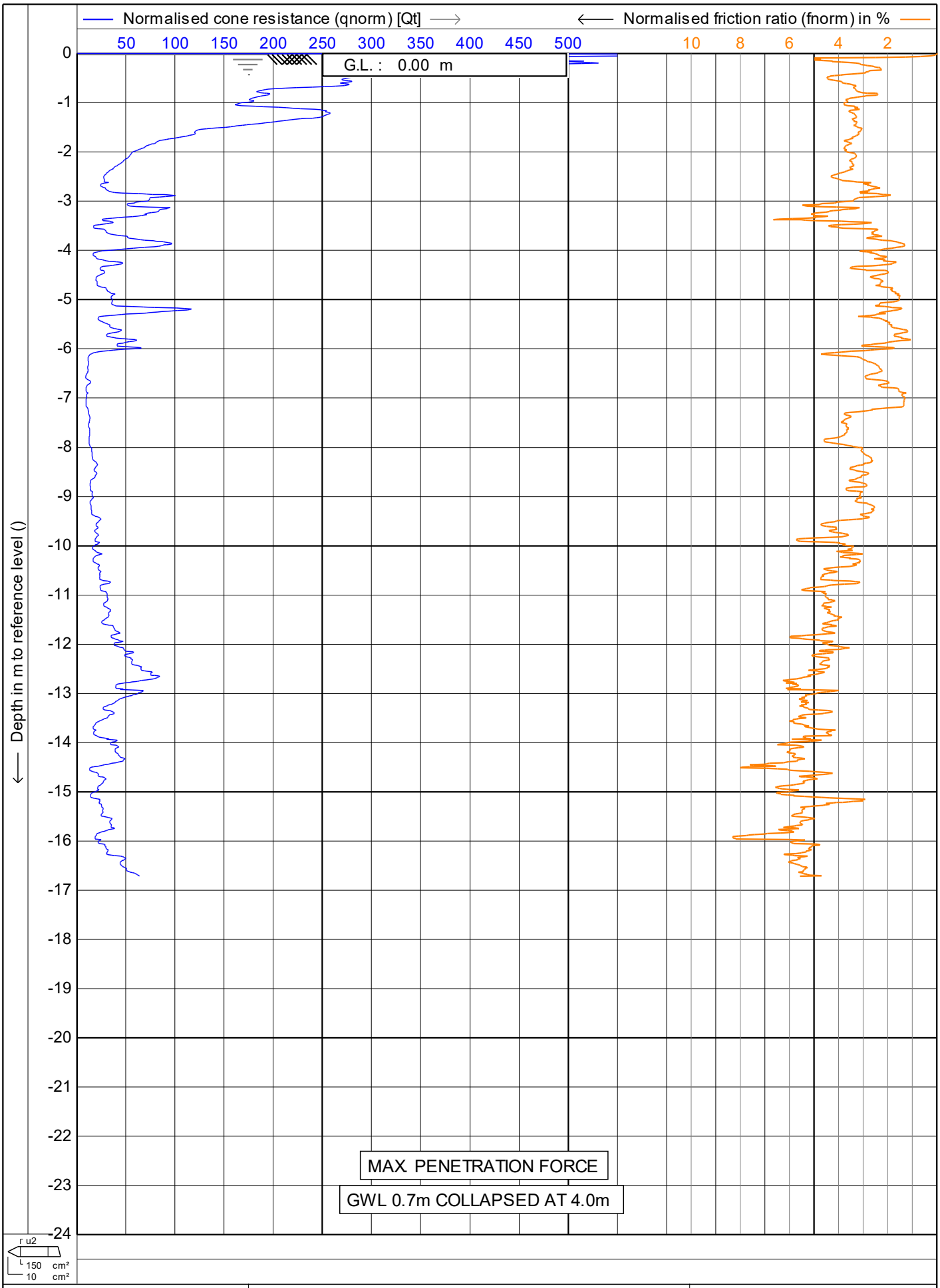
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **7/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

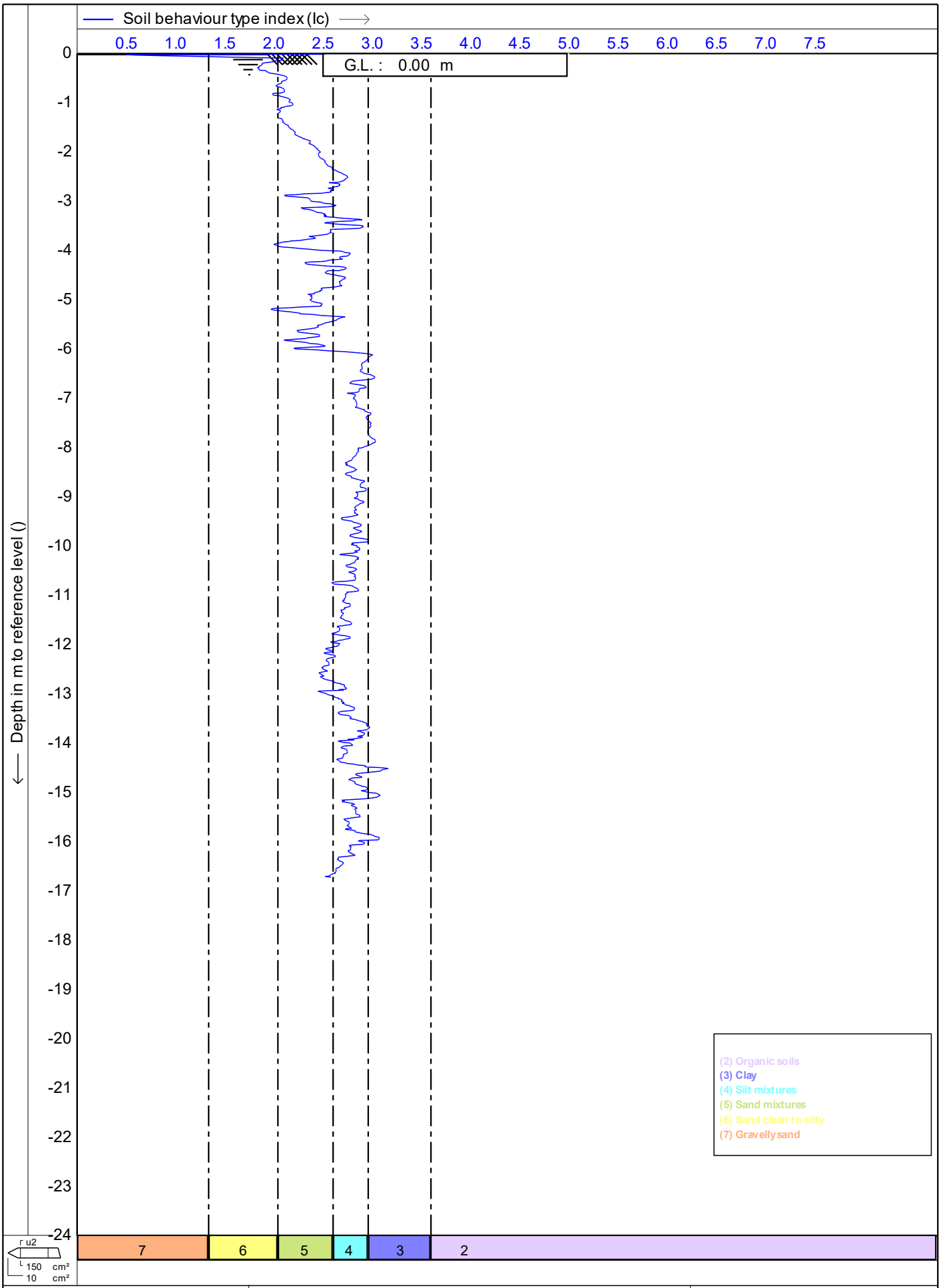
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **8/15**

1.49



Test according NEN 5140 class 1

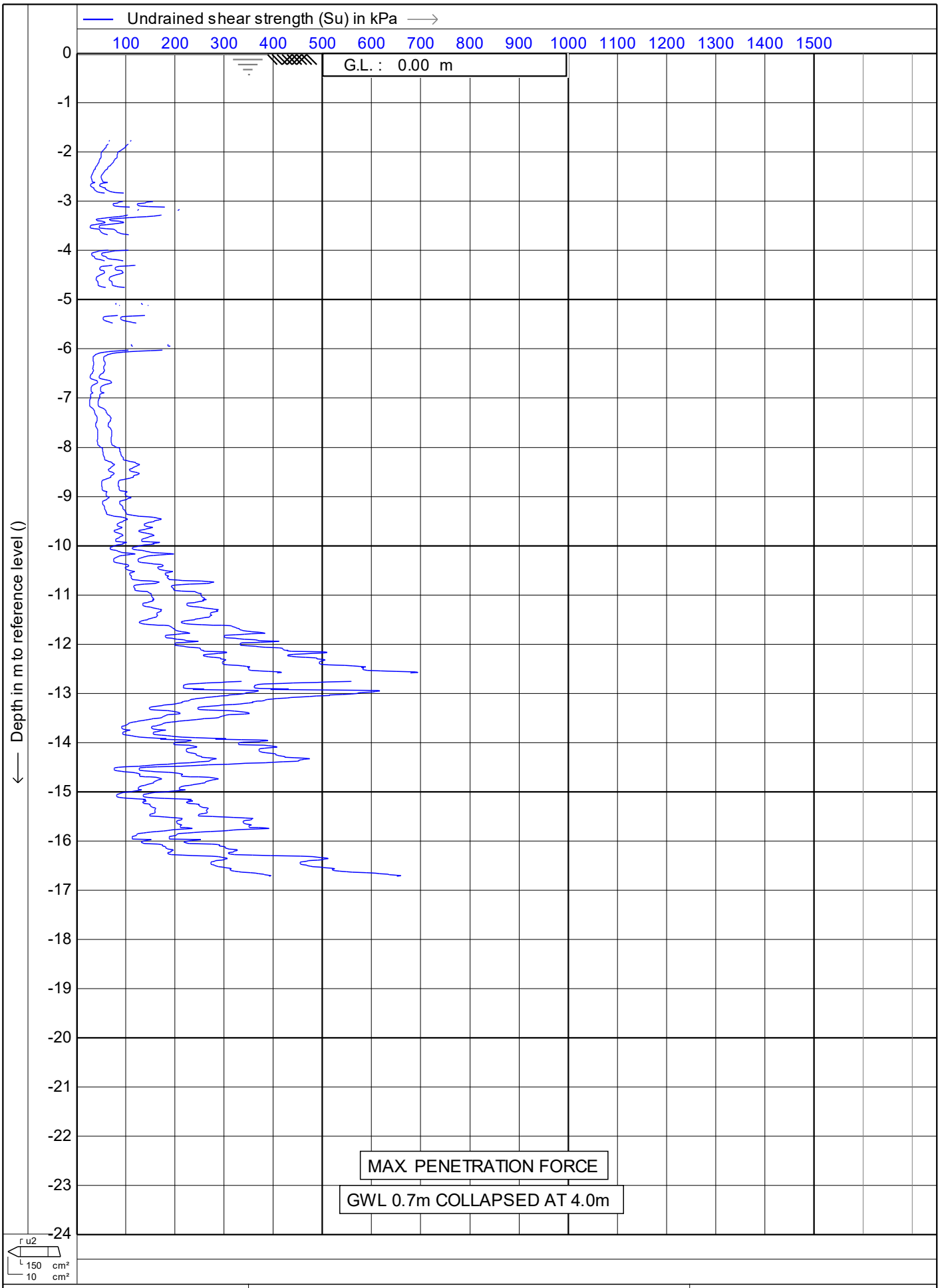
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **9/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

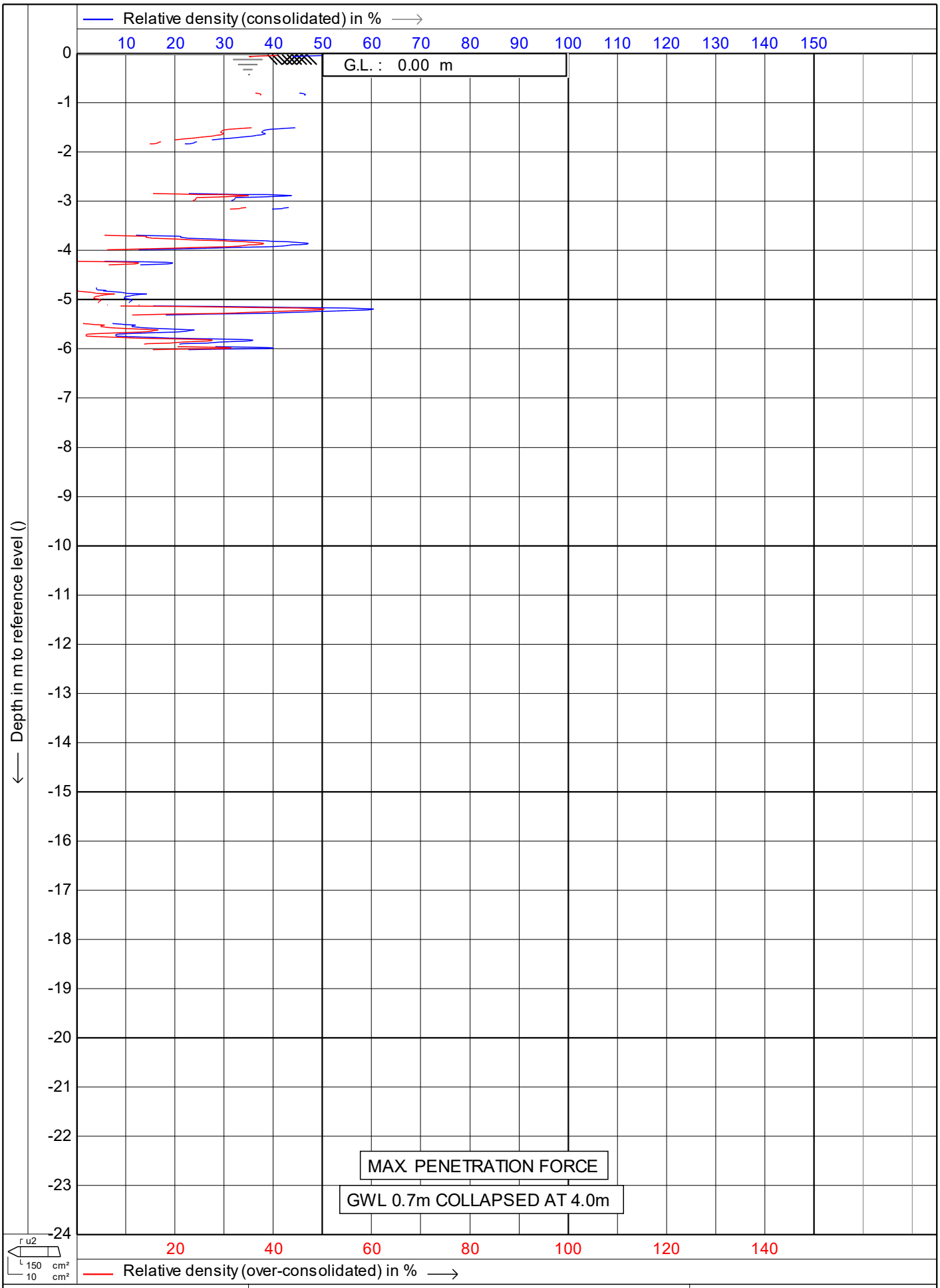
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **10/15**

1.49



Test according NEN 5140 class 1

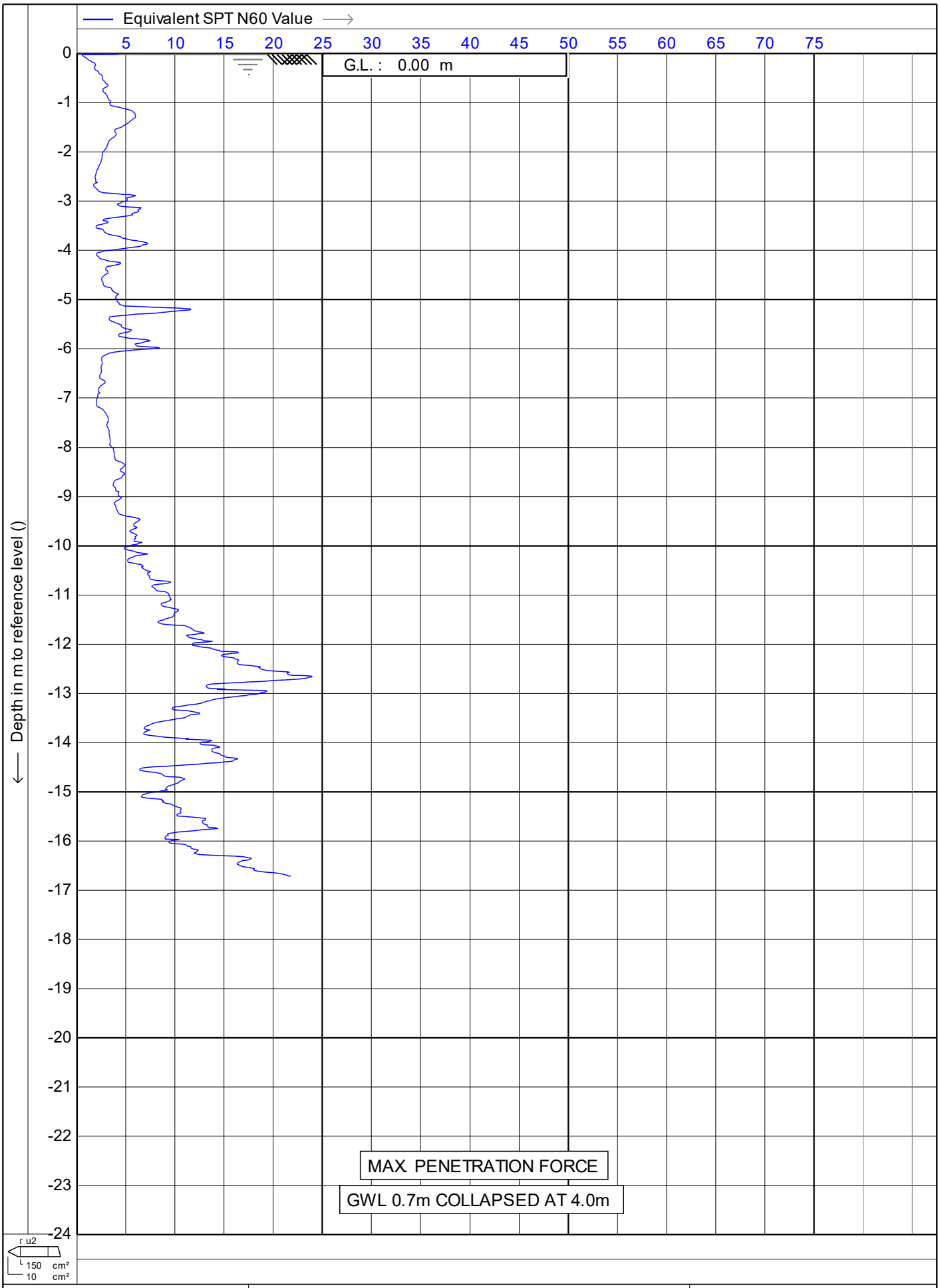
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **11/15**

1.49



Test according NEN 5140 class 1

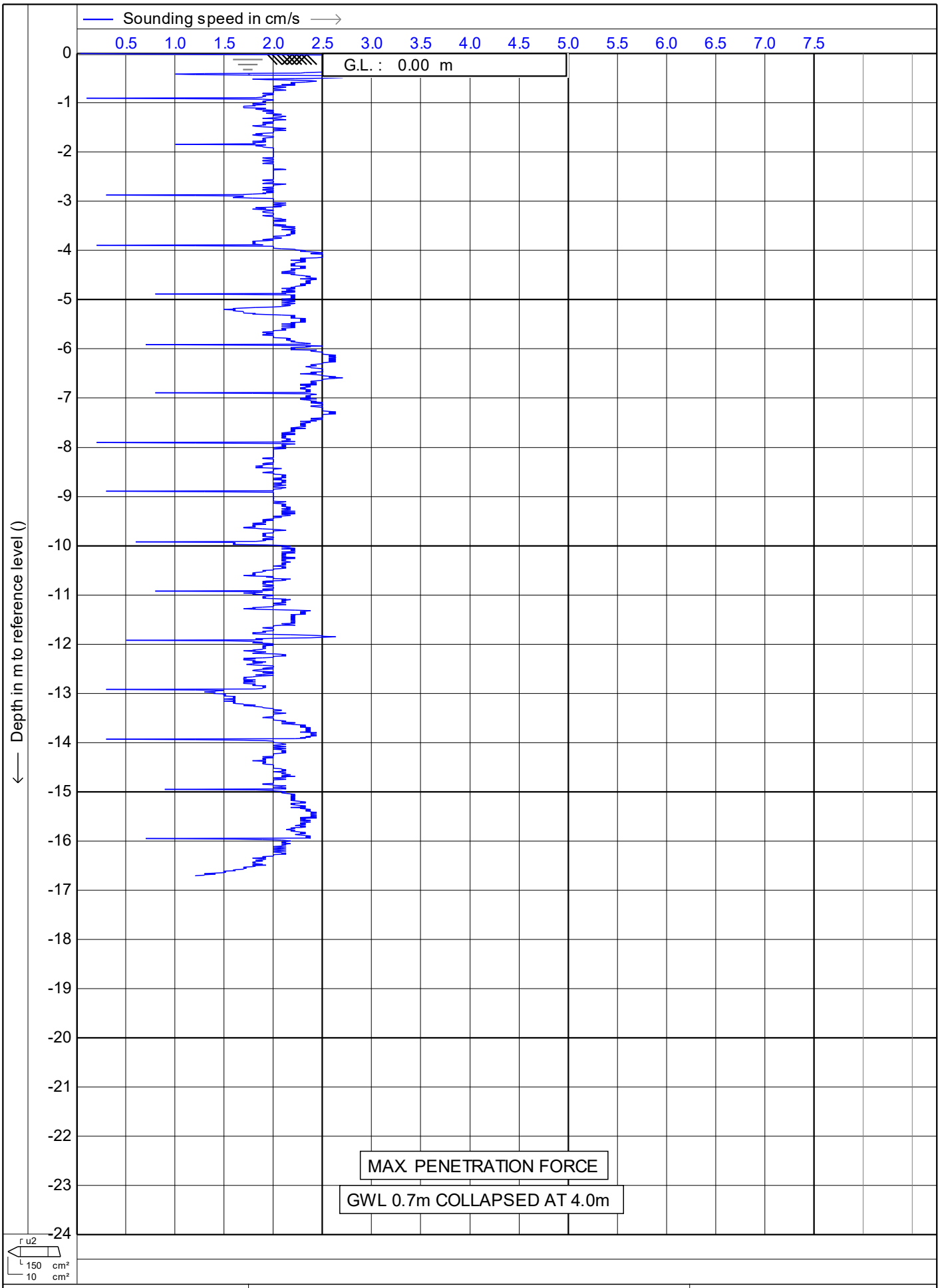
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B** **12/15**

1.49



Test according NEN 5140 class 1

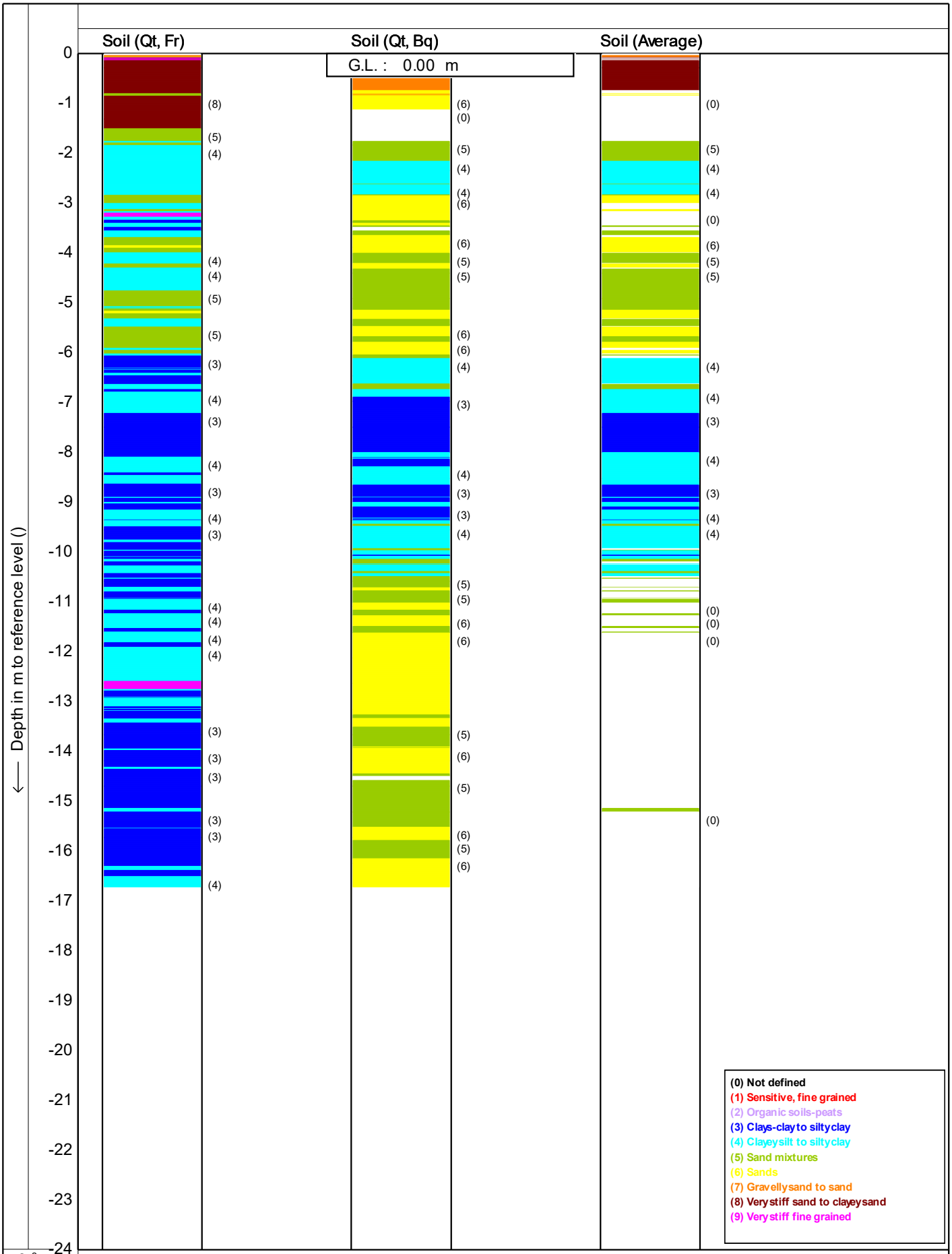
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_01B**

1.49



Soil behaviour type classification after Robertson 1990

r u2
150 cm²
10 cm²

Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

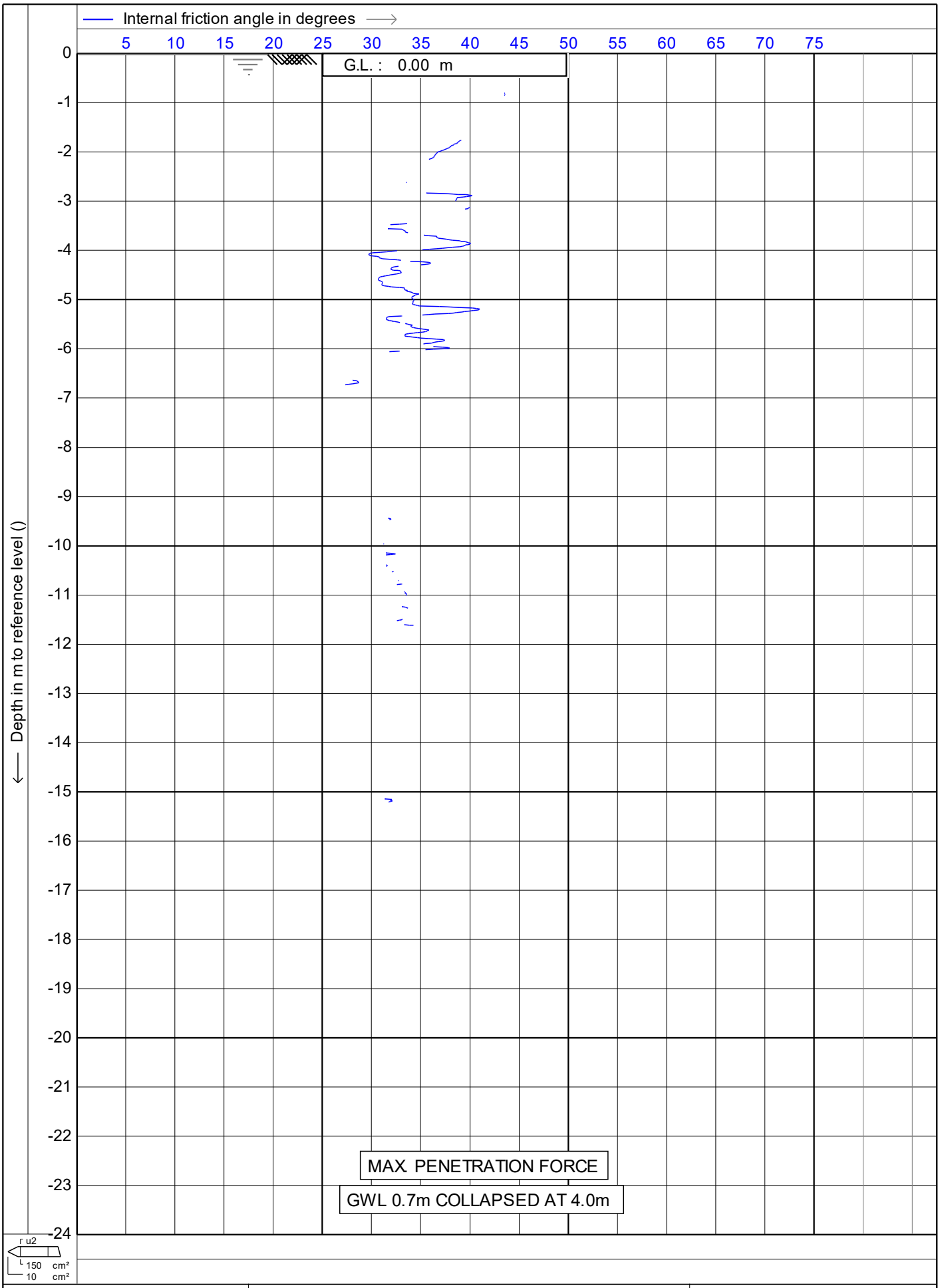
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **14/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10985, 37.14498**

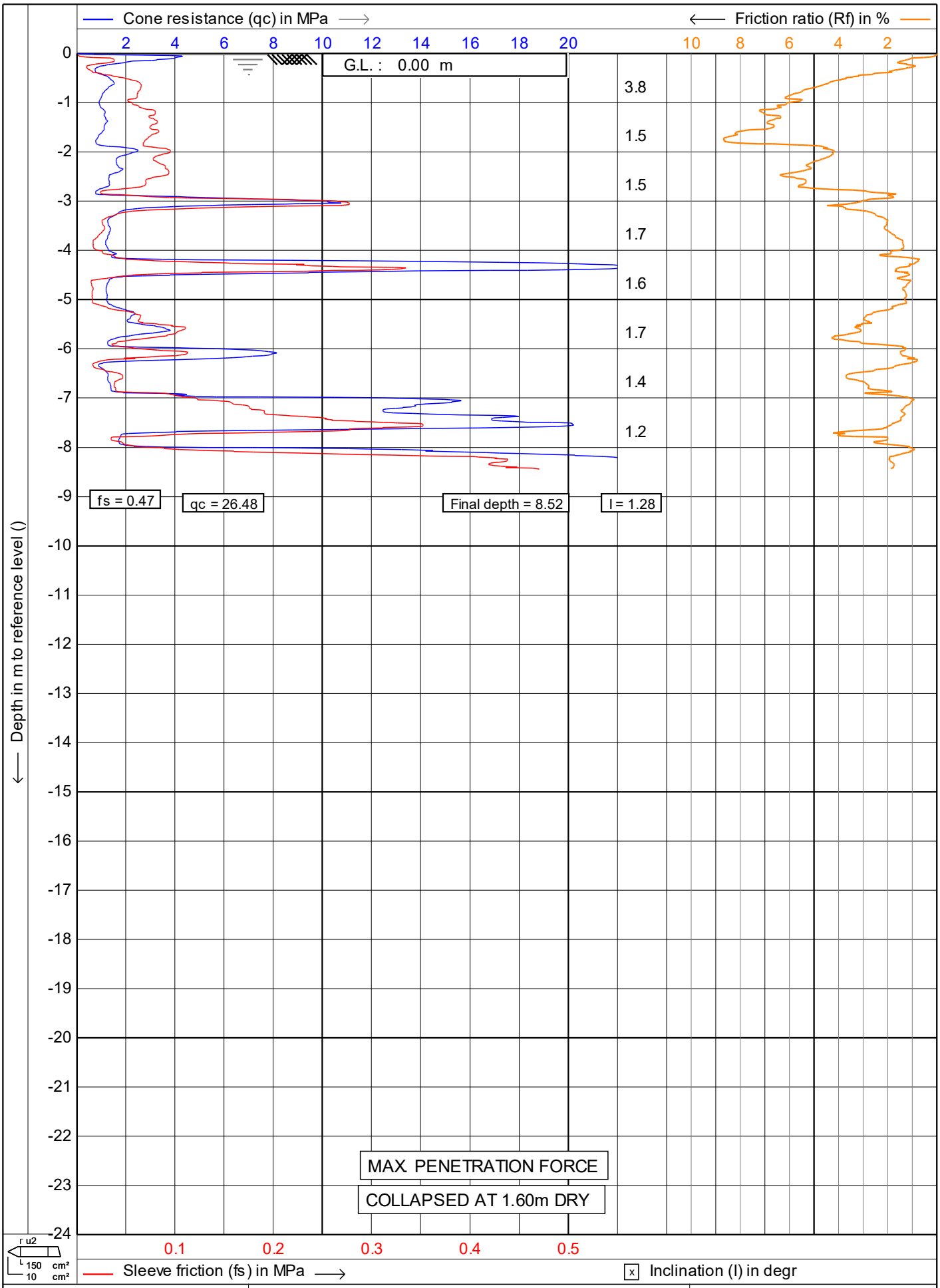
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_01B** **15/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

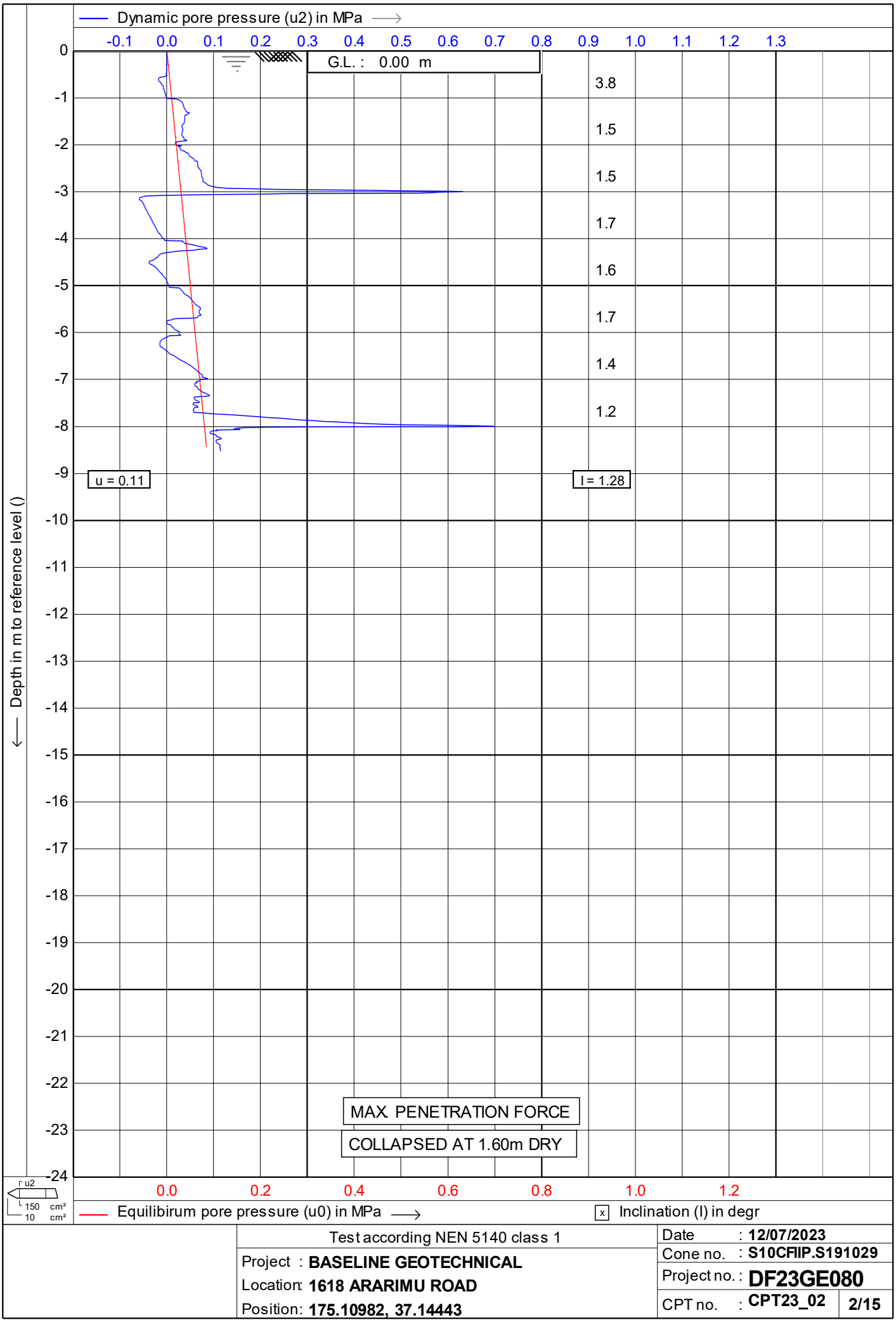
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

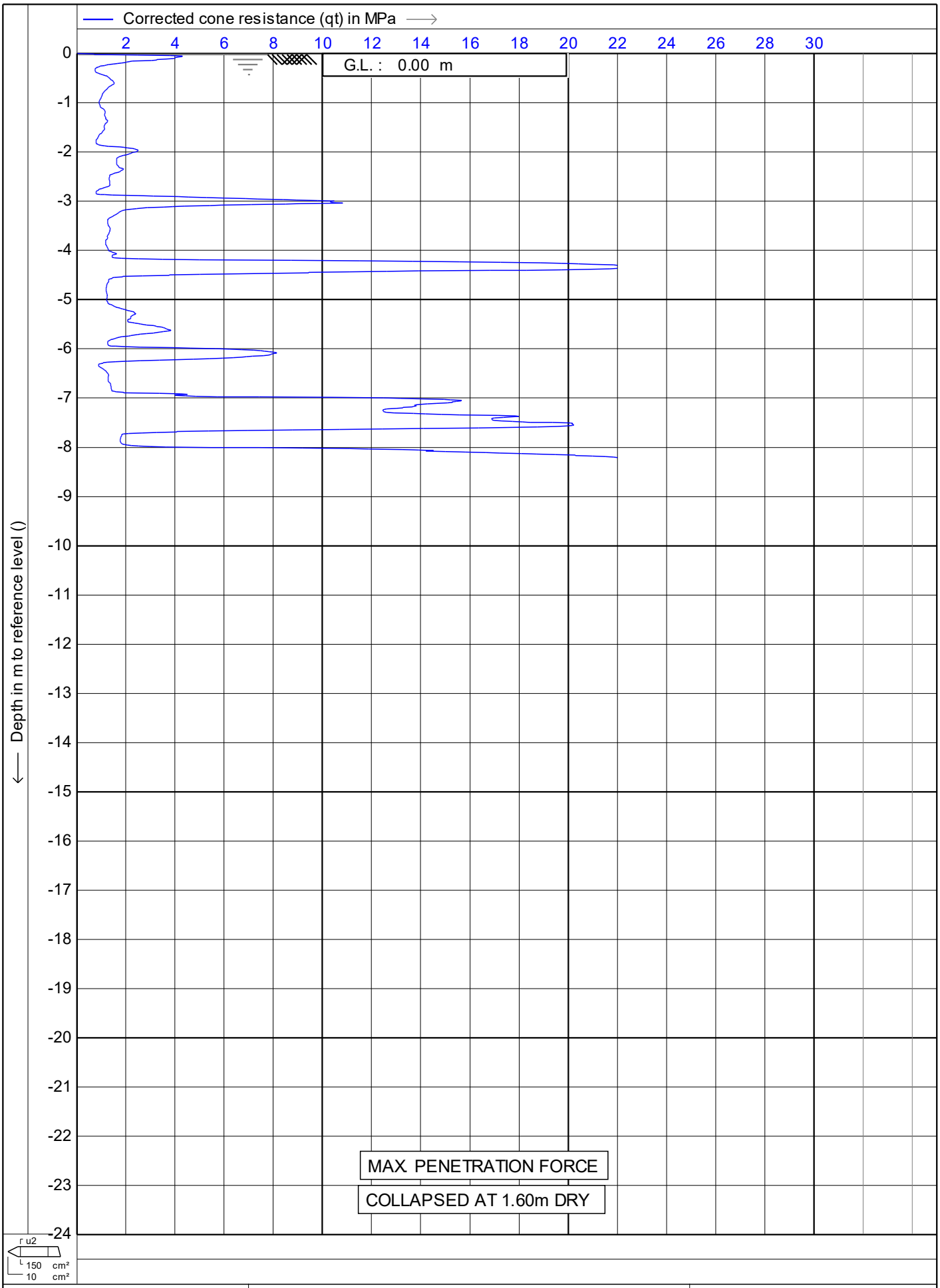
CPT no. : **CPT23_02** **1/15**

1.49



	Test according NEN 5140 class 1	Date : **12/07/2023**
	Project : **BASELINE GEOTECHNICAL**	Cone no. : **S10CFIIP.S191029**
	Location: **1618 ARARIMU ROAD**	Project no. : **DF23GE080**
	Position: **175.10982, 37.14443**	CPT no. : **CPT23_02** **2/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

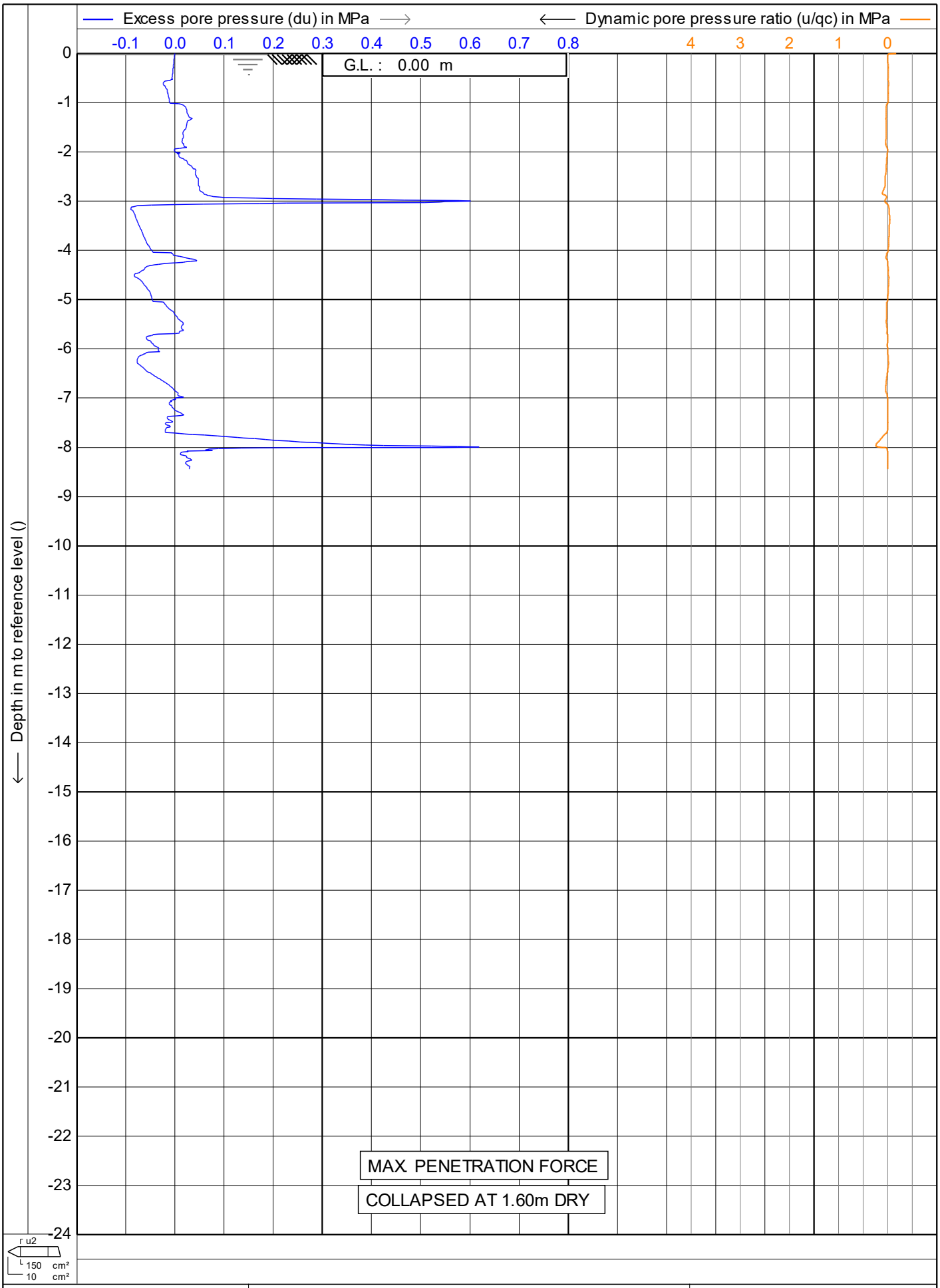
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **3/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

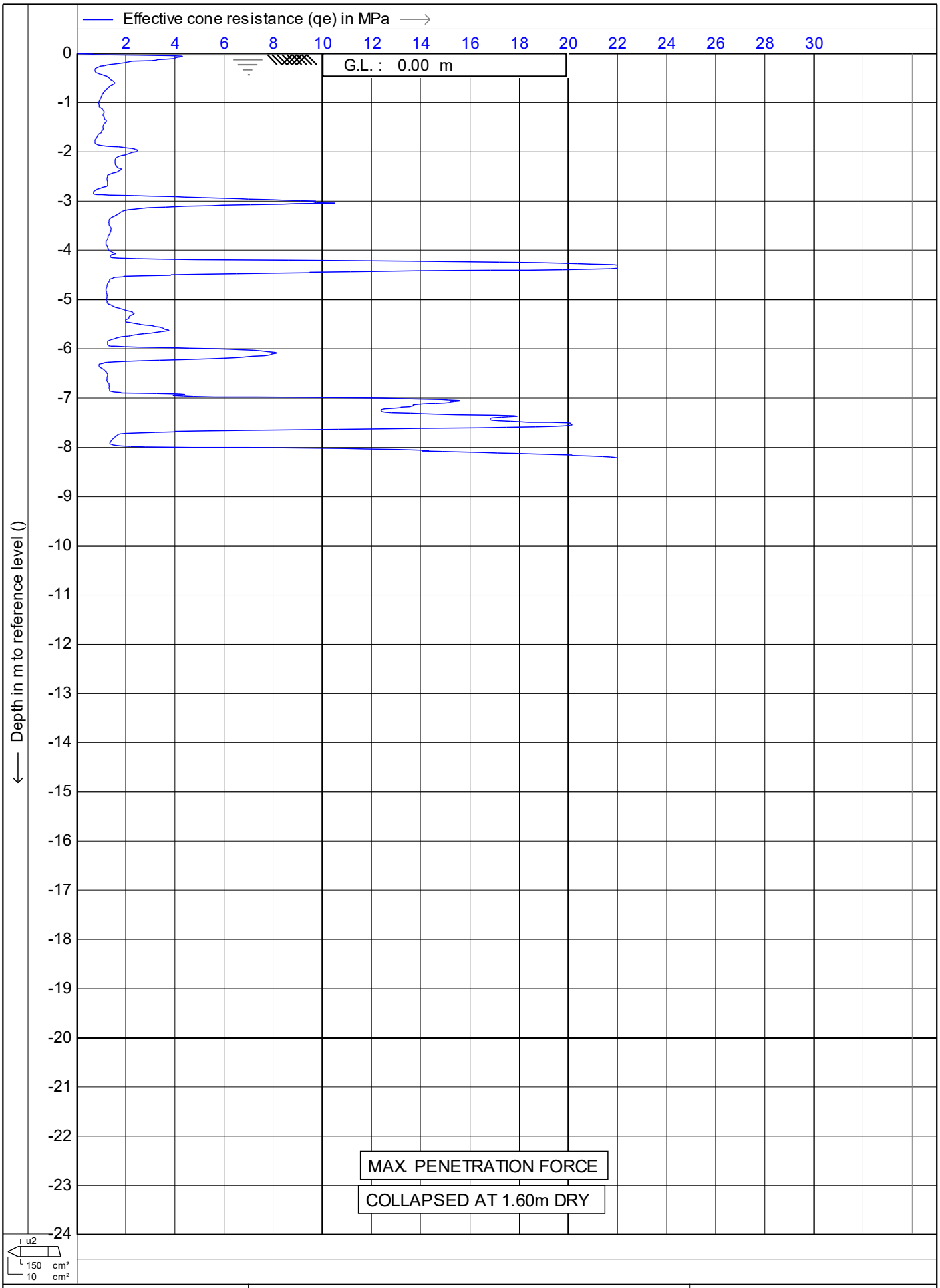
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **4/15**

1.49



Test according NEN 5140 class 1

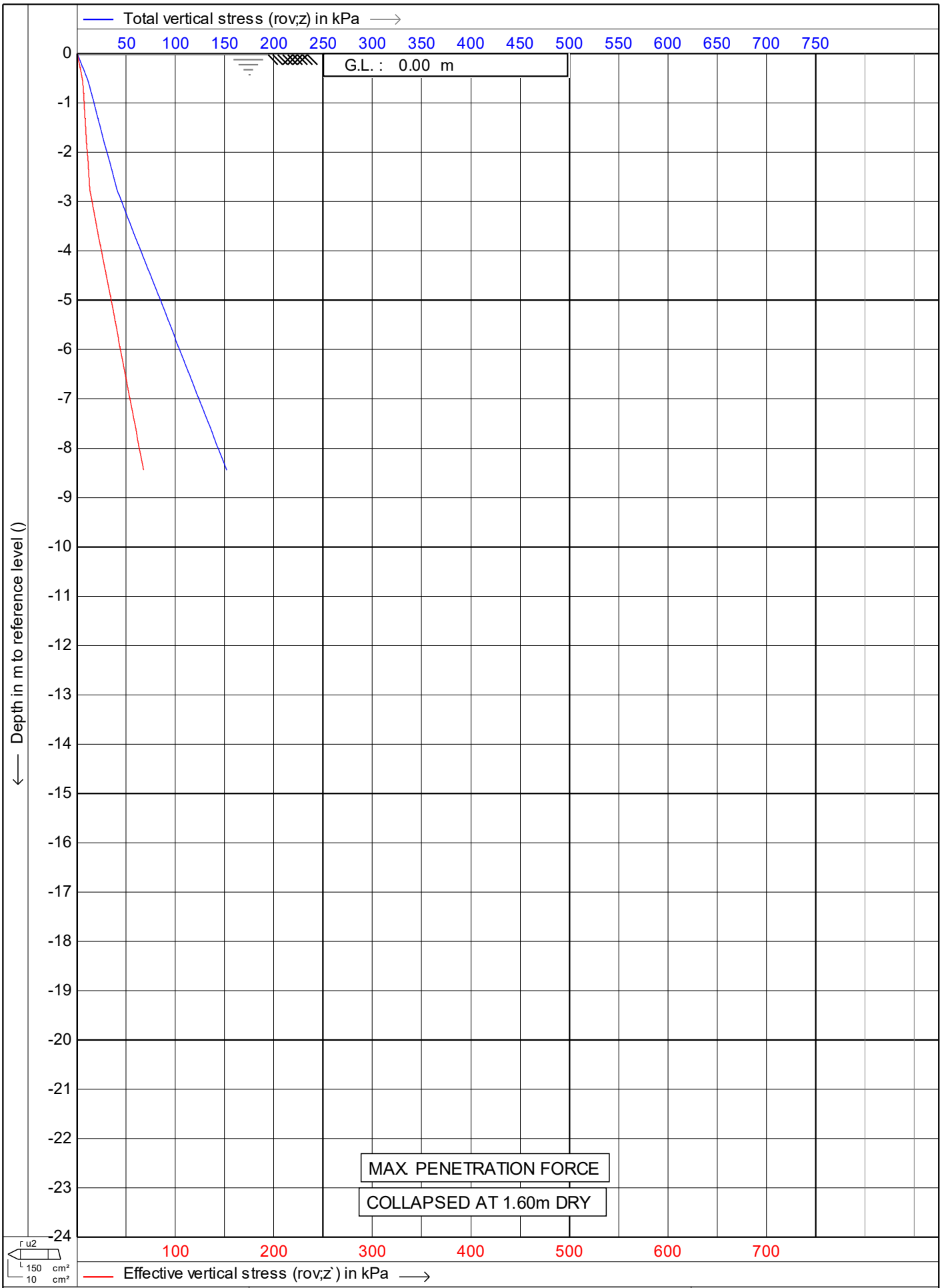
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02** **5/15**

1.49



Test according NEN 5140 class 1

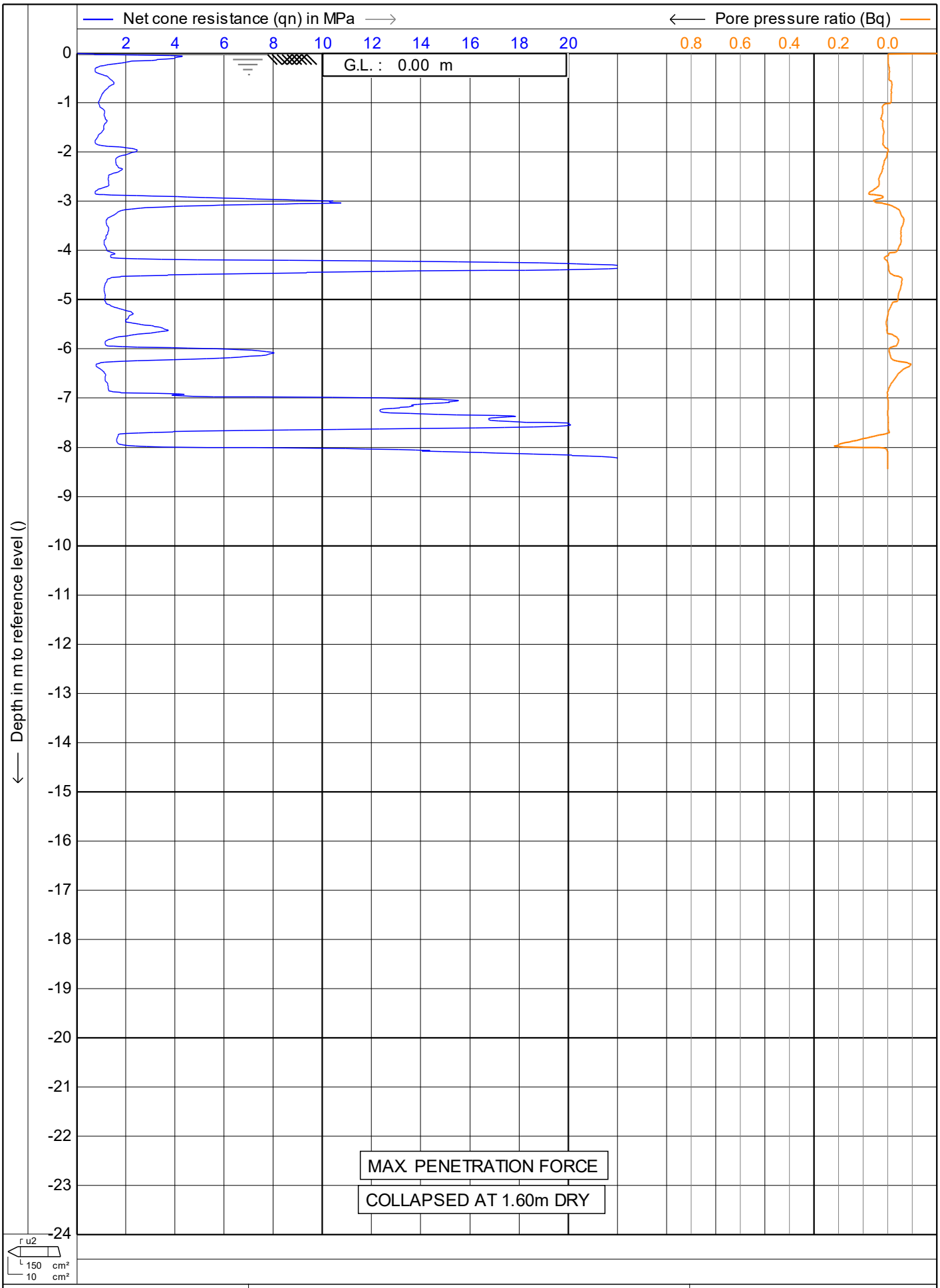
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

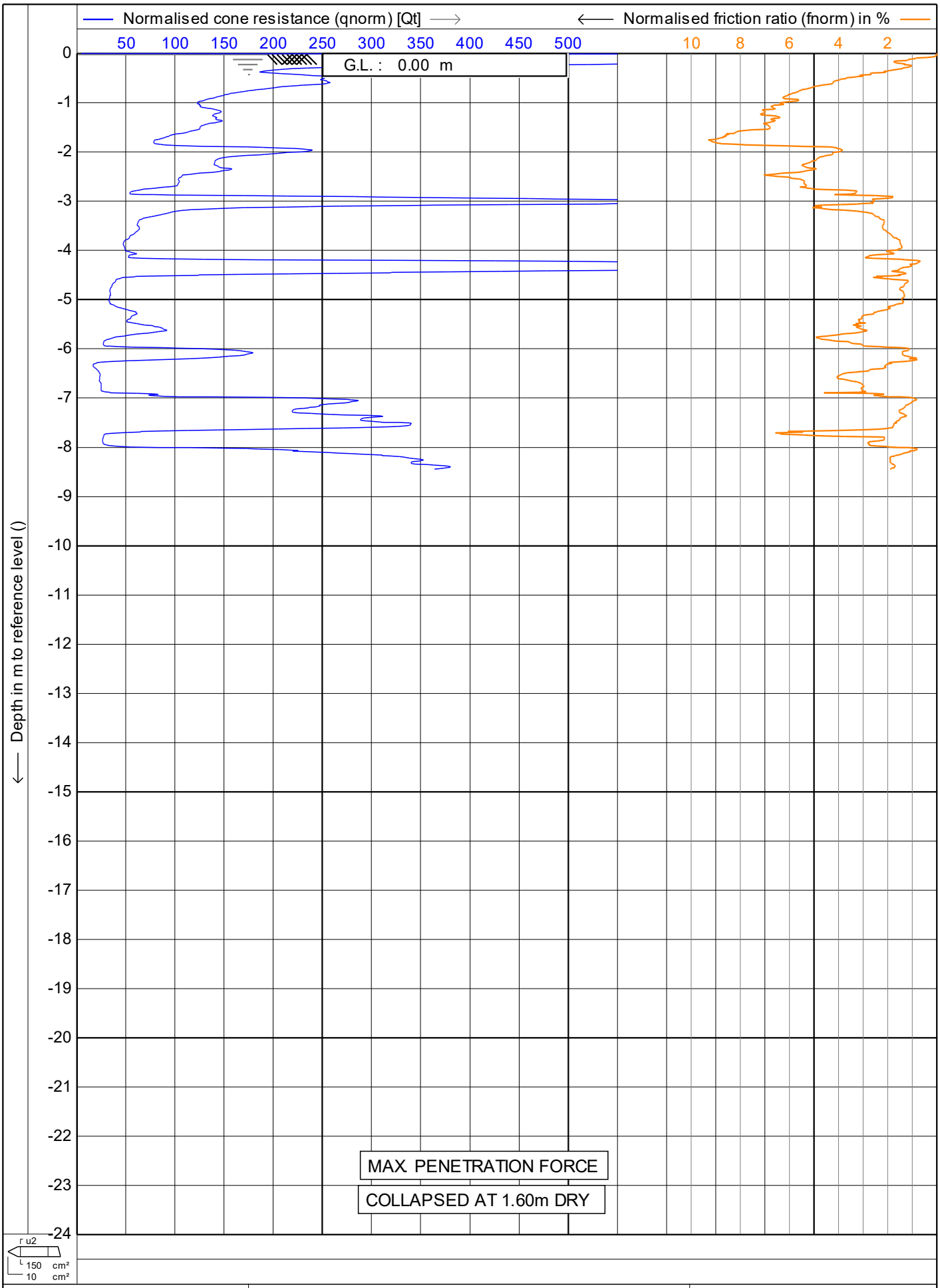
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **7/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

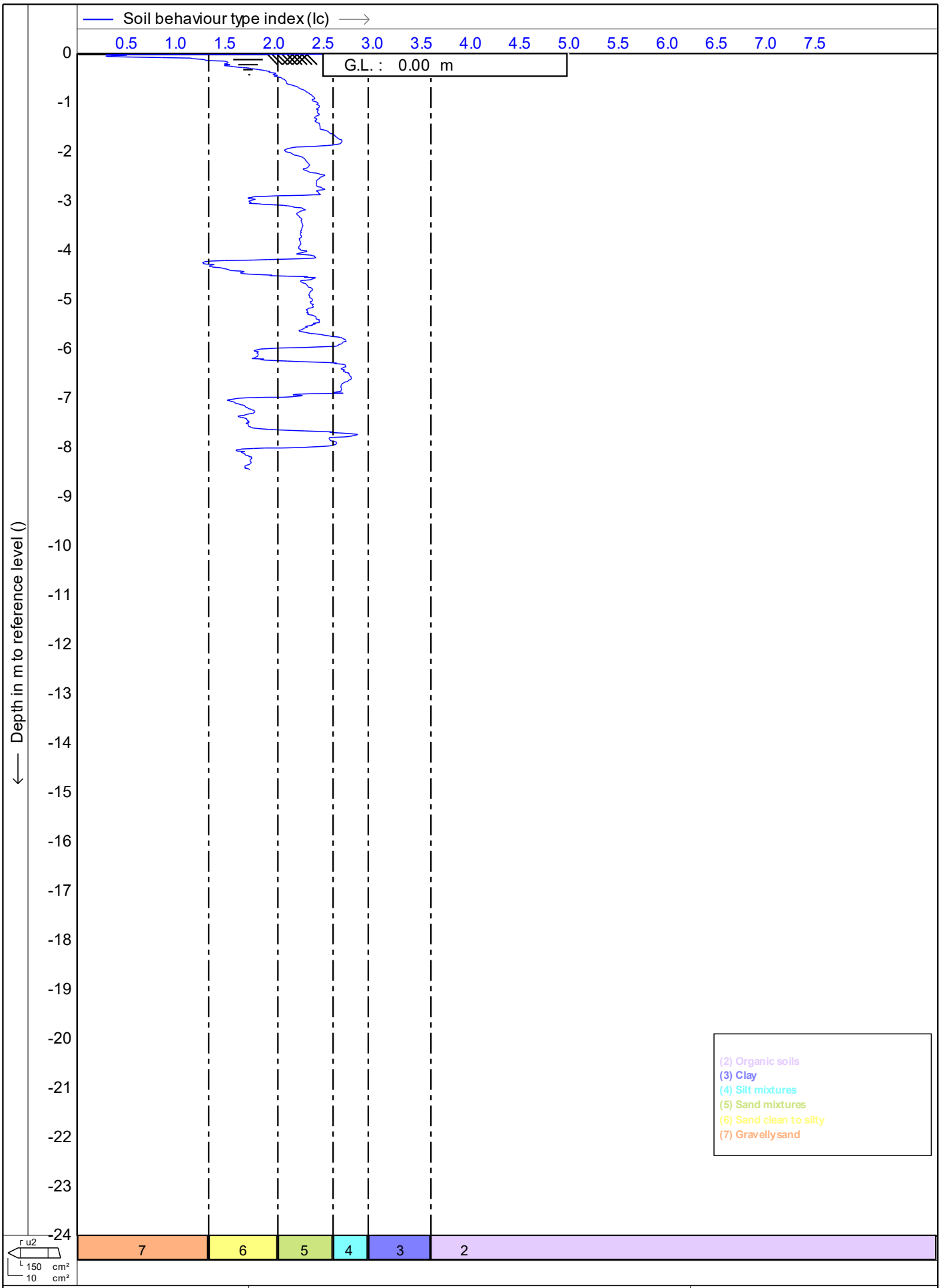
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **8/15**

1.49



Test according NEN 5140 class 1

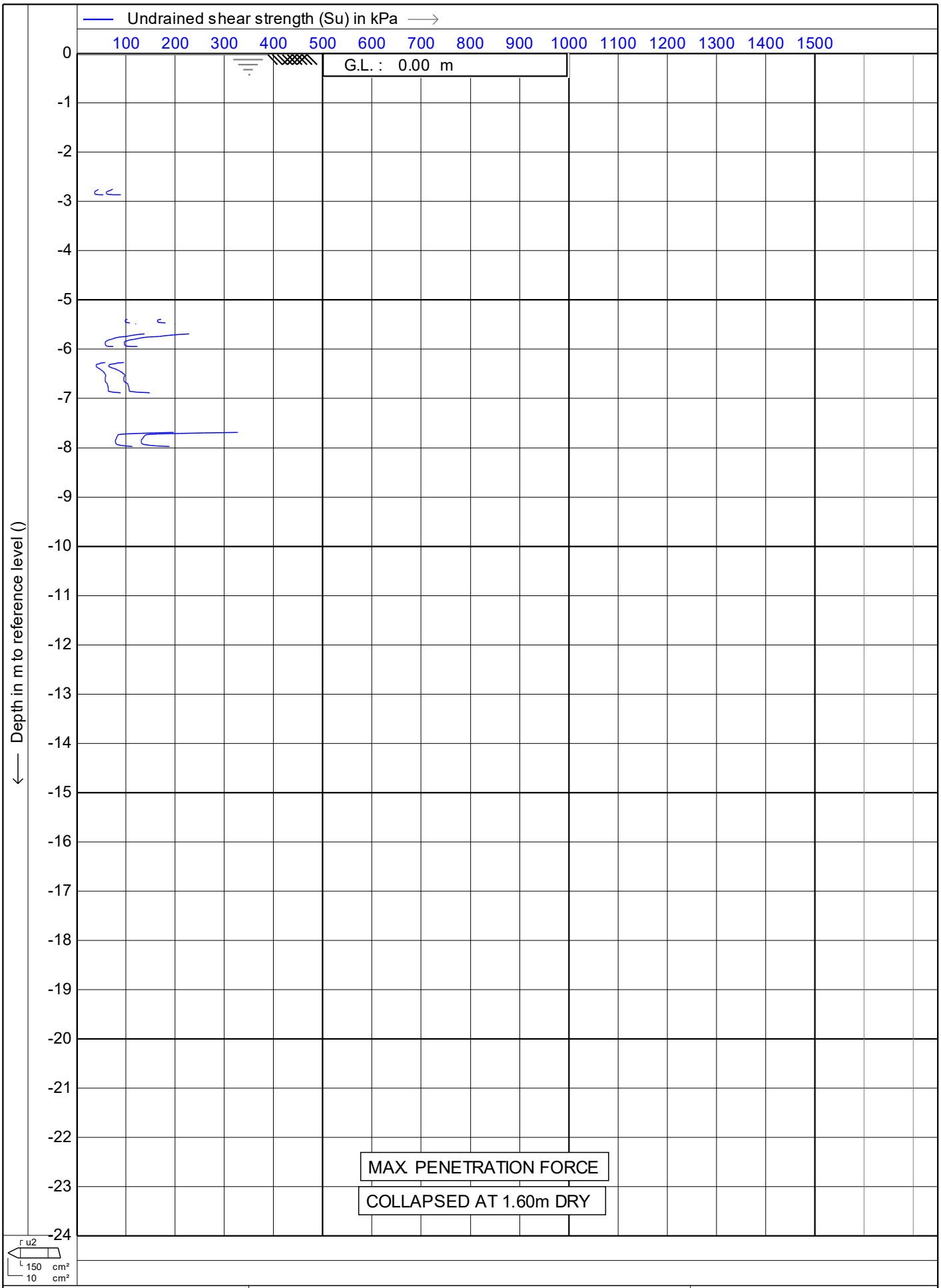
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02** **9/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

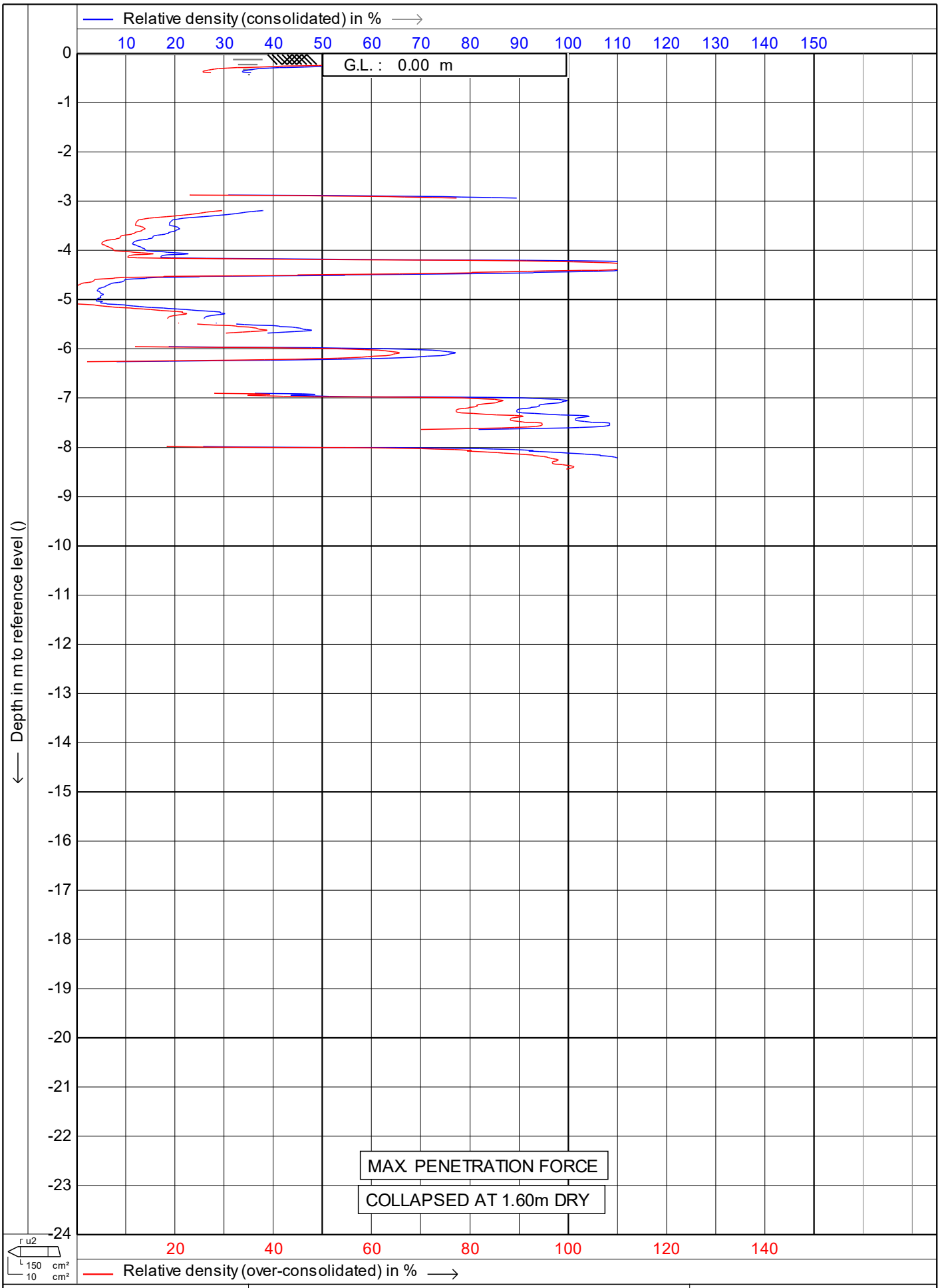
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **10/15**

1.49



Test according NEN 5140 class 1

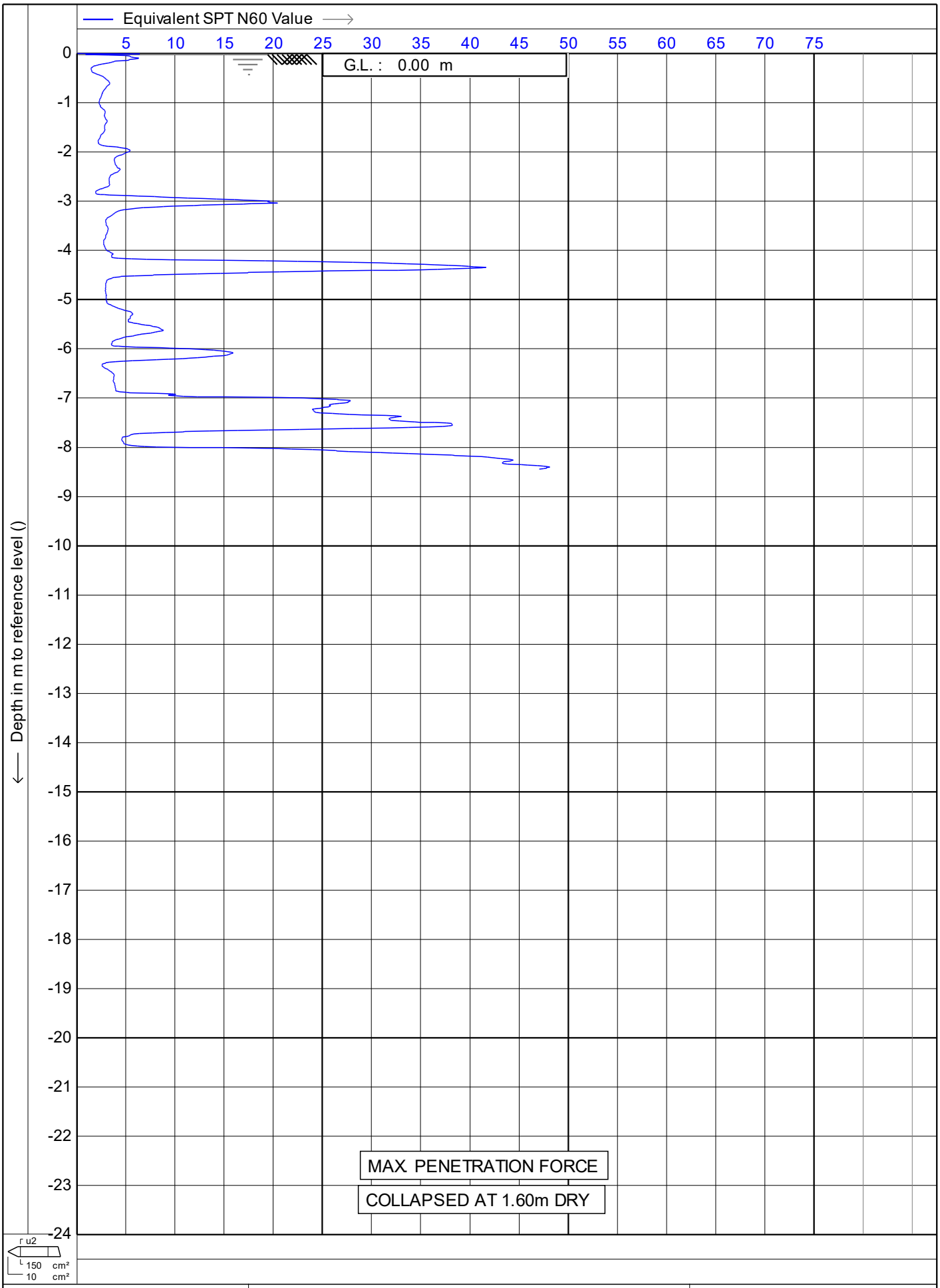
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

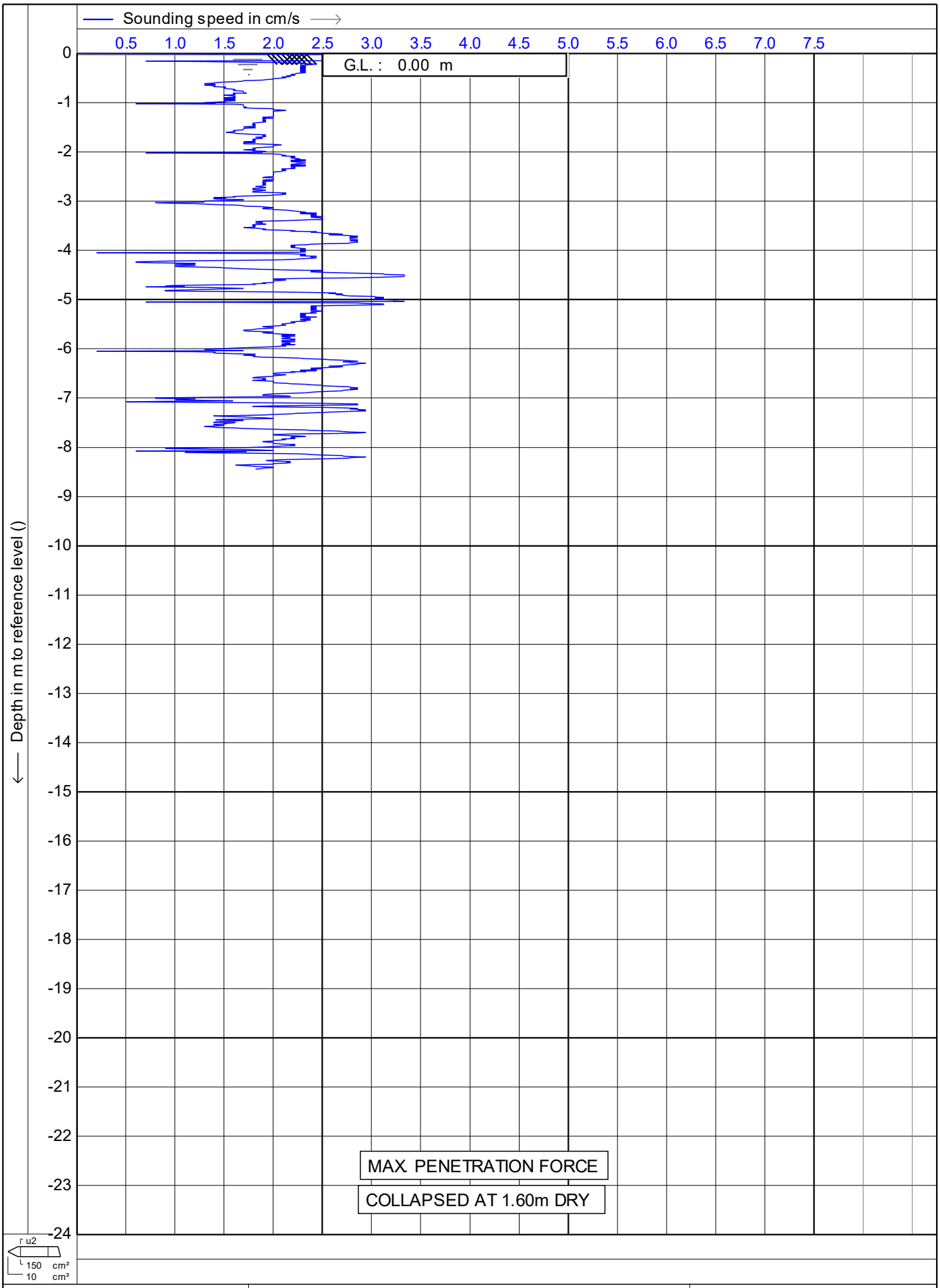
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **12/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

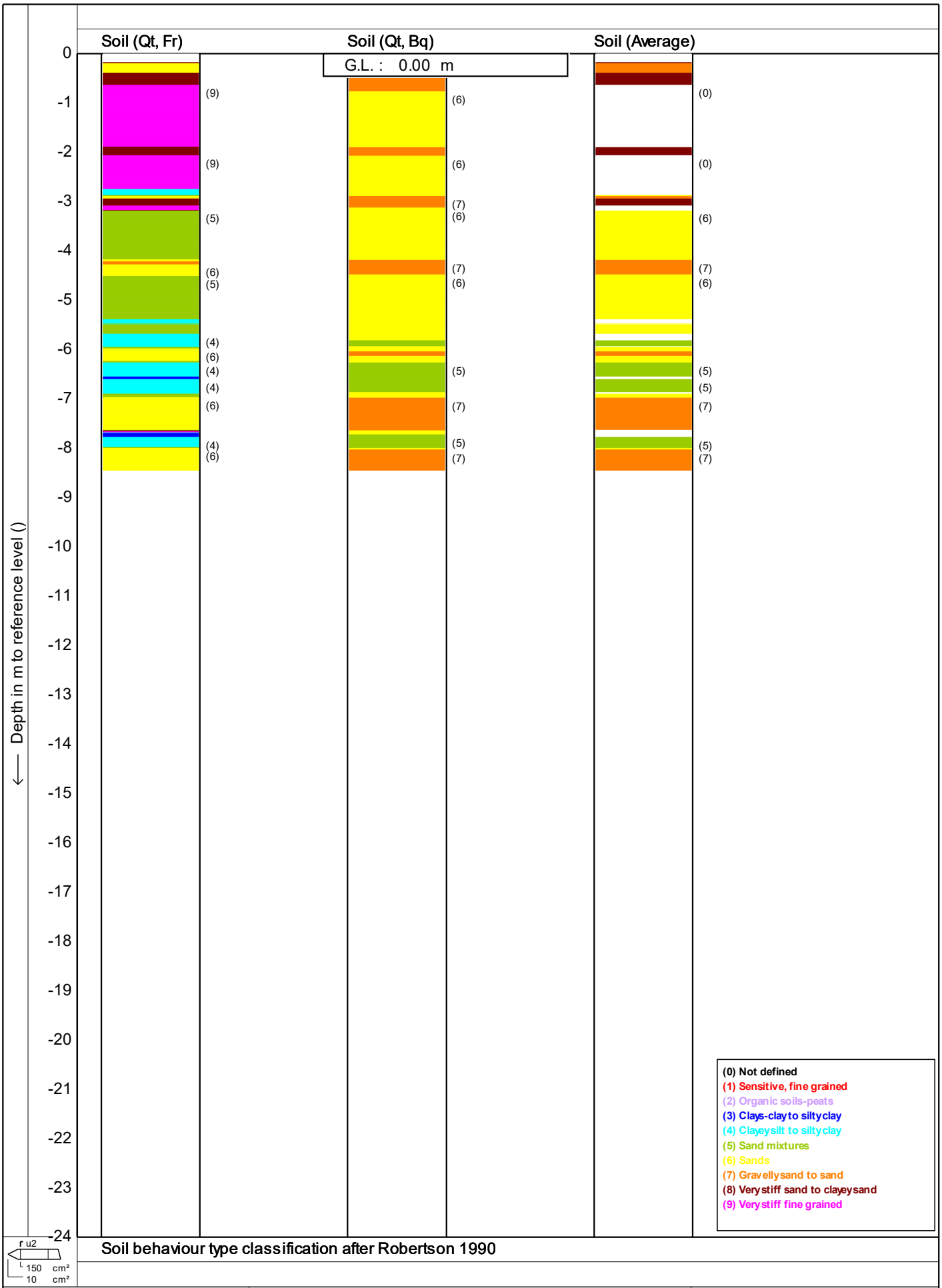
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **13/15**

1.49



Soil behaviour type classification after Robertson 1990

Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

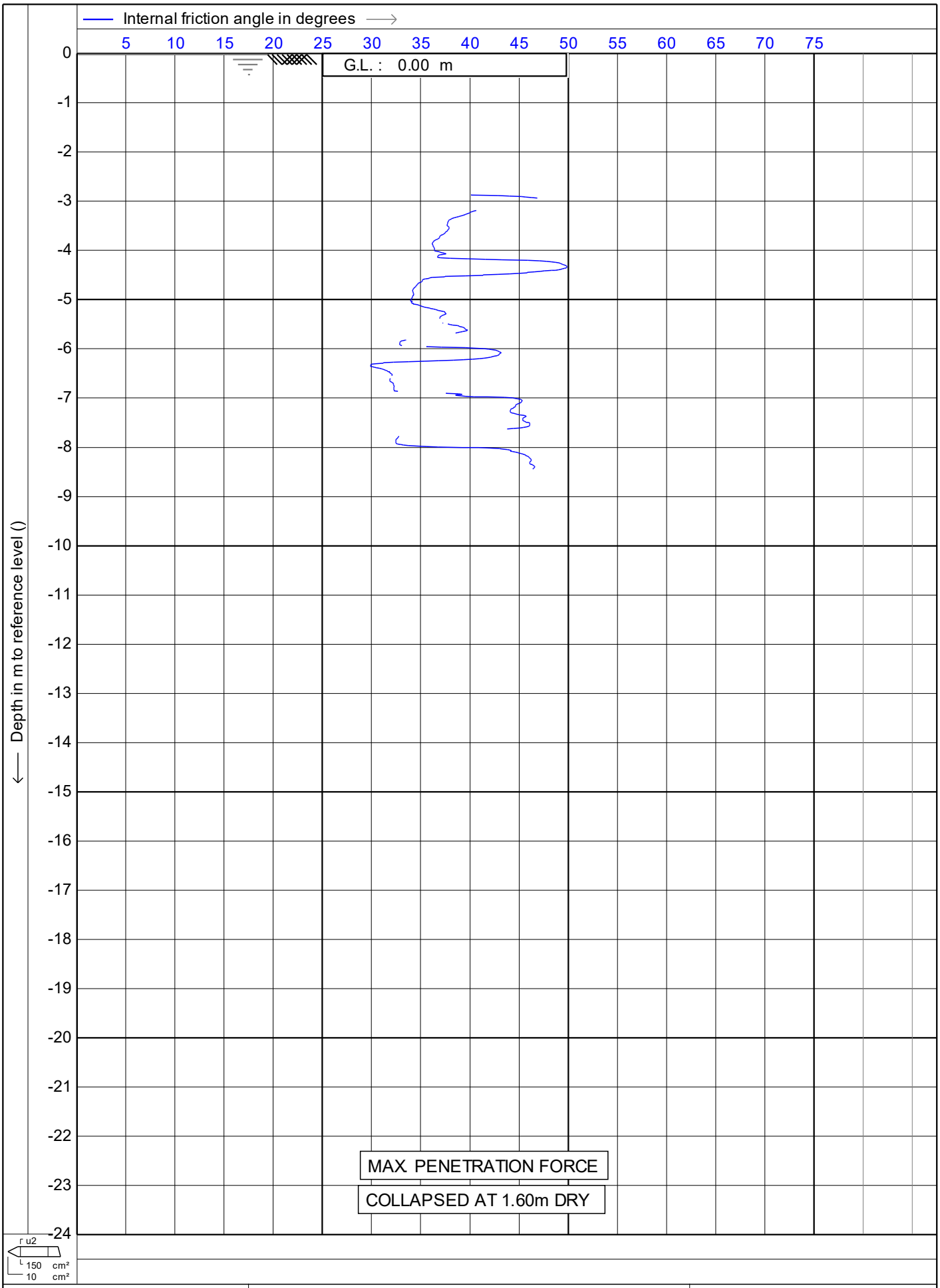
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10982, 37.14443**

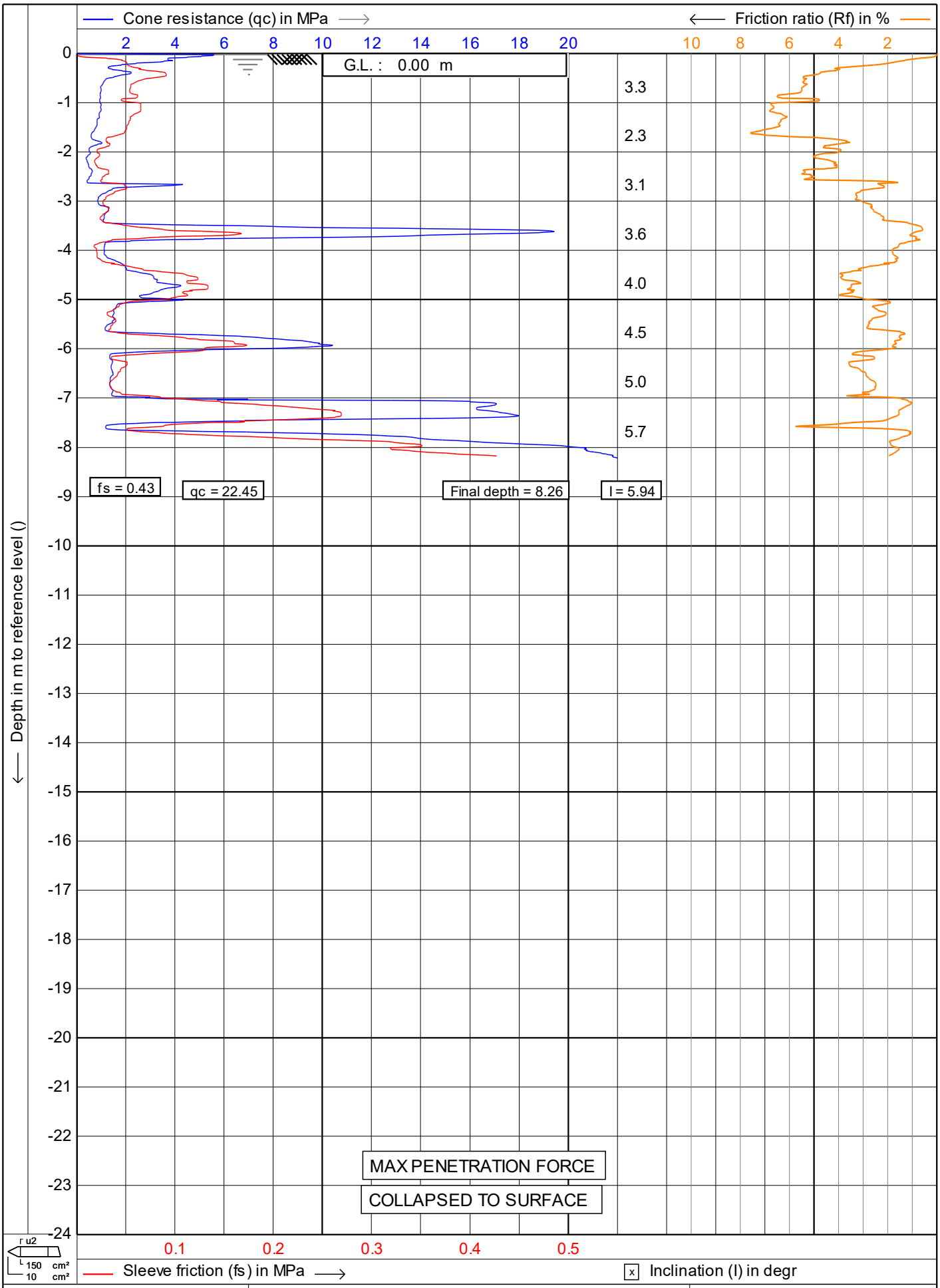
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02** **15/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

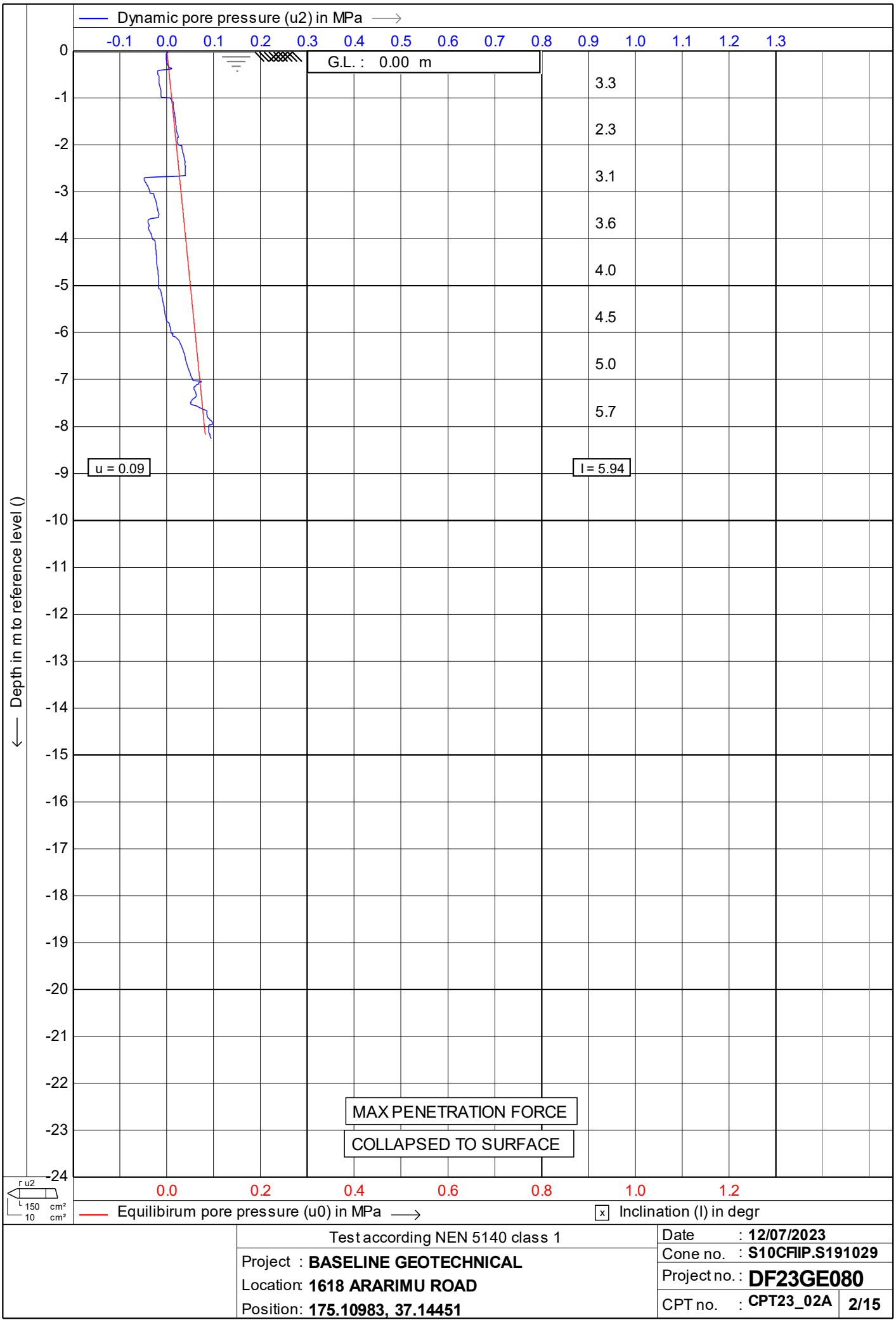
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **1/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

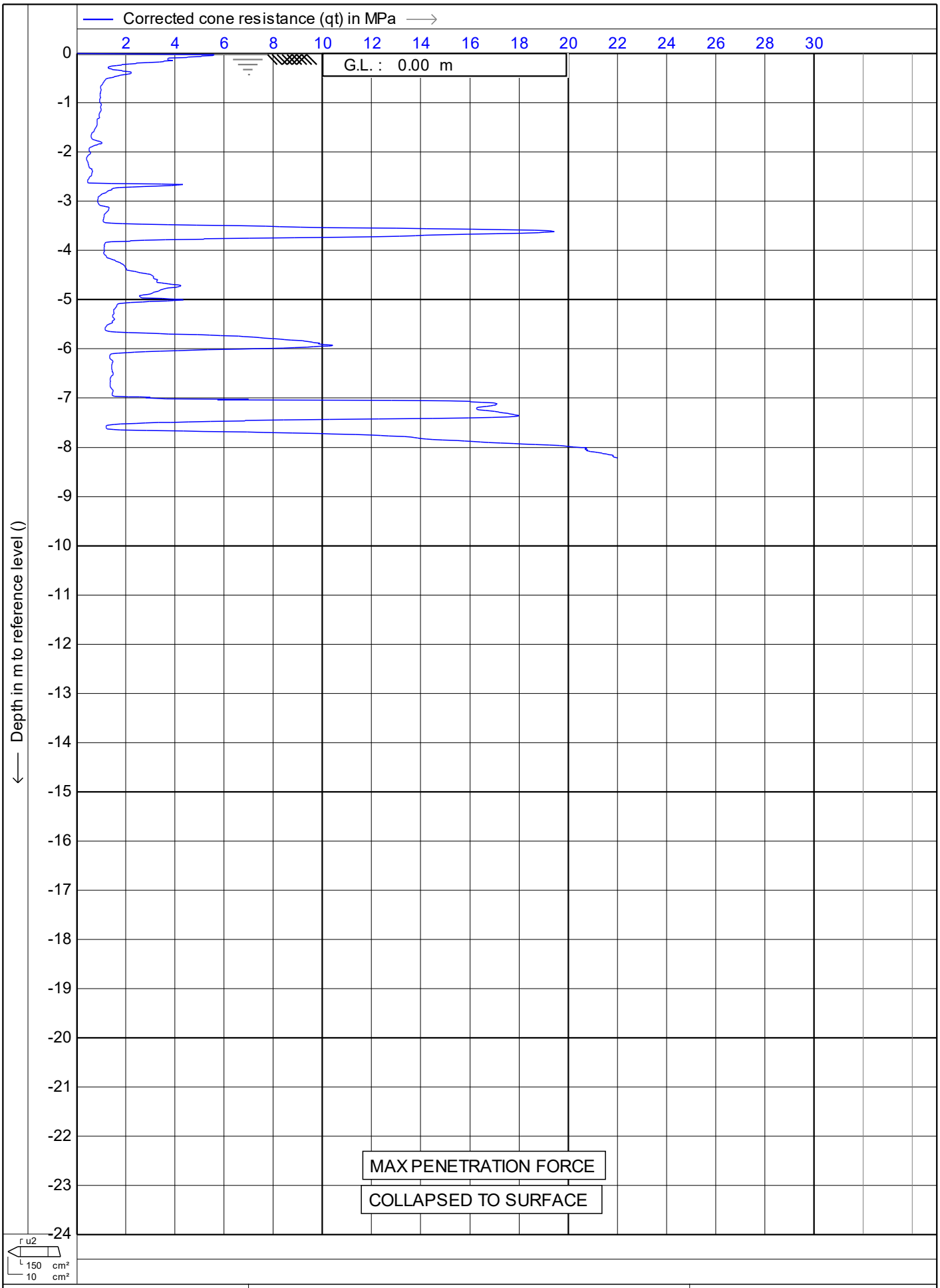
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **2/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

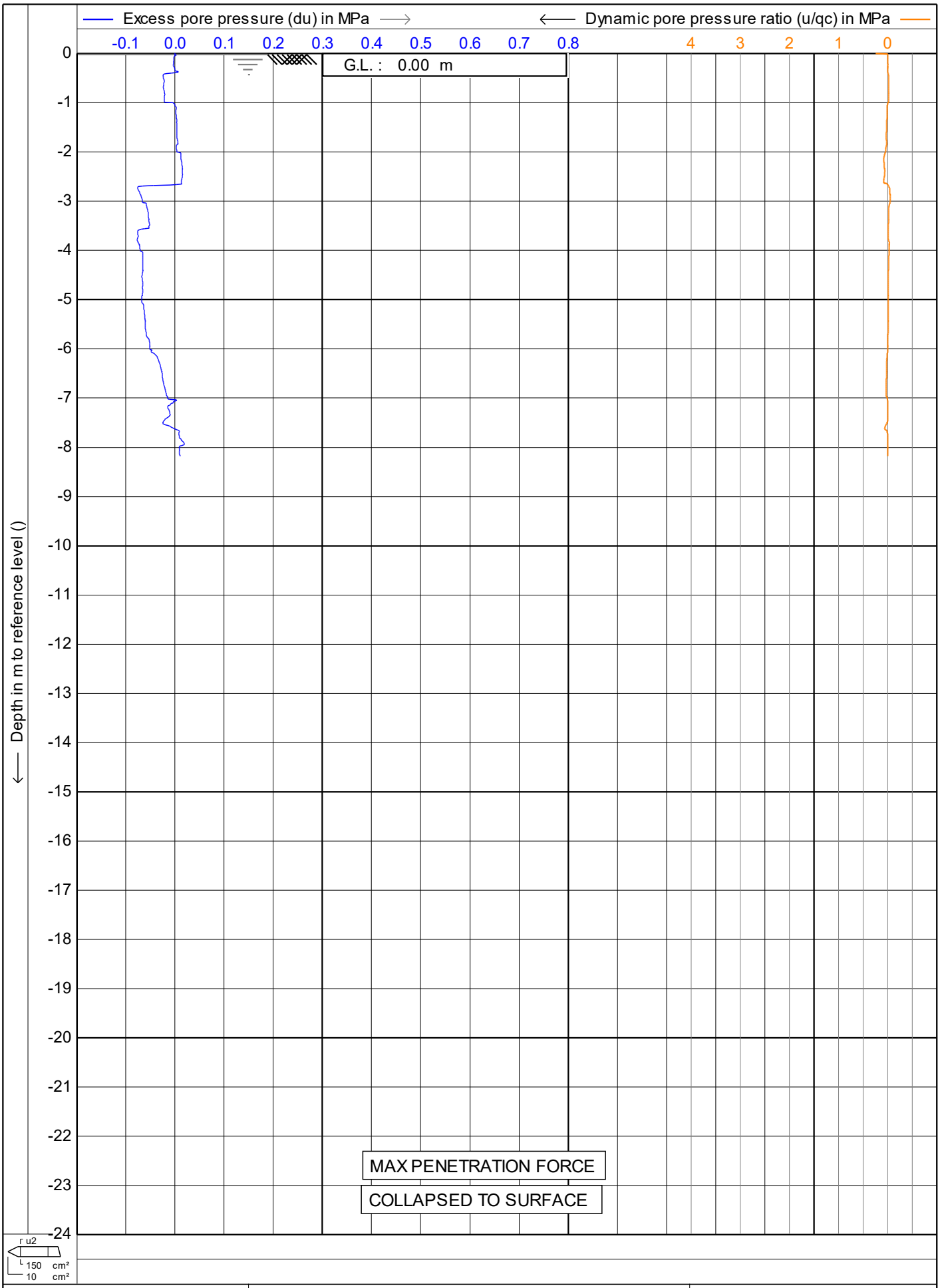
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **3/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

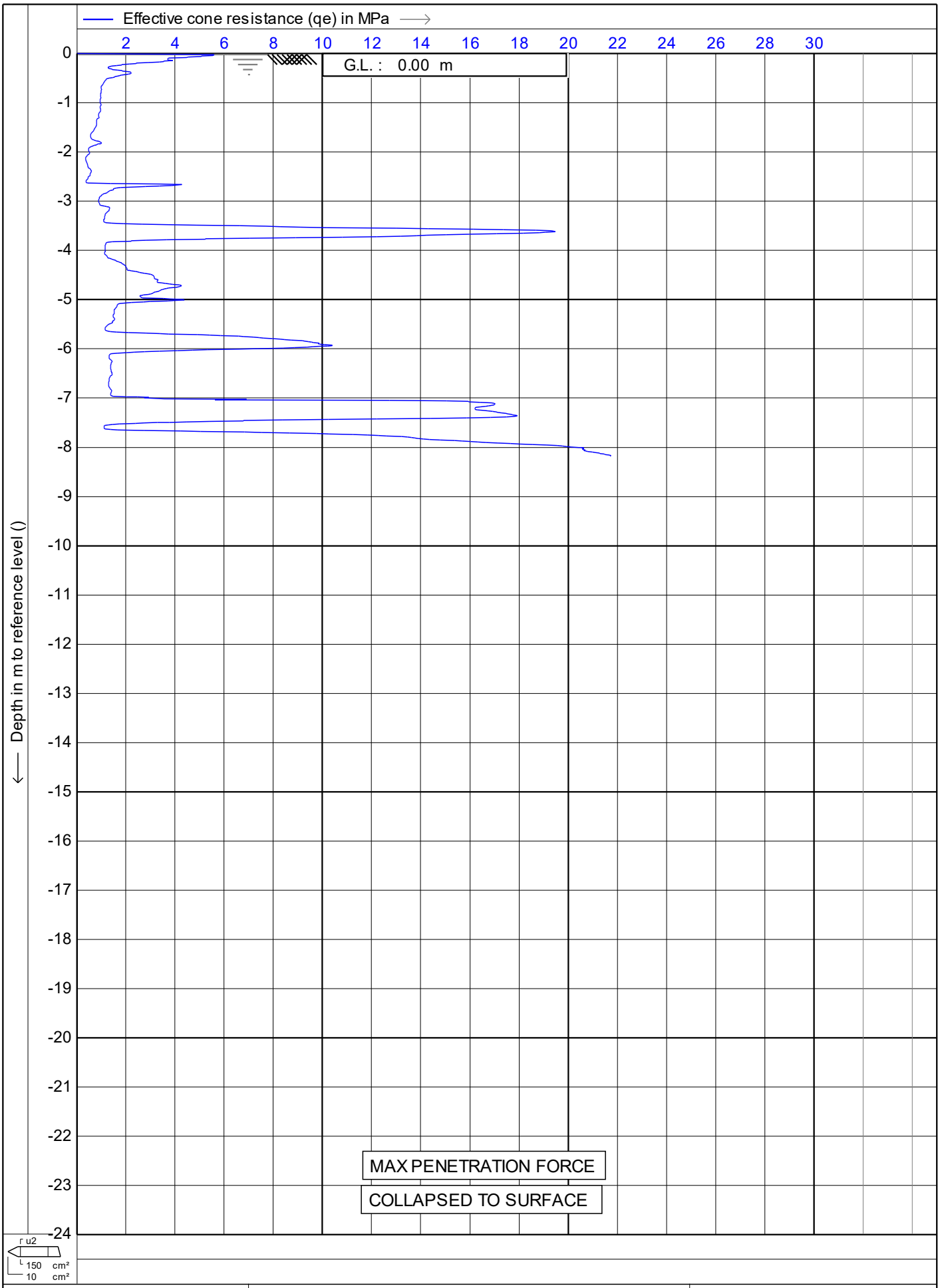
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **4/15**

1.49



Test according NEN 5140 class 1

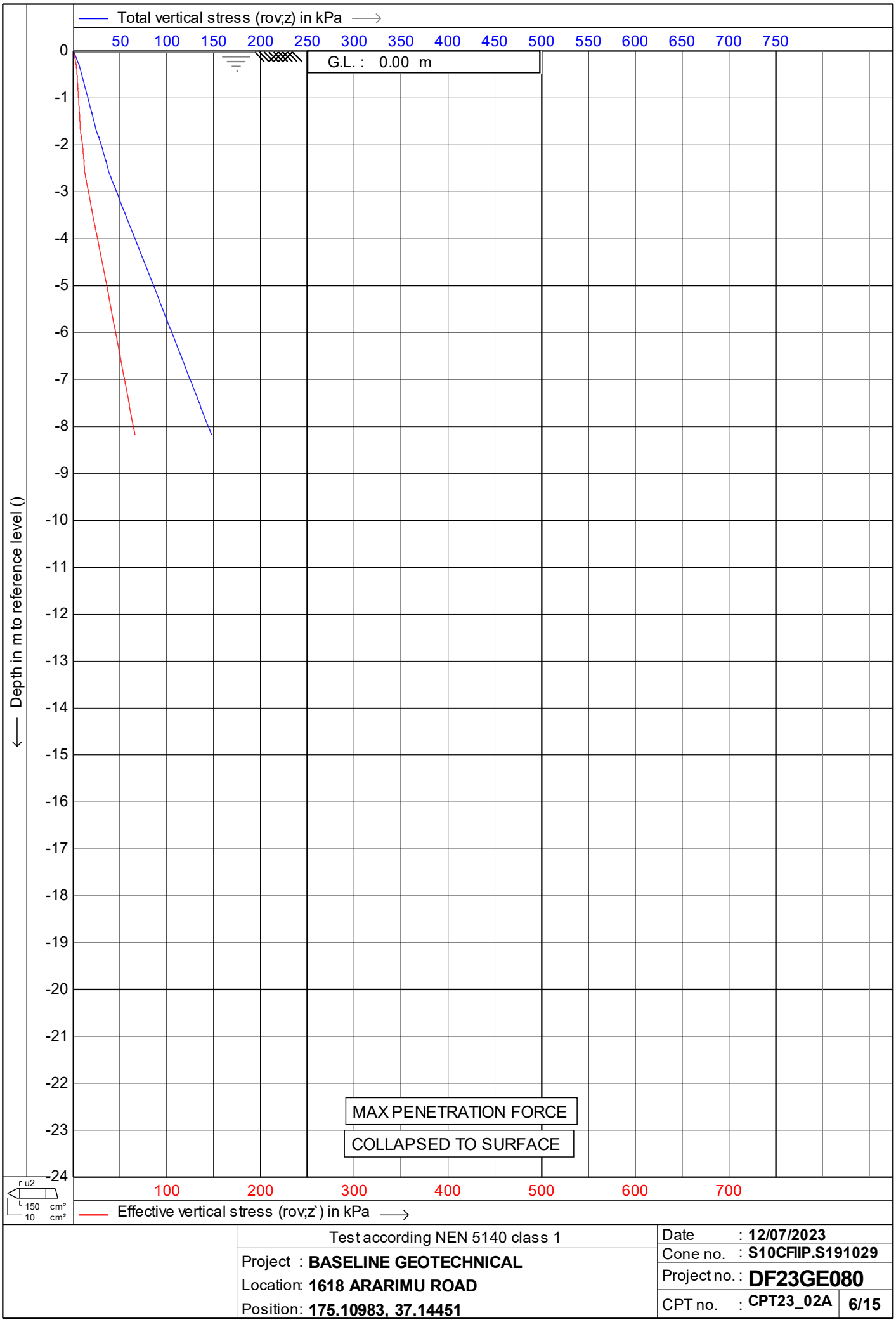
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02A** **5/15**

1.49



Test according NEN 5140 class 1

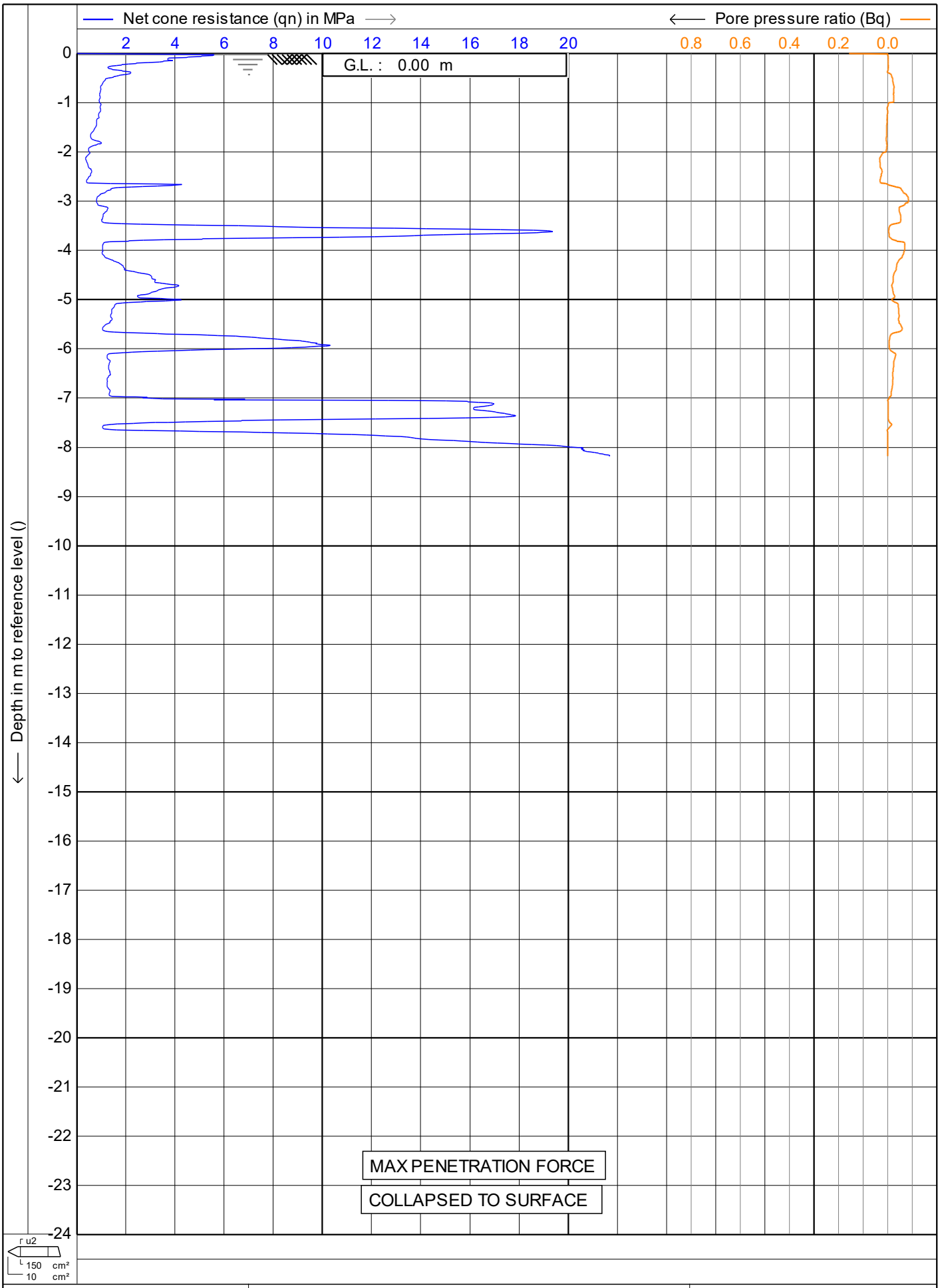
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02A** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

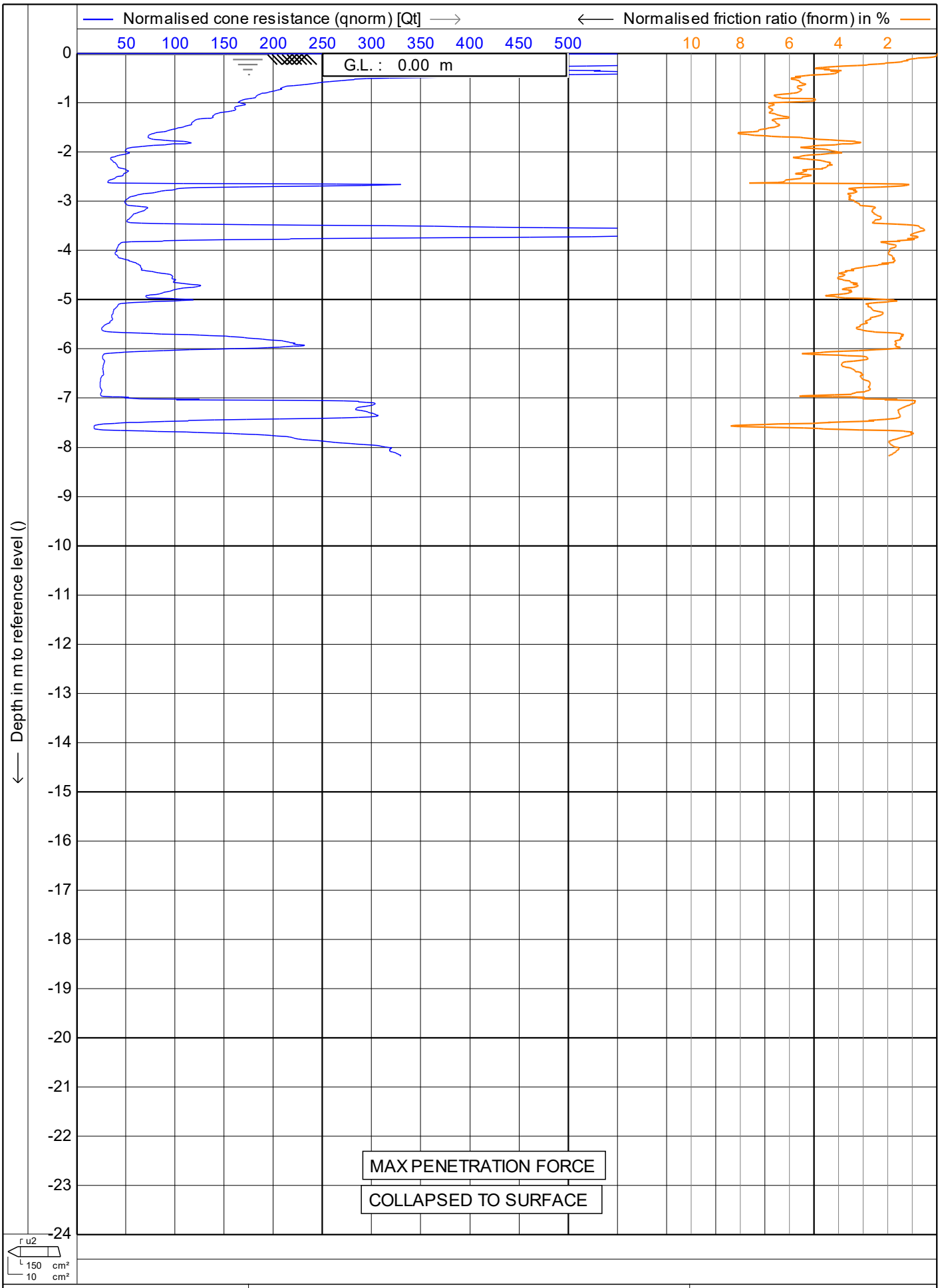
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **7/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

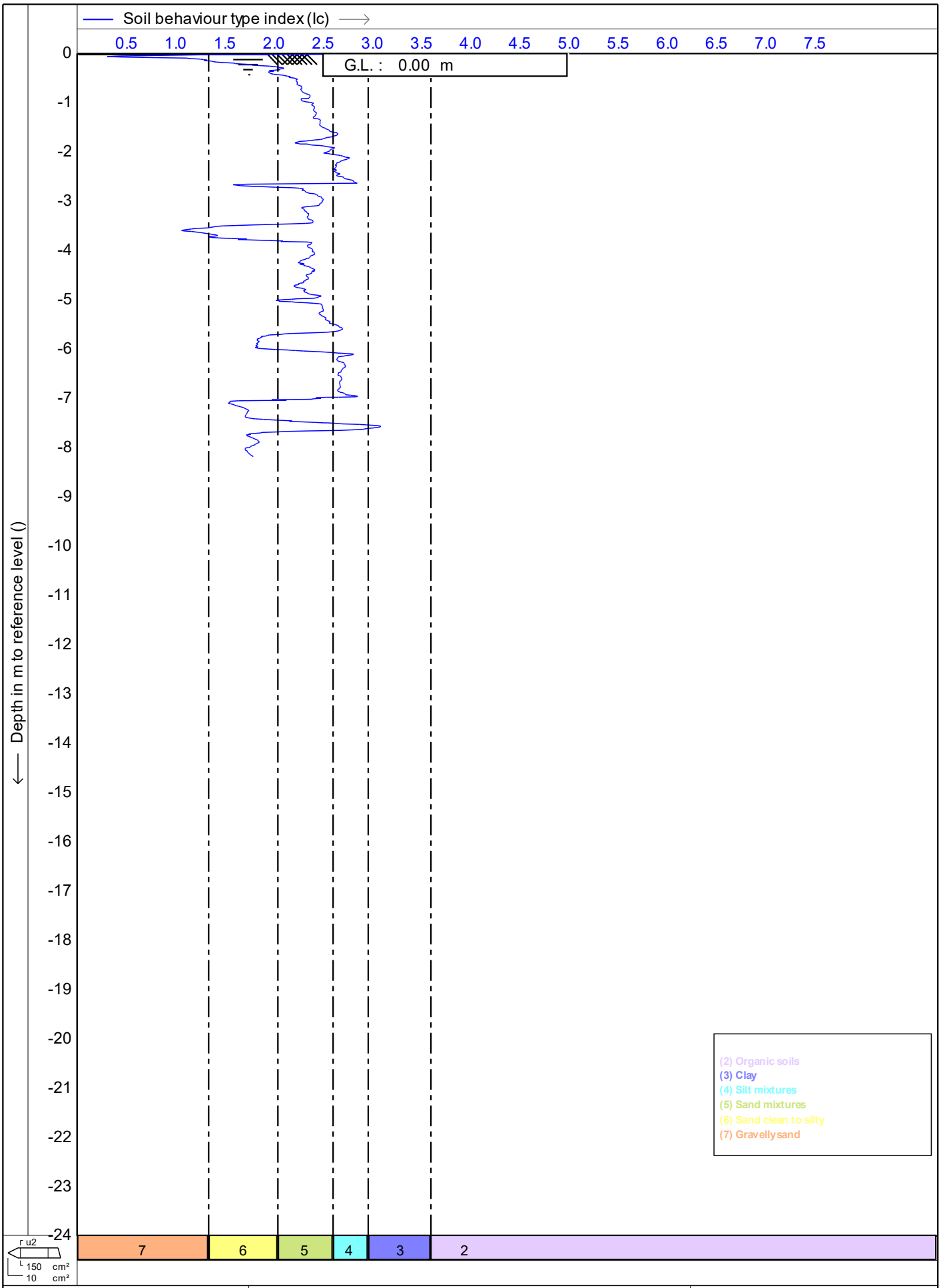
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **8/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

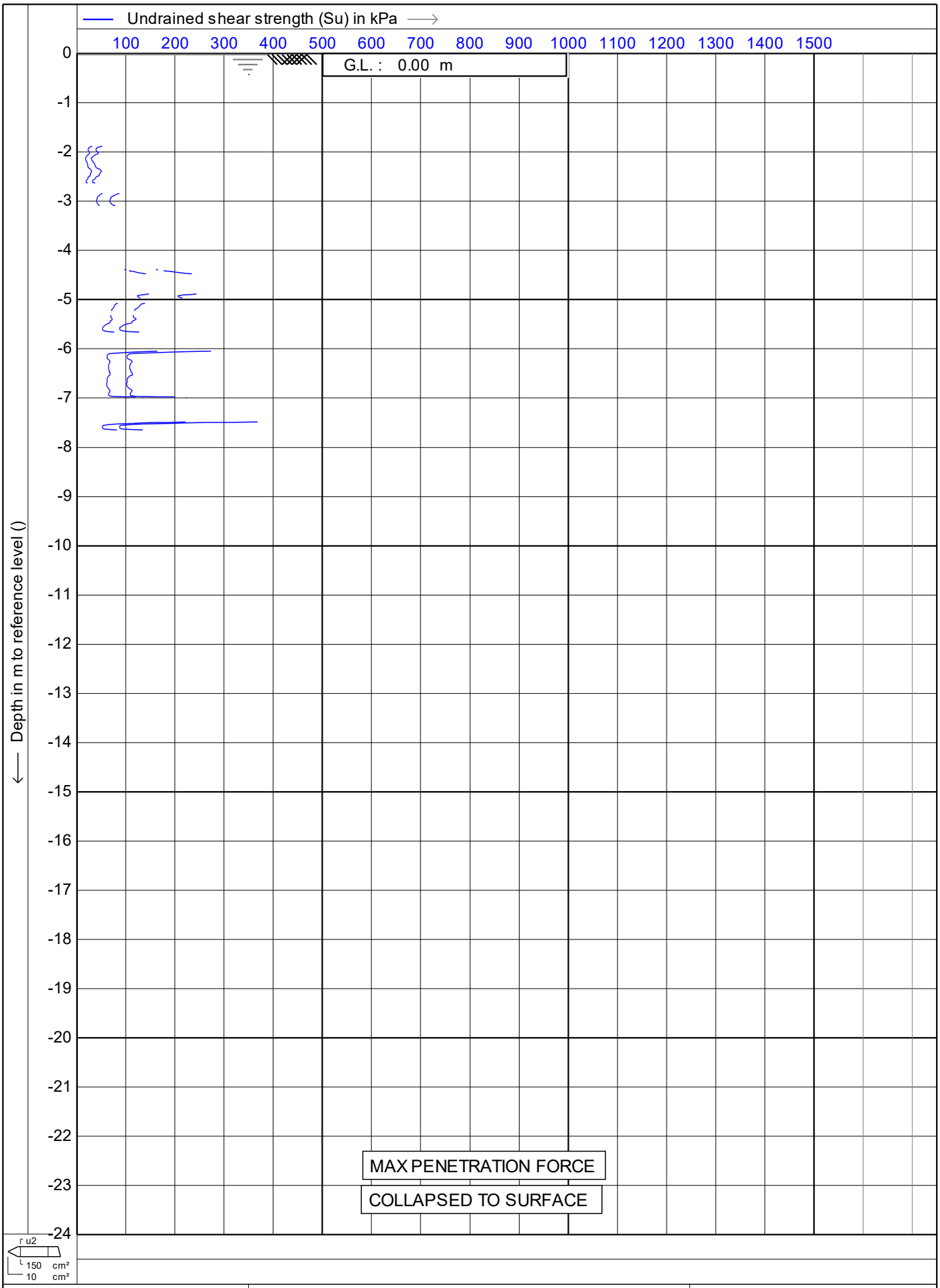
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **9/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

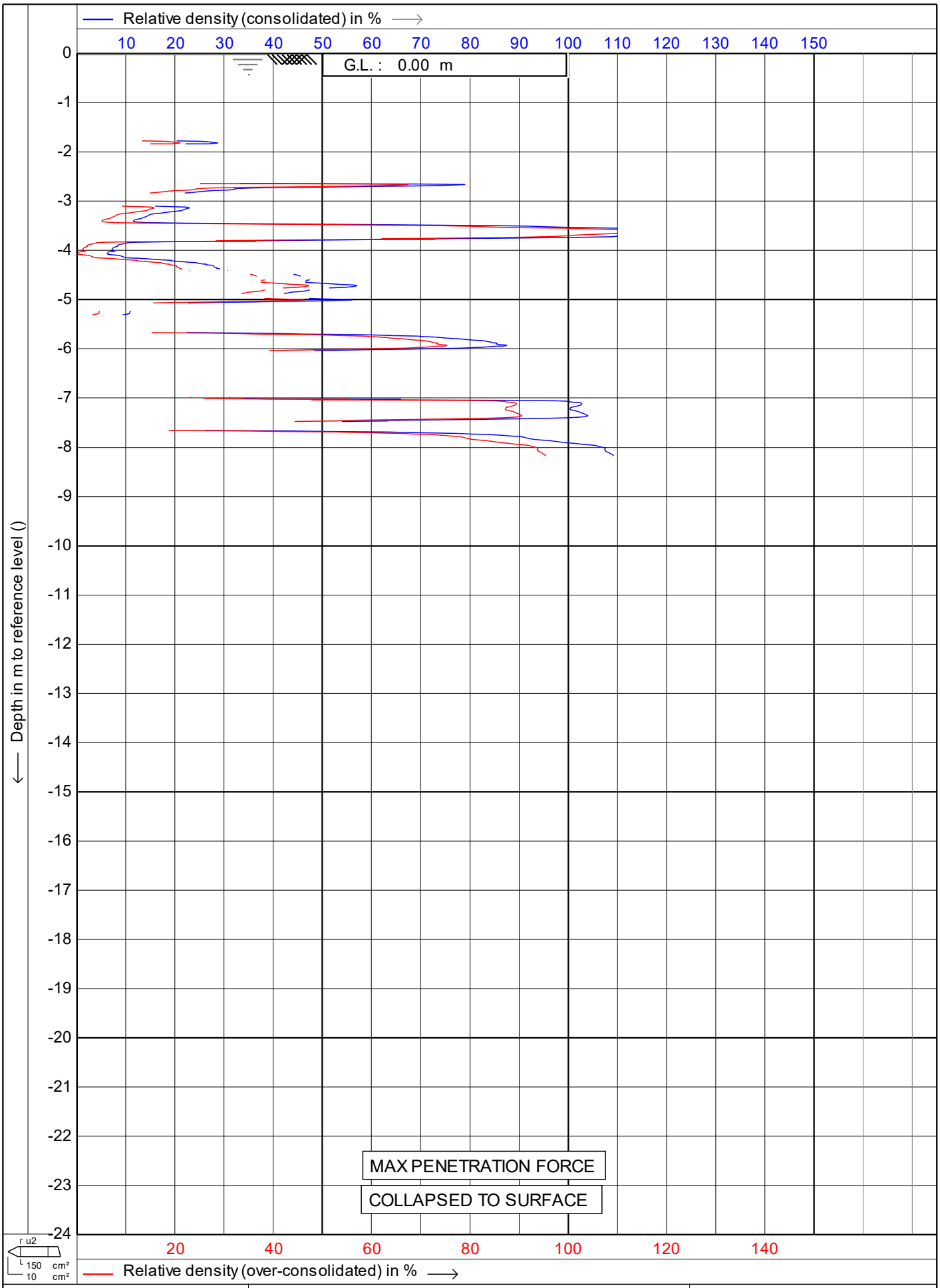
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **10/15**

1.49



Test according NEN 5140 class 1

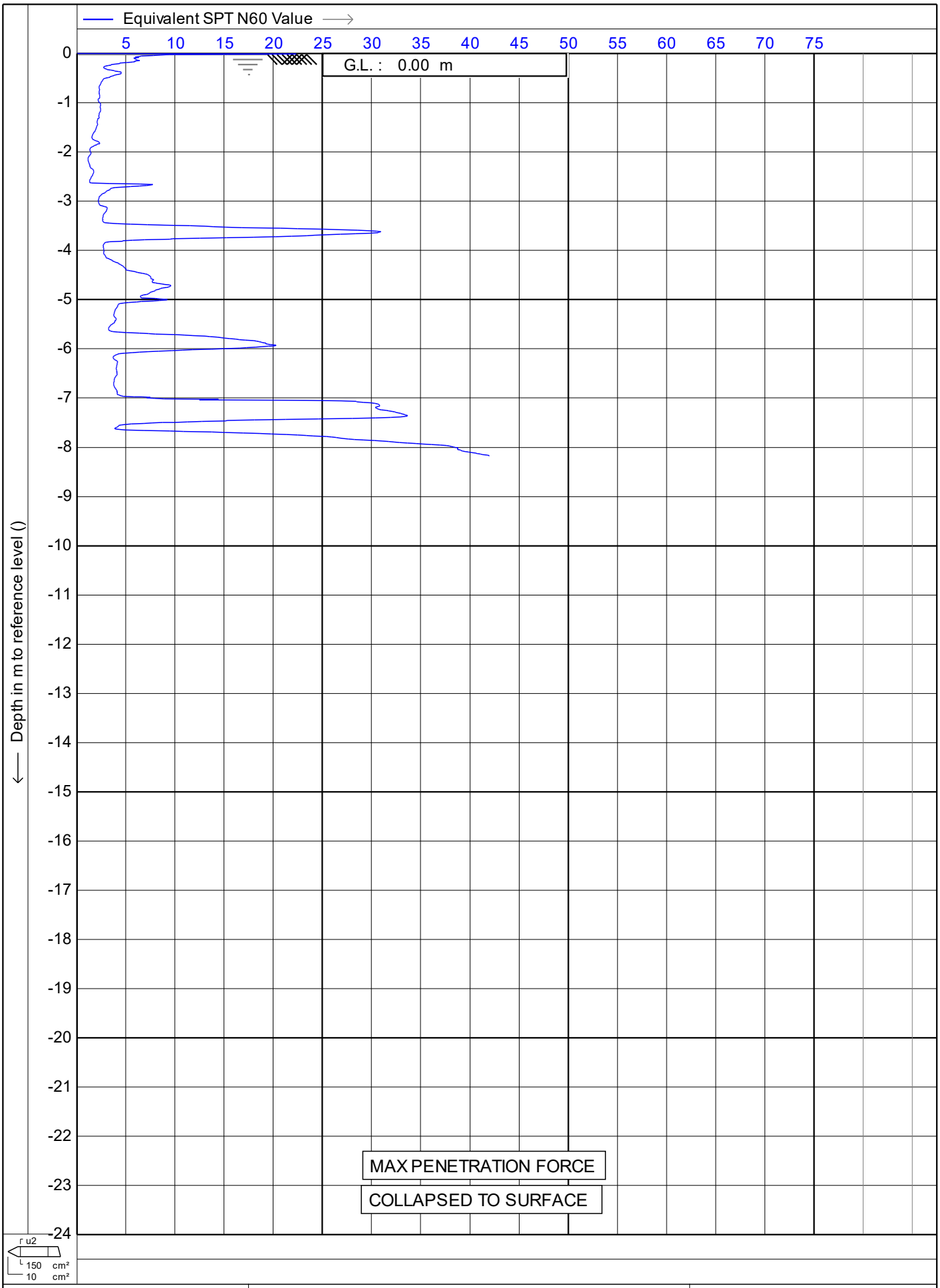
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

Date	: **12/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT23_02A** **11/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

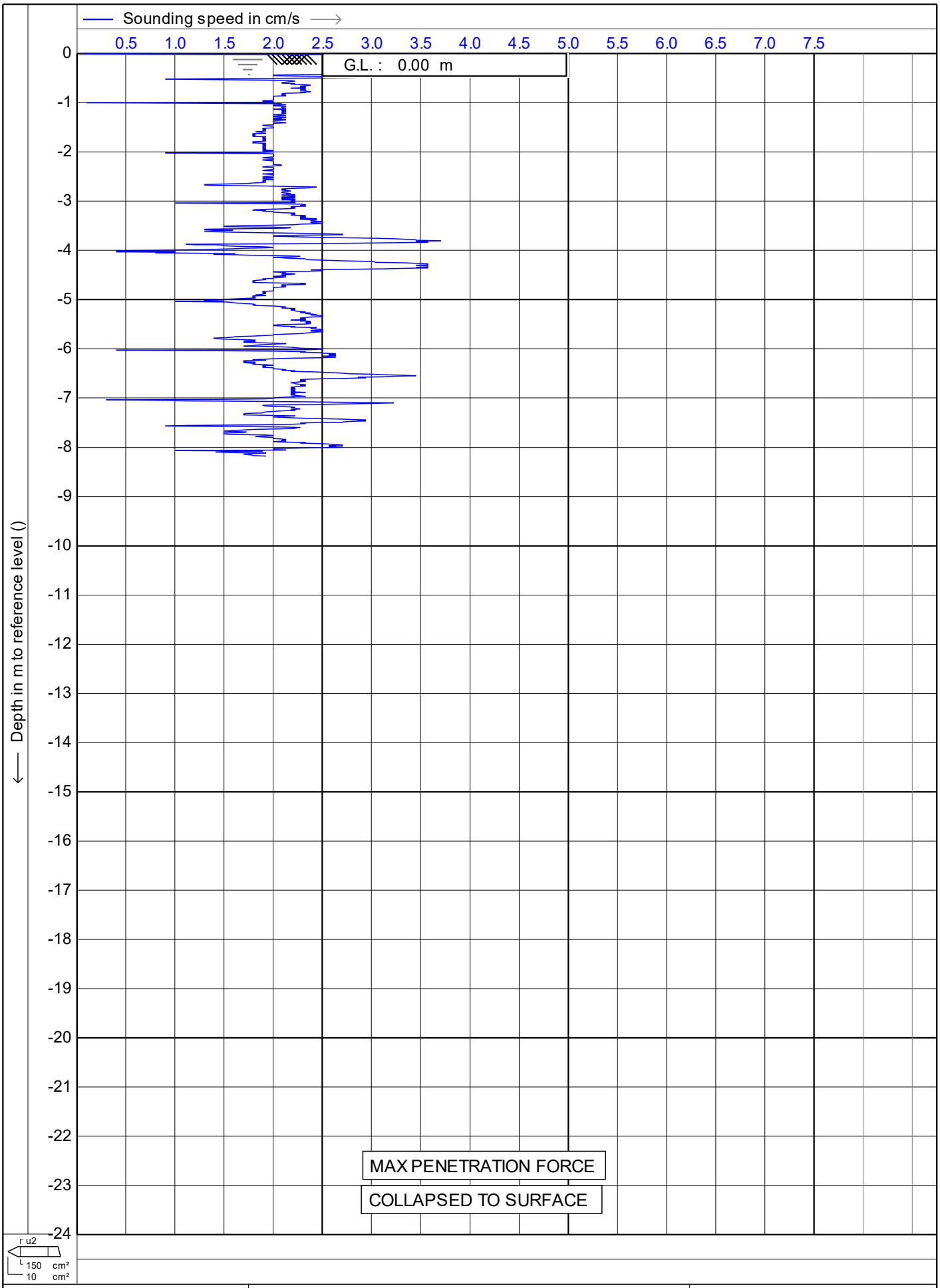
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **12/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

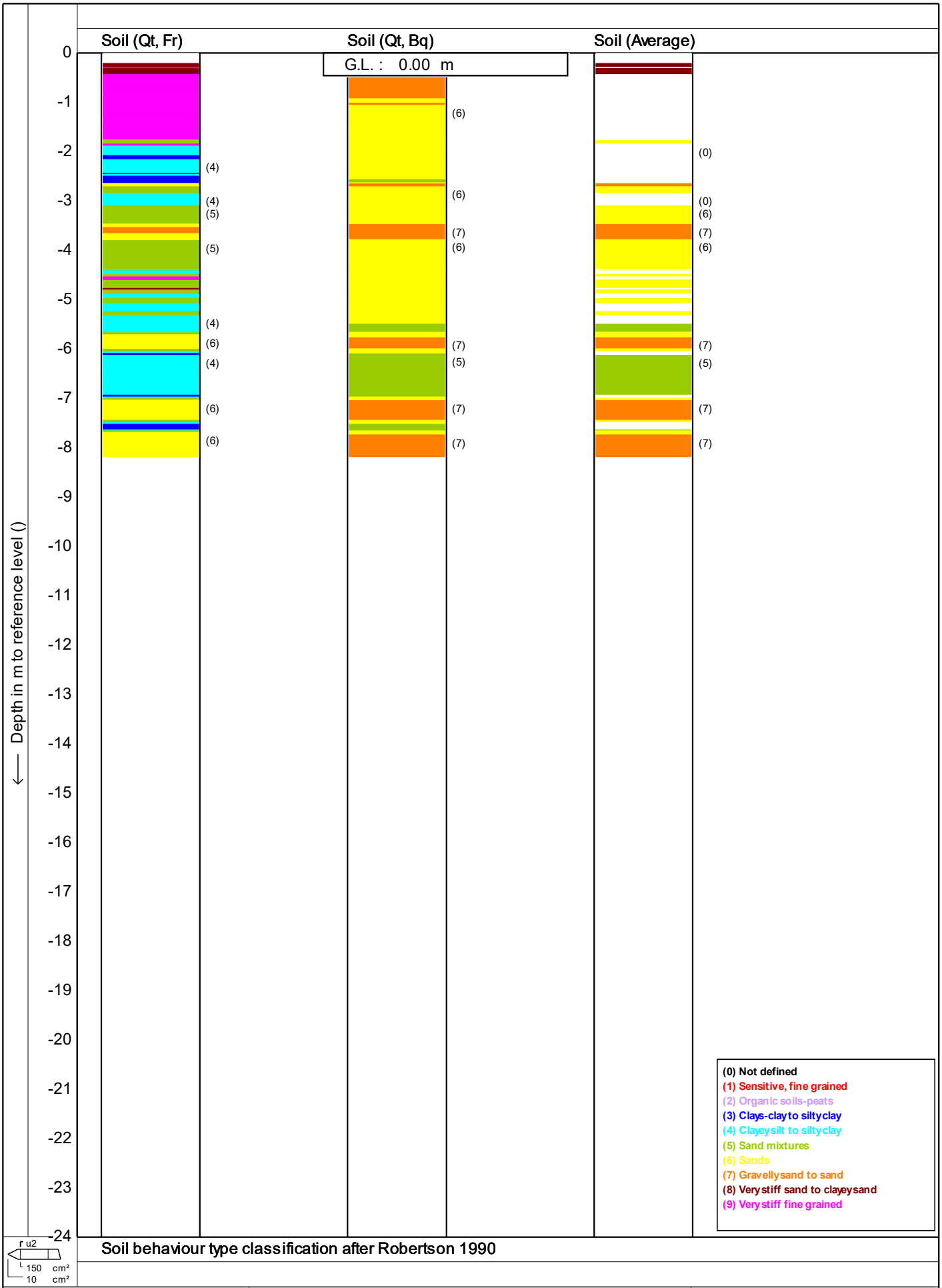
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **13/15**

1.49



Soil behaviour type classification after Robertson 1990

Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

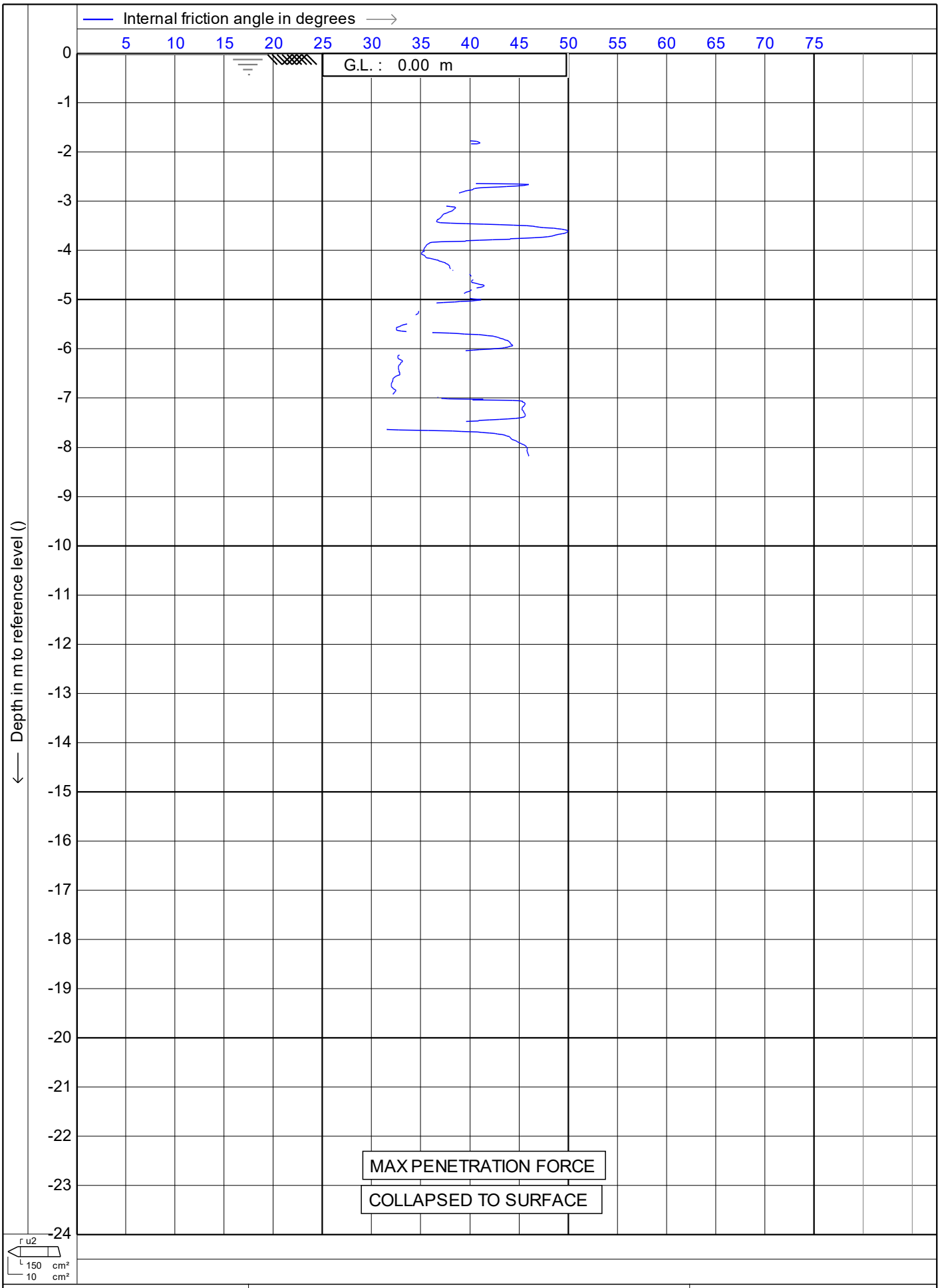
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **14/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.10983, 37.14451**

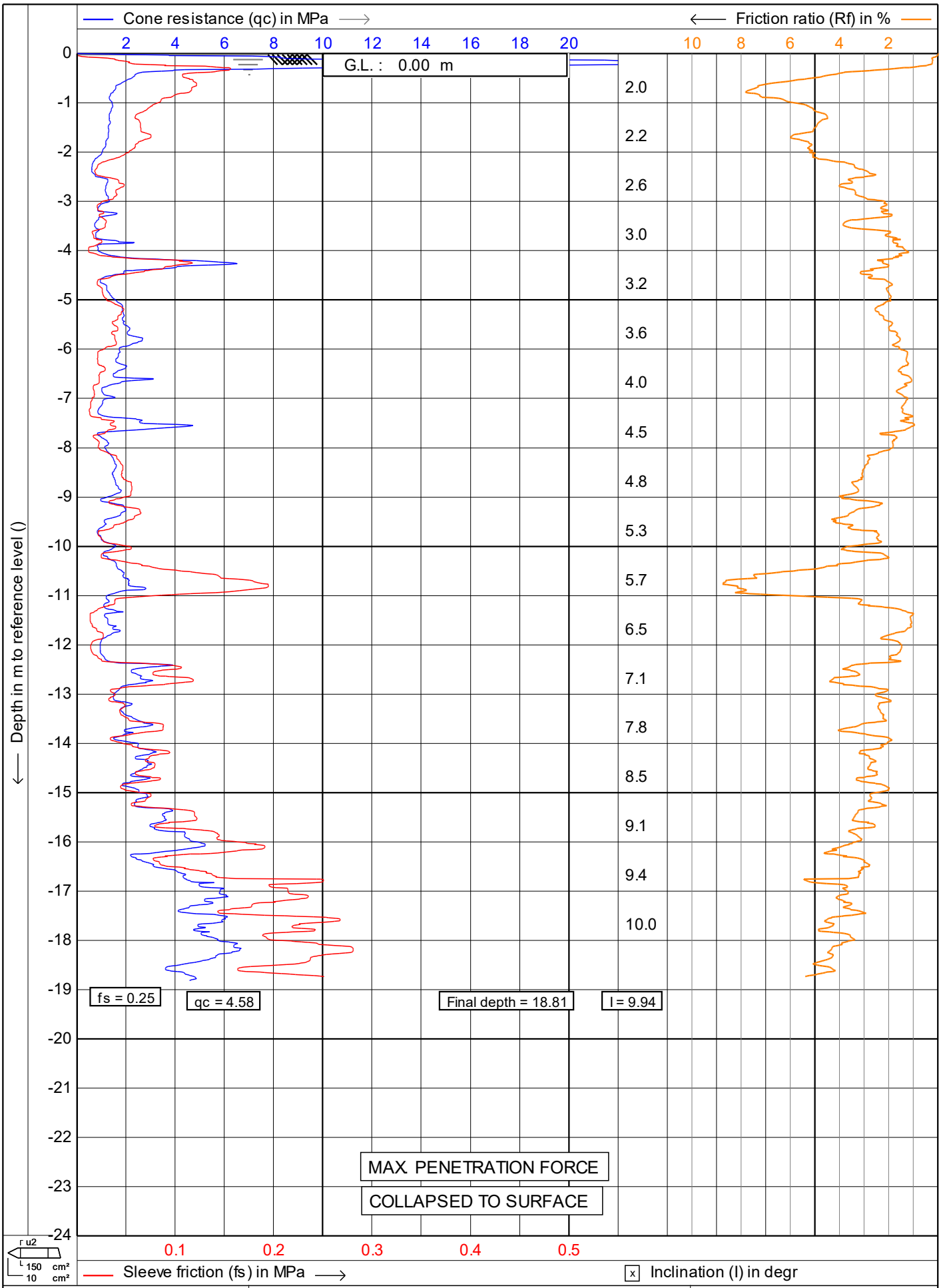
Date : **12/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT23_02A** **15/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

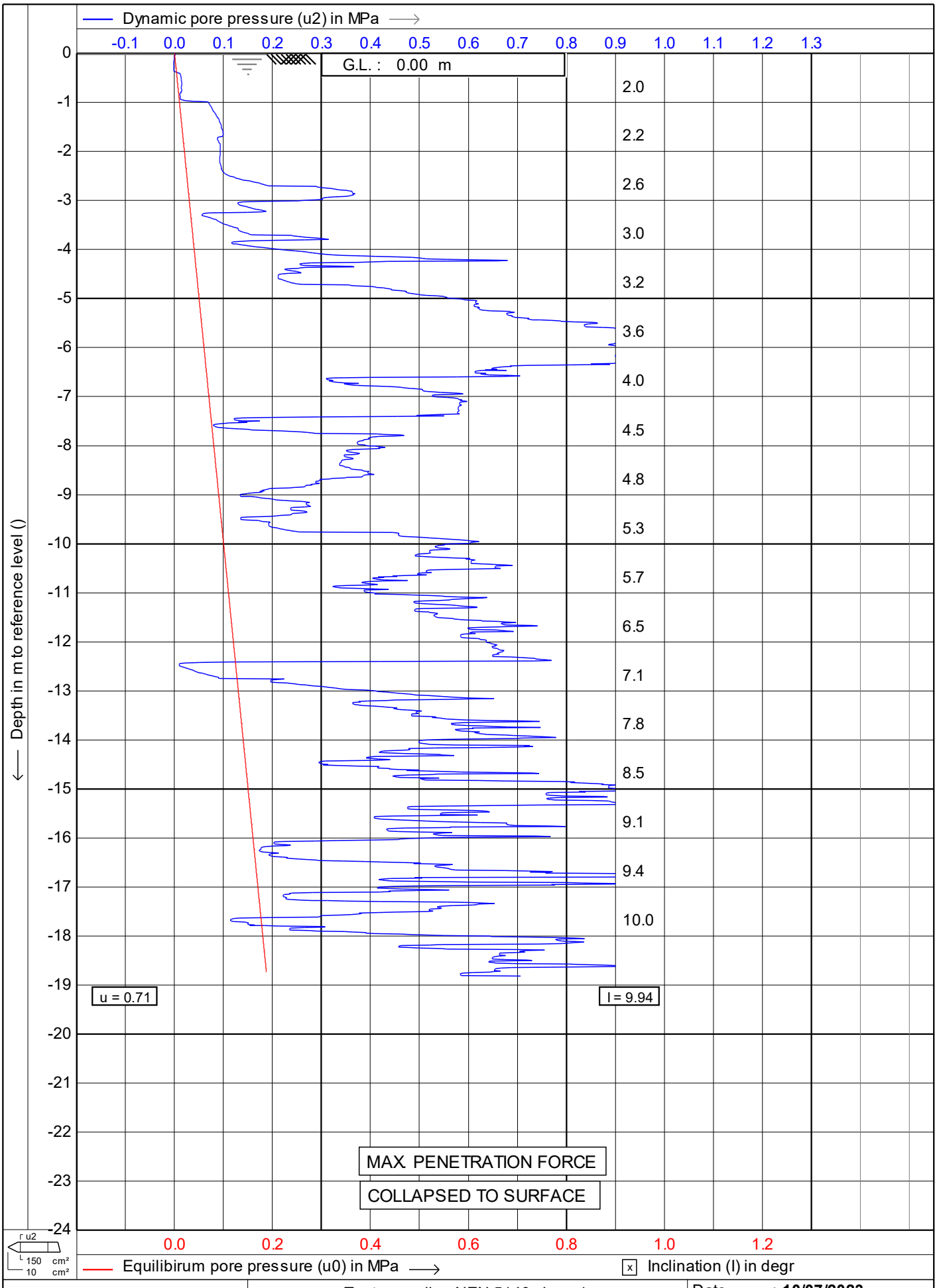
Position: **175.11115, 37.14522**

Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **1/15**



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

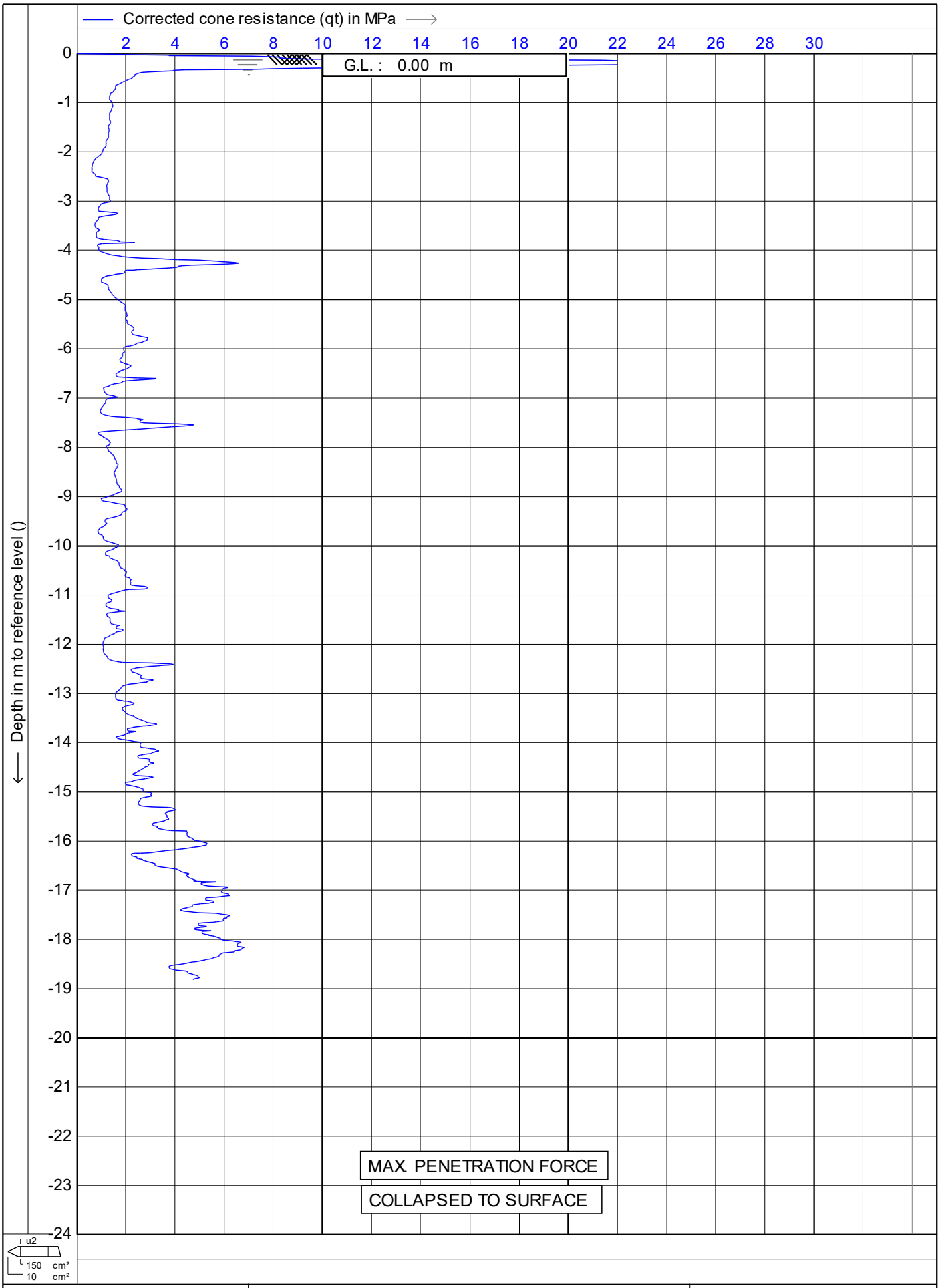
Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **2/15**

1.49



Test according NEN 5140 class 1

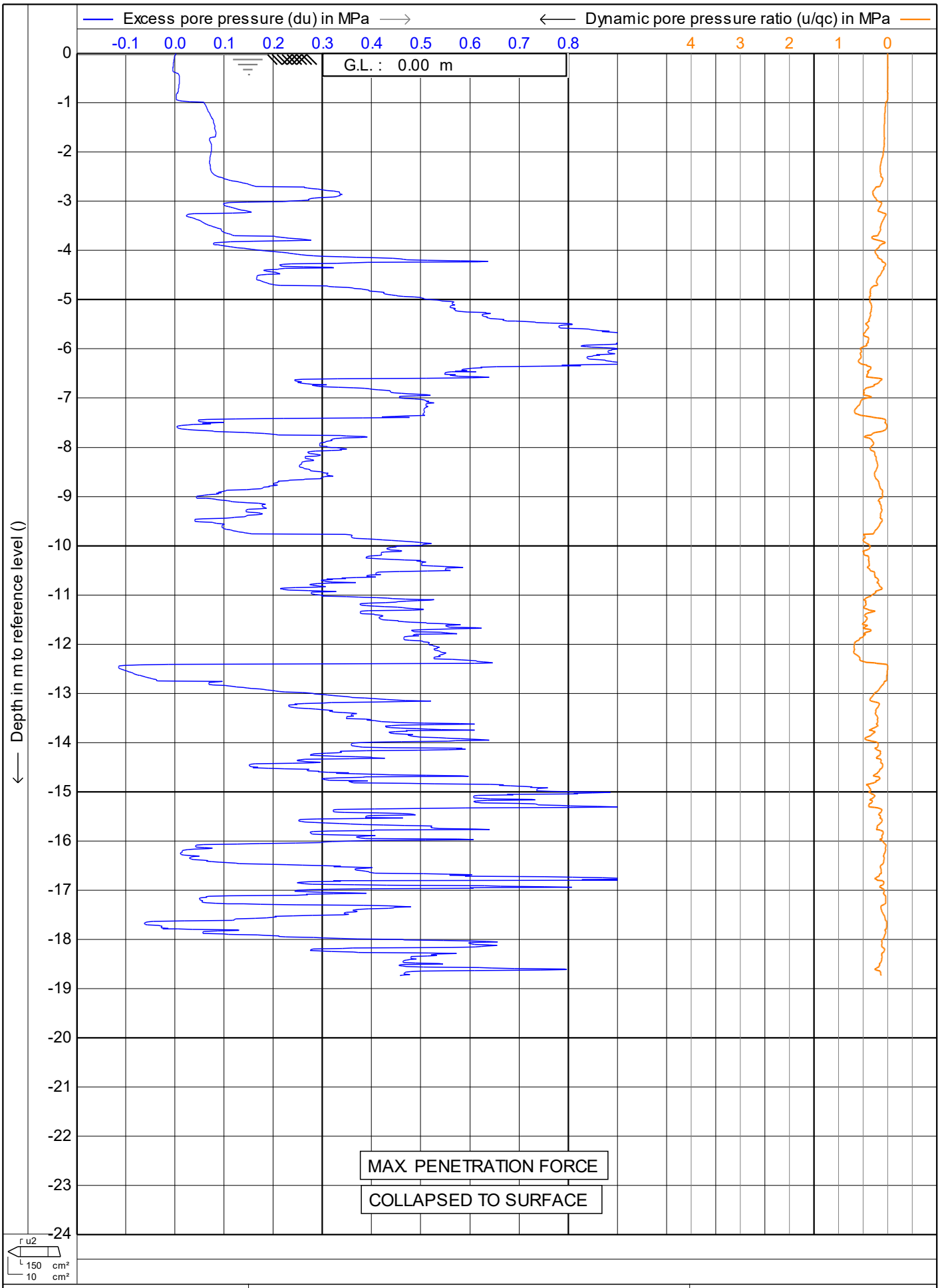
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **3/15**

1.49



Test according NEN 5140 class 1

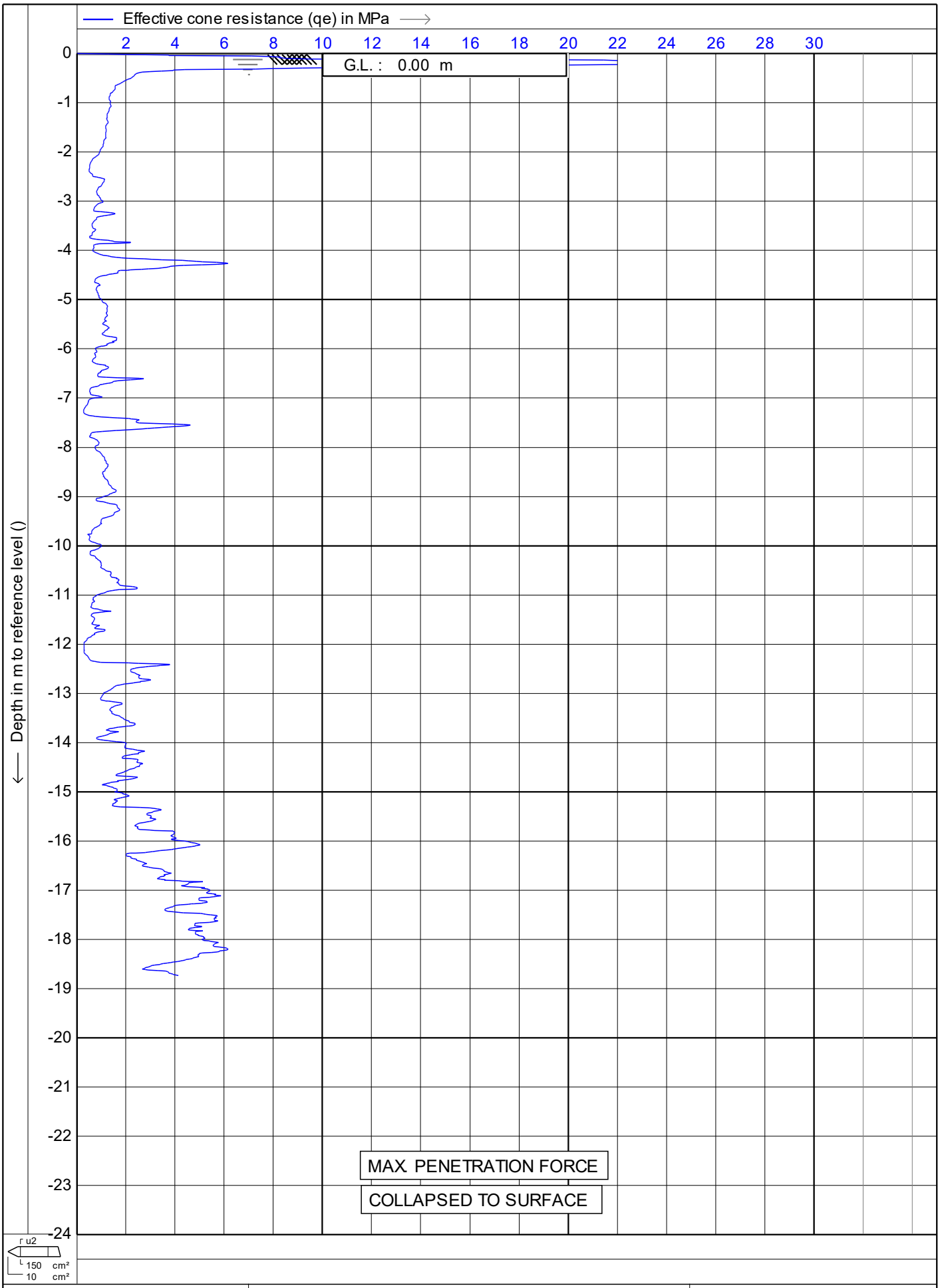
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **4/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

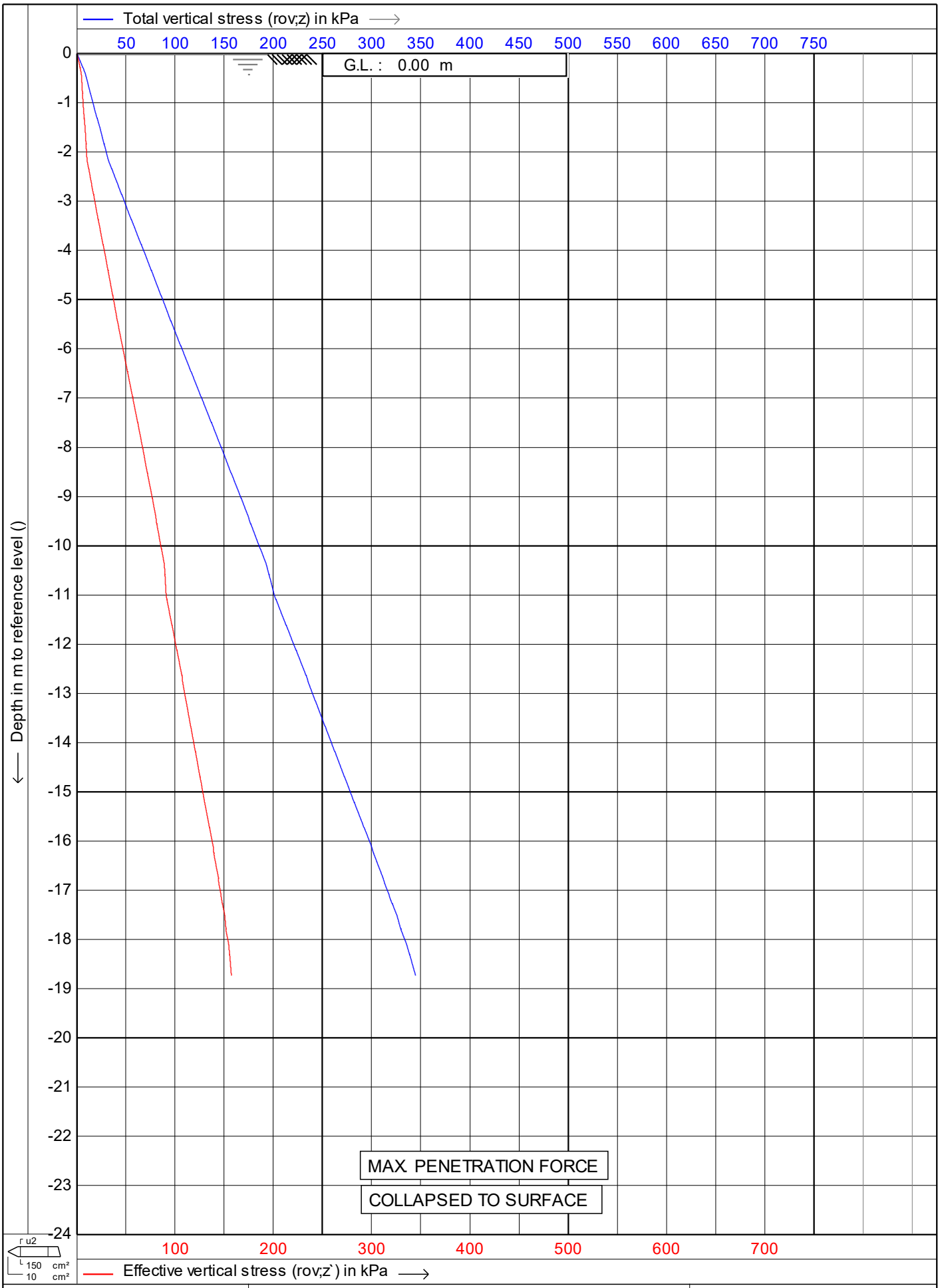
Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **5/15**

1.49



Test according NEN 5140 class 1

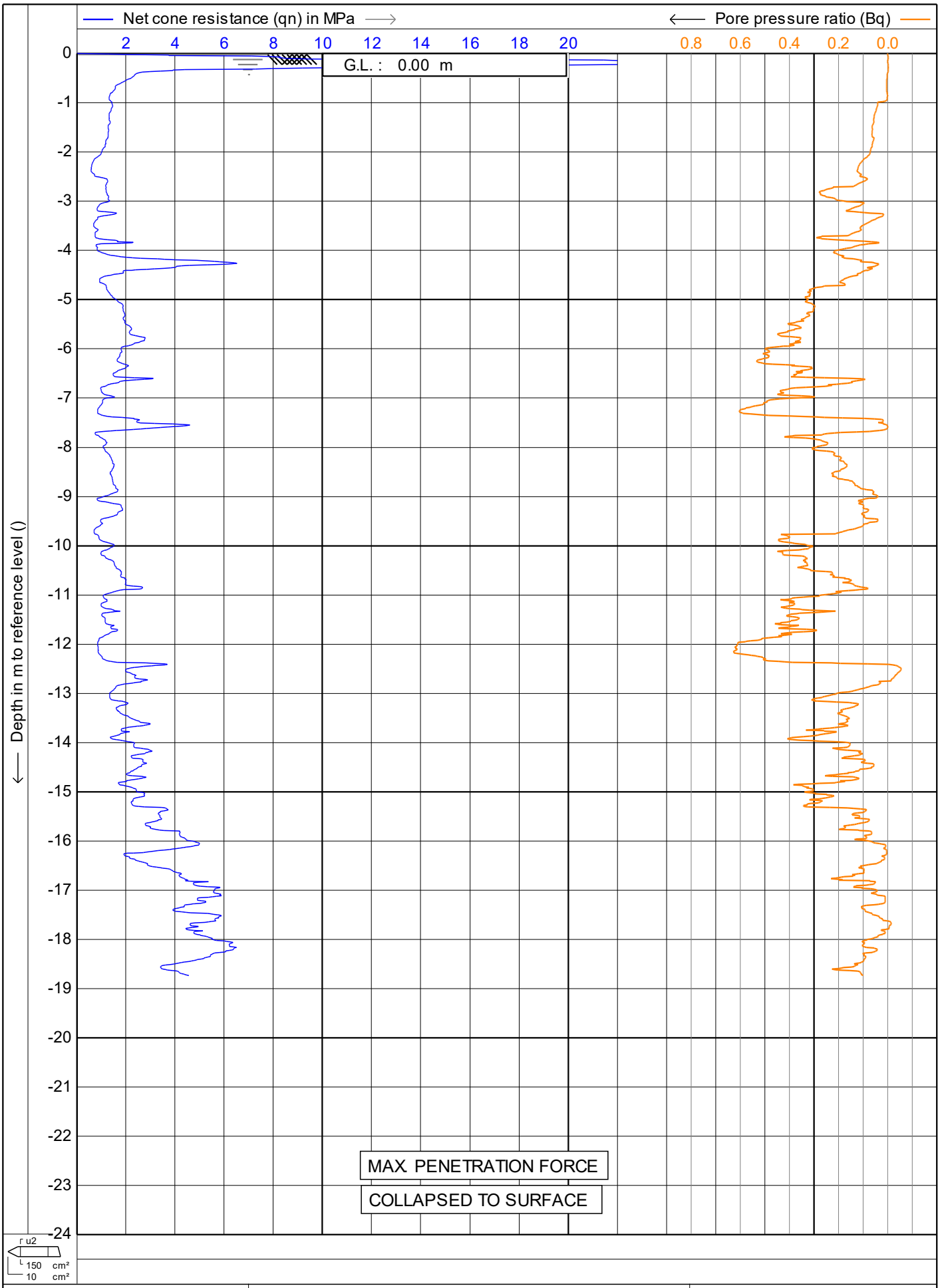
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **6/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

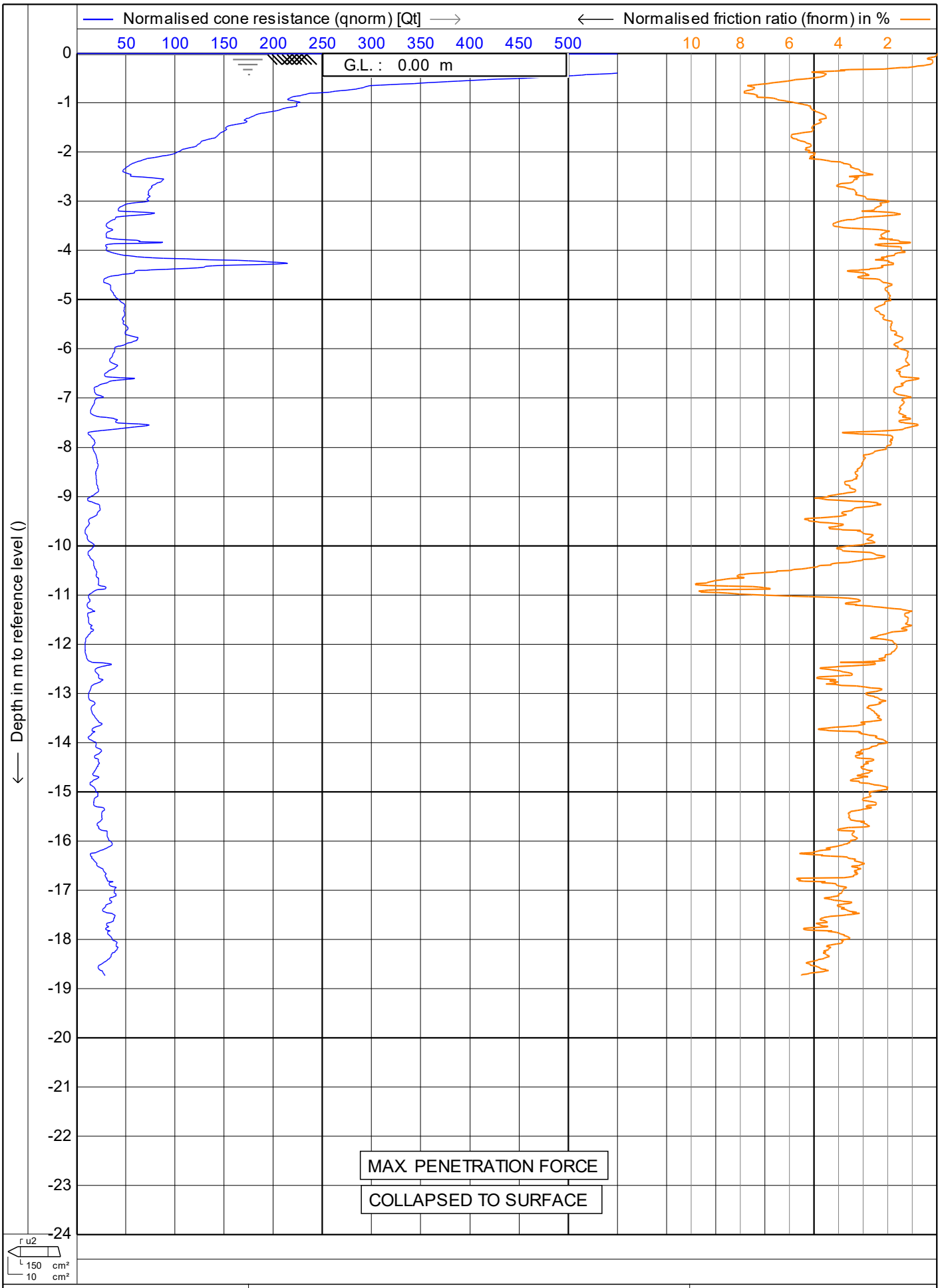
Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **7/15**

1.49



Test according NEN 5140 class 1

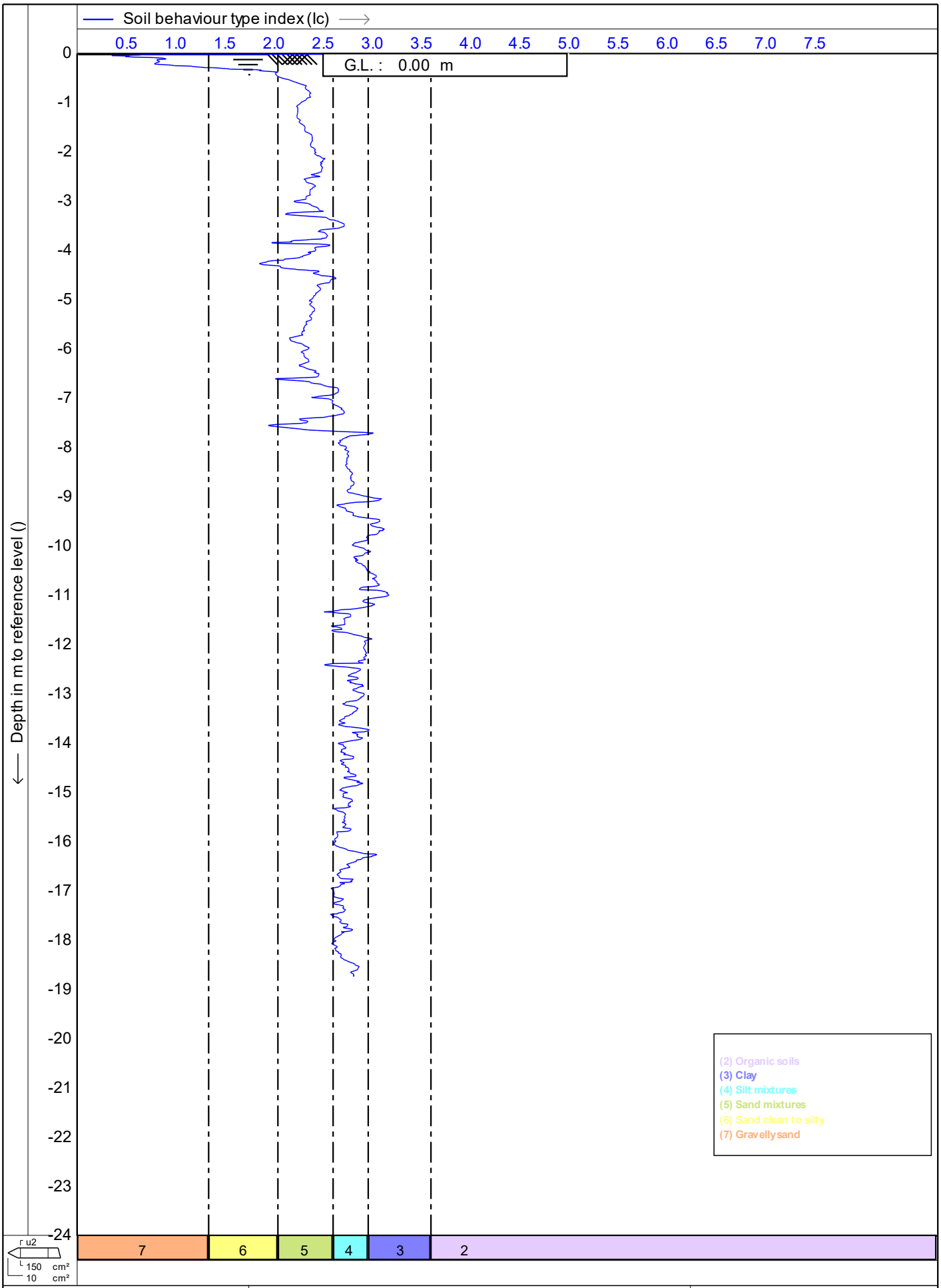
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

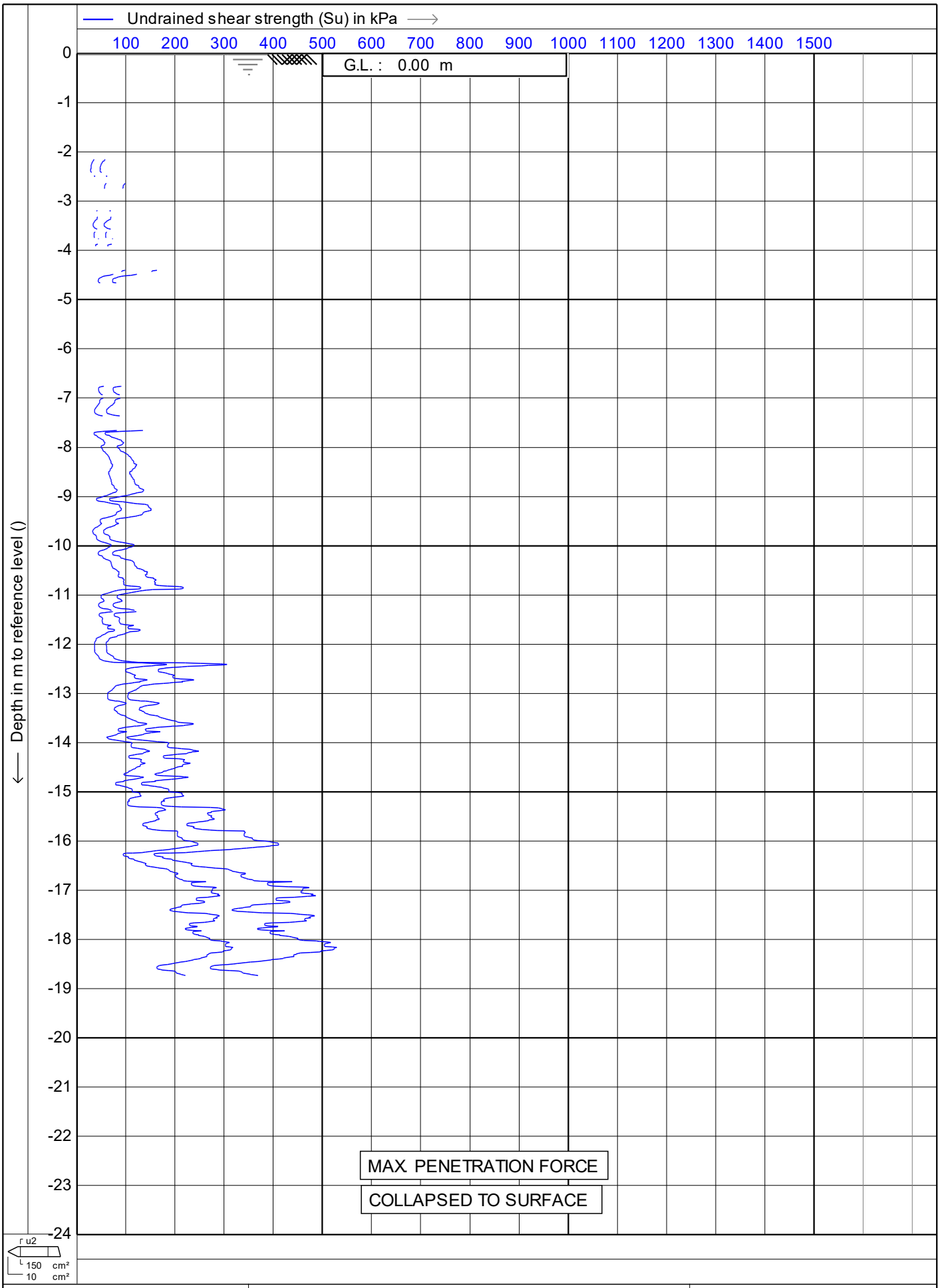
Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **8/15**

1.49



	Test according NEN 5140 class 1	Date : **10/07/2023**
	Project : **BASELINE GEOTECHNICAL**	Cone no. : **S10CFIIP.S191029**
	Location: **1618 ARARIMU ROAD**	Project no. : **DF23GE080**
	Position: **175.11115, 37.14522**	CPT no. : **CPT-23-03** **9/15**

1.49



Test according NEN 5140 class 1

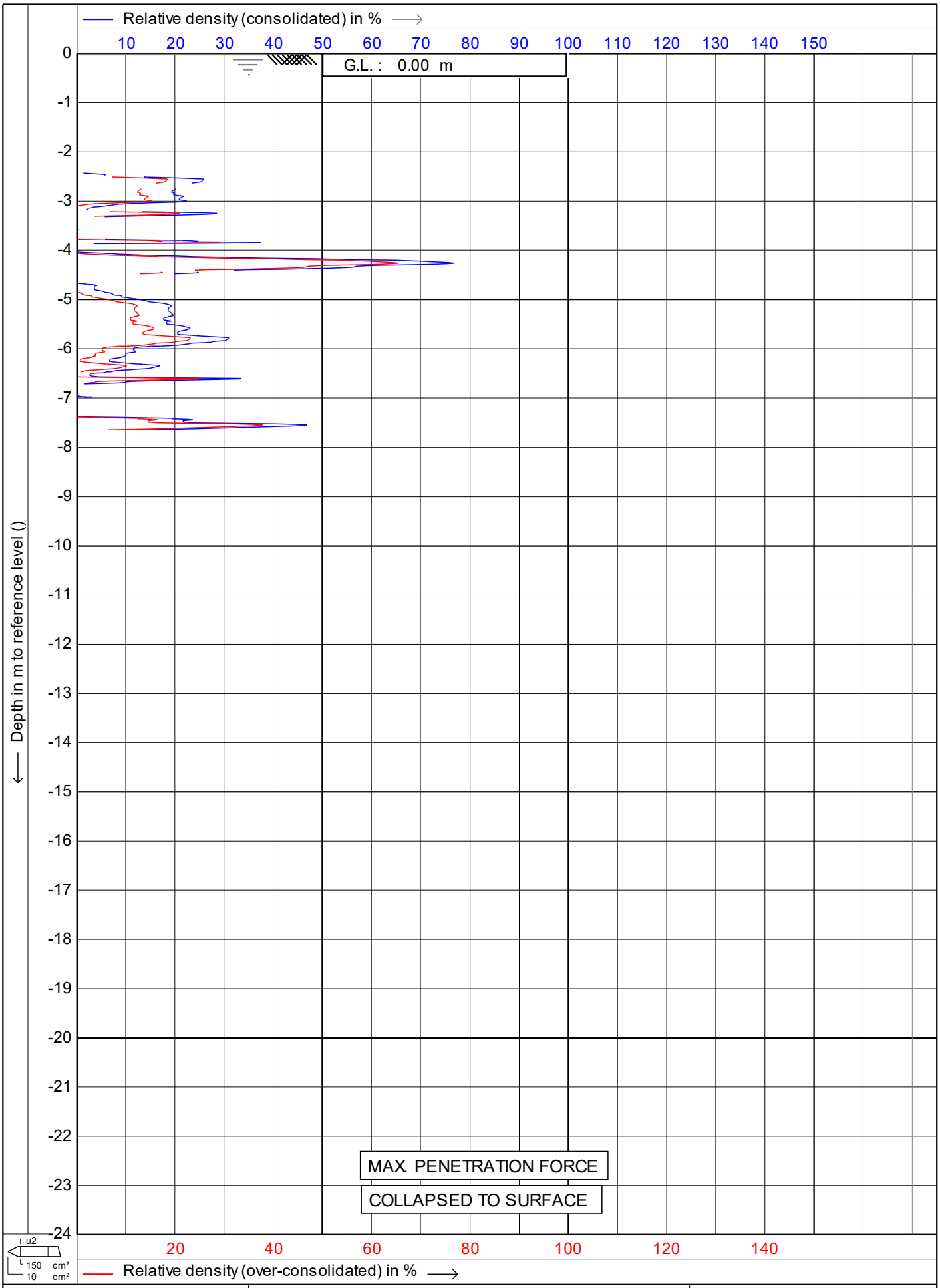
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **10/15**

1.49



Test according NEN 5140 class 1

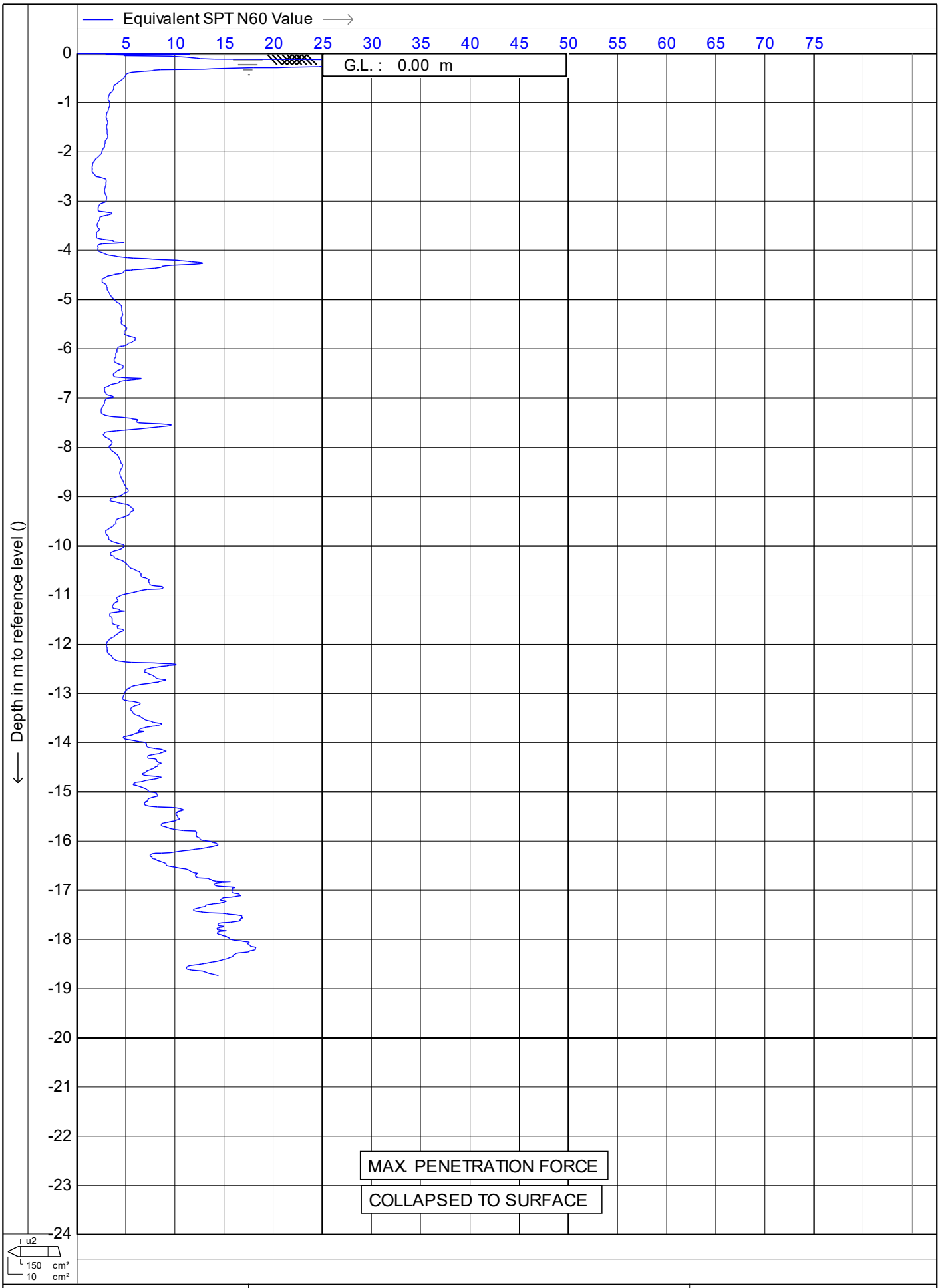
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **11/15**

1.49



Test according NEN 5140 class 1

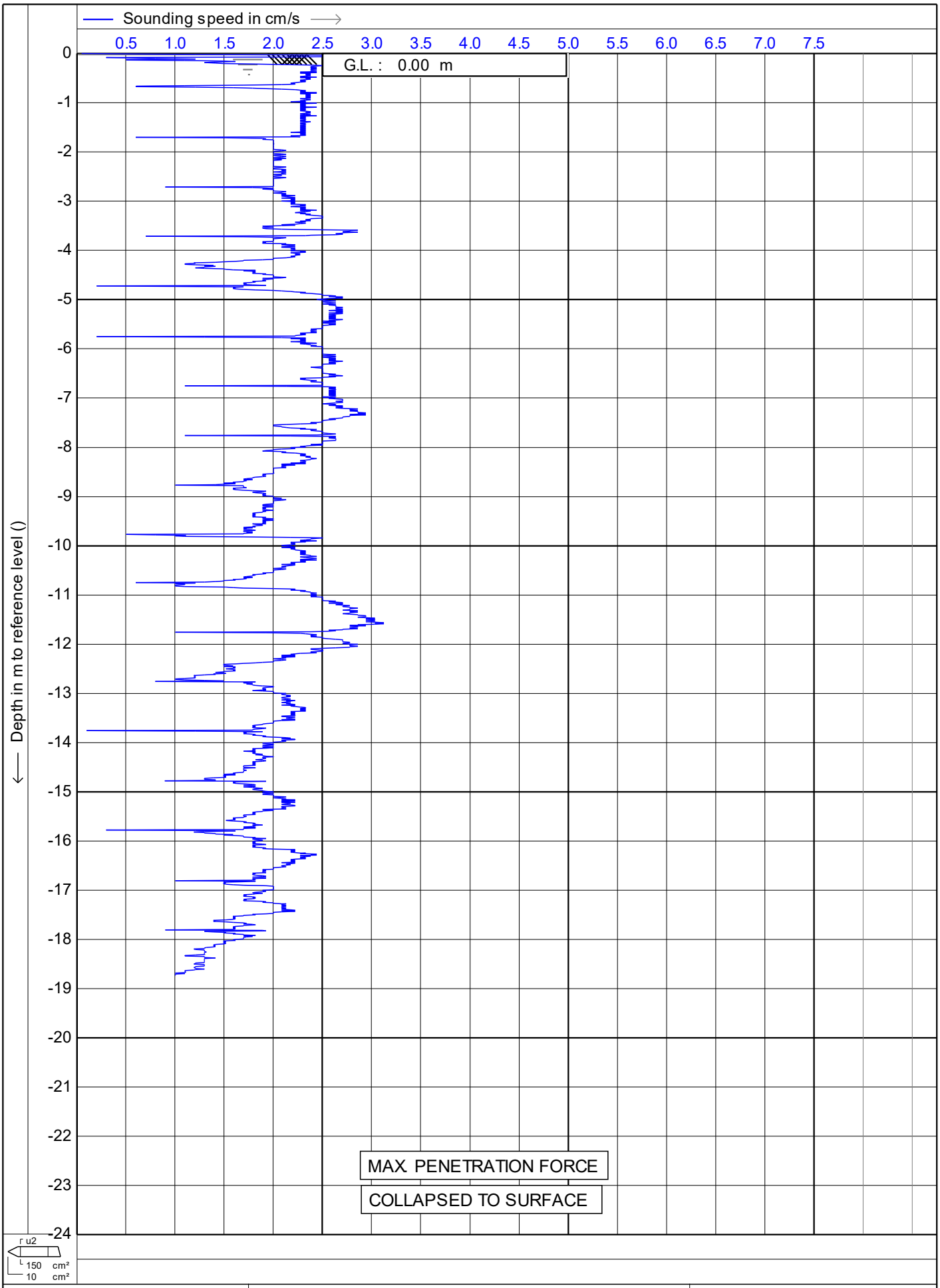
Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date	: **10/07/2023**
Cone no.	: **S10CFIIP.S191029**
Project no.	: **DF23GE080**
CPT no.	: **CPT-23-03** **12/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

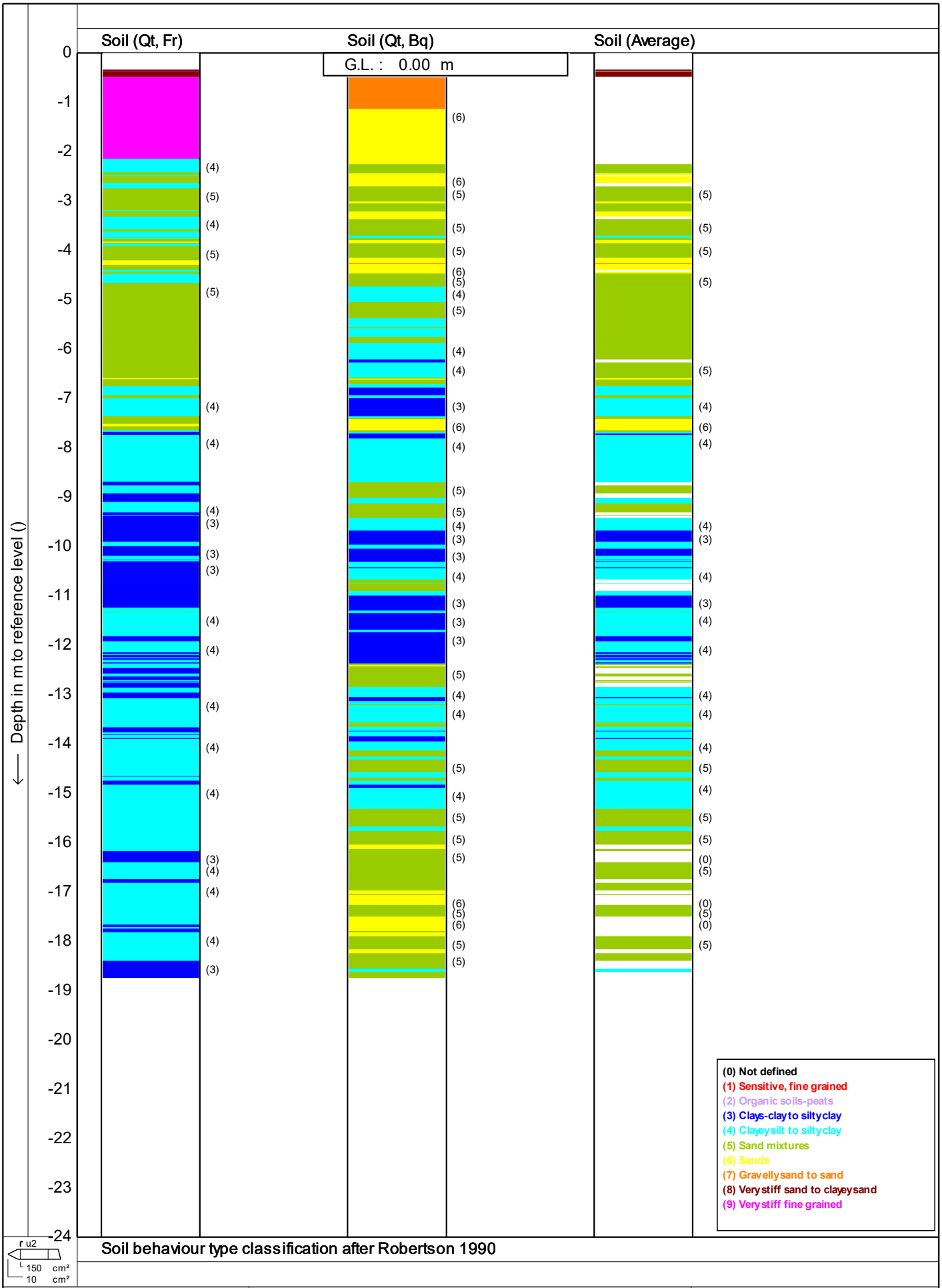
Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **13/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

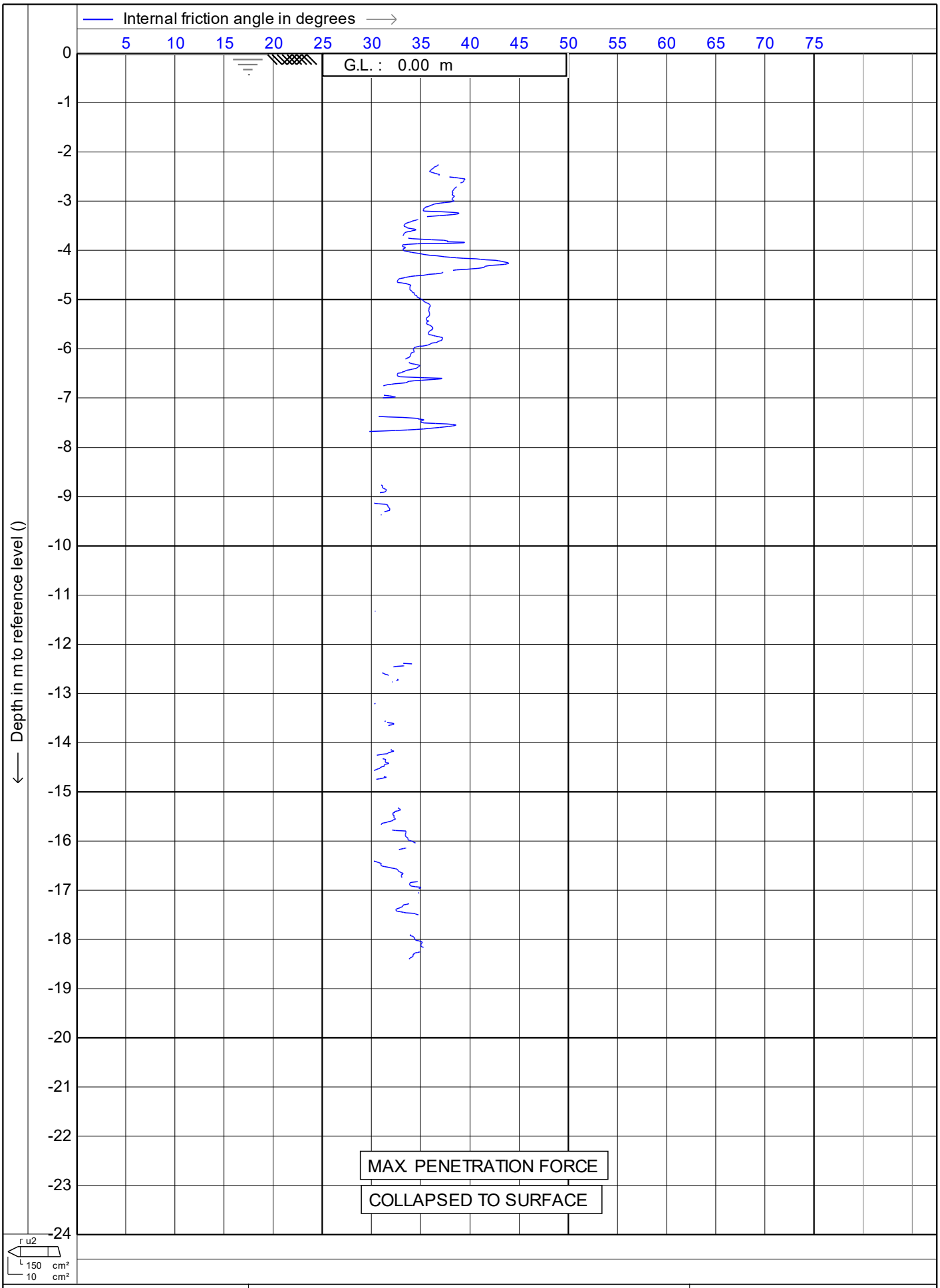
Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **14/15**

1.49



Test according NEN 5140 class 1

Project : **BASELINE GEOTECHNICAL**

Location: **1618 ARARIMU ROAD**

Position: **175.11115, 37.14522**

Date : **10/07/2023**

Cone no. : **S10CFIIP.S191029**

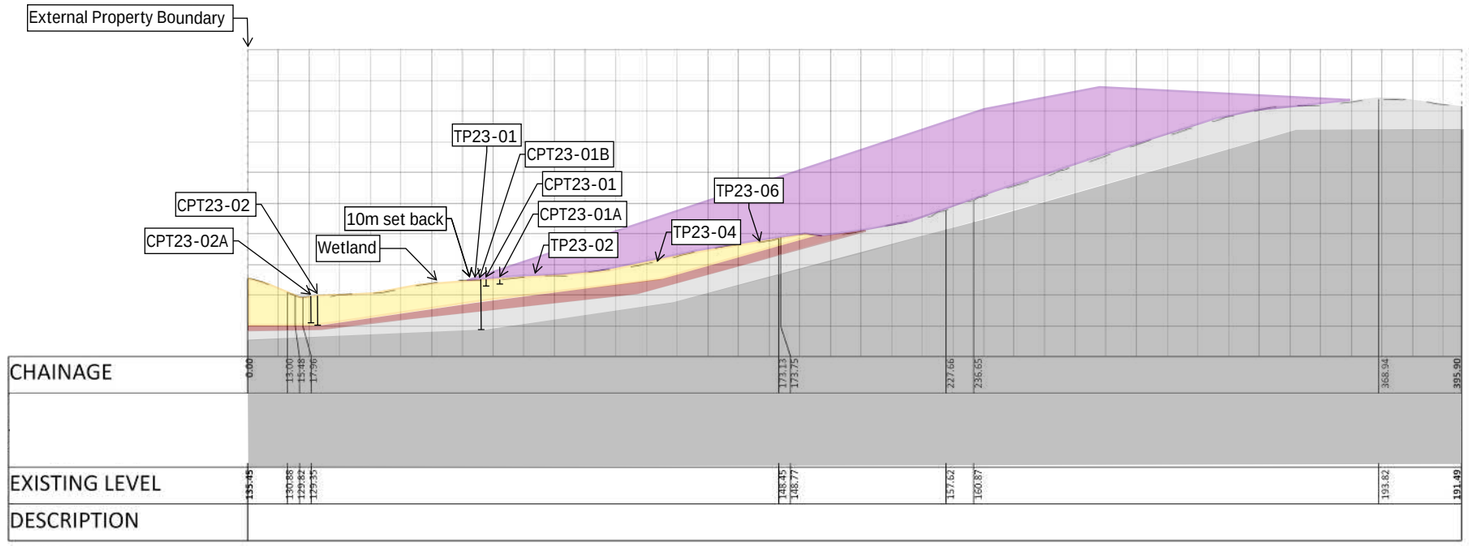
Project no. : **DF23GE080**

CPT no. : **CPT-23-03** **15/15**

1.49

Appendix E - Geological model

LEGEND:
EXISTING SURFACE

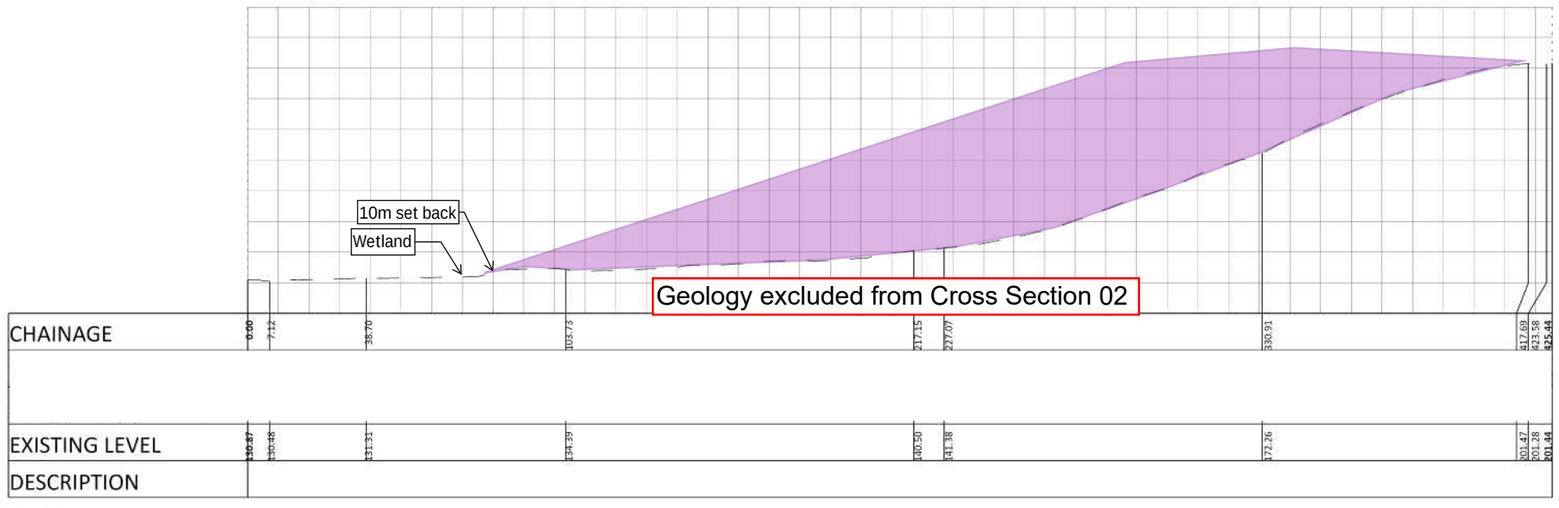


XS01
SCALE H1:2000 V1:2000

Approximate property boundaries, etland perimeter and 10m set back distances scaled from Civix DWG 3000 Dated 17/07/2023

LEGEND

- Proposed FILL
- Clays/Silts
- Clays/Silts/Sands
- Grewacke Soils
- Greywacke Rock



XS02
SCALE H1:2000 V1:2000

Approximate property boundaries, etland perimeter and 10m set back distances scaled from Civix DWG 3000 Dated 17/07/2023

SCAN FOR 3D:
allsite.ai

REV: | DATE: | DESCRIPTION: | DES: | REV: | REL: | LOGO:

CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

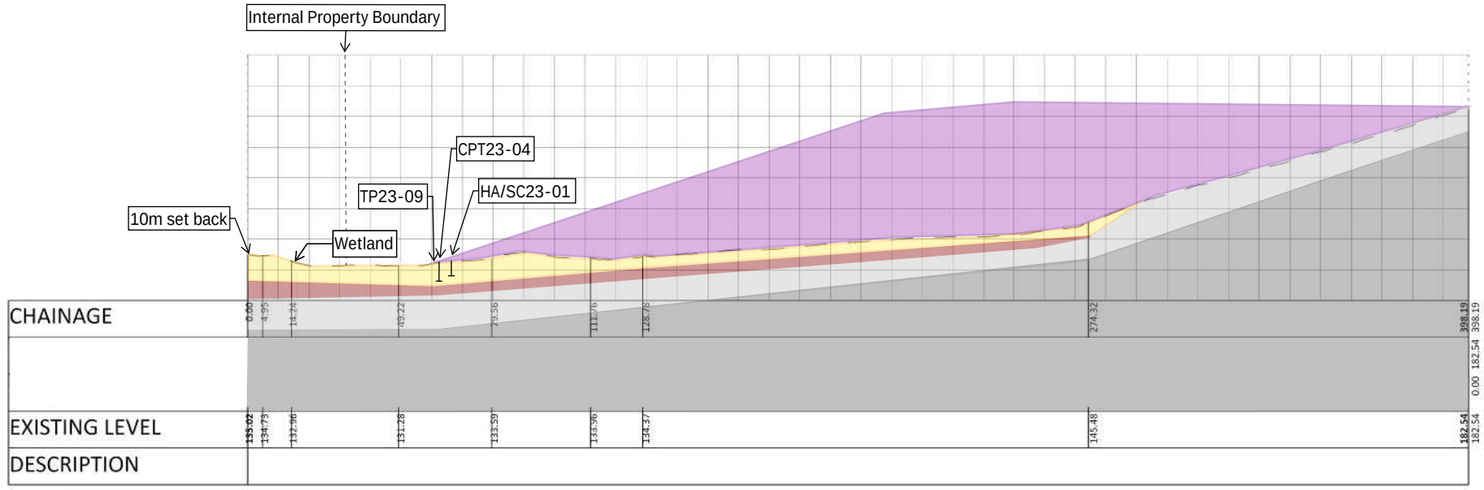
TITLE: EARTHWORKS SECTIONS

STATUS: FOR INFORMATION ONLY

DRAWING NO: 32000

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	21/07/23	21/07/23

LEGEND:
EXISTING SURFACE

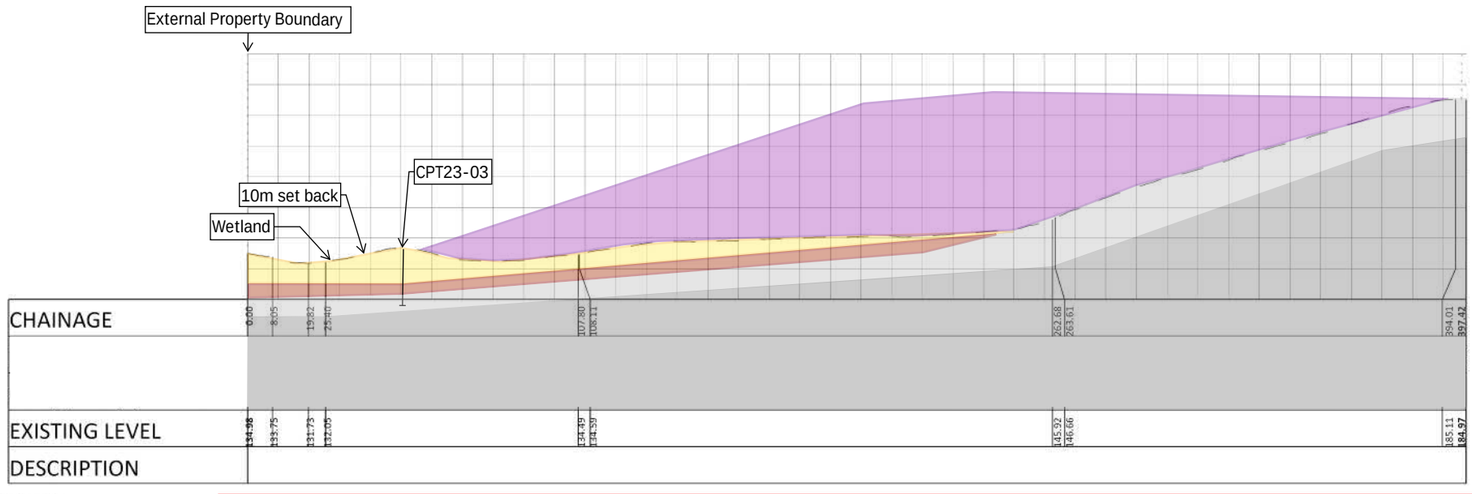


XS03
SCALE H1:2000 V1:2000

Approximate property boundaries, etland perimeter and 10m set back distances scaled from Civix DWG 3000 Dated 17/07/2023

LEGEND

- Proposed FILL
- Clays/Silts
- Clays/Silts/Sands
- Grewacke Soils
- Greywacke Rock



XS04
SCALE H1:2000 V1:2000

Approximate property boundaries, etland perimeter and 10m set back distances scaled from Civix DWG 3000 Dated 17/07/2023

SCAN FOR 3D:
allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

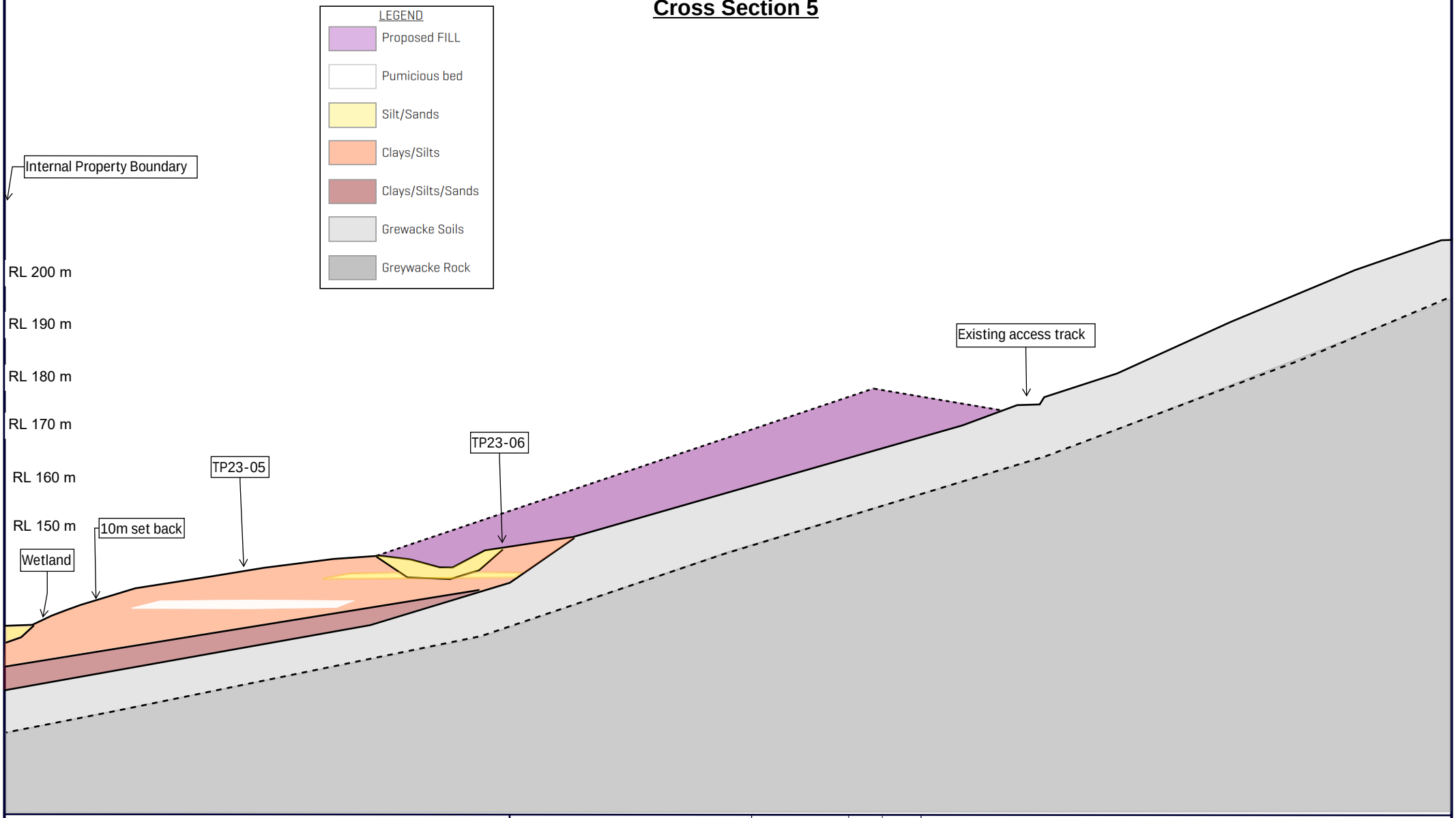
TITLE: EARTHWORKS SECTIONS

STATUS: FOR INFORMATION ONLY

DRAWING NO: 32001

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	21/07/23	21/07/23

Cross Section 5



1. Surface profile based on contours provided by CIVIX
2. Dashed lines between units represent inferred boundaries that may vary away from investigation locations.

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DRAWN	SC	14.08.23
DRAFTING CHECKED	CJL	14.08.23

APPROX. SCALE (AT A4 SIZE): 1:1000

PROJECT No.: BLG000170

Ararimu – Managed Fill

Geological Cross Section

1618 Ararimu Road

Ararimu - Auckland

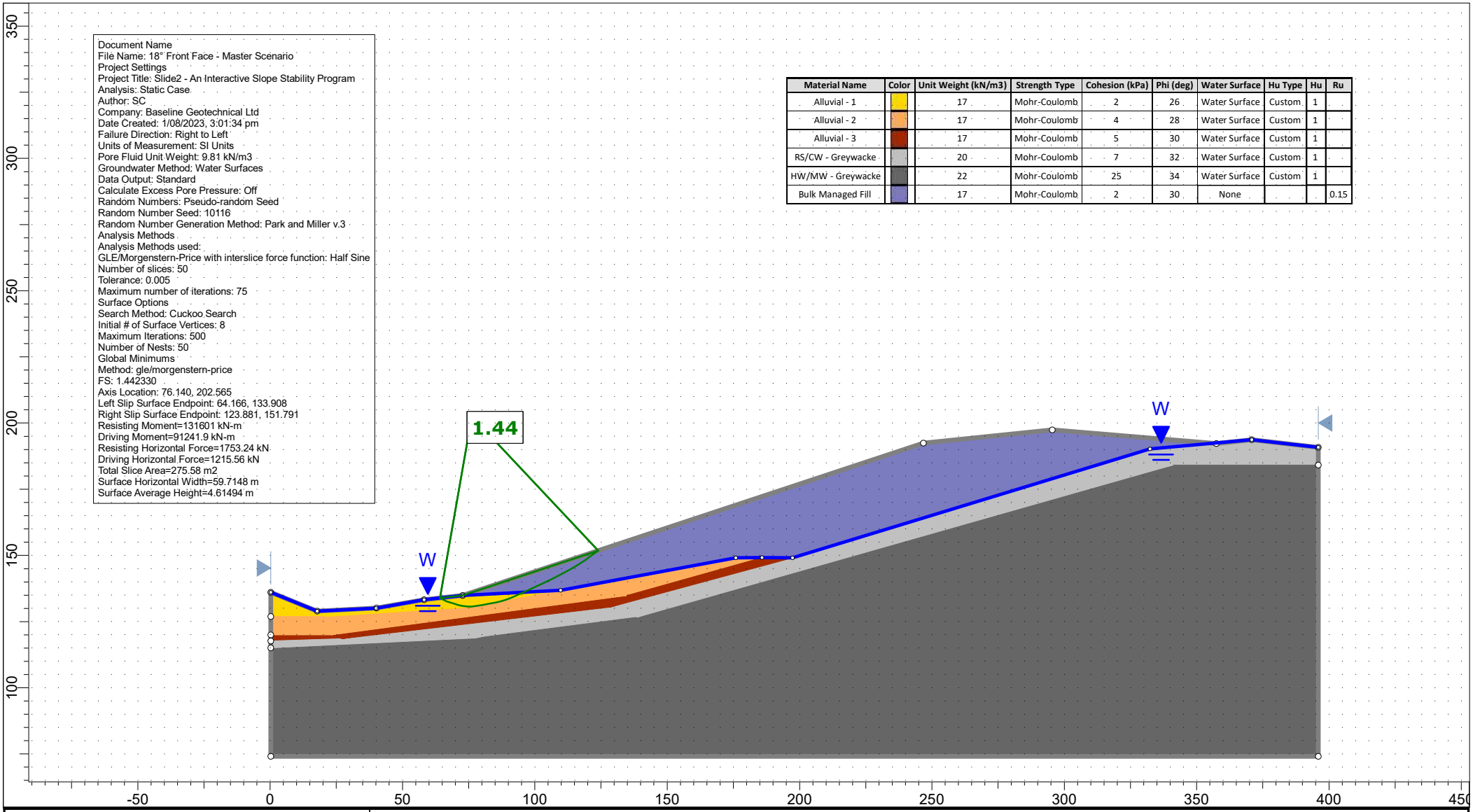
FIG. No. Appendix E - Figure 5

REV. 0

Appendix F - Slope analysis

Document Name
File Name: 18° Front Face - Master Scenario
Project Settings
Project Title: Slide2 - An Interactive Slope Stability Program
Analysis: Static Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.442330
Axis Location: 76.140, 202.565
Left Slip Surface Endpoint: 64.166, 133.908
Right Slip Surface Endpoint: 123.881, 151.791
Resisting Moment=131601 kN-m
Driving Moment=91241.9 kN-m
Resisting Horizontal Force=1753.24 kN
Driving Horizontal Force=1215.56 kN
Total Slice Area=275.58 m2
Surface Horizontal Width=59.7148 m
Surface Average Height=4.61494 m

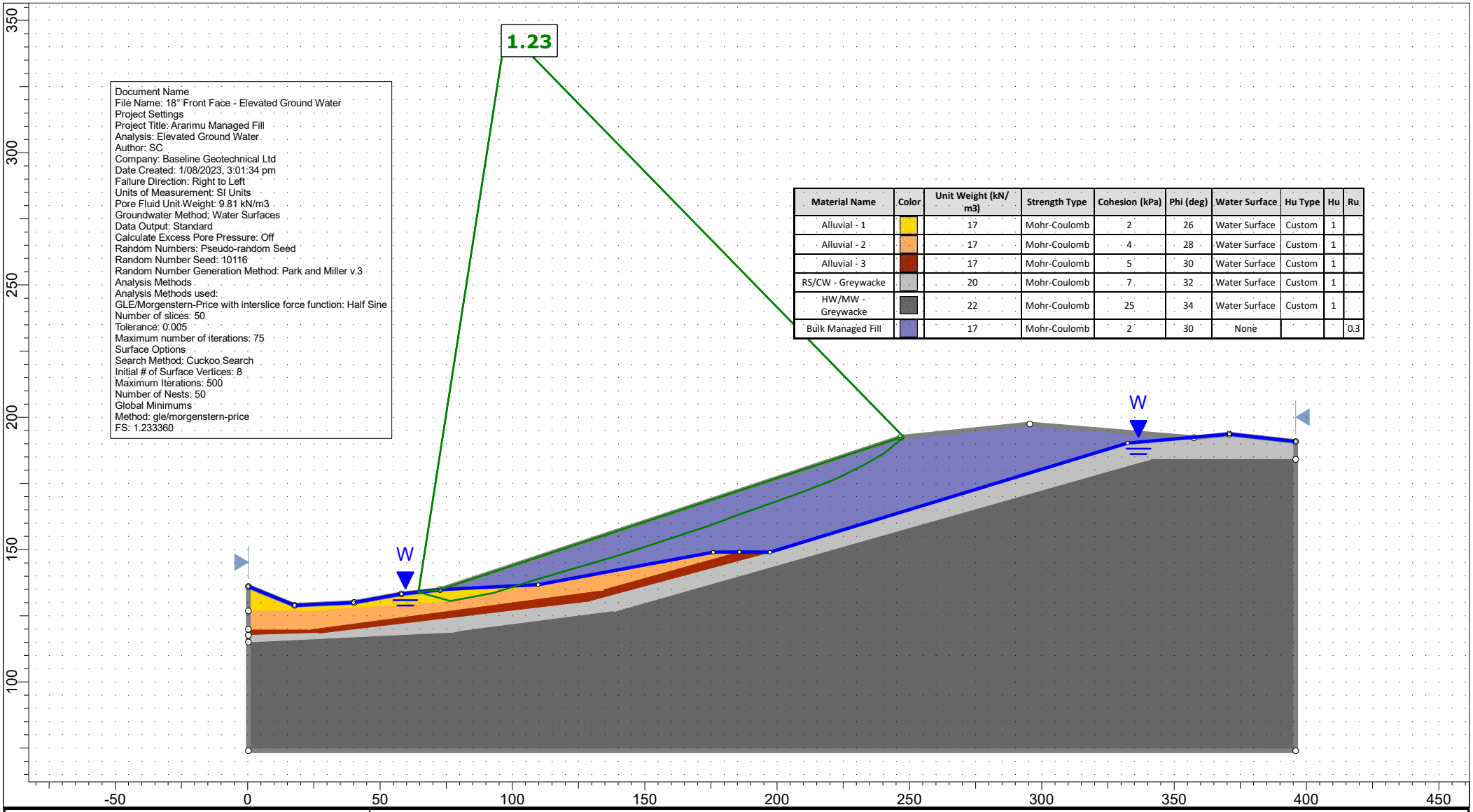
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15



BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 1- Static				
Drawn By	SC	*Scale*	1:2000	*Company*	Baseline Geotechnical Ltd
Date	4/08/2023			*File Name*	Cross Section 1.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.3

BASELINE GEOTECHNICAL

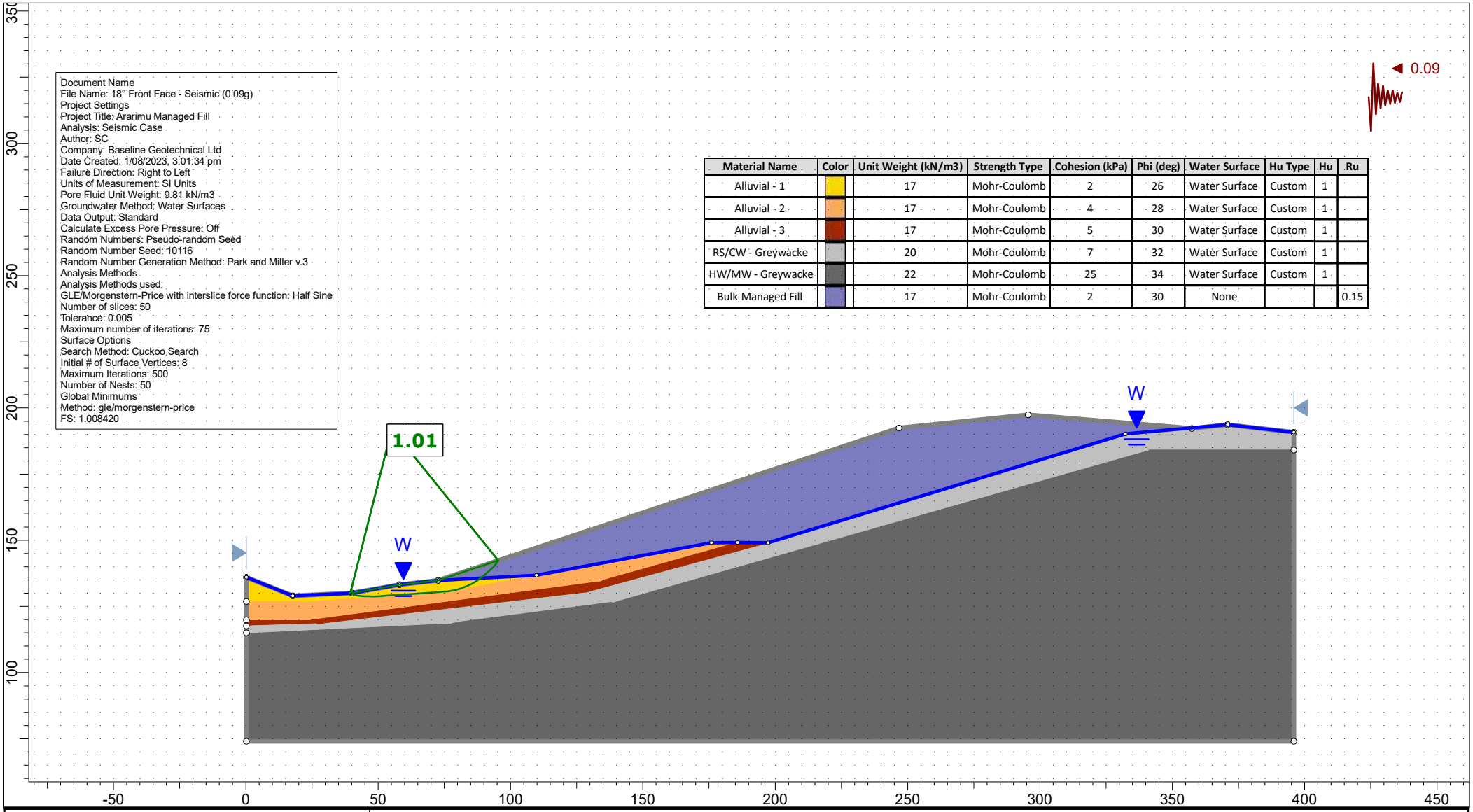
SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill			
Analysis Description	Cross Section 1- Elevated Ground Water			
Drawn By	SC	*Scale*	1:2000	*Company* Baseline Geotechnical Ltd
Date	4/08/2023			*File Name* Cross Section 1.slmd

Document Name
File Name: 18° Front Face - Seismic (0.09g)
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Seismic Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.008420

◀ 0.09

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15



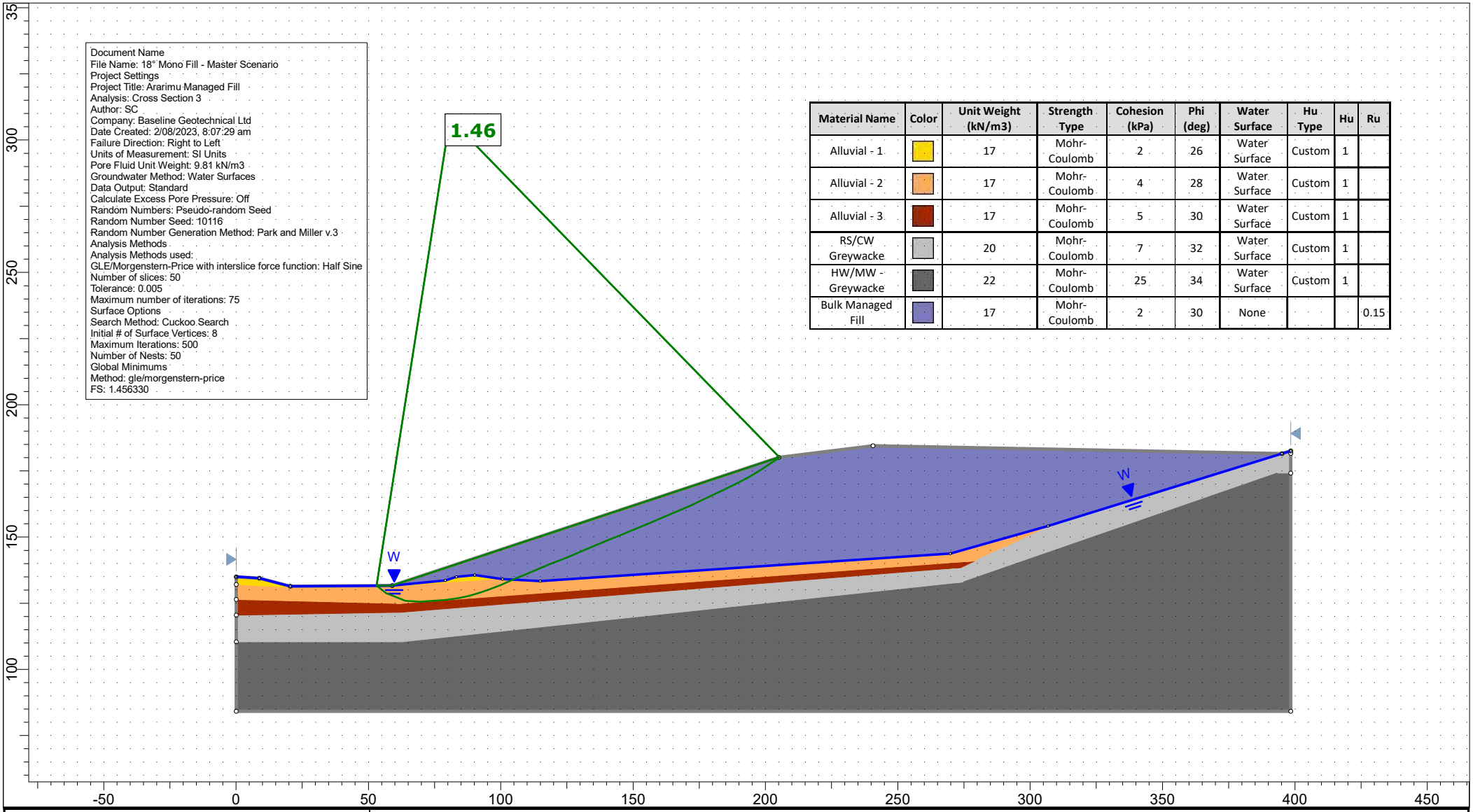
BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 1- Seismic				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	4/08/2023			File Name	Cross Section 1.slmd

Document Name
File Name: 18° Mono Fill - Master Scenario
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 3
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:07:29 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.456330

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15

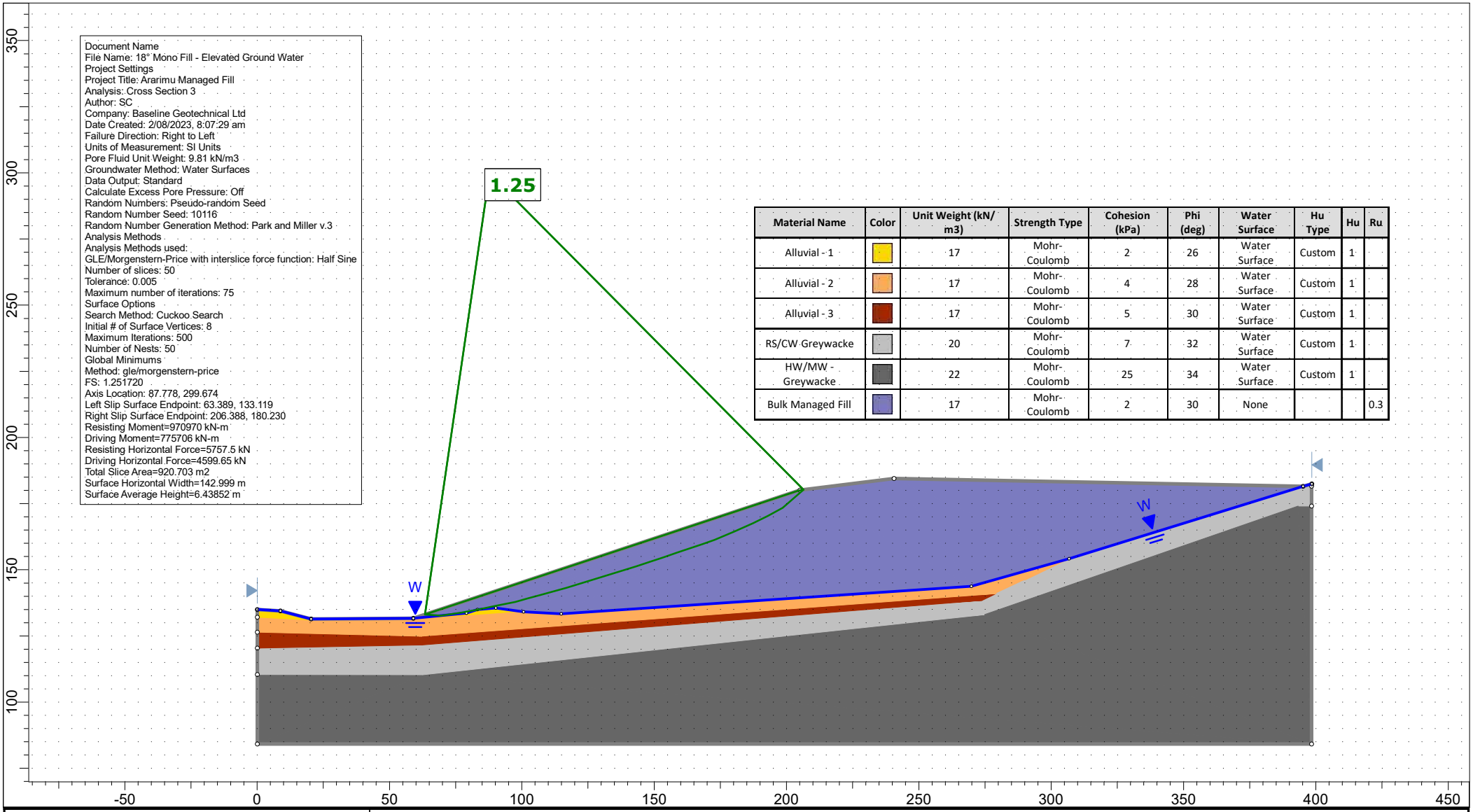


BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 3 - Static				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	4/08/2023			File Name	Cross Section 3.slmd

Document Name
File Name: 18° Mono Fill - Elevated Ground Water
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 3
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:07:29 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.251720
Axis Location: 87.778, 299.674
Left Slip Surface Endpoint: 63.389, 133.119
Right Slip Surface Endpoint: 206.388, 180.230
Resisting Moment=970970 kN-m
Driving Moment=775706 kN-m
Resisting Horizontal Force=5757.5 kN
Driving Horizontal Force=4599.65 kN
Total Slice Area=920.703 m2
Surface Horizontal Width=142.999 m
Surface Average Height=6.43852 m



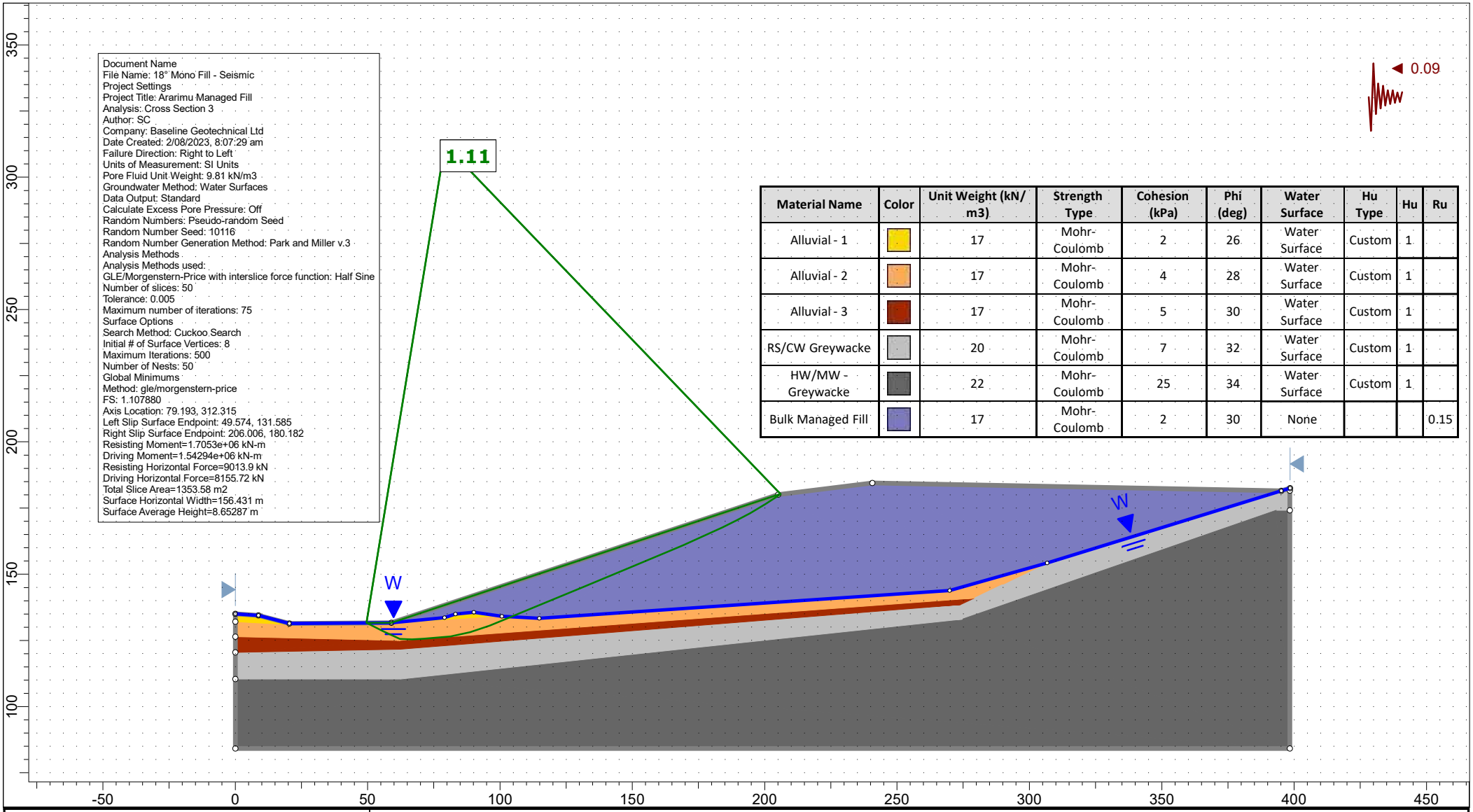
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.3

BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill		
Analysis Description	Cross Section 3 - Elevated Ground Water		
Drawn By	SC	*Scale* 1:2000	*Company* Baseline Geotechnical Ltd
Date	4/08/2023		*File Name* Cross Section 3.slmd

Document Name
File Name: 18° Mono Fill - Seismic
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 3
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:07:29 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.107880
Axis Location: 79.193, 312.315
Left Slip Surface Endpoint: 49.574, 131.585
Right Slip Surface Endpoint: 206.006, 180.182
Resisting Moment=1.7053e+06 kN-m
Driving Moment=1.54294e+06 kN-m
Resisting Horizontal Force=9013.9 kN
Driving Horizontal Force=8155.72 kN
Total Slice Area=1353.58 m2
Surface Horizontal Width=156.431 m
Surface Average Height=8.65287 m



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15

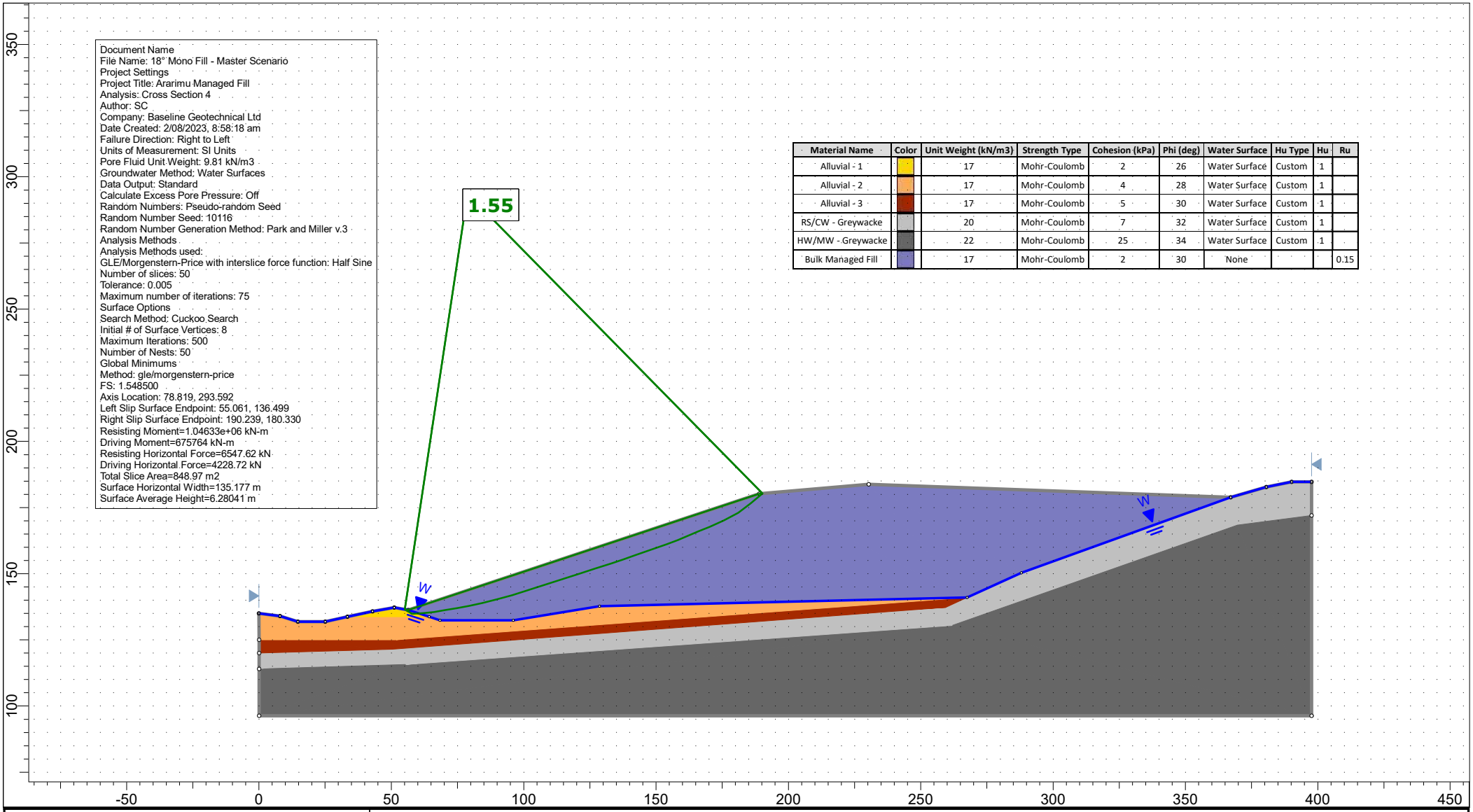
BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill			
Analysis Description	Cross Section 3 - Seismic			
Drawn By	SC	Scale	1:2000	Company: Baseline Geotechnical Ltd
Date	4/08/2023			File Name: Cross Section 3.slmd

Document Name
File Name: 18° Mono Fill - Master Scenario
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 4
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:58:18 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.548500
Axis Location: 78.819, 293.592
Left Slip Surface Endpoint: 55.061, 136.499
Right Slip Surface Endpoint: 190.239, 180.330
Resisting Moment=1.04633e+06 kN-m
Driving Moment=675764 kN-m
Resisting Horizontal Force=6547.62 kN
Driving Horizontal Force=4228.72 kN
Total Slice Area=848.97 m2
Surface Horizontal Width=135.177 m
Surface Average Height=6.28041 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15



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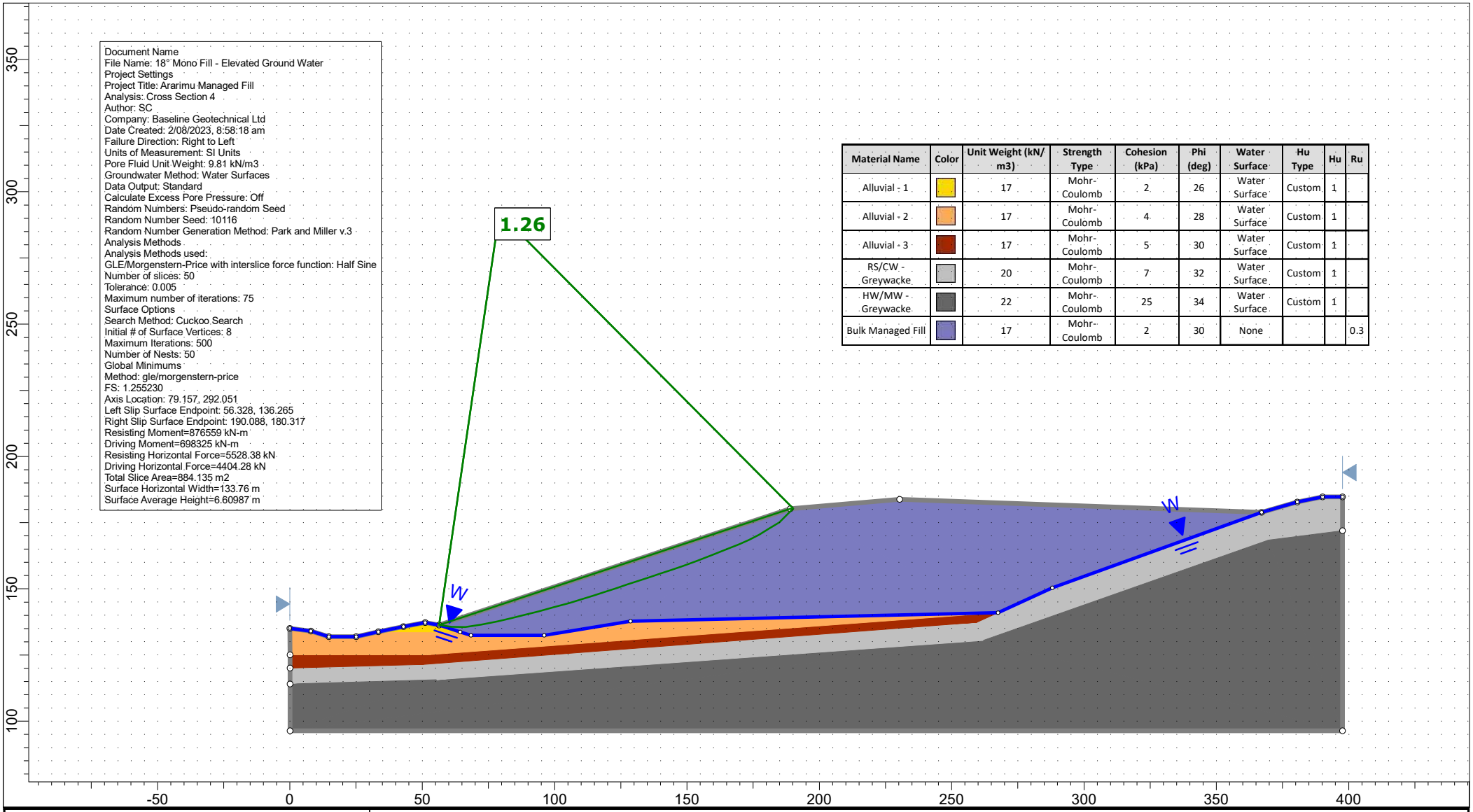
SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 4 - Static				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	4/08/2023			File Name	Cross Section 4.slmd

Document Name
File Name: 18° Mono Fill - Elevated Ground Water
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 4
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:58:18 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.255230
Axis Location: 79.157, 292.051
Left Slip Surface Endpoint: 56.328, 136.265
Right Slip Surface Endpoint: 190.088, 180.317
Resisting Moment=876559 kN-m
Driving Moment=698325 kN-m
Resisting Horizontal Force=5528.38 kN
Driving Horizontal Force=4404.28 kN
Total Slice Area=884.135 m2
Surface Horizontal Width=133.76 m
Surface Average Height=6.60987 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.3



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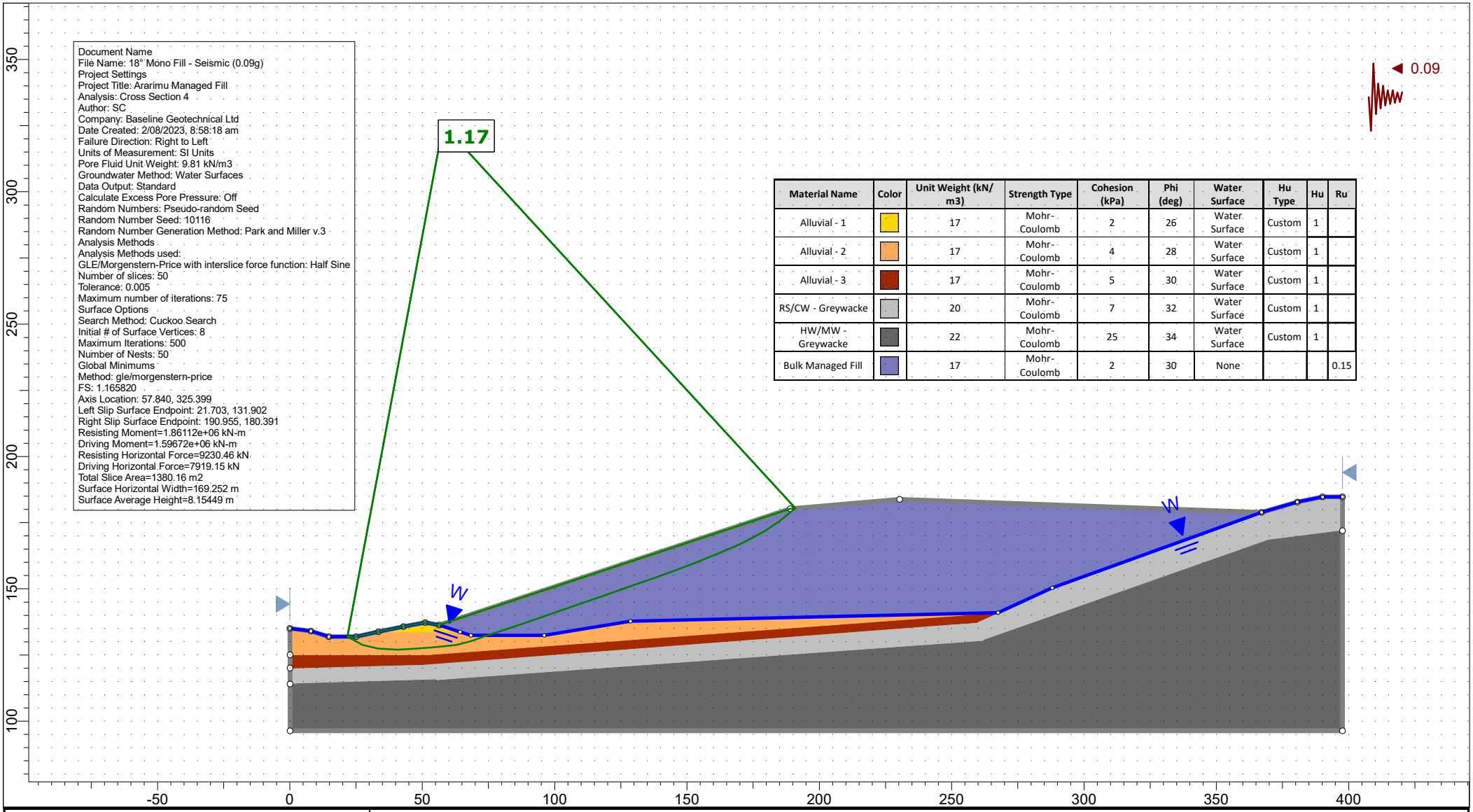
SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 4 - Elevated Ground Water				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	4/08/2023			File Name	Cross Section 4.slmd

Document Name
File Name: 18° Mono Fill - Seismic (0.09g)
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 4
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:58:18 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.165820
Axis Location: 57.840, 325.399
Left Slip Surface Endpoint: 21.703, 131.902
Right Slip Surface Endpoint: 190.955, 180.391
Resisting Moment=1.86112e+06 kN-m
Driving Moment=1.59672e+06 kN-m
Resisting Horizontal Force=9230.46 kN
Driving Horizontal Force=7919.15 kN
Total Slice Area=1380.16 m2
Surface Horizontal Width=169.252 m
Surface Average Height=8.15449 m



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15

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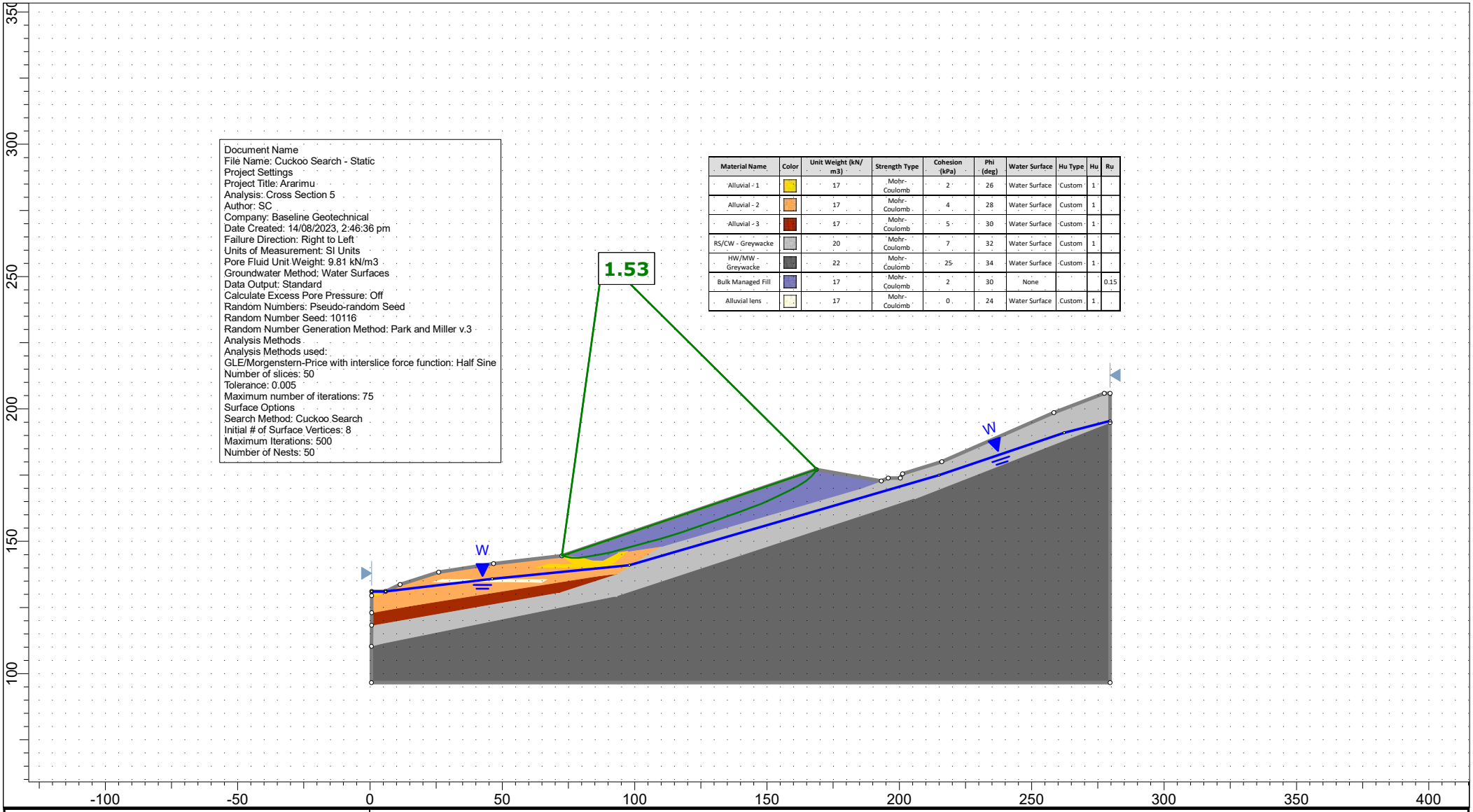
SLIDEINTERPRET 9.025

Project	Ararimu Managed Fill				
Analysis Description	Cross Section 4 - Seismic				
Drawn By	SC	*Scale*	1:2000	*Company*	Baseline Geotechnical Ltd
Date	4/08/2023			*File Name*	Cross Section 4.slmd

Document Name
File Name: Cuckoo Search - Static
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15
Alluvial lens		17	Mohr-Coulomb	0	24	Water Surface	Custom	1	



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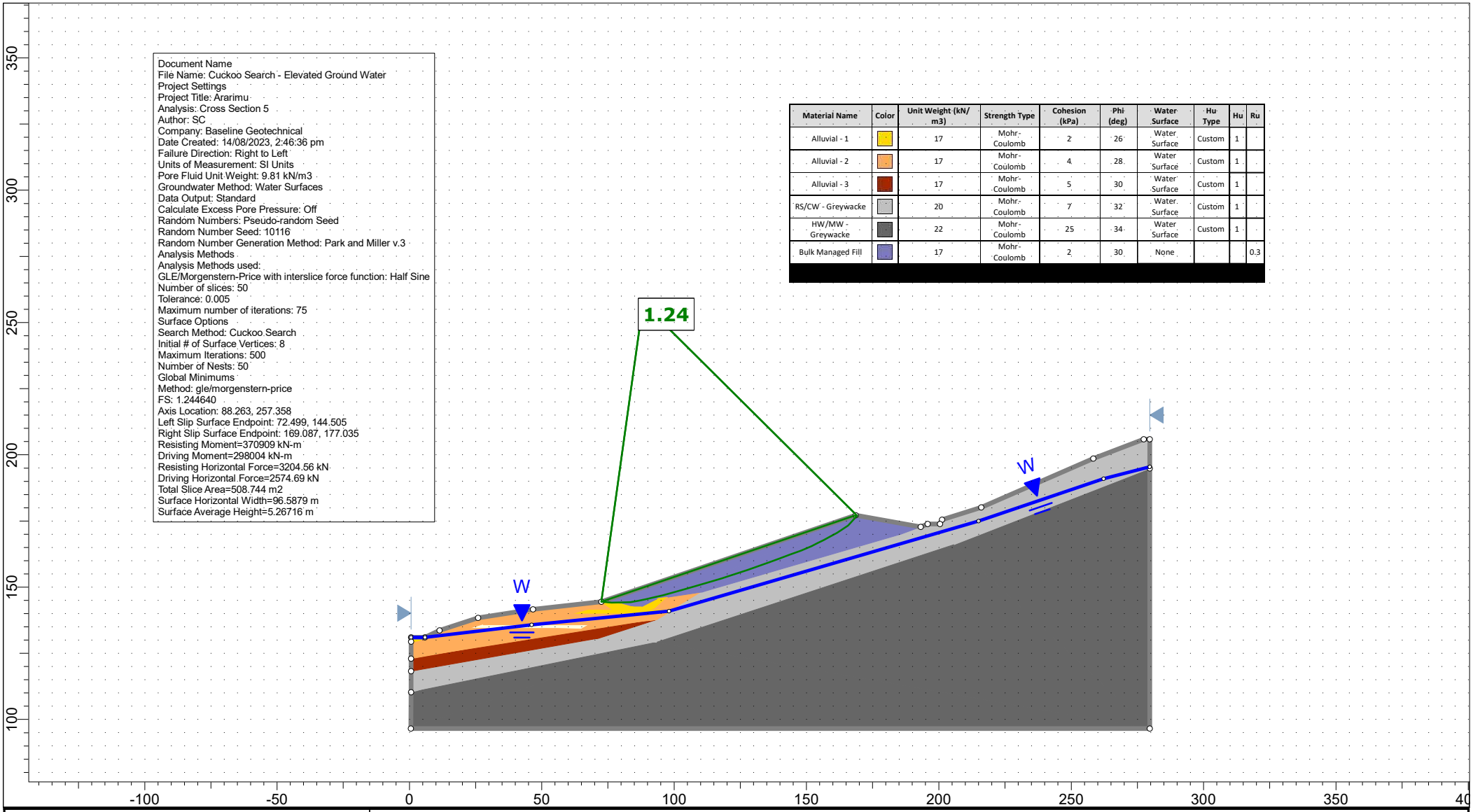
SLIDEINTERPRET 9.025

Project	Ararimu				
Analysis Description	Cross Section 5 - Static				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical
Date	15/08/2023			File Name	Cross Section 5.slmd

Document Name
File Name: Cuckoo Search - Elevated Ground Water
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.244640
Axis Location: 88.263, 257.358
Left Slip Surface Endpoint: 72.499, 144.505
Right Slip Surface Endpoint: 169.087, 177.035
Resisting Moment=370909 kN-m
Driving Moment=298004 kN-m
Resisting Horizontal Force=3204.56 kN
Driving Horizontal Force=2574.69 kN
Total Slice Area=508.744 m2
Surface Horizontal Width=96.5879 m
Surface Average Height=5.26716 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.3



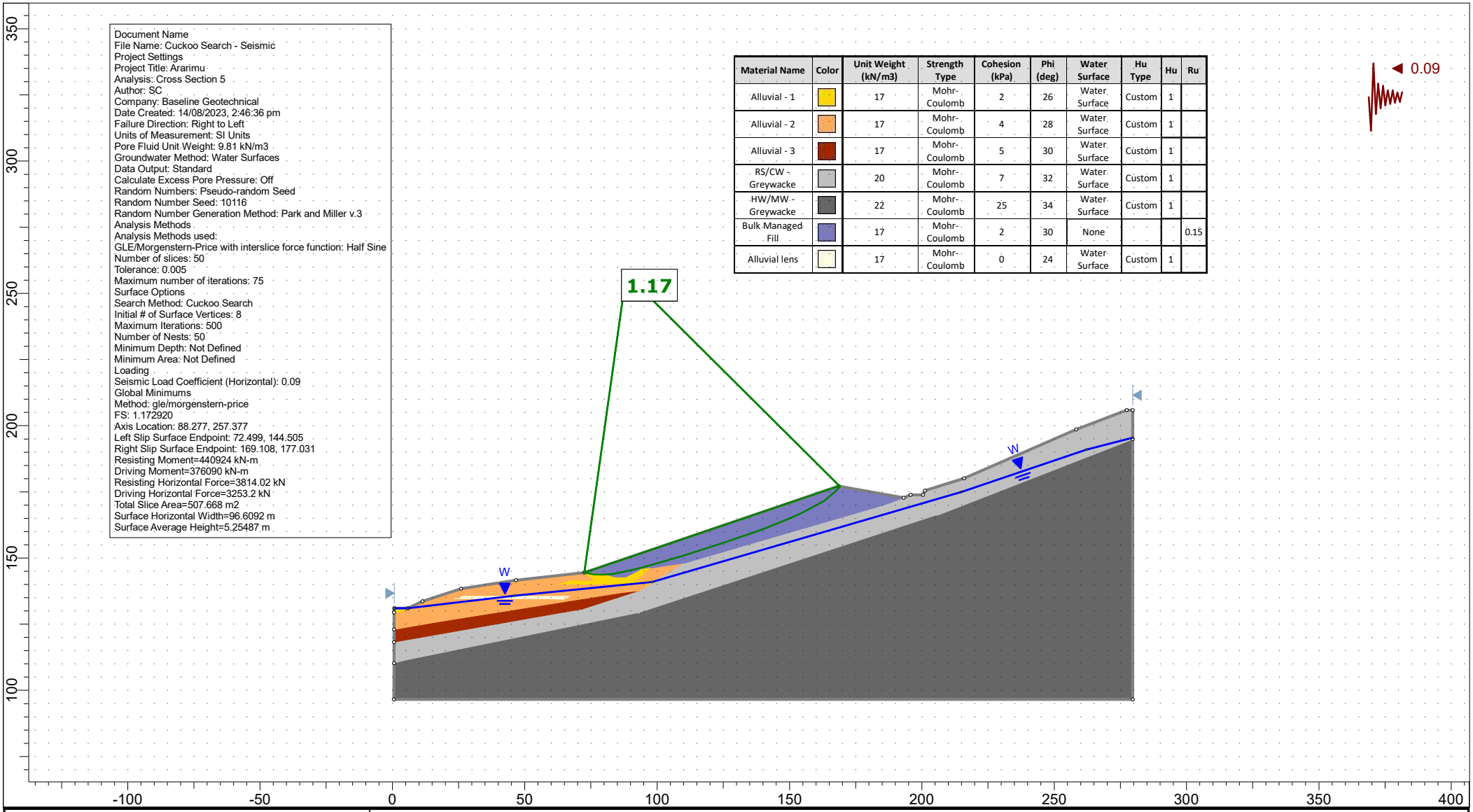
BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu				
Analysis Description	Cross Section 5 - Elevated ground ater				
Drawn By	SC	*Scale*	1:2000	*Company*	Baseline Geotechnical
Date	15/08/2023			*File Name*	Cross Section 5.slmd

Document Name
File Name: Cuckoo Search - Seismic
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Minimum Depth: Not Defined
Minimum Area: Not Defined
Loading
Seismic Load Coefficient (Horizontal): 0.09
Global Minimums
Method: gle/morgenstern-price
FS: 1.172920
Axis Location: 88.277, 257.377
Left Slip Surface Endpoint: 72.499, 144.505
Right Slip Surface Endpoint: 169.108, 177.031
Resisting Moment=440924 kN-m
Driving Moment=376090 kN-m
Resisting Horizontal Force=3814.02 kN
Driving Horizontal Force=3253.2 kN
Total Slice Area=507.668 m2
Surface Horizontal Width=96.6092 m
Surface Average Height=5.25487 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15
Alluvial lens		17	Mohr-Coulomb	0	24	Water Surface	Custom	1	



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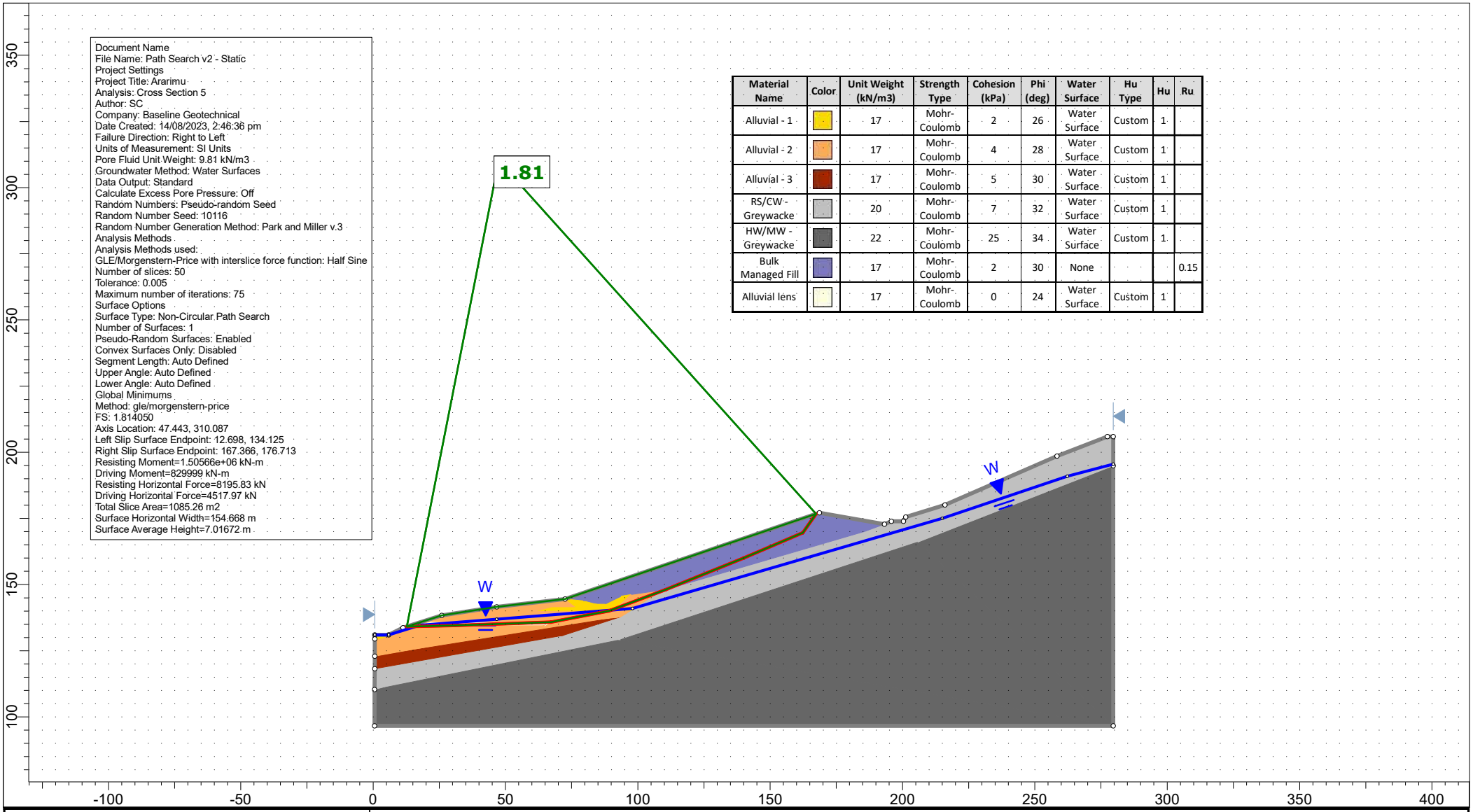
SLIDEINTERPRET 9.025

Project	Ararimu		
Analysis Description	Cross Section 5 - Seismic		
Drawn By	SC	Scale 1:2000	Company Baseline Geotechnical
Date	15/08/2023		File Name Cross Section 5.slmd

Document Name
File Name: Path Search v2 - Static
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Surface Type: Non-Circular Path Search
Number of Surfaces: 1
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Segment Length: Auto Defined
Upper Angle: Auto Defined
Lower Angle: Auto Defined
Global Minimums
Method: gle/morgenstern-price
FS: 1.814050
Axis Location: 47.443, 310.087
Left Slip Surface Endpoint: 12.698, 134.125
Right Slip Surface Endpoint: 167.366, 176.713
Resisting Moment=1.50566e+06 kN-m
Driving Moment=829999 kN-m
Resisting Horizontal Force=8195.83 kN
Driving Horizontal Force=4517.97 kN
Total Slice Area=1085.26 m2
Surface Horizontal Width=154.668 m
Surface Average Height=7.01672 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15
Alluvial lens		17	Mohr-Coulomb	0	24	Water Surface	Custom	1	



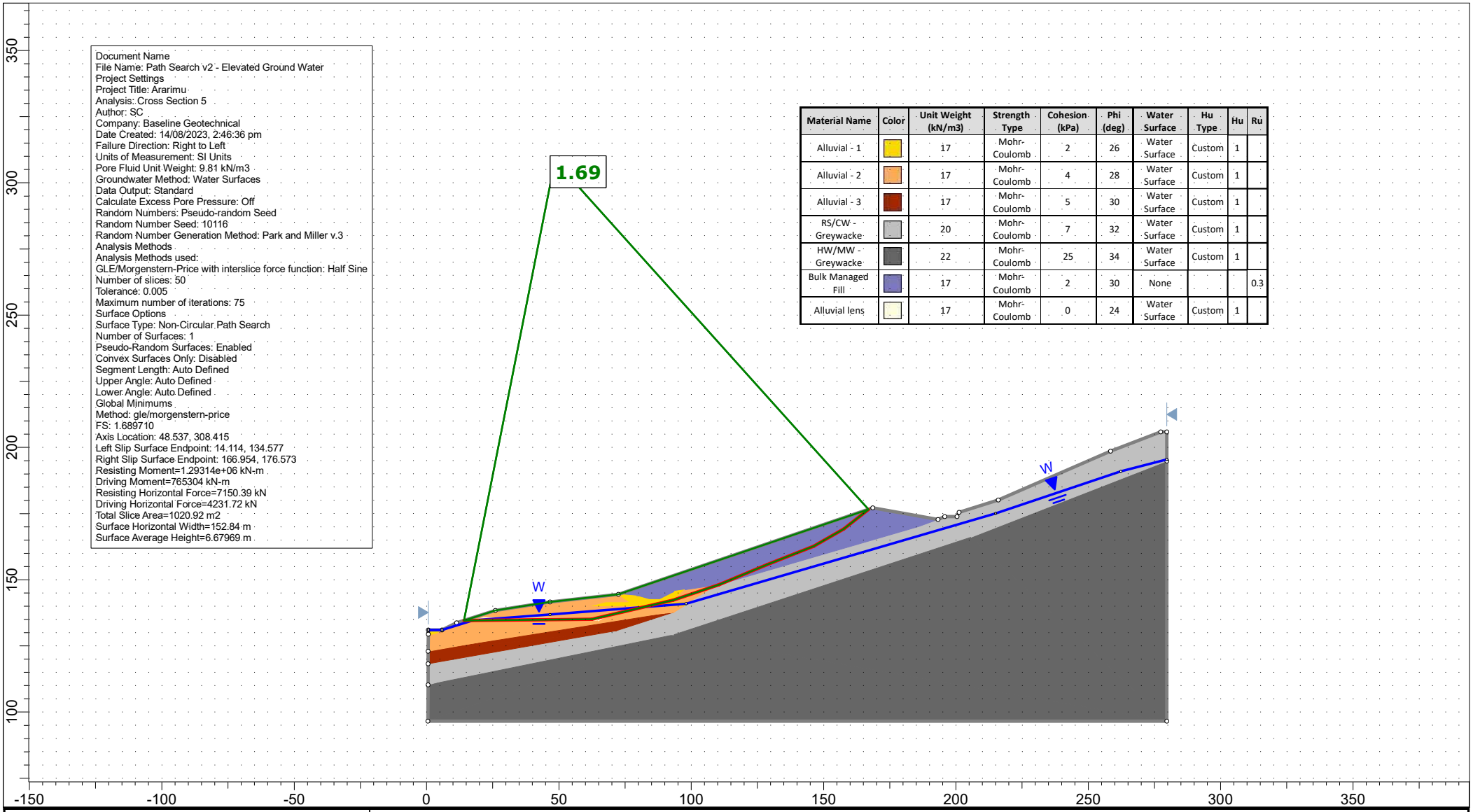
BASELINE GEOTECHNICAL®

SLIDEINTERPRET 9.025

Project	Ararimu		
Analysis Description	Cross Section 5 - Static - Single surface		
Drawn By	SC	*Scale*	1:2000
Company	Baseline Geotechnical		
Date	15/08/2023	*File Name*	Cross Section 5.slmd

Document Name
File Name: Path Search v2 - Elevated Ground Water
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Surface Type: Non-Circular Path Search
Number of Surfaces: 1
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Segment Length: Auto Defined
Upper Angle: Auto Defined
Lower Angle: Auto Defined
Global Minimums
Method: gle/morgenstern-price
FS: 1.689710
Axis Location: 48.537, 308.415
Left Slip Surface Endpoint: 14.114, 134.577
Right Slip Surface Endpoint: 166.954, 176.573
Resisting Moment=1.29314e+06 kN-m
Driving Moment=765304 kN-m
Resisting Horizontal Force=7150.39 kN
Driving Horizontal Force=4231.72 kN
Total Slice Area=1020.92 m2
Surface Horizontal Width=152.84 m
Surface Average Height=6.67969 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.3
Alluvial lens		17	Mohr-Coulomb	0	24	Water Surface	Custom	1	



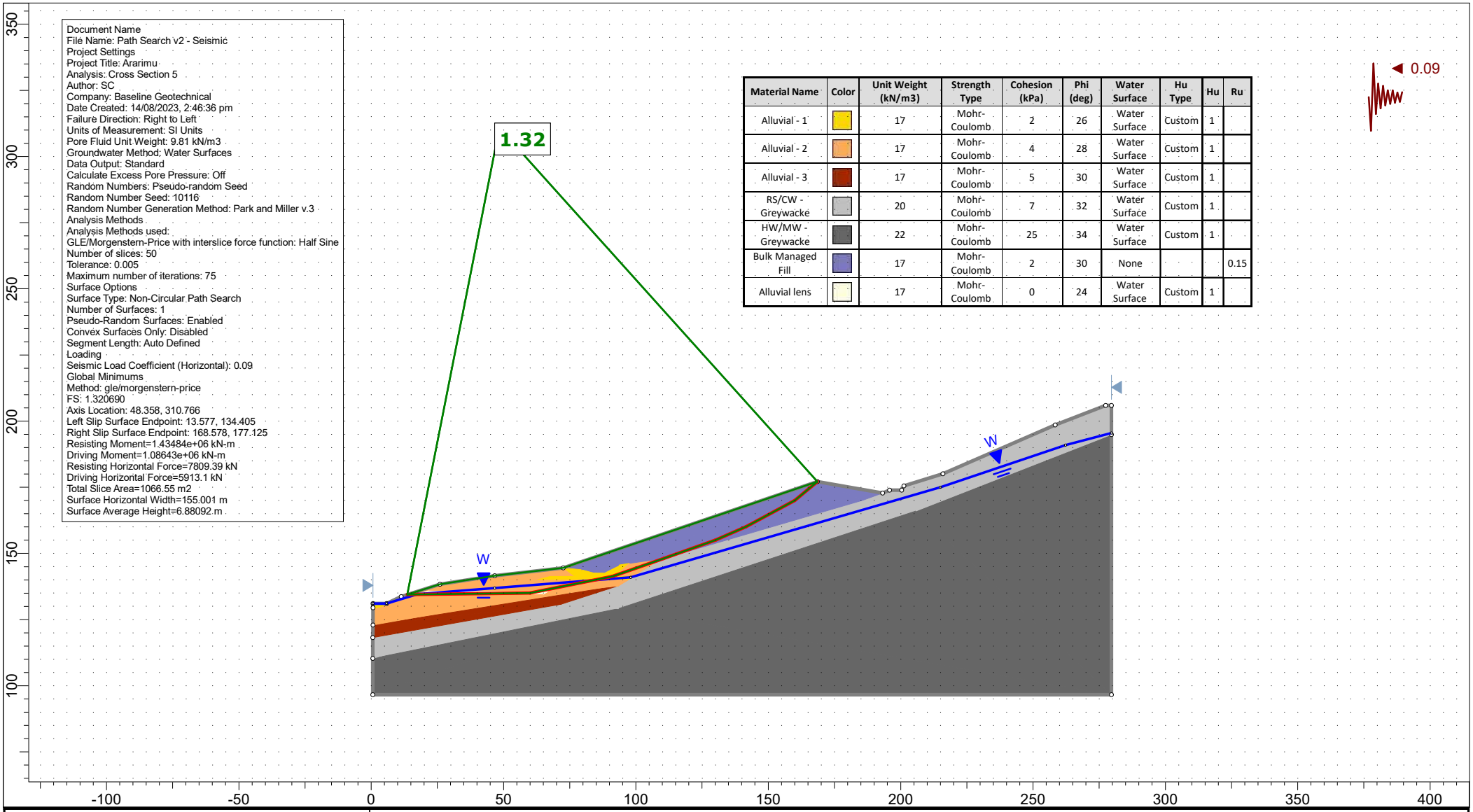
BASELINE GEOTECHNICAL

SLIDEINTERPRET 9.025

Project	Ararimu				
Analysis Description	Cross Section 5 - Elevated ground ater - Single surface				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical
Date	15/08/2023			File Name	Cross Section 5.slmd

Document Name
File Name: Path Search v2 - Seismic
Project Settings
Project Title: Ararimu
Analysis: Cross Section 5
Author: SC
Company: Baseline Geotechnical
Date Created: 14/08/2023, 2:46:36 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Surface Type: Non-Circular Path Search
Number of Surfaces: 1
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Segment Length: Auto Defined
Loading
Seismic Load Coefficient (Horizontal): 0.09
Global Minimums
Method: gle/morgenstern-price
FS: 1.320690
Axis Location: 48.358, 310.766
Left Slip Surface Endpoint: 13.577, 134.405
Right Slip Surface Endpoint: 168.578, 177.125
Resisting Moment=1.43484e+06 kN-m
Driving Moment=1.08643e+06 kN-m
Resisting Horizontal Force=7809.39 kN
Driving Horizontal Force=5913.1 kN
Total Slice Area=1066.55 m2
Surface Horizontal Width=155.001 m
Surface Average Height=6.88092 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Alluvial - 1		17	Mohr-Coulomb	2	26	Water Surface	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28	Water Surface	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30	Water Surface	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32	Water Surface	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34	Water Surface	Custom	1	
Bulk Managed Fill		17	Mohr-Coulomb	2	30	None			0.15
Alluvial lens		17	Mohr-Coulomb	0	24	Water Surface	Custom	1	



BASELINE GEOTECHNICAL

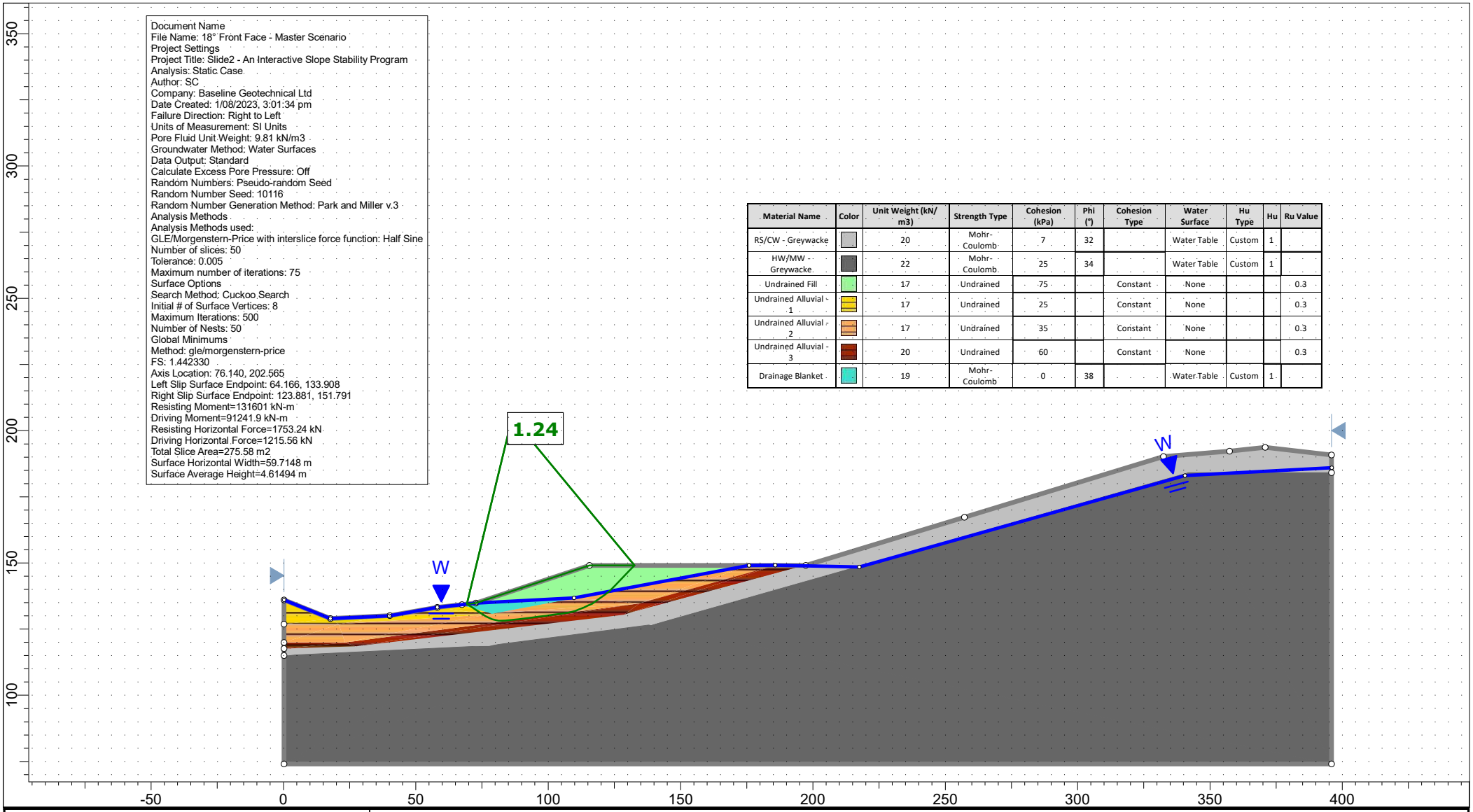
SLIDEINTERPRET 9.025

Project	Ararimu				
Analysis Description	Cross Section 5 - Seismic - Single surface				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical
Date	15/08/2023			File Name	Cross Section 5.slmd

Appendix G – Undrained slope analyses

Document Name
File Name: 18° Front Face - Master Scenario
Project Settings
Project Title: Slide2 - An Interactive Slope Stability Program
Analysis: Static Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.442330
Axis Location: 76.140, 202.565
Left Slip Surface Endpoint: 64.166, 133.908
Right Slip Surface Endpoint: 123.881, 151.791
Resisting Moment=131601 kN-m
Driving Moment=91241.9 kN-m
Resisting Horizontal Force=1753.24 kN
Driving Horizontal Force=1215.56 kN
Total Slice Area=275.58 m2
Surface Horizontal Width=59.7148 m
Surface Average Height=4.61494 m

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu	Ru Value
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1	
Undrained Fill		17	Undrained	75		Constant	None			0.3
Undrained Alluvial - 1		17	Undrained	25		Constant	None			0.3
Undrained Alluvial - 2		17	Undrained	35		Constant	None			0.3
Undrained Alluvial - 3		20	Undrained	60		Constant	None			0.3
Drainage Blanket		19	Mohr-Coulomb	0	38		Water Table	Custom	1	



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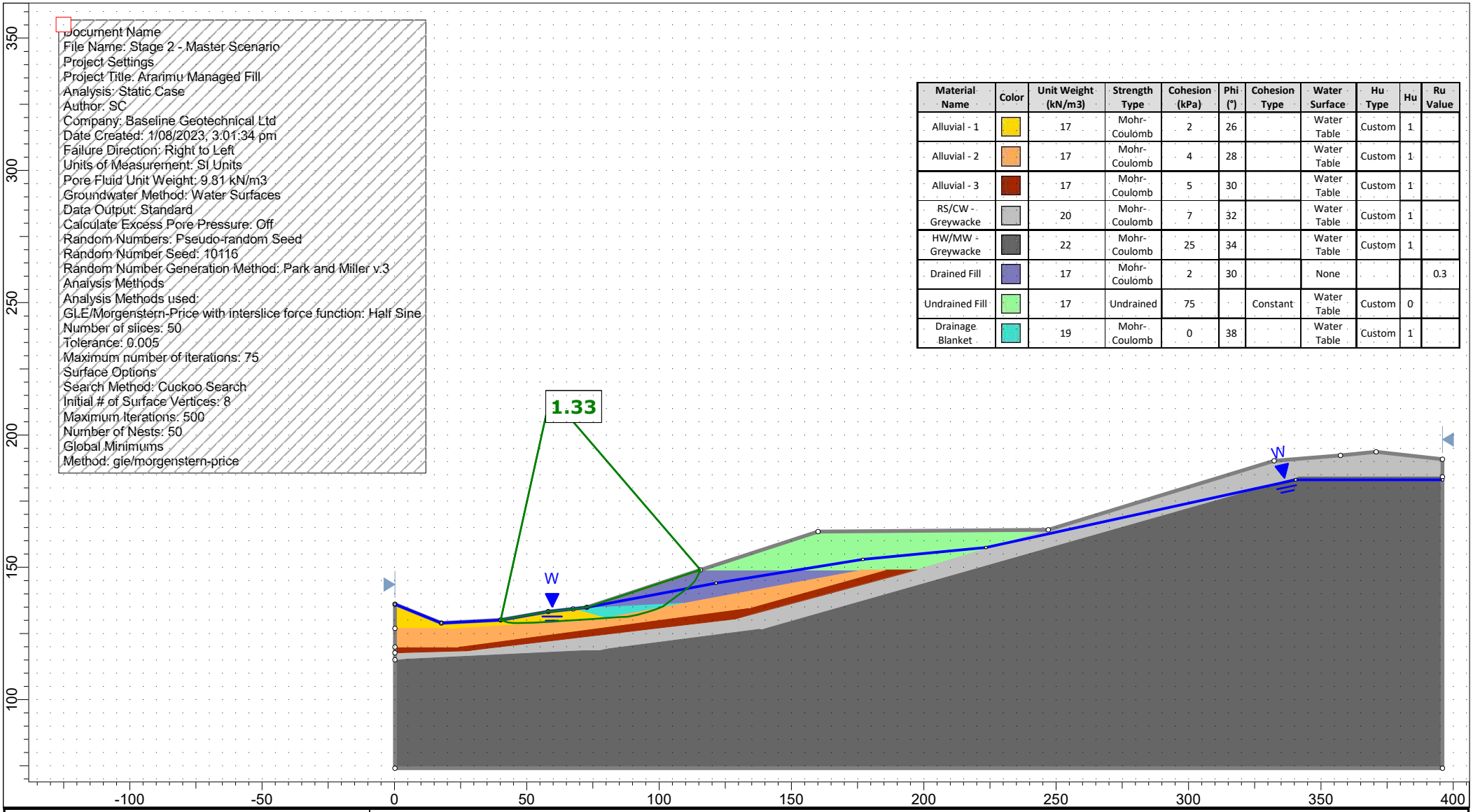
SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill				
Analysis Description	Section 1 - Undrained - Stage 1				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	23/04/2024			File Name	Cross Section 1.slmd

Document Name
File Name: Stage 2 - Master Scenario
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Static Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu	Ru Value
Alluvial - 1		17	Mohr-Coulomb	2	26		Water Table	Custom	1	
Alluvial - 2		17	Mohr-Coulomb	4	28		Water Table	Custom	1	
Alluvial - 3		17	Mohr-Coulomb	5	30		Water Table	Custom	1	
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1	
Drained Fill		17	Mohr-Coulomb	2	30		None			0.3
Undrained Fill		17	Undrained	75		Constant	Water Table	Custom	0	
Drainage Blanket		19	Mohr-Coulomb	0	38		Water Table	Custom	1	



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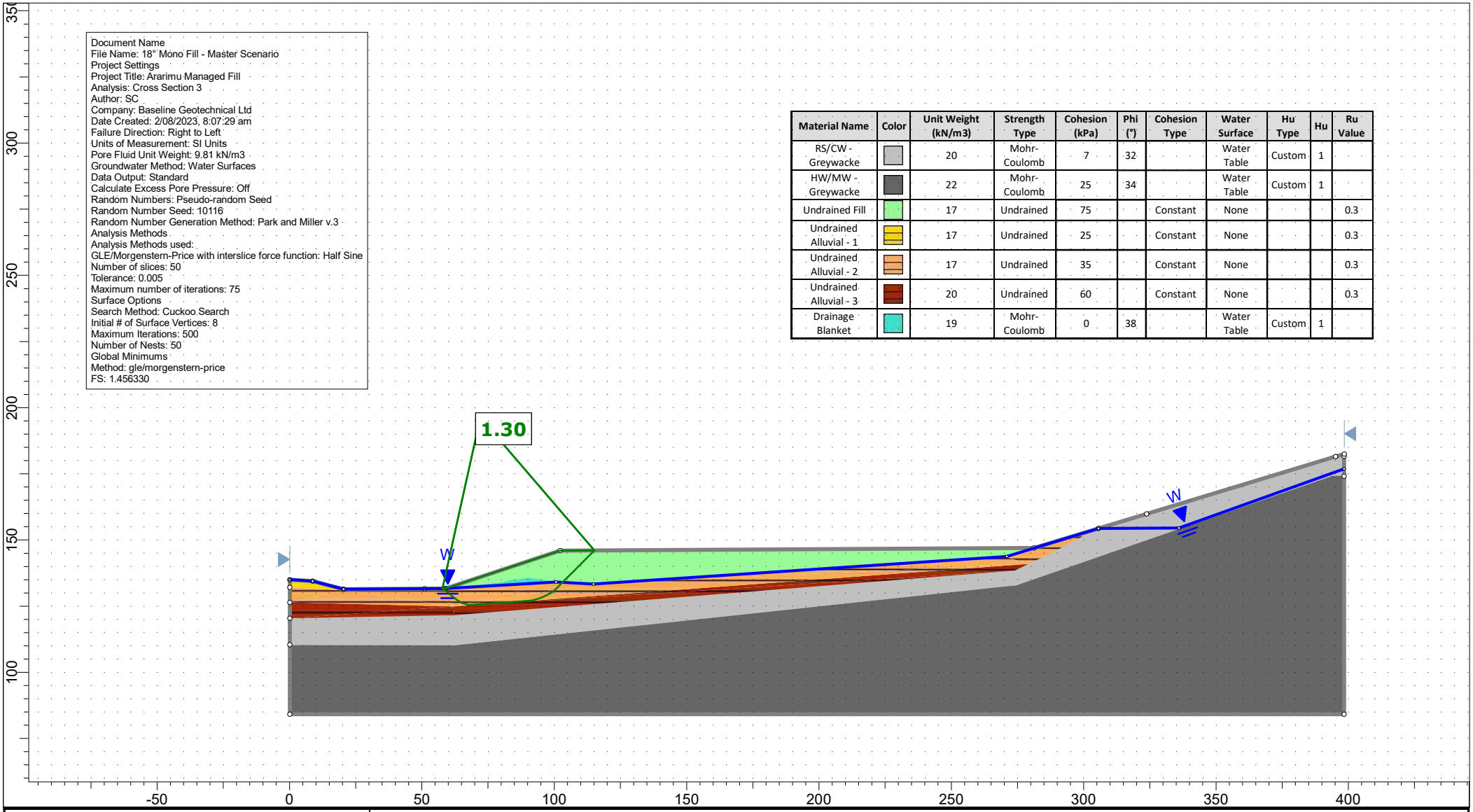
SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill			
Analysis Description	Section 1 - Undrained - Stage 2			
Drawn By	SC	Scale	1:2000	Company: Baseline Geotechnical Ltd
Date	23/04/2024			File Name: Cross Section 1.slmd

Document Name
File Name: 18" Mono Fill - Master Scenario
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 3
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:07:29 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price
FS: 1.456330

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu	Ru Value
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1	
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1	
Undrained Fill		17	Undrained	75		Constant	None			0.3
Undrained Alluvial - 1		17	Undrained	25		Constant	None			0.3
Undrained Alluvial - 2		17	Undrained	35		Constant	None			0.3
Undrained Alluvial - 3		20	Undrained	60		Constant	None			0.3
Drainage Blanket		19	Mohr-Coulomb	0	38		Water Table	Custom	1	



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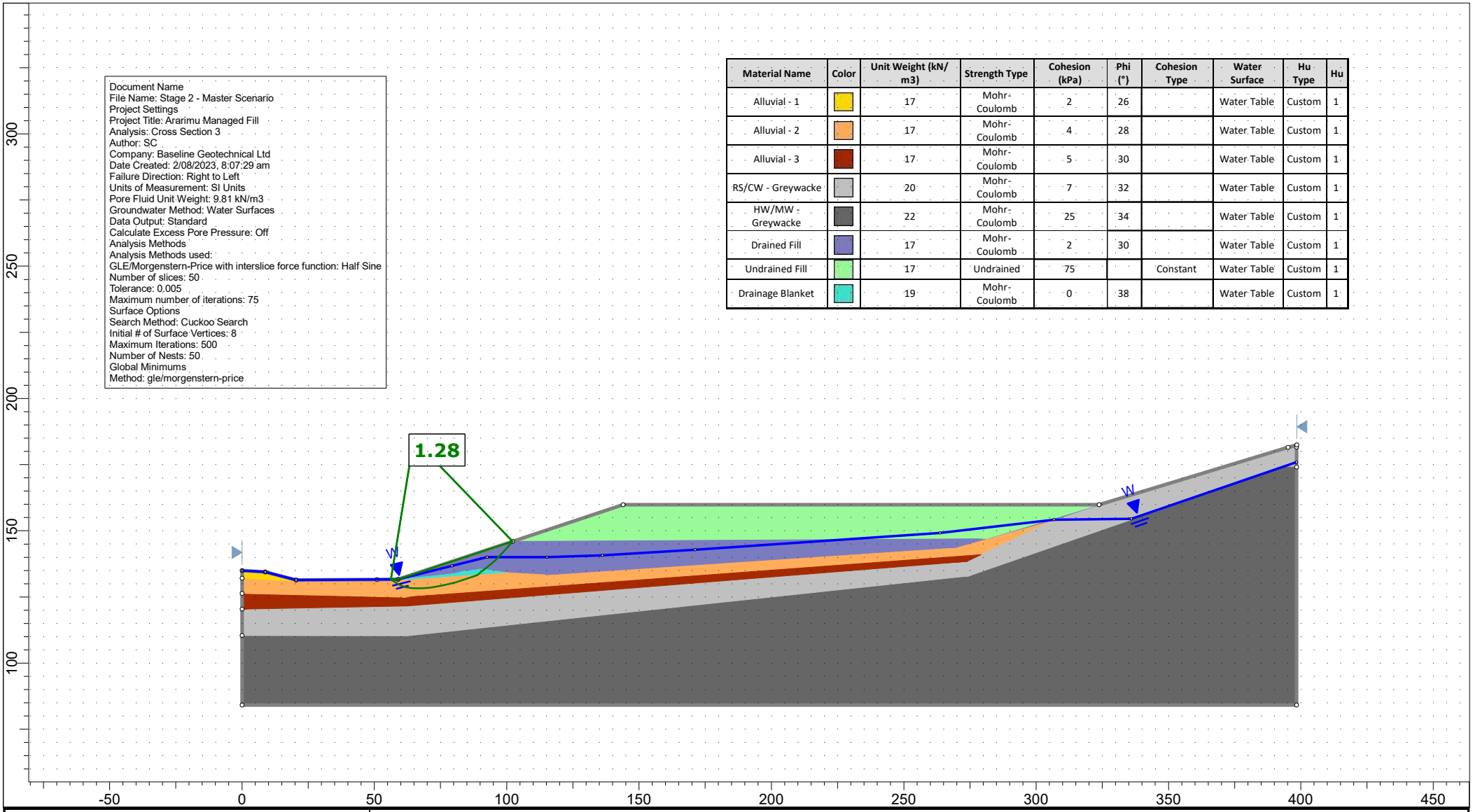
SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill				
Analysis Description	Section 3 - Undrained - Stage 1				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	23/04/2024			File Name	Cross Section 3.slmd

Document Name
File Name: Stage 2 - Master Scenario
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Cross Section 3
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 2/08/2023, 8:07:29 am
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu
Alluvial - 1		17	Mohr-Coulomb	2	26		Water Table	Custom	1
Alluvial - 2		17	Mohr-Coulomb	4	28		Water Table	Custom	1
Alluvial - 3		17	Mohr-Coulomb	5	30		Water Table	Custom	1
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1
Drained Fill		17	Mohr-Coulomb	2	30		Water Table	Custom	1
Undrained Fill		17	Undrained	75		Constant	Water Table	Custom	1
Drainage Blanket		19	Mohr-Coulomb	0	38		Water Table	Custom	1



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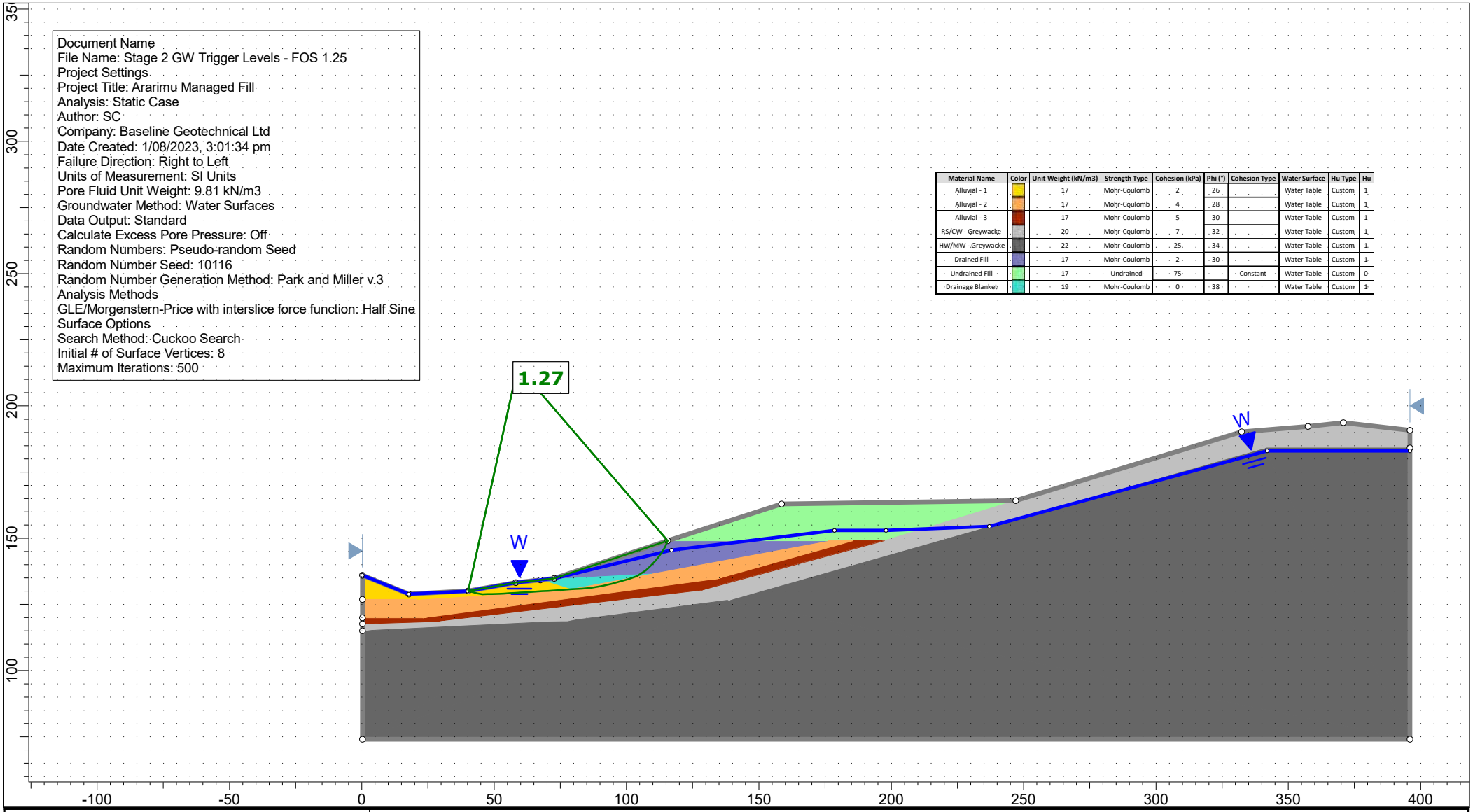
SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill				
Analysis Description	Section 3 - Undrained - Stage 2				
Drawn By	SC	Scale	1:2000	Company	Baseline Geotechnical Ltd
Date	23/04/2024			File Name	Cross Section 3.slmd

Document Name
File Name: Stage 2 GW Trigger Levels - FOS 1.25
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Static Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
GLE/Morgenstern-Price with interslice force function: Half Sine
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu
Alluvial - 1		17	Mohr-Coulomb	2	26		Water Table	Custom	1
Alluvial - 2		17	Mohr-Coulomb	4	28		Water Table	Custom	1
Alluvial - 3		17	Mohr-Coulomb	5	30		Water Table	Custom	1
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1
Drained Fill		17	Mohr-Coulomb	2	30		Water Table	Custom	1
Undrained Fill		17	Undrained	75		Constant	Water Table	Custom	0
Drainage Blanket		19	Mohr-Coulomb	0	38		Water Table	Custom	1



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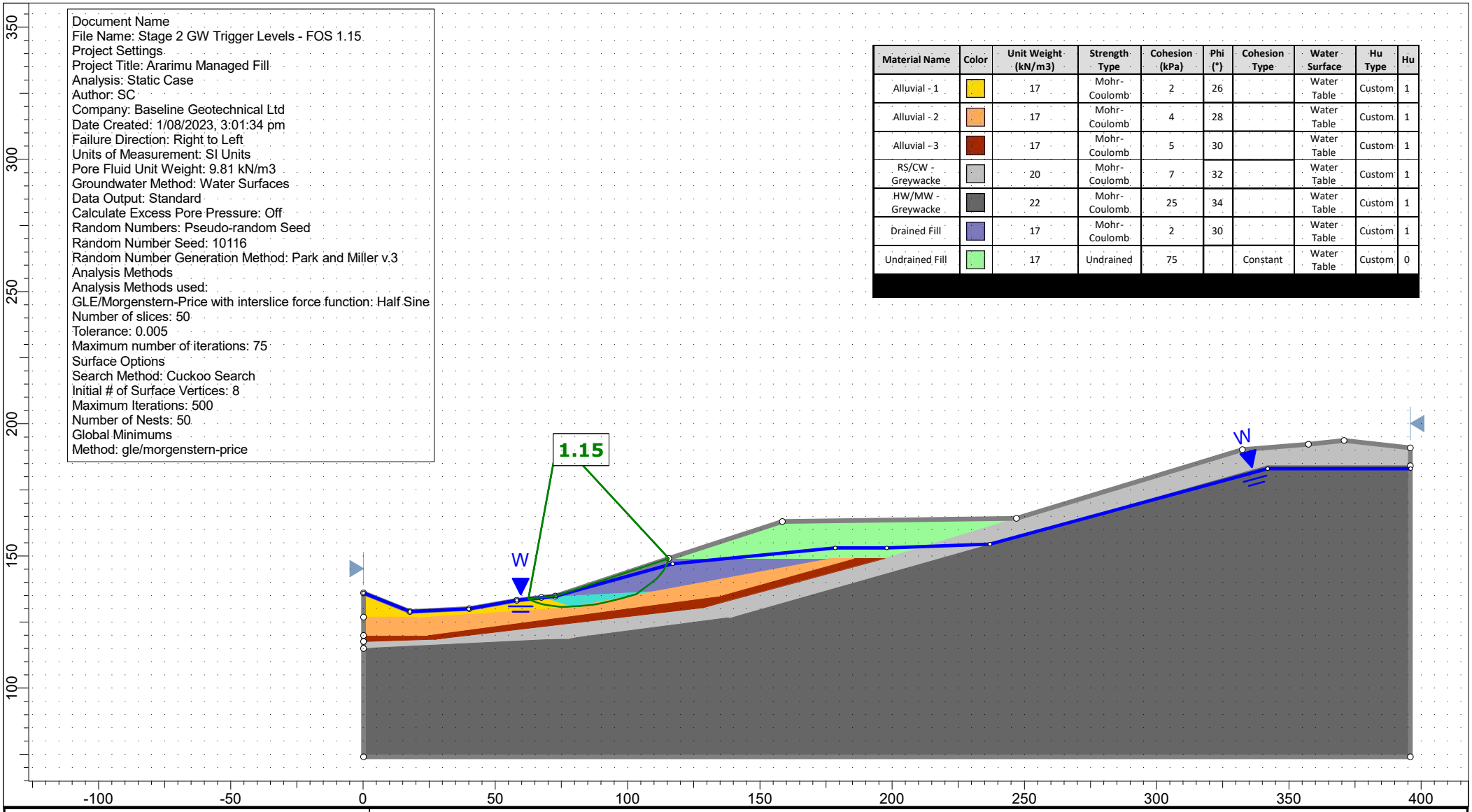
SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill			
Analysis Description	Section 1 - Undrained FOS 1.25 (due to increased piezometric profile)			
Drawn By	SC	Scale	1:2000	Company: Baseline Geotechnical Ltd
Date	23/04/2024			File Name: Cross Section 1.slmd

Document Name
File Name: Stage 2 GW Trigger Levels - FOS 1.15
Project Settings
Project Title: Ararimu Managed Fill
Analysis: Static Case
Author: SC
Company: Baseline Geotechnical Ltd
Date Created: 1/08/2023, 3:01:34 pm
Failure Direction: Right to Left
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3
Analysis Methods
Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Surface Options
Search Method: Cuckoo Search
Initial # of Surface Vertices: 8
Maximum Iterations: 500
Number of Nests: 50
Global Minimums
Method: gle/morgenstern-price

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu
Alluvial - 1		17	Mohr-Coulomb	2	26		Water Table	Custom	1
Alluvial - 2		17	Mohr-Coulomb	4	28		Water Table	Custom	1
Alluvial - 3		17	Mohr-Coulomb	5	30		Water Table	Custom	1
RS/CW - Greywacke		20	Mohr-Coulomb	7	32		Water Table	Custom	1
HW/MW - Greywacke		22	Mohr-Coulomb	25	34		Water Table	Custom	1
Drained Fill		17	Mohr-Coulomb	2	30		Water Table	Custom	1
Undrained Fill		17	Undrained	75		Constant	Water Table	Custom	0



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SLIDEINTERPRET 9.029

Project	Ararimu Managed Fill			
Analysis Description	Section 1 - Undrained FOS 1.15 (due to increased piezometric profile)			
Drawn By	SC	Scale	1:2000	Company: Baseline Geotechnical Ltd
Date	23/04/2024			File Name: Cross Section 1.slmd

Appendix H - Liquefaction analysis

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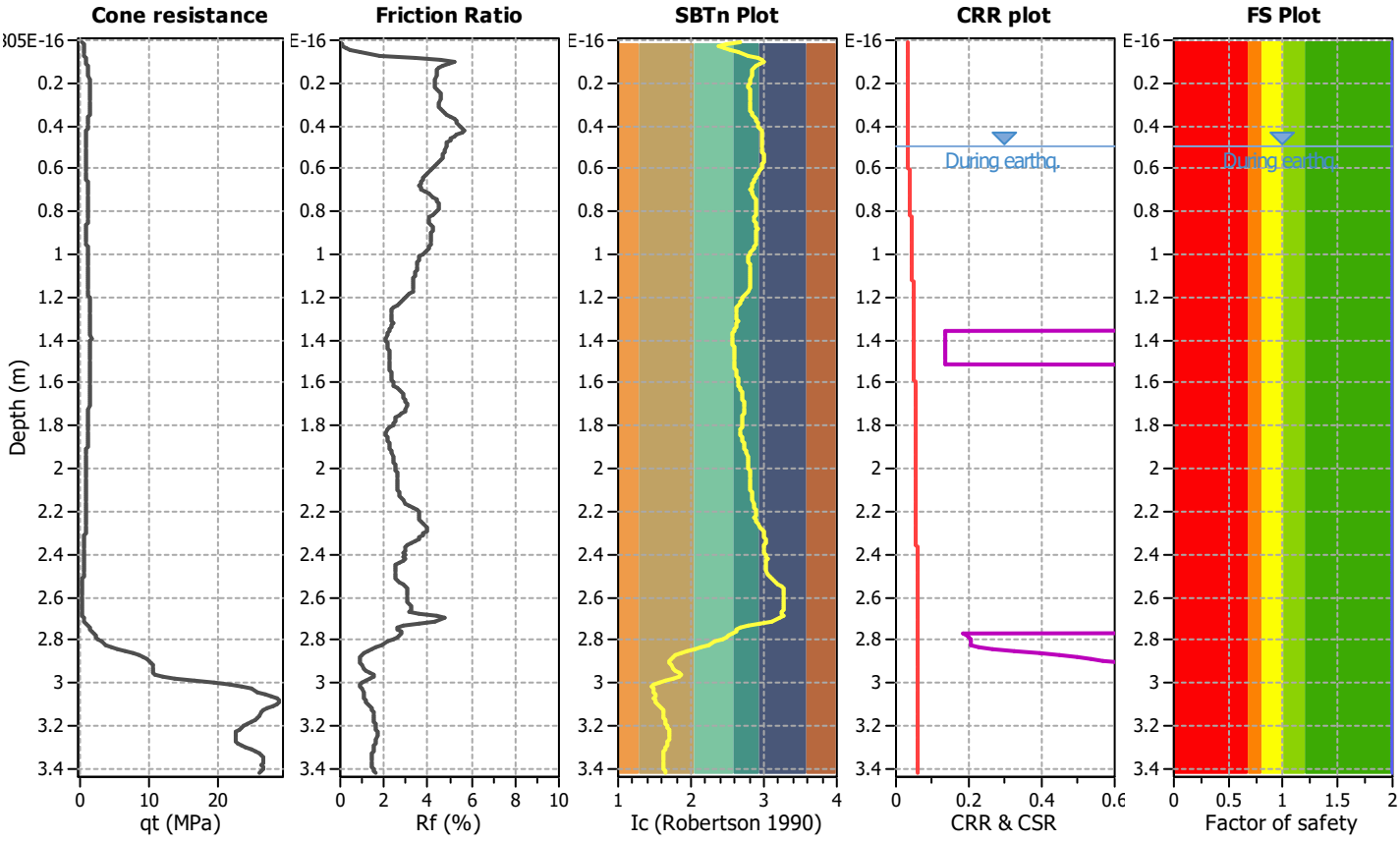
LIQUEFACTION ANALYSIS REPORT

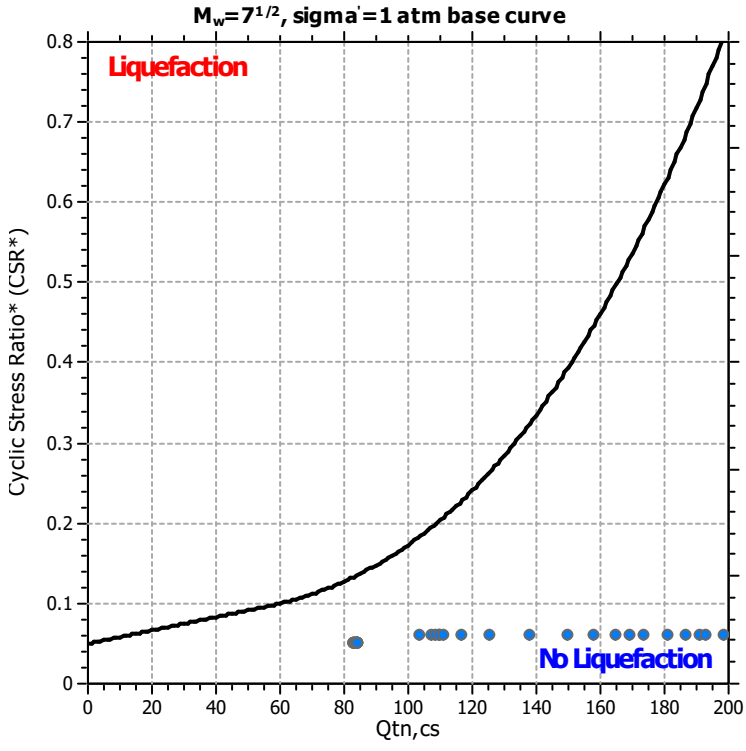
Project title : **Location :**

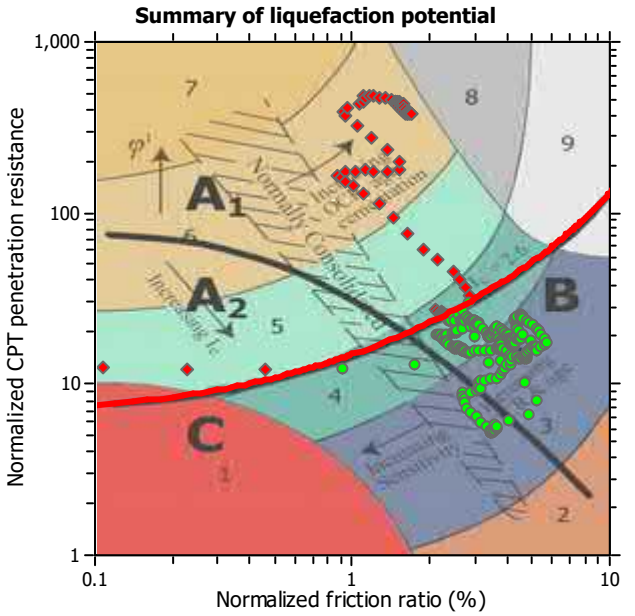
CPT file : CPT23-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

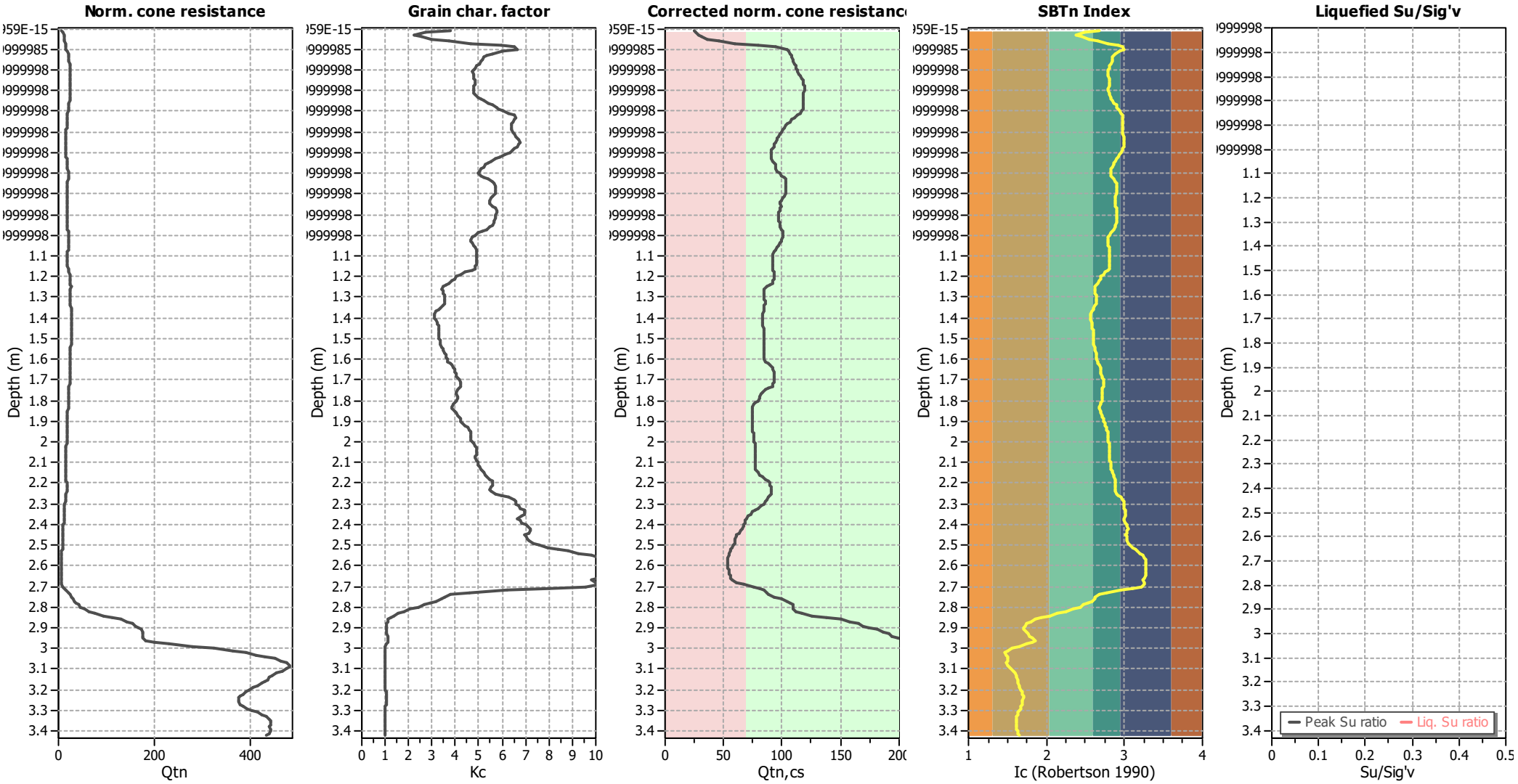






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

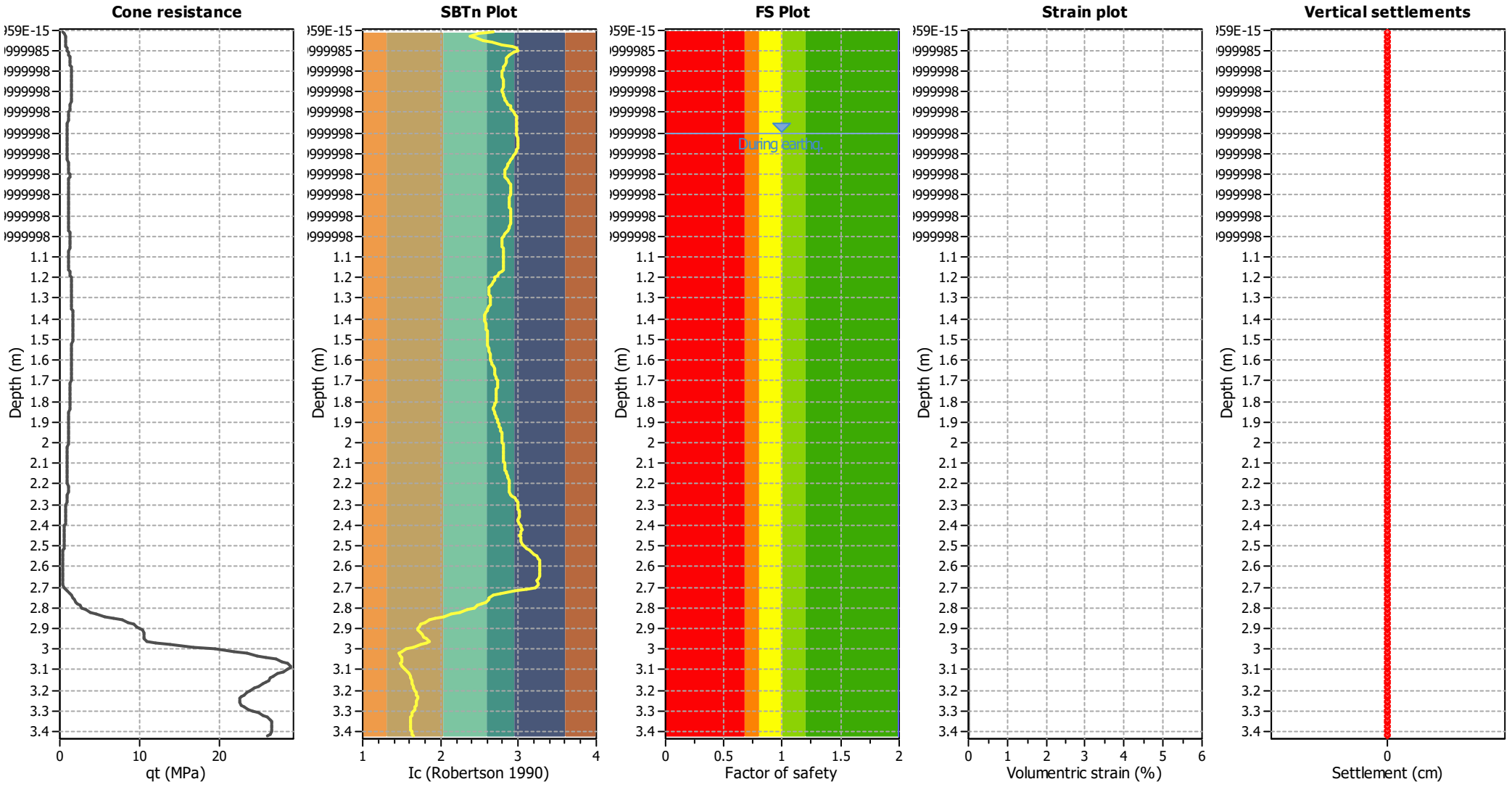
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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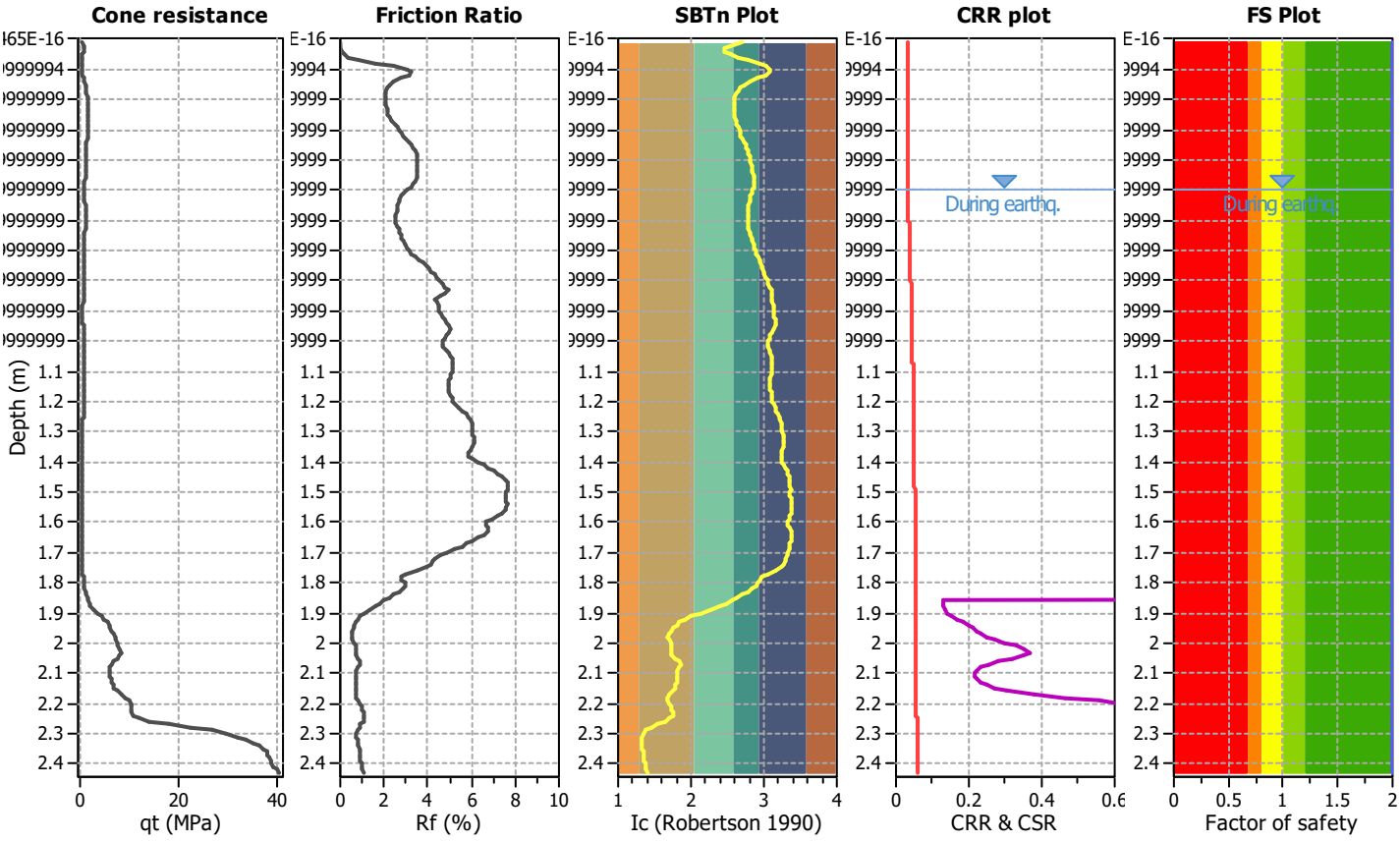
LIQUEFACTION ANALYSIS REPORT

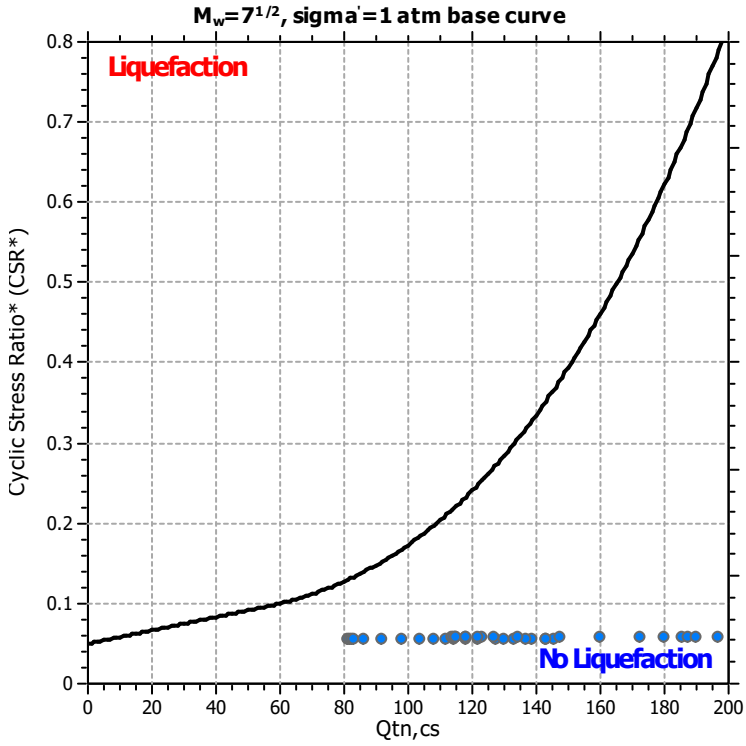
Project title : **Location :**

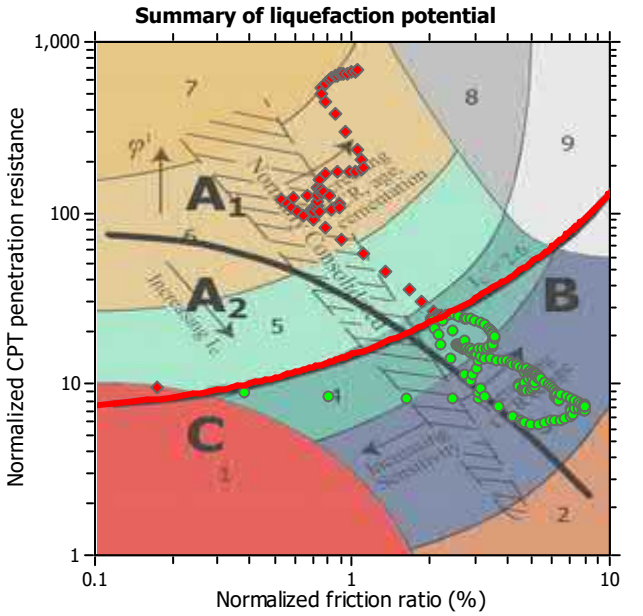
CPT file : CPT23-01A

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

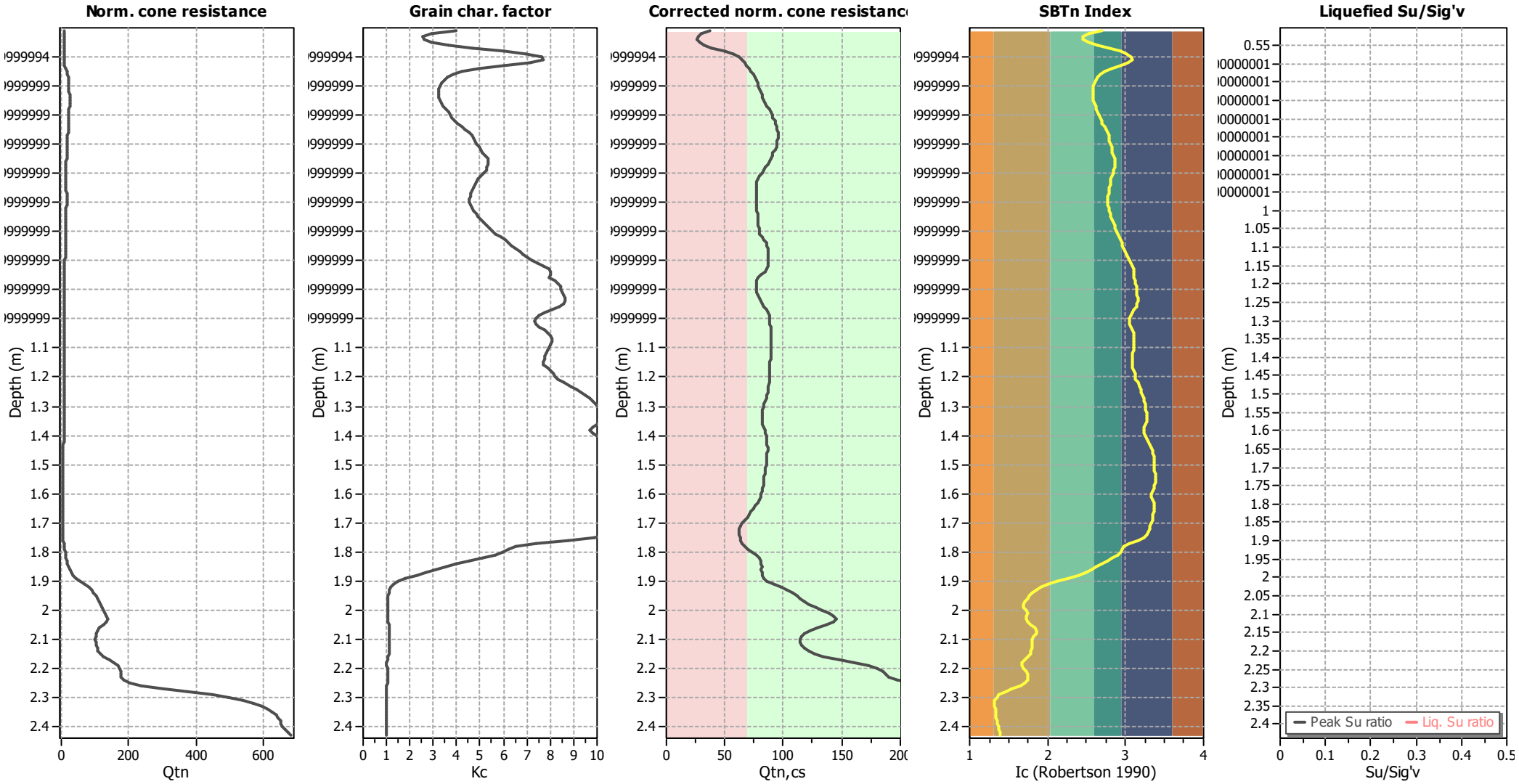






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

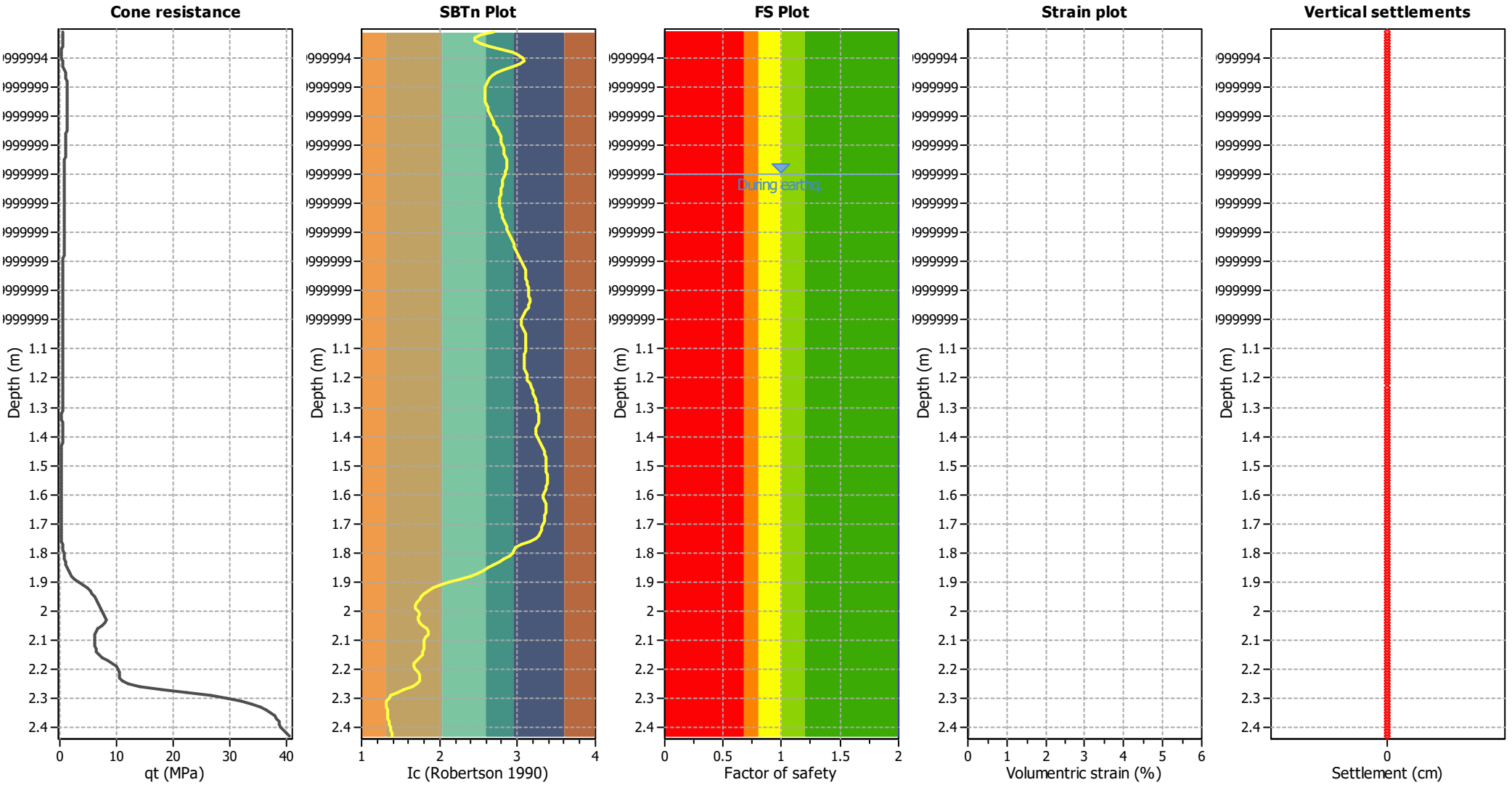
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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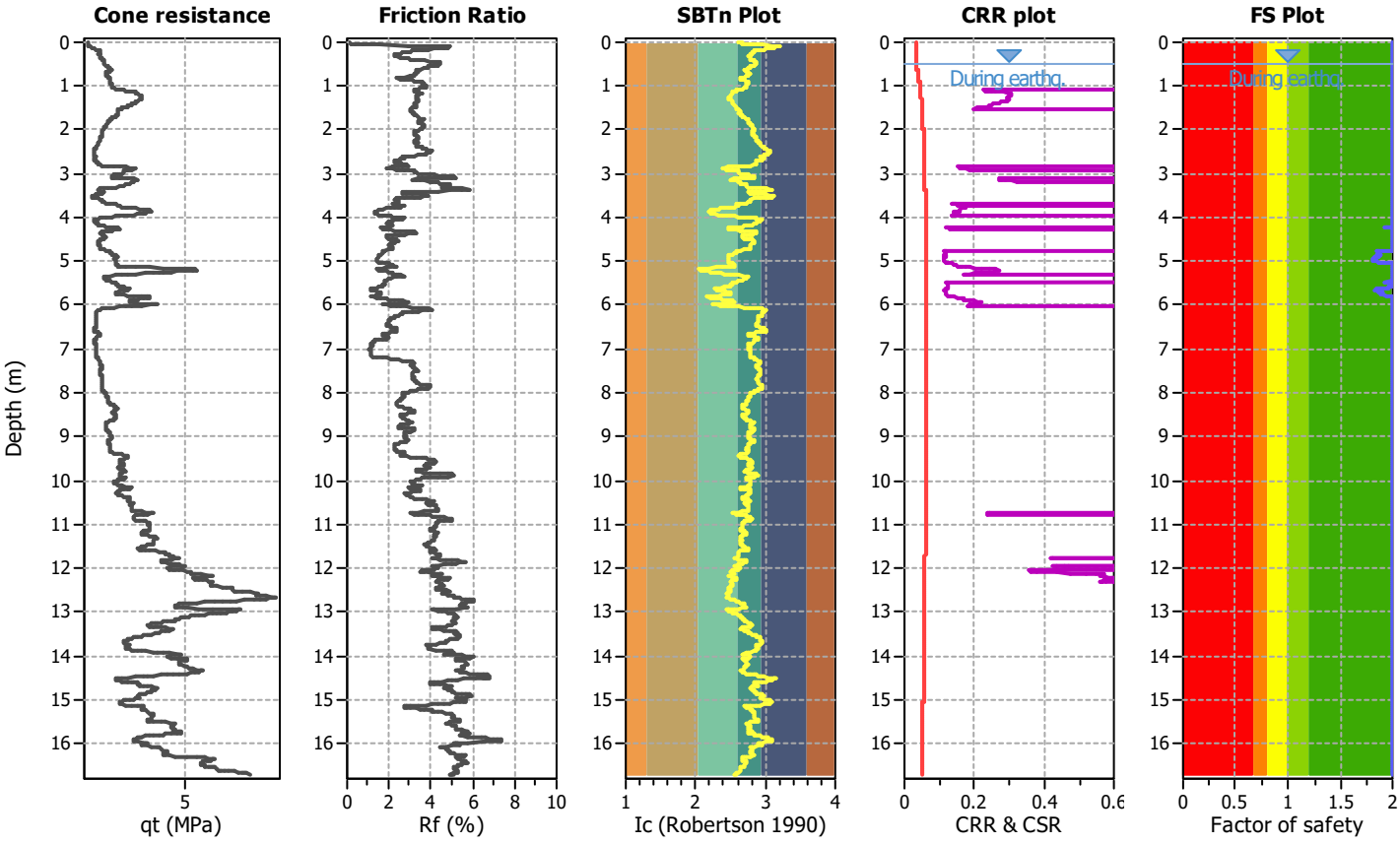
LIQUEFACTION ANALYSIS REPORT

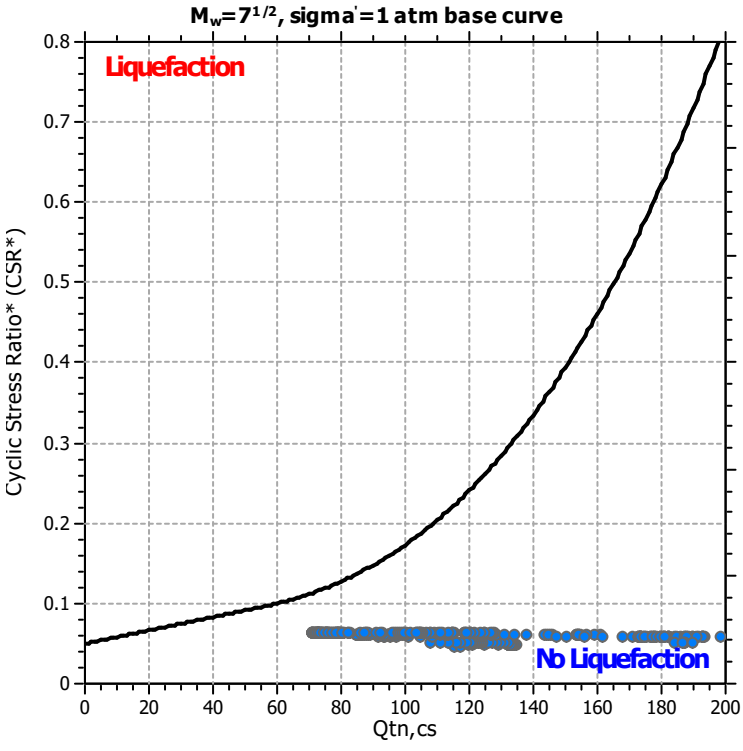
Project title : **Location :**

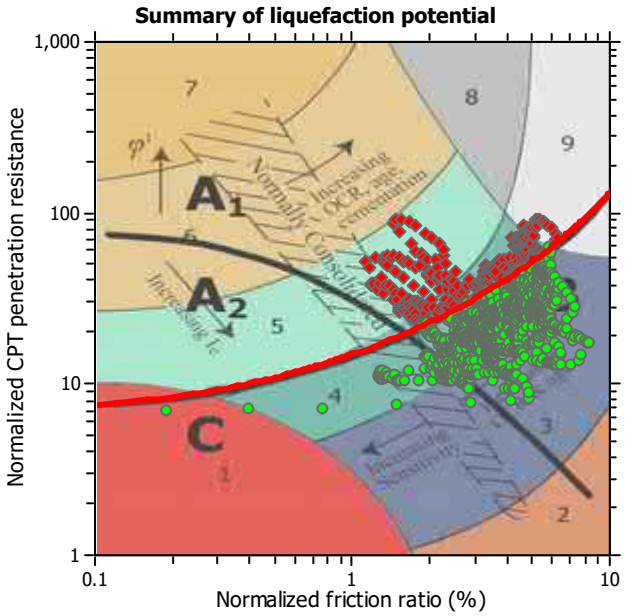
CPT file : CPT23-01B

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

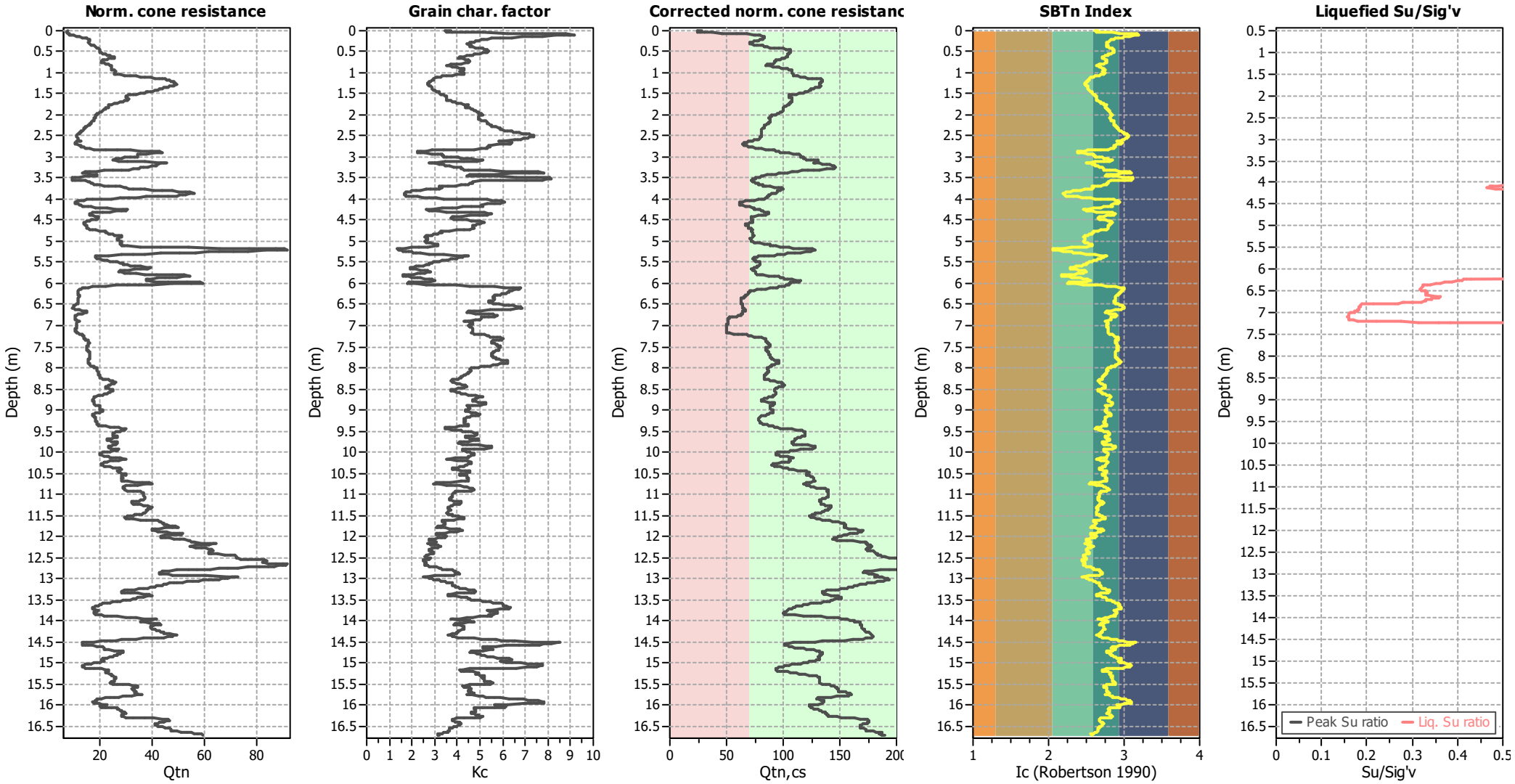






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

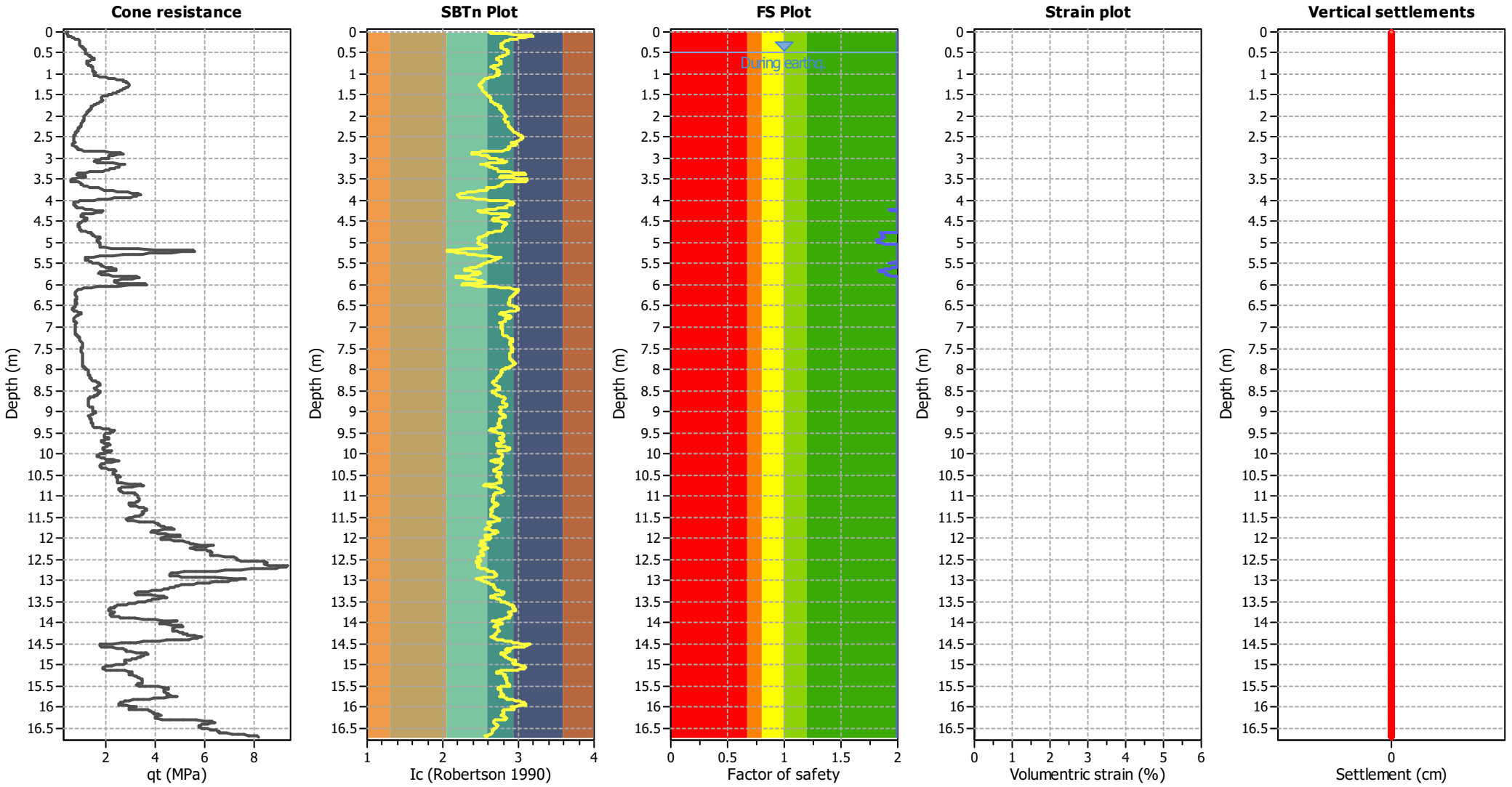
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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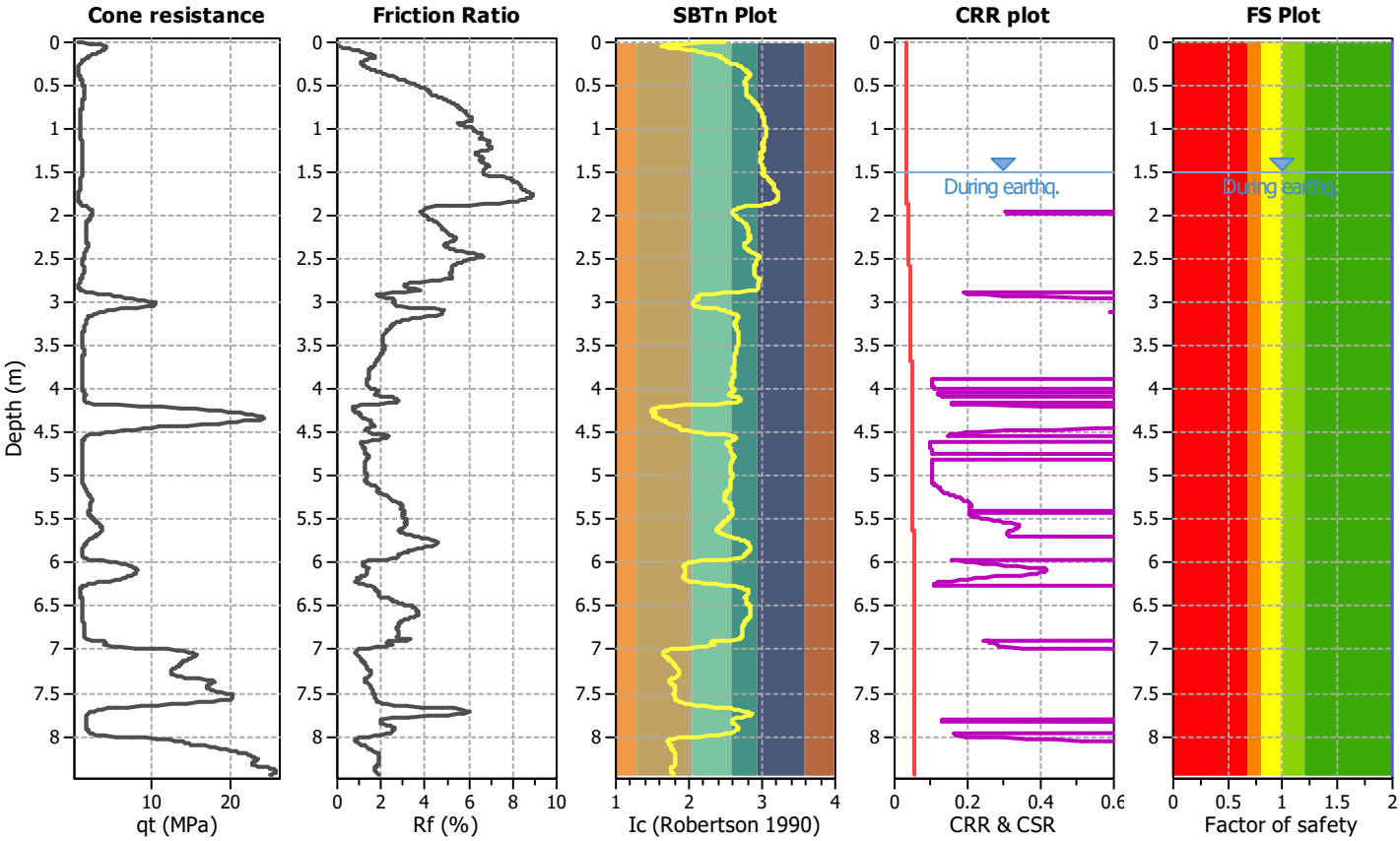
LIQUEFACTION ANALYSIS REPORT

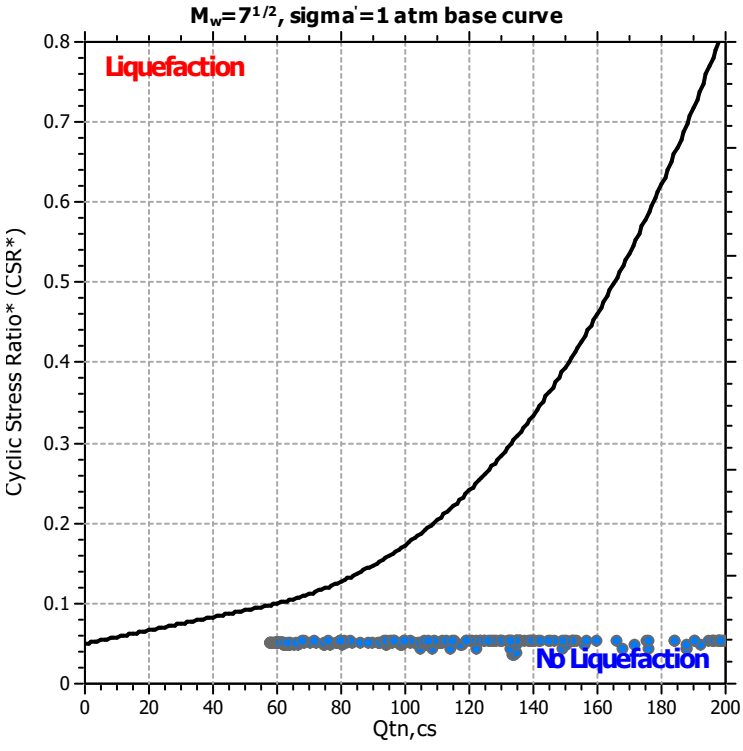
Project title : **Location :**

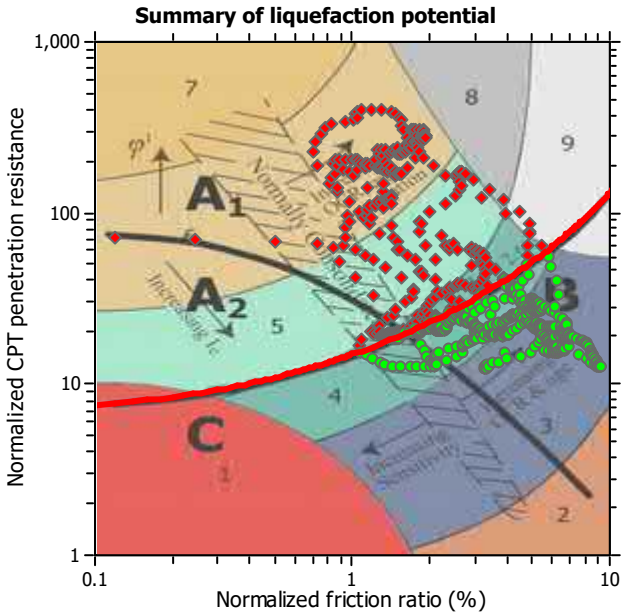
CPT file : CPT23-02

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

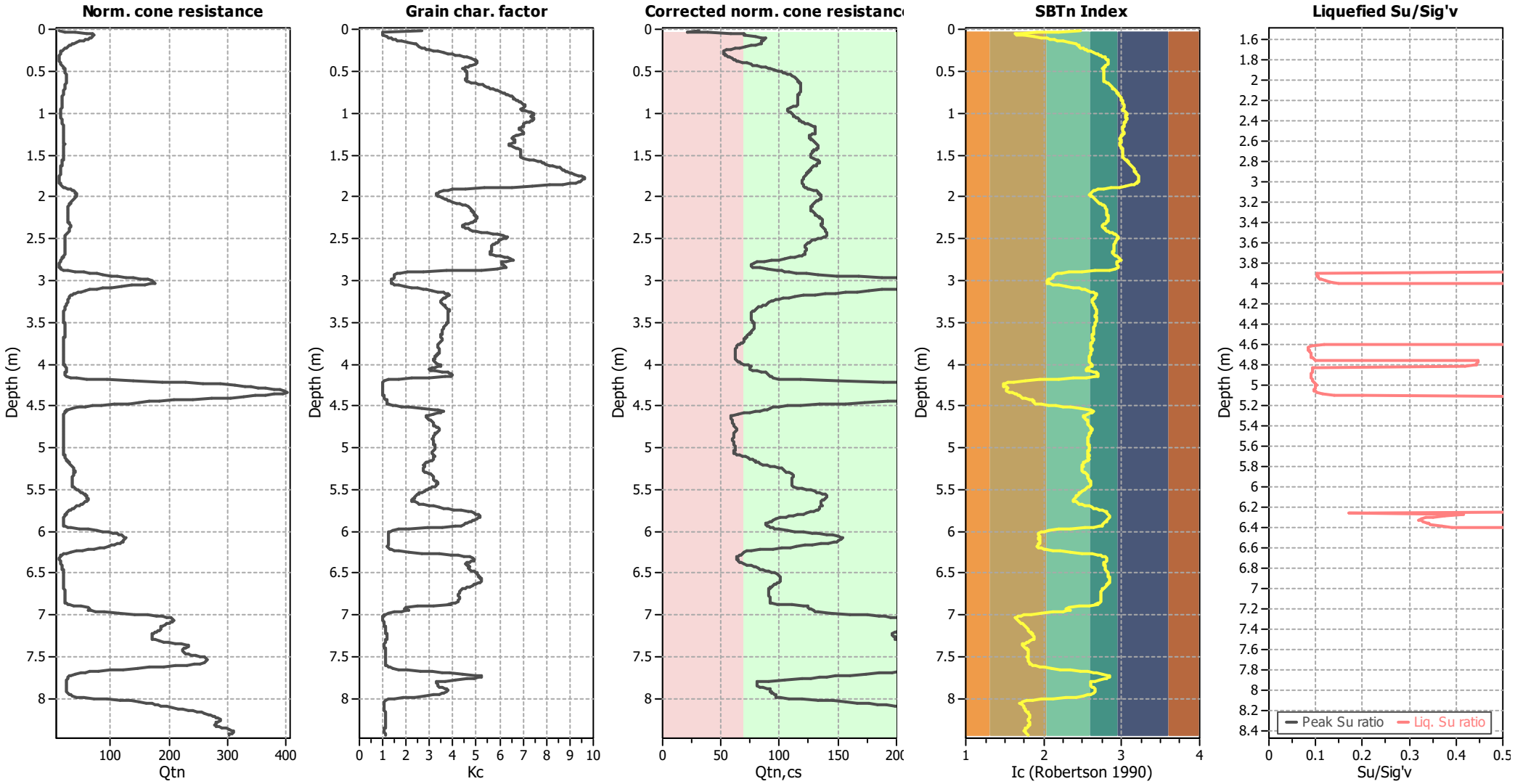






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

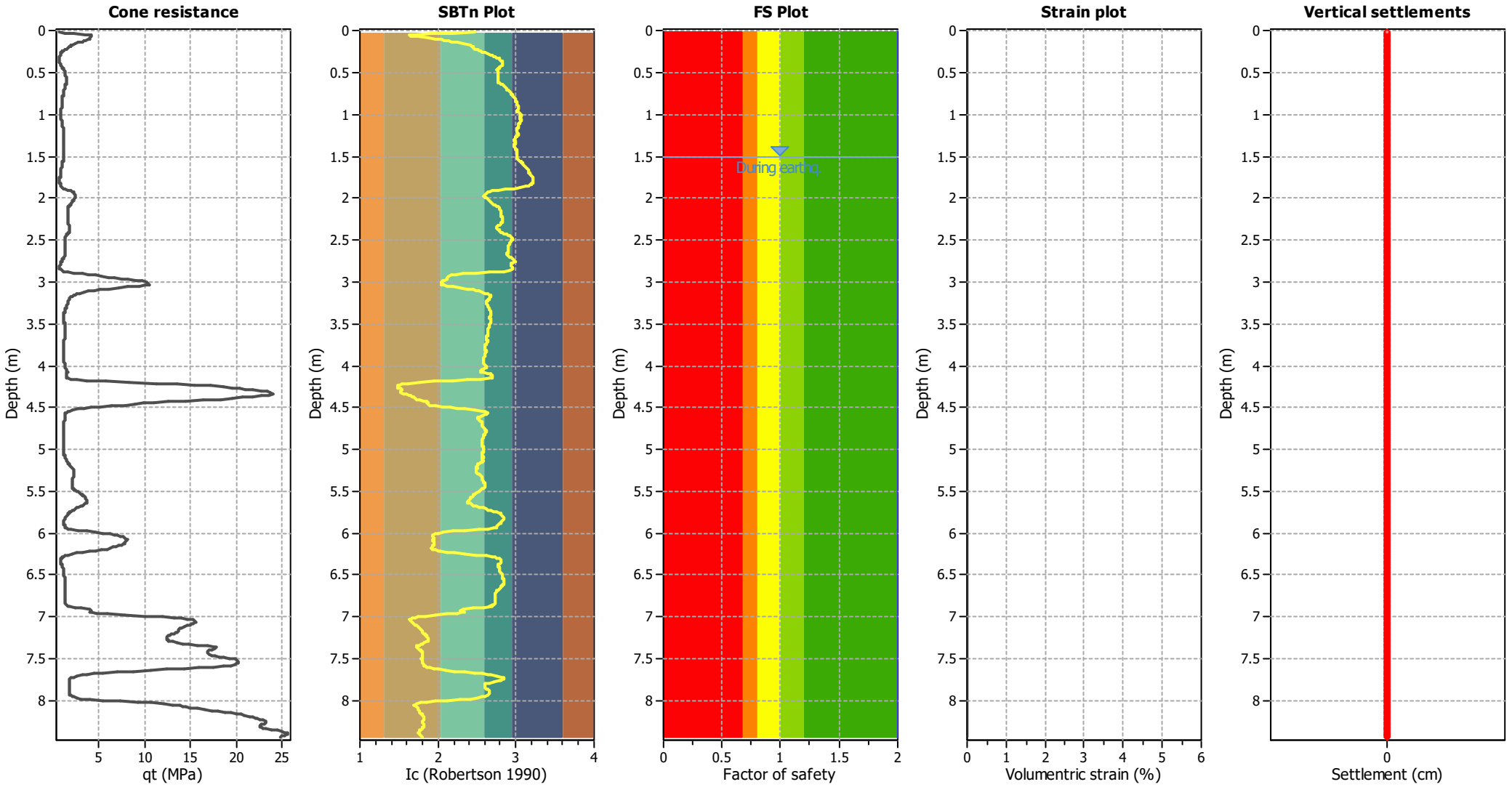
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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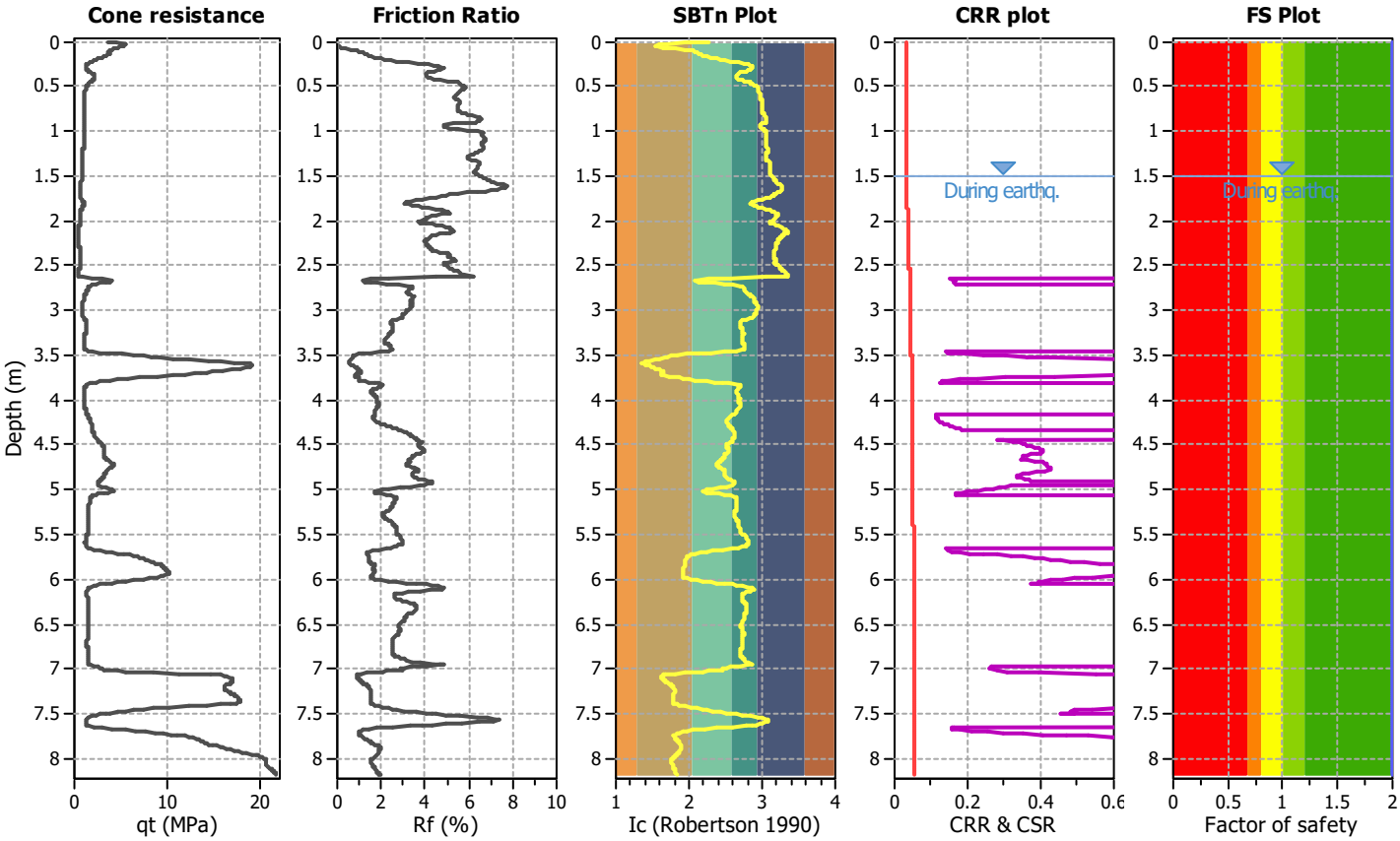
LIQUEFACTION ANALYSIS REPORT

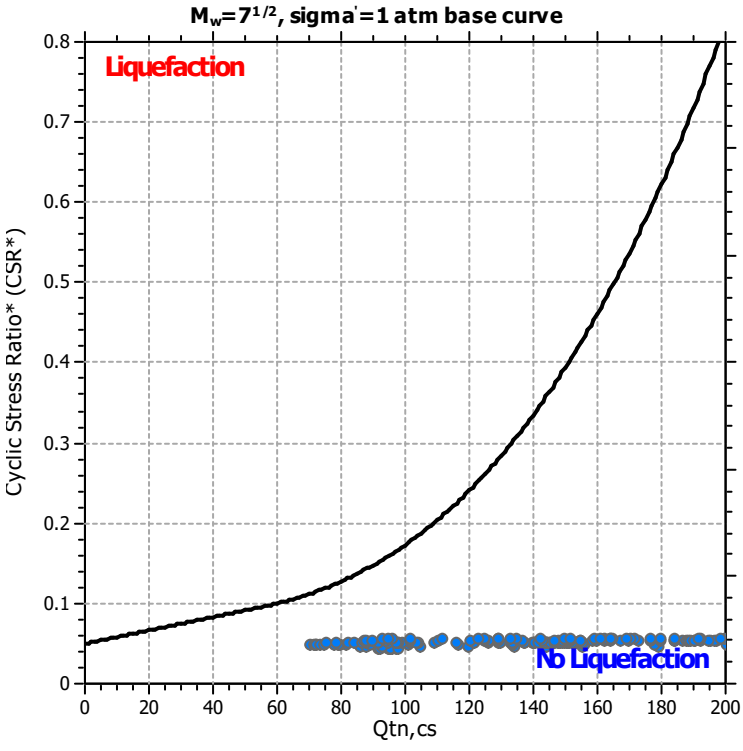
Project title : **Location :**

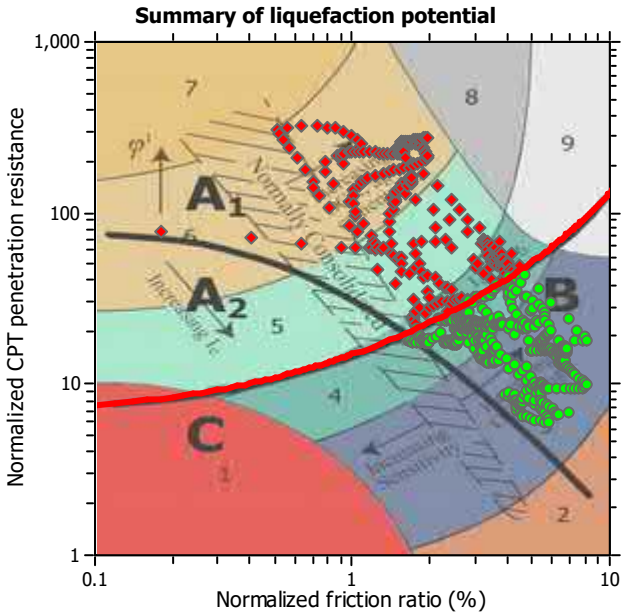
CPT file : CPT23-02A

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

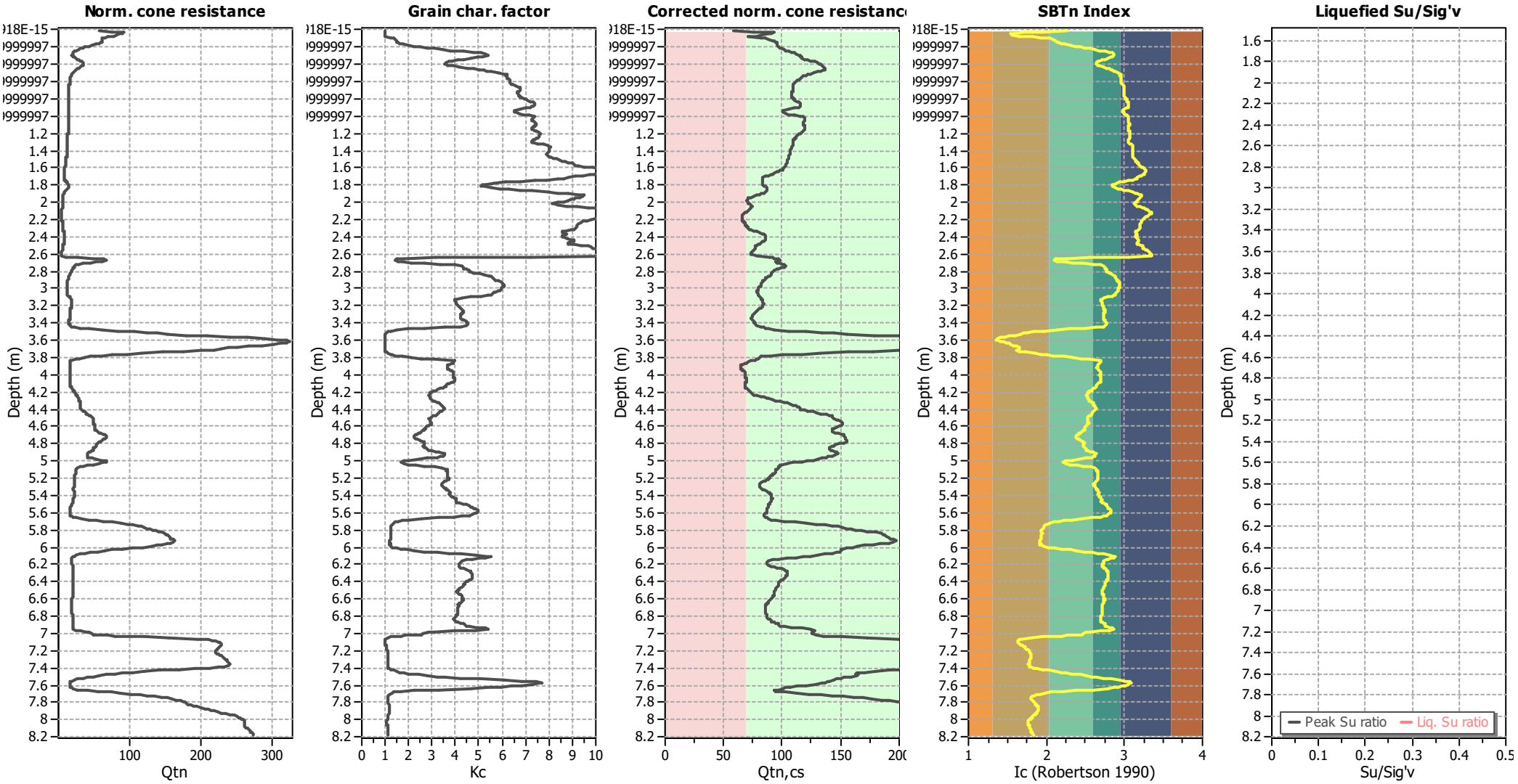






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

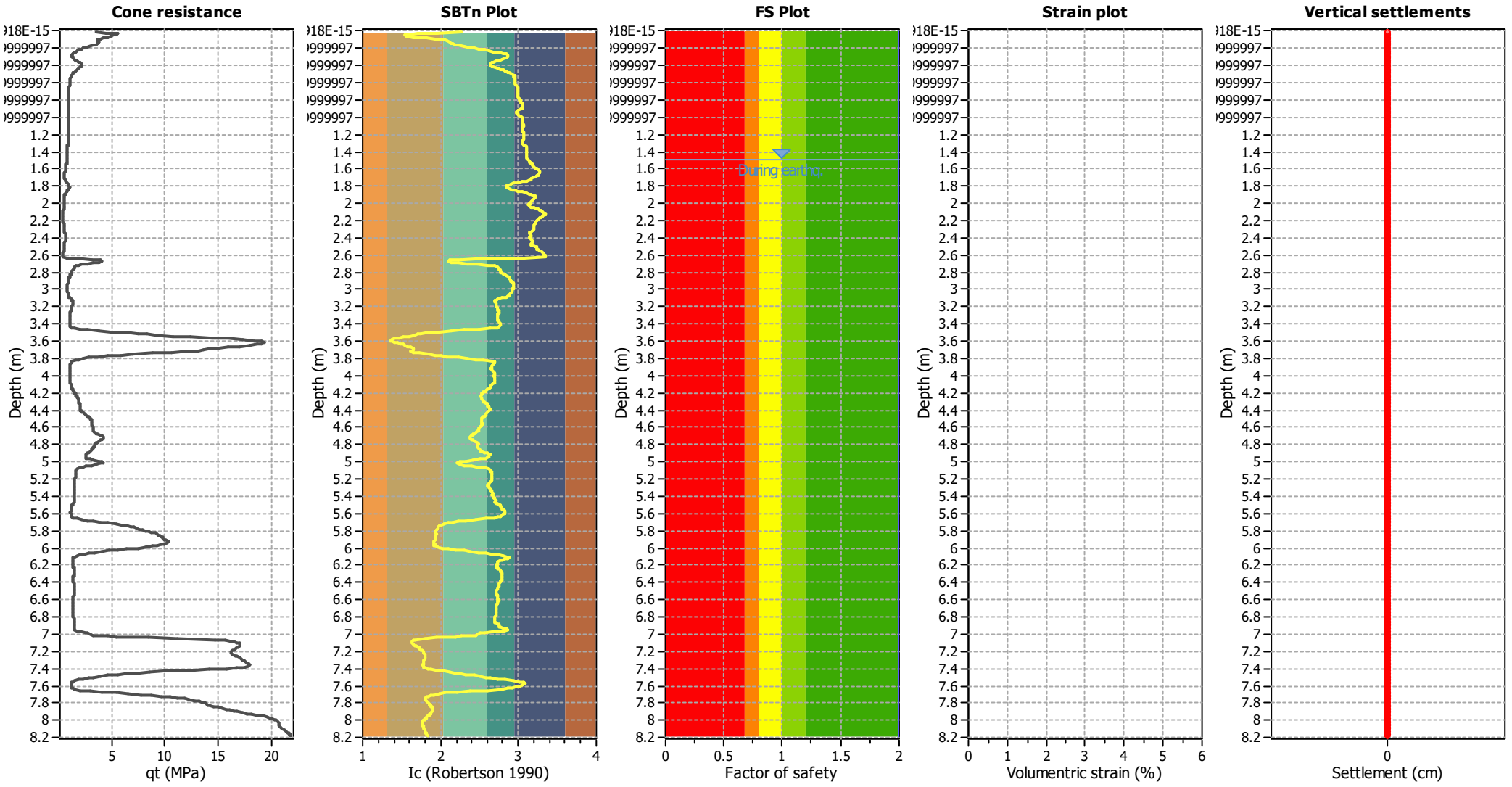
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

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Volumentric strain:	Post-liquefaction volumentric strain

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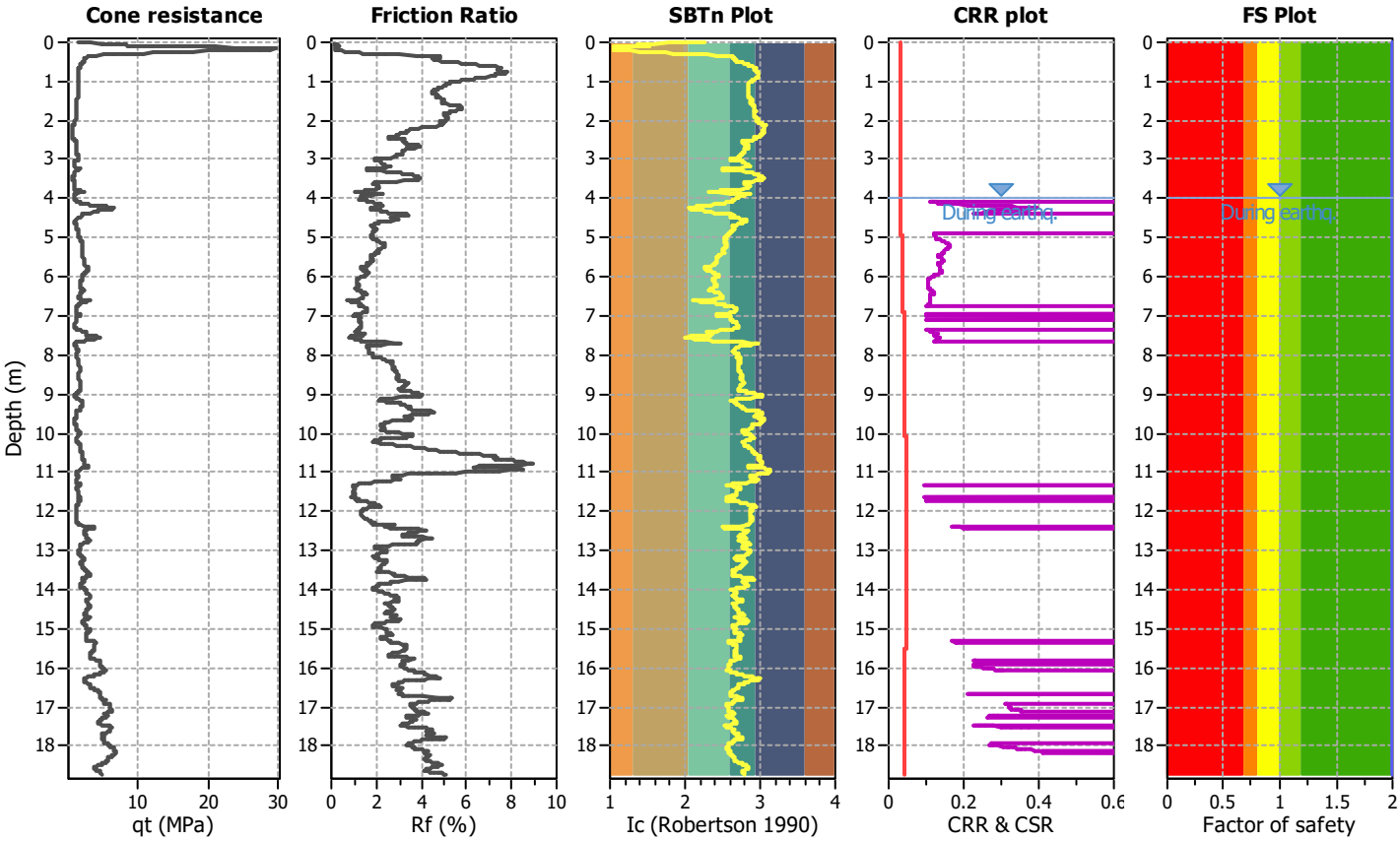
LIQUEFACTION ANALYSIS REPORT

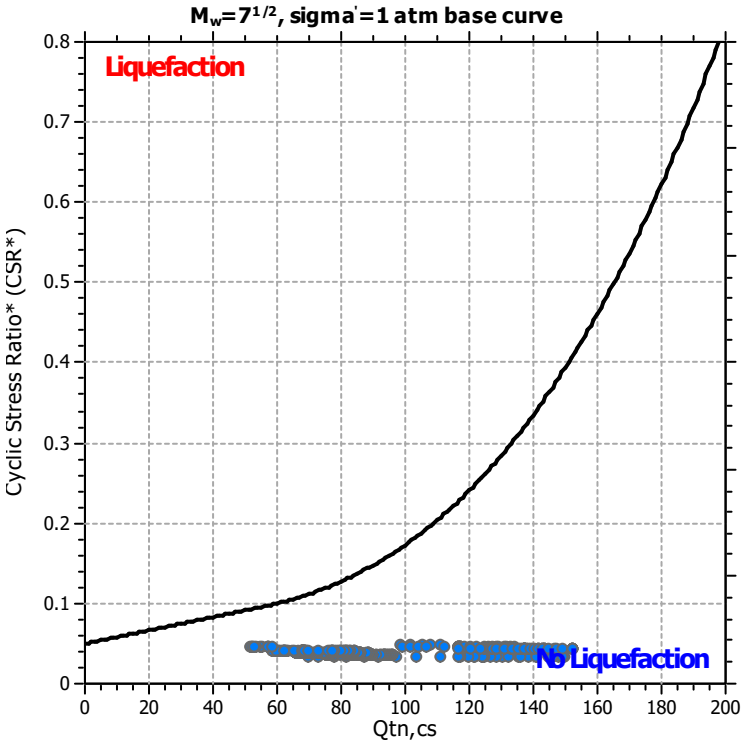
Project title : **Location :**

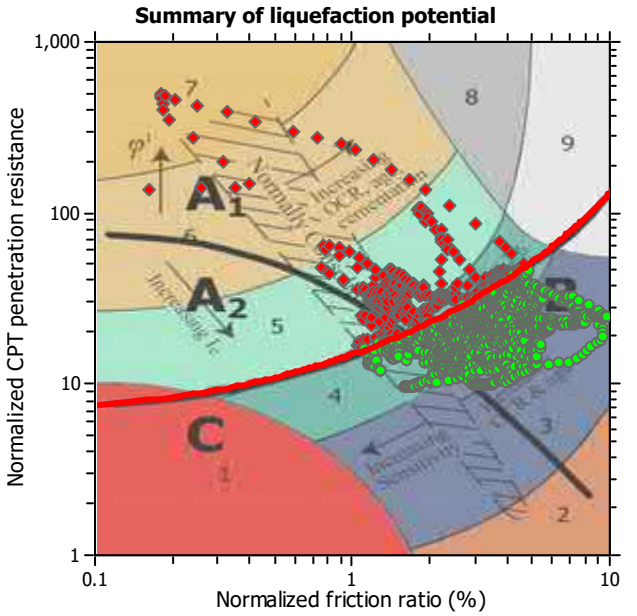
CPT file : CPT23-03

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

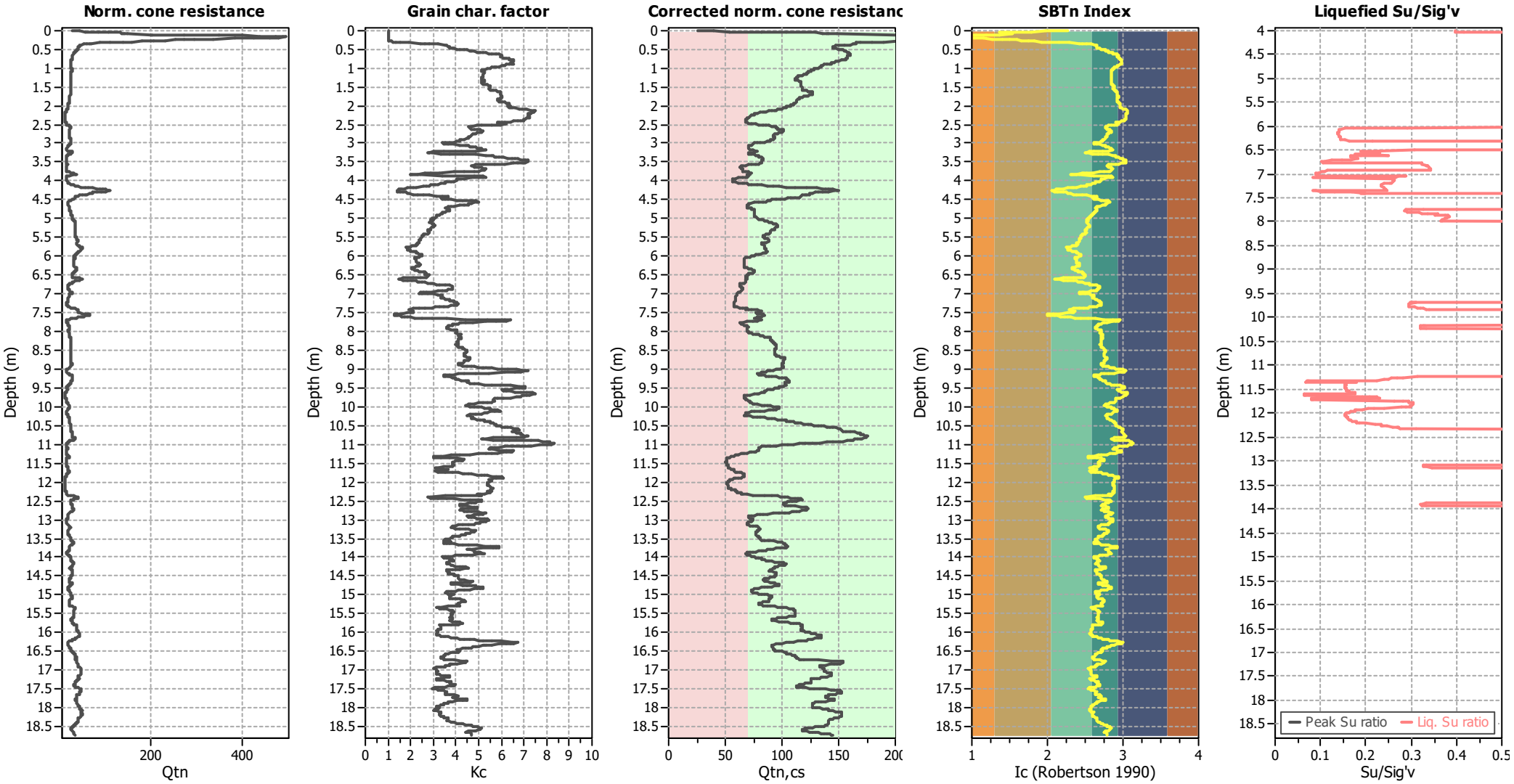






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

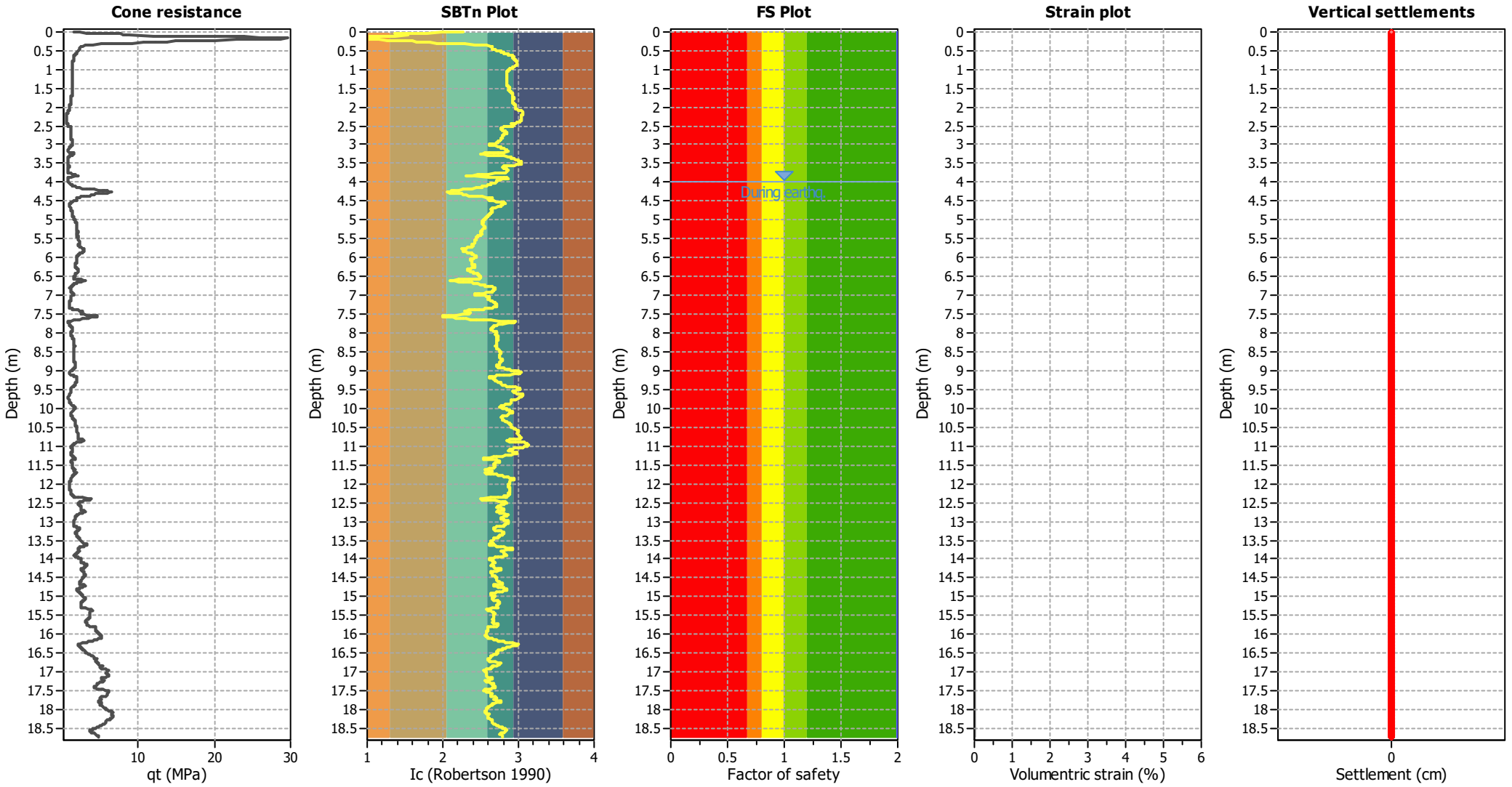
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	4.00 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

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Volumentric strain:	Post-liquefaction volumentric strain

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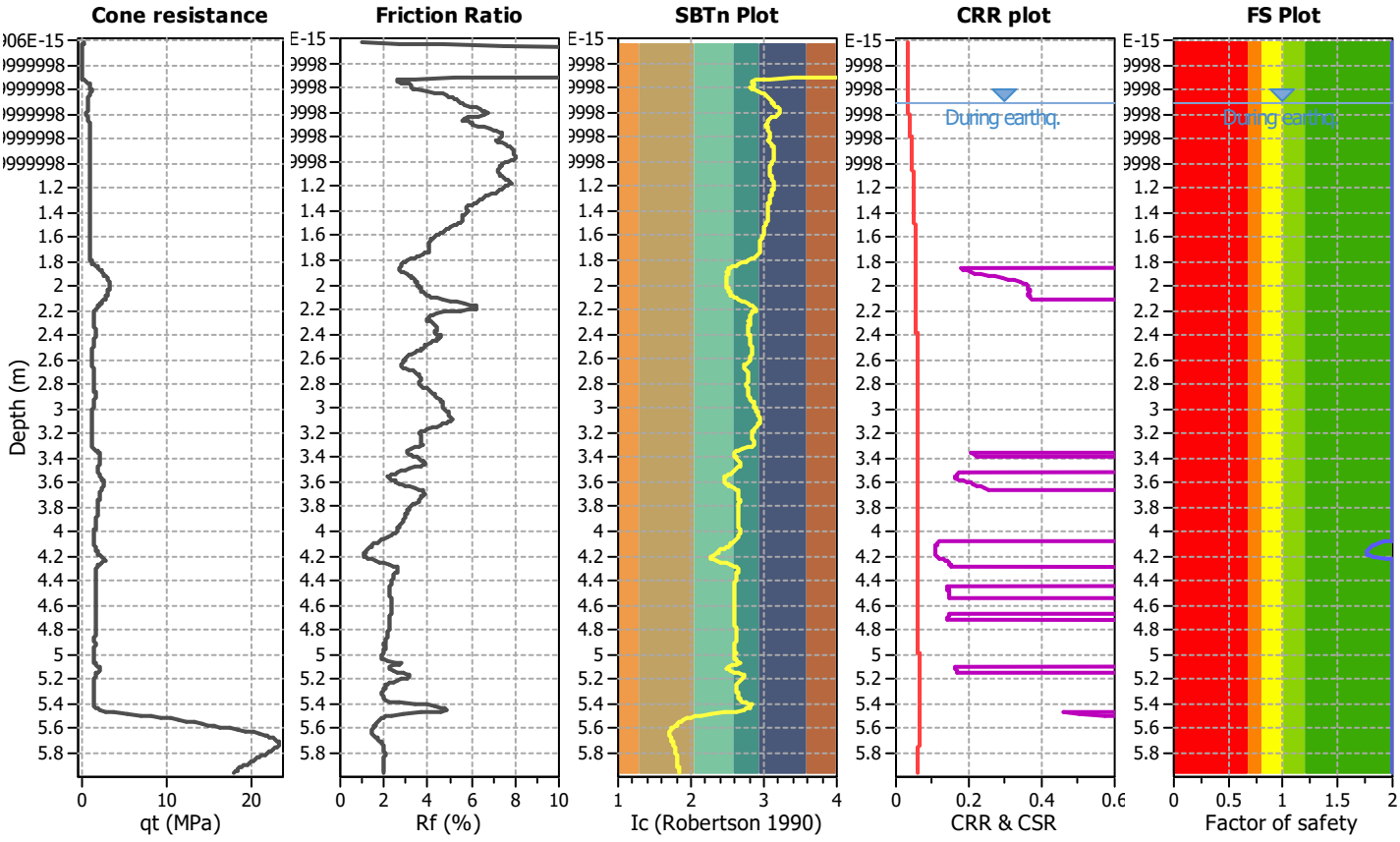
LIQUEFACTION ANALYSIS REPORT

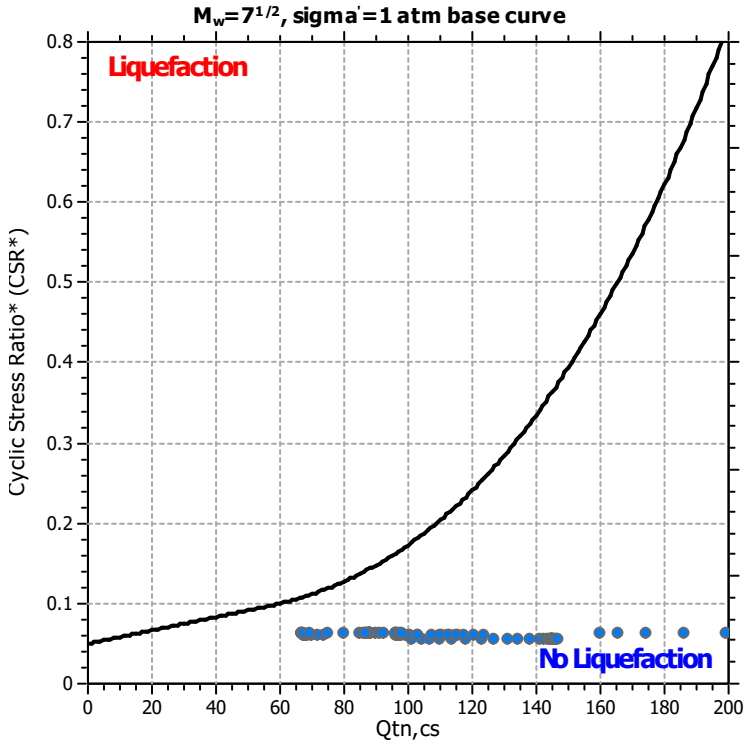
Project title : **Location :**

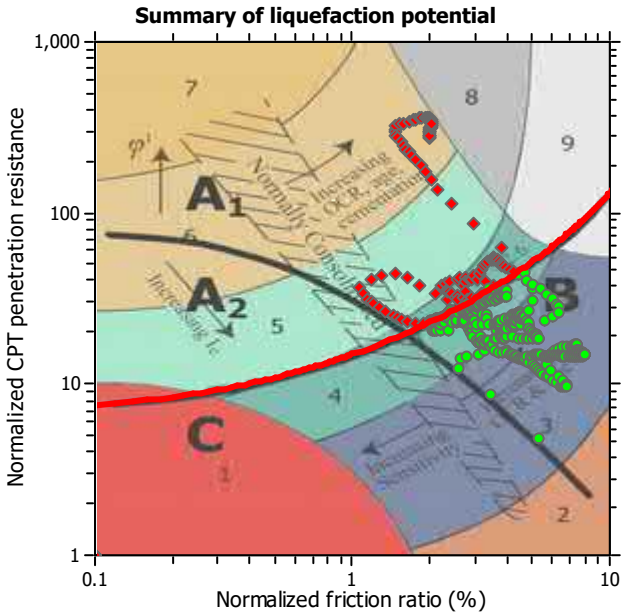
CPT file : CPT23-04

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	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:	0.09	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

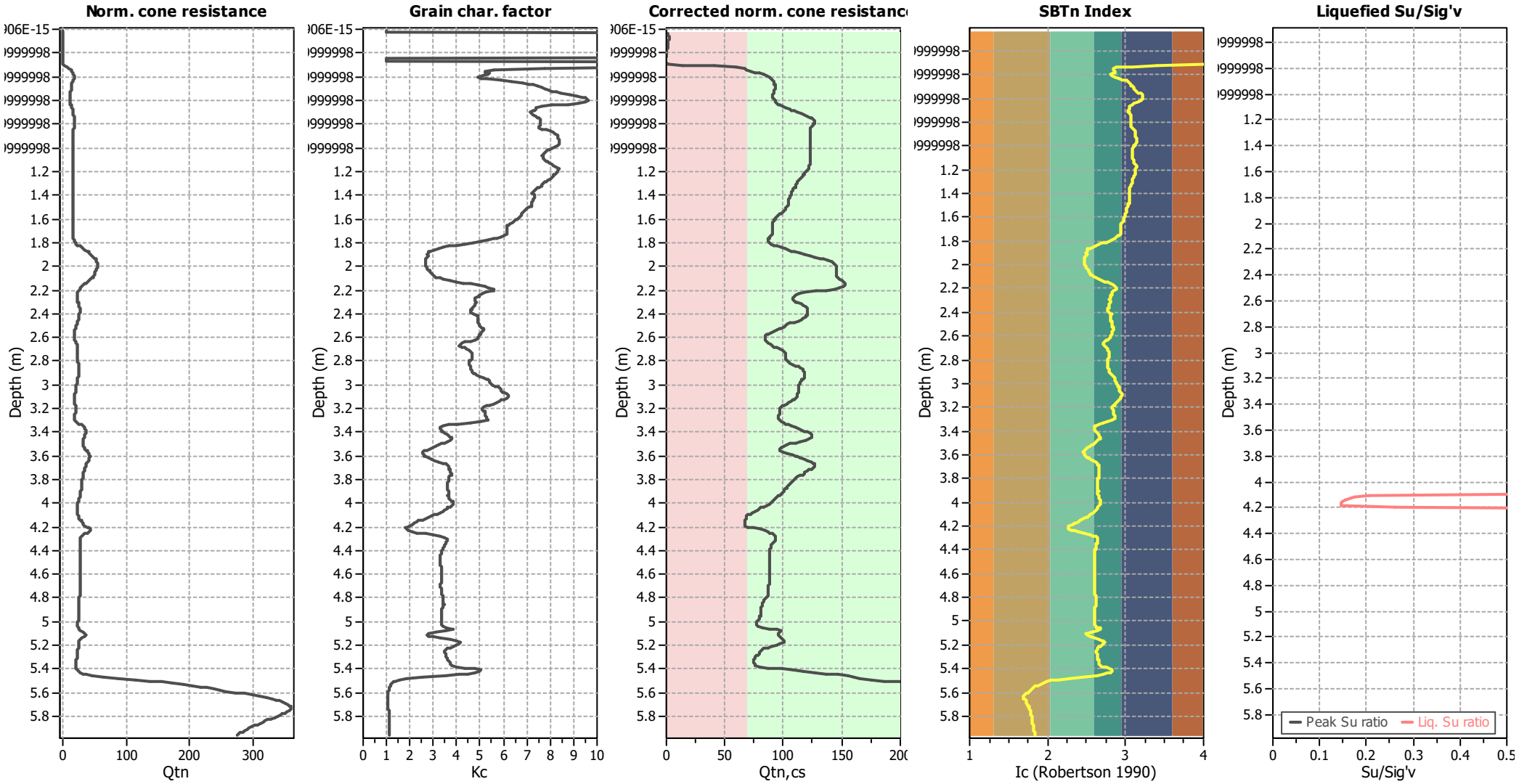






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

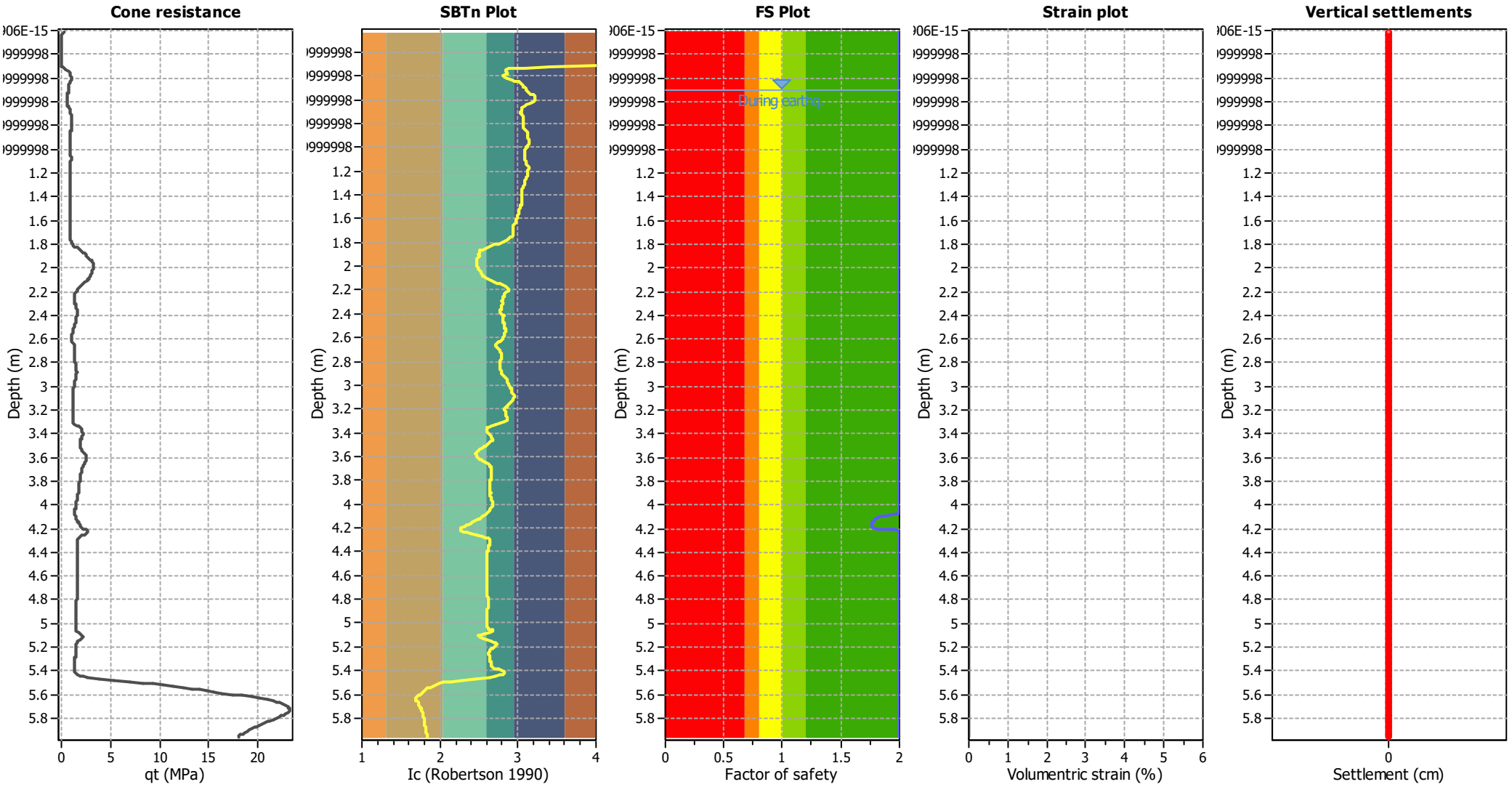
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.09	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Appendix I – Toe position for landform design

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (1.0m)

NEW PARCELS

EXISTING PARCELS

Wetland

Wetland 5m offset

Wetland 10m offset

EARTHWORKS SECTIONS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Auckland Council, Maxar, Earthstar Geographics

DESIGNED ON:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:

LOGO: CIVIX

PROJECT: 1618 ARARIMU ROAD, PAPAKURA

TITLE: EXISTING CONTOUR PLAN

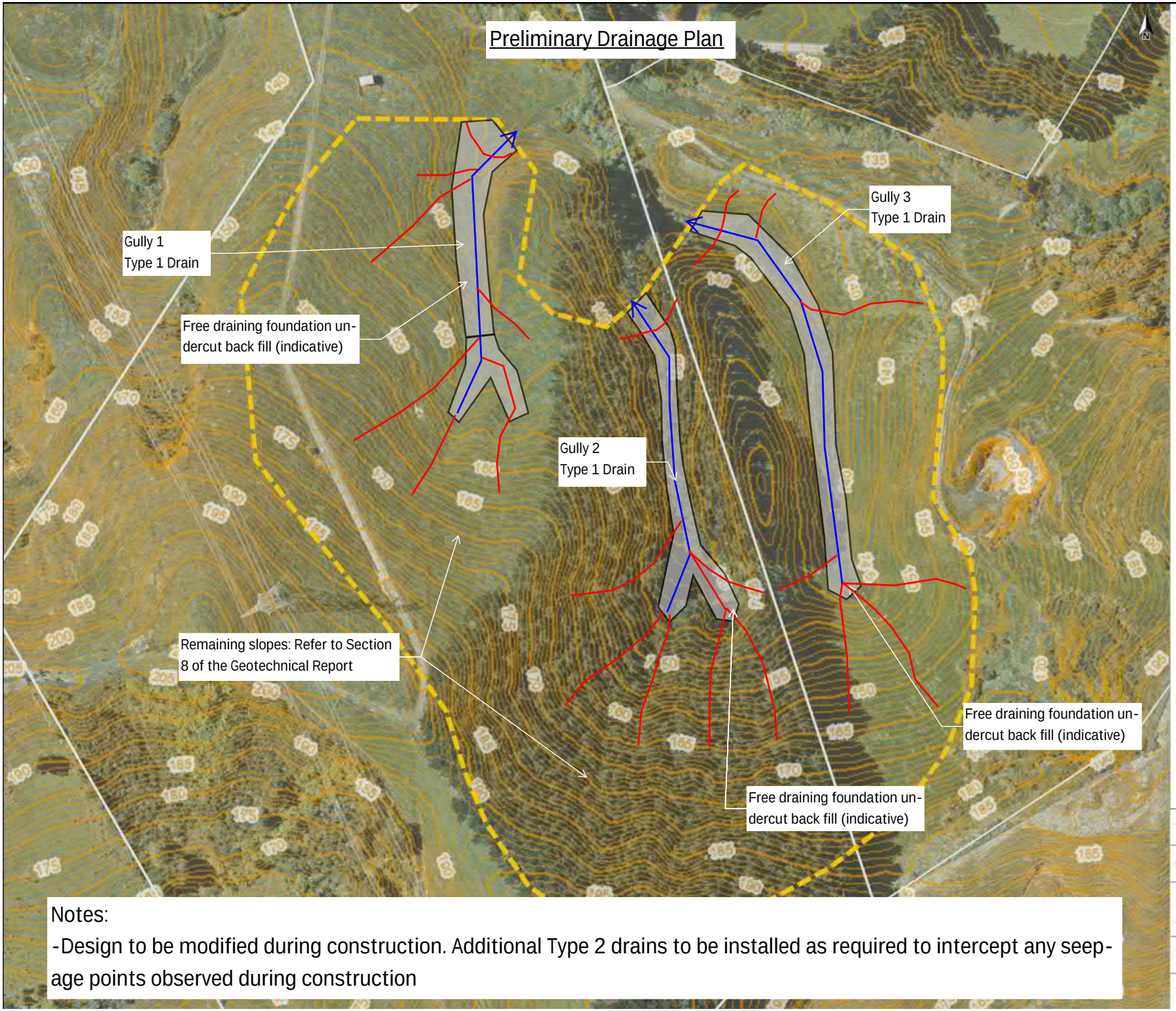
STATUS: FOR RESOURCE CONSENT

DRAWING NO: 22004

SCALE:	SIZE:	REVISION:	DATE:
1:2,000	A3	07/08/23	07/08/23

Appendix J - Concept sub-soil drain design

Preliminary Drainage Plan



Legend

- Managed fill perimeter
- Property Boundary (LINZ)
- Property Boundary (LINZ)
- Contours (2016)
- Type 1 Drain
- Type 2 Drain

0 25 m 50 m

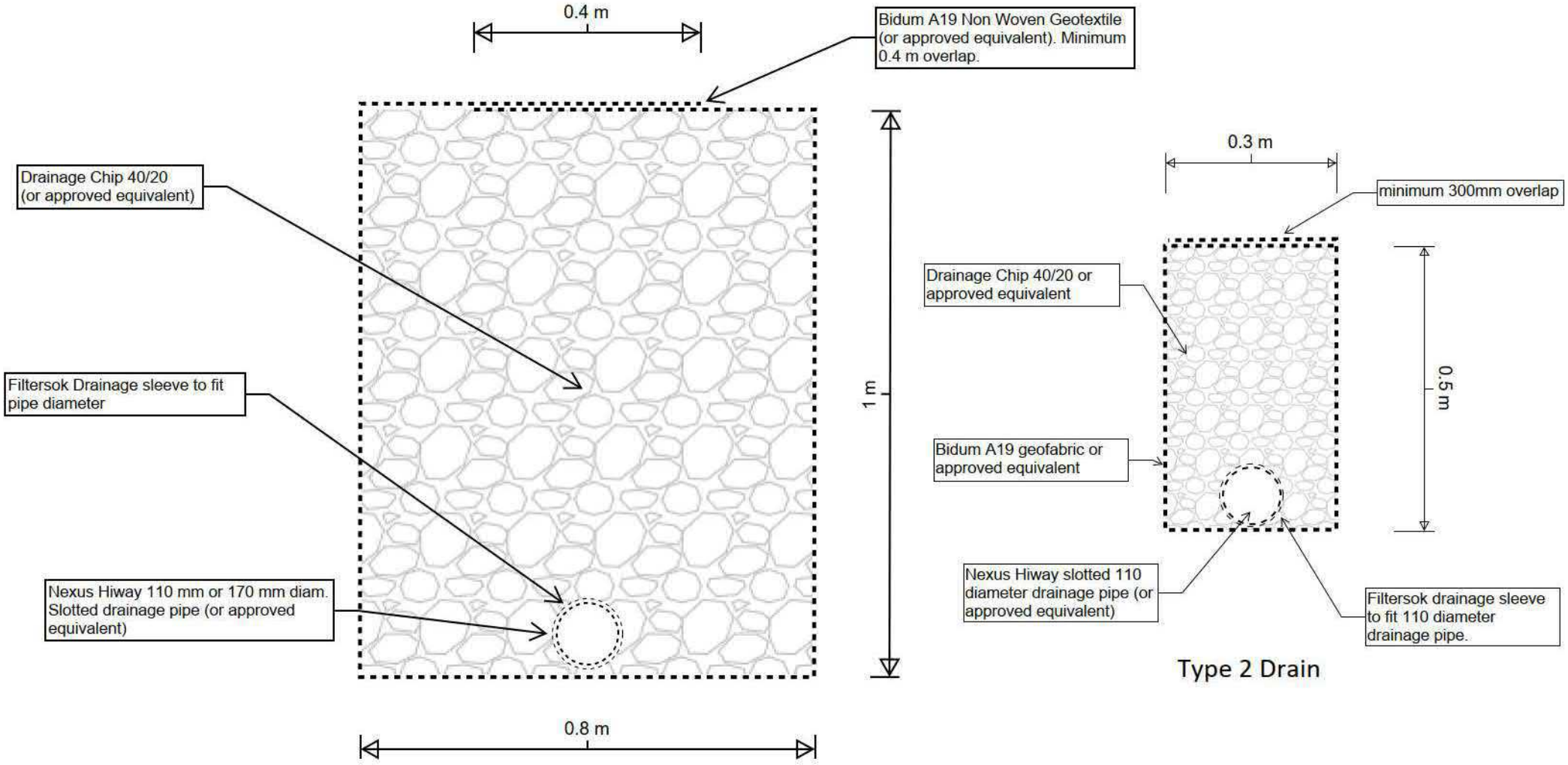
BASELINE GEOTECHNICAL

Produced by Datanest.earth

Notes:

-Design to be modified during construction. Additional Type 2 drains to be installed as required to intercept any seepage points observed during construction

Title: Drainage Plan		
Client: SB Civil Ltd		Size: A4
Project: Ararimu MF	Drawn: SC	Figure No.: 6
Date: 08-04-2024	Checked: CL	
Proj No: BGL00170	Scale: 1:2500	Version: V0.1



BASELINE GEOTECHNICAL

www.baselinegeotechnical.co.nz

DRAWN	SC	29.08.23
DRAFTING CHECKED	CL	29.08.23

APPROX. SCALE (AT A4 SIZE): As Shown

PROJECT No.: BGL000170

Ararimu Managed Fill

Concept Sub Soil Drains

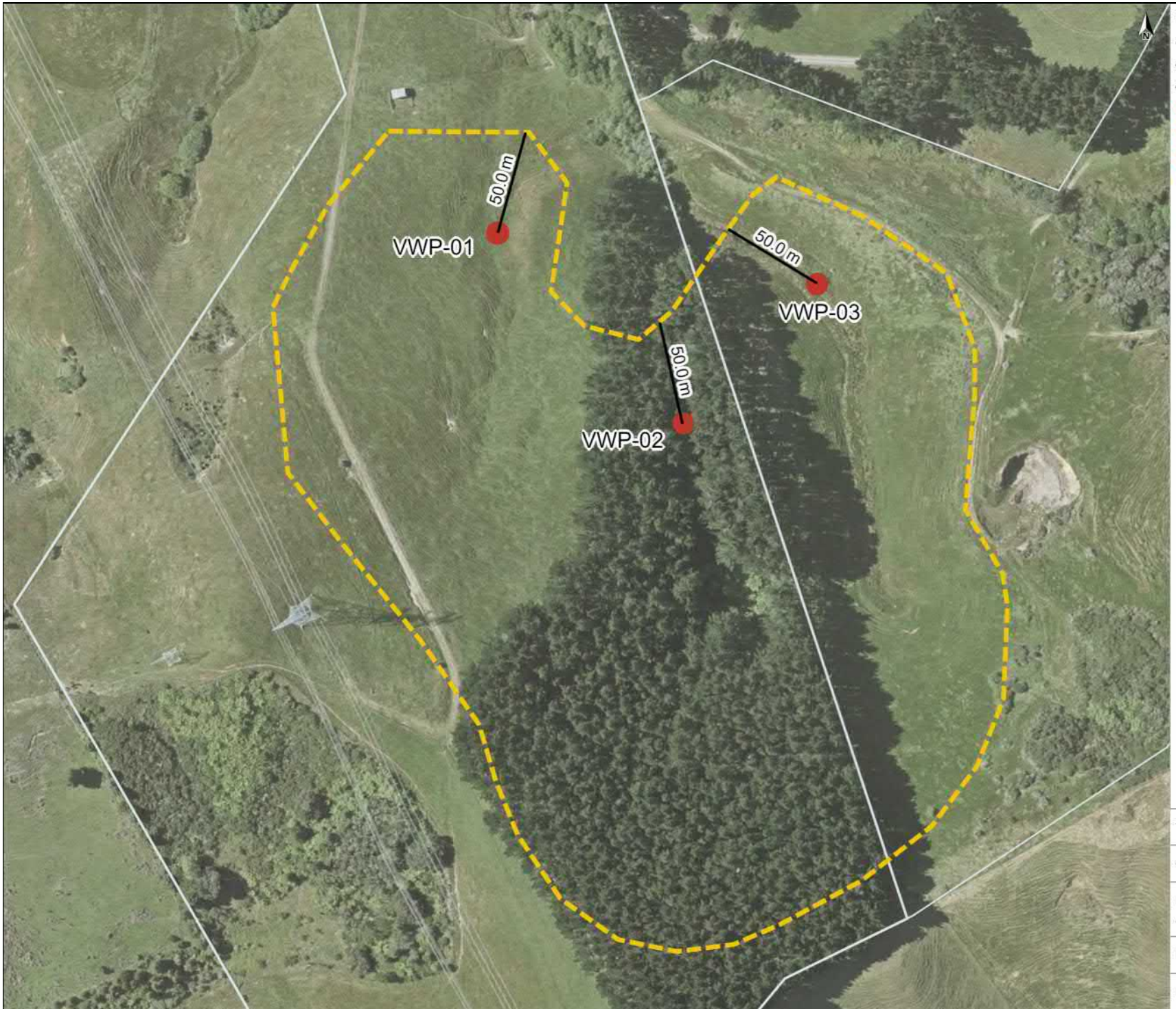
1618 Ararimu Road

Auckland

FIG. No.: Appendix F - Figure 1

REV.: 0

Appendix K – VWP locations



Legend

- Line
- Line
- Line
- VWP-03
- VWP-02
- VWP-01
- Managed fill perimeter
- Property Boundary (LINZ)
- Property Boundary (LINZ)

0 25 m 50 m

BASELINE GEOTECHNICAL

Produced by **Datanest.earth**

Title: Vibrating wire piezometer locations		
Client: SB Civil Ltd		Size: A4
Project: Ararimu MF	Drawn: SC	Figure No.: 5
Date: 08-04-2024	Checked: CL	
Proj No: BGL00170	Scale: 1:2500	Version: V0.1