



Main Investigation Report

at

Sarum Academy, Westwood Road, Salisbury, Wiltshire SP2 9HS

for

Morgan Sindall

Reference: 22247/MIR RevI.0I
March 2026

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.



Commission

This document comprises the Main Investigation Report (MIR) and incorporates the results, discussion, and conclusions to this intrusive works. General site data is recorded below:

Commission Record	
Client	Morgan Sindall
Site Name	Sarum Academy, Westwood Road, Salisbury, Wiltshire SP2 9HS
Grid Reference	SU115318
Soils Limited Quotation Ref	Q29748rev3, dated 20 th November 2026
Clients Purchase Order	75CC13/0014

The record of revision to this document is presented below:

Record Of Revisions		
Revision	Date	Reason
1.0	February 2026	Original to Client
1.01	March 2026	Report Update following additional works

Note(s): The latest revised document supersedes all previous revisions of the MIR produced by Soils Limited.

Documents associated with this development that must be referred to are given below.

Record Of Associated Documents			
Reference	Type	Date	Creator
75CC13-STN-XX-XX-SK-S-0001-PO2	Trial Hole Location Plan	Oct 25	Stantec
75CC13-STN-ZZ-ZZ-DR-S-0200	Development Plan	Nov 25	Stantec

Limitations and Disclaimers

The report was prepared solely for the brief described in our quotation and Section 1.1 of this report. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of our engagement.

We have exercised all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

This report is a snapshot of the site and conditions taken only at the time of our investigation works and described in our reporting. The ground is a product of continuing natural and artificial processes, and has variation by depth and location that cannot be determined absolutely. While a ground investigation will aim to understand and mitigate, risk cannot be eliminated.

Current regulations and good practice were used in the preparation of this report. Consideration of any subsequent changes to regulations or practice that may have occurred following issue of this report is the responsibility of the user.

If the term “competent person” is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is not a Ground Investigation Report as defined by Eurocode 7.

Any reference to ground level relates to the site level at the time of the investigation, unless otherwise stated. Ground elevations and coordinates are only provided when this forms part of our engagement.

A survey of the possible presence or absence of invasive species including Japanese Knotweed is outside the scope of this investigation.

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Section I Introduction

I.1 Objective of Investigation

The Client commissioned Soils Limited to undertake an intrusive ground investigation and to prepare a Main Investigation Report to supply the Client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The investigation was made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the exploratory holes.

A PIR was not commissioned, but soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of vulnerable receptors from any contamination identified.

Additional site investigation works were undertaken in February 2026 across the central area of the site. These works were undertaken within the February half term period to minimise disturbance on site. The works comprised Plate load testing, trial pitting, soakaway testing and a rotary borehole for pile design.

I.2 Site Description

The Sarum Academy site comprises the main school building located on the central area of the site comprising a 3 storey building with a number of single storey outbuildings to the north. To the south and south-west of the main school building were playing fields and a multipurpose MUGA pitch. To the north and west of the main school building were areas of hardstanding which included a playground and parking areas. Another sports pitch was located to the north-west of the main school building.

The site was flat and level. The playing fields comprised of kept grass. Maintained soft landscaping areas were noted to the north of the main building which comprised of grassed areas, small shrubs and sporadic semi-mature trees. The site boundaries to the north, west and south comprised dense woodland made up of mature trees.

The land to the north and west of the site comprised undeveloped fields and agricultural land. The land to the south beyond the playing fields comprised a disused quarry. The land to the east of the site comprised a residential housing estate.

The site location plan is given in Figure 1. An aerial photograph of the site and its close environs has been included in Figure 2.

I.3 Proposed Development

The proposed development comprises two new two-storey classroom blocks located on the central and eastern portion of the site to the north of the existing school building. The buildings will comprise a mixture of classrooms, and plant and machinery rooms. It is assumed that areas of soft landscaping will be retained around the building but this has

not been confirmed.

In compiling this report reliance was placed on the documents listed in the Record Of Associated Documents. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the Client are presented in Appendix G.

1.4 Anticipated Geology

The 1:50,000 BGS map showed the site to be located upon the bedrock Newhaven Chalk Formation with overlying superficial deposits of Head Deposits.

1.4.1 Head Deposits

Head Deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands, gravels and chalk of local derivation.

1.4.2 Newhaven Chalk Formation

The Newhaven Chalk Formation is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments.

At various levels clay sized material occurs as marl seampartins and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering and general solution. Weathering by frost action may extend to a depth of several metres.

Chalk is a weak rock and as such it should be noted that the drilling, excavating and sampling process is detrimental to its fabric and structure. Chalk samples that have been machine sampled will therefore appear to be of a lower descriptive grade, as given in CIRIA C574, than the in-situ chalk. Soil sampling and visual observations from open excavations i.e. trial pits would allow chalk description and classification in accordance with CIRIA 574 including commenting for any aperture and discontinuities in the chalk structure.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are found in the chalk. The features sometimes manifest themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

CIRIA C574 states that the presence of dissolution features should always be assumed when designing foundations for all sites underlain by calcium carbonate rich chalk.

Section 2 Site Works

2.1 Proposed Project Works

The intrusive investigation was undertaken to the specification provided by the Client and was to include the items listed below. The investigation was designed to provide information on the ground conditions and to aid the design of foundations for the proposed development. The intended investigation, as outlined within the Soils Limited quotation (Q29748, dated 20th November 2026), was to comprise the following items:

- Service clearance using GPR and CAT and GENNY
- 2No. (up to) 25m deep rotary cored boreholes
- 13No (up to) 25m deep cone penetration testing holes
- 5No. machine excavated trial pits with BRE365 infiltration tests
- 8No. machine excavated trial strip trenches to investigate existing foundations
- 4No. CBR tests via plate load tests
- Geotechnical laboratory testing
- Contamination soils laboratory testing

2.1.1 Actual Project Works

The actual project works were undertaken between the 8th and 19th December 2025, with subsequent sample logging, laboratory testing and reporting. The actual works comprised:

- Service clearance using GPR and CAT and GENNY
- 1No. 25m deep rotary cored borehole
- 13No (up to) 25m deep cone penetration testing holes
- 3No. machine excavated trial pits with BRE365 infiltration tests
- 8No. machine excavated trial strip trenches to investigate existing foundations
- 2No. CBR tests via plate load tests
- Geotechnical laboratory testing
- Contamination soils laboratory testing

CPT7 and CPT12 were not accessible to the rig, whilst TTP3 and STP4 were not required as confirmed by the Client. TTP8 was located within a walkway area and was therefore not undertaken to minimise disruption as agreed with the Client.

A number of trial hole locations were not accessible at the time of the site works in December 2025, and were rescheduled for February 2026, including CH2, TTP7, STP1, CBR3 and CBR4. These works were undertaken between the 16th-19th February 2026.

All exploratory hole locations undertaken in December 2025 have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub-sampled so that

samples could be sent to the laboratory for both contamination and geotechnical testing.

2.2 Proposed Project Works February 2026

The additional investigation works were based on the trial holes and testing that could not be completed in December 2025, as outlined within the Soils Limited quotation (Q29748, dated 20th November 2026), to comprise the following items:

- Service clearance using GPR and CAT and Genny
- 1No. (up to) 25m deep rotary cored borehole
- 1No. machine excavated trial pit with BRE365 infiltration testing
- 1No. machine excavated trial strip trench to investigate existing foundations
- 4No. machine excavated trial pits
- 2No. CBR plate load tests
- Geotechnical laboratory testing
- Contamination soils laboratory testing

2.2.1 Actual Project Works February 2026

The actual project works were undertaken between the 16th and 19th February 2026, with subsequent sample logging, laboratory testing and reporting. The actual works comprised:

- Service clearance using GPR and CAT and Genny
- 1No. (up to) 25m deep rotary cored borehole
- 1No. machine excavated trial pit with BRE365 infiltration testing
- 1No. machine excavated trial strip trench to investigate existing foundations
- 4No. machine excavated trial pits
- 2No. CBR plate load tests
- Geotechnical laboratory testing
- Contamination soils laboratory testing

All exploratory hole locations undertaken in February 2026 have been presented in Figure 4.

Following completion of site works, soil cores were logged and sub-sampled so that samples could be sent to the laboratory for both contamination and geotechnical testing.

2.3 Ground Conditions

Between the 9th and 11th December 2025 eleven CPT holes were driven to depths of between 14.20m and 25.78m bgl.

CH1 was drilled between the 15th-18th December to a final depth of 25.00m bgl and CH2 was drilled between the 16th-18th February 2026 to a final depth of 25.00m bgl.

In December 2025 5No. trial trenches and 3No. Infiltration test pits were excavated to depths of between 1.40-4.30m bgl.

In February 2026 1No. trial trench, 1No. infiltration test and 4No. trial pits were excavated to depths of between 1.10-3.10m bgl.

The maximum depths of exploratory holes have been included in Table 2.1.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
CHI	25.00	CPT2	14.20
TTP1	2.20	CPT3A	24.86
TTP2	1.40	CPT4	16.86
TTP4	1.50	CPT5	15.50
TTP5	3.90	CTP6	15.04
TTP6	3.18	CPT8	23.94
SPT2	4.30	CPT9	24.98
SPT3	3.50	CPT10	24.88
SPT5	4.30	CPT11	24.84
CPT1	25.78	CPT13	24.94
CH2	25.00	TPI01	2.95
TTP7	1.65	TPI02	2.93
STPI	2.90	TPI03	1.10
		TPI04	3.10

Note(s): The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the exploratory hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

It must be noted that CPT interpretation in cemented soils, such as chalk, is far more complex, in terms of structure and variable weathering grades than uncemented soils such as sands and clays. Standard CPT soil parameter correlations do not reliably apply to cemented soils, such as chalk, because bonding and structure dominate the cones response. Standard interpretation, therefore interprets the results of CPT based on classical interpretation resolves the results as either clays or granular sand/gravel.

For more complete information about the soils encountered within the general area of the site reference must be made to the detailed records given within Appendix B, but for the

purposes of discussion, the succession of conditions encountered in the exploratory holes in descending order can be summarised as:

Made Ground/Topsoil (MG/TS)
Head Deposits (HEAD)
Newhaven Chalk Formation (NCK)

The ground conditions encountered in the exploratory holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
	Top	Bottom		
MG/TS	GL	0.40-1.70	1.00	MG-Soft to firm orangish brown, slightly sandy, gravelly CLAY/ clayey GRAVEL, with frequent clinker, brick, metal wire, concrete and wood fragments. TS- soft dark greyish brown gravelly silty CLAY.
HEAD	0.40-1.70	2.10-13.50	2.00	Firm orangish brown slightly sandy gravelly CLAY.
NCK	2.10-13.50	3.18 ¹ -20.50	4.00	Structureless chalk recovered as white stained orangish yellow slightly gravelly clayey SILT. Grade Dm.
NCK	5.50-20.50	17.50 ³ -25.00	10.00	Structureless CHALK recovered as slightly silty subangular medium to coarse GRAVEL. Clasts are weak. Matrix is white with occasional flint cobbles. Grade Dc
NCK	17.50-19.70	23.94 ³ - 25.78 ³	Not Proven	Structured C5-A1 Chalk. Recovered as black speckled, rarely orange stained, white, angular to subangular, fine to coarse gravel sized weak chalk clasts in a comminuted silty matrix. Matrix is light white. Rare angular coarse gravel sized rinded flint nodules

Note(s): ¹ Final depth of exploratory hole. ² Base of strata not encountered. The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.
³ Inferred Depth from CPT

2.4 Ground Conditions Encountered in Exploratory Holes

The ground conditions encountered in exploratory holes have been described below in descending order. The engineering logs are presented in Appendix B.1.

2.4.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in fifteen of the sixteen exploratory holes from ground level to depths ranging between 0.40m (SPT5) and 1.70m bgl (STP1).

The Made Ground typically comprised soft to firm orangish brown, slightly sandy, gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and basalt. Sand is medium to coarse. Frequent clinker, brick, metal wire, concrete and wood fragments.

Soils described as Topsoil were encountered in one exploratory hole (SPT5) from ground level to a depth of 0.40m bgl.

The Topsoil comprised soft dark greyish brown gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. Occasional rootlets.

The established depth of Made Ground and Topsoil found at each exploratory hole location have been included in Table 2.3. Please note that it was not possible to differentiate between either Made Ground or Topsoil in the results of the CPTs.

Table 2.3 Established Depth of Made Ground/Topsoil

Exploratory Hole	Strata	Depth (m bgl)	Exploratory Hole	Strata	Depth (m bgl)
CHI	MG	0.75	TTP6	MG	1.50
TTP1	MG	1.25	SPT2	MG	1.10
TTP2	MG	1.00	SPT3	MG	1.20
TTP4	MG	1.20	SPT5	TS	0.40
TTP5	MG	1.60	TPI01	MG	0.65
CH2	MG	1.20	TPI02	MG	0.85
TTP7	MG	1.40	TPI03	MG	1.10 ¹
STPI	MG	1.70	TPI04	MG	1.30

Note(s): The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

¹ Final depth of exploratory hole.

2.4.2 Head Deposits

Soils described as Head Deposits were encountered in fifteen of the sixteen exploratory holes below the Made Ground/Topsoil to depths ranging between 2.10m (SPT5) and 13.50m bgl (CH2) and from the CPT holes the Head deposits were inferred to depths of between 2.20m and 4.00m bgl with these soils generally classified as a mixture of cohesive and granular soils.

The Head Deposits typically comprised Firm orangish brown slightly sandy gravelly CLAY/ clayey GRAVEL. Gravel is angular to subrounded fine to coarse flint and chalk. Sand is fine to medium.

The established, and inferred in the case of the CPT locations, depth of the Head Deposits found at each exploratory hole location has been included in Table 2.4.

Table 2.4 Established Depth of Head Deposits

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
CHI	3.50	TTP6	3.10
TTP1	2.20 ¹	SPT2	3.50
TTP2	1.40 ¹	SPT3	2.60
TTP4	1.50 ¹	SPT5	2.10
TTP5	3.70	CPT6	2.20 ²
CPT1	3.20 ²	CPT8	4.00 ²
CPT2	4.00 ²	CPT9	3.50 ²
CPT3A	3.50 ²	CPT10	3.00 ²
CPT4	2.20 ²	CPT11	4.00 ²

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
CPT5	3.50 ²	CPT13	3.00 ²
CH2	13.50	TPI01	2.95 ¹
TTP7	1.65 ¹	TPI02	2.93 ¹
STPI	2.90 ¹	TPI04	3.10 ¹

Note(s): ¹ Final depth of exploratory hole. The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

² Inferred level within CPT hole

2.4.3 Newhaven Chalk Formation

Soils described as Newhaven Chalk Formation were encountered in seven of the sixteen exploratory holes (excluding CPT holes) below the Head Deposits to the base of the trial holes to depths ranging between 3.18m (TTP6) and 25.00m bgl (CH1/CH2), the Newhaven Chalk formation was inferred below the Head Deposits to the full investigatory depth of between 14.20-25.78m bgl in all CPT test locations.

The Newhaven Chalk Formation typically comprised structureless chalk recovered as white stained orangish yellow slightly gravelly clayey SILT. Gravel is extremely weak white with black speckling with occasional flint classified as Grade Dm, to depths of between 3.18m bgl (TTP6) and 20.50m bgl (CH2) and to inferred depths of between 4.5m bgl (CPT10) and 10m (CPT11).

With depth the Newhaven Chalk Formation typically comprised structureless CHALK recovered as slightly silty subangular medium to coarse GRAVEL. Clasts are weak. Matrix is white with occasional flint cobbles, Grade Dc, to a depth of 18.50m bgl (CH1) and 25.00m bgl in CH2 and to inferred depths of between 17.5m bgl (CPT1 and 19.7m (CPT10).

Below the Grade Dc chalk was structured chalk described as structured falling into Grade C5 – A1 was encountered (except for in CH2). Recovered as black speckled, rarely orange stained, white, angular to subangular, fine to coarse gravel sized weak chalk clasts in a comminuted silty matrix. Matrix is light white. Rare angular coarse gravel sized rimmed flint nodules. This was recorded to the base of CH1 at 25.00m bgl and was inferred to the base of the CPT test holes.

The established depth of the Newhaven Chalk Formation found at each exploratory hole location has been included in Table 2.5.

Table 2.5 Established Depth of Newhaven Chalk Formation

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
CH1	25.00 ¹	SPT2	4.30 ¹
TTP5	3.90 ¹	SPT3	3.50 ¹
TTP6	3.18 ¹	SPT5	4.30 ¹
CPT1	25.78 ^{1,2}	CPT8	23.94 ^{1,2}
CPT2	14.20 ^{1,2}	CPT9	24.98 ^{1,2}
CPT3A	24.86 ^{1,2}	CPT10	24.88 ^{1,2}
CPT4	16.86 ^{1,2}	CPT11	24.84 ^{1,2}
CPT5	15.50 ^{1,2}	CPT13	24.94 ^{1,2}
CPT6	15.04 ^{1,2}	CH2	25.00 ¹

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
Note(s): ¹ Final depth of exploratory hole. The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation. ² Inferred level within CPT hole			

2.5 Roots

Roots were encountered in fifteen of the sixteen exploratory holes at depths ranging between 0.15m and 3.50m bgl, as detailed in Table 2.6.

Table 2.6 Established Depth of Root Penetration

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
CHI	3.50	TTP6	0.90
TTP1	1.00	SPT2	0.30
TTP2	0.50	SPT3	0.40
TTP4	1.00	SPT5	2.10
TTP5	0.70	STP1	0.20
TTP7	0.30	TPI03	0.20
TPI01	0.15	TPI04	0.20
TPI02	0.20		

Note(s): The depths given were taken from the ground level adjacent to each exploratory hole at the time of investigation.

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low. A direct observation such as from within a trial pit is necessary to gain a better indication of the maximum root depth.

Google Earth historical aerial photographs dated from 2002 onwards recorded semi mature trees on the central area of the site which have remained on site up to the present day (2026). Mature trees were noted towards the school entranceway from the earliest photos up to the present day. As part of the development trees will be removed on the central area of the site.

2.6 Groundwater

A groundwater seepage was recorded in TTP7 at 1.15m bgl. This was however likely perched water within the Made Ground and could have been influenced by the rain encountered during the day of excavation. Groundwater was not encountered within any of the other trial holes.

Changes in groundwater level occur for reasons including seasonal effects and variations in drainage. The investigation was conducted in December 2025 and February 2026, when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September to the annual maximum (highest) which typically occurs around March.

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made via groundwater monitoring wells. Please note that the groundwater level given within the results of the CPTs was not measured but was assumed.

Section 3 Geotechnical In-Situ and Laboratory Testing

3.1 Standard Penetration Tests

Standard Penetration Tests (SPTs) were undertaken in CH1. The results were interpreted based on the classifications outlined in Appendix C.1, Table C.1.1 to Table C.1.3.

Table 3.1 Hammer Efficiency

SPT Hammer Ref	Energy Ratio Er (%)
AR4992	69
MDL04	36

Table 3.2 Standard Penetration Tests (SPT) Interpretation

Strata	Depth Range (m bgl)	N60 Range	Soil Classification
HEAD (CH1)	0.75-13.50	9-50	Medium to High ($C_u = 45-150\text{kPa}$) Very Dense
NCK (CH1)	3.50-25.00	<5-57	Structureless (Dm) to Structured chalk (C5 – A1)
HEAD (CH2)	1.20-13.50	7-30	Low to High ($C_u = 35-75\text{kPa}$) Dense
NCK (CH2)	13.50-25.00	<5-30	Structureless (Dm) to Structured chalk (C5 – A1)

A full interpretation of the SPT results is outlined in Appendix C.2, Table C.2.1.

Low SPT values were recorded at 11.00m and 12.50m bgl within CH1 which coincides with the switch between dynamic sampling to rotary coring and is potentially a result of remoulding of weathered chalk at this depth by flushing and/or pressure effects caused by the drilling process.

3.2 Cone Penetrometer Tests

Cone Penetration testing was undertaken at 11No locations to depths of between 14.20m and 25.78m bgl. At 1No. location early refusal was recorded (CPT-3), which was re-positioned and is referenced as CPT-3A.

It is not possible to pick up the boundary between any Made Ground and Head Deposits from surface. The Head deposits were inferred to depths of between 2.20m and 4.00m bgl with these soils generally classified as a mixture of cohesive and granular soils, with estimated SPT N60 values ranging between $N=5$ and 60. Granular bands within the Head deposits recorded high N60 values.

The Newhaven Chalk formation was inferred below the Head Deposits to the full investigatory depth of between 14.20-25.78m bgl. SPT N60 values ranged between $N60=5$ and 60. The Newhaven Chalk formation between 5-10m generally recorded lower N60 values that increases with depth especially beyond 10m. With increased

depth the chalk becomes more structured as the pore water pressure goes negative indicating that the rig was cutting through the chalk as opposed to just passing through the more structureless bands. This was recorded at depths of between 17.50-19.70m bgl.

The Newhaven Chalk has been recorded as “Sands” within the CPT report. The ‘Soil Behaviour Type’ (SBT) is not intended to be an accurate representation of composition but rather, as its name alludes to, describes how a material behaves mechanically with respect to ‘average’ silicate/organic soils. Therefore, in this instance the chalk material is mechanically ‘behaving’ like ‘sands’ that the SBT correlation zones have been based on. The SBT should therefore be viewed as a parameter and an independent line of evidence.

The CPT report can be found in Appendix F.

3.3 Infiltration Tests

Infiltration testing was undertaken in four trial pits: STP1, SPT2, SPT3 and SPT5 within the Head Deposits and Newhaven Chalk Formation following the principles of BRE Digest 365 Soakaway design: 2016.

Three full test cycles were achieved in STP1, SPT2 and SPT3. A full test cycle was not completed in SPT5 due to insufficient head loss over time with the test ending before 75% of the water drained away. As such, the tests did not fully comply with BRE Digest 365 “Soakaway Design”.

Infiltration rates are detailed in Table 3.3.

Table 3.3 Infiltration Rates

Exploratory Hole	Test No.	Infiltration Rate (m/s)	Comment
SPT1	1	2.6E-04	
	2	2.7E-04	
	3	2.6E-04	
SPT2	1	5.4E-05	
	2	5.6E-05	
	3	6.5E-05	
SPT3	1	2.5E-05	
	2	3.0E-05	
	3	2.2E-05	
SPT5	1	- ¹	No Infiltration rate calculated

Note(s): ¹No infiltration rate calculated due to insufficient head loss over time within ground conditions encountered.

3.4 Atterberg Limit Tests

Atterberg Limit tests were performed on five samples obtained from the Head Deposits. The results were classified in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

Table 3.4 Atterberg Limit Results Classification

Strata	Depth (m bgl)	Classification	
		NHBC	BRE 240
HEAD	0.90-1.90	Low-Medium	Low-Medium

Details are given in Table C.2.2, Appendix C.2 and the laboratory report in Appendix C.3.

3.5 Saturation Moisture Content Tests

Saturated Moisture Content (SMC) tests were performed on five samples recovered from the Newhaven Chalk Formation. The results were classified based on Table 3.2, CIRIA Publication, Engineering in Chalk, C574, 2002.

Table 3.5 Saturated Moisture Content Classification

Strata	Depth (m bgl)	Classification (CIRIA)	
		SMC (%)	Density (Mg/m ³)
NCK	3.00-14.00	26-38	1.34-1.59

A full interpretation of the SMC tests, are outlined in Table C.2.3, Appendix C.2 and the laboratory report in Appendix C.3.

3.6 Particle Size Distribution Tests

A Particle Size Distribution (PSD) test was performed on one sample from the granular Head Deposits.

Table 3.6 Particle Size Distribution Classification

Strata	Depth (m bgl)	Volume Change Potential	
		NHBC	BRE 240
HEAD	2.20	No	No

Note that a cohesive soil is only classified as having a volume change potential if it is also plastic and an Atterberg Limit test can be conducted on the strata.

A full interpretation of the PSD tests, are outlined in Table C.2., Appendix C.2 and the laboratory report in Appendix C.3.

3.7 Plate Load Tests

Plate Load Tests were carried out at two locations near surface, in accordance with the scheme prepared by the Client's engineer/designer with details of the testing included in Table 3.7.

Table 3.7 Plate Load Test Results

Exploratory Hole	Strata	Depth (m bgl)	Estimated CBR Value (%)
PL/CBR1	HEAD	0.40	1.3
PL/CBR2	HEAD	0.40	1.4
PL/CBR3	HEAD	0.40	4.9
PL/CBR4	HEAD	0.40	4.8

The full testing reports are included in Appendix C.3.

3.8 Sulphate and pH Tests

Five samples in total (2No. Made Ground, 1No. Head Deposits and 2No. Newhaven Chalk) Water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground'.

Table 3.8 Sulphate and pH Test Results

Strata	Depth (m bgl)	Sulphate Concentration (mg/l)	pH
MG	0.45-0.90	23-130	8.1-8.4
HEAD	0.90-2.20	20-54	7.3-8.7
NCK	4.70-14.00	17-37	8.8-9.1

The significance of the sulphate and pH Test results are discussed in Section 5.2 and the laboratory report in Appendix C.3.

Section 4 Engineering Appraisal

4.1 Established Ground Conditions

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the exploratory holes.

4.1.1 Made Ground and Topsoil

Soils described as Made Ground/Topsoil were encountered in all sixteen exploratory holes from ground level to depths ranging between 0.40m (SPT5) and 1.70m bgl (STP1). Please note that Topsoil or Made Ground could not be differentiated from the underlying natural soils at the CPT locations, which could mean that the Made ground may extend to a greater depth than established

Foundations must not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design. Foundations must be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

4.1.2 Head Deposits

Soils described as Head Deposits were encountered in fifteen of the sixteen exploratory holes directly below the Topsoil/Made Ground and persisted to depths, both measured and inferred, ranging between 2.10m and 13.50m bgl.

Soils of the Head Deposits are predominantly cohesive or granular soils, with the cohesive soils being normally consolidated, and as such are expected to display low to moderate bearing capacities with moderate to high settlement characteristics.

4.1.3 Newhaven Chalk Formation

Soils described as Newhaven Chalk Formation were encountered underlying the Head Deposits from 2.10m to 13.50m bgl and persisted to the full investigatory depth of 3.18m-25.00m bgl.

Generally, shallow soils of the Newhaven Chalk Formation are structureless to weak rock and would possess low to moderate bearing and settlement characteristics. This unit would be a suitable bearing stratum using a piled foundation solution.

4.1.4 Guidance on Shrinkable Soils

The ground conditions were established as Head Deposits, with a typical thickness of 3.00m, overlying bedrock of the Newhaven Chalk Formation.

The volume change potential for the Head Deposits was established and presented in Table 4.1.

Table 4.1 Established Volume Change Potential by Strata

Strata	Volume Change Potential		Established Lower Boundary (m bgl)
	BRE	NHBC	
HEAD	Medium	Medium	13.50

Medium volume change potential must be adopted for design within the Head Deposits.

4.1.5 Groundwater

A groundwater seepage was recorded in TTP7 at 1.15m bgl. This was however likely perched water within the Made Ground and possibly due to heavy rainfall at the time of excavation. Groundwater was not encountered within any of the other trial holes.

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made via groundwater monitoring wells. Please note that the groundwater level given within the results of the CPTs was not measured but was assumed.

Section 5 Foundation Scheme

5.1 Foundation Recommendations

Foundations **must not** be constructed within any Made Ground and Head Deposits due to the likely variability and potential for large load induced settlements both total and differential.

Considering the type of development, a shallow foundation solution was not considered suitable, and a deep foundation solution must be adopted.

5.1.1 Piled Foundations

Piled foundations must be taken through any Made Ground and Head Deposits into suitable strength soils of the Newhaven Chalk Formation.

The construction of a piled foundation is a specialist job with the actual pile working load depending on the pile type and installation method. Prior to finalising the foundation design the advice from a reputable contractor who is familiar with the ground and groundwater conditions present at the site must be sought.

The vertical load capacities are provided for varying diameters and lengths of bored piles taken into the Newhaven Chalk Formation, based on geotechnical laboratory testing, SPT blow counts and the CPT testing results and in-situ testing and must only be used for preliminary design purposes.

A factor of safety of 2.5 was applied to the characteristic line derived from testing undertaken on the chalk, for both the shaft and base load capacities. Where groundwater was present at or below the end bearing depth a factor of safety of 5 was applied to the end bearing.

Two pile design sheets have been provided for CH1 and CH2 with the bearing values given in Appendix D.1 and D.2., that are applicable to single vertically loaded piles. Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of about 0.8 and a calculation made to check the factor of safety against block failure. Two separate designs have been undertaken given the difference in ground conditions between the two locations.

From ground level the upper 4m of the pile shaft has been ignored in the preliminary pile design given.

To prevent necking of the green concrete, temporary casing may be required where the pile passes through the Made Ground or Head Deposits and below the groundwater table (if encountered). To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

No allowance has been made for negative skin friction that could be generated where piles pass through Made Ground and Head Deposits underlying the site. The negative skin friction must be applied to the pile working load and must not be factored.

Guidance on the design of a working platform for piling rigs can be provided by Soils Limited in accordance with the BRE “Working platform for tracked plant, 2004” documentation.

If a piled foundation scheme is to be adopted for the proposed development, to prevent any downward migration of contaminants into the underlying groundwater/aquifers or create preferential vertical pathways between aquifers, specific piling techniques should be employed in accordance with The National Groundwater and Contaminated Land Centre Report NC/99/73: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention published by the EA, which presents guidance on piling on contaminated sites.

5.2 Subsurface Concrete

The sulphate and pH tests carried out in accordance with BRE Special Digest 1, 2005, ‘Concrete in Aggressive Ground’, established the site concrete classifications for each stratum as presented in Table 5.1.

Table 5.1 Concrete Classification

Stratum	Design Sulphate Class	ACEC Class
MG	DS-I	AC-Is
HEAD	DS-I	AC-Is
NCK	DS-I	AC-I

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, ‘Concrete in Aggressive Ground’ taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

5.3 Excavations

Shallow excavations in the Made Ground/Topsoil and Head Deposits are likely to be marginally stable in the short term at best.

Deeper excavations taken into the Head Deposits and Newhaven Chalk Formation are likely to be unstable and require support. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions must therefore be taken to ensure that such earth faces are adequately supported or battered back to a safe angle of repose.

Excavations beneath the groundwater table are likely to be unstable and dewatering of foundation trenches may be necessary.

Section 6 Site Drainage

6.1 Soakaways

The results of in-situ infiltration tests gave soil infiltration rates in the Newhaven Chalk Formation of between $2.6\text{E-}04\text{m/s}$ and $6.5\text{E-}05\text{m/s}$. These indicate the soils to be of generally good drainage characteristics. However, the infiltration testing undertaken in STP5 recorded poor drainage characteristics as an infiltration rate could not be calculated, likely due to the fact that the test was mainly undertaken within the cohesive Head Deposits rather than the Newhaven Chalk Formation.

It is recommended that the results of the in-situ testing are passed to a drainage engineer for commentary and design.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are found in the chalk within this area. These features sometimes manifesting themselves at the surface, as shallow circular depressions.

Dissolution features can form due to manmade features such as deneholes. These features can then be reactivated or caused to collapse by the concentrated ingress of water from leaking drains or soakaways.

In line with current guidance (BRE Digest 365, NHBC and CIRIA C574) soakaways must be located remote from the proposed foundations, ideally greater than 20m away from the face of any existing or proposed footing.

In respect to the control of drainage CIRIA C574, Engineering in Chalk; 2002 states;

- “Concentrated ingress of water into the chalk can initiate new dissolution features, particularly in low-density chalk, and destabilise the loose backfill of existing ones. For this reason, any soakaways should be sited well away from foundations for structures, roads or railways, as indicated below:
- In areas where dissolution features are known to be prevalent, soakaways should be avoided if at all possible but, if unavoidable, should be sited at least 20m away from any foundations;
- Where the chalk is of low density, or its density is not known, soakaways should be sited at least 10m away from any foundations;
- Where the chalk is of medium density (or higher), the closest part of the soakaway should be at least 5m away from any foundations.
- For drainage systems, flexible jointed pipes should be used wherever possible; particular care should be taken for the avoidance of leaks in both water supply and drainage pipework.

As the Chalk is a vitally important aquifer, the Environment Agency and local authority must be consulted when planning soakaway installations where chalk lies below the site even where it is mantled with superficial deposits.

Consultation with the Environment Agency must be sought regarding any use which may have an impact on groundwater resources.

Based on in house records, the wider area was "indicated" as low risk from Ground dissolution. The field data (undertaken to date) supports this but it is recommend that a BGS report for the site is obtained and reviewed.

Section 7 Determination of Chemical Analysis

7.1 Site Characterisation

The site investigation works identified Made Ground to depths between 0.75m and 1.70m bgl. Please note that Topsoil or Made Ground could not be differentiated from the underlying natural soils at the CPT locations, which could mean that the Made Ground may extend to a greater depth than established. Superficial Head Deposits were encountered underlying the Made Ground.

There were no significant visual or olfactory indicators of contamination noted and no Groundwater was observed. No Preliminary Investigation report has been undertaken on this site, therefore no Conceptual Site Model has been generated.

7.2 Soil Sampling

Exploratory hole locations were established to provide an overview of ground conditions across the site in relation to the proposed construction, together with enabling the collection of samples to enable chemical characterisation of the underlying strata.

Representative samples for potential environmental testing were obtained from the exploratory holes at depths of between 0.10m and 0.90m to allow appropriate representation of the materials encountered.

7.3 Determination of Chemical Analysis

Analytical testing was based initially on a screening suite of commonly identified inorganic and organic contaminants, taking into account the prevailing site conditions.

The chemical analyses were carried out on 15 samples of Made Ground. The nature of the analyses is detailed in Table 7.1.

Table 7.1 Chemical Analyses Suites - Soil

No. of Tests	Determinants
MG	
15	Metal suites: Arsenic, Boron (Water Soluble), Cadmium, Chromium (total & hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc
15	Organic Matter
15	pH
15	Polycyclic aromatic hydrocarbons (PAH) – (EPA 16)
15	Phenols – total monohydric
15	Extractable petroleum hydrocarbons (EPH) – Texas banding
15	Asbestos screening
1	Asbestos quantification

The soil testing was carried out in compliance with the MCERTS performance standard, and the results are shown in Appendix E.1, test reports 25-29834 and 26-04453.

Section 8 Qualitative Risk Assessment

8.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix E.2.

8.2 Representative Contamination Criteria - Soil

In compiling this report reliance was placed on drawing number 75CC13-STN-ZZ-ZZ-DR-S-0200, dated November 2025 and was prepared by Stantec. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic assessment criteria (GAC) for a 'Public Open Space' end use, as presented in SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014 (C4SL), derived for the protection of human health.

To assess the potential toxicity of organic determinants (Petroleum Hydrocarbons and Polyaromatic Hydrocarbons) to the human health, soils samples were analysed for Soil Organic Matter (SOM). The selected samples analysed recorded, SOM values of between 0.6% and 4.1%. For each soil sample tested, the resultant SOM allowed for the correct comparison to be made with the appropriate guideline value for each organic determinant analysed.

8.2.1 Risk Assessment – Made Ground

No exceedances were recorded within the fifteen samples of the Made Ground tested when compared to GAC for a Public Open Space end use.

8.3 Asbestos

The test certificate for each sample submitted for contamination analysis during this investigation includes the results of an Asbestos Screen.

1No. Sample (TTP2/0.10m) was reported as 'Detected' with a material type of Chrysotile, present as fibre bundles. An Asbestos Quantification test was undertaken on the positive sample with a result of 0.002%.

Advice must be sought from a specialist asbestos consultant.

8.4 Risk to Controlled Waters

The site is located on a secondary undifferentiated superficial aquifer and principal bedrock aquifer and is within a zone II groundwater source protection zone.

The nearest surface watercourse feature is the River Nadder, located approximately 1km to the south of the site.

Based on the ground conditions, lack of exceedances in the shallow soils analyses and absence of groundwater, the risk to controlled waters was considered to be very low. The proposal will also include a new drainage regime which will control surface water run-off.

8.5 Radon

The site **was not situated** within an area where protection or risk assessment against the ingress of radon was required. Radon protective measures **will not be required** within the proposed new development.

8.6 Recommendations

Soil chemical analysis did not record any samples with substance levels over their representative guideline values. No further works are required in respect of chemical contaminants, subject to regulatory approval.

1No. sample tested for Asbestos was reported as 'Detected' with a material type of Chrysotile, present as fibre bundles and a quantification of 0.002%.

Advice must be sought from a specialist asbestos consultant.

8.7 Protection of Services

Contamination of the ground may pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligations, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from contaminants specified in UKWIR Report 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010), or that the proposed remedial strategy will mitigate any existing risk.

8.8 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

8.9 Excavated Material

Excavated material as waste must be defined or classified prior to any disposal, transport, recycling or re-use at or by an appropriately licensed or exempt carrier and/or off-site disposal facility. The requirements inherent in both Duty of Care and Health and Safety must also be complied with. In order to determine what is to happen, what is

suitable, appropriate and most effective in the disposal of wastes, especially those subject to CDM waste management plan requirements, several factors must be considered, and competent advice must always be sought.

8.10 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

8.11 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

8.12 Discovery Strategy

There may be areas of contamination not identified during the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

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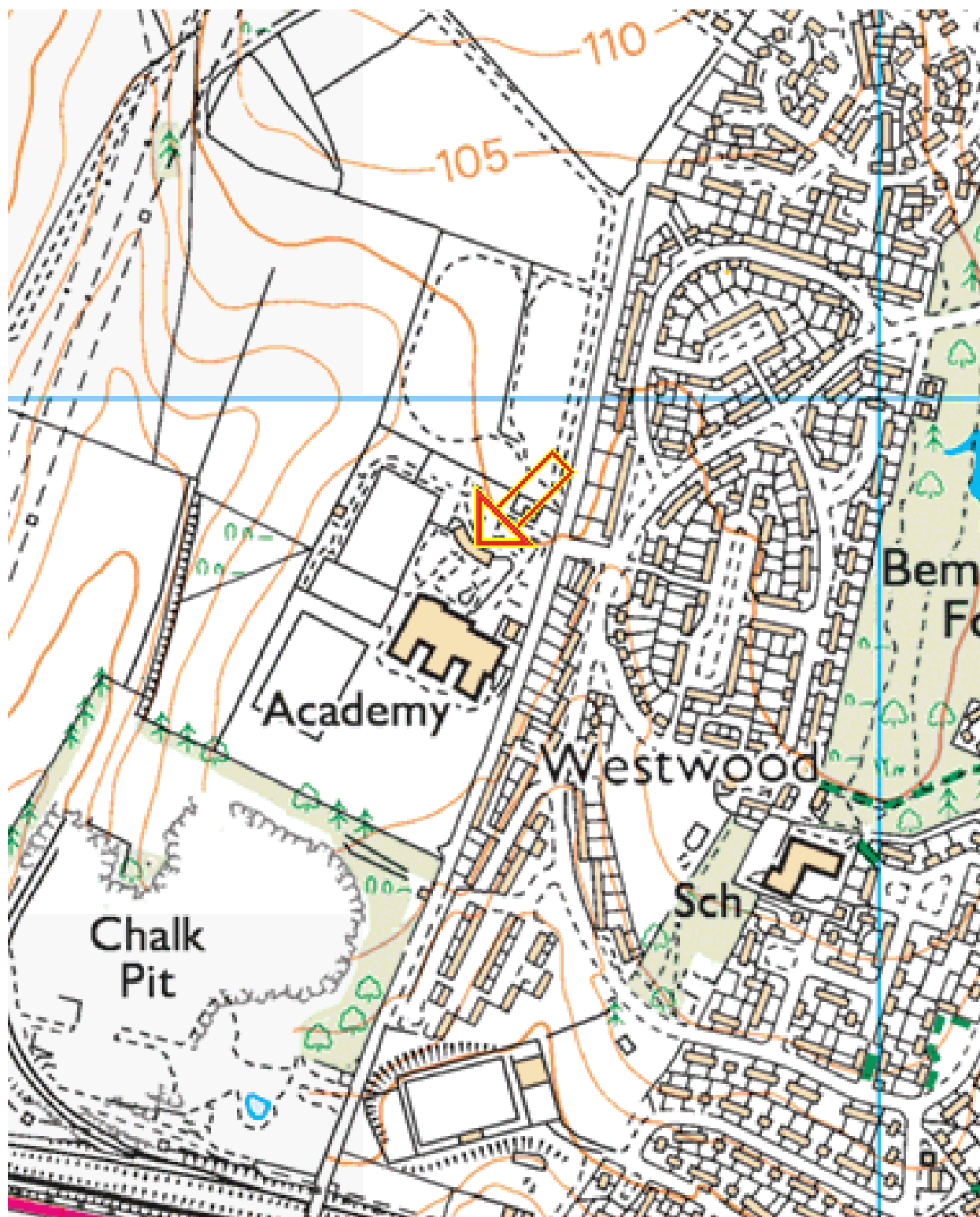


Figure 1 Site Location Plan

Job Number
22247

Project
Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Client
Morgan Sindall

Date
March 2026



Figure 2 Aerial Photograph



Job Number
22247

Project
Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Client
Morgan Sindall

Date
March 2026

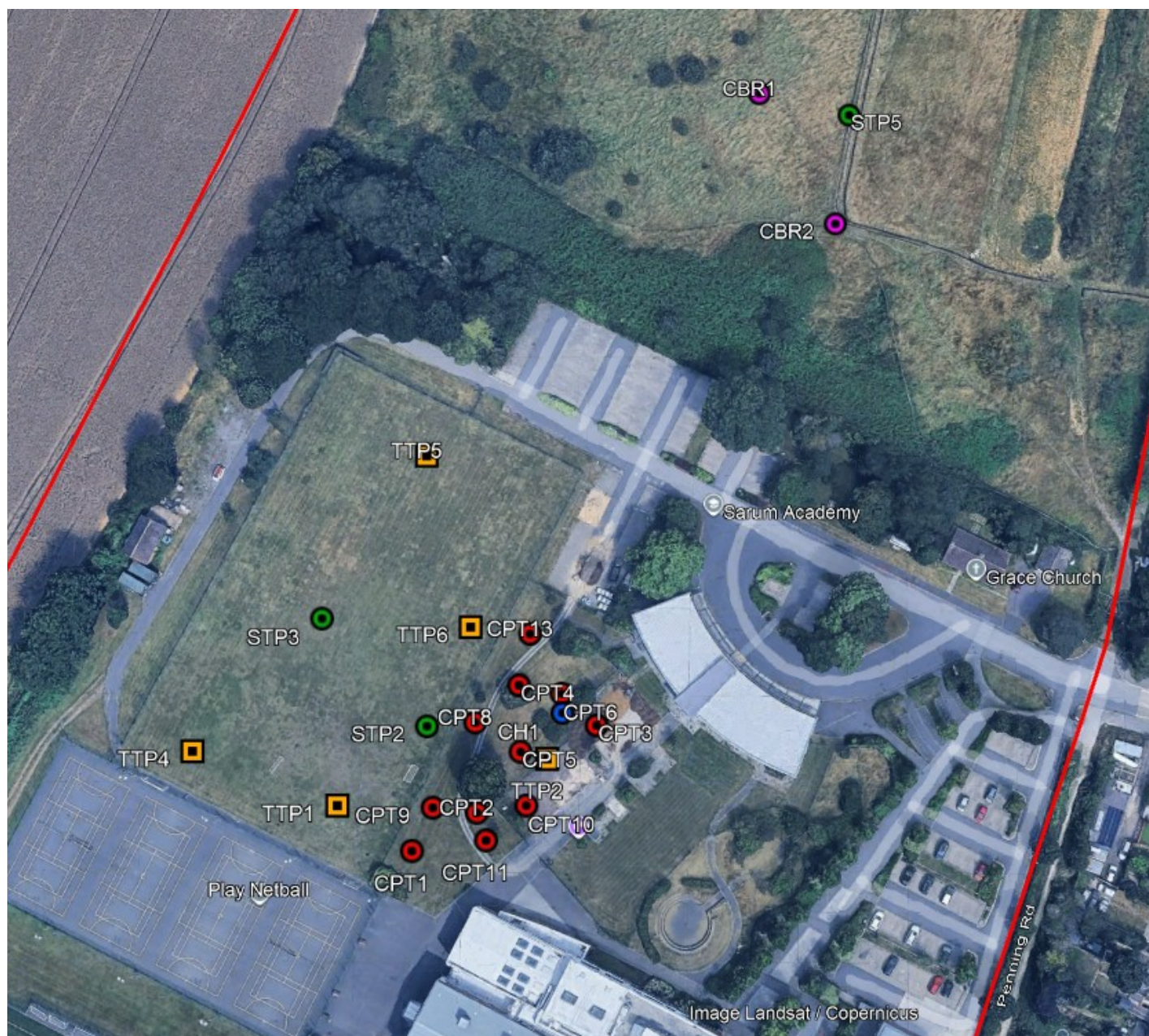


Figure 3 Exploratory Hole Plan December 2025



Job Number
22247

Project
Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Client
Morgan Sindall

Date
March 2026



Figure 4 Exploratory Hole Plan February 2026 works

Job Number
22247

Project
Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Client
Morgan Sindall

Date
March 2026

Appendix A Standards and Resources

The site works, soil descriptions and geotechnical testing were undertaken in accordance with the following standards where applicable:

- BS 5930:2015+A1:2020 and BS EN ISO 22476-2 2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- BS 8004:2015 – Code of practice for foundations
- BS 1377:1990 Parts 1 to 8
- BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'
- Stroud, M. A. 1974, "The Standard Penetration Test – its application and interpretation", Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.
- Robertson, P.K., 1990. Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27, pp. 151 – 158.
- Robertson, P.K., 2010, "Soil Behaviour type from the CPT: an update", 2nd International Symposium on Cone Penetration Testing, Huntington Beach, CA, Vol.2. pp575-583.
- N.E. Simons, B.K. Menzies, "A Short Course in Foundation Engineering"
- NHBC Standards Chapter 4.2, January 2024.
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- CIRIA C733, Asbestos in soil and made ground: a guide to understanding and managing risks and CAR2012 regulations.
- CIRIA C574, Engineering in Chalk; 2002
- Google Earth
- British Geological Survey Website & iGeology App

Appendix B Field Work

Appendix B.1 Engineers Logs



Borehole Log

CH1
Sheet 1 of 3

Hole Type CP+RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-15	End Date 2025-12-17

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
--------------------------	------------------	---

Inst/ Backfill	Water Levels	Samples and Tests			Coring			Frac	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)			Legend	Description
										(0.20) 0.20		Soft brown mottled, black, sandy CLAY with fine to medium subangular flint gravel. Sand is fine. Abundant rootlets. [MADE GROUND]
										(0.55) 0.75		Soft to firm orangish brown, slightly sandy, gravelly CLAY. Gravel is fine to coarse subangular to subrounded flint and basalt. Sand is medium to coarse. Frequent clinker and wood fragments. [MADE GROUND]
		1.20 1.30 1.40	SPT D ES	N=26 (4,6/7,7,7,5)								Soft to firm, orangish brown to brown, slightly sandy, gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Sand is fine to coarse. Occasional rootlets and rare woody material. Frequent decayed organic material below 2.4m bgl, likely decayed rootlets. [HEAD DEPOSITS]
		1.90 2.00 2.20	D SPT ES	N=20 (4,6/6,4,4,6)						(2.45) 2.50		
		2.80 2.90 3.00	ES D SPT	N=8 (1,3/2,2,3,1)						3.00		
		3.25 3.35	D ES							3.20 (0.30) 3.50		Soft to firm, brown mottled, orangish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium subangular flint. Sand is fine. Occasional black mottling, likely decayed rootlets. Thin (1-2 mm) layer of black decayed organic matter including woody material at base of unit. [HEAD DEPOSITS]
		3.60 3.70	D ES									Structureless CHALK. Recovered as black speckled, rarely orange stained, white, angular to subangular, fine to coarse gravel sized weak chalk clasts in a comminuted silty matrix. Matrix is light white. Rare angular coarse gravel sized rinded flint nodules. [NEWHAVEN CHALK FORMATION]
		4.00 4.10	SPT D	N=6 (1,1/0,2,1,3)								
		4.60 4.70	D ES									
		5.00 5.10	SPT D	N=10 (1,2/1,2,3,4)								
		5.60 5.70	D ES									
		6.50 6.60	SPT D	N=7 (2,2/2,2,1,2)						(21.50) 7.00		
		7.10 7.40 7.60	D ES D									
		8.00 8.10	SPT D	N=10 (6,4/4,3,2,1)								
		8.60	D									
		9.10	D									
		9.50 9.60	SPT D	N=20 (3,4/5,4,5,6)								Chalk clast occurrence decreases at between 9.50-11.60 m bgl (9.50 - 11.60m)
												Continued on next page

Remarks Rootlets observed to 3.50m bgl.	Method, Plant, Stability, Dimensions 0.00 - 25.00m Archway	Logger TW
Status: FINAL		

CH1
Sheet 2 of 3

Hole Type CP+RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy		Project No. 22247	Start Date 2025-12-15	End Date 2025-12-17

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level	Depth (thickness)	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		10.10	D	N=4 (5,1/1,1,1,1)									10.5	
	10.50 10.60	ES D	11.0											
	11.00	SPT	11.5											
	11.20	D	12.0											
	11.80	D	N=0 (1,0/0,0,0,0)	12.5										
	12.50	SPT		13.0										
	13.50			13.5										
	14.00	SPT		14.0										
	14.20	D	14.5											
	14.80	D	15.0											
	15.20	D	N=25 (3,3/4,6,8,7)	15.5										
	15.50	SPT		16.0										
	15.70	D		16.5										
	16.20	D		17.0										
	16.70	D	N=26 (3,4/3,9,7,7)	17.5										
	17.00	SPT		18.0										
	18.50	SPT		18.5										
	18.90	D		19.0										
	19.30	D	N=20 (7,8/4,6,5,5)	19.5										
	19.50	SPT		20.0										
19.80	D													
		Continued on next page												

Remarks Rootlets observed to 3.50m bgl.	Method, Plant, Stability, Dimensions 0.00 - 25.00m Archway	Logger TW
Status: FINAL		



Borehole Log

CH1
Sheet 3 of 3

Hole Type CP+RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-15	End Date 2025-12-17

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		20.30	D										As previous page.	
		21.00	SPT	N=19 (1,2/3,5,5,6)										
		22.50	SPT	N=34 (6,4/6,5,10,13)										
		24.00	SPT	N=48 (7,6/8,11,13,16)										
		25.00	SPT	N=43 (7,7/9,13,10,11)							25.00		End of Borehole at 25.00m	

Remarks Rootlets observed to 3.50m bgl.	Method, Plant, Stability, Dimensions 0.00 - 25.00m Archway	Logger TW
Status: FINAL		



Borehole Log

CH1

SUPPLEMENTARY INFO

Hole Type CP+RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-15	End Date 2025-12-17
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)					N=26 (4,6/7,7,7,5)
2.00 (S)					N=20 (4,6/6,4,4,6)
3.00 (S)					N=8 (1,3/2,2,3,1)
4.00 (S)					N=6 (1,1/0,2,1,3)
5.00 (S)					N=10 (1,2/1,2,3,4)
6.50 (S)					N=7 (2,2/2,2,1,2)
8.00 (S)					N=10 (6,4/4,3,2,1)
9.50 (S)					N=20 (3,4/5,4,5,6)
11.00 (S)					N=4 (5,1/1,1,1,1)
12.50 (S)					N=0 (1,0/0,0,0,0)
14.00 (S)					N=50 for 280mm (5,8/25,14,11,0 for 55mm)
15.50 (S)					N=25 (3,3/4,6,8,7)
17.00 (S)					N=26 (3,4/3,9,7,7)
18.50 (S)					N=26 (8,4/5,7,9,5)
19.50 (S)					N=20 (7,8/4,6,5,5)
21.00 (S)					N=19 (1,2/3,5,5,6)
22.50 (S)					N=34 (6,4/6,5,10,13)
24.00 (S)					N=48 (7,6/8,11,13,16)
25.00 (S)					N=43 (7,7/9,13,10,11)

Continued on next page

Remarks Rootlets observed to 3.50m bgl.	Method, Plant, Stability, Dimensions 0.00 - 25.00m Archway	Logger TW
Status: FINAL		



Borehole Log

CH1

SUPPLEMENTARY INFO

Hole Type CP+RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-15	End Date 2025-12-17
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Sample Details

Sample ID	Type	Water Level (m)	Remarks
1.30	D		
1.40	ES		
1.90	D		
2.20	ES		
2.50	D		
2.80	ES		
2.90	D		
3.25	D		
3.35	ES		
3.60	D		
3.70	ES		
4.10	D		
4.60	D		
4.70	ES		
5.10	D		
5.60	D		
5.70	ES		
6.60	D		
7.10	D		
7.40	ES		
7.60	D		
8.10	D		
8.60	D		
9.10	D		
9.60	D		
10.10	D		
10.50	ES		
10.60	D		
11.20	D		
11.80	D		
14.20	D		
14.80	D		
15.20	D		
15.70	D		
16.20	D		
16.70	D		
18.90	D		
19.30	D		
19.80	D		
20.30	D		
1.60-1.70	WAC		
2.3-2.5	WAC		
17.0-18.5	D		
21.0-22.5	D		
22.5-24.0	D		

Remarks Rootlets observed to 3.50m bgl.	Method, Plant, Stability, Dimensions 0.00 - 25.00m Archway	Logger TW
Status: FINAL		



Trial Pit

TTP1
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-10	End Date 2025-12-11	
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.60	ES		
0.60	ES		
1.00	D		
1.30	D		
1.50	D		

Remarks Rootlets observed to 1.00m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.20m JCB 3CX Stable L = 14.00m W = 0.47m	Logger JM
Status: FINAL		

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-10	End Date 2025-12-10	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.10	ES			(0.30)		Soft dark brown sandy slightly gravelly SILT. Gravel is angular to surrounded fine to coarse flint. Sand is fine to coarse. Frequent rootlets. [MADE GROUND]	
		0.45	D			0.30		Firm greyish brown slightly sandy gravelly CLAY. Gravel is fine to large boulder size brick/brick wall, concrete, and flint. Sand is fine to coarse. [MADE GROUND]	0.5
		1.30	D			1.00		Firm orangish brown slightly sandy gravelly CLAY. Gravel is angular to surrounded fine to coarse flint. Sand is fine to medium. [HEAD DEPOSITS]	1.0
						(0.40)			
						1.40		End of Trial Pit at 1.40m	1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0

Remarks Rootlets observed to 0.50m bgl. Trench shortened due to fenceline on the west end.	Method, Plant, Stability, Dimensions 0.00 - 1.40m JCB 3CX Stable L = 3.20m W = 0.47m	Logger JM
Status: FINAL		



Trial Pit

TTP2A
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-10	End Date 2025-12-10
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.10	ES		
0.45	D		
1.30	D		

Remarks Rootlets observed to 0.50m bgl. Trench shortened due to fenceline on the west end.	Method, Plant, Stability, Dimensions 0.00 - 1.40m JCB 3CX Stable L = 3.20m W = 0.47m	Logger JM
Status: FINAL		



Trial Pit

TTP4

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25
Project Name	Project No.	Start Date	End Date	
Sarum Academy	22247	2025-12-10	2025-12-10	
Client	Consultant	Contractor		
Morgan Sindall	AS	Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

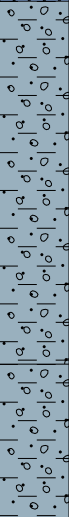
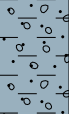
Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.10	ES		
0.50	ES		
1.00	D		
1.40	D		

Remarks	Method, Plant, Stability, Dimensions	Logger
Rootlets observed to 1.00m bgl. Concrete located 0.60m bgl and was 0.10m thick and 0.50m wide. Blue pipe which ran diagonal into the trench, open-ended.	0.00 - 1.50m Stable L = 12.00m W = 0.47m	JCB 3CX JM
Status: FINAL		

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-11	End Date 2025-12-12	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.10	ES			(0.15)		Soft dark brown sandy slightly gravelly SILT. Gravel is angular to surrounded fine to coarse flint. Sand is fine to coarse. Frequent rootlets.
		0.10	ES			0.15		[MADE GROUND]
		0.50	ES					Greyish brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL of flint, brick, concrete, plastic, and rare metal wires, tarmacadam, and cobbles. Sand is fine to coarse. Occasional rootlets becoming rare with depth. Becoming slightly sandy very clayey GRAVEL/gravelly CLAY with depth.
		0.90	D			(1.45)		[MADE GROUND]
		1.10	D					
		1.40	D					
		1.50	D					
						1.60		
								Firm orangish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Sand is fine to medium.
						(1.20)		[HEAD DEPOSITS]
						2.80		Firm orangish brown slightly sandy slightly gravelly CLAY with frequent irregular shaped and sized chalk patches. Gravel is angular to subrounded fine to coarse flint. Sand is fine to medium. Becoming more chalky with depth.
						(0.90)		[HEAD DEPOSITS]
						3.70		Structureless CHALK composed of white stained yellow slightly gravelly SILT. Gravel is extremely weak to very weak white with black speckling.
						(0.20)		Occasional flint. Grade Dm.
						3.90		[NEWHAVEN CHALK FORMATION]
								End of Trial Pit at 3.90m

Remarks Rootlets observed to 0.70m bgl. Trench shifted slightly southeast due to service.	Method, Plant, Stability, Dimensions 0.00 - 3.90m Stable L = 23.60m W = 0.47m	Logger JM
Status: FINAL		



Trial Pit

TTP5A
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-11	End Date 2025-12-12
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

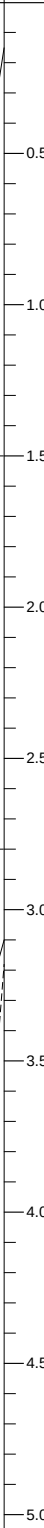
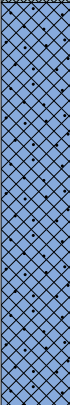
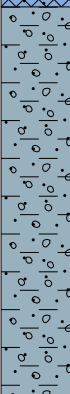
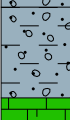
Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.10	ES		
0.10	ES		
0.50	ES		
0.90	D		
1.10	D		
1.40	D		
1.50	D		

Remarks Rootlets observed to 0.70m bgl. Trench shifted slightly southeast due to service.	Method, Plant, Stability, Dimensions 0.00 - 3.90m JCB 3CX Stable L = 23.60m W = 0.47m	Logger JM
Status: FINAL		

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-11	End Date 2025-12-11	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.10	ES			(0.15)		Soft dark brown sandy slightly gravelly SILT. Gravel is angular to surrounded fine to coarse flint. Sand is fine to coarse. Frequent rootlets.	
		0.30	ES			0.15		[MADE GROUND] Greyish brown slightly sandy clayey angular to subrounded fine to large boulder size GRAVEL of brick/ brick wall, concrete, flint, tarmacadam, metal wires, and rare chalk. Sand is fine to coarse. Occasional rootlets becoming rare with depth.	
		0.90	D			(1.35)		Concrete and pipe, thickness of concrete unconfirmed (0.80 - 0.90m)	
		1.40	D			1.50		Firm orangish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Sand is fine to medium.	
						(1.30)		[HEAD DEPOSITS]	
						2.80		Firm orangish brown slightly sandy slightly gravelly CLAY with frequent irregular shaped and sized chalk patches. Gravel is angular to subrounded fine to coarse flint. Sand is fine to medium. Becoming more chalky with depth.	3.0
				(0.30)		3.10 (0.08) 3.18		[HEAD DEPOSITS]	
								Structureless CHALK composed of white stained yellow slightly gravelly SILT. Gravel is extremely weak white with black speckling. Occasional flint. Grade Dm.	3.5
								[NEWHAVEN CHALK FORMATION]	
								End of Trial Pit at 3.18m	
									4.0
									4.5
									5.0



Trial Pit

TTP6A
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-11	End Date 2025-12-11
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.10	ES		
0.30	ES		
0.90	D		
1.40	D		

Remarks Rootlets observed to 0.90m bgl. Trench shortened on south end due to fenceline. Concrete located 0.80m bgl and was 0.20m wide, thickness unconfirmed. Old pipe running north to south along the east side of the trench. Lots of concrete, possible footing or manhole base.	Method, Plant, Stability, Dimensions 0.00 - 3.18m JCB 3CX Stable L = 15.00m W = 0.47m	Logger JM
Status: FINAL		

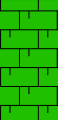


Soakaway

STP2A
Sheet 1 of 1

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-16	End Date 2025-12-16	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.30	ES			(0.15) 0.15		Soft dark brown silty SAND. Frequent fine gravel. Frequent rootlets. [MADE GROUND]	
		0.90	ES			(0.95)		Orange and brown sandy GRAVEL. Frequent brick, concrete, and pipe fragments. [MADE GROUND]	0.5
						1.10		Pipe (0.90 - 0.95m)	1.0
		1.60	D			(2.40)	Orange clayey sandy GRAVEL. Gravel is flint. Frequent cobbles. Frequent clay lenses. [HEAD DEPOSITS]	1.5 2.0 2.5 3.0	
		3.70	D			3.50		Structureless chalk recovered as white stained orangish yellow slightly gravelly clayey SILT. Gravel is extremely weak white with black speckling. Occasional flint. Grade Dm. [NEWHAVEN CHALK FORMATION]	3.5
						(0.80)			4.0
						4.30	End of Borehole at 4.30m		

Remarks Rootlets observed to 0.30m bgl.	Method, Plant, Stability, Dimensions 0.00 - 4.30m JCB 3CX Unstable, major collapse L = 2.30m W = 1.20m	Logger MS
Status: FINAL		



Soakaway

STP2A
SUPPLEMENTARY INFO

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-16	End Date 2025-12-16
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

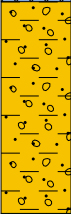
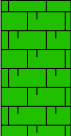
Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.30	ES		
0.90	ES		
1.60	D		
3.70	D		

Remarks Rootlets observed to 0.30m bgl.	Method, Plant, Stability, Dimensions 0.00 - 4.30m JCB 3CX Unstable, major collapse L = 2.30m W = 1.20m	Logger MS
Status: FINAL		

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-16	End Date 2025-12-17	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.10	ES			0.20		Soft dark brown silty SAND. Frequent fine gravel. Frequent rootlets. [MADE GROUND]	
		0.50	ES			1.00		Brown sandy GRAVEL. Frequent brick, concrete fragments. Occasional cobbles. [MADE GROUND]	0.5
		1.00	ES			1.20			1.0
						1.40		Orangish clayey sandy GRAVEL. Gravel is flint. Frequent flint cobbles. Frequent clay lenses. [HEAD DEPOSITS]	1.5
						2.60			2.0
						3.30			2.5
						3.50		Structureless CHALK recovered as white stained orangish yellow slightly gravelly clayey SILT. Gravel is extremely weak white with black speckling. Occasional flint. Grade Dm. [NEWHAVEN CHALK FORMATION]	3.0
									3.5
								End of Borehole at 3.50m	3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks Rootlets observed to 0.40m bgl.	Method, Plant, Stability, Dimensions 0.00 - 3.50m JCB 3CX Stable, minor collapse L = 2.00m W = 0.60m	Logger MS
Status: FINAL		



Soakaway

STP3A
SUPPLEMENTARY INFO

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-16	End Date 2025-12-17
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.10	ES		
0.50	ES		
1.00	ES		
3.30	ES		

Remarks Rootlets observed to 0.40m bgl.	Method, Plant, Stability, Dimensions 0.00 - 3.50m JCB 3CX Stable, minor collapse L = 2.00m W = 0.60m	Logger MS
Status: FINAL		

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2025-12-18	End Date 2025-12-18	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.20	D			(0.40)		Soft dark greyish brown gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. Occasional rootlets. [TOPSOIL]	
		0.50	D			0.40		Soft orangish brown gravelly CLAY. Gravel is angular to subangular fine to coarse flint. Occasional rootlets. [HEAD DEPOSITS]	0.5
		1.00	D			(1.70)			1.0
		1.50	D						1.5
		2.00	D			2.10			2.0
		2.50	D					Structureless CHALK recovered as slightly silty subangular medium to coarse GRAVEL. Clasts are weak. Matrix is white. Occasional flint cobbles. Grade Dc. [NEWHAVEN CHALK FORMATION]	2.5
		3.00	D			(1.90)			3.0
		3.50	D						3.5
		4.00	D			4.00			4.0
								End of Borehole at 4.00m	
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks Rootlets observed to 2.10m bgl.	Method, Plant, Stability, Dimensions 0.00 - 4.30m Stable L = 1.50m W = 0.50m	Logger GJB
Status: FINAL		



Soakaway

STP5
SUPPLEMENTARY INFO

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247		Start Date 2025-12-18	End Date 2025-12-18
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, Tim Coates		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
0.20	D		
0.50	D		
1.00	D		
1.50	D		
2.00	D		
2.50	D		
3.00	D		
3.50	D		
4.00	D		

Remarks Rootlets observed to 2.10m bgl.	Method, Plant, Stability, Dimensions 0.00 - 4.30m JCB 3CX Stable L = 1.50m W = 0.50m	Logger GJB
Status: FINAL		

CH2
Sheet 1 of 3

Hole Type RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy		Project No. 22247	Start Date 2026-02-16	End Date 2026-02-18

Client	Consultant	Contractor
Morgan Sindall	AS	Marshall Drilling, AR Banks

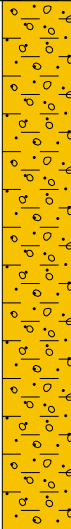
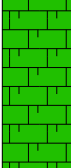
[illegible]

Remarks
No Rootlets observed

Method, Plant, Stability, Dimensions

Logger

Hole Type RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-16	End Date 2026-02-18	
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks		

Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
		10.00	SPT	N=50 for 75mm (25/50)									As previous page.
		11.50	SPT	N=50 for 75mm (25/50)									
		13.00	SPT	N=50 for 75mm (25/50)									
		13.50									13.50		Structureless CHALK. Recovered as slightly orange stained, creamy white, angular to sub-angular, fine to coarse gravel sized weak chalk clasts in a comminuted silty matrix. Matrix is slightly orange stained, white. Rare angular coarse gravel sized flint nodules. Grade DM [NEWHAVEN CHALK FORMATION]
		14.50	SPT D	N=8 (2,3/1,2,3,2)									
		16.00	SPT	N=6 (1,1/1,1,2,2)									
		17.50	SPT	N=12 (1,1/2,2,3,5)									
		19.00	SPT	N=9 (1,0/2,2,2,3)									
													Continued on next page

Remarks No Rootlets observed	Method, Plant, Stability, Dimensions	Logger
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Rotary Core Log

CH2
Sheet 3 of 3

Hole Type RC	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-16	End Date 2026-02-18	

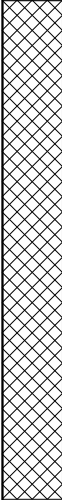
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		20.50	SPT	N=9 (1,1/2,2,2,3)							20.50		As previous page.	20.5
		21.00	D										Structureless CHALK. Recovered as slightly orange stained, creamy white, angular to sub-angular, fine to coarse gravel sized weak chalk clasts in a comminuted silty matrix. Matrix is slightly orange stained, white. Rare angular coarse gravel sized flint nodules. Grade DM to DC [NEWHAVEN CHALK FORMATION]	21.0
		22.00	SPT	N=16 (2,2/3,4,4,5)										21.5
		23.50	SPT	N=12 (2,1/2,2,3,5)							(4.50)			22.0
		25.00	SPT	N=50 for 0mm (0,0)							25.00			22.5
													End of Borehole at 25.00m	23.0
														23.5
														24.0
														24.5
														25.0
														25.5
														26.0
														26.5
														27.0
														27.5
														28.0
														28.5
														29.0
														29.5
														30.0

Remarks No Rootlets observed	Method, Plant, Stability, Dimensions	Logger
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Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-17	End Date 2026-02-17	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.20	D			(0.25)		Soft dark brown, slightly sandy, slightly gravelly SILT with frequent rootlets. Gravel is angular to subangular, fine to coarse flint. [MADE GROUND]	
		0.50	D			0.25		Greyish brown slightly clayey sandy GRAVEL .Sand is fine to coarse Gravel is angular to subangular, fine to cobble sized flint with fragments of brick and concrete. [MADE GROUND]	0.5
						(1.15)			1.0
		1.20	D			1.40		Firm to stiff orangish brown slightly sandy CLAY. Sand is fine to coarse. Gravel us angular to subangular fine to coarse flint . [HEAD DEPOSITS]	1.5
		1.65	D			(0.25) 1.65			2.0
								End of Trial Pit at 1.65m	2.5
									3.0
									3.5
									4.0
									4.5
									5.0

Remarks Rootlets observed to 0.30m bgl.	Method, Plant, Stability, Dimensions 0.00 - 1.65m Stable L = 18.30m W = 0.85m	Logger AN
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Trial Pit

TTP7
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2026-02-17	End Date 2026-02-17
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
0.85				Slow Seepage

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		
	D		

Remarks Rootlets observed to 0.30m bgl.	Method, Plant, Stability, Dimensions 0.00 - 1.65m 8 Ton Tracked Machine Stable L = 18.30m W = 0.85m	Logger AN
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Soakaway Test

STP1
Sheet 1 of 1

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-17	End Date 2026-02-17	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.10	D			(0.15) 0.15		Soft dark brown, slightly sandy, slightly gravelly SILT with frequent rootlets. Gravel is angular to subangular, fine to coarse flint. [MADE GROUND]	0.5
		0.80	D			(1.55)		Greyish brown slightly clayey, sandy GRAVEL. Sand is fine to coarse Gravel is angular to subangular, fine to cobble sized flint with fragments of brick, tarmac and cement . [MADE GROUND]	1.0
		1.40	D			1.70			1.5
		1.80	D			(0.75)		Firm orangish brown slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse flint. [HEAD DEPOSITS]	2.0
		2.50	D			2.45 (0.45) 2.90		Firm orangish brown mottled white slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse flint .Rare angular cobble sized chalk gravel [HEAD DEPOSITS]	2.5
								End of Borehole at 2.90m	3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks Rootlets observed to 0.20m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.90m Stable L = 2.60m W = 1.30m	Logger AN
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Soakaway Test

STP1
SUPPLEMENTARY INFO

Hole Type SOAK	Easting	Northing	Ground Level (m)	Scale 1:50
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-17	End Date 2026-02-17	
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		
	D		
	D		

Remarks Rootlets observed to 0.20m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.90m Stable L = 2.60m W = 1.30m	Logger AN
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Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-18	End Date 2026-02-18	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.10	D			(0.15) 0.15		Soft dark brown, slightly sandy, slightly gravelly SILT with frequent rootlets. Gravel is angular to subangular, fine to coarse flint. [MADE GROUND]
		0.40	D			(0.30) 0.45		Soft to firm greyish brown longhand, slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse flint with brick and concrete. [MADE GROUND]
		0.60	D			(0.20) 0.65		8cm thick tarmac layer over light reddish brown type 1 gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular fine to coarse limestone and flint [MADE GROUND]
		1.20	D			(2.30)		Orangish brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint. [HEAD DEPOSITS]
		2.50	D			2.95		
								End of Trial Pit at 2.95m

Remarks Rootlets observed to 0.15m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.95m Stable L = 3.00m W = 0.85m	Logger AN
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Trial Pit

TP101
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2026-02-18	End Date 2026-02-18
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		
	D		
	D		

Remarks Rootlets observed to 0.15m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.95m Stable L = 3.00m 8 Ton Tracked Machine W = 0.85m	Logger AN
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Trial Pit

TP102
SUPPLEMENTARY INFO

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247		Start Date 2026-02-18	End Date 2026-02-18
Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		
	D		
	D		

Remarks Rootlets observed to 0.20m bgl.	Method, Plant, Stability, Dimensions 0.00 - 2.93m Stable L = 3.00m W = 0.85m	Logger AN
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Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-18	End Date 2026-02-18	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.10	D			(0.50)		Soft dark brown, slightly sandy, slightly gravelly SILT with frequent rootlets. Gravel is angular to subangular, fine to coarse flint and chalk. [MADE GROUND]	
		0.50	D			0.50		Greyish brown and orangish brown sandy gravelly clay with metal bricks, concrete. [MADE GROUND]	0.5
		0.90	D			(0.60)			1.0
						1.10		End of Trial Pit at 1.10m	1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0

Remarks Rootlets observed to 0.20m bgl.	Method, Plant, Stability, Dimensions 0.00 - 1.10m Stable L = 3.00m W = 0.85m	Logger AN
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Trial Pit

TP103

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25
Project Name	Project No.	Start Date	End Date	
Sarum Academy	22247	2026-02-18	2026-02-18	
Client	Consultant	Contractor		
Morgan Sindall	AS	Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

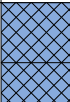
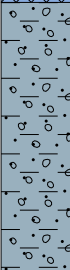
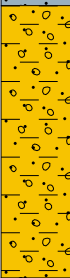
Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		

Remarks	Method, Plant, Stability, Dimensions	Logger
Rootlets observed to 0.20m bgl.	0.00 - 1.10m Stable L = 3.00m W = 0.85m	8 Ton Tracked Machine AN

Hole Type TP	Easting	Northing	Ground Level (m)	Scale 1:25
Project Name Sarum Academy	Project No. 22247	Start Date 2026-02-18	End Date 2026-02-18	

Client Morgan Sindall	Consultant AS	Contractor Marshall Drilling, AR Banks
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.10	D			(0.20)		Soft dark brown, slightly sandy, slightly gravelly SILT with frequent rootlets.
		0.20	Gravel is angular to subangular, fine to coarse flint, [MADE GROUND]					
		0.80	D			(1.10)		Soft to firm greyish brown slightly sandy, slightly gravelly CLAY Sand is fine to coarse.
								Gravel is angular to subangular fine to coarse flint with brick concrete [MADE GROUND]
		1.20	D			1.30		Soft to firm Orangish brown slightly clayey sandy slightly gravelly CLAY. Sand is fine to coarse.
		1.70	D			(0.90)		Gravel is angular to subangular fine to coarse flint [HEAD DEPOSITS]
		2.50	D			2.20		Orangish brown slightly clayey slightly sandy GRAVEL. Sand is fine to coarse.
						(0.90)		Gravel is angular to subangular fine to coarse flint [HEAD DEPOSITS]
		3.10	End of Trial Pit at 3.10m					



Trial Pit

TP104

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25
Project Name	Project No.	Start Date	End Date	
Sarum Academy	22247	2026-02-18	2026-02-18	
Client	Consultant	Contractor		
Morgan Sindall	AS	Marshall Drilling, AR Banks		

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
				No groundwater encountered.

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	D		
	D		
	D		

Remarks	Method, Plant, Stability, Dimensions	Logger
Rootlets observed to 0.20m bgl.	0.00 - 3.10m Stable L = 3.00m W = 0.85m	8 Ton Tracked Machine AN

Appendix C Geotechnical In-Situ and Laboratory Testing

Appendix C.1 Classification

Classification based on SPT “N” values:

The inferred undrained strength of the cohesive soils was based on the SPT “N” blow counts, derived from the relationship suggested by Stroud (1974) and classified using Table C.1.1. (Ref: Stroud, M. A. 1974, “The Standard Penetration Test – its application and interpretation”, Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.).

Table C.1.1 SPT “N” Blow Count Cohesive Classification

Classification	Undrained Cohesive Strength C_u (kPa)
Extremely low	<10
Very low	10 – 20
Low	20 – 40
Medium	40 – 75
High	75 – 150
Very high	150 – 300
Extremely high	> 300

Note(s): (Ref: BS EN ISO 14688-2:2004+A1:2013 Clause 5.3.)

The relative density of granular soils was classified based of the relationship given in Table C.1.2.

The *UK National Annex to Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing*, NA 3.7 SPT test, BS EN 1997-2:2007, Annex F states “Relative density descriptions on borehole records should also be based on uncorrected SPT N values, unless significantly disturbed, using the density classification in BS 5930:2015, Table 7.

Table C.1.2 SPT “N” Blow Count Granular Classification

Classification	SPT “N” blow count (blows/300mm)
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	Greater than 50

Note(s): (Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

Chalk samples recovered are disturbed by the sampling process. Therefore, it is difficult to assess an accurate chalk grade for in accordance with CIRIA C574 ‘Engineering in Chalk’. In the absence of a standardised correlation between SPT “N” values and chalk grade for the most recent chalk classification (CIRIA C574) a broad indication of the in-situ chalk grade can be assessed using a paper by T.R.M. Wakeling from a site in Mundford, Norfolk, which compares SPT “N” values to the old Spink & Norbury chalk

classification. From the Spink & Norbury classification it is possible to infer a basic CIRIA Grade (structureless or structured), as outlined in Table C.1.3.

Table C.1.3 Interpretation of SPT “N” Blow Counts in Chalk

SPT “N” Value Range	Spink & Norbury Grade	Inferred CIRIA Grade
<8	VI	Structureless (Dm)
8 – 15	V	Structureless (Dc)
15 – 20	IV	Structured chalk (C5 – A1)
20 – 25	III	Structured chalk (C5 – A1)
25 – 35	II	Structured chalk (C5 – A1)
>35	I	Structured chalk (C5 – A1)

Note(s):

Consistency for cohesive soils

Cohesive soils consistency terms like *soft*, *firm*, *stiff*, *very stiff* (for clays and silts) are based on **hand pressure tests** in the field (thumb penetration, finger pressure, etc.). These rely on the samplers or loggers judgement, so there is inevitably some subjectivity and may vary from the results of geotechnical tests.

Classification of DCP results to CBR:

Terms for description of consistency

Field description term	Consistency description definition [after BS EN ISO 14688-1:2002 , 5.14]
Very soft	Finger easily pushed in up to 25 mm
Soft	Exudes between fingers Finger pushed in up to 10 mm
Firm	Moulded by light finger pressure Thumb makes impression easily
Stiff	Cannot be moulded by fingers, rolls in the hand to a 3 mm thick thread without breaking or crumbling Can be indented slightly by thumb
Very stiff	Crumbles in rolling a 3 mm thick thread, but can then be remoulded into a lump Can be indented by thumb nail
	Cannot be moulded but crumbles under pressure

NOTE 1 These subdivisions can be approximate, particularly in material of low plasticity.

NOTE 2 The description of materials of higher consistency than very stiff should use rock strengths and material names.

NOTE 3 Soils varying around the boundary between soil (very stiff consistency) and rock (extremely weak strength) can be described as, for example, “very stiff CLAY/extremely weak MUDSTONE”. A boundary on the log at rockhead if it is a simple transition is preferable.

Appendix C.2 Interpretation

Table C.2.1 Interpretation of SPT Tests

BH	Strata	SPT N60 Blow Counts	Inferred Cohesive Strength
CH1	HEAD 0.75– 3.50 Gravelly silty CLAY	9-30	Medium to very high (Cu = 45-150kPa)
	NCK 3.50 – 25.00 Chalk	<5 – 57	Structureless chalk (Dm) to Structured chalk (C5 – A1)
CH2	HEAD 1.20-7.00 Gravelly sandy CLAY	7-15	Low to high (Cu = 35-75kPa)
	HEAD 7.00-13.50 Sandy clayey GRAVEL	30	Dense
	NCK 13.50-25.00 Chalk	<5-30	Structureless chalk (Dm) to Structured chalk (C5 – A1)

Table C.2.2 Interpretation of Atterberg Limit Tests

Stratum	M/C (%)	PI (%)	>425µm (%)	Mod PI (%)	Class	VCP BRE	NHBC
HEAD	15.9 – 41.3	20 - 41	79 - 96	17.8 – 34.44	CI - CV	Low-Medium	Low-Medium

Note(s): BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results). VCP=Volume Change Potential
 NHBC Volume Change Potential refers to NHBC Standards Chapter 4.2
 Soils Classification based on British Soil Classification System
 The Atterberg Limit Tests were undertaken in accordance with BS 1377:Part 2:1990 Clauses 3.2, 4.3 and 5

Table C.2.3 Interpretation of SMC Tests

Location	Depth (m bgl)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	MC (%)	SMC (%)	Classification (CIRIA)
CH1	4.10	1.90	1.47	30	31	Low
CH1	7.10	1.86	1.43	31	33	Low
SPT2	3.70	1.99	1.59	25	26	Medium
STP3	3.30	1.91	1.51	27	29	Low
SPT5	3.00	1.89	1.45	30	32	Low
STP1	2.50	1.78	1.34	33	38	Low
CH2	14.00	1.83	1.36	35	36	Low

Note(s): (The Determination of Saturation Moisture Content of Chalk Tests were made in accordance with BS 1377: Part 2: 1990 Clauses 3.3)

Table C.2.4 Interpretation of PSD Tests

Location	Depth (m bgl)	Soil Description	VCP		>63µm Sieve (%)
			BRE	NHBC	
TPI01	2.20	Brown clayey silty fine to medium SAND	No	No	13
Note(s): (The Particle Size Distribution Tests were undertaken in accordance with BS 1377: Part 2: 1990 Clause 9). VCP=Volume Change Potential					

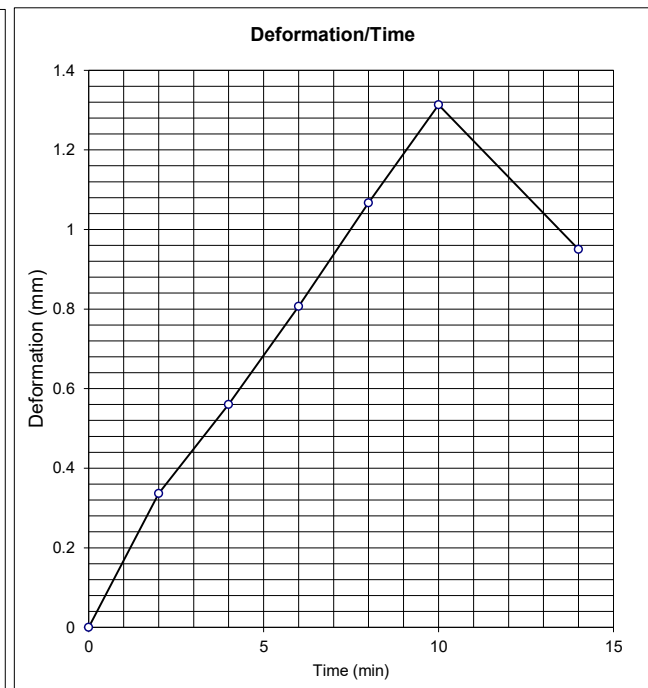
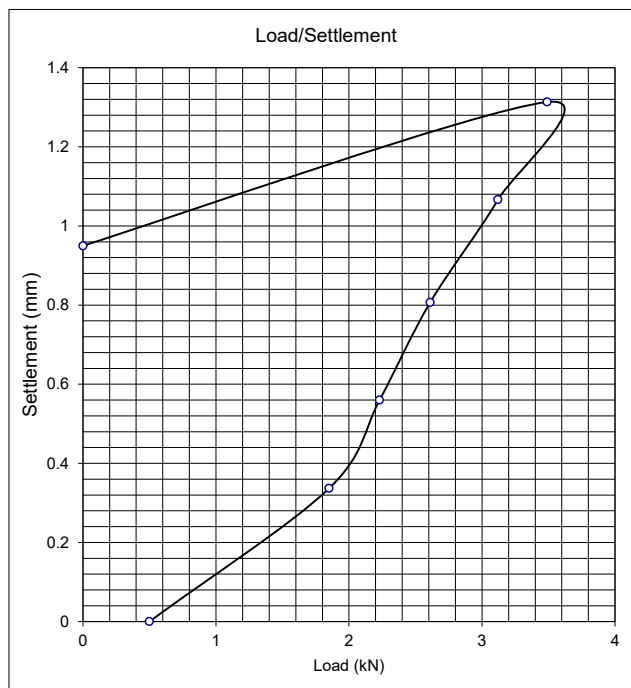
Appendix C.3 Geotechnical In-Situ and Laboratory Results

	Plate Bearing		Job Ref	38286	
			Position No:	PL/CBR1	
Site Name:	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS		Depth m	0.40	
Project No:	-	Client	Soils Limited	Date tested:	18/12/2025
Soil Description:	Orangish brown gravelly sandy silty CLAY with occasional roots and rootlets (gravel is fmc and sub-angular to sub-rounded)		Reported	07/01/2026	
			Plate Diameter	300 mm	
Test Method	BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)				

NOTE: The report shall not be reproduced except in full without authority of the laboratory. These results only apply to the locations tested.

Sample Information		Test Data	
Environmental conditions	Rain	Loading procedure	Incremental
Material Type	-	Description of Reaction load	JCB
Temperature (OC):	10	In-situ moisture content %	23
Remarks:			
Equivalent CBR = 1.3% - Modulus Of Subgrade Reaction 16961 kN/m ² /m			

Load Increment no:	Load	Cumulative Settlement
	kN	mm
Seating load	0.5	0
1	1.9	0.34
2	2.2	0.56
3	2.6	0.81
4	3.1	1.07
5	3.5	1.31
6	0.0	0.95



	K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com	Checked and Approved Initials: J.P. Date: 07/01/2026	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) IAN 73/06 Revision 1, 2009 (Draft HD25) - Standard withdrawn	Page 1 of 2	MSF-5-R9 (Rev.0)
	2519		



Plate Bearing

Job Ref 38286

Position No: PL/CBR1

Site Name: Sarum Academy, Westwood Rd, Salisbury, SP2 9HS

Depth m 0.40

Project No: - Client Soils Limited

Date tested: 18/12/2025

Soil Description: Orangish brown gravelly sandy silty CLAY with occasional roots and rootlets (gravel is fmc and sub-angular to sub-rounded)

Reported 07/01/2026

Plate Diameter 300 mm

Test Method BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)

Sample Information

Environmental conditions Rain

Material Type -

Temperature (OC): 10

Test Data

Loading procedure Incremental

Description of Reaction load JCB

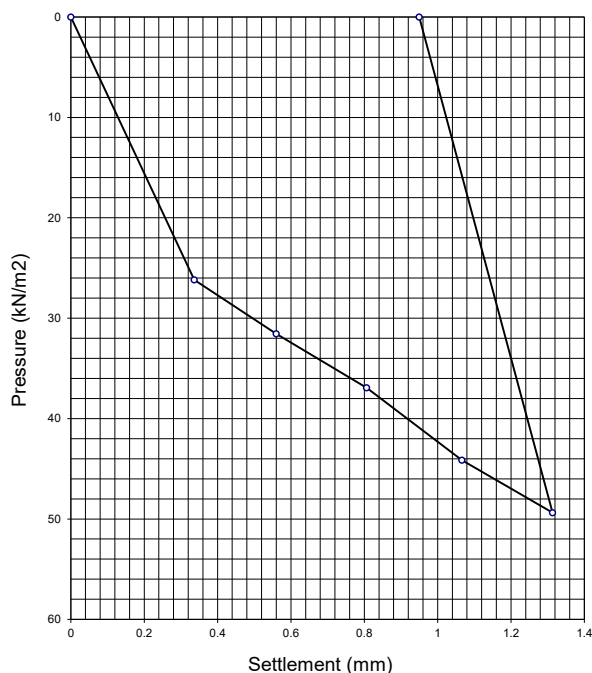
Insitu moisture content % 23

Remarks:

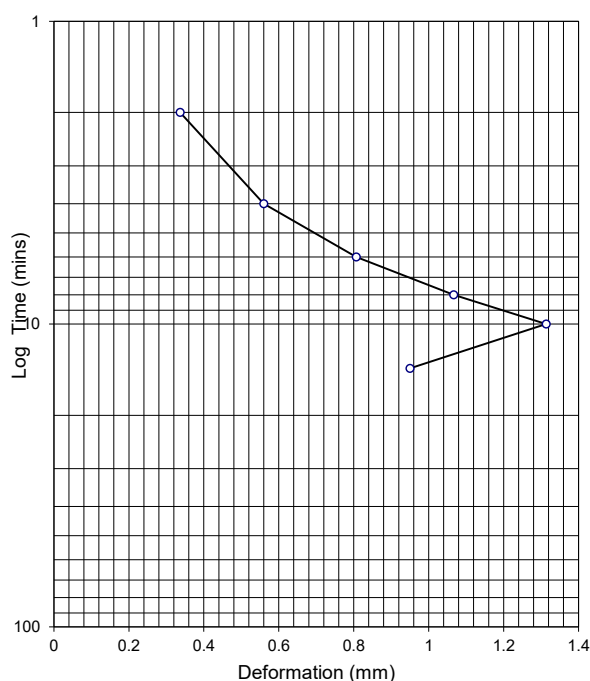
Equivalent CBR = 1.3% - Modulus Of Subgrade Reaction 16961 kN/m2/m

Load Increment no:	Load	Settlement	Pressure
	kN	mm	kN/m2
Seating load	0.5	0	0
1	1.9	0.34	26
2	2.2	0.56	32
3	2.6	0.81	37
4	3.1	1.07	44
5	3.5	1.31	49
6	0.0	0.95	0

Settlement/Pressure



Deformation/ Log Time



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Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved

Initials: J.P

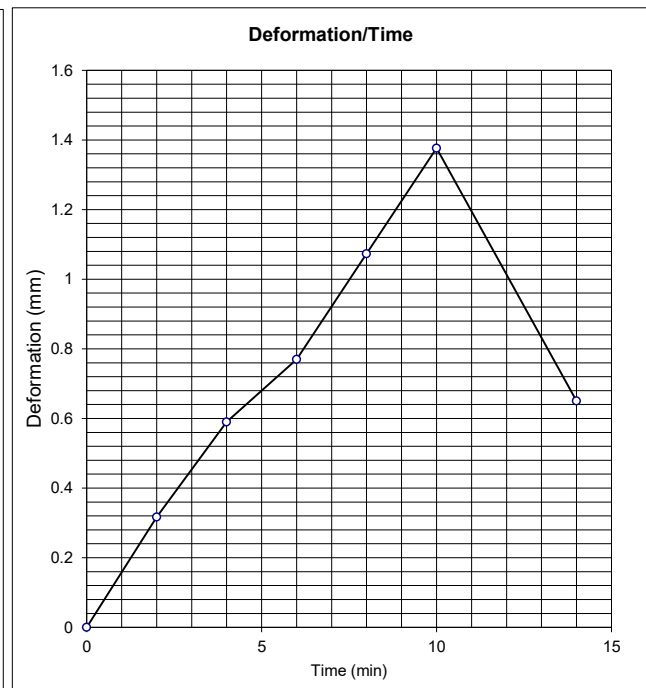
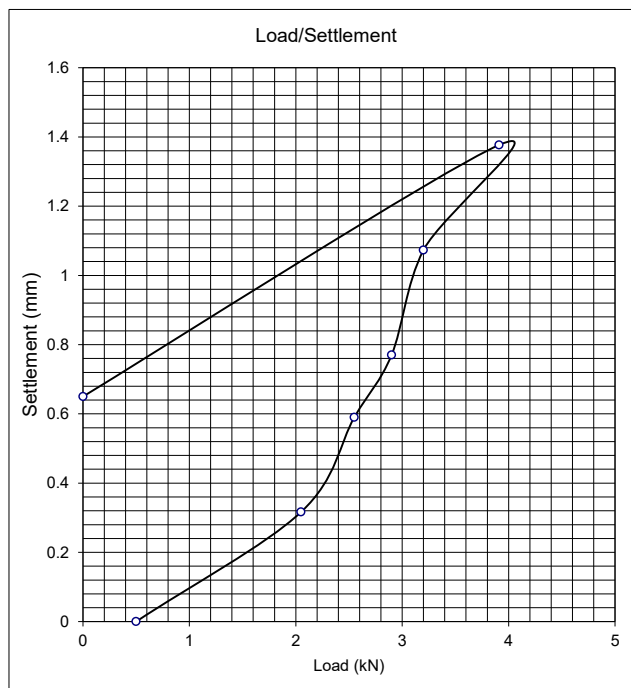
Date: 07/01/2026

	Plate Bearing		Job Ref	38286
			Position No:	PL/CBR2
Site Name:	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS		Depth m	0.40
Project No:	-	Client	Soils Limited	Date tested: 18/12/2025
Soil Description:	Orangish brown slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets (gravel is fmc and sub-angular to sub-rounded)		Reported	07/01/2026
			Plate Diameter	300 mm
Test Method	BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)			

NOTE: The report shall not be reproduced except in full without authority of the laboratory. These results only apply to the locations tested.

Sample Information		Test Data	
Environmental conditions	Rain	Loading procedure	Incremental
Material Type	-	Description of Reaction load	JCB
Temperature (OC):	10	In-situ moisture content %	24
Remarks:			
Equivalent CBR = 1.4% - Modulus Of Subgrade Reaction 18021 kN/m2/m			

Load Increment no:	Load	Cumulative Settlement
	kN	mm
Seating load	0.5	0
1	2.1	0.32
2	2.6	0.59
3	2.9	0.77
4	3.2	1.07
5	3.9	1.38
6	0.0	0.65



	K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com		Checked and Approved
			Initials: J.P. Date: 07/01/2026
2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) IAN 73/06 Revision 1, 2009 (Draft HD25) - Standard withdrawn	Page 1 of 2	MSF-5-R9 (Rev.0)



Plate Bearing

Job Ref 38286

Position No: PL/CBR2

Site Name: Sarum Academy, Westwood Rd, Salisbury, SP2 9HS

Depth m 0.40

Project No: - Client: Soils Limited

Date tested: 18/12/2025

Soil Description: Orangish brown slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets (gravel is fmc and sub-angular to sub-rounded)

Reported 07/01/2026

Plate Diameter 300 mm

Test Method BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)

Sample Information

Environmental conditions Rain

Material Type -

Temperature (OC): 10

Test Data

Loading procedure Incremental

Description of Reaction load JCB

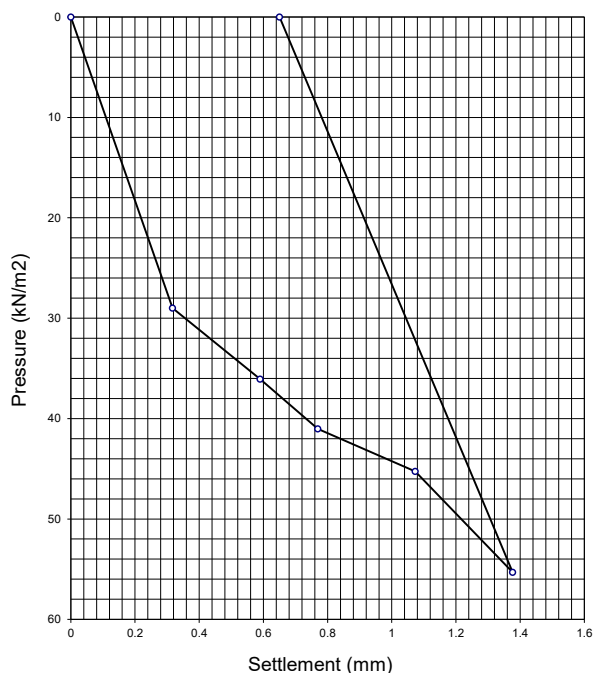
Insitu moisture content % 24

Remarks:

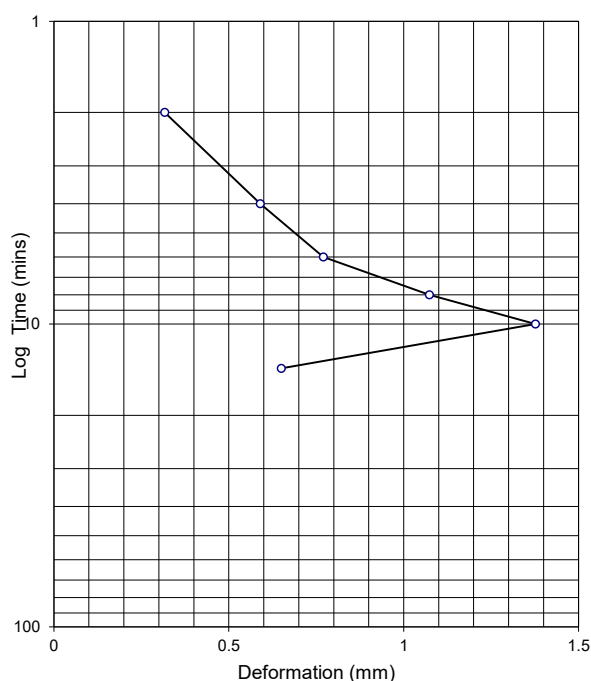
Equivalent CBR = 1.4% - Modulus Of Subgrade Reaction 18021 kN/m2/m

Load Increment no:	Load	Settlement	Pressure
	kN	mm	kN/m2
Seating load	0.5	0	0
1	2.1	0.32	29
2	2.6	0.59	36
3	2.9	0.77	41
4	3.2	1.07	45
5	3.9	1.38	55
6	0.0	0.65	0

Settlement/Pressure



Deformation/ Log Time



K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved

Initials: J.P

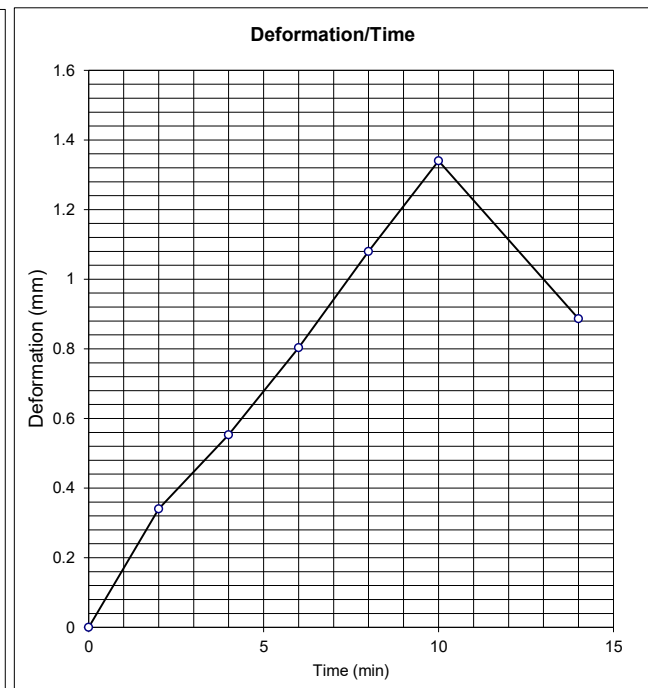
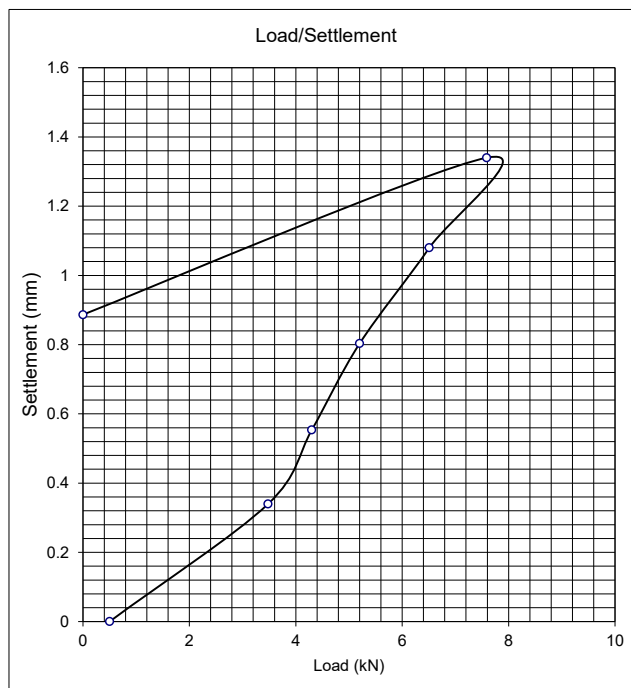
Date: 07/01/2026

	Plate Bearing		Job Ref	38525		
			Position No:	PL/CBR3		
Site Name:	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS		Depth m	0.40		
Project No:	-	Client	Soils Limited		Date tested:	18/02/2026
Soil Description:	Brown slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)			Reported	02/03/2026	
				Plate Diameter	300	mm
Test Method	BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)					

NOTE: The report shall not be reproduced except in full without authority of the laboratory. These results only apply to the locations tested.

Sample Information		Test Data	
Environmental conditions	Overcast/Light rain	Loading procedure	Incremental
Material Type	-	Description of Reaction load	Tracked Excavator
Temperature (OC):	5	In-situ moisture content %	13
Remarks:			
Equivalent CBR = 4.9% - Modulus Of Subgrade Reaction 36396 kN/m2/m			

Load Increment no:	Load	Cumulative Settlement
	kN	mm
Seating load	0.5	0
1	3.5	0.34
2	4.3	0.55
3	5.2	0.80
4	6.5	1.08
5	7.6	1.34
6	0.0	0.89



	K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com	Checked and Approved Initials: J.P. Date: 02/03/2026	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) IAN 73/06 Revision 1, 2009 (Draft HD25) - Standard withdrawn	Page 1 of 2	MSF-5-R9 (Rev.0)
	2519		



Plate Bearing

Job Ref 38525

Position No: PL/CBR3

Site Name: Sarum Academy, Westwood Rd, Salisbury, SP2 9HS

Depth m 0.40

Project No: - Client Soils Limited

Date tested: 18/02/2026

Soil Description: Brown slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)

Reported 02/03/2026

Plate Diameter 300 mm

Test Method BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)

Sample Information

Environmental conditions Overcast/Light rain

Material Type -

Temperature (OC): 5

Test Data

Loading procedure Incremental

Description of Reaction load Tracked Excavator

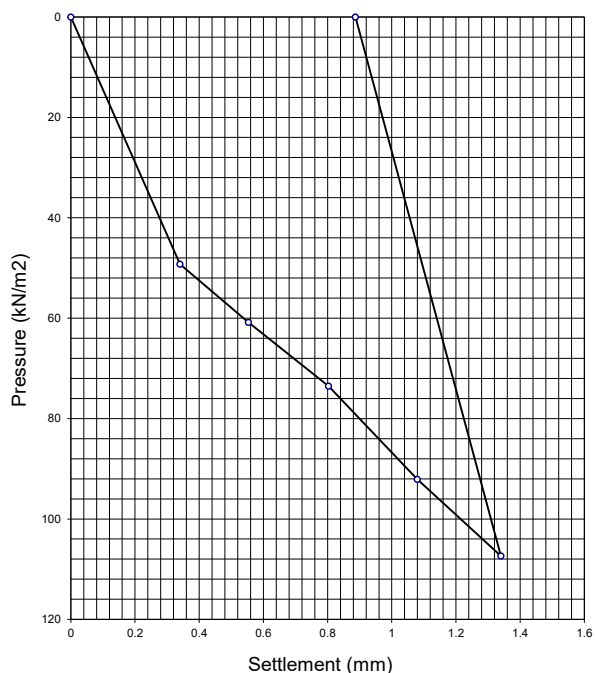
Insitu moisture content % 13

Remarks:

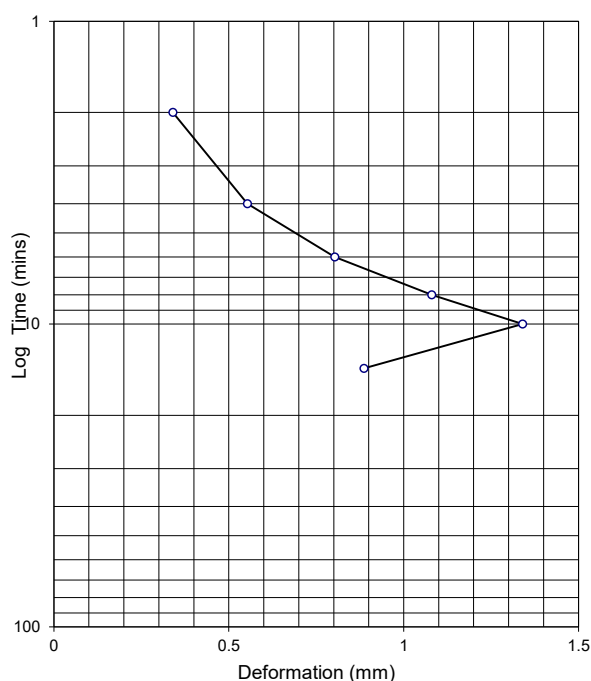
Equivalent CBR = 4.9% - Modulus Of Subgrade Reaction 36396 kN/m2/m

Load Increment no:	Load	Settlement	Pressure
	kN	mm	kN/m2
Seating load	0.5	0	0
1	3.5	0.34	49
2	4.3	0.55	61
3	5.2	0.80	74
4	6.5	1.08	92
5	7.6	1.34	107
6	0.0	0.89	0

Settlement/Pressure



Deformation/ Log Time



K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved

Initials: J.P

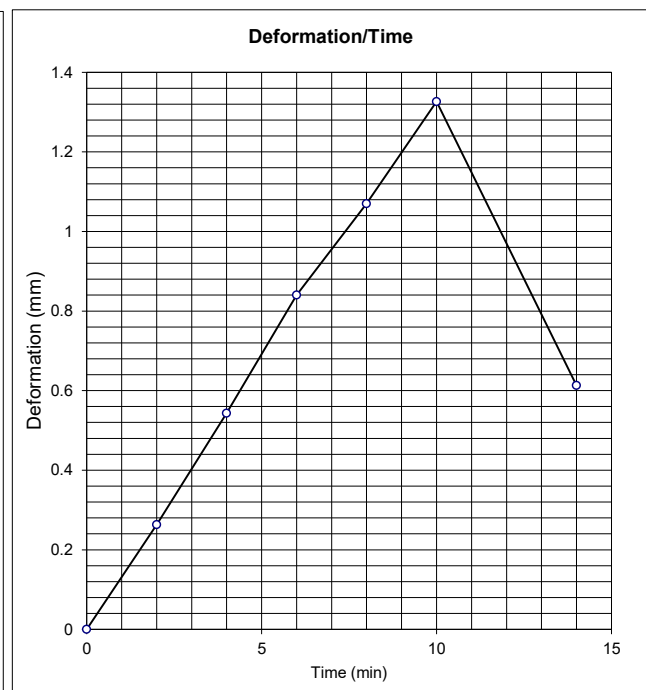
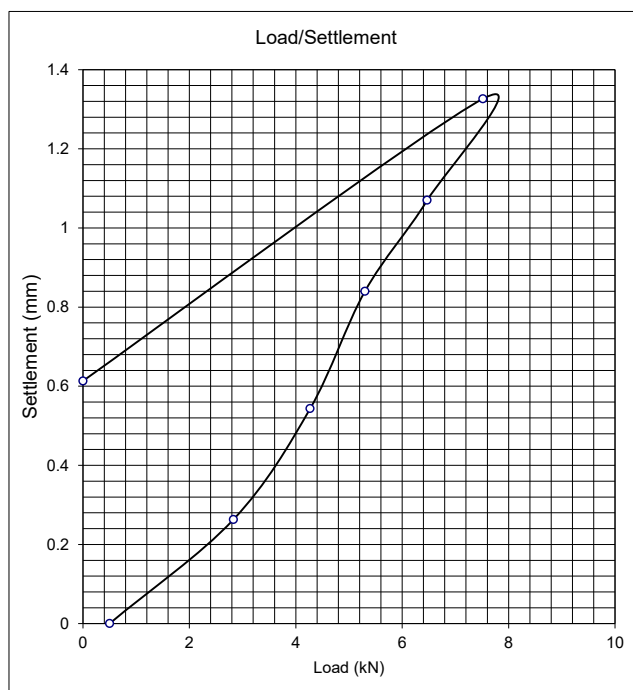
Date: 02/03/2026

	Plate Bearing		Job Ref	38525	
			Position No:	PL/CBR4	
Site Name:	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS		Depth m	0.40	
Project No:	-	Client	Soils Limited	Date tested:	18/02/2026
Soil Description:	Brown slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)		Reported	02/03/2026	
			Plate Diameter	300 mm	
Test Method	BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)				

NOTE: The report shall not be reproduced except in full without authority of the laboratory. These results only apply to the locations tested.

Sample Information		Test Data	
Environmental conditions	Overcast/Light rain	Loading procedure	Incremental
Material Type	-	Description of Reaction load	Tracked Excavator
Temperature (OC):	5	In-situ moisture content %	11
Remarks:			
Equivalent CBR = 4.8% - Modulus Of Subgrade Reaction 36043 kN/m2/m			

Load Increment no:	Load	Cumulative Settlement
	kN	mm
Seating load	0.5	0
1	2.8	0.26
2	4.3	0.54
3	5.3	0.84
4	6.5	1.07
5	7.5	1.33
6	0.0	0.61



	K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com	Checked and Approved Initials: J.P. Date: 02/03/2026	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) IAN 73/06 Revision 1, 2009 (Draft HD25) - Standard withdrawn	Page 1 of 2	MSF-5-R9 (Rev.0)
	2519		



Plate Bearing

Job Ref 38525

Position No: PL/CBR4

Site Name: Sarum Academy, Westwood Rd, Salisbury, SP2 9HS

Depth m 0.40

Project No: - Client Soils Limited

Date tested: 18/02/2026

Soil Description: Brown slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)

Reported 02/03/2026

Plate Diameter 300 mm

Test Method BS1377 Part 9 : 1990 : 4.1 & IAN 73/06 Revision 1, 2009 (Draft HD25)

Sample Information

Environmental conditions Overcast/Light rain

Material Type -

Temperature (OC): 5

Test Data

Loading procedure Incremental

Description of Reaction load Tracked Excavator

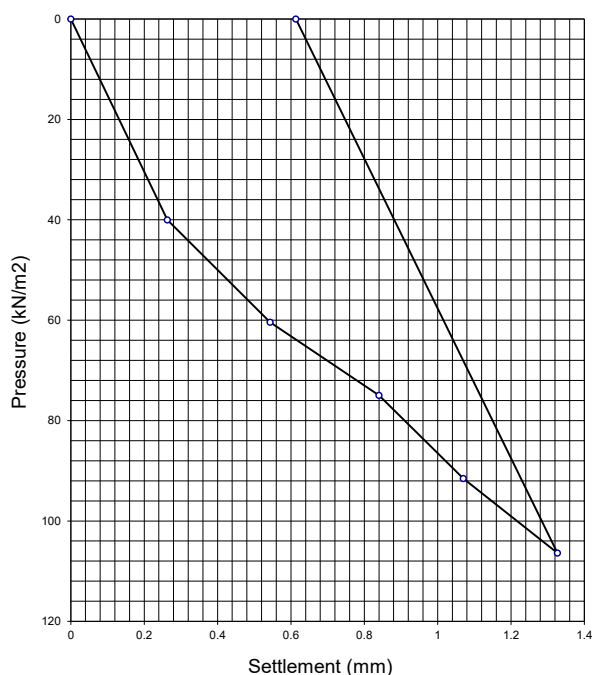
Insitu moisture content % 11

Remarks:

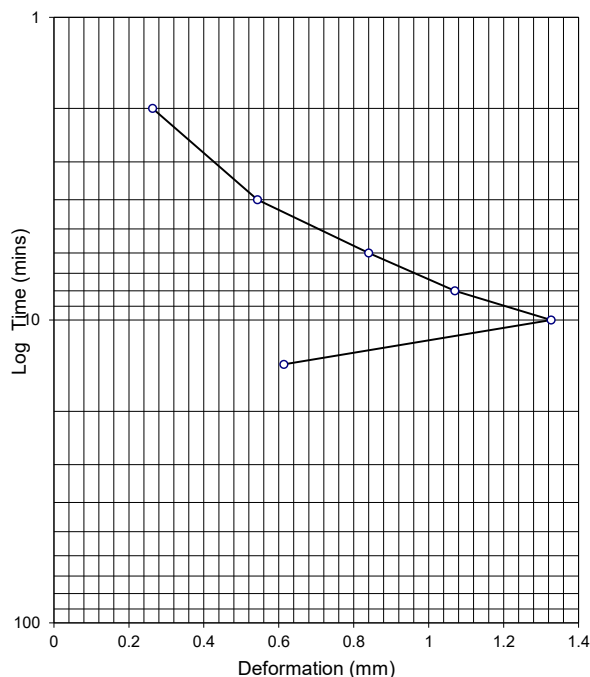
Equivalent CBR = 4.8% - Modulus Of Subgrade Reaction 36043 kN/m²/m

Load Increment no:	Load	Settlement	Pressure
	kN	mm	kN/m ²
Seating load	0.5	0	0
1	2.8	0.26	40
2	4.3	0.54	60
3	5.3	0.84	75
4	6.5	1.07	92
5	7.5	1.33	106
6	0.0	0.61	0

Settlement/Pressure



Deformation/ Log Time



K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/03/2026

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) IAN 73/06 Revision 1, 2009 (Draft HD25) - Standard withdrawn

Page 2 of 2

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Laboratory Report



Contract Number: 83500

Client Ref: **22247**
Client PO: **22247/AS**

Date Received: **22-12-2025**
Date Completed: **20-01-2026**
Report Date: **20-01-2026**

Client: **Soils Limited**

This report has been checked and approved by:

Contract Title: **Sarum Academy, Westwood Rd, Salisbury, SP2 9HS**
For the attention of: **Alex Stratford**


Shaun Jones
Laboratory manager

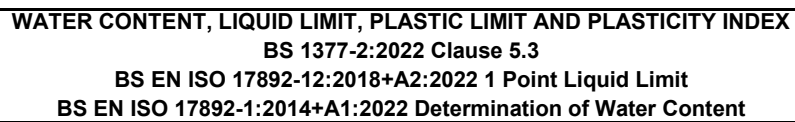
Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - * UKAS	3
1 point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	3
Saturated Moisture Content of chalk (SMC) BS 1377:1990 - Part 2 : 3.3 - * UKAS	2

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Business Support Co-ordinator) - Darren Bourne (Quality Senior Technician) - Jason Jenkins (Business Development Manager)
Luke Williams (Senior Laboratory Technician) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Vince Williams (Site Technician)
Wayne Honey (HR & HSE Manager)

[illegible]

Operator
Clayton. J

Saturation Moisture Content of Chalk
BS 1377 : Part 2 : 1990 Section 3.3

Contract Number	83500	
Project Name	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS	
Date Tested	23.12/25	

[illegible]

Key	Reported As	Clause
-----	-------------	--------

Moisture Content	%	3.2
Bulk Density	Mg/m ³	7.2
Dry Density	Mg/m ³	7.2
SMC	%	3.3.6

If there is a NON-STANDARD in the remarks next to the reported SMC result this means there was no lump of chalk of sufficient volume (300mL-500mL) present in the samples received to meet the testing requirements of the stated standard.

Operator
Julian Jones



Laboratory Report



Contract Number: 83958

Client Ref: **22247**

Client PO: **22247/AS**

Date Received: **19-01-2026**

Date Completed: **23-01-2026**

Report Date: **23-01-2026**

Client: **Soils Limited**

This report has been checked and approved by:

Contract Title: **Sarum Academy, Westwood Rd, Salisbury, SP2 9HS**

For the attention of: **Alex Stratford**

Darren Bourne
Quality Senior Technician

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - * UKAS	2
1 point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	2
Saturated Moisture Content of chalk (SMC) BS 1377:1990 - Part 2 : 3.3 - * UKAS	3

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

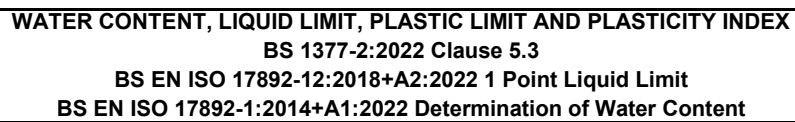
- denotes test carried out by approved contractor

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Approved Signatories:

Brendan Evans (Business Support Co-ordinator) - Darren Bourne (Quality Senior Technician) - Jason Jenkins (Business Development Manager)
Luke Williams (Senior Laboratory Technician) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Vince Williams (Site Technician)
Wayne Honey (HR & HSE Manager)

[illegible]



Laboratory Report



Contract Number: 84895

Client Ref: **22247**

Client PO: **22247/AS**

Date Received: **25-02-2026**

Date Completed: **06-03-2026**

Report Date: **06-03-2026**

Client: **Soils Limited**

This report has been checked and approved by:

Contract Title: **Sarum Academy, Westwood Rd, Salisbury, SP2 9HS**

For the attention of: **Alex Stratford**

Richard John
Quality/Technical Manager

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - * UKAS	3
1 point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	3
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	1
Saturated Moisture Content of chalk (SMC) BS 1377:1990 - Part 2 : 3.3 - * UKAS	2

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

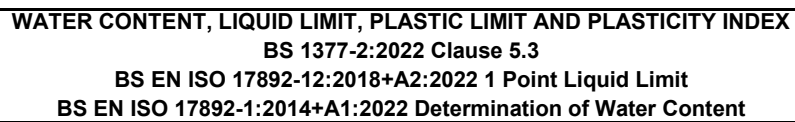
- denotes test carried out by approved contractor

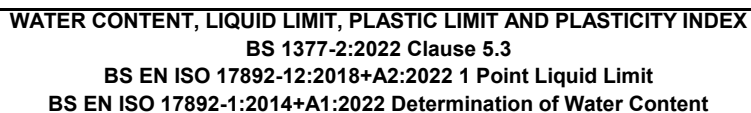
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Business Support Co-ordinator) - Darren Bourne (Quality Senior Technician) - Jason Jenkins (Business Development Manager)
Luke Williams (Senior Laboratory Technician) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Vince Williams (Site Technician)
Wayne Honey (HR & HSE Manager)

[illegible]



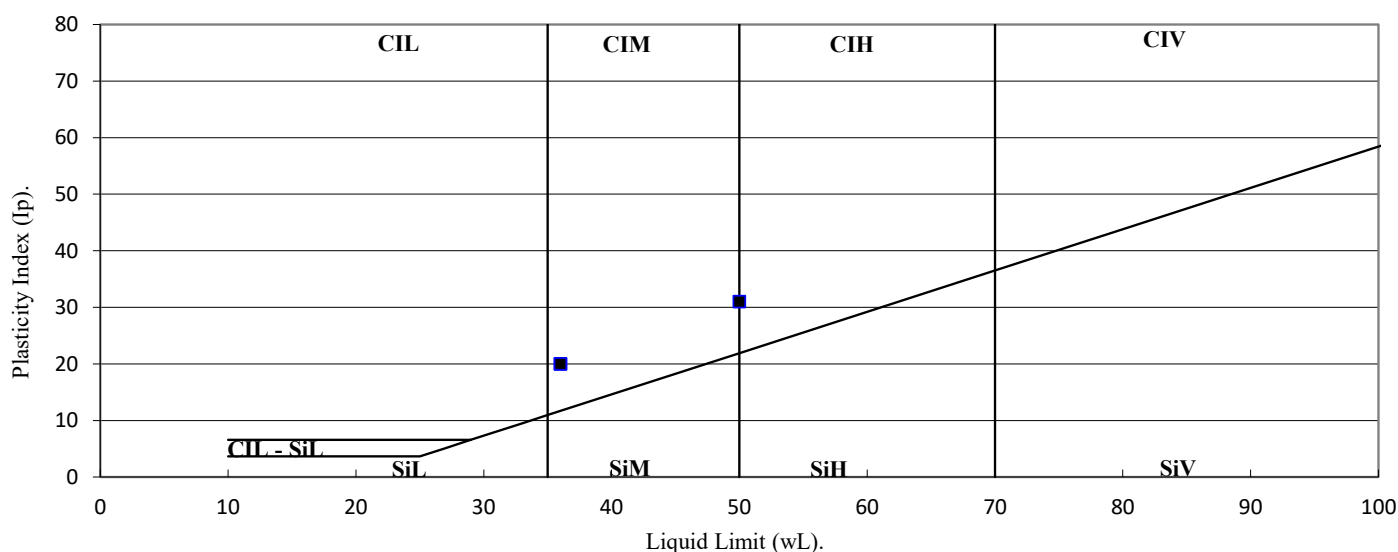
Contract Number	84895	
Project Name	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS	
Date Tested	05/03/2026	
Test Comments	80g/30° Fall cone used	

[illegible]

SYMBOLS : NP = Non Plastic

PLASTICITY CHART

BS EN ISO 14688-2:2018 Clause 4.4



*For sample descriptions please see sample descriptions sheet

Operator
Cameron E.

PARTICLE SIZE DISTRIBUTION
BS 1377-2:2022 Clause 10 &
BS EN ISO 17892-4:2016
Wet Sieve, Clause 5.2

Contract Number

84895

Borehole/Pit No.

TP101

Project Name

Sarum Academy, Westwood Rd, Salisbury, SP2 9HS

Sample No.

Sample Description

Brown/white fine to coarse sandy silty/clayey fine to coarse GRAVEL
(with tar)

Depth Top

2.20

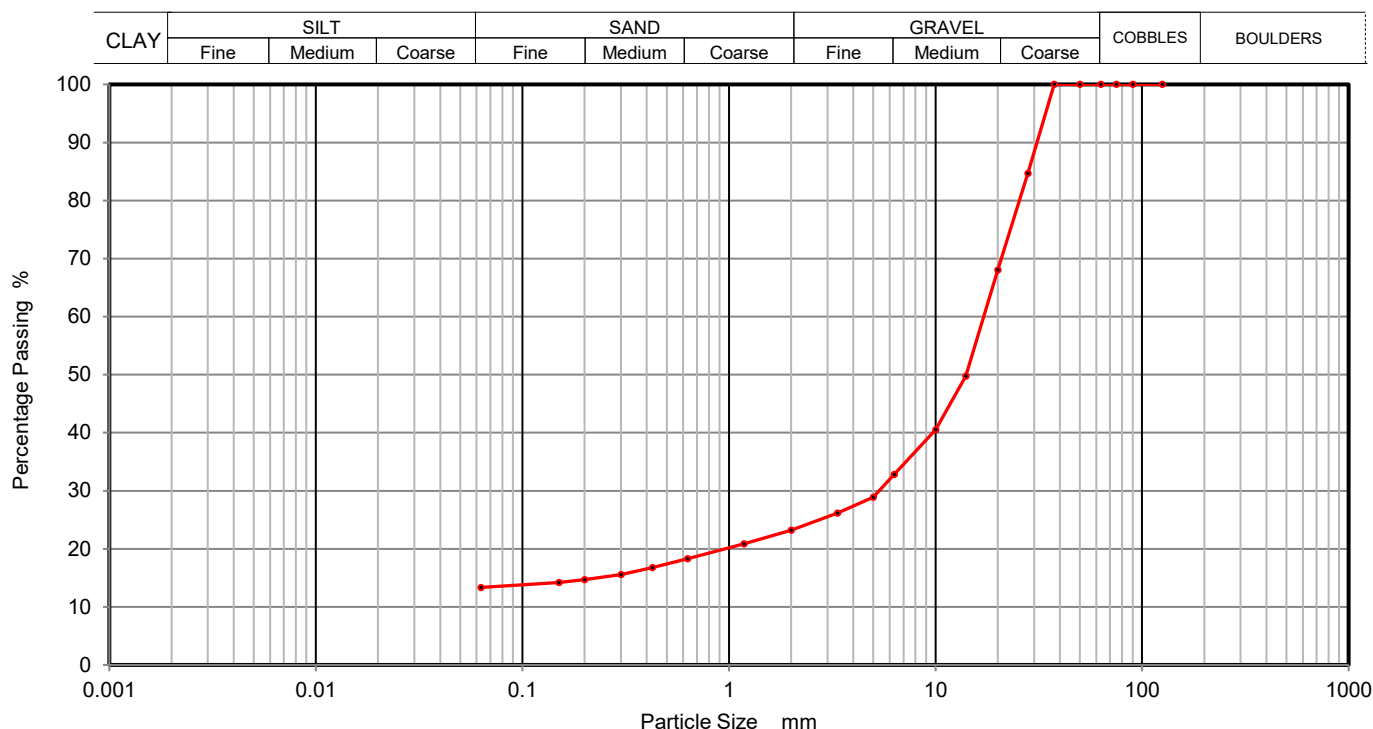
Depth Base

Date Tested

03/03/2026

Sample Type

D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	85		
20	68		
14	50		
10	41		
6.3	33		
5	29		
3.35	26		
2	23		
1.18	21		
0.63	18		
0.425	17		
0.30	16		
0.20	15		
0.15	14		
0.063	13		

Sample Proportions	% dry mass
Cobbles	0
Gravel	77
Sand	10
Silt and Clay	13

Grading Analysis	
Uniformity Coefficient	N/A

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator

Corey J.

Saturation Moisture Content of Chalk
BS 1377 : Part 2 : 1990 Section 3.3

Contract Number	84895	
Project Name	Sarum Academy, Westwood Rd, Salisbury, SP2 9HS	
Date Tested	27/02/2026	

[illegible]

Key	Reported As	Clause
-----	-------------	--------

Moisture Content	%	3.2
Bulk Density	Mg/m ³	7.2
Dry Density	Mg/m ³	7.2
SMC	%	3.3.6

If there is a NON-STANDARD in the remarks next to the reported SMC result this means there was no lump of chalk of sufficient volume (300mL-500mL) present in the samples received to meet the testing requirements of the stated standard.

Operator
Emyr A.

Certificate of Analysis

Certificate Number 25-29654

Issued: 07-Jan-26

Client Soils Limited
Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Our Reference 25-29654

Client Reference ~ 22247

Order No ~ 22247/AS

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Description 3 Soil samples.

Date Received 18-Dec-25

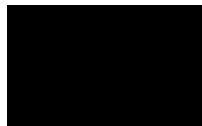
Date Started 18-Dec-25

Date Completed 07-Jan-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Reyhan Irfan
Operations Manager



2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis Soil Samples

Our Ref 25-29654

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2617514	2617515	2617516
Sample ID ~	TTP4	TTP2	TTP5
Depth ~	1.40	0.45	0.90
Other ID ~			
Sample Type ~	SOIL	SOIL	SOIL
Sampling Date ~	10/12/2025	10/12/2025	10/12/2025
Sampling Time ~	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Magnesium Aqueous Extract (2:1)	DETSC 2076*	10	mg/l	< 10	< 10	12
Inorganics						
pH	DETSC 2008#		pH	8.4	8.4	8.1
Ammoniacal Nitrogen as NH ₄	DETSC 2119*	0.5	mg/kg	< 0.50	< 0.50	4.2
Chloride Aqueous Extract (2:1)	DETSC 2055	1	mg/l	14	8.3	3.8
Nitrite as NO ₂	DETSC 2055	1	mg/kg	< 1.0	< 1.0	< 1.0
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	45	23	130
Sulphur as S, Total	DETSC 2320	0.01	%	0.02	0.01	0.02
Sulphate as SO ₄ , Total	DETSC 2321#	100	mg/kg	627	774	138

Information in Support of the Analytical Results

Our Ref 25-29654
 Client Ref ~ 22247
 Contract ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2617514	TTP4 1.40 SOIL	10/12/25	PT 1L	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2617515	TTP2 0.45 SOIL	10/12/25	PT 1L	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
2617516	TTP5 0.90 SOIL	10/12/25	PT 1L	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results
 * -not accredited.
 # -MCERTS (accreditation only applies if report carries the MCERTS logo).
 \$ -subcontracted.
 n/s -not supplied.
 I/S -insufficient sample.
 U/S -unsuitable sample.
 t/f -to follow.
 nd -not detected.

End of Report Ver 25.10.03

Certificate of Analysis

Certificate Number 26-00647

Issued: 22-Jan-26

Client Soils Limited
Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Our Reference 26-00647

Client Reference ~ 22247

Order No ~ 22247/AS

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Description 2 Soil samples.

Date Received 14-Jan-26

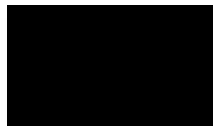
Date Started 14-Jan-26

Date Completed 22-Jan-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Louise Cook
Contracts Manager



Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis

Soil Samples

Our Ref 26-00647

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2624785	2624786
Sample ID ~	CH1	CH1
Depth ~	4.70	10.50
Other ID ~		
Sample Type ~	SOIL	SOIL
Sampling Date ~	12/01/2026	12/01/2026
Sampling Time ~	n/s	n/s

Test	Method	LOD	Units		
Metals					
Magnesium Aqueous Extract (2:1)	DETSC 2076*	10	mg/l	< 10	< 10
Inorganics					
pH	DETSC 2008#		pH	8.8	9.1
Ammoniacal Nitrogen as NH ₄	DETSC 2119*	0.5	mg/kg	1.8	1.8
Chloride Aqueous Extract (2:1)	DETSC 2055	1	mg/l	40	4.5
Nitrite as NO ₂	DETSC 2055	1	mg/kg	< 1.0	1.1
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	37	37
Sulphur as S, Total	DETSC 2320	0.01	%	< 0.01	0.02
Sulphate as SO ₄ , Total	DETSC 2321#	100	mg/kg	426	471

Information in Support of the Analytical Results

Our Ref 26-00647
 Client Ref ~ 22247
 Contract ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date		Containers Received	Holding time exceeded for tests	Incorrect container for tests
		Sampled ~				
2624785	CH1 4.70 SOIL	12/01/26		GJ 250ml, GJ 30ml, PT 1L		
2624786	CH1 10.50 SOIL	12/01/26		GJ 250ml, GJ 30ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub
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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

- ~ Sample details are provided by the client and can affect the validity of the results
- * -not accredited.
- # -MCERTS (accreditation only applies if report carries the MCERTS logo).
- \$ -subcontracted.
- n/s -not supplied.
- I/S -insufficient sample.
- U/S -unsuitable sample.
- t/f -to follow.
- nd -not detected.

End of Report Ver 25.10.03

Certificate of Analysis

Certificate Number 26-04450

Issued: 09-Mar-26

Client Soils Limited
Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Our Reference 26-04450

Client Reference ~ 22247

Order No ~ 22247/AS

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Description 5 Soil samples.

Date Received 25-Feb-26

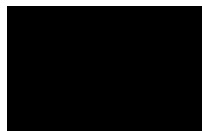
Date Started 25-Feb-26

Date Completed 09-Mar-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 26-04450

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2646752	2646753	2646754	2646755	2646756
Sample ID ~	TTP7	TP101	TP104	CH2	CH2
Depth ~	1.20	0.90	2.20	2.00	14.00
Other ID ~					
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Metals								
Magnesium Aqueous Extract (2:1)	DETSC 2076*	10	mg/l	< 10	< 10	< 10	< 10	< 10
Inorganics								
pH	DETSC 2008#		pH	8.7	8.1	7.3	8.1	8.8
Ammoniacal Nitrogen as NH4	DETSC 2119*	0.5	mg/kg	7.9	9.7	16	9.0	9.9
Chloride Aqueous Extract (2:1)	DETSC 2055	1	mg/l	1500	2.8	7.2	2.9	12
Nitrite as NO2	DETSC 2055	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	31	20	54	38	17
Sulphur as S, Total	DETSC 2320	0.01	%	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	185	< 100	202	136	394

Information in Support of the Analytical Results

Our Ref 26-04450

Client Ref ~ 22247

Contract ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2646752	TTP7 1.20 SOIL	24/02/26	PT 1L		
2646753	TP101 0.90 SOIL	24/02/26	PT 1L		
2646754	TP104 2.20 SOIL	24/02/26	PT 1L		
2646755	CH2 2.00 SOIL	24/02/26	GJ 250ml, PT 1L		
2646756	CH2 14.00 SOIL	24/02/26	GJ 250ml, PT 1L		

Key: P-Plastic T-Tub G-Glass J-Jar

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve

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Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

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* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

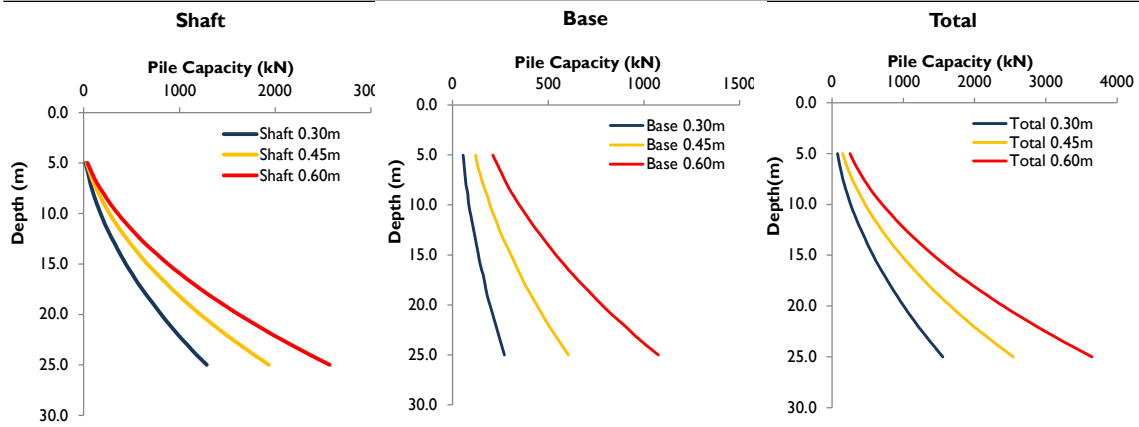
nd -not detected.

End of Report Ver 25.10.03

Appendix D Foundation Design

Appendix D.1 Preliminary Pile Design CHI

Preliminary Pile Working Loads								
Single Vertically Loaded Pile (kN)								
Name:	Sarum Acade	Chalk Density	14	Pile Start Depth:	4	FOS		
						Shaft	Base	
							Above GWL	Below GWL
Job No:	22247	Depth of GW (m):	30	Pile Final Depth:	25			
Date:	21.1.26			Pile Increment:	1	2.5	2.5	5
Notes:								



Pile Diameter (m):									
Pile Depths (m bgl)	0.30			0.45			0.60		
	Shaft	Base	Total	Shaft	Base	Total	Shaft	Base	Total
4.0									
5.0	20	55	75	30	120	150	40	210	250
6.0	45	60	105	65	130	195	85	235	320
7.0	70	65	135	105	145	250	140	260	400
8.0	100	70	170	155	160	315	205	285	490
9.0	135	80	215	210	180	390	275	315	590
10.0	175	85	260	270	195	465	355	350	705
11.0	220	95	315	335	215	550	445	385	830
12.0	270	105	375	410	235	645	540	420	960
13.0	325	115	440	490	255	745	645	460	1105
14.0	380	125	505	575	280	855	760	500	1260
15.0	440	135	575	665	305	970	880	540	1420
16.0	505	145	650	765	330	1095	1010	585	1595
17.0	575	160	735	870	355	1225	1150	630	1780
18.0	650	170	820	980	380	1360	1300	680	1980
19.0	730	180	910	1095	410	1505	1455	730	2185
20.0	810	195	1005	1220	440	1660	1620	780	2400
21.0	895	210	1105	1350	470	1820	1795	835	2630
22.0	985	225	1210	1485	500	1985	1975	895	2870
23.0	1080	240	1320	1630	535	2165	2165	950	3115
24.0	1180	255	1435	1780	570	2350	2365	1010	3375
25.0	1285	270	1555	1935	605	2540	2570	1075	3645

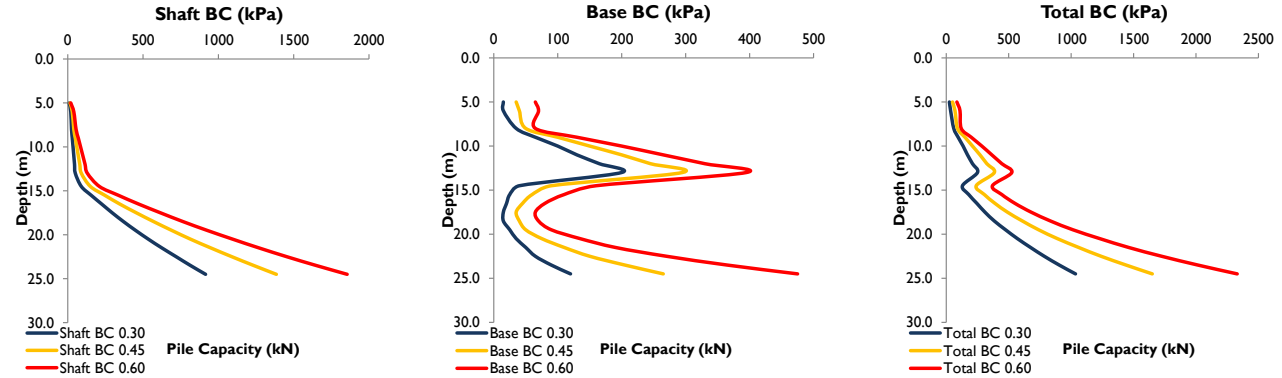
Appendix D.2 Preliminary Pile Design CH2

Preliminary Pile Working Loads

Single Vertically Loaded Pile (kN)

Parameters:	FOS:	Shaft	Base	Alpha Value (α):	0.45	Maximum no. of layers	3
Name: AS	Clay:	3	3	GW Level: 30	NC Value:	9	
Job No: 22247	Chalk:	2.5	2.5		Specific Chalk Density:	14	
Date: 9.3.26	Gravel:	3	3		Depth to top of strata:	7	

Notes:



Pile Diameter (m):

Pile Depths		0.3			0.45			0.6			Layer
Material	(m bgl)	Shaft	Base	Total	Shaft	Base	Total	Shaft	Base	Total	
Clay	5.0	10	15	25	15	35	50	20	65	85	1
Clay	6.0	20	15	35	30	40	70	40	70	110	1
Gravel	8.0	25	35	60	40	50	90	55	65	120	2
Gravel	9.0	30	65	95	50	100	150	70	130	200	2
Gravel	10.0	35	100	135	60	150	210	85	200	285	2
Gravel	11.0	40	130	170	70	200	270	100	265	365	2
Gravel	12.0	45	165	210	80	245	325	115	330	445	2
Gravel	13.0	50	200	250	90	295	385	130	395	525	2
Chalk	14.5	90	40	130	150	90	240	210	160	370	3
Chalk	15.5	155	25	180	245	60	305	335	110	445	3
Chalk	16.5	225	20	245	345	45	390	470	80	550	3
Chalk	17.5	295	15	310	455	35	490	615	65	680	3
Chalk	18.5	370	15	385	570	40	610	765	70	835	3
Chalk	19.5	450	25	475	690	50	740	925	90	1015	3
Chalk	20.5	535	35	570	815	75	890	1095	135	1230	3
Chalk	21.5	625	50	675	950	110	1060	1270	190	1460	3
Chalk	22.5	720	65	785	1090	150	1240	1455	270	1725	3
Chalk	23.5	815	90	905	1235	205	1440	1650	365	2015	3
Chalk	24.5	915	120	1035	1385	265	1650	1855	475	2330	3

Appendix E Chemical Laboratory Analyses

Appendix E.1 Chemical Laboratory Results

Certificate of Analysis

Certificate Number 25-29834

Issued: 12-Jan-26

Client Soils Limited
Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Our Reference 25-29834

Client Reference ~ 22247

Order No ~ 22247/AS

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Description 8 Soil samples.

Date Received 19-Dec-25

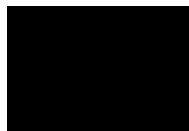
Date Started 19-Dec-25

Date Completed 12-Jan-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Reyhan Irfan
Operations Manager



2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2619037	2619038	2619039	2619040	2619041	2619042
Sample ID ~	TTP1	TTP2	TTP4	TTP5	TTP6	CH1
Depth ~	0.60	0.10	0.50	0.10	0.30	0.20
Other ID ~						
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	11/12/2025	10/12/2025	10/12/2025	11/12/2025	11/12/2025	15/12/2025
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%		0.002				
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	8.5	7.1	6.5	5.1	6.7	10
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.5	0.8	0.4	0.5	0.4	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.1	0.3	0.2	0.3	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	15	11	14	8.9	14	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	11	13	7.7	11	9.7	9.5
Lead	DETSC 2301#	0.3	mg/kg	28	27	19	27	23	16
Mercury	DETSC 2325#	0.05	mg/kg	0.06	< 0.05	0.07	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	11	7.4	8.8	5.8	9.9	10
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	23	27	19	17	22	25
Zinc	DETSC 2301#	1	mg/kg	68	51	44	46	48	54
Inorganics									
pH	DETSC 2008#		pH	8.6	8.4	8.5	8.1	8.9	8.4
Organic matter	DETSC 2002#	0.1	%	1.0	3.5	0.8	3.9	1.2	2.4
Petroleum Hydrocarbons									
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	32	< 10
EPH (C21-C36)	DETSC 3311	10	mg/kg	120	< 10	< 10	< 10	93	< 10
EPH (C36-C40)	DETSC 3311	10	mg/kg	16	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311#	10	mg/kg	150	< 10	< 10	< 10	150	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.48	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.34	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	5.4	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	1.8	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.08	0.04	0.03	0.06	12	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.08	0.03	0.03	0.06	11	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	0.04	5.5	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.05	< 0.03	< 0.03	0.05	5.2	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.03	0.04	0.08	4.9	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.11	1.7	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	0.05	3.0	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	0.03	0.05	1.3	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.39	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	0.03	0.05	1.3	< 0.03

Summary of Chemical Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2619037	2619038	2619039	2619040	2619041	2619042
Sample ID ~	TTP1	TTP2	TTP4	TTP5	TTP6	CH1
Depth ~	0.60	0.10	0.50	0.10	0.30	0.20
Other ID ~						
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	11/12/2025	10/12/2025	10/12/2025	11/12/2025	11/12/2025	15/12/2025
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.49	< 0.10	< 0.10	0.55	55	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.7	< 0.3	0.5	< 0.3	0.5

Summary of Chemical Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2619043	2619044
Sample ID ~	STP2	STP3
Depth ~	0.90	0.10
Other ID ~		
Sample Type ~	SOIL	SOIL
Sampling Date ~	16/12/2025	16/12/2025
Sampling Time ~	n/s	n/s

Test	Method	LOD	Units		
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	6.8	6.4
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.6	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	14	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	8.0	11
Lead	DETSC 2301#	0.3	mg/kg	18	29
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	8.9	8.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	22	18
Zinc	DETSC 2301#	1	mg/kg	37	47
Inorganics					
pH	DETSC 2008#		pH	8.8	8.7
Organic matter	DETSC 2002#	0.1	%	0.6	2.8
Petroleum Hydrocarbons					
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10
EPH (C21-C36)	DETSC 3311	10	mg/kg	< 10	< 10
EPH (C36-C40)	DETSC 3311	10	mg/kg	< 10	< 10
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	0.06
Pyrene	DETSC 3303#	0.03	mg/kg	0.08	0.06
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.04
Chrysene	DETSC 3303	0.03	mg/kg	0.05	0.05
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	0.06
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.05	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04

Summary of Chemical Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2619043	2619044
Sample ID ~	STP2	STP3
Depth ~	0.90	0.10
Other ID ~		
Sample Type ~	SOIL	SOIL
Sampling Date ~	16/12/2025	16/12/2025
Sampling Time ~	n/s	n/s

Test	Method	LOD	Units		
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.34	0.36
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.7

Summary of Asbestos Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2619037	TTP1 0.60	SOIL	NAD	none	Keith Wilson
2619038	TTP2 0.10	SOIL	Chrysotile	Bundles of Chrysotile fibres	Keith Wilson
2619039	TTP4 0.50	SOIL	NAD	none	Keith Wilson
2619040	TTP5 0.10	SOIL	NAD	none	Keith Wilson
2619041	TTP6 0.30	SOIL	NAD	none	Keith Wilson
2619042	CH1 0.20	SOIL	NAD	none	Keith Wilson
2619043	STP2 0.90	SOIL	NAD	none	Keith Wilson
2619044	STP3 0.10	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 25-29834

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2619038
Sample ID ~	TTP2
Depth ~	0.10
Other ID ~	
Sample Type ~	
Sampling Date ~	10/12/2025
Sampling Time ~	

Test	Method	LOQ	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	0.002
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	0.002
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na

Breakdown of Gravimetric Analysis (a)

Mass of Sample			g	115.79
ACMs present*			type	
Mass of ACM in sample			g	
% ACM by mass			%	
% asbestos in ACM			%	
% asbestos in sample			%	

Breakdown of Detailed Gravimetric Analysis (b)

% Amphibole bundles in sample			Mass %	na
% Chrysotile bundles in sample			Mass %	0.002

Breakdown of PCOM Analysis (c)

% Amphibole fibres in sample			Mass %	na
% Chrysotile fibres in sample			Mass %	na

Breakdown of Potentially Respirable Fibre Analysis (d)

Amphibole fibres			Fibres/g	na
Chrysotile fibres			Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Information in Support of the Analytical Results

Our Ref 25-29834

Client Ref ~ 22247

Contract ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date		Containers Received	Holding time exceeded for tests	Incorrect container for tests
		Sampled ~				
2619037	TTP1 0.60 SOIL	11/12/25		GJ 250ml, GJ 30ml, PT 1L	pH + Conductivity (7 days)	
2619038	TTP2 0.10 SOIL	10/12/25		GJ 250ml, GJ 30ml, PT 1L	pH + Conductivity (7 days)	
2619039	TTP4 0.50 SOIL	10/12/25		GJ 250ml, GJ 30ml, PT 1L	pH + Conductivity (7 days)	
2619040	TTP5 0.10 SOIL	11/12/25		GJ 250ml, GJ 30ml, PT 1L	pH + Conductivity (7 days)	
2619041	TTP6 0.30 SOIL	11/12/25		GJ 250ml, GJ 30ml, PT 1L	pH + Conductivity (7 days)	
2619042	CH1 0.20 SOIL	15/12/25		GJ 250ml, GJ 30ml, PT 1L		
2619043	STP2 0.90 SOIL	16/12/25		GJ 250ml, GJ 30ml, PT 1L		
2619044	STP3 0.10 SOIL	16/12/25		GJ 250ml, GJ 30ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report Ver 25.10.03

Certificate of Analysis

Certificate Number 26-04453

Issued: 09-Mar-26

Client Soils Limited
Thomas Telford House
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Our Reference 26-04453

Client Reference ~ 22247

Order No ~ 22247/AS

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Description 7 Soil samples.

Date Received 25-Feb-26

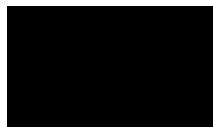
Date Started 25-Feb-26

Date Completed 09-Mar-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 26-04453

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2646763	2646764	2646765	2646766	2646767	2646768	2646769
Sample ID ~	TTP7	STP1	TP101	TP102	TP103	TP104	CH2
Depth ~	0.20	0.50-0.80	0.50	0.10	0.30	0.10	0.30
Other ID ~							
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	5.1	8.3	3.5	8.5	6.0	14	6.0
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	0.4	< 0.2	0.3	0.3	0.5	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.2	0.6	0.3	0.2	0.2	0.4
Chromium	DETSC 2301#	0.15	mg/kg	9.6	20	3.2	12	12	18	8.8
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	16	14	5.2	17	14	14	7.3
Lead	DETSC 2301#	0.3	mg/kg	160	25	29	47	17	27	22
Mercury	DETSC 2325#	0.05	mg/kg	0.08	0.15	< 0.05	0.09	< 0.05	0.14	0.06
Nickel	DETSC 2301#	1	mg/kg	6.6	15	4.4	7.8	7.8	11	5.8
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	15	24	5.2	20	17	47	14
Zinc	DETSC 2301#	1	mg/kg	53	53	55	76	39	58	52
Inorganics										
pH	DETSC 2008#		pH	9.7	8.9	9.3	8.7	10.1	8.7	9.1
Organic matter	DETSC 2002#	0.1	%	3.6	0.9	1.4	4.3	0.9	4.1	0.8
Petroleum Hydrocarbons										
VPH (C6-C10): HS_1D_Total	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
EPH (C10-C12): EH_1D_Total	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C12-C16): EH_1D_Total	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C16-C21): EH_1D_Total	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C21-C36): EH_1D_Total	DETSC 3311	10	mg/kg	140	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C36-C40): EH_1D_Total	DETSC 3311	10	mg/kg	62	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40): EH_1D_Total	DETSC 3311#	10	mg/kg	210	< 10	< 10	< 10	< 10	< 10	< 10
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.26
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	0.04	< 0.03	< 0.03	0.23
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	0.04	< 0.03	< 0.03	0.18
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	0.05
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	1.0

Summary of Chemical Analysis

Soil Samples

Our Ref 26-04453

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	2646763	2646764	2646765	2646766	2646767	2646768	2646769
Sample ID ~	TTP7	STP1	TP101	TP102	TP103	TP104	CH2
Depth ~	0.20	0.50-0.80	0.50	0.10	0.30	0.10	0.30
Other ID ~							
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026	24/02/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units
Phenols			
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg

1.8	< 0.3	< 0.3	< 0.3	< 0.3	0.9	< 0.3
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Summary of Asbestos Analysis Soil Samples

Our Ref 26-04453

Client Ref ~ 22247

Contract Title ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2646763	TTP7 0.20	SOIL	NAD	none	Jason Barsby
2646764	STP1 0.50-0.80	SOIL	NAD	none	Jason Barsby
2646765	TP101 0.50	SOIL	NAD	none	Jason Barsby
2646766	TP102 0.10	SOIL	NAD	none	Jason Barsby
2646767	TP103 0.30	SOIL	NAD	none	Jason Barsby
2646768	TP104 0.10	SOIL	NAD	none	Jason Barsby
2646769	CH2 0.30	SOIL	NAD	none	Jason Barsby

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 26-04453
 Client Ref ~ 22247
 Contract ~ Sarum Academy, Westwood Rd, Salisbury SP2 9HS

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2646763	TTP7 0.20 SOIL	24/02/26	GJ 250ml, PT 1L		
2646764	STP1 0.50-0.80 SOIL	24/02/26	GJ 250ml, PT 1L		
2646765	TP101 0.50 SOIL	24/02/26	GJ 250ml, PT 1L		
2646766	TP102 0.10 SOIL	24/02/26	GJ 250ml, PT 1L		
2646767	TP103 0.30 SOIL	24/02/26	GJ 250ml, PT 1L		
2646768	TP104 0.10 SOIL	24/02/26	GJ 250ml, PT 1L		
2646769	CH2 0.30 SOIL	24/02/26	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
VPH (C6-C10)	HS_1D_Total
EPH (C10-C12)	EH_1D_Total
EPH (C12-C16)	EH_1D_Total
EPH (C16-C21)	EH_1D_Total
EPH (C21-C36)	EH_1D_Total
EPH (C36-C40)	EH_1D_Total
EPH (C10-C40)	EH_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report Ver 25.10.03

Appendix E.2 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land was initially defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2, and retained in the Environment Act 2021, ref 1.3, as;

‘Land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

- (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) pollution of controlled waters is being, or is likely to be, caused.’

The UK guidance on the assessment of contaminated land has developed as a direct result of the introduction of these Acts. The technical guidance supporting the original legislation was summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs). These have since been replaced or superseded by Land Contamination Risk Management (LCRM) 2021, ref 1.4 produced and administrated by the Environment Agency online through the .GOV.uk website <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> .

However, the basic definitions, methodology and guidance remain essentially the same utilizing the UK Contaminated Land Exposure Assessment Models (CLEA) as within the original CLR and planning guidance it replaces or supersedes.

In establishing whether a site fulfils the statutory definition of ‘contaminated land’ it remains necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the identified receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A ‘pollutant linkage’ may therefore be defined as the confirmation of a link between a contaminant ‘source’ and a vulnerable at risk ‘receptor’ by means of a ‘pathway’ and that the risk is potentially significant. If there is no complete linkage, risk defaults to low to negligible and can never be potentially significant.

Assessment Methodology

A four-stage assessment process is followed for identifying potential pollutant linkages on a site. These stages are summarised in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable in the context of existing and future proposals.

Stages 1 and 2 develop an initial '*conceptual model*' based upon information collated from desk-based available and existing site information and a walkover of the site as recommended in BS10175 and LCRM. The formation of any conceptual model is an iterative process and as such it should be updated and refined throughout each phase of the project to reflect any additional information obtained and unknowns being resolved and identify the potential contaminants of concern at the site, i.e. those with the potential to cause significant harm to identified receptors.

The extent of the desk studies and enquiries to be conducted should be in general accordance with BS10175 and other UK guidance to produce an initial conceptual model highlighting the known potential risks, remaining unknowns and contaminants of concern. The information from these enquiries is presented in a desk study or preliminary report with recommendations, if necessary, for further work based upon the conceptual model findings and any identified or unresolved unknowns.

If potential pollutant linkages or potentially significant unknowns are identified within the initial conceptual model, further site investigation and report will be recommended and usually required under planning. Such investigation should be based on and driven by the findings of the initial conceptual model and planned in general accordance with BS10175, LCRM and other current UK guidance where relevant. The number of exploratory holes and samples collected for analysis should be consistent with the size, extent and nature of the site, the identified contaminants of concern and the level of initial risk identified in the initial conceptual model. This will enable a contamination risk assessment to be conducted in accordance with current UK requirements, at which point the conceptual model can be updated and any relevant pollutant linkages can be further quantified and any remaining unknowns resolved. As previously this is an iterative process that may highlight or require additional investigation to resolve to the satisfaction of the regulator.

A two-stage investigation process may therefore be more appropriate where time constraints are less of an issue with the first intrusive investigation being conducted as an initial or screening assessment to confirm or validate the presence of potential sources on site identified in the initial conceptual model and to investigate if additional unknown sources not previously identified are present. This helps to define the scope, extent and requirements of a second more refined and targeted investigation to delineate wherever possible the extent of the identified contamination, contaminants of concern and/or remaining unknowns.

All site works should be undertaken in general accordance with the British Standards BS 10175, ref. 5, for environmental only investigations and BS 5930:2015, ref. 1.6, in the case of combined Geoenvironmental and/or Geotechnical investigations.

The results of analysis are compared initially against generic guidance values which are dependent on the proposed end-use of the development and which must ultimately be based on traceable, scientifically valid and justified exposure and chemical data using the UKCLEA methodology.

The end-use and therefore potential exposure pathways may be defined as one of the following under current UK guidance;

- Residential with homegrown produce i.e. typical low rise and low-density housing with gardens where vegetables and fruits may be grown for home consumption.
- Residential without homegrown produce i.e. low-density housing where no gardens are present where vegetables and fruits could be grown for home consumption.
- Allotments – i.e. areas where vegetables and fruits are grown for home consumption but are not specifically associated with a residential property.
- Public open space residential – i.e. grassed areas adjacent and/or directly related to high density housing and other common or communal open areas on which underlying soils could be exposed but on which vegetables and fruits are not grown for consumption.
- Public open space – i.e. areas such as parks, playing fields and other recreational areas to which public access is possible but otherwise to which there is no direct residential linkage.
- Commercial – i.e. industrial premises where there is limited exposure to soil and residents are not present on site.

Standard Land-use Scenarios

The standard land-use scenarios used to develop exposure models are further detailed in the following sections:

Residential with homegrown produce

Generic scenario assumes a house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

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- Critical receptor is assumed to be a young female child (zero to six years old)
 - Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
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A sub-set of the Residential land-use is **Residential without Homegrown produce**. The generic scenario assumes low density housing with communal landscaped gardens where the consumption of homegrown vegetables will not occur and the pathways of direct ingestion and produce inputs are suitably moderated.

Allotments

Areas of open space commonly made available to local users but remote from residential properties, but on which tenants may grow fruit and vegetables for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make only occasional accompanied visits.

Although some allotment holders may choose to keep animals on allotments, potential exposure to animal products is not currently considered within the CLEA model.

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- Critical receptor is a young female child (zero to six years old)
 - Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours but at reduced exposure levels reflecting non-residential status.
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Commercial

This generic scenario assumes a typical commercial or light industrial property at which employees spend most time indoors and are involved in office-based or relatively light physical work.

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- Critical receptor is a working female adult (aged 16 to 65 years old).
 - Exposure duration is over working lifetime
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours but exposure reduced to reflect non-residential nature and general lack of open spaces.
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Public Open Space within Residential Area

This generic scenario refers to any grassed area up to 0.05 ha that is associated with residential properties but is not for their exclusive use and on which no fruit or vegetables are grown for home consumption.

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- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil which can be interacted with directly
 - Predominantly used by children for play and/or access
 - Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
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- older children chosen as the critical receptor on basis that they will use site most frequently (age class 4-9 years)
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- ingestion rate assumed to be 75 mg.day⁻¹
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Public Open Space Park

This generic scenario refers to any public park or grassed space that is more than 0.5ha in area:

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- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% assumed cover)
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- Female child age classes 1-6
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- Soil ingestion rate of 50 mg.day⁻¹
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- Occupancy period outdoors = 2 hours.day⁻¹
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- Exposure frequency of 170 days.year⁻¹ for age classes 2-18 and 85 days.year⁻¹ for age class 1
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- Outdoor exposure pathways only (no tracking back of soils).
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Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC) generated using the CLEA model based on the exposure and land use scenario assumptions noted above.

GAC's are deliberately conservative values adopted to ensure that they are applicable to the majority of possible contaminated sites and below which there is considered a low to negligible risk to identified human health receptors, i.e. there can be no harm. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC's derived by a competent third party or the Environment Agency / DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC's to ensure that they are used appropriately.

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses or the contaminant is susceptible to wide variation depending on factors such as form and bioavailability, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific or remediation values for relevant soil contaminants based on site and contaminant specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL), refs 1.8 and 1.9, as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3) ref 1.7 used in the generation of SGVs. C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern. Where a C4SL has been published, Soils Limited has adopted them as GAC for these six substances.

For all other substances the soils will be compared to Suitable For Use Levels (S4ULs) published by LQM, ref. 1.10, which were developed for around 85 substances and are

intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants.

Where no S4UL or C4SL is available, assessment criteria may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.11, Toxicological and physico-chemical/fate and transport data used to generate the criteria has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs (DEFRA) documents;
2. Other documents produced by UK Government or state organisations;
3. European institution documents;
4. International organisation documents;
5. Foreign government institutions.

In the case of the majority of contaminants considered, the toxicological data has been drawn originally from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), where available. Where no TOX report is available reference has been made to appropriately determined health criteria values, derived from the above-noted hierarchy, as this is considered to represent appropriate peer reviewed data sources. Similarly, fate and transport data should also be determined by reference to appropriate sources and the CLEA model assumptions.

Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 1.12. Individual concentrations are then compared to the selected guideline values to identify and isolate concentrations of contaminants that are in excess of the selected screening low or no risk criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, further risk evaluation needs to be undertaken often as a site specific DQRA in line with current guidance to determine and confirm if the identified exceedances are significant in the context of the proposed development or activity.

References

- 1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.
- 1.2 Environment Act 1995, Section 57, DoE 1995.
- 1.3 Environment Act 2021 OEP 2021.
- 1.4 Land Contamination Risk Management Gov.UK (EA) 2021
- 1.5 BS 10175: 2011+A2:2017 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2017
- 1.6 BS 5930: 2015+A1:2020 '*Code of practice for ground investigations*', British Standards Institute, 2015
- 1.7 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008
- 1.8 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.
- 1.9 Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*', Revision 2, DEFRA research project SP1010.
- 1.10 The LQM/S4ULs for Human Health Risk Assessment, Nathanail P, McCaffery C, Gillett A, Ogden R, and Nathanail J, Land Quality Press, Nottingham, published 2015.
- 1.11 CLEA '*Software Version 1.071*' (downloaded from the CL:AIRE website , <https://www.claire.co.uk/home/news/44-risk-assessment/178-soil-guideline-values>)
- 1.12 CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE), May 2008.

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5							6	1	2.5	6	1	2.5				6
Type	Contaminants	Species	Year																					
Metals	Antimony		2010					550						7500							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010	
	Arsenic		2014			37		40			49			640		79		168			C4SL	DEFRA	2014	
			2015			37		40			40			640		79		170			S4UL	LQM/CIEH	2015	
	Barium		2010					1300						22000							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010	
	Beryllium		2015			1.7		1.7			35			12		2.2		63			S4UL	LQM/CIEH	2015	
	Boron		2015			290		11000			45			240000		21000		46000			S4UL	LQM/CIEH	2015	
	Cadmium		2015			11		85			1.9			190		120		532			S4UL	LQM/CIEH	2015	
	Chromium	III	2014			26		149			4.9			410		220		880			C4SL	DEFRA	2014	
			2015			910		910			18000		8600		1500		33000			S4UL	LQM/CIEH	2015		
			2014			21		21			170		49		23		250			C4SL	DEFRA	2014		
		VI	2015			6		6			1.8			33		7.7		220			S4UL	LQM/CIEH	2015	
	Copper		2015			2400		7100			520			68000		12000		44000			S4UL	LQM/CIEH	2015	
	Lead		2014*			82-210		130-310			30-84			1100-6000		270-760		580-1400			C4SL	DEFRA	2014	
	Mercury	Elemental	2012			1.0		1.0			26			26								210	DEFRA	2012
			2015			1.2		1.2			21			58		16		30			S4UL	LQM/CIEH	2015	
		Inorganic	2012			170		170			80			36000							SGV	DEFRA	2012	
			2015			40		56			19			1100		120		240			S4UL	LQM/CIEH	2015	
		Methyl	2012			11		11			8			410								SGV	DEFRA	2012
			2015			11		15			6			320		40		68			S4UL	LQM/CIEH	2015	
	Molybdenum		2010					670						17000							EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010	
	Nickel		2012			130		130			230			1800								SGV	DEFRA	2012
			2015			130		180			53			980		230		800			S4UL	LQM/CIEH	2015	
	Selenium		2012			350		595			120			13000								SGV	DEFRA	2012
			2015			250		430			88			12000		1100		1800			S4UL	LQM/CIEH	2015	
	Vanadium		2015			410		1200			91			9000		2000		5000			S4UL	LQM/CIEH	2015	
	Zinc		2015			3700		40000			620			730000		81000		170000			S4UL	LQM/CIEH	2015	
BTEX & MTBE	Benzene	2012			0.33		0.33			0.07			95								SGV	DEFRA	2012	
		2014			0.87		3.3			0.18			98		140		230				C4SL	DEFRA	2014	
		2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015	
	Toluene	2012			610		610			120			4400								SGV	DEFRA	2012	
		2015	130	290	660	880	1900	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015	
	Ethylbenzene	2012			350		350			90			2800								SGV	DEFRA	2012	
		2015	47	110	260	83	190	440	16	39	91	5700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015	
	Xylenes	o-xylene	2012			250		250			160			2600								SGV	DEFRA	2012
			2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015
		m-xylene	2012			240		240			180			3500								SGV	DEFRA	2012
	2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015		
	p-xylene	2012			230		230			160			3200								SGV	DEFRA	2012	
		2015	56	130	310	79	180	430	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015	
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6	2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	5900	12000	S4UL	LQM/CIEH	2015	
	Aliphatic >C6 - C8	2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	17000	40000	S4UL	LQM/CIEH	2015	
	Aliphatic >C8 - C10	2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	4800	11000	S4UL	LQM/CIEH	2015	
	Aliphatic >C10 - C12	2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	47000	S4UL	LQM/CIEH	2015	
	Aliphatic >C12 - C16	2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	82000	90000	S4UL	LQM/CIEH	2015	
	Aliphatic >C16 - C35	2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	170000	180000	S4UL	LQM/CIEH	2015	
	Aliphatic >C35 - C44	2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	170000	180000	S4UL	LQM/CIEH	2015	
	Aromatic >C5 - C7	2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015	
Aromatic >C7 - C8	2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015		

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			SOM	1.0	2.5	6	1	2.5							6	1	2.5	6	1	2.5				6
Type	Contaminants	Species	Year																					
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9200	S4UL	LQM/CIEH	2015
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	28000	28000	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH' s) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	29000	29000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	29000	29000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10		21	C4SL	DEFRA	2014	
			2015	2.2	2.7	3	3.2	3.2	3.2	0.79	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar (Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene (PCE)		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015
			2021	0.31	0.7	1.6	0.32	0.71	1.6	2	4.8	11	24	55	130	3200	3300	3400	1400	1900	2500	C4SL	CLAIRE	2021
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene (TCE)		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
			2021	0.0093	0.02	0.043	0.0097	0.02	0.045	0.032	0.072	0.16	0.73	1.5	3.4	76	78	79	41	54	69	C4SL	CLAIRE	2021
	Trichloromethane (Chloroform)		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (Cloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
			2021	0.0064	0.01	0.017	0.015	0.019	0.029	0.0017	0.0031	0.0058	1.1	1.4	2.2	7.8	7.8	7.8	18	19	19	C4SL	CLAIRE	2021
Explosives	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015
Pesticides	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170										

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)											Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential						Park					
			home-grown produce			home-grown produce									1			2.5			6					1
Type	Contaminants	Species	Year	SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6				
Chlorobenzenes	Chlorobenzene		2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300	2000	2900	S4UL	LQM/CIEH	2015		
	1,2-Dichlorobenzene		2015	23	55	130	24	57	130	94	230	540	2000	4800	11000	90000	95000	98000	24000	36000	51000	S4UL	LQM/CIEH	2015		
	1,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015		
	1,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	4400	10000	25000	17000	17000	1700	36000	36000	36000	S4UL	LQM/CIEH	2015		
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770	1100	1600	S4UL	LQM/CIEH	2015		
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700	2600	4000	S4UL	LQM/CIEH	2015		
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380	580	860	S4UL	LQM/CIEH	2015		
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600	S4UL	LQM/CIEH	2015		
	1,2,3,5,- Tetrachlobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015		
	1,2,4, 5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015		
	Pentachlrobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	640	770	830	100	100	100	190	190	190	S4UL	LQM/CIEH	2015		
	Hexachlorobenzene		2015	1.8	3.3	4.9	4.1	5.7	6.7	0.47	1.1	2.5	110	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015		
Phenols & Chlorophenols	Phenols		2012	420			420			280			3200									SGV	DEFRA	2012		
			2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015		
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015		
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015		
Others	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015		
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015		
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012	8			8			8			240									SGV	DEFRA	2012		
NOTE																										
	Priority	Guideline (mg kg ⁻¹)																								
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																								
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014 and 2021) * Use upper range value for Lead unless otherwise indicated																								
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																								
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail et al, 2015)																								
For Generic Risk Assessment, the values in Bold should have priority unless site specific, Client or regulatory requirements dictate otherwise – which must be justified																										
Table reviewed January 2024																										

Appendix F CPT Report

SALISBURY

SOIL INVESTIGATION

CPT REPORT

**Cone penetration testing
Parameter derivation**

Project Reference.: 25-32-30578-1

Report Issue No.: 01 30578_01

PROJECT:	Salisbury
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CLIENT:	Soils Limited
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FIELDWORK

CPT rig(s)	20.5-tonne track-truck mounted CPT unit (UK3)
Date fieldwork started	9 th December 2025
Date fieldwork completed	12 th December 2025
Lankelma's representative	Paul Dimelow
Client's representative	Alex Stratford

DOCUMENT CHECKING

Action	Date	Name
Completed	19/12/2025	Christopher Player
Checked	22/12/2025	Joseph Hobbs
Approved	22/12/2025	Joseph Hobbs

Issue	Date	Status
01_01	22/12/2025	Final

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1 INTRODUCTION

At the request of Soils Limited, a soils investigation was carried out on project *Salisbury*.

Site location:

(In the general region of)

Sarum Academy
Westwood Road
Salisbury
SP2 9HS

2 DISCLAIMER

The information contained in this report and all other associated reporting deliverables supplied in digital data files and AGS format data files referenced within this report (collectively "Report") are for the sole benefit of Lankelma's client ("Client") identified at the front of this report.

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3 GLOSSARY OF SYMBOLS, TERMS AND ABBREIATIONS

SYMBOLS (excluding base units)

B_q	Pore pressure ratio. The net pore pressure normalized with respect to the net cone resistance: $B_q = (u_2 - u_0) / (q_t - \sigma_v)$
c_{vh}	Coefficient of consolidation. Subscript vh indicates some combination of horizontal and vertical flow when assessed from CPTu dissipation tests.
d	Cone diameter
E	Young's modulus (generic, E' and E_u apply to drained and undrained deformation conditions respectively)
F_r	Normalised friction sleeve resistance: $F_r = f_s / (q_c - \sigma_v)$
f_s	Friction sleeve resistance: The total frictional force acting on the friction sleeve, F_s , divided by its surface area A_s : $f_s = F_s / A_s$
g	Gravitational field strength: $g = 9.81 \text{ N kg}^{-1}$

G	Shear modulus (generic, G_0 applies to small strain conditions, G_u applies to undrained shear (G at existing effective stress) and $G_{\%}$ applies to stress at variable % mobilised yield stress (e.g. G_{50}))
s	Specific gravity of solids
I_c & I_{SBT}	Soil Behaviour Type Index: Continuous numerical representations of Robertson soil behaviour type classification charts. I_c and I_{SBT} apply to the Robertson (1990) and Robertson and Cabal (2010) classification charts respectively. Soil Behaviour Type Index: Continuous numerical representation of Robertson & Cabal (2010) soil behaviour type classification chart based on dimensionless parameters.
I_R	Rigidity Index: Ratio of shear modulus to undrained shear strength, $I_R = G_u/s_u$
k	Coefficient of permeability with units of velocity
m_v	Coefficient of compressibility: $m_v = 1/M'$
m'	Pre-consolidation (yield) stress exponent (section 0).
M'	Constrained modulus
q_c	Cone resistance: The total force, Q_c , acting on the cone, divided by the projected area of the cone, A_c : $q_c = Q_c/A_c$
Q_t	Normalised cone resistance (method 1): $Q_t = (q_c - \sigma_v)/\sigma'_v$
Q_{tn}	Normalised cone resistance where normalisation varies with soil type. See section 6.4.
q_t	Corrected tip resistance: The cone tip resistance q_c corrected for pore water pressure effects on the cone shoulder
q_{t-net}	Net cone resistance: $q_{t-net} = q_t - \sigma_v$. Where q_t is unavailable q_c is applied
q_{t1}	Normalised cone resistance (method 2): $q_{t1} = (q_t)/(\sigma'_v)^{0.5}$
Dr	Relative density (percentage)
R_f	Friction ratio: The ratio, expressed as a percentage, of the sleeve friction, f_s , to the cone resistance, q_c : $R_f = (f_s/q_c) \cdot 100$
r	Radius
s_u	Undrained shear strength (generic)
t	Time
T	Time factor relating to a given degree of consolidation.
u_0	Equilibrium pore pressure
u_2	Measured pore pressure: Dynamic pore pressure measured at the shoulder position (u_2) during penetration and dissipation tests. $u_2 = \Delta u_2 + u_0$
Δu_2	Excess (or differential) pore pressure: $\Delta u_2 = u_2 - u_0$
v	Penetration velocity
V_s, V_p	Shear wave velocity, V_s , and pressure wave velocity, V_p . Measured with use of a seismic receiver
V	Normalised penetration velocity. $V = vd/c_{vh}$.
<u>Greek</u>	
γ	Unit weight of soil
γ_w	Unit weight of water
ρ	Volumetric mass density (or specific mass) of soil: $\rho = \gamma/g$
σ_v	Total overburden stress
σ'_v	Effective overburden stress
σ_{atm}, P_a	Reference atmospheric stress: $\sigma_{atm} = 101.3$ kPa

TERMS AND ABBREVIATIONS

Cone or 'tip': The conical tip of the cone penetrometer. This is sometimes referred to as the 'point' in other literature

CPT: Cone penetration test

CPTu: Cone penetration test using a penetrometer with pore pressure measurement (piezocone).

Friction sleeve: The section of the cone penetrometer upon which the sleeve friction is measured, located behind the conical tip.

HOC: Heavily overconsolidated

LOC: Lightly overconsolidated

mBGL: Meters below ground level

NC: Normally consolidated

OC: Overconsolidated

Penetration length: CPT test length without correction for inclination

Piezocone: A cone penetrometer with a pore pressure sensor (u_2 or u_1 position).

Seismic cone: A cone penetrometer with a seismic receiver incorporated.

Dynamic pore pressure: The pore pressure measured during penetration (u_2 or u_1)

Soil behaviour type, or 'SBT': A classified soil type according to a classification system based on CPT or CPTu measurements.

Rod string: The series of hollow tube push rods that transmit thrust force to the penetrometer.

Zero value(s) or baseline value(s): The analogue or digital output of a sensor (or set of sensors) with no load applied.

4 COMPLETED WORKS

- 12 nr. cone penetration tests with pore pressure measurement (CPTu)
- Factual report including point data interpretation of selected parameters

Appendix A contains tabulated details of the works completed together with analysis results where applicable.

5 FIELDWORK GENERAL

Fieldwork was performed with a 20.5-tonne track-truck mounted CPT unit (UK3) equipped with a 17.0-tonne capacity hydraulic ram set.

The Client was responsible for the positioning and re-survey of all investigative locations.

The target depth for the investigation was 25 m below ground level. Table 3 details the final test depths and reasons for test termination (*refusal factor*). Where required, each penetration refusal decision was verbally confirmed with the Client's on-site representative.

6 CONE PENETRATION TESTS

Cone penetration testing was carried out in general accordance with BS ISO 22476-1:2022.

Penetrometer measurements included cone tip resistance, friction sleeve resistance and dynamic pore water pressure sampled at a 10 mm resolution.

Penetrometers were calibrated in accordance with BS ISO 22476-1:2022 within 9 months of the fieldwork completion. Copies of all calibration certificates for the cones used are provided in Appendix B.

The penetrometer used was a 150 kN axial capacity model with digital output (down-hole digitisation) and internal measurement of load cell temperature. The temperature data was used for QA during the test and QC during processing. The test operative aimed to keep the rate of temperature change to less than $0.5^{\circ}/\text{min}$ in low strength soils to maintain acceptable measurement error. The temperature data can be used to assess ground temperature at depths where the cone has paused for more than 20-50 minutes with an accuracy of $\pm 0.5^{\circ}$, depending on the thermal properties of the soil.

The piezometer filter element was HDPE plastic with a nominal filtration of 40 to 60 microns. The filter was vacuum saturated in a $> 99.9\%$ vacuum under 1.5 Pa.s vegetable glycerine oil for > 7 days prior to mobilisation. The cone was vacuum saturated in the disassembled state and assembled under oil prior to each test. The filter position used for each test is indicated in Table 3 CPT summary in Appendix A.

At intervals during the fieldwork, the penetrometer was temperature stabilised in a water bath to obtain stabilised zero load baseline values (after extraction from the water). This was done prior to each test, or approximately every 30 m of testing where the final depths were relatively shallow, when larger zero drifts were observed (non-stabilised), or when changing penetrometer. The purpose of this procedure is to prevent transient temperature effects from influencing the strain gauge sensors, so that representative baseline values may be subtracted from the data collected during penetration - where temperature is controlled, and temperature effects are corrected for based on the magnitude and rate of change in temperature. Additionally, it enables more reliable assessment of long-term shift in the baseline output of the sensors.

Penetrometer dimensional measurements and tolerance checks were obtained using calibrated digital callipers prior to each test, or following each 20-60 m of testing, depending on aggressiveness of ground conditions and closeness of prior measurements to tolerance limits. The tip measurement was based on the largest diameter portion of the tip (comprising the conical part, u_2 pore pressure filter and 'equal end area piece' adjacent to the friction sleeve), while the sleeve measurement was obtained at both ends of the sleeve and averaged for the purpose of determining the surface area.

6.1 CPT DATA REDUCTION AND PRESENTATION

Presentation

The raw CPT results are presented in Appendix C. The cone resistance (q_c or q_t), local side friction (f_s), dynamic pore water pressure (u_2), friction ratio (R_f) and inclination are all presented against depth and elevation in accordance with BS ISO 22476-1:2022 unless otherwise specified.

CPT data and the associated derived geotechnical parameters are included in the 4.0 data file provided.

Derivation of pressure

The cone tip and sleeve force measurements were converted to pressure using the tip and sleeve diameters measured during fieldwork.

Zero load reference values

Zero load reference values were recorded before and after each test, and periodically these were obtained after temperature stabilisation in a water bath to remove the influence of transient temperature effects. When selecting the most representative reference values (for subtraction from the raw data), priority was given to values obtained following temperature stabilisation. Depending on the frequency of stabilisation, the stabilised reference values applied to the raw data may be obtained prior to a previous test, or, following a subsequent test when the average of pre & post stabilised baseline values is applied to the data.

Temperature correction (post-processing algorithmic)

For standard high capacity cones the correction and/or control of temperature effects is critical to the production of results suitable for design purposes, particularly in lower strength fine soils where temperature error can become a large proportion of the measured values.

For tests with load cell temperature measurements the tip and pore pressure measurements were corrected for static and transient temperature effects using parameters obtained from temperature response tests. For each recorded value, the static and transient temperature error components (apparent sensor output due to change in temperature) were subtracted from the reading.

For subtraction type cones incorporating traditional temperature compensation wiring in the strain gauge circuit, the apparent cone tip resistance ($q_{c:a}$) and apparent pore pressure (u_a) due to static and transient temperature effects can be approximated by

$$q_{c:a} = a(\Delta T / \Delta t) + b(\Delta T),$$

$$u_a = b(\Delta T)$$

Where $q_{c:a}$ is the apparent tip resistance, a is the apparent resistance due to unit transient temperature change, and b is the change in apparent resistance per unit static temperature change relative to the temperature of the penetrometer at the time of zero load output measurement.

The temperature corrected tip ($q_{c:c}$), and pore pressure (u_c) are then found from

$$q_{c:c} = q_{c:m} - q_{c:a},$$

$$u_c = u_{:m} - u_{:a}$$

Where subscript ' $:m$ ', denotes the field measured resistance/pressure as recorded in the raw data files.

Notes:

1. Temperature correction of the sleeve data is possible but is often unwarranted as it does not substantially improve accuracy. This is because for subtraction type cones the errors in the sleeve force largely cancel with errors in the tip force when they have the same sign, which is expected when temperature change is the primary source of sensor drift.

2. To avoid confusion the parameter designation is kept unchanged in the logs and AGS data (q_c , q_t , f_s , and u_2) and unless stated otherwise, temperature correction has been applied.
3. The parameters and method applied are the same as those applied in the temperature verification section of the calibration certificate, which shows the uncorrected and corrected response of sensors during plunge tests between water baths of different temperature.

The effectiveness of the correction parameters is verified by the ISO 22476:2022 temperature verification procedure presented in the calibration certificate.

Correction for pore pressure effects

For piezocone tests the total cone resistance (or 'corrected cone resistance'), q_t , was calculated according to the formula

$$q_t = q_c + u_2 (1 - a)$$

Where a is the 'net area ratio' of projected shaft area divided by projected face area, and $1 - a$ is the proportion of cross-sectional area between the cone tip and penetrometer body where pore pressures (positive or negative) can act to add or subtract from the total external axial force on the tip. The difference between measured and corrected values is largest in low strength collapsible soils with large excess pore pressures. The percentage adjustment is described by the curves on the chart below for $a = 0.8$:

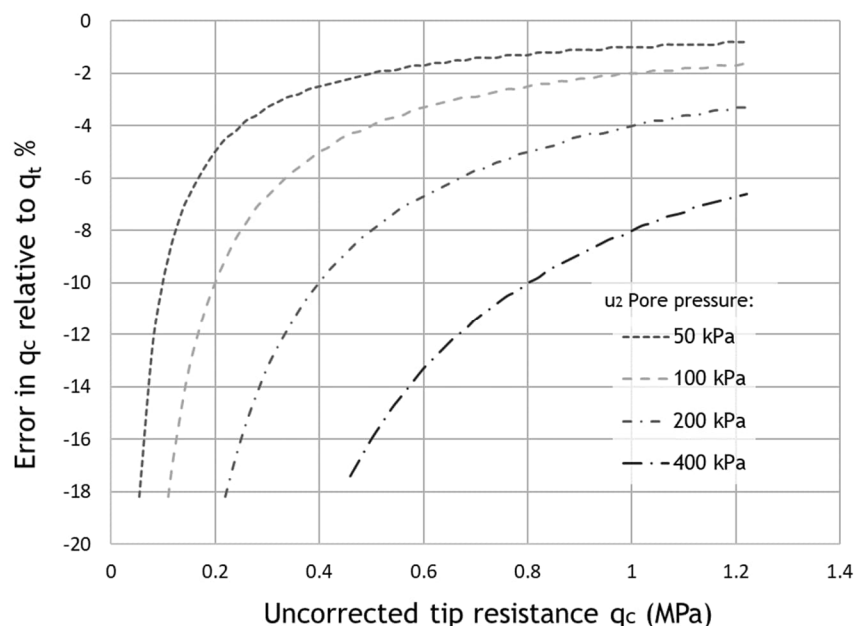


Figure 6-1 Uncorrected tip with % error for various pore pressure values

All penetrometers had equal sleeve end areas and no correction for pore pressure effects was applied to the sleeve readings.

Depth corrections

Penetration length readings were corrected for inclination according to the procedure described in ISO-22476-1:2022. Sleeve readings were depth corrected for the dimensional offset between cone tip and sleeve and an additional 'effective' offset between the sleeve and focal point of bearing resistance within the soil below the conical tip.

Spike/ artefact removal and resampling

Rod spikes (artefacts of the pause for push rod addition) were filtered from the cone tip and sleeve data and replaced with an interpolated value.

The data was re-sampled from 10 mm resolution to 20 mm to reduce the size of the data set to a more manageable size for end users. A 20 mm resolution is within the intrinsic influence zone of the cone tip measurement, and the loss of meaningful resolution is negligible.

Parameter derivation and data deliverables

Raw data plots are presented in Appendix C and include the intermediate interpretation parameters friction ratio, R_f , and pore pressure ratio B_q . For piezocone tests q_t is reported on all logs, and q_c only appears in the digital AGS data.

Geotechnical parameters appropriate for drained and undrained cone penetration conditions are derived for corresponding drained and undrained derived soil behaviour types (SBTs) respectively, however, to account for uncertainty in the SBT correlation with drainage behaviour, all parameters are derived over a range of transitional soils within the range $2.4 < I_c < 2.7$ (see section 6.5). Geotechnical parameter plots are presented in Appendix D onwards.

All raw and derived data are provided in the AGS 4.0 data file delivered alongside this report.

6.2 IN-SITU STRESS CONDITIONS

An estimate of the equilibrium pore pressure and total and effective vertical stress states is required for derivation of net and normalised readings required for interpretation of most soil parameters obtained from the CPT and dissipation test.

The total vertical stress with depth was calculated as the sum of the unit weight values derived for each shallower depth increment:

$$\sigma_{v0} = \sum_{i=1}^n \gamma_i h_i$$

Where γ_i is the soil unit weight (kN/m^3) derived over the depth increment h_i (m).

See section 6.3 for information on the applied empirical estimate of soil unit weight.

An arbitrary phreatic surface of 3.00 mBGL was applied in the calculation of effective stress.

Note: The term phreatic surface is used here, and it is assumed that the piezometric level measured by the piezometer, under hydrostatic conditions, coincides with the phreatic surface. The phreatic

surface reported is intended to provide information about pore pressure distribution assumed for calculation purposes and may not represent the true position of the groundwater table or perched water bodies. Complex groundwater pressure distributions will be applied if they are observed from the measurements and are sufficiently well defined.

6.3 SOIL UNIT WEIGHT

The soil unit weight was estimated using the method of Robertson (2010b):

$$\frac{\gamma}{\gamma_w} = 0.27 \log(R_f) + 0.36 (\log(q_t/R_f)) + 1.236$$

Throughout pre-drilled zones (inspection pits or drill-out) the soil was assigned a nominal unit weight of 17 kN/m³.

For depths where the friction sleeve resistance measurement was less than zero due to measurement limitations, the friction sleeve resistance input parameter was substituted with a nominal 1.0 kPa resistance for the purpose of obtaining an approximate soil unit weight necessary for estimation of total vertical stress over the entire test profile.

6.4 SOIL BEHAVIOUR TYPE (SBT)

The data was interpreted using 4 soil behaviour type schemes: Robertson (1990, 2010, 2016) and Schneider et al, 2008. The Robertson (1990) scheme is very widely used and forms the bases of the layer analysis whereby the profile is split into approximate zones of common classification or classification variance. The Robertson (2010 & 2016) and Schneider et al methods are less widely used in general practice but can provide classification that is more relevant to the design problem in many instances, and the reader is directed to the relevant references for additional information.

For all SBT classification systems discussed in this report, it should be noted that:

- The systems provide a general soil type that tends to show biased towards the soil fraction that dominates the mechanical behaviour in relation to the CPT parameters on which the system is based.
- Significant bonding/microstructure will influence derived soil type (Robertson 2022).
- If cohesive soils are dry and/or heavily overconsolidated, the classification tends to shift towards a coarser soil type (or lower I_c index).
- All SBT methods are applicable to saturated or near saturated soils. Performance of SBT systems in dryer soils exhibiting pore fluid suction should receive due scrutiny where applicable.
- While the repeatability and behavioural bias of the SBT is often of practical benefit, the classification may not be an appropriate substitute for classification based on particle size grading and/or consistency (Atterberg indices).

A dedicated SBT comparison log is provided in Appendix D.

Robertson (1990, 2010)

The Robertson 1990 and 2010 SBT classification systems, based on the same chart shown in Figure 6-3, provides 9 classification zones as a function of q_t (or q_c) and f_s .

The 1990 system is based on dimensionless stress normalised parameters of cone resistance (Q_t) and friction ratio (F_r). Where:

$$Q_t = \left(\frac{q_t - \sigma_{v0}}{\sigma'_{v0}} \right)$$

$$F_r = \left(\frac{f_s}{q_t - \sigma_{v0}} \right)$$

Robertson (2009) recommended use of an improved stress normalisation method for tip resistance (Q_{tn}) that uses a stress exponent n that varies with the derived soil type and is found iteratively (starting with Q_t) from:

$$Q_{tn} = \left(\frac{q_t - \sigma_{v0}}{p_a} \right) \cdot \left(\frac{p_a}{\sigma'_{v0}} \right)^n$$

and

$$n = 0.318(I_c) + 0.05 \left(\frac{\sigma'_{v0}}{p_a} \right) - 0.15$$

where I_c is the SBT index discussed in section 6.5, and is continuous function of Q_{tn} and F_r .

Three iterations of Q_{tn} were performed during data processing, with the initial calculation based on an average of the non-normalised and normalised values of I_c for the upper 6 m to limit the effects of overconsolidation at shallow depth.

While the classification based on normalised parameters is more accurate, particularly for NC soils exceeding ~15 m depth, the classification is often significantly in error (artificially granular/drained) at shallow depth (< ~1-3 m). The error at shallow depth is largely associated with the potentially large difference between the estimated vertical effective stress (applied in normalisation of q_t and f_s) and the unknown horizontal stress influencing penetration resistance, especially at high OCR state.

Robertson (2010) proposed a non-normalised version of the 1990 chart which uses dimensionless cone resistance (q_c/Pa) and friction ratio (Rf). SBT classification according to this chart is generally more reliable at shallow depth in Lankelma's experience.

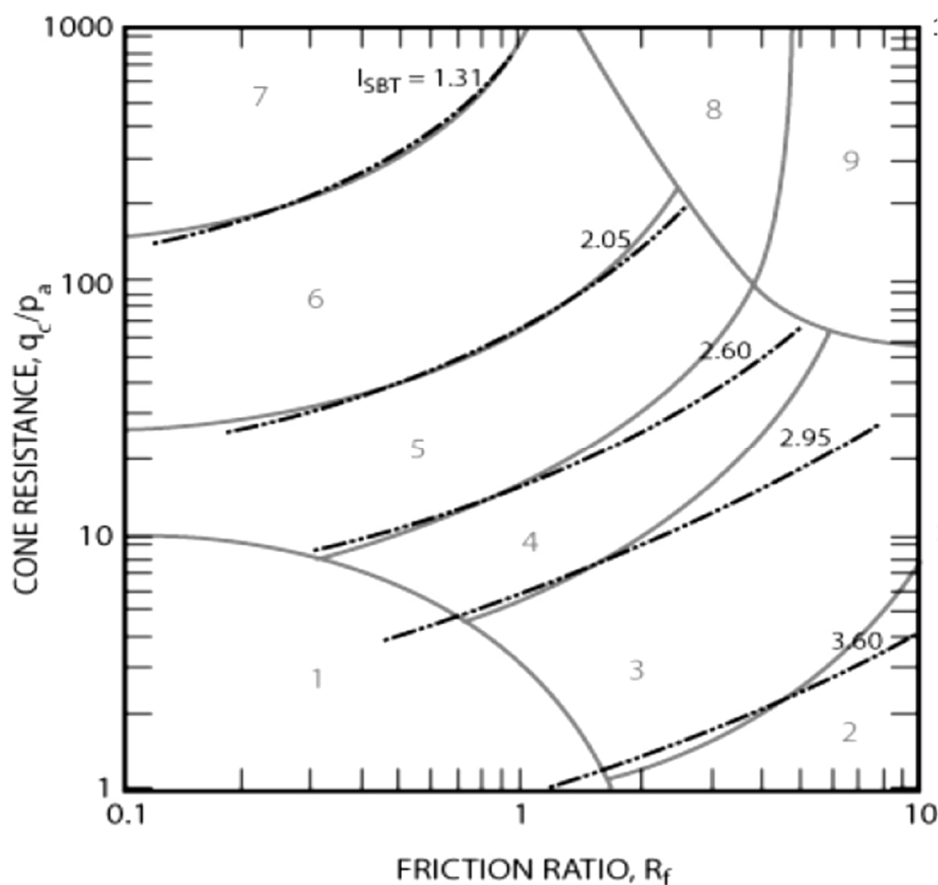


Figure 6-2 Non-normalised SBT chart by Robertson et al. (2010) based on dimensionless cone resistance (q_c/p_a) and friction ratio, R_f , showing contours of SBT index I_{SBT} (denoted I_c on the test plots). The chart is equally applicable to normalised tip resistance (Q_t , Q_{tn}) and normalised friction ratio (F_r) values using the same dimensionless scales.

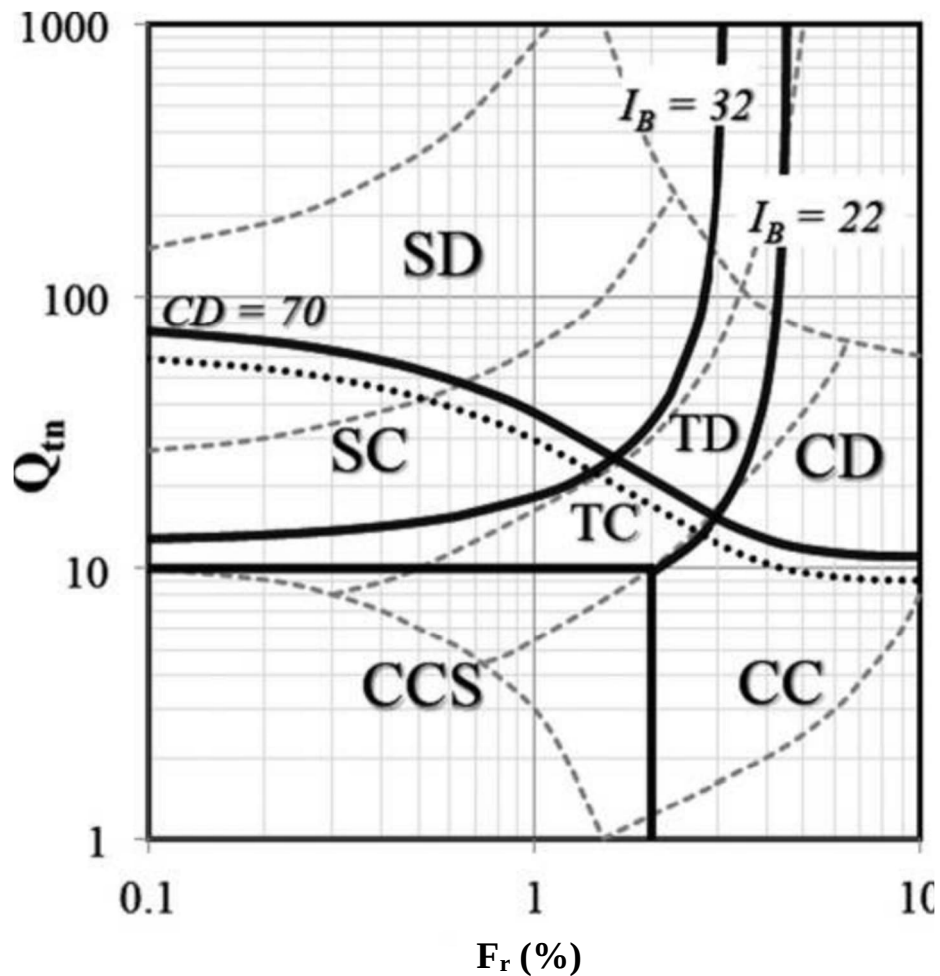
Table 1 Robertson (1990, 2010) soil behaviour type zone descriptions

Zone	Soil Behaviour Type (SBT)	
1	Sensitive fine-grained	6 Sands - clean sand to silty sand
2	Organic soils	7 Gravelly sand to sand
3	Clays – clay to silty clay	8* Very stiff/dense sand to clayey sand ¹
4	Silt mixtures - clayey silt to silty clay	9* Very stiff fine grained ¹
5	Sand mixtures – silty sand to sandy silt	*Heavily overconsolidated or cemented

¹Note zones 8 and 9 appear as 'Very stiff/dense sand to clayey sand - HOC or cemented' and 'Very stiff fine grained - HOC or cemented' within the soil unit descriptions of plots in Appendix D.

Robertson 2016

Using the same Q_{tn} - F_r space as the 1990 and 2010 charts, Robertson (2016) proposed an alternative purely behavioural classification system that places less emphasis on classification according to composition/textural properties and more emphasis on mechanical behaviour - namely the tendency of the soil to dilate or collapse during large strain shear, and sensitivity.



Zone	Soil Behaviour Type (SBT)
CCS	Clay-like – contractive - sensitive
CC	Clay-like – Contractive
CD	Clay-like – Dilative
TC	Transitional - Contractive
TD	Transitional - Dilative
SC	Sand-like - Contractive
SD	Sand-like - Dilative

Figure 6-3 Robertson 2016 soil behaviour type classification chart and zone descriptions

Schneider *et al.* (2008)

Schneider *et al.* (2008) proposed a classification system based on the normalised pore pressure B_q and normalised tip resistance Q_t . This system is particularly useful for fully saturated soils with a repeatable and dynamic pore pressure response.

A set of logs showing both the Robertson and Schneider *et al.* classification results are provided for comparison in Appendix D.

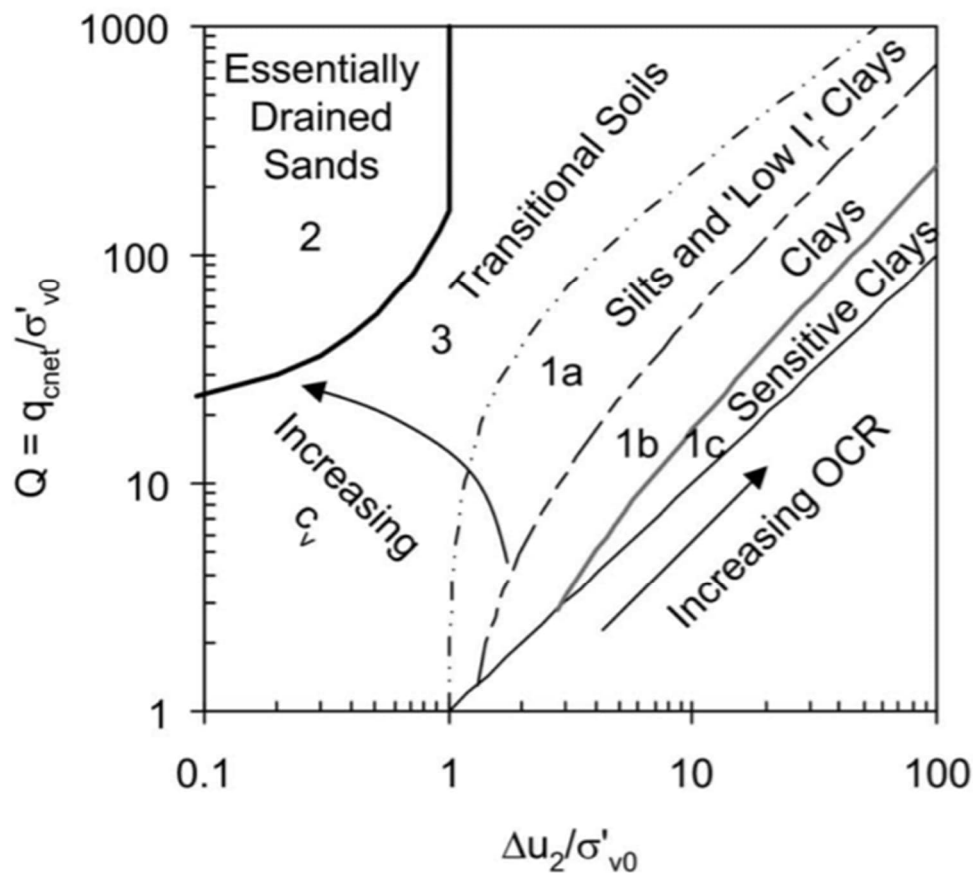


Figure 6-4 Schneider 2008 soil behaviour type classification chart

Layer Analysis

The layer boundaries were manually interpreted based on broad changes in Robertson's (1990) SBT classification and variation with depth. Once the layer boundaries had been defined, the SBT zones within each layer were listed with the corresponding percentage of valid data points (excluding null/filtered data). The modal classification was reported in full, while secondary zones were provided with abbreviated descriptions. For example: 'Clays – clay to silty clay [74%]; Silt mixtures [20%]', where the asterisk indicates an abbreviation of the full description 'Silt mixtures – clayey silt to silty clay'.

It is important to note that classification zone boundaries do not exist naturally, and minor variations in cone response can result in multiple classifications within layers of relatively uniform behaviour when the data plots near a zone boundary. Therefore, a system is necessary to limit the number of classified zones within each layer description. The following logic has been applied to retain only the most significant classifications:

For $LT \geq 1$, $C = 85$
 For $0.5 \leq LT < 1$, $C = 75$
 For $LT < 0.5$, $C = 65$

Where

C = Minimum % SBT zone classification coverage within the layer description text
 LT = Layer thickness (m)

For layers having a thickness of less than 1 m, 8% of data at the top and bottom of the layer (16% total) are excluded to limit the effect of transition zone data (measured resistance influenced by overlying or underlying strata of different stiffness) being included in the classification.

The continuous SBT index I_c can be used to assess the classification distribution and variation not accounted for by the layer description.

6.5 SOIL BEHAVIOUR TYPE INDEX – I_c

The principal trend in soil behaviour type (SBT) variation can be expressed by a continuous index, I_c , as proposed by Robertson and Wride (1998) based on a similar index proposed by Jefferies and Davies (1993). The index provides a continuous profile of SBT variation with depth for end-user analysis of soil units and small-scale behavioural variation. The equivalent non-normalised version proposed by Robertson (2010) is provided for comparison.

The basis of I_c and its approximation of the original chart classification zones may be seen from Figure 6-2. The method does not identify zones 1 (*sensitive fine grained*) or zones 8 & 9 (*heavily overconsolidated or cemented*).

Normalised SBT index I_c (Robertson and Wride, 1998), as updated by Robertson (2009) to use Q_{tn} :

$$I_c = [(3.47 - \log Q_{tn})^2 + (\log F_r + 1.22)^2]^{0.5}$$

Non-normalised SBT index I_c (Robertson, 2010):

$$I_c = \left[\left(3.47 - \log \left(\frac{q_c}{\sigma_{atm}} \right) \right)^2 + (\log R_f + 1.22)^2 \right]^{0.5}$$

The normalised version of I_c is considered more accurate, while the non-normalised version is intended for compatibility with the non-normalised Robertson's (2010) SBT chart and may be more accurate at shallow depths in overconsolidated soils.

I_c results are presented in Appendix D and are repeated alongside derived parameters on all plot sheets to provide SBT context.

6.6 RELATIVE DENSITY

The relative density of sands was calculated based on an empirical relationship proposed by Jamiolkowski *et al.* (2001) based on a large database of undisturbed frozen samples and calibration chamber tests on clean sands.

$$D_r = 100 \left[0.268 \cdot \ln \left(\frac{q_t / \sigma_{atm}}{\sqrt{\sigma_{vo}' / \sigma_{atm}}} \right) - k \right]$$

k = Compressibility dependant constant can be taken as -0.675 for medium compressibility (applied value in our interpretation), ≤ 1 for high compressibility and ≥ 2 for compressible sands.

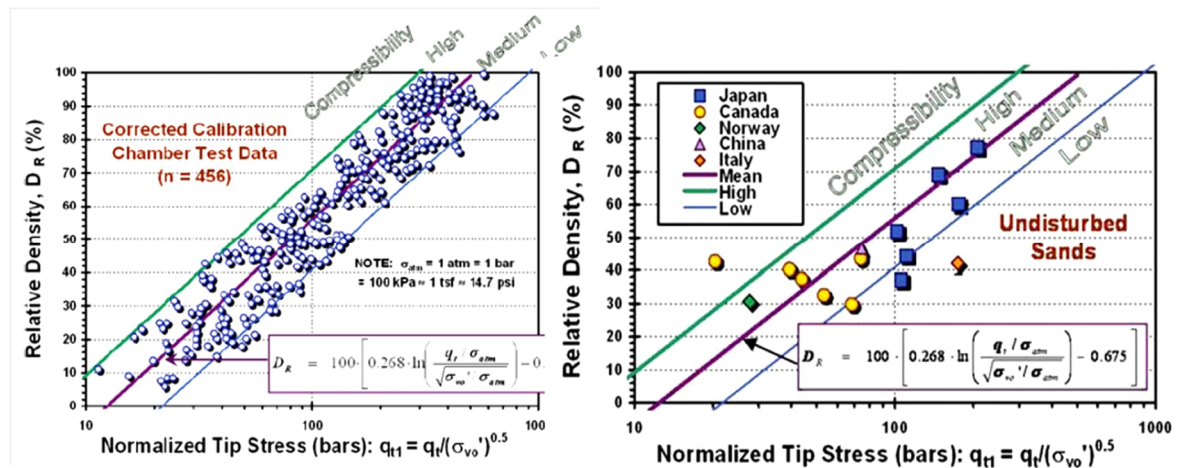


Figure 6-5 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

The results are presented in Appendix F.

6.7 UNDRAINED SHEAR STRENGTH

The undrained shear strength s_u is usually estimated by dividing the net tip resistance by an empirical cone factor N_k (Lunne *et al.*, 1997):

$$s_u = \frac{q_c - \sigma_{v0}}{N_k}$$

Mayne and Peuchen (2018) performed an evaluation of 407 high-quality undrained anisotropically consolidated triaxial compression tests (CAUC) with net tip resistance data pairs, resulting in N_{kt} factors with regression analysis details for five categories of clays shown in Table 2.

Table 2 Summary of CAUC s_u versus q_{net} for various clays. Reproduced from Mayne and Peuchen (2018).

Clay Group	Number of sites	Nr Data	Correlation Coefficient r2	Factor N_{kt}	Mean Pore Pressure Parameter Bq
Offshore NC-LOC (1)	17	115	0.98	12.32	0.51
Onshore NC-LOC (2)	30	191	0.867	12.00	0.53
Sensitive NC-LOC (3)	5	43	0.507	10.33	0.84
OC Intact (4)	5	36	0.862	13.57	0.49
OC Fissured (5)	5	22	0.393	22.47	-0.01
All clays	62	407	0.923	13.33	0.55

The test plots of Appendix E provide profiles of s_u corresponding to the N_{kt} factors of groups 2, 4 and 5, with the applicable N_{kt} value and soil group name indicated in the header legend. ' $s_{u3...reference}$ ' on the logs corresponding to $N_{kt} = 15$ and has been included for comparison to data interpreted using the commonly adopted N_{kt} value of 15 for 'normal' clays.

A variable N_{kt} factor can be estimated with depth as a function of the pore pressure parameter B_q , applicable for B_q values of > -0.01 . The following equation proposed by Mayne and Peuchen is based on the same database evaluation:

$$N_{kt} = 10.5 - 4.6 \cdot \ln(B_q + 0.1)$$

Where the pore pressure parameter B_q is the ratio of excess pore pressure to net tip resistance:

$$B_q = \frac{u_2 - u_0}{q_t - \sigma_{v0}}$$

The estimate of N_{kt} has a standard error of 2.4 and correlation coefficient of 0.645.

When calculated, the s_u estimate based on B_q is presented as 's_u5 - Dynamic N_{kt} from B_q (CAUC)' on the plots and is only suitable for tests that have a high-quality pore pressure data, often indicated by a positive, repeatable, and dynamic response.

Note: N_{kt} (with subscript 'kt') indicates a N_k factor that has been established using the corrected (total) tip resistance q_t . N_{kt} can be applied to the uncorrected tip resistance q_c but results in a slightly lower estimate of s_u depending on the correction magnitude ($q_c - q_t$) in lower strength soils.

s_u results are presented in Appendix E.

6.8 OVERCONSOLIDATION RATIO

The preconsolidation stress σ'_p was calculated using the method of Mayne et al (2009):

$$\sigma'_p = k \cdot (q_t - \sigma_{v0})^{m'}$$

$$OCR = \sigma'_p / \sigma'_{v0}$$

In this study it was found that the exponent m' trended non-linearly with mean grain size and can be estimated by relation to soil behaviour type index I_c :

$$m' = 1 - \frac{0.28}{1 + (I_c/2.65)^{25}}$$

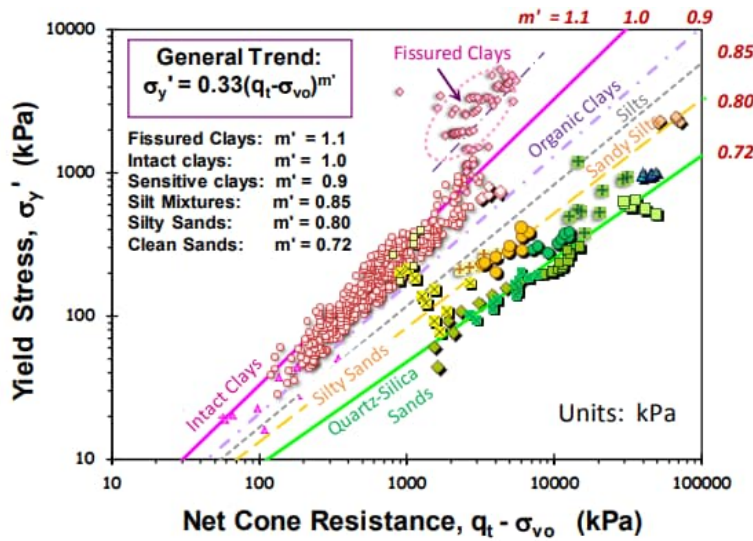


Figure 6-6 Preconsolidation stress with net cone resistance power law, reproduced from Mayne (2014).

An additional set of σ_p' and OCR values were calculated for $m' = 1.1$ to reflect the upper trend for over consolidated fissured clays not captured by the correlation with I_c .

The results are presented in Appendix E.

6.9 SPT N60 VALUES

Equivalent SPT N_{60} values, defined as the non-normalised SPT blow count over a 30 cm interval, with a reference hammer efficiency (energy transfer ratio, 'ETR' or 'ER') of 60%, were derived according to two correlations:

Method 1 - Jefferies and Davies (1993) cited in, and modified by, Lunne *et al.* (1997) to use I_c according to normalised Robertson 1990 SBT chart:

$$N_{60} = \frac{q_t}{8.5 \cdot \sigma_{atm} \cdot (1 - I_c/4.6)}$$

Method 2 - Robertson (2012):

$$\frac{\left(\frac{q_t}{p_a}\right)}{N_{60}} = 10^{(1.268 - 0.2817I_c)}$$

The correlations are intended for clays, silts and sands and not for carbonates or cemented geo-materials.

Conversion of N_{60} values for comparison to other hammer efficiency values, or vice-versa, can be performed using the relationship:

$$N_{60} \cdot \frac{60}{ETR} = N_{ETR}$$

Where ETR is entered as a percentage.

The results are presented in Appendix F.

6.10 FRICTION ANGLE

Sands

The peak friction angle of granular materials was calculated using the method of Kulhawy and Mayne (1990). The relationship is based on a calibration chamber database from 24 sands (mainly sampled by freezing) of varying mineralogy:

$$\phi' = 17.6 + 11.0 \cdot \log(q_{t1})$$

Where:

ϕ' = Peak friction angle (degrees)

q_{t1} = stress normalised cone resistance:

$$q_{t1} = \left(\frac{q_t}{\sigma_{atm}} \right) / \left(\frac{\sigma_{v0'}}{\sigma_{atm}} \right)^{0.5}$$

The presence of compressible minerals or fines tends to reduce tip resistance resulting in lower estimate of friction angle, while very coarse (sand) or larger grain size tends to increase tip resistance resulting in higher estimate. Increased penetration resistance due to high k_0 conditions also results in an overestimate of friction angle.

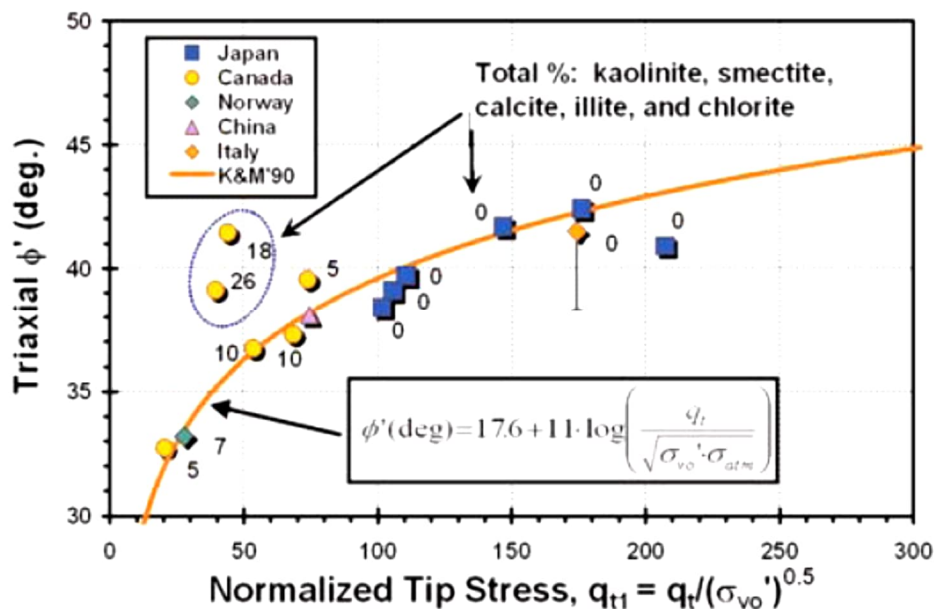


Figure 6-7 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

Fine grained soils

The effective friction angle for fine grained soils was calculated based on the Senneset *et al.* (1988, 1989) method, referred to as 'NTH' (Norwegian Institute of Technology) solution, using the modified

and approximate closed form solution by Mayne & Campanella (2005) as a direct function of the pore pressure parameter B_q and normalised tip resistance Q_{tn} (referred to as Q in figure Figure 6-8 Triaxial ϕ' versus CPTu-evaluated value (NTH method) for 105 soft-firm clays with OCRs < 2.5 (Ouyang and Mayne 2018, cited in Mayne et al 2022). The method is generally applicable where $0.1 < B_q < 1.0$ and $20^\circ < \phi' < 45^\circ$ and is appropriate for non-cemented normally consolidated to lightly overconsolidated soils.

$$\phi' = 29.5^\circ B_q^{0.121} [0.256 + 0.336 B_q + \log Q]$$

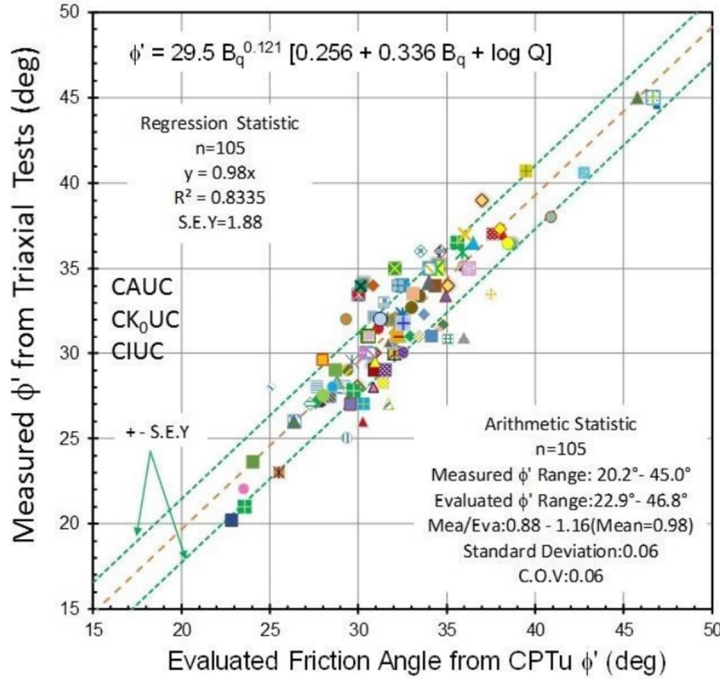


Figure 6-8 Triaxial ϕ' versus CPTu-evaluated value (NTH method) for 105 soft-firm clays with OCRs < 2.5 (Ouyang and Mayne 2018, cited in Mayne *et al* 2022).

The results are presented in Appendix F.

6.11 COEFFICIENT OF VOLUME CHANGE

Coefficient of volume change m_v defined as the inverse of the constrained modulus M , was evaluated for all soil types using the constrained modulus method proposed by Mayne (2006) cited in Mayne (2007). The value may be used to predict settlement at the end of primary consolidation and is applicable to the present state of vertical effective stress up to the pre-consolidation stress for overconsolidated soils.

$$m_v = 1/M'$$

Where:

$$M' = \alpha \cdot (q_t - \sigma_v)$$

$$\alpha = 5$$

An alpha factor of 8.25 reported by Kulhawy & Mayne (1990) for fine grained soils appears to provide a better fit through the data for intact non-organic clays, reducing to around 1 to 2 for organic plastic clays.

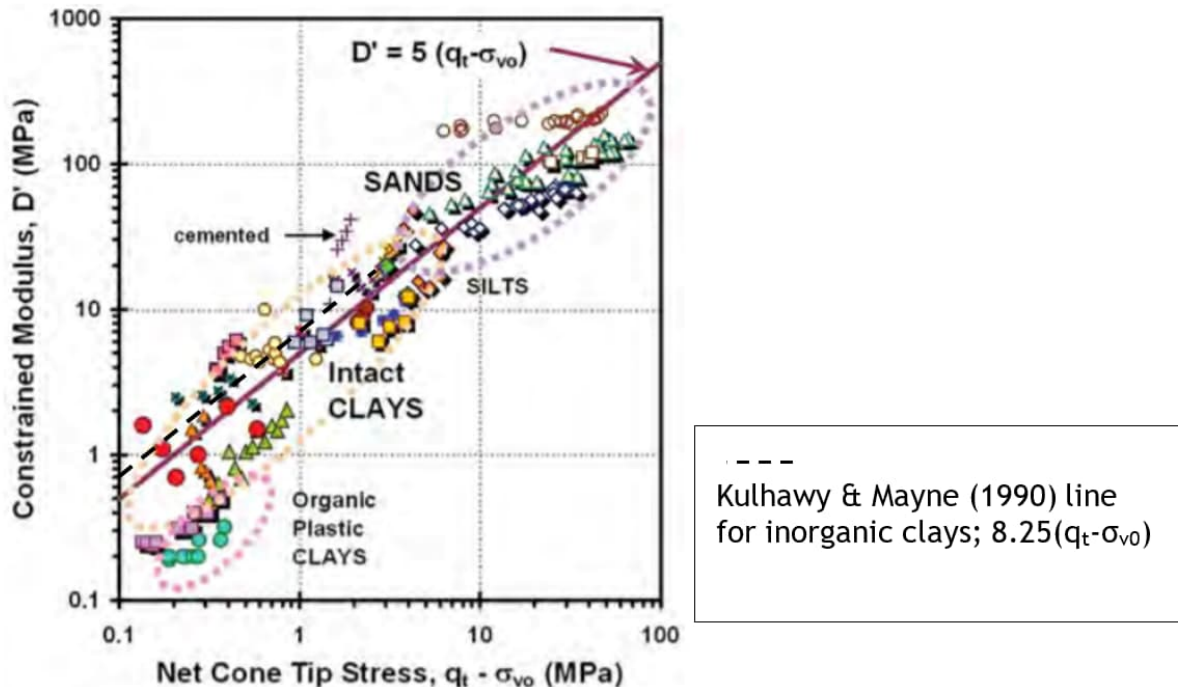


Figure 6-9 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

The results are presented in Appendix E.

6.12 YOUNG'S MODULUS

The secant Young's modulus E' at 25% mobilised shear strength (FOS = 4) was calculated according to the method proposed by Robertson (2009):

$$E' = \alpha(q_t - \sigma_v)$$

Where:

$$\alpha = 0.015(10^{0.55Ic+1.68})$$

The method described by Robertson may be adapted to estimate E' for loading at different percentages of mobilised shear strength.

The results are presented in Appendix F.

7 GENERAL INTERPRETATION NOTES

Provided below is a non-exhaustive set of notes on interpretation of the acquired CPT data with reference to examples within the dataset where appropriate.

DRAINED AND UNDRAINED SOIL BEHAVIOUR

Geotechnical parameters appropriate for drained and undrained cone penetration conditions are derived for drained and undrained soil behaviour types (SBTs) respectively, however, to help mitigate the uncertainty in the SBT correlation with drainage behaviour, all parameters are derived over the Soil Behaviour Type range $2.4 < I_c < 2.7$. For partially drained conditions, error will be introduced within derived parameters.

Piezocone dynamic pore pressure and dissipation tests may be used to identify drainage conditions. Dissipation t_{50} values exceeding 50 seconds indicate undrained penetration behaviour based on the findings of Kim *et al.* (2008).

In partially drained materials the friction sleeve resistance may rise significantly immediately following a pause in penetration due to consolidation and increased effective stress on the friction sleeve.

DYNAMIC PORE PRESSURE u_2 (CPTu)

While the piezo system is saturated before use, testing through unsaturated soils may result in some degree of desaturation leading to a less accurate and more 'sluggish' pore pressure response. Desaturation can also occur during penetration due to suction pressure causing cavitation during dilative shear at the cone shoulder. Dissipation tests that are undertaken following desaturation are likely to have a more pronounced initial rise and the results of analysis may have some degree of error.

If the piezometer system becomes desaturated it may re-saturate at higher excess pressures later in the test as gas dissolves under pressure. The pore pressure response in saturated contractive soils should normally have a dynamic 'peaky' appearance.

The tip resistance in lower strength contractive soils without pore pressure measurement in the u_2 position is likely to be significantly lower (up to 20%, typically ~10%) than the equivalent corrected tip resistance depending on the magnitude of excess pore pressure generated during penetration.

CONICAL TIP AND FRICTION SLEEVE OFFSET

The accuracy of the friction ratio (and derived SBT) over thin layers and at layer boundaries is sensitive to the offset between the focal point of shear in front of the conical tip and the centre of the friction sleeve, and the difference in the vertical extent of soil influencing the sensors. This often results in sharp peaks or troughs at boundaries when the sleeve rises or falls out of unison with tip resistance. More broadly, this error will be seen in any circumstances where the spacing between inclusions or discontinuities causes the cone tip and sleeve to experience heterogeneity, for example in disturbed fill or landslide material with a 'blocky' macro fabric or large inclusions. The figure below provides an example of the tip-sleeve offset and resulting (erroneous) friction ratio spike.

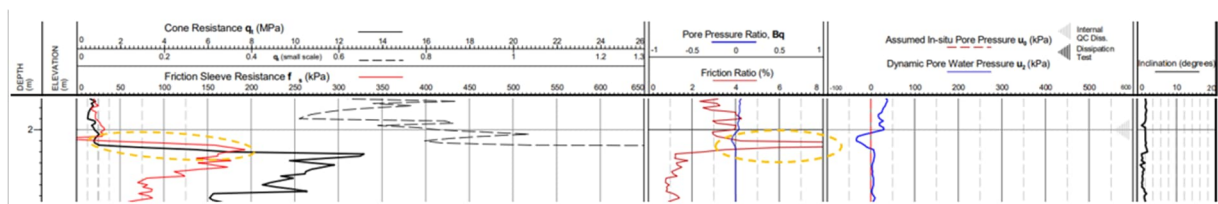


Figure 7-1 example of offset in tip and sleeve response at a strata boundary.

Note that the cone-sleeve offset results in the absence of friction ratio over the last ~14 cm of each test location, and therefore the SBT material description does not extend over this range.

FRICTION SLEEVE DATA

There are three common causes of friction sleeve measurement error; 1) unequal pore pressure acting on the sleeve end areas as the sleeve passes through materials of different permeability and hence excess pore pressure Δu_2 , often resulting in a negative/positive spike, 2) Accuracy limitations and temperature effects in very low strength or sensitive soils, and 3) error associated with bending strain that occurs while the cone inclination deviates rapidly. Temperature effects are generally mitigated by temperature stabilisation during the test and at the time of zero output measurement.

In sand, particularly loose to medium dense, the sleeve data may show a sudden drop following a penetration pause, followed by a much more gradual recovery over 15-30 cm. This is believed to be associated with relaxation of stress on the sleeve due to creep as stresses are redistributed further from the cone. The effect of this on SBT classification is generally very small.

CONE TYPE

The reference cone type has a 10 cm² projected cone tip area and 150 cm² friction sleeve area, however it is common to use a larger 15 cm² cone with a 225 cm² friction sleeve area for improved sensitivity, temperature stability, damage prevention and penetration depth potential due to the higher bending strength. Use of a 15 cm² cone does however require higher penetration force (reaction force) for a given penetration pressure and produces more pronounced transition zones and thin layer effects due to the larger influence zone.

TRANSITION ZONES AND THIN LAYER EFFECTS

During penetration at the boundary between soils of contrasting stiffness, a transition zone is often evident prior to mobilisation of the true soil stiffness. These data should be cautiously ignored in assessment of soil behaviour type and parameter evaluation. Where the stiff layer is thin (<~1 m) mobilised resistance may be significantly less than that of an equivalent thick layer. The effect for thin low stiffness layers is less significant. Procedures for thin-layer effect correction are provided by Robertson and Wride (1998) and Boulanger & DeJong (2018).

GRAVELS

The presence of gravel or larger clasts in a soil is often characterised by short peaks in the CPT tip and sleeve readings, possibly with associated inclinometer 'shake' and/or short sharp reductions in pore water readings due to dilation effects. Frequent gravels in soft or loose soils may generate localised erroneous friction ratio values.

8 REFERENCES

- Boulanger, R.W. and DeJong, J.T. (2018) 'Inverse filtering procedure to correct cone penetration data for thin-layer effects', Proceedings of the 4th International Symposium on Cone Penetration Testing (CPT'18), 21-22 June 2018, Delft, The Netherlands. CRC Press, pp. 25-44.
- DeJong, J.T., Jaeger, R.A., Boulanger, R.W. and Randolph, M.F. (2013) 'Variable penetration rate cone testing for characterization of intermediate soils', in Coutinho, R.Q. and Mayne, P.W. (eds.) Geotechnical and Geophysical Site Characterization 4. Boca Raton, FL: Taylor & Francis, pp. 25-42.
- DeJong, J.T. & Randolph, M.F. (2012) 'Influence of partial consolidation during cone penetration on estimated soil behavior type and pore pressure dissipation measurements'. Journal of Geotechnical and Geoenvironmental Engineering, 138(7), pp. 777-788.
- Houlsby, G.T. and Teh, C.I. (1988) 'Analysis of the Piezocone in Clay', Proceedings of the International Symposium on Penetration Testing (ISOPT-1), Orlando, Vol. 2, pp. 777-783. Rotterdam: Balkema.
- ISO 10012:2003 (2003) Measurement management systems - Requirements for measurement processes and measuring equipment.
- ISO 22476-1:2022 (2022) Geotechnical investigation and testing - Field testing - Part 1: Electrical cone and piezocone penetration test.
- Idriss, I.M. and Boulanger, R.W. (2008) Soil liquefaction during earthquakes. Monograph MNO-12. Oakland, CA: Earthquake Engineering Research Institute, pp. 261.
- Jamiolkowski, M., LoPresti, D.C.F. and Manassero, M. (2001) 'Evaluation of relative density and shear strength of sands from cone penetration test and flat dilatometer test', in Soil Behaviour and Soft Ground Construction (GSP119). Reston, VA: American Society of Civil Engineers, pp. 201-238.
- Jefferies, M.G. and Davies, M.P. (1993) 'Use of CPTu to estimate equivalent SPT N60', Geotechnical Testing Journal, 16(4), pp. 458-467.
- Kim, K., Prezzi, M., Salgado, R. and Lee, W. (2008) 'Effect of penetration rate on cone penetration resistance in saturated clayey soils', Journal of Geotechnical and Geoenvironmental Engineering, 134(8), pp. 1142-1153.
- Kulhawy, F.H. and Mayne, P.W. (1990) Manual on estimating soil properties for foundation design. Report EPRI EL-6800, Research Project 1493-6. Palo Alto, CA: Electric Power Research Institute, pp. 306.
- Lunne, T., Robertson, P.K. and Powell, J.J.M. (1997) Cone penetration testing in geotechnical practice. New York: Blackie Academic.
- Lunne, T. and Kleven, A. (1981) 'Role of CPT in North Sea foundation engineering', in Cone Penetration Testing and Materials. Session at the ASCE National Convention. American Society of Civil Engineers (ASCE), pp. 76-107.
- Mayne, P.W. and Campanella, R.G. (2005) 'Versatile site characterisation by seismic piezocone', Proceedings of the 16th International Conference on Soil Mechanics and Geotechnical Engineering, Vol. 2. Rotterdam, The Netherlands: Millpress, pp. 721-724.
- Mayne, P.W. and Peuchen, J. (2018) 'Evaluation of CPTU Nkt cone factor for undrained strength of clays', Proceedings of the 4th International Symposium on Cone Penetration Testing (CPT'18), 21-22 June 2018, Delft, The Netherlands. CRC Press, pp. 423-429.
- Mayne, P.W. (2007) Cone penetration testing - A synthesis of highway practice. NCHRP Synthesis 368. Washington, D.C.: Transportation Research Board.
- Mayne, P.W. (2014) 'KN2: Interpretation of geotechnical parameters from seismic piezocone tests', Proceedings of the 3rd International Symposium on Cone Penetration Testing (CPT'14), June 2014. ISSMGE Technical Committee TC 102, edited by P.K. Robertson and K.I. Cabal, pp. 47-73.

Parez, L. and Fauriel, R. (1988) 'Le piézocône. Améliorations apportées à la reconnaissance de sols', Revue Française de Géotechnique, 33, pp. 13-27.

Robertson, P.K. and Cabal, K. (2022) Guide to Cone Penetration Testing. 7th edition. [Online] Available at: www.cpt-robertson.com [Accessed January 2023].

Robertson, P.K. (2009) 'Interpretation of cone penetration tests – a unified approach', Canadian Geotechnical Journal, 46, pp. 1337-1355.

Robertson, P.K. (2010a) 'Soil behaviour type from the CPT: An update', Proceedings of the 2nd International Symposium on Cone Penetration Testing, Huntington Beach, CA, USA.

Robertson, P.K. (2010b) 'Estimating soil unit weight from CPT', Proceedings of the 2nd International Symposium on Cone Penetration Testing, Huntington Beach, CA, USA.

Robertson, P.K. (2012) 'Interpretation of in-situ tests – some insights', Proceedings of the 4th International Conference on Geotechnical & Geophysical Site Characterization (ISC'4), Brazil, 1.

Robertson, P.K. (2014) 'Estimating in-situ soil permeability from CPT & CPTu', Proceedings of the 3rd International Symposium on Cone Penetration Testing (CPT'14), June 2014. ISSMGE Technical Committee TC 102.

Senneset, K., Sandven, R. and Janbu, N. (1989) 'Evaluation of soil parameters from piezocone tests', Transportation Research Record 1235, Transportation Research Board, National Research Council, Washington D.C., pp. 24-37.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J. (1999) 'An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils', Canadian Geotechnical Journal, 36, pp. 369-381

APPENDICES

Appendix A	SUMMARY TABLES
Appendix B	GENERAL INFORMATION
Appendix C	CONE PENETRATION TEST RESULTS
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APPENDIX A SUMMARY TABLES

Table 3 CPT summary

Location ID	Stroke number	Final depth (m)	Cone ID	Piezocene test	Pre-drilled (m)	Pre-drilling details	Rig	Primary refusal factor	Applied zero values	Tip zero drift (kPa)	Sleeve zero drift (subtraction) (kPa)	Piezo. zero drift (kPa)	Nr dissipation tests	Raw file name	X Coordinate	Y Coordinate	Z Coordinate	Date	Remarks
CPT01	1	25.78	S15-CFIPTT.1646	YES			UK3	Target depth	pre	-10.80	1.00	-0.40		30578-V1-091225-UK3-LP110.L04				09/12/2025	
CPT02	1	14.20	S15-CFIPTT.1646	YES			UK3	Lateral support at depth	pre	9.20	0.10	0.60		30578-V1-101225-UK3-LP110.L06				10/12/2025	
CPT03	1	0.46	S15-CFIPTT.1646	YES			UK3	Tip load	pre	24.00	-2.90	0.00		30578-V1-091225-UK3-LP110.L02				09/12/2025	
CPT03A	1	24.86	S15-CFIPTT.1646	YES			UK3	Target depth	pre	24.00	-2.90	0.00		30578-V1-091225-UK3-LP110.L03				09/12/2025	
CPT04	1	16.86	S15-CFIPTT.1646	YES			UK3	Piezo load	pre	7.00	-3.50	0.80		30578-V1-101225-UK3-LP110.L09				10/12/2025	
CPT05	1	15.50	S15-CFIPTT.1646	YES			UK3	Lateral support at depth	pre	-4.60	-0.50	-1.60		30578-V1-101225-UK3-LP110.L07				10/12/2025	
CPT06	1	15.04	S15-CFIPTT.1646	YES			UK3	Lateral support at depth	pre	8.60	0.20	0.80		30578-V1-101225-UK3-LP110.L08				10/12/2025	
CPT08	1	23.94	S15-CFIPTT.1646	YES			UK3	Lateral support at depth	pre	-6.80	-2.00	-1.50		30578-V1-111225-UK3-LP110.L12				11/12/2025	
CPT09	1	24.98	S15-CFIPTT.1646	YES			UK3	Target depth	pre	-21.00	2.40	-1.10		30578-V1-111225-UK3-LP110.L11				11/12/2025	
CPT10	1	24.88	S15-CFIPTT.1646	YES			UK3	Target depth	pre	-45.60	-0.20	-1.60		30578-V1-091225-UK3-LP110.L01				09/12/2025	
CPT11	1	24.84	S15-CFIPTT.1646	YES			UK3	Target depth	pre	3.00	-0.50	-1.70		30578-V1-101225-UK3-LP110.L05				10/12/2025	
CPT13	1	24.94	S15-CFIPTT.1646	YES			UK3	Target depth	pre	-12.60	-1.80	-3.10		30578-V1-111225-UK3-LP110.L10				11/12/2025	

CPT test plots are presented in Appendix C.

APPENDIX B GENERAL INFORMATION

LIST OF FIGURES

Cone calibration certificate: S15-CFIIP.1646

Data sheet: 20.5-tonne track-truck mounted CPT unit (UK3)

Test Setup

Calibrated Instrument

Instrument type:	Subtraction	Number of sensors:	5
Serial number:	DS15-CFIPTT.1646	Manufacturer:	Eijkelpamp Geopoint
Nominal cone area:	15 cm ²	Nominal sleeve area:	227 cm ²
Calibration standard:	BS EN ISO 22476-1:2023	Location:	Lankelma Calibration Laboratory
Calibration date:	20 August 2025	Calibration expiry:	20 February 2026

Sensor measurand	Calibration range	Maximum rating	Momentary overload	Sensor stability (60 sec)	Max drift before re-calibration
Cone resistance (qc)	66.67 MPa	100 MPa	100 MPa	± 0.41 kPa	4 bar
Sleeve friction (fs)	4.41 MPa	1.00 MPa*	1.00 MPa	± 0.04 kPa	0.04 bar
Pore pressure (u)	4 MPa	5 MPa	6.75 MPa	± 0.02 kPa	0.14 bar
Inclination (i)	20 °	90 °		± 0.03 °	
Temperature (t)	30 °C	90 °C		± 0.002 °C	
Magnetic field (m)					

* The maximum usable sleeve friction stress is limited by the physical strength of the sleeve.

ISO 22476-22 Cone Penetrometer Classification

Sensor measurand	Measurement uncertainty U _{qc: class} , U _{fs: class} , U _{u: class}	Ambient temperature stability			Transient temperature stability			Bending influence Δb _{qc} , Δb _{fs} , Δb _u	Overall classification (highest number represents penetrometer class)
		Uncorrected Δa _{qc} , Δa _{fs} , Δa _u	Corrected Δa _{qc} , Δa _{fs} , Δa _u		Uncorrected Δt _{qc} , Δt _{fs} , Δt _u	Corrected Δt _{qc} , Δt _{fs} , Δt _u			
Cone resistance	0	2	0		2	2		0	2
Sleeve friction	0	2	0		2	0		0	0
Pore pressure	0#	N/A	0		2	0		0	0

Indicates the exclusion of the u1 uncertainty for classification in accordance with BS EN ISO 22467-1:2023.

Calibration signed by:

Paul Metcalf

Digitally signed by Paul Metcalf
DN: cn=Paul Metcalf, o=Lankelma Ltd,
email=paulmetcalf@lankelma.co.uk
Date: 2025.09.02 08:52:57 +01'00'

P Metcalf

Calibration checked by:

Alastair Harman

Digitally signed by Alastair Harman
DN: cn=Alastair Harman, o=Lankelma Ltd,
email=alastairharman@lankelma.co.uk
Date: 2025.09.02 08:52:41 +01'00'

A Harman

Cone penetrometer, serial number: DS15-CFIPTT.1646 was found to comply with the requirements of BS EN ISO 22476-1:2023 for the following classifications:
Cone Resistance - Class 2 Sleeve Friction - Class 0 Pore Pressure - Class 0

Reference Instruments

Device	Serial number	Uncertainty of recorded value	Calibration date
AM DSCCHA-100 kN	66914	0.02 ± %	01/07/2025
AM DSCCHA-5 kN	61065	0.05 ± %	01/07/2025
Keithley 7.5 Digit DMM	4496826	12.00 PPM	10/06/2025
MMG750V1P1MC0T3A6CE	547961	0.02 ± %	02/09/2024
ETI Ref Thermometer	D24276054	0.04 °C	17/09/2024
Lankelma HV6 Rotary Table	INC-JIG 01	0.10 °	17/07/2023
10 kg Calibration Weight	H1-S1 10kg	0.001 %	02/08/2024
Mitutoyo 200mm Caliper	A23044194	0.02 ± mm	14/06/2025

Calibration Standard

The calibration was performed according to BS EN ISO 22476-1:2023 & BS EN ISO 17025:2017 for the calibration of cone penetrometers.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation for each of the calibrated sensors has been carried out in accordance with BS EN ISO 22476-1:2023 requirements.

The report provides traceability of measurement to national standards and the SI system of units.

Clause 5.1.2 of BS EN ISO 22476-1:2023, states that the maximum period of validity of the calibration of the cone penetrometer shall not exceed 12 months. The cone penetrometer shall be recalibrated if the readings before a test show a zero baseline drift of over 2% of full scale output compared to the calibration zero load readings.

Cone Dimension Verification

Cone Tip

Cone shoulder diameter

Rotational position	d_c
0 °	43.87 mm
120 °	43.87 mm
240 °	43.87 mm

Height of the cylindrical extension of the cone

Rotational position	h_e
0 °	12.39 mm
120 °	12.39 mm
240 °	12.39 mm

Height of the conical section of the cone

Rotational position	h_c
0 °	34.98 mm
120 °	34.99 mm
240 °	34.96 mm

Filter element diameter

Rotational position	d_{fl}
0 °	43.51 mm
120 °	43.51 mm
240 °	43.51 mm

Friction Sleeve

Friction sleeve diameter

Rotational position	Upper section d_{2u}	Middle section d_{2m}	Lower section d_{2l}
0 °	44.05 mm	44.03 mm	44.07 mm
120 °	44.05 mm	44.01 mm	44.01 mm
240 °	44.06 mm	44.01 mm	44.04 mm

Friction sleeve length

Rotational position	l_s
0 °	164.90 mm
120 °	164.90 mm
240 °	164.90 mm

Gap between the cone and the lower end of the friction sleeve

Rotational position	l_{gl}
0 °	2.55 mm
120 °	2.54 mm
240 °	2.53 mm

Gap above the upper end of the friction sleeve

Rotational position	l_{gu}
0 °	2.62 mm
120 °	2.61 mm
240 °	2.60 mm

Cone Tip Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_c	43.870 mm
Relative error b_c	0.000 %
Area A_c	1511.559 mm ²
Dimension uncertainty U_{dc}	0.015 mm
Area uncertainty u_{Ac}	1.034 mm ²
Expanded area uncertainty U_{Ac}	2.067 mm ²

Friction Sleeve Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_2	44.037 mm
Relative error b_{c2}	0.076 %
Average length l_s	164.900 mm
Relative error b_{ls}	0.000 %
Area A_s	22813.135 mm ²
Dimension uncertainty diameter u_{d2}	0.024 mm
Dimension uncertainty length u_{ls}	0.015 mm
Area uncertainty u_{as}	12.810 mm ²
Expanded area uncertainty U_{as}	25.619 mm ²
Sleeve length to diameter ratio	3.745
Diameter difference, sleeve - tip	0.167 mm

Cone Resistance Calibration

Calibration method

1. The cone was loaded to full range 3 times for no less than 1 minute before calibration.
2. The cone was calibrated with 4 sets of increasing forces and 2 sets of decreasing forces, with rotation before set 3 and 5.
3. The coefficients of a linear and third order equation relating the the estimate of applied force as a function of the deflection were calculated and are shown in Table 1.
4. The forces applied, and the resulting deflections are given in Tables 2. No corrections for temperature have been applied to these results.
5. The combined expanded uncertainty* of deflection U_{qc} and U_{qc_class} for each force is shown as a percentage of the recorded value and in units of pressure (kPa) as shown in Table 3.

* The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

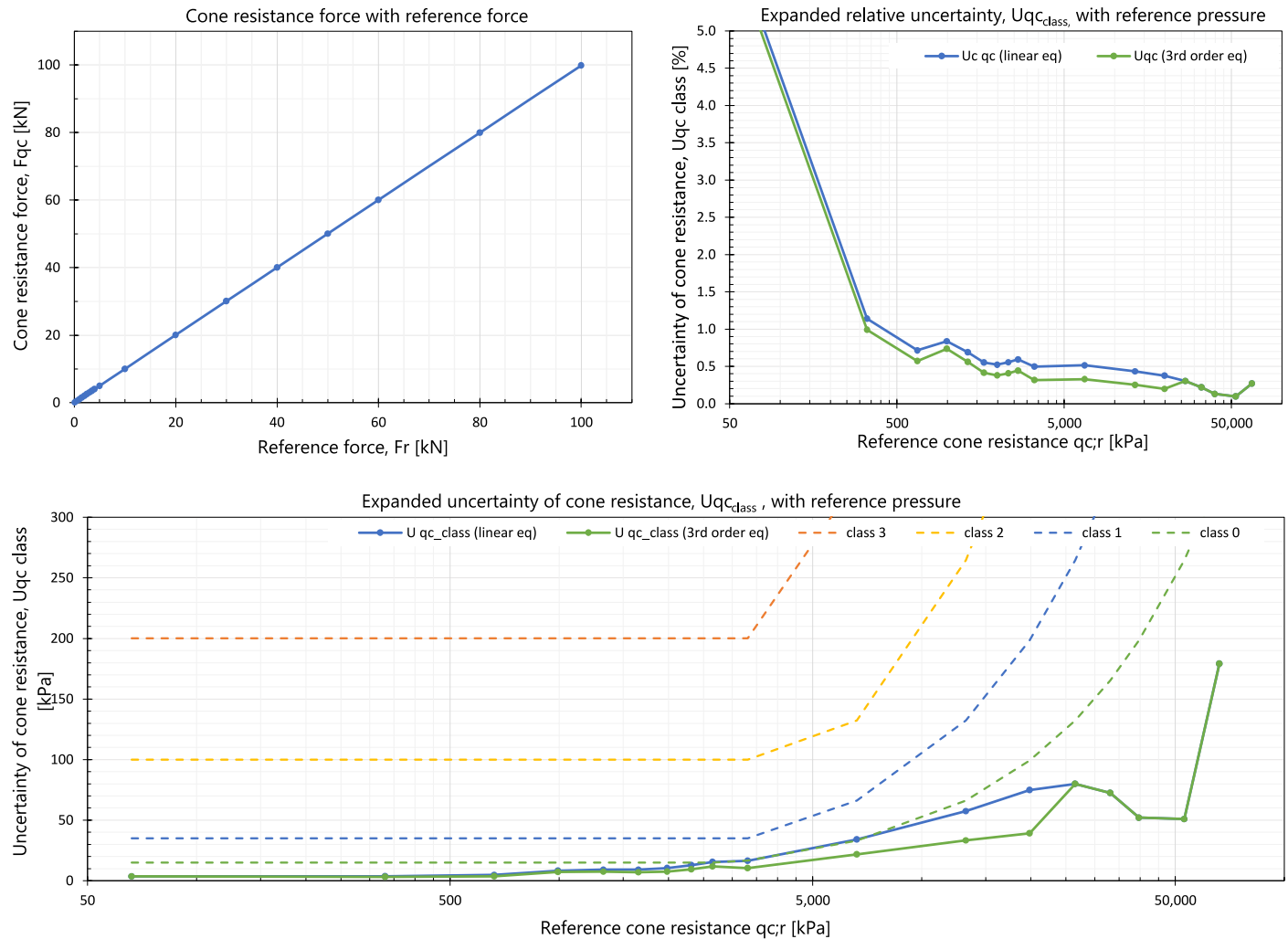
Cone Penetrometer	
Cone penetrometer type	Subtraction
Cone resistance capacity	150 kN
Calibration range	100 kN
Cone resistance effective resolution	0.0005 kN
Cone area	1,512 mm ²
Measured alpha factor cone area ratio	0.78
Historic drift between cone calibrations (U_{drift})	0.01989 %
Apparent pore pressure (u_a) at full range	-0.06 kPa
Cone resistance max zero drift	0.53 kPa
Reference load cell max zero drift	2.70 kPa

Calibration Conditions	
Ambient temperature	26.2 °C
Ambient temperature variation	0.65 °C
Instrument temperature variation	0.43 °C

Reference Load Cell Uncertainty	
AM DSCCHA-100 kN	0.02 ±%
AM DSCCHA-5 kN	0.05 ±%

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Cone Resistance Calibration - Graphical Results



Interpolation

Table - 1		
Linear Equation	The cone output in force units of D (0.1 N) is derived using a linear factor from the raw cone output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.008713
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (in 0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = 0$ $a_1 = 0.999008822$ $a_2 = -4.48605E-09$ $a_3 = 1.6196E-14$ Polynomial calc. is only to be used when the cone load is under 30 kN

Cone Resistance Calibration - Tabular Results

Table - 2a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0008	0.0001	0.0005		0.0002	
0.1	0.1030	0.1022	0.1017		0.1010	
0.5	0.5032	0.5039	0.5003		0.5012	
1	1.0040	1.0032	1.0000		1.0004	
1.5	1.5040	1.5038	1.5005		1.5016	
2	2.0047	2.0052	2.0019		2.0025	
2.5	2.5046	2.5058	2.5029		2.5012	
3	3.0046	3.0040	3.0039		3.0019	
3.5	3.5070	3.5071	3.5024		3.5039	
4	4.0099	4.0052	4.0034		4.0026	
5	5.0083	5.0093	5.0064		5.0065	
4				4.0012		3.9981
3.5				3.5024		3.4991
3				3.0036		3.0011
2.5				2.5014		2.5000
2				2.0001		1.9969
1.5				1.4972		1.4990
1				0.9964		0.9969
0.5				0.4976		0.4981
0.1				0.0984		0.0982

Table -2b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	10.0181	10.0169	10.0135		10.0147	
20	20.0260	20.0271	20.0229		20.0193	
30	30.0329	30.0274	30.0244		30.0190	
40	40.0669	40.0637	40.0577		40.0519	
50	50.0613	50.0543	50.0525		50.0410	
60	60.0457	60.0357	60.0326		60.0207	
80	79.9862	79.9723	79.9683		79.9610	
100	99.8844	99.8696	99.8678		99.8529	
80				79.9771		79.9688
60				60.0421		60.0355
50				50.0594		50.0519
40				40.0628		40.0585
30				30.0297		30.0280
20				20.0265		20.0235
10				10.0132		10.0128

Table - 3 Uncertainty assessment

Reference force	Reference tip resistance	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Tip calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	qc;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Uc qc		Uqc class			Udrift ***
0	0	0.0000	0.0002	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0003	0.0003	0.4		0.4		0	0.0
0.1	66	0.0004	0.0006	0.0005	0.0002	0.0000	0.0019	0.0017	0.0000	0.0027	0.0027	3.6	5.40	3.6	5.40	0	0.0
0.5	331	0.0006	0.0007	0.0004	0.0002	0.0000	0.0015	0.0017	0.0000	0.0025	0.0025	3.3	1.00	3.3	0.99	0	0.1
1	662	0.0007	0.0010	0.0005	0.0002	0.0000	0.0015	0.0021	0.0000	0.0029	0.0029	3.9	0.59	3.8	0.57	0	0.1
1.5	992	0.0048	0.0007	0.0001	0.0002	0.0000	0.0020	0.0017	0.0000	0.0055	0.0056	7.4	0.75	7.3	0.74	0	0.2
2	1,323	0.0041	0.0005	0.0003	0.0002	0.0000	0.0030	0.0022	0.0000	0.0056	0.0058	7.6	0.58	7.4	0.56	0	0.3
2.5	1,654	0.0041	0.0008	0.0007	0.0002	0.0000	0.0029	0.0008	0.0000	0.0052	0.0055	7.2	0.44	6.8	0.41	0	0.3
3	1,985	0.0044	0.0010	0.0003	0.0002	0.0000	0.0035	0.0003	0.0000	0.0057	0.0061	8.0	0.40	7.5	0.38	0	0.4
3.5	2,315	0.0053	0.0009	0.0001	0.0002	0.0000	0.0044	0.0014	0.0000	0.0071	0.0075	9.9	0.43	9.4	0.41	0	0.5
4	2,646	0.0061	0.0014	0.0027	0.0002	0.0000	0.0053	0.0020	0.0000	0.0089	0.0093	12.3	0.46	11.7	0.44	0	0.5
5	3,308	0.0023	0.0016	0.0006	0.0002	0.0000	0.0071	0.0021	0.0000	0.0079	0.0086	11.4	0.34	10.4	0.32	0	0.7
10	6,616	0.0046	0.0031	0.0007	0.0002	0.0001	0.0154	0.0006	0.0000	0.0164	0.0178	23.5	0.36	21.7	0.33	0	1.3
20	13,231	0.0079	0.0069	0.0006	0.0002	0.0002	0.0227	0.0023	0.0000	0.0251	0.0286	37.8	0.29	33.2	0.25	0	2.6
30	19,847	0.0108	0.0095	0.0032	0.0002	0.0002	0.0254	0.0041	0.0000	0.0297	0.0361	47.7	0.24	39.2	0.20	0	3.9
40	26,463	0.0133	0.0044	0.0018	0.0002	0.0003	0.0587	0.0034	0.0000	0.0605	0.0664	87.9	0.33	80.1	0.30	0	5.3
50	33,078	0.0163	0.0059	0.0040	0.0002	0.0004	0.0516	0.0051	0.0000	0.0548	0.0646	85.4	0.26	72.5	0.22	0	6.6
60	39,694	0.0179	0.0072	0.0057	0.0002	0.0005	0.0330	0.0070	0.0000	0.0393	0.0568	75.2	0.19	52.0	0.13	0	7.9
80	52,925	0.0232	0.0075	0.0081	0.0002	0.0006	0.0282	0.0048	0.0000	0.0384	0.0669	88.5	0.17	50.9	0.10	0	10.5
100	66,157	0.0281	0.0091	0.0086	0.0002	0.0008	0.1318	0.0000	0.0000	0.1353	0.1516	200.6	0.30	179.1	0.27	0	13.2

The class of the penetrometer is determined from the measurement uncertainty at any deflection

At each given deflection the expanded measurement uncertainty Uqc_class is calculated from the readings obtained during calibration.

$$Uqc_{class} = \frac{2}{5} \times \sqrt{\sum_{i=1}^8 u_i^2}$$

where,

u1 is the standard uncertainty associated with the applied calibration force.

u2 is the standard uncertainty associated with the reproducibility of the calibration results.

u3 is the standard uncertainty associated with the repeatability of the calibration results.

u4 is the standard uncertainty associated with the resolution and noise of the system.

u5 is the standard uncertainty associated with the drift in zero output.

u6 is the standard uncertainty associated with interpolation.

u7 is the standard uncertainty associated with reversibility.

u8 is the standard uncertainty associated with apparent load transfer from other sensor.

* u1 is not a requirement for BS EN ISO 22476-1:2023 class uncertainty Uqc_class. We have included u1 for clarity and confidence in the result.

** If the classification is altered with the inclusion u1, then the lower classification will be given alongside a # symbol as identification.

*** udrift is the standard uncertainty associated with the drift in sensitivity between calibrations. This is an uncertainty associated with subsequent use and not a calibration uncertainty.

Sleeve Friction Calibration

Calibration method

1. The sleeve was loaded to full range 3 times for no less than 1 minute before calibration.
2. The sleeve was calibrated with 4 sets of increasing forces and 2 sets of decreasing forces, with rotation before set 3 and 5.
3. The coefficients of a linear and third order equation relating the estimate of applied force as a function of the deflection were calculated and are shown in Table 4.
4. The forces applied, and the resulting deflections are given in Tables 5. No corrections for temperature have been applied to these results.
5. The combined expanded uncertainty* of deflection U_{fs} and U_{fs_class} for each force is shown as a percentage of the recorded value and in units of pressure (kPa) as shown in Table 6.

*The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

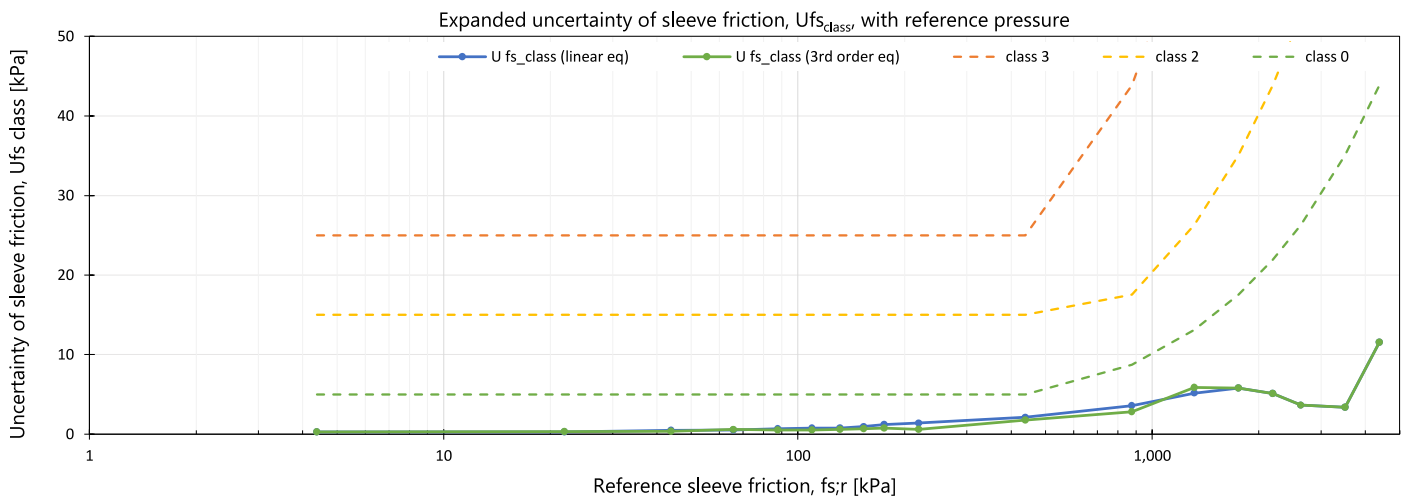
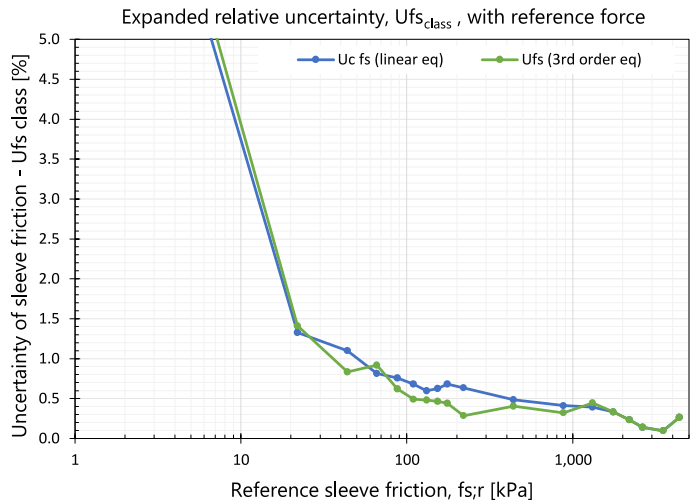
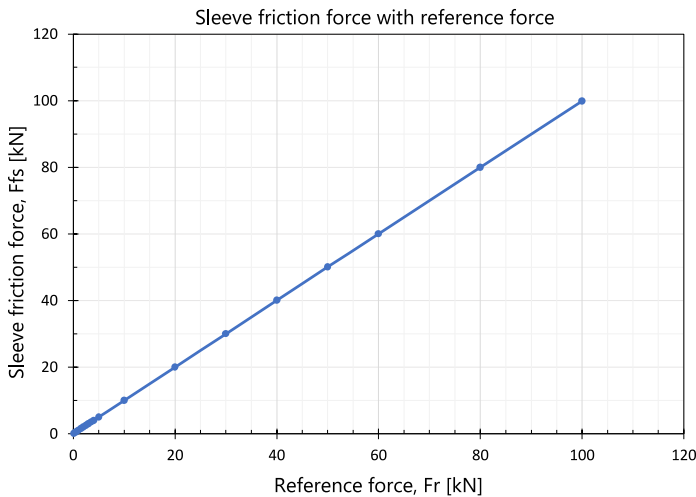
Cone Penetrometer	
Cone penetrometer type	Subtraction
Sleeve friction capacity	150 kN
Calibration range	100 kN
Sleeve friction effective resolution	0.005 kN
Sleeve area	22,813 mm ²
Measured beta factor sleeve area ratio	-0.004
Historic drift between sleeve calibrations (U_{drift})	0.05774 %
Apparent pore pressure (u_a) at full range	-0.06 kPa
Sleeve friction max zero drift	0.16 kPa
Reference load cell max zero drift	0.18 kPa

Calibration Conditions	
Ambient temperature	26.2 °C
Ambient temperature variation	0.65 °C
Instrument temperature variation	0.46 °C

Reference Load Cell Uncertainty	
AM DSCCHA-100 kN	0.02 ±%
AM DSCCHA-5 kN	0.05 ±%

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Sleeve Friction Calibration - Graphical Results



Interpolation

Table - 4

Linear Equation	The sleeve output in force units D (0.1 N) is derived using a linear factor from the raw sleeve output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.008482
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = 0$ $a_1 = 0.99691423$ $a_2 = 3.47284E-09$ $a_3 = 9.47068E-16$ Polynomial calc. is only to be used when the sleeve load is under 30 kN

Sleeve Friction Calibration - Tabular Results

Table - 6a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0014	0.0019	0.0001		0.0036	
0.1	0.0996	0.1000	0.1002		0.0991	
0.5	0.5016	0.5011	0.5008		0.4967	
1	0.9995	0.9975	1.0031		0.9990	
1.5	1.4979	1.4972	1.4994		1.4972	
2	1.9983	1.9982	1.9995		2.0007	
2.5	2.4988	2.4984	2.5010		2.4981	
3	2.9978	2.9985	2.9986		2.9989	
3.5	3.4990	3.4985	3.4989		3.4987	
4	4.0004	3.9972	4.0010		3.9979	
5	5.0011	5.0009	5.0011		4.9999	
4				3.9995		3.9989
3.5				3.5001		3.5006
3				2.9996		3.0011
2.5				2.4978		2.5004
2				1.9942		1.9989
1.5				1.4956		1.4967
1				0.9932		0.9988
0.5				0.4964		0.4971
0.1				0.0973		0.0998

Table - 6b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	9.9981	9.9957	9.9960		9.9947	
20	19.9911	19.9925	19.9926		19.9946	
30	30.0603	30.0554	30.0574		30.0545	
40	40.0670	40.0676	40.0668		40.0594	
50	50.0607	50.0586	50.0579		50.0472	
60	60.0435	60.0362	60.0378		60.0267	
80	79.9811	79.9726	79.9695		79.9624	
100	99.8844	99.8732	99.8716		99.8599	
80				79.9820		79.9745
60				60.0468		60.0416
50				50.0658		50.0600
40				40.0711		40.0705
30				30.0683		30.0678
20				20.0021		19.9998
10				9.9985		9.9985

Table - 6 Uncertainty assessment

Reference force	Reference sleeve friction	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 Class	Sleeve calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	fs;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Ucfs		Ufsclass			Udrift***
0	0	0.0000	0.0010	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0023	0.0023	0.20		0.20		0	0.00
0.1	4	0.0004	0.0003	0.0002	0.0020	0.0000	0.0004	0.0010	-0.0023	0.0033	0.0033	0.29	6.60	0.29	6.60	0	0.00
0.5	22	0.0006	0.0015	0.0003	0.0020	0.0000	0.0003	0.0014	-0.0019	0.0035	0.0035	0.31	1.41	0.31	1.41	0	0.01
1	44	0.0007	0.0013	0.0012	0.0020	0.0000	0.0005	0.0029	-0.0010	0.0042	0.0042	0.37	0.84	0.37	0.84	0	0.03
1.5	66	0.0048	0.0006	0.0004	0.0020	0.0001	0.0018	0.0013	-0.0039	0.0069	0.0069	0.61	0.92	0.60	0.92	0	0.04
2	88	0.0041	0.0007	0.0001	0.0020	0.0001	0.0005	0.0021	-0.0035	0.0062	0.0063	0.55	0.63	0.55	0.63	0	0.05
2.5	110	0.0041	0.0009	0.0002	0.0020	0.0001	0.0007	0.0016	-0.0036	0.0061	0.0063	0.55	0.50	0.54	0.50	0	0.06
3	132	0.0044	0.0004	0.0004	0.0020	0.0001	0.0016	0.0009	-0.0050	0.0072	0.0074	0.65	0.49	0.63	0.49	0	0.08
3.5	153	0.0053	0.0001	0.0003	0.0020	0.0001	0.0011	0.0009	-0.0056	0.0081	0.0083	0.73	0.48	0.71	0.48	0	0.09
4	175	0.0061	0.0009	0.0018	0.0020	0.0001	0.0002	0.0007	-0.0055	0.0088	0.0091	0.80	0.45	0.77	0.45	0	0.10
5	219	0.0023	0.0004	0.0001	0.0020	0.0002	0.0007	0.0003	-0.0064	0.0071	0.0077	0.67	0.31	0.62	0.31	0	0.13
10	438	0.0046	0.0010	0.0014	0.0020	0.0004	0.0038	0.0018	-0.0192	0.0203	0.0211	1.85	0.42	1.78	0.42	0	0.25
20	877	0.0079	0.0010	0.0008	0.0020	0.0007	0.0072	0.0042	-0.0299	0.0321	0.0341	2.99	0.34	2.82	0.34	0	0.51
30	1,315	0.0108	0.0017	0.0028	0.0020	0.0011	0.0573	0.0070	0.0320	0.0670	0.0691	6.05	0.46	5.87	0.46	0	0.76
40	1,753	0.0133	0.0025	0.0003	0.0020	0.0015	0.0643	0.0044	0.0056	0.0662	0.0699	6.13	0.35	5.80	0.35	0	1.01
50	2,192	0.0163	0.0041	0.0012	0.0020	0.0018	0.0552	0.0060	0.0037	0.0582	0.0646	5.67	0.26	5.10	0.26	0	1.27
60	2,630	0.0179	0.0050	0.0042	0.0020	0.0022	0.0360	0.0069	0.0030	0.0415	0.0535	4.69	0.18	3.64	0.18	0	1.52
80	3,507	0.0232	0.0055	0.0049	0.0020	0.0029	0.0290	0.0071	-0.0009	0.0387	0.0593	5.20	0.15	3.40	0.15	0	2.02
100	4,383	0.0281	0.0071	0.0065	0.0020	0.0036	0.1282	0.0000	0.0036	0.1317	0.1432	12.55	0.29	11.55	0.29	0	2.53

The class of the penetrometer is determined from the measurement uncertainty at any deflection.

At each given deflection the expanded measurement uncertainty Ufs_class is calculated from the readings obtained during calibration.

$$Ufs_{class} = \frac{2}{5} \times \sqrt{\sum_{i=1}^8 u_i^2}$$

where,

u1 is the standard uncertainty associated with the applied calibration force.

u2 is the standard uncertainty associated with the reproducibility of the calibration results.

u3 is the standard uncertainty associated with the repeatability of the calibration results.

u4 is the standard uncertainty associated with the resolution and noise of the system.

u5 is the standard uncertainty associated with the drift in zero output.

u6 is the standard uncertainty associated with interpolation.

u7 is the standard uncertainty associated with reversibility.

u8 is the standard uncertainty associated with apparent load transfer from other sensor. Includes subtraction error where: Fr;qC = Fr;fs.

* u1 is not a requirement for BS EN ISO 22476-1:2023 class uncertainty Ufs_class. We have included u1 for clarity and confidence in the result.

** If the classification is altered with the inclusion u1, then the lower classification will be given alongside a # symbol as identification.

*** udrift is the standard uncertainty associated with the drift in sensitivity between calibrations. This is an uncertainty associated with subsequent use and not a calibration uncertainty.

Sleeve Friction Calibration - Subtraction Error

In use, the forces acting on the sleeve load cell element are a combination of tip resistance and sleeve friction, with the tip resistance force value from the tip load cell element being subtracted to give the sleeve friction value. The resultant error values for differing tip and sleeve values are shown in Table 7.

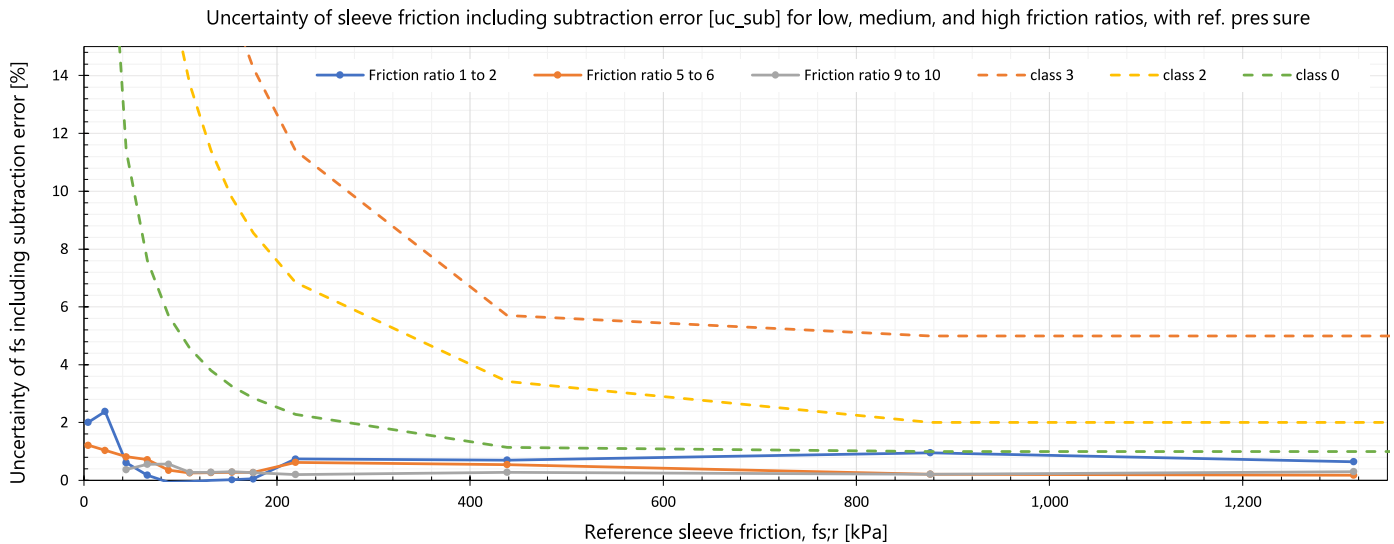
The highlighted cell results in Table 7, show a direct reading of the subtraction error from the calibration results.

The non-highlighted cells in Table 7, show an interpolated subtraction error from the calibration results.

Sleeve friction - tip subtraction combined standard uncertainty uc_{sub} , where friction ratio is between 0.1% and 10%.

Table - 7

		Sleeve friction combined standard uncertainty including subtraction error (%)												
		Sleeve friction kPa →												
		4	22	44	66	88	110	132	153	175	219	438	877	1,315
Tip resistance kPa ↓	66	1.22	-	-	-	-	-	-	-	-	-	-	-	-
	331	2.01	1.04	-	-	-	-	-	-	-	-	-	-	-
	662	3.40	2.04	0.82	0.55	-	-	-	-	-	-	-	-	-
	992	0.99	1.75	0.89	0.72	0.56	-	-	-	-	-	-	-	-
	1,323	1.80	1.97	1.18	0.82	0.60	0.28	0.28	-	-	-	-	-	-
	1,654	2.21	2.33	1.21	0.48	0.35	0.29	0.30	0.29	-	-	-	-	-
	1,985	1.27	2.54	1.25	0.41	0.50	0.26	0.27	0.27	0.26	-	-	-	-
	2,315	1.17	2.69	0.29	0.41	0.30	0.25	0.26	0.26	0.26	0.19	-	-	-
	2,646	1.71	0.46	1.18	0.44	0.32	0.27	0.28	0.28	0.27	0.20	-	-	-
	3,308	1.81	0.48	0.35	0.45	0.33	0.28	0.28	0.28	0.28	0.62	-	-	-
	6,616	-	-1.11	-0.44	-0.08	-0.07	-0.04	0.02	0.05	0.08	0.05	0.55	-	-
	13,231	-	-1.34	-0.56	-0.16	-0.13	-0.09	-0.02	0.02	0.05	0.02	1.02	0.54	0.30
	19,847	-	12.96	6.59	4.61	3.45	2.77	2.36	2.06	1.84	1.45	1.05	0.54	0.17
	26,463	-	-	4.92	3.49	2.61	2.10	1.81	1.59	1.42	1.12	0.62	0.44	0.47
	33,078	-	-	5.68	4.00	2.99	2.41	2.06	1.81	1.61	1.27	0.57	0.52	0.40
	39,694	-	-	6.58	4.60	3.44	2.77	2.36	2.06	1.83	1.45	0.91	0.50	0.52
52,925	-	-	-	5.62	4.21	3.38	2.87	2.50	2.22	1.76	1.06	1.16	0.57	
66,157	-	-	-	-	5.39	4.33	3.66	3.18	2.81	2.23	1.30	0.76	0.65	
Friction ratio (for a given row) →														
		Friction ratio (for a given column) ↑												



Pore Pressure Calibration

Calibration method

1. The cone penetrometer was placed in a pressure vessel and was pressurised to full range 3 times for no less than 1 minute before calibration.
2. The pore pressure was calibrated with 2 sets of increasing pressures and 2 sets of decreasing pressures.
3. The coefficients of a linear and third order equation relating the estimate of applied pressure as a function of deflection were calculated and are shown in Table 8.
4. The pressures applied, and the resulting deflections are given in Tables 9. No corrections for temperature have been applied to these results.
5. The combined expanded uncertainty* of deflection U_u and U_{u_class} for each force is shown as a percentage of the recorded value and in units of pressure kPa as shown in Table 10.

* The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

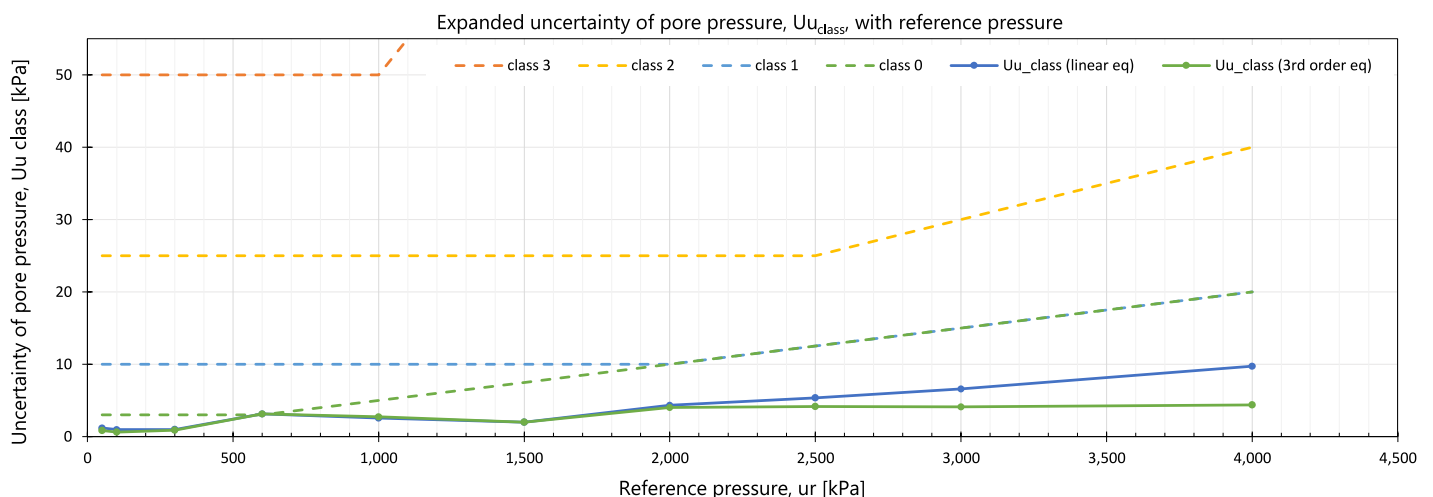
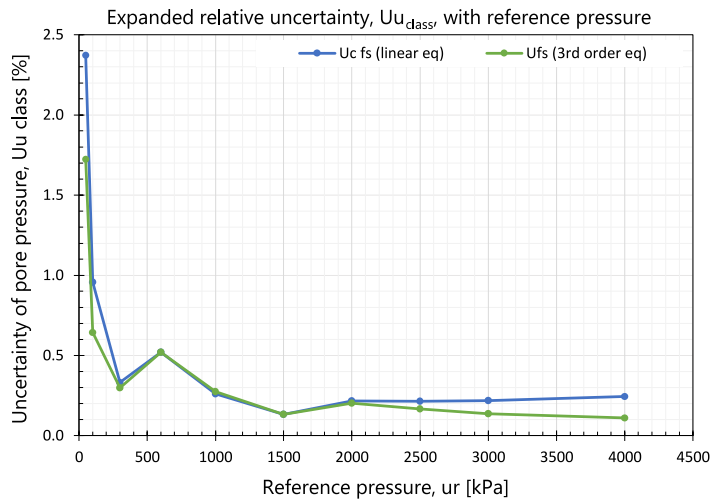
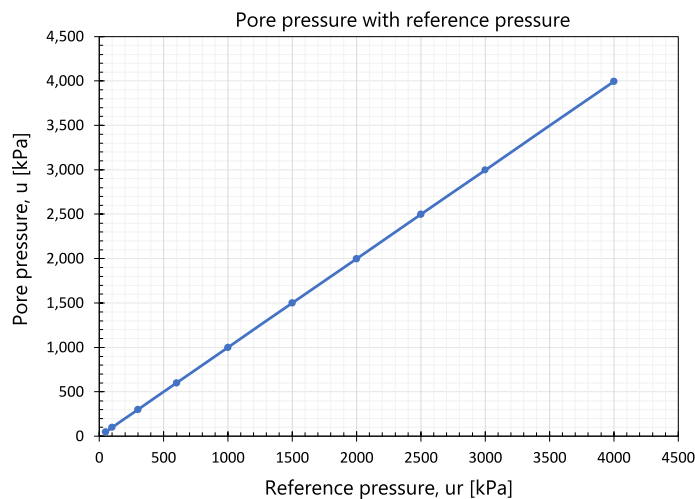
Cone Penetrometer	
Pore pressure sensor capacity	5 MPa
Calibration range	4 MPa
Pore pressure resolution	0.005 kPa
Historic drift between pore calibrations (u_{drift})	0.05774 %
Pore pressure sensor max zero drift	0.39 kPa
Reference pressure sensor max zero drift	0.12 kPa

Calibration Conditions	
Ambient temperature	27.9 °C
Pressure chamber temperature variation	0.36 °C
Instrument temperature variation	0.40 °C

Reference Pressure Sensor Uncertainty	
MMG750V1P1MC0T3A6CE	0.02 ±%

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Pore Pressure Calibration - Graphical Results



Interpolation

Table - 8

Linear Equation	The pore pressure output in pressure units D (0.1 Pa) is derived using a linear factor from the raw pore pressure output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 Pa Factor = 0.04792
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 Pa units), the corrected applied pressure, P (in 0.1 Pa units) is calculated from : $P = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$	$a0 = 5062.479642$ $a1 = 0.998464215$ $a2 = 7.98682E-11$ $a3 = -4.89221E-19$

Pore Pressure Calibration - Tabular Results

Table - 9 Calibration results

kPa ur	kPa X1	kPa X2'	kPa X3	kPa X4'
0	0.39		0.12	
50	49.88		50.18	
100	99.98		100.04	
300	299.79		299.92	
600	600.06		599.79	
1000	998.94		1000.04	
1500	1499.82		1499.94	
2000	1998.60		1998.88	
2500	2498.72		2498.99	
3000	2998.82		2999.20	
4000	3999.58		3999.74	
3000		3000.71		2999.58
2500		2500.49		2500.72
2000		2000.37		2000.76
1500		1500.21		1500.93
1000		1000.95		1001.12
600		600.97		595.56
300		300.32		300.39
100		99.80		99.37
50		50.59		50.69

Table - 10 Uncertainty assessment

Reference pressure ur	Standard uncertainty u1 to u6						Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Pore calibration drift
	kPa u1*	kPa u2	kPa u3	kPa u4	kPa u5	kPa u6	kPa u _i	%	kPa U _u	%	kPa U _u _{class}	%		
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0	0.00
50	0.18	0.17	0.00	0.00	0.03	0.35	0.43	0.86	0.86	1.72	0.86	1.72	0	0.03
100	0.21	0.04	0.00	0.01	0.01	0.24	0.32	0.32	0.64	0.64	0.64	0.64	0	0.06
300	0.31	0.08	0.00	0.03	0.14	0.29	0.45	0.15	0.90	0.30	0.90	0.30	0	0.17
600	0.45	0.15	0.00	0.06	0.07	1.48	1.56	0.26	3.12	0.52	3.12	0.52	0#	0.35
1000	0.65	0.64	0.00	0.10	0.51	0.89	1.37	0.14	2.75	0.27	2.75	0.27	0	0.58
1500	0.90	0.07	0.00	0.14	0.12	0.40	1.00	0.07	2.01	0.13	2.01	0.13	0	0.87
2000	1.15	0.16	0.00	0.19	1.26	1.05	2.02	0.10	4.03	0.20	4.03	0.20	0	1.15
2500	1.39	0.16	0.00	0.24	1.14	1.01	2.09	0.08	4.17	0.17	4.17	0.17	0	1.44
3000	1.64	0.22	0.00	0.29	0.99	0.65	2.06	0.07	4.11	0.14	4.11	0.14	0	1.73
4000	2.13	0.09	0.00	0.39	0.34	0.00	2.20	0.05	4.39	0.11	4.39	0.11	0	2.31

The class of the penetrometer is determined from the measurement uncertainty at any deflection

At each given deflection the expanded measurement uncertainty U_{u_class} is calculated from the readings obtained during calibration.

$$U_{u_class} = 2 \times \sqrt{\sum_{i=1}^6 u_i^2}$$

where,

- u1 is the standard uncertainty associated with the applied calibration pressure.
- u2 is the standard uncertainty associated with the repeatability of the calibration results.
- u3 is the standard uncertainty associated with the resolution and noise of the system.
- u4 is the standard uncertainty associated with the drift in zero output.
- u5 is the standard uncertainty associated with interpolation.
- u6 is the standard uncertainty associated with reversibility.

* u1 is not a requirement for BS EN ISO 22476-1:2023 class uncertainty U_{u_class} . We have included u1 for clarity and confidence in the result.

** If the classification is altered with the inclusion u1, then the lower classification will be given alongside a # symbol as identification.

*** udrift is the standard uncertainty associated with the drift in sensitivity between calibrations. This is an uncertainty associated with subsequent use and not a calibration uncertainty.

Pore Pressure Calibration - Measured Area Ratios
Calibration method

1. The apparent cone resistance $q_{c;a}$ and apparent sleeve friction $f_{s;a}$ are recorded for all pore pressure calibration intervals, and shown in Table 11a and 11b.
2. The resulting net area ratios of the cone a and net area ratios of the sleeve b are computed and shown in Table 11a and 11b.
3. The final recorded cone net area ratio a and sleeve net area ratio b are shown in Table 12, where reference pressure $u_r = 2000\text{kPa}$

Table - 11a Cone net area ratio assessment

kPa u_r	Apparent cone resistance [$q_{c;a}$]					Alpha factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	36.8		38.4		37.6	0.75
100	74.6		76.0		75.3	0.75
300	227.1		229.4		228.3	0.76
600	457.6		458.4		458.0	0.76
1000	767.0		769.3		768.2	0.77
1500	1157.1		1159.8		1158.5	0.77
2000	1551.9		1552.2		1552.1	0.78
2500	1948.8		1950.5		1949.6	0.78
3000	2349.1		2351.3		2350.2	0.78
4000	3152.8		3153.2		3153.0	0.79
3000		2359.9		2358.1	2359.0	0.79
2500		1961.69		1960.19	1960.9	0.78
2000		1564.45		1562.52	1563.5	0.78
1500		1166.99		1167.66	1167.3	0.78
1000		776.774		774.608	775.7	0.78
600		463.085		458.124	460.6	0.77
300		229.959		229.593	229.8	0.77
100		76.013		74.0652	75.0	0.75
50		37.3753		36.8465	37.1	0.74

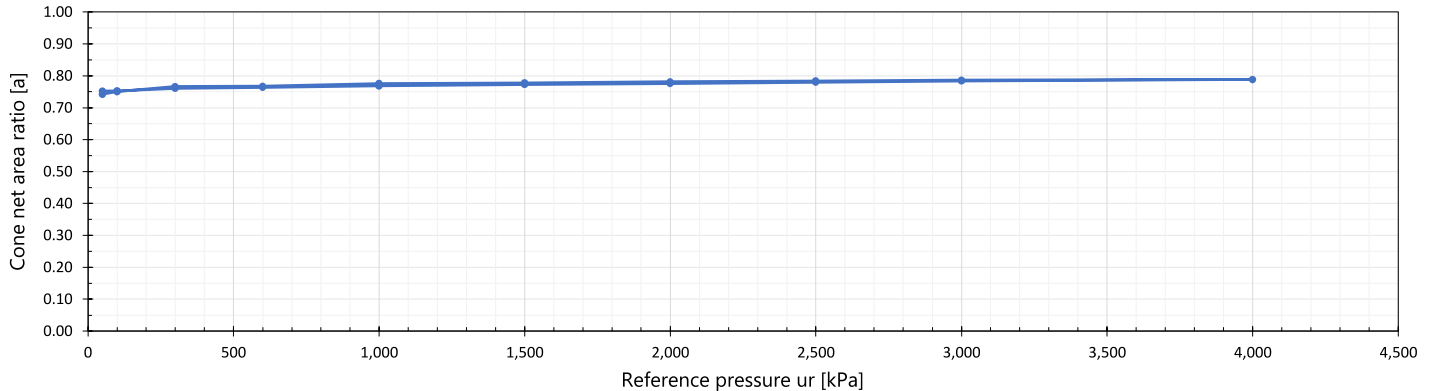
Table - 11b Sleeve friction net area ratio assessment

kPa u_r	Apparent sleeve friction [$f_{s;a}$]					Beta factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	-0.27		-0.46		-0.36	-0.007
100	-0.62		-0.73		-0.67	-0.007
300	-1.90		-2.10		-2.00	-0.007
600	-3.54		-3.74		-3.64	-0.006
1000	-5.12		-5.58		-5.35	-0.005
1500	-6.29		-6.87		-6.58	-0.004
2000	-6.95		-7.57		-7.26	-0.004
2500	-7.54		-8.19		-7.86	-0.003
3000	-8.83		-9.20		-9.01	-0.003
4000	-11.63		-11.93		-11.78	-0.003
3000		-6.31		-6.25	-6.28	-0.002
2500		-4.38		-4.32	-4.35	-0.002
2000		-3.01		-2.82	-2.92	-0.001
1500		-1.78		-1.64	-1.71	-0.001
1000		-0.38		-0.19	-0.29	0.000
600		-0.09		-0.02	-0.06	0.000
300		-0.24		0.03	-0.10	0.000
100		-0.18		0.17	0.00	0.000
50		0.13		0.24	0.19	0.004

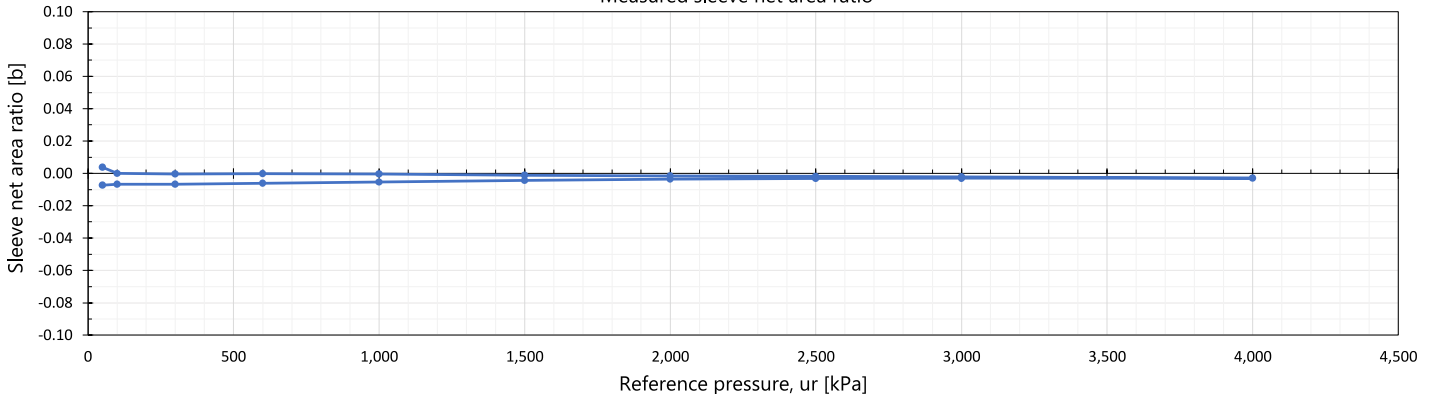
Table - 12

Cone net area ratio [a]	0.78
Sleeve friction net area ratio [b]	-0.004

Measured cone net area ratio



Measured sleeve net area ratio



Inclination Calibration

Calibration method

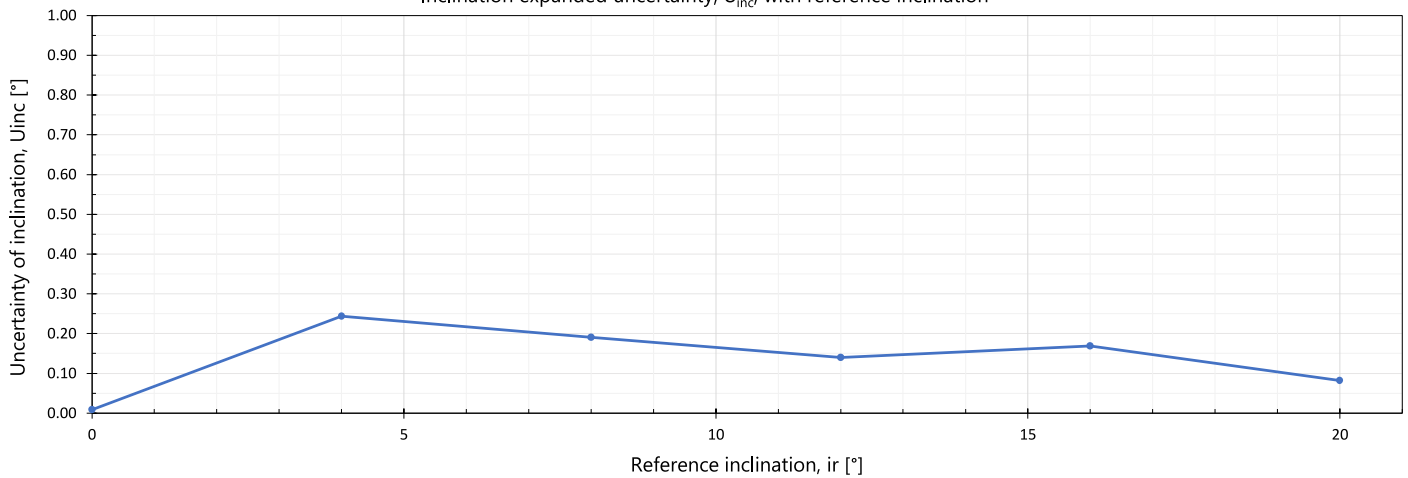
1. The cone penetrometer was placed in the inclination calibration frame and set to a vertical reference inclination of $i_r = 0^\circ$.
2. The inclination was calibrated from $i_r = 0^\circ$ to $i_r = 20^\circ$. This was conducted twice, once with the cone at 0° rotation and once with the cone at 90° rotation.
3. The coefficients of a linear equation relating the estimate of the inclination as a function of raw sensor deflection were calculated and are shown in Table 13.
4. The inclination angle applied, and the resulting measurements are given in Table 14.
5. The combined expanded uncertainty* of measurement U_{inc} for each inclination angle is shown as a percentage of the recorded value and in units of arc degrees $^\circ$, as shown in Table 15.

* The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

Cone Penetrometer		Reference Inclination Rotary Table Uncertainty	
Inclination sensor range	90 $^\circ$	Lankelma HV6 Rotary Table	0.10 $^\circ$
Calibration range	20 $^\circ$		
Inclination resolution	0.005 $^\circ$		
Inclinometer number of axis	2		

Inclination - Graphical Results

Inclination expanded uncertainty, U_{inc} with reference inclination



Interpolation

Table - 13

Linear Equation	The Inclination output in angular units ($0.1^\circ \times 10^{-3}$) is derived using a linear factor from the raw inclination output.	X axis Factor =	9.80418
		Y axis Factor =	9.913159

Inclination Calibration - Tabular Results

Table - 14

Inclination calibration

i_r	θ_0	θ_{90}
0	0.00	0.00
4	3.88	3.88
8	7.90	7.91
12	12.03	12.10
16	16.03	16.12
20	20.06	20.00

Table - 15 Uncertainty assessment

Reference Inclination	Standard calibration uncertainty u_1 to u_4				Combined standard calibration uncertainty u_i		Expanded calibration uncertainty U_{inc} [$k=2$]	
	i_r	u_1	u_2	u_3	u_4	u_i	U_{inc}	
0	0	0.00	0.00	0.00	0.00	0.00	0.01	
4	4	0.01	0.00	0.00	-0.12	0.12	3.05	0.24
8	8	0.02	0.00	0.00	-0.09	0.10	1.19	0.19
12	12	0.02	0.03	0.00	0.06	0.07	0.59	0.14
16	16	0.02	0.03	0.00	0.08	0.08	0.53	0.17
20	20	0.02	0.02	0.00	0.03	0.04	0.21	0.08

At each given deflection the expanded measurement uncertainty U_{inc} is calculated from the readings obtained during calibration.

$$U_{inc} = 2 \times \sqrt{\sum_{i=1}^4 u_i^2}$$

where,

u_1 is the standard uncertainty associated with the applied calibration inclination.

u_2 is the standard uncertainty associated with the reproducibility of the calibration results.

u_3 is the standard uncertainty associated with the resolution and noise of the system.

u_4 is the standard uncertainty associated with interpolation.

Temperature Calibration

Calibration method

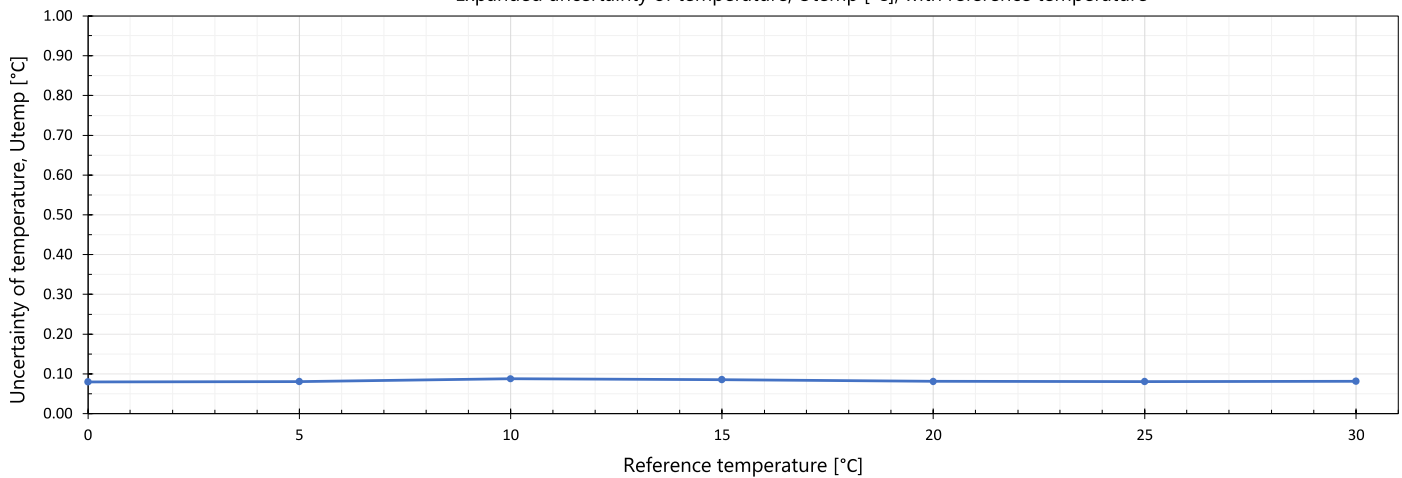
1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 0°C.
2. The temperature was calibrated from Tr = 0°C to Tr = 30°C.
3. The coefficients of a linear equation relating the estimate of temperature as a function of raw temperature sensor deflection were calculated and are shown in Table 16.
4. The applied temperature, and the resulting measurements are given in Table 17.
5. The combined expanded uncertainty* of measurement Utemp for each temperature is shown as a percentage of the recorded value and in units of Celsius °C, as shown in Table 18.

* The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Cone Penetrometer		Reference Thermometer Uncertainty	
Temperature sensor range	90 °	ETI Ref Thermometer	0.04 °
Calibration range	30 °		
Temperature resolution	0.005 °	Temperature Datalogger Uncertainty	
Temperature number of axis	2	ETI ThermoData	0.4 °

Temperature Calibration - Graphical Results

Expanded uncertainty of temperature, Utemp [°C], with reference temperature



Interpolation

Table - 16

Linear Equation	The temperature sensor output in temperature units (0.1°C x 10 ⁻³) is derived using a linear factor from the raw temperature output.	Temperature sensor [qc] factor =	0.383574
		Temperature sensor [fs] factor =	0.383337

Temperature Calibration - Tabular Results

Table - 17
Temperature calibration

°C	°C
Tr	Ta
0	0.00
5	5.00
10	10.02
15	15.01
20	19.99
25	25.00
30	29.99

Table - 18 Uncertainty assessment

Reference temp	Standard calibration uncertainty u1 to u3			Combined standard calibration uncertainty ut		Expanded calibration uncertainty Utemp [k=2]	
	°C	°C	°C	°C	%	°C	%
Tr	u1	u2	u3	ut		Utemp	
0	0.04	0.00	0.00	0.04		0.08	
5	0.04	0.00	0.00	0.04	0.80	0.08	1.61
10	0.04	0.00	0.02	0.04	0.44	0.09	0.88
15	0.04	0.00	0.01	0.04	0.28	0.09	0.57
20	0.04	0.00	-0.01	0.04	0.20	0.08	0.40
25	0.04	0.00	0.00	0.04	0.16	0.08	0.32
30	0.04	0.00	-0.01	0.04	0.14	0.08	0.27

At each given deflection the expanded measurement uncertainty Utemp is calculated from the readings obtained during calibration.

$$U_{temp} = 2 \times \sqrt{\sum_{i=1}^3 u_i^2}$$

where,

u1 is the standard uncertainty associated with the applied calibration temperature.

u2 is the standard uncertainty associated with the resolution and noise of the system.

u3 is the standard uncertainty associated with interpolation.

Temperature Influence Verification
Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 30°C, the second bath temperature was set to 0°C.
2. The test method for verification of a cone penetrometer for temperature influence was followed as set out in BS EN ISO 22476-1:2023, clause B.2.7.2.
3. The bath temperatures, apparent cone resistance, apparent sleeve friction, apparent pore pressure, and apparent cone temperature were recorded for the duration of the test.
4. The correction factors for f_{sc} , corrected apparent cone resistance, corrected sleeve friction, and corrected pore pressure were applied in post processing.
5. The start and end apparent readings are shown in Table 19. The maximum and minimum apparent readings are shown in Table 20.
6. The ambient stability, transient stability, and resulting penetrometer class were calculated and are shown in Table 21.

Table - 19 Start and end apparent readings

	°C	°C	kPa	kPa	kPa	kPa	kPa	kPa
	Ta _{qc}	Ta _{fs}	qc;a	qc;ac	fs;a	fs;ac	u;a	u;ac
T30	29.9	29.7	-5.6	-6.7	1.0	0.9	-0.3	0.0
T0	0.0	0.0	-91.9	-20.7	-2.4	1.1	30.3	2.2

Table - 20 Maximum / minimum apparent readings

	kPa	kPa	kPa	kPa	kPa	kPa
	qc;a	qc;ac	fs;a	fs;ac	u;a	u;ac
max	305.5	236.6	7.4	8.2	30.4	3.1
min	-393.7	-248.3	-8.0	-6.3	-3.5	-6.7

Maximum rate of change

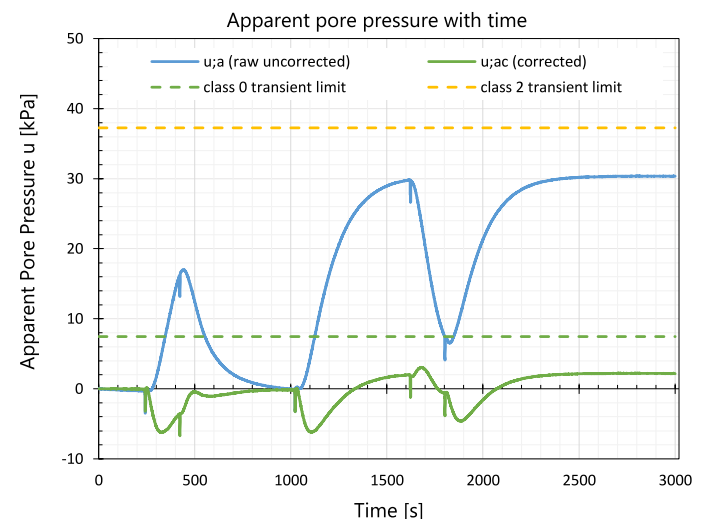
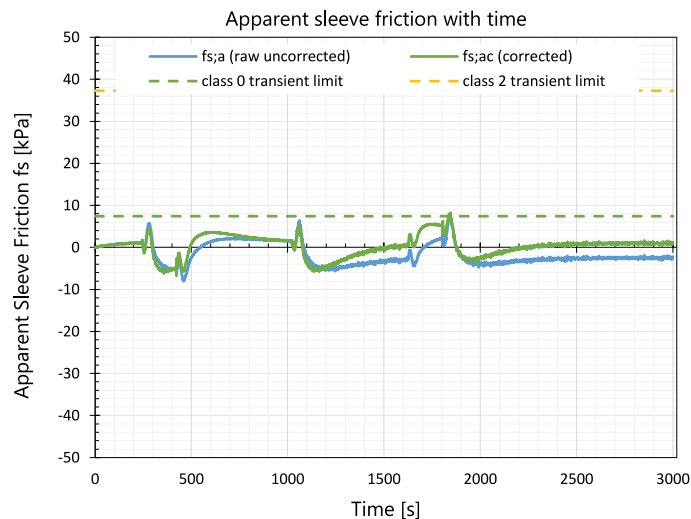
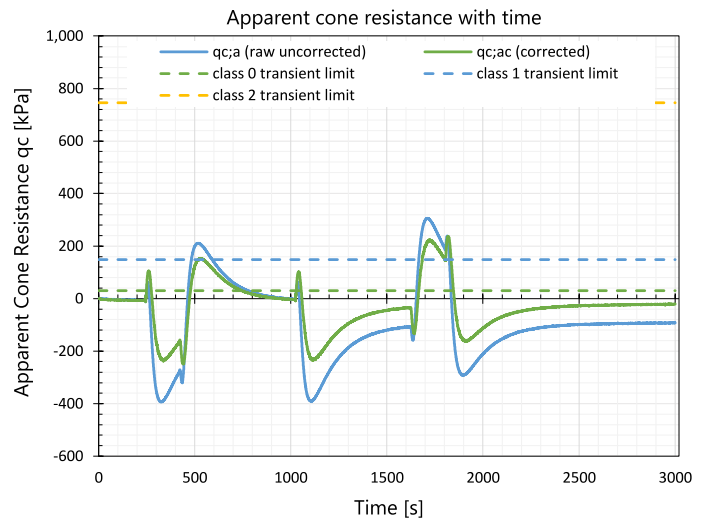
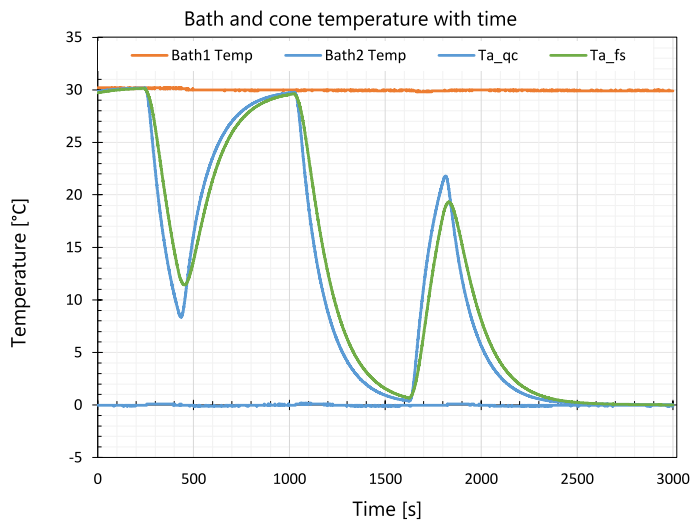
kPa/s	kPa/s	kPa/s	kPa/s	kPa/s	kPa/s
Δf_{gqc}	Δf_{gqcc}	Δf_{gfs}	Δf_{gpsc}	Δf_{gu}	Δf_{guc}
13.53	9.49	0.31	0.33	0.23	0.19

Table - 21a Ambient temperature stability and classification

Ambient temperature stability		kPa/°C	Class
Uncorrected	Δa_{qc}	2.89	2
	Δa_{fs}	0.11	2
	Δa_u	-1.03	N/A
Corrected	Δa_{qcc}	0.47	0
	Δa_{psc}	-0.01	0
	Δa_{uc}	-0.07	0

Table - 21b Transient temperature stability and classification

Transient temperature stability		kPa/°C	Class
Uncorrected	Δt_{qc}	23.45	2
	Δt_{fs}	0.52	2
	Δt_u	1.14	2
Corrected	Δt_{qcc}	16.26	2
	Δt_{psc}	0.49	0
	Δt_{uc}	0.33	0



Bending Influence Verification

Verification Method

1. The cone penetrometer was placed in the bending influence frame, clamping the cone horizontally.
2. The test method for verification of a cone penetrometer for bending influence was followed as set out in BS EN ISO 22476-1:2023, clause B.2.8.2.
3. The air temperature, apparent cone resistance, apparent sleeve friction, and apparent pore pressure were recorded for the duration of each test. In total 8 tests were performed from 0° rotation to 315° rotation, evenly spaced with 45° rotation between tests.
4. The bending influence results and resulting cone penetrometer classification was calculated and are shown in Table 22.

Table - 22 Bending Influence results

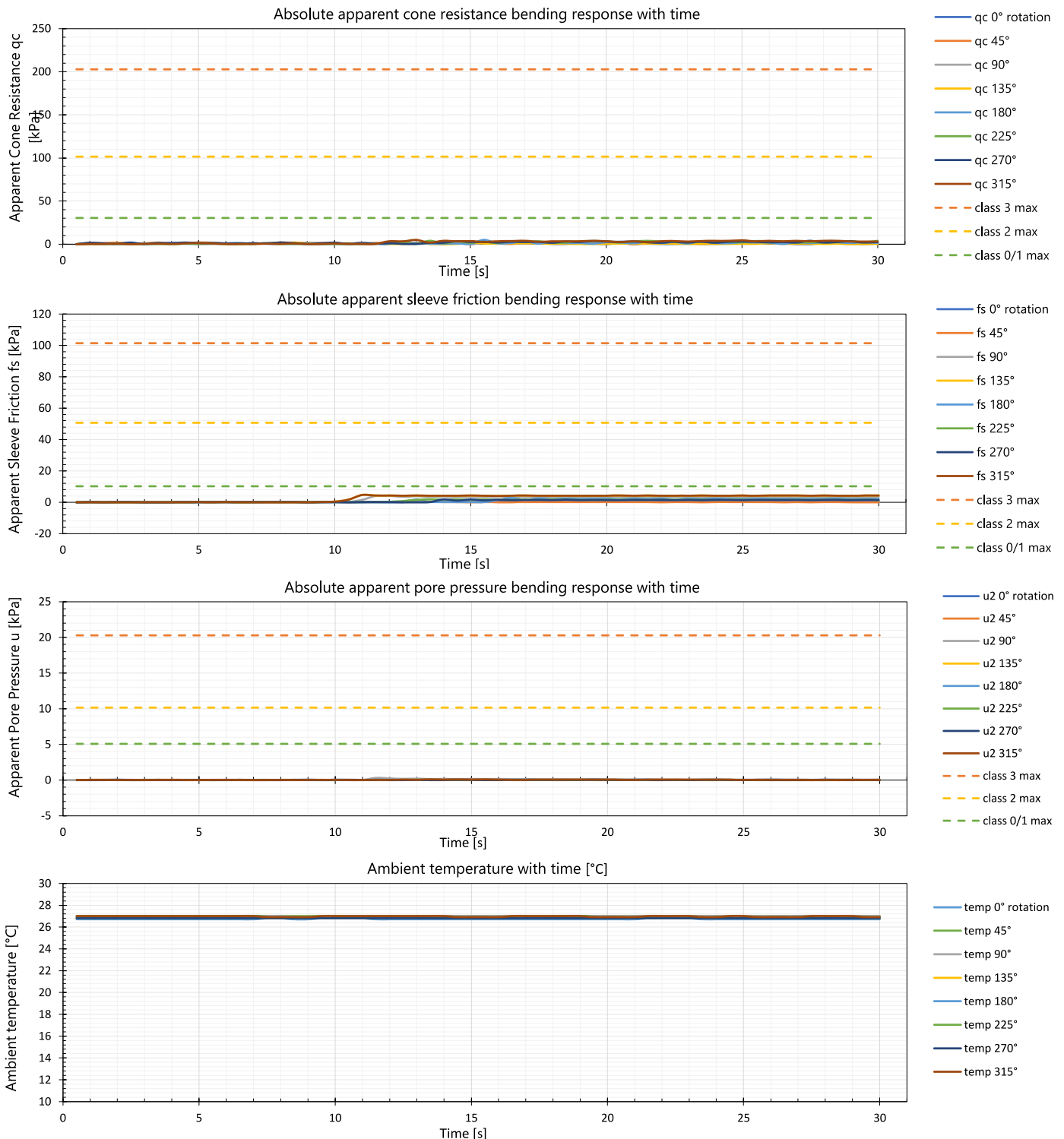
	qc;a [kPa/N]	fs;a [kPa/N]	u2;a [kPa/N]	Ambient Temp [°C]
max	0.048	0.001	0.003	27.0
min	-0.034	-0.053	0.000	26.9
max test Δb, Δt	0.082	0.054	0.003	0.1
class	0	0	0	

10 kg Calibration Weight Uncertainty

10 kg Calibration Weight 0.001 %

10 kg Calibration Weight

Reference weight 10.341 kg
Reference force 101.411 N



Sensor Stability Verification

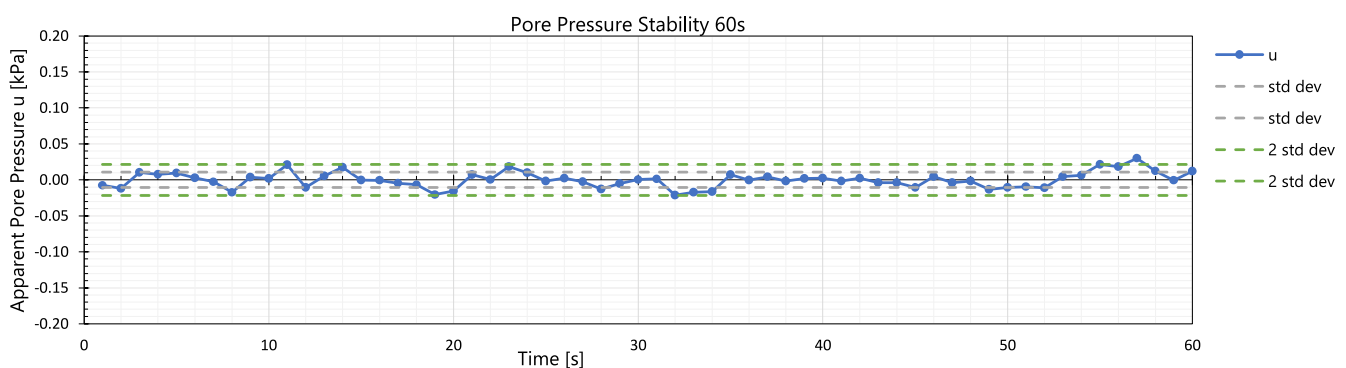
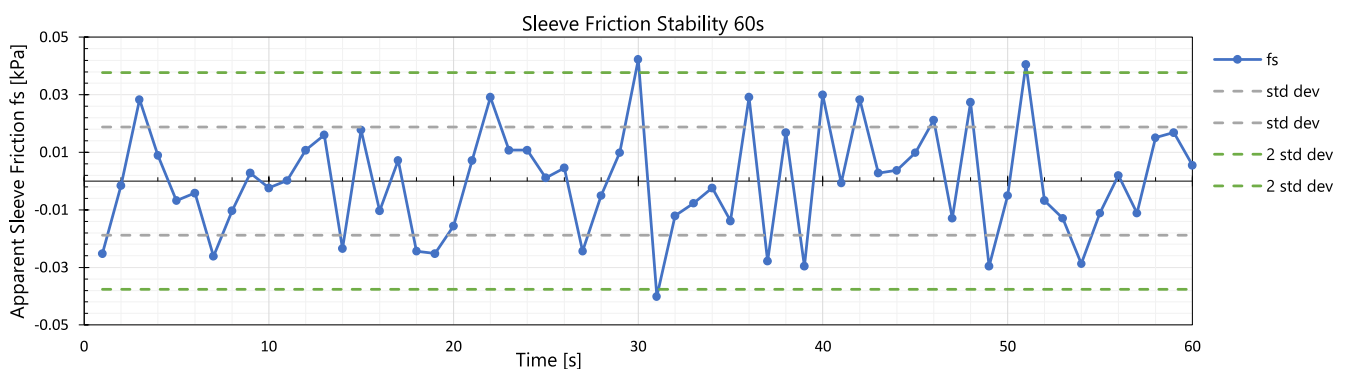
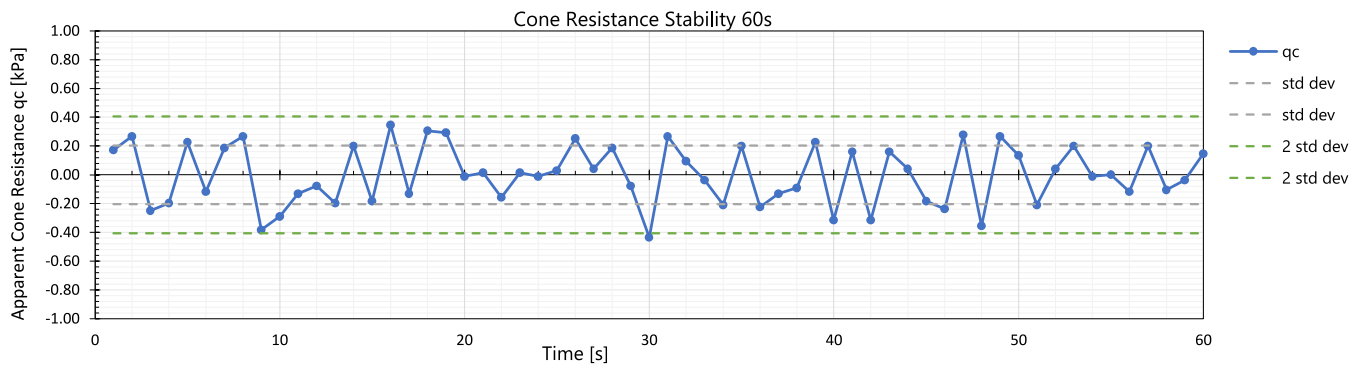
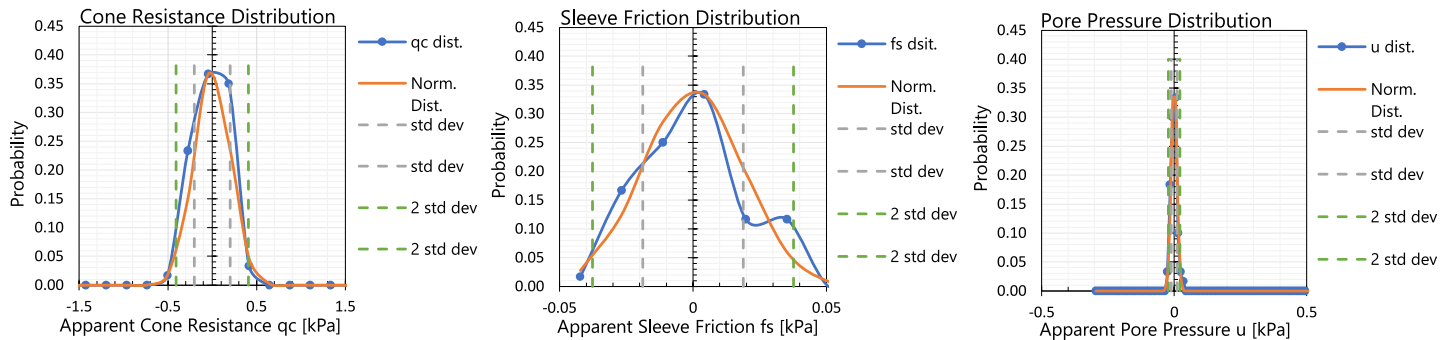
The purpose of this section is to quantify the stability of the geotechnical sensors (q_c , f_s , u) and demonstrate validity of applying a normal distribution, described by standard deviation and mean, when assessing probability of noise magnitude. The sampling duration has been limited to 60 seconds to allow direct comparison to the field verification data required under BS EN ISO 22476-1: 2023.

Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath at ambient temperature.
2. The cone penetrometer was left for no less than 30 minutes or until the output was stable.
3. The output was recorded for 60 seconds at a frequency of 1Hz. The maximum change and standard deviation are shown in Table 23.

Table - 23 Sensor stability results

	q_c (kPa)	f_s (kPa)	u (kPa)	Inc (°)	Temp (°C)
Max	0.346	0.042	0.030	0.040	0.002
Min	-0.435	-0.040	-0.021	-0.037	-0.002
Δ (Max - Min)	0.781	0.082	0.051	0.080	0.006
Standard deviation (68% coverage)	± 0.203	± 0.019	± 0.011	± 0.017	± 0.001
2 standard deviations (95% coverage)	± 0.406	± 0.038	± 0.022	± 0.034	± 0.002





UK3 Track-truck

Rig weight	20.5 T
Max. operating ram capacity	17 T
Max. travelling speed	86 km/h
Track material	Steel
Track length	3300 mm
Track width	650 mm
Jack plate dimensions	Tracks act as jacks
Jack arrangements	1nr. on each side
Max. ground clearance on jacks	210 mm
Max. ground bearing pressure	Tracking/pushing – 47 kPa Pulling – 88 kPa
Max. testing gradient	10 degrees
Max. traversing gradient	20 degrees (operator assessed)
Noise output at 2 m	Testing - 74 dBA Driving – 87 dBA
Clamp arrangement	36/55 push-pull clamp
Ram stroke	1.2 m
Max. casing size	55 mm

Lankelma's versatile track-truck is suitable for most geotechnical sites. The rig is driven to site as a self-contained HGV with tracks that can be deployed to cope with soft or uneven terrain. Fitted with a chalywn valve and spark arrestor.

Typical production

An expected 100m+ of standard CPTu testing can be executed in a day (depending on conditions and access).

Specialist testing

Seismic
Pressuremeter
Magnetometer
Video cone
Wing cone
Push-in shear vane

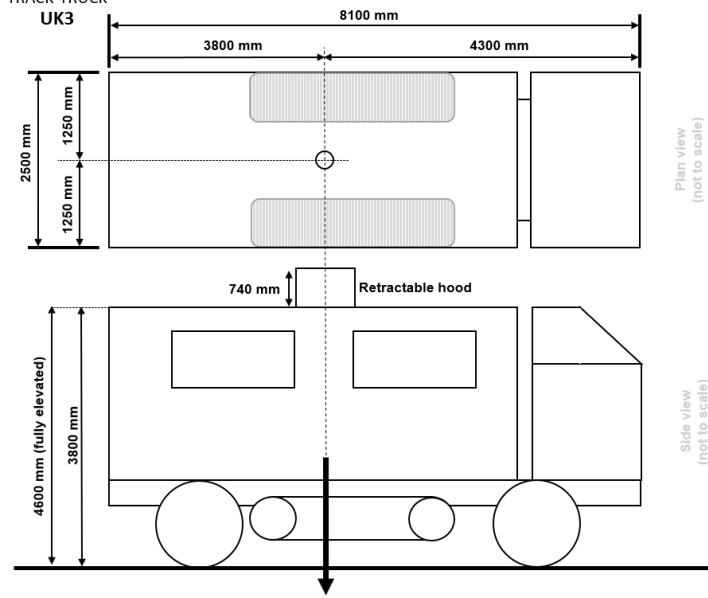
Installations

VWP
Piezometer
Inclinometer

Sampling

MOSTAP
Shelby

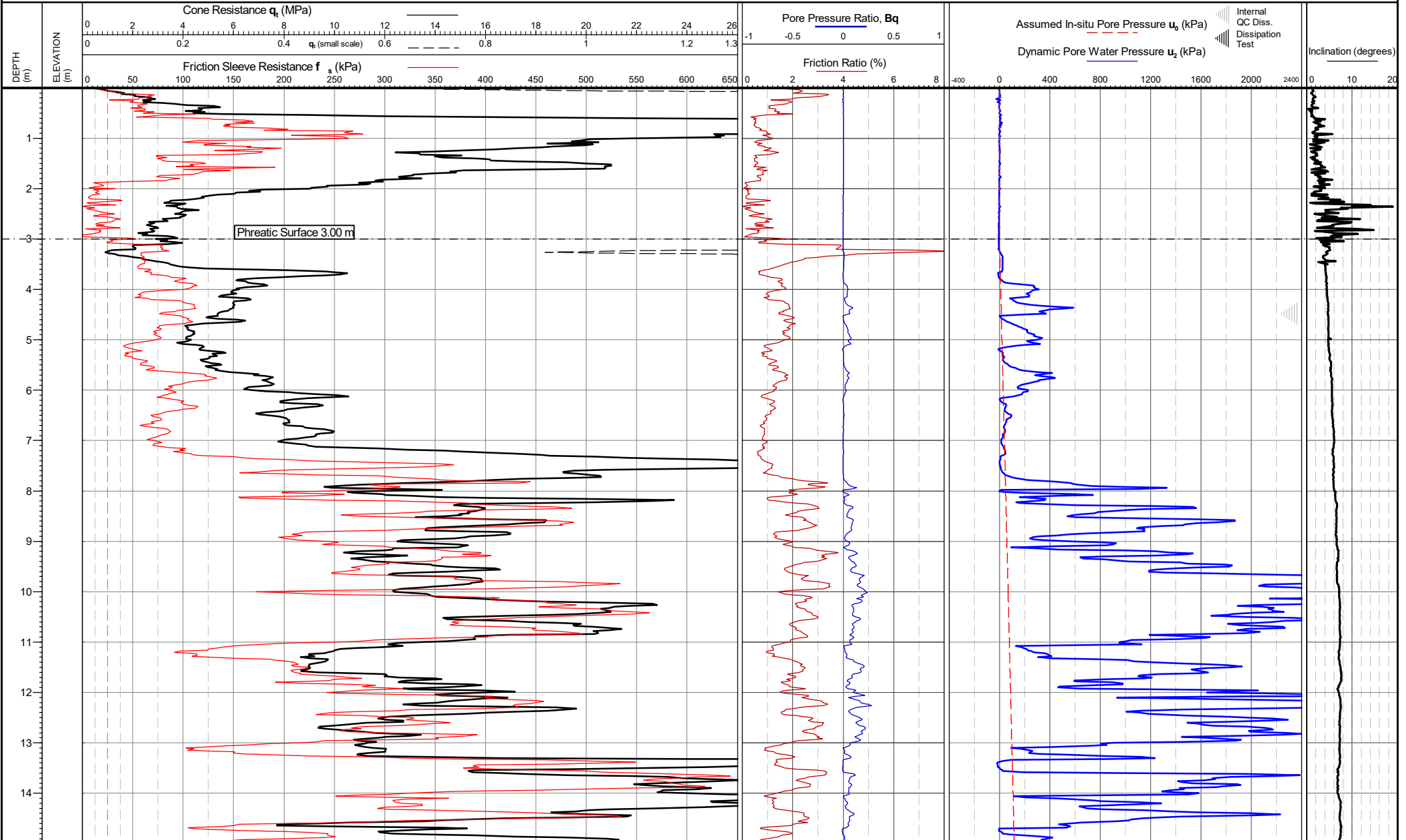
TRACK-TRUCK



APPENDIX C CONE PENETRATION TEST RESULTS

Measured CPT parameters

intermediate parameters R_f and B_q



Cone area (mm²):
Cone ID: S15-CIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

Zero drift (Pre/post test)
 q_t (kPa): -10.8
 f_s (kPa): 1.0
 u_2 (kPa): -0.4

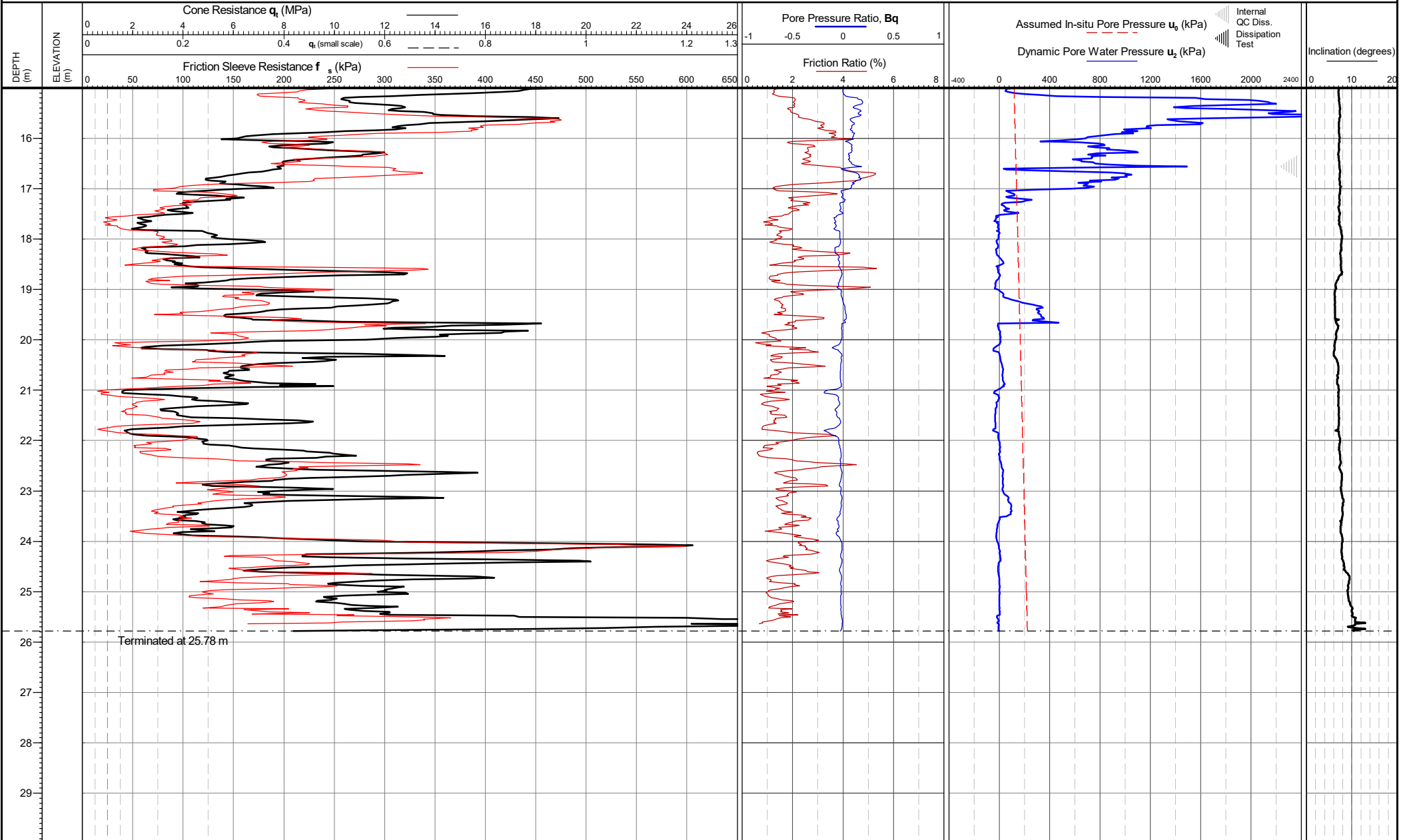
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

Zero drift (Pre/post test)
q_e (kPa): -10.8
f_s (kPa): 1.0
u₂ (kPa): -0.4

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Date of plot:
12-12-25

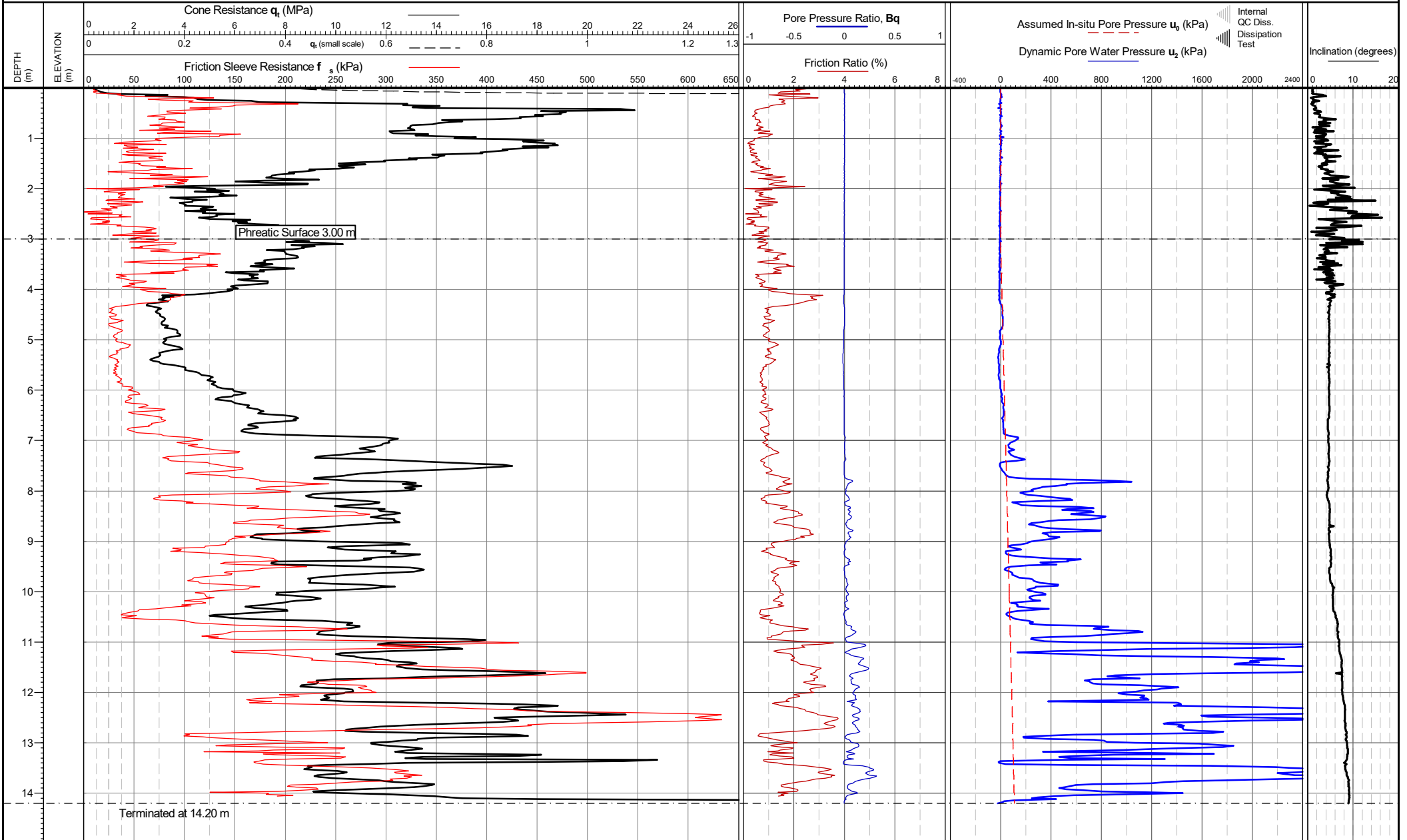
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 10:23:52

Zero drift (Pre/post test)
 q_0 (kPa): 9.2
 f_0 (kPa): 0.1
 u_2 (kPa): 0.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot:
12-12-25
Checked by:
Chris Player

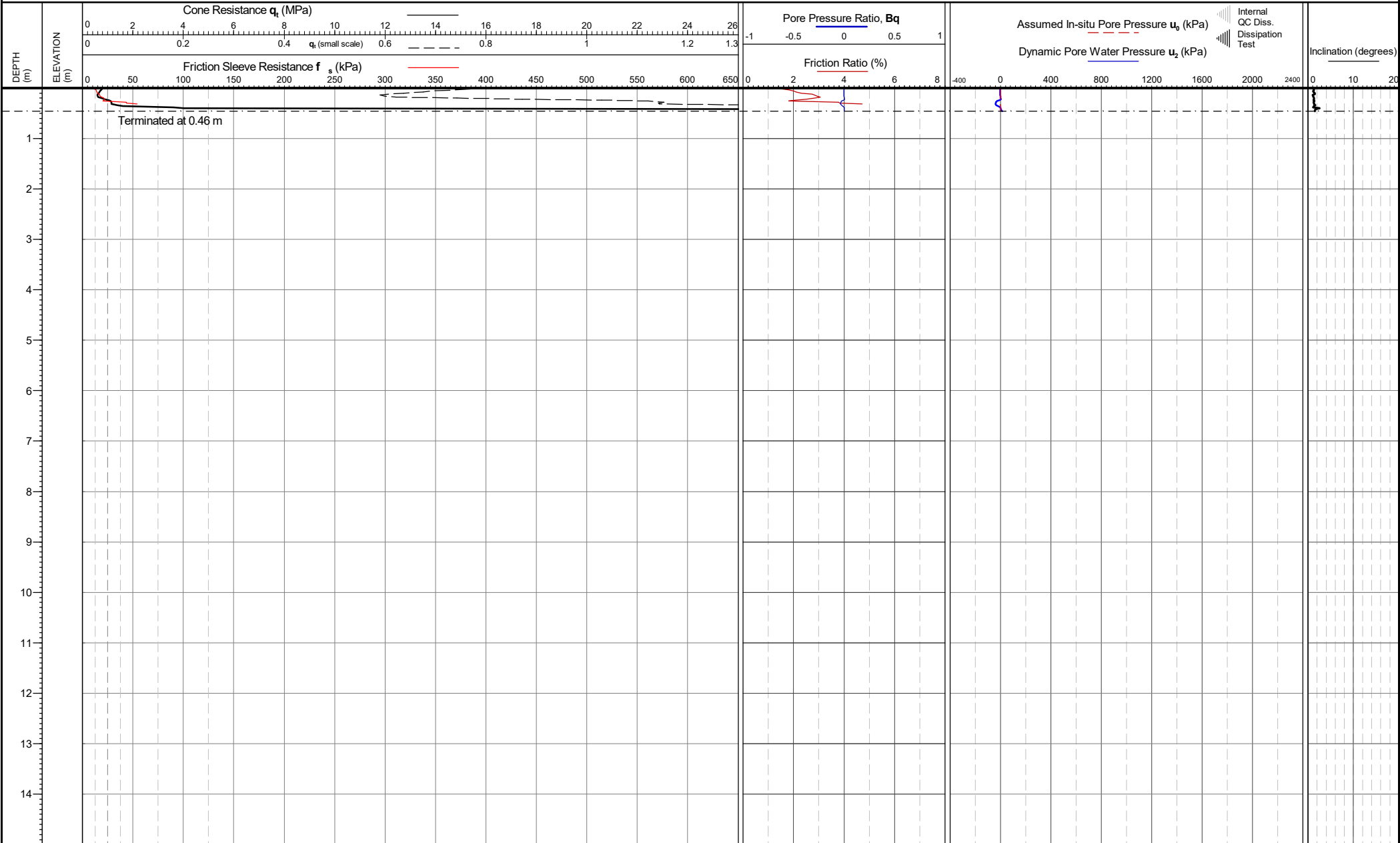
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT02

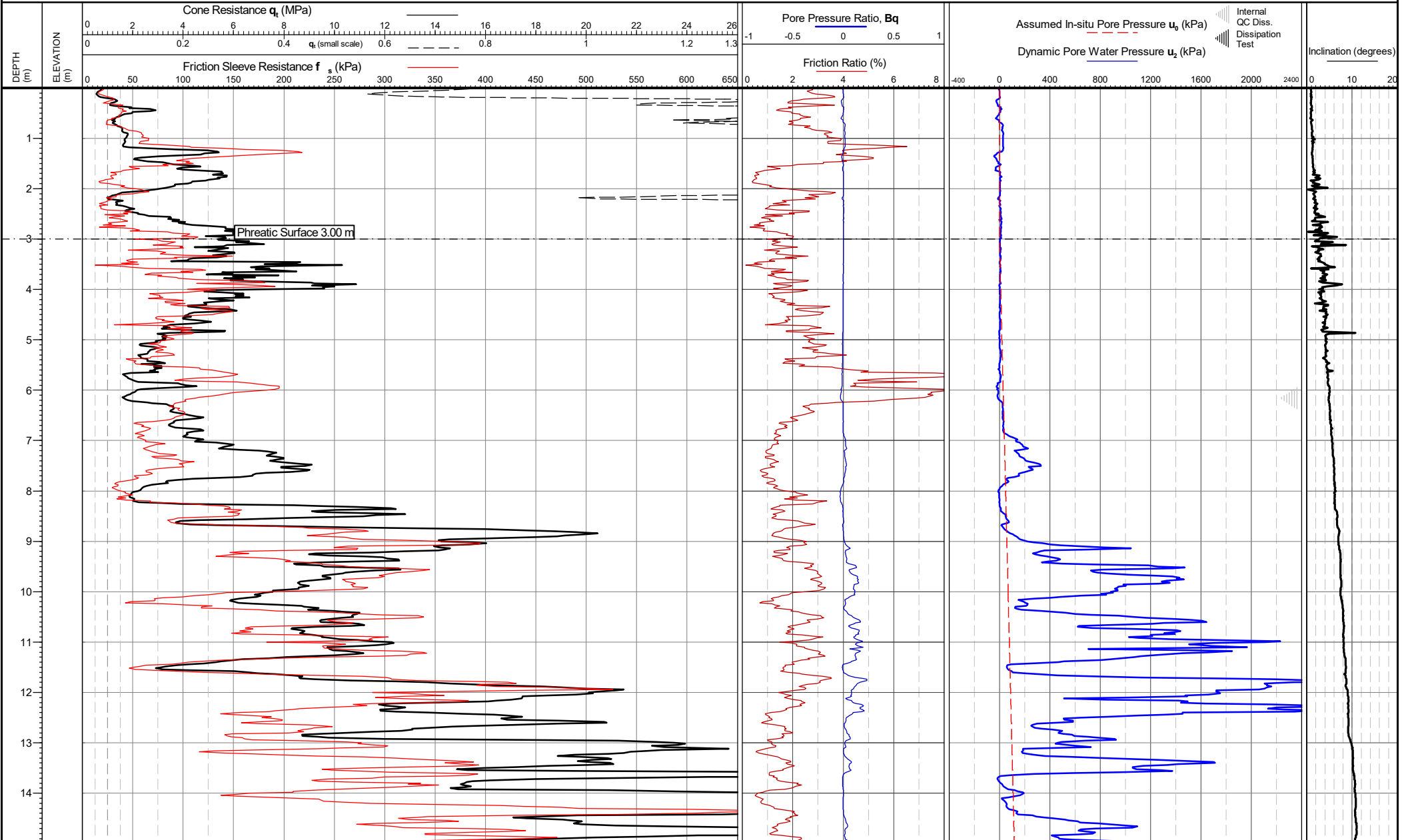
Page 1 of 1



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 09/12/2025 13:04:35	Zero drift (Pre/post test) q_t (kPa): 24.0 f_s (kPa): -2.9 u_z (kPa): 0.0	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Tip load	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT03 Page 1 of 1
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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Zero drift (Pre/post test)
 q_c (kPa): 24.0
 f_s (kPa): -2.9
 u_2 (kPa): 0.0

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

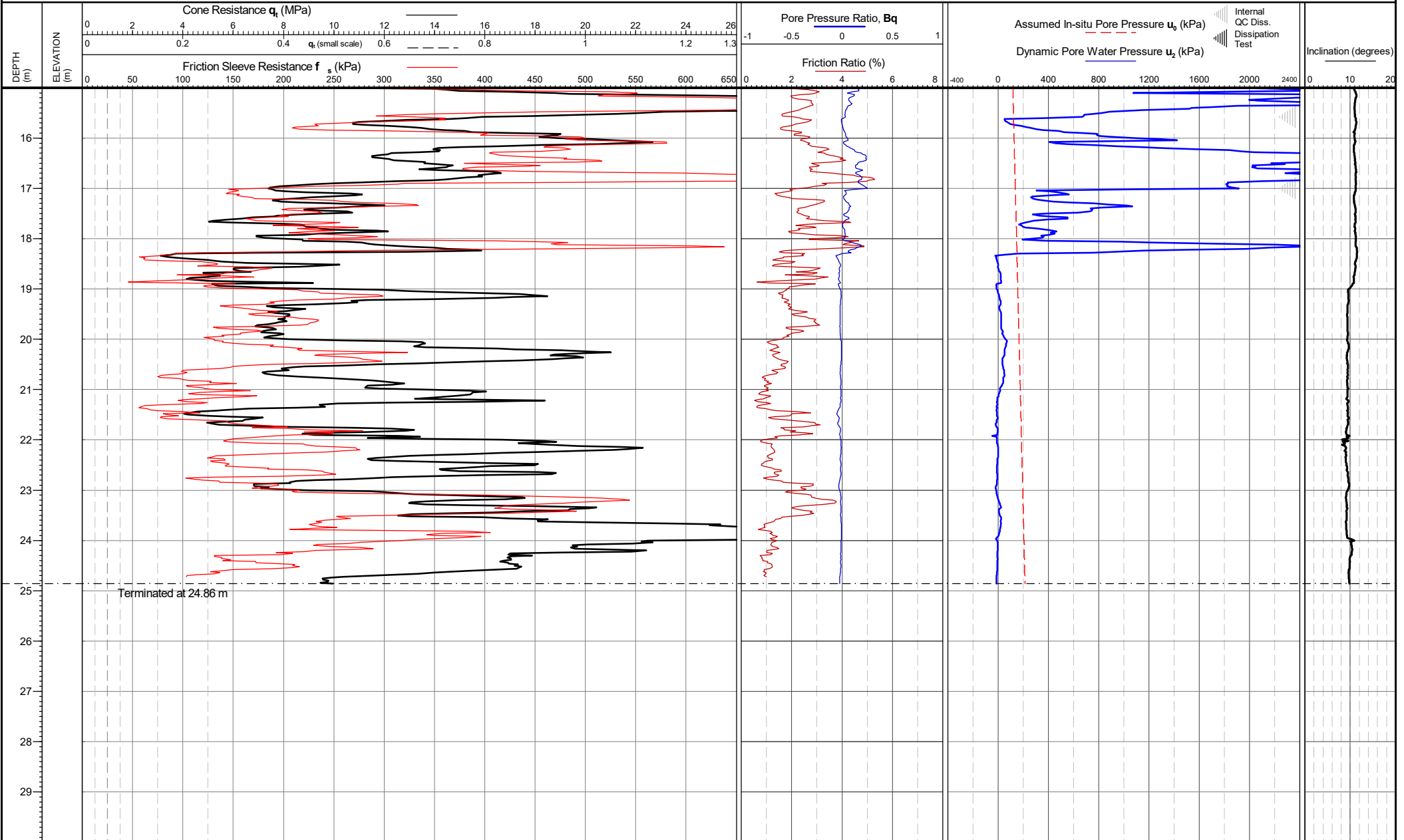
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT03A



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Zero drift (Pre/post test)
 q_0 (kPa): 24.0
 f_0 (kPa): -2.9
 u_2 (kPa): 0.0

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

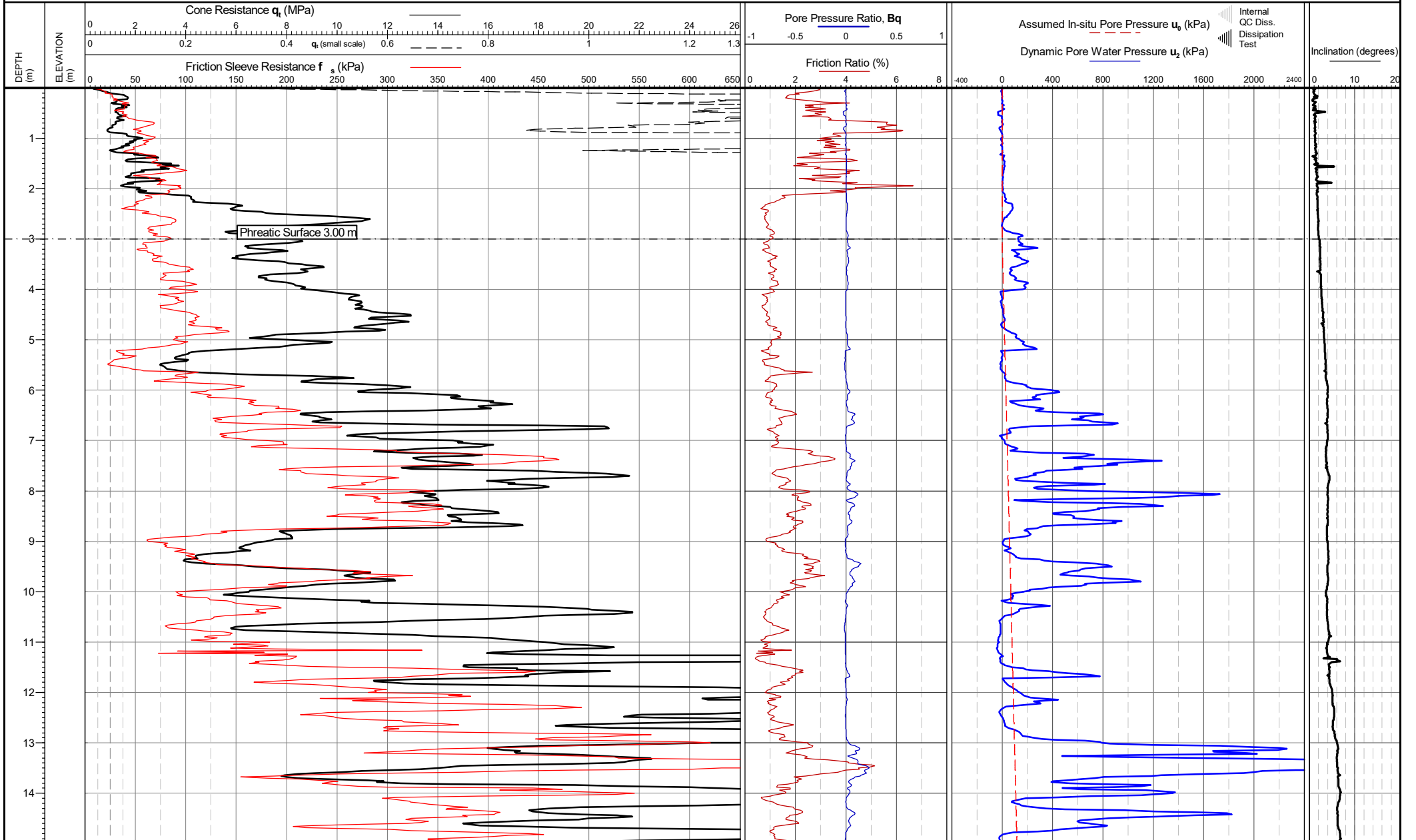
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT03A

Page 2 of 2



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 13:46:59

Zero drift (Pre/post test)
 q_0 (kPa): 7.0
 f_0 (kPa): -3.5
 u_2 (kPa): 0.8

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Piezo load

Date of plot:
12-12-25
Checked by:
Chris Player

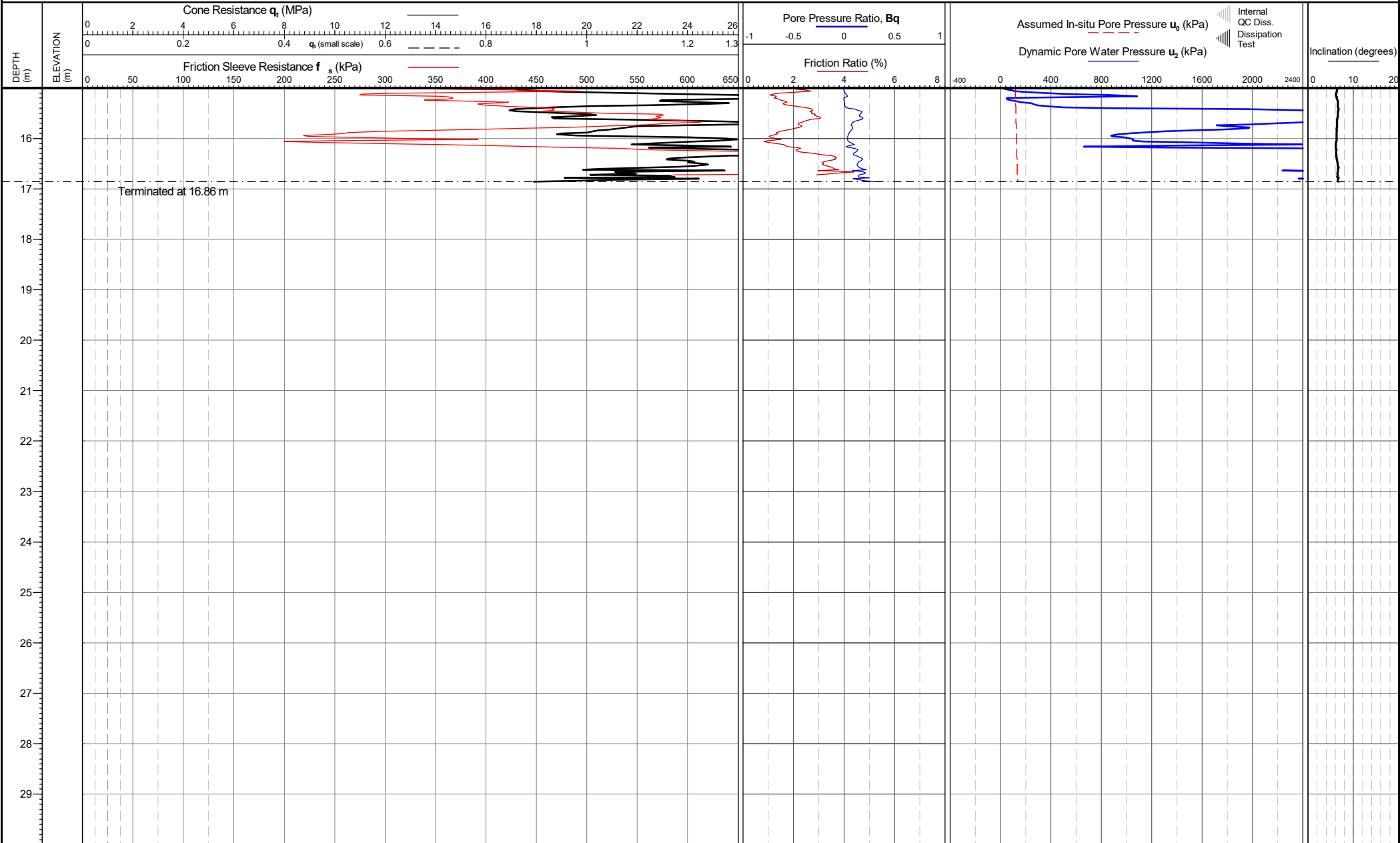
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25-32-30578-1

TEST ID: CPT04

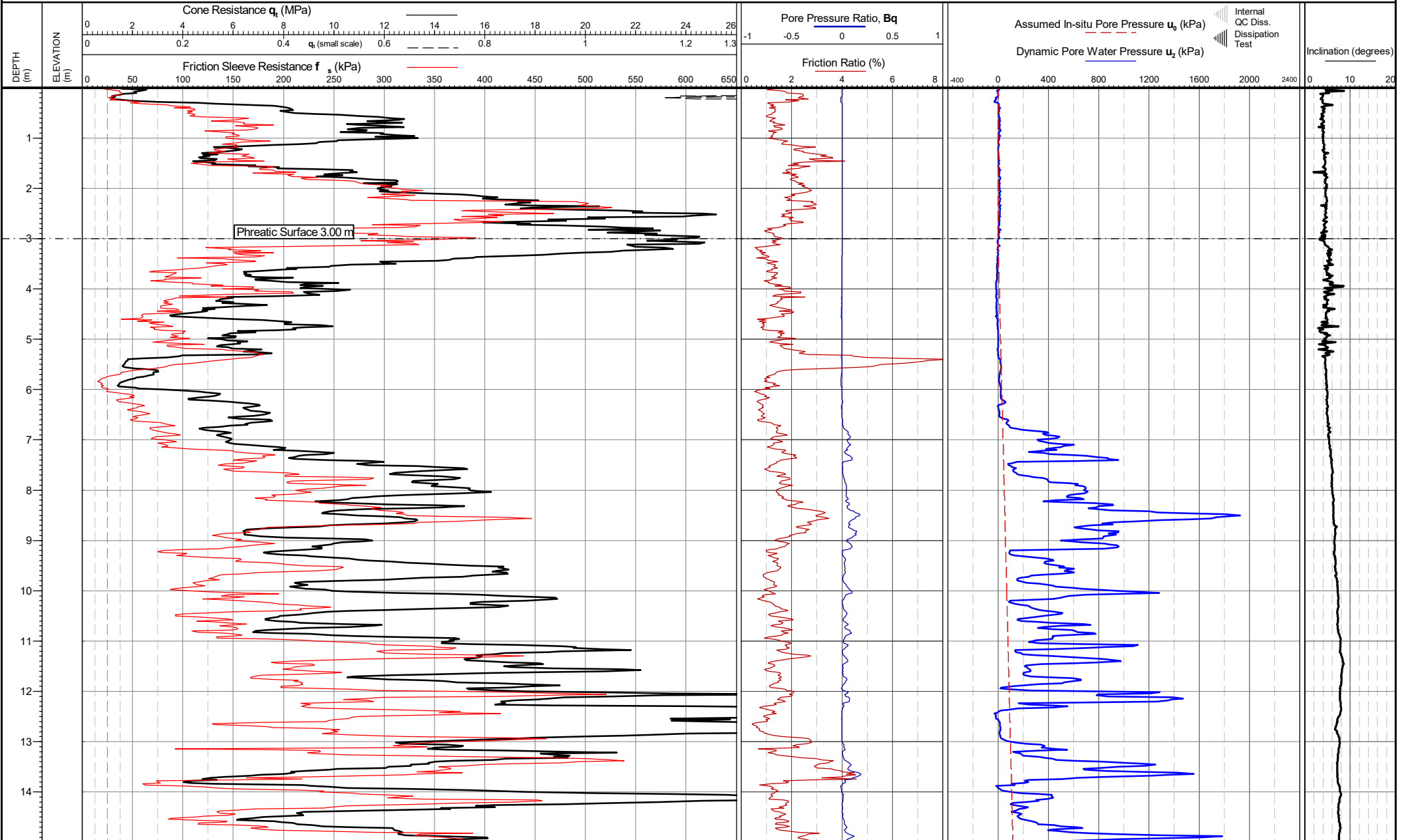
Page 1 of 2



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 10/12/2025 13:46:59	Zero drift (Pre/post test) q_t (kPa): 7.0 f_s (kPa): -3.5 u_2 (kPa): 0.8	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Piezo load	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT04 Page 2 of 2
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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 11:25:52

Zero drift (Pre/post test)
 q_t (kPa): -4.6
 f_s (kPa): -0.5
 u_2 (kPa): -1.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

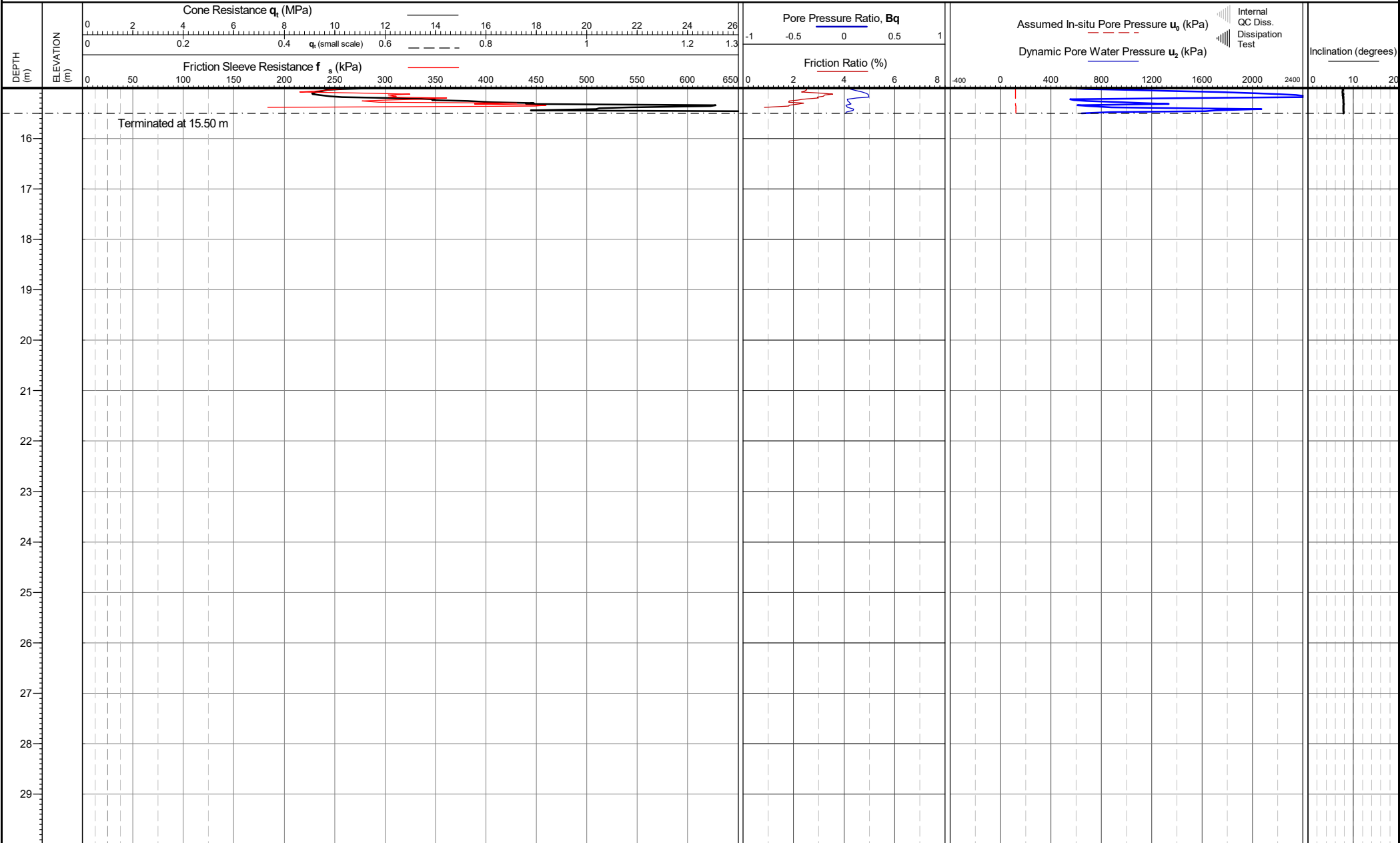
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

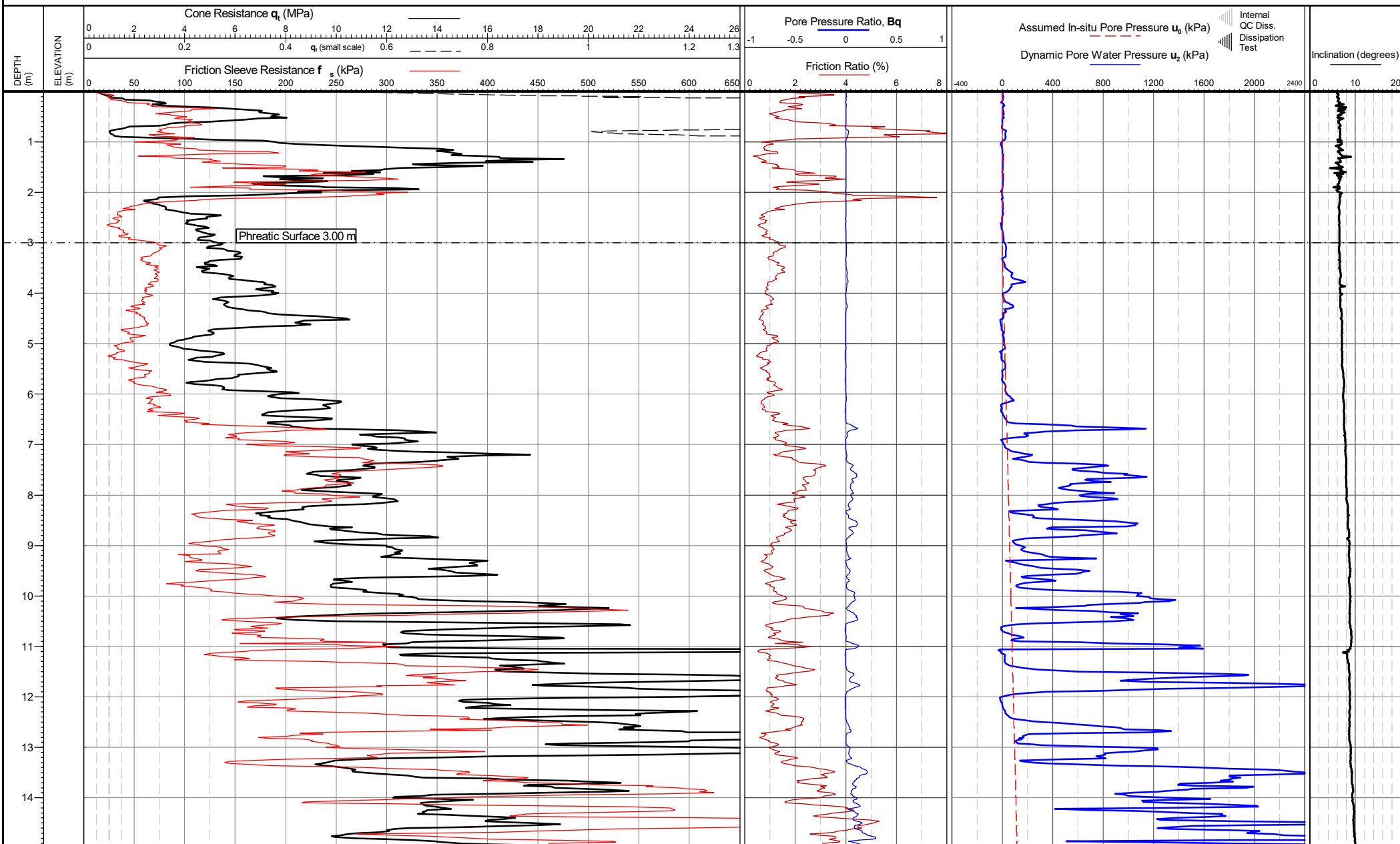
TEST ID: CPT05



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 10/12/2025 11:25:52	Zero drift (Pre/post test) q_t (kPa): -4.6 f_s (kPa): -0.5 u_2 (kPa): -1.6	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Lateral support at depth	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT05 Page 2 of 2
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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 12:32:44

Zero drift (Pre/post test)
 q_c (kPa): 8.6
 f_s (kPa): 0.2
 u_2 (kPa): 0.8

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

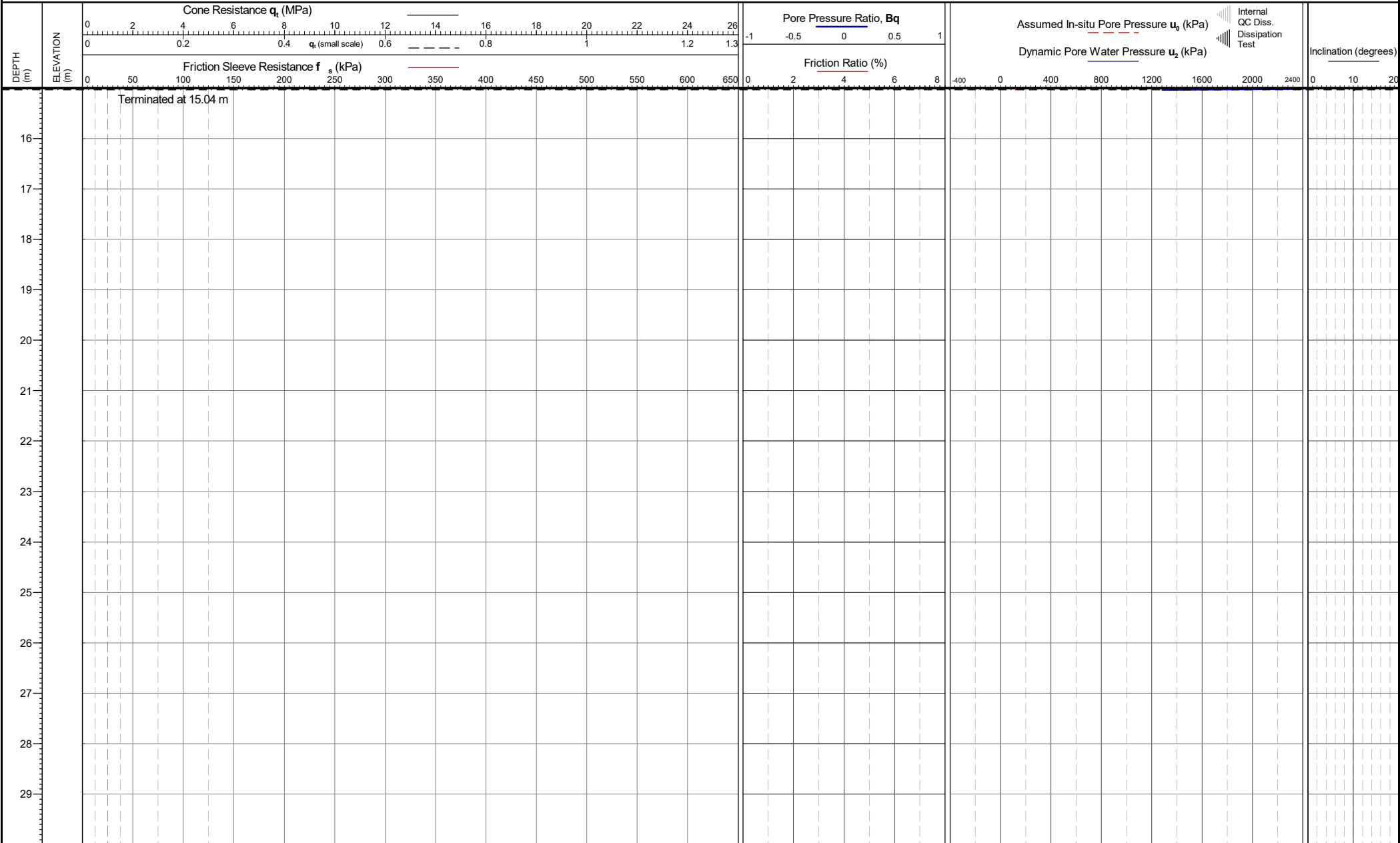
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

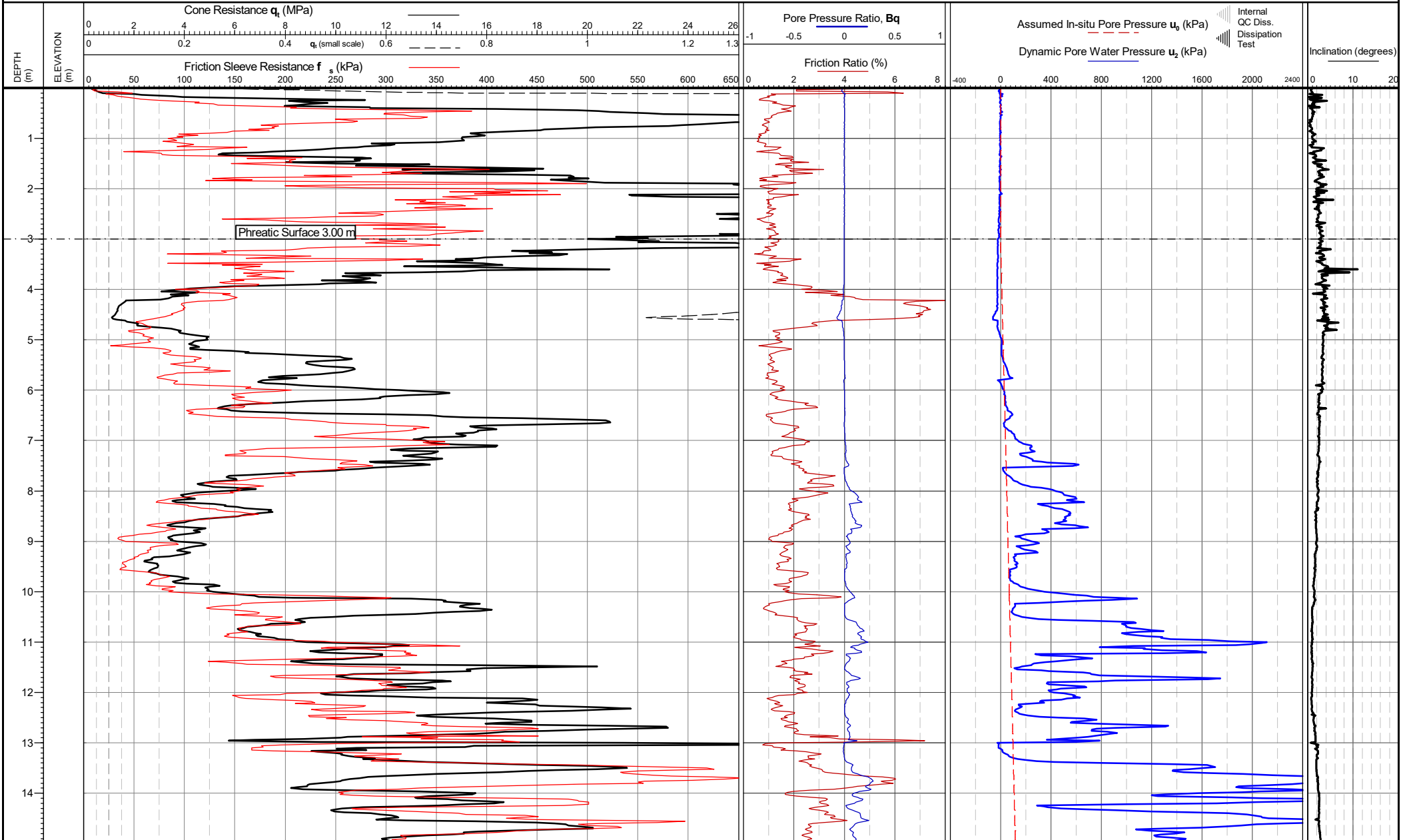
TEST ID: CPT06



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 10/12/2025 12:32:44	Zero drift (Pre/post test) q_0 (kPa): 8.6 f_0 (kPa): 0.2 u_2 (kPa): 0.8	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Lateral support at depth	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT06 Page 2 of 2
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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Zero drift (Pre/post test)
 q_e (kPa): -6.8
 f_e (kPa): -2.0
 u_2 (kPa): -1.5

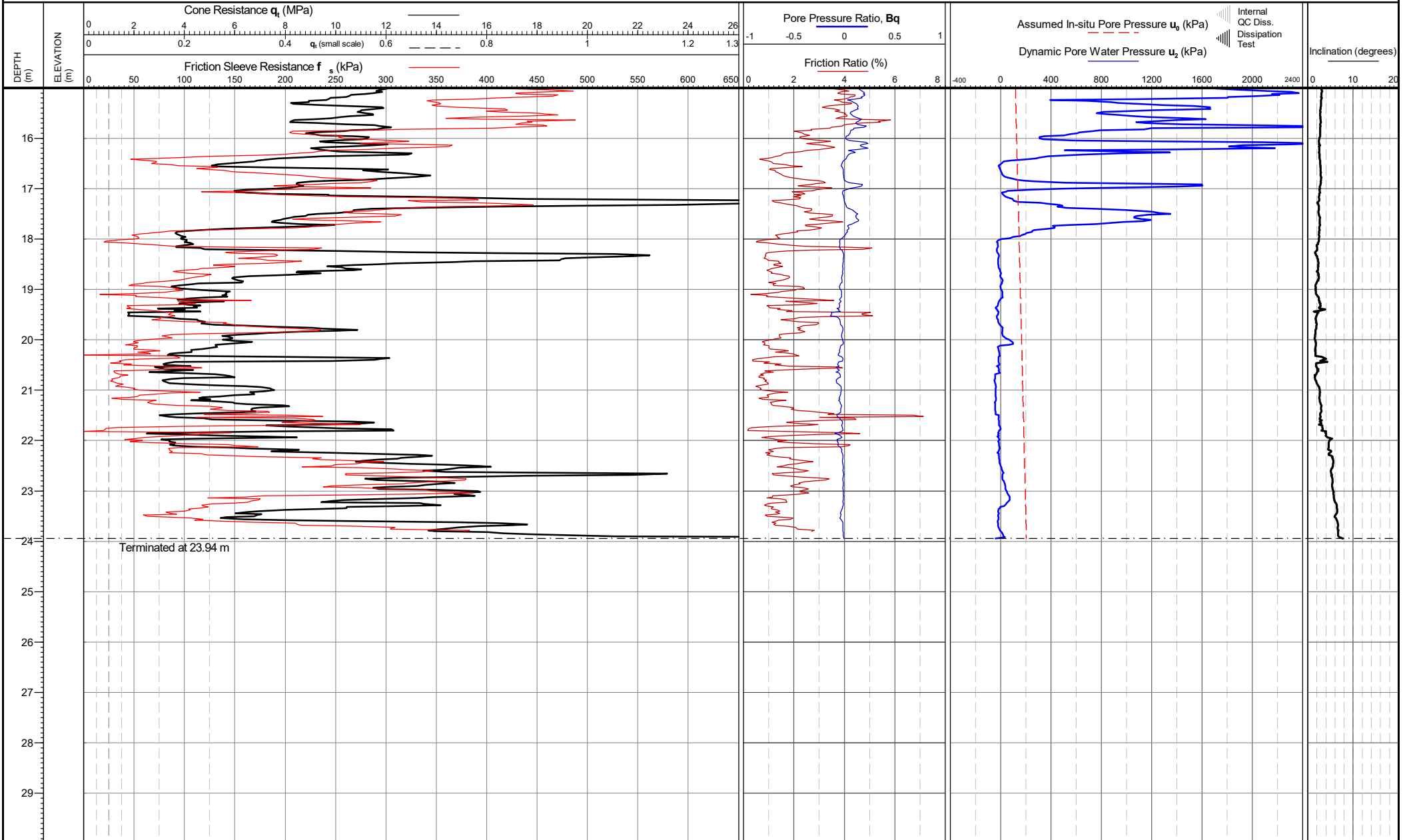
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT08



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Zero drift (Pre/post test)
 q_0 (kPa): -6.8
 f_0 (kPa): -2.0
 u_2 (kPa): -1.5

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value

Termination Remark: Lateral support at depth

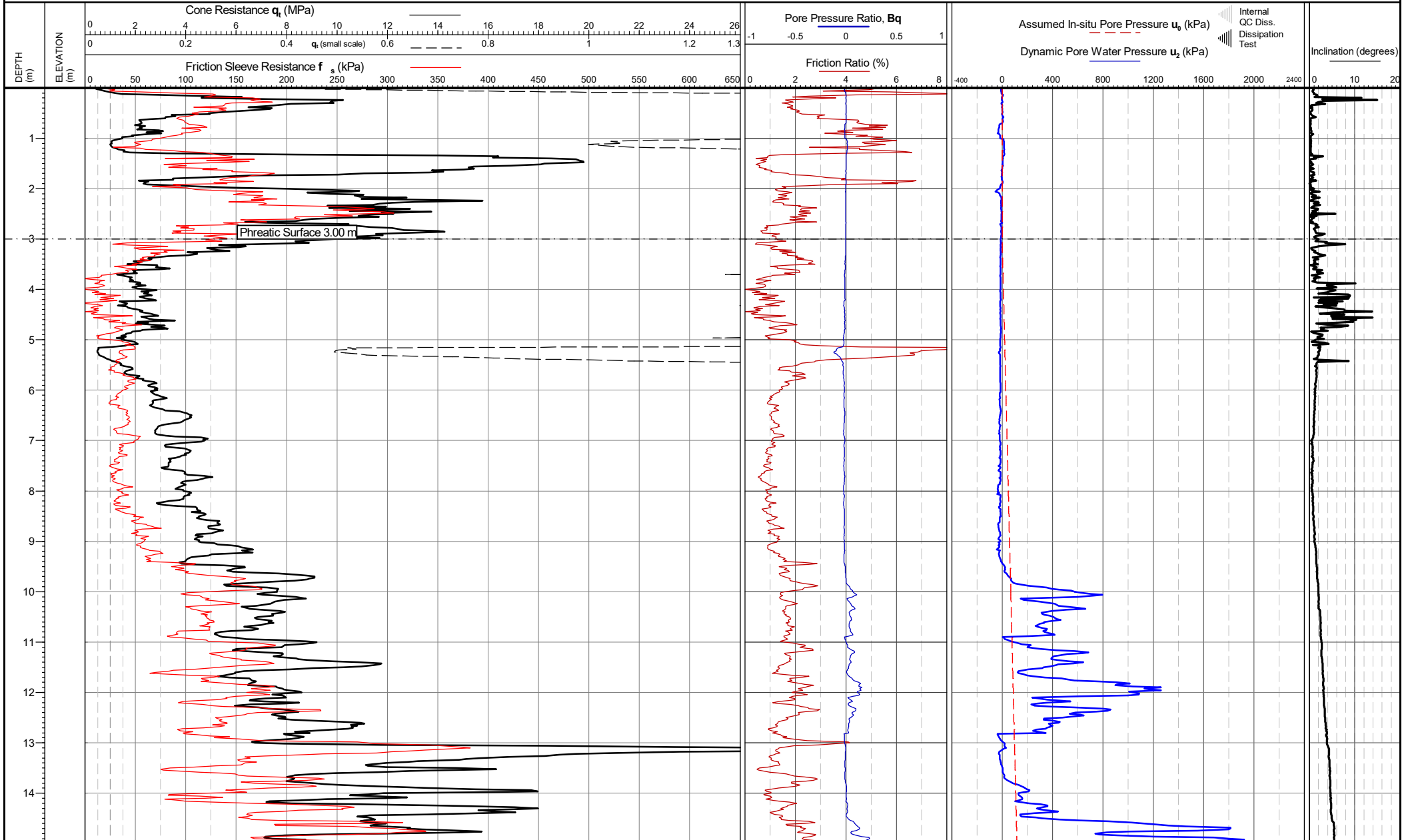
Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1

Checked by:
Chris Player

TEST ID: CPT08



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Zero drift (Pre/post test)
 q_0 (kPa): -21.0
 f_0 (kPa): 2.4
 u_z (kPa): -1.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

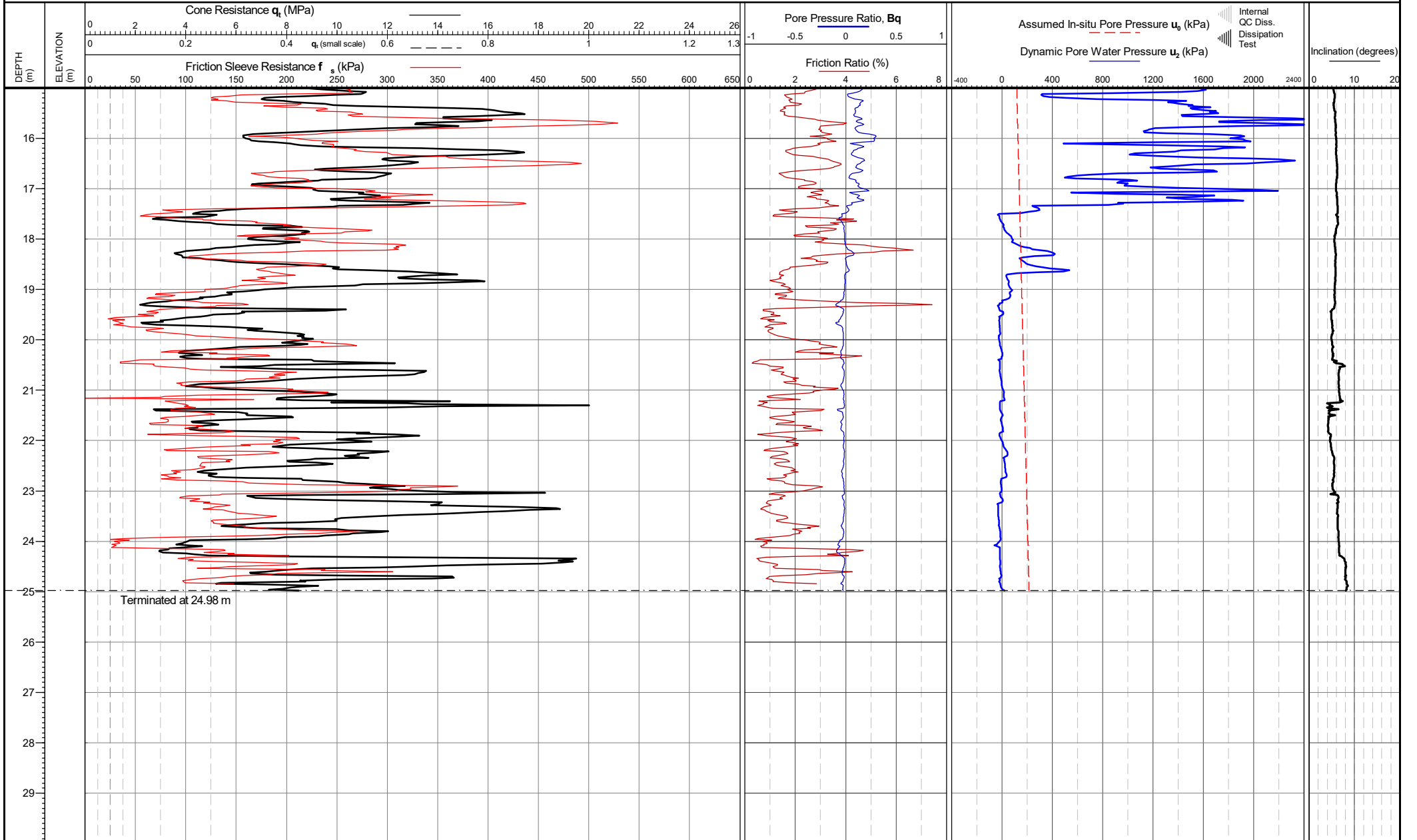
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09

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Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Zero drift (Pre/post test)
 q_0 (kPa): -21.0
 f_s (kPa): 2.4
 u_2 (kPa): -1.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

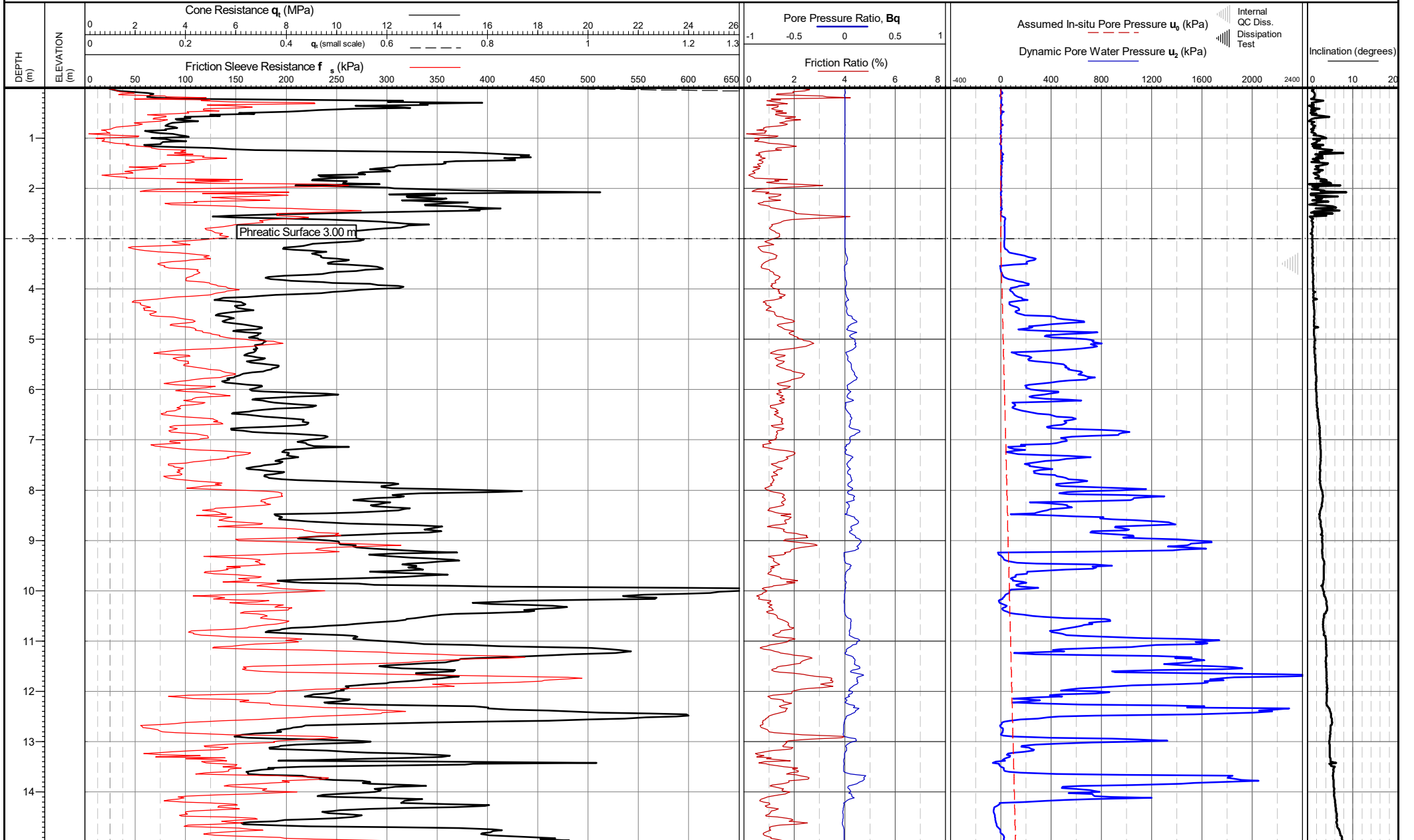
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09

Page 2 of 2



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Zero drift (Pre/post test)
 q_c (kPa): -45.6
 f_s (kPa): -0.2
 u_2 (kPa): -1.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

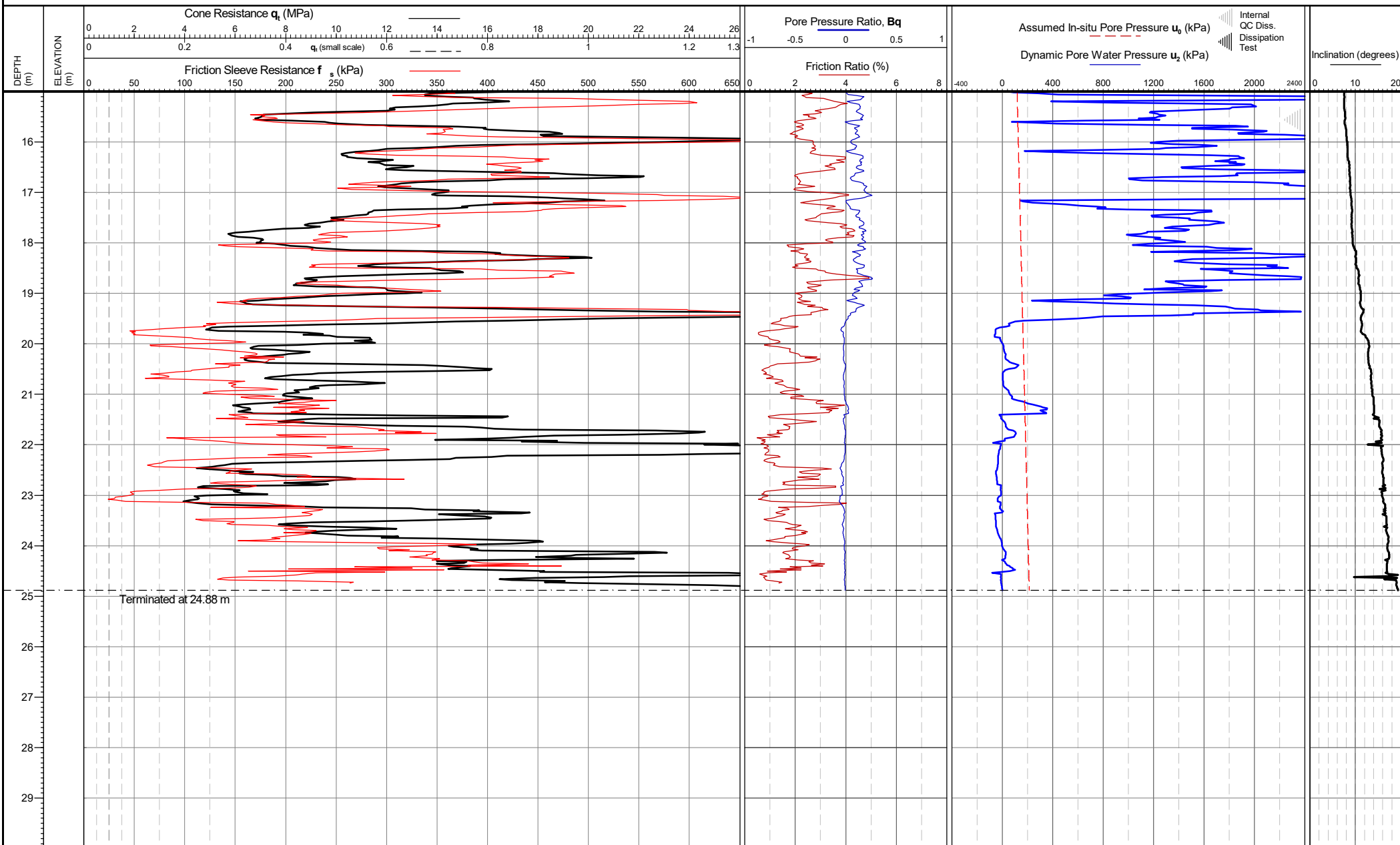
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10

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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Zero drift (Pre/post test)
 q_0 (kPa): -45.6
 f_0 (kPa): -0.2
 u_2 (kPa): -1.6

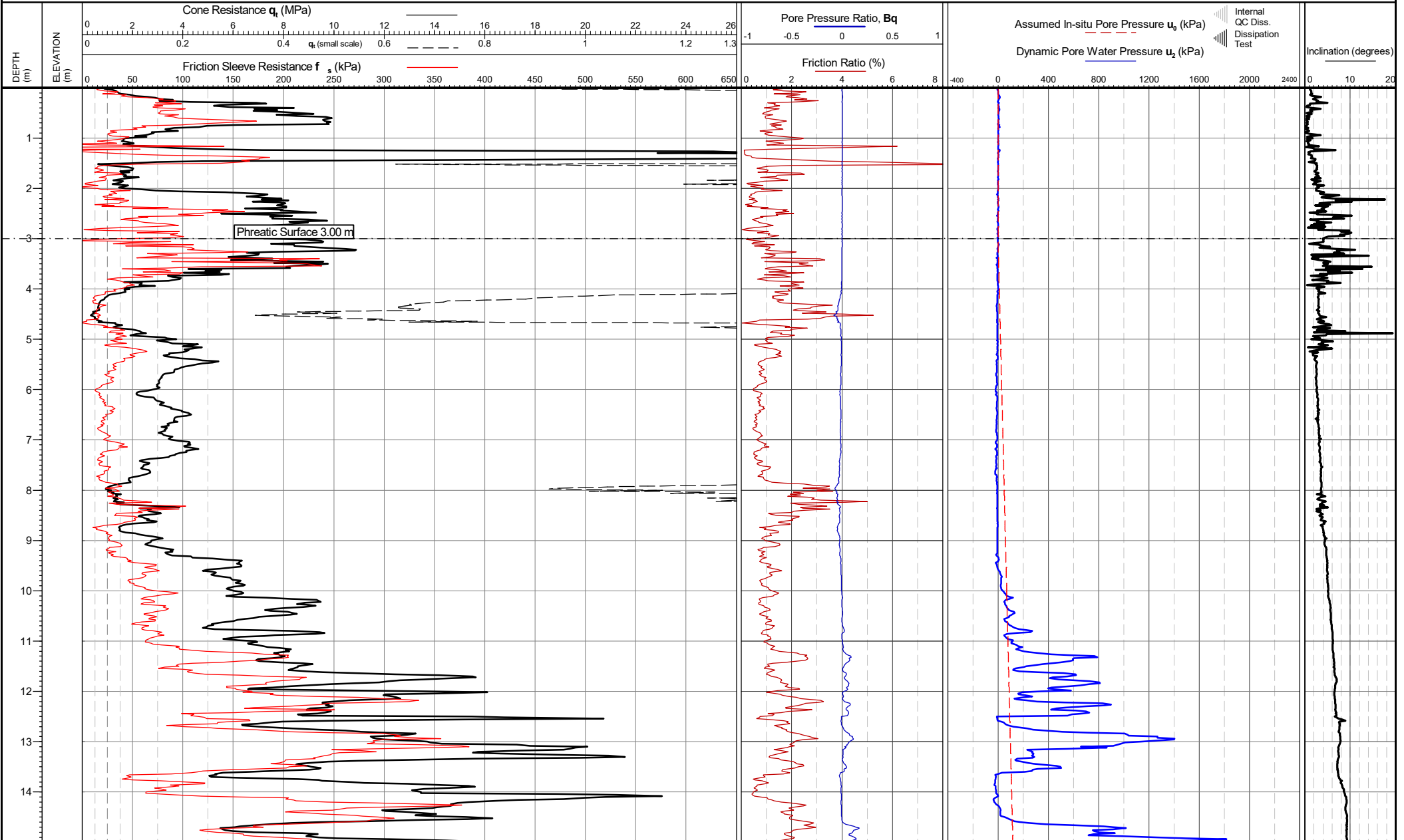
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Zero drift (Pre/post test)
 q_0 (kPa): 3.0
 f_0 (kPa): -0.5
 u_z (kPa): -1.7

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

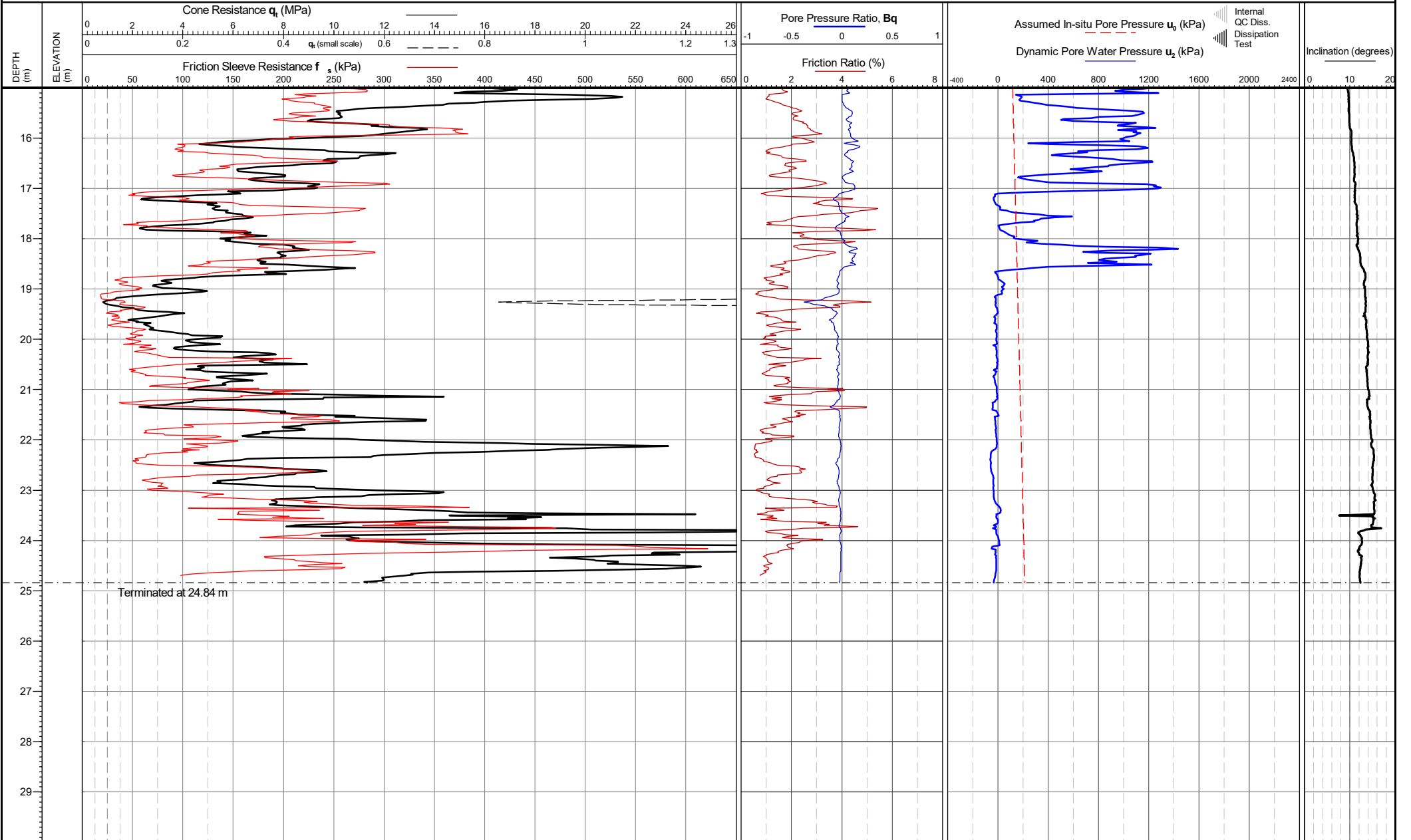
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT11



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Zero drift (Pre/post test)
 q_0 (kPa): 3.0
 f_0 (kPa): -0.5
 u_2 (kPa): -1.7

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

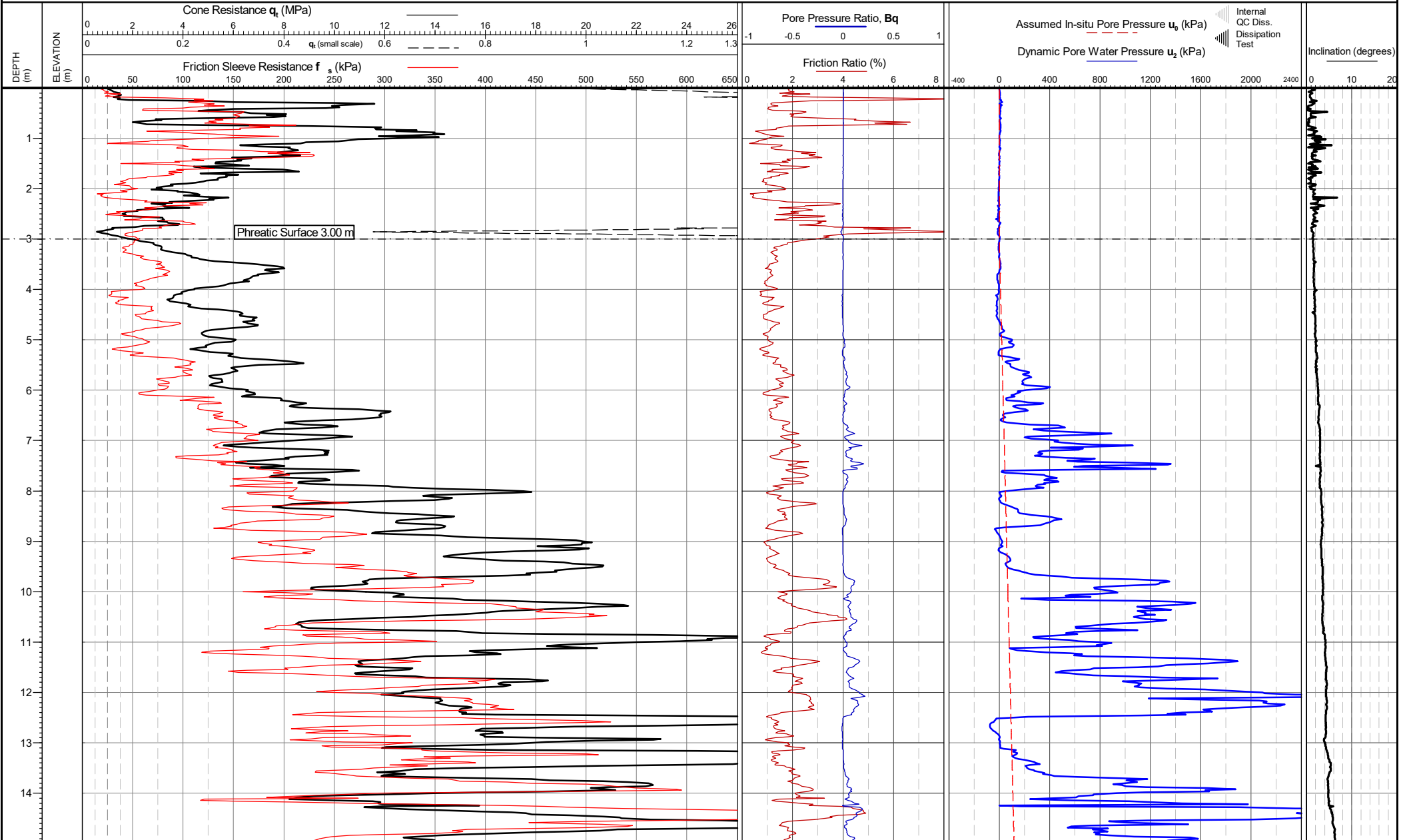
TEST ID: CPT11

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Project: SALISBURY

Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Zero drift (Pre/post test)
 q_c (kPa): -12.6
 f_s (kPa): -1.8
 u_z (kPa): -3.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

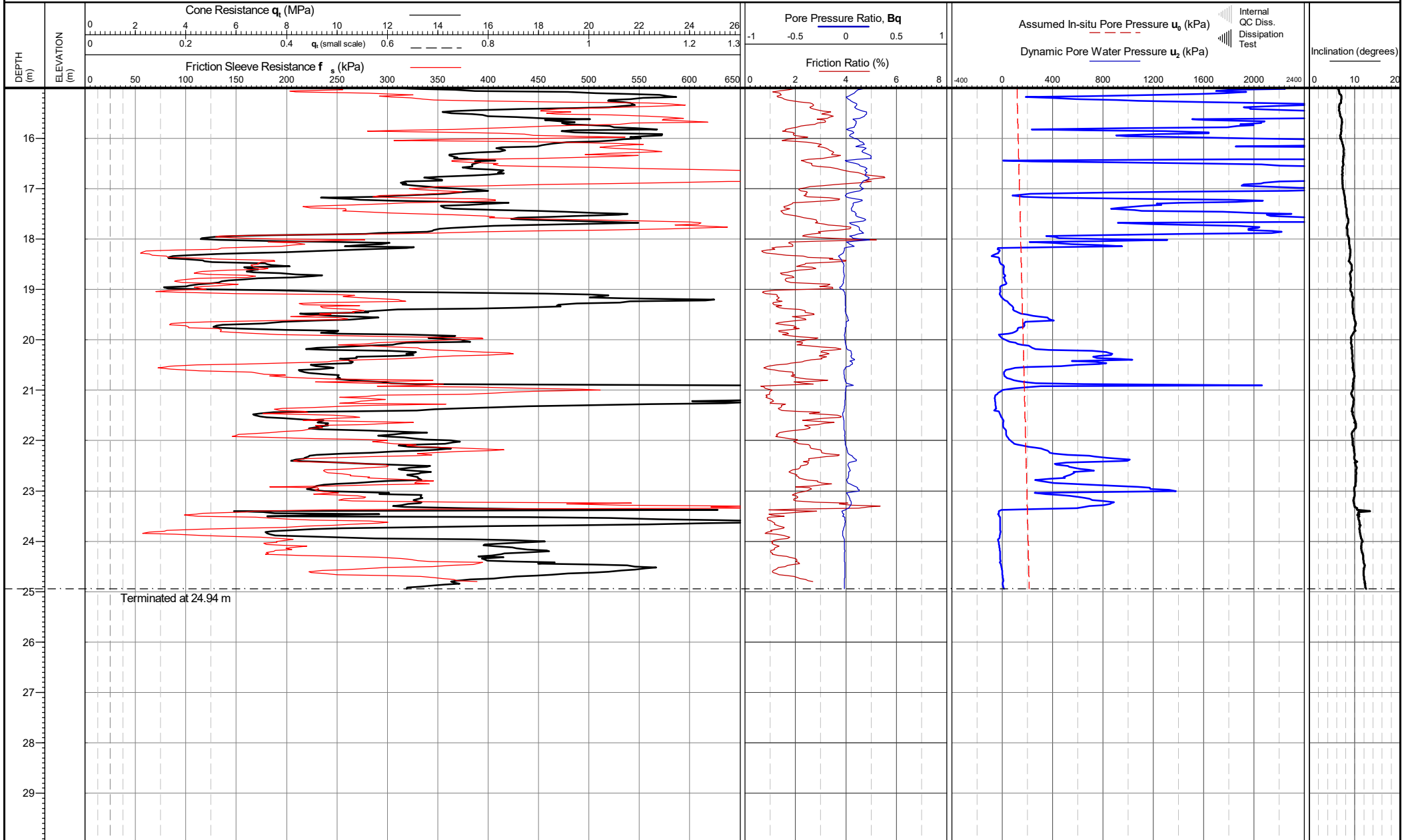
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT13

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Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Zero drift (Pre/post test)
 q_0 (kPa): -12.6
 f_0 (kPa): -1.8
 u_2 (kPa): -3.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT13

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APPENDIX D SOIL BEHAVIOUR TYPE RESULTS

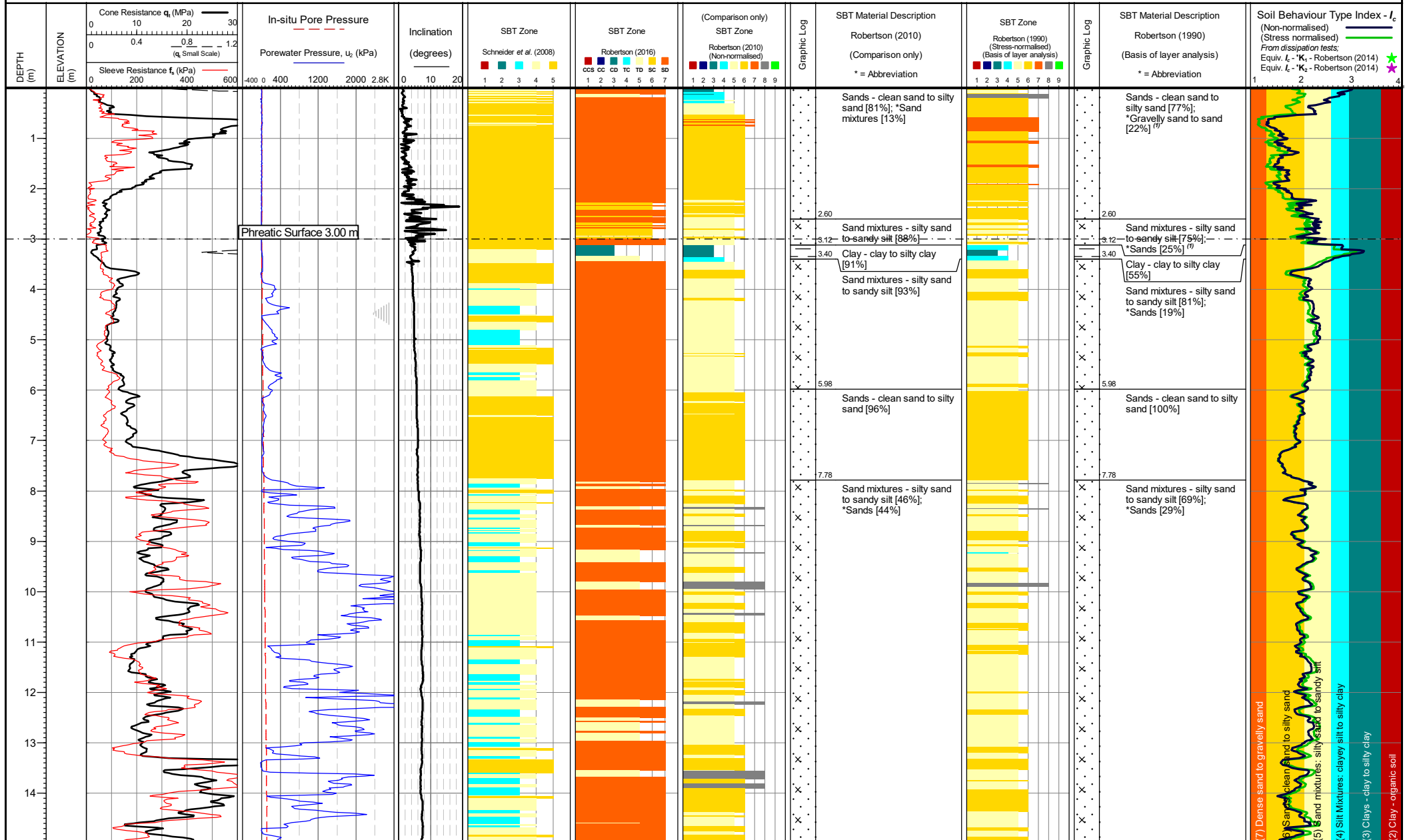
Soil behaviour type (SBT) point data evaluation according to:

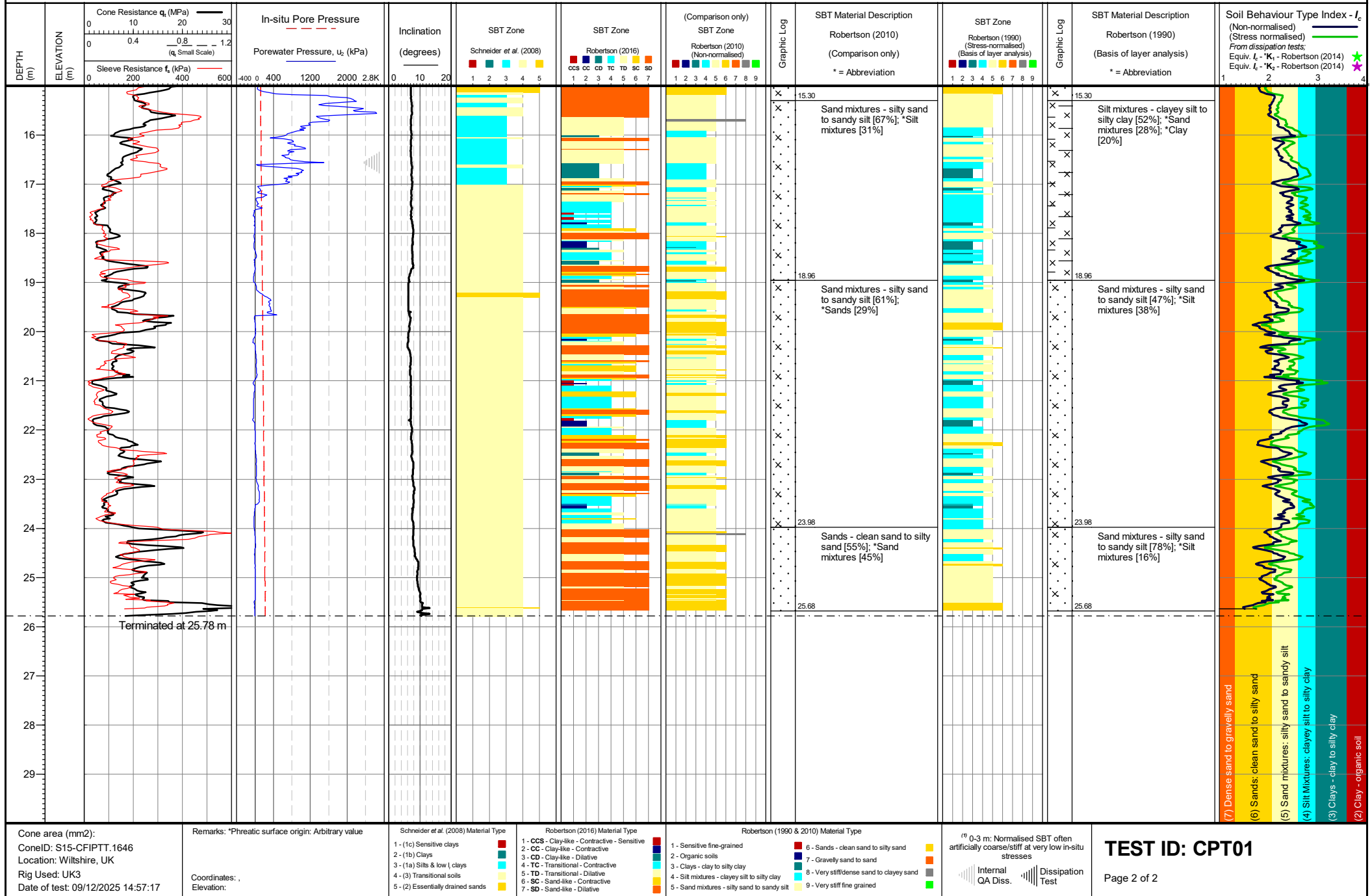
Schneider et al (2008)

Robertson (2016)

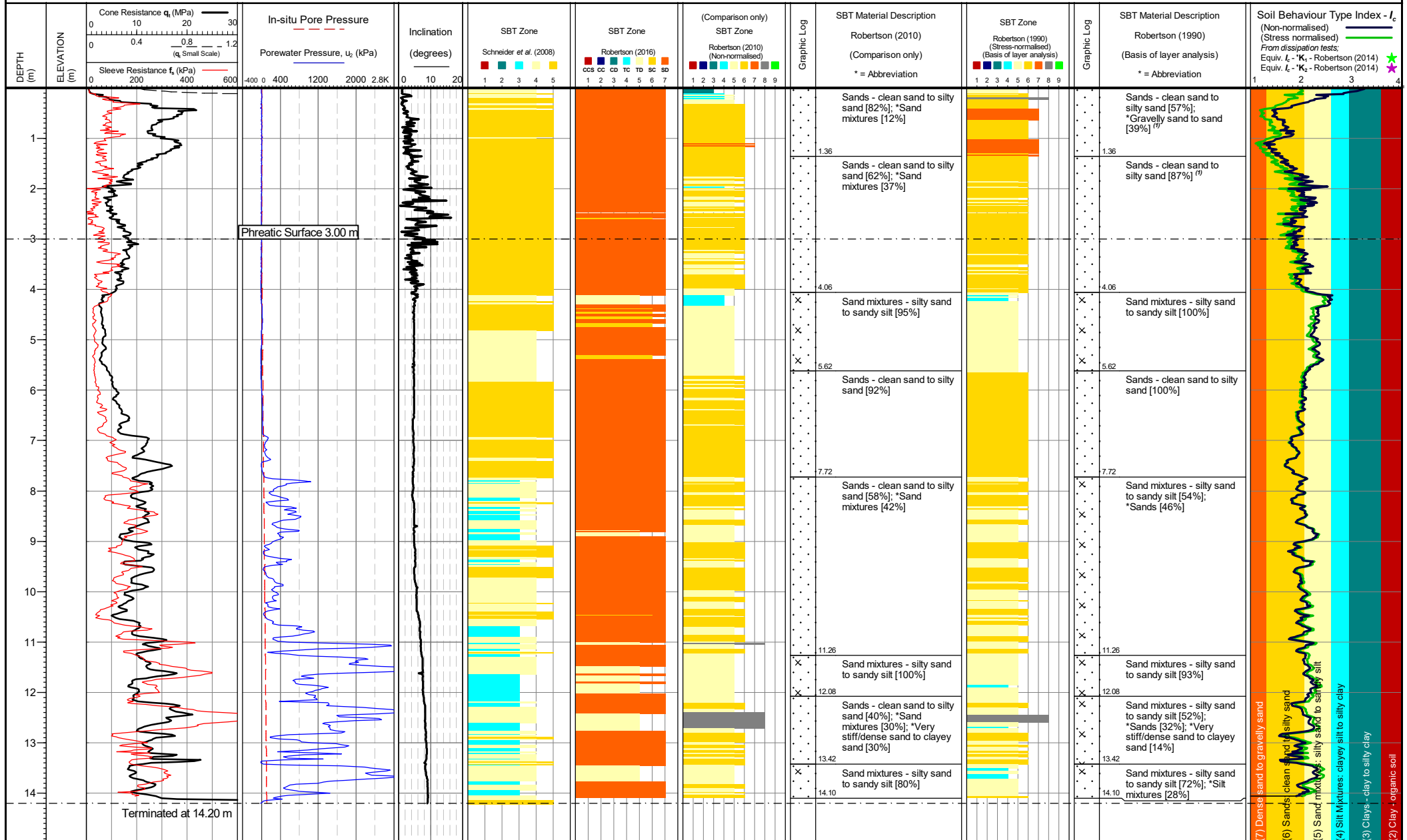
Robertson (2010) with aggregate layer descriptions

Robertson (1990) with aggregate layer descriptions





TEST ID: CPT01



Cone area (mm²):
ConeID: S15-CFIPIT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 10:23:52

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type

- 1 - (1c) Sensitive clays
- 2 - (1b) Clays
- 3 - (1a) Silts & low l. clays
- 4 - (3) Transitional soils
- 5 - (2) Essentially drained sands

Robertson (2016) Material Type

- 1 - CCS - Clay-like - Contractive - Sensitive
- 2 - CC - Clay-like - Contractive
- 3 - CD - Clay-like - Dilative
- 4 - TC - Transitional - Contractive
- 5 - TD - Transitional - Dilative
- 6 - SC - Sand-like - Contractive
- 7 - SD - Sand-like - Dilative

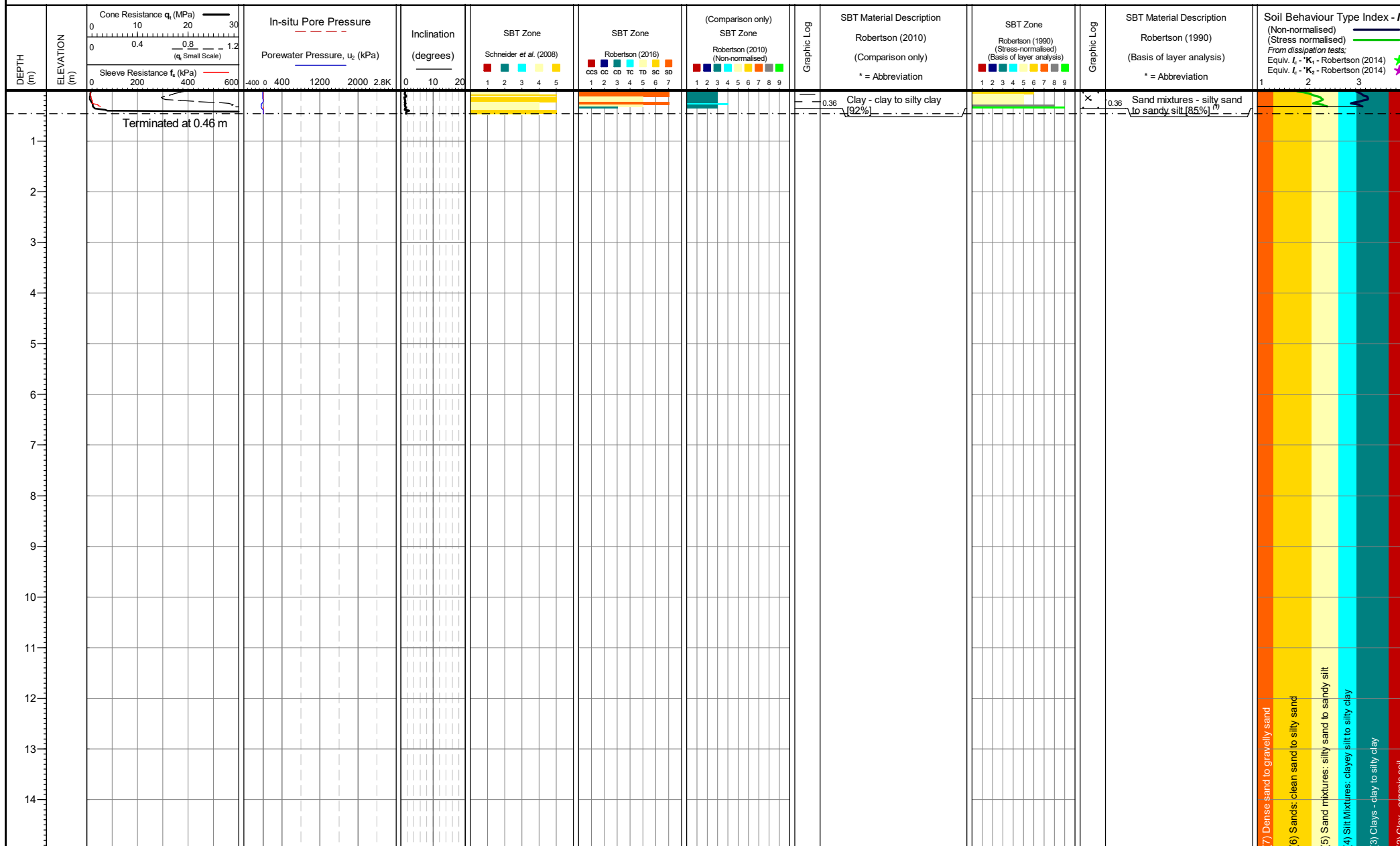
Robertson (1990 & 2010) Material Type

- 1 - Sensitive fine-grained
- 2 - Organic soils
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt
- 6 - Sands - clean sand to silty sand
- 7 - Gravelly sand to sand
- 8 - Very stiff/dense sand to clayey sand
- 9 - Very stiff fine grained

⁽⁷⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss. Dissipation Test

TEST ID: CPT02



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 09/12/2025 13:04:35

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt
6 - Sands - clean sand to silty sand
7 - Gravely sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

^(b) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT03



Cone area (mm2):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type

1 - (1c) Sensitive clays	
2 - (1b) Clays	
3 - (1a) Silts & low l. clays	
4 - (3) Transitional soils	
5 - (2) Essentially drained sands	

Robertson (2016) Material Type

- CS** - Clay-like - Contractive - Sensitive
- C** - Clay-like - Contractive
- D** - Clay-like - Dilative
- C** - Transitional - Contractive
- D** - Transitional - Dilative
- C** - Sand-like - Contractive
- D** - Sand-like - Dilative

Robertson (1999)

- 1 - Sensitive fine-grained
- 2 - Organic soils
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt

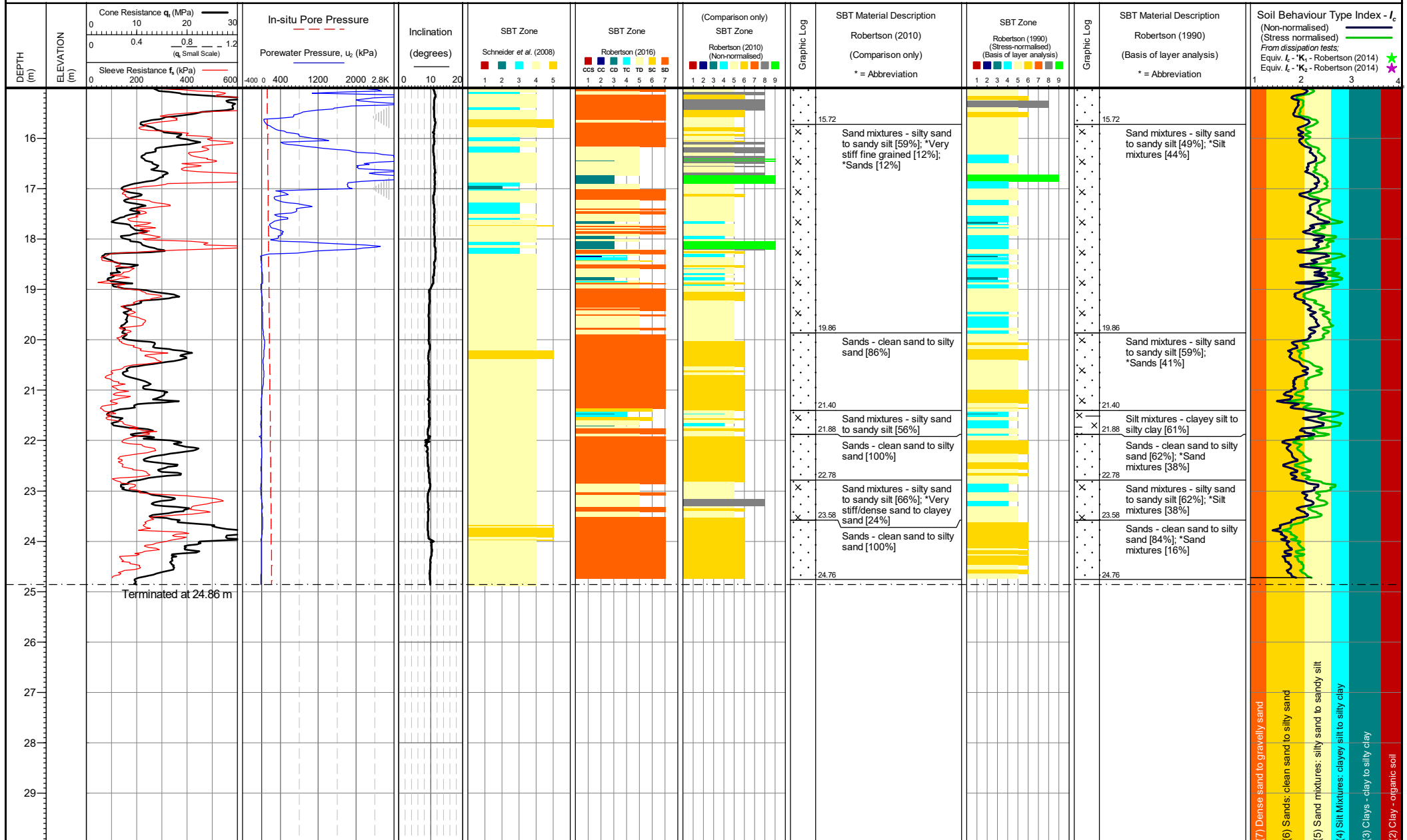
Material Type

Sands - clean sand to silty sand	
Gravelly sand to sand	
Very stiff/dense sand to clayey sand	
Very stiff fine grained	

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

TEST ID: CPT03A

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Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

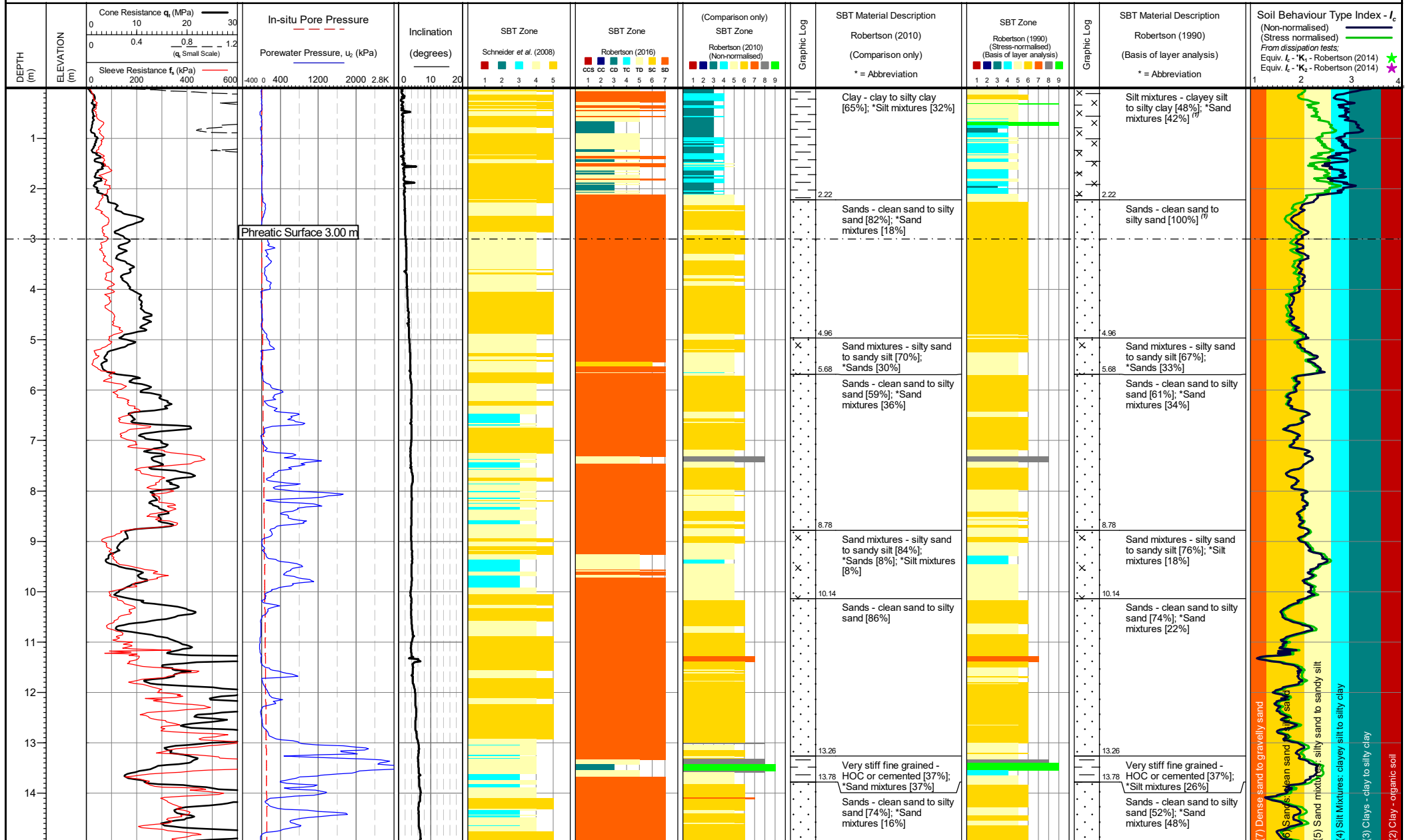
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT03A



Cone area (mm²):
ConeID: S15-CFIPIT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 13:46:59

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

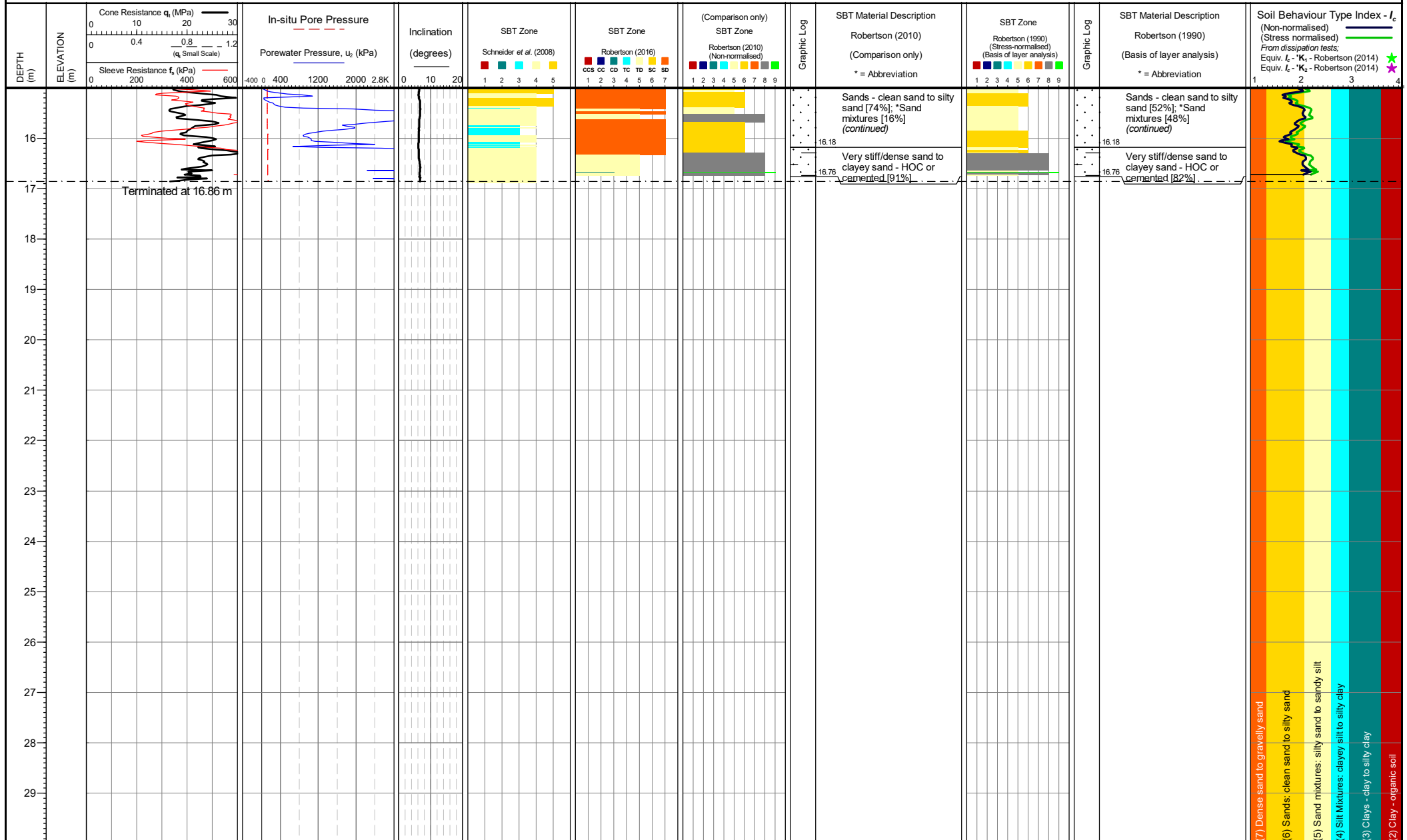
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽¹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT04



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 13:46:59

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l' clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

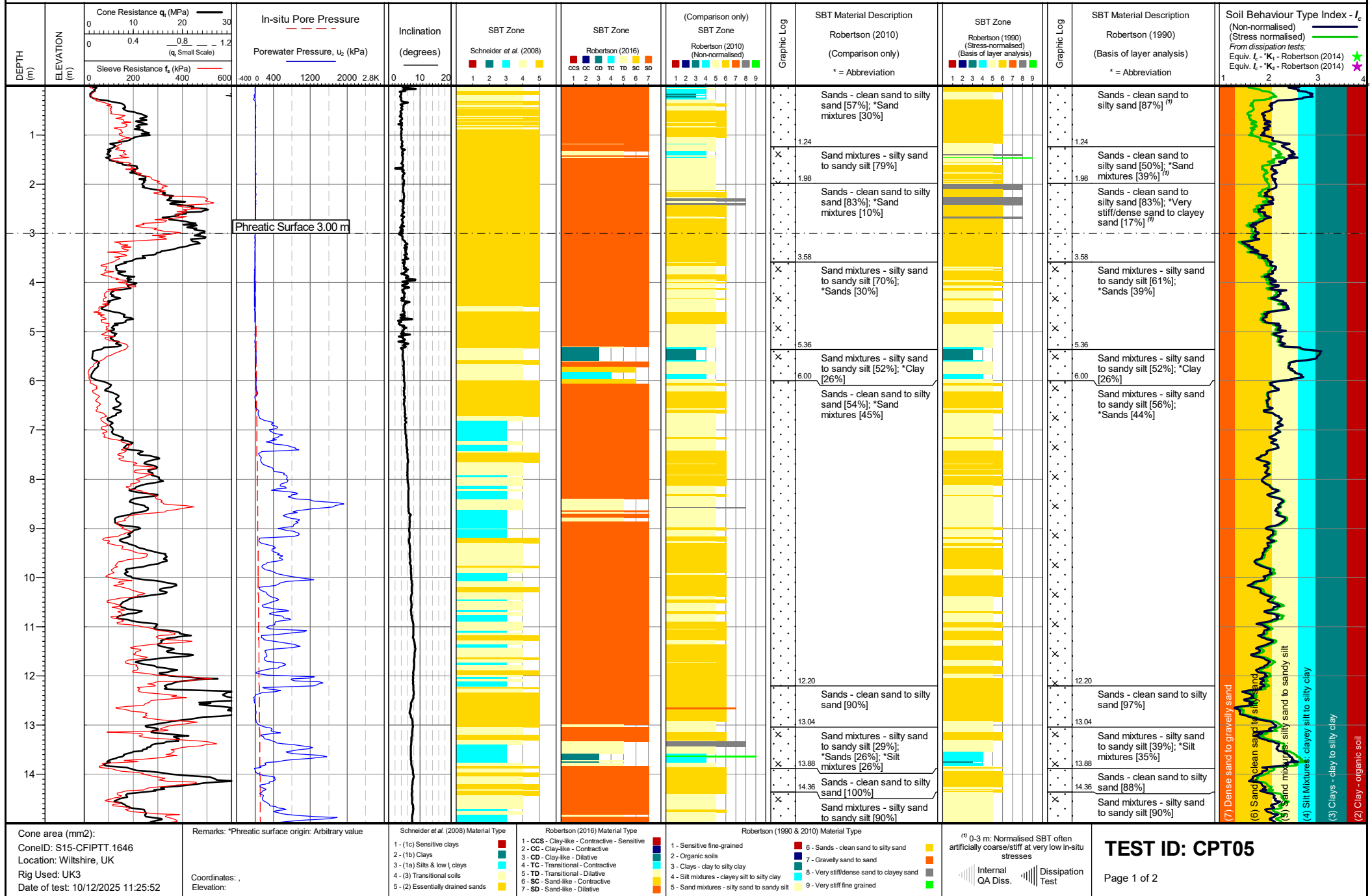
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

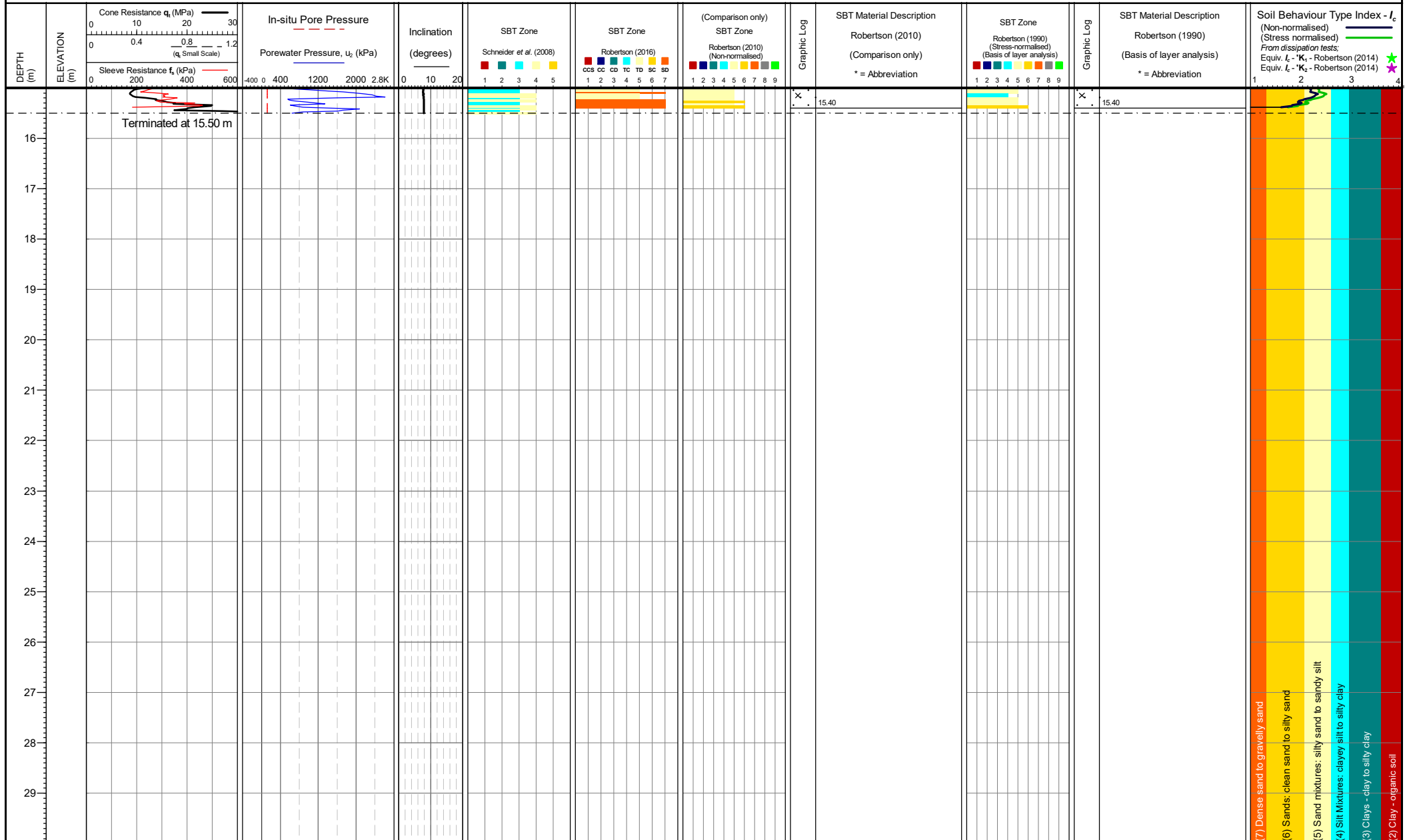
Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

Robertson (1990 & 2010) Material Type
6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT04





Cone area (mm²):
ConeID: S15-CFIPPT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 11:25:52

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type

- 1 - (1c) Sensitive clays
- 2 - (1b) Clays
- 3 - (1a) Silts & low l. clays
- 4 - (3) Transitional soils
- 5 - (2) Essentially drained sands

Robertson (2016) Material Type

- 1 - CCS - Clay-like - Contractive - Sensitive
- 2 - CC - Clay-like - Contractive
- 3 - CD - Clay-like - Dilative
- 4 - TC - Transitional - Contractive
- 5 - TD - Transitional - Dilative
- 6 - SC - Sand-like - Contractive
- 7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type

- 1 - Sensitive fine-grained
- 2 - Organic soils
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt
- 6 - Sands - clean sand to silty sand
- 7 - Gravely sand to sand
- 8 - Very stiff/dense sand to clayey sand
- 9 - Very stiff fine grained

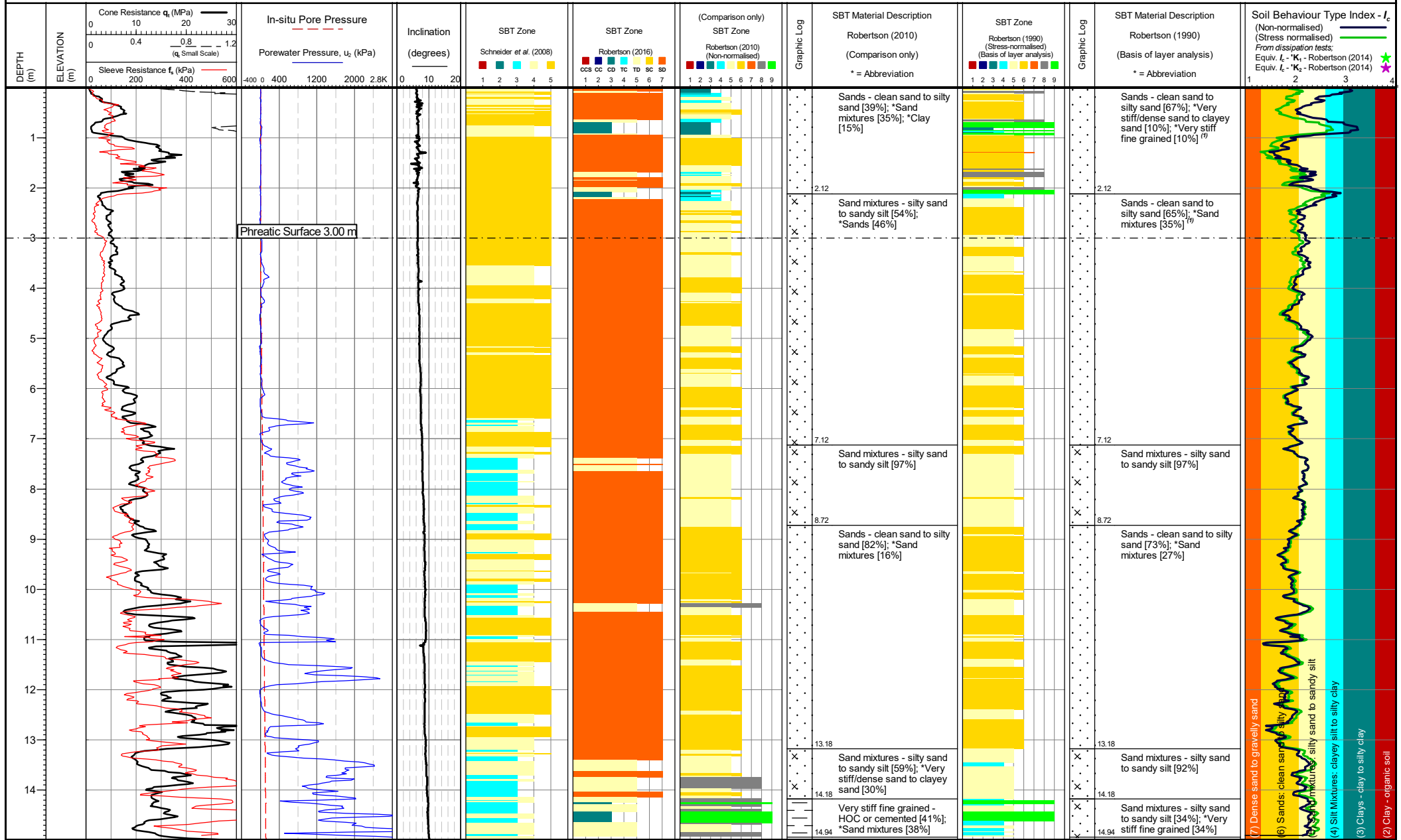
⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

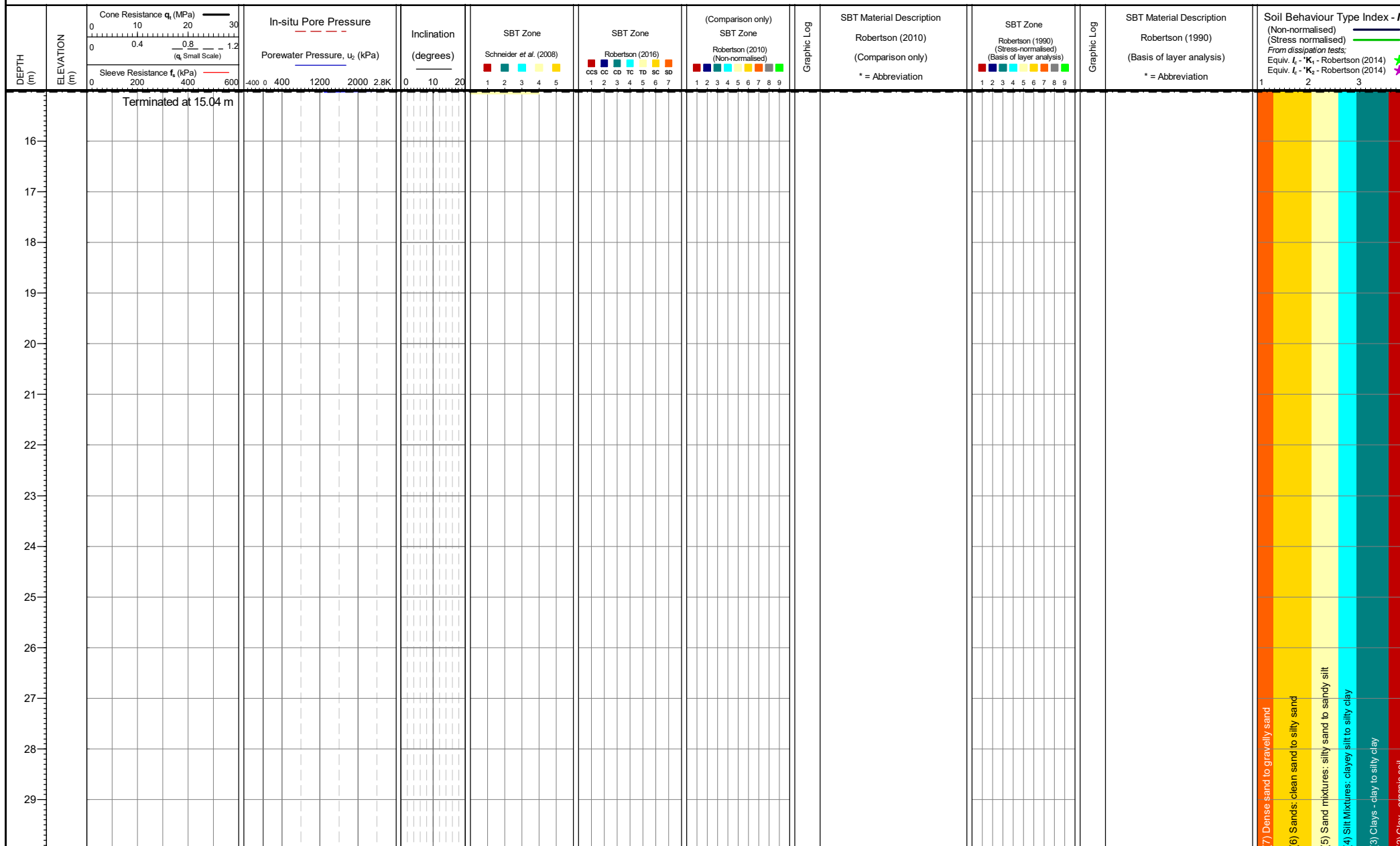
Internal QA Diss. Dissipation Test

TEST ID: CPT05

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(7) Dense sand to gravelly sand
(6) Sands: clean sand to silty sand
(5) Sand mixtures: silty sand to sandy silt
(4) Silt mixtures: clayey silt to silty clay
(3) Clays - clay to silty clay
(2) Clay - organic soil





Cone area (mm²):
ConeID: S15-CFIPPT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 12:32:44

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

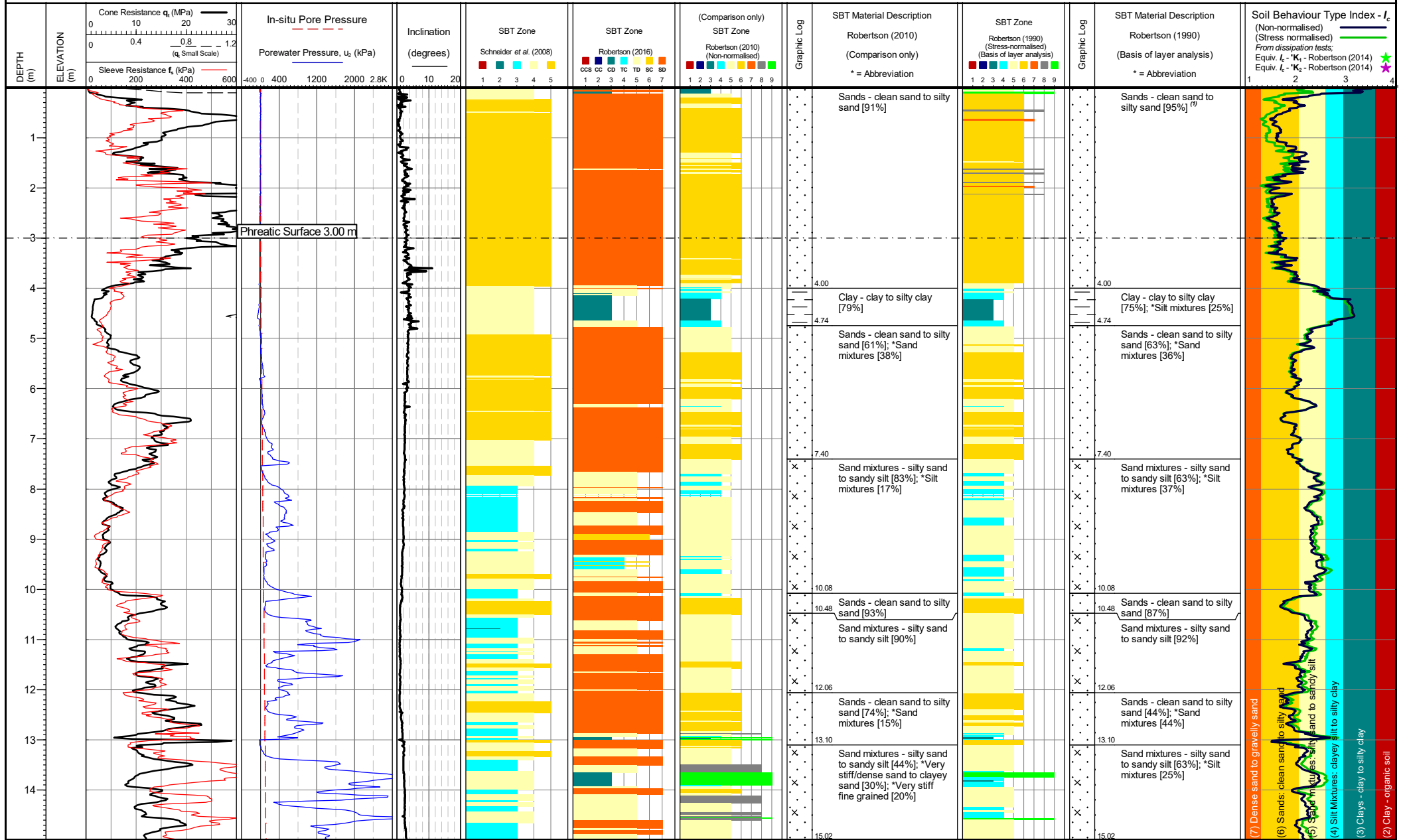
Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt
6 - Sands - clean sand to silty sand
7 - Gravely sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT06



Cone area (mm²):
ConeID: S15-CFPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Remarks: *Phreatic surface origin: Arbitrary value
Coordinates: ,
Elevation:

Schneider et al. (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

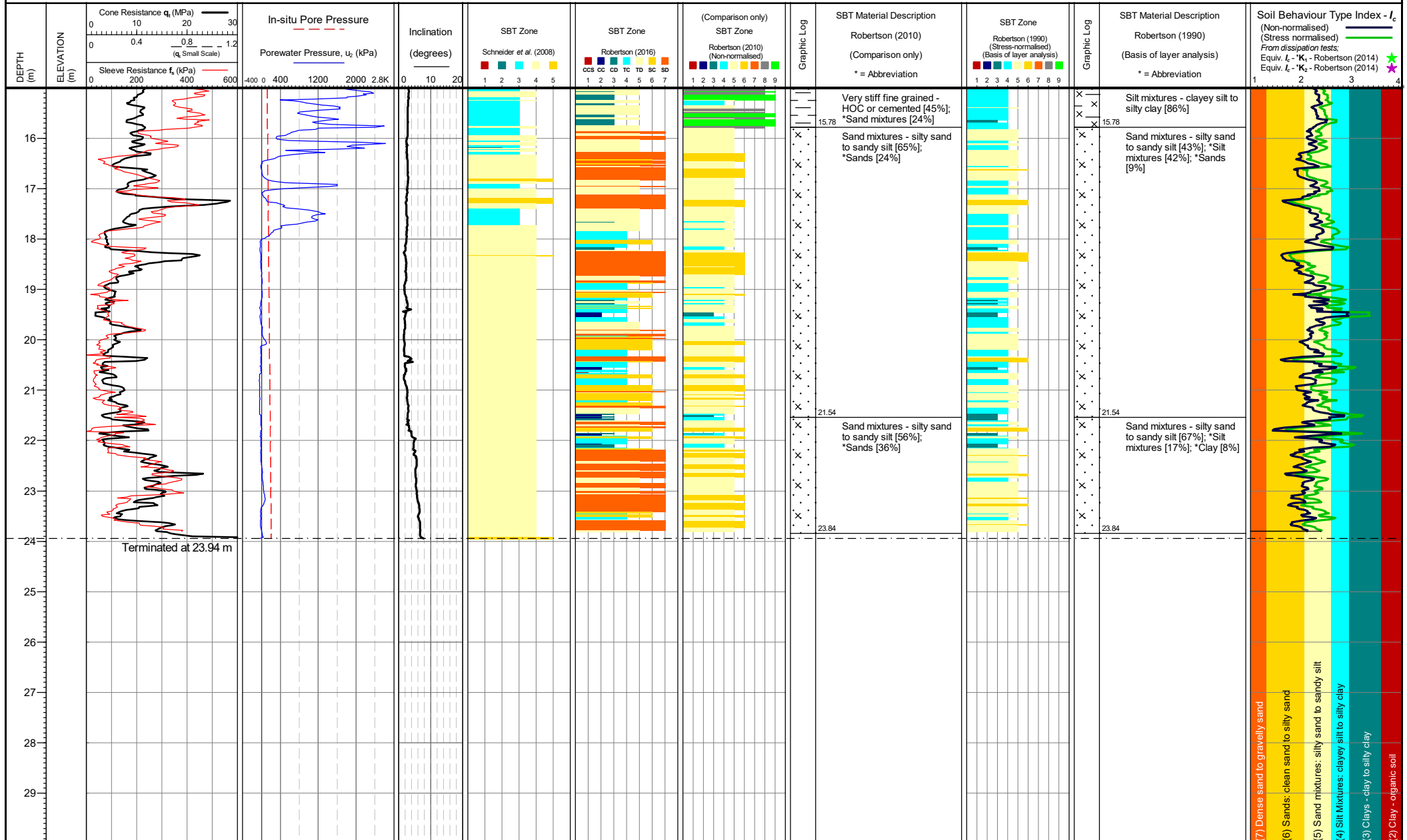
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT08



Cone area (mm²):
ConeID: S15-CFIPIT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

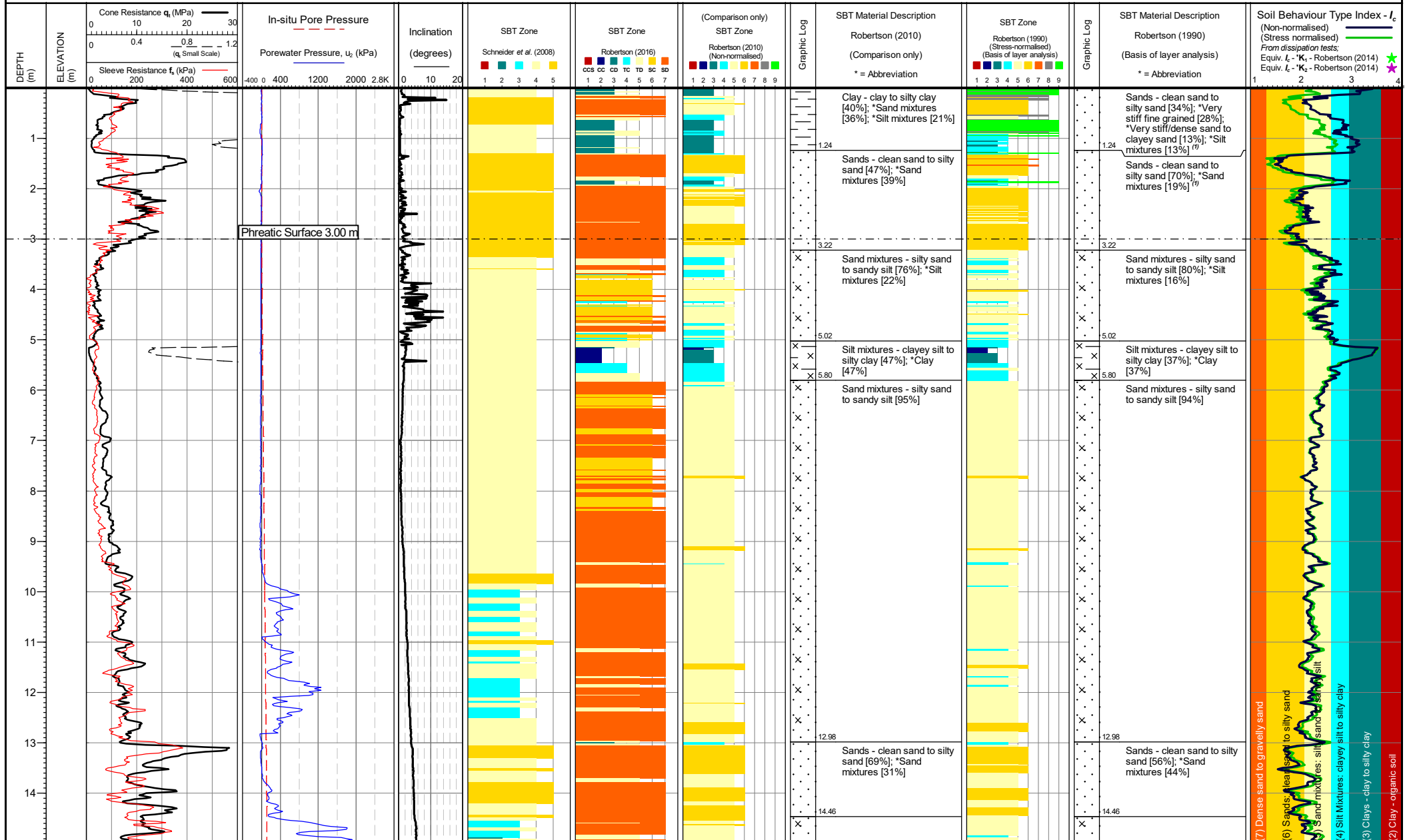
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT08



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

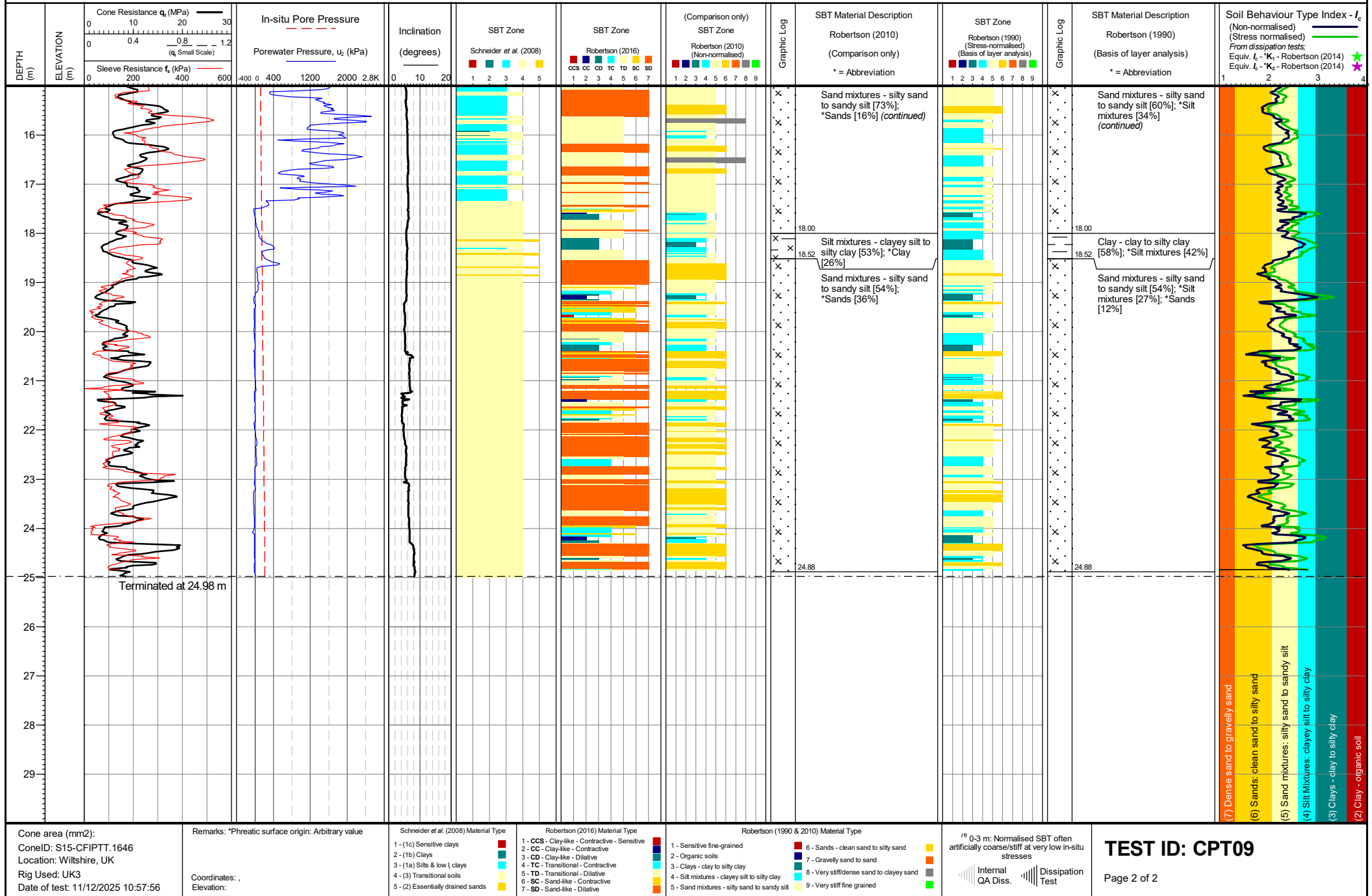
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

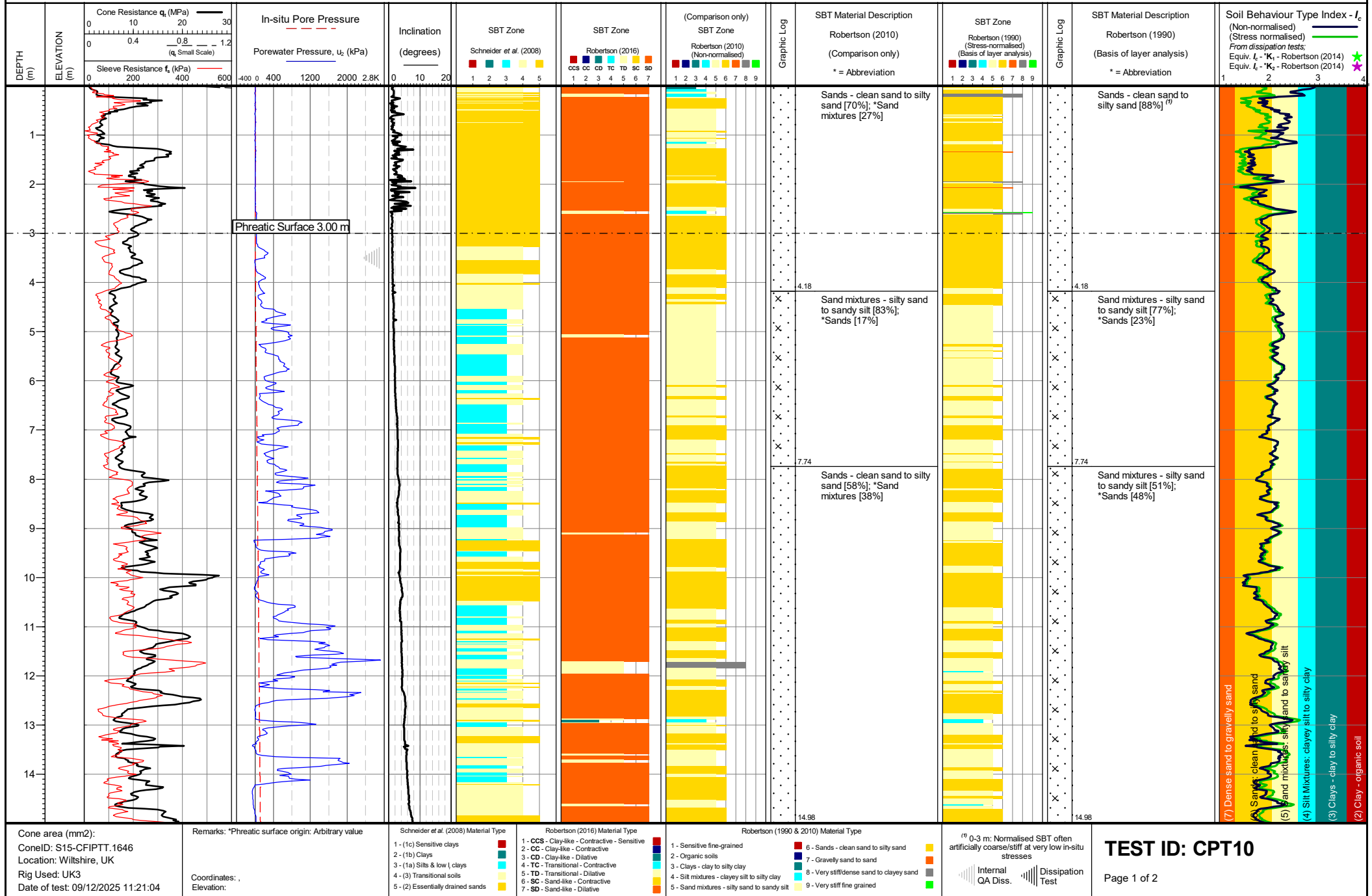
6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

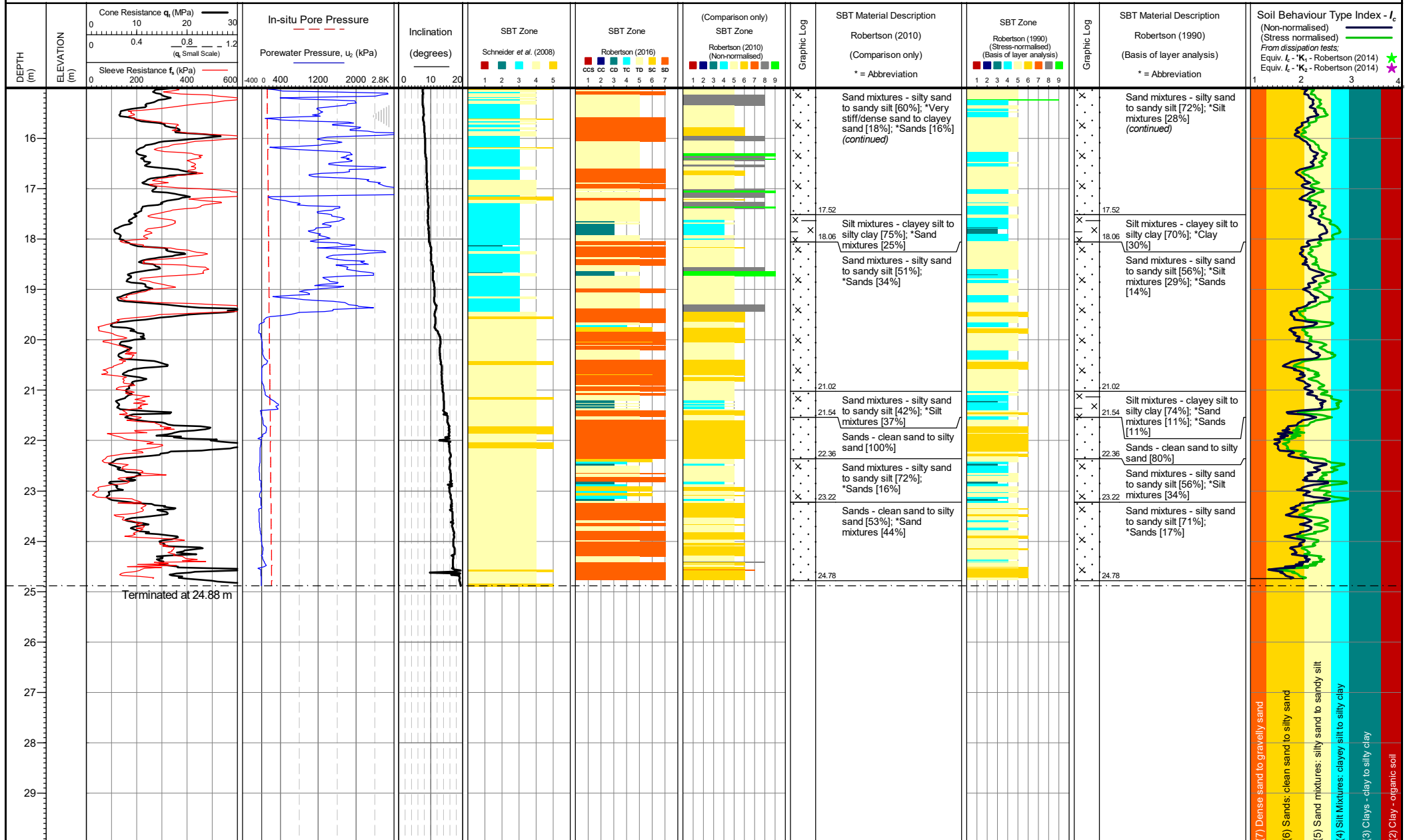
TEST ID: CPT09



(7) Dense sand to gravelly sand
(6) Sands: clean sand to silty sand
(5) Sand mixtures: silty sand to sandy silt
(4) Silt mixtures: clayey silt to silty clay
(3) Clays - clay to silty clay
(2) Clay - organic soil



(7) Dense sand to gravelly sand
Sands: clean sand to silty sand
(5) Sand mixtures: silty sand to sandy silt
(4) Silt Mixtures: clayey silt to silty clay
(3) Clays - clay to silty clay
(2) Clay - organic soil



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

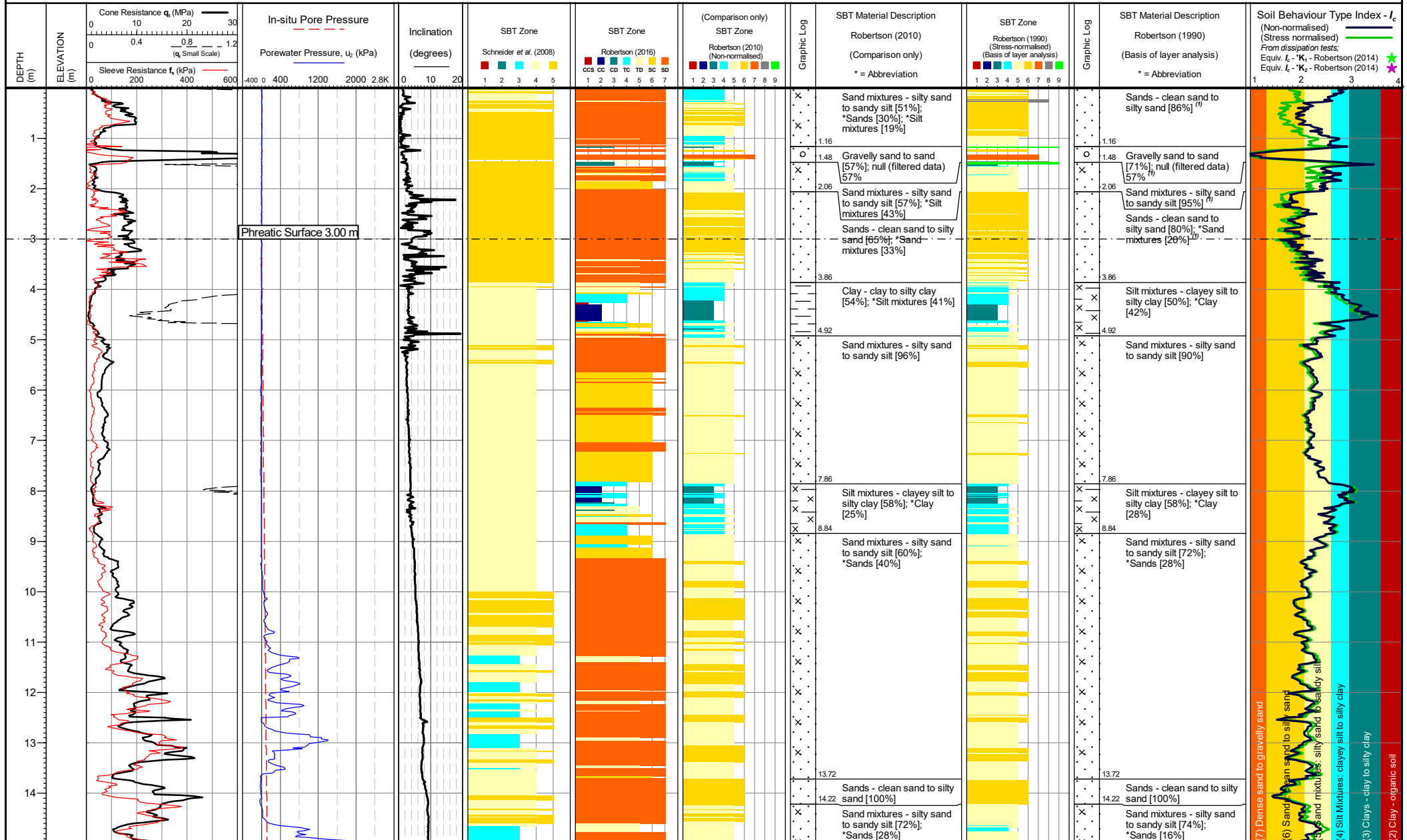
Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT10

(7) Dense sand to gravelly sand
(6) Sands: clean sand to silty sand
(5) Sand mixtures: silty sand to sandy silt
(4) Silt Mixtures: clayey silt to silty clay
(3) Clays - clay to silty clay
(2) Clay - organic soil



Cone area (mm²):
ConeID: S15-CFIPPT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

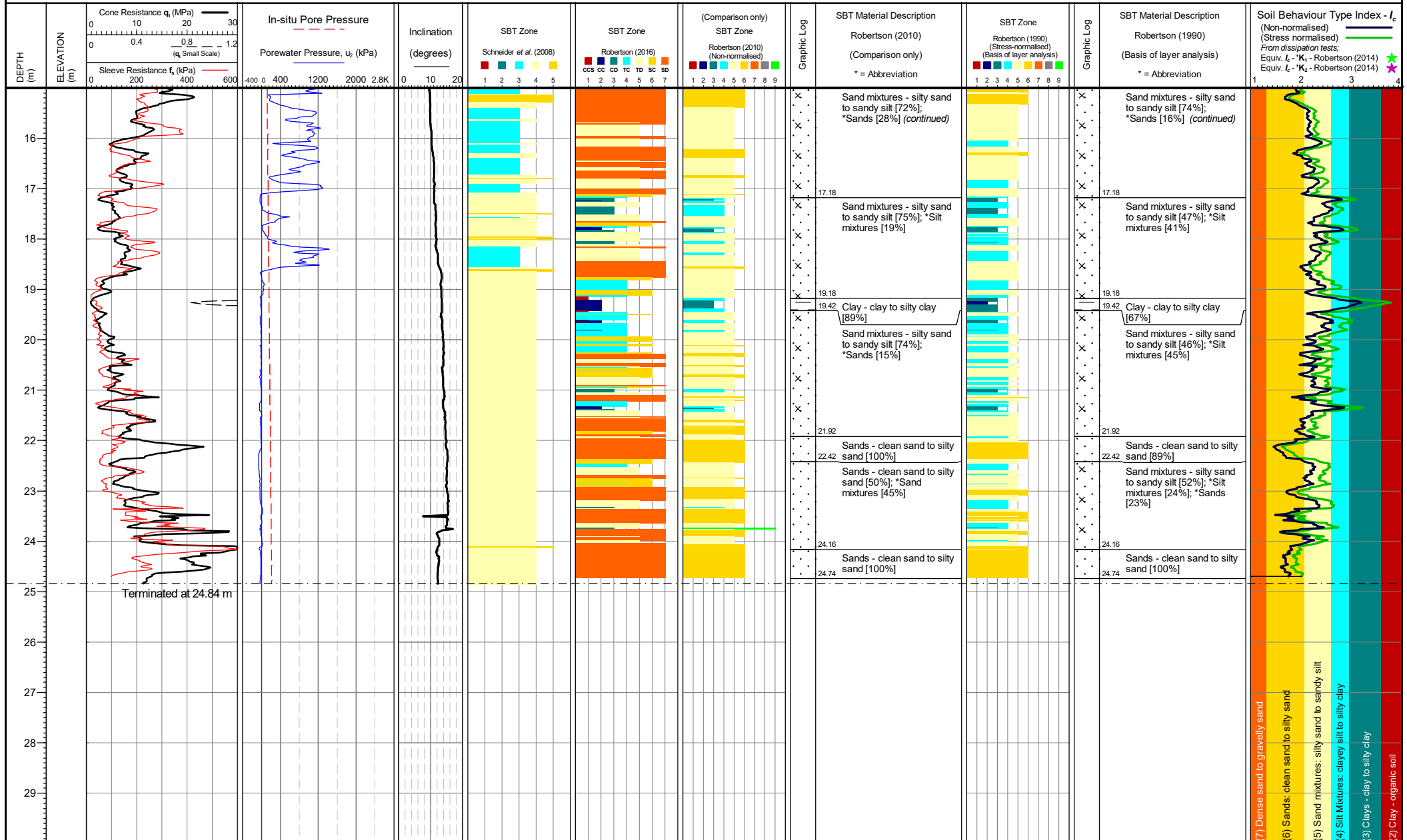
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

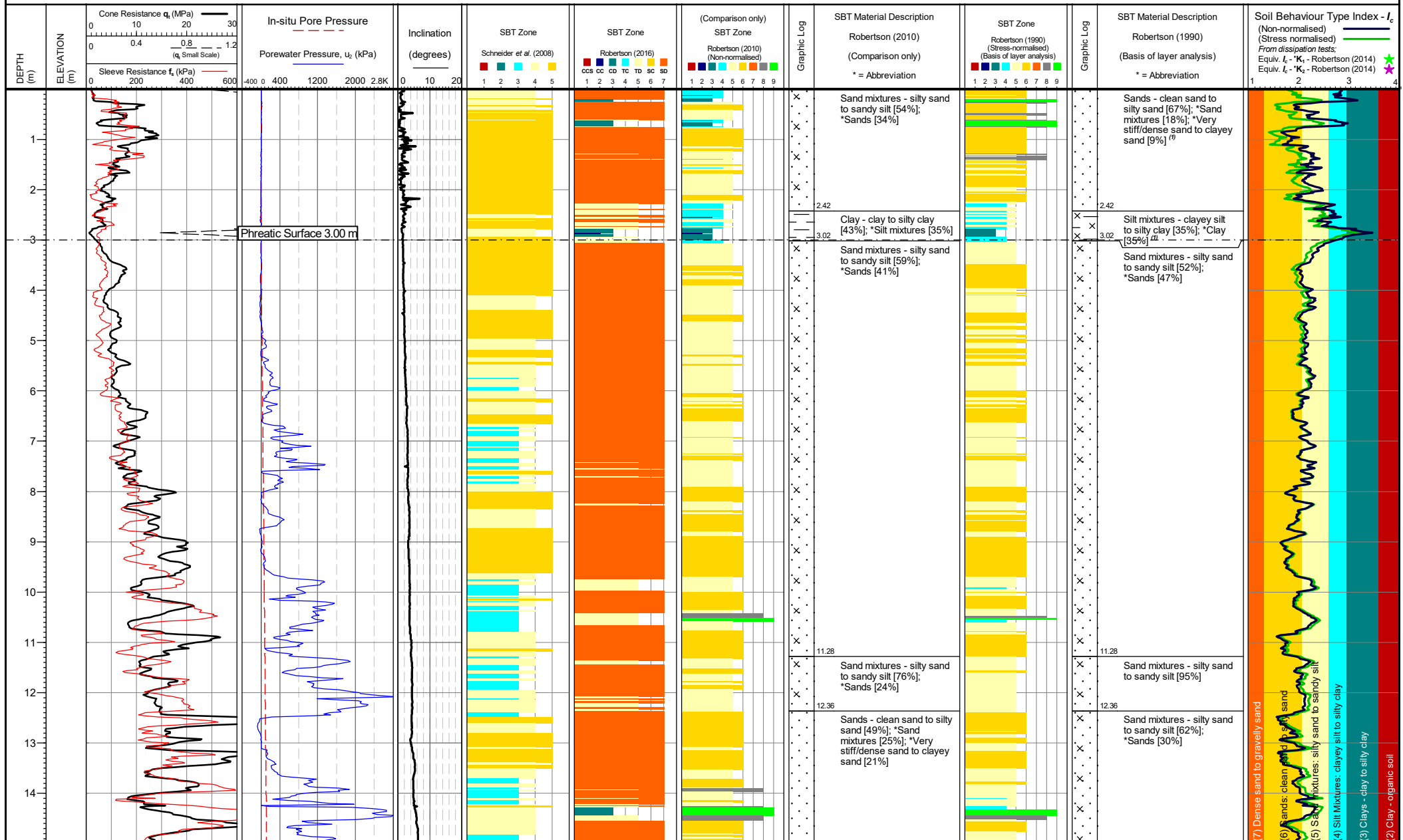
Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁷⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT11





Cone area (mm²):
ConeID: S15-CFIPIT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

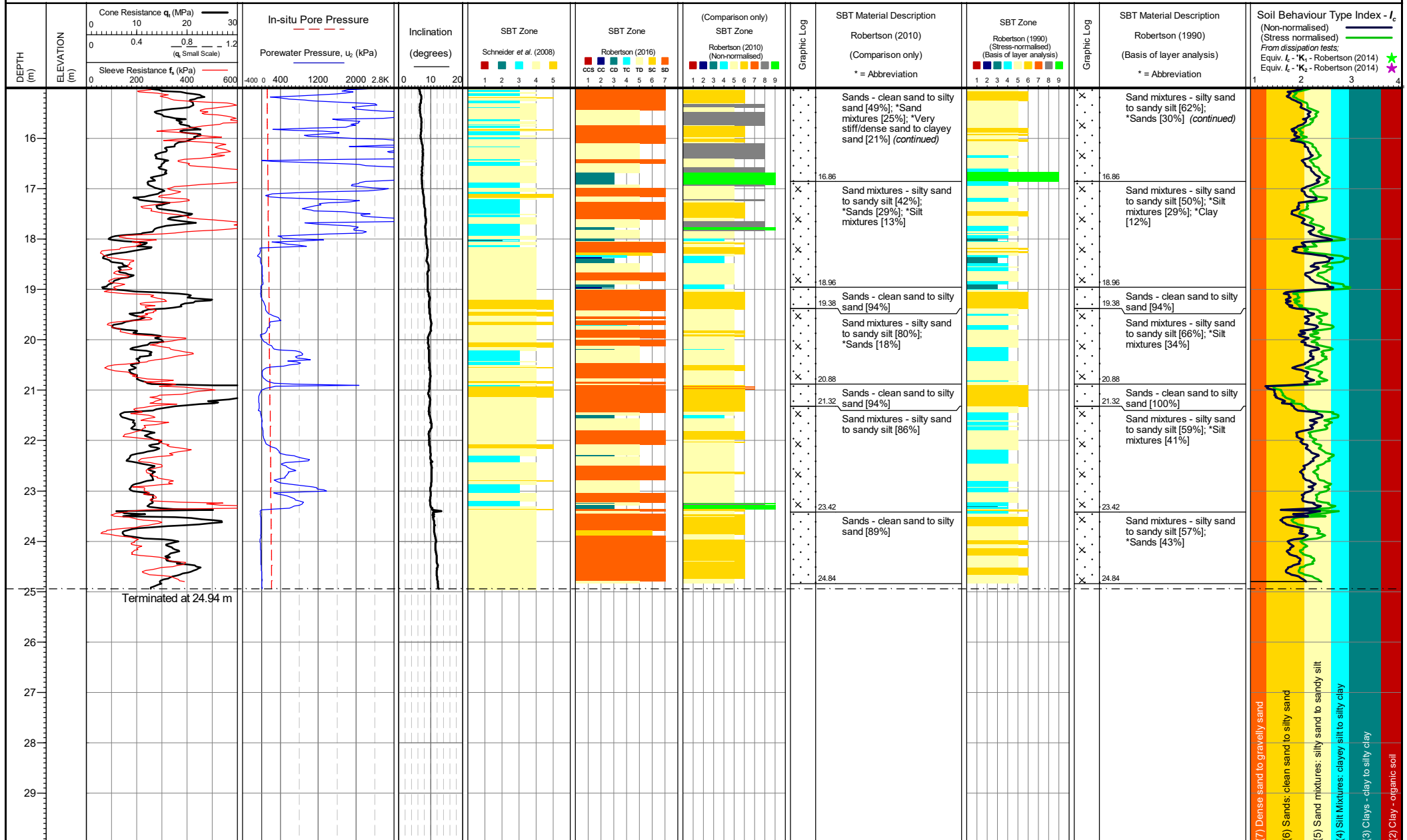
Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

Robertson (2016) Material Type
1 - CC - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt
6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT13



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Location: Wiltshire, UK
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT13

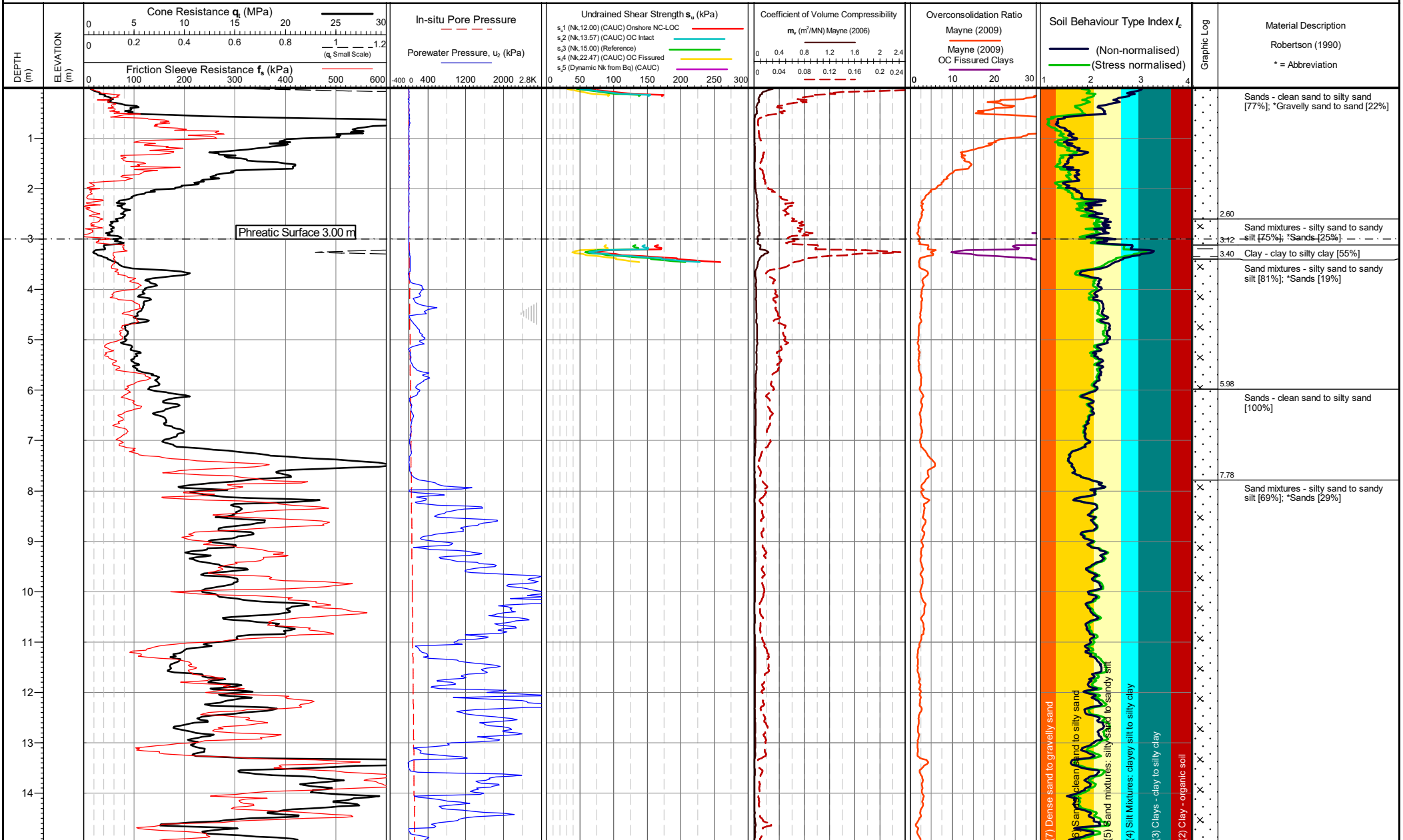
APPENDIX E PARAMETER RESULTS 1 – S_u , M_v , OCR, SBT, I_c

Undrained shear strength

Coefficient of volume change

Overconsolidation ratio

Robertson 1990 SBT descriptions & SBT index I_c



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

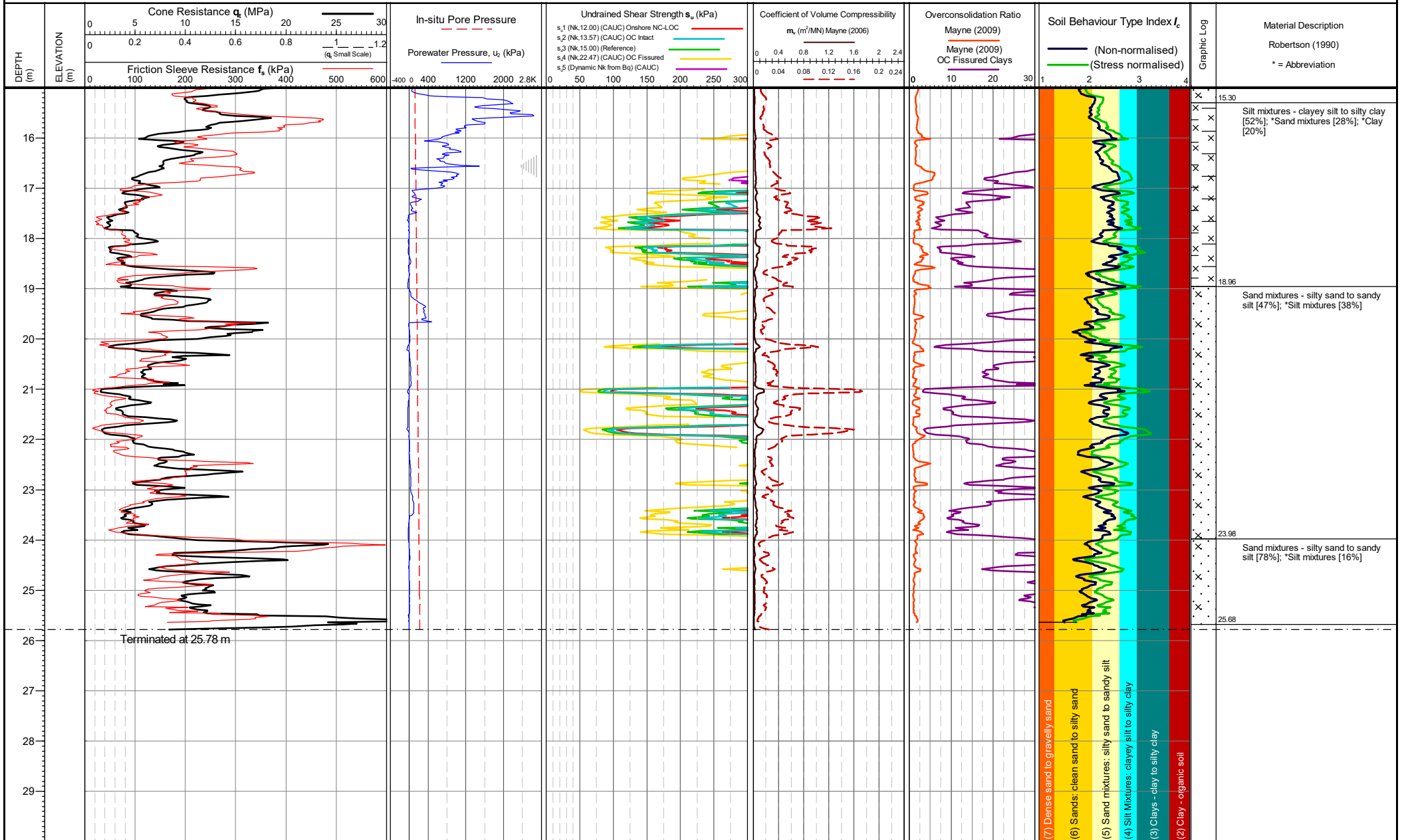
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value
Termination Remark:
Target depth

Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1
Checked by: Chris Player

TEST ID: CPT01



Cone area (mm²):
ConeID: S15-CF1PTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

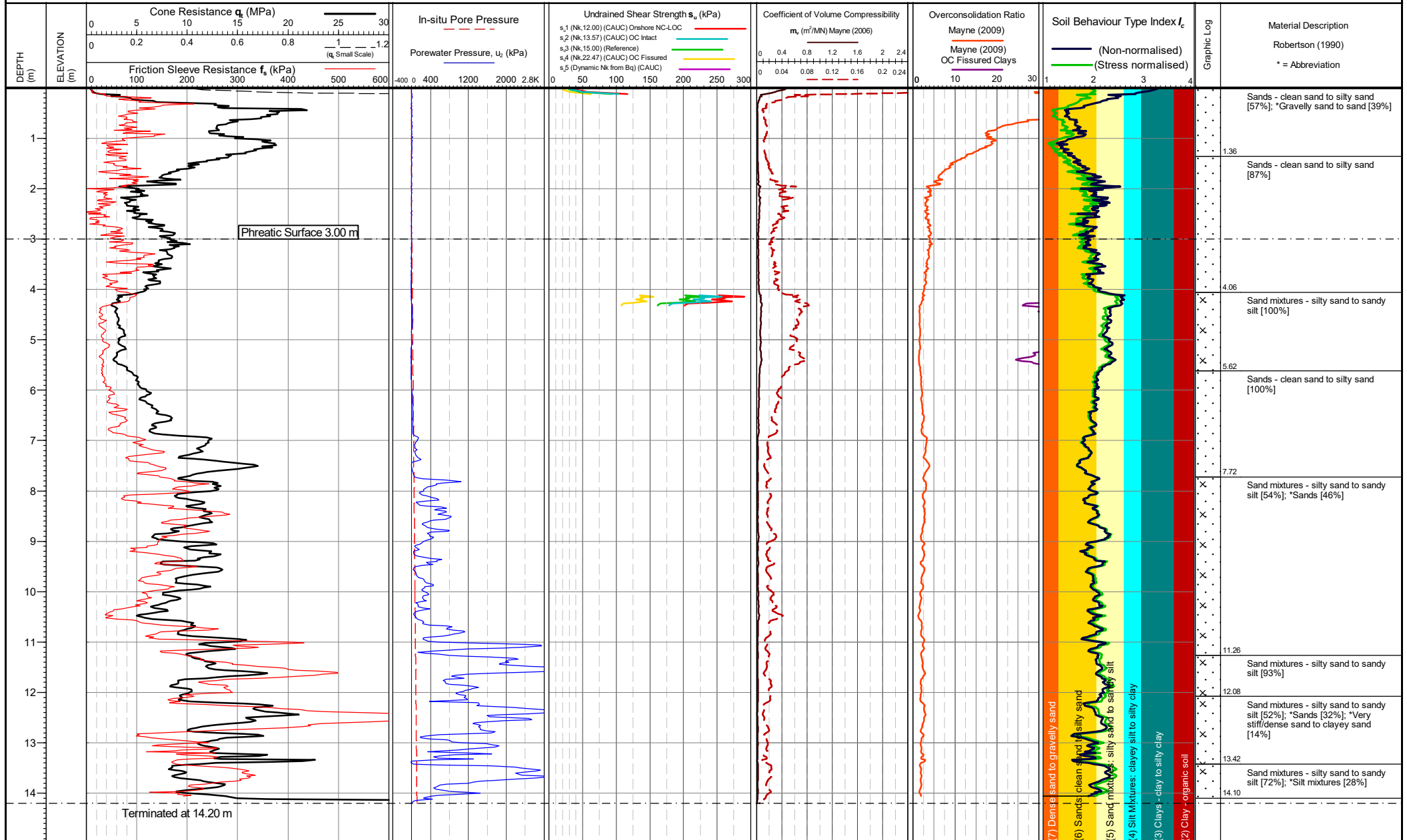
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 10:23:52

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at depth

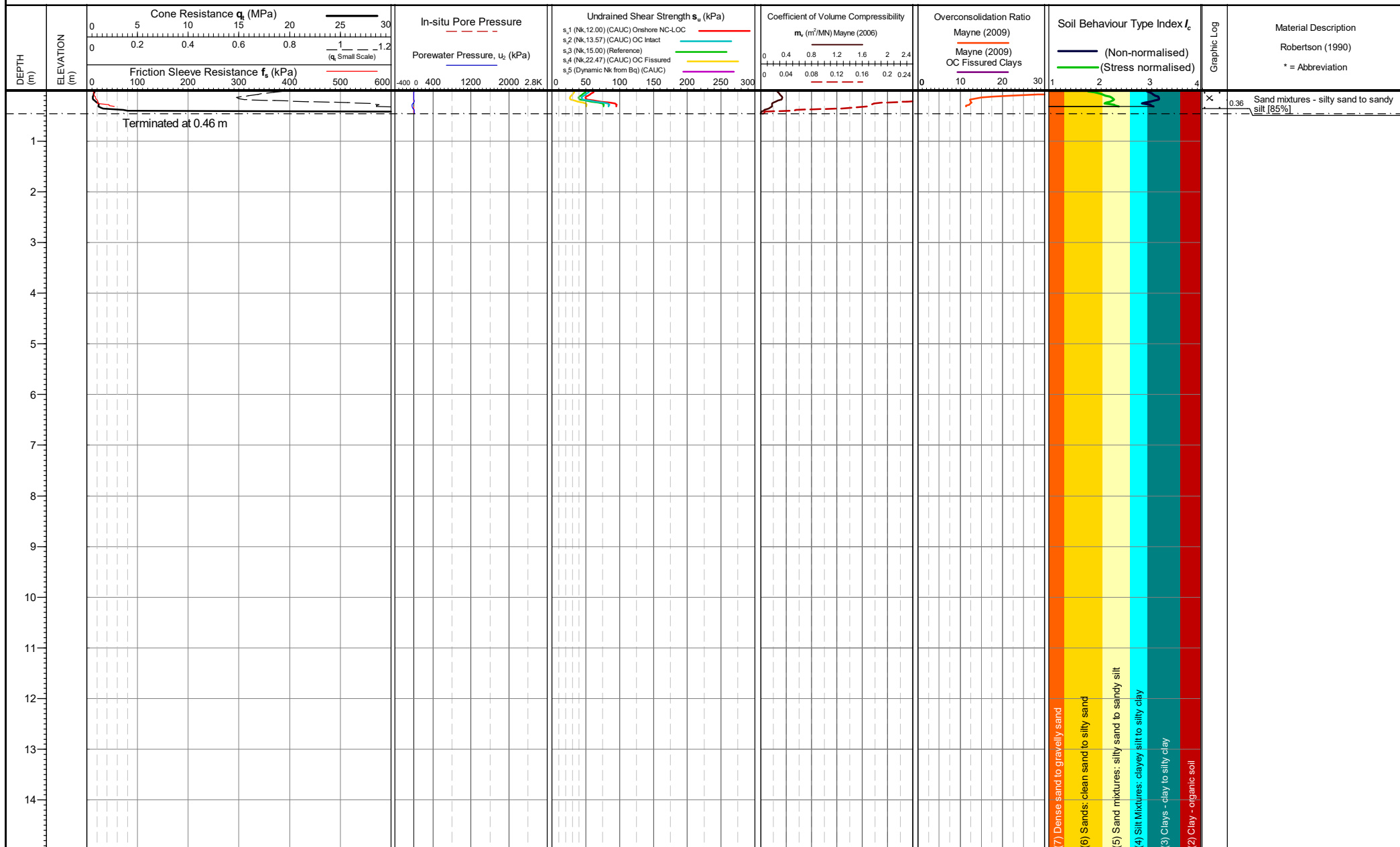
Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1

Checked by: Chris Player

TEST ID: CPT02



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:04:35

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Tip load

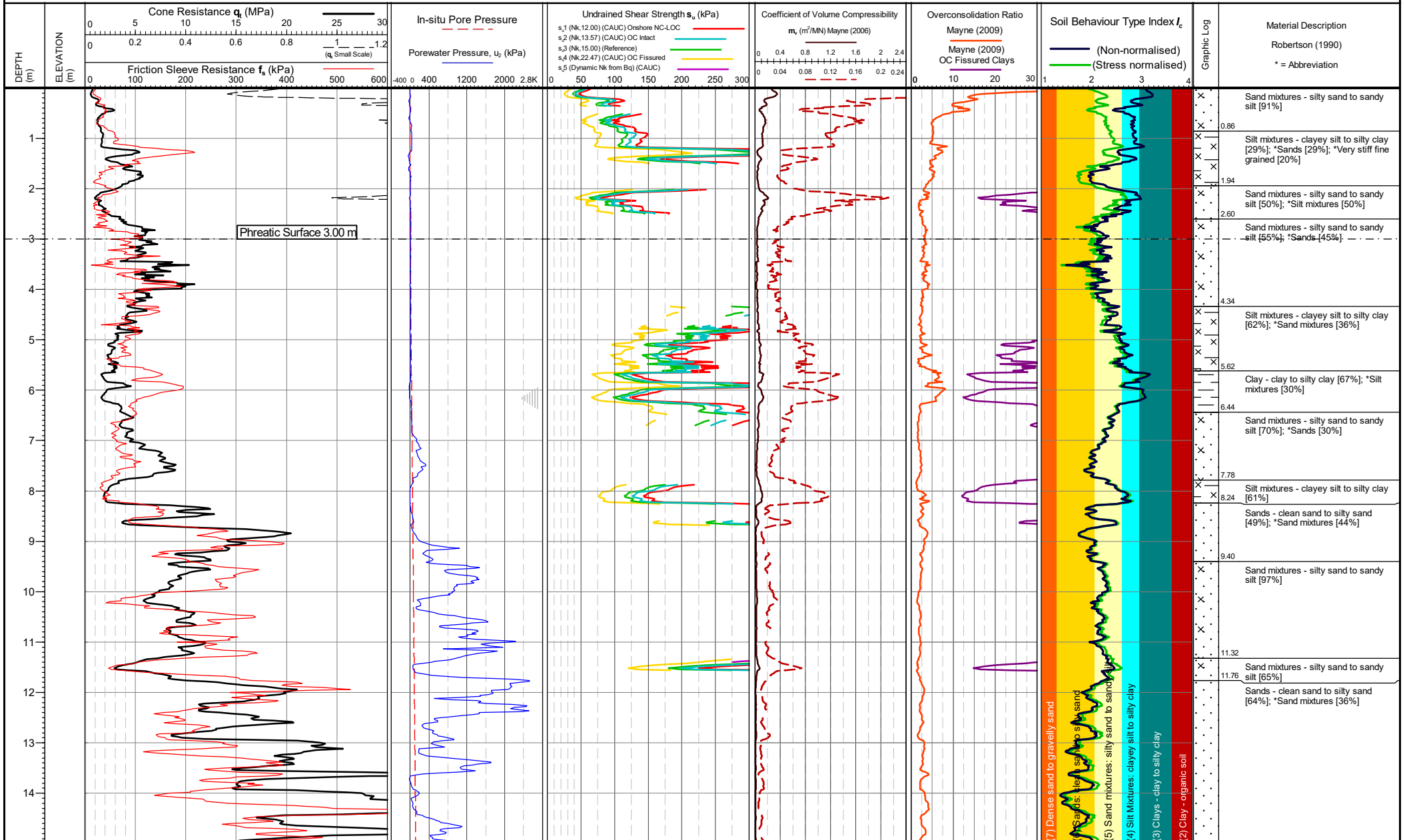
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT03



Cone area (mm²):
ConeID: S15-CFIPPT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

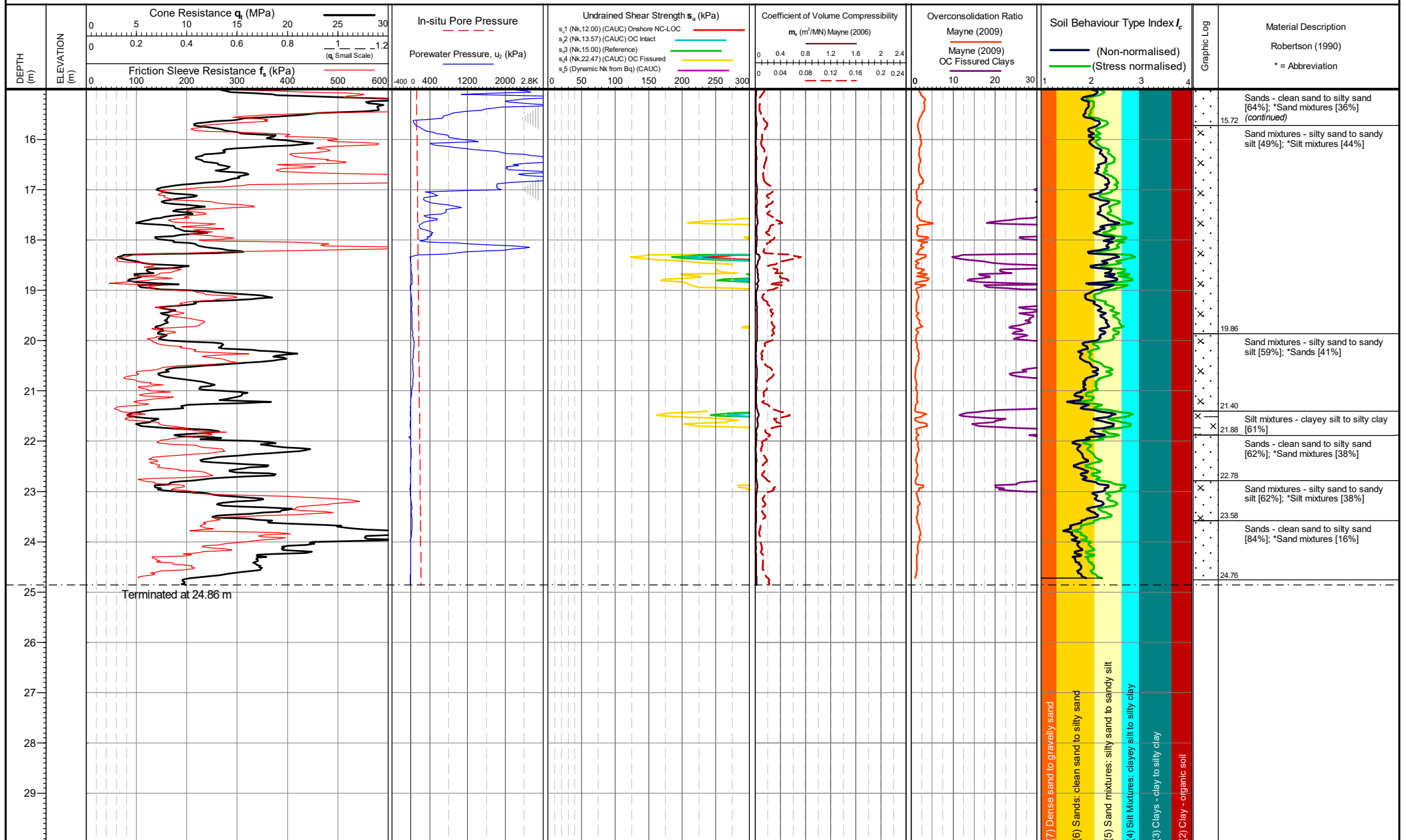
Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = 1c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot: 12-12-25
Checked by: Chris Player

Lankelma Project Ref: 25-32-30578-1

TEST ID: CPT03A



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

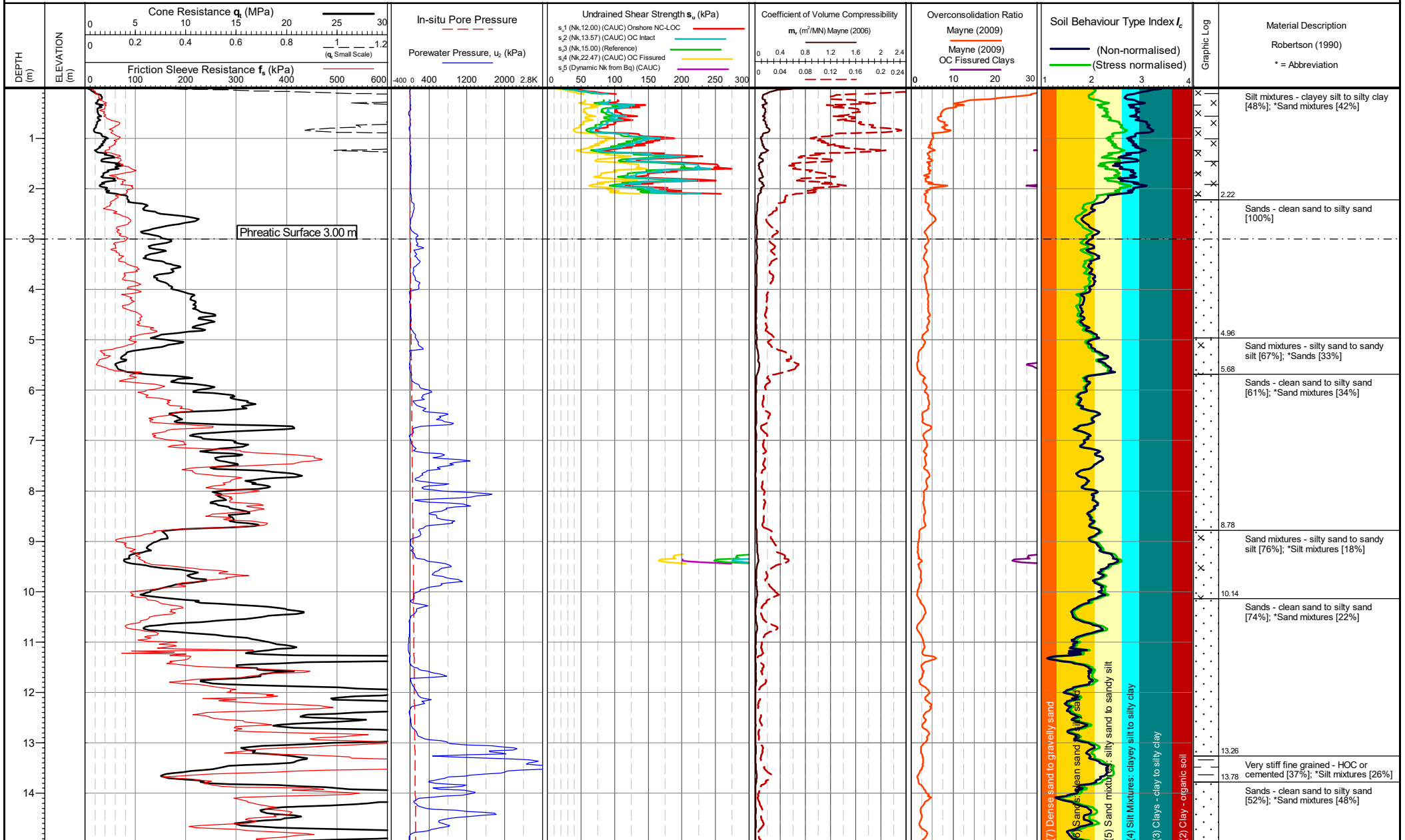
Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1
Checked by:
Chris Player

TEST ID: CPT03A
Page 2 of 2



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 13:46:59

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Piezo load

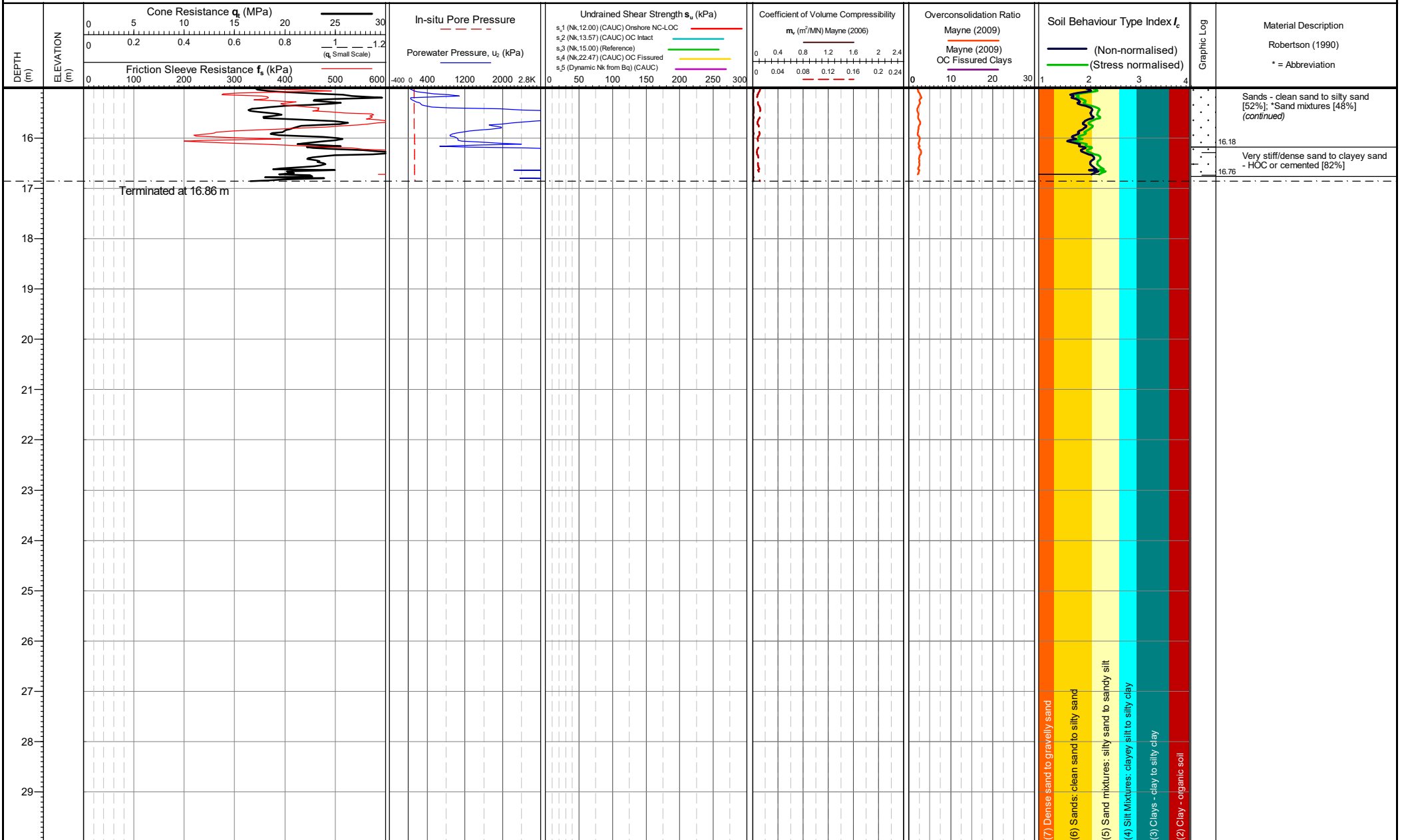
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

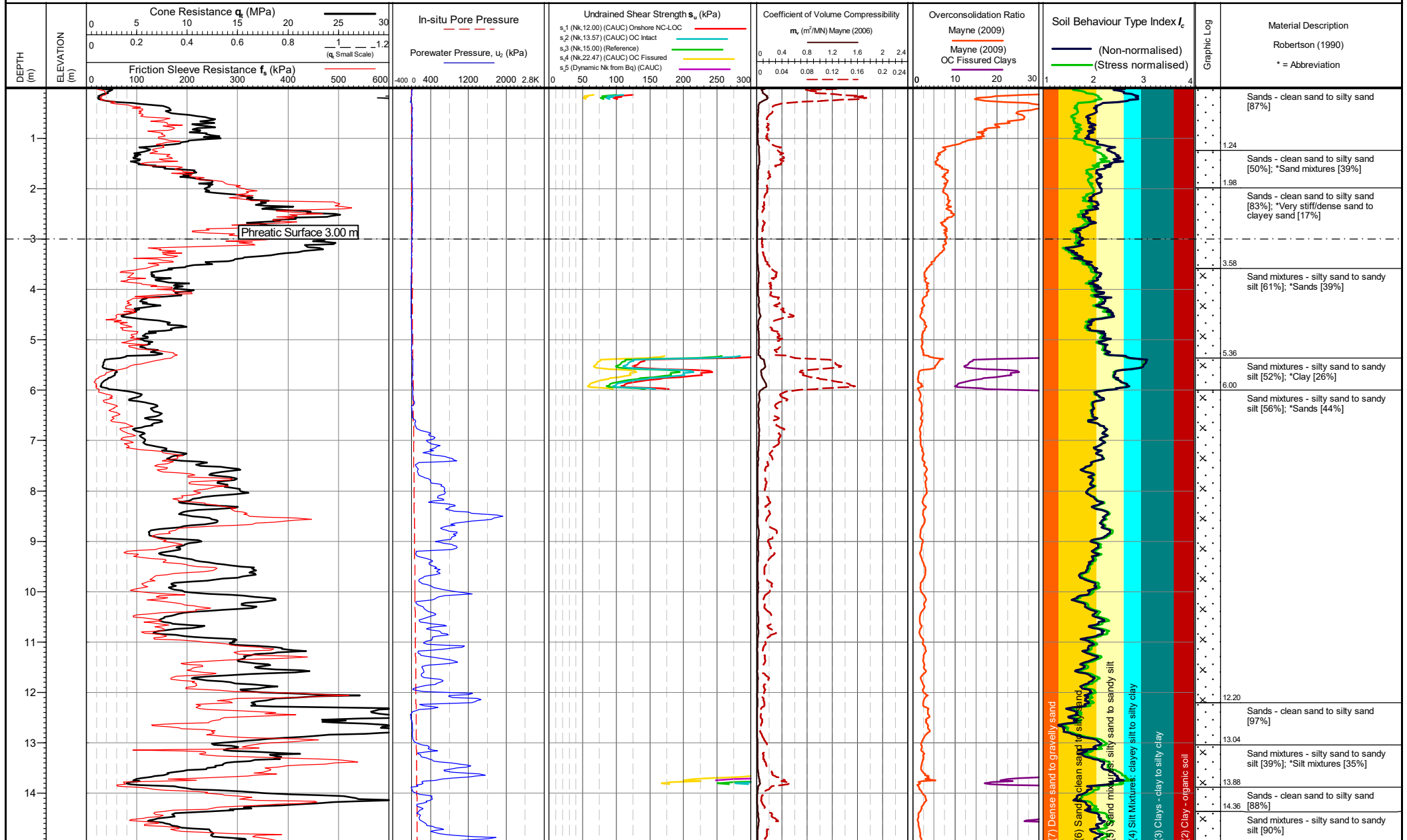
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT04





Cone area (mm²):
ConeID: S15-CFIPPT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 11:25:52

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

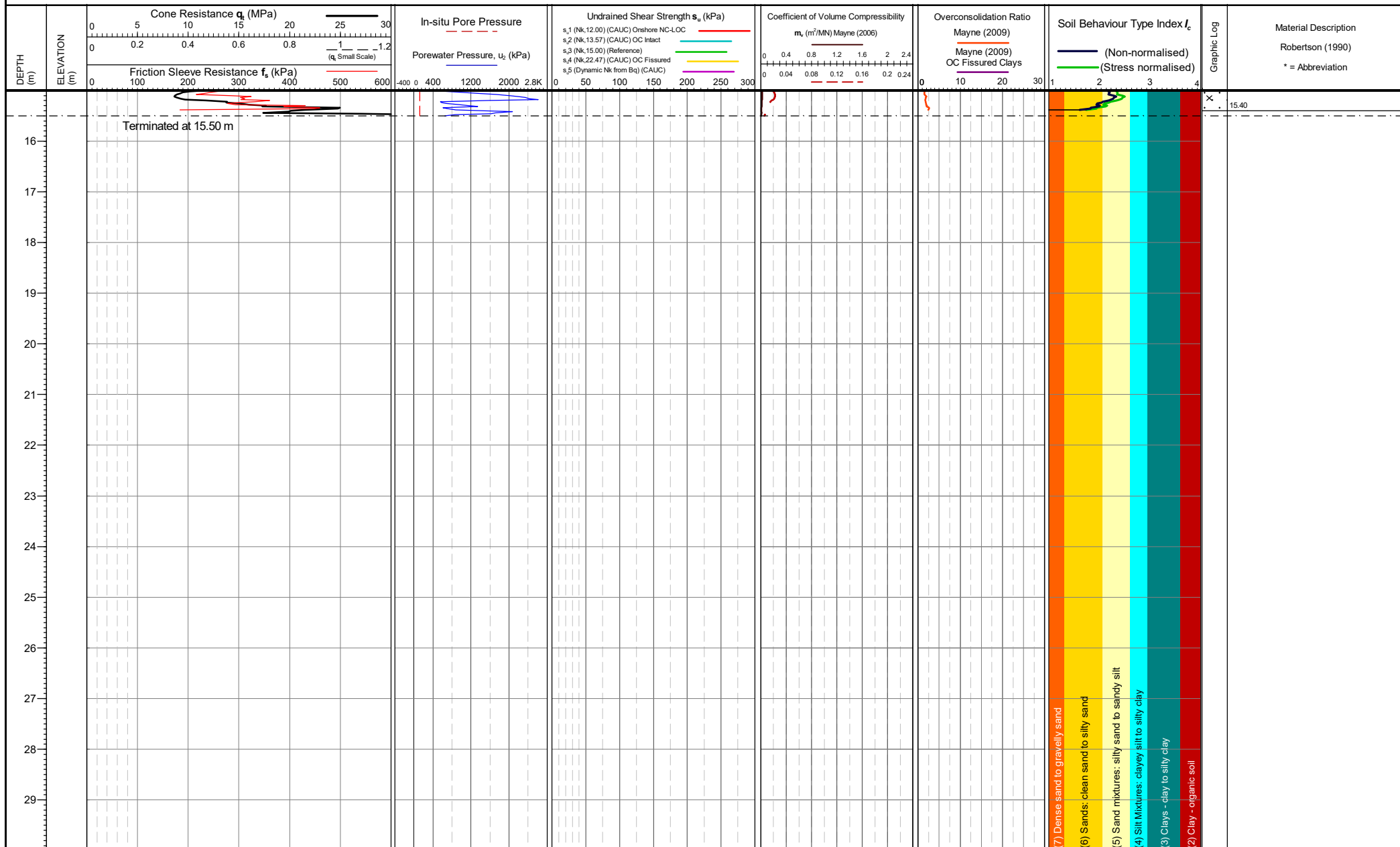
Termination Remark:
Lateral support at depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT05



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 11:25:52

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

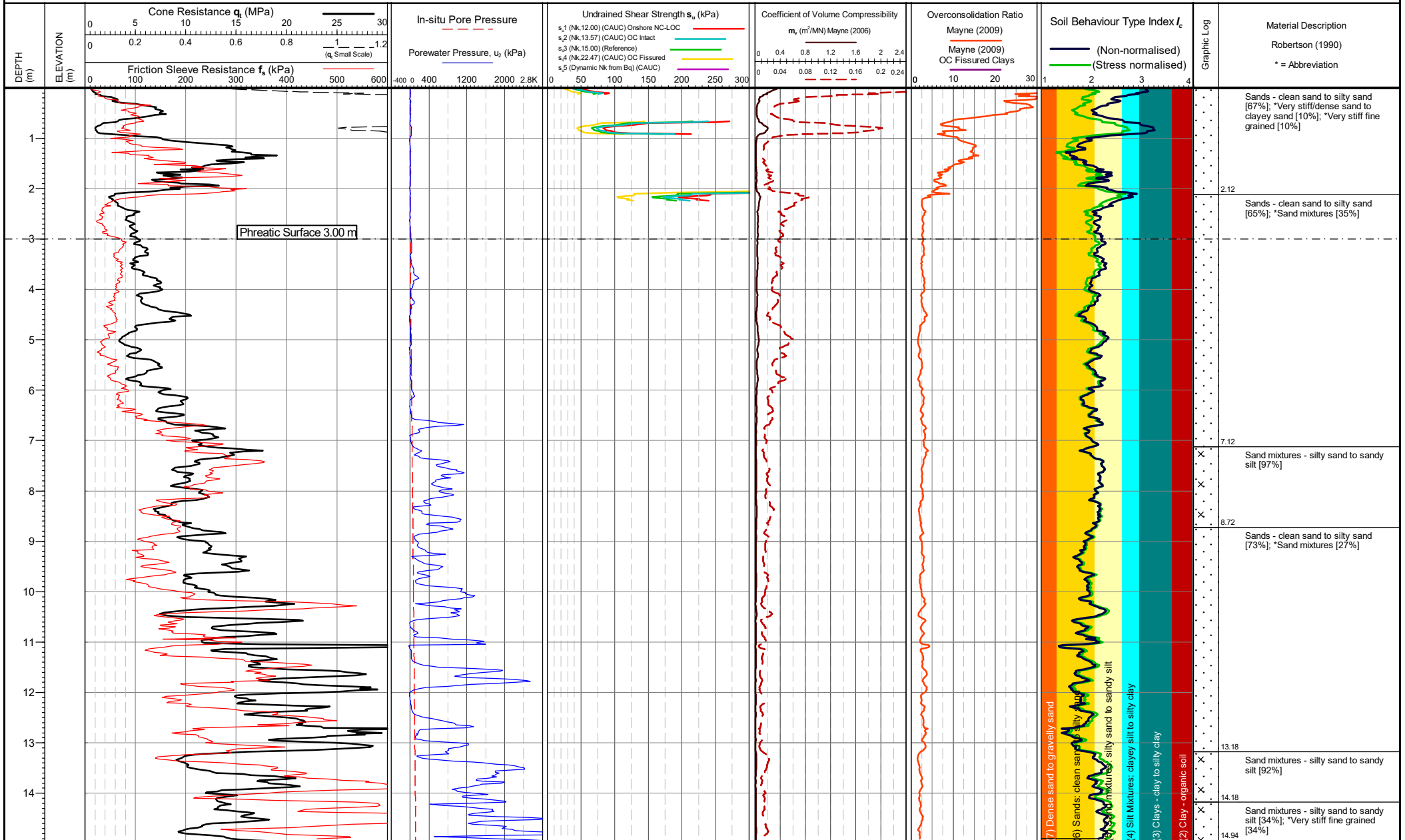
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT05

Page 2 of 2



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 12:32:44

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at depth

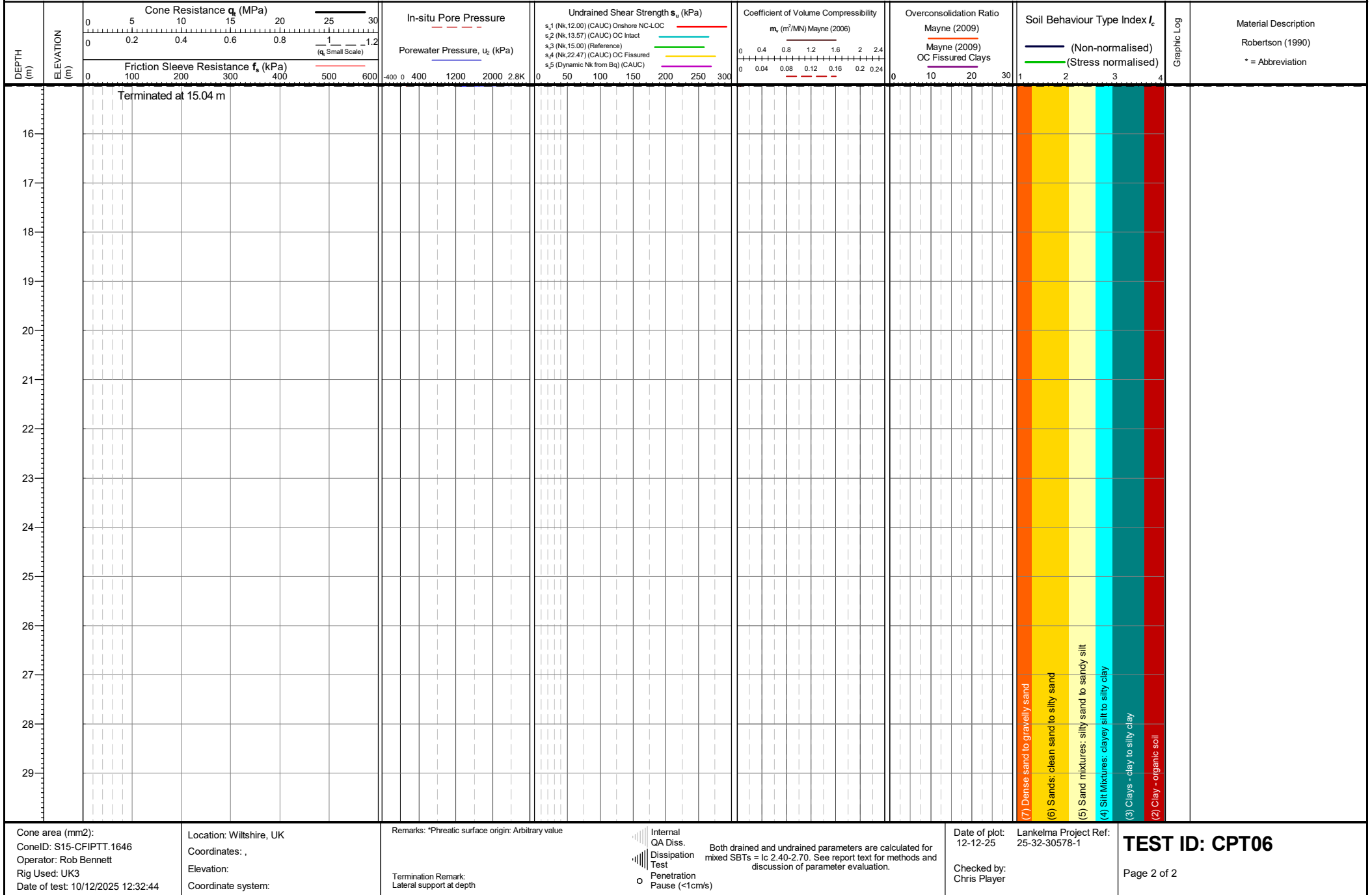
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

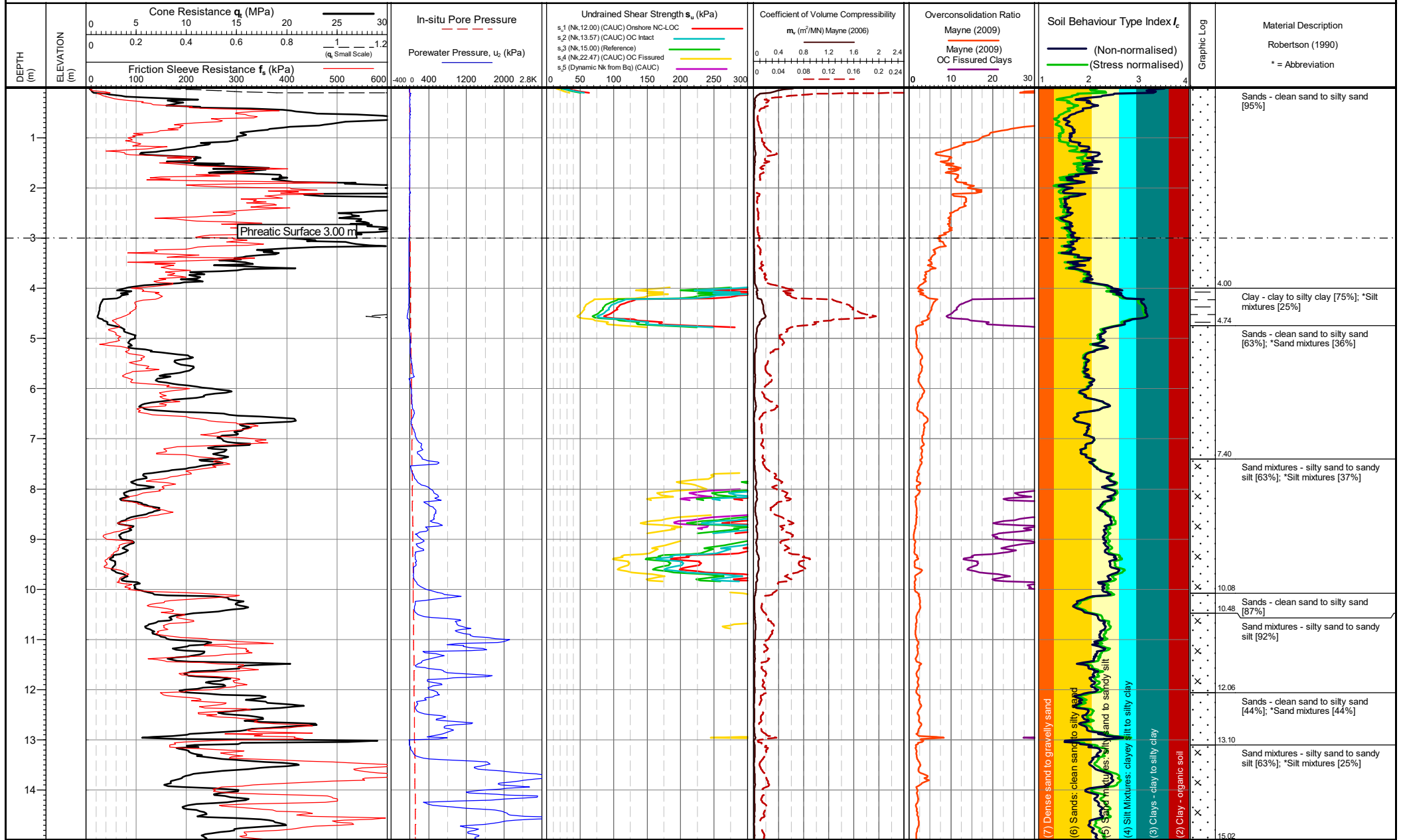
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT06





Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at depth

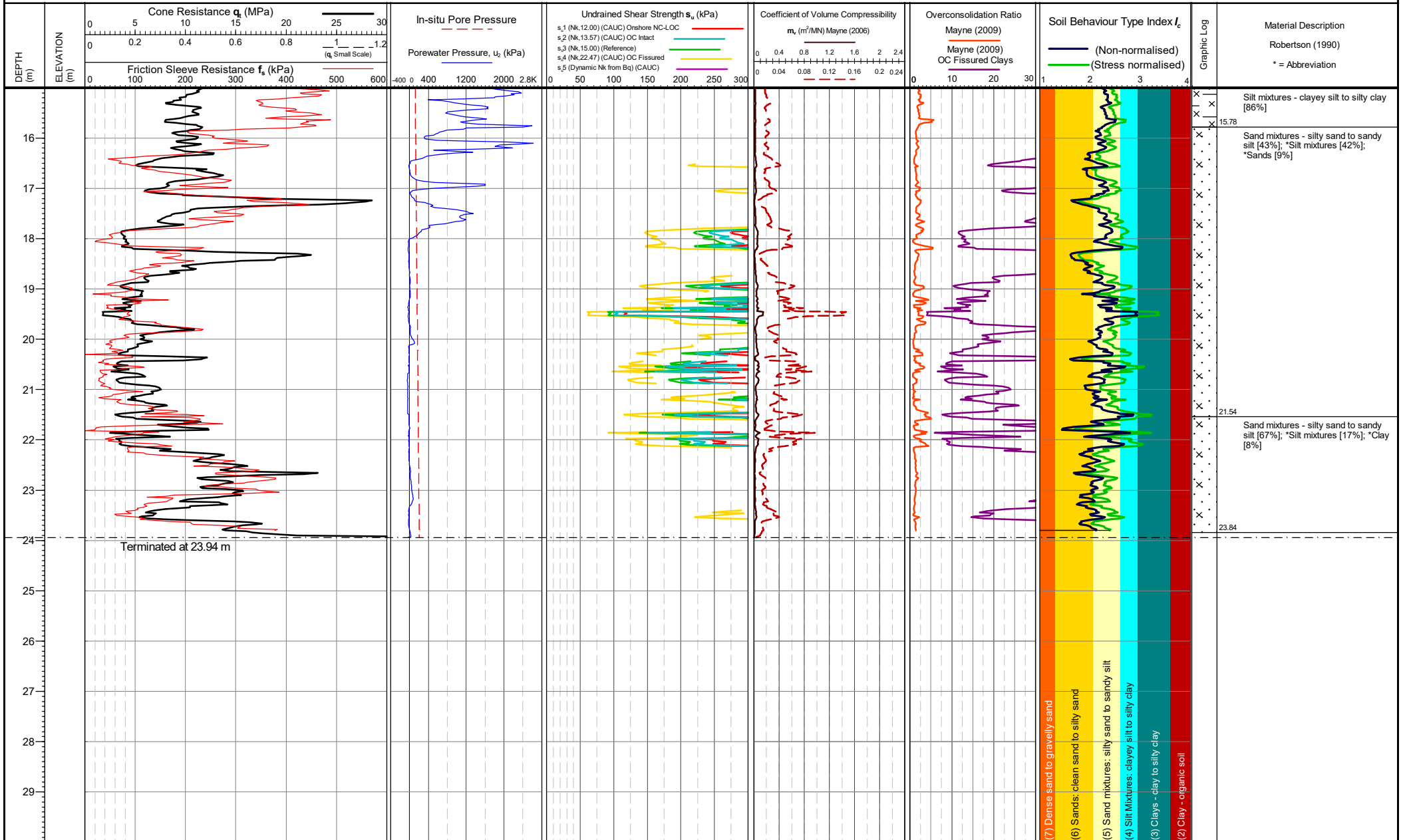
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT08



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

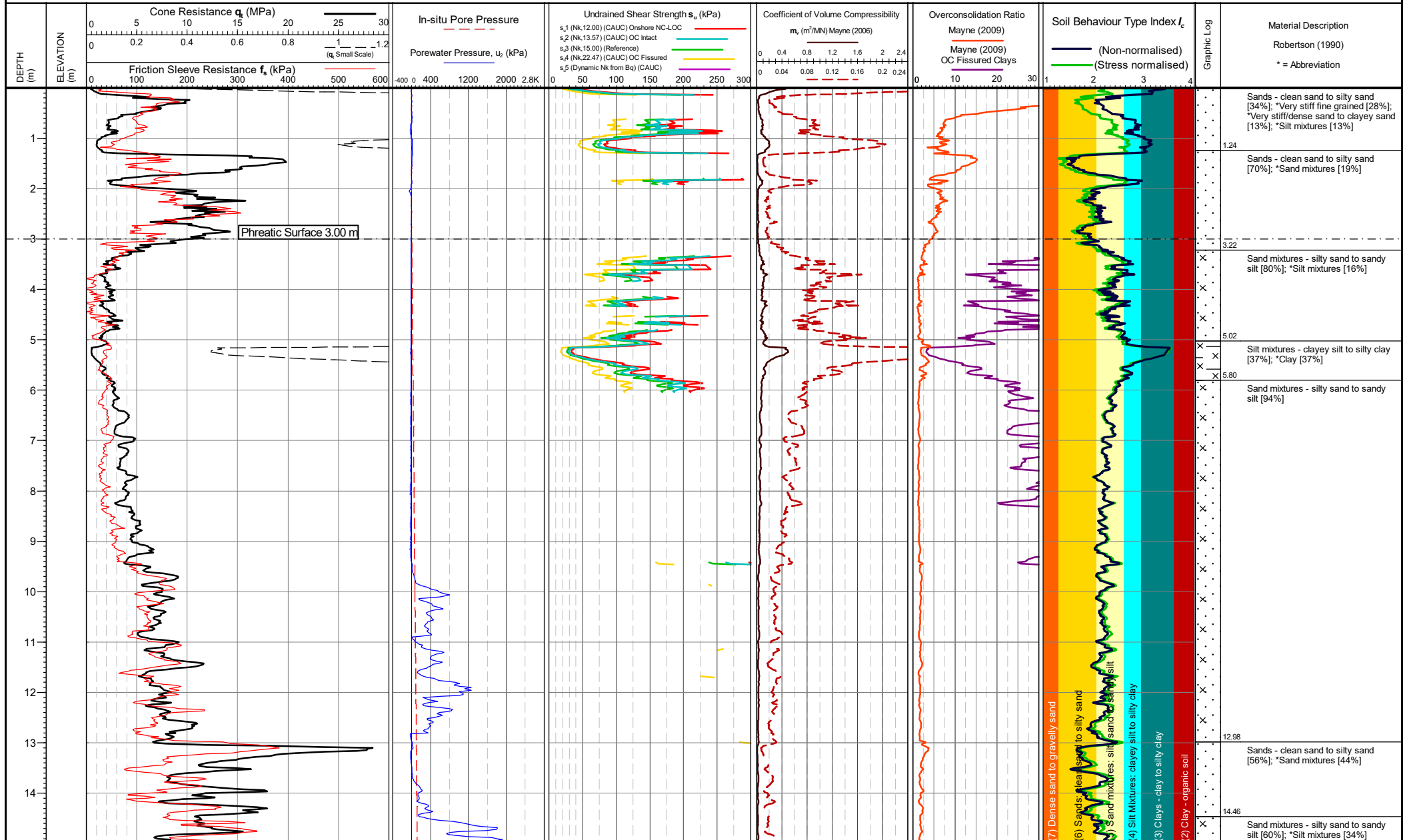
Termination Remark:
Lateral support at depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1
Checked by:
Chris Player

TEST ID: CPT08



Cone area (mm²):
ConeID: S15-CFIPIT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

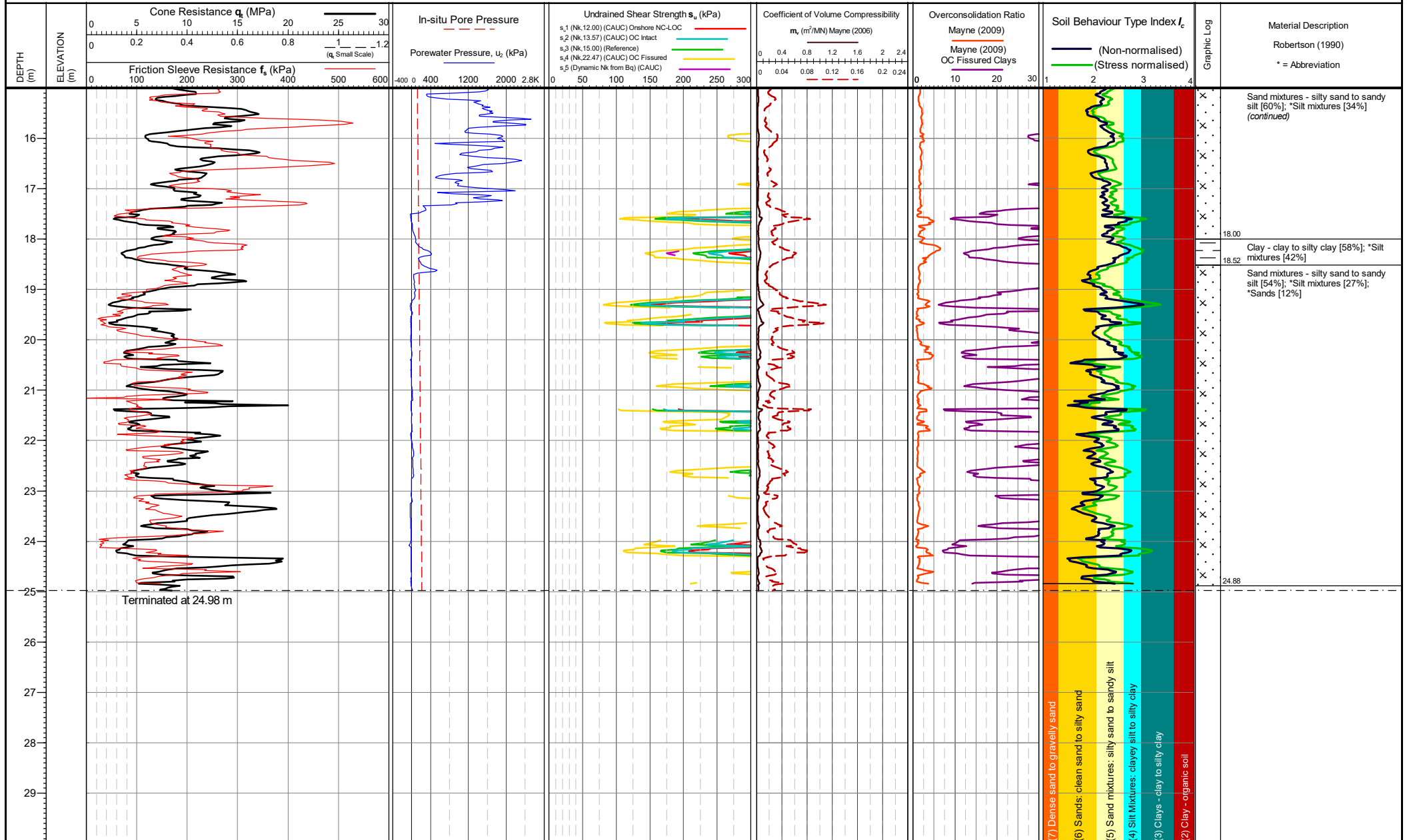
Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

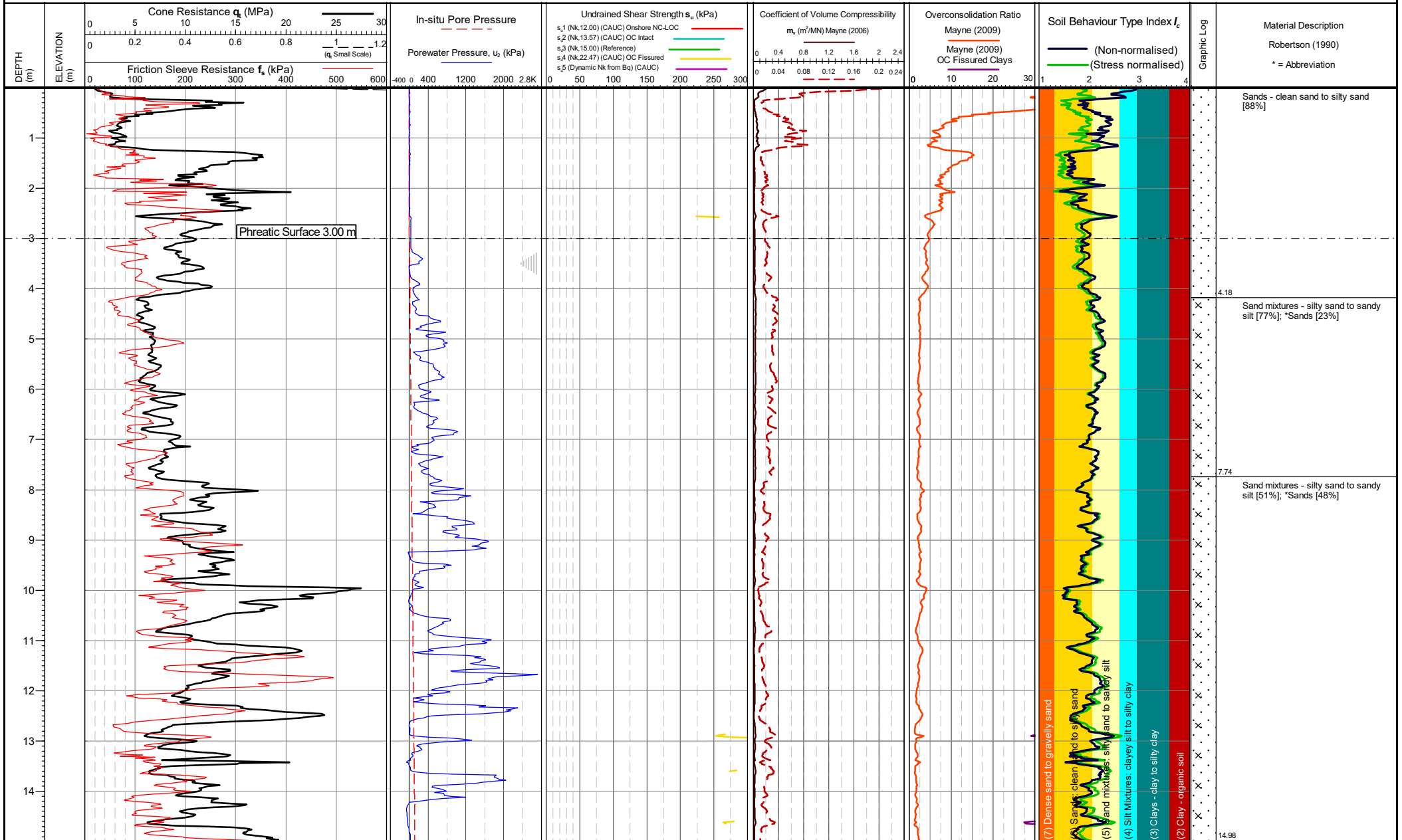
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1

Checked by:
Chris Player

TEST ID: CPT09



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

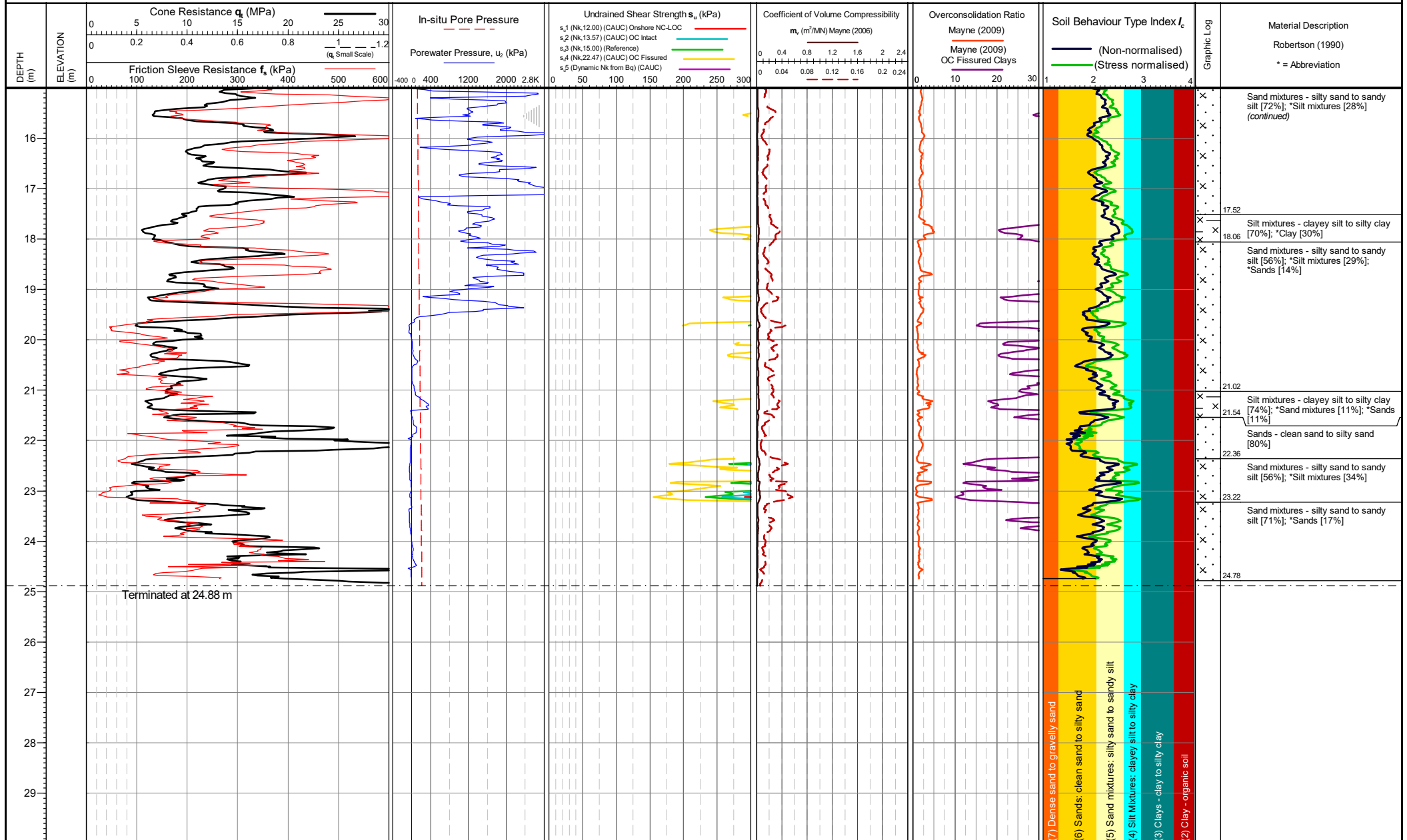
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

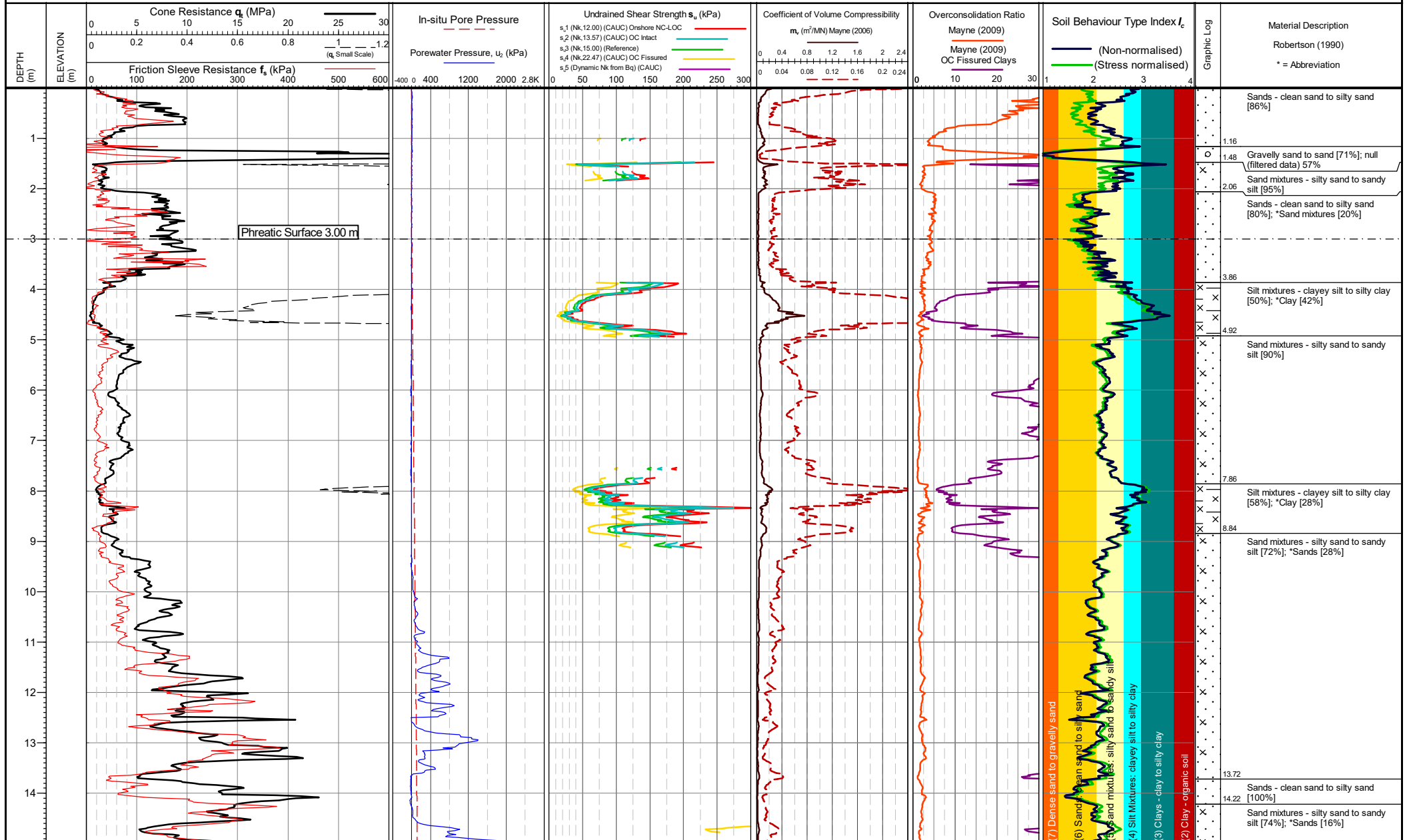
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1

Checked by:
Chris Player

TEST ID: CPT10

Page 2 of 2



Cone area (mm²):
ConeID: S15-CFIPIT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

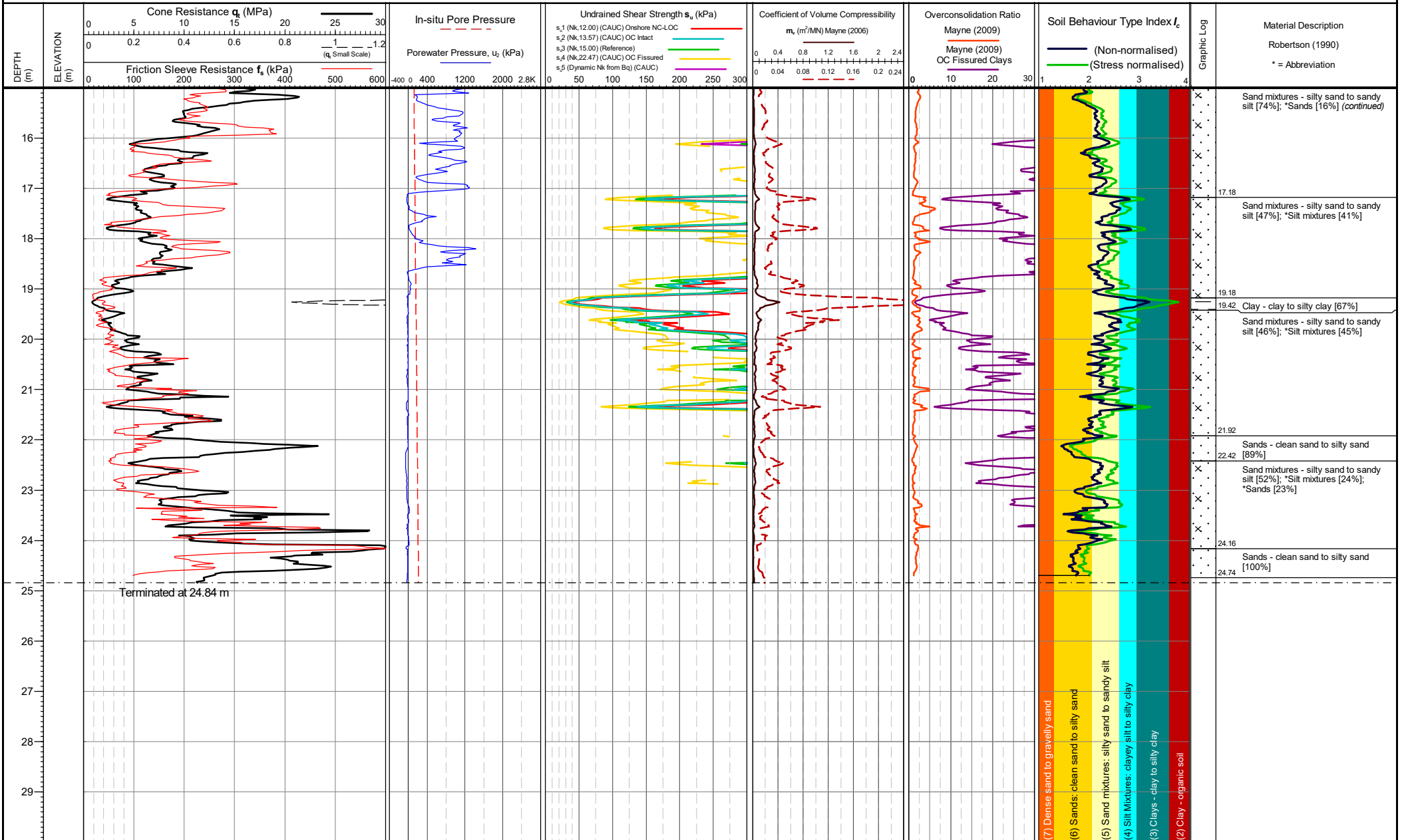
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

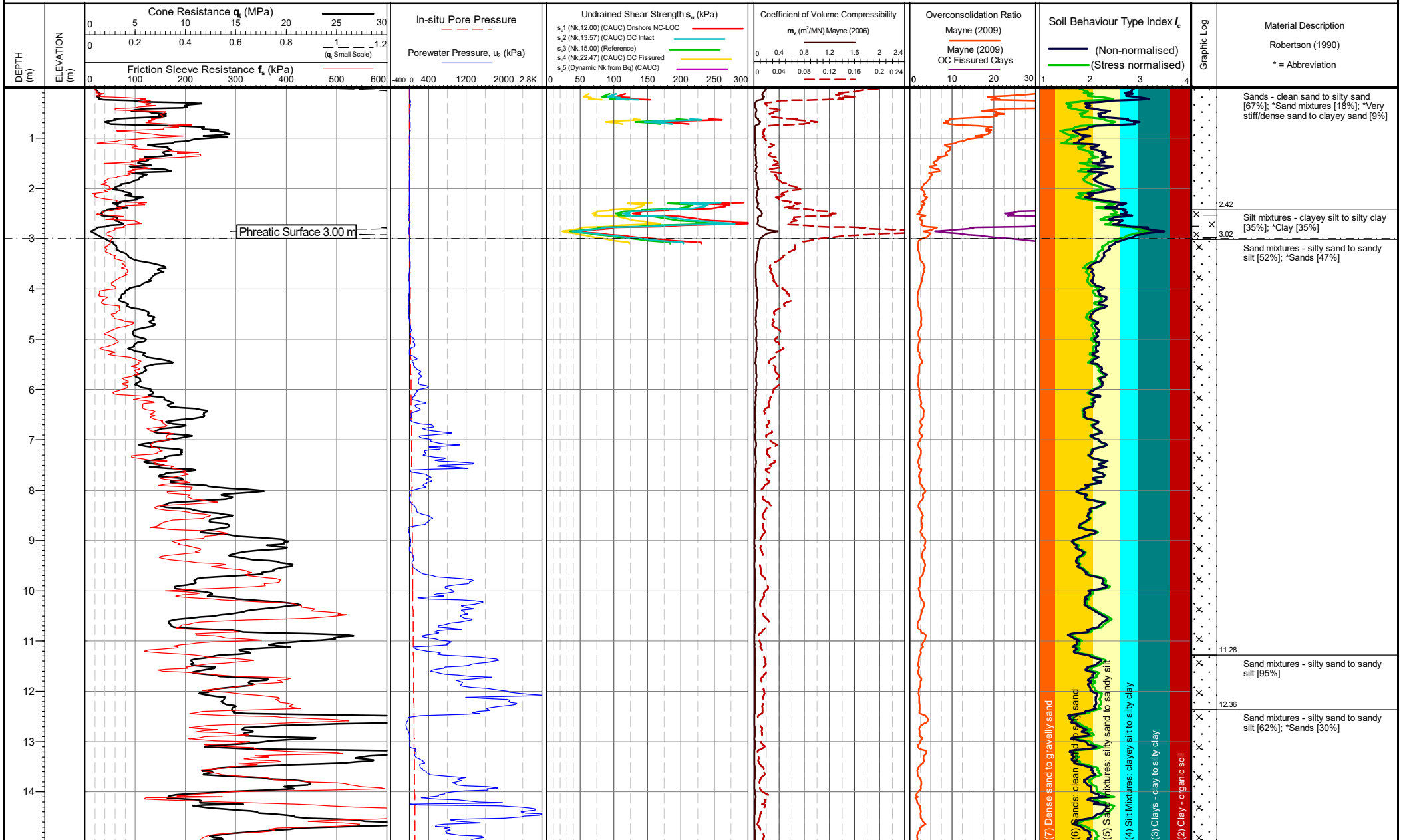
Date of plot:
12-12-25

Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT11





Cone area (mm²):
ConeID: S15-CFIPPT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

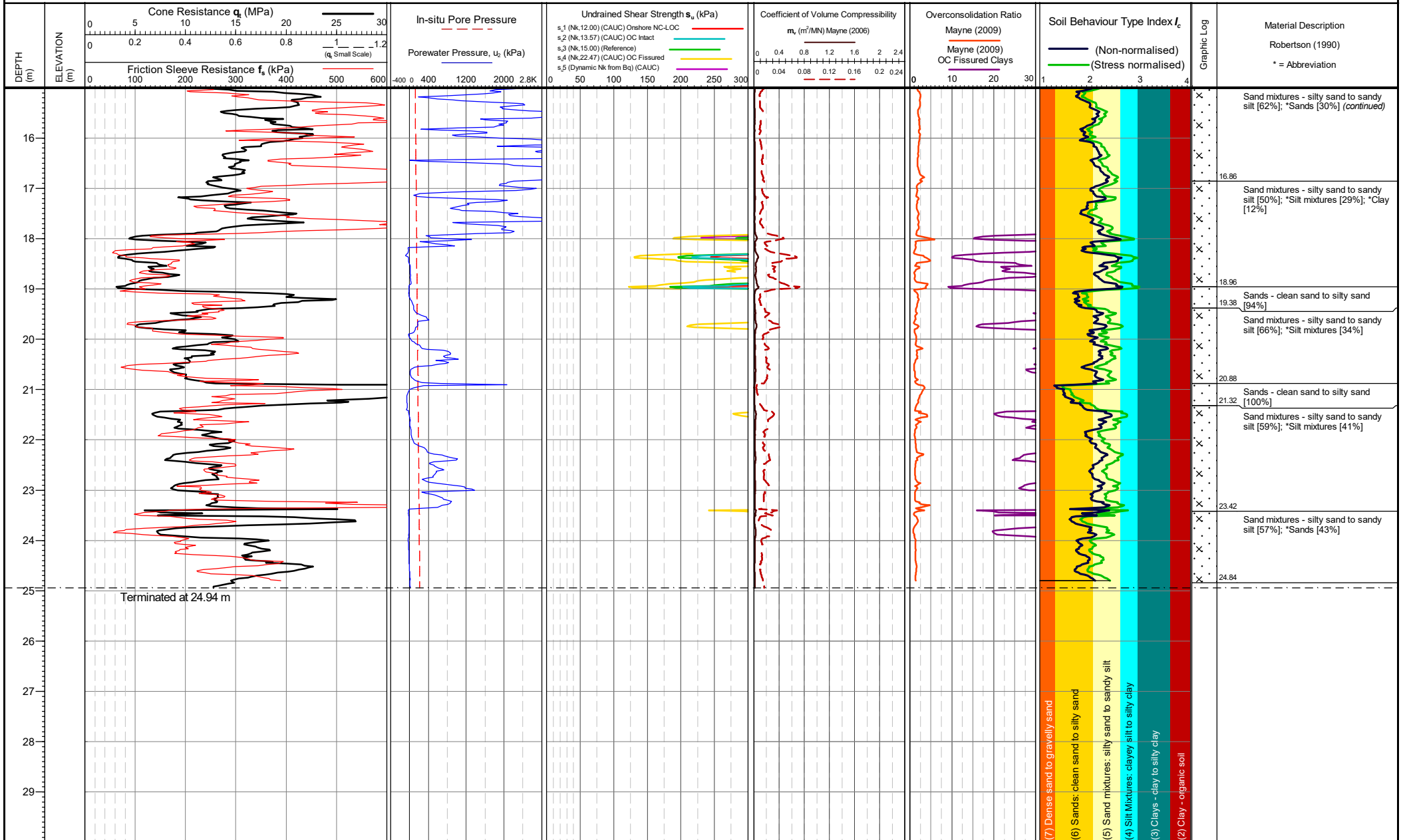
Remarks: *Phreatic surface origin: Arbitrary value
Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1
Checked by:
Chris Player

TEST ID: CPT13



Cone area (mm²):
ConeID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
12-12-25
Lankelma Project Ref:
25-32-30578-1

Checked by:
Chris Player

TEST ID: CPT13

Page 2 of 2

APPENDIX F PARAMETER RESULTS 2 – SPT N60, ϕ , D_R , E , I_c

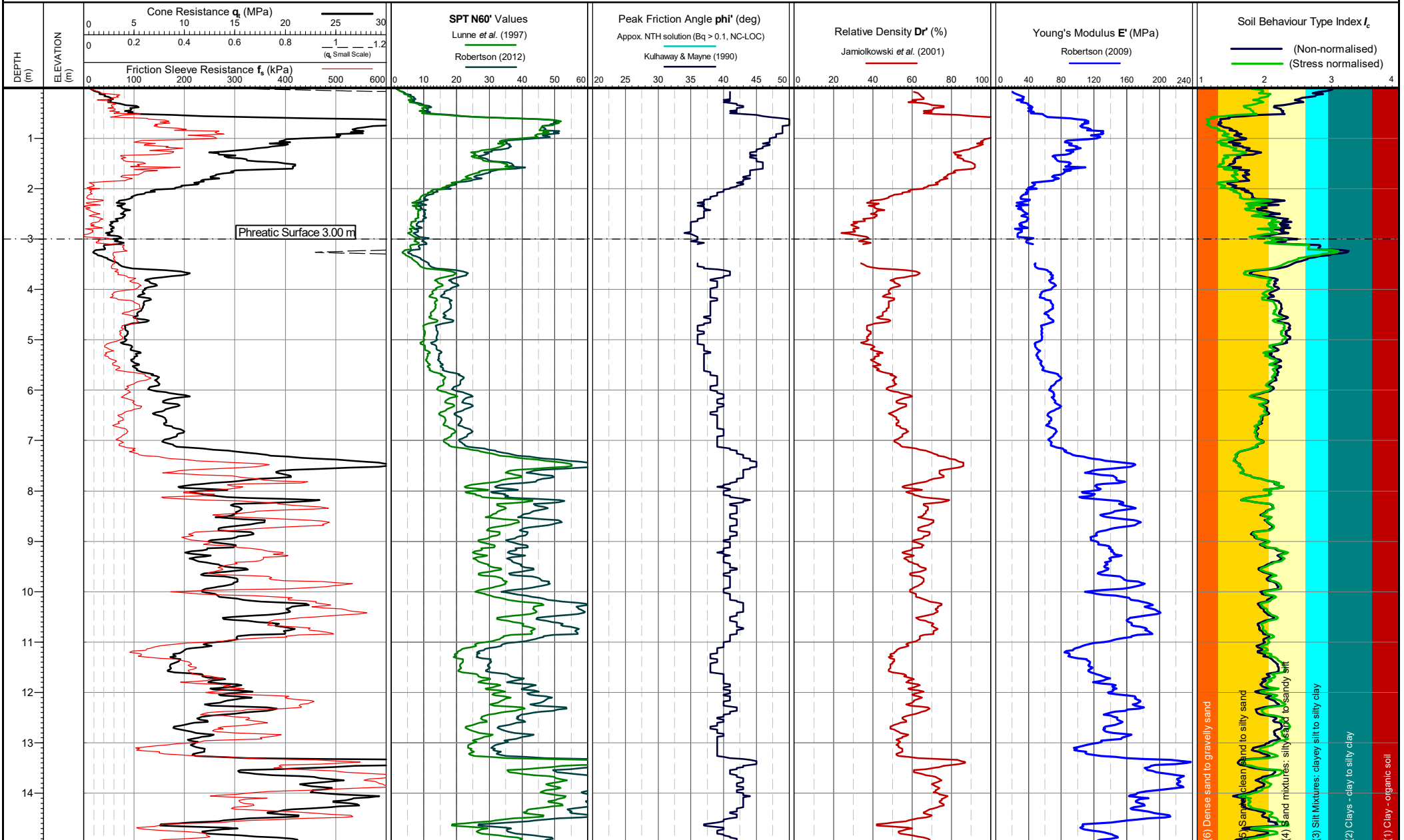
Equivalent SPT N60

Peak friction angle

Relative density

Young's modulus

SBT index I_c



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 14:57:17

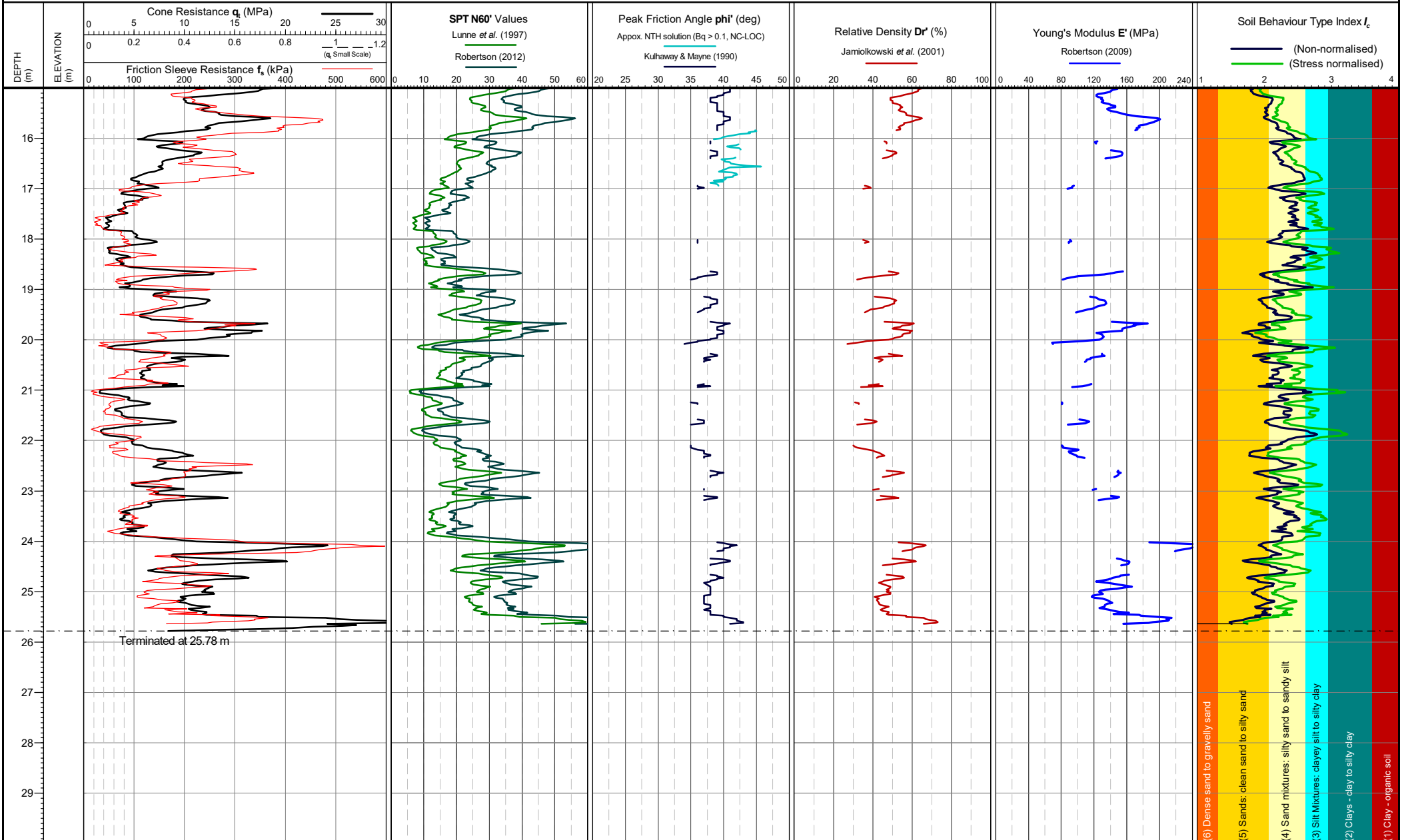
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 14:57:17

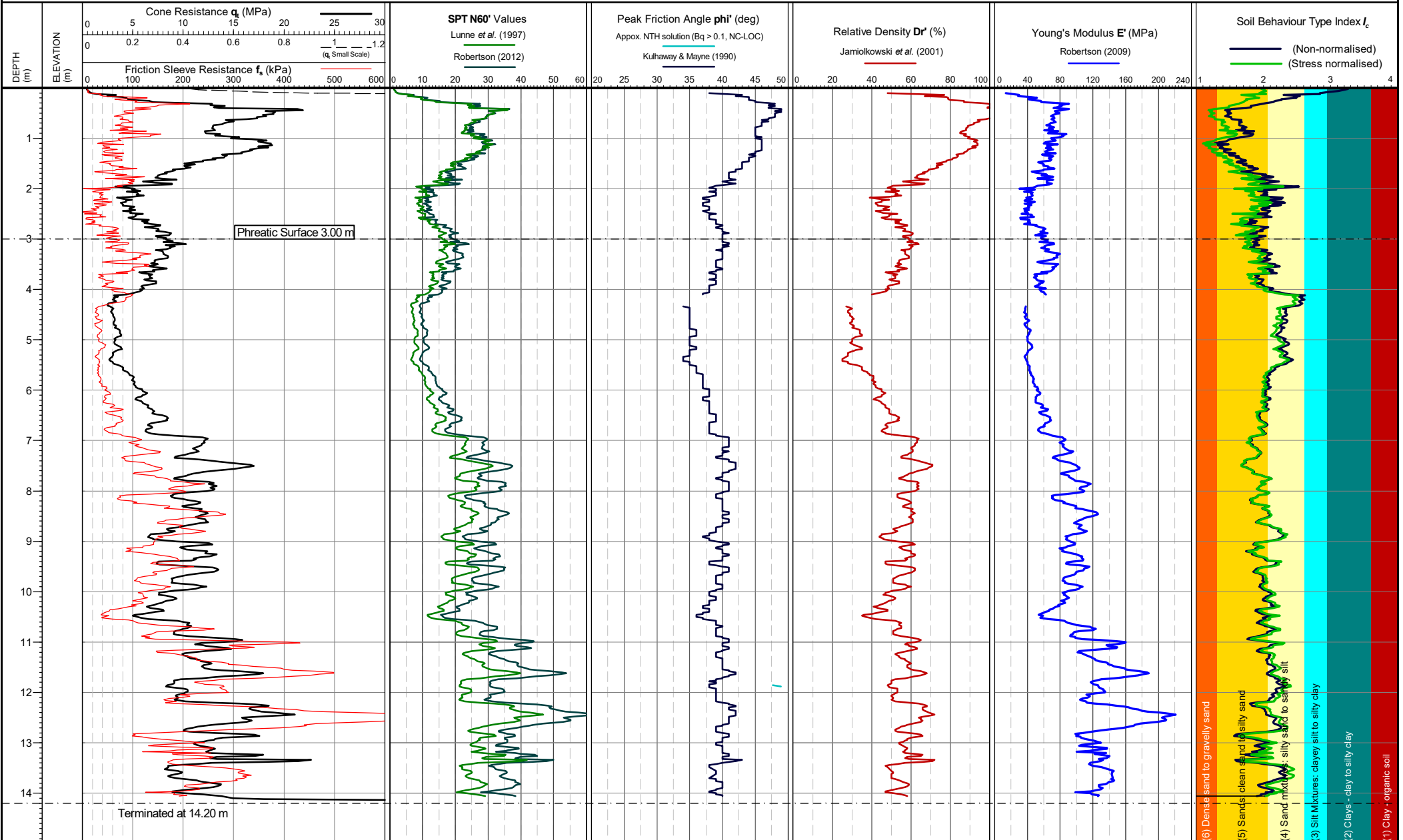
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 10:23:52

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

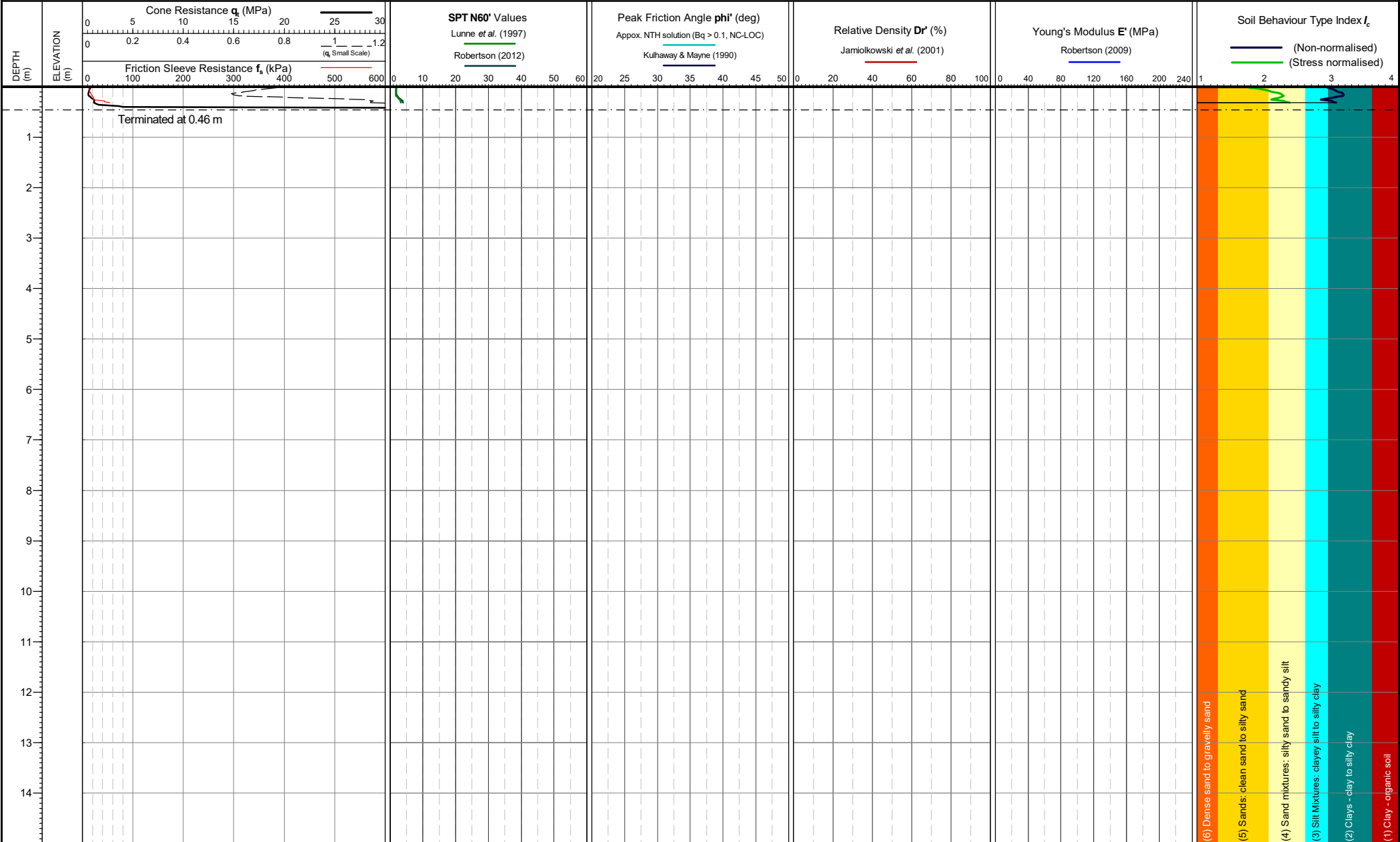
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT02

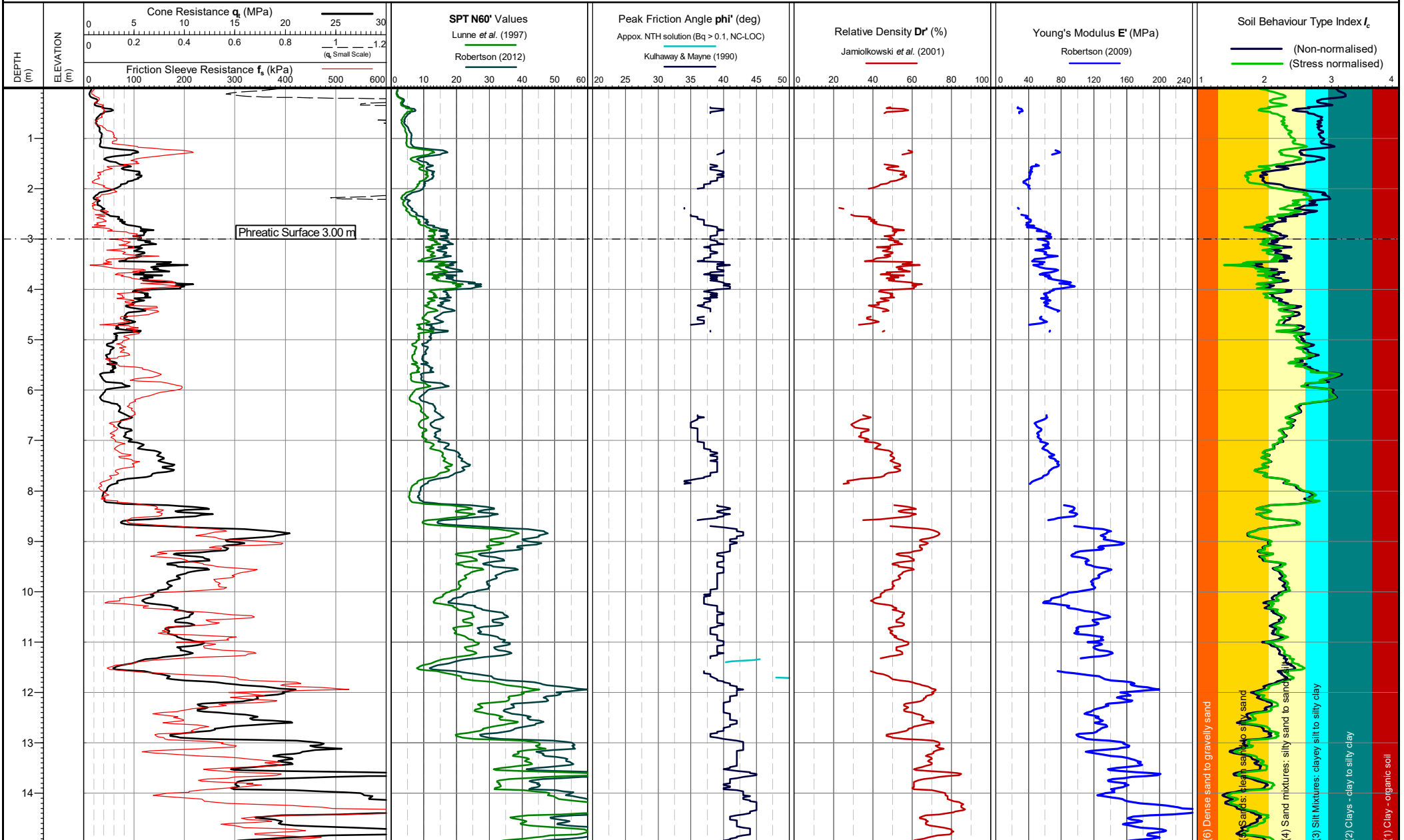


Project: SALISBURY
Client: SOILS LIMITED





Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 13:28:11

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

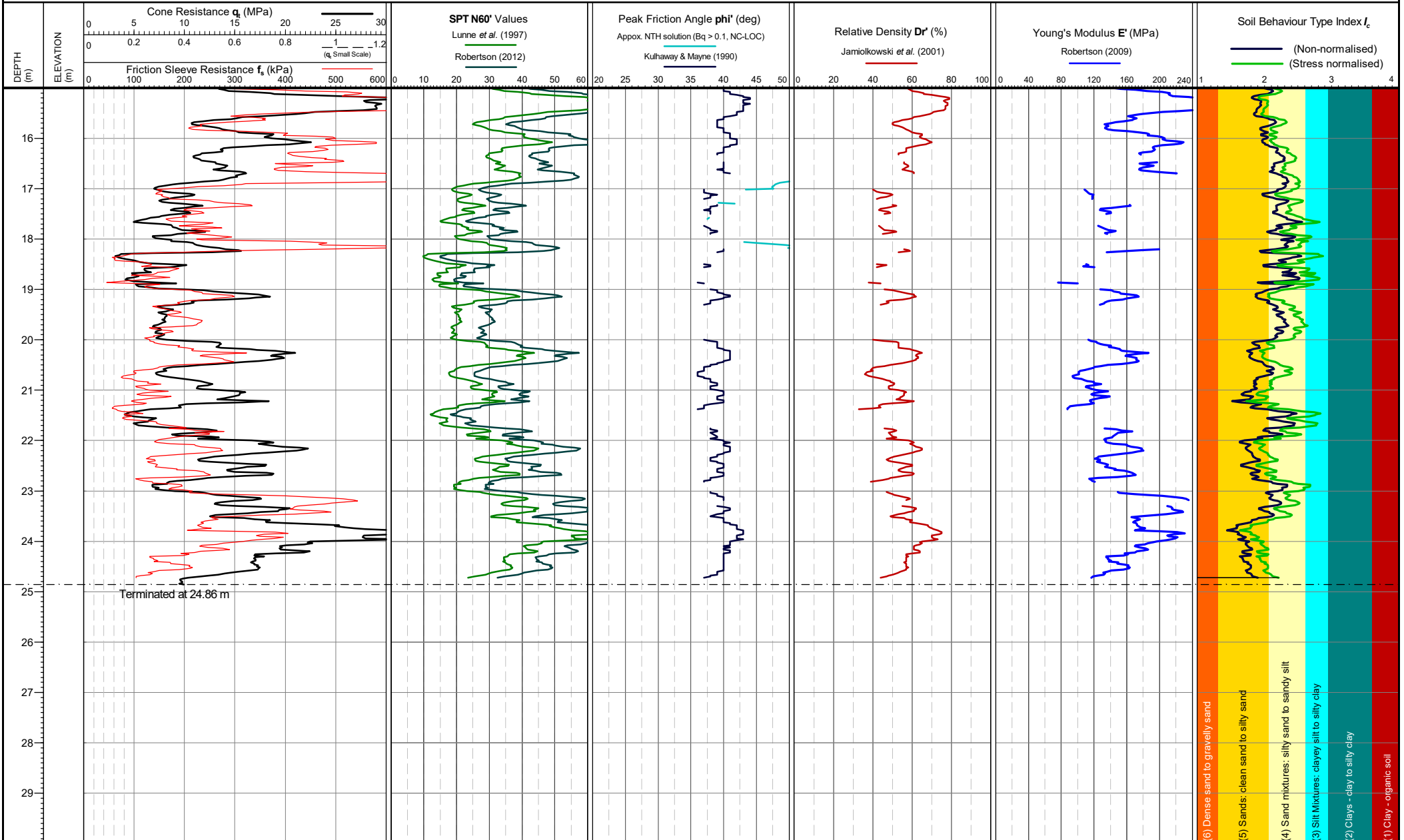
Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT03A

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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 13:28:11

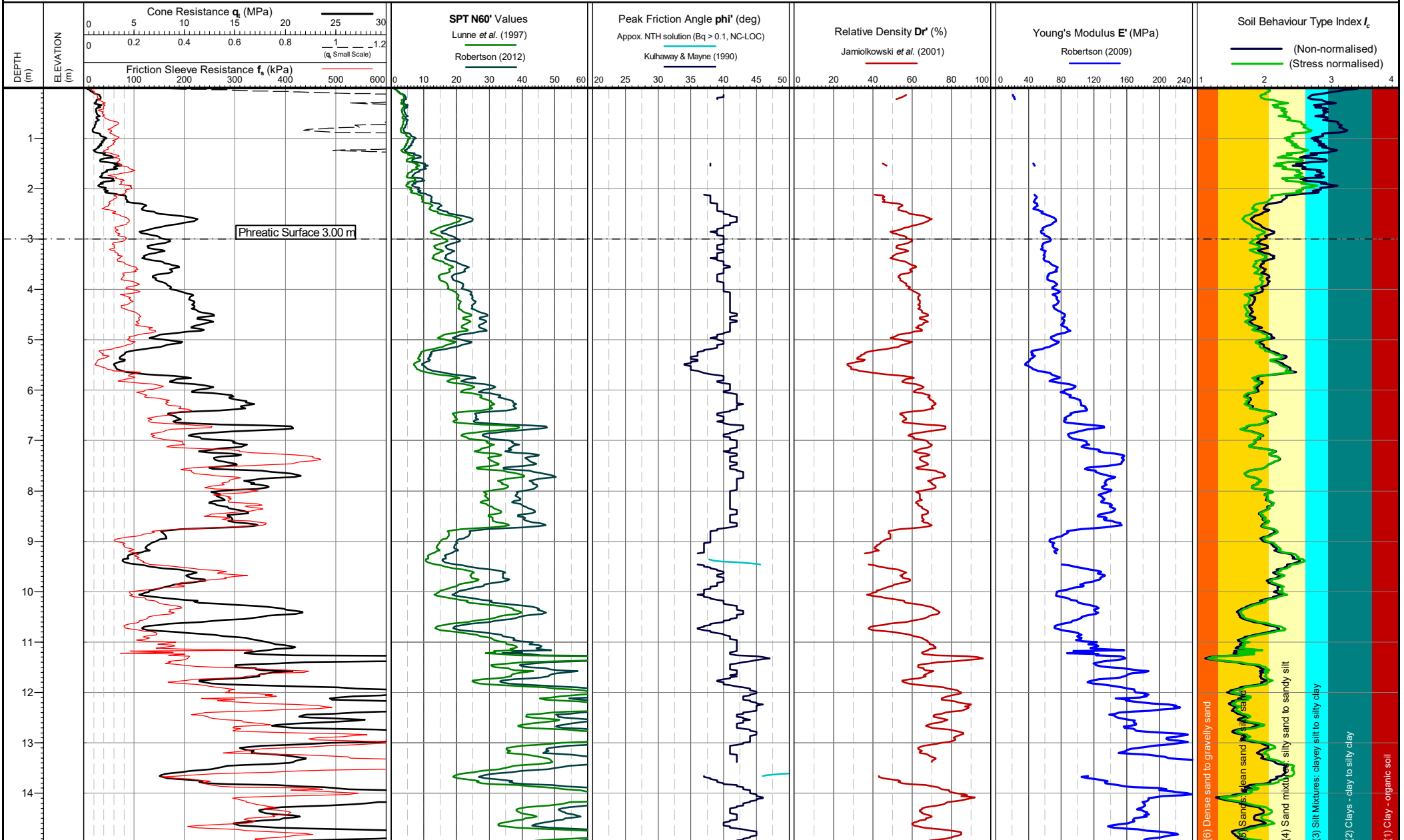
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT03A



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 13:46:59

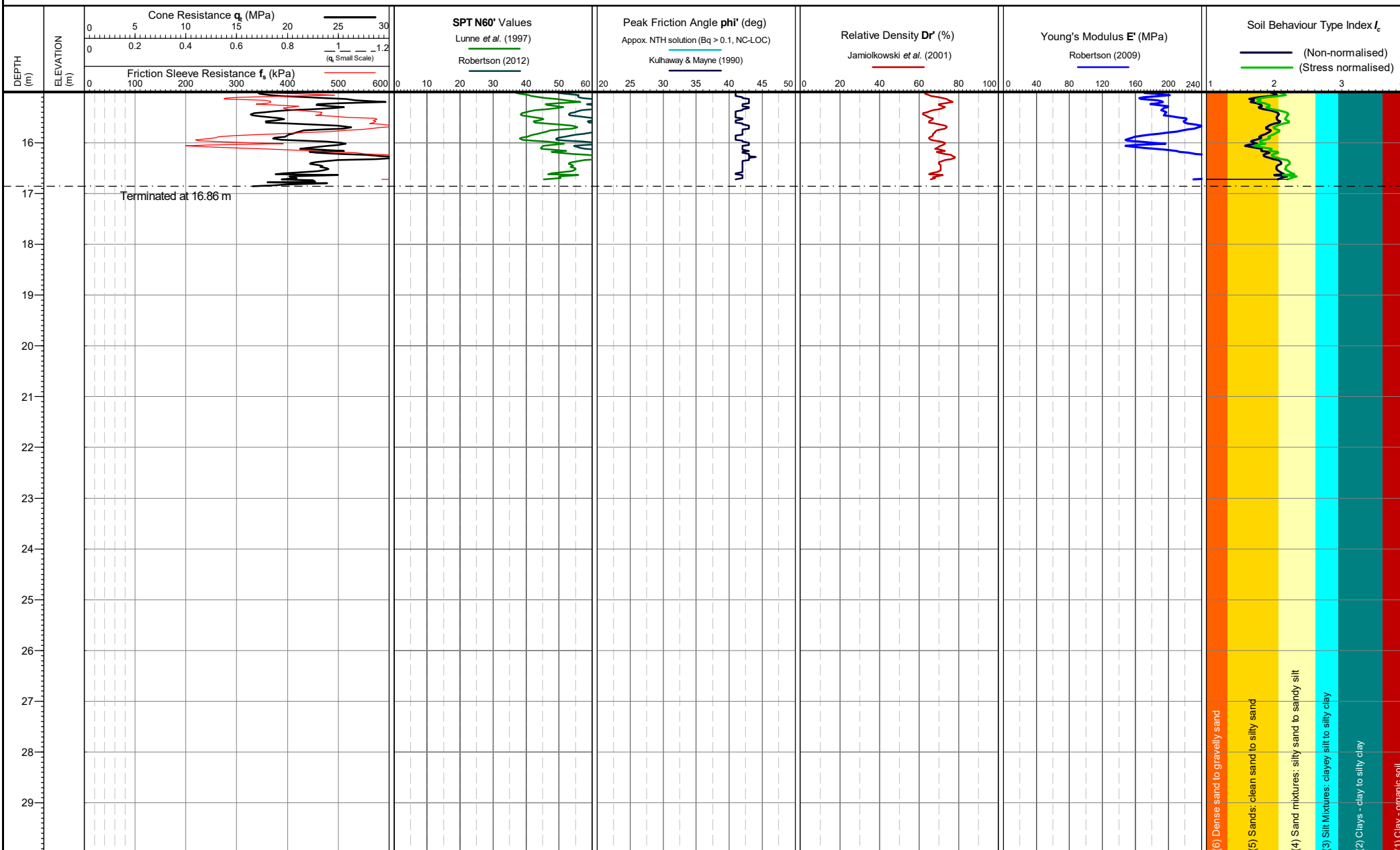
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT04



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 13:46:59

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25

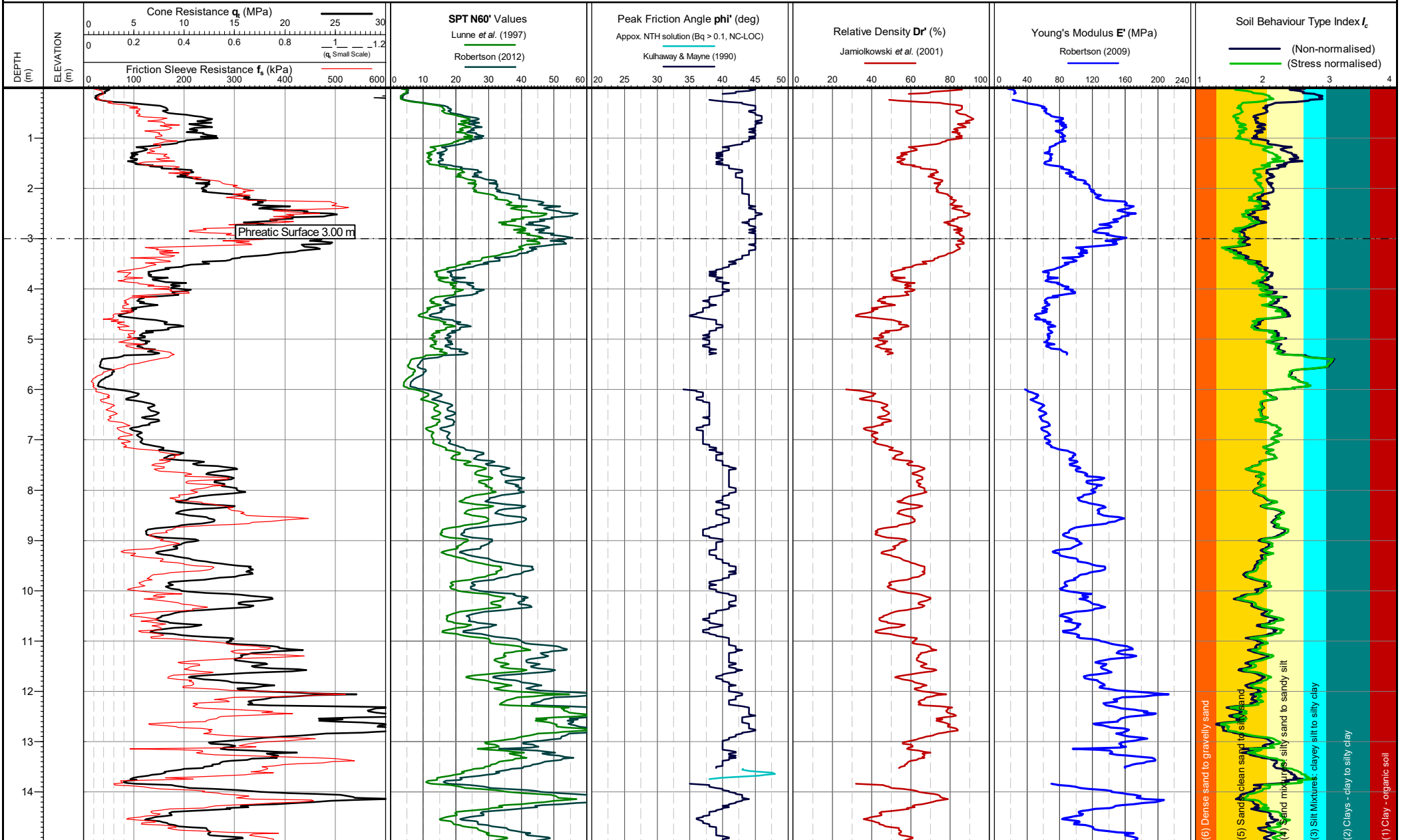
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT04

Page 2 of 2

(6) Dense sand to gravelly sand
(5) Sands: clean sand to silty sand
(4) Sand mixtures: silty sand to sandy silt
(3) Silt Mixtures: clayey silt to silty clay
(2) Clays - clay to silty clay
(1) Clay - organic soil



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 11:25:52

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

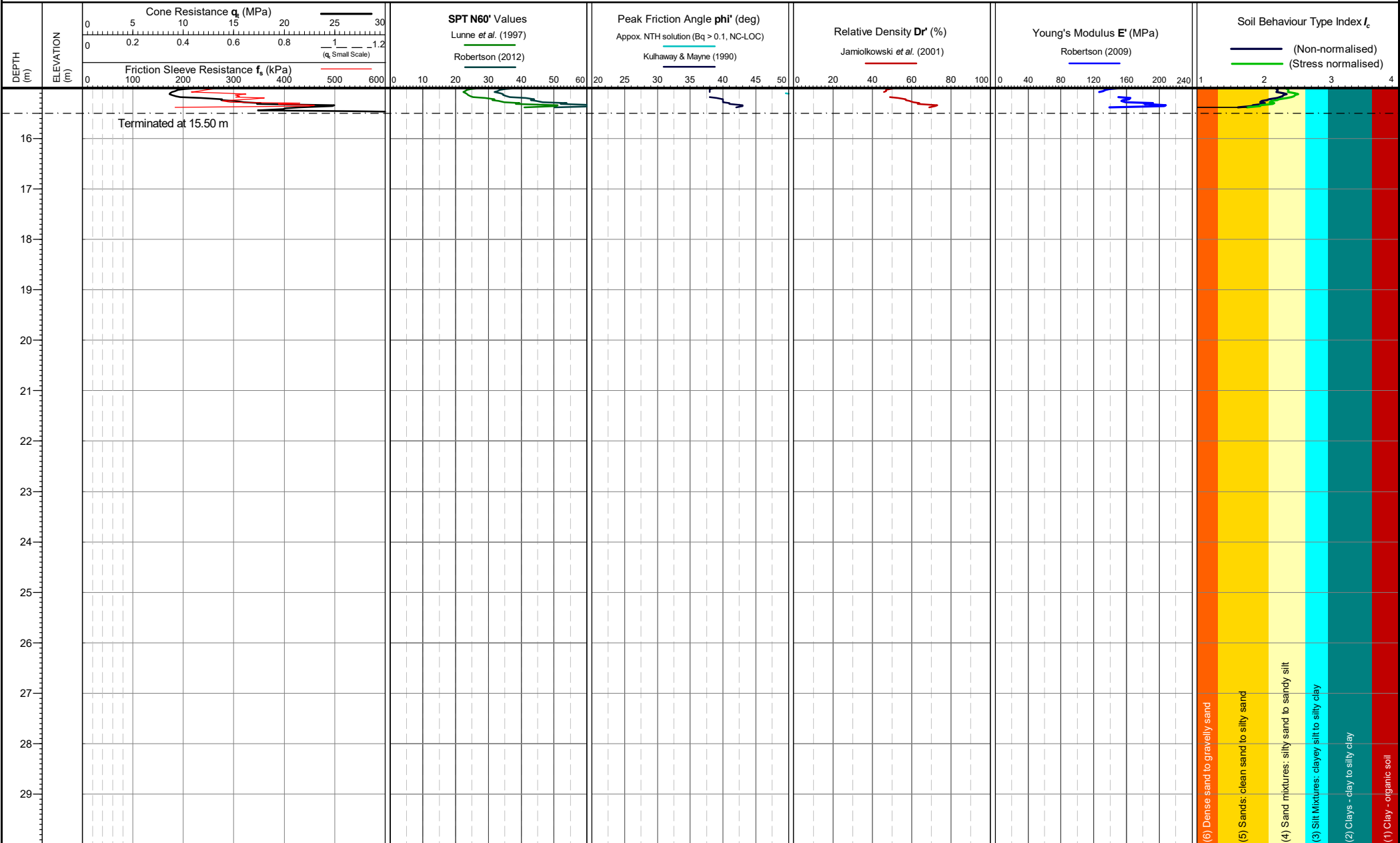
Date of plot:
12-12-25
Checked by:
Chris Player

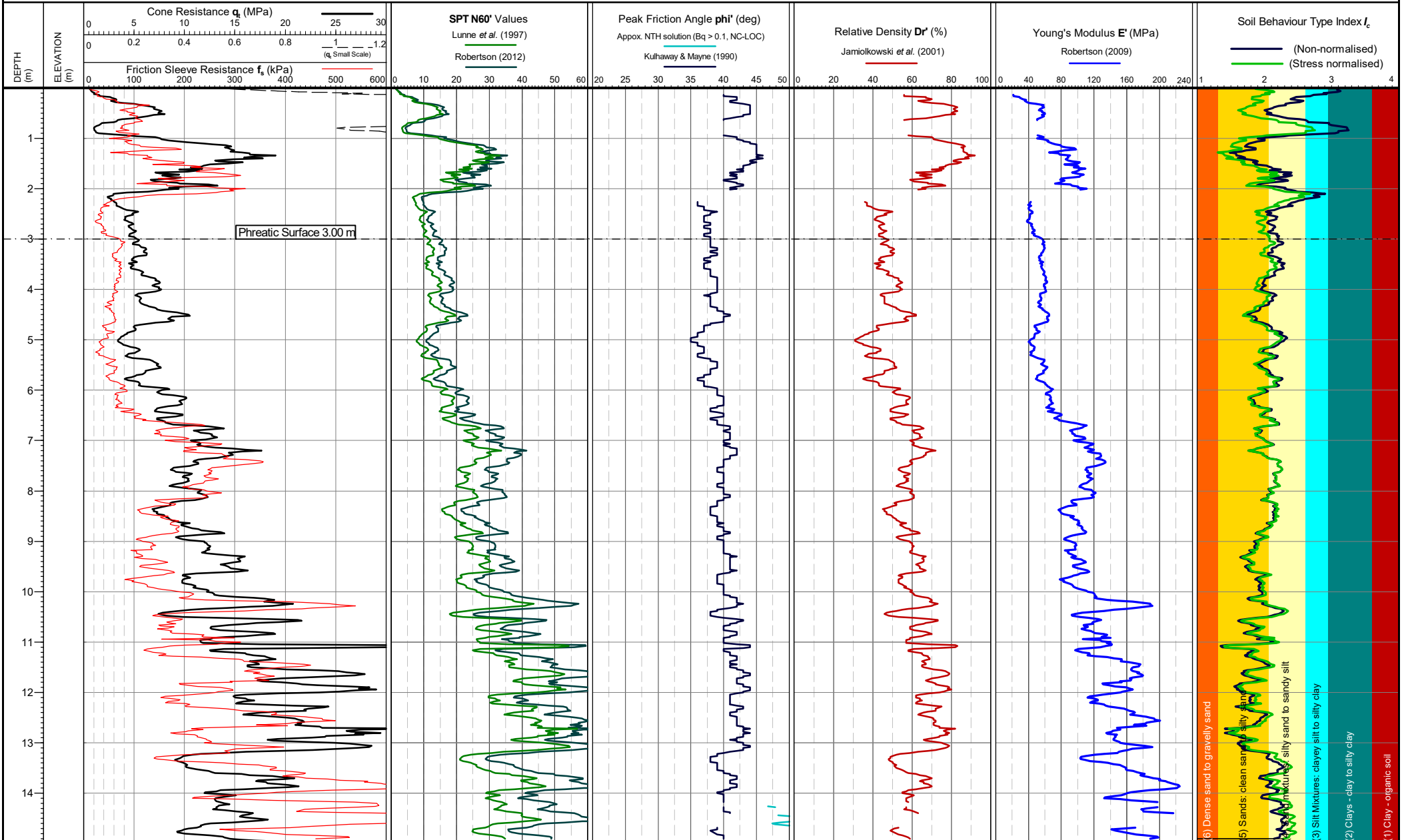
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT05



Project: SALISBURY
Client: SOILS LIMITED





Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 12:32:44

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

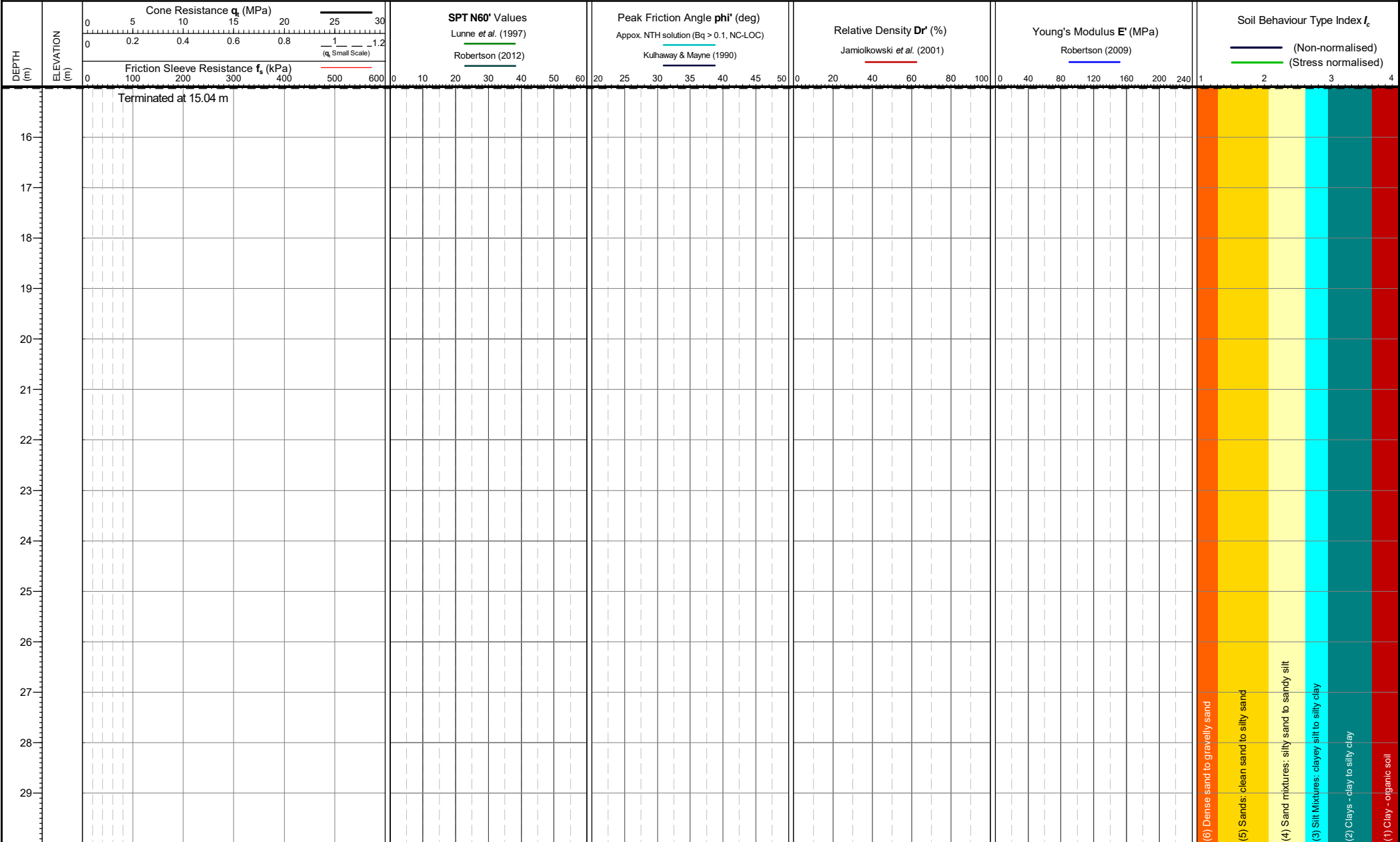
Date of plot:
12-12-25
Checked by:
Chris Player

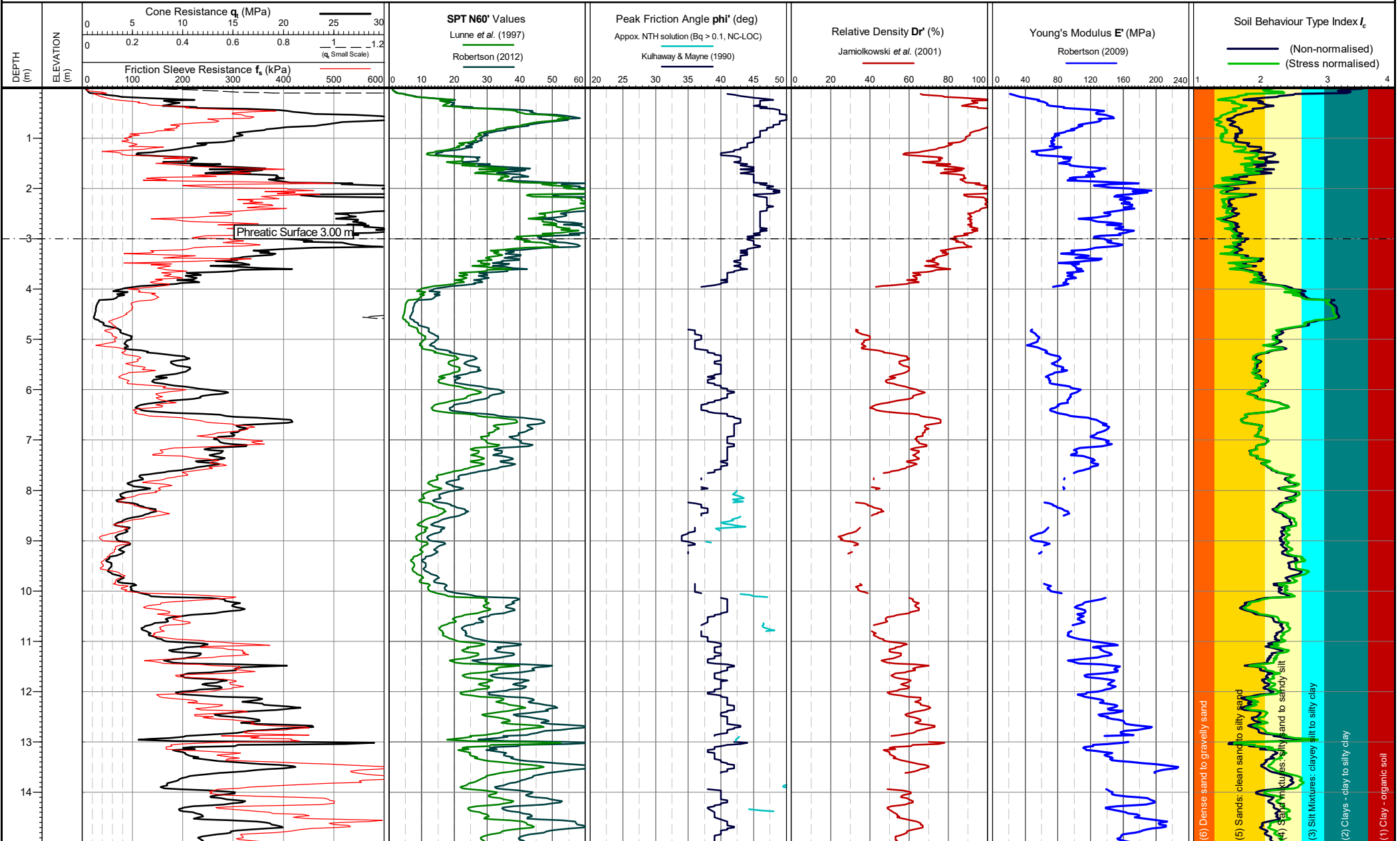
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT06



Project: SALISBURY
Client: SOILS LIMITED





Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 11/12/2025 12:38:41

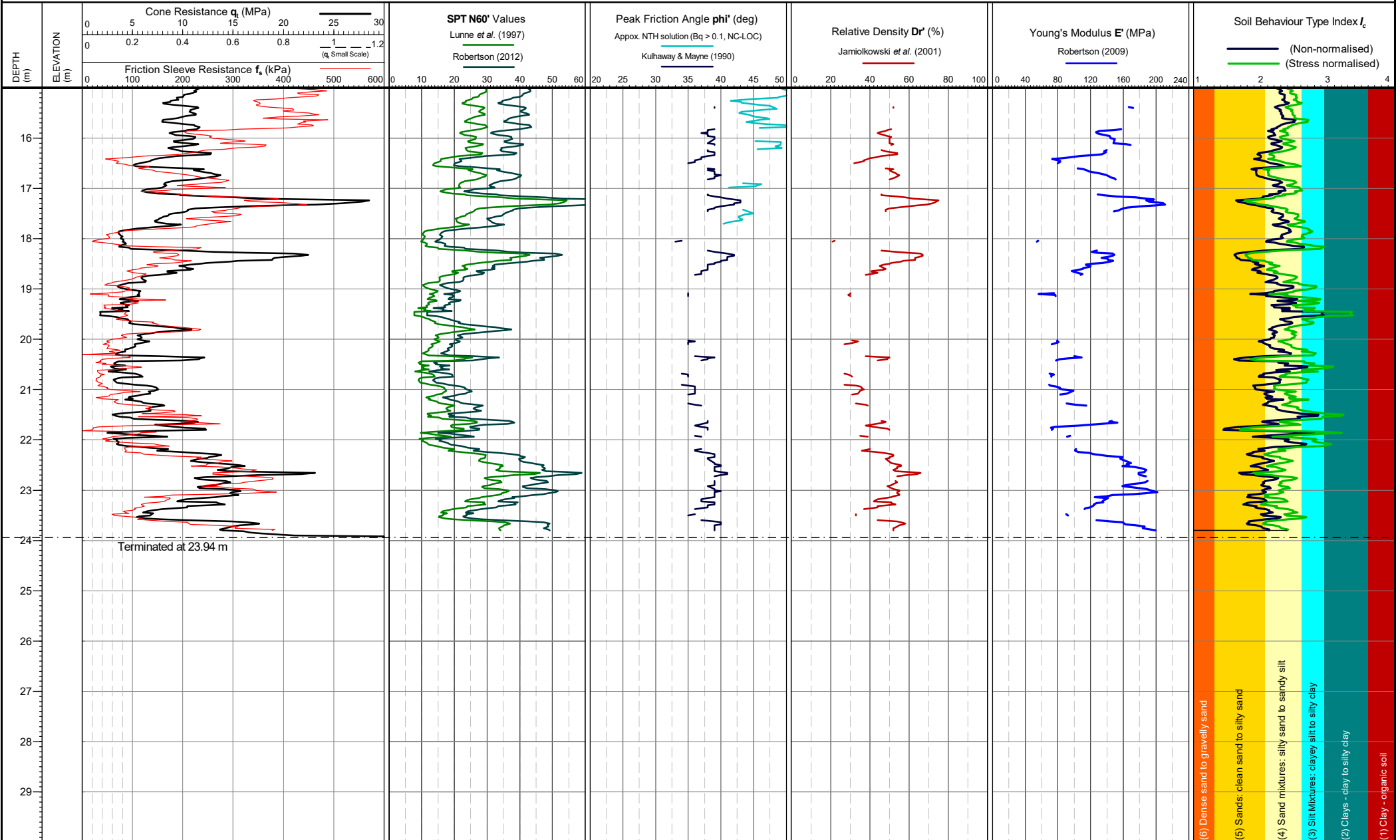
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = Ic 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT08



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 11/12/2025 12:38:41

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

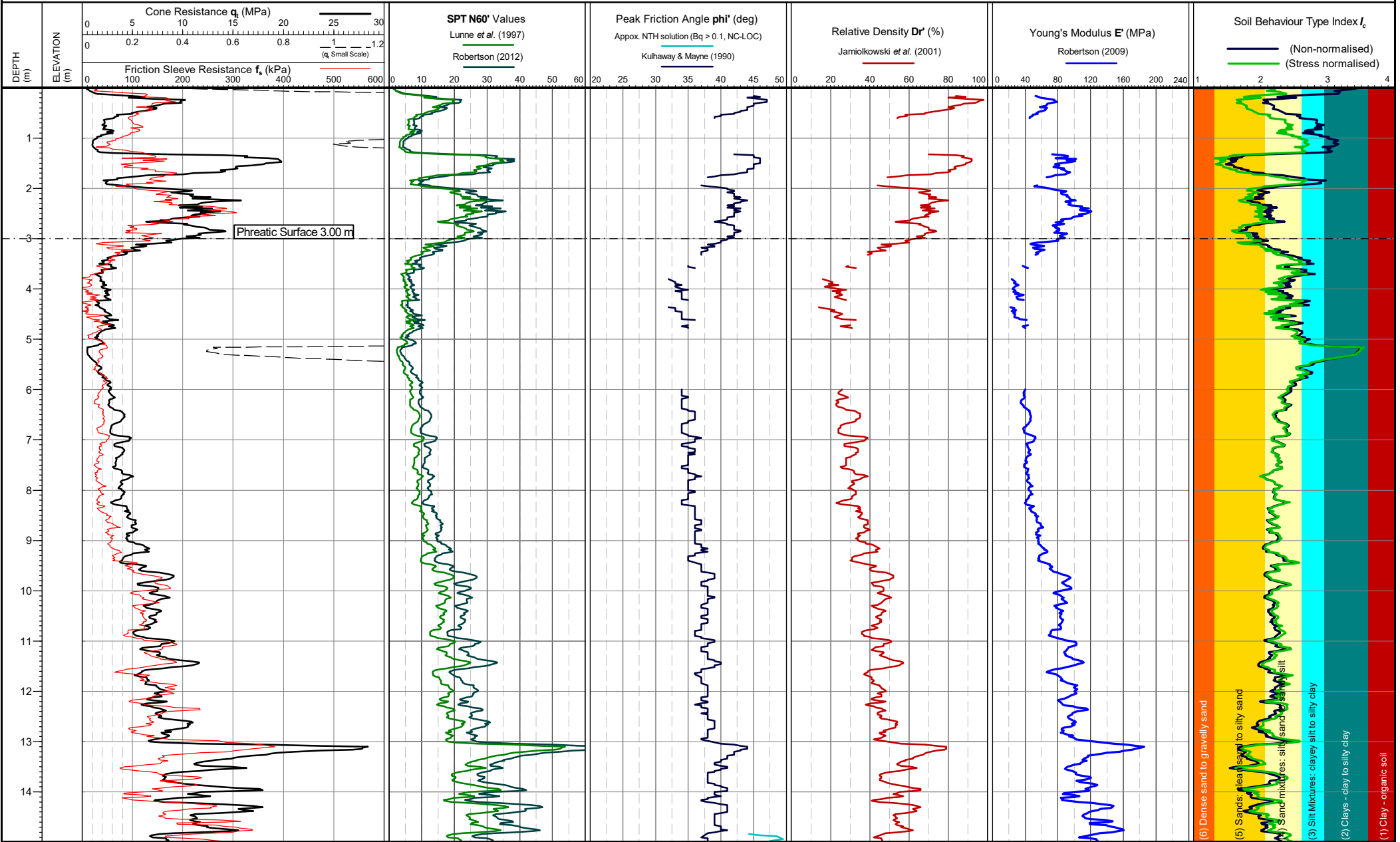
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT08

Page 2 of 2

- (6) Dense sand to gravelly sand
- (5) Sands: clean sand to silty sand
- (4) Sand mixtures: silty sand to sandy silt
- (3) Silt Mixtures: clayey silt to silty clay
- (2) Clays - clay to silty clay
- (1) Clay - organic soil



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 11/12/2025 10:57:56

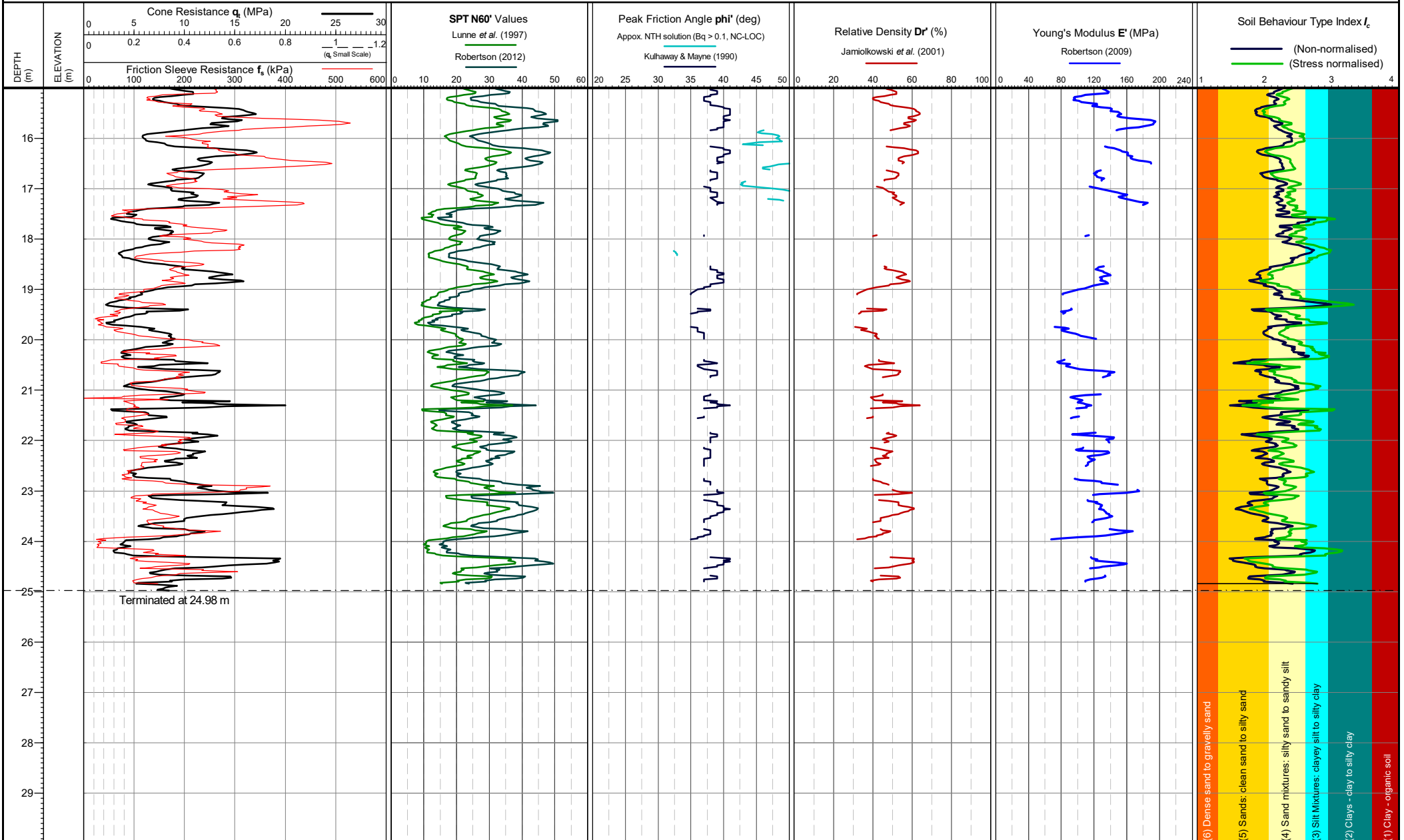
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 11/12/2025 10:57:56

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

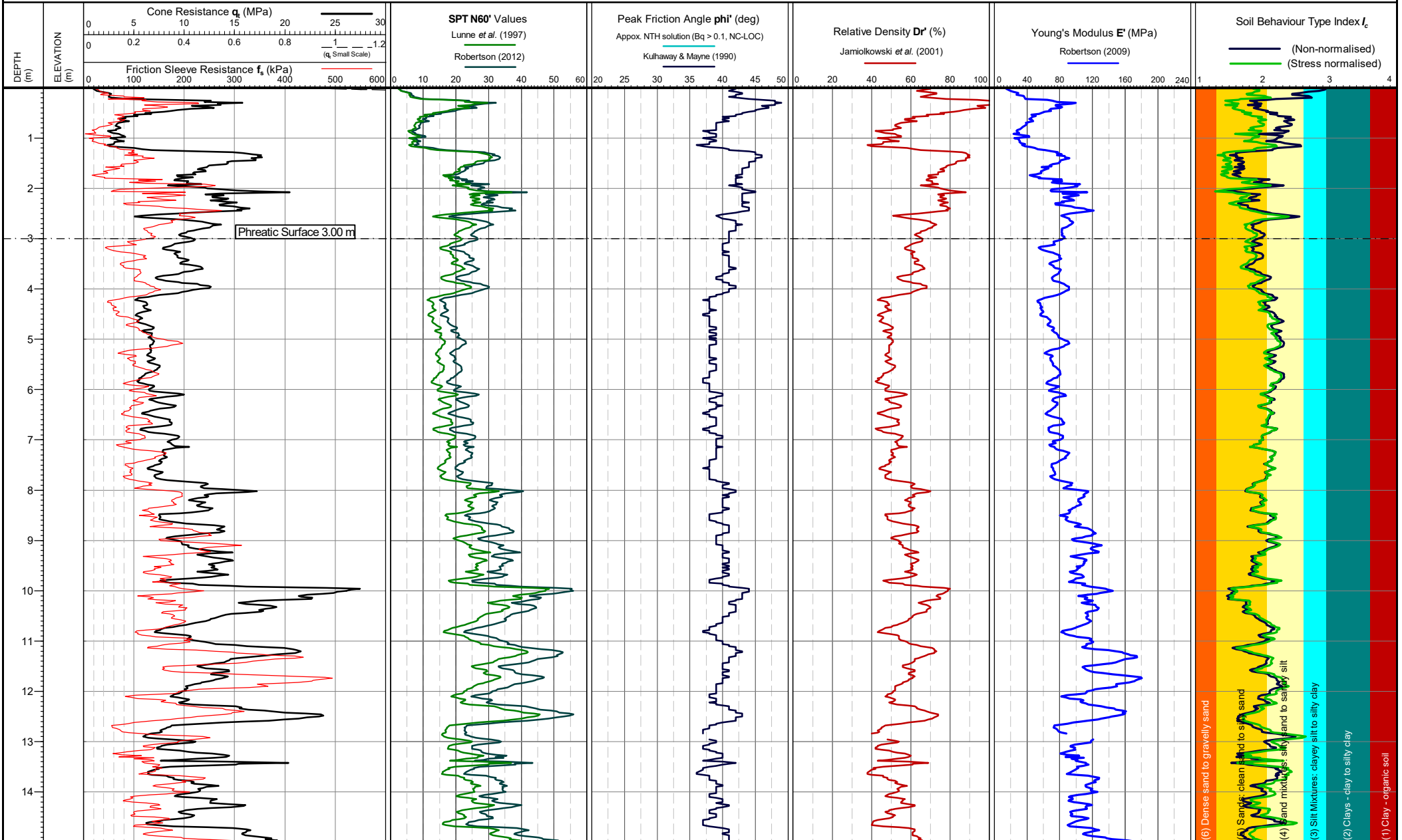
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09

Page 2 of 2

- (6) Dense sand to gravelly sand
- (5) Sands: clean sand to silty sand
- (4) Sand mixtures: silty sand to sandy silt
- (3) Silt Mixtures: clayey silt to silty clay
- (2) Clays - clay to silty clay
- (1) Clay - organic soil



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 11:21:04

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

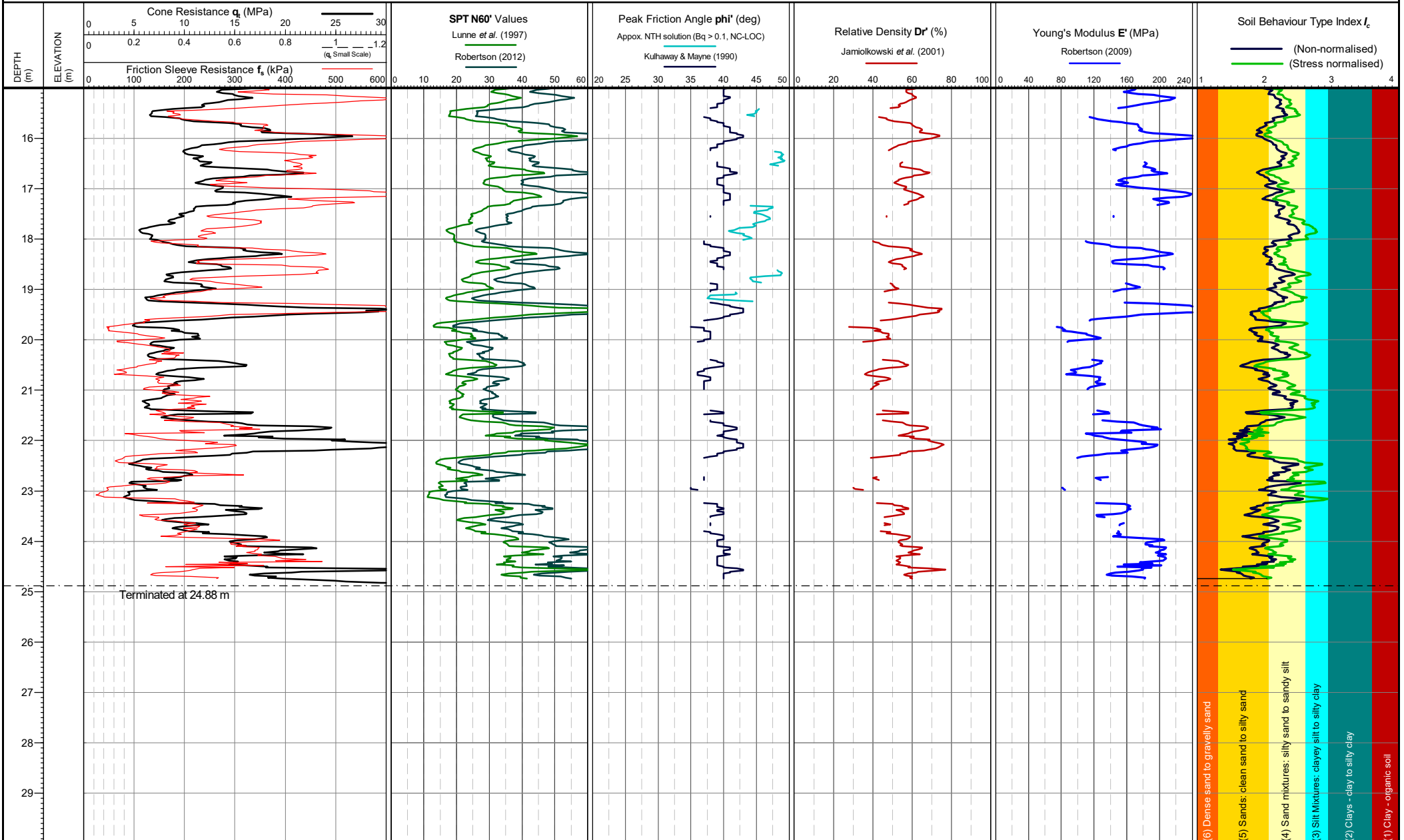
Date of plot:
12-12-25

Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10

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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 09/12/2025 11:21:04

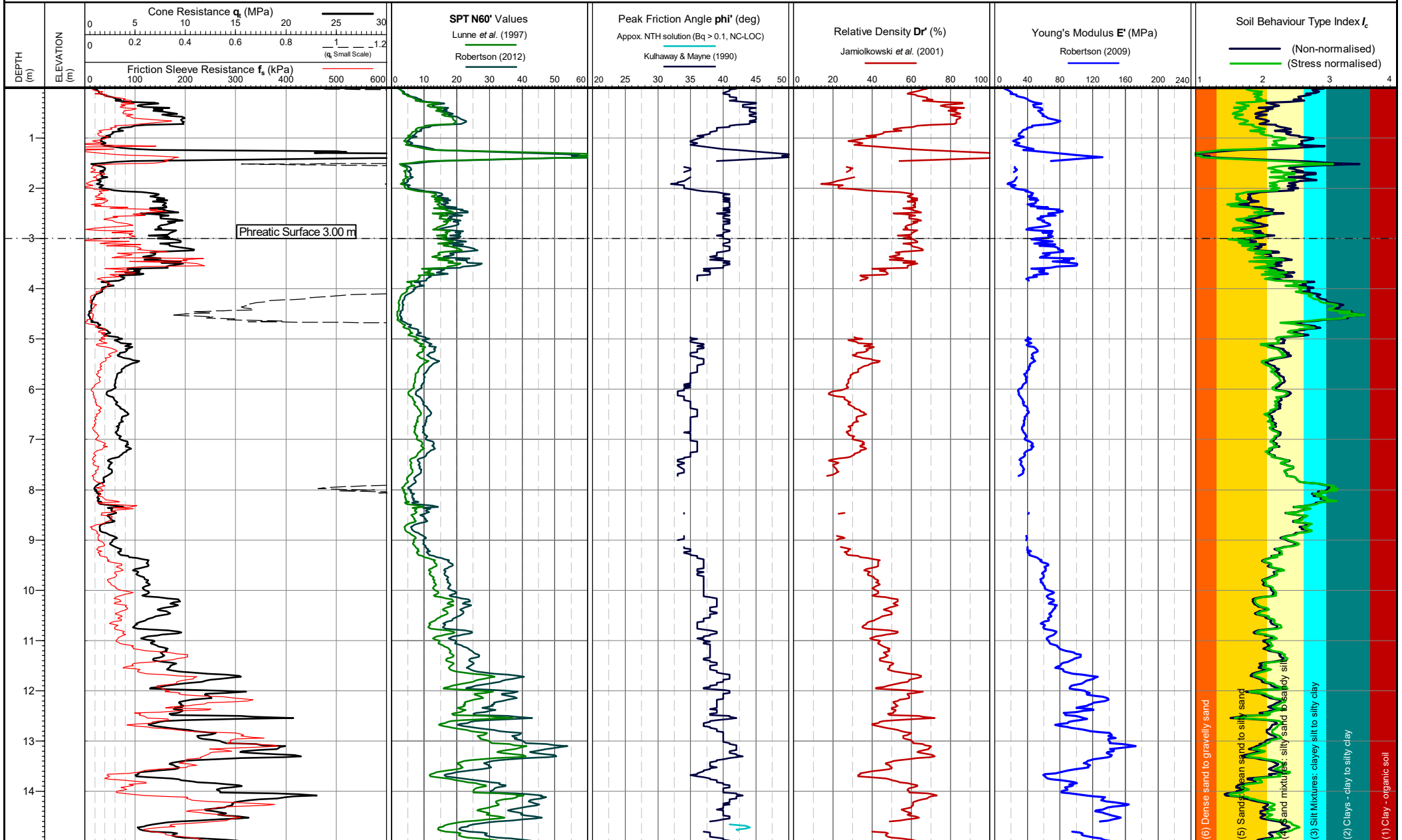
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 09:01:30

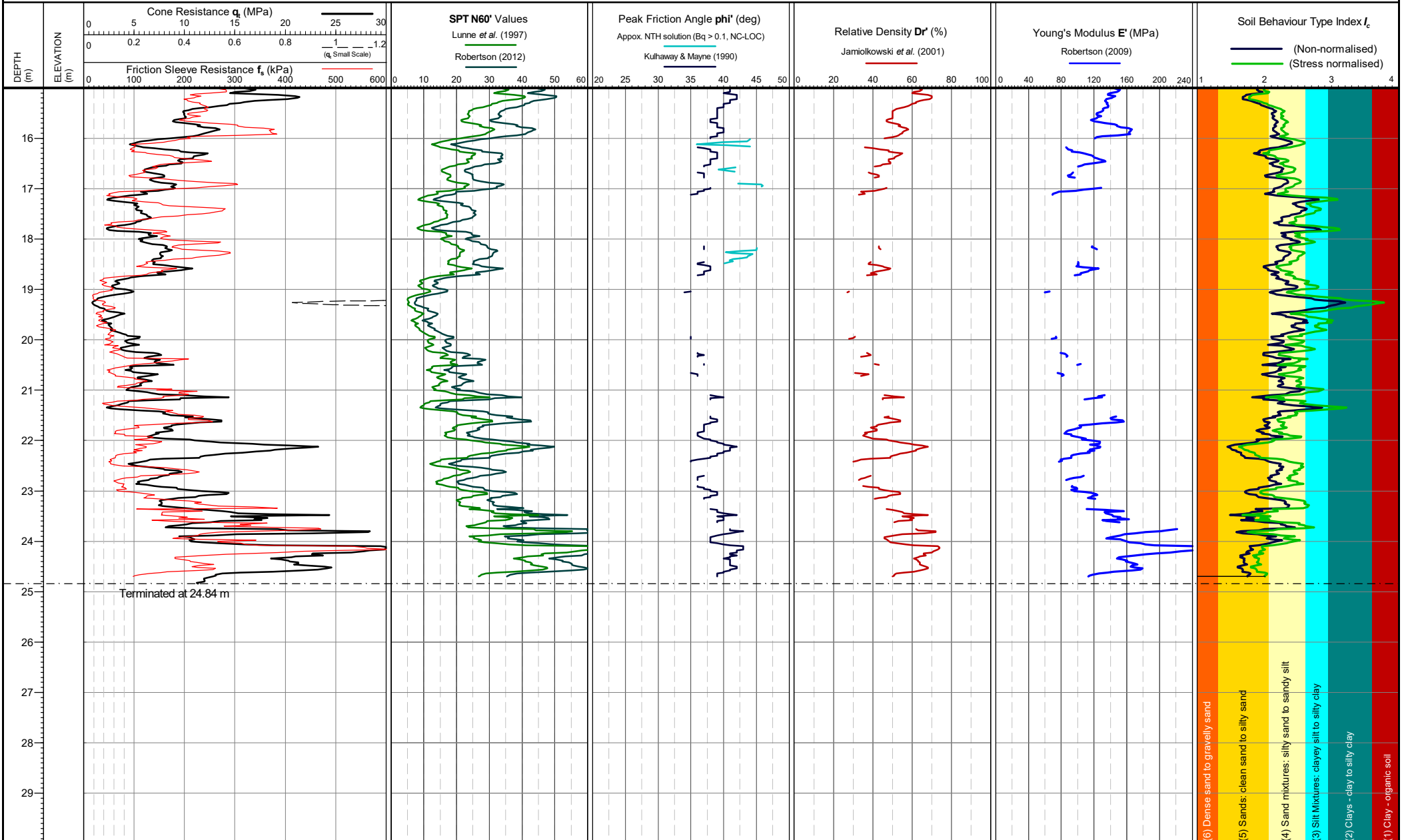
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT11



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 10/12/2025 09:01:30

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

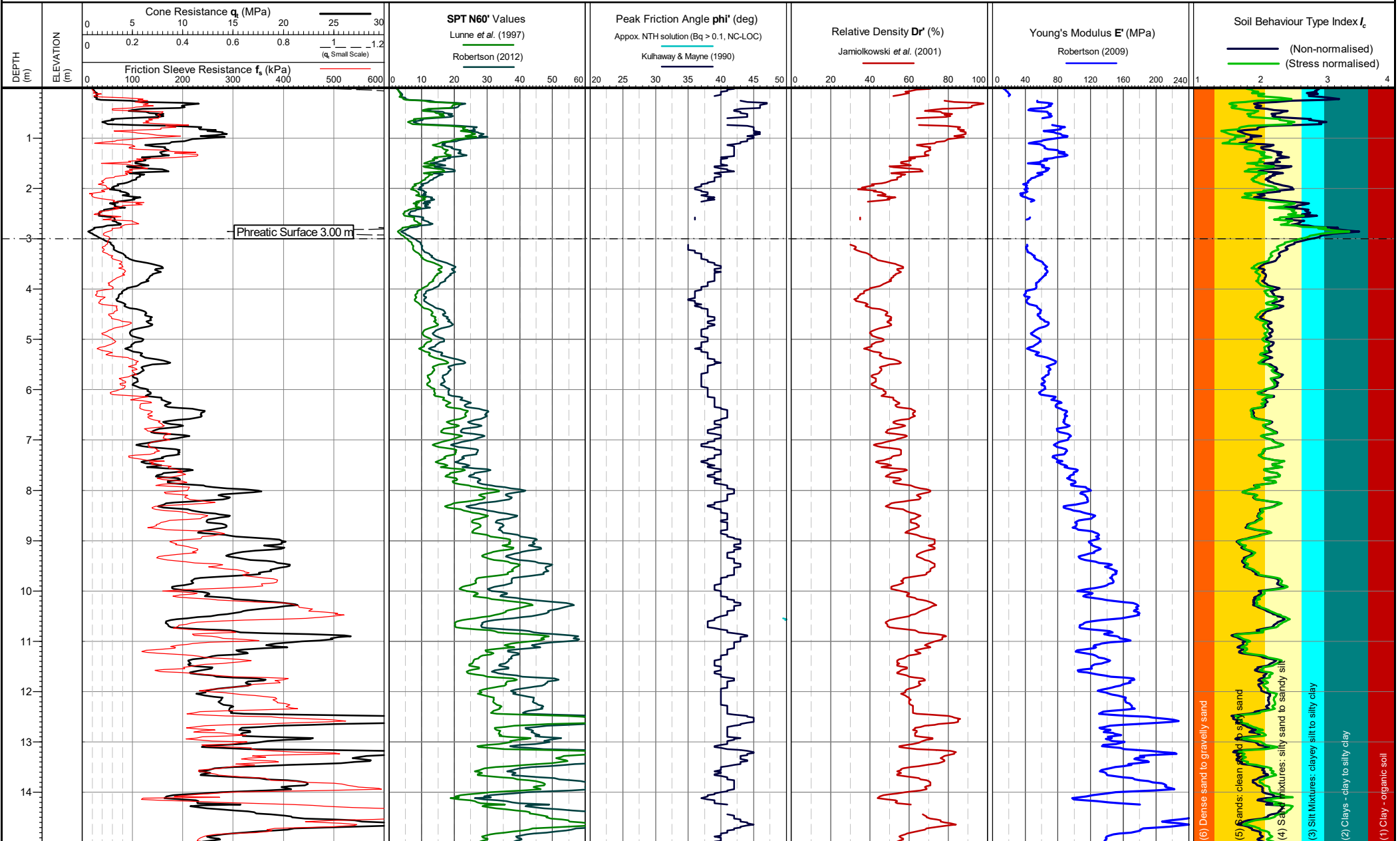
Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT11

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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Date of test: 11/12/2025 09:02:34

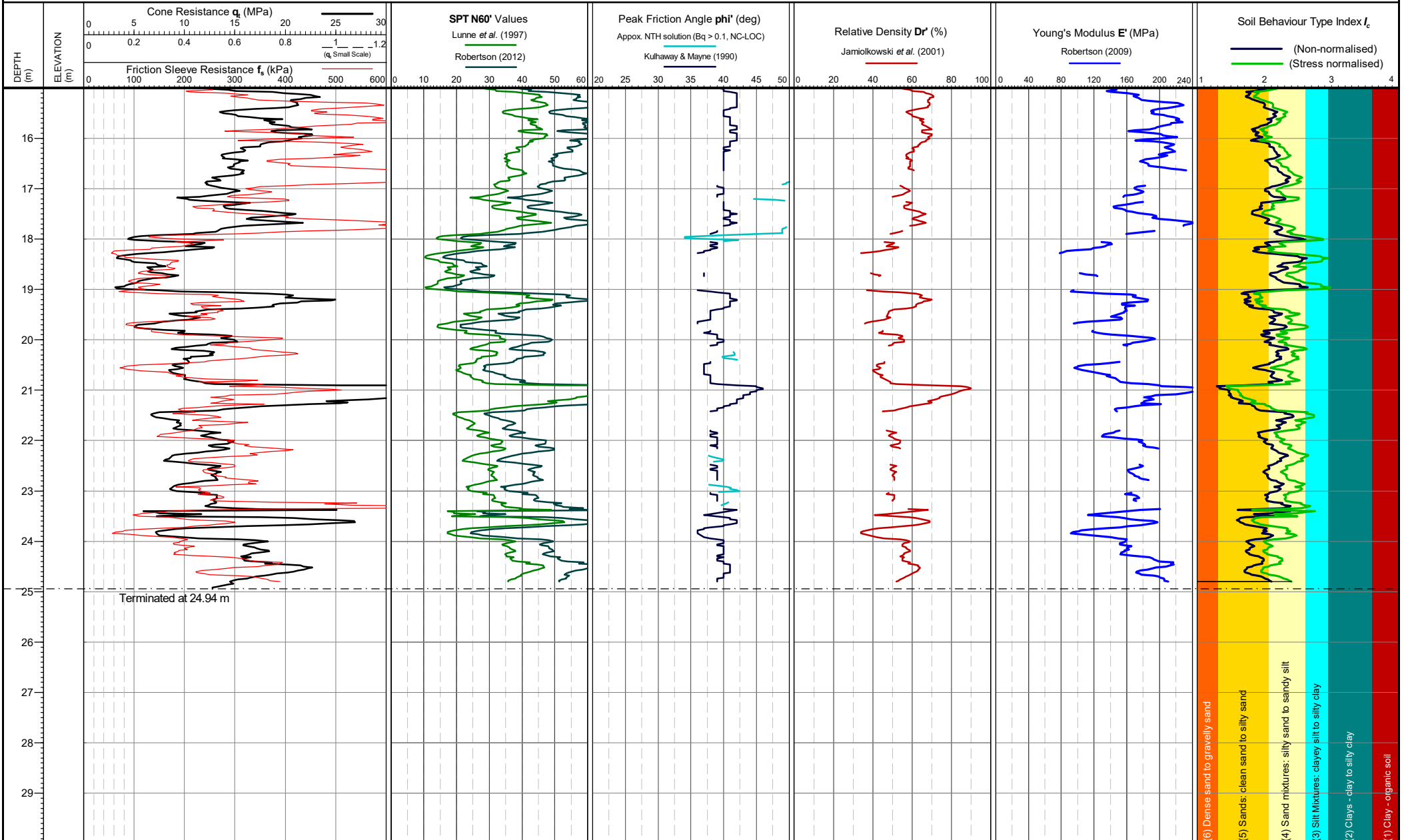
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT13



- (6) Dense sand to gravelly sand
- (5) Sands: clean sand to silty sand
- (4) Sand mixtures: silty sand to sandy silt
- (3) Silt Mixtures: clayey silt to silty clay
- (2) Clays - clay to silty clay
- (1) Clay - organic soil

APPENDIX G PENETROMETER TEMPERATURE RESULTS

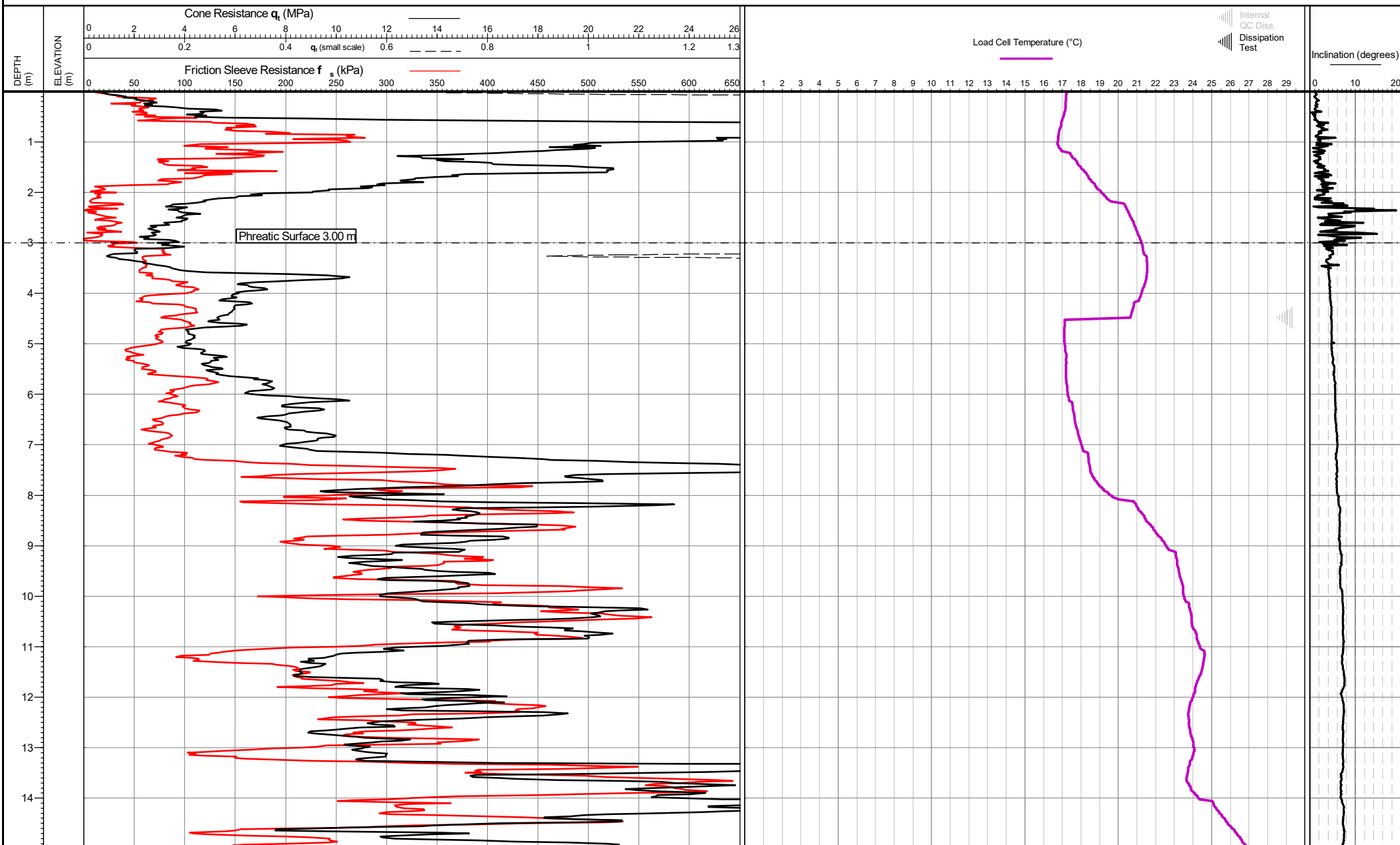
The logs of this Appendix present the recorded temperature of the penetrometer tip load cell. The data is used for QC purposes during fieldwork and post processing, and the reader may compare the data to the temperature verification section of the corresponding calibration certificate. The data has been used during post processing to correct the tip and pore pressure results for transient and static temperature effects.

Note:

Ground temperature is only represented following a penetration pause of 20-50 minutes, depending on the thermal properties of the soil.

Plots will not be provided for tests performed with magnetometer readings.

Near horizontal lines (steps) in the temperature plots indicate change in temperature during a pause in penetration for dissipation tests, rod join pauses, or QA stabilisation pauses.



Cone area (mm²):
Cone ID: S15-CFPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

Zero drift (Pre/post test)
 q_e (kPa): -10.8
 f_s (kPa): 1.0
 u_z (kPa): -0.4

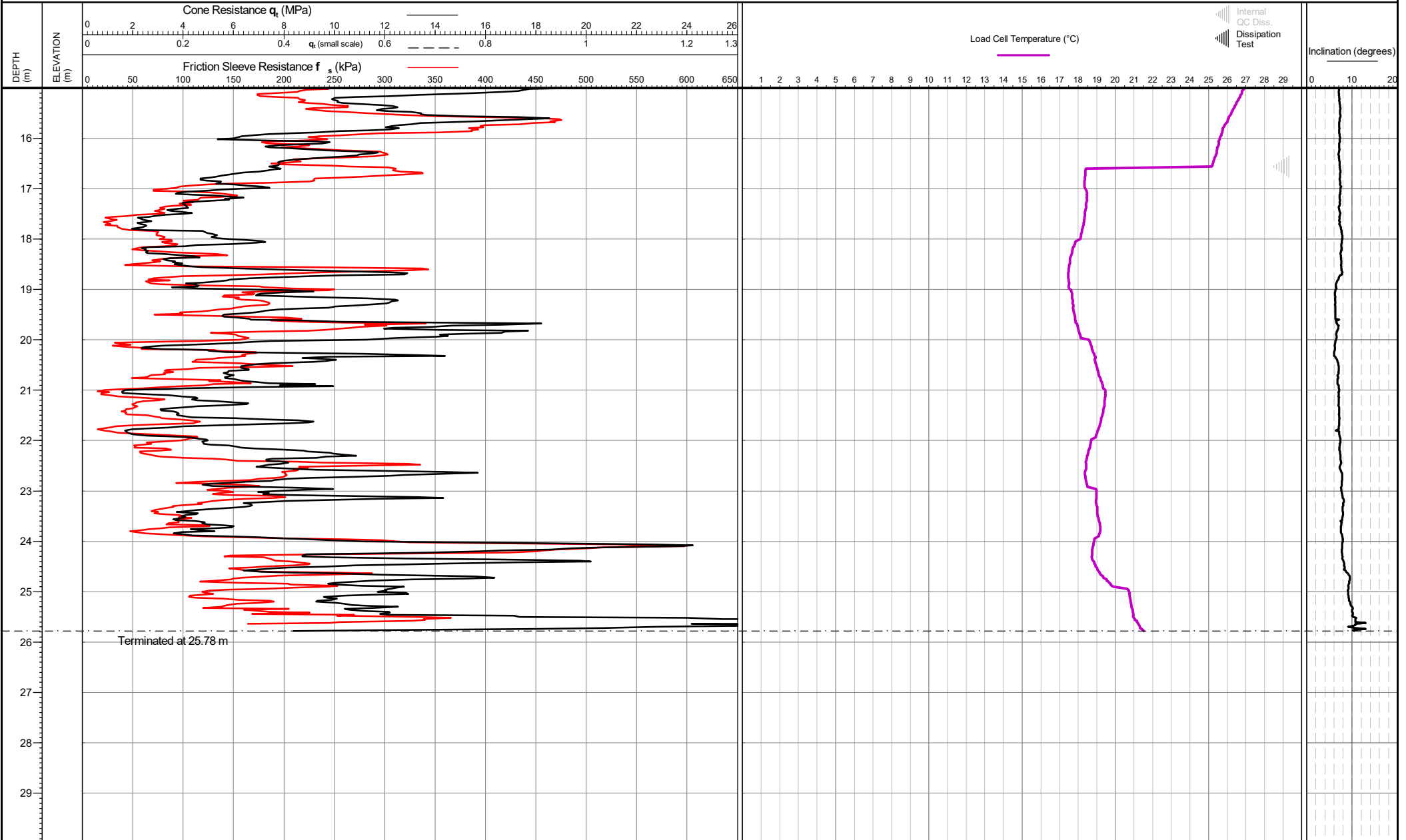
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 14:57:17

Zero drift (Pre/post test)
 q_e (kPa): -10.8
 f_e (kPa): 1.0
 u_z (kPa): -0.4

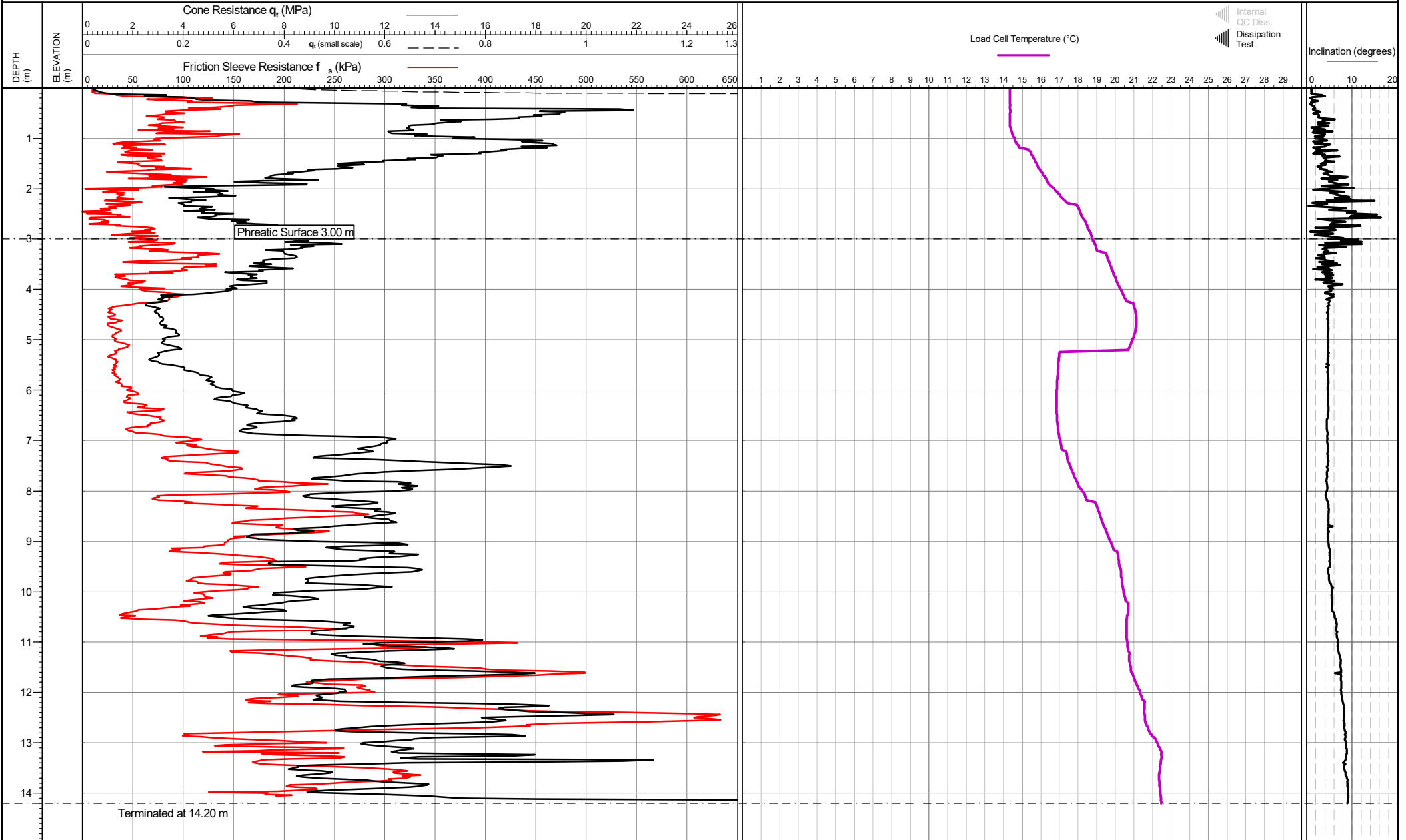
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT01



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 10:23:52

Zero drift (Pre/post test)
 q_t (kPa): 9.2
 f_s (kPa): 0.1
 u_z (kPa): 0.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

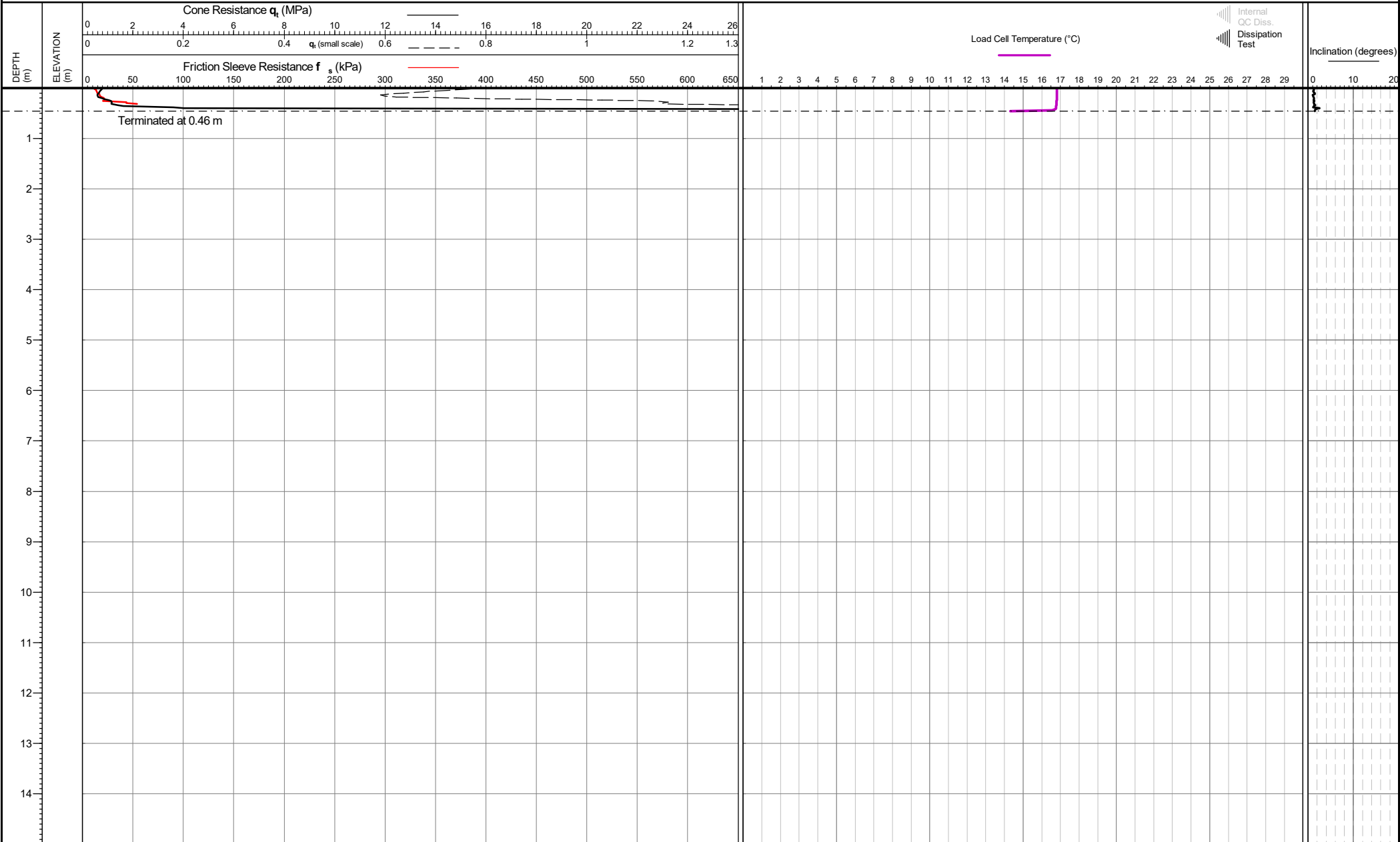
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT02



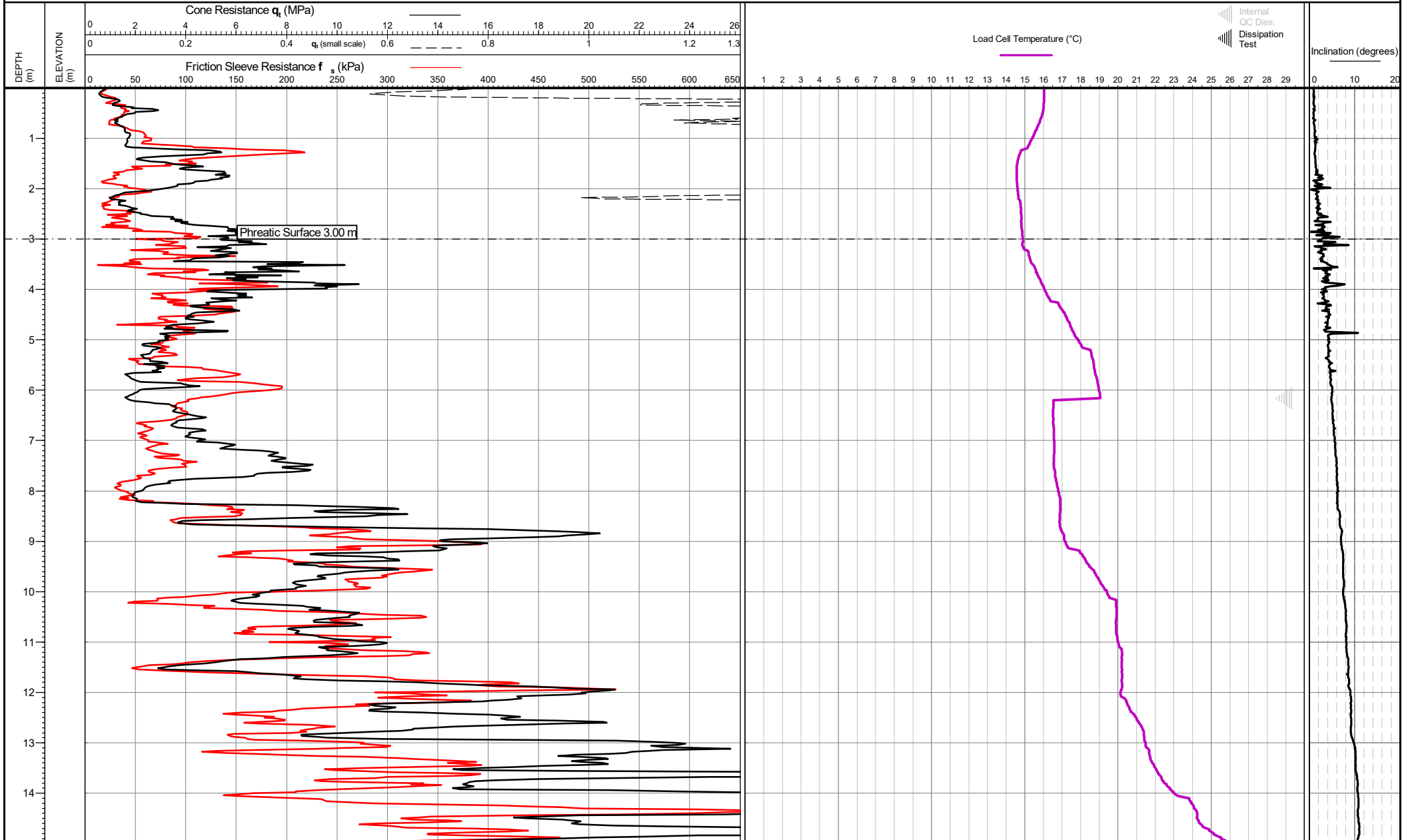
Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 09/12/2025 13:04:35	Zero drift (Pre/post test) q _t (kPa): 24.0 f _s (kPa): -2.9 u _z (kPa): 0.0	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Tip load	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT03 Page 1 of 1
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Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Zero drift (Pre/post test)
 q_c (kPa): 24.0
 f_s (kPa): -2.9
 u_z (kPa): 0.0

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

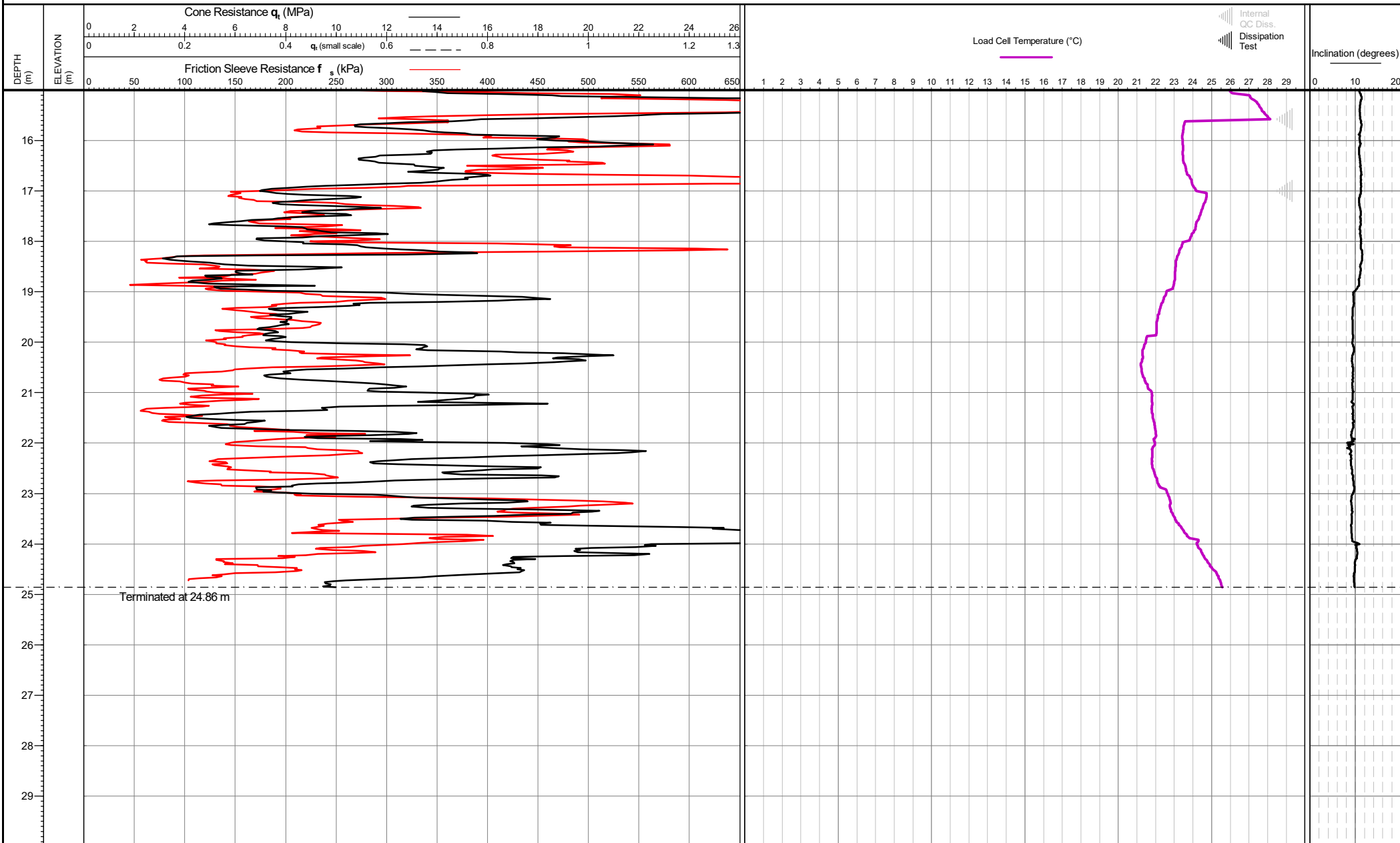
TEST ID: CPT03A

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Project: SALISBURY

Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 13:28:11

Zero drift (Pre/post test)
 q_t (kPa): 24.0
 f_s (kPa): -2.9
 u_z (kPa): 0.0

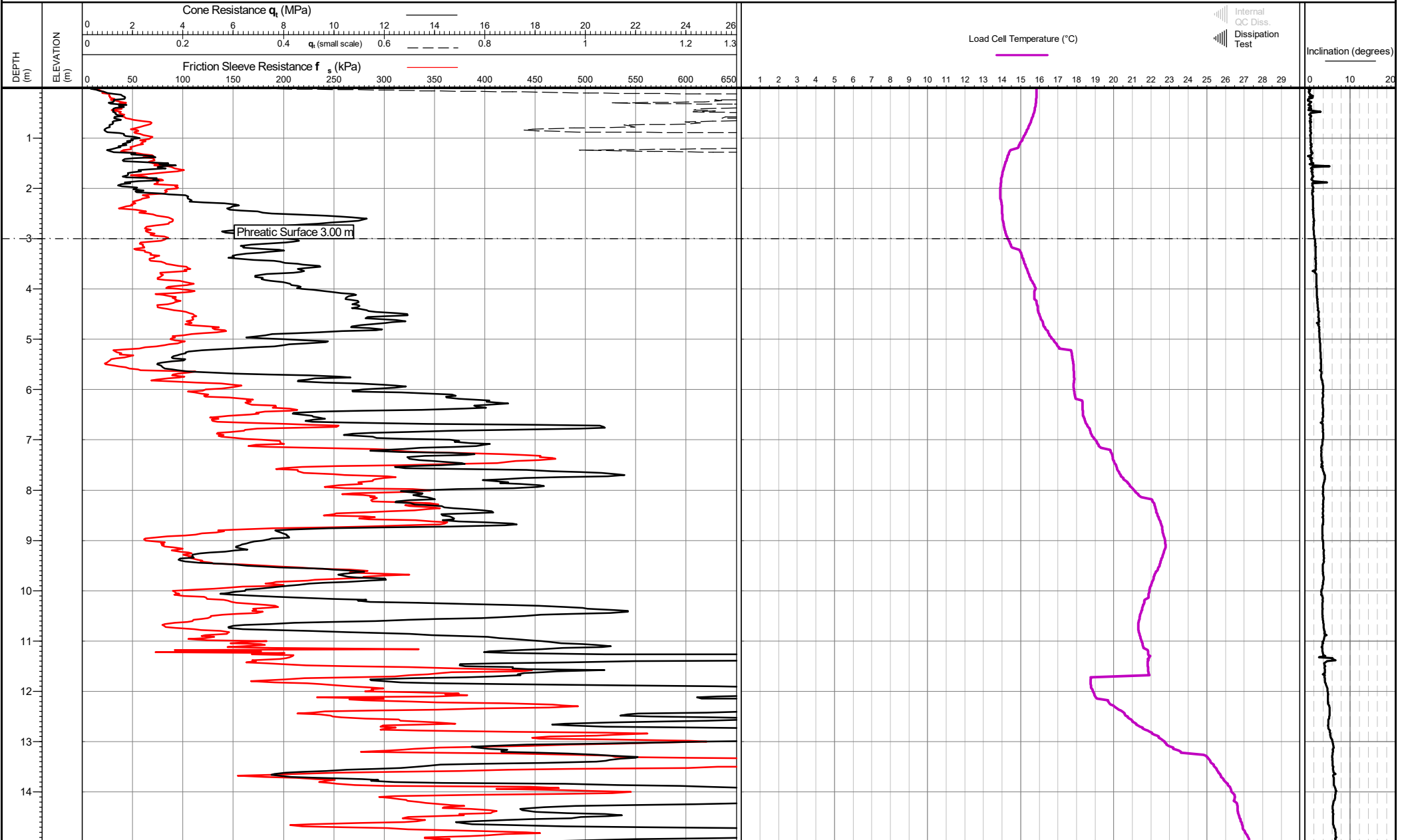
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1
Checked by: Chris Player

TEST ID: CPT03A

Page 2 of 2



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 13:46:59

Zero drift (Pre/post test)
 q_e (kPa): 7.0
 f_e (kPa): -3.5
 u_z (kPa): 0.8

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Piezo load

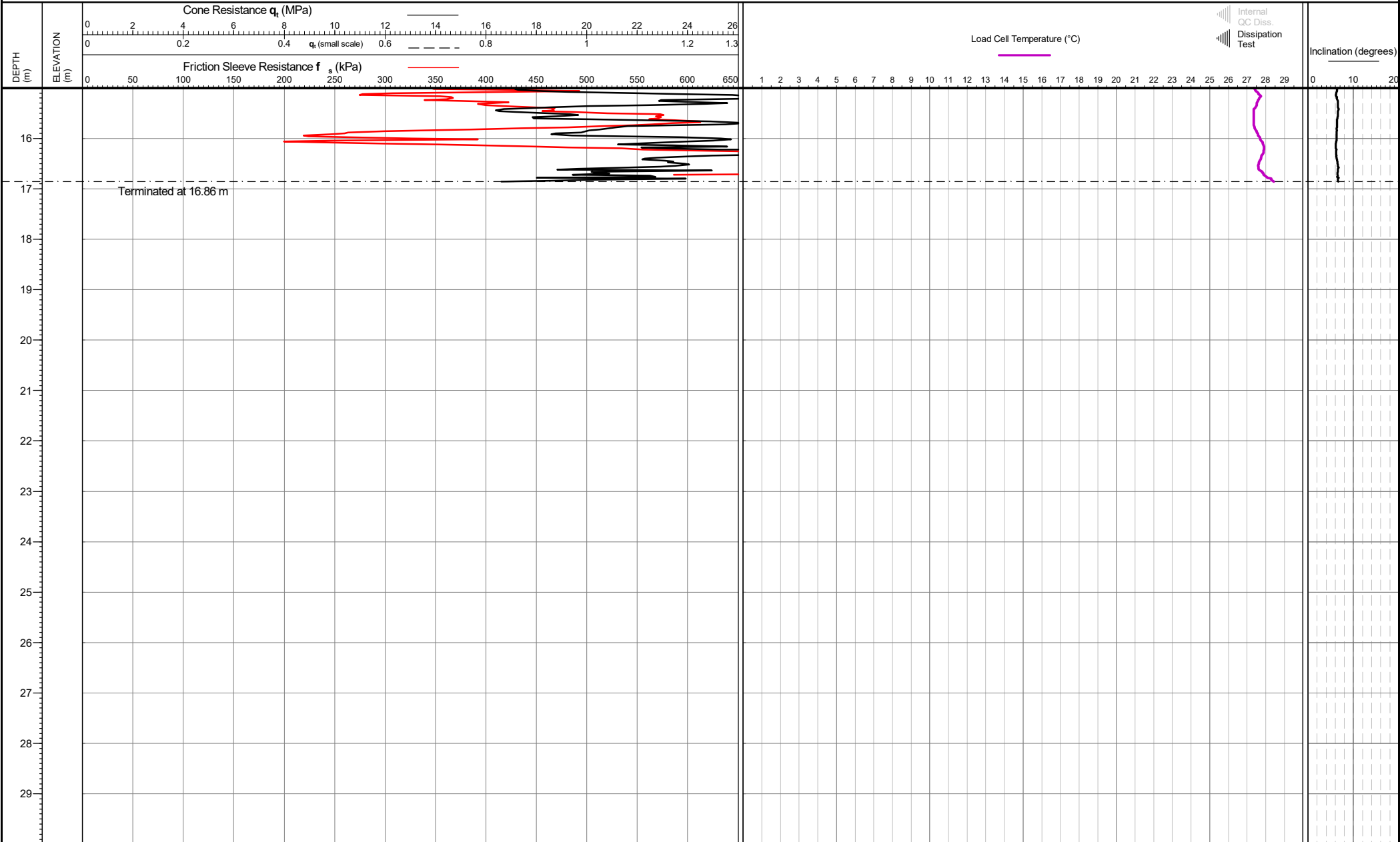
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

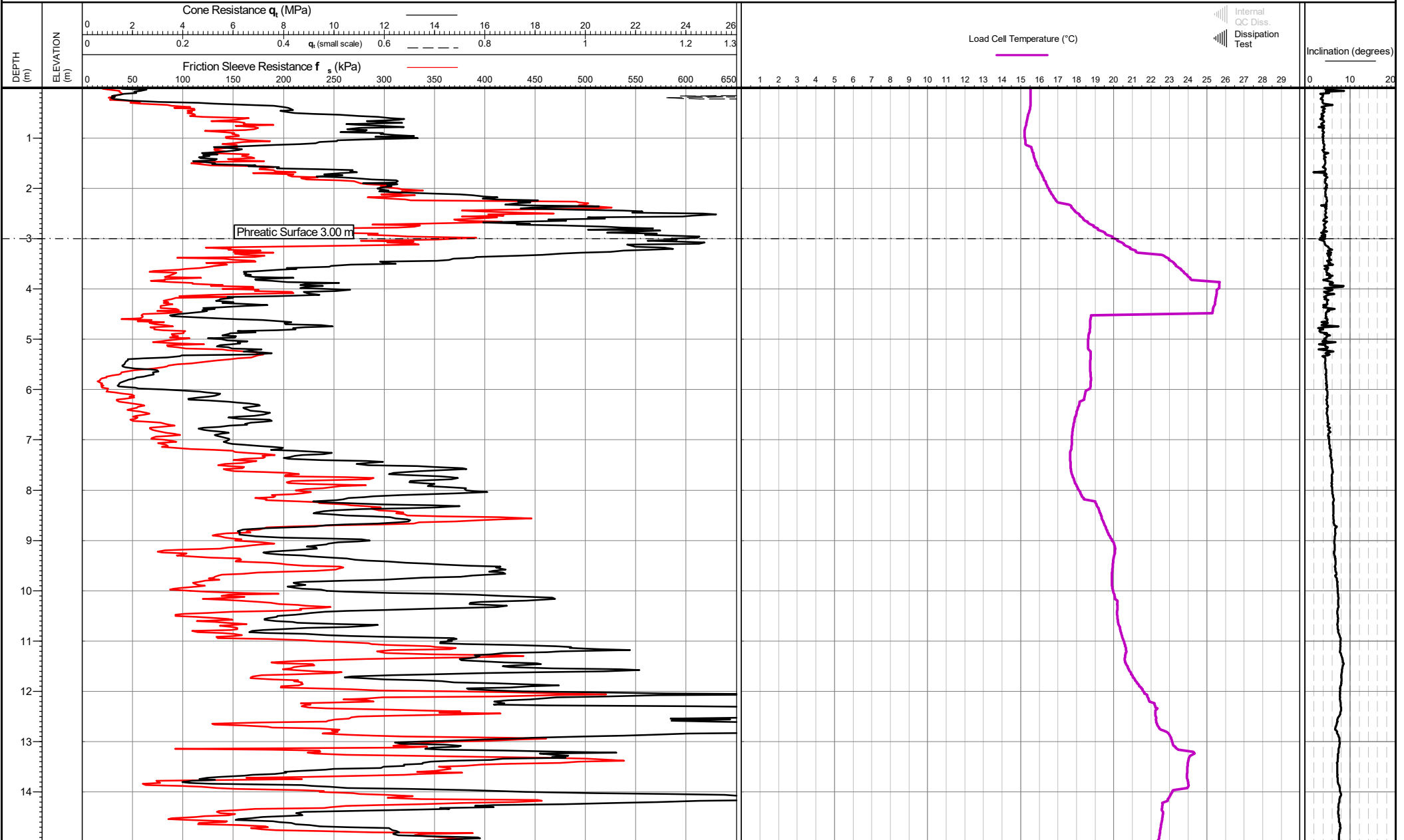
TEST ID: CPT04



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm2): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 10/12/2025 13:46:59	Zero drift (Pre/post test) q _t (kPa): 7.0 f _s (kPa): -3.5 u _z (kPa): 0.8	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Piezo load	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT04 Page 2 of 2
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Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 11:25:52

Zero drift (Pre/post test)
 q_t (kPa): -4.6
 f_s (kPa): -0.5
 u_z (kPa): -1.6

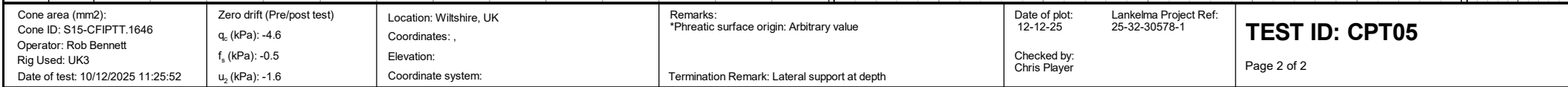
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

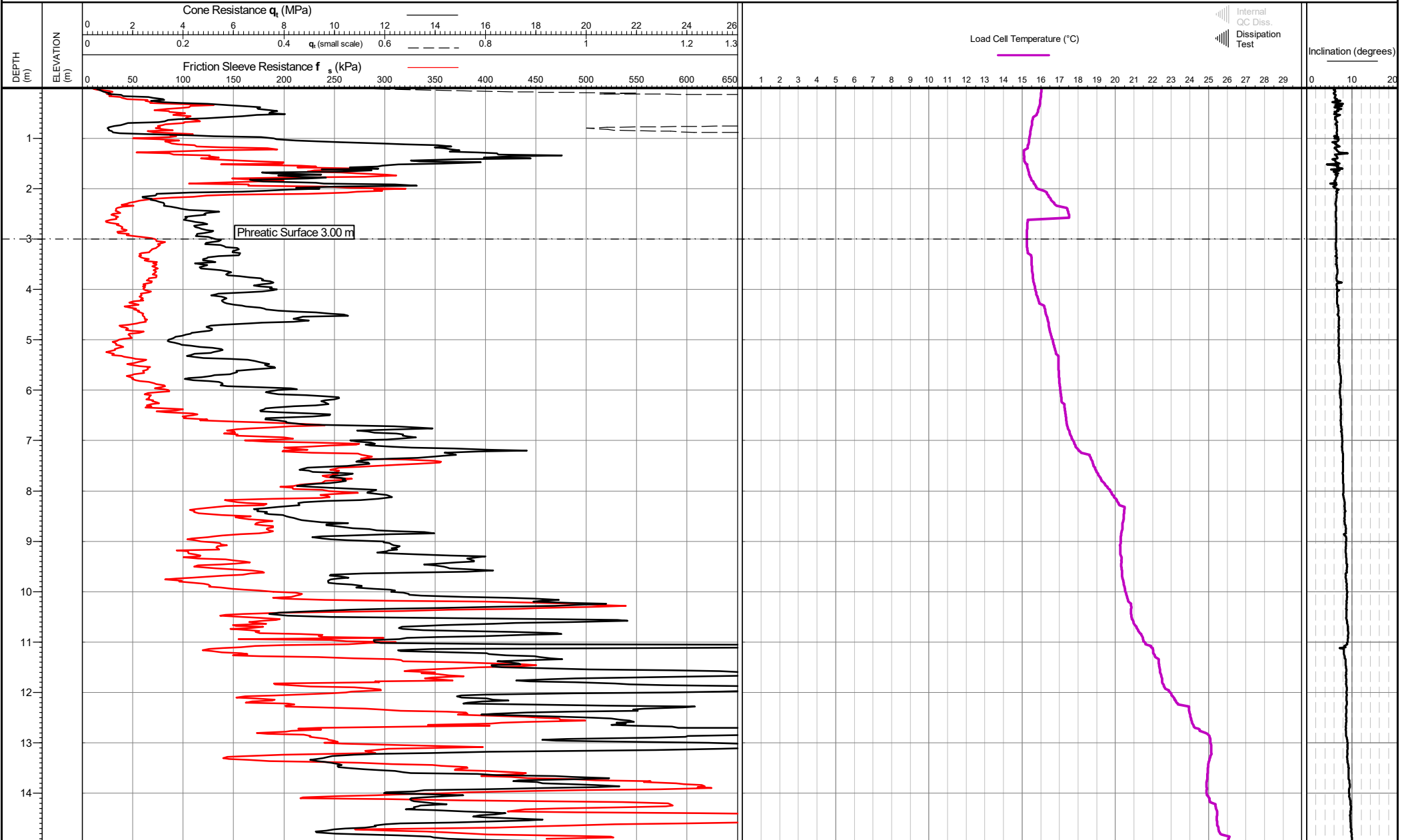
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT05





Cone area (mm²):
Cone ID: S15-CFPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 12:32:44

Zero drift (Pre/post test)
 q_c (kPa): 8.6
 f_s (kPa): 0.2
 u_z (kPa): 0.8

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot:
12-12-25
Checked by:
Chris Player

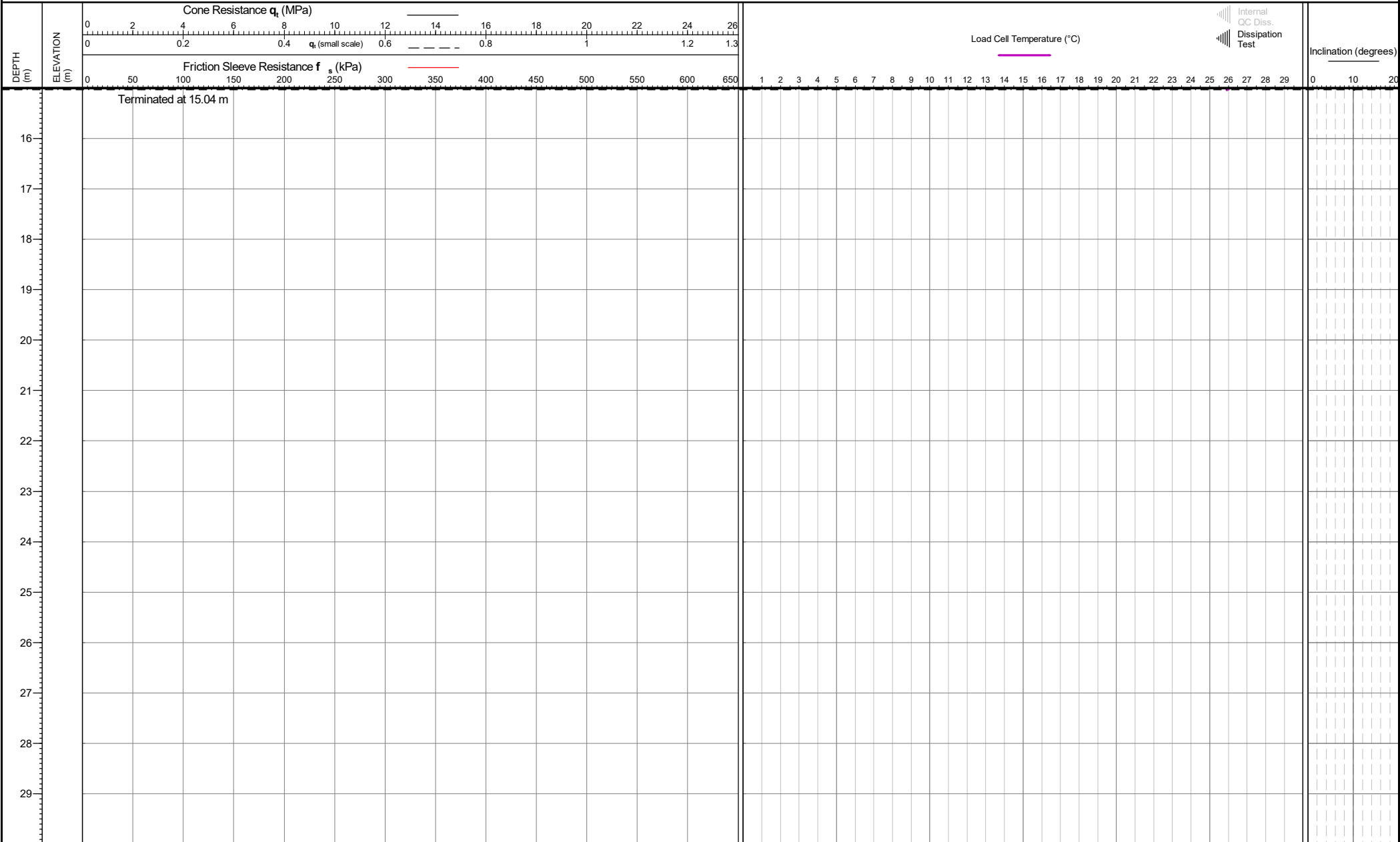
Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT06

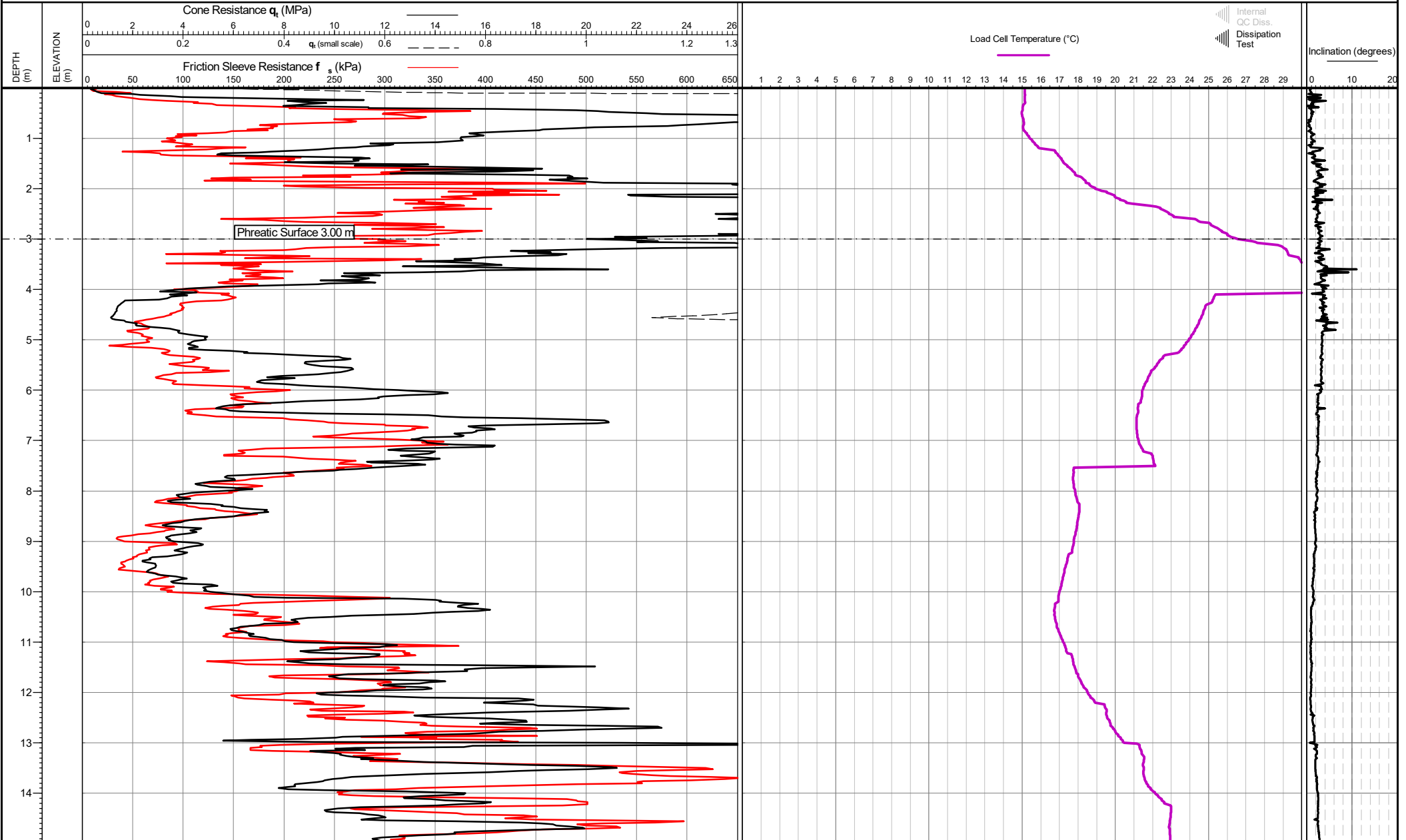
Page 1 of 2



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm ²): Cone ID: S15-CFIPTT.1646 Operator: Rob Bennett Rig Used: UK3 Date of test: 10/12/2025 12:32:44	Zero drift (Pre/post test) q_0 (kPa): 8.6 f_0 (kPa): 0.2 u_z (kPa): 0.8	Location: Wiltshire, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Lateral support at depth	Date of plot: 12-12-25 Checked by: Chris Player	Lankelma Project Ref: 25-32-30578-1	TEST ID: CPT06 Page 2 of 2
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Cone area (mm²):
Cone ID: S15-CFPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Zero drift (Pre/post test)
 q_c (kPa): -6.8
 f_s (kPa): -2.0
 u_z (kPa): -1.5

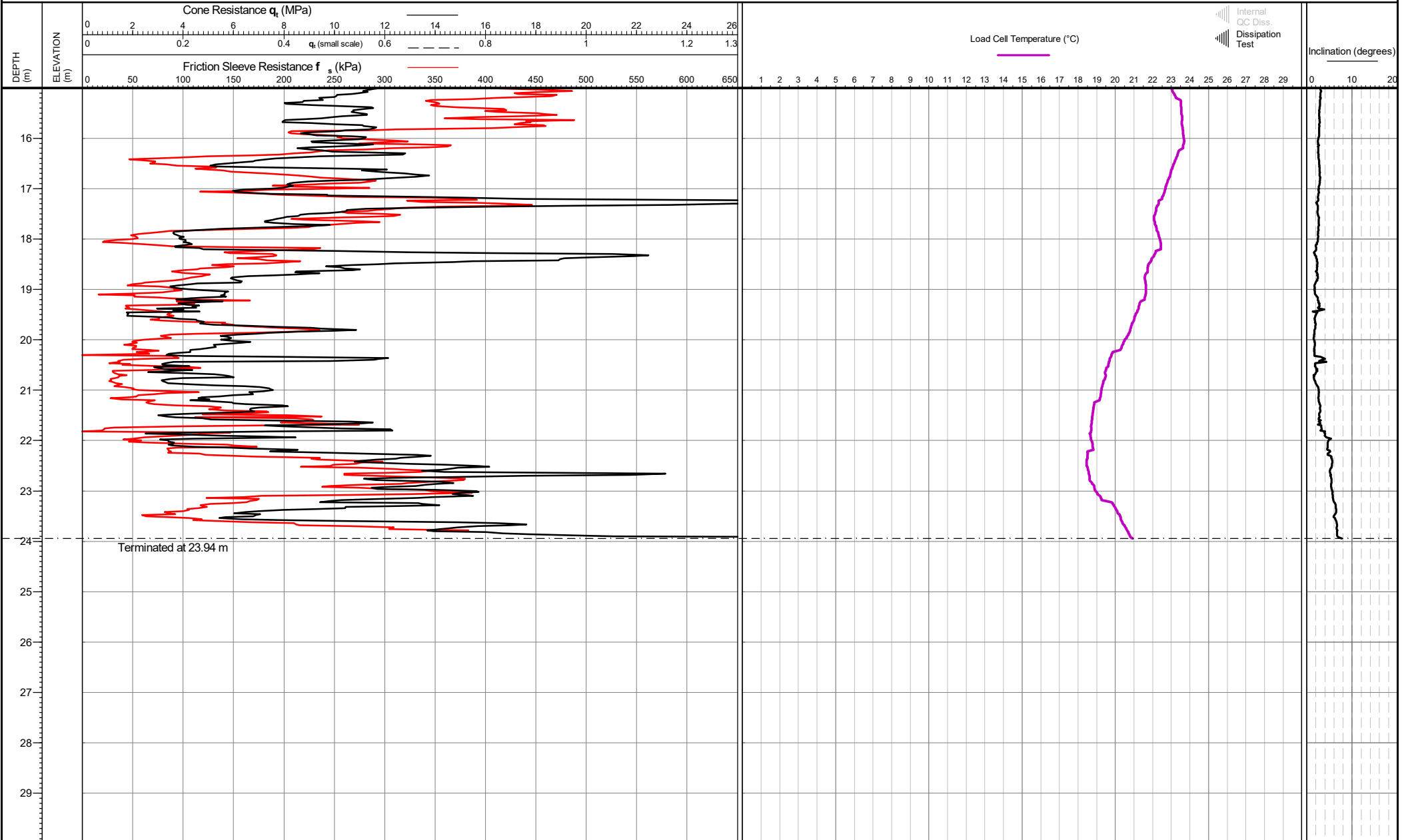
Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT08



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 12:38:41

Zero drift (Pre/post test)
 q_e (kPa): -6.8
 f_s (kPa): -2.0
 u_z (kPa): -1.5

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

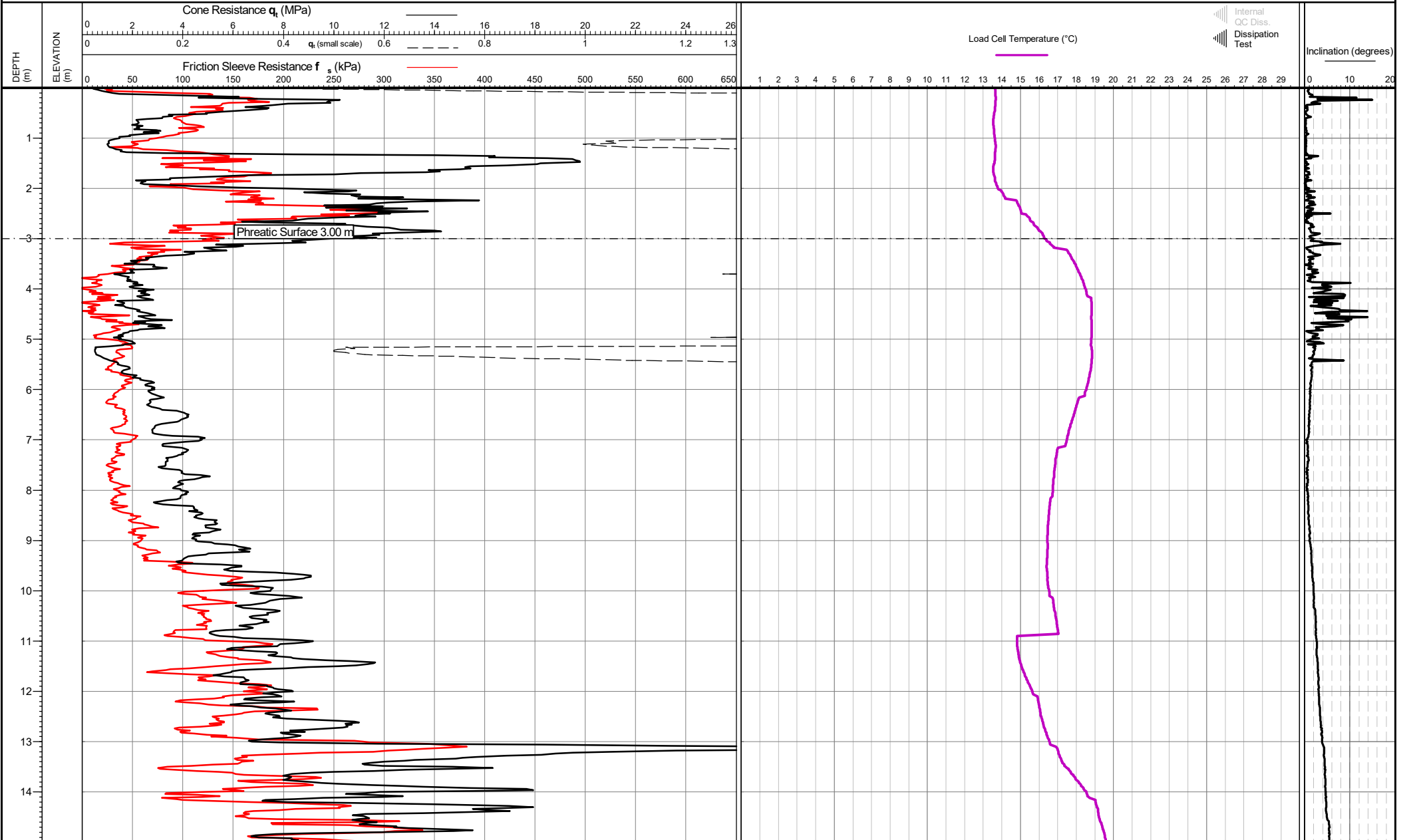
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at depth

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1
Checked by: Chris Player

TEST ID: CPT08



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Zero drift (Pre/post test)
 q_t (kPa): -21.0
 f_s (kPa): 2.4
 u_z (kPa): -1.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

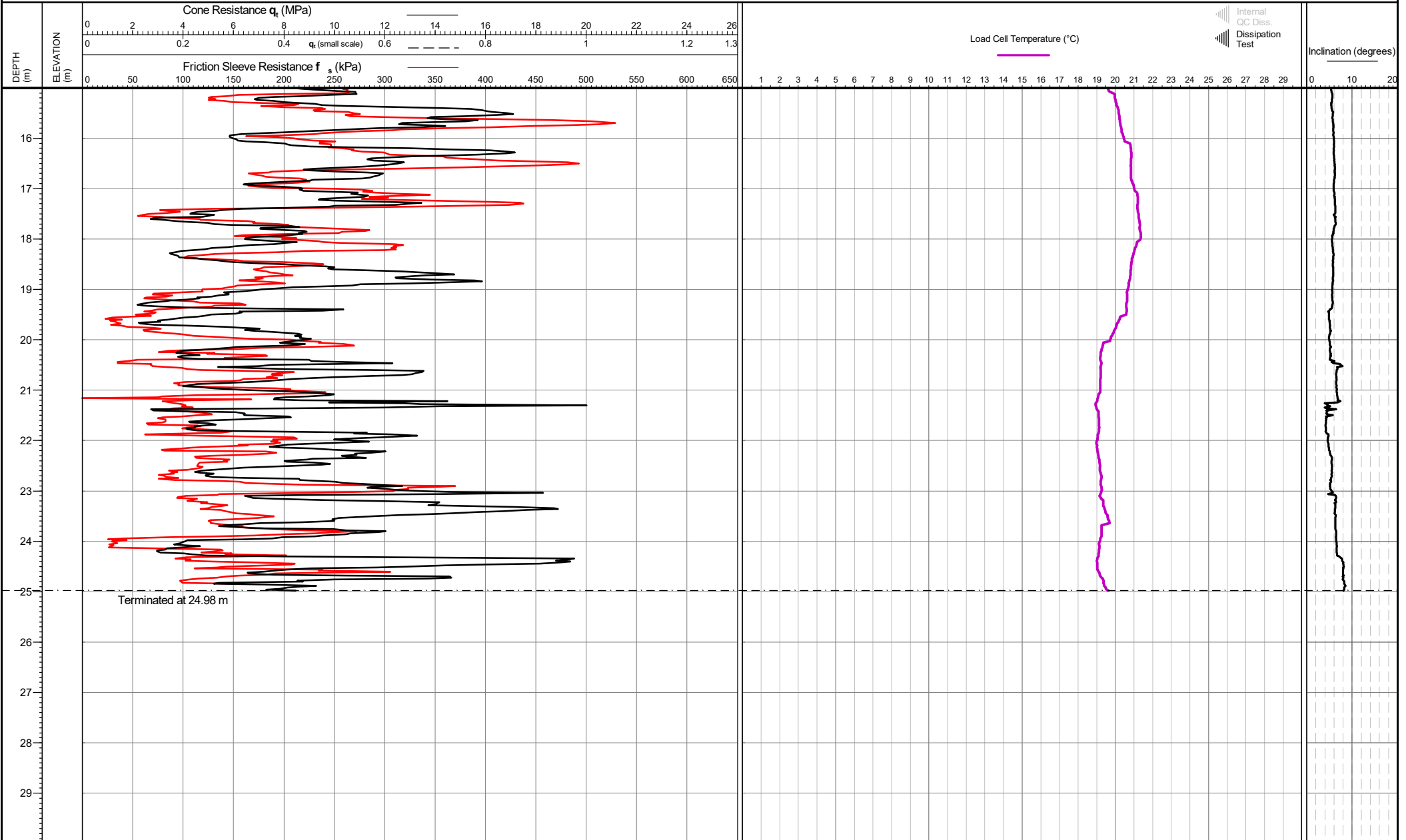
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09

Page 1 of 2



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 10:57:56

Zero drift (Pre/post test)
 q_e (kPa): -21.0
 f_e (kPa): 2.4
 u_z (kPa): -1.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

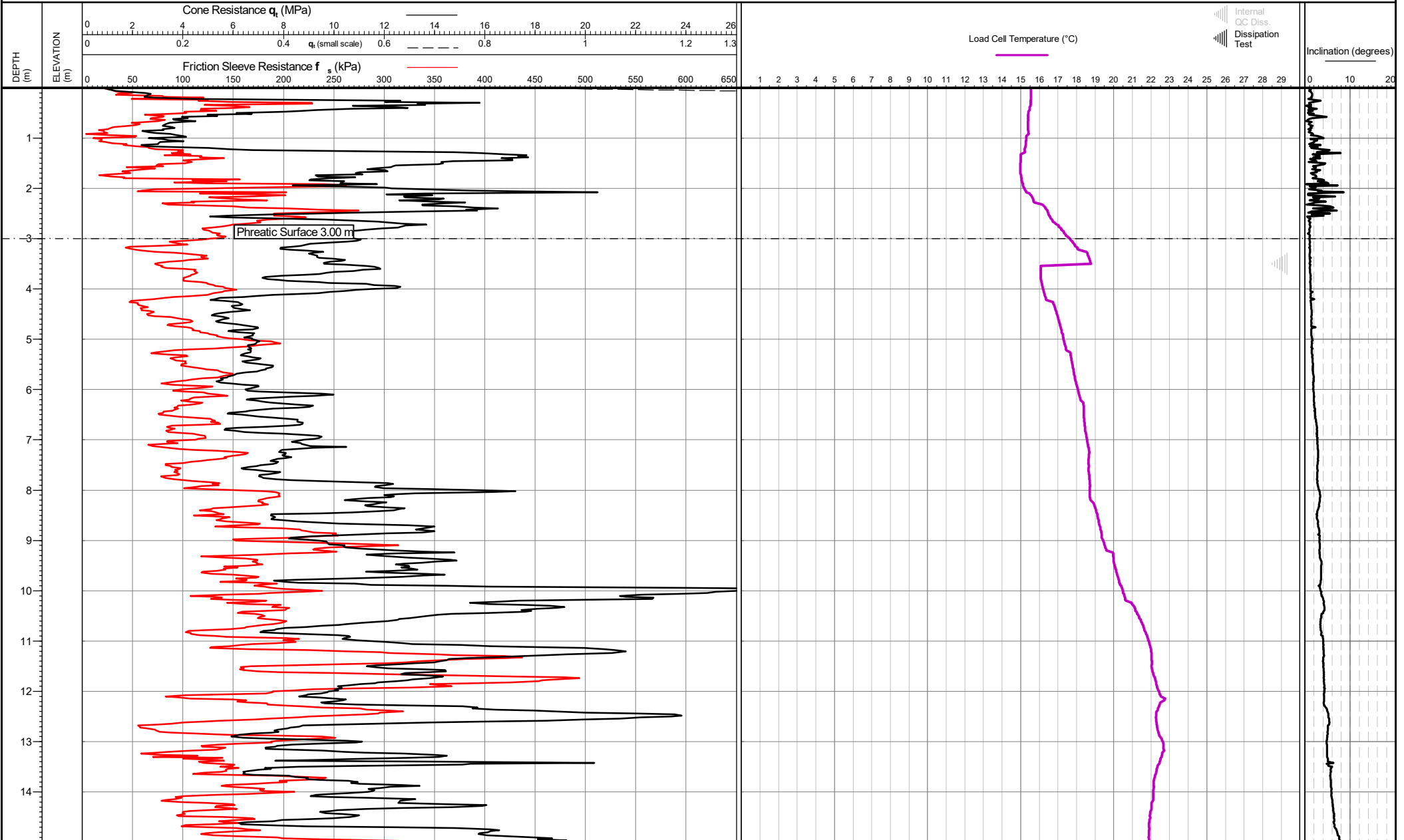
Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT09



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Zero drift (Pre/post test)
 q_t (kPa): -45.6
 f_s (kPa): -0.2
 u_z (kPa): -1.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

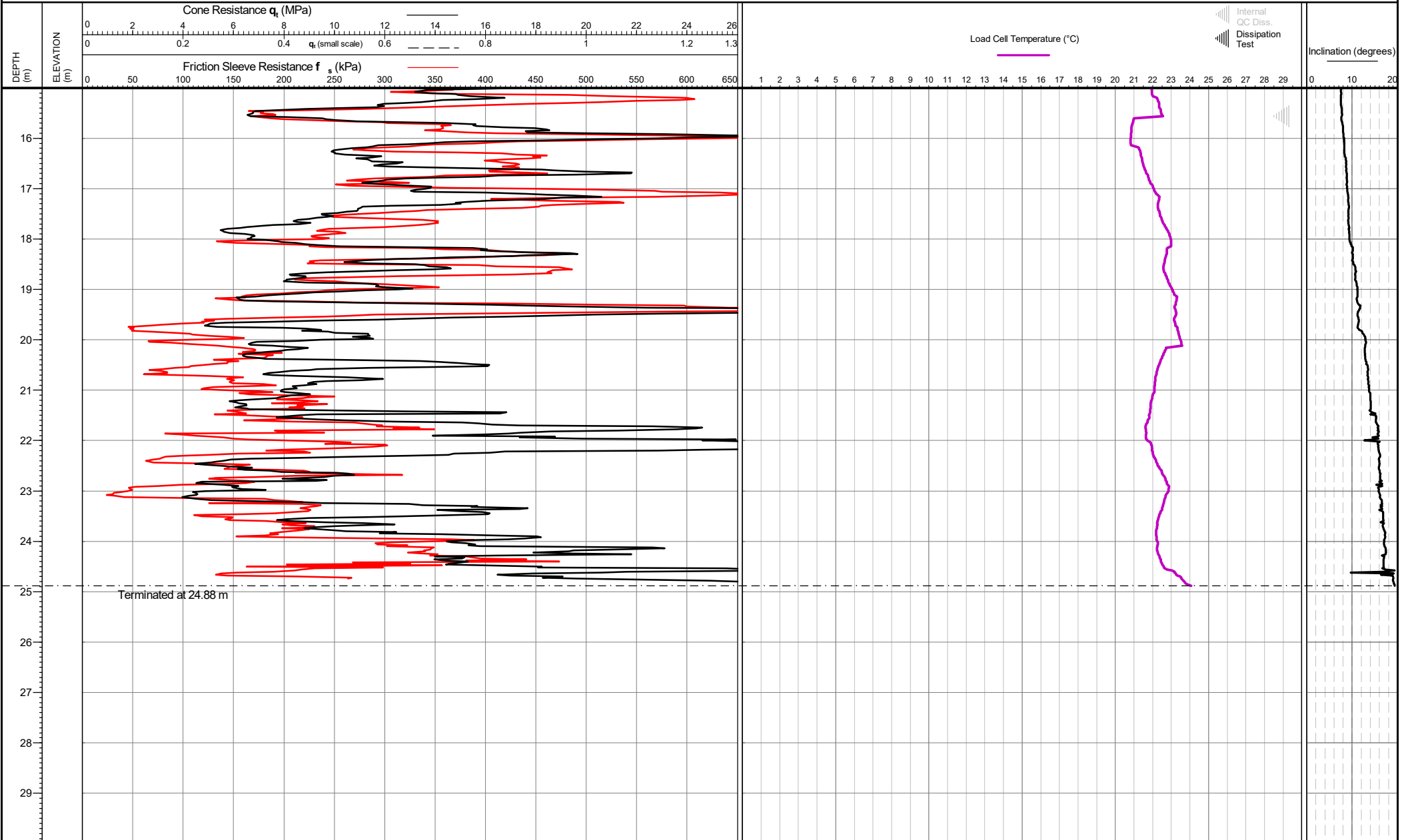
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT10

Page 1 of 2



Cone area (mm²):
Cone ID: S15-CFPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 09/12/2025 11:21:04

Zero drift (Pre/post test)
 q_e (kPa): -45.6
 f_e (kPa): -0.2
 u_z (kPa): -1.6

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

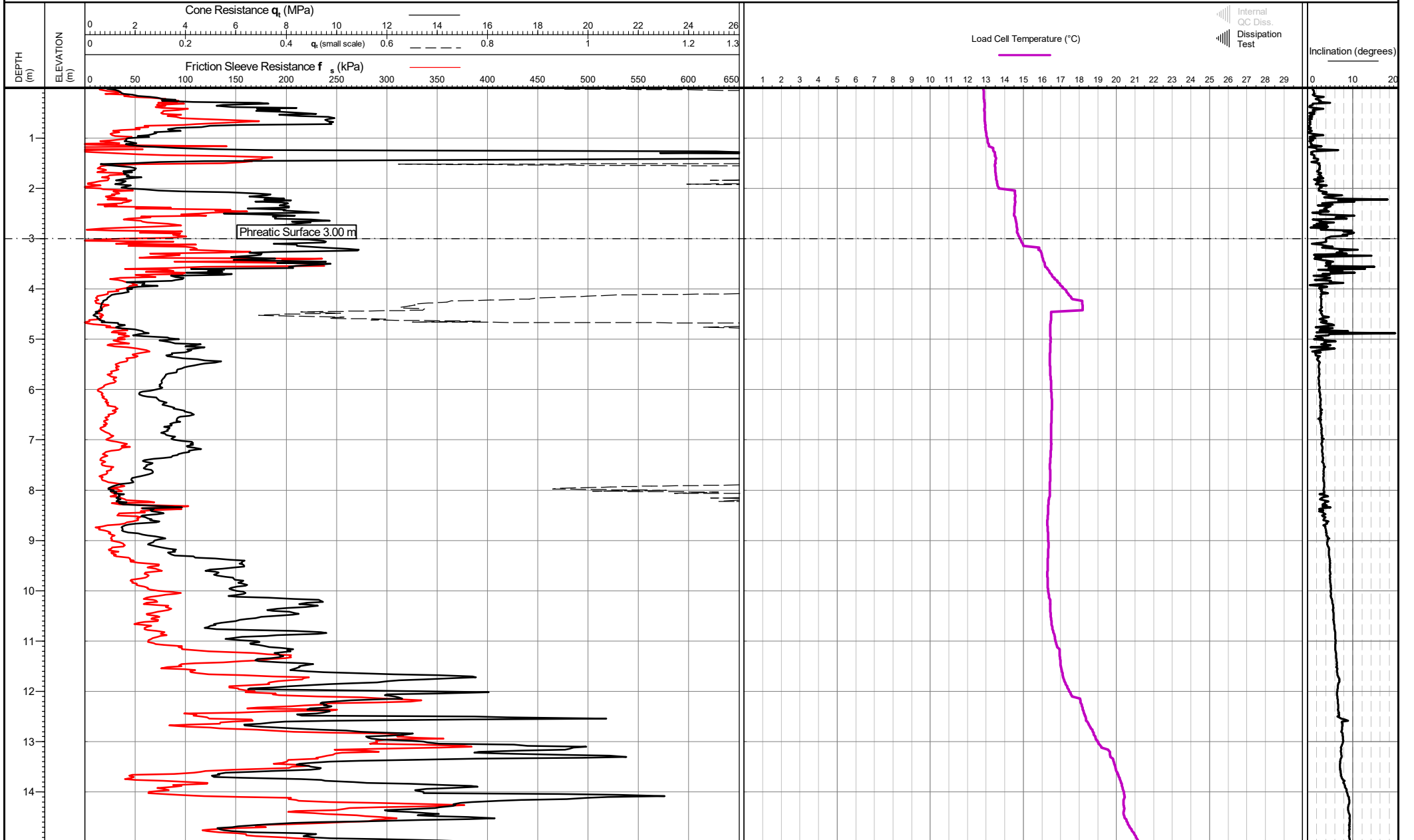
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1
Checked by: Chris Player

TEST ID: CPT10



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Zero drift (Pre/post test)
 q_t (kPa): 3.0
 f_s (kPa): -0.5
 u_z (kPa): -1.7

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

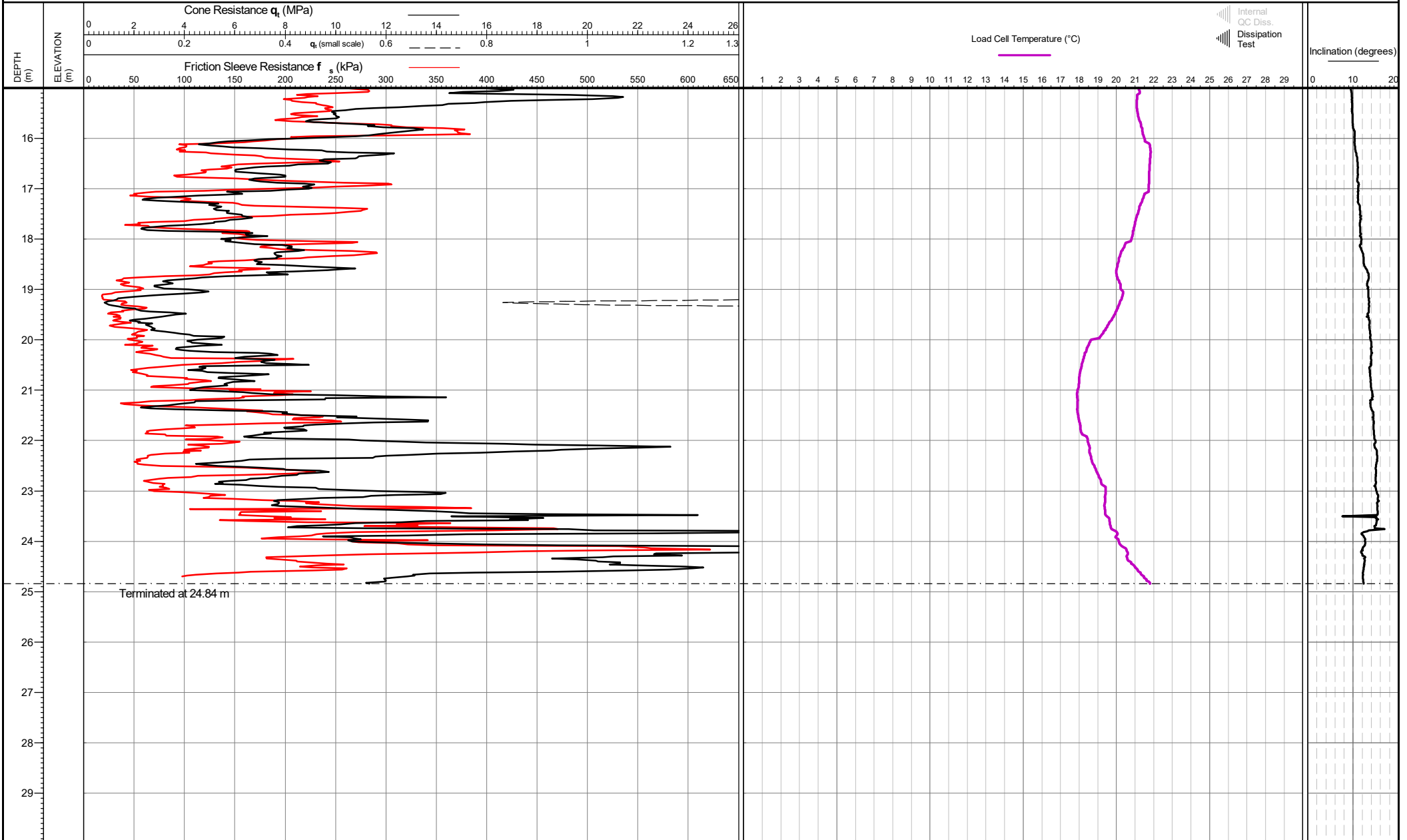
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT11

Page 1 of 2



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 10/12/2025 09:01:30

Zero drift (Pre/post test)
 q_0 (kPa): 3.0
 f_0 (kPa): -0.5
 u_z (kPa): -1.7

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

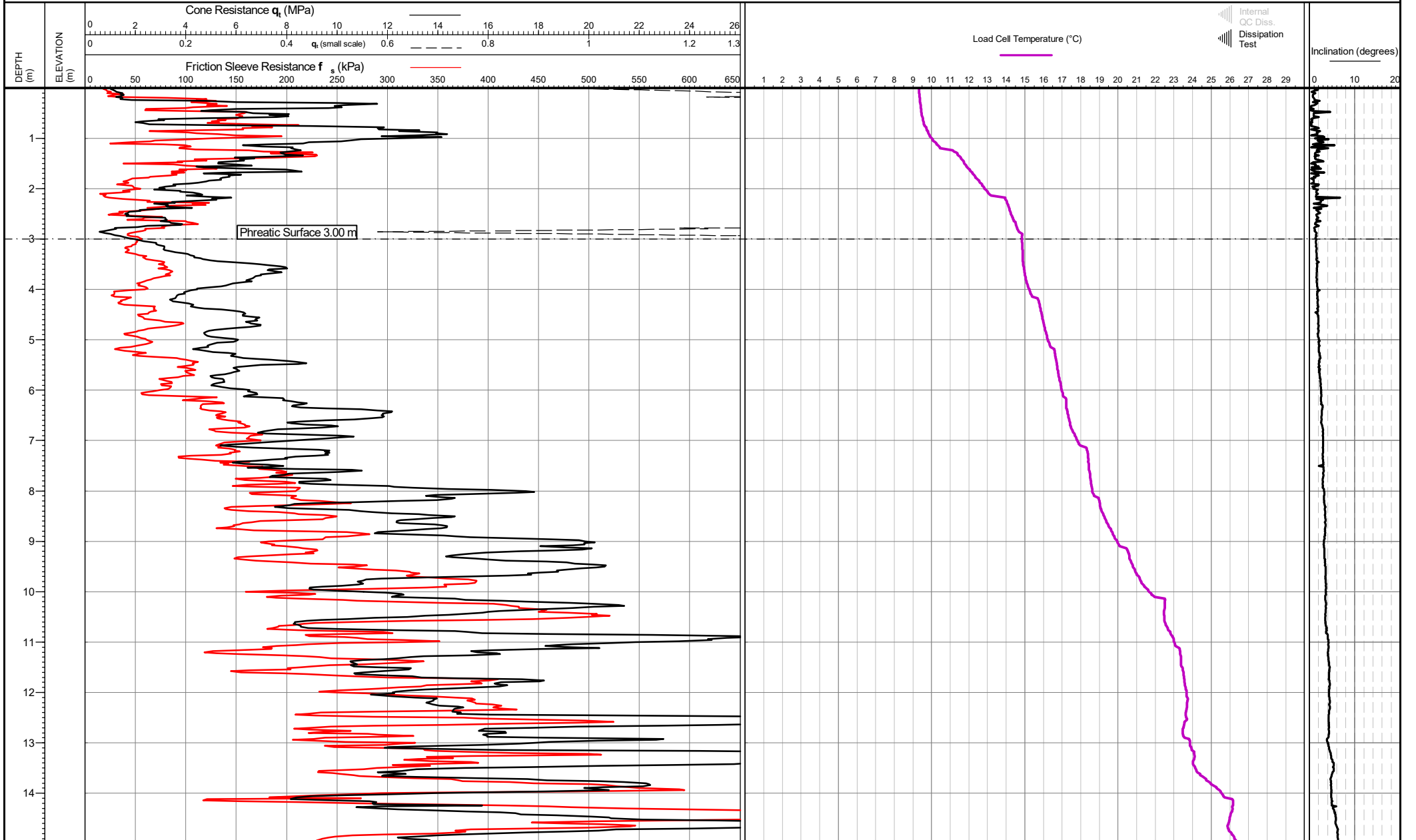
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot: 12-12-25
Lankelma Project Ref: 25-32-30578-1
Checked by: Chris Player

TEST ID: CPT11



Project: SALISBURY
Client: SOILS LIMITED



Cone area (mm²):
Cone ID: S15-CFPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Zero drift (Pre/post test)
 q_e (kPa): -12.6
 f_e (kPa): -1.8
 u_z (kPa): -3.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

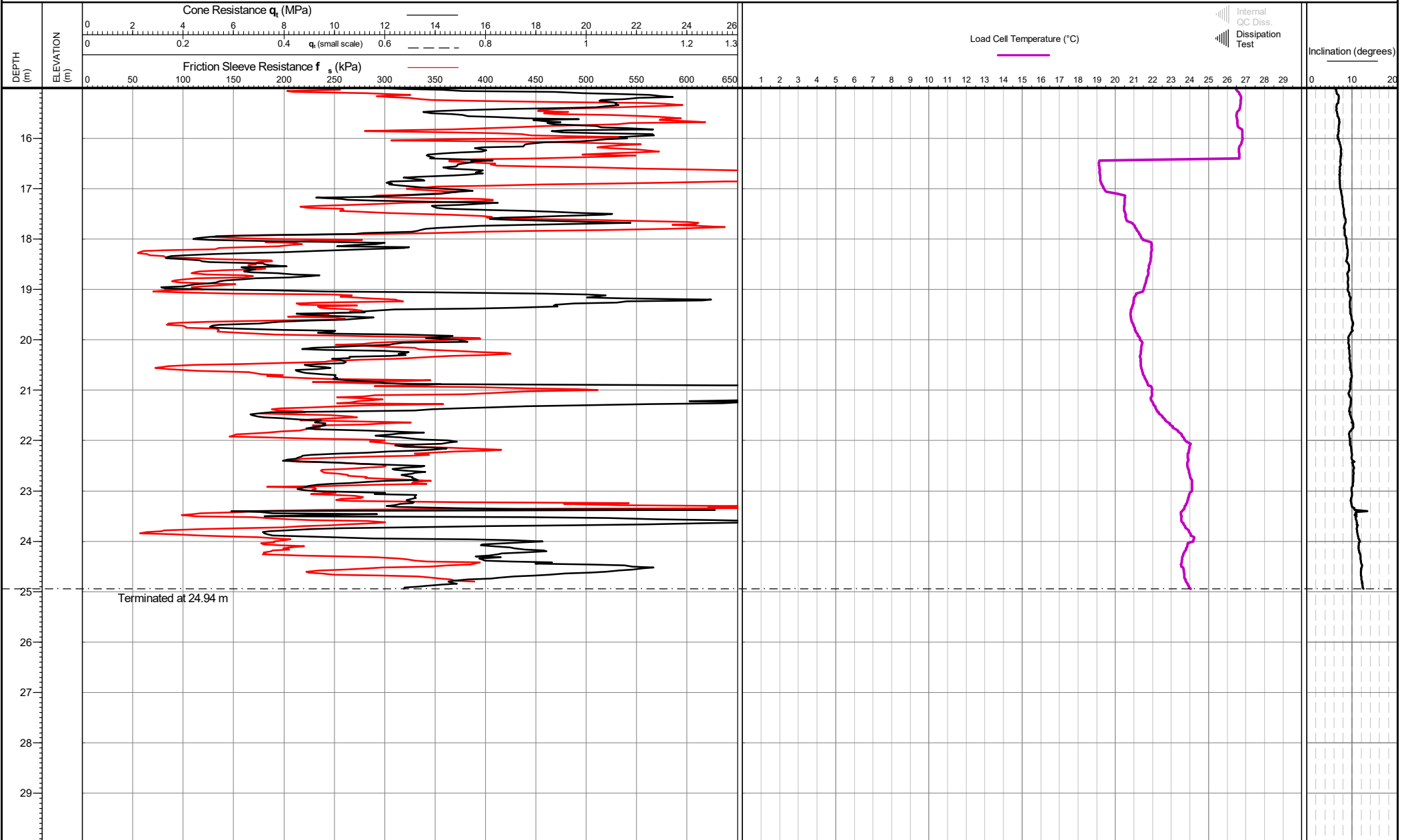
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT13

Page 1 of 2



Cone area (mm²):
Cone ID: S15-CFIPTT.1646
Operator: Rob Bennett
Rig Used: UK3
Date of test: 11/12/2025 09:02:34

Zero drift (Pre/post test)
 q_t (kPa): -12.6
 f_s (kPa): -1.8
 u_z (kPa): -3.1

Location: Wiltshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Target depth

Date of plot:
12-12-25
Checked by:
Chris Player

Lankelma Project Ref:
25-32-30578-1

TEST ID: CPT13

Appendix G Information Provided by the Client

Legend

- CH#

CH 1 & 2 - Combined Driven & Rotary Coreholes
C1 & C2 to 25mbgl
- CPT#

CPT 1 to CPT12 - Static Cone Penetration Testing
to 25m
(cone end bearing and sleeve friction
measurements together with
porewater pressure measurements)
- STP#

Soakaway tests to BRE - Estimated 3mbgl min
depth, or deeper, to be within chalk band for
testing
- TTP#

450mm min wide trial pit to 1.5mbgl to
investigate if existing foundations are still
present. Minimum lengths of trail pits as shown
on plan.
- CBR#

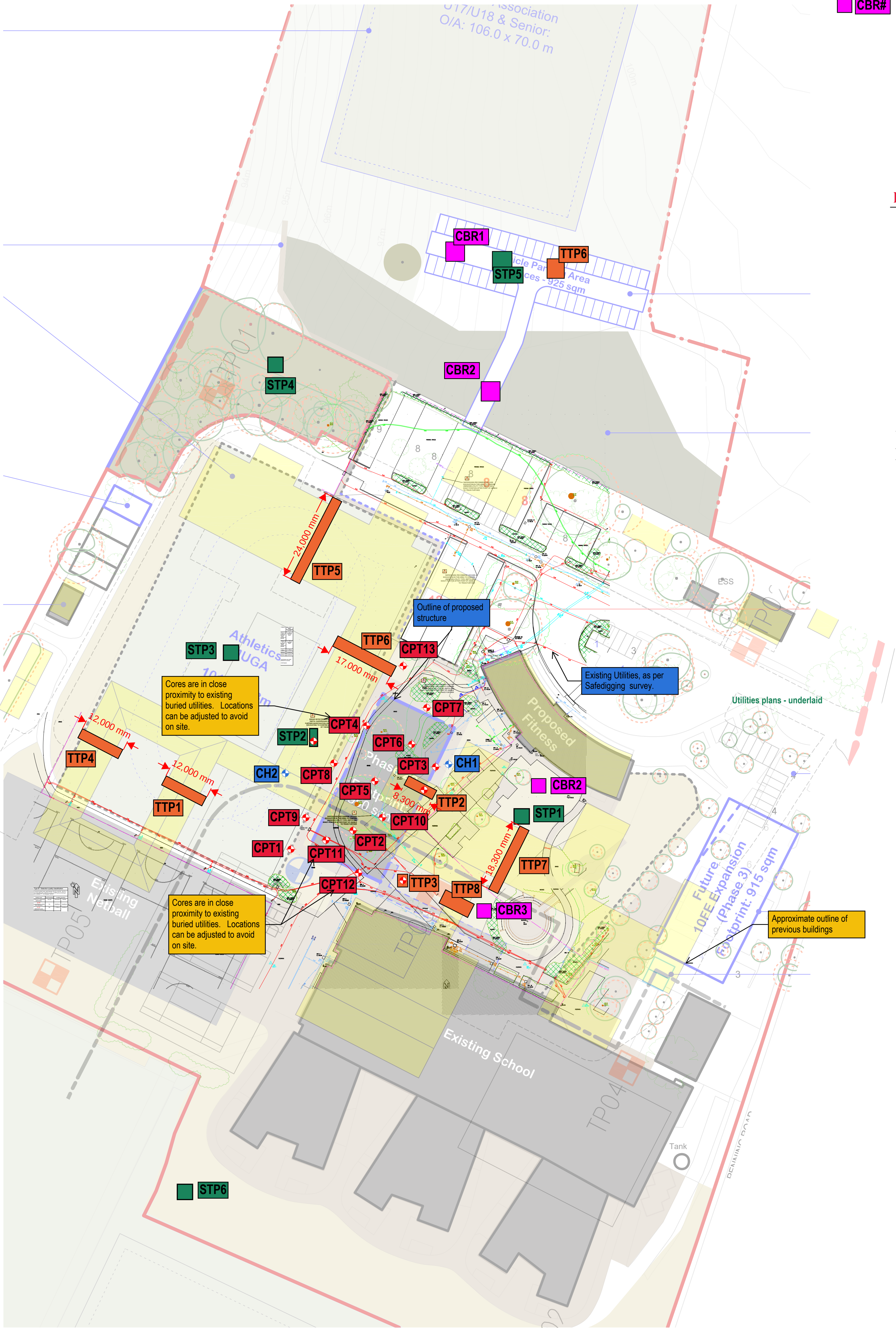
Indicates CBR test location. To be carried out at
400mm below existing ground level.

One soil sample to be taken for each
trial/soakway pit for Geotechnical and
Geoenvironmental testing.

Unless noted below, locations are approximate
and can be adjusted slightly to suit site
constraints, and to avoid buried services.

Location Co-ordinates

Reference	Eastings	Northing
CH1	4411581.6	131849.6
CH2	411541	131847
CPT1	411542.2	131826.4
CPT2	411557.6	131831.7
CPT3	411578	131849
CPT4	411561	131860
CPT5	411563	131845
CPT6	441572	131855
CPT7	411576	131865
CPT8	411553	131850
CPT9	411546	131835
CPT10	411565	131835
CPT11	411551	131829
CPT12	411559	131820
STP1	411548	131856
TTP2	411575	131842
TTP3	411570	131818



P01	First issue	SJW	SJW	2025.10.13
P01	First issue	SJW	SJW	2025.10.07
Issued/Revision		By	Appd	YYYY.MM.DD

S2
For Information

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Client/Project
Morgan Sindall Construction

Sarum Academy

Title
Site investigation
Scope of Works

Project No. 333700772	Scale n/t/s
Revision P02	Drawing No. 75CC13-STN-XX-XX-SK-S-0001

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1. This drawing is to be read in conjunction with all relevant Architects, Services Engineers, Civil Engineers & specialist drawings, specifications, schedules and building models.
2. If there are any discrepancies within the drawing or between the drawing and the specification, please ask the engineer for clarification.
3. All dimensions shown are in millimetres (mm) unless noted otherwise.
4. All levels shown are in metres (m) unless noted otherwise.
5. All columns, walls and beams to be set out symmetrically about grid lines unless shown otherwise.
6. The Architect is responsible for setting out of the building grid and geographical location coordinates of the site. All dimensions are to be confirmed on site by the Contractor before commencement of works. Any deviations are to be reported to the Engineer & Architect.
7. The Contractor shall ensure temporary loads onto the new structure shall be less than those for which it has been designed.
8. The Contractor is deemed to be responsible for the permanent condition only. The Contractor is responsible for the stability of the structure during its temporary condition and any temporary works required during construction. If the contractor wishes to use the permanent structure as temporary works (e.g. crane support) he must demonstrate with drawings and calculations that this will not affect the future performance of the permanent works.
9. Any information shown on Stattec drawings relating to the existing structure is based on limited recorded drawing information. It is the contractor's responsibility to check and confirm these details (by site survey and opening up works etc.) prior to commencement of permanent works.
10. See drawing TSC/C1/2015/XX-XX-XX-DRS-0003 for project notes.

P05	Notes updated	SJW	SJW	27.11.2020
P04	Updated coordinates	SJW	SJW	26.11.2020
P03	Revised as clouded	SJW	SJW	21.10.2020
P02	2nd Issue	SJW	SJW	13.10.2020
P01	First Issue	SJW	SJW	07.10.2020

Issue Status

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Client

Morgan Sindall

Project

Sarum Academy

Teaching Block

Sarum Academy, Westwood Road,
Salisbury, Wiltshire SP2 9HS

Title
PROPOSED SITE INVESTIGATION
SCOPE OF WORKS

Project No.
333701706

Drawing No. **75CC13-STN-ZZ-ZZ-DR-S-0200**



SURVEY STATIONS			
Name	Easting	Northing	Height
S01	411667.332	131856.618	99.52
S02	411638.024	131815.236	99.41
S03	411814.302	131856.618	99.41
S04	411598.995	131796.202	99.41
S05	411553.208	131815.557	100.00
S06	411532.517	131796.537	99.91
S07	411593.169	131846.081	100.04
S08	411551.318	131841.188	100.28
S09	411562.725	131865.902	100.03
S10	411592.242	131902.764	98.85
S11	411629.810	131892.853	99.29

ORIGINAL SHEET - ISO A1

GENERAL NOTES

All flat roofs designed to min. 1:40 falls to min. 1:80 construction to BS 6229:2018 (Except roofs with tapered insulation - all to specialist manufacturer/sub-contractor design and requirements).

ROOF DRAINAGE
ALL TO SPECIALIST DESIGN. TO BE IN ACCORDANCE WITH BS EN 12056-3:2000 AND DFE TECHNICAL ANNEX 2F 12.2.6 & 12.2.7.

Rainfall Intensity: in accordance with fig. NB.4 of BS EN 12056-3:2000.

Parapets/Vertical Upstands/Adjacent Roofs: 50% of the area of adjacent vertical surfaces to be included in the run-off calculations, as per BS EN 12056-3:2000.

Overflows: A minimum of two roof overflows to be provided to flat roofs with parapets. The capacity of an overflow to not be less than that of an outlet. Overflows to be sufficiently positioned to discharge away from the building to prevent staining of the external fabric. Overflows to be provided and positioned 25mm below door thresholds in accordance with BS 6229:2018.

Rainwater Outlets/Gutters: To be fitted with mechanically fixed leaf guards to prevent blockage.

Rainwater Downpipes: Externally mounted rainwater downpipes to be anti-climb/vandal resistant.

ROOF TYPES

RT-01 | Warm Flat Roof

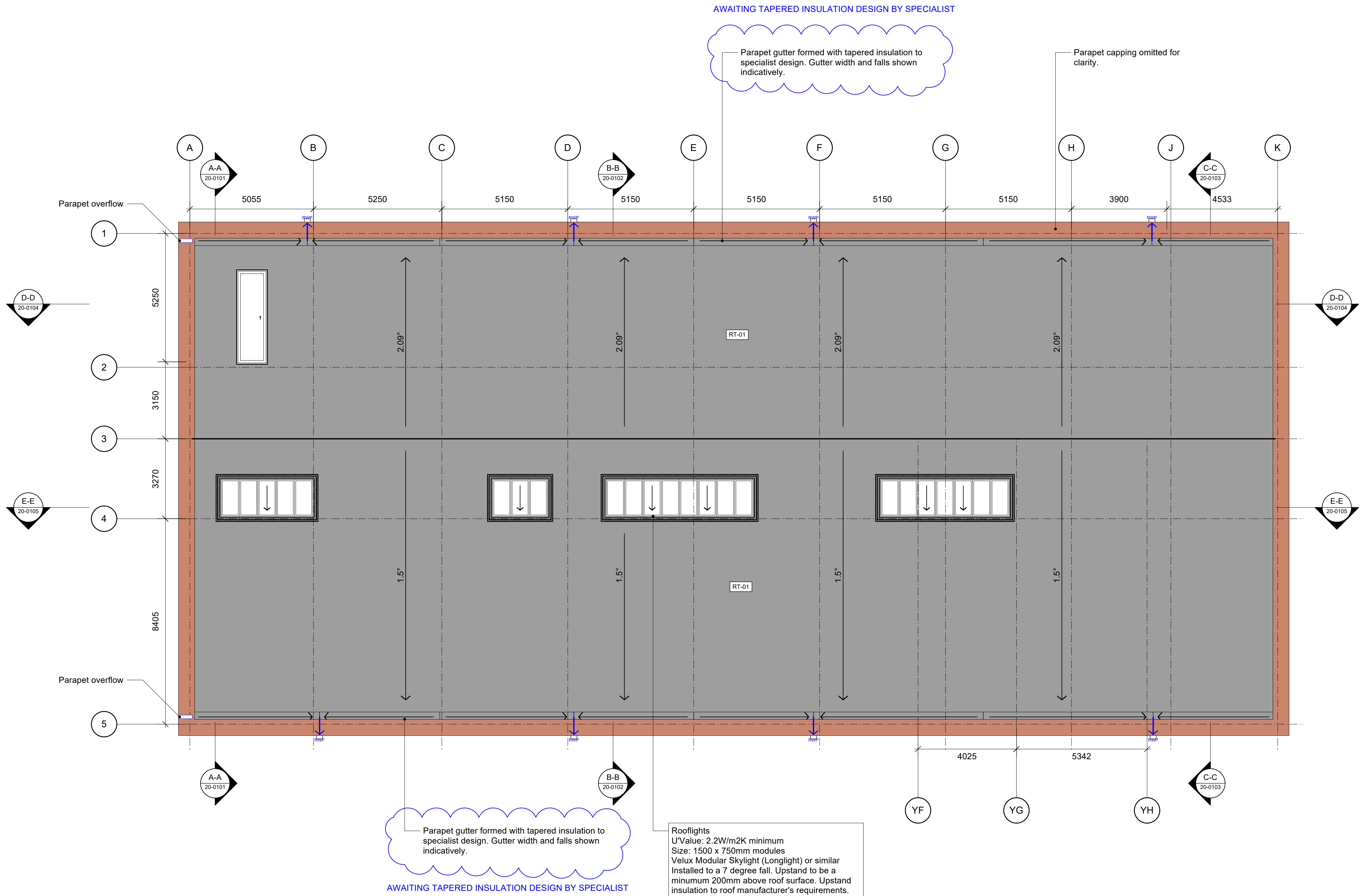
U'Value
Required: 0.10W/m²K

Fire Resistance
Required: REI60 (TBC)

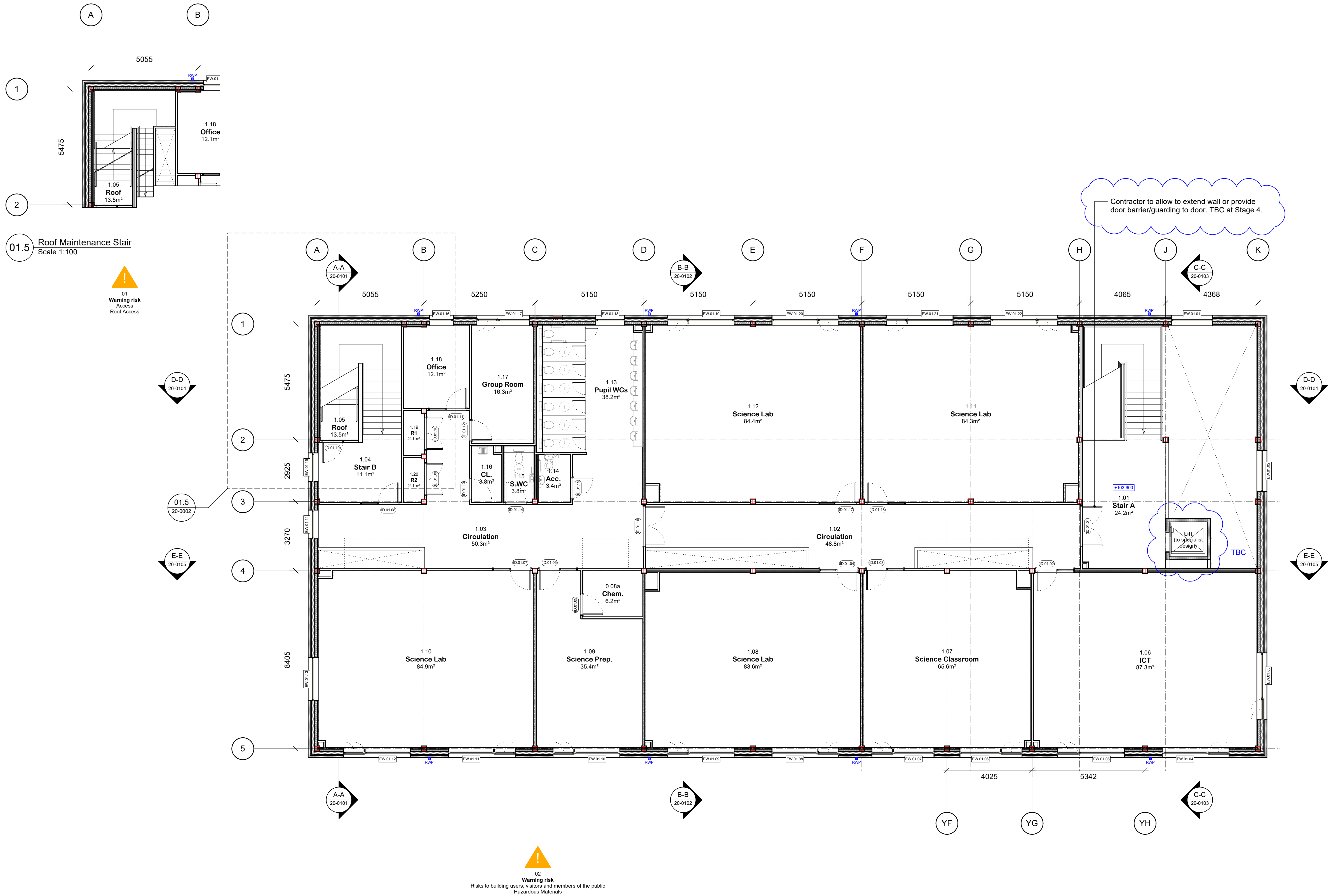
Fire Classification
Required:
- BROOF (H4) to BS EN 13501-5
- Euroclass A2-s1,d0 to BS EN 13501-1

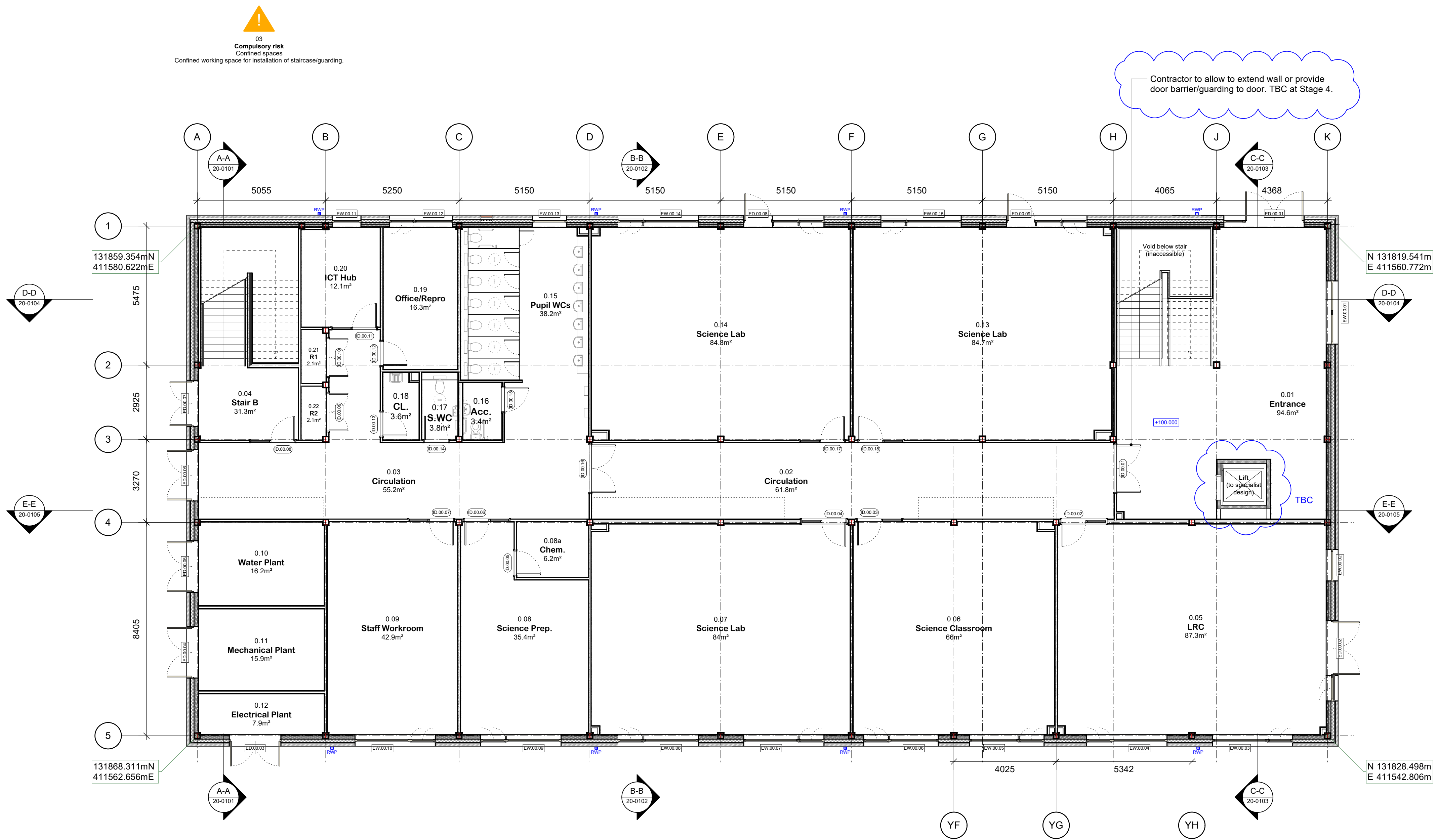
Pitch (Falls formed by structural frame)
- North-West Face: 1.5°
- South-East Face: 2.09°

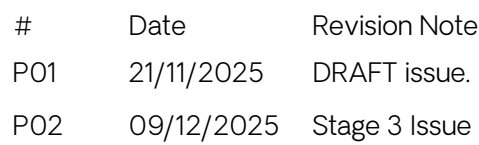
Construction (Outside to Inside)
- Reinforced bitumen roofing membrane
- **Dual density mineral wool insulation (A2-s1,d0)**
- Bituminous vapour control layer
- 40mm screed topping (TBC by S.E)
- 150mm precast hollowcore concrete planks to S.E design and specification
- Primary steel frame to falls to S.E design

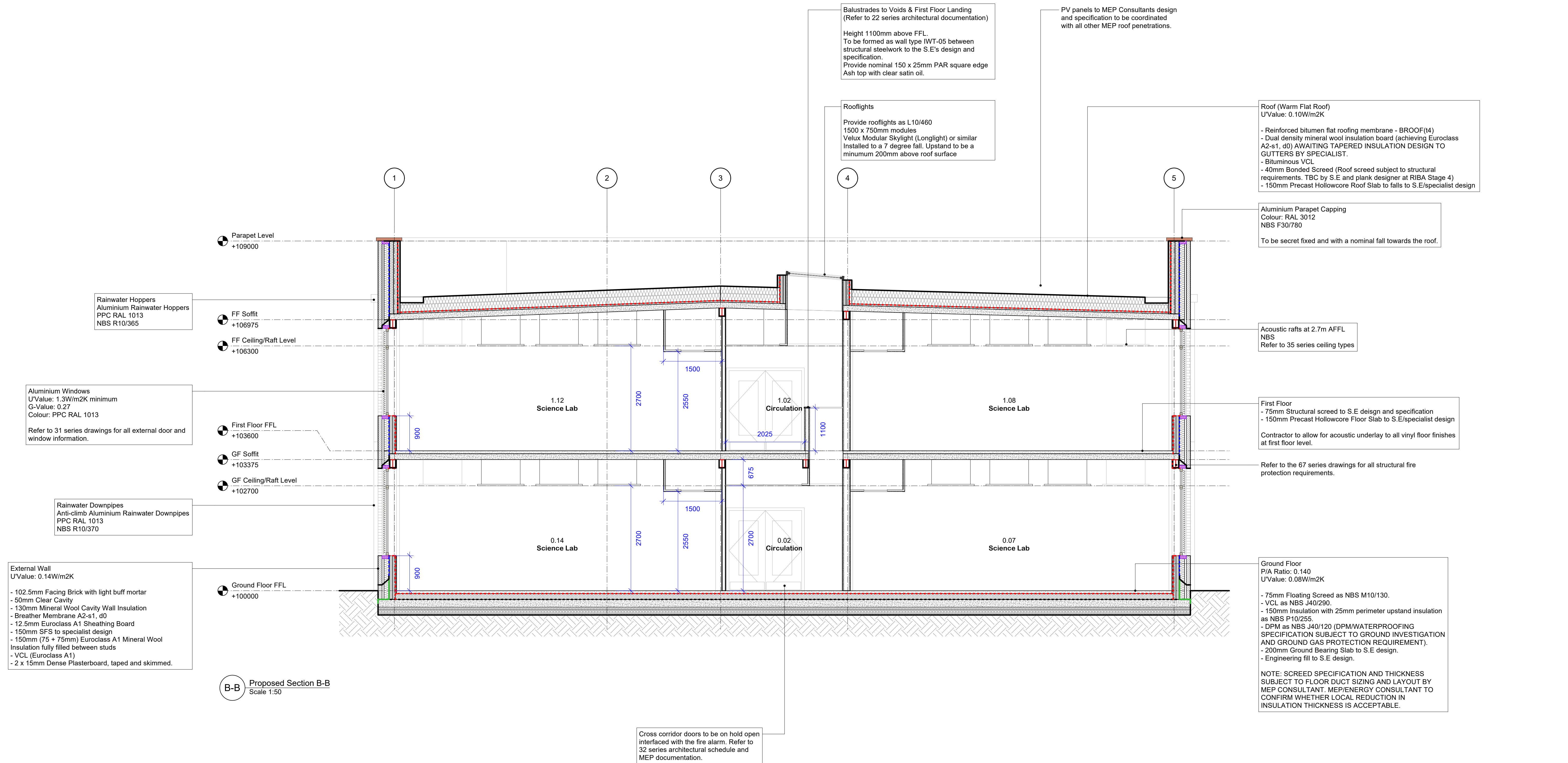


NOT COORDINATED WITH MEP









STAIR C - ROOF ACCESS
UTILITY/MAINTENANCE STAIR

Total Rise: 1150
Goings: 250mm
Risings: 7 @ 164mm
Width between walls/stringers: 1800mm

GENERAL
Precast concrete stair to specialist design.

HANDRAIL
Nominal 50mm diameter mild steel handrail PPC RAL 9005 at 900mm above pitch line.
Handrail to be continuous without doglegs. Handrail to extend 300mm past start and end of stair and turn down. Contractor to fully patress partition walls for handrails.

FINISHES
Refer to 40 series architectural documentation for floor finishes and nosings.

ALL TO SPECIALIST DESIGN. ALL STRUCTURE TO S.E REQUIREMENTS

Roof Access Hatch

Provide roof access hatch as NBS L20/630.
Upstand to be a minimum 200mm above roof surface.

Balustrades to Voids & First Floor Landing
(Refer to 22 series architectural documentation)

Height 1100mm above FFL.
To be formed as wall type IWT-05 between structural steelwork to the S.E's design and specification.
Provide nominal 150 x 25mm PAR square edge Ash top with clear satin oil.

PV panels to MEP Consultants design and specification to be coordinated with all other MEP roof penetrations.

Rooflights

Provide rooflights as L10/460
1500 x 750mm modules
Velux Modular Skylight (Longlight) or similar
Installed to a 7 degree fall. Upstand to be a minimum 200mm above roof surface

Roof (Warm Flat Roof)

U'Value: 0.10W/m2K

- Reinforced bitumen flat roofing membrane - BROOF(4)
- Dual density mineral wool insulation board (achieving Euroclass A2-s1, d0) AWAITING TAPERED INSULATION DESIGN TO GUTTERS BY SPECIALIST.
- Bituminous VCL
- 40mm Bonded Screed (Roof screed subject to structural requirements. TBC by S.E and plank designer at RIBA Stage 4)
- 150mm Precast Hollowcore Roof Slab to falls to S.E/specialist design

Aluminium Parapet Capping
Colour: RAL 3012
NBS F30/780

To be secret fixed and with a nominal fall towards the roof.

Acoustic rafts at 2.7m AFFL
NBS
Refer to 35 series ceiling types

First Floor
- 75mm Structural screed to S.E design and specification
- 150mm Precast Hollowcore Floor Slab to S.E/specialist design

Contractor to allow for acoustic underlay to all vinyl floor finishes at first floor level.

Refer to the 67 series drawings for all structural fire protection requirements.

Ground Floor
P/A Ratio: 0.140
U'Value: 0.08W/m2K

- 75mm Floating Screed as NBS M10/130.
- VCL as NBS J40/290.
- 150mm Insulation with 25mm perimeter upstand insulation as NBS P10/255.
- DPM as NBS J40/120 (DPM/WATERPROOFING SPECIFICATION SUBJECT TO GROUND INVESTIGATION AND GROUND GAS PROTECTION REQUIREMENT).
- 200mm Ground Bearing Slab to S.E design.
- Engineering fill to S.E design.

NOTE: SCREED SPECIFICATION AND THICKNESS SUBJECT TO FLOOR DUCT SIZING AND LAYOUT BY MEP CONSULTANT. MEP/ENERGY CONSULTANT TO CONFIRM WHETHER LOCAL REDUCTION IN INSULATION THICKNESS IS ACCEPTABLE.

MEMBRANE KEY

- Damp Proof Course (DPC)
- Vapour Control Layer (VCL) to provide air seal line
- Breather Membrane
- Damp Proof Membrane (DPM) (to specialist design)
- Bitumen Membrane (to specialist design)
- EPDM
- Below Ground Tanking (to specialist design)
- Below Ground Drainage Protection Layer (to specialist design)

A-A Section A-A
Scale 1:50

STAIR B

Total Rise: 3600mm
Goings: 280mm
Risings: 24 @ 150mm (Flight 1: 12 risers/Flight 2: 12 risers)
Width between walls/stringers: 1800mm

GENERAL
Precast concrete stair to specialist design. Contractor to allow for screeding to mid-landing.

HANDRAIL
Nominal 50mm diameter ash timber handrail at 900mm above pitch line. Handrail to be continuous without doglegs. Handrail to extend 300mm past start and end of stair and turn down. Provide clear satin oil to all handrails. Contractor to fully patress partition walls for handrails.

FINISHES
Refer to 40 series architectural documentation for floor finishes and nosings.

ALL TO SPECIALIST DESIGN. ALL STRUCTURE TO S.E REQUIREMENTS

Cross corridor doors to be on hold open interfaced with the fire alarm. Refer to 32 series architectural schedule and MEP documentation.

External Wall
U'Value: 0.14W/m2K

- 102.5mm Facing Brick with light buff mortar
- 50mm Clear Cavity
- 130mm Mineral Wool Cavity Wall Insulation
- Breather Membrane A2-s1, d0
- 12.5mm Euroclass A1 Sheathing Board
- 150mm SFS to specialist design
- 150mm (75 + 75mm) Euroclass A1 Mineral Wool Insulation fully filled between studs
- VCL (Euroclass A1)
- 2 x 15mm Dense Plasterboard, taped and skimmed.

Rainwater Hoppers
Aluminium Rainwater Hoppers
PPC RAL 1013
NBS R10/365

Rainwater Downpipes
Anti-climb Aluminium Rainwater Downpipes
PPC RAL 1013
NBS R10/370

Parapet Level
+109000

FF Soffit
+106975

FF Ceiling/Raft Level
+106300

First Floor FFL
+103600

GF Soffit
+103375

GF Ceiling/Raft Level
+102700

Ground Floor FFL
+100000

1:50 @ A1

0m 1m 2m 4m 8m

Notes: Unless otherwise stated, this drawing is for information only. Do not scale, unless for planning purposes. Use figured dimensions only. Check all dimensions on site and advise of any discrepancies before commencing work on site. Copyright Footprint Architects Ltd.

#	Date	Revision Note
P01	28/11/2025	DRAFT WIP Issue
P02	09/12/2025	Stage 3 Issue

Sarum Academy Expansion Project | Salisbury

Created: November 2025

Proposed Section A-A

Project Ref: 7410

1:50 @ A1

Drawing No: Project - Origin - Zone - Level - Type - Role - Number

Status:

Rev:

75CC13- FTP - ZA - ZZ - DR - A - 20-0101

S2 - Suitable for Information

P02

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