Protos Carbon Capture Interpretive Report

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[1] Introduction

[1.1] Background Information

Ayesa was commissioned by Encyclis (the Client) to carry out a Supplementary Geotechnical Ground Investigation (GI) to inform the foundation design of a proposed carbon capture facility on a site adjacent to a new Energy Recovery Facility (ERF) facility. The site is to be constructed within the Protos complex, located within the Ince Marshes, Cheshire, CH2 4RB. As part of the investigation, a geo-environmental assessment of the site for the proposed development is also required.

[1.2] Development Proposals

Encyclis have proposed the site is to be developed into a new carbon capture facility including the construction of:

- Booster fans;
- Turbine and compressor halls;
- Offtake pipework routing from Protos ERF;
- Tanks and vessels;
- Steel structure for cooling system;
- Underground electrical cables and services;
- Road alterations;
- Potential drainage and underground service diversions; and
- Infilling of existing ponds.

To plan and progress the proposed development options, Encyclis engaged a team of consultants to provide design, planning and permitting support, with HZI providing the design of the carbon capture facility and associated infrastructure. Ayesa were retained to provide site investigation and environmental support for the project.

To inform the design of the proposed development and environmental studies and to support the future planning and permitting submissions, it is necessary to undertake site investigations to supplement those undertaken previously.

The proposed development layout is presented in **Figure 1.1.**

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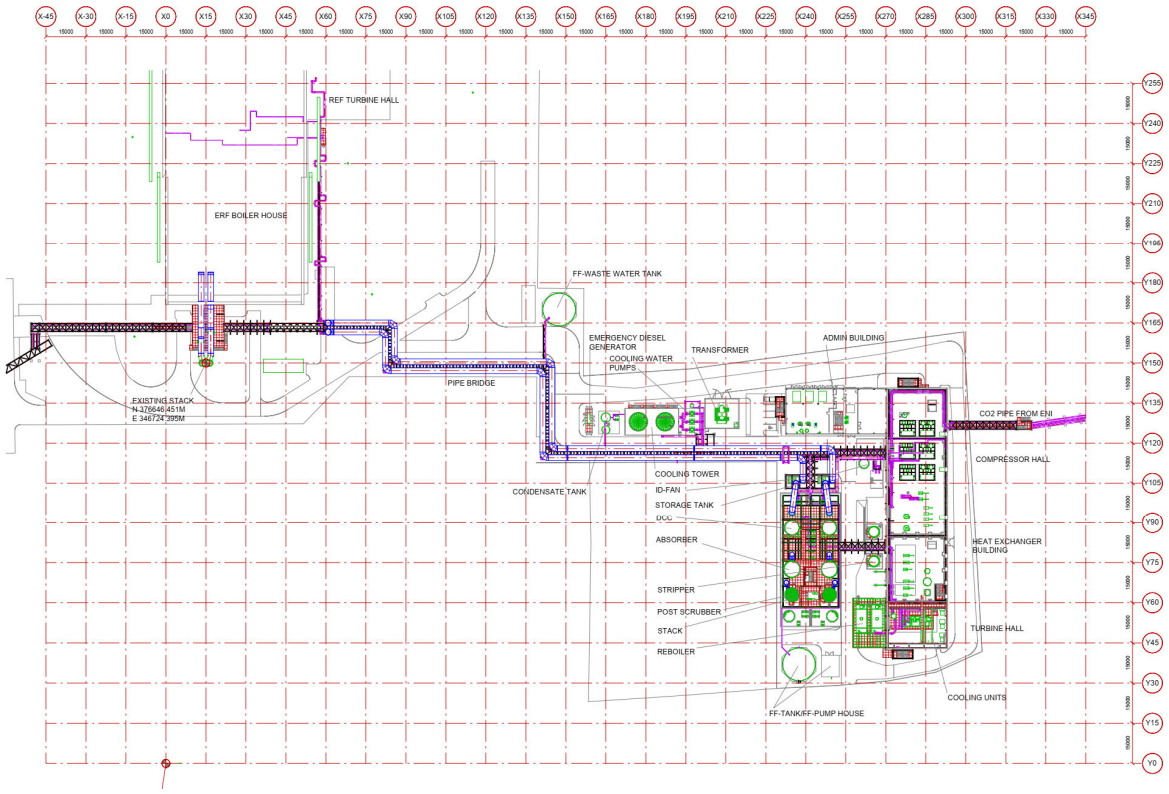


Figure 1.1 – The proposed development layout for the carbon capture facility. Picture sourced from the HZI (drawing ref: LD010/HZI/40419989)

[1.3] Objectives

This purpose of this report is to detail and interpret the geotechnical aspects of the site investigation, alongside assessing any geo-environmental risks posed to construction workers or post development operators.

The geo-environmental purpose of the site investigation was to recover samples of soil from within the exploratory holes, across the site within the Topsoil and shallow natural Tidal Flat Deposits for chemical laboratory testing to inform future environmental risk assessments.

On the other hand, the geotechnical purpose of the site investigation was to inform a preliminary geotechnical study to aid in the foundation design for the carbon capture facility and its associated infrastructure.

This report complies with the relevant principles and requirements of a range of guidance with regards to potentially contaminated land, including but not limited to:

- Part IIA of the Environment Protection Act, 1990;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (HCA, February 2019);
- BS5930:2015: “Code of practice for site investigations”;
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites - Code of Practice”;

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- The Building Regulations 2010. Part C (HM Government 2013);
- Environment Agency Online Guidance (October 2020): Land Contamination Risk Management Land Contamination (LCRM) (which replaced Report CLR11 (2004) Model Procedures for the Management of Land Contamination);
- Environment Agency (2011) Report GPLC1 "Guiding Principles for Land Contamination"; and,
- Environment Agency (2017) "The Environment Agency's Approach to Groundwater Protection" November 2017 Version 1.1.

The scope of any further site investigations will in part depend on the findings of the preliminary site investigations, the requirements of the regulators and the need to further inform the design of the development.

[1.4] Limitations

Whilst every attempt is made to record full details of the strata encountered in the exploratory holes, techniques of exploratory hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

All information given in this report is based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been considered, such as unpredictable soil strata, contaminant concentrations and water conditions between or below exploratory holes. It should be noted that groundwater levels, gas concentrations and gas flows usually vary due to seasonal, atmospheric and/or other effects and may at times differ to those measured during the investigation.

The 'Service Constraints, Report Limitations & Planning Requirements' are presented as **Appendix A**, and a description of Environmental Risk Assessment Methodology and Terminology is presented in **Appendix B**.

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[1.5] Site Location and Description

The site location and extent is as indicated in **Figures 1.2** and **1.3**, respectively, and the site location is summarised in words in **Table 1.1**, followed by a full description of the site and its surroundings.

Table 1.1 Summary of Site Location

Site Location	
Location	The site is located on land of the Ince Marshes, Cheshire within the Protos Development Area, CH2 4RB.
Site Access	The site has a gated entrance off Marsh Lane, accessed within the Protos Development Area. The road is a public lane.
Eastings, Northings	346952, 376643 (SJ 46952 76633).
Postcode	CH2 4RB (nearest).
Site Area	~1.77 ha.
Site Shape	The site is approximately rectangular in shape.
Topography	The site elevation varies from between 3 – 5m AOD with the lagoon bases being approximately 1 – 2m AOD.

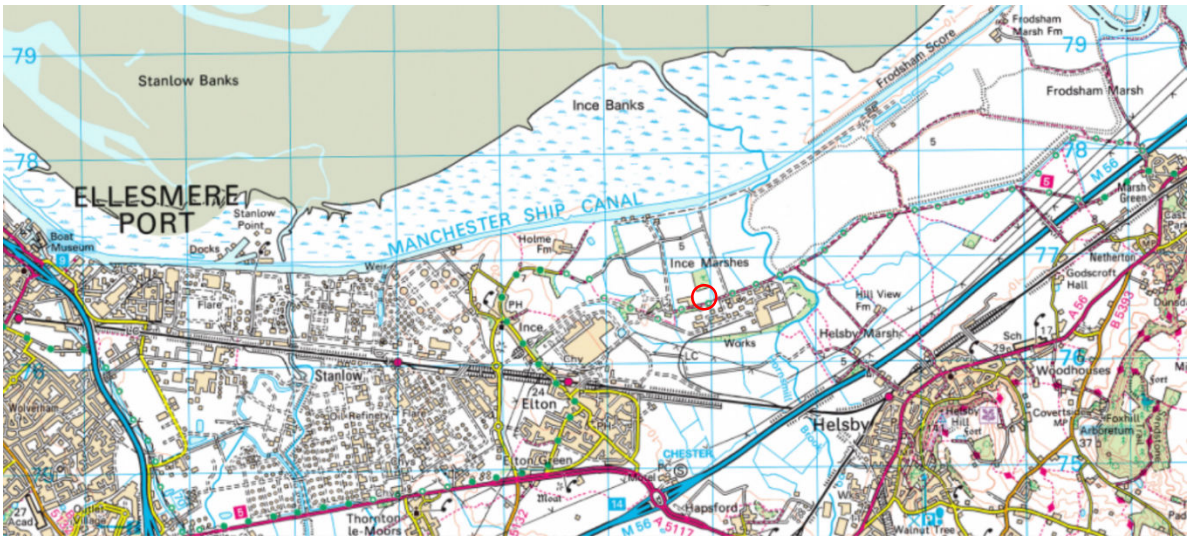


Figure 1.2 - Indicative Site Location (Source: Ordnance Survey) Reproduced from Ordnance Survey 1:50,000 Map with the permission of Ordnance Survey ® on behalf of the Controller of Her Majesty's Stationary Office © Crown copyright (2008) All Rights Reserved Licence number 100035365. Red circle indicates the site location.

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Figure 1.3 – Approximate site boundary. Red line indicates the site boundary. Recreated from Google Earth Pro. Imagery date: 14th March 2022. Lat/long: 53°17'04.25'N, 2°47'49.41'W. Elevation 15m. eye altitude 1.14 km

The site consisted of relatively flat grassy ground with some elevated area within the eastern and northwestern areas. The central portion of the site was dominated by a large attenuation pond associated with the adjacent Energy Recovery Facility, with a small island like strip of land cutting through the middle of the ponds. Tree saplings were located along the southern, eastern and western areas towards the site boundaries.

The site shares a boundary with Ince Park Biomass Plant and Energy Recovery Facility to the west. Boundaries to the site comprise of the Energy Recovery Facility to the west; A small, wooded area to the north; A drainage ditch to the east with agricultural land further beyond that; Another drainage ditch is located immediately south of the site with Marsh Lane situated beyond the southern boundary, with the CF Fertilisers plant situated to the immediate south.

Site elevations are between 3m AOD through the central grassy areas and 4-5m AOD on the embanked areas in the eastern, northwestern and parts of the southern section of the site. The attenuation ponds are roughly 1 – 2m AOD at their base.

[1.6] Site History and Background Information

[1.6.1] Brief Site History

As mentioned in the Protos CC Site Investigation Specification (Report ref: S3753-0030-0006RAR) the site has been previously used as agricultural land and is now referred to as Ecological Area E with attenuation ponds. Whilst assessing Google Earth imagery, the site appears to be an open field from 1945 until 2022 where the attenuation ponds then become visible.

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[1.6.2] Previous Site Investigations

TerraConsult Ltd (now Ayesa) was commissioned by Covanta Energy Ltd (now Encyclis) to carry out a geotechnical and environmental site investigation for an area of land off Marsh Lane, Ince Marshes, Cheshire, adjacent to the Protos Carbon Capture site reported in this investigation (report reference 3951/02, dated September 2018).

The investigation comprised the following:

- 13 No. cable percussive boreholes, drilled to depths between 30 - 40m bgl. Monitoring wells were installed in 6 No. boreholes.
- 9 No. CPTs advanced to 25m.
- 9 No. dynamic sampling borehole, drilled to maximum 5m bgl. Monitoring wells were installed.
- Seismic testing was conducted in a number of the boreholes.
- 10 No. trial pits excavated to depths of between 2.8 and 3.7m bgl with electric and thermal resistivity testing undertaken in each pit.
- 3 No. infiltration (soakaway) tests in accordance with BRE Digest 365 (2016).
- 6 No. in situ plate bearing tests were carried out.

Ground conditions are summarised below:

- Site surface: grass, bare soil and MOT stone yard surfacing (present only in south part of site).
- Topsoil (0.1 to 0.9 m thick).
- Tidal Flat Deposits including peat layers: (9.3 to 14.5 m thick).
- Fluvio Glacial/Outwash Deposits: 1.2 to 7.2 m thick.
- Glacial Till: 21.5 m thick proven.
- Bedrock: Not encountered during investigations.
- Groundwater: Relatively high within 0.15 to 1.7 m of current ground level during August and early September 2018.

[1.6.3] Geology

The British Geological Society (BGS) records indicate the superficial geology comprises Tidal Flat Deposits, overlying Glacial Till. The superficial material is shown to be underlain by the Kinnerton Sandstone Formation.

The ground investigations (listed in Section 1.6) nearby to the site have identified the following strata to be present:

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• Topsoil and made ground;

• Tidal flat deposits, including peat;

• Fluvio glacial deposits;

• Glacial Till; and,

• Sandstone

No assurance is given to the accuracy of this data.

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[2] Site Investigation Scope and Rationale

[2.1] General Observations

The intrusive fieldwork upon which this report is based was carried out between 29th January and 15th February 2024 with three monitoring visits carried out between March 2024 and April 2024. Ayesa personnel were present on site to provide supervision, describe the ground encountered and retrieve soil samples. A services search was carried out prior to the site work and a Cable Avoidance Tool (CAT) and Genny scan performed at the location of each exploratory hole location. Each exploratory hole location was also cleared of utilities by a service clearance survey and the GPS locations were recorded. Fieldwork procedures were undertaken in accordance with the relevant sections of:

- British Drilling Association “Guidance for Safe Intrusive Activities on contaminated or Potentially Contaminated Land” (2008);
- BS5930:2015 "Code of Practice for Site Investigations"; and,
- BS10175:2011 + A2:2017 “Investigation of potentially contaminated sites – Code of practice.”

[2.2] Investigation Scope and Summary

The proposed scope of the investigation consisted of:

- The drilling of 7 No. cable percussive boreholes to a target depth between 30 - 40m bgl (3no. boreholes to be installs for ground gas and groundwater monitoring) to obtain both geotechnical and geochemical data from both the Made Ground and underlying Tidal Flat deposits;
- Perform 7 No. Cone Penetration Tests to a target depth of 40.00 m bgl, to obtain both geotechnical and geochemical data from the underlying strata, along with 2No. Dissipation tests at each location to further understand pore water pressures across the site.
- Perform 7 No. Trial pits with plate load testing within each trial pit at a depth of 1.00m bgl in order to further understand the ground bearing capacity of the shallow topsoil.
- Perform 2 No. infiltration tests (soakaway tests) at two different trial pit locations in order to determine the viability of SUDS.
- Perform 5 No. field permeability tests in the form of falling/rising head tests at 2 varying depths within the boreholes.
- Perform 5 No. soil resistivity tests, using the Wenner 4 Probe method across the sites to aid the principal designer in creating a multi-layer soil resistivity profile using RESAP module of the CDEGS software package.
- 3 No. groundwater and ground gas monitoring visits on completion of the fieldwork.

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Table 2.1 Site Investigation Rationale

Exploratory Holes	Rationale
Cable Percussive Boreholes	7 No. cable percussive boreholes are to be drilled in total, spread evenly across the site. 2 No. boreholes are to be drilled in the eastern area of the site, 2 No. boreholes along the southern portion of the site and 3 No boreholes in the central and northwestern portion of the site. All boreholes are to advance through the natural tidal flat and peat deposits expected within the subsurface. Standard Penetration Tests (SPTs) are to be taken at 1.0 m intervals within the first 10.00m bgl and every 1.50m thereafter. Disturbed, high quality undisturbed and in-situ soil samples will be recovered for future laboratory testing. Soil samples for geochemical testing will also be collected as the borehole advance. 3 No. of the borehole are to be installed, with well screening the underlying peat and tidal flat deposits, to allow for biweekly monitoring visits for groundwater and gas levels. 5 No. variable head tests are to be completed at two varying depths in order to gain knowledge relating to the permeability of the underlying superficial strata.
Cone Penetration Tests using piezocone	CPTs are to be carried out in 7 No. locations to measure the quasi-static penetration of a conical steel tool into the topsoil/made ground, peat and tidal flat deposits, to determine a range of geotechnical parameters. Porewater pressure would also be measured by means of a porous filter connected to a pressure transducer. These will be drilled to maximum depth of 40.00 m bgl, in order to receive data that is in conjunction with the cable percussive boreholes. A magnetometer will be used during the probing works to check for metallic objects (e.g., buried drums and UXO). The locations of the CPT holes have been selected to provide adequate coverage across the site. No samples are due to be collected during the CPT operations.
Trial pitting Plate load testing Soil infiltration testing	7 No. Trial pits are to be completed, spread evenly across the site. The trial pits are to be excavated with a suitably sized excavator in order to reach the target depth of 4.50m bgl. Sampling within the trial pits will be taken every 1 m bgl or with every change of strata for geotechnical testing and every 0.50 m bgl through the made ground and into the natural ground for geochemical testing. 2 No. locations will have soil infiltration testing done within them from a maximum depth of 3.00 m bgl.
Soil resistivity testing	5 No. traverses across the site are to be conducted using the Wenner four probe method for soil resistivity testing. This is to aid in the development of a multi-layer soil resistivity model.

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[2.3] Geochemical Testing Strategy

Samples for geochemical testing and strata description would be taken/made during the excavation of the exploratory holes in general accordance with BS5930:2015, BS10175:2011 and BS EN ISO 22475-1:2006.

The suite of tests would be selected by Ayesa based upon the ground investigation specification provided by Fitchner and from observations noted within logging of the exploratory holes.

The suite of tests were selected by Ayesa based upon the observations noted within logging of the exploratory holes, alongside any suspected visual or olfactory contamination. The testing suite included metals, inorganics, hydrocarbons, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and PCB's.

Soil samples for chemical analysis comprised a plastic tub for metals and inorganics and one amber glass vial and one amber glass jar for organics. The soil samples were stored in a cool box with ice in accordance with the sampling protocols and were collected directly by the testing laboratory (UKAS accredited).

[2.4] Geotechnical Testing Strategy

Samples for geotechnical testing and strata description would be taken/made during the excavation of the exploratory holes in general accordance with BS5930:2015, BS10175:2011 and BS EN ISO 22475-1:2006.

The suite of tests would be selected by Ayesa based upon the observations noted within logging of the exploratory holes, alongside in-situ testing performed and identified data gaps from previous investigations.

Soil samples for geotechnical analysis would incorporate a plastic tub for testing that requires a small amount of material (e.g., Atterberg limits and sedimentation by pipette), 20kg bulk bags for testing that required a large amount of material (e.g., particle size distribution), U100 samples for triaxial shear strength and consolidation testing. All samples were to be taken under supervision of an Ayesa engineer and sent to a UKAS accredited laboratory.

[2.5] Ground Gas and Groundwater Monitoring Strategy

The groundwater monitoring strategy consisted of 3, biweekly visits in order to assess groundwater level changes over an extended period of time at the newly exploratory hole locations. Groundwater levels were to be checked using a dip meter.

It was also considered prudent to measure gas flow and constituent concentrations using a Gas Flow Monitor (GFM) analyser.

Groundwater samples were collected at each of the monitoring visits in order to assess for groundwater contamination across the site. All samples were to be collected using a separate water bailer for each exploratory hole and placed into three 300ml glass jars and two 40ml glass vials and sent directly to i2 Analytical for testing. The testing requirements were outlined in the ground investigation specification supplied by Fitchner and testing requirements consisted of heavy metals, hydrocarbons, inorganics, hardness testing, VOC's and pH levels.

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[3] Fieldwork

[3.1] Intrusive Works

The intrusive fieldwork was carried out between 29th January and 15th February 2024. The scope of the investigation was as follows:

- 7 No. cable percussive boreholes (BH201, BH202, BH203, BH204, BH205, BH206 and BH207) with 4 No. variable head tests taken within two separate depths (BH202, BH204, BH205 and BH206)
- 7 No. Cone Penetration Tests (CPT221, CPT222, CPT223, CPT224, CPT225, CPT226 and CPT227) utilising a piezocone and magnetometer cones.
- 7 No. mechanically excavated trial pits (TP211, TP212, TP213, TP214, TP215, TP216, TP217) with hand shear vane testing and plate load testing at a depth of 1.00m bgl.
- 2 No. infiltration testing within two of the seven trial pit locations (TP213 and TP217).
- Soil resistivity testing using the Wenner 4 probe method.
- Logging of ground conditions encountered in accordance with BS5930:2015 "Code of Practice for Site Investigations";
- Geochemical soil sampling of the Made ground encountered and of the underlying natural strata;
- Geotechnical soil sampling throughout each of the exploratory hole locations to their targeted depths.

Photographs taken at the time of investigation are included in **Appendix C**.

[3.2] Changes to the Proposed Scope of Works

The following changes to the scope of works were necessitated by the ground conditions and other site constraints encountered:

- Three of the proposed locations (BH201, TP211 and CPT221) were abandoned due to site access issues. These were located within the active construction site, adjacent to the site which were related to the ongoing construction of the energy facility. Encyclis advised that it would not be possible to grant access to these locations due to temporary infrastructure blocking the pathway to the locations. Access from the site onto the locations was also deemed unfeasible due to heavy plant being unable to cross the attenuation ponds and up a steep embankment, onto the locations.
- Three of the proposed locations (BH202, TP212 and CPT222) were moved from the northern edge of the site, onto the middle island, due to heavy vegetation deeming it unfeasible to set up on these locations. The heavy vegetation along with a thin access path in close proximity to the attenuation ponds deemed access to these locations unsafe. Additional to this, due to ongoing site conditions, BH205 was abandoned due to safety concerns and blowing sands causing the drillers casing to become jammed

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within the borehole. This location was moved approximately 10m south to the sapling area along the southern portion of the site.

- Variable head testing was completed within four of the proposed five borehole locations due to the uncertainty of changes to the proposed number of exploratory hole locations. By the time the changes had been made, two of the proposed seven boreholes had already been completed, meaning there were only four boreholes remaining to perform variable head testing in, after BH201 had been abandoned.
- The original scope of works requested rotary holes. Based on a review of hiusotical

[3.3] Exploratory Holes

The exploratory holes were logged by an experienced Ayesa engineer in accordance with the recommendations of BS5930:2015 +A1:2020, which incorporates the requirements of BS EN ISO 14688-1, 14688-2:2018 and 14689:2018. Methods of formation and geological descriptions, together with sample records, in-situ test results and observations made during formation of the exploratory hole are given in the logs presented in **Appendix D** and should be read in conjunction with the key included therein.

The positions of the exploratory holes are shown on the Borehole and CPT Location Plan presented as S3753-8600-0001.

A summary of the exploratory holes is listed in **Table 3.1** below:

Table 3.1 A summary of exploratory holes

Location ID	Type	Easting	Northing	National Grid Referencing System	Ground Level (mOD)	Final Depth (mbgl)
BH202	CP	3466905.69	376655.35	OSGB	4.312	30.45
BH203	CP	346974.742	376696.989	OSGB	4.258	40.45
BH204	CP	346992.303	376656.904	OSGB	4.333	40.45
BH205	CP	346957.562	376594.642	OSGB	4.278	25.00
BH205A	CP	346955.33	376579.59	OSGB	5.29	40.50
BH206	CP	346931.707	376643.722	OSGB	4.529	30.45
BH207	CP	347007.157	376599.869	OSGB	4.318	30.45
CPT222	CPT	346905.692	376655.346	OSGB	4.312	19.80
CPT223	CPT	346995.306	376696.366	OSGB	4.316	34.40
CPT224	CPT	347007.486	376632.058	OSGB	4.479	32.50
CPT225	CPT	346954.178	376648.331	OSGB	4.329	36.48
CPT226	CPT	346983.595	376592.746	OSGB	4.339	23.22
CPT227	CPT	346933.921	376582.049	OSGB	4.462	25.62
TP212	TP	346946.90	376646.44	OSGB	4.247	4.00
TP213	TP	346998.292	376704.758	OSGB	4.501	4.00

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TP214	TP	346884.953	376633.00	OSGB	4.352	4.10
TP215	TP	347009.037	376667.835	OSGB	4.496	4.10
TP216	TP	346981.748	376580.878	OSGB	4.315	4.10
TP217	TP	346920.313	376572.732	OSGB	4.477	4.00

[3.4] Monitoring

The monitoring of the wells, installed within the cable percussive boreholes, was carried out by Ayesa personnel. The monitoring was to be undertaken on three occasions between February 2024 and April 2024 of which one has been completed at the time of writing this report. Groundwater levels were checked using a dip meter. The use of disposable bailers were used in order to collect groundwater samples.

All monitoring visits were to comprise of gas flow and constituent measurement using a Gas Flow Monitor (GFM) analyser, however, groundwater levels within the boreholes were at ground level, meaning gas monitoring could not be conducted due to a lack of headspace for gas accumulation, rendering gas analysis inaccurate.

[3.5] In – Situ Testing

A total of 6 No. plate load tests were undertaken at depths of between 0.3m bgl and 0.5m bgl within the trial pits excavated prior to their completion. CBR values were calculated for each test, and the results ranged between 0.2% and 1.4%. Test results sheets are presented in **Appendix E**.

Two infiltration tests, SA01 and SA02, were conducted as part of the fieldwork in locations TP213 and TP217 respectively. Insufficient infiltration was achieved during the first test at both locations, therefore the tests were not repeated at either of these locations, and the data gathered was insufficient to calculate an infiltration rate.

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[4] Laboratory Testing

[4.1] Geotechnical Testing

The testing was scheduled by Ayesa and was carried out by Murray Rix in accordance with BS 1377 (1990), ISRM and BRE SD1 unless otherwise stated. The testing is summarised below and the results are presented in **Appendix G**.

Table 4.1 – Summary of Geotechnical Laboratory Testing

Laboratory Test	Number undertaken	Method	Remarks
Moisture content	38	BS EN ISO 17892-1:2014+A1:2022	
Liquid limit, plastic limit and plasticity index	38	BS EN ISO 17892-12:2018+A2:2022	
Bulk density by linear measurement	7	BS EN ISO 17892-2	
Particle density	9	BS1377-2:2022	
Particle size distribution with sedimentation by pipette	35	BS EN ISO 17892-4:2016	
Dry density/water content relationship 2.5kg rammer	9	BS1377-2:2022	
CBR	5	BS1377-2:2022	
One-dimensional consolidation	16	BS EN ISO 17892-5: 2017	
Quick undrained triaxial (QUT)	15	BS EN ISO 17892-8:2018	
Consolidated undrained triaxial	4	BS1377-8:1990	
BRE pH and Sulphate	12	BRE Special Digest 1	Greenfield site (pyrite present)

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[4.2] Geochemical testing

The geochemical testing was scheduled by Ayesa and was carried out by i2 Analytical in accordance with BS 5930. The scheduled analysis and number of samples tested is summarised in **Table 4.2** The laboratory certificates are presented in **Appendix H.**

Table 4.2. Summary of scheduled geochemical analysis

Analysis	No. of Soil Samples Analysed	No. of Groundwater Samples Analysed
TPH-CWG including Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE)	14	9
VOC/Chlorinated Hydrocarbons	14	9
SVOCs	14	
Metals	14	9
Speciated polycyclic aromatic hydrocarbons (PAHs)	14	9
Phenols	14	9
pH, SO4 / total sulphate, water soluble sulphate, cyanide	14	
Soil Organic Matter (SOM)	14	
Asbestos	14	
WAC	10	
PCB	4	
General Inorganics: pH, Cyanide, SO4, Sulphide, Chloride, AmmN as N, Nitrate as N, Nitrate as NO3, Hardness		9

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[5] Ground Conditions

[5.1] Anticipated Geology

The anticipated geological sequence across the site was as follows:

- Topsoil and Made Ground;
- Tidal flat deposits, including peat;
- Fluvio glacial deposits;
- Glacial Till; and
- Sandstone (Kinnerton Sandstone Formation).

[5.2] Encountered Ground Conditions

The ground conditions encountered during this investigation are summarised in **Table 5.1** and discussed below.

Table 5.1. Summary of Encountered Ground Conditions

Stratum	Location	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven thickness (m)
Topsoil/ Made Ground	BH202 – BH207 TP202 – TP207	0.00	0.15 – 1.20	0.15 – 1.20
Upper Peat (Tidal Flat Deposits)	BH202 – BH207 TP202 - TP207	1.10 – 3.00	3.00 - 5.00	0.50 (BH203)-3.00
Lower Peat (Tidal Flat Deposits)	BH202, BH204, BH205, BH206 and BH207	9.00 – 10.50	10.50 – 12.00	1.00 – 2.00
Upper Tidal Flat Deposits (excluding peat)	BH202 – BH207	0.15 – 3.50 (BH204)	9.00 – 10.50	6.00 – 8.35
Lower Tidal Flat Deposits (excluding peat)	BH202 - BH207	10.50 – 12.00	Base not proven	>30m

[5.3] Topsoil/ Made Ground

Topsoil/ Made Ground was encountered across the site, with every borehole logged by Ayesa having encountered it to some degree. The maximum base of the Topsoil/ Made Ground was found to be 1.20m bgl during this ground investigation.

Table 5.2. A summary of the strata layers encountered within the Topsoil/ Made Ground

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General Description	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven Thickness (m)
Soft to firm brown or grey slightly - very sandy CLAY with occasional rootlets.	0.00	0.15 - 1.20	0.15 – 1.20
Soft – firm brown slightly gravelly silty CLAY with rootlets. Gravel is angular to rounded fine to coarse sandstone and mudstone. (BH205A)	0.00	0.80	0.80
Brown silty clayey fine SAND with occasional rootlets.	0.00	0.30 - 1.00	0.30 - 1.00

[5.4] Peat Deposits

The peat deposits were found across the site and encountered to some degree within every exploratory hole constructed during this investigation. This stratum has been split into two sub strata named the Upper Peat Deposits and Lower Peat Deposits depending on its location within the larger Tidal Flat Deposit strata. The Upper Peat Deposits were encountered either directly below the Topsoil/ Made Ground or below the Upper Tidal Flat Deposits (see Section 5.5.1) absent of peat. A second layer of Peat was found directly below the base of the Upper Tidal Flat Deposits and above the Lower Tidal Flat Deposits (See Section 5.5.2). The Base of the Upper Peat Deposits was proven to be approximately a maximum of 5.00m bgl. The base of the Lower Peat Deposits was proven to be approximately a maximum of 12.00m bgl.

[5.4.1] Upper Peat Deposits

A summary of the Upper Peat Deposits can be found in **Table 5.3.**

Table 5.3. A summary of the Upper Peat Deposits

General Description	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven Thickness (m)
Black plastic pseudo-fibrous PEAT with a mild organic odour	1.20 – 1.65	3.50 – 4.00	2.25 – 2.35
Black plastic fibrous PEAT	2.00 - 3.00	3.50 – 3.90	0.50 – 1.90
Black crumbly pseudo-fibrous PEAT with a strong sulphur odour.	2.00	5.00	2.50 – 2.60

[5.4.2] Lower Peat Deposits

A summary of the Lower Peat Deposits can be found in **Table 5.4.**

Table 5.4. A summary of the Lower Peat Deposits.

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General Description	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven Thickness (m)
Black plastic pseudo-fibrous PEAT	10.00	11.00	1.00
Black silty crumbly amorphous PEAT (BH207)	9.00	10.50	1.50
Black crumbly pseudo-fibrous PEAT	9.40 – 10.50	11.00 - 12.00	1.50 – 2.00

[5.5] Tidal Flat Deposits (absent of peat)

The tidal flat deposits that were absent of peat were observed in every exploratory hole during this investigation. These deposits can be split into two sub-strata named the Upper Tidal Flat deposits (absent of peat) and the Lower Tidal Flat deposits (absent of peat). The Upper Tidal flat deposits (absent of peat) can be found either directly above or below the Upper Peat Deposits and the Lower Tidal Flat deposits (absent of peat) can be found directly below the Lower Peat Deposits except in BH203 where it is found directly below the Upper Tidal Flat Deposits (absent of peat). The base of the Upper Tidal Flat Deposits (absent of peat) has been proven to be approximately a maximum of 10.50m bgl. The base of the Lower Tidal Flat Deposits (absent of peat) has not been proven.

[5.5.1] Upper Tidal Flat Deposits (absent of peat)

A summary of the Upper Tidal Flat deposits (absent of peat) can be found in Table 5.5

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Table 5.5. A summary of the Upper Tidal Flat Deposits (absent of peat)

General Description	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven Thickness (m)
Very soft black or grey slightly sandy or silty CLAY	0.30- 4.50	1.20 – 9.00	0.80 – 5.00
Very soft greyish brown and yellow slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone	1.20	1.65	0.40
Soft to firm grey and black slightly sandy slightly gravelly organic CLAY. Gravel is subrounded fine of sandstone.	1.20	3.00	1.80
Very soft dark grey slightly sandy organic CLAY with a mild - strong sulphur odour.	3.50	5.00	0.50 – 1.50
Very soft grey sandy clayey SILT	0.80 (BH205A) – 6.00	2.40 (BH205A) - 10.50	1.60 - 6.10

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[5.5.2] Lower Tidal Flat Deposits (absent of peat)

A summary of the Lower Tidal Flat Deposits (absent of peat) can be found in **Table 5.6**.

Table 5.6. A Summary of the Lower Tidal Flat Deposits (absent of peat)

General Description	Surface Depth (m bgl)	Proven Base Depth (m bgl)	Proven Thickness (m)
Medium dense grey or brown very silty (shallower) or very clayey (deeper) fine SAND.	10.00 - 36.00	10.50 - >40.45	0.50 - >4.45
Medium dense brown slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and quartz.	10.50 – 29.00	16.00 – >40.45	1.50 – >11.50
Dense brown silty very clayey fine to coarse SAND. With instances of blowing sands	29.00 – 37.00	>40.45	> 11.45
Medium dense brown slightly gravelly silty fine to coarse SAND with low cobble content of subrounded mudstone. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz.	16.00 - 16.50	19.50 - 21.60	3.50 - 5.10
Medium dense dark brown gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz.	16.50	18.00	2.50
Medium dense multicoloured sandy angular to subrounded fine to coarse GRAVEL of mudstone, sandstone, and quartz.	12.00 – 24.00	13.50 – 26.30	1.50 – 2.30
Firm becoming Stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (possible Boulder Clay)	11.50 – 26.30	11.50 – 37.00	>8.85 – 10.70

[5.5.3] Bedrock

Rockhead was not encountered during this investigation. Rockhead is estimated to be at elevations of ~-40m OD based upon the rockhead contour plot on the published 1:50:000 geological map of the site (Sheet 97 – Runcorn [Drift Edition] 1977). The site is located at a point where a north-south trending drift filled channel intersects with the River Mersey.

Instruction was received by Encyclis to attempt deeper drilling. BH204 was already completed prior to receiving this instruction. It was attempted to extend BH205's depth to bedrock. However, this was not possible due to blowing sands and the borehole was terminated.

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[5.6] Groundwater

A summary of the groundwater strikes recorded within the cable percussive drilling are contained within **Table 5.7** below. It is possible that further groundwater strikes were obscured by water added to assist drilling. Groundwater monitoring occurred on three visits, and a summary of the water levels on the third visit (11th April 2024) is presented in **Table 5.8**. **Appendix F** provides full details of the groundwater monitoring disclosed during the monitoring visits.

Table 5.7. A summary of groundwater strikes encountered during cable percussive borehole drilling

Borehole ID	Strike Depth (m bgl)	Depth after 20 mins (m bgl)
BH202	11.00	4.00
BH203	10.00	4.80
BH204	1.20	0.70
	11.00	4.20
BH205	11.00	4.00
	22.50	2.80
BH205A	11.00	4.00
	29.00	12.00
BH206	10.50	4.30
BH207	10.50	4.00

Table 5.8. Groundwater levels on 11th April 2024

Borehole ID	Surface Elevation (mAOD)	Water Depth (m bgl)
BH202	4.312	0.10
BH204	4.258	0.10
BH207	4.318	0.10

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[6] Laboratory Chemical Analysis Summary and Initial Screening

Soil and groundwater samples were submitted to i2 Analytical, a UKAS accredited lab in accordance with ISO17025 and are also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratories carry out Quality Assurance and Quality Control in accordance with BS ISO 17025 and participate in external laboratory comparison and quality control schemes. Details of the accreditation and the methods of analysis are provided on the relevant test reports for the soil and groundwater analysis results, included within **Appendix H**.

[6.1] Soil Analysis Summary

To screen the soils laboratory analysis the *'LQM/CIEH Suitable for Use Levels (S4ULs) for commercial land use at 1% SOM'* were considered most appropriate for assessing the risks to human health at this site based on the current proposed industrial development.

Analysis of 20 no. soil samples selected for testing did not record elevated concentrations of potential contaminants above the adopted screening criteria.

All samples that were tested for VOCs, SVOCs and PCBs showed concentrations below the detection limits, meaning they were not present or present in negligible concentrations. For this reason, SVOCs have not been included on the chemical soil screening sheet, which can be found in **Appendix I**.

Asbestos was not detected within any of the soil samples tested for asbestos during this investigation.

As exceedances of the adopted commercial end-use screening criteria were not detected, remediation of the site soils will not be required for the proposed development. The risk posed to human health is considered to be **low**, with limited mitigation measures required.

[6.2] Groundwater Analysis Summary

Groundwater samples were retrieved from BH202, BH204 and BH207 on three separate monitoring visits (4th and 18th March 2024, and 11th April 2024), and the samples taken were submitted to i2 Analytical laboratory for a suite of analysis, as summarised in **Section 4.2**.

The risks to controlled waters from contaminants on site have been assessed with regard to EA guidance "The Environment Agency's Approach to Groundwater Protection" (2017). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Agency's 'limit' pollution objective. Acceptable Water Quality Targets (WQT) are defined for protection of human health based on Drinking Water Standards (DWS). A summary table of the groundwater results screening is presented in **Appendix J**. At the time of writing, this assessment has been based on the results from the first two rounds of water sampling only, awaiting laboratory results from the final round.

A number of exceedances of the adopted screening values were detected, including one exceedance of arsenic and one of iron at BH202 and BH204 respectively on the first sampling round. Screening values for Chloride and Ammonia (as N) were exceeded at BH202 and BH204 within both sets of samples, while Benzene concentrations detected within the samples

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analysed were all reported as less than 0.003mg/l, below the laboratory limit of detection but above the screening value of 0.001mg/l. This exceedance should be disregarded.

[6.3] Waste Classification

One soil sample from TP216, taken from a depth of 1.20m bgl, was submitted to a UKAS accredited laboratory for Waste Acceptance Criteria (WAC) Analysis as part of this investigation. The analysis results indicated that the sample tested would be suitable for disposal at a non-hazardous landfill.

The above should be seen as a preliminary guide, and defining the class of waste should be carried out on the actual waste being disposed of. The landfilling facility accepting the waste will also have the final decision on acceptability of the waste.

It is recommended that if soils are to be removed from the site, the appointed contractor should commission sampling and analysis of the actual excavated material and provide the intended landfill site with the available chemical data and seek a formal waste characterisation.

[6.4] Risk to Plant Life

Concentrations of the phytotoxic metals have not been found to be in excess of the guideline values for the protection of plants (copper and zinc) as presented in the MAFF document “Code of Good Agricultural Practice for the Protection of Soil” (1998) in either of the Topsoil/ Made Ground or the Tidal Flat Deposits

Given there were no exceedances within any of the phytotoxic metals, the risk to plant life is considered to be **low** and will not require mitigation.

Detriment to plant life is hard to quantify as many of the GACs are based on agricultural crop yields rather than serious harm or death of a species.

The possibility of hazards to local flora and fauna arising from some of the levels of contamination cannot be precluded. Appropriate advice should be sought from the Local Authority Ecological Consultant if the excavated material is to be re-used for landscaping with planting.

[6.5] Water Supply Pipes

Plastic pipe materials are potentially vulnerable to attack from elevated concentrations of hydrocarbon compounds and can potentially lead to contamination of potable water supplies.

Water supply companies require an assessment to be made regarding the potential for attack on pipework as well as the risk to their workers from other contaminants in the ground. UK Water Industry Research (UKWIR) (2011) "*Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites*" (Ref 10/WM/03/21; the ‘UKWIR Guidance’).

The aim of the guidance is to ensure that the correct materials are selected for water pipes and components to be used below ground in brownfield sites to protect the quality of drinking water.

The pipeline materials considered by the guidance are PE, PVC, wrapped steel, wrapped ductile iron or copper pipe and barrier pipe. PE are assessed using threshold concentrations for various chemical groups including VOCs, semi-volatile organic compounds (SVOC),

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mineral oils, aldehydes, ketones etc. Wrapped steel, wrapped ductile iron, and copper pipe are assessed using corrosive properties. The default recommendation for water supply pipes is to use PE with other types of pipework only used if the limits for PE pipes are exceeded. When assessing the ground for water supply pipes the suite of potential contaminants to be tested only needs to be those contaminants that are potentially present on site.

Ayesa has carried out a preliminary screen of the soils data against these guidelines. **Table 6.1** summarises the relevant analytical results compared to pipeline threshold concentrations:

Table 6.1 Summary of the analytical results compared to pipeline threshold concentrations

Test Group	Testing Required	PE Threshold (mg/kg)	Maximum Site Concentrations (mg/kg)	Pass or Fail PE Threshold
Total VOCs	Where Preliminary Risk Assessment (PRA) has identified land potentially affected by contamination	0.5	<0.005	Pass
Total BTEX & MTBE		0.1	<5.0	Pass
Total SVOCs (excluding PAHs and those Substances marked with an *)		2	None detected	Pass
EC5-EC10 aliphatic and aromatic hydrocarbons		2	<0.05	Pass
EC10-EC16 aliphatic and Aromatic hydrocarbons		10	14.2 (BH203 @ 1.50m bgl)	Fail
EC16-EC40 aliphatic and aromatic hydrocarbons		500	89	Pass
Phenols* (from SVOC analysis)		2	<1	Pass
Cresols and chlorinated phenols*(from SVOC analysis)		2	-	Not tested
Ethers *	Only where identified	0.5	-	Not tested
Nitrobenzene *		0.5	-	Not tested
Ketones *		0.5	-	Not tested
Aldehydes *		0.5	-	Not tested
Amines *		0.5	-	Not tested
Corrosive	Conductivity, Redox and pH	See [1]	pH >8: 8.5 (BH203 @ 0.50m bgl) 8.3 (BH204 @ 0.50m bgl) 8.2 (BH205 @ 0.50m bgl) 8.6 (BH207 @ 0.50m bgl)	pH tested Copper pipe Fail

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Test Group	Testing Required	PE Threshold (mg/kg)	Maximum Site Concentrations (mg/kg)	Pass or Fail PE Threshold
			8.3 (BH207 @ 1.50m bgl) 8.2 (TP216 @ 0.10m bgl) 8.4 (TP216 @ 0.30m bgl)	

Notes:

[1] Threshold: For wrapped steel, corrosive if pH<7 and conductivity >400 µS/cm. For wrapped ductile iron corrosive if pH<5, Eh not neutral and conductivity >400 µS/cm. For Copper, corrosive if pH<5 or >8 and Eh positive. For barrier pipe – Pass.

Highlighted where concentrations exceed the threshold for PE.

Where concentrations exceed the threshold for PE then Barrier pipe or Metal Pipe is required.

It is envisaged that water supply pipe will be installed as part of the proposed development.

One exceedance of the threshold values for PE pipes use was detected. This exceedance was of EC10-EC16 aliphatic and aromatic hydrocarbons, in a sample analysed from BH203 at 1.50mbgl. pH values were recorded outside of the acceptable range for copper pipes. Therefore, copper pipes are not considered to be suitable for use at the site. While one exceedance of threshold values for the use of PE pipes was detected, a sample analysed from a shallower depth at the same borehole location did not exceed threshold values. Consideration should be given to the potential depths at which water supply pipes may be installed and in any case, the local water supply company should be consulted for their approval of the proposed water supply pipes to be installed.

[6.6] Assessment for the Protection of Controlled Waters

The risks to controlled waters (River Mersey and primary aquifer [Kinerton Sandstone Formation]) from contaminants on site have been assessed with regard to EA guidance “The Environment Agency’s Approach to Groundwater Protection” (2017). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Agency’s ‘limit’ pollution objective. Acceptable Water Quality Targets (WQT) are defined for protection of human health based on Drinking Water Standards (DWS).

[6.6.1] Risks Presented from Soils

In terms of risks to controlled waters from soils at the site, neither of metals, PAH compounds and heavy end TPH fractions that were encountered above normal natural background levels and at levels representative of ‘typical’ Made Ground. Metals are typically immobile at normal pH and redox conditions and are unlikely to leach from soils into ground/surface waters. Furthermore, PAH compounds and heavy end TPH fractions get strongly adsorbed by organic materials in Made Ground soils or the peat deposits, again making them unlikely to leach.

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Light end TPH factions were recorded at very low (trace) concentrations and VOC compounds were recorded very close to or below Method Detection Limits (MDLs), therefore these are not considered to pose a risk to controlled waters.

[6.6.2] Risks Presented from Groundwater

As discussed in **Section 6.2**, a small number of exceedances of groundwater screening criteria were detected. The minor exceedance of Arsenic and Iron screening values at one location each could be considered negligible. The exceedance of Ammonia and Chloride screening values from groundwater samples at two borehole locations could potentially be as a result of storage of surface water run-off at the site and the surrounding industrial area. Considering the surrounding land use and its commercial nature, it is considered that the risks presented to controlled waters from groundwater at the site are low.

[6.7] Gas Assessment

A preliminary investigation of ground gas conditions was carried out, based upon the monitoring results to date, in order to assess the potential risk of gas ingress to enclosed spaces proposed for the site. The spaces are expected to be occupied, and so the potential risk of flammable conditions were required to be assessed.

Guidance on the assessment of ground gases has been published by CIRIA (Report No. C665, 2007). The document introduces the concept of the Gas Screening Value (GSV) as a means of assessing potential risk.

The Gas Screening Value is calculated directly from borehole monitoring data and is defined as follows:

GSV (l/hr) = Gas well concentration (% v/v) x Gas well flow rate (l/hr)

The concept of the GSV underpins the risk assessment process outlined in CIRIA C665, with a higher GSV indicating a higher degree of risk to an enclosed space receptor. The GSV approach not only considers the hazard associated with the concentration and quantity of gas present, but also the potential for this gas to migrate (i.e. the flow rate from the borehole is indicative of a pressure gradient existing, and a measure of the likelihood of ground gas migration by advective flow). Based on the GSV principle, the CIRIA document contains a risk classification that categorises the level of risk based on the calculated GSV value as presented below.

Table 6.2 Summary of CIRIA C665 Risk Classification Rankings

Characteristic Situation	Risk Classification	GSV (CH4 or CO2) (l/hr)	Additional Factors
1	Very low	<0.07	Typically<1% methane concentration and <5% carbon dioxide concentration (otherwise and increase to CS2)
2	Low	<0.7	Typical measured flow rate <70L/h (otherwise consider an increase to CS3)
3	Moderate	<3.5	
4	Moderate to high	<15	

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5	High	<70
6	Very high	>70

The CIRIA methodology provides a useful means of evaluating the potential risks from methane and carbon dioxide.

At the time of writing, gas monitoring of installed boreholes was not possible due to high groundwater levels encountered at each installation leaving insufficient head space within the standpipe (See **Appendix F**). As a result, calculation of a GSV for the site based on monitoring results was not possible. An alternative assessment of gas risk at the site was conducted in order to determine the Characteristic Situation classification for the underlying Made Ground at the site, using the CL:AIRE research bulletin RB17 (November 2012) “A Pragmatic Approach to Ground Gas Risk Assessment”. This bulletin should be referred to for a full outline of the assessment process.

A comparison of the recorded thickness of the Made Ground on site, and the maximum recorded Total Organic Carbon (TOC) content of the Made Ground soil samples analysed, against the RB17 screening criteria, indicated a conservative **CS2 classification** for the site.

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[7] Geotechnical Assessment

[7.1] Proposed Structures and Anticipated Loads

There is no information available to Ayesa at the time of writing regarding the dimensions or loading of the proposed structures. Any advice regarding foundation options appraisal or indeed with regards any other geotechnical aspects of the proposed development given in this document is based on the Ayesa's experience of working on similar schemes. Therefore, if there are structures with particular loading and/or settlement tolerance conditions other than those widely accepted in the construction industry (i.e. maximum 25mm total and maximum 1v:400h differential settlement criteria), the geotechnical interpretation presented herein may not remain applicable and should be revisited by a suitably qualified geotechnical / foundation design engineer for the particular structures(s).

[7.2] In-Situ and Laboratory Data Review

Details of the in-situ (including resistivity testing) and the laboratory geotechnical tests undertaken are shown on the exploratory hole logs and the test certificates included in **Appendix D and Appendix G**, respectively.

[7.2.1] Topsoil/Made Ground

A thin mantling of topsoil/made ground was present to a maximum thickness of 1.2m across the site comprising a soft sandy clay/clayey sand.

[7.2.2] Tidal Flat Deposits

The Tidal Flat Deposits were varied but have been generalised by the following sequence:

- Upper Tidal Flat Deposits: Very soft organic clays and silts to maximum depths of 10.5m. Peat layers present at ~3.0m and ~10.5m.
- Lower Tidal Flat Deposits: Medium dense becoming dense slightly gravelly sand extending to depths of >~40m bgl. A firm becoming stiff, occasionally slightly gravelly sandy clay was present at depths from ~21.5m - ~26.5m to ~22m – ~37m.

The Upper Tidal Flat Deposits recorded SPT N_{60} values ranging from 1.2 (BH202 at 5.00 m bgl and BH205A at 2.00 m bgl) to 13.2 (BH206 at 10.50m). There was no observed increasing density with depth trend within these deposits of organic clays, silts and peat.

Clays and silts of the Upper Tidal Flat deposits were observed to generally exhibit intermediate to high plasticity with samples from BH205 at 7.0m and BH207 at 5.0m recording very high plasticity. The peat layers recorded extremely high plasticity.

Hand shear vane tests were recorded within cohesive soils within the Upper Tidal Flat Deposits (mainly from the trial pits). These values range from 11 kPa within TP213 at 3.5m bgl to 55 kPa within TP213 at 0.7m bgl. Quick undrained triaxial shear strength tests for the clays and silts recorded shear strengths of 5kPa (BH202 at 2.0m) to 73kPa (BH205A at 6.0m). Shear strength recorded in the peat layers were 25kPa (BH204 at 4.0m) and 144 KPa (BH203 at 9.0m). There is some evidence of an increase in shear strength in the deeper parts of the Upper Tidal Flat Deposits.

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The Lower Tidal Flat Deposits recorded SPT N_{60} values ranging from 6.0 (BH205A at 21.0 m bgl to 60 (refusal) (BH2 at 18.0m & BH2 at 22.0), although the lowest value may have been affected by blowing sand conditions.

There was generally an increase in SPT values with depth within the Lower Tidal Flat deposits, although this is increase is paused within the cohesive layer. To illustrate this characteristic SPT values at 12m bgl is ~15 rising to ~30 at 22m bgl. SPT values within the cohesive soil layer then range fairly widely from 17.6 to 40.8. Then beneath the cohesive layer characteristic SPT values increase again from 31.5 bgl at ~33, rising to ~50 at 40.0m. BH203 does not at first appear to fit this trend at its deeper depths, where SPT values ranged from 11 at 36.00m bgl to 14.3 at 39.00m, but these low values are likely to be as a result of blowing sand conditions and not a true representation of the in-situ density.

Cohesive soils of the Lower Tidal Flat Deposits were generally of intermediate plasticity with three of the thirteen results being of high plasticity.

Hand shear vane tests were recorded within cohesive soils of the Lower Tidal Flat Deposits. These values range from 61 kPa within BH203 at 26.0m bgl to 214 kPa within BH202 at 25.50m & 28.00m bgl. The low shear vane readings from BH204 have been ignored as they were considered unrepresentative. Quick undrained triaxial shear strength tests on the cohesive soils of the Lower Tidal Flat Deposits ranged from 35kPa (BH203 at 30.0m) to 120kPa (BH206 at 22.5m)

[7.2.3] Groundwater

Groundwater was resting at a depth of 0.1m bgl in the monitoring wells installed as part of the investigation, equating to a groundwater elevation of 4.16m - 4.22mOD at the site.

[7.2.4] Standard Penetration Test (SPT) and Plasticity Charts

Figure 7.1 provides a graphical representation of the corrected Standard Penetration Test (SPT) values for the different ground conditions encountered versus depth (m bgl).

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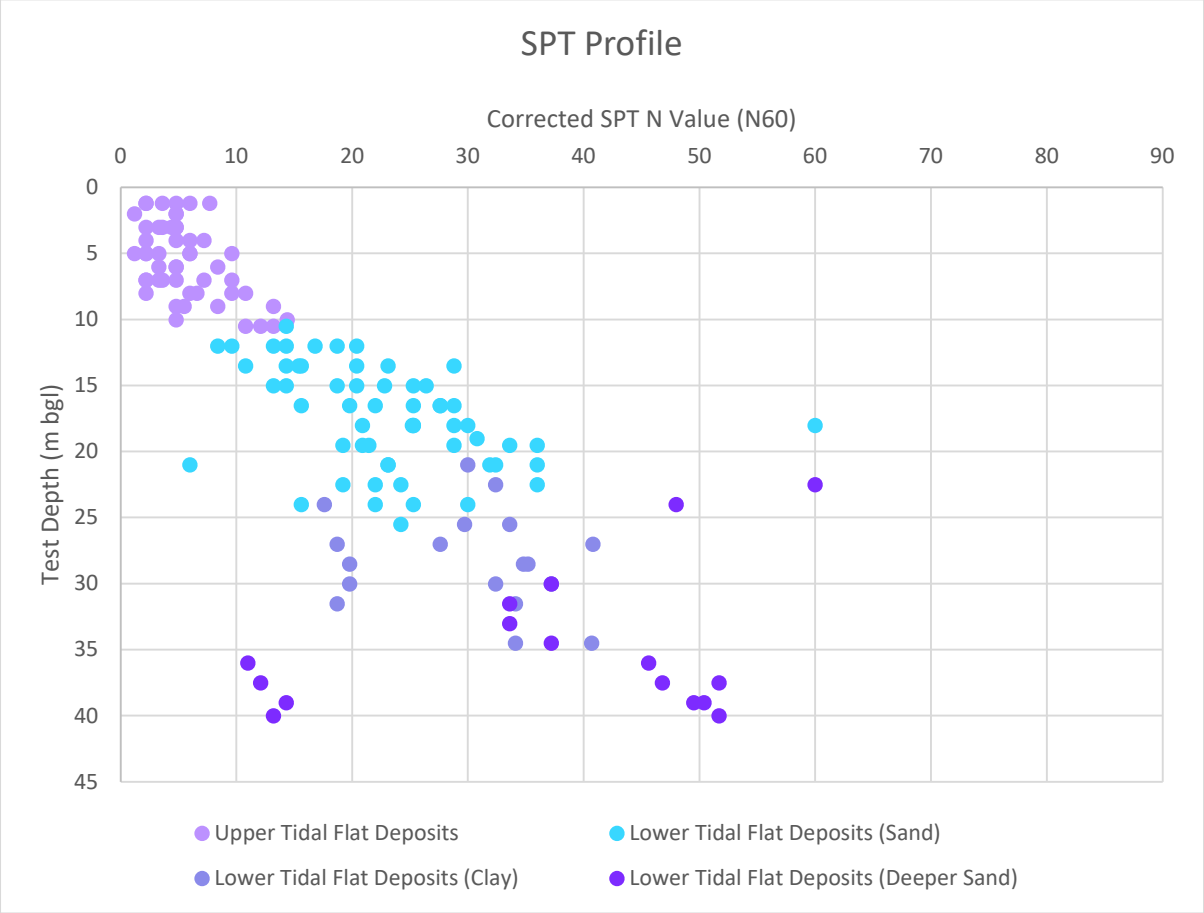


Figure 7.1 SPT Profile with Depth

Figure 7.2 shows the Casagrande plot prepared for the plasticity data for the 37 no. soil samples tested from various depths and exploratory hole locations within the Tidal Flat Deposits.

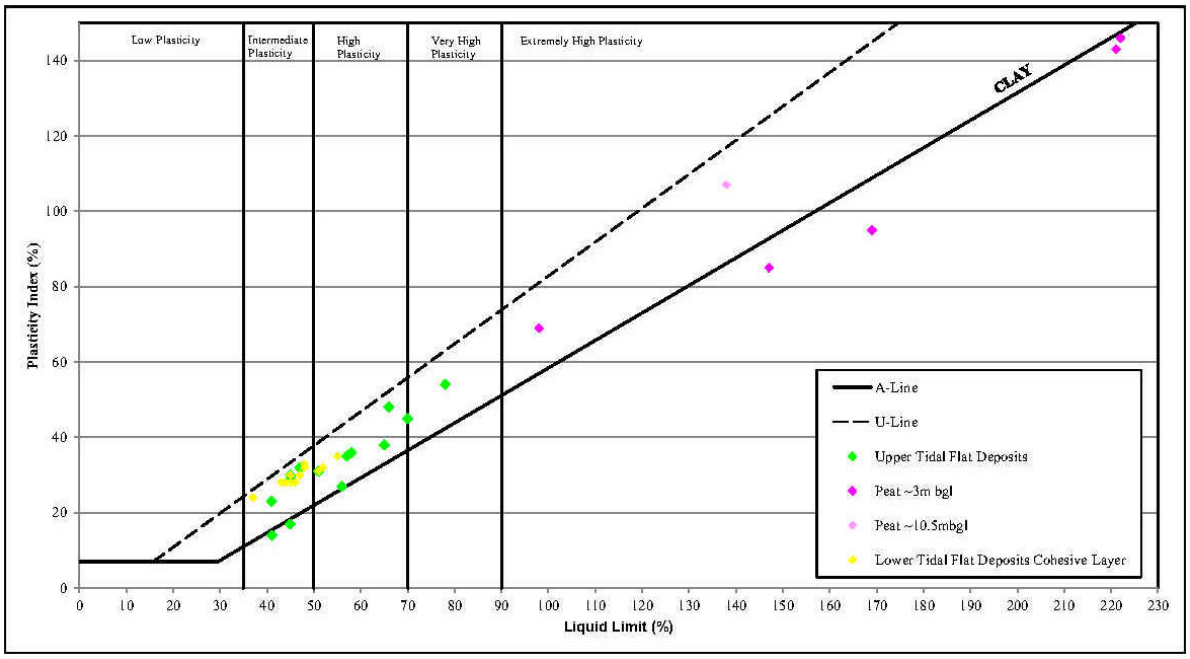


Figure 7.2 Plasticity Chart

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[7.2.5] Summary of Geotechnical Parameters

Considering the assumptions made in the above section, **Table 7.1** to **7.3** contains a summary of characteristic geotechnical parameters for various soils.

Table 7.1 Characteristic Geotechnical Parameters Upper Tidal Flat Deposits

	SPT (N60) (*1) [50no]	Plasticity Index	Undrained Shear Strength (Cu) in kN/m^2 (*2)	Co-efficient of Volume Compressibility m_v (*3)	Bulk Density Mg/m^3 (*4)	Effective Angle of Friction (Φ' °) (*5)	Effective Cohesion (c' kN/m^2) (*5)	Modulus of Elasticity Em (*6)
Minimum	1.2	14/*69*[+]	5/*25*[+]	0.29	0.97	10	0	0.2
Maximum	13.2	54/*146*[+]	73/*144*[+]	5.01	2.24	27	0	7.3
Characteristic Value	5	8/*100*[+]	10/*40*[+]	2.00	1.25	17	0	0.5

[+] *Peat Layers*

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Table 7.2 Characteristic Geotechnical Parameters Lower Tidal Flat Deposits (Granular)

	SPT (N60) (*1) [58no]	Plasticity Index	Undrained Shear Strength (Cu) in kN/m² (*2)	Co-efficient of Volume Compressibility m_v (*3)	Bulk Density Mg/m³ (*4)	Effective Angle of Friction (Φ' °) (*5)	Effective Cohesion (c' kN/m²) (*5)	Modulus of Elasticity Em (*6)
Minimum	6	n/a	n/a	n/a	1.80	30	0	3.6
Maximum	60 (Refusal)	n/a	n/a	n/a	2.10	35	0	36
Characteristic Value	22 at 17m 42 at 35m	n/a	n/a	n/a	2.00	32 at <25m 34 at >25m	0	13 at 17m 25 at 35m

Table 7.3 Characteristic Geotechnical Parameters of the Lower Tidal Flat Deposits (Cohesive)

Parameter	SPT (N60) (*1) [18no]	Plasticity Index	Undrained Shear Strength (Cu) in kN/m² (*2)	Co-efficient of Volume Compressibility m_v (*3)	Bulk Density Mg/m³ (*4)	Effective Angle of Friction (Φ' °) (*5)	Effective Cohesion (c' kN/m²) (*5)	Modulus of Elasticity Em (*6)
Minimum	17	24	35	0.14	1.96	22	0	0.5
Maximum	40	35	214	2.06	2.25	25	0	21
Characteristic Value	27	30	80	0.5	2.20	24	0	8

1* ***SPT Hammer Energy Ratios of 68 and 77 reported.*

2* ***Based on Hand Shear Vane measurements in trial pits, triaxial testing, and as inferred from CPT data.*

3* ***Using a correlation factor = 0.65 based on Plasticity Index – Stroud and Butler (1975), if not directly measured. The unit for this parameter is m^2/MN.*

4* ***Minimum value and maximum value is based on the undisturbed, triaxial and oedometer test result. Where no testing available, it has been estimated based upon established correlations with SPT N values. The unit for this parameter is Mg/m^3.*

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*5 *The Φ' is based on the correlation between the parameter and Plasticity Index (cohesive soils) or the gradings and densities (granular soils) (BS8002:2015). For high plasticity organic clays/Peat 10 has been assumed. Although some consolidated undrained tests were undertaken the results have been interpreted with caution.*

*6 *In granular soils Em = 0.73x SPT N value. In unconsolidated cohesive soils Em = 100x Cu. Also Em =1/mv used if consolidation testing available. The unit for this parameter is MPa.*

[7.2.6] CPT Results

A summary of the CPT results obtained during the site works is displayed in the table below.

Table 7.4 CPT Summary

Location ID	Stroke No.	Final Depth (m)	Primary Refusal Factor	Applied Zero Values	Tip Zero Drift (kPa)	Sleeve Zero Drift (subtraction) kPa	Piezo Zero Drift (kPa)
CPT222	1	19.8	Total reaction force	Pre	22.4	-1.8	2.1
CPT223	1	34.4	Lateral support at depth	Pre	-28.2	1.3	-4.1
CPT224	1	32.5	Total reaction force	Pre	-46.6	2.6	-4.0
CPT225	1	36.48	Tonnage + inclination	Pre	-10.8	1.3	-3.6
CPT226	1	23.22	Total reaction force	Pre	0.00	-0.5	-3.1
CPT227	1	21.28	Acquisition error	Pre	26.8	-2.80	-2.5
CPT227	2	25.62	Toral reaction force	Pre	9.4	-2.70	-3.0

[7.2.7] Electrical Resistivity Testing

Electrical resistivity testing was undertaken across the site in five locations using the Wenner Method. In summary, resistance above 1Ω was generally recorded above 3mbgl with a maximum of around 26Ω in SV05 at 0.5mbgl.

[7.3] Foundation Appraisal

Due to the presence of significant thickness of geotechnically incompetent natural soils with depth (i.e. Tidal Flat Deposits of high organic content and very soft and soft consistencies), adoption of traditional shallow foundations will most likely prove unsuitable, even for the less structurally onerous elements of the proposed development.

Deep (i.e. piled) foundations will provide a technically feasible foundation solution for the proposed development. However, once details of the structural loads and the settlement tolerances are known, the client is encouraged to explore the feasibility of innovative ground improvement measures such as 'Rigid Inclusions' (e.g. Controlled Modulus Columns (CMC) /

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Bi-Modulus Columns (BMC)) for the proposed development as an alternative to piled foundations.

Should a piled solution be preferred, the presence of blowing sands at depth, and the absence of apparent contamination or neighbours sensitive to noise and vibration may favour a displacement (driven) piled solution, which tend to increase the density of granular soils during formation. The structural loads may however dictate that the piles are required to socket into the underlying bedrock. Should this be the case, additional ground investigation will be required to confirm the depth and competency of underlying Kinnerton Sandstone Formation.

It should be noted that in the very soft and soft natural cohesive deposits such as those recorded by Ayesa in the subject site investigation, a decrease in excess pore water pressure as the result of a decrease in groundwater level, caused by a local groundwater abstraction for example, can result in significant consolidation settlement. In other words, in the ground conditions like what has been recorded at the subject site, a structure may not necessarily be subjected to a sizeable structural loads for it to settle beyond the permissible limits.

For the 'external' areas of the proposed development (e.g. roads and vehicular bay / parking areas), where cyclic traffic loads as opposed to significant point loads and/or distributed loads will more likely to be applicable, piled foundations to support the pavement will probably prove costly. Advice from a suitably qualified ground improvement contractor should be sought for a design which is warranted by the contractor and validated independently in this regard. On the grounds of construction cost are similar to piled foundations, ground improvement in external areas via the construction of CMC/BMC may be economically unjustifiable. As an alternative, the client is encouraged to engage the services of a specialist contractor for the design and construction of Mechanically Stabilised Layer (MSL) using geogrids in support of the pavement design. Another alternative in this context will be recourse to chemical stabilisation of the geotechnically poor soils at depth, mindful of the chemical aggressivity to decrease the risk of undue settlement.

Based on our experience of working on similar schemes in challenging ground conditions such as those recorded in the subject investigation, piled foundations are likely to provide a feasible foundation solution. Estimation of pile capacity and settlement of piled foundations are not within the scope of this report. of the detailed structural layout plan nor the estimated structural loads for the proposed development. Nonetheless, based on our experience of working on similar schemes in challenging ground conditions such as those recorded in the subject investigation, piled foundations are likely to provide a feasible foundation solution. Estimation of pile capacity and settlement of piled foundations are not within the scope of this report.

For lightly-loaded structures and where total settlements in the regions of 50 mm may be regarded as tolerable by the structural designer of the scheme, a preliminary design of reinforced pad foundations may be considered using the following 'presumed bearing capacity' values. The concept of presumed bearing values for foundation on soil has been introduced in 'Foundation Design and Construction' by MJ Tomlinson (7th Edition).

[7.4] Earthworks and Compaction

It is not known if bulk earthworks will form part of the scheme, but given the level nature of the site (between 4-4.5m AOD), and the surrounding land, significant cut and fill isn't envisaged. It is also not known if significant excavation for sub-surface features will form part of the scheme that could give rise a surplus of fill materials.

Therefore, the following earthworks section has been kept generic.

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5no. bulk soil samples of Upper Tidal Flat Deposit organic clay underwent California Bearing Ratio (CBR) and compaction testing along with a further 4no. samples that underwent compaction testing alone. The results of the performance testing have been summarised in **Table 7.5**.

Table 7.5 Summary of Laboratory 2.5kg Rammer Performance Testing

Sample ID	Natural Moisture Content	Particle Size Density (PSD) (Mg/m^3)	California Bearing Ratio (%)	Optimum Moisture Content (OMC) (%)	Maximum Dry Density (MDD) (Mg/m^3)
BH206 1.20-1.65m B	60	2.55	0.3	22	1.56
TP212 0.8-1.0m B	43	2.37	0.1	23	1.48
TP213 0.4m B	32	2.59	1.1	21	1.62
TP214 0.4-0.5m B	26	2.58	0.9	21	1.63
TP215 0.3m B	35	2.45	0.5	23	1.50
TP216 0.4-0.8m B	27	2.64	-	15	1.80
TP216 1.3-1.5m B	41	2.68	-	23	1.62
TP217 0.4-0.55m B	30	2.65	-	20	1.67
TP217 0.9-1.2m B	34	2.65	-	19	1.69

In its current state the shallow soils of the Upper Tidal Flat Deposits are unlikely to form a suitable substrate for the formation of earthworks. The soils are recorded to be water logged (generally significantly wetter than optimum), of low strength (as demonstrated by the CBR values generally <1%) and poorly consolidated. The options discussed in section 7.3 to improve these should be followed to allow a working platform to be established as well as to support areas of external hardstanding and the installation of site infrastructure.

Furthermore, it is also considered that the high organic content, high moisture content and high plasticity of these soils, if won through excavation, would render them unsuitable for use in formed earthworks too.

The following general earthworks considerations should be made during the works:

- Materials and plant should not be stockpiled or parked unnecessarily at the top of cuts/excavations.
- Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations, such

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faces shall be benched into the slope by a maximum of 0.5m, immediately before placing the subsequent fill.

- Benches should not be cut unless the fill is ready to be placed and compacted.
- Prior to filling, the formation should be proof rolled and inspected to identify any soft or loose zones. Such zones should be removed and replaced by compacted Class 6F2 granular fill material or appropriately stabilised/reinforced materials as per the agreed design.
- Temporary stockpiles of any material shall not exceed 5.0 m in height and shall have maximum side slopes of 1 in 2.
- If following placement of fill, adverse weather conditions render the upper layer of fill unacceptable, this material shall be removed and replaced with acceptable material.
- Temporary over steepening of fill shall not be permitted, although temporary over widening to achieve adequate compaction at edges is permitted.

A full earthworks strategy and specification should be produced as part of the enabling works to assist in the selection, placement, compaction, stabilisation or reinforcement of fill materials, so that the limiting of the settlement of the external areas/services to tolerable values is achieved as well as to provide an engineered platform for any piling rig which may be required. The earthworks should be supervised and validated by suitably qualified earthworks / geotechnical professionals.

[7.5] Groundwater and Excavations

A number of groundwater strikes were observed during the intrusive works, particularly within granular layers of the Tidal Flat Deposits. During monitoring visits, resting groundwater levels were recorded at shallow depths in the well network, generally within less than 0.5m of ground surface.

To that end it is expected that groundwater will be encountered during earthworks and in excavations at the site. Given the potential for sub-artesian conditions, groundwater inflows could be significant and a scheme to deal with dewatering should be in place. Groundwater inflows will likely cause softening of the ground and require excavation support in order to prevent instability of the sides of excavations and formed slopes at the site.

Excavations through the soils to a depth of about 2.0 m should be stable in the short term (up to 3 to 4 hours). However, it is anticipated that if groundwater bearing strata are encountered at depth, the excavation would gradually collapse through undercutting the overlying clays and leading to instability of the sides of excavations. All excavations should be carried out in accordance with CIRIA Report 97 “Trenching Practice” and BS6031: 2009: Code of Practice for Earthworks. Further guidance on this aspect of site works is given in the British Standards for “Workmanship on Building Sites”, BS 8000, Parts 1 and 14, and in the Construction Industry Training Board’s Site Safety Note 10.

Given the presence of organic soils at shallow depths, monitoring of excavations for toxic, explosive or anoxic conditions should be undertaken as the high groundwater levels have prevented gas monitoring from being undertaken.

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[7.6] Buried Concrete

Laboratory testing for pH, sulphate and total sulphur content testing (BRE pyrite bearing - greenfield suite) has been undertaken on soil and groundwater samples of the Upper and Lower Tidal Flat Deposits (See **Appendices F and G**). Due to the organic nature of the Upper Tidal Flat Deposits, they have been assessed separately.

For the Upper Tidal Flat Deposits, a Design Sulphate Class of DS-5 and ACEC Class AC-5 (for mobile groundwater) would be applicable due to the high concentrations of Total Potential Sulphate in organic soils. However, in accordance with BRE Special Digest 1, 2005 this may be reduced to DS-4/AC-4 as the soluble sulphate and groundwater concentrations were equal to DS-3 or less.

A number of tests were also undertaken on the very shallow (<1.0m) made ground soils and deeper Lower Tidal Flat Deposits. These returned lower concentrations of both Total Potential Sulphate and soluble sulphate and resultantly gave a classification in the order of DS1-2/AC1-2 classifications. However, as it is likely that most below ground concrete would be exposed to the organic Upper Tidal Flat Deposits, as well as these less aggressive soils, the higher classification should be adopted for the site as a precaution.

Any fill material to be imported onto the site should be tested and should not exceed the classifications given above.

[7.7] Drainage

Infiltration testing was attempted in two of the trial pits during the siteworks. No meaningful fall in water levels was observed during the tests. Furthermore, observations of groundwater seepages were also made. This, along with the predominantly cohesive nature of the shallow soils at the site, suggest that infiltration drainage is unlikely to be a suitable option for disposal of surface water.

Alternative drainage options should therefore be considered.

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[8] Conclusions and Recommendations

[8.1] Summary of the Ground Conditions and Groundwater

The site investigation revealed the following general downward succession:

- Topsoil/ Made Ground (Extended to depths up to 1.20m bgl)
- Tidal Flat Deposits (Extending to depths greater than 40.45m bgl)
    - Upper Peat Deposits: (Extending to depth up to 5.00m bgl)
    - Lower Peat Deposits: (Extending to depths up to 12.00m bgl)
    - Upper Tidal Flat Deposits (absent of peat): (Extending to depths up to 10.50m bgl)
    - Lower Tidal Flat Deposits (absent of peat): (Extending to depths greater than 40.45m bgl)

The Topsoil/ Made Ground was typically described as:

- Soft to firm brown or grey slightly - very sandy CLAY with occasional rootlets.
- Brown silty clayey fine SAND with occasional rootlets.

The Tidal Flat Deposits were typically described as:

Upper Peat Deposits:

- Black plastic pseudo-fibrous PEAT with a mild organic odour.
- Black plastic fibrous PEAT.

Lower Peat Deposits:

- Black plastic pseudo-fibrous PEAT.
- Black crumbly pseudo-fibrous PEAT.

Upper Tidal Flat Deposits (absent of peat):

- Very soft black or grey slightly sandy or silty CLAY
- Very soft greyish brown and yellow slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone.
- Very soft grey sandy clayey SILT

Lower Tidal Flat Deposits (absent of peat):

- Medium dense grey or brown very silty (shallower) or very clayey (deeper) fine SAND.
- Medium dense brown slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and quartz.
- Medium dense multicoloured sandy angular to subrounded fine to coarse GRAVEL of mudstone, sandstone, and quartz.

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- Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz.

Groundwater was encountered resting at depths between 0.00 m bgl (at ground level) and 0.15 m bgl on the monitoring visit undertaken on 4th March 2024. Two further monitoring visits were undertaken where groundwater was encountered at depths between 0.10 m bgl and 0.20 m bgl.

Electrical Resistivity testing generally recorded values of over 1Ω in shallow soils above 3mbgl.

[8.2] Laboratory Testing Summary

A total of 20 No. soil samples from locations and varied depths across the site were sent for laboratory geochemical testing. The analysis disclosed no elevated concentrations or exceedances when compared against the commercial end-use human health screening criteria (S4UL), considered most appropriate for the site. Concentrations of VOCs, SVOCs and PCBs within the samples analysed were all below the laboratory detection limits meaning they were not present or were present in negligible concentrations.

No asbestos fibres were found within the samples scheduled for testing. However, as no official asbestos survey has been carried out on the site, the presence of asbestos and asbestos containing materials cannot be completely ruled out.

[8.3] Summary of Ground Gas Risk Assessment

Monitoring of ground gas concentrations was not possible at the site, due to the high groundwater level encountered during monitoring visits. An assessment of gas risk for the site was undertaken using screening criteria as presented in CL:AIRE RB17 (November 2012) “A Pragmatic Approach to Ground Gas Risk Assessment”, whereby the site was given a CS2 classification.

[8.4] Geotechnical Summary

There is no information available to Ayesa at the time of writing regarding the dimensions or loading of the proposed structures.

The Tidal Flat Deposits beneath the site were varied but have been generalised by the following sequence:

- Upper Tidal Flat Deposits: Very soft organic clays and silts of intermediate to high plasticity to maximum depths of 10.5m. Peat layers of extremely high plasticity present at ~3.0m and ~10.5m.
- Lower Tidal Flat Deposits: Medium dense becoming dense slightly gravelly sand extending to depths of >~40m bgl. A firm becoming stiff, occasionally slightly gravelly sandy clay of intermediate was present at depths from ~21.5m - ~26.5m to ~22m – ~37m.

Due to the presence of significant thickness of geotechnically incompetent natural soils with depth (i.e. Tidal Flat Deposits of high organic content and very soft and soft consistencies), adoption of traditional shallow foundations will most likely prove unsuitable, even for the less structurally onerous elements of the proposed development.

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Deep (i.e. piled) foundations will provide a technically feasible foundation solution for the proposed development. However, once details of the structural loads and the settlement tolerances are known, the client is encouraged to explore the feasibility of innovative ground improvement measures such as 'Rigid Inclusions' (e.g. Controlled Modulus Columns (CMC) / Bi-Modulus Columns (BMC)) for the proposed development as an alternative to piled foundations.

In its current state the shallow soils of the Upper Tidal Flat Deposits are unlikely to form a suitable substrate for the formation of earthworks. The soils are recorded to be water logged (generally significantly wetter than optimum), of low strength (as demonstrated by the CBR values generally <1%) and poorly consolidated. The client is encouraged to engage the services of a specialist contractor for the design and construction of Mechanically Stabilised Layer (MSL) using geogrids in support of the pavement design. Another alternative in this context will be recourse to chemical stabilisation of the geotechnically poor soils at depth, mindful of the chemical aggressivity to decrease the risk of undue settlement.

Based on our experience of working on similar schemes in challenging ground conditions such as those recorded in the subject investigation, piled foundations are likely to provide a feasible foundation solution. Estimation of pile capacity and settlement of piled foundations are not within the scope of this report. of the detailed structural layout plan nor the estimated structural loads for the proposed development. Nonetheless, based on our experience of working on similar schemes in challenging ground conditions such as those recorded in the subject investigation, piled foundations are likely to provide a feasible foundation solution. Estimation of pile capacity and settlement of piled foundations are not within the scope of this report.

For lightly-loaded structures and where total settlements in the regions of 50 mm may be regarded as tolerable by the structural designer of the scheme, a preliminary design of reinforced pad foundations may be considered using the following 'presumed bearing capacity' values. The concept of presumed bearing values for foundation on soil has been introduced in 'Foundation Design and Construction' by MJ Tomlinson (7th Edition).

It is expected that groundwater will be encountered during earthworks and in excavations at the site. Given the potential for sub-artesian conditions, groundwater inflows could be significant and a scheme to deal with dewatering should be in place.

For the Upper Tidal Flat Deposits a Design Sulphate Class of DS-5 and ACEC Class AC-5 (for mobile groundwater) would be applicable due to the high concentrations of Total Potential Sulphate in organic soils. However, in accordance with BRE Special Digest 1, 2005 the classification may be reduced to DS-4/AC-4 as the soluble sulphate and groundwater sulphate concentrations were equal to DS-3 or less.

Infiltration drainage is unlikely to be a suitable option for disposal of surface water and therefore alternative drainage options should be considered.

[8.5] Recommendations for Further Works

The structural loads of the proposed structures may dictate that the preferred foundation solution (piles) are required to socket into the underlying bedrock rather than end bear in the dense sands of the Lower Tidal Flat Deposits. Should this be the case, additional ground investigation will be required to confirm the depth and competency of underlying Kinnerton Sandstone Formation.

A full earthworks strategy and specification should be produced as part of the enabling works to assist in the selection, placement, compaction, stabilisation or reinforcement of fill materials,

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so that the limiting of the settlement of the external areas/services to tolerable values is achieved as well as to provide an engineered platform for any piling rig which may be required.

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[9] General Considerations

[9.1] Watching Brief during Earthworks

It is recommended that a watching brief is maintained on site, particularly during the earthworks stage whichever scheme progresses. During any earthworks an appraisal of the exposed soils should be made by a competent person, which as an example could be the site manager, or supervising environmental consultant. These procedures can include the use of personal gas alarms, correctly fitted RPE (with suitable filter) and the use of photo ionisation detectors (PID). Iv Contaminated material is to be found during the earthworks stage, this material should be stockpiled separately and tested prior to its appropriate removal off-site or re-use onsite. If soils suspected of being contaminated are encountered, it is recommended that a contaminated land specialist is consulted. Further details for dealing with unforeseen ground contamination are included in **Appendix K**.

[9.2] Soil Disposal

Should soils be required to be removed from site, the process outlined in the Environment Agency's Technical Guidance Document WM3 '*Waste Classification – Guidance on the Classification and Assessment of Waste'*, 1st Edition v1.2.GB, October 2021 should be followed. Background information and the results of chemical laboratory analysis within this assessment may be used as part of an initial characterisation to determine the likely waste classification of waste soils. For any soils intended for off-site landfill disposal, it may be required to carry out Waste Acceptance Criteria (WAC) analysis.

[9.3] Statuary Authority Consultation

Should any future planning conditions require, it is recommended that this report is sent to the statutory authorities including the Local Authority Environmental Health and Planning Departments prior to development of the site commencing to seek their comments. Where necessary, they will consult the Environment Agency or other relevant statutory authorities. The Environment Agency would be required to be consulted with any change to the permitting status of the site in any case. If remediation works are required, a remediation/earthworks strategy and verification report should be submitted to the relevant authorities for approval.

[9.4] Health and Safety

As outlined within the HSE publication "Successful Health and Safety Management – HSG65" this report should inform your development of safe systems of work and the information used as an input to the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2015.

Ground workers must ensure dust is kept to a minimum and wear PPE including disposable overalls and gloves and employ basic hygiene such as regular hand washing and no eating onsite.

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[11] Licences

1. British Geological Survey Reproduction Licence Number: IPR/187-68CF CO8/053-CSL

2. Ordnance Survey Reproduction Licence Number. 100035365

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[12] Drawings

- K0525.1.002 Exploratory Hole Location Plan

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A3

BH203
TP213
CPT223
SV3
CPT222
BH204
TP215
SV2
CPT225
SV4
BH202
TP214
BH206
TP212
CPT224
SV1
BH205
CPT226
SV5
CPT227
BH207
TP216
TP217
BH205A
Ince Biopower[3]
CF Fertilisers[4]
Marsh Lane[5]
Proposed Ecological Management Are
Proposed Protos
Proposed Protos Carbon Capture Facility

GENERAL NOTES

KEY

1. DO NOT SCALE
2. ALL MEASUREMENTS ARE IN mm
3. ALL CO-ORDINATES ARE TO THE LOCAL GRID AND ALL LEVELS ARE IN METRES ABOVE DATUM.
4. ANY ANOMALIES ON THIS DRAWING SHOULD BE BROUGHT TO THE ATTENTION OF AYESA

LEGEND

- SITE BOUNDARY
- BH203 — BOREHOLE MARKER
- CPT223 — CABLE PERCUSSION TEST MARKER
- TP214 — TRIAL PIT MARKER

Rev	Date	Description	By	Chk	App

ayesa

CLIENT
ENCYCLIS

PROJECT
PROTOS CARBON CAPTURE SITE

DRAWING TITLE
BOREHOLE LOCATION PLAN

STATUS				SUITABILITY
FINAL				–
Date: 08/04/24	Scale: 1:1000	Drawn: JM	Chk: PP	App: GH
Project No: K0525	Drg. No: K0525.1.002			Rev: –

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Appendix A – Service Constraints Report Limitations & Planning Requirements

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Service Constraints, Report Limitations & Planning Requirements

This consultancy contract, report, and the site investigation (together comprise the "Services") were compiled and carried out by ByrneLooby Partners UK Limited (ByrneLooby) for the client named at the front of the report (the "client") on the basis of a defined programme and scope of works and the terms of a contract between ByrneLooby and the "client." The Services were performed by ByrneLooby with all reasonable skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by ByrneLooby taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between ByrneLooby and the client. ByrneLooby Partners UK Limited cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered out with the agreed scope of works.

Other than that, expressly contained in the above paragraph, ByrneLooby provides no other representation or warranty whether express or implied, is made in relation to the Services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of ByrneLooby. If a third party relies on this report, it does so wholly at its own and sole risk and ByrneLooby disclaims any liability to such parties.

It is ByrneLooby's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without ByrneLooby's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of ByrneLooby Partners UK Limited.

The report has been prepared at the date shown on the front page and should be read in light of any subsequent changes in legislation, statutory requirements, and industry practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of ByrneLooby. In the absence of such written advice of ByrneLooby, reliance on the report in the future shall be at the client's own and sole risk. Should ByrneLooby be requested to review the report in the future, ByrneLooby shall be entitled to additional payment at the then existing rate, or such other terms as may be agreed between ByrneLooby and the client.

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The observations and conclusions described in this report are based solely upon the Services that were provided pursuant to the agreement between the client and ByrneLooby. ByrneLooby has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. ByrneLooby is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, ByrneLooby did not seek to evaluate the presence on or off the site of electromagnetic fields or materials in buildings (i.e., materials inside or as part of the building fabric) such as asbestos, lead paint, radioactive or hazardous materials.

The Services are based upon ByrneLooby's observations of existing physical conditions at the site gained from a walkover survey of the site together with ByrneLooby's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst ByrneLooby Partners UK Limited have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. Further ByrneLooby was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. ByrneLooby is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to ByrneLooby and including the doing of any independent investigation of the information provided to ByrneLooby save as otherwise provided in the terms of the contract between the client and ByrneLooby.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and ByrneLooby based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.

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Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation, and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A2 2017. For the geotechnical aspects of the report, the general requirements of Eurocode 7 (BS EN 1997-2:2007) are to produce a Ground Investigation Report (GIR) which shall form part of the Geotechnical Design Report (GDR). The geotechnical section of this report is intended to fulfil the general requirements of the GIR as outlined in BS EN 1997-2, Section 6. The GIR contains the factual information including geological features and relevant data, and a geotechnical evaluation of the information stating the assumptions made in the interpretation of the test results. This report shall not be considered as being a GDR.

Planning Requirements

The National Planning Policy Framework (NPPF, 2019) emphasises the presumption in favour of sustainable development. Paragraph 11, which defines the presumption in favour of sustainable development, has two similar clauses which related to potentially contaminated land and sensitive receptors:

> *11) Plans and decisions should apply a presumption in favour of sustainable development.*
>
> *For **plan-making** this means that:*
>
> *b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas, unless:*
>
> *i) the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type or distribution of development in the plan area;*
>
> *For **decision-taking** this means:*
>
> *d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
>
> *ii) the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed*

In accordance with the NPPF, areas or assets of particular importance are defined as:

> *Habitats sites (and those sites listed in paragraph 176 – potential Special Protection Areas and Possible Areas of Conservation; listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on habitats*

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sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets (and other heritage assets of archaeological interest referred to in footnote 63 (Non-designated heritage assets of archaeological interest, which are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.); and areas at risk of flooding or coastal change.

Paragraph 118 states that planning policies and decisions should:

- *give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;*

Paragraph 170 clarifies that enhancing the natural environment includes:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

Paragraph 180 of NPPF states that planning policies and decisions should ensure the following:

- *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*

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Paragraph 178 of NPPF states that planning policies and decisions for developments should also ensure that:

a) *a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);*

b) *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*

c) *adequate site investigation information, prepared by a competent person, is available to inform these assessments.*

Paragraph 179 states that where a site is affected by contamination or land stability issues, responsibility for securing a safe development rest with the developer and/or landowner.

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

Unexploded Ordnance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA Report C681 (Stone et al 2009). A non-UXO specialist screening exercise has been carried out for the site by considering any evidence of UK defence activities on or near the site evident from the gathered desk study information and the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experience in the desk study, field investigation and clearance of UXO/UXB.

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Appendix B – Environmental Risk Assessment Methodology & Terminology

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Environmental Risk Assessment Methodology & Terminology

Legislation Overview

This report includes hazard identification and environmental risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. The contaminated land regime is the statutory regime for remediation of contaminated land that causes an unacceptable level of risk and is set out in Part 2A of the Environmental Protection Act 1990 ("EPA 1990"). The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health, or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any 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."

In order to assist in establishing if there is a "significant possibility of significant harm" there must be a "contaminant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of contaminant-pathway-receptor is termed a "contaminant linkage or CPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations. Key implementing legislation of the Part 2A regime includes the Contaminated Land (England) Regulations 2006 (SI 2006/1380) as amended by the overarching legislation for the contaminated land regime, which implements the provisions of Part IIA of the Environmental Protection Act 1990 (as inserted by section 57 of the Environment Act 1995), came into force on 14th July 2000 together with recent amended regulations: Contaminated Land (England) (Amendment) Regulations 2012 (SI 2012/263). Revised Contaminated Land Statutory Guidance was published by DEFRA in April 2012. Part IIA defines the duties of Local Authorities in dealing with it. Part IIA places contaminated land responsibility as a part of planning and redevelopment process rather than Local Authority direct action except in situations of very high pollution risk.

In the planning process guidance is provided by National Planning Policy Framework (NPPF) of July 2018 which requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. In practice, Planning Authorities require sites being developed to have a lower level of risk post development than the higher level of risk that is required in order to determine a site as being contaminated in accordance with Part IIA. This is to ensure that there is a suitable zone of safety below the level for Part IIA determination

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and prevent recently developed sites becoming reclassified as contaminated land if there are future legislative or technical changes (e.g., a substance is subsequently found to be more toxic than previously assessed this increases its hazard).

The criteria for assessing concentrations of contaminants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

a) to identify and remove unacceptable risks to human health and the environment;

b) to seek to bring damaged land back into beneficial use;

c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to risk management and remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise ("remediating" the land); the contaminated land regime provides the regulatory mechanisms to achieve this;

b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of contaminants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the use that the site has and will have in the future.

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Overall Methodology

The work presented in this report has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the EA online guidance: Land Contamination: Risk Management (LCRM) (Environment Agency, 2020), and BS10175:2011+A2 2017. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

The first stage of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011), often referred to as the Phase 1 Study, comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed which identifies potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of potential contaminant linkages (of contaminant source-pathway-receptor). Potential contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The scope of the Ground Investigation is based on the findings of the Preliminary Risk Assessment and is designed to reduce uncertainty in the geotechnical and geo-environmental hazard identification. The Ground Investigation comprises fieldwork, laboratory testing and usually also on-site monitoring. The Ground Investigation may include the Exploratory, Main and Supplementary Investigations described in BS 10175:2011+A2 2017. The results of the Ground Investigation reduces uncertainty in the geotechnical and geo-environmental risks. Depending on the findings more detailed investigations or assessments may be required.

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Preliminary Risk Assessment

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

> "(a) The probability, or frequency, or occurrence of a defined hazard; and
>
> (b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment Transport and the Regions (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection" (also called Greenleaves II). This established an iterative, systematic staged process which comprises:

a) Hazard identification;
b) Hazard assessment;
c) Risk estimation;
d) Risk evaluation;
e) Risk assessment;

At each stage during the development process, the above steps are repeated as more detailed information becomes available for the site.

For an environmental risk to be present, all three of the following elements must be present:

- Source/Contaminant: hazardous substance that has the potential to cause adverse impacts;
- Receptor: target that may be affected by contamination: examples include human occupants/users of site, water resources (rivers or groundwater), or structures;
- Pathway: a viable route whereby a hazardous substance may come into contact with the receptor.

The absence of one or more of each component (contaminant, pathway, receptor) would prevent a contaminant linkage being established and there would be no significant environmental risk.

The identification of potential contaminant linkages is based on a Conceptual Model of the site, which is subject to continual refinement as additional data becomes available. As part of a Preliminary Risk Assessment (Desk Study and site walk over) a Preliminary Conceptual Site Model (PCSM) is formed. Based on the PCSM, potential contaminant linkages can be assessed. If the PCSM and hazard assessment indicate that a contaminant linkage is not of significance then no further assessment or action is required for this linkage. For each significant and potential linkage, a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the Conceptual Site Model and assess the level of risk from each contaminant linkage.

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Definition of Risk Assessment Terminology

CIRIA Report C552, Contaminated Land Risk Assessment A Guide to Good Practice, 2001 sets out a methodology for estimating risk. The methodology for risk evaluation is a qualitative method for interpreting the output for the risk estimation stage of the assessment. It involves the classification of the:

- Magnitude of the potential consequence (severity) of risk occurring.
- Magnitude of the probability (likelihood) of the risk occurring.

The classification of consequence and probability are set out in table B1 and B2 below:

Table B1 Classification of Consequence

Classification	Definition	Examples
Severe (Sv)	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment protection Act 1990, Part IIA. Short term risk of pollution of controlled waters. Catastrophic damage to buildings / property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem	High concentrations of cyanide on the surface of an informal recreation area Major spillage of contaminants from site into controlled water. Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied.)
Medium (Md)	Chronic damage to Human Health ("significant harm"). Pollution of controlled waters. A significant change in a particular ecosystem, organism forming part such ecosystem.	Concentrations of contaminants from site exceeding generic or site-specific screening criteria. Leaching of contaminants into a major or minor aquifer. Death of species within a designated nature reserve.
Mild (Mi)	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures, and services. Damage to sensitive buildings / structures / services or the environment.	Pollution of non-classified groundwater. Damage to building, rendering it unsafe to occupy (e.g., foundation damage resulting in instability)
Minor (Mr)	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by measures such as protective clothing etc). Easily repairable effects of damage to buildings, structures, and services.	The presence of contaminants at such concentrations that protective equipment is required during site work. The loss of plants in a landscaping scheme. Discolouration of concrete.

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The classification of consequence does not take into account the probability of the consequence being realised. Therefore there may be more than one consequence for a particular pollutant linkage. Both a severe and medium classification can result in death. Severe relates to short term (acute) risk while medium relates to long term (chronic) risk. Mild relates to significant harm but to less sensitive receptors. Minor classification relates to harm which is not significant but could have a financial cost.

Table B2 Classification of Probability

Classification	Definition
High likelihood (Hi)	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable in the long term, or there is evidence at the receptor or harm or pollution.
Likely (Li)	There is a pollutant linkage, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood (Lw)	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the short term.
Unlikely (Ul)	There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

The classification gives a guide as to the severity and consequence of identified risk when compared with other risk presented on the site. It should be noted that if a risk is identified it cannot be classified as “no risk” but as “very low risk”. Differing stakeholders may have a different view on the acceptability of a risk.

Once the consequence and probability have been classified these can be compared using a matrix (**Table B3**) to identify an overall risk category. These categories and the actions required are categorised in **Table B4.**

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Table B3 Risk Evaluation Matrix

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High likelihood (Hi)	Very High Risk (VH)	High Risk (H)	Moderate Risk (M)	Mod/Low Risk (M/L)
	Likely (Li)	High Risk (H)	Moderate Risk (M)	Mod/Low Risk (M/L)	Low Risk (L)
	Low likelihood (Lw)	Moderate Risk (M)	Mod/Low Risk (M/L)	Low Risk (L)	Very Low Risk (VL)
	Unlikely (Ul)	Mod/Low Risk (M/L)	Low Risk (L)	Very Low Risk (VL)	Very Low Risk (VL)

Table B4 Risk Categorisations

Very High Risk (VH)	**There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.**
High Risk (H)	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer-term.
Moderate Risk (M)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low Risk (L)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk (VL)	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

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Generic Qiantitative Risk Assessment

In the following sections the current UK guidance on risks to the following receptors are discussed: human health, plant life and controlled waters

Human Health

The overall methodology for assessing the risk to human health from potential contaminants in soil is set out in the Environment Agency's guidance "Using Soil Guideline Values" SC050021/SGV Introduction, March 2009 and using the CLEA 1.06 model software (and CLEA 1.071 for nickel). The generic assessment criteria are in accordance with the following:

- Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil;
- Science Report SC050021/SR3: Updated technical background to the CLEA model;
- Science Report SC050021/SR4: CLEA Software (Version 1.071, 2014) & Handbook;
- Toxicological reports and SGV technical notes;
- Toxicological data published by LQM/CIEH (2009) and CL:AIRE/EIC/AGS (2009);
- DEFRA Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 (December 2013);
- LQM/CIEH Suitable 4 Use Levels (S4ULs) for Human Health Risk Assessment; and,
- Toxicology review published by the European Food Safety Authority for nickel (2015).

In March 2014 six 'proposed' Category 4 Screening Levels (pC4SL) were issued by Defra. These screening values are considered to be within Category 4 as defined in the Contaminated Land Statutory Guidance and indicate safe levels for new developments passing through the planning system. The SGV for lead has been withdrawn, and the pC4SL for lead has been derived using current best practice. In January 2015 LQM/CIEH published S4ULs for 89 contaminants in accordance with the C4SL methodology.

Note that groundwater contamination may pose a risk to human health but that there are no relevant generic assessment criteria available for comparison. ByrneLooby has derived our own assessment criteria for this.

Phytotoxic Risks

Generic assessment of phytotoxicity is by comparison with guideline values presented in the British Standard for Topsoil and the MAFF document "Code of Good agricultural practice for the protection of soil", October 1998. This is in accordance with LCRM's reference to DEFRA notice CLAN 4/04.

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Controlled Waters

Risks to controlled waters (groundwater and surface waters) from contaminants are assessed in accordance with the EA documents “The Environment Agency’s Approach to Groundwater Protection” (2017) and Remedial Targets Methodology (RTM, 2006). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Environment Agency’s ‘limit’ pollution objective. Acceptable water quality targets (WQT) are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)). The risk posed to controlled waters from total soil concentrations cannot be directly assessed. The risk is assessed either by comparison of results of leachate tests carried out on soil samples, or from the direct testing of samples of groundwater to screening criteria. Leachate testing generally forms a conservative assessment and is not appropriate for organic contaminants.

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CURRENT GUIDANCE ON INTERPRETATION OF CHEMICAL ANALYSIS OF SOILS

Contaminated land is defined under law through Part IIA of the Environmental Protection Act 1990, implemented through Section 57 of the Environment Act 1995. This supports a 'suitable for use' based approach to the risk assessment of potentially contaminated land. The site-specific risk assessment is based upon assessment of plausible contaminant linkages, referred to as the contaminant-pathway- receptor model, based upon the current or proposed use of the site.

Before undertaking a risk assessment, a conceptual site model is devised in order to identify the potential contaminants, pathways and receptors. The individual contaminants, pathways and receptors then need to be further investigated in order to refine the initial assessment and risk assessment undertaken.

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. These reports (CLR7-10) together with associated "SGV" documents were withdrawn and the following documents have been published as revised guidance to the CLEA assessment:

- Environment Agency : 2008: Using Soil Guideline Values SC050021/SGV Introduction, March 2008.
- Environment Agency : 2008: Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
- Environment Agency : 2008: Science Report SC050021/SR3: Updated technical background to the CLEA model.
- Environment Agency : 2008 : Compilation of Data for Priority Organic Contaminants for Derivation of Soil Guideline Values Science report SC050021/SR7
- Environment Agency : Science Report SC050021/SR4: CLEA Software (Version 1.071, 2015) & Handbook.
- DEFRA Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 (December 2013).
- LQM/CIEH Suitable 4 Use Levels for Human Health Risk Assessment.

Additional guidance on statistical assessment replacing CLR 7 is partly provided in:

- CL:AIRE: 2009: Guidance on Comparing Data With a Critical Concentration

A different approach to the statistical appraisal of data is required depending on whether the assessment of risk is to assess whether land is Contaminated Land in accordance with regulations, or whether the assessment is to assess whether the site is suitable for new

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development in according with Planning guidance. This is discussed further in CL:AIRE: 2009 "Guidance on Comparing Data With a Critical Concentration".

The introduction of the Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) reassessed the CLEA Model and the derived SGVs (and associated GACs calculated using the model). This re-assessment concluded that the SGVs/GACs were conservative screening criteria for determining the suitability of soil with regard to the risk to human health under the planning regime and defined a new upper limit for planning purposes which is the boundary between the new Category 3 and 4. In March and September 2014 DEFRA issued guidance on these new Category 4 Screening Levels (C4SL) and these are discussed further below.

Soil Guideline Values

A program for the derivation of SGVs based on the above guidance is provided by the Environment Agency and is entitled "CLEA Software Version 1.06". These reports, together with supporting toxicology reviews ("Tox" or Supplementary Information Reports) for individual substances (which will be gradually updated), Soil Guideline Value Reports and other guidance referred to in the above documents, provide guidance and the scientific basis for assessing the risk to human health from potential contaminants. Soil Guideline Value Reports (SGV Reports) have been published for a number of contaminants and these are published on the Environment Agency website. Eventually the reports will include SGVs for:

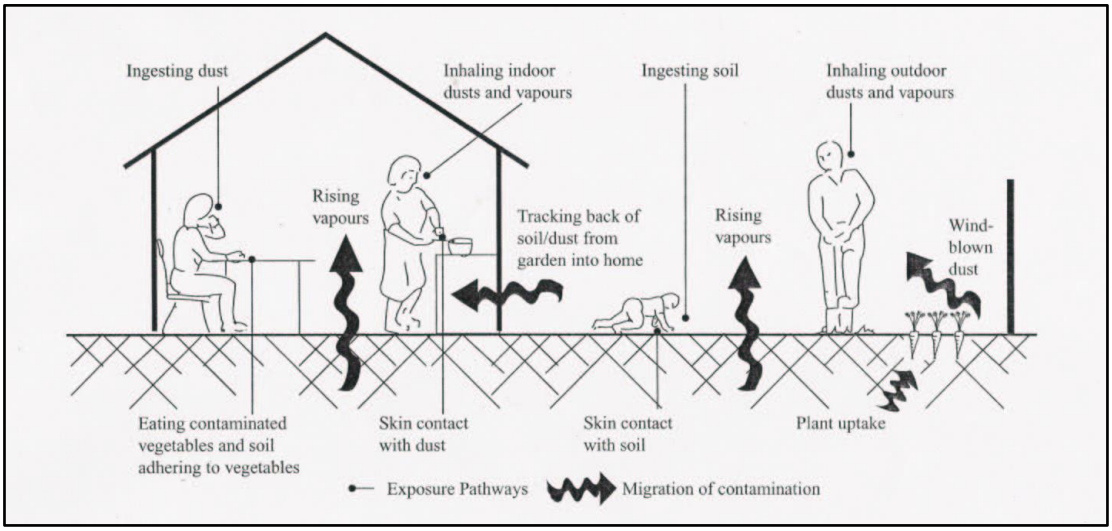
- heavy metals and other inorganic compounds: arsenic, cadmium, chromium, cyanide, lead (now withdrawn), mercury nickel (now withdrawn), and selenium;
- benzene, ethylbenzene, toluene, and xylenes;
- phenol;
- dioxins and dioxin-like polychlorinated biphenyls (PCBs);
- polycyclic aromatic hydrocarbons (PAHs) – 11 substances.

In September 2015, CLEA was re-issued as 'CLEA Version 1.071'. Currently, the software has been used to produce an in-house GAC for nickel, following with withdrawal of the SGV.

In addition, CIEH through LQM and the EIC have published generic assessment criteria (GACs) for a wide variety of other parameters including metals, hydrocarbons, chlorinated aliphatic compounds, PAHs and explosive substances for three standard land uses. These have been produced to supplement the Environment Agency guidance. These GACs will be replaced by SGVs when or if the Environment Agency publishes any more SGVs.

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathways. Ten human exposure pathways are covered in the CLEA model as presented below:

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- Ingestion:
  - ingestion of outdoor soil;
  - ingestion of indoor dust;
  - ingestion of home-grown vegetables;
  - ingestion of soil attached to home grown vegetables.

- Dermal Contact:
  - dermal contact with outdoor soil;
  - dermal contact with indoor dust.

- Inhalation:
  - inhalation of outdoor dust;
  - inhalation of indoor dust;
  - inhalation of outdoor soil vapour;
  - inhalation of indoor soil vapour.

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g., certain organic compounds can pass through plastic water pipes into drinking water supply.

The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle ‘default’ land use types and makes a series of ‘default’ assumptions with regard to human exposure frequency, duration and critical human target groups for each land use considered:

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- residential land use;
- allotments;
- commercial and industrial land use.

The land use categories defined in the CLEA are detailed below.

Residential: This land use category assumes that people live in a variety of dwellings including terraced, detached and semi-detached houses up to two storeys high. The structure of buildings varies. Default parameters for building materials and building design are included in CLEA documents to calculate the relevant multi-layer diffusion coefficients for vapour intrusion and to model indoor vapour intrusion. The CLEA model assumes that regardless of the style of housing the residents will have access to either a private garden or community open space nearby, and that soil tracked into the home will form indoor dust. It allows for the ingestion pathways from home grown vegetables.

Allotments: The CLEA model incorporates an assessment of land provided by local authorities specifically for people to grow fruit and vegetables for their own consumption. Consumption of such fruit and vegetables present several exposure pathways; plants absorb contaminants mainly via water uptake through roots, the contaminants move to edible portions of plants via translocation and contaminated soil particles become trapped in the skin and between leaves. At present the model fails to account for exposure through the consumption of animals, and their products (e.g., eggs), which have been reared on contaminated land.

Commercial/Industrial: Although there are a wide variety of workplaces and work-related activities, the CLEA assessment of this land-use assumes that work occurs in a permanent, three-storey structure, where employees spend most time indoors, conducting office-based or light physical work. The model assumes employees sit outside during breaks for most of the year. Limitations in applying this land-use to different industries is detailed in EA publication "Updated technical background to the CLEA model" (2011). The generic model assumes that the site would not be covered by hard standing. Risk of exposure to contaminants would be clearly less where commercial land is essentially all buildings and hard standing.

Based on the assumptions of each land use and the associated applicable exposure pathways, a 'Soil Guideline Value' (SGV) may be calculated for each contaminant under consideration for a particular land use in order to determine whether certain contaminant soil concentrations pose a significant risk to human health. The primary purpose of the CLEA SGVs are as 'trigger values' – indicators to a risk assessor that soil concentrations below this level require no further assessment as it can be assumed that the soil is suitable for the proposed use. Where soil concentrations occur above the SGV then further assessment of the results is required. The Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) which came into force in early April 2012 provides new clarity on the assessment of risk where soil concentrations exceed the SGV. The guidance introduces a four-stage classification system relating to concentration of contaminants and the assessed risk which indicates appropriate actions. Category 1 and 2 sites are classified as "Contaminated Land" as defined in Part IIA of The Environmental Protection Act (1990). Category 3 and 4 sites are not considered as "Contaminated Land" in accordance with the Act. This can be explained using the figure on the following page.

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There are also difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and that they would lead to "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) and determine that the land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and also a scientific judgement on what constitutes an 'unacceptable' risk. It is for local authorities or the Environment Agency to determine whether a particular site is contaminated land, and it is for local Planning Authorities to determine whether land affected by contamination can be redeveloped.

Given the SGVs have been derived only for a limited number of contaminants and there was little prospect of further SGVs being published, two professional groupings have produced Generic Assessment Criteria (GACs) in accordance with the CLEA model for a large number of additional contaminants. These GACs were recognised in the new Contaminated Land Statutory Guidance (DEFRA, 2012) and have been produced as follows:

- *LQM/CIEH : 2009 Nathaniel CP, McCaffrey C, Ashmore MH, Cheng NPS GROUP, Gillett A, Ogden R & Scott D : 2009 . The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition). Land Quality Press, Nottingham.*
- *CL:AIRE/EIC/AGS: 2009 : Soil Generic Assessment Criteria (GAC) for Human Health Risk Assessment. Contaminated Land: Applications in Real Environments, Environment Industries Commission & Association of Geotechnical and Environmental Specialists. December 2009.*

Category 4 Screening Levels and LQM/CIEH Suitable 4 Use Levels

For new developments progressing through the planning regime, it is desirable that the soil concentrations are within Category 4 where there is a valid contaminant linkage. The upper boundary between Category 4 and 3 is not defined in the guidance. This boundary can also be better defined by carrying out a Detailed Quantified Risk Assessment (DQRA) and this is discussed later in this appendix.

In December 2013 Defra issued the findings of a research project undertaken by CL:AIRE to set out the framework by which potential Category 4 Screening Levels (pC4SL) may be derived. The report was not designed to produce 'final' C4SL as the steering group producing the report believes that final C4SL should be set by a 'relevant authority' (e.g., Defra), the toxicological framework proposed has not been reviewed by the Committee on Toxicity and the document has yet to be subject to peer review.

In March 2014, appendices to the main Defra report were published detailing the derivation of pC4SL for 6 contaminants and other appendices regarding a review of the CIEH/CL:AIRE statistics guidance and sensitivity analysis. For each contaminant, a range of pC4SL have been produced relating to modifying toxicological parameters only, modifying exposure parameters only or by modifying both. It should be noted that the pC4SL produced for lead (the SGV was withdrawn in 2011) has undertaken a relatively large toxicological review in relation to modelling blood lead concentrations. pC4SL have been produced for:

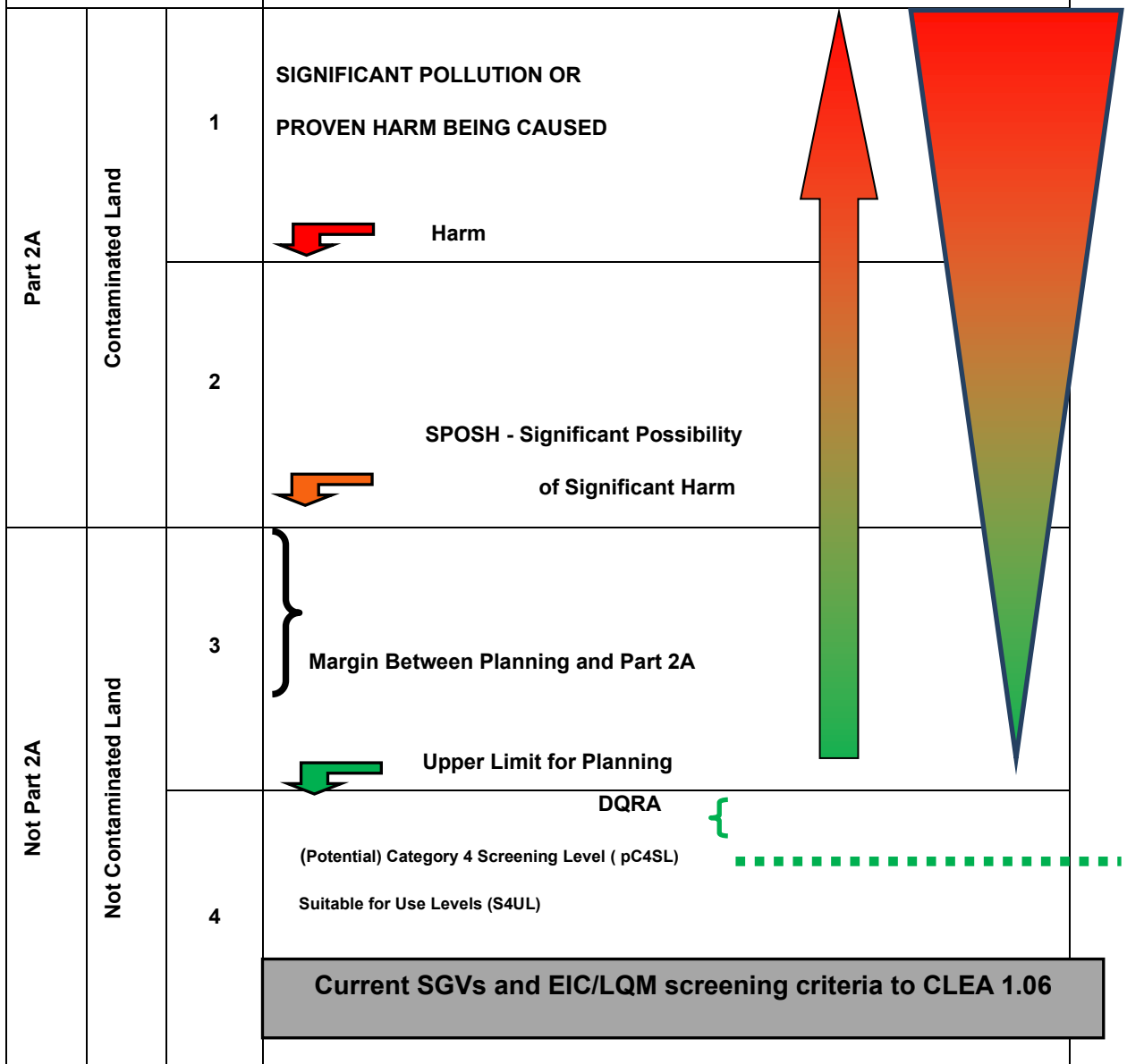
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- Arsenic;
- Benzene;
- Benzo(a)pyrene (as a surrogate marker for PAHs);
- Cadmium;
- Chromium (VI); and
- Lead

As previously discussed the values were initially published as 'potential' C4SL but have become 'final' following DEFRA having issued a policy decision letter indicating that they are to be used in the planning regime (letter of 3rd September 2014). It is considered that the pC4SL provide a simple test for deciding whether land is suitable for use without any remediation. The pC4SL represent a new set of screening levels that are more pragmatic (but strongly precautionary) compared to the existing soil guideline values (SGVs and the other GACs calculate in accordance with the existing CLEA methodology). The pC4SL provide cautious estimates of contaminant concentrations in soil that are still considered to present an acceptable level of risk, within the context of Part 2A, by combining information on toxicology, exposure assessment and normal levels of exposure to these contaminants. pC4SL values should not be seen as 'SPOH values.' Exceeding a pC4SL means that further investigation is required, not that the land is necessarily contaminated. In January 2015, LQM published Suitable 4 Use Levels (S4ULs) for a further 89 contaminants using the Defra C4SL methodology. In a similar manner to the pC4SLs, no authoritative review has been undertaken although the approach and quality of the work undertaken is widely accepted as being of high quality.

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Relationship Between Contaminant Concentration, Risk and Screening Values



Note:

The vertical scale should not be considered as being linear and will be site and contaminant specific.

- SPOSH concentrations could be 10 to 100 times the SGV/EIC/LQM screening concentration.
- C4SL were issued as 'potential' but have become 'final' following DEFRA having issued a policy decision letter indicating that they are to be used in the planning regime (letter of 3rd September 2014).

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Lead:

The SGV for lead was withdrawn in 2011 and is not used in this report. The pC4SL for lead provides a technically robust and conservative assessment tool using significantly updated toxicological modelling in line with current scientific understanding of lead toxicology.

Nickel

The SGV for nickel was withdrawn in 2015 and is not used in this report. In-house GACs for nickel have been produced using the updated toxicological review by the EFSA and the CLEA 1.071 software.

Public Open Space

The Defra report (December 2013) has also introduced exposure scenarios for two other commonly occurring land uses which require assessment (under the planning and Part 2A regimes) on a relatively frequent basis. These exposure scenarios are:

- Public Open Space – Space Near Residential Housing (POS_{resi}); and,
- Public Open Space – Public Park (POS_{park}).

Potential use of pC4SL relating to Public Open Space (POS) require care due to the significant variability in exposure characteristics. For example, POS may include:

- Children's play areas, public parks where children practise sport several times a week and teenagers only once a week;
- Grassed areas adjacent to residential properties which are rarely used;
- Dedicated sports grounds where exposure is only to players and groundworkers; and,
- Nature reserves or open ground with low level activity (for example, dog walking).

Within the Defra report (December 2013) the following exposure scenarios have been modelled as these are considered the most important for potential exposure for the critical receptor i.e., young children:

- Green open space close to housing, including tracking back of soil (POS_{resi}); and
- Park-type scenario where distance is considered sufficient to discount tracking back of soil (POS_{park}).

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Detailed Quantified Risk Assessment (DQRA)

SGVs, GACs, pC4SL and S4ULs are based on a number of basic assumptions. There are two main options for developing Site Specific Assessment Criteria (SSAC) by adjusting the CLEA model so that they have greater relevance to the site:

- **Simple adjustment of the generic SGV / C4SL model**. Such adjustment is restricted to the choice of exposure routes selected for the generic land use, building type, soil type and soil organic matter content within the CLEA software.
- **Detailed adjustment.** It may be relevant to make greater modifications to the model due to the specific use of the land in question. This can include modification to any parameter value, including exposure assumptions, building parameters, and the choice and application of fate and transport models. This is equally relevant to site-specific modifications of existing generic land uses, the development of new land uses, and the inclusion of additional exposure pathways. Much of this can be undertaken using the CLEA software. Depending on the complexity of the detailed adjustments required, it may be necessary to use other tools either alone or in conjunction with the CLEA software. Both options should follow established protocols for DQRA and require sufficient justification and supporting information for the adjustments made. Detailed adjustments are likely to require substantially greater technical justification and supporting documentation, especially if modifications are based on information not contained within the SGV framework documents.

The two choices present the risk assessor with three options/decisions:

1. Use a published SGV/GAC/pC4SL/S4UL if it can be demonstrated that the assumptions inherent in the value are appropriate to the site in question. If they are not, proceed to either option 2 or 3 below.
2. Make simple site-specific adjustments to the generic exposure model used to derive the SSAC. Three examples of when this could be appropriate are:
    a. High density residential development with no exposed contaminated soil at surface. It is appropriate in this case to consider the relevance of direct contact pathways and consumption of homegrown produce.
    b. Soil type is significantly different (specifically when soil type is likely to be less protective e.g., made ground) to that assumed in the SGV/GAC/pC4SL/S4UL.
    c. Soil organic matter content is significantly different to that assumed in the derivation of the SGV/GAC/pC4SL/S4UL.
3. If simple adjustments are not sufficient to reflect site conditions, undertake a DQRA. This may be undertaken using the CLEA software or by using an alternative risk assessment methodology that is relevant, appropriate, authoritative, and scientifically based. Changes to toxicological end points may also be considered, although this should only be undertaken by a toxicology expert. In the context of this

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guidance, simple adjustments of a generic land use scenario for soil type or SOM content for example are not considered sufficient to be classed as a DQRA.

DQRAs should be conducted with the agreement of the local authority (or the Environment Agency) since it is the authority that determines whether land is Contaminated Land or whether Planning Permission for a new development may be granted.

Representative Data

The type, quantity and quality of the available soil data influence the method chosen to obtain a site representative soil concentration that is compared with an SGV/GAC/pC4SL/S4UL in the screening process. The soil data should be representative of the exposure scenario being considered. This can include factors such as:

- Averaging area over which exposure occurs;
- Sample depth; and,
- Heterogeneity of soil.

where the 'averaging area' is defined as:

> *"That area (together with a consideration of depth) of soil to which a receptor is exposed or which otherwise contributes to the creation of hazardous conditions".*

Site investigations take discrete samples from a given area (and to a certain depth). It has to be assumed that these samples are to some degree representative of the contaminant concentration throughout that volume of soil. The critical soil volume (taking into account area and depth) which might be usefully compared with an SGV/GAC/pC4SL/S4UL is a site-specific decision, but a starting point is the generic land use scenarios used in the derivation of the SGV/GAC/pC4SL/S4UL. The critical soil volume depends on two factors:

- Contaminant distribution and vertical profile (bands of highly contaminated material or lateral hot spots should not necessarily be averaged out with more extensive cleaner areas of soil without justification)
- Contribution to average exposure underpinning the SGV. Direct contact exposure pathways depend on the adult or child coming into contact with near-surface soils and the area over which that exposure occurs is usually important (i.e., the averaging area). Vapour pathways are less dependent on surface area, for example vapour intrusion may result from a highly concentrated hot spot beneath a building leading to elevated average indoor air concentrations. For the three standard land uses for which SGVs are derived, relevant considerations are:
- For the standard **residential or allotment land use**, the critical soil volume is the area of an individual garden, communal play area or working plot from the surface to a depth of between 0.50m and 1.00m. This is the ground over which children are most likely to come into contact with soil or from which vegetable and fruit produce will be harvested. In the case of volatile contaminants, it may also be appropriate to consider the volume of soil underneath the footprint of the building

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although vapour intrusion may be driven by a soil volume much smaller than this if the contaminant source is highly concentrated.

- For the standard **commercial land use**, the critical soil volume has to be decided on a case-by- case basis due to the wide range of possible site layouts. However, for non-volatile contaminants, landscaped and recreational areas around the perimeter of office buildings are likely to be most important. For volatile contaminants, the footprint occupied by the building itself should also be considered.

- For **most exposure pathways**, the contamination is assumed to be at or within one metre of the surface.

The use of averaging areas must be justified on the basis of relevance to the exposure scenario. SGVs are relevant only when the exposure assumptions inherent in them are appropriate for the identified exposure averaging area. Further guidance on critical soil volumes and the consideration of averaging exposure areas can be found in:

- *Secondary model procedure for the development of appropriate soil sampling strategies for land contamination (Environment Agency, 2000);*

- *Guidance on comparing soil contamination data with a critical concentration (CIEH/CL:AIRE, 2009); and*

- *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Appendix I (Defra December 2013, March 2014)*

It is the mean soil concentration for the individual contaminant within an individual averaging area, which is compared to the SGV. However, as contaminant concentrations vary across a site, and sampling and analysis will introduce measurement errors, the comparison between measured mean concentration and the SGV must take this uncertainty into account.

There are two principal options available to obtain site representative soil concentrations from a site investigation dataset; statistical and non-statistical methods. Data objectives, quality and quantity are likely to determine which approach is most appropriate. If statistical methods such as those presented in CIEH/CL:AIRE (2011) are to be used, sufficient data need to be available or obtained. No one single statistical approach is applicable to all sites and circumstances. The wider range of robust statistical techniques developed by organisations including the US Environmental Protection Agency (USEPA) are also important tools. Risk assessors should choose an appropriate statistical approach on the basis of the specific site and the decision that is being made. For further guidance on the appropriate use of statistical approaches, refer to USEPA 2006 or good environmental monitoring statistics textbooks.

When statistical approaches are inappropriate (this will depend on the objectives of the site investigation), individual or composite samples should be compared directly to the SGV. Guidance on use of alternative data handling approaches such as the use of composite sampling can be found in documents such as:

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- *Verification of remediation of land contamination* (Environment Agency, 2010);
- *Sampling and testing of wastes to meet landfill Waste Acceptance Criteria* (Environment Agency, 2005);
- *Guidance on choosing a sampling design for environmental data collection* (USEPA, 2002); and,
- *Soil Quality – Sampling, ISO 10381 series* (ISO, 2002–2007).

The statistical tests should not be used as arbiters for decisions under Part 2A. They are an additional, useful line of evidence to assist in decision-making. The implications of the basis for the derivation of the site representative soil concentration must be taken into account in any decision-making process and clearly documented.

Where the statistical tests are conducted in accordance with the method described in CL:AIRE 2009:

- For the Planning situation, it has to be demonstrated that the concentration of contaminants is low compared to the pC4SL/S4UL or SSAC. All of the test data should be below the screening criteria and no statistical analysis is required or if there are exceedances of the criteria then a statistical assessment is required. For the statistical assessment this decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is lower than the screening criteria.
- For the Part 2A scenario the regulator needs to determine whether the concentration of contaminants is greater than the SGV/GAC/pC4SL/S4UL or SSAC. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is higher than the SSAC. However, the regulator may proceed with determination if there is just a 51% probability, “on the balance of probabilities.”

If the screening levels are exceeded then more sophisticated quantitative risk assessment can be undertaken or remedial action may be taken to break the contaminant linkages. The benefits of undertaking a quantitative risk assessment must be weighed against the likelihood that it will bring about cost savings in the proposed remediation. Further information about the use of soil guideline values is provided in Environment Agency : 2008: Using Soil Guideline Values SC050021/SGV Introduction, March 2008.

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Generic Risk Assessment Criteria For Risk To Plants

Soil contaminants, if present at sufficient concentrations, can have an adverse effect on the plant population. Phytotoxic effects can be manifested by a variety of responses, such as growth inhibition, interference with plant processes, contaminant-induced nutrient deficiencies and chlorosis (yellowing of leaves). All chemicals are probably capable of causing phytotoxic effects. Thus, the phytotoxic potential of substances is dependent on the concentrations capable of having adverse effects on plants and the concentrations likely to be found at contaminated sites. Phytotoxicity is a difficult parameter to quantify given that experimental techniques vary widely, and variations exist in plant tolerances, soil effects and synergistic/antagonistic reactions between chemicals. Contaminants may be taken up and accumulated by plants through a range of mechanisms. The principal pathways are active and/or passive uptake through the plant root, adsorption to root surfaces and volatilisation from the soil surface followed by foliar uptake. After plant uptake, contaminants may be metabolised or excreted, or they may be bioaccumulated and this is highly species dependant. Many of the substances capable of adversely affecting vegetation exert this effect because of their water solubility, a characteristic that could result in their transport from contaminated sites into adjacent locations where the chemical may generate a phytotoxic response. This could be important if, for example, the adjacent site has important conservation status.

The concentration in soil at which substances become phytotoxic depend on a range of factors including plant type, soil type, pH, the form and availability of the contaminant and other vegetation stress factors that may be present (such as drought). Some plants (including some rare plants will only grow in soils where there are relatively high concentrations which would be phytotoxic to other species. Whilst many contaminants may be phytotoxic, data are limited. Some heavy metals are essential as trace elements for plant growth but may become toxic at higher concentrations.

ByrneLooby has carried out a review of a number of current and former guidance documents and other texts on phytotoxicity. It is not possible to produce a definitive list of phytotoxic substances on account of the variables mentioned above. However, a number of metals are repeatedly cited as commonly occurring priority pollutants. As a result, the following list is adopted by ByrneLooby as indicators of the potential for phytotoxicity: As, Cr, Cu, Ni and Zn (note that Boron has been excluded from this list because the more modern studies do not assess this).

As the CLEA framework is a risk-based approach, applied to humans, an alternative strategy is required to assess the risk to plants from substances that are phytotoxic. Reference to published criteria and background concentrations can help put site data into context. Published assessment criteria for the protection of plant life from a number of countries are given in the following Table. The most authoritative source is the British Standard for topsoil, but this only lists three elements. LCRM states that the ICRCL Guidance Note 70/90 can be used for initial screening criteria. This approach has been adopted by ByrneLooby where BS3882 is lacking, but where an ICRCL 70/90 criterion is lacking, the lowest criterion in Table below from, firstly UK, and, secondly, European and then other worldwide criteria. The adopted criteria are highlighted in the table 3.8. The MAFF value of 250 mg/kg has been chosen for As over the ICRCL value of 50 mg/kg as MAFF explains the 50 is applicable to vegetables and human health, whereas 250 is applicable to the plants themselves.

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Table B.5: Published Assessment Criteria for Phytotoxic Elements (mg/kg)							
Reference	**As**	**CR (Total)**	**Cr (III)**	**Cr (VI)**	**Cu**	**Ni**	**Zn**
British Standard for topsoil (BS3882:2007)	-	-	-	-	200 (pH >7) 135 (pH 6-7) 100 (pH 5.5-6.0)	110 (pH >7) 75 (pH 6-7) 60 (pH 5.5-6.0)	300 (pH >7) 200 (pH 6-7) 200 (pH 5.5-6.0)
MAFF Code of Good Agricultural Practice for the Protection of Soil (1998)	250	-	400 for sites containing sewage and sludge	-	500 (grass) but may fall to 250 for clover and sensitive species (at pH>6)	110 (pH>7) 75 (pH 6-7) 60 (pH 5.5-6.0)	1000 (clover & grass at pH 6), may fall to 300 for sensitive species (at pH 6-7)
ICRCL 59/83 (1987) now withdrawn for human health assessment	-	-	-	-	130	70	300
ICRCL 70/90 (1990) threshold trigger value	50	-	-	25 *	250	-	1000
Dutch ecotoxicological intervention value (Swartjes 1993 & 1994)	40	230	-	7	190	-	-
Australian Guideline B(1) (1999), Interim Urban Ecological Investigation Level (EIL). Soils not generally considered phytotoxic below these EILs.	20	-	400	1	100	60	200
New Zealand guidelines for timber treatment sites (1977), estimated based on Cu bioavailability *	-	-	-	-	500 - 1000 clay soils	-	-

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New Zealand guidelines for timber treatment sites (1977), soil criteria for protection of plant life (residential/ agricultural setting)	10-20	-	600	25	130	-	-
Note: * Cr (VI) is only likely to be present in as a significant proportion of total Cr where pH >12 so this does not routinely need to be tested for regarding plant health.							

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Current Guidance For Controlled Waters Risk Assessment

Summary of Regulatory Context

Government policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. When considering the current use of land, Part IIA of the Environment Protection Act 1990 [4] (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995 [5], which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health, controlled waters or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

> *"any 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."*

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

> *"the entry into controlled waters of **any** poisonous, noxious or polluting matter or **any** solid waste matter"*

Part IIA is supported by a substantial quantity of guidance and other Regulations, especially for England, The Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) which came into force in early April 2012. The document re-confirms the duties of Enforcing Authorities in dealing with contamination including the role of the Environment Agency which has powers under Part 7 of The Water Resources Act (1991) to take action to prevent or remedy the pollution of controlled waters, including circumstances where the pollution arises from contamination in the land.

Part IIA introduces the concept of a contaminant linkage; where for potential harm to exist, there must be a connection between the source of the hazard and the receptor via a pathway. Risk assessment in contaminated land is therefore directed towards identifying the contaminants, pathways and receptors that can provide contaminant linkages. This is known as the contaminant-pathway-receptor link (CPR or contaminant linkage).

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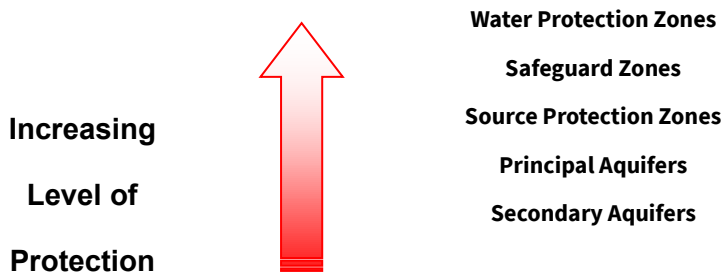
Part IIA places contaminated land responsibility as a part of the planning and redevelopment process rather than Local Authority or Environment Agency taking direct action except in situations of very high pollution risk or where harm is occurring. In the planning process guidance is provided by National Planning Policy Framework (NPPF) of March 2012. This requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. Therefore, appropriate risk-based investigation is required to identify the contaminant linkages that can then be assessed, and then mitigated using methods that can be readily agreed with the planners.

Environment Agency Guidance

Legislation and guidance surrounding the protection of controlled waters in the UK is numerous and can be complex. The Environment Agency's overall position on groundwater is *"To protect and manage groundwater resources for present and future generation in ways that are appropriate for the risks that we identify"* (The Environment Agency's Approach to Groundwater Protection, 2017). In brief, the core objectives of the existing legislation serve to enforce this position.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document was influential as it provided a focus for key developments such as Source Protection Zones (SPZs) and Groundwater Vulnerability Maps. The Policy was then revised in 1998, since which there have been substantial changes in legislation, driven by Europe. Key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991 as amended by the Water Act 2003. Further to legislative changes, gaps identified in the 1998 PPPG required addressing. These changes are reflected in the Environment Agency Policy document *The Environment Agency's Approach to Groundwater Protection"* of March 2017.

The Environment Agency follows a tiered, risk-based approach to drinking water protection, and this should be taken into account when carrying out controlled waters risk assessment:



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Tools available for Risk Assessment of Controlled Waters

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. A number of tools are available for this purpose.

Three main stages apply to any risk assessment of controlled waters, these are:

i. Risk Screening (devise Conceptual Site Model, making reference to groundwater vulnerability maps, site setting etc)

ii. Generic Risk Assessment (using the EA Remedial Targets Methodology – Tier 1 - Comparison of groundwater data with relevant standards)

iii. Detailed Quantitative Risk Assessment (Consideration of aquifer properties and site-specific parameters, using the EA Remedial Targets Methodology - Tiers 2 & 3)

The process is summarised below (Taken from the Environment Agency GP3 consultation document, 2006):

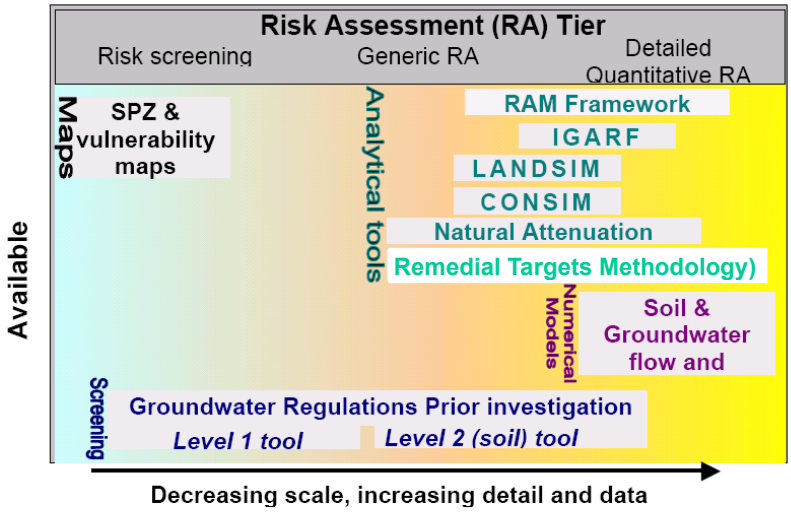


Figure 1-1 Environment Agency groundwater assessment tools, mapped against the different levels of risk assessment.

When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four tiers of assessment:

- **Tier 1** utilises either a soil concentration (calculation of pore water concentrations based on partitioning calculations), leaching test or pore-water concentration of

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perched water as a source concentration input and these are contrasted directly to water quality standards. No dilution or attenuation is considered at Level 1.

- **Tier 2 (groundwater)** considers dilution of the contaminant within the underlying receiving groundwater or surface water body. To determine a dilution, factor the infiltration rate of pore water and the discharge of groundwater beneath the source must be determined. Level 2 Assessment comprises a comparison between measured groundwater concentrations with to water quality standards.
- **Tier 3** considers natural attenuation in the form of dispersion, retardation and degradation of the contaminant. As the levels are progressed, the assessment becomes increasingly more detailed and less conservative as the data requirements are increased with each successive tier. The Environment Agency has released Excel Worksheets to carry out basic calculations using a conservative approach up to Tier 3. However, in this case the conceptual model is a simple one and assumes there is a simple migration of contaminants from the source zone into the aquifer receptor. Using these worksheets requires a sensitivity analysis showing how by varying each parameter, what effect it might have on the outcome of the assessment. Groundwater conceptual models are not always this simple.
- **Tier 4** is for more complex conceptual models where multiple sources, multiple pathways, multiple receptors and complex water balances can be assessed.

The Environment Agency developed a spreadsheet-based code to support the Remedial Target Methodology, and the code is capable of undertaking assessments for Tiers 1 to 3. Tier 4 assessment is not supported by the spreadsheet-based code.

A more advanced code, ConSim 2, developed on behalf of the Environment Agency to support the Remedial Targets Methodology, allows for the introduction of additional geological horizons and is used mainly to determine the concentrations reaching a receptor and the timescales over which this may happen.

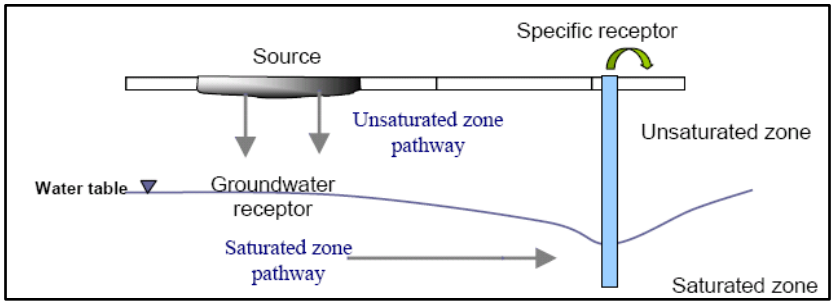
The codes assess only the dissolved phase contaminants. There are many further codes commercially available for use in controlled waters risk assessment, particularly for more complex situations, however, these should be used with caution and only once agreement has been obtained from the Environment Agency. All have the overall aim of the estimation of risk from contaminant linkages and the protection of controlled waters.

General notes on each stage of the controlled waters risk assessment process

Risk Screening

The understanding of the Conceptual Site Model (CSM) is the key to assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example, if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment. An example of a basic Source-Pathway-Receptor concept is given below (taken from the Environment Agency GP3, 2006):

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Generic Risk Assessment

When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

There is a hierarchy of screening criteria which is as follows:

- Updated Recommendations on Environmental Technical Standards, River Basin Management (2015-21), April 2012 by the UK Technical Advisory Group on the Water Framework Directive;
- Environmental Quality Standards (EQS) for freshwaters based on The EC Dangerous Substances Directive (76/464/EEC and Daughter Directives);
- Surface Waters (Abstraction for Drinking Water)(Classification) Regulations (1996)
- Surface Waters (Fishlife) (Classification) Regulations (1997)
- UK Drinking Water Standards (DWS) (Water Supply (Water Quality) Regulations 2000);
- Dutch Ministry of Housing, Spatial Planning and Environment (2001) Intervention Values and Target Values – soil quality standards;
- World Health Organisation Guidelines for Drinking Water (2004).

Should the Level 1 or 2 assessments indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

- To devise suitable remedial solutions;
- To carry out more investigation, sampling and analysis;

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- To conduct a site-specific Detailed Quantitative Risk Assessment (DQRA) to whether or not the soil materials are suitable for their site-specific intended use or to devise a site-specific clean-up level.

Detailed Quantitative Risk Assessment (DQRA)

The decision to carry out a DQRA will be dependent on the extent and implications of the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the former two stages. The CSM will be sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment, the remainder having been screened out.

Additional site-specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

Remediation criteria derived will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or *compliance point*. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

> *"Territorial Waters…which extend seawards for three miles…, coastal waters…, inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata."*

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

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Environment Agency's Aquifer Designations

The Environment Agency have classified different types of aquifers from which groundwater can be extracted. The aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

The maps are split into two different types of aquifer designation:

- **Superficial (Drift)** – permeable unconsolidated (loose) deposits.
- **Bedrock (Solid)** – solid permeable formations e.g., sandstone, chalk, limestone.

The aquifer designations displayed on the Environment Agency maps are as follows:

- **Principal Aquifers (formerly termed Major Aquifers) –** These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.
- **Secondary Aquifers (formerly termed Minor Aquifers) –** These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
    - **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
    - **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
    - **Secondary Undifferentiated** - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
- **Unproductive Strata (formerly termed Non-Aquifer) –** These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

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Hazardous and Non-Hazardous Substances

The Groundwater (England and Wales) Regulations 2009 control the disposal to the hydrogeological environment of potentially polluting substances which are divided into Hazardous Substances and Non-hazardous Contaminants (this roughly approximates to the former List 1 and List 2 substances).

Hazardous Substances are the most damaging and toxic and must be prevented from directly or indirectly entering the groundwater environment. Hazardous Substances include mineral oils and hydrocarbons, pesticides, biocides, herbicides, solvents and some metals. Discharge of Hazardous Substances to Controlled Waters must be prevented.

Non-hazardous Pollutants are any contaminants other than Hazardous Substances. Non-hazardous Pollutants are potentially toxic but are less harmful than Hazardous Substances, but their direct discharge to groundwater is generally not permitted and any indirect discharge to groundwater must be limited and be controlled by technical precautions in order to prevent pollution. Non-hazardous Pollutants include ammonia and nitrites, many metals and fluorides.

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Management Of Contaminated Land

When risk assessment of the site has been completed and this indicates that remedial works are required, the main guidance in managing this process is set out in the DEFRA/EA online guidance LCRM (2020) “Land Contamination: Risk Management” The stages of managing remediation are as follows:

(a) Options Appraisal and develop Remediation Strategy;

(b) Develop Implementation Plan and Verification Plan;

(c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on-site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

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Glossary

TERMS		UNITS	
AST	Above Ground Storage Tank	m	Metres
BGS	British Geological Survey	km	Kilometres
BSI	British Standards Institute	%	Percent
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	%v/v	Percent volume in air
CIEH	Chartered Institute of Environmental Health	mb	Milli Bars (atmospheric pressure)
CIRIA	Construction Industry Research Association	l/hr	Litres per hour
CLEA	Contaminated Land Exposure Assessment	ha	Hectare (10,000m^2)
CSM	Conceptual Site Model	µg/l	Micrograms per Litre (parts per billion)
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	ppb	Parts Per Billion
DWS	Drinking Water Standard	mg/kg	Milligrams per kilogram (parts per million)
EA	Environment Agency	ppm	Parts Per Million
EQS	Environmental Quality Standard	mg/m^3	Milligram per metre cubed
GAC	General Assessment Criteria	Mg/m^3	Megagram per metre cubed
GL	Ground Level	$µg/m^3$	Microgram per metre cubed
GSV	Gas Screening Value	m bgl	Metres Below Ground Level
HCV	Health Criteria Value	m bcl	Metre Below Cover Level
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel)	mOD	Metres Above Ordnance Datum (sea level)
ND	Not Detected	kN/m^2	Kilo Newtons per metre squared
LMRL	Lower Method Reporting Limit	kPa	Kilo Pascal – same as kN/m^2
NR	Not Recorded	µm	Micro metre
OD	Ordnance Datum		
PAH	Poly Aromatic Hydrocarbon		
PCB	Poly-Chlorinated Biphenyl		
PID	Photo Ionisation Detector		
PCSM	Preliminary Conceptual Site Model		
SGV	Soil Guideline Value		
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)		
SPT	Standard Penetration Test		
SVOC	Semi Volatile Organic Compound		
UST	Underground Storage Tank		
VCCs	Vibro Concrete Columns VSCs Vibro Stone Columns		
VOC	Volatile Organic Compound		

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Appendix C – Fieldwork Photographs

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Sitework



Photo 1: Looking east from the centre of the site



Photo 2: Looking southeast from the centre of the site



Photo 3: Photograph taken looking north east from the western side of the site.



Photo 4: Photo taken looking north from the western side of the site

Sitework



Photo 5: Photograph taken looking northwest from the southern section of the site.



Photo 6: Photograph taken looking north-east from the southern section of the site, showing the CP rig set up on BH204.



Photo 7: Photograph taken looking west from the southern section of the site



Photo 8: Photograph taken looking south from the eastern section of the site.

Sitework



Photo 9: Photograph taken looking north from the eastern section of the site.



Photo 10: Photograph taken looking west from the eastern section of the site



Photo 11: Photograph of CPT rig set up on CPT225 and the CP rig set up on BH203



Photo 12: Photograph of the CP rig set up on BH207.

Sitework



Photo 13: Photograph of the CP rig set up on BH206



Photo 16: Photograph taken of the CP rig set up on BH205.



Photo 14: Photograph of Soil Resistivity Testing.

TP212



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil

TP213



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil

TP213



Photograph of Plate Bearing Test conducted in trial pit.



Photograph of filling water for soakaway test in trial pit.



Photograph of soakaway test in trial pit

TP214



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil.



Photograph of Plate Bearing Test conducted in trial pit.

TP215



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil

TP216



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil

TP217



Photograph of the length of the trial pit.



Photograph of the side wall of the trial pit.



Photograph of excavated spoil.



Photograph of soakaway test in trial pit.

Appendix D – Exploratory Hole Records and SPT Calibration Certificates

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Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	05-02-24	05-02-24	DF	Hand tools	N/A	N/A	05-02-24	AS	
CP	1.20	30.45	05-02-24	08-02-24	DF	Dando 2000	N/A	N/A	08-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 346905.69
mN: 376655.35
m OD: 4.31
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			4.01	(0.30) 0.30	Greyish brown slightly sandy CLAY with occasional pockets of yellow sand up to 5mm in size and occasional rootlets. (TOPSOIL)			0.20	ES1	
				(0.90)	Very soft black mottled grey slightly sandy CLAY. (TIDAL FLAT DEPOSITS)			1.00	ES2	
			3.11	1.20		Dry	1.20	1.20 - 1.65 1.20 - 1.65 1.20 - 1.65	S B2 D1	N=3 (1,1/1,1,0,1)
				(0.45)	Very soft greyish brown and yellow slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone. (TIDAL FLAT DEPOSIT)			1.50	ES3	
			2.66	1.65	Spongy black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)	Dry		2.00 - 2.45	UT3	9 (75%)
								2.50	D4	
				(2.25)		Dry	3.00	3.00 - 3.45 3.00 - 3.45 3.00 - 3.45	S B6 D5	N=3 (1,0/0,1,1,1)
	▼		0.41	3.90				3.90	B7	
					Very soft grey slightly sandy clayey SILT. (TIDAL FLAT DEPOSITS)	Dry	4.00	4.00 - 4.45 4.00 - 4.45 4.00 - 4.45	S B9 D8	N=6 (1,0/1,2,2,1)
				(1.55)						
						4.00	5.00	5.00 - 5.45 5.00 - 5.45 5.00 - 5.45	S B11 D10	N=1 (1,0/0,0,1,0)
			-1.14	5.45	Soft to firm grey slightly sandy SILT. (TIDAL FLAT DEPOSITS)					
						5.00	6.00	6.00 - 6.45 6.00 - 6.45 6.00 - 6.45	S B13 D12	N=4 (1,1/1,1,1,1)
						6.00	7.00	7.00 - 7.45 7.00 - 7.45 7.00 - 7.45	S B15 D14	N=8 (2,1/2,2,2,2)
				(4.55)						
						7.00	8.00	8.00 - 8.45 8.00 - 8.45 8.00 - 8.45	S B17 D16	N=9 (2,2/3,2,2,2)
						Dry	9.00	9.00 - 9.45 9.00 9.00 - 9.45	S B19 D18	N=11 (2,3/2,3,3,3)
	Inst (Ø)		-5.69	10.00		Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	30.00	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH202

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	05-02-24	05-02-24	DF	Hand tools	N/A	N/A	05-02-24	AS	
CP	1.20	30.45	05-02-24	08-02-24	DF	Dando 2000	N/A	N/A	08-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 346905.69
mN: 376655.35
m OD: 4.31
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Spongy black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)					
				(1.00)		Dry	10.50	10.50 - 10.95 10.50 - 10.95	S D22	N=9 (2,2/2,2,3,2)
			-6.69	11.00	Grey very silty fine SAND. (TIDAL FLAT DEPOSITS)			11.00	B21	
				(1.00)						
			-7.69	12.00	Medium dense brown silty fine SAND. (TIDAL FLAT DEPOSITS)	3.00	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B24 D23	N=17 (4,5/5,4,4,4)
				(2.00)						
						3.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B26 D25	N=24 (4,5/6,6,6,6)
			-9.69	14.00	Medium dense brown slightly gravelly slightly silty fine to medium SAND. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
						6.00	15.00	15.00 - 15.45 15.00 - 15.45	C B27	N=19 (5,5/5,4,5,5)
				(2.50)						
			-12.19	16.50	Medium dense brown slightly gravelly silty fine to coarse SAND with low cobble content of subrounded mudstone. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)	7.00	16.00	16.50 - 16.95 16.50 - 16.95	C B28	N=23 (5,5/5,5,6,7)
						8.00	18.00	18.00 - 18.45 18.00 - 18.45 18.00 - 18.45	S B30 D29	N=24 (6,6/6,5,6,7)
				(5.10)						
						8.00	19.50	19.50 - 19.95 19.50 - 19.95	C B31	N=30 (6,7/7,8,7,8)
	SP Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
11.00	4.00	11.00	22.50

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	30.00	30.00

Depth related remarks:

From:	To:	Remarks:
17.00	21.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH202

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	05-02-24	05-02-24	DF	Hand tools	N/A	N/A	05-02-24	AS	
CP	1.20	30.45	05-02-24	08-02-24	DF	Dando 2000	N/A	N/A	08-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 346905.69
mN: 376655.35
m OD: 4.31
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense brown slightly gravelly silty fine to coarse SAND with low cobble content of subrounded mudstone. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)					
						9.00	21.00	21.00 - 21.45	C	N=30 (7,7/7,8,7,8)
								21.00 - 21.45	B32	
			-17.29	21.60	Stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)			21.60	Hand-held field vane	185 kPa
								21.60	B33	
						Dry	22.50	22.50 - 22.95	S	N=27 (4,6/6,6,7,8)
								22.50 - 22.95	B35	
								22.50 - 22.95	D34	
								23.00	Hand-held field vane	208 kPa
						Dry		24.00	UT36	33 (100%)
								24.50	D37	
					25.20 - 30.45 m: Becomes very stiff.					
						Dry	25.50	25.50 - 25.95	S	N=28 (5,6/7,7,7,7)
								25.50	Hand-held field vane	214 kPa
				(8.85)				25.50 - 25.95	B39	
								25.50 - 25.95	D38	
						Dry		27.00 - 27.45	UT40	36 (100%)
								28.00	Hand-held field vane	214 kPa
								28.00	D41	
						Dry	28.50	28.50 - 28.95	S	N=29 (6,6/7,7,8,7)
								28.50 - 28.95	B43	
								28.50 - 28.95	D42	
						Dry	30.00	30.00 - 30.45	S	N=31 (5,6/7,8,8,8)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	30.00	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH202

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	05-02-24	05-02-24	DF	Hand tools	N/A	N/A	05-02-24	AS	
CP	1.20	30.45	05-02-24	08-02-24	DF	Dando 2000	N/A	N/A	08-02-24	AS	SPT hammer ID: AR1101

Location details:

mE:	346905.69
mN:	376655.35
m OD:	4.31
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			-26.14	30.45	Stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)			30.00 - 30.45	D45	
					Borehole ends at 30.45m (Target depth reached.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	30.00	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH202

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	JG	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	40.45	29-01-24	05-02-24	JG	Dando 2000	N/A	N/A	05-02-24	AS	SPT hammer ID: AR2812

Location details:

mE:	346974.74
mN:	376696.99
m OD:	4.26
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Grass over firm to stiff brown grey slightly sandy CLAY with occasional rootlets. (TOPSOIL)			0.00 - 0.50	B1	
				(1.20)				0.50	ES101	
								0.50 - 1.20	B2	
								1.00	ES102	
			3.06	1.20	Soft to firm grey and black slightly sandy slightly gravelly organic CLAY. Gravel is subrounded fine of sandstone. (TIDAL FLAT DEPOSITS)	Dry	1.20	1.20 - 1.65	S	N=2 (1,0/1,0,1,0)
								1.20 - 1.65	B3	
								1.20 - 1.65	D3	
								1.50	ES103	
	▼			(1.80)		Dry		2.00 - 2.45	UT4	4 (100%)
			1.26	3.00	Spongy black fibrous PEAT. (TIDAL FLAT DEPOSITS)	Dry	3.00	3.00 - 3.45	S	N=2 (1,0/1,0,1,0)
				(0.50)				3.00 - 3.45	B5	
								3.00 - 3.45	D5	
			0.76	3.50	Very soft dark grey slightly sandy organic CLAY with a strong sulfur odour. (TIDAL FLAT DEPOSITS)			3.50 - 4.00	B6	
				(0.50)						
			0.26	4.00	Very soft grey silty CLAY. (TIDAL FLAT DEPOSITS)	Dry	4.00	4.00 - 4.45	S	N=2 (1,0/1,0,1,0)
								4.00 - 4.45	B7	
	▼							4.00 - 4.45	D7	
				(2.00)		Dry	5.00	5.00 - 5.45	S	N=2 (1,0/1,0,1,0)
								5.00 - 5.45	B8	
								5.00 - 5.45	D8	
			-1.74	6.00	Very soft grey very clayey SILT. (TIDAL FLAT DEPOSITS)	5.00	6.00	6.00 - 6.45	S	N=3 (1,0/1,1,0,1)
								6.00 - 6.45	B9	
								6.00 - 6.45	D9	
						6.50	7.00	7.00 - 7.45	S	N=2 (1,0/1,1,0,0)
								7.00 - 7.45	B10	
								7.00 - 7.45	D10	
				(4.00)		Dry	8.00	8.00 - 8.45	S	N=2 (1,0/1,0,1,0)
								8.00 - 8.45	B11	
								8.00 - 8.45	D11	
						Dry		9.00 - 9.45	UT12	43 (100%)
								9.50	D13	
	▽		-5.74	10.00				10.00 - 10.50	B14	
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
10.00	4.80	10.00	27.50

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH203

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	JG	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	40.45	29-01-24	05-02-24	JG	Dando 2000	N/A	N/A	05-02-24	AS	SPT hammer ID: AR2812

Location details:

mE:	346974.74
mN:	376696.99
m OD:	4.26
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
				(0.50)	Medium dense dark grey slightly clayey silty fine SAND. (TIDAL FLAT DEPOSITS)					
			-6.24	10.50	Medium dense dark grey and brown slightly gravelly silty fine SAND. Gravel is subangular fine to medium of mudstone and quartz. (TIDAL FLAT DEPOSITS)	6.00	10.50	10.50 - 10.95 10.50 10.50 - 10.95	S B15 D15	N=13 (2,3/3,3,3,4)
					12.00 - 13.00 m: Brown mottled grey.	8.00	12.00	12.00 - 12.45 12.00 - 12.45	S D16	N=17 (3,3/4,4,4,5)
				(3.50)	*13.00 - 14.00 m: Sand is fine to medium.*					
						10.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B17 D17	N=21 (3,4/4,5,5,7)
			-9.74	14.00	Medium dense multicoloured gravelly slightly silty SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
						11.00	15.00	15.00 - 15.45 15.00 - 15.45 15.00 - 15.45	C B18 D18	N=23 (4,4/5,5,6,7)
				(2.50)						
			-12.24	16.50	Medium dense dark brown gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)	0.20	16.50	16.50 - 16.95 16.50 - 16.95 16.50 - 16.95	C B19 D19	N=23 (4,5/6,5,6,6)
				(1.50)						
			-13.74	18.00	Medium dense brown slightly gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz (TIDAL FLAT DEPOSITS)	0.80	18.00	18.00 - 18.45 18.00 - 18.45 18.00 - 18.45	C B20 D20	N=23 (5,5/5,6,6,6)
						1.50	19.50	19.50 - 19.95 19.50 - 19.95 19.50 - 19.95	S B21 D21	N=25 (5,5/6,6,6,7)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
14.00	2.00	14.00	27.50

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:
12.00	16.00	Blowing sands
19.00	21.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH203

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	JG	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	40.45	29-01-24	05-02-24	JG	Dando 2000	N/A	N/A	05-02-24	AS	SPT hammer ID: AR2812

Location details:

mE: 346974.74
mN: 376696.99
m OD: 4.26
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
				(4.50)	Medium dense brown slightly gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)	0.00	21.00	21.00 - 21.45 21.00 - 21.45	S B22	N=21 (5,4/5,5,5,6)
			-18.24	22.50		0.00	22.50	22.50 - 22.95 22.50 - 22.95 22.50 - 22.95	C B23 D23	N=20 (4,5/5,4,5,6)
				(1.50)	Medium dense multicoloured sandy angular to subrounded fine to coarse GRAVEL of mudstone, sandstone, and quartz. (TIDAL FLAT DEPOSITS)					
			-19.74	24.00		0.00	24.00	24.00 - 24.45 24.00 - 24.45 24.00 - 24.45	C B24 D24	N=20 (5,5/4,5,5,6)
				(1.50)	Medium dense reyish brown gravelly SAND. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
			-21.24	25.50		1.00	25.50	25.50 - 25.95 25.50 - 25.95 25.50 - 25.95	C B25 D25	N=27 (5,5/6,7,7,7)
					Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)			26.00	Hand-held field vane	61 kPa
						Dry		27.00 - 27.45	UT26	31 (60%)
						28.00	28.50	28.50 - 28.95 28.50 - 28.95 28.50 - 28.95	S B27 D27	N=32 (4,6/7,8,8,9)
								29.00	Hand-held field vane	93.6 kPa
						Dry		30.00 - 30.45	UT28	34 (100%)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH203

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	JG	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	40.45	29-01-24	05-02-24	JG	Dando 2000	N/A	N/A	05-02-24	AS	SPT hammer ID: AR2812

Location details:

mE:	346974.74
mN:	376696.99
m OD:	4.26
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
				(10.50)						
						Dry	31.50	31.50 - 31.95	S	N=31 (5,6/7,8,8,8)
								31.50	Hand-held field vane	87.3 kPa
								31.50 - 31.95	B29	
								31.50 - 31.95	D29	
						Dry		33.00 - 33.45	UTNR	30 (0%)
						34.00	34.50	34.50 - 34.95	S	N=37 (4,6/8,9,10,10)
								34.50 - 34.95	B31	
								34.50 - 34.95	D31	
			-31.74	36.00	Medium dense brown silty very clayey SAND. (TIDAL FLAT DEPOSITS)	19.00	36.00	36.00 - 36.45	S	N=10 (1,2/2,3,3,2)
								36.00 - 36.45	B32	
						7.00	37.50	37.50 - 37.95	S	N=11 (2,2/2,3,3,3)
								37.50 - 37.95	B33	
				(4.45)						
						2.00	39.00	39.00 - 39.45	S	N=13 (2,3/3,4,3,3)
								39.00 - 39.45	B34	
								39.00 - 39.45	D34	
						2.00	40.00	40.00 - 40.45	S	N=12 (2,2/2,3,3,4)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:
36.00	40.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH203

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	JG	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	40.45	29-01-24	05-02-24	JG	Dando 2000	N/A	N/A	05-02-24	AS	SPT hammer ID: AR2812

Location details:

mE:	346974.74
mN:	376696.99
m OD:	4.26
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			-36.19	40.45	Medium dense brown silty very clayey SAND. (TIDAL FLAT DEPOSITS)					
					Borehole ends at 40.45m (Target depth reached.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	21.00	21.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH203

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	06-02-24	06-02-24	JG	Hand tools	N/A	N/A	06-02-24	AS	
CP	1.20	40.45	06-02-24	13-02-24	JG	Dando 2000	N/A	N/A	13-02-24	AS	SPT hammer ID: AR2812

Location details:

mE: 346992.30
mN: 376656.90
m OD: 4.33
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Water	Casing	Depth	Type & No	Results/Remarks
					Samples & In Situ Testing					
					Grass over firm brown slightly sandy CLAY with occasional rootlets. (TOPSOIL)			0.00 - 0.50	B1	
				(1.20)				0.50	ES101	
								0.50 - 1.20	B2	
								1.00	ES102	
			3.13	1.20	Spongy black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)	0.80	1.20	1.20 - 1.65	S	N=2 (1,0/1,0,1,0)
								1.20 - 1.65	B3	
								1.20 - 1.65	D3	
								1.50	ES103	
						Dry		2.00 - 2.45	UT4	7 (100%)
				(2.30)						
						Dry	3.00	3.00 - 3.45	S	N=3 (1,0/1,0,1,1)
								3.00 - 3.45	B5	
								3.00 - 3.45	D5	
			0.83	3.50	Very soft black and grey slightly sandy organic CLAY with a mild sulfur odour. (TIDAL FLAT DEPOSITS)			3.50 - 4.00	B6	
						Dry		4.00 - 4.45	UT7	5 (100%)
				(1.50)						
			-0.67	5.00	Very soft grey slightly sandy very clayey SILT. (TIDAL FLAT DEPOSITS)	Dry	5.00	5.00 - 5.45	S	N=3 (1,0/1,0,1,1)
								5.00 - 5.45	B8	
								5.00 - 5.45	D8	
						Dry		6.00 - 6.45	UT9	5 (80%)
					7.00 - 10.00 m: Becomes slightly clayey.	Dry	7.00	7.00 - 7.45	S	N=3 (1,0/1,1,0,1)
								7.00 - 7.45	B10	
								7.00 - 7.45	D10	
				(5.50)						
						Dry		8.00 - 8.45	UTNR	5 (0%)
						4.50	9.00	9.00 - 9.45	S	N=5 (1,1/1,1,1,2)
								9.00 - 9.45	B12	
								9.00 - 9.45	D12	
								9.50 - 10.00	B13	
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
1.20	0.70	N/A	2.00

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	26.00	26.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH204

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	06-02-24	06-02-24	JG	Hand tools	N/A	N/A	06-02-24	AS	
CP	1.20	40.45	06-02-24	13-02-24	JG	Dando 2000	N/A	N/A	13-02-24	AS	SPT hammer ID: AR2812

Location details:

mE: 346992.30
mN: 376656.90
m OD: 4.33
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Very soft grey slightly sandy very clayey SILT. (TIDAL FLAT DEPOSITS)					
			-6.17	10.50	Firm black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)	7.00	10.50	10.50 - 10.95 10.50 - 10.95 10.50 - 10.95	S B14 D14	N=11 (2,3/3,2,3,3)
				(1.50)						
			-7.67	12.00	Medium dense greyish brown very sandy silty angular to subrounded fine to coarse GRAVEL of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)	6.00	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B15 D15	N=13 (2,3/3,3,3,4)
				(1.50)						
			-9.17	13.50	Medium dense greyish brown slightly gravelly slightly silty fine to medium SAND. Gravel is subangular to subrounded fine to medium of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)	7.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B16 D16	N=14 (3,3/3,3,4,4)
				(2.50)						
					15.00 - 16.00 m: Sand becomes fine to course	5.00	15.00	15.00 - 15.45 15.00 - 15.45 15.00 - 15.45	C B17 D17	N=17 (3,3/4,4,4,5)
			-11.67	16.00	Medium dense brown gravelly slightly clayey SAND with low cobble content. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. Cobbles are subrounded of mudstone. (TIDAL FLAT DEPOSITS)	4.00	16.50	16.50 - 16.95 16.50 - 16.95 16.50 - 16.95	C B18 D18	N=20 (4,4/5,5,5,5)
				(3.50)						
						4.50	18.00	18.00 - 18.45 18.00 - 18.45 18.00 - 18.45	C B19 D19	N=19 (4,5/4,5,5,5)
			-15.17	19.50	Medium dense brown slightly gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TDIAL FLAT DEPOSITS)	5.00	19.50	19.50 - 19.95 19.50 - 19.95 19.50 - 19.95	S B20 D20	N=19 (5,5/4,5,5,5)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
11.00	4.20	10.50	30.00

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	26.00	26.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:
11.00	14.50	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH204

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	06-02-24	06-02-24	JG	Hand tools	N/A	N/A	06-02-24	AS	
CP	1.20	40.45	06-02-24	13-02-24	JG	Dando 2000	N/A	N/A	13-02-24	AS	SPT hammer ID: AR2812

Location details:

mE: 346992.30
mN: 376656.90
m OD: 4.33
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense brown slightly gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TDIAL FLAT DEPOSITS)					
						5.50	21.00	21.00 - 21.45	S	N=21 (4,5/5,5,5,6)
								21.00 - 21.45	B21	
								21.00 - 21.45	D21	
				(4.50)						
						6.00	22.50	22.50 - 22.95	C	N=22 (5,5/5,5,6,6)
								22.50 - 22.95	B22	
								22.50 - 22.95	D22	
			-19.67	24.00	Medium dense dark brown very sandy angular subrounded fine to coarse GRAVEL of mudstone, sandstone and quartz with medium cobble content of subrounded mudstone. (TIDAL FLAT DEPOSITS)	3.00	24.00	24.00 - 24.45	C	N=23 (5,5/5,6,6,6)
								24.00 - 24.45	B23	
								24.00 - 24.45	D23	
				(2.30)						
						1.00	25.50	25.50 - 25.95	C	N=22 (5,5/5,5,6,6)
								25.50 - 25.95	B24	
								25.50 - 25.95	D24	
			-21.97	26.30	Stiff laminated brown slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)			26.50	Hand-held field vane	26 kPa
								26.50 - 27.00	B25	
						26		27.00 - 27.45	UTNR	19 (0%)
						28.00	28.50	28.50 - 28.95	S	N=18 (4,4/5,4,4,5)
								28.50	Hand-held field vane	7 kPa
								28.50 - 28.95	B27	
								28.50 - 28.95	D27	
						Dry		30.00 - 30.45	UT28	20 (100%)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	26.00	26.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:
26.00	37.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH204

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	06-02-24	06-02-24	JG	Hand tools	N/A	N/A	06-02-24	AS	
CP	1.20	40.45	06-02-24	13-02-24	JG	Dando 2000	N/A	N/A	13-02-24	AS	SPT hammer ID: AR2812

Location details:

mE: 346992.30
mN: 376656.90
m OD: 4.33
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Stiff laminated brown slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
				(10.70)		Dry	31.50	31.50 - 31.95	S	N=17 (4,4/4,4,4,5)
								31.50	Hand-held field vane	10 kPa
								31.50 - 31.95	B29	
								31.50 - 31.95	D29	
						32.5		33.00 - 33.45	UT30	56 (100%)
								33.50	D31	
						34.00	34.50	34.50 - 34.95	S	N=31 (5,6/7,7,8,9)
								34.50	Hand-held field vane	12 kPa
								34.50 - 34.95	B32	
								34.50 - 34.95	D32	
						35.5		36.00 - 36.45	UT33	60 (100%)
			-32.67	37.00	Dense brown silty very clayey fine to coarse SAND. (TIDAL FLAT DEPOSITS)					
						10.00	37.50	37.50 - 37.95	S	N=47 (9,10/11,11,12,13)
								37.50 - 37.95	B34	
								37.50 - 37.95	D34	
				(3.45)						
						9.00	39.00	39.00 - 39.45	S	N=45 (8,9/10,11,11,13)
								39.00 - 39.45	B35	
								39.00 - 39.45	D35	
	SP Inst (Ø)					9.00	40.00	40.00 - 40.45	S	N=47 (10,10/10,11,13,13)

Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	26.00	26.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH204

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	06-02-24	06-02-24	JG	Hand tools	N/A	N/A	06-02-24	AS	
CP	1.20	40.45	06-02-24	13-02-24	JG	Dando 2000	N/A	N/A	13-02-24	AS	SPT hammer ID: AR2812

Location details:

mE:	346992.30
mN:	376656.90
m OD:	4.33
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Dense brown silty very clayey fine to coarse SAND. (TIDAL FLAT DEPOSITS)			40.00 - 40.45	D36	
			-36.12	40.45	Borehole ends at 40.45m (Target depth reached.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	26.00	26.00
150	40.00	40.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH204

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	12-02-24	12-02-24	DF	Hand tools	N/A	N/A	12-02-24	AS	
CP	1.20	25.00	12-02-24	14-02-24	DF	Dando 2000	N/A	N/A	14-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 346957.56
mN: 376594.64
m OD: 4.28
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Grass over soft yellowish brown very sandy CLAY with occasional rootlets. (TOPSOIL)			0.10 - 1.20	B1	
								0.50	ES101	
				(1.20)				1.00	ES102	
			3.08	1.20	Very soft grey slightly sandy CLAY. (TIDAL FLAT DEPOSITS)	Dry	1.20	1.20 - 1.65	S	N=5 (1,1/1,1,2,1)
								1.20 - 1.65	B3	
								1.20 - 1.65	D2	
				(0.80)				1.50	ES103	
			2.28	2.00	Firm black pseudo-fibrous PEAT with a strong sulfur odour. (TIDAL FLAT DEPOSITS)	Dry	2.00	2.00 - 2.45	S	N=4 (1,2/1,1,1,1)
								2.00 - 2.45	B5	
								2.00 - 2.45	D4	
						2.00	3.00	3.00 - 3.45	S	N=4 (1,1/1,1,1,1)
								3.00 - 3.45	B7	
				(2.50)				3.00 - 3.45	D6	
						3		4.00 - 4.45	UT8	10 (100%)
			-0.22	4.50	Very soft dark grey slightly silty CLAY. (TIDAL FLAT DEPOSITS)			4.50	D9	
				(0.50)						
			-0.72	5.00	Soft grey very clayey SILT. (TIDAL FLAT DEPOSITS)	4.00	5.00	5.00 - 5.45	S	N=8 (1,2/2,2,2,2)
								5.00 - 5.45	B11	
								5.00 - 5.45	D10	
						5.00	6.00	6.00 - 6.45	S	N=7 (2,2/1,2,2,2)
								6.00 - 6.45	B13	
								6.00 - 6.45	D12	
						6.00	7.00	7.00 - 7.45	S	N=6 (2,2/1,2,1,2)
								7.00 - 7.45	B15	
								7.00 - 7.45	D14	
				(5.00)						
					8.00 - 8.45 m: With pockets of pseudo fibrous peat.	7.00	8.00	8.00 - 8.45	S	N=8 (2,2/2,2,2,2)
								8.00 - 8.45	B17	
								8.00 - 8.45	D16	
					8.45 - 10.00 m: Becomes clayey					
						8.00	9.00	9.00 - 9.45	S	N=7 (2,2/2,1,2,2)
								9.00 - 9.45	B19	
								9.00 - 9.45	D18	
			-5.72	10.00		8.00	10.00	10.00 - 10.45	C	N=12 (2,3/3,3,3,3)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	21.00	21.00
150	25.00	24.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH205

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	12-02-24	12-02-24	DF	Hand tools	N/A	N/A	12-02-24	AS	
CP	1.20	25.00	12-02-24	14-02-24	DF	Dando 2000	N/A	N/A	14-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 346957.56
mN: 376594.64
m OD: 4.28
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Firm black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)			10.00 - 10.45	B20	
				(2.00)						
			-7.72	12.00	Medium dense brown silty fine SAND. (TIDAL FLAT DEPOSITS)	7.00	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B22 D21	N=7 (3,2/2,2,1,2)
				(3.00)		8.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B24 D23	N=13 (2,2/3,4,3,3)
			-10.72	15.00	Medium dense brown slightly gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)	7.00	15.00	15.00 - 15.45 15.00 - 15.45	C B25	N=17 (4,4/4,5,4,4)
						8.00	16.50	16.50 - 16.95 16.50 - 16.95	C B26	N=23 (4,5/5,6,6,6)
				(6.00)		9.00	18.00	18.00 - 18.45 18.00 - 18.45	C B27	N=21 (5,5/5,5,6,5)
						10.00	19.50	19.50 - 19.95 19.50 - 19.95	C B28	N=24 (4,5/5,6,7,6)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
11.00	4.00	11.00	

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	21.00	21.00
150	25.00	24.00

Depth related remarks:

From:	To:	Remarks:
17.00	25.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH205

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	12-02-24	12-02-24	DF	Hand tools	N/A	N/A	12-02-24	AS	
CP	1.20	25.00	12-02-24	14-02-24	DF	Dando 2000	N/A	N/A	14-02-24	AS	SPT hammer ID: AR1101

Location details:

mE:	346957.56
mN:	376594.64
m OD:	4.28
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense brown slightly gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)			20.50	B29	
			-16.72	21.00	Stiff laminated brown slightly gravelly CLAY. Gravel is subangular to rounded find to coarse of sandstone and mudstone, (TIDAL FLAT DEPOSITS)	12.00	21.00	21.00 - 21.45	S	N=25 (4,5/6,6,6,7)
				(1.50)						
			-18.22	22.50	Dense brown gravelly silty SAND. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and quartz. (TIDAL FLAT DEPOSITS)	4.00	22.50	22.50 - 22.62	S	50 (25 for 75mm/50 for 45mm)
				(2.50)						
						1.00	14.00	24.00 - 24.45	C	N=40 (8,12/10,12,8,10)
			-20.72	25.00	Borehole ends at 25.00m (Terminated due to blowing sands.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
22.50	2.80	22.50	

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	11.50	11.50
200	21.00	21.00
150	25.00	24.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH205

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	16-02-24	16-02-24	DF	Hand tools	N/A	N/A	16-02-24	HP	
CP	1.20	40.50	16-02-24	23-02-24	DF	Dando 2000	N/A	N/A	23-02-24	HP/EG	SPT hammer ID: AR1101

Location details:

mE:	346955.33
mN:	376579.59
m OD:	5.29
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Grass over soft greyish brown slightly gravelly silty CLAY with abundant rootlets. Gravel is subangular to rounded fine to coarse of sandstone and mudstone. (TOPSOIL)			0.10 - 1.20	B1	
			4.49	0.80	(0.80)					
					Soft brown sandy clayey SILT. (TIDAL FLAT DEPOSITS)					
						1.2		1.20 - 1.65	UT2	10 (75%)
					(1.60)			1.70	D3	
						Dry	2.00	2.00 - 2.45	S	SWP: 150 mm
								2.00 - 2.45	B5	N=1 (0,0/1,0,0,0)
								2.00 - 2.45	D4	
			2.89	2.40	Firm black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)					
						3		3.00 - 3.45	UT6	9 (100%)
					(2.60)			3.50	D7	
	▼					Dry	4.00	4.00 - 4.45	S	SWP: 75 mm
								4.00 - 4.45	B9	N=4 (0,1/1,1,1,1)
								4.00 - 4.45	D8	
			0.29	5.00	Very soft bluish grey slightly sandy clayey SILT. (TIDAL FLAT DEPOSITS)	4.00	5.00	5.00 - 5.45	S	SWP: 150 mm
								5.00 - 5.45	B11	N=5 (0,0/1,2,1,1)
								5.00 - 5.45	D10	
						5		6.00 - 6.45	UT12	8 (100%)
								6.50	D13	
						6.00	7.00	7.00 - 7.45	S	N=4 (1,2/1,1,1,1)
					(4.40)			7.00 - 7.45	B15	
								7.00 - 7.45	D14	
						7		8.00 - 8.45	UT16	12 (100%)
								8.50	D17	
						7.00	9.00	9.00 - 9.45	S	N=4 (1,2/1,1,1,1)
								9.00 - 9.45	B19	
								9.00 - 9.45	D18	
			-4.11	9.40	Firm black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)					
						8.00	10.00	10.00 - 10.45	S	N=4 (1,1/1,1,1,1)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	17.50	17.50
200	25.50	25.50
150	40.50	40.50

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH205A

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	16-02-24	16-02-24	DF	Hand tools	N/A	N/A	16-02-24	HP	
CP	1.20	40.50	16-02-24	23-02-24	DF	Dando 2000	N/A	N/A	23-02-24	HP/EG	SPT hammer ID: AR1101

Location details:

mE:	346955.33
mN:	376579.59
m OD:	5.29
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
				(1.60)	Firm black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)			10.00 - 10.45 10.00 - 10.45	B21 D20	
	▽		-5.71	11.00						
				(0.50)	Loose brown silty fine to coarse SAND. (TIDAL FLAT DEPOSITS)					
			-6.21	11.50						
	▼			(0.95)	Firm grey slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of mudstone. (TIDAL FLAT DEPOSITS)	4.00	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B23 D22	N=8 (1,2/2,2,2,2)
			-7.16	12.45						
				(2.55)	Loose grey slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mudstone. (TIDAL FLAT DEPOSITS)	5.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B25 D24	N=9 (2,2/2,2,3,2)
			-9.71	15.00						
				(4.50)	Medium dense brown gravelly silty fine to coarse SAND. Gravel is subangular to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)	5.00	15.00	15.00 - 15.45 15.00 - 15.45 15.00 - 15.45	S B27 D26	N=11 (3,3/3,3,2,3)
						6.00	16.50	16.50 - 16.95 16.50 - 16.95	S D28	N=13 (3,3/3,4,3,3)
						5.00	18.00	18.00 - 18.44 18.00 - 18.45 18.00 - 18.45	S B30 D29	50 (5,8/50 for 290mm)
			-14.21	19.50						
					Medium dense brown silty fine to coarse SAND. (TIDAL FLAT DEPOSITS)	5.00	19.50	19.50 - 19.95 19.50 - 19.95 19.50 - 19.95	S B32 D31	N=16 (2,3/4,4,4,4)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
11.00	4.00	11.00	17.50

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	17.50	17.50
200	25.50	25.50
150	40.50	40.50

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH205A

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	16-02-24	16-02-24	DF	Hand tools	N/A	N/A	16-02-24	HP	
CP	1.20	40.50	16-02-24	23-02-24	DF	Dando 2000	N/A	N/A	23-02-24	HP/EG	SPT hammer ID: AR1101

Location details:

mE: 346955.33
mN: 376579.59
m OD: 5.29
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
				(1.50)	Medium dense brown silty fine to coarse SAND. (TIDAL FLAT DEPOSITS)					
			-15.71	21.00	Medium dense brown gravelly silty fine to coarse SAND. Gravel is subangular to rounded fine to course of sandstone and mudstone. (TIDAL FLAT DEPOSITS)	6.00	21.00	21.00 - 21.45 21.00 - 21.45	S B34	N=5 (1,1/1,2,1,1)
				(3.50)		6.00	22.50	22.50 - 22.95 22.50 - 22.95	S B36	N=16 (2,3/4,4,4,4)
						6.00	24.00	24.00 - 24.45 24.00 - 24.45	S B38	N=13 (3,3/3,4,3,3)
			-19.21	24.50	Stiff brown gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)			24.50	B39	
						Dry		25.50 - 25.95	UT40	37 (100%)
								26.00	D41	
				(4.50)		Dry	27.00	27.00 - 27.45 27.00 - 27.45 27.00 - 27.45	S B43 D42	N=34 (5,6/8,8,9,9)
						Dry		28.50 - 28.95	UT44	42 (100%)
	▽		-23.71	29.00	Medium dense becoming dense brown gravelly silty fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)			29.00	D45	
	Inst (Ø)					12.00	30.00	30.00 - 30.45	S	N=31 (5,6/7,8,8,8)
						Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
29.00	12.00	29.00	

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	17.50	17.50
200	25.50	25.50
150	40.50	40.50

Depth related remarks:

From:	To:	Remarks:
23.00	24.00	Blowing sands
29.00	40.50	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH205A

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	16-02-24	16-02-24	DF	Hand tools	N/A	N/A	16-02-24	HP	
CP	1.20	40.50	16-02-24	23-02-24	DF	Dando 2000	N/A	N/A	23-02-24	HP/EG	SPT hammer ID: AR1101

Location details:

mE:	346955.33
mN:	376579.59
m OD:	5.29
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense becoming dense brown gravelly silty fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)			30.00 - 30.45 30.00 - 30.45	B47 D46	
						12.00	31.50	31.50 - 31.95 31.50 - 31.95 31.50 - 31.95	S B49 D48	N=28 (5,6/7,7,7,7)
						15.00	33.00	33.00 - 33.45 33.00 - 33.45 33.00 - 33.45	S B51 D50	N=28 (6,6/6,7,8,7)
						15.00	34.50	34.50 - 34.95 34.50 - 34.95 34.50 - 34.95	S B53 D52	N=31 (5,6/7,8,8,8)
				(11.50)						
						16.00	36.00	36.00 - 36.45 36.00 - 36.45 36.00 - 36.45	S B55 D54	N=38 (6,9/9,10,10,9)
						16.00	37.50	37.50 - 37.95 37.50 37.50 - 37.95	S D56 B57	N=39 (7,8/10,10,9,10)
						15.00	39.00	39.00 - 39.45 39.00 - 39.45 39.00 - 39.45	S B59 D58	N=42 (8,8/10,11,10,11)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	17.50	17.50
200	25.50	25.50
150	40.50	40.50

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH205A

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	16-02-24	16-02-24	DF	Hand tools	N/A	N/A	16-02-24	HP	
CP	1.20	40.50	16-02-24	23-02-24	DF	Dando 2000	N/A	N/A	23-02-24	HP/EG	SPT hammer ID: AR1101

Location details:

mE:	346955.33
mN:	376579.59
m OD:	5.29
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			-35.21	40.50	Medium dense becoming dense brown gravelly silty fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)					
					Borehole ends at 40.50m (Terminated due to blowing sands.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
250	17.50	17.50
200	25.50	25.50
150	40.50	40.50

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH205A

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	14-02-24	14-02-24	JG	Hand tools	N/A	N/A	14-02-24	EG	
CP	1.20	30.45	14-02-24	15-02-24	JG	Dando 2000	N/A	N/A	15-02-24	HP/EG	SPT hammer ID: AR2812

Location details:

mE:	346931.71
mN:	376643.72
m OD:	4.53
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Grass over soft to firm brownish grey sandy CLAY with occasional rootlets. (TOPSOIL)			0.00 - 0.50	B1	
				(1.20)				0.50 - 1.70	B2	
			3.33	1.20	Soft grey and brown slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)	Dry		1.20 - 1.65 1.20 - 1.65 1.20 - 1.65	S B3 D3	N=7 (1,2/2,2,2,1)
				(0.45)						
			2.88	1.65	Spongy black pseudo-fibrous PEAT with a mild organic odour. (TIDAL FLAT DEPOSITS)					
						Dry		2.00 - 2.45	UTNR	4 (0%)
				(2.35)		Dry		3.00 - 3.45 3.00 - 3.45 3.00 - 3.45	S B5 D5	N=4 (1,1/1,1,1,1)
	▼		0.53	4.00	Very soft clayey SILT. (TIDAL FLAT DEPOSITS)	Dry		4.00 - 4.45	UT6	4 (100%)
						Dry	5.00	5.00 - 5.45 5.00 - 5.45 5.00 - 5.45	S B7 D7	N=2 (1,1/0,1,0,1)
						Dry		6.00 - 6.45	UTNR	4 (0%)
				(6.00)		Dry	7.00	7.00 - 7.45 7.00 - 7.45 7.00 - 7.45	S B9 D9	N=2 (1,1/0,1,0,1)
						Dry	8.00	8.00 - 8.45 8.00 - 8.45 8.00 - 8.45	S B10 D10	N=6 (1,1/1,2,1,2)
						Dry		9.00 - 9.45	UT11	13 (100%)
								9.50	D12	
	Inst (Ø)		-5.47	10.00		Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH206

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	14-02-24	14-02-24	JG	Hand tools	N/A	N/A	14-02-24	EG	
CP	1.20	30.45	14-02-24	15-02-24	JG	Dando 2000	N/A	N/A	15-02-24	HP/EG	SPT hammer ID: AR2812

Location details:

mE: 346931.71
mN: 376643.72
m OD: 4.53
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
	▽				Spongy black pseudo-fibrous PEAT. (TIDAL FLAT DEPOSITS)	5.00	10.50	10.50 - 10.95 10.50 - 10.95 10.50 - 10.95	S B13 D13	N=12 (2,2/3,3,3,3)
				(2.00)						
			-7.47	12.00	Medium dense brown gravelly silty fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mudstone and sandstone. (TIDAL FLAT DEPOSITS)	3.00	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B14 D14	N=12 (2,2/3,3,3,3)
						3.00	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B15 D15	N=13 (2,3/3,3,3,4)
						3.50	15.00	15.00 - 15.45 15.00 - 15.45 15.00 - 15.45	S B16 D16	N=13 (3,3/3,3,3,4)
						4.00	16.50	16.50 - 16.95 16.50 - 16.95 16.50 - 16.95	S B17 D17	N=18 (3,4/4,4,5,5)
				(12.00)		4.00	18.00	18.00 - 18.45 18.00 - 18.45	C B18	N=23 (4,5/5,6,6,6)
						4.00	19.50	19.00 - 19.45 19.00 - 19.45	C B19	N=28 (5,5/6,7,7,8)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
10.50	4.30	10.50	22.50

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:
13.00	18.00	Blowing sands

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH206

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	14-02-24	14-02-24	JG	Hand tools	N/A	N/A	14-02-24	EG	
CP	1.20	30.45	14-02-24	15-02-24	JG	Dando 2000	N/A	N/A	15-02-24	HP/EG	SPT hammer ID: AR2812

Location details:

mE: 346931.71
mN: 376643.72
m OD: 4.53
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense brown gravelly silty fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mudstone and sandstone. (TIDAL FLAT DEPOSITS)					
						2.00	21.00	21.00 - 21.45 21.00 - 21.45	C B20	N=29 (5,5/6,7,8,8)
					Stiff brown sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)					
						20		22.50 - 22.95	UT21	30 (100%)
			-19.47	24.00		23.50	22.50	24.00 - 24.45 24.00 - 24.45 24.00 - 24.45	S B22 D22	N=16 (3,3/4,4,4,4)
						25		25.50 - 25.95	UT23	31 (80%)
				(8.95)						
						26.50	22.50	27.00 - 27.45 27.00 - 27.45 27.00 - 27.45	S B24 D24	N=17 (4,4/4,5,4,4)
						28		28.50 - 28.95	UT25	34 (100%)
						29.00	22.50	30.00 - 30.45	S	N=18 (4,4/4,4,5,5)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH206

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	14-02-24	14-02-24	JG	Hand tools	N/A	N/A	14-02-24	EG	
CP	1.20	30.45	14-02-24	15-02-24	JG	Dando 2000	N/A	N/A	15-02-24	HP/EG	SPT hammer ID: AR2812

Location details:

mE:	346931.71
mN:	376643.72
m OD:	4.53
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			-25.92	30.45	Stiff brown sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of sandstone and mudstone. (TIDAL FLAT DEPOSITS)			30.00 - 30.45	D26	
					Borehole ends at 30.45m (Target depth reached.)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH206

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	DF	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	30.45	01-02-24	02-02-24	DF	Dando 2000	N/A	N/A	02-02-24	AS	SPT hammer ID: AR1101

Location details:

mE:	347007.16
mN:	376599.87
m OD:	4.32
Grid:	OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Brown silty clayey fine SAND with occasional roots. (TOPSOIL)			0.00 - 0.60	B1	
				(1.00)				0.50	ES101	
			3.32	1.00				1.00	ES102	
			3.12	1.20	Soft brown mottled grey slightly sandy slightly silty CLAY. (TIDAL FLAT DEPOSITS)	Dry	1.20	1.00 - 1.20	B2	N=4 (1,1/1,1,1,1)
					Soft to firm grey mottled brown slightly silty CLAY. (TIDAL FLAT DEPOSITS)			1.20 - 1.65	S	
								1.20 - 1.65	B4	
				(0.80)				1.20 - 1.65	D3	
								1.50	ES103	
			2.32	2.00	Spongy black fibrous PEAT. (TIDAL FLAT DEPOSITS)	Dry	2.00	2.00 - 2.45	S	N=4 (1,1/1,1,1,1)
								2.00 - 2.45	B6	
								2.00 - 2.45	D5	
				(1.90)						
					3.00 - 3.90 m: Becomes pseudo fibrous peat.	Dry	3.00	3.00 - 3.45	S	N=4 (1,2/1,1,1,1)
								3.00 - 3.45	B8	
								3.00 - 3.45	D7	
	▼		0.42	3.90				3.90	B9	
			0.32	4.00	Very soft dark grey and black slightly silty organic CLAY. (TIDAL FLAT DEPOSITS)	Dry	4.00	4.00 - 4.45	S	N=5 (1,2/2,1,1,1)
					Very soft grey silty CLAY. (TIDAL FLAT DEPOSITS)			4.00 - 4.45	B11	
								4.00 - 4.45	D10	
						Dry	5.00	5.00 - 5.45	S	N=5 (1,1/1,1,2,1)
								5.00 - 5.45	B13	
								5.00 - 5.45	D12	
						Dry	6.00	6.00 - 6.45	S	N=4 (1,0/1,1,1,1)
								6.00 - 6.45	B15	
								6.00 - 6.45	D14	
				(5.00)						
						Dry	7.00	7.00 - 7.45	S	N=3 (1,0/0,1,1,1)
								7.00 - 7.45	B17	
								7.00 - 7.45	D16	
						Dry	8.00	8.00 - 8.45	S	N=5 (1,2/2,1,1,1)
								8.00 - 8.45	B19	
								8.00 - 8.45	D18	
			-4.68	9.00	Spongy black silty amorphous PEAT. (TIDAL FLAT DEPOSITS)			9.00 - 9.45	B21	
								9.00 - 9.45	D20	
				(1.50)						
						Dry		10.00 - 10.45	UTNR	10 (0%)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:50

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

BH207

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	DF	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	30.45	01-02-24	02-02-24	DF	Dando 2000	N/A	N/A	02-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 347007.16
mN: 376599.87
m OD: 4.32
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Spongy black silty amorphous PEAT. (TIDAL FLAT DEPOSITS)					
			-6.18	10.50	Dark grey slightly clayey very silty fine SAND. (TIDAL FLAT DEPOSITS)			10.50	B23	
				(1.50)						
			-7.68	12.00	Medium dense brown silty fine SAND. (TIDAL FLAT DEPOSITS)	Dry	12.00	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45	S B25 D24	N=14 (2,3/3,4,3,4)
				(1.50)						
			-9.18	13.50	Medium dense brown slightly gravelly slightly silty SAND. Gravel is subangular to rounded fine to medium of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)	Dry	13.50	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95	S B27 D26	N=17 (2,3/4,4,4,5)
						Dry	15.00	15.00 - 15.45 15.00 - 15.45	C B28	N=22 (4,5/5,6,5,6)
					16.50 m: Sand becomes fine to medium	Dry	16.50	16.50 - 16.95 16.50	C B29	N=24 (5,6/6,6,6,6)
						Dry	18.00	18.00 - 18.45 18.00 - 18.45	C B30	N=25 (5,4/6,6,7,6)
				(11.00)						
						Dry	19.50	19.50 - 19.95 19.50 - 19.95	C B31	N=28 (6,6/7,7,7,7)
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
10.50	4.00	10.50	

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH207

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	DF	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	30.45	01-02-24	02-02-24	DF	Dando 2000	N/A	N/A	02-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 347007.16
mN: 376599.87
m OD: 4.32
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense brown slightly gravelly slightly silty SAND. Gravel is subangular to rounded fine to medium of mudstone, sandstone and quartz. (TIDAL FLAT DEPOSITS)					
						Dry	21.00	21.00 - 21.45	S	N=27 (5,6/6,7,7,7)
								21.00 - 21.45	B33	
								21.00 - 21.45	D32	
					22.50 m: Sand becomes fine to coarse	3.00	22.50	22.50 - 22.95	S	N=30 (6,7/7,8,7,8)
								22.50 - 22.95	B35	
								22.50 - 22.95	D34	
						5.00	25.50	24.00 - 24.45	S	N=25 (6,7/7,6,6,6)
								24.00 - 24.45	B37	
								24.00 - 24.45	D36	
			-20.18	24.50	Stiff brown slightly sandy slightly gravelly laminated CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. (TIDAL FLAT DEPOSITS)			25.00	Hand-held field vane	86.6 kPa
								25.50 - 25.95	B39	
								25.50 - 25.95	D38	
								26.00	Hand-held field vane	91.3 kPa
						Dry	27.00	27.00 - 27.45	S	N=23 (5,5/6,6,5,6)
								27.00	Hand-held field vane	87.3 kPa
								27.00 - 27.45	B41	
				(5.95)				27.00 - 27.45	D40	
						Dry		28.50 - 28.95	UT42	32 (100%)
								29.00	D43	
						Dry	27.00	30.00 - 30.45	S	N=27 (5,6/6,7,7,7)
	SP Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH207

Borehole Log

ayesa

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:
IP	0.00	1.20	29-01-24	29-01-24	DF	Hand tools	N/A	N/A	29-01-24	AS	
CP	1.20	30.45	01-02-24	02-02-24	DF	Dando 2000	N/A	N/A	02-02-24	AS	SPT hammer ID: AR1101

Location details:

mE: 347007.16
mN: 376599.87
m OD: 4.32
Grid: OSGB

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results/Remarks
			-26.13	30.45	Stiff brown slightly sandy slightly gravelly laminated CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. (TIDAL FLAT DEPOSITS)			30.00 - 30.45	D44	
					Borehole ends at 30.45m (Target depth reached.)					

	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
200	22.50	22.50
150	30.45	30.00

Depth related remarks:

From:	To:	Remarks:

Chiselling details:

From:	to:	Duration:	Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL
Scale: 1:50

Project: Protos Carbon Capture Site Investigation
Project No: K0525
Client: Encyclis

Exploratory position reference:

BH207

Trial Pit Log

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	OS	Method:	Machine Excavated Pit	Width:	0.70	Easting:	346946.90 m E	Start:	31/01/2024
Checked by:	HP			Length:	2.20	Northing:	376646.44 m N	End:	31/01/2024
Approved by:	HP	Plant:	13 Tonne Excavator	Orientation:		Level:	4.27 m OD	Logged:	31/01/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.30)	Grass over brown sandy CLAY with abundant rootlets. (TOPSOIL)	0.10 0.10 - 0.30	ES1 B1	
			3.97 0.30				
			(0.30)	Soft to firm brown mottled orangish brown silty CLAY. (TIDAL FLAT DEPOSITS)	0.40 0.45 - 0.65	ES2 B2	
			3.67 0.60				
			(0.80)	Soft bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)	0.70 0.80 - 1.00	ES3 B3	
			2.87 1.40				
			(2.10)	Spongy brown fibrous PEAT with a strong sulphurous odour. (TIDAL FLAT DEPOSITS)	1.80 2.60 - 2.80	B4 B5	
			0.77 3.50				
			(0.50)	Firm bluish grey clayey SILT with occasional plant material. (TIDAL FLAT DEPOSITS)	3.70 - 3.90	B6	
			0.27 4.00	Trial pit ends at 4.00 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Light Showers

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP212

Sheet 1 of 1

Trial Pit Log

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	EG	Method:	Machine Excavated Pit	Width:	0.60	Easting:	346998.29 m E	Start:	01/02/2024
Checked by:	HP			Length:	2.00	Northing:	376704.76 m N	End:	01/02/2024
Approved by:	HP	Plant:	13 Tonne Excavator	**Orientation:**		Level:	4.50 m OD	Logged:	01/02/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.30)	Grass over soft light brown slightly sandy CLAY with abundant rootlets with cobble sized pieces of red clay pipe fragments. (TOPSOIL)	0.00 - 0.30	B1	
					0.20	HV	80 kPa
					0.20	ES1	
			4.20 0.30	Firm grey mottled orangish brown slightly sandy CLAY. (TIDAL FLAT DEPOSITS)	0.40 - 1.10	B2	
			(0.90)		0.70	HV	55 kPa
					0.70	ES2	
			3.30 1.20	Firm dark brown pseudo-fibrous PEAT with a strong sulphurous odour. (TIDAL FLAT DEPOSITS)	1.30 - 2.90	B3	
			(1.80)		2.12		
			1.50 3.00	Soft bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)	3.10 - 3.90	B4	
			(1.00)		3.50	HV	11 kPa
					3.50	ES4	
			0.50 4.00	Trial pit ends at 4.00 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Overcast

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP213

Sheet 1 of 1

Trial Pit Log

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	OS	Method:	Machine Excavated Pit	Width:	0.60	Easting:	346884.95 m E	Start:	29/01/2024
Checked by:	HP			Length:	2.10	Northing:	376633.00 m N	End:	29/01/2024
Approved by:	HP	Plant:	20 Tonne Excavator	**Orientation:**		Level:	4.35 m OD	Logged:	29/01/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.30)	Grass over soft dark brown sandy CLAY with abundant rootlets. (TOPSOIL)	0.10 - 0.20	B1	
					0.20	ES1	
			4.05 0.30	Soft to firm light brown silty CLAY. (TIDAL FLAT DEPOSITS)	0.40 - 1.10	B2	
					0.60	HV	51 kPa
			(0.90)		0.60	ES2	
			3.15 1.20	Spongy dark brown fibrous PEAT with a strong sulphurous odour. (TIDAL FLAT DEPOSITS)	1.30	ES3	
					1.40 - 1.80	B3	
					2.40 - 2.80	B4	
			(2.90)				
					3.40 - 3.80	B5	
			0.25 4.10	Trial pit ends at 4.10 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Light Showers

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP214

Trial Pit Log

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	OS	Method:	Machine Excavated Pit	Width:	0.70	Easting:	347009.04 m E	Start:	30/01/2024
Checked by:	HP			Length:	2.00	Northing:	376667.84 m N	End:	30/01/2024
Approved by:	HP	Plant:	13 Tonne Excavator	**Orientation:**		Level:	4.50 m OD	Logged:	30/01/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			4.35 0.15	Grass over dark brown sandy CLAY. (TOPSOIL)	0.05 - 0.15	B1	
					0.10	ES1	
				Soft to firm light brown mottled orangish brown silty CLAY with occasional sandy layers. (TIDAL FLAT DEPOSITS)	0.30 - 0.60	B2	
					0.40	HV	52 kPa
					0.40	ES2	
			(0.95)				
					0.80 - 1.00	B3	
			3.40 1.10	Spongy dark brown fibrous PEAT with a strong sulphurous odour. (TIDAL FLAT DEPOSITS)			
					1.40	ES3	
					1.50 - 1.70	B4	
					2.30 - 2.70	B5	
			(3.00)				
					3.50 - 3.70	B6	
			0.40 4.10	Trial pit ends at 4.10 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Overcast

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP215

Trial Pit Log

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	OS	Method:	Machine Excavated Pit	Width:	0.70	Easting:	346981.75 m E	Start:	31/01/2024
Checked by:	HP			Length:	2.30	Northing:	376580.88 m N	End:	31/01/2024
Approved by:	HP	Plant:	13 Tonne Excavator	**Orientation:**		Level:	4.32 m OD	Logged:	31/01/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			4.12 0.20	Grass over brown slightly gravelly sandy CLAY with abundant roots and rootlets. Gravel is angular to subrounded fine to coarse of limestone, siltstone and occasionally red brick. (MADE GROUND)	0.10	ES1	
			(1.00)	Very soft to soft brown mottled orangish brown slightly gravelly, silty CLAY. Gravel is subrounded fine to coarse of siltstone. (TIDAL FLAT DEPOSITS)	0.30	ES2	
					0.40 - 0.80	B1	
					0.50	HV	36 kPa
			3.12 1.20	Soft bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)	1.30	ES3	
			(0.30)		1.30 - 1.50	B2	
			2.82 1.50	Firm brown pseudo-fibrous PEAT and a strong sulphurous odour. (TIDAL FLAT DEPOSITS)	1.60 - 2.00	B3	
			(2.60)		2.60 - 3.00	B4	
					3.20 - 4.00	B5	
			0.22 4.10	Trial pit ends at 4.10 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Light Showers

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP216

Trial Pit Log

ayesa

Personnel:		Equipment & methods:		Dimensions:		Coordinates & level:		Dates:	
Logged by:	OS	Method:	Machine Excavated Pit	Width:	0.60	Easting:	346920.31 m E	Start:	30/01/2024
Checked by:	HP			Length:	2.10	Northing:	376572.73 m N	End:	30/01/2024
Approved by:		Plant:	13 Tonne Excavator	**Orientation:**		Level:	4.48 m OD	Logged:	30/01/2024
		Shoring:	None	Strike A - C = °		Grid:	OSGB		

Backfill/ Instal'n	Water-strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.30)	Grass over brown sandy CLAY with abundant roots and rootlets. (TOPSOIL)	0.15 0.20 - 0.30	ES1 B1	
			4.18 0.30				
			(0.30)	Soft light brown silty CLAY. (TIDAL FLAT DEPOSITS) *0.40 m: Land drain on southern side of pit.*	0.40 0.40 - 0.55	ES2 B2	
			3.88 0.60				
			(1.10)	Soft to firm grey to bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)	0.70 0.90 - 1.20 1.22	ES3 B3	
			2.78 1.70				
			(2.30)	Spongy dark brown fibrous PEAT with strong sulphurous odour. (TIDAL FLAT DEPOSITS)	2.00 2.00 - 2.40 3.00 - 3.40	ES3 B4 B5	
			0.48 4.00	Trial pit ends at 4.00 m (Target depth reached.)			
					Depth	Type & No	Results

Groundwater entries:

Depth:	Rose to:	After (mins):	Remarks:

Depth related remarks:

From to: Remarks:

General remarks:

Weather: Overcast

Stability: Stable

Remarks:

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: FINAL

Scale: 1:25

Project: Protos Carbon Capture Site Investigation

Project No: K0525

Client: Encyclis

Exploratory position reference:

TP217

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING UK LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	AR1101
Test Date:	04/01/2024
Report Date:	04/01/2024
File Name:	AR1101.spt
Test Operator:	CM

Instrumented Rod Data

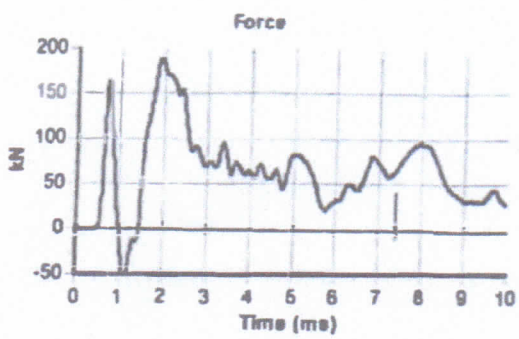
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	
Accelerometer No.2:	

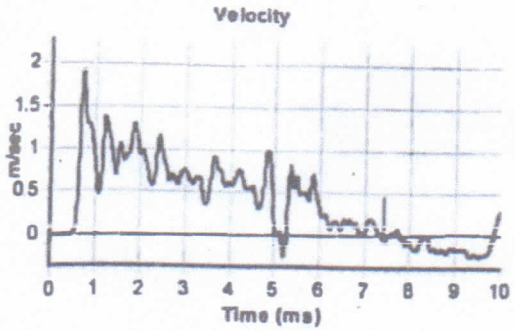
SPT Hammer Information

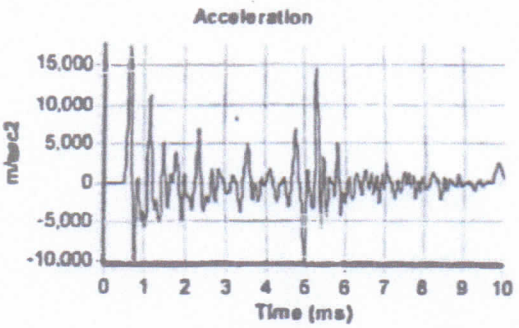
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

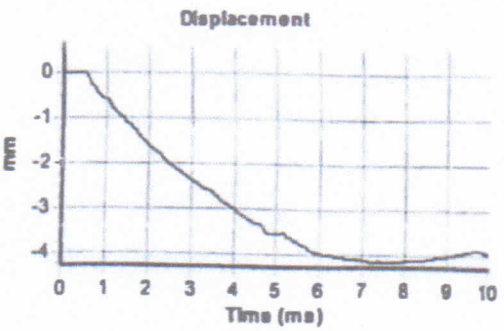
Comments / Location

VC - 83450









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	339

Energy Ratio E_r (%): **72**

Signed: J.LOCK

Title: FITTER

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SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING UK LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	AR2812
Test Date:	04/01/2024
Report Date:	04/01/2024
File Name:	AR2812.spt
Test Operator:	CM

Instrumented Rod Data

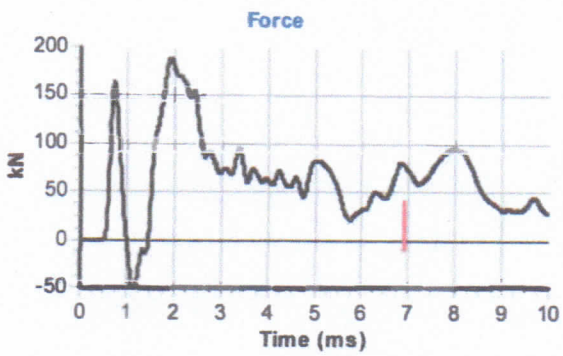
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	
Accelerometer No.2:	

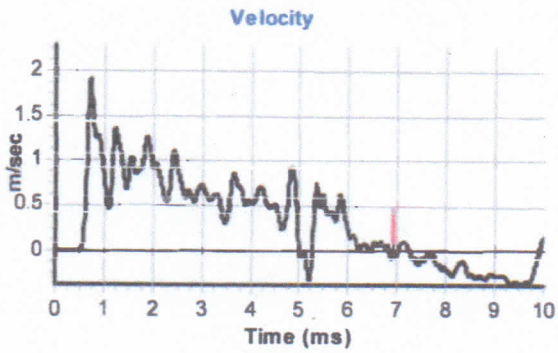
SPT Hammer Information

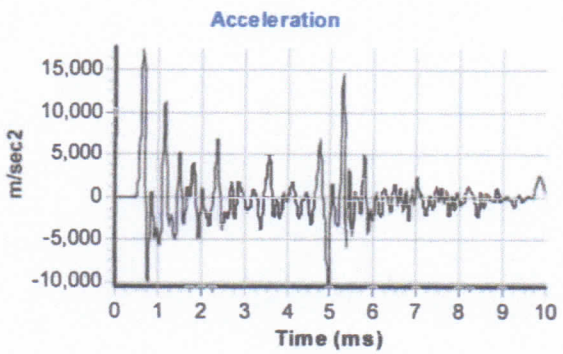
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

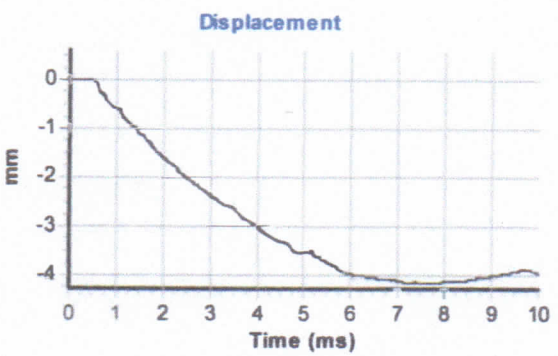
Comments / Location

VC - 83450









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	312

Energy Ratio E_r (%): **66**

Signed: J.LOCK

Title: FITTER

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Exploratory Hole Key Sheet

SAMPLES:

Undisturbed:	
U	Driven tube sample
UT	Thin wall driven tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample
L	Liner sample (from windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
C	Core sample (from rotary core) taken for laboratory testing
Disturbed:	
D	Small sample
B	Bulk sample
AMAL	Amalgamated sample
Environmental:	
ES	Environmental soil sample
EW	Environmental water sample
Comments:	Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that an attempt was made to take a tube sample; however, there was no recovery. Sample recovery is given as a percentage.

TESTS:

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C)
	The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).
ICBR	In situ CBR
IV	In situ vane shear strength, peak (p) and remoulded (r), kPa
HV	Hand vane shear strength, peak (p) and remoulded (r), kPa
PP	Pocket penetrometer test, converted to shear strength, kPa
KFH, KRH, KPI	Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value
PID/FID	Photo-ionisation detector/Flame-ionisation detector
	Test results provided in Field Records column

DRILLING RECORDS:

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930: 2015 and BS EN ISO 22575-1 (2006)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented.
NI	Non intact is used where the core is fragmented.
CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER:

▽ Groundwater strike

▼ Groundwater level after standing period

DEPTH REMARKS:

EoS	End of Shift
SoS	Start of Shift
EoBH	End of Borehole

INSTRUMENTATION:

Details of installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill. The type of instrument installed is indicated by a code adjacent to the Legend column at the base of the instrument.

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer
AP	Access pipe
GMP	Gas monitoring standpipe
(xx)	Internal diameter (mm)
ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator
ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
ETR	Rod extensometer

EXPLORATORY HOLE TYPE:

CP	Cable percussion
DP	Dynamic probe
DCP	Dynamic cone penetrometer
HA	Hand auger
IP	Inspection pit
OP	Observation pit/trench
PC	Pavement core
RC	Rotary core
RO	Rotary open hole
SH	Shaft
SNC	Sonic (resonance)
TP	Trial pit/trench
TRAV	Traverse
WLS	Windowless (dynamic) sample
WS	Window (dynamic) sample

AGS

Project: **Protos Carbon Capture Site Investigation**

Project No: **K0525**

Client: **Encyclis**

Reference

KEY SHEET

Appendix E – In Situ Testing Results

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PROTOS, INCE

SOIL INVESTIGATION

CPT REPORT

Cone penetration testing
Dissipation testing
Parameter interpretation

Project Reference.: 24-28-27124-1

Report Issue No.: 01 27124_01

PROJECT:	Protos, Ince

CLIENT:	Ayesa

FIELDWORK

CPT rig	13.0-tonne hybrid crawler CPT unit (UK23)
Date fieldwork started	5th February 2024
Date fieldwork completed	12th February 2024
Lankelma's representative	Paul Dimelow
Client's representative	Hannah Plunkett

DOCUMENT CHECKING

Action	Date	Name
Completed	26/02/2024	Nick Mason
Checked	26/02/2024	Christopher Player
Approved	26/02/2024	Joseph Hobbs

Issue	Date	Status
01_01	26/02/2024	Final

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1 INTRODUCTION

At the request of Ayesa, a soils investigation was carried out on project *Protos, Ince*.

Site location:

(In the general region of)

Protos Carbon Capture
Grinsome Road
Metka, Protos, Ince
CH2 4RB

2 DISCLAIMER

The investigation information, raw data and interpretations provided in this report are for the sole benefit of the Client identified at the front of the report.

Lankelma has exercised reasonable skill and care in the fieldwork and preparation of this report. This report has been completed based on information available to Lankelma at the time of preparation. The measurement and interpreted data in this report do not constitute recommendations for design purposes. An appropriately qualified person must review and interpret the data given in this report, together with any assumptions we have made that affect the data, before using the data for design or recommendation. Lankelma accepts no responsibility for the accuracy or suitability of any assumptions, derived soil parameters, soil classification descriptions or soil layer boundaries contained in this report.

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: $B_q = (u_2 - u_0)/(q_t - \sigma_v)$
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 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 6.8).
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.** Calculated by iteration as a function of I_c
q_t	**Corrected tip resistance:** The cone tip resistance q_c corrected for pore water pressure effects on the cone shoulder
$q_{t\text{-}net}$	**Net cone resistance:** $q_{t\text{-}net} = q_t - \sigma_v$. 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: $R_f = (f_s/q_c) \cdot 100$
s_u	**Undrained shear strength** (generic)
u_0	**Equilibrium pore pressure**
u_2	**Pore pressure:** Dynamic pore pressure measured at the shoulder position (u_2) during penetration and during dissipation tests. $u_2 = \Delta u_2 + u_0$
Δu_2	**Excess (or differential) pore pressure:** $\Delta u_2 = u_2 - u_0$
V_s, V_p	**Shear wave velocity, V_s, and pressure wave velocity, V_p.** Measured with use of a seismic receiver

Greek

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:** σ_{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

Friction sleeve or 'sleeve': The section of the cone penetrometer upon which the sleeve friction is measured, located behind the cone 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 to derive true depth

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

Seismic cone: A cone penetrometer with a seismic receiver incorporated inside or behind the cone

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 Robertson (1990, 2016), abbreviated to SBT, or SBTn when based on stress normalised parameters

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

Zero [load output] value(s) or **baseline value(s):** The analog or digital output of a sensor (or set of sensors) with no load/force applied

4 COMPLETED WORKS

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

Several non-scheduled short QA/QC dissipation tests were undertaken during the works during testing downtime, to verify drainage conditions or during temperature stabilisation pauses. These have not been included in the dissipation interpretation but do appear in the AGS 4.0 data file provided.

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

5 FIELDWORK GENERAL

Fieldwork was performed with a 13.0-tonne hybrid crawler CPT unit (UK23) equipped with a 13.0-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 40 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.

The depths of dissipation tests were advised by the Investigation Supervisor or Engineer's Representative.

6 CONE PENETRATION TESTS

Cone penetration testing was carried out in general accordance with BS ISO 22476-1:2012.

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 ISO 376:2011 within 6 months of the fieldwork completion. The management of calibration records is in accordance with ISO 10012. 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°/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 10 minutes with an accuracy of ~+- 0.5°.

The piezometer filter element was in the u_2 position and was vacuum saturated in a > 99.9% vacuum under 1000 cSt silicone oil for > 7 days prior to mobilisation. The pore pressure system was vacuum saturated in the disassembled state under 500 cSt glycerine oil (dipropylene glycol or propylene glycol) and assembled under oil prior to each test.

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, 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 prior to each test, or following each 20-60 m of testing, depending on ground conditions and closeness of measurements to tolerance limits.

6.1 CPT DATA REDUCTION AND PRESENTATION

The CPT results are presented in Appendix C. The corrected cone resistance (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 BS ISO 22476-1:2012. CPT data and the associated derived geotechnical parameters are included in the 4.0 data file provided.

The cone tip and sleeve force measurements were converted to pressure using the nominal dimensions of the penetrometer (mid-point of wear on the tip and sleeve).

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

For tests performed with digital cones, the tip sleeve and pore pressure measurements were corrected for static and transient temperature effects using parameters obtained from the *TEMPERATURE EFFECTS* section of the calibration certificate. For each CPT, the dataset was first grouped into penetration strokes (max 1.2 m) and then locally sub-grouped by q_c values above and below 2 MPa. For each sub-group of q_c < 2 MPa, the slope of the temperature (T) profile with time (t) was determined by regression to obtain the rate of temperature change $\Delta T/\Delta t$. For each recorded value, the static and transient temperature error component (apparent sensor output due to change in temperature) was subtracted from the reading.

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

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

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

and

$u_a = b(\Delta T)$

Where $q_{c:a}$ is the apparent tip resistance, $f_{s:a}$ is the apparent sleeve resistance, a is the apparent resistance due to unit transient temperature change $\Delta T/\Delta t$, 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. Note that for the piezometer sensor only the static temperature component is considered and is only applied to piezometer sensors without temperature compensation circuitry.

Parameter a is established by subjecting the cone to a positive and negative nominal temperature change (ΔT ~ +- 9°) in water and measuring the apparent output corresponding to the maximum rate of temperature change at the load cells. Parameter b is established by measuring the apparent output after the cone has temperature stabilised.

The temperature corrected tip ($q_{c:c}$), sleeve resistance ($f_{s:c}$) and pore pressure ($u_{:c}$) are then found from

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

$f_{s:c} = f_{s:m} - f_{s:a}$

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

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

Notes:

1. Depending on the temperature performance of the individual cone, temperature correction of the sleeve is often not warranted 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.

2. There is currently no recognised nomenclature for CPT parameters with temperature correction applied during post processing. To avoid confusion the nomenclature 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 using the parameters reported in the calibration certificate.

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

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

Where a is the 'area ratio' 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:

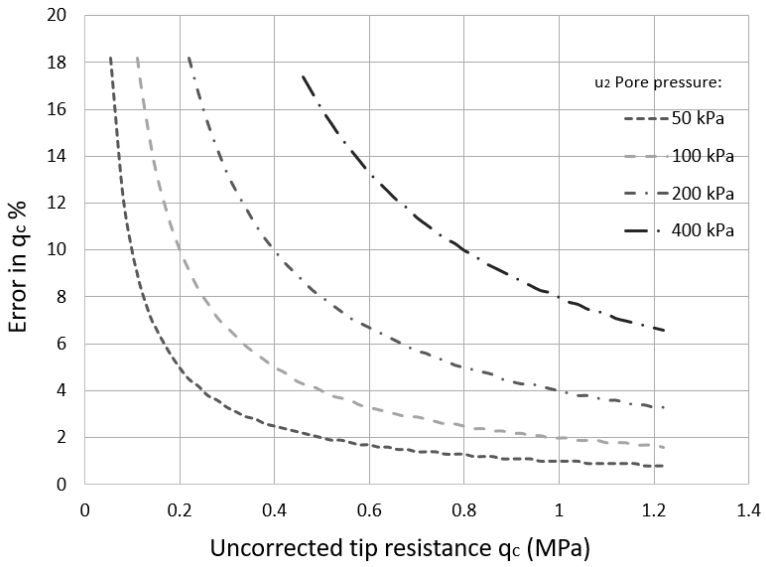


Figure 6-1 Uncorrected tip with measured tip resistance

Penetration length readings were corrected for inclination and sleeve readings were depth corrected for the dimensional offset between cone tip and sleeve during post processing. 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 well within the intrinsic influence zone of the cone tip measurement and the loss of meaningful resolution is negligible.

The raw data is presented in Appendix C. For piezocone tests q_t is reported on all logs, and q_c only appears in the digital AGS data. Dissipation test curves are plotted in Appendix H. Dissipation interpretation values are presented alongside CPT test results in Appendix G.

Geotechnical parameters appropriate for drained and undrained cone penetration conditions were 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 were derived over a range of transitional soils within the range $2.4 < I_c < 2.7$ (see section 6.5).

In general, the engineering parameters derived for fine grain soils (undrained) are suitable for soils of both silicate and carbonate composition, whereas parameters derived for coarse soils are intended for non-cemented silicate composition.

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 most soil parameters obtained from the CPT and dissipation test.

The total vertical stress with depth was calculated as the sum of the derived soil unit weight above a given depth. See section 6.3 for information on the empirical estimate of soil unit weight.

The depth of the phreatic surface applied in the calculation of effective stress was estimated for each location based on interpretation of piezocone measurements in drained soils and/or the final pressure

of dissipation tests which proceeded to equilibrium pressure. The project average piezometric depth (or elevation if available) was applied to locations without direct measurements.

The in-situ pore pressure for specific dissipation test interpretation was assumed as above or, where possible, assessed directly from the dissipation plot.

Note: The term phreatic surface is used here, however when it is based on piezometer measurements (piezocone) it is assumed that the piezometric level (under hydrostatic conditions) and phreatic surface coincide. The phreatic or piezometric level 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 following method proposed by Robertson (2010b).

$$\frac{y}{y_w} = 0.27\,Log(R_f) + 0.36\,(Log(q_t/R_f)) + 1.236$$

Throughout pre-drilled zones (inspection pits or drill-out) the soil was assigned a nominal unit weight of 17 kN/m^3.

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

The data have been interpreted using 4 soil behaviour type schemes: Robertson (1990, 2010, 2016) and Schneider et al, 2008. The Robertson (1990) scheme is widely used and forms the bases of the layer analysis whereby the profile is split into zones of common classification. The Robertson (2010 & 2016) and Schneider at al methods are less widely used but can provide better or more relevant classification in many instances. Differences in classification between the Robertson 1990, 2016 and Schneider et al schemes can also help to identify significant structure/cementation (Robertson 2016).

A dedicated soil behaviour type comparison log is provided in Appendix D.

Robertson (1990, 2010)

The soil behaviour type (SBT) was interpreted using the Robertson (1990) classification system based on the normalised cone resistance (Qt) and normalised friction sleeve resistance (Fr) for silicate and organic soils.

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 associated with the potentially large difference between the estimated vertical effective stress (applied in normalisation) and the unknown horizontal stress influencing penetration resistance.

Robertson (2010) proposed a non-normalised version of the 1990 chart which uses dimensionless cone resistance (q_c/Pa) and friction ratio (Rf). The classification according to this chart can be more reliable at shallow depth.

It should be noted that:

- The SBT classification provides a general soil type and tends to show biased towards the soil fraction that dominates the mechanical behaviour.
- If fine cohesive soils are dry and overconsolidated, the classification tends to shift towards a coarser soil type (or lower I_c index)

While the repeatability and behavioural bias of the SBT is usually beneficial, the classification is not always an appropriate substitute for classification based on particle size and plasticity index tests.

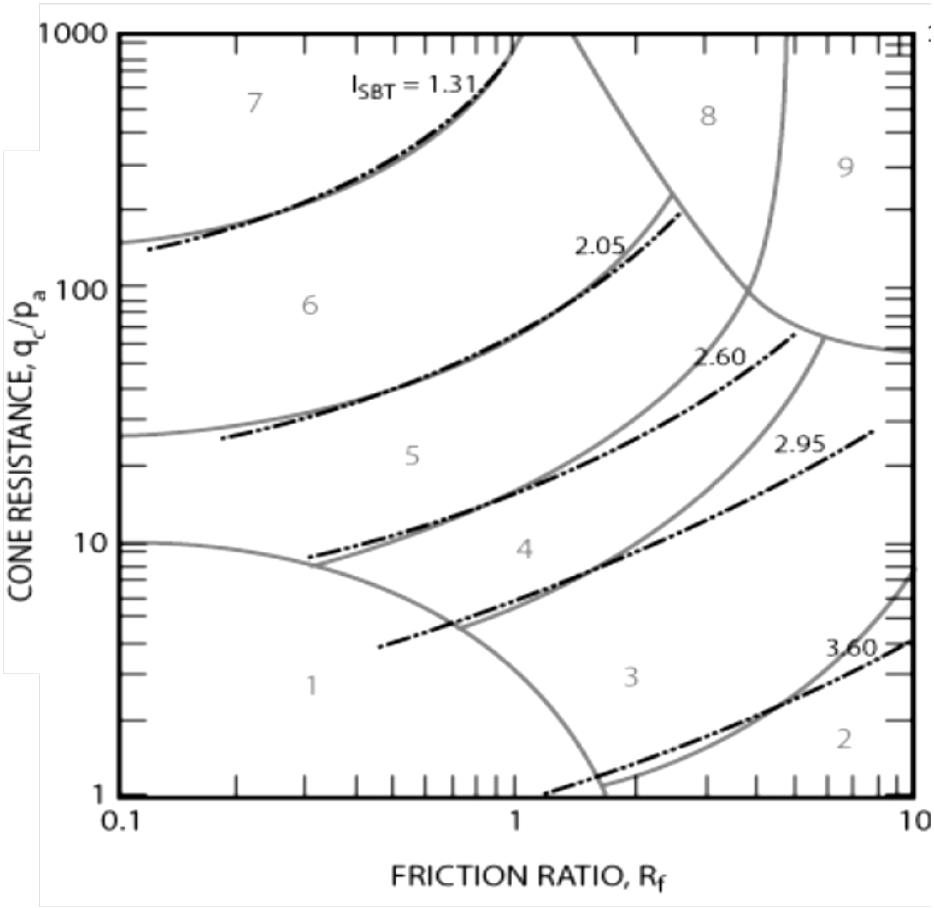


Figure 6-2 Non-normalised SBT chart by Robertson et al. (2010) based on dimensionless cone resistance (qc/Pa) and friction ration, Rf, showing contours of SBT index ISBT (denoted Ic on the test plots). The chart is also applicable to normalised tip (Q_t) and sleeve (F_r) values.

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

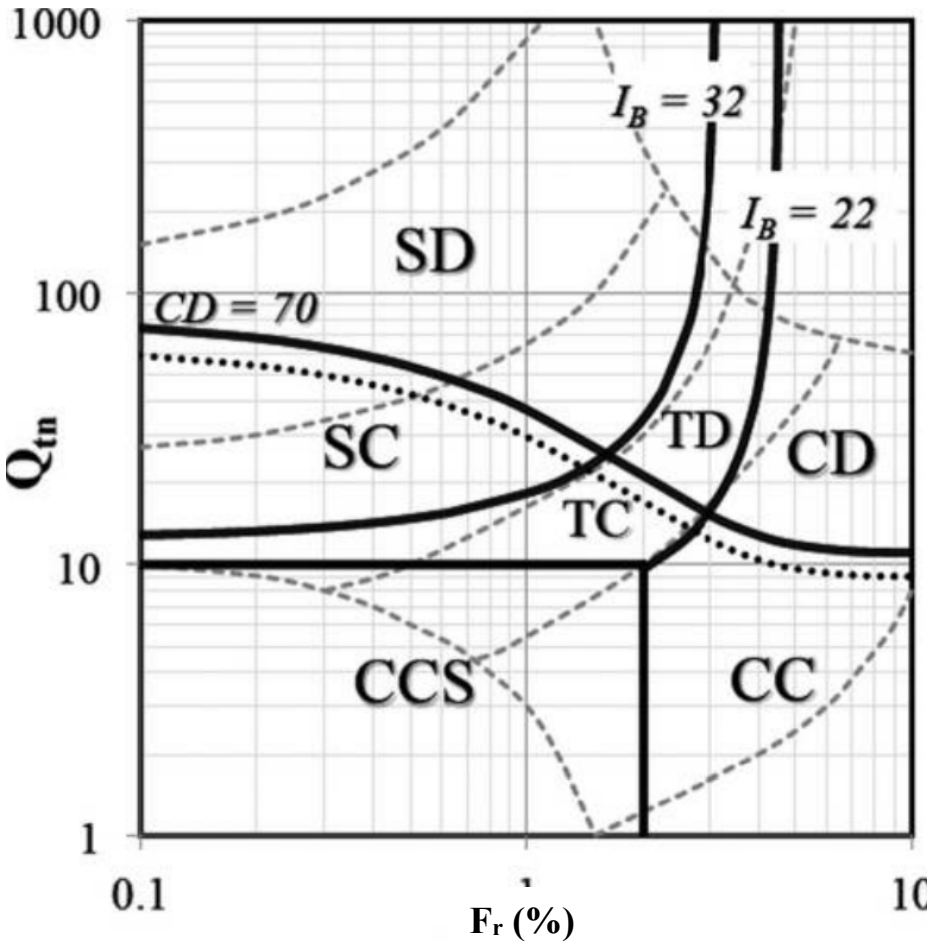
Zone	Soil Behaviour Type (SBT)		
1	Sensitive fine-grained	6	Sands - clean sand to silty sand
2	Organic soils	7	Gravelly sand to sand
3	Clays – clay to silty clay	8*	Very stiff/dense sand to clayey sand[1]
4	Silt mixtures - clayey silt to silty clay	9*	Very stiff fine grained[1]
5	Sand mixtures – silty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

[1]Note 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.

Results are presented in Appendix D.

Robertson 2016

Using the same Q_t - F_r space as above, 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 tip resistance Q_t. This system is particularly useful for soils of very low strength or that exhibit drainage behaviour or u_2 response inconsistent with the SBT derived from tip and sleeve measurements. However, when using this method for onshore CPT data, the u_2 piezometer response should be assessed for possible desaturation. Generally, it is safest to only use this method when the piezometer response is 'spikey' and responding dynamically to changes in tip resistance.

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

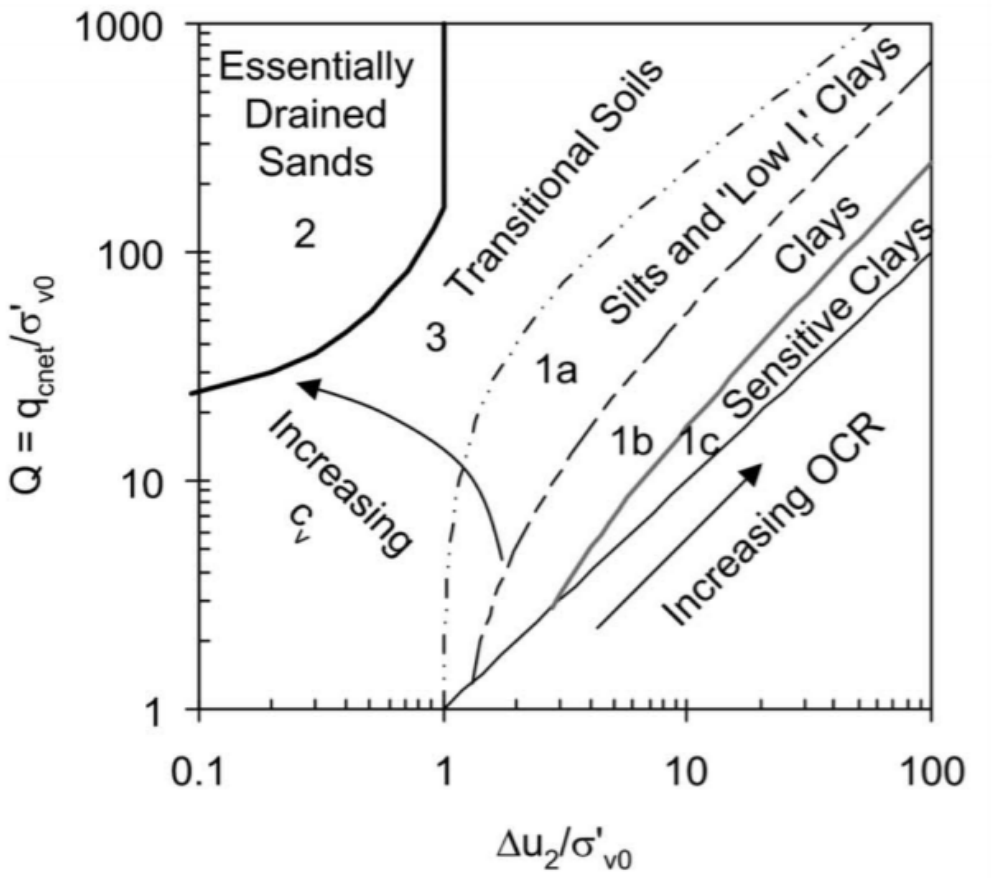


Figure 6-4 Schneider 2008 soil behaviour type classification chart and zone descriptions

Layer Analysis

The layer boundaries are manually interpreted based on broad changes in Robertson 1990 SBT classification or variance with depth. Once layer boundaries are defined, the SBT zones classified within each layer are listed together with the corresponding percentage of data points within the layer (excluding null/filtered data). The modal classification is reported in full, with abbreviated short descriptions for all secondary zones, for example - '*Clays - clay to silty clay [74%]; *Silt mixtures [20%]*', where the asterisk represents an abbreviation of the full description '*Silt mixtures - clayey silt to silty clay*'. It is important to consider that the classification zone boundaries do not exist in nature and small shifts in the cone response can lead to multiple classifications within layers of relatively uniform behaviour; especially were the layer data plot close to a zone junction and/or has spurious spikes or very thin layers. Therefore, some system is required to limit the number of classified

zones that appear within each layer description. The following logic has been used to only retain high % constituent classification values:

For LT >= 1, C = 85
For 0.5 <= 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, 10% of data at the top and bottom of the layer are excluded to limit the effect of transition zone data (measured resistance influenced by overlying or underlying strata) being included in the classification.

The continuous SBT index I_c should 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, 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 variation within units. 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 5-2. 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)*:*

$$I_c = [(3.47 - \log Q_t)^2 + (logF_r + 1.22)^2]^{0.5}$$

Non-normalised SBT index I_C (Robertson, 2010)*:*

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

The normalised version of I_c is generally 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.

The results are presented in Appendix D.

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.

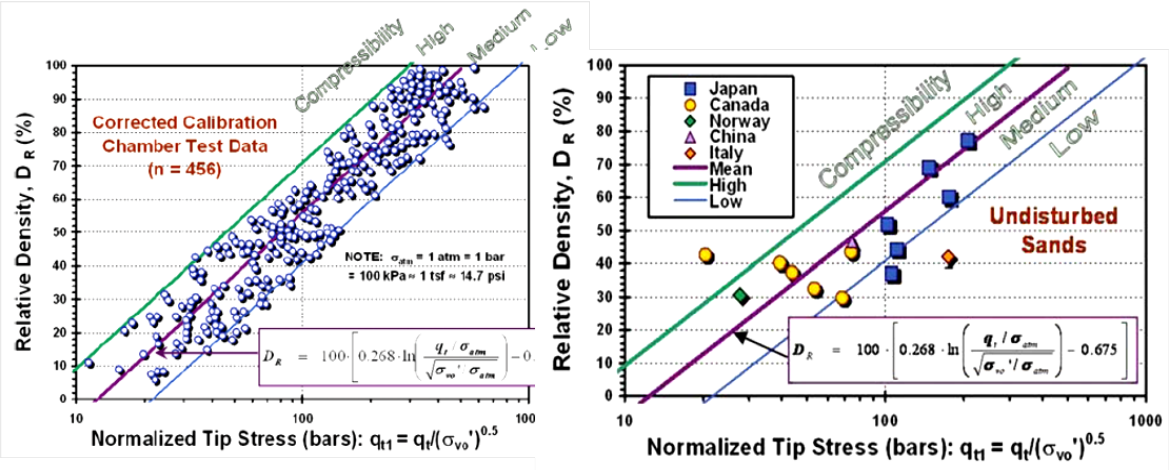


Figure 6-5 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

The results are presented in Appendix F.

6.7 UNDRAINED SHEAR STRENGTH

The undrained shear strength s_u is usually estimated by the bearing capacity method, whereby the net tip resistance is divided by a factor N_k (Lunne *et al*, 1981):

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

Where N_k is an empirical factor which varies with soil type, stress history, structure/fabric, plasticity, and the mode of shear.

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 clays. Reproduced from Mayne and Peuchen (2018).

Clay Group	Number of sites	Nr Data	Correlation Coefficient r^2	Factor N_{kt}	Mean Pore Pressure Parameter B_q
Offshore NC-LOC	17	115	0.98	12.32	0.51
Onshore NC-LOC	30	191	0.867	12	0.53
Sensitive NC-LOC	5	43	0.507	10.33	0.84
OC Intact	5	36	0.862	13.57	0.49
OC Fissured	5	22	0.393	22.47	-0.01
All clays	62	407	0.923	13.33	0.55

Alternatively, a variable N_{kt} factor can be estimated for the profile 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 N_{kt} estimate has a standard error of 2.4 N_k and correlation coefficient of 0.645.

The estimate based on B_q is presented as 's_u5' on the parameter 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 't') indicates a N_k factor that has been established using the corrected tip resistance q_t. N_{kt} can be applied to the uncorrected tip resistance q_c (non-piezocone tests) but results in a slightly lower estimate of s_u depending on the correction magnitude (q_c - q_t) in lower strength soils.

Undrained shear strengths corresponding to selected values of N_k are presented on the plots of Appendix D. '*s_u3*' on the logs (N_k = 15) has been included as a reference for comparison to traditionally applied N_k values of 15 and 20.

The results are presented in Appendix E.

6.8 OVERCONSOLIDATION RATIO

The preconsolidation stress σ_p' was calculated based on the method proposed by Mayne et al (2009):

$$\sigma_p' = k \cdot (q_t - \sigma_{vo})^{m'}$$

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

Mayne *et al* found that the trend with mean grain size followed a power law through the addition of exponent m' and that its value can be estimated by relation to soil behaviour type index I_c:

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

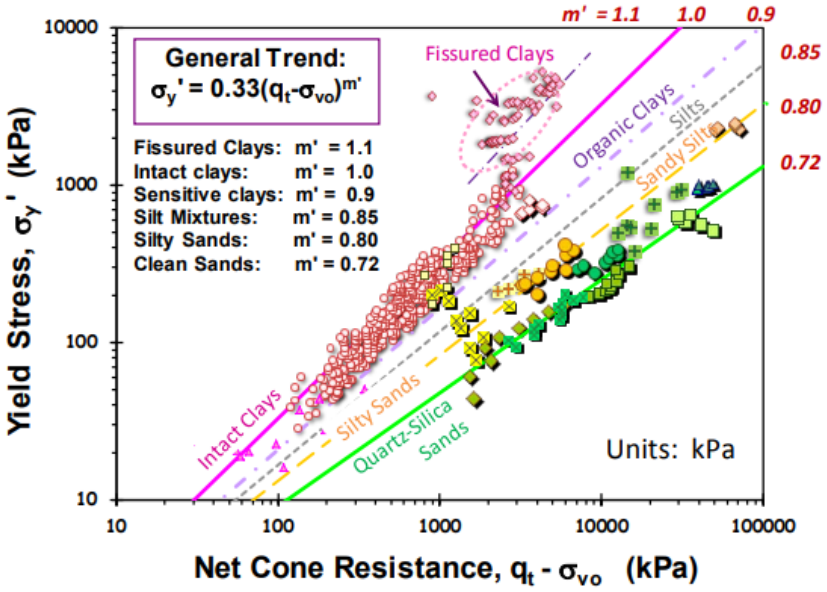


Figure 6-6 Preconsolidation stress with net cone resistance power law, reproduced from Mayne (2014).

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 for two correlations.

Method 1 - Jefferies and Davies (1993) cited in Lunne *et al.* (1997):

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

Method 2 - Robertson (2012):

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

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, uses the relationship:

N_{60} x 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 Kulhawy and Mayne (1990) method. The relationship is based on a calibration chamber database from 24 sands (mainly sampled by freezing) of varying mineralogy and is found from:

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

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 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.

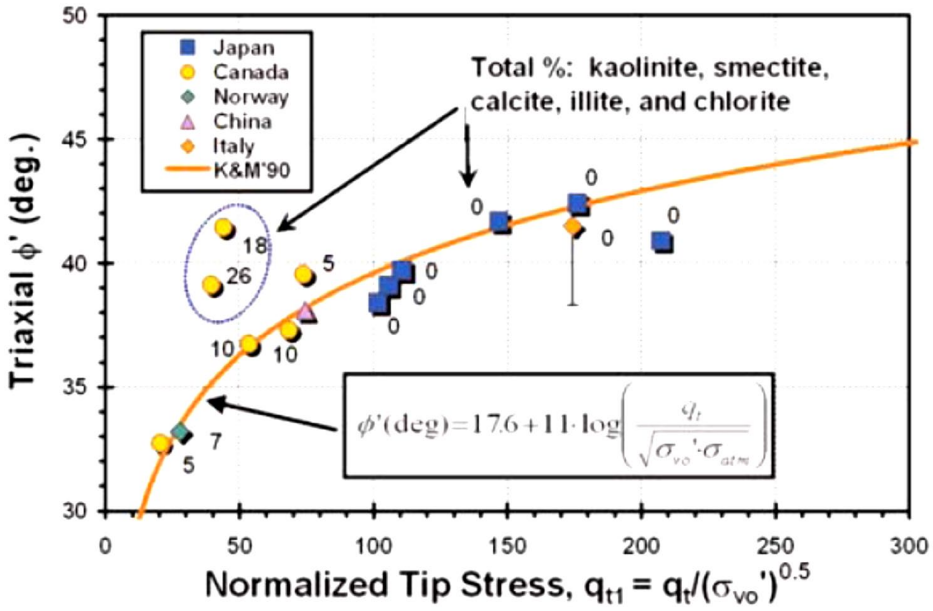


Figure 6-7 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

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 approximate closed form solution by Mayne & Campanella (2005) as a direct function of the pore

pressure parameter Bq and normalised tip resistance Q, referred to as the 'approximate NTH' solution. The method is generally applicable where 0.1 < B_q < 1.0 and 20° < ϕ′< 45°and appropriate for non-cemented normally consolidated to lightly overconsolidated soils.

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

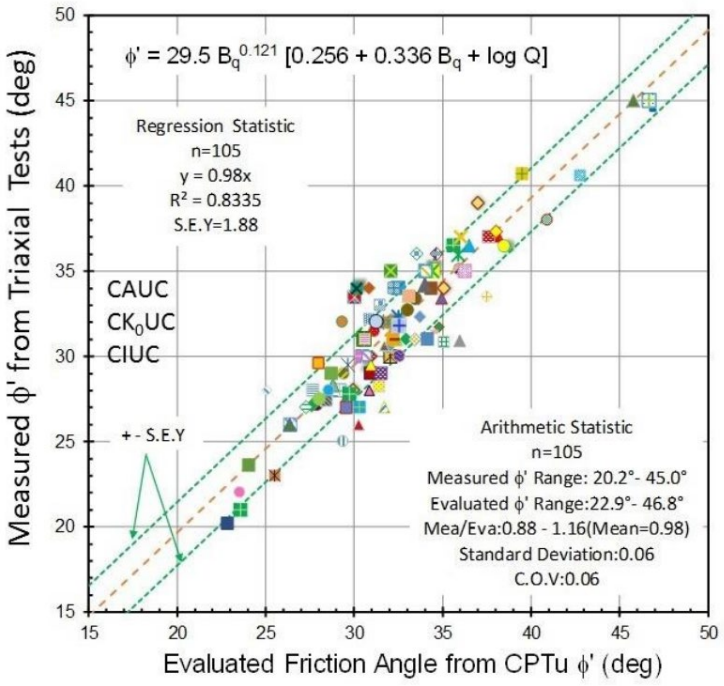


Figure 8 Triaxial ϕ' versus CPTu-evaluated value (NTH method) for 105 soft-firm clays with OCRs < 2.5 (Ouyang and Mayne 2018, cited in Mayne *et al* 2022).

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, is 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.

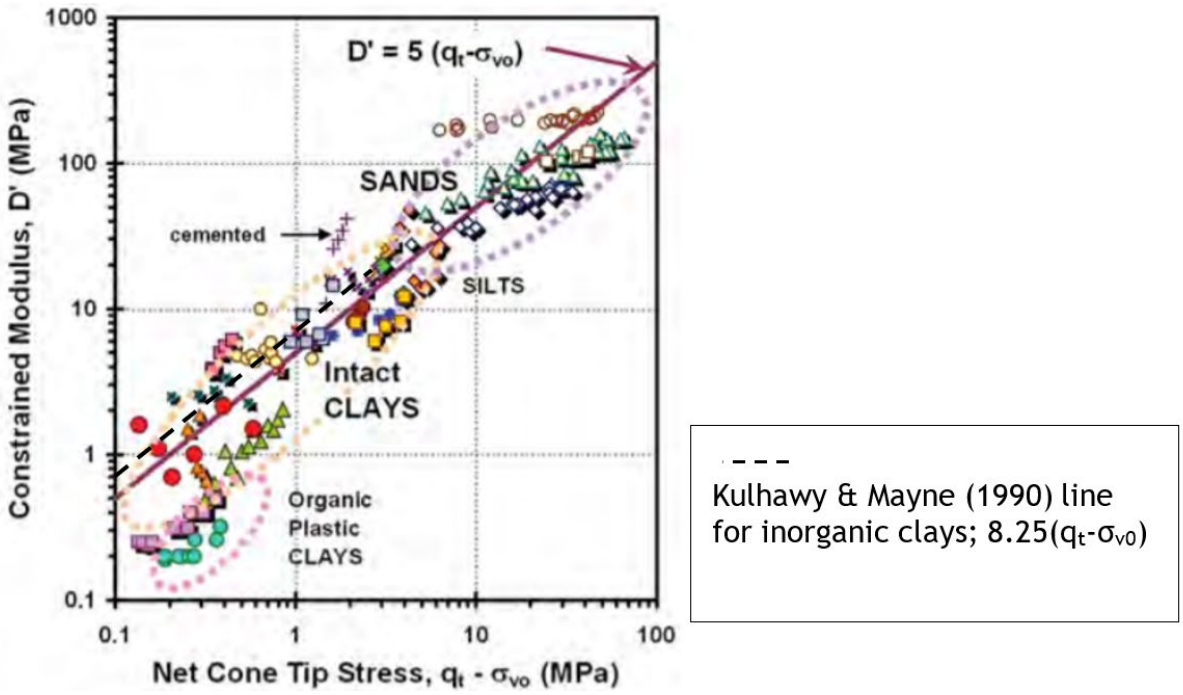


Figure 6-9 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

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:

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

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 DISSIPATION TESTS

Dissipation tests were performed during the CPT at depths specified by the Client's representative or Investigation Supervisor on site.

The hydraulic clamp was on and maintained pressure for the duration of the test.

Pore pressures were sampled at 1 second resolution up to 300 seconds followed by a 10 second resolution thereafter.

7.1 COEFFICIENT OF CONSOLIDATION

The interpretation of the dissipation test applies the method of Teh and Houlsby (1988). Modified dimensionless time factors T^* have been determined from which values of c_{vh} can be derived by the relationship:

$$T^* = \frac{c_{vh} \cdot t}{r^2 \cdot \sqrt{Ir}}$$

Where r^2 = Radius of the cone, Ir= Rigidity Index (Assumed = 100), T^*= Time factor for a given degree of pore water dissipation (see table below for values), t = Measured time to a given degree of pore water pressure dissipation.

Rigidity index is defined as:

$$Ir = \frac{G_u}{s_u}$$

Where G_u= Shear modulus and s_u= undrained shear strength

A Ir value of 100 has been assumed in the analysis. The initial peak pressure has been corrected for soil dilatancy (initial rise in pressure) using the Sully *et al* (1999) method by backwards extrapolation of the initial decay curve plotted in root time.

The saturated porous filter was in the shoulder (u_2) position in all cases. The results of the dissipation tests are presented in Appendix G.

Table 3 Modified time factors T^* from consolidation analysis (Teh and Houlsby, 1988)

Degree of dissipation (%)	u_1 measuring position	u_2 measuring position
0	0.014	0.038
30	0.032	0.078
40	0.063	0.142
50	0.118	0.245

Where a test is of insufficient duration to perform the above analysis an upper-bound value of c_{vh} will be calculated taking the time of the final value as equal to t_{50}. This should be treated with caution but is usually a safe assumption given that the peak measured pore pressure is very rarely less than 65% of the corrected initial pressure estimated by the Sully *et al*. method described above.

For dissipation tests with t_{50} values of less than ~40 seconds in NC-LOC soils, the estimate of coefficient of consolidation may become significantly influenced by partial consolidation during penetration prior to the test beginning. This results in a lower bound value of c_{vh} and is indicated as such in the results table (Table 4) of Appendix A.

7.2 PERMEABILITY

Method 1: Parez and Fauriel (1988) method based on t_{50}:

$$k = \left(\frac{1}{251 \cdot t_{50}}\right)^{1.25}$$

Where t_{50} is the time to 50% dissipation of excess pore pressure, and k is permeability (cm/s).

This method is based on monotonic dissipation results and should be cautiously applied to dissipations that exhibit dilative behaviour (showing initial rise to peak pressure) where t_{50} is calculated using a corrected initial pore pressure. Permeability values are multiplied by a factor of 1.5 for 15 cm^2 cones.

Method 2: Theoretical method, as discussed by Robertson (2014), which accounts for the effect of soil stiffness:

$$k = \frac{c_{vh} \cdot \gamma_w}{M}$$

Where c_{vh} is the coefficient of consolidation; γ_w is the specific weight of water and M is the constrained modulus. The derivations of c_{vh} and M are described separately within this report.

Robertson (2014) proposed an approximate relationship between permeability (k) and the soil behaviour type index (I_c) as follows:

For $1.0 < I_c \leq 3.27 \quad k = 10^{(0.952-3.04\, I_c)}$

For $3.27 < I_c < 4.0 \quad k = 10^{(-4.52-1.37\, I_c)}$

The values have been derived and are presented in Appendix G.

Where dissipation tests have been performed, it is possible to reverse calculate the 'equivalent' SBT index I_c from the calculated permeability based on dissipation tests. These values have been derived and plotted in the I_c log as K1 and K2 corresponding to permeability method 1 and 2 above. Permeability values for K2 are only evaluated for t_{50} values exceeding 35 seconds.

This equivalent I_c values are not intended as a correction nor a more accurate version of the index; the index value evaluated from the CPT is a parameter describing the soil type which typically has mechanical properties consistent with the CPT measurements, and often represents the soil constituent controlling mechanical behaviour. The equivalent value based on permeability simply provides comparative insight into the soil type in terms of approximate drainage characteristics.

8 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.

CONE TIP AND SLEEVE OFFSET

The accuracy of the SBT over thin layers and at layer boundaries is sensitive to offset error in the friction ratio often resulting in sharp peaks or troughs at boundaries. The friction ratio is often inaccurate in heavily disturbed soils with a 'blocky' macro fabric. The last ~8 cm of data is also not included in the SBT material description as no friction sleeve measurements are recorded.

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 though 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.

CONE TYPE

The reference cone type has a 10 cm^2 projected cone tip area and 150 cm^2 friction sleeve area, however it is common to use a larger 15 cm^2 cone with a 225 cm^2 friction sleeve area for improved sensitivity, temperature stability, damage prevention and penetration depth potential due to the higher bending strength. Use of a 15 cm^2 cone does however require higher penetration force (reaction force) for a given penetration pressure and produces more pronounced transitions 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 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 associate 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.

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APPENDICES

Appendix A	**SUMMARY TABLES**
Appendix B	**GENERAL INFORMATION**
Appendix C	**CONE PENETRATION TEST RESULTS**
Appendix D	**SOIL BEHAVIOUR TYPE RESULTS**
Appendix E	**PARAMETER RESULTS 1 – s_u, m_v, OCR, SBT, I_c**
Appendix F	**PARAMETER RESULTS 2 – SPT N60, Phi, D_r, E, I_c**
Appendix G	**INTERPRETED DISSIPATION TEST RESULTS**
Appendix H	**DISSIPATION TEST CURVES & GRAPHICAL ANALYSIS**
Appendix I	**PENETROMETER TEMPERATURE RESULTS**

APPENDIX A SUMMARY TABLES

Table 3 CPT summary

Location ID	Stroke number	Final depth (m)	Cone ID	Piezocone 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	Easting (m)	Northing (m)	Elevation (m)	Date	Remarks
CPT222	1	19.80	S15-CFIPTT.1846	YES			UK23	Total reaction force	pre	22.40	-1.80	2.10	4	26125-V1-060224-UK23-LP100.L02	346905.692	376655.346	4.312	06/02/2024	
CPT223	1	34.40	S15-CFIPTTM250.2065	YES			UK23	Lateral support at depth	pre	-28.20	1.30	-4.10	4	26125-V1-120224-UK23-LP100.L07	346995.306	376696.366	4.316	12/02/2024	
CPT224	1	32.50	S15-CFIPTTM250.2065	YES			UK23	Total reaction force	pre	-46.60	2.60	-4.00	3	26125-V1-090224-UK23-LP100.L06	347007.486	376632.058	4.479	09/02/2024	
CPT225	1	36.48	S15-CFIPTT.1846	YES			UK23	Tonnage + inclination	pre	-10.80	1.30	-3.60	3	26125-V1-050224-UK23-LP100.L01	346954.178	376648.331	4.329	05/02/2024	
CPT226	1	23.22	S15-CFIPTT.1846	YES			UK23	Total reaction force	pre	0.00	-0.50	-3.10	3	26125-V1-080224-UK23-LP100.L05	346983.595	376592.746	4.339	08/02/2024	
CPT227	1	21.28	S15-CFIPTT.1846	YES			UK23	Acquisition error	pre	26.80	-2.80	-2.50	1	26125-V1-070224-UK23-LP100.L03	346933.921	376582.049	4.462	07/02/2024	
CPT227	2	25.62	S15-CFIPTT.1846	YES			UK23	Total reaction force	pre	9.40	-2.70	-3.00		26125-V1-070224-UK23-LP100.L04	346933.921	376582.049	4.462	07/02/2024	

Note: Coordinates and levels have been provided by the Client for inclusion in this report.

CPT test plots are presented in Appendix C.

Table 4 Dissipation test interpretation summary

Location ID	Depth (m)	Elevation (m)	Piezometric level (m)	u0 (kPa)	Piezometric level / u0 origin	Final interpreted time value (s)	Final interpreted degree dissipation (%)	Coefficient of consolidation c_vh (m2/yr)	Upper bound c_vh - final time as t50 (m2/yr)	Lower Bound c_vh - (m2/yr)	Constrained modulus (MPa)	Permeability 1 k (m/s)	Permeability 2 k (m/s)	Permeability 2 k (m/s) upper bound (based on upper bound c_vh)	Remarks
CPT222	2.51	1.802	0.17	22.955	Average measured piezometric depth at this location, approx. +- 0.7 mbgl						0.8				*CIP, *ID
CPT222	6.82	-2.508	0.09	66.000	u0 final dissipation pressure	66.0	50.0	575.2			2.4	8.017E-08	7.456E-08		*ICIP, *U0
CPT222	9.25	-4.938	0.17	89.075	Average measured piezometric depth at this location, approx. +- 0.7 mbgl	7829.1	47.9	4.4			2.4	1.788E-10	5.638E-10		*CIP
CPT222	19.78	-15.468	0.21	192.000	u0 final dissipation pressure						236.1				*U0, *NEP, *NI
CPT223	8.05	-3.734	0.61	73.000	Piezocone response in drained soils, approx. +- 0.8 mbgl	21.0	50.0			1807.80	2.2	3.355E-07			*ICIP, *PC, *LBI, *U0
CPT223	11.60	-7.284	0.90	105.000	Piezocone response in drained soils, approx. +- 0.8 mbgl						58.0				*U0, *IEP, *NI
CPT223	25.08	-20.764	0.00	246.035	Piezocone response in drained soils, approx. +- 0.8 mbgl	64.0	50.0	593.2			10.0	8.331E-08	1.845E-08		*CIP
CPT223	25.88	-21.564	0.00	253.883	Piezocone response in drained soils, approx. +- 0.8 mbgl	1176.0	50.0	32.3			7.9	2.19E-09	1.271E-09		*CIP
CPT224	6.99	-2.511	0.70	61.700	u0 final dissipation pressure	39.0	50.0			973.43	2.5	1.547E-07			*ICIP, *PC, *LBI, *U0
CPT224	9.15	-4.671	0.00	89.762	Piezocone response in drained soils, approx. +- 0.7 mbgl	2771.0	50.0	13.7			4.5	7.501E-10	9.47E-10		*CIP
CPT224	26.02	-21.541	0.00	255.256	Piezocone response in drained soils, approx. +- 0.7 mbgl	4094.0	50.0	9.3			9.3	4.603E-10	3.101E-10		*CIP
CPT225	9.03	-4.701	0.11	87.505	Average measured piezometric depth at this location, approx. +- 0.7 mbgl	4569.0	50.0	8.3			2.3	4.015E-10	1.124E-09		*CIP
CPT225	10.62	-6.291	0.11	103.100	u0 final dissipation pressure						26.4				*U0, *NEP, *NI
CPT225	22.76	-18.431	0.11	222.197	Average measured piezometric depth at this location, approx. +- 0.7 mbgl	6032.0	50.0	6.3			6.4	2.835E-10	3.057E-10		*CIP
CPT226	8.87	-4.531	0.00	87.015	Piezocone response in drained soils, approx. +- 0.7 mbgl	81.0	50.0	468.7			1.9	6.206E-08	7.674E-08		*CIP
CPT226	17.01	-12.671	0.00	166.868	Piezocone response in drained soils, approx. +- 0.7 mbgl						201.4				*U0, *NEP, *NI
CPT226	22.52	-18.181	-0.42	225.000	u0 final dissipation pressure						168.6				*U0, *NEP, *NI
CPT227	9.14	-4.678	0.00	89.663	Estimated by inverse distance modelling of piezometric elevation observations at other locations	4875.0	50.0	7.8			2.1	3.704E-10	1.154E-09		*CIP

*Abbreviations:

NEP: No excess pore pressure generated - excess pore pressure is required for interpretation of C_{vh})
ID: Insufficient test duration - insufficient or no decay of excess pore pressure
UR: Uncharacteristic response - uncharacteristic pore pressure dissipation response precludes interpretation
DR: Drained or partially drained response - calculation of C_{vh} is appropriate for undrained cone penetration response only, t_{50} time limit of 30 s is applied
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions

PUS: Potentially unsaturated soil
MD: Monotonic decay
IEP: Insufficient excess pressure generated
LBI: Lower bound interpretation
UBI: Upper bound interpretation
DT: Disrupted test
NI: No interpretation
PC: Partial consolidation/drainage during penetration is significant (t50 < 35 s) - c_{vh} is lower bound
CIP: Corrected initial pressure
ICIP: Indicative corrected initial pressure

Graphical analysis of dissipation tests are presented in Appendix H

APPENDIX B GENERAL INFORMATION

LIST OF FIGURES

Cone calibration certificate: S15-CFIIP.1846

Cone calibration certificate: S15-CFIIP.2065

Data sheet: 13.0-tonne hybrid crawler CPT unit (UK23)

CERTIFICATE OF CALIBRATION

Certificate Number: 1546

Cone Serial Number: DS15-CFIIPTT.1846

Instrument:	**Digital-Geopoint-S15-150kN-5MPa**	**Location:**	**Lankelma Calibration Laboratory**
Serial number:	**DS15-CFIIPTT.1846**	**Temperature (°C):**	**20.9**
Manufacturer:	**Geopoint**	**Temperature change (°C):**	**0.08**
Calibration standard:	**Conforms to ISO 376:2011 & ISO 22476-1:2012**	**Calibration engineer:**	**P Metcalf**
ISO 22476-1:2012 application class:	**Class 1**	**Date of calibration:**	**15/09/2023**
		Calibration expiry:	**15/03/2024**

This calibration certificate is valid for 6 months.

Calibration signed and dated by:

P Metcalf

Calibration checked and dated by:

A Harman

REFERENCE INSTRUMENTS	SERIAL NUMBER	UNCERTAINTY OF RECORDED VALUE	CALIBRATION DATE
AM DSCCHA-100kN Load Cell	66914	0.02%	19/06/2023
AM DSCCHA-5kN Load Cell	90446	0.05%	19/06/2023
Omega MMG750V	502273	0.01%	09/08/2023
Keithley 3706A Multimeter	4067652	10ppm	11/08/2023
LD Solar2-45	168558	0.04°	01/08/2022
ETI Ref Thermometer	D20345255	0.01°C	08/09/2022

The calibration tests were made in the Lankelma force standards machine. The applied forces of which are within an uncertainty of:
± 0.050 % of nominal value from 0.5kN up to 10kN, then 0.02% of nominal from 10kN up to 100kN.

MEASUREMENTS
1. The forces applied, and the resulting deflections are given in Tables 1. No corrections for temperature have been applied to these results.
2. The cone was loaded to full range 3 times for no less than 1 minute before calibration and after each rotation.
3. The cone was calibrated in low and high range using two reference load cells. The low range calibration consisted of a maximum load of 5kN with 4 sets of increasing forces and 2 sets of decreasing forces. The high range calibration consisted of a maximum load of 100kN with 3 sets of increasing forces and 2 sets of decreasing forces.
4. The difference in deflection for each applied force with rotation is the relative reproducibility error b, shown as a percentage of the recorded value and in units of pressure MPa. The uncertainty relating to the difference in deflection for increasing forces against degreasing forces is the reversibility uncertainty U_rev, shown as a percentage of the recorded value and in units of pressure MPa.
5. For each application of force, the coefficients of a linear and third order equation relating the estimate of the mean deflection as a function of the applied calibration force were calculated. Table 2.
6. The combined expanded uncertainty of deflection U for each force is shown as a percentage of the recorded value and in units of pressure MPa.
7. The coefficients of a third order equation relating a given applied force to the estimate of the mean deflection were also calculated. The coefficients are given in Table 3.
8. In use the forces acting on the sleeve load cell element are a combination of tip resistance and sleeve friction, with the tip resistance 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 4.
* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

The calibration uncertainty is the uncertainty in the force value calculated from the interpolation equation at any deflection.

At each calibration point a combined standard uncertainty *uc* is calculated from the readings obtained during the calibration.

$$uc = \sqrt{\sum_{i=1}^{8} ui^2}$$

and

$$U = k \times uc$$

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 creep of the instrument.
u6 is the standard uncertainty associated with the drift in zero output.
u7 is the standard uncertainty associated with temperature of the instrument.
u8 is the standard uncertainty associated with interpolation best fit of the linear or 3rd order polynomial equation.

Symbols and their designations

Symbol	Designation
Ref LC	Reference load cell with calibration force in kN
cts	Counts. Base digital cone units.
0.1N	Interpolated digital cone units from counts
b	Relative reproducibility error
U_rev	Reversibility uncertainty
Uc	Combined standard uncertainty
Uc_sub	Combined standard uncertainty including sleeve subtraction
U	Combined expanded uncertainty
k=2	95% uncertainty coverage factor

Cone tempreture effect profile:

This section deals with the apparent pressure readings obtained from sensors due to static and transient temperature change. The parameters for post-processing temperature correction are established and the apparent pressures after correction are presented. Depending on the design or temperature performance, correction of the friction sleeve and/or piezometer readings may not be warranted

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1546

Cone Serial Number: DS15-CFIIPTT.1846

CONE END RESISTANCE CALIBRATION

Table 1-a.

Low range calibration									High range calibration							
	Tip change In output (cts)				Reproducibility error *b*		Reversibility error *U_rev*			Tip change in output (cts)			Reproducibility error *b*		Reversibility error *U_rev*	
Ref LC (kN)	1 0°	2 120°	3 240°	4 240°	MPa	%	MPa	%	Ref LC (kN)	1 0°	2 120°	3 240°	MPa	%	MPa	%
0.100	1.083E+05	1.128E+05	1.112E+05	1.112E+05	0.001	1.20			5.000	5.590E+06	5.572E+06	5.575E+06	0.003	0.09		
0.500	5.567E+05	5.562E+05	5.540E+05	5.548E+05	0.000	0.15			10.000	1.117E+07	1.114E+07	1.114E+07	0.005	0.08		
1.000	1.113E+06	1.108E+06	1.111E+06	1.111E+06	0.001	0.13			15.000	1.674E+07	1.671E+07	1.671E+07	0.006	0.06		
1.500	1.670E+06	1.666E+06	1.666E+06	1.666E+06	0.001	0.07			20.000	2.231E+07	2.228E+07	2.228E+07	0.006	0.05		
2.000	2.227E+06	2.222E+06	2.219E+06	2.220E+06	0.001	0.11			30.000	3.344E+07	3.340E+07	3.340E+07	0.008	0.04		
2.500	2.784E+06	2.775E+06	2.775E+06	2.772E+06	0.002	0.10			40.000	4.456E+07	4.451E+07	4.451E+07	0.009	0.04		
3.000	3.340E+06	3.330E+06	3.329E+06	3.327E+06	0.002	0.10			50.000	5.566E+07	5.561E+07	5.561E+07	0.010	0.03		
3.500	3.897E+06	3.887E+06	3.884E+06	3.885E+06	0.002	0.10			60.000	6.676E+07	6.670E+07	6.670E+07	0.011	0.03		
4.000	4.451E+06	4.442E+06	4.440E+06	4.441E+06	0.002	0.08			80.000	8.892E+07	8.886E+07	8.886E+07	0.013	0.02		
5.000	5.567E+06	5.554E+06	5.550E+06	5.551E+06	0.003	0.09			100.000	1.111E+08	1.110E+08	1.110E+08	0.014	0.02		
4.000	4.452E+06	4.441E+06			0.002	0.08	0.000	0.00	80.000	8.893E+07	8.888E+07		0.011	0.02	-0.004	-0.01
3.500	3.896E+06	3.888E+06			0.002	0.07	0.000	0.00	60.000	6.679E+07	6.674E+07		0.011	0.03	-0.012	-0.03
3.000	3.339E+06	3.331E+06			0.002	0.09	0.000	0.00	50.000	5.570E+07	5.565E+07		0.011	0.03	-0.014	-0.04
2.500	2.784E+06	2.775E+06			0.002	0.11	0.000	0.00	40.000	4.460E+07	4.455E+07		0.009	0.04	-0.013	-0.05
2.000	2.227E+06	2.220E+06			0.002	0.11	0.001	0.04	30.000	3.348E+07	3.344E+07		0.008	0.04	-0.014	-0.07
1.500	1.669E+06	1.666E+06			0.000	0.05	0.000	0.02	20.000	2.234E+07	2.230E+07		0.007	0.05	-0.011	-0.08
1.000	1.113E+06	1.109E+06			0.001	0.11	0.000	-0.04	15.000	1.676E+07	1.674E+07		0.006	0.06	-0.009	-0.09
0.500	5.564E+05	5.536E+05			0.001	0.17	0.000	0.15	10.000	1.119E+07	1.116E+07		0.005	0.08	-0.007	-0.11
0.100	1.101E+05	1.106E+05			0.000	0.16	0.000	0.05	5.000	5.603E+06	5.585E+06		0.004	0.11	-0.004	-0.13

Table 2-a.

Low range calibration								High range calibration							
Reference output		Linear equation			3rd order equation			Reference output		Linear equation			3rd order equation		
Ref Load Cell Nom. (MPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** MPa	%	Equation output (0.1N)	Expanded uncertainty *U** MPa	%	Ref Load Cell Nom. (MPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** MPa	%	Equation output (0.1N)	Expanded uncertainty *U** MPa	%
0.067	1000	996	0.002	2.91	1002	0.002	2.84	3.333	50000	50197	0.028	0.83	50015	0.009	0.27
0.333	5000	4999	0.002	0.64	4988	0.003	0.79	6.667	100000	100323	0.046	0.69	99977	0.017	0.25
0.667	10000	9993	0.003	0.48	9962	0.006	0.89	10.000	150000	150435	0.062	0.62	149955	0.022	0.22
1.000	15000	15000	0.004	0.37	14949	0.008	0.77	13.333	200000	200516	0.073	0.55	199930	0.027	0.20
1.333	20000	20002	0.005	0.37	19931	0.010	0.78	20.000	300000	300620	0.090	0.45	299905	0.037	0.19
1.667	25000	24997	0.006	0.38	24907	0.014	0.82	26.667	400000	400618	0.094	0.35	399881	0.048	0.18
2.000	30000	29987	0.007	0.35	29879	0.017	0.87	33.333	500000	500510	0.087	0.26	499854	0.058	0.17
2.333	35000	34992	0.007	0.30	34865	0.019	0.82	40.000	600000	600322	0.076	0.19	599846	0.067	0.17
2.667	40000	39984	0.007	0.27	39838	0.023	0.85	53.333	800000	799699	0.094	0.18	799868	0.086	0.16
3.333	50000	49996	0.010	0.29	49814	0.026	0.79	66.667	1000000	998916	0.187	0.28	1000087	0.121	0.18
2.667	40000	40005	0.006	0.23	39859	0.020	0.74	53.333	800000	799895	0.082	0.15	800065	0.081	0.15
2.333	35000	35015	0.006	0.24	34887	0.016	0.68	40.000	600000	600720	0.114	0.29	600245	0.071	0.18
2.000	30000	30006	0.005	0.26	29897	0.015	0.73	33.333	500000	500941	0.136	0.41	500285	0.065	0.20
1.667	25000	25009	0.005	0.29	24919	0.012	0.71	26.667	400000	401039	0.145	0.54	400302	0.060	0.22
1.333	20000	20005	0.004	0.30	19934	0.010	0.72	20.000	300000	301031	0.141	0.71	300315	0.054	0.27
1.000	15000	15003	0.002	0.20	14952	0.007	0.67	13.333	200000	200839	0.114	0.86	200253	0.042	0.31
0.667	10000	9997	0.002	0.30	9966	0.005	0.74	10.000	150000	150716	0.097	0.97	150236	0.037	0.37
0.333	5000	4994	0.002	0.61	4982	0.003	0.89	6.667	100000	100559	0.076	1.14	100213	0.032	0.48
0.067	1000	993	0.002	2.36	998	0.001	1.66	3.333	50000	50330	0.045	1.36	50147	0.022	0.65

Table 3-a. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

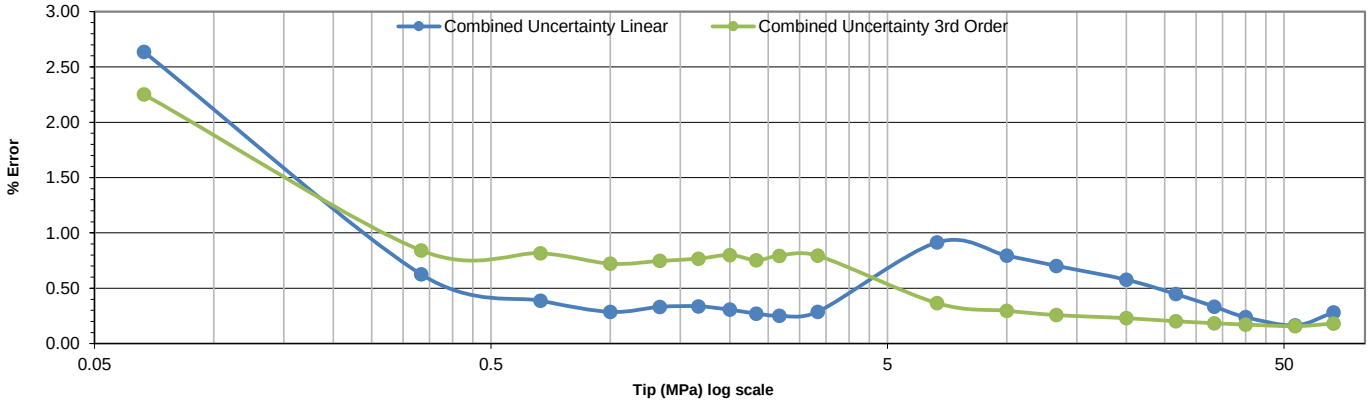
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	9.30456
a1	=	0.99588
a2	=	5.85219E-09
a3	=	-5.67628E-16

Maximum tip zero drift during the calibration (MPa) =	0.001
Maximum load cell zero drift during the calibration (MPa) =	0.000
Factor used to convert from counts to 0.1N units =	0.0089973
Maximum tip full scale reading (MPa) =	100.00
Tip resolution (Pa) =	66.7
Tip area (cm^2) =	15
Tip area ratio factor =	0.805

COMBINED EXPANDED UNCERTAINTY TIP



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1546

Cone Serial Number: DS15-CFIIPTT.1846

SLEEVE FRICTION CALIBRATION

Table1-b.

Low range calibration									High range calibration							
	Sleeve change In output (cts)				Reproducibility error *b*		Reversibility error *U_rev*			Sleeve change in output (cts)			Reproducibility error *b*		Reversibility error *U_rev*	
Ref LC	1	2	3	4					Ref LC	1	2	3				
(kN)	0°	120°	240°	240°	kPa	%	kPa	%	(kN)	0°	120°	240°	kPa	%	kPa	%
0.100	1.136E+05	1.159E+05	1.172E+05	1.172E+05	0.040	0.91			5.000	5.736E+06	5.735E+06	5.737E+06	0.016	0.01		
0.500	5.716E+05	5.763E+05	5.724E+05	5.770E+05	0.056	0.26			10.000	1.147E+07	1.147E+07	1.147E+07	0.059	0.01		
1.000	1.144E+06	1.148E+06	1.146E+06	1.149E+06	0.042	0.10			15.000	1.720E+07	1.720E+07	1.720E+07	0.045	0.01		
1.500	1.718E+06	1.721E+06	1.722E+06	1.723E+06	0.041	0.06			20.000	2.293E+07	2.293E+07	2.293E+07	0.058	0.01		
2.000	2.292E+06	2.296E+06	2.295E+06	2.297E+06	0.046	0.05			30.000	3.440E+07	3.439E+07	3.439E+07	0.134	0.01		
2.500	2.863E+06	2.867E+06	2.867E+06	2.868E+06	0.044	0.04			40.000	4.585E+07	4.583E+07	4.583E+07	0.247	0.01		
3.000	3.437E+06	3.441E+06	3.440E+06	3.442E+06	0.044	0.03			50.000	5.728E+07	5.726E+07	5.726E+07	0.203	0.01		
3.500	4.011E+06	4.013E+06	4.013E+06	4.016E+06	0.028	0.02			60.000	6.871E+07	6.868E+07	6.869E+07	0.269	0.01		
4.000	4.583E+06	4.584E+06	4.585E+06	4.591E+06	0.031	0.02			80.000	9.153E+07	9.151E+07	9.151E+07	0.333	0.01		
5.000	5.729E+06	5.732E+06	5.732E+06	5.737E+06	0.045	0.02			100.000	1.143E+08	1.143E+08	1.143E+08	0.245	0.01		
4.000	4.581E+06	4.586E+06			0.069	0.04	-0.012	-0.01	80.000	9.150E+07	9.150E+07		0.017	0.00	0.461	0.01
3.500	4.008E+06	4.012E+06			0.046	0.03	0.037	0.02	60.000	6.871E+07	6.870E+07		0.117	0.00	-0.218	-0.01
3.000	3.436E+06	3.436E+06			0.003	0.00	0.075	0.06	50.000	5.729E+07	5.728E+07		0.098	0.00	-0.400	-0.02
2.500	2.862E+06	2.866E+06			0.048	0.04	0.032	0.03	40.000	4.587E+07	4.585E+07		0.182	0.01	-0.453	-0.03
2.000	2.291E+06	2.293E+06			0.029	0.03	0.039	0.04	30.000	3.441E+07	3.441E+07		0.016	0.00	-0.506	-0.04
1.500	1.717E+06	1.720E+06			0.043	0.07	0.028	0.04	20.000	2.296E+07	2.296E+07		0.044	0.00	-0.664	-0.08
1.000	1.146E+06	1.146E+06			0.008	0.02	-0.004	-0.01	15.000	1.724E+07	1.723E+07		0.163	0.02	-0.668	-0.10
0.500	5.736E+05	5.707E+05			0.040	0.18	0.039	0.18	10.000	1.150E+07	1.149E+07		0.170	0.04	-0.479	-0.11
0.100	1.137E+05	1.164E+05			0.036	0.82	-0.006	-0.14	5.000	5.751E+06	5.744E+06		0.103	0.05	-0.260	-0.12

Table 2-b.

Low range calibration							
Reference output		Linear factor output			3rd order equation		
Ref Load Cell Nom. (kPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** kPa	%	Equation output (0.1N)	Expanded uncertainty *U** kPa	%
4	1000	1010	0.136	3.10	1002	0.105	2.39
22	5000	5012	0.264	1.20	4989	0.261	1.18
44	10000	10015	0.250	0.57	9974	0.313	0.71
66	15000	15038	0.410	0.62	14977	0.314	0.48
88	20000	20050	0.525	0.60	19972	0.379	0.43
110	25000	25048	0.516	0.47	24952	0.513	0.47
132	30000	30062	0.632	0.48	29948	0.555	0.42
154	35000	35067	0.678	0.44	34936	0.652	0.42
176	40000	40066	0.702	0.40	39918	0.827	0.47
220	50000	50092	0.950	0.43	49911	0.922	0.42
176	40000	40064	0.644	0.37	39916	0.798	0.45
154	35000	35049	0.510	0.33	34918	0.768	0.50
132	30000	30030	0.365	0.28	29917	0.774	0.59
110	25000	25030	0.353	0.32	24934	0.622	0.57
88	20000	20032	0.334	0.38	19954	0.441	0.50
66	15000	15020	0.231	0.35	14960	0.378	0.57
44	10000	10016	0.165	0.37	9974	0.244	0.55
22	5000	5001	0.123	0.56	4978	0.230	1.04
4	1000	1005	0.111	2.53	998	0.103	2.35

High range calibration							
Reference output		Linear factor output			3rd order equation		
Ref Load Cell Nom. (kPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** kPa	%	Equation output (0.1N)	Expanded uncertainty *U** kPa	%
220	50000	50136	1.267	0.58	49955	0.572	0.26
441	100000	100258	2.416	0.55	99929	1.024	0.12
661	150000	150349	3.280	0.50	149901	1.429	0.11
881	200000	200433	4.077	0.46	199893	1.715	0.10
1322	300000	300580	5.504	0.42	299934	2.129	0.08
1762	400000	400617	6.056	0.34	399961	2.686	0.08
2203	500000	500532	5.707	0.26	499954	3.285	0.07
2643	600000	600390	5.169	0.20	599970	3.867	0.07
3524	800000	799886	5.300	0.15	799984	5.206	0.07
4405	1000000	999235	10.115	0.23	1000064	7.564	0.09
3524	800000	799738	5.464	0.16	799835	5.161	0.07
2643	600000	600503	5.798	0.22	600083	3.808	0.07
2203	500000	500711	6.990	0.32	500133	3.323	0.08
1762	400000	400820	7.677	0.44	400164	2.977	0.08
1322	300000	300789	7.218	0.55	300143	2.311	0.09
881	200000	200695	6.254	0.71	200154	1.867	0.11
661	150000	150617	5.538	0.84	150168	1.820	0.14
441	100000	100439	3.945	0.90	100109	1.246	0.14
220	50000	50235	2.122	0.96	50054	0.654	0.15

Table 3-b. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

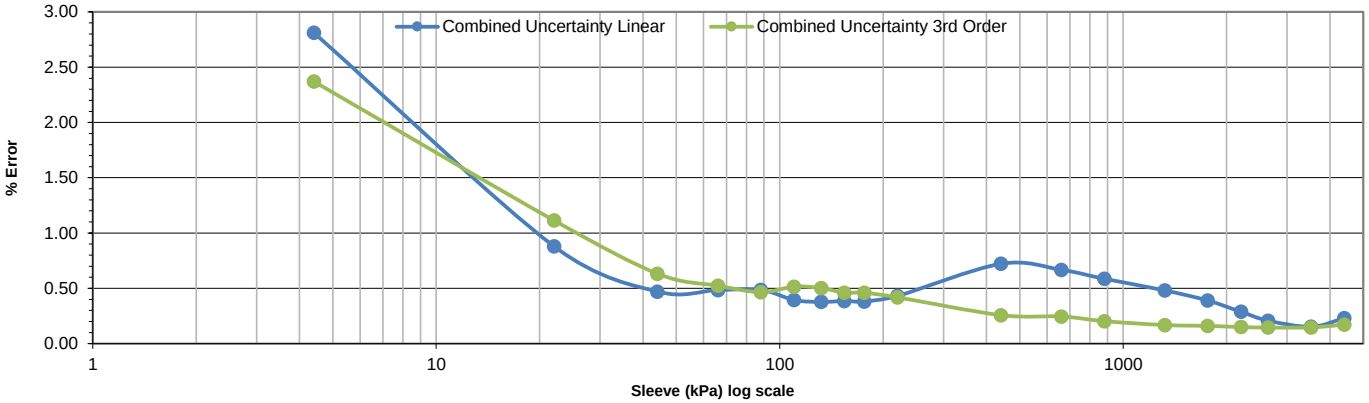
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	-3.82057
a1	=	0.99616
a2	=	6.09138E-09
a3	=	-1.41486E-15

Maximum sleeve zero drift during the calibration (kPa) =	0.041
Maximum load cell zero drift during the calibration (kPa) =	0.011
Factor used to convert from counts to 0.1N units =	0.0087404
Physical strength limited maximum sleeve reading (MPa) =	1.333
Sleeve resolution (Pa) =	4.4
Sleeve area (cm²) =	227
Sleeve area ratio factor =	-0.002

COMBINED EXPANDED UNCERTAINTY SLEEVE



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1546

Cone Serial Number: DS15-CFIIPTT.1846

Table 4-b **Sleeve friction - tip subtraction combined standard uncertainty Uc_sub, where friction ratio is between 0.25% and 10%.**

Tip MPa	Sleeve linear equation subtraction error (%) Sleeve kPa → 4	22	44	66	110	154	220	661
0.07	1.6	-	-	-	-	-	-	-
0.33	2.2	0.6	-	-	-	-	-	-
0.67	1.8	0.5	0.3	0.3	-	-	-	-
1.00	1.8	0.5	0.3	0.3	-	-	-	-
1.67	2.1	0.6	0.3	0.3	0.2	0.2	-	-
2.33	-	0.5	0.2	0.2	0.2	0.2	0.2	-
3.33	-	0.5	0.3	0.3	0.2	0.2	0.2	-
10.00	-	-	0.9	0.7	0.5	0.4	0.4	0.3
13.33	-	-	0.9	0.4	0.4	0.4	0.3	0.3

Tip MPa	Sleeve 3rd order equation subtraction error (%) Sleeve kPa → 4	22	44	66	110	154	220	661
0.07	1.2	-	-	-	-	-	-	-
0.33	2.6	0.8	-	-	-	-	-	-
0.67	2.7	0.9	0.5	0.4	-	-	-	-
1.00	3.2	1.0	0.5	0.4	-	-	-	-
1.67	4.4	1.2	0.6	0.5	0.4	0.3	-	-
2.33	-	1.2	0.7	0.5	0.4	0.3	0.3	-
3.33	-	1.7	0.9	0.7	0.5	0.4	0.3	-
10.00	-	-	0.4	0.3	0.3	0.2	0.2	0.1
13.33	-	-	0.4	0.3	0.3	0.3	0.2	0.1

PORE PRESSURE CALIBRATION

Table1-c.

Ref PR (kPa)	PWP change in output (cts) 1 0°	2 120°	3 240°	Reproducibility error *b* kPa	%	Reversibility error *U_rev* kPa	%
100	1.950E+07	1.951E+07	1.948E+07	0.0	0.05		
200	3.910E+07	3.911E+07	3.908E+07	0.0	0.02		
400	7.820E+07	7.823E+07	7.818E+07	0.1	0.02		
600	1.172E+08	1.173E+08	1.173E+08	0.1	0.02		
800	1.562E+08	1.562E+08	1.562E+08	0.1	0.01		
1000	1.951E+08	1.951E+08	1.951E+08	0.0	0.00		
1500	2.920E+08	2.920E+08	2.920E+08	0.0	0.00		
2000	3.888E+08	3.889E+08	3.889E+08	0.1	0.01		
2500	4.856E+08	4.856E+08	4.856E+08	0.0	0.00		
3000	5.823E+08	5.823E+08	5.823E+08	0.0	0.00		
2500	4.852E+08	4.851E+08		0.1	0.00	1.5	0.06
2000	3.879E+08	3.880E+08		0.1	0.00	2.9	0.14
1500	2.910E+08	2.910E+08		0.1	0.01	2.9	0.20
1000	1.942E+08	1.942E+08		0.0	0.00	2.7	0.27
800	1.554E+08	1.554E+08		0.1	0.01	2.4	0.29
600	1.166E+08	1.166E+08		0.0	0.01	2.0	0.33
400	7.780E+07	7.779E+07		0.0	0.00	1.2	0.31
200	3.892E+07	3.892E+07		0.0	0.00	0.5	0.27
100	1.943E+07	1.947E+07		0.1	0.06	0.2	0.16

Table 2-c.

Reference output: Ref Pressure (kPa)	Ref Pressure (0.1Pa)	Linear factor output: Cone output (0.1Pa)	Expanded uncertainty *U** kPa	%	3rd order equation: Equation output (0.1N)	Expanded uncertainty *U** kPa	%
100	1000000	1004816	0.997	1.00	1001207	0.313	0.31
200	2000000	2014754	2.995	1.50	2005379	1.155	0.58
400	4000000	4030322	6.148	1.54	4011729	2.520	0.63
600	6000000	6043862	8.909	1.48	6018829	4.034	0.67
800	8000000	8049268	10.024	1.25	8020243	4.402	0.55
1000	10000000	10053689	10.939	1.09	10022763	4.971	0.50
1500	15000000	15048928	10.094	0.67	15020221	4.681	0.31
2000	20000000	20042084	8.826	0.44	20021478	5.017	0.25
2500	25000000	25028055	6.114	0.24	25016373	4.057	0.16
3000	30000000	30007725	3.337	0.11	30000773	2.960	0.10
2500	25000000	25002437	2.452	0.10	24990716	3.036	0.12
2000	20000000	19992612	2.977	0.15	19971913	6.182	0.31
1500	15000000	14997332	2.427	0.16	14968563	6.718	0.45
1000	10000000	10006478	2.382	0.24	9975575	5.276	0.53
800	8000000	8008304	2.408	0.30	7979339	4.481	0.56
600	6000000	6008738	2.272	0.38	5983796	3.545	0.59
400	4000000	4009247	2.075	0.52	3990736	2.063	0.52
200	2000000	2005837	1.235	0.62	1996510	0.810	0.41
100	1000000	1002386	0.530	0.53	998793	0.319	0.32

Table 3-c. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

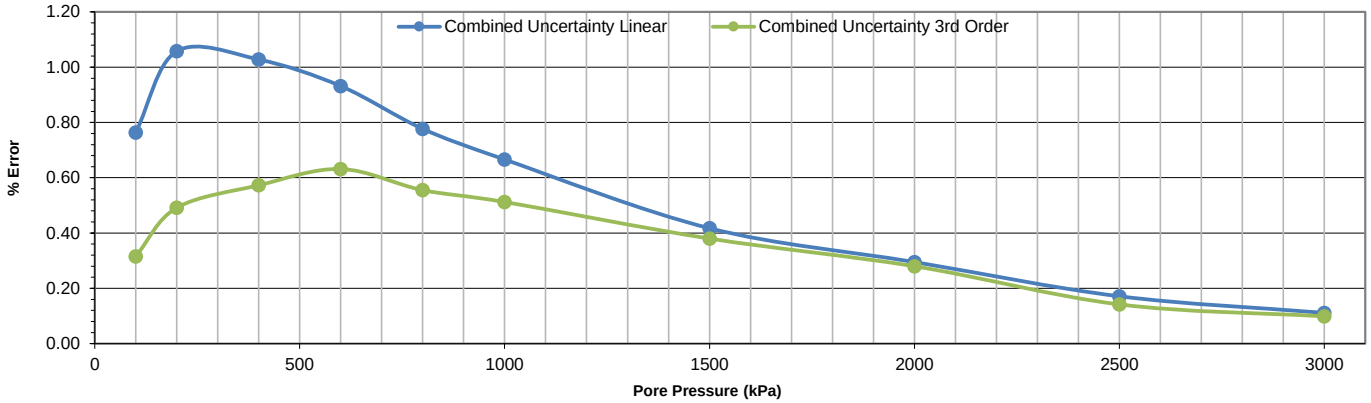
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	2943.22156
a1	=	0.99306
a2	=	4.22990E-10
a3	=	-6.75679E-18

Maximum PWP zero drift during the calibration (kPa) =	0.09
Maximum reference zero drift during the calibration (kPa) =	0.08
Factor used to convert from counts to 0.1Pa units =	0.0515364
Maximum PWP full scale reading (kPa) =	5000
PWP resolution (Pa) =	0.1

COMBINED EXPANDED UNCERTAINTY PORE PRESSURE



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1546

Cone Serial Number: DS15-CFIIPTT.1846

INCLINATION CALIBRATION

Ref Inclination (°C)	Cone inclination output X Inc (cts)	Y Inc (cts)
-25	-27415	-25901
0	-1873	-320
25	23300	25254

Ref Inclination (°)	Cone inclination output X Inc (°)	Y Inc (°)
-25	-25.2	-25.0
0	0.0	0.0
25	24.8	25.0

	X inc	Y inc
Factor used to convert from counts to 0.1m° units =	9.8588421	9.77421556
Inclination error (°) =	0.2	0.0

TEMPERATURE CALIBRATION

Recorded temp (°C)	Cone output 1 FS (cts)	Cone output 2 QC (cts)
5.30	0	2995301
10.30	0	3080883
15.10	0	3166284
20.20	0	3255862
25.30	0	3345773

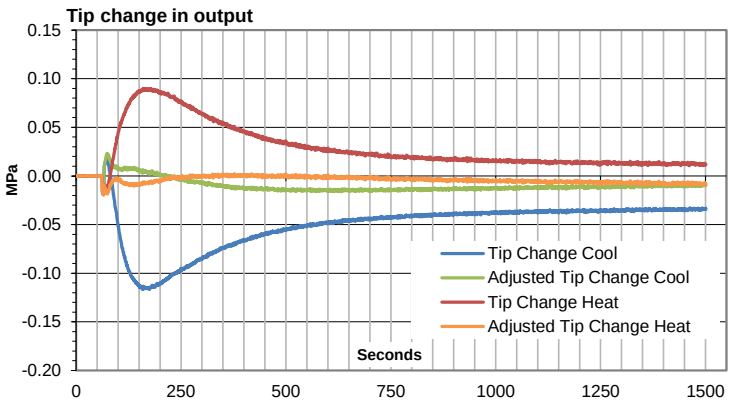
Recorded temp (°C)	Cone output 1 FS (°C)	Cone output 2 QC (°C)
5.30	0.00	5.35
10.30	0.00	10.23
15.10	0.00	15.10
20.20	0.00	20.20
25.30	0.00	25.32

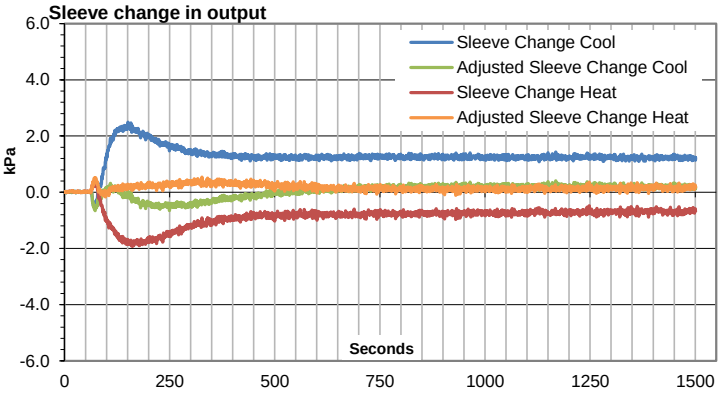
Factor used to convert from counts to 0.00001°C units =	0	0.5696824
Temperature error (°C) =	0.00	0.07

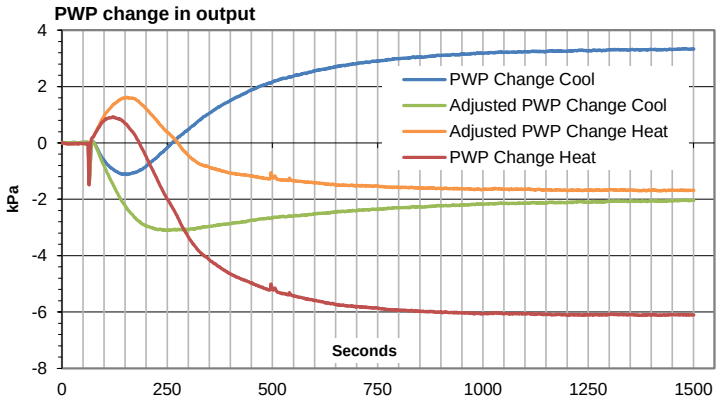
CONE TEMERATURE RESPONSE AND CORRECTION

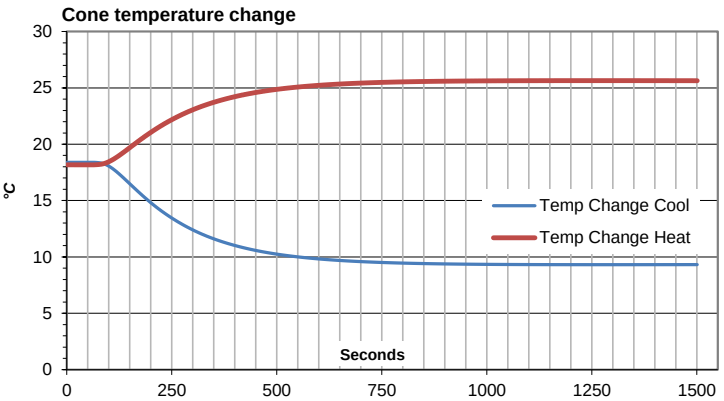
	Cooling	Heating
Start temperature =	18.39	18.17
End temperature =	9.32	25.64
Temperature change =	-9.08	7.47

	Cooling	Heating
Tip maximum rate of change (MPa/(°C/min)) =	0.055	0.053
Tip end change (MPa/°C) =	-0.004	0.002
Adjusted tip end change (MPa/°C) =	0.001	0.001
Sleeve maximum rate of change (kPa/(°C/min)) =	2.60	2.42
Sleeve end change (kPa/°C) =	0.14	-0.09
Adjusted sleeve end change (kPa/°C) =	0.02	0.02
PWP end change (kPa/°C) =	0.37	-0.82
Adjusted PWP end change (kPa/°C) =	0.22	-0.23









CERTIFICATE OF CALIBRATION

Certificate Number: 1577

Cone Serial Number: S15-CFIIPTTM.2065

Instrument:	**Digital-Geopoint-S15-150kN-5MPa**	**Location:**	**Lankelma Calibration Laboratory**
Serial number:	**S15-CFIIPTTM.2065**	**Temperature (°C):**	**17.5**
Manufacturer:	**Geopoint**	**Temperature change (°C):**	**0.05**
Calibration standard:	**Conforms to ISO 376:2011 & ISO 22476-1:2012**	**Calibration engineer:**	**P Metcalf**
ISO 22476-1:2012 application class:	**Class 1**	**Date of calibration:**	**15/01/2024**
		Calibration expiry:	**15/07/2024**

This calibration certificate is valid for 6 months.

Calibration signed and dated by:	**Calibration checked and dated by:**	**Calibration verification signed and dated by:**

REFERENCE INSTRUMENTS	SERIAL NUMBER	UNCERTAINTY OF RECORDED VALUE	CALIBRATION DATE
AM DSCCHA-100kN Load Cell	66914	0.02%	19/06/2023
AM DSCCHA-5kN Load Cell	90446	0.05%	19/06/2023
Omega MMG750V	502273	0.01%	09/08/2023
Keithley 3706A Multimeter	4067652	10ppm	11/08/2023
LD Solar2-45	168558	0.04°	01/08/2022
ETI Ref Thermometer	D20345255	0.01°C	14/09/2023

The calibration tests were made in the Lankelma force standards machine. The applied forces of which are within an uncertainty of:
± 0.050 % of nominal value from 0.5kN up to 10kN, then 0.02% of nominal from 10kN up to 100kN.

MEASUREMENTS
1. The forces applied, and the resulting deflections are given in Tables 1. No corrections for temperature have been applied to these results.
2. The cone was loaded to full range 3 times for no less than 1 minute before calibration and after each rotation.
3. The cone was calibrated in low and high range using two reference load cells. The low range calibration consisted of a maximum load of 5kN with 4 sets of increasing forces and 2 sets of decreasing forces. The high range calibration consisted of a maximum load of 100kN with 3 sets of increasing forces and 2 sets of decreasing forces.
4. The difference in deflection for each applied force with rotation is the relative reproducibility error b, shown as a percentage of the recorded value and in units of pressure MPa. The uncertainty relating to the difference in deflection for increasing forces against degreasing forces is the reversibility uncertainty U_rev, shown as a percentage of the recorded value and in units of pressure MPa.
5. For each application of force, the coefficients of a linear and third order equation relating the estimate of the mean deflection as a function of the applied calibration force were calculated. Table 2.
6. The combined expanded uncertainty of deflection U for each force is shown as a percentage of the recorded value and in units of pressure MPa.
7. The coefficients of a third order equation relating a given applied force to the estimate of the mean deflection were also calculated. The coefficients are given in Table 3.
8. In use the forces acting on the sleeve load cell element are a combination of tip resistance and sleeve friction, with the tip resistance 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 4.
* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

The calibration uncertainty is the uncertainty in the force value calculated from the interpolation equation at any deflection.

At each calibration point a combined standard uncertainty *uc* is calculated from the readings obtained during the calibration.

$$uc = \sqrt{\sum_{i=1}^{8} ui^2}$$

and

$$U = k \times uc$$

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 creep of the instrument.
u6 is the standard uncertainty associated with the drift in zero output.
u7 is the standard uncertainty associated with temperature of the instrument.
u8 is the standard uncertainty associated with interpolation best fit of the linear or 3rd order polynomial equation.

Symbols and their designations

Symbol	Designation
Ref LC	Reference load cell with calibration force in kN
cts	Counts. Base digital cone units.
0.1N	Interpolated digital cone units from counts
b	Relative reproducibility error
U_rev	Reversibility uncertainty
Uc	Combined standard uncertainty
Uc_sub	Combined standard uncertainty including sleeve subtraction
U	Combined expanded uncertainty
k=2	95% uncertainty coverage factor

Cone tempreture effect profile:

This section deals with the apparent pressure readings obtained from sensors due to static and transient temperature change. The parameters for post-processing temperature correction are established and the apparent pressures after correction are presented. Depending on the design or temperature performance, correction of the friction sleeve and/or piezometer readings may not be warranted

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1577

Cone Serial Number: S15-CFIIPTTM.2065

CONE END RESISTANCE CALIBRATION

Table 1-a.

Low range calibration									High range calibration							
	Tip change In output (cts)				Reproducibility error *b*		Reversibility error *U_rev*			Tip change in output (cts)			Reproducibility error *b*		Reversibility error *U_rev*	
Ref LC	1	2	3	4					Ref LC	1	2	3				
(kN)	0°	120°	240°	240°	MPa	%	MPa	%	(kN)	0°	120°	240°	MPa	%	MPa	%
0.100	1.112E+05	1.117E+05	1.104E+05	1.104E+05	0.000	0.34			5.000	5.538E+06	5.541E+06	5.541E+06	0.001	0.02		
0.500	5.579E+05	5.556E+05	5.525E+05	5.539E+05	0.001	0.28			10.000	1.106E+07	1.107E+07	1.107E+07	0.001	0.01		
1.000	1.108E+06	1.110E+06	1.108E+06	1.109E+06	0.000	0.04			15.000	1.658E+07	1.659E+07	1.659E+07	0.001	0.01		
1.500	1.661E+06	1.664E+06	1.662E+06	1.659E+06	0.000	0.04			20.000	2.210E+07	2.211E+07	2.211E+07	0.002	0.01		
2.000	2.215E+06	2.215E+06	2.216E+06	2.216E+06	0.000	0.02			30.000	3.313E+07	3.314E+07	3.314E+07	0.002	0.01		
2.500	2.768E+06	2.767E+06	2.767E+06	2.767E+06	0.000	0.02			40.000	4.415E+07	4.416E+07	4.416E+07	0.002	0.01		
3.000	3.322E+06	3.324E+06	3.320E+06	3.321E+06	0.001	0.04			50.000	5.516E+07	5.517E+07	5.517E+07	0.002	0.01		
3.500	3.876E+06	3.876E+06	3.876E+06	3.874E+06	0.000	0.00			60.000	6.616E+07	6.617E+07	6.618E+07	0.003	0.01		
4.000	4.428E+06	4.427E+06	4.427E+06	4.427E+06	0.000	0.01			80.000	8.814E+07	8.815E+07	8.816E+07	0.003	0.01		
5.000	5.533E+06	5.533E+06	5.531E+06	5.533E+06	0.000	0.01			100.000	1.101E+08	1.101E+08	1.101E+08	0.003	0.00		
4.000	4.424E+06	4.428E+06			0.001	0.02	0.001	0.02	80.000	8.816E+07	8.817E+07		0.002	0.00	-0.005	-0.01
3.500	3.872E+06	3.875E+06			0.001	0.03	0.001	0.03	60.000	6.620E+07	6.621E+07		0.002	0.00	-0.012	-0.03
3.000	3.316E+06	3.321E+06			0.001	0.05	0.001	0.07	50.000	5.520E+07	5.521E+07		0.001	0.00	-0.013	-0.04
2.500	2.764E+06	2.768E+06			0.001	0.05	0.000	0.03	40.000	4.419E+07	4.419E+07		0.002	0.01	-0.011	-0.04
2.000	2.213E+06	2.216E+06			0.001	0.05	0.000	0.02	30.000	3.316E+07	3.317E+07		0.002	0.01	-0.011	-0.05
1.500	1.659E+06	1.662E+06			0.001	0.08	0.001	0.07	20.000	2.213E+07	2.213E+07		0.001	0.01	-0.008	-0.06
1.000	1.108E+06	1.107E+06			0.000	0.04	0.001	0.08	15.000	1.661E+07	1.661E+07		0.001	0.01	-0.008	-0.08
0.500	5.543E+05	5.550E+05			0.000	0.05	0.001	0.22	10.000	1.107E+07	1.108E+07		0.001	0.02	-0.004	-0.06
0.100	1.106E+05	1.118E+05			0.000	0.38	0.000	0.12	5.000	5.549E+06	5.549E+06		0.000	0.00	-0.003	-0.10

Table 2-a.

Low range calibration							
Reference output		Linear equation			3rd order equation		
Ref Load Cell Nom. (MPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** MPa	%	Equation output (0.1N)	Expanded uncertainty *U** MPa	%
0.067	1000	1008	0.002	2.28	999	0.001	1.65
0.333	5000	5039	0.006	1.68	5010	0.003	0.93
0.667	10000	10061	0.009	1.30	10008	0.003	0.43
1.000	15000	15084	0.011	1.11	15007	0.004	0.40
1.333	20000	20101	0.015	1.09	19999	0.004	0.29
1.667	25000	25111	0.015	0.91	24986	0.005	0.28
2.000	30000	30140	0.019	0.96	29992	0.005	0.25
2.333	35000	35169	0.023	0.97	34998	0.005	0.20
2.667	40000	40173	0.023	0.88	39980	0.006	0.22
3.333	50000	50200	0.029	0.87	49964	0.012	0.35
2.667	40000	40161	0.022	0.83	39968	0.006	0.23
2.333	35000	35150	0.020	0.87	34979	0.005	0.21
2.000	30000	30113	0.016	0.79	29965	0.006	0.32
1.667	25000	25102	0.014	0.85	24977	0.005	0.28
1.333	20000	20091	0.013	0.95	19989	0.003	0.24
1.000	15000	15065	0.009	0.91	14988	0.003	0.29
0.667	10000	10049	0.007	1.02	9995	0.002	0.24
0.333	5000	5033	0.005	1.40	5004	0.002	0.47
0.067	1000	1009	0.002	2.93	1001	0.001	1.78

High range calibration							
Reference output		Linear equation			3rd order equation		
Ref Load Cell Nom. (MPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** MPa	%	Equation output (0.1N)	Expanded uncertainty *U** MPa	%
3.333	50000	50267	0.037	1.10	50031	0.011	0.33
6.667	100000	100412	0.057	0.85	99985	0.015	0.22
10.000	150000	150502	0.069	0.69	149925	0.022	0.22
13.333	200000	200612	0.085	0.63	199921	0.026	0.19
20.000	300000	300691	0.097	0.49	299877	0.037	0.18
26.667	400000	400704	0.102	0.38	399891	0.044	0.16
33.333	500000	500586	0.093	0.28	499881	0.053	0.16
40.000	600000	600420	0.082	0.20	599915	0.061	0.15
53.333	800000	799859	0.083	0.15	799960	0.081	0.15
66.667	1000000	999143	0.163	0.24	1000018	0.116	0.17
53.333	800000	799959	0.077	0.15	800061	0.078	0.15
40.000	600000	600694	0.109	0.27	600190	0.064	0.16
33.333	500000	500891	0.128	0.38	500187	0.055	0.16
26.667	400000	400975	0.136	0.51	400162	0.046	0.17
20.000	300000	300949	0.130	0.65	300134	0.036	0.18
13.333	200000	200791	0.107	0.80	200100	0.025	0.19
10.000	150000	150690	0.093	0.93	150112	0.023	0.23
6.667	100000	100520	0.071	1.06	100093	0.019	0.28
3.333	50000	50348	0.048	1.43	50112	0.018	0.54

Table 3-a. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

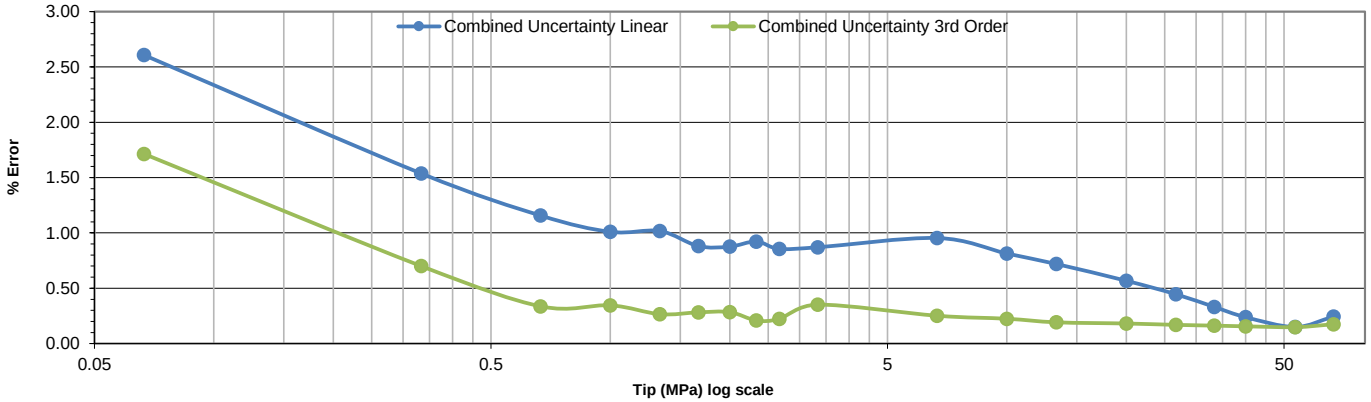
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	-3.37532
a1	=	0.99494
a2	=	8.67983E-09
a3	=	-2.73913E-15

Maximum tip zero drift during the calibration (MPa) =	0.002
Maximum load cell zero drift during the calibration (MPa) =	0.000
Factor used to convert from counts to 0.1N units =	0.0090738
Maximum tip full scale reading (MPa) =	100.00
Tip resolution (Pa) =	66.7
Tip area (cm²) =	15
Tip area ratio factor =	0.792

COMBINED EXPANDED UNCERTAINTY TIP



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1577

Cone Serial Number: S15-CFIIPTTM.2065

SLEEVE FRICTION CALIBRATION

Table1-b.

Low range calibration									High range calibration							
	Sleeve change In output (cts)				Reproducibility error *b*		Reversibility error *U_rev*			Sleeve change in output (cts)			Reproducibility error *b*		Reversibility error *U_rev*	
Ref LC	1	2	3	4					Ref LC	1	2	3				
(kN)	0°	120°	240°	240°	kPa	%	kPa	%	(kN)	0°	120°	240°	kPa	%	kPa	%
0.100	1.147E+05	1.147E+05	1.161E+05	1.161E+05	0.018	0.40			5.000	5.724E+06	5.726E+06	5.725E+06	0.021	0.01		
0.500	5.742E+05	5.747E+05	5.730E+05	5.759E+05	0.020	0.09			10.000	1.143E+07	1.143E+07	1.143E+07	0.038	0.01		
1.000	1.147E+06	1.150E+06	1.147E+06	1.148E+06	0.045	0.10			15.000	1.713E+07	1.713E+07	1.713E+07	0.034	0.01		
1.500	1.720E+06	1.720E+06	1.720E+06	1.718E+06	0.005	0.01			20.000	2.282E+07	2.283E+07	2.283E+07	0.061	0.01		
2.000	2.292E+06	2.294E+06	2.291E+06	2.291E+06	0.032	0.04			30.000	3.421E+07	3.421E+07	3.422E+07	0.103	0.01		
2.500	2.864E+06	2.865E+06	2.863E+06	2.864E+06	0.021	0.02			40.000	4.558E+07	4.559E+07	4.559E+07	0.137	0.01		
3.000	3.436E+06	3.439E+06	3.433E+06	3.435E+06	0.059	0.04			50.000	5.693E+07	5.695E+07	5.695E+07	0.210	0.01		
3.500	4.004E+06	4.007E+06	4.005E+06	4.006E+06	0.025	0.02			60.000	6.829E+07	6.830E+07	6.831E+07	0.196	0.01		
4.000	4.576E+06	4.579E+06	4.577E+06	4.577E+06	0.030	0.02			80.000	9.096E+07	9.098E+07	9.099E+07	0.272	0.01		
5.000	5.717E+06	5.718E+06	5.717E+06	5.719E+06	0.015	0.01			100.000	1.136E+08	1.136E+08	1.136E+08	0.305	0.01		
4.000	4.575E+06	4.576E+06			0.016	0.01	0.040	0.02	80.000	9.098E+07	9.100E+07		0.242	0.01	-0.419	-0.01
3.500	4.005E+06	4.008E+06			0.044	0.03	-0.016	-0.01	60.000	6.833E+07	6.834E+07		0.114	0.00	-0.855	-0.03
3.000	3.435E+06	3.435E+06			0.001	0.00	0.055	0.04	50.000	5.698E+07	5.699E+07		0.109	0.00	-0.978	-0.04
2.500	2.865E+06	2.864E+06			0.022	0.02	0.004	0.00	40.000	4.562E+07	4.563E+07		0.076	0.00	-0.897	-0.05
2.000	2.291E+06	2.295E+06			0.053	0.06	-0.006	-0.01	30.000	3.424E+07	3.425E+07		0.078	0.01	-0.816	-0.06
1.500	1.721E+06	1.722E+06			0.013	0.02	-0.034	-0.05	20.000	2.286E+07	2.286E+07		0.051	0.01	-0.725	-0.08
1.000	1.148E+06	1.150E+06			0.035	0.08	-0.010	-0.02	15.000	1.716E+07	1.716E+07		0.014	0.00	-0.587	-0.09
0.500	5.759E+05	5.747E+05			0.017	0.08	-0.019	-0.09	10.000	1.145E+07	1.145E+07		0.023	0.01	-0.438	-0.10
0.100	1.161E+05	1.149E+05			0.015	0.35	-0.017	-0.39	5.000	5.738E+06	5.737E+06		0.025	0.01	-0.278	-0.13

Table 2-b.

Low range calibration							
Reference output		Linear factor output			3rd order equation		
Ref Load Cell Nom. (kPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** kPa	%	Equation output (0.1N)	Expanded uncertainty *U** kPa	%
4	1000	1013	0.134	3.05	999	0.076	1.73
22	5000	5047	0.443	2.01	5007	0.180	0.82
44	10000	10094	0.852	1.94	10024	0.287	0.65
66	15000	15121	1.088	1.65	15020	0.290	0.44
88	20000	20156	1.401	1.59	20026	0.347	0.39
110	25000	25181	1.621	1.47	25022	0.340	0.31
132	30000	30210	1.876	1.42	30021	0.377	0.29
154	35000	35216	1.925	1.25	34999	0.312	0.20
176	40000	40245	2.189	1.24	40002	0.340	0.19
220	50000	50270	2.481	1.13	49974	0.728	0.33
176	40000	40231	2.057	1.17	39988	0.298	0.17
154	35000	35223	1.981	1.29	35007	0.272	0.18
132	30000	30200	1.776	1.34	30012	0.266	0.20
110	25000	25184	1.635	1.48	25024	0.303	0.27
88	20000	20164	1.458	1.66	20034	0.354	0.40
66	15000	15135	1.191	1.80	15034	0.321	0.49
44	10000	10103	0.914	2.08	10033	0.309	0.70
22	5000	5058	0.524	2.38	5019	0.195	0.88
4	1000	1015	0.156	3.55	1001	0.079	1.79

High range calibration							
Reference output		Linear factor output			3rd order equation		
Ref Load Cell Nom. (kPa)	Ref Load Cell (0.1N)	Cone output (0.1N)	Expanded uncertainty *U** kPa	%	Equation output (0.1N)	Expanded uncertainty *U** kPa	%
220	50000	50334	3.014	1.37	50037	0.733	0.33
441	100000	100511	4.605	1.05	99981	0.971	0.11
661	150000	150629	5.681	0.86	149918	1.439	0.11
881	200000	200704	6.386	0.72	199859	1.964	0.11
1322	300000	300797	7.333	0.55	299818	2.644	0.10
1762	400000	400788	7.443	0.42	399827	3.086	0.09
2203	500000	500669	6.753	0.31	499851	3.555	0.08
2643	600000	600490	5.805	0.22	599915	3.947	0.07
3524	800000	799888	5.309	0.15	799986	5.218	0.07
4405	1000000	999135	10.744	0.24	999983	7.573	0.09
3524	800000	800003	5.004	0.14	800101	5.082	0.07
2643	600000	600797	7.968	0.30	600222	4.248	0.08
2203	500000	501021	9.529	0.43	500204	3.627	0.08
1762	400000	401122	10.229	0.58	400161	2.990	0.08
1322	300000	301104	9.934	0.75	300125	2.294	0.09
881	200000	200979	8.739	0.99	200134	1.819	0.10
661	150000	150855	7.617	1.15	150143	1.690	0.13
441	100000	100680	6.059	1.38	100149	1.584	0.18
220	50000	50444	3.970	1.80	50147	1.449	0.33

Table 3-b. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

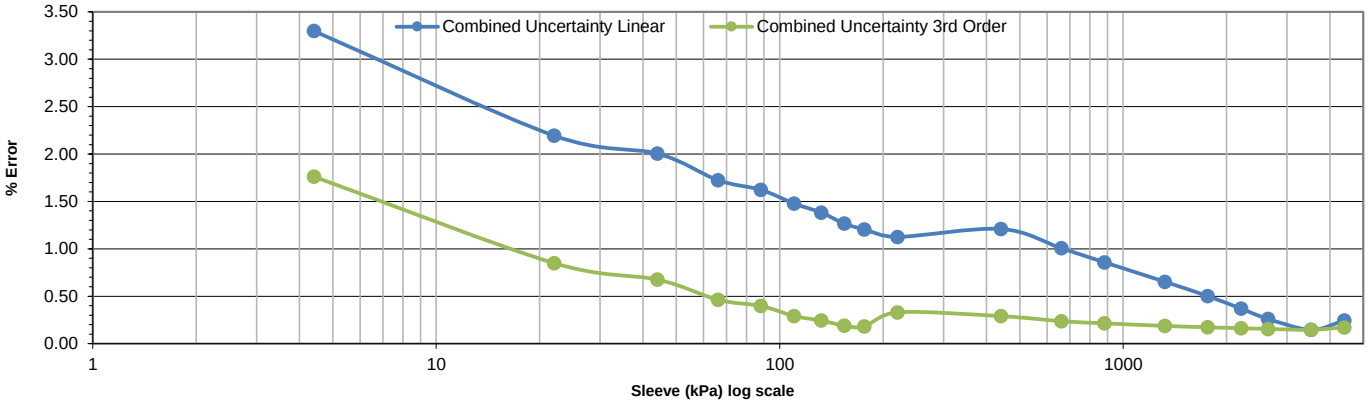
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	-7.59599
a1	=	0.99368
a2	=	1.16202E-08
a3	=	-4.43773E-15

Maximum sleeve zero drift during the calibration (kPa) =	0.097
Maximum load cell zero drift during the calibration (kPa) =	0.029
Factor used to convert from counts to 0.1N units =	0.0087922
Physical strength limited maximum sleeve reading (MPa) =	1.333
Sleeve resolution (Pa) =	4.4
Sleeve area (cm²) =	227
Sleeve area ratio factor =	-0.001

COMBINED EXPANDED UNCERTAINTY SLEEVE



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

Table 4-b **Sleeve friction - tip subtraction combined standard uncertainty Uc_sub, where friction ratio is between 0.25% and 10%.**

Tip MPa	Sleeve linear equation subtraction error (%) Sleeve kPa → 4	22	44	66	110	154	220	661
0.07	2.5	-	-	-	-	-	-	-
0.33	5.5	1.9	-	-	-	-	-	-
0.67	9.6	2.7	1.8	1.4	-	-	-	-
1.00	11.1	3.0	1.9	1.5	-	-	-	-
1.67	15.2	3.8	2.4	1.8	1.3	1.0	-	-
2.33	-	4.3	2.6	1.9	1.4	1.1	0.9	-
3.33	-	7.2	4.1	2.9	2.0	1.5	1.2	-
10.00	-	-	4.3	3.1	2.1	1.6	1.2	0.6
13.33	-	-	4.4	2.8	2.1	1.6	1.1	0.6

Tip MPa	Sleeve 3rd order equation subtraction error (%) Sleeve kPa → 4	22	44	66	110	154	220	661
0.07	0.9	-	-	-	-	-	-	-
0.33	2.5	0.7	-	-	-	-	-	-
0.67	4.8	1.2	0.7	0.5	-	-	-	-
1.00	4.7	1.2	0.7	0.5	-	-	-	-
1.67	5.6	1.4	0.8	0.5	0.3	0.2	-	-
2.33	-	1.3	0.8	0.5	0.3	0.2	0.2	-
3.33	-	1.0	0.6	0.4	0.3	0.2	0.2	-
10.00	-	-	0.4	0.3	0.2	0.1	0.2	0.1
13.33	-	-	0.7	0.7	0.3	0.2	0.2	0.1

PORE PRESSURE CALIBRATION

Table1-c.

Ref PR (kPa)	PWP change in output (cts) 1 0°	2 120°	3 240°	Reproducibility error *b* kPa	%	Reversibility error *U_rev* kPa	%
100	2.082E+07	2.096E+07	2.066E+07	0.4	0.41		
200	4.164E+07	4.168E+07	4.174E+07	0.1	0.07		
400	8.332E+07	8.316E+07	8.288E+07	0.6	0.15		
600	1.247E+08	1.246E+08	1.247E+08	0.2	0.03		
800	1.662E+08	1.661E+08	1.661E+08	0.1	0.02		
1000	2.083E+08	2.075E+08	2.077E+08	1.2	0.12		
1500	3.114E+08	3.110E+08	3.111E+08	0.6	0.04		
2000	4.147E+08	4.145E+08	4.145E+08	0.4	0.02		
2500	5.174E+08	5.175E+08	5.171E+08	0.5	0.02		
3000	6.200E+08	6.208E+08	6.199E+08	1.5	0.05		
2500	5.179E+08	5.179E+08		0.1	0.00	-1.3	-0.05
2000	4.152E+08	4.152E+08		0.0	0.00	-1.7	-0.09
1500	3.121E+08	3.127E+08		0.9	0.06	-3.5	-0.23
1000	2.092E+08	2.092E+08		0.0	0.00	-3.7	-0.37
800	1.681E+08	1.684E+08		0.4	0.06	-6.0	-0.75
600	1.268E+08	1.268E+08		0.1	0.01	-6.1	-1.02
400	8.502E+07	8.524E+07		0.4	0.09	-5.3	-1.31
200	4.247E+07	4.281E+07		0.6	0.29	-2.7	-1.36
100	2.128E+07	2.118E+07		0.2	0.18	-0.9	-0.95

Table 2-c.

Reference output: Ref Pressure (kPa)	Ref Pressure (0.1Pa)	Linear factor output: Cone output (0.1Pa)	Expanded uncertainty *U** kPa	%	3rd order equation: Equation output (0.1N)	Expanded uncertainty *U** kPa	%
100	1000000	1007130	1.786	1.79	990036	2.251	2.25
200	2000000	2017391	3.932	1.97	1986012	3.352	1.68
400	4000000	4022317	5.825	1.46	3967555	7.484	1.87
600	6000000	6032040	7.621	1.27	5959970	8.999	1.50
800	8000000	8038727	8.769	1.10	7954905	9.900	1.24
1000	10000000	10056077	11.797	1.18	9965409	7.788	0.78
1500	15000000	15057278	11.858	0.79	14967229	7.173	0.48
2000	20000000	20062378	12.701	0.64	19990659	2.868	0.14
2500	25000000	25035148	7.488	0.30	24990061	3.207	0.13
3000	30000000	30014017	4.963	0.17	29994909	4.214	0.14
2500	25000000	25062468	12.748	0.51	25017534	4.206	0.17
2000	20000000	20093307	18.837	0.94	20021737	4.810	0.24
1500	15000000	15118708	24.076	1.61	15028796	6.605	0.44
1000	10000000	10124758	25.241	2.52	10033938	7.283	0.73
800	8000000	8143182	29.102	3.64	8058889	12.493	1.56
600	6000000	6137542	27.972	4.66	6064723	13.577	2.26
400	4000000	4119755	24.459	6.11	4064017	13.299	3.32
200	2000000	2063571	13.098	6.55	2031581	6.673	3.34
100	1000000	1027361	5.657	5.66	1009964	2.124	2.12

Table 3-c. Third order equation

For a given cone indicated output of D (0.1N units), the corrected applied force

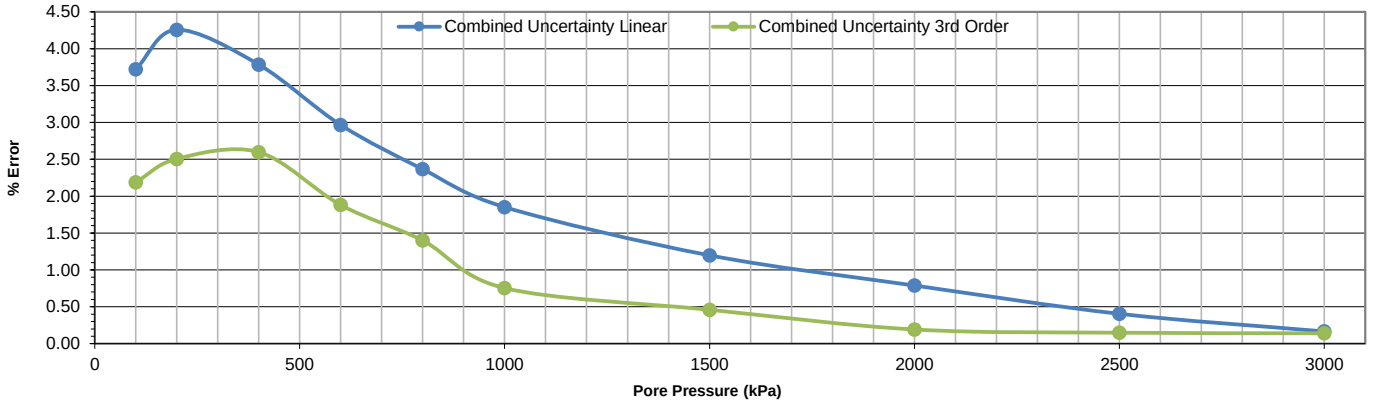
F (in 0.1N units) is calculated from :

$F = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$

a0	=	-1083.10957
a1	=	0.98320
a2	=	9.08140E-10
a3	=	-1.22751E-17

Maximum PWP zero drift during the calibration (kPa) =	0.08
Maximum reference zero drift during the calibration (kPa) =	0.073
Factor used to convert from counts to 0.1Pa units =	0.0483921
Maximum PWP full scale reading (kPa) =	5000
PWP resolution (Pa) =	0.1

COMBINED EXPANDED UNCERTAINTY PORE PRESSURE



* The combined expanded uncertainties shown are to k=2 with a 95% coverage factor.

LANKELMA

CERTIFICATE OF CALIBRATION

Certificate Number: 1577

Cone Serial Number: S15-CFIIPTTM.2065

INCLINATION CALIBRATION

Ref Inclination (°C)	Cone inclination output X Inc (cts)	Y Inc (cts)
-25	-29203	-27079
0	-3492	-1460
25	21873	23502

Ref Inclination (°)	Cone inclination output X Inc (°)	Y Inc (°)
-25	-25.2	-25.3
0	0.0	0.0
25	24.8	24.7

	X inc	Y inc
Factor used to convert from counts to 0.1m° units =	9.7891838	9.88457884
Inclination error (°) =	0.2	0.3

TEMPERATURE CALIBRATION

Recorded temp (°C)	Cone output 1 FS (cts)	Cone output 2 QC (cts)
5.88	3044050	3039697
10.77	3131864	3118728
15.37	3211998	3198684
20.10	3295202	3281820
25.38	3388692	3375370

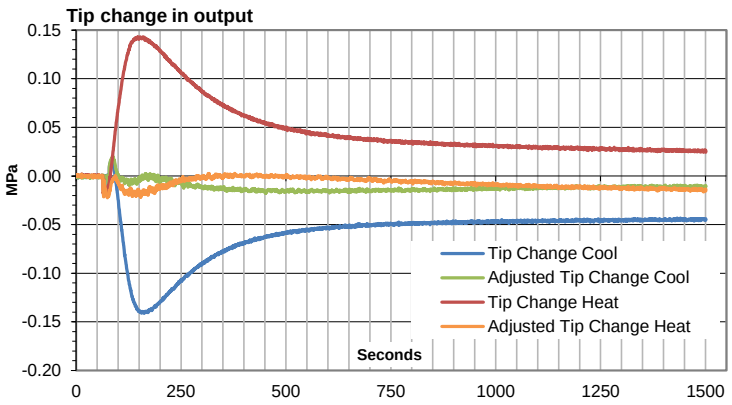
Recorded temp (°C)	Cone output 1 FS (°C)	Cone output 2 QC (°C)
5.88	5.85	6.05
10.77	10.82	10.63
15.37	15.37	15.26
20.10	20.08	20.07
25.38	25.38	25.49

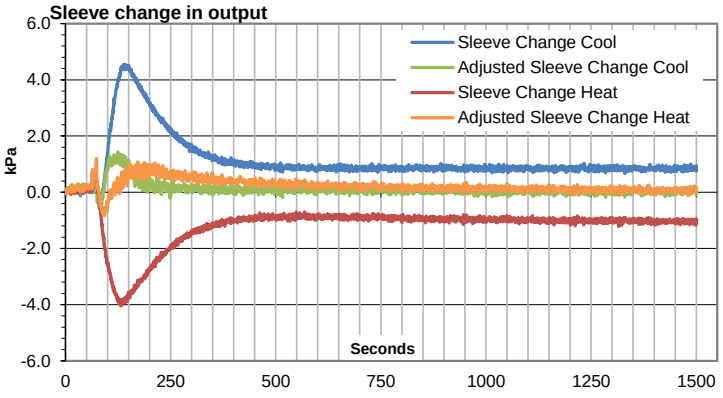
Factor used to convert from counts to 0.00001°C units =	0.566775119	0.579054715
Temperature error (°C) =	0.05	0.17

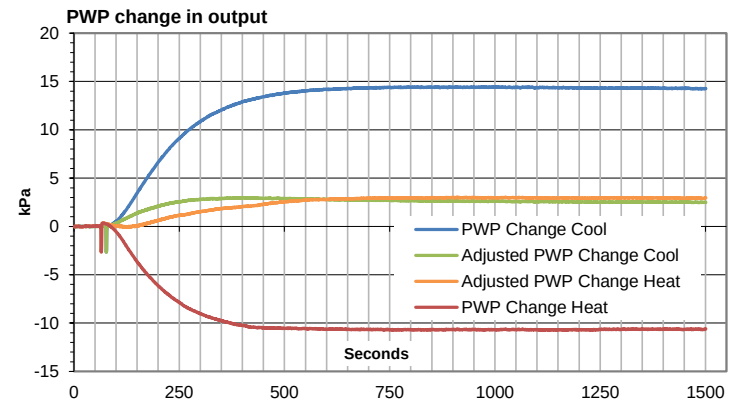
CONE TEMERATURE RESPONSE AND CORRECTION

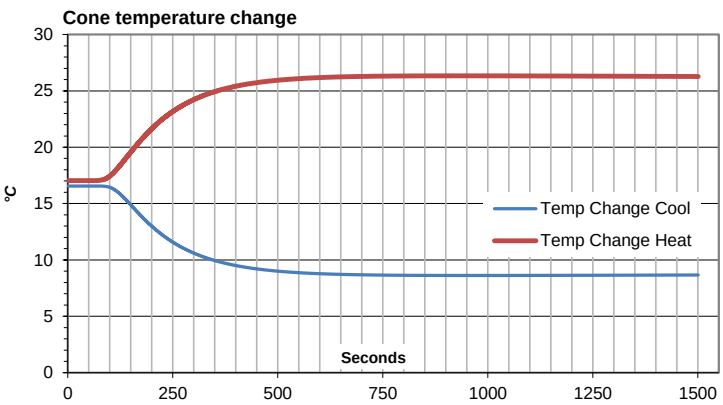
	Cooling	Heating
Start temperature =	16.56	17.03
End temperature =	8.62	26.34
Temperature change =	-7.94	9.30

	Cooling	Heating
Tip maximum rate of change (MPa/(°C/min)) =	0.057	0.050
Tip end change (MPa/°C) =	-0.006	0.003
Adjusted tip end change (MPa/°C) =	0.001	0.001
Sleeve maximum rate of change (kPa/(°C/min)) =	2.59	2.58
Sleeve end change (kPa/°C) =	0.10	-0.12
Adjusted sleeve end change (kPa/°C) =	-0.01	0.01
PWP end change (kPa/°C) =	1.80	-1.14
Adjusted PWP end change (kPa/°C) =	-0.32	0.32









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CERTIFICATE OF CALIBRATION

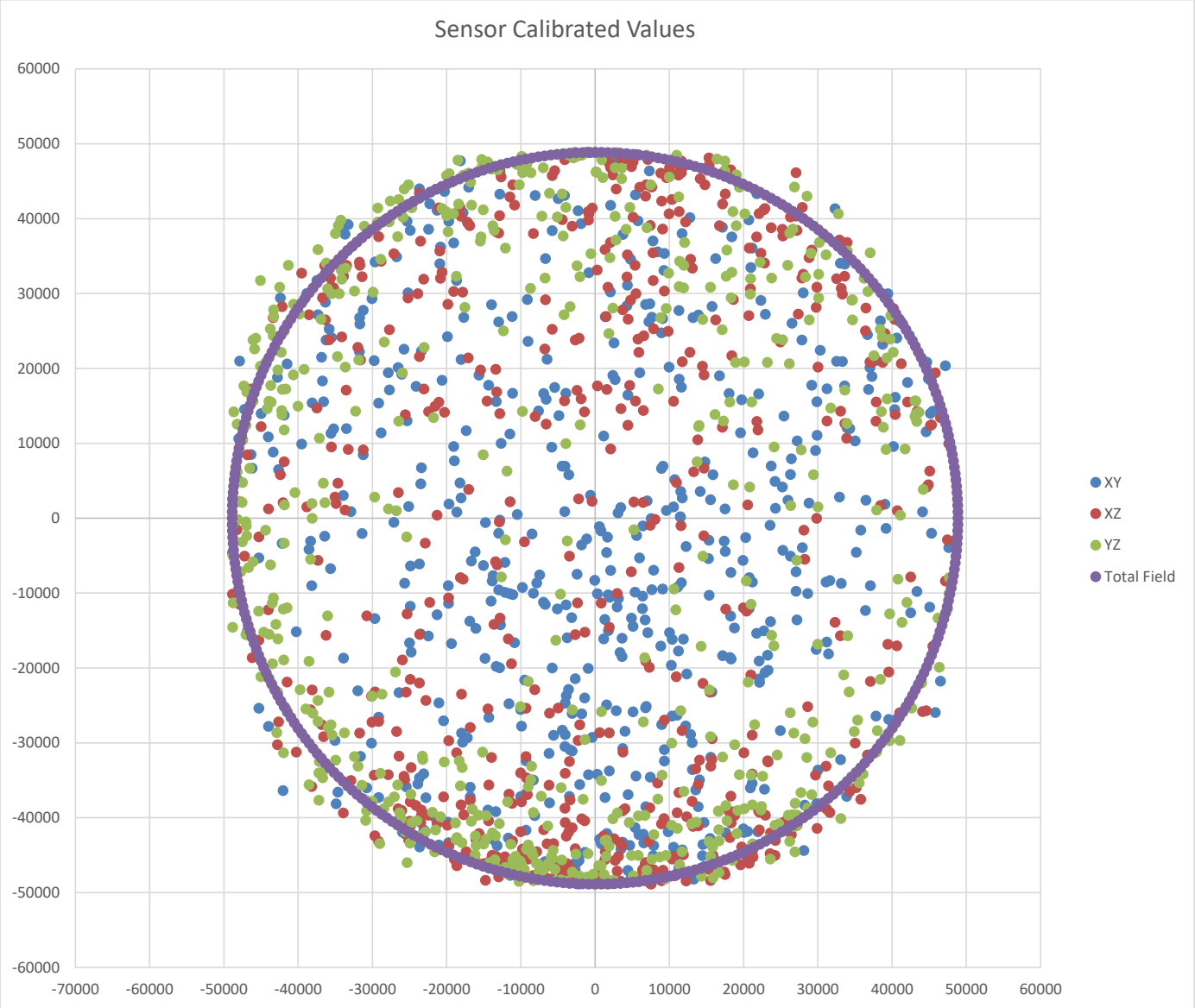
Certificate Number: 1577

Cone Serial Number: S15-CFIIPTTM.2065

MAGNETOMETER CALIBRATION

World magnetic model total field calculation		
NOAA WMM total field estimate =	48867	nT
Uncertainty =	145	nT
Lattitude =	50.974964 N	°
Longditude =	0.711456 E	°
Elevation =	31	m

Calibration for soft iron effects, inc cone and crossover rod		
Sensor range =	200	uT
Resolution =	10	nT
Calibration average total field =	48908	nT
Total field error mean =	0.08	%
Total field error 1 std dev =	3.52	%



Calibration factors		
X axis bias =	2008	nT
Y axis bias =	2575	nT
Z axis bias =	1750	nT
X axis factor =	0.970	factor
Y axis factor =	1.031	factor
Z axis factor =	0.500	factor

UK23

Hybrid plug-in electric crawler



Rig weight / push capacity	13 T
Max. travelling speed	3.4 km/h
Track material	Composite
Track length	2.87 m
Track width	0.60 m
Ground bearing pressure	Tracking/testing: 37 kPa Rod extraction: 81 kPa
Jack arrangements	3nr. (1nr. under engine, 2nr. under access door)
Noise output at 2 m	Testing – 64.5 dBA Tracking – 73.9 dBA
Clamp arrangement	Hydraulic push-pull clamp
Ram stroke	1.22 m
Max. casing Ø	79 mm (55 mm mobilised as standard)
Typical production	100m+ of standard CPTu testing per day (depending on site conditions and access)

Can operate on the diesel engine or completely on plug-in electric. Requires a 3-phase power source to run on electric.

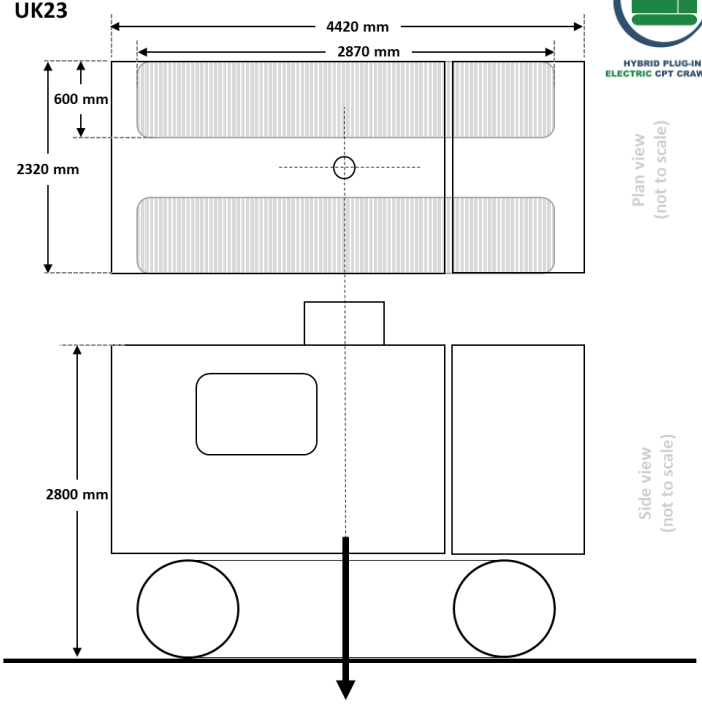
The rig is driven externally with a wireless remote-control device allowing the operator to have clear views for access and manoeuvring.

Ideal for sites with limited access or working internally. Composite tracks and chapter 8 signage for working on highways.

PLUG-IN HYBRID
ELECTRIC CPT CRAWLER

UK23

HYBRID PLUG-IN ELECTRIC CPT CRAWLER



LANKELMA
01797 280050 – www.lankelma.com

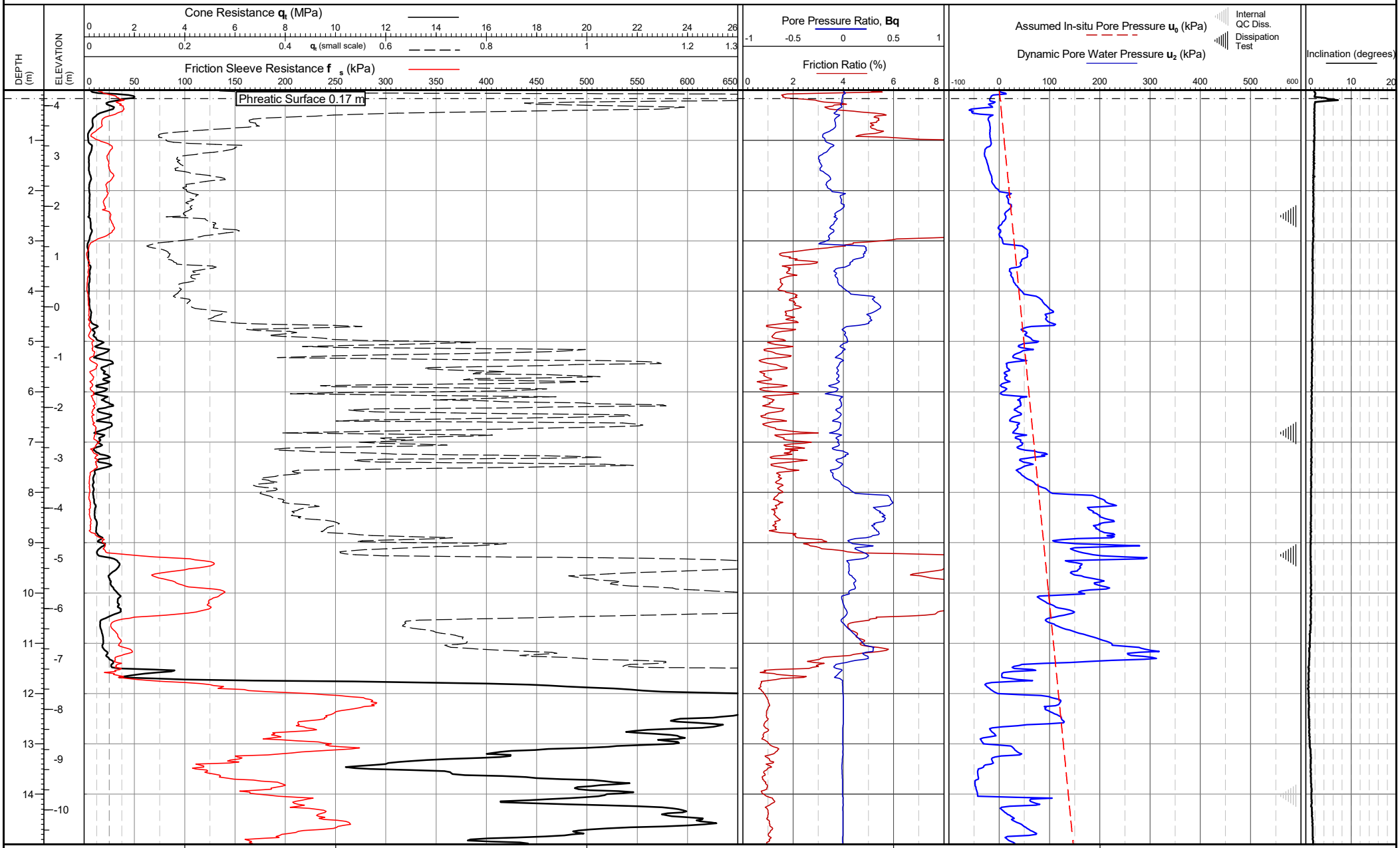
APPENDIX C CONE PENETRATION TEST RESULTS

Measured CPT parameters

intermediate parameters R_f and B_q

Project: PROTOS, INCE

Client: AYESA

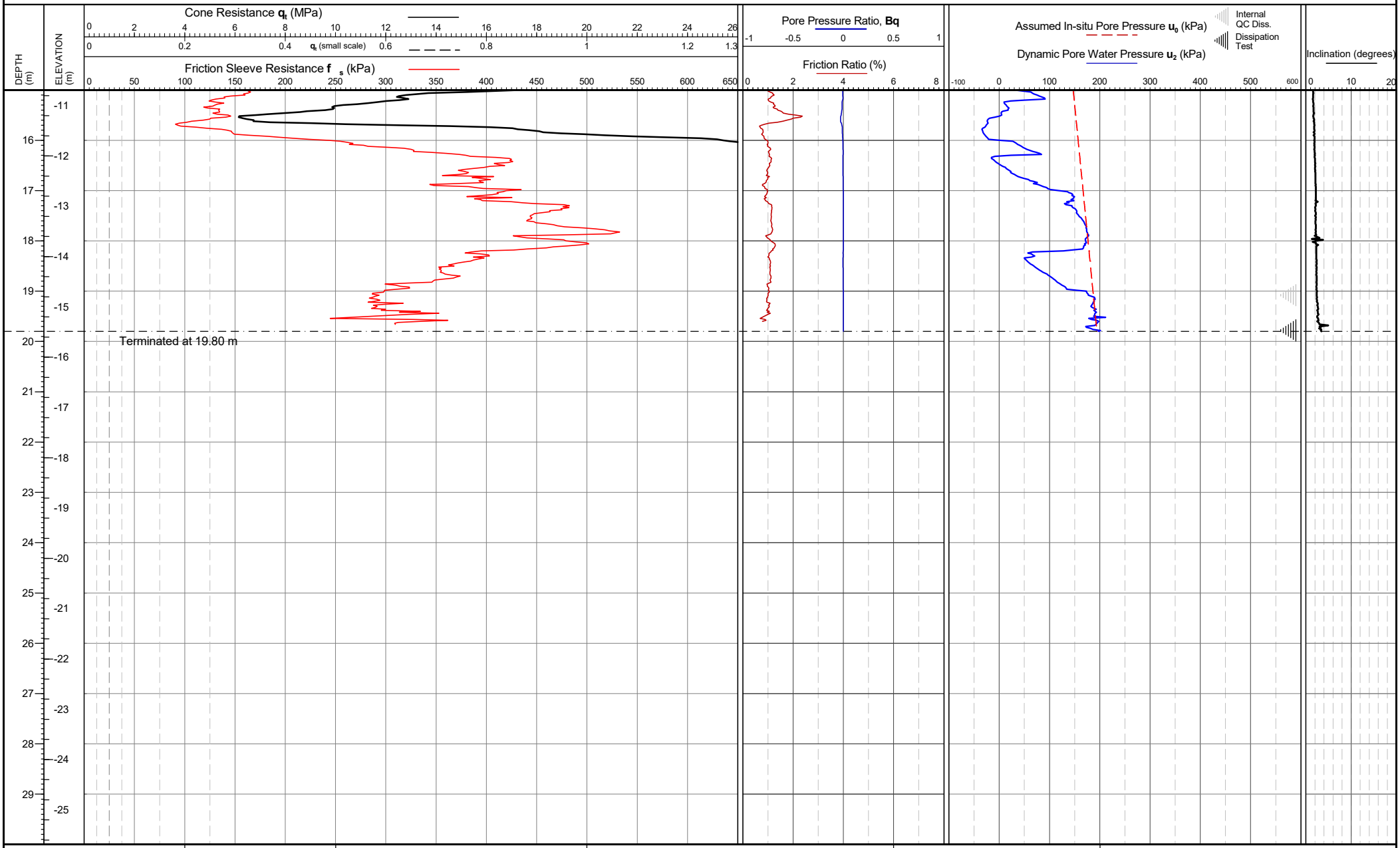


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 06/02/2024 09:13:28	Zero drift (Pre/post test) q_c (kPa): 22.4 f_s (kPa): -1.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): 2.1	Location: Cheshire, UK Coordinates: 346905.692, 376655.346 Elevation: 4.312 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA



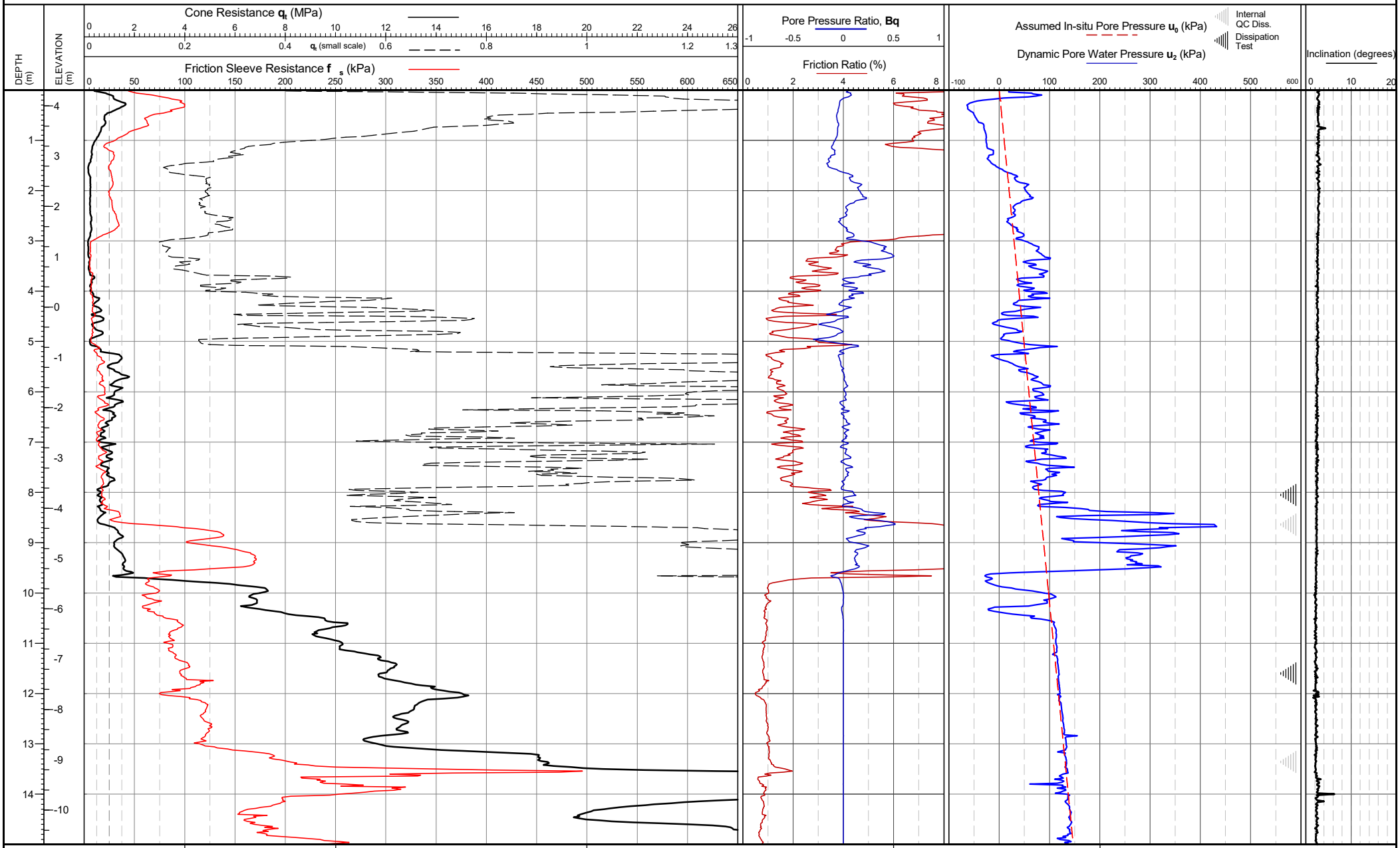
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 06/02/2024 09:13:28	Zero drift (Pre/post test) q_c (kPa): 22.4 f_s (kPa): -1.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): 2.1	Location: Cheshire, UK Coordinates: 346905.692, 376655.346 Elevation: 4.312 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT222

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Zero drift (Pre/post test)
q_c (kPa): -28.2
f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$)
u_2 (kPa): -4.1

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

Remarks:
*Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

Termination Remark: Lateral support at depth

Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

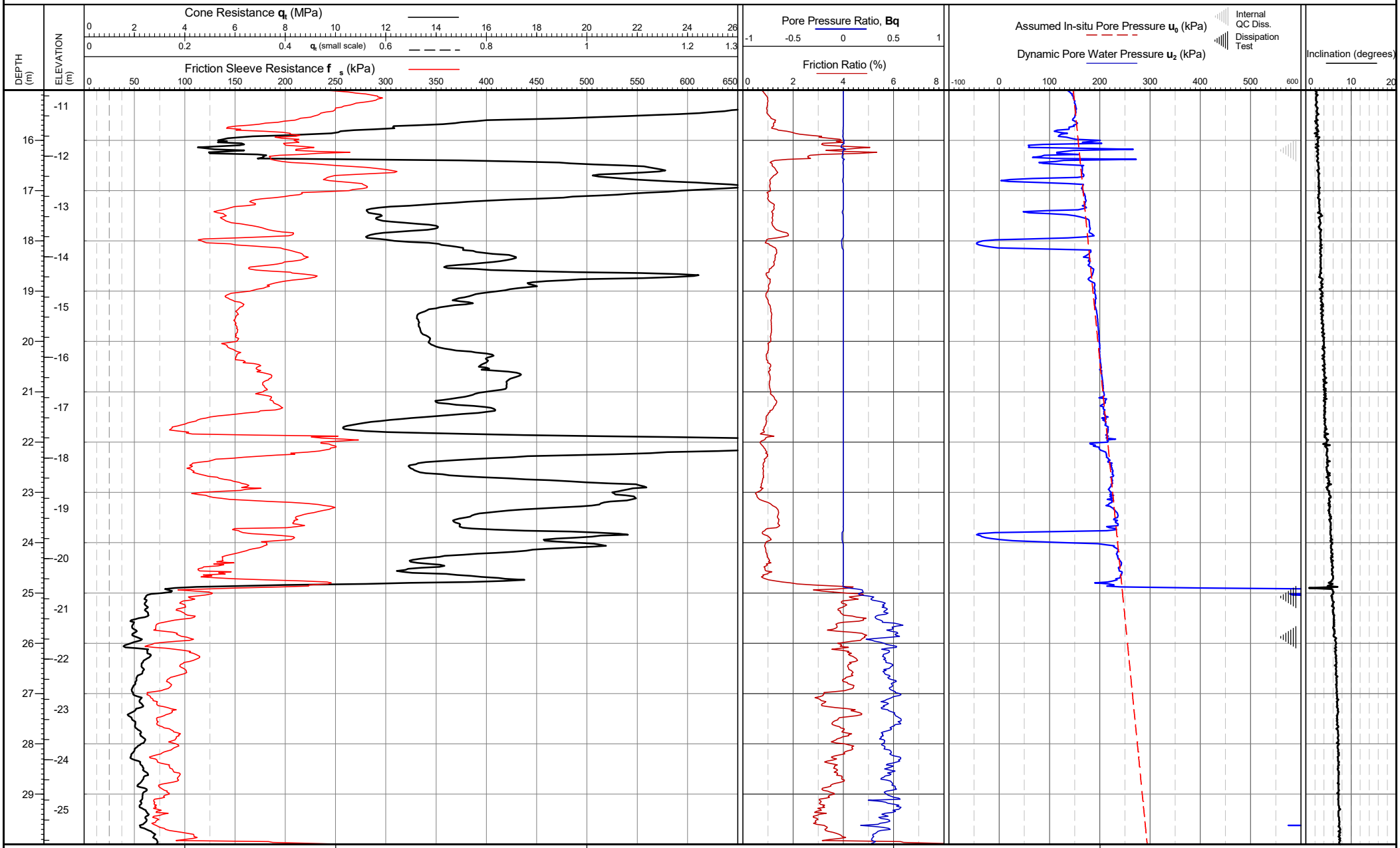
Checked by:
Nick Mason

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Zero drift (Pre/post test)
q_c (kPa): -28.2
f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$)
u_2 (kPa): -4.1

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

Remarks:
*Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

Termination Remark: Lateral support at depth

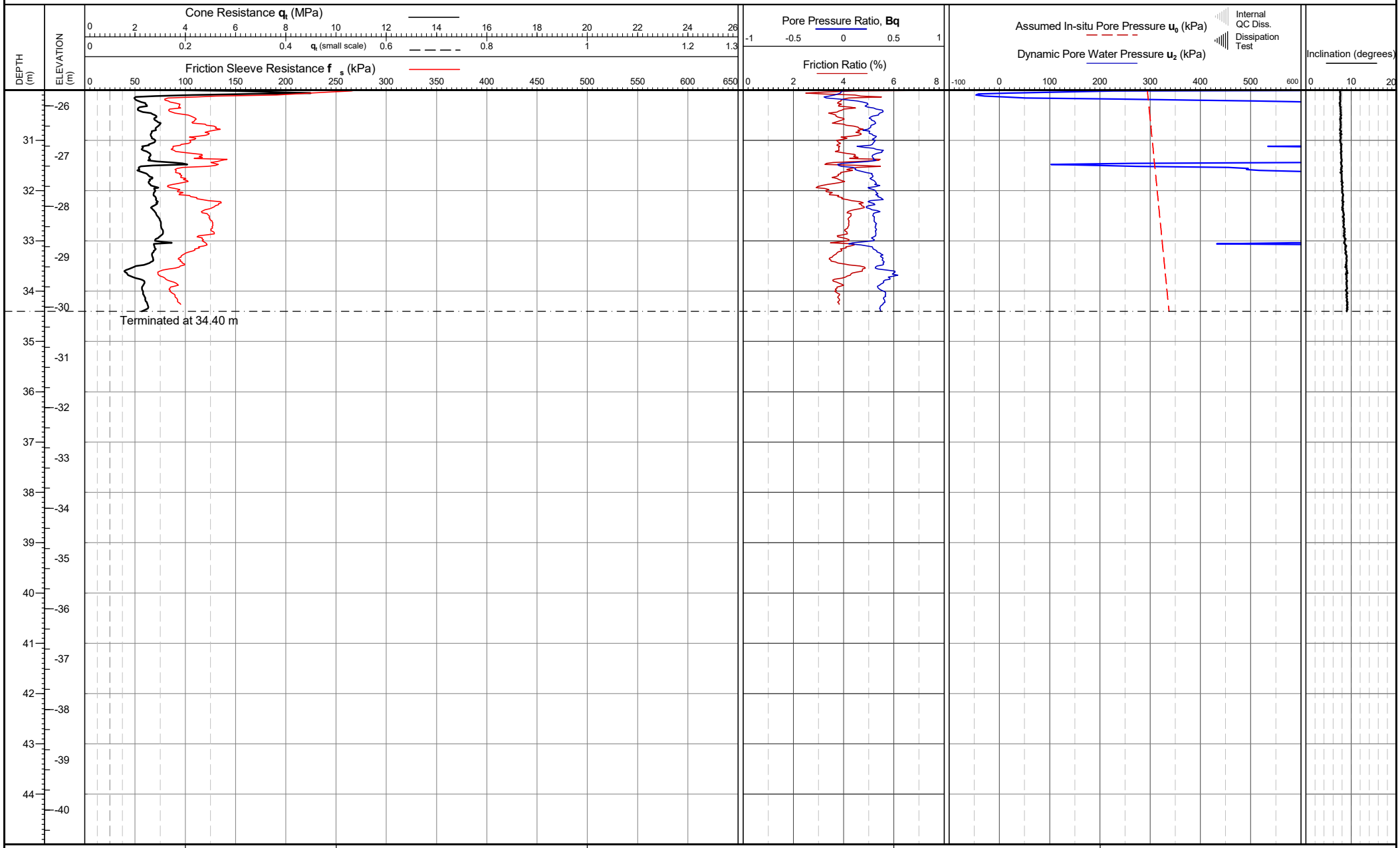
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by: Nick Mason

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



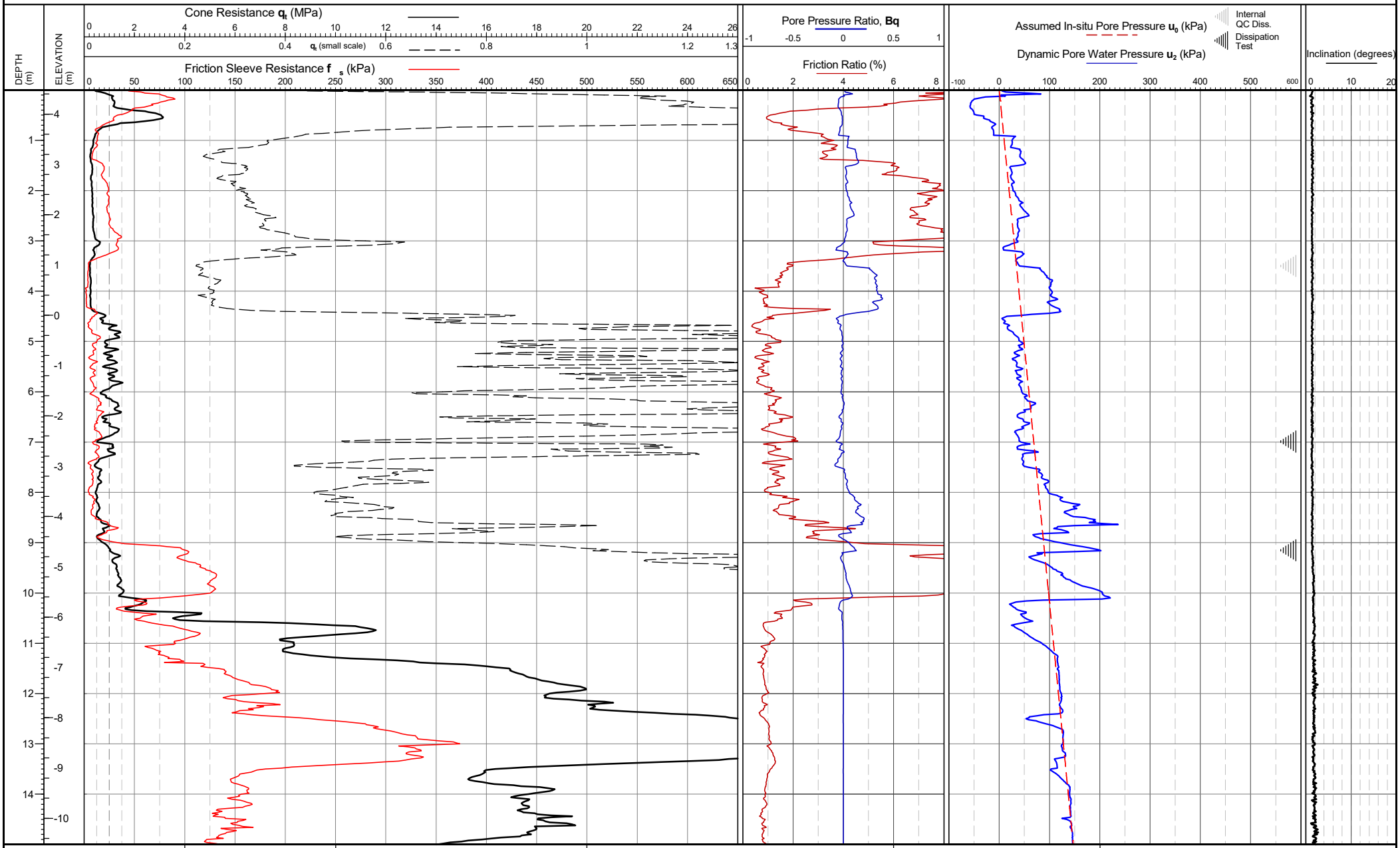
Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 12/02/2024 09:51:48	Zero drift (Pre/post test) q_c (kPa): -28.2 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.1	Location: Cheshire, UK Coordinates: 346995.306, 376696.366 Elevation: 4.316 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl Termination Remark: Lateral support at depth	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



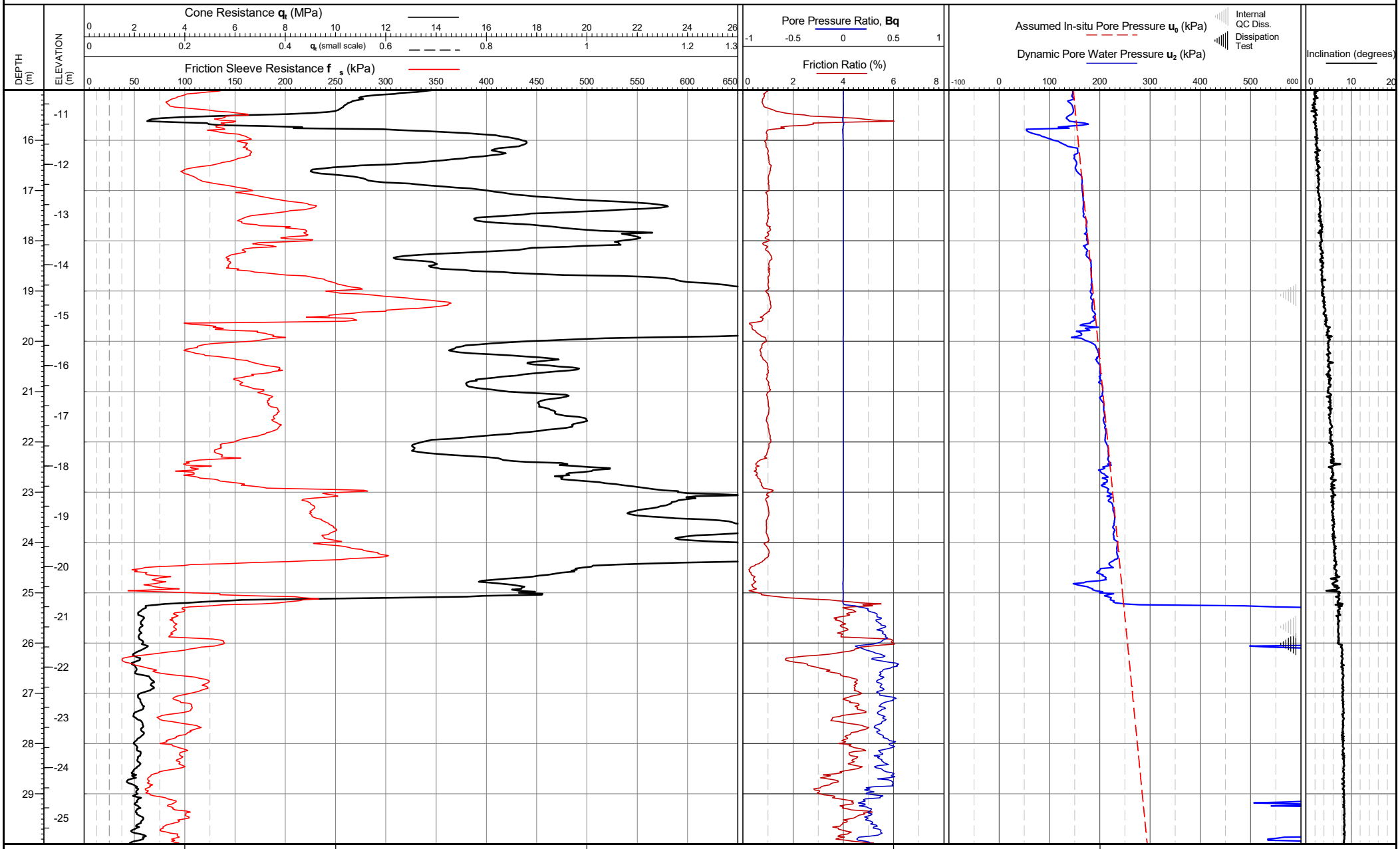
Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 09/02/2024 08:14:21	Zero drift (Pre/post test) q_c (kPa): -46.6 f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.0	Location: Cheshire, UK Coordinates: 347007.486, 376632.058 Elevation: 4.479 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA

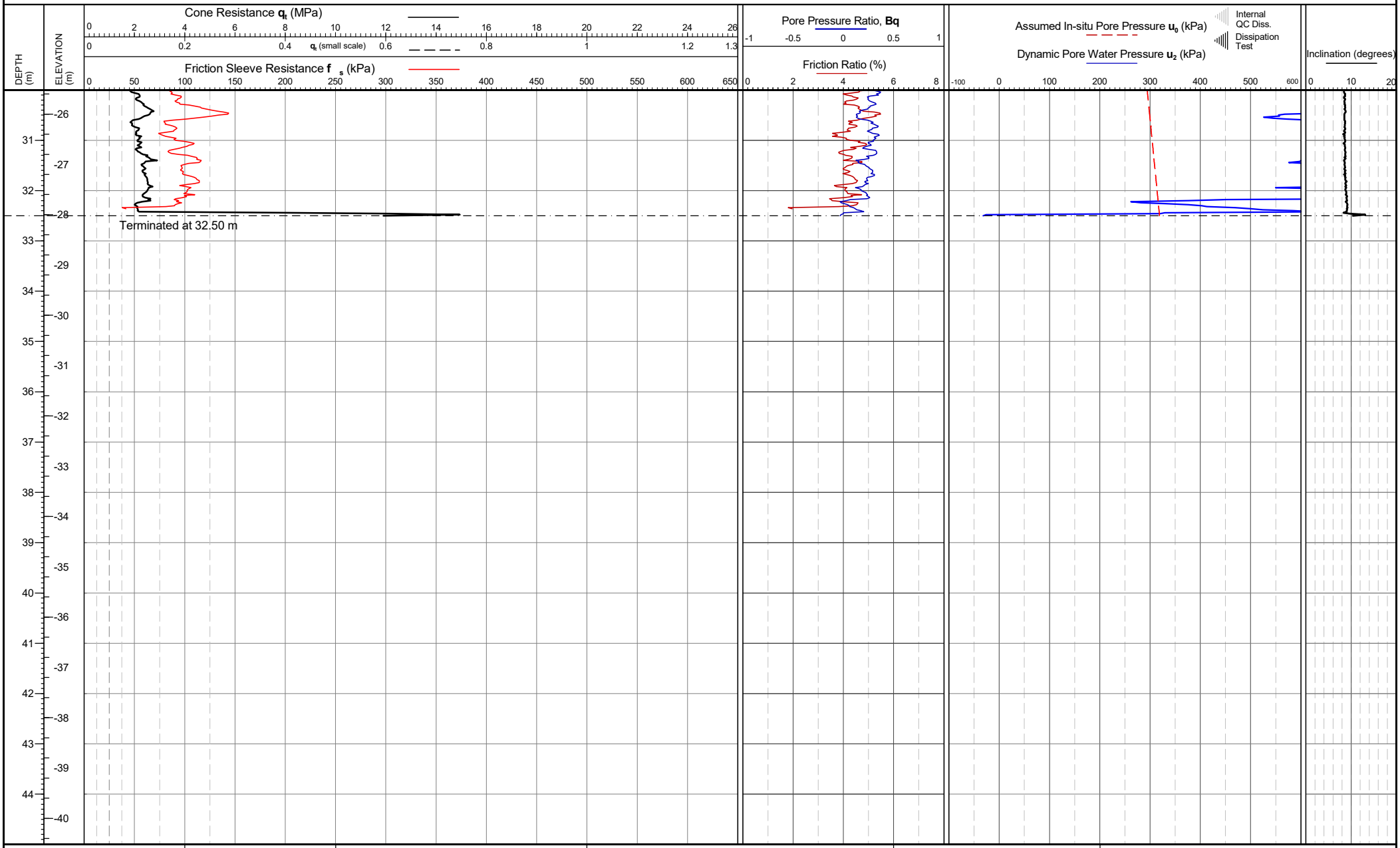


Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 09/02/2024 08:14:21	Zero drift (Pre/post test) q_c (kPa): -46.6 f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.0	Location: Cheshire, UK Coordinates: 347007.486, 376632.058 Elevation: 4.479 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



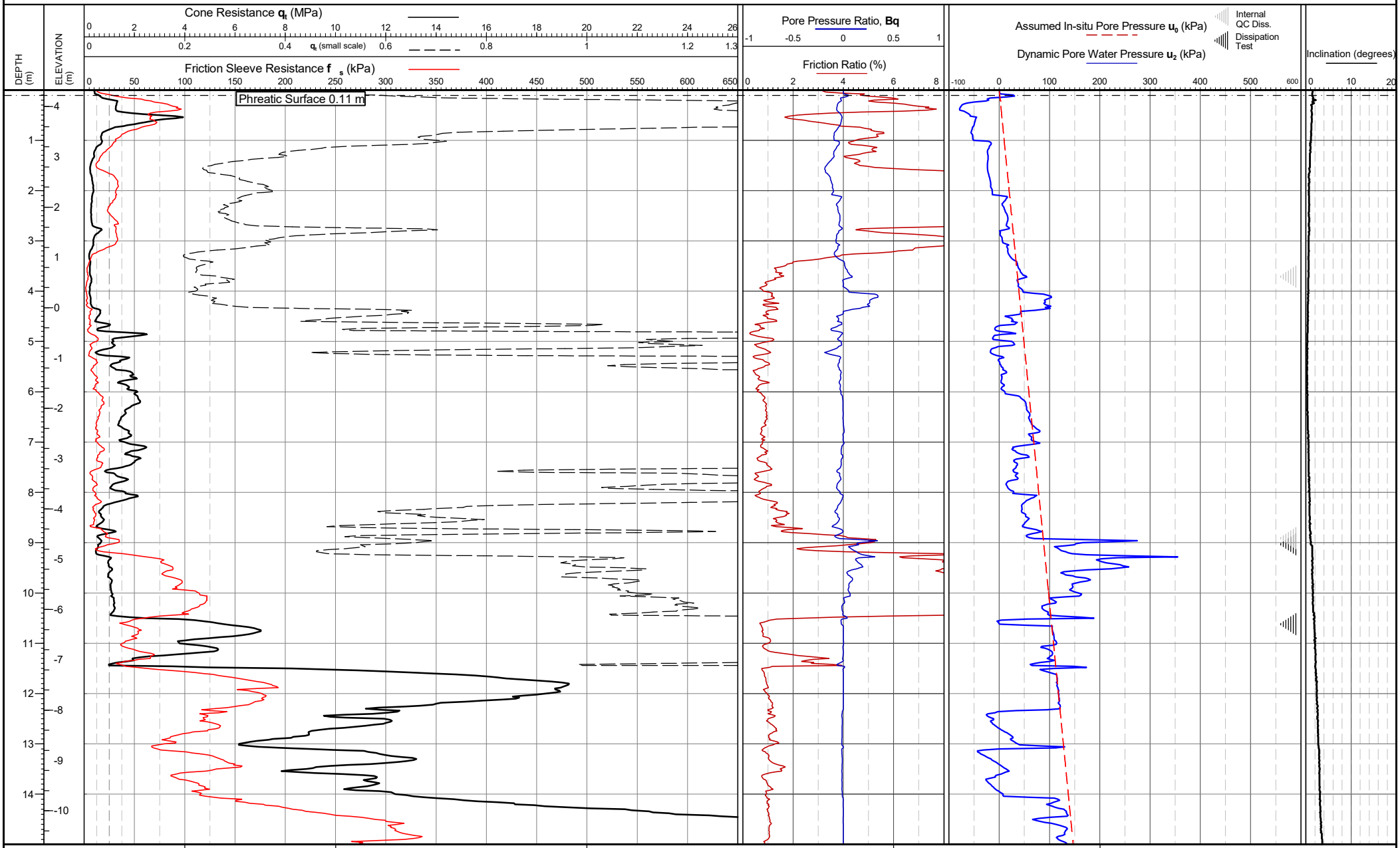
Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 09/02/2024 08:14:21	Zero drift (Pre/post test) q_c (kPa): -46.6 f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.0	Location: Cheshire, UK Coordinates: 347007.486, 376632.058 Elevation: 4.479 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA



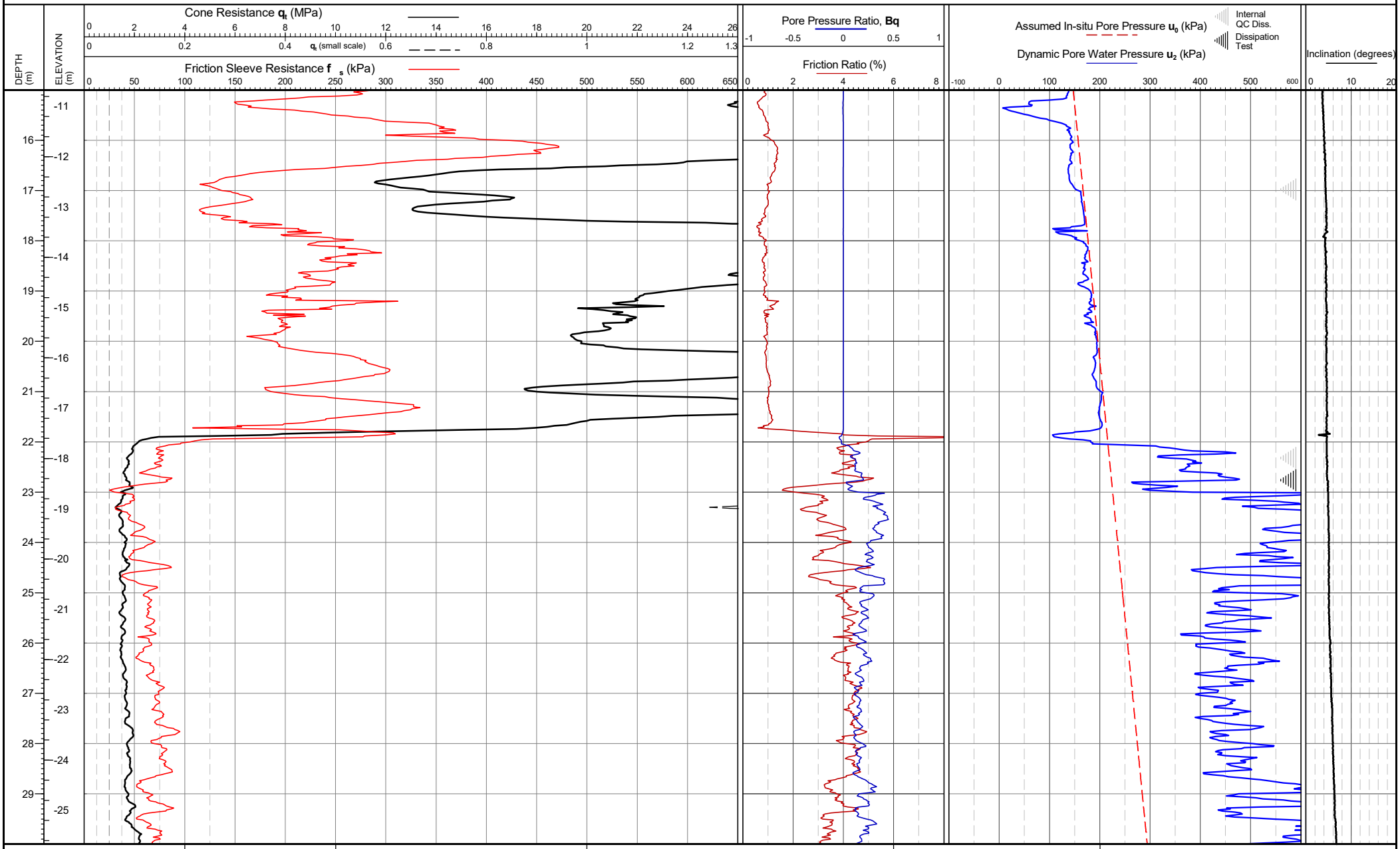
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 05/02/2024 09:38:43	Zero drift (Pre/post test) q_c (kPa): -10.8 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -3.6	Location: Cheshire, UK Coordinates: 346954.178, 376648.331 Elevation: 4.329 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Tonnage + inclination	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



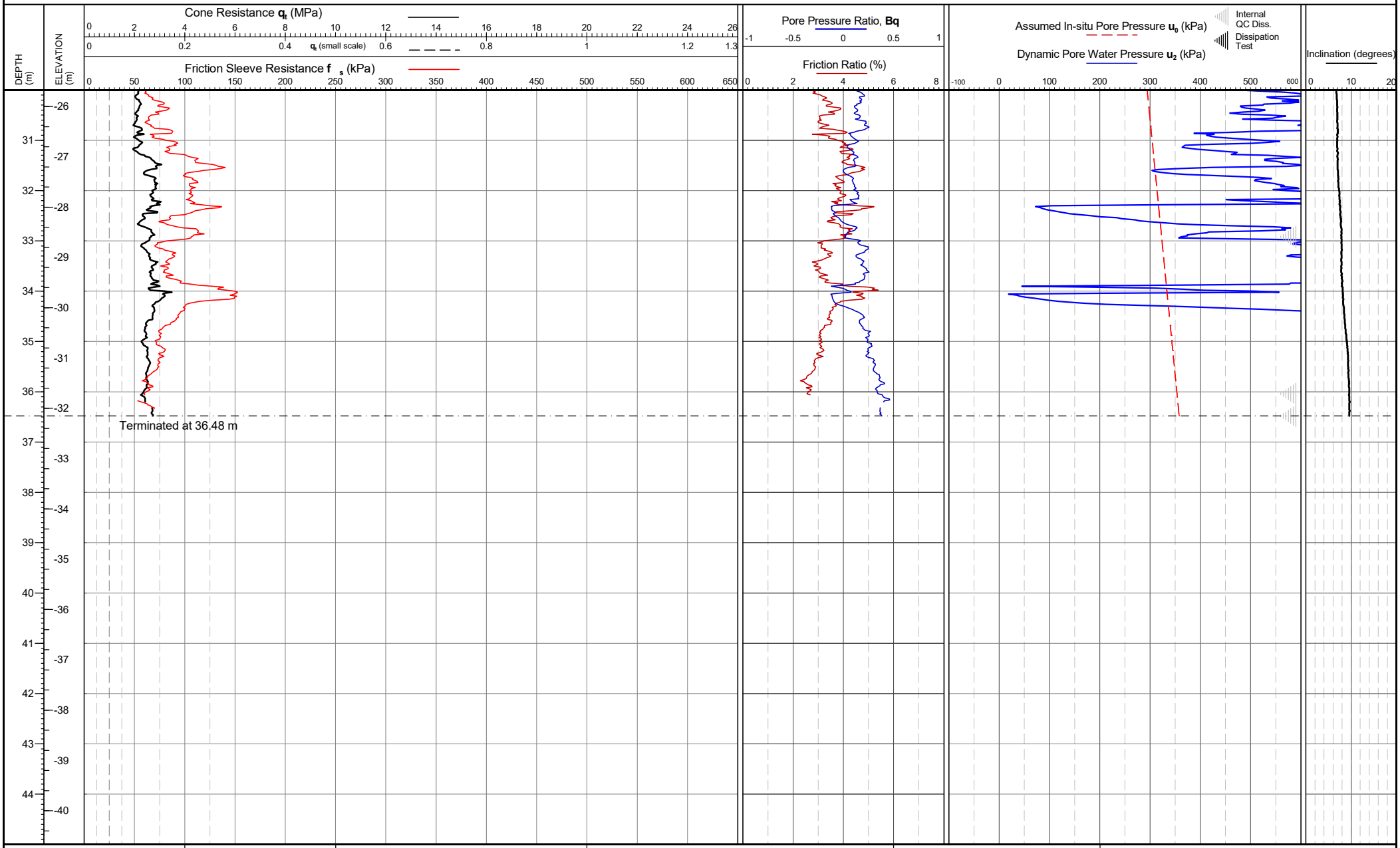
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 05/02/2024 09:38:43	Zero drift (Pre/post test) q_c (kPa): -10.8 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -3.6	Location: Cheshire, UK Coordinates: 346954.178, 376648.331 Elevation: 4.329 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Tonnage + inclination	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Zero drift (Pre/post test)
q_c (kPa): -10.8
f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$)
u_2 (kPa): -3.6

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
Coordinate system:

Remarks:
*Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark: Tonnage + inclination

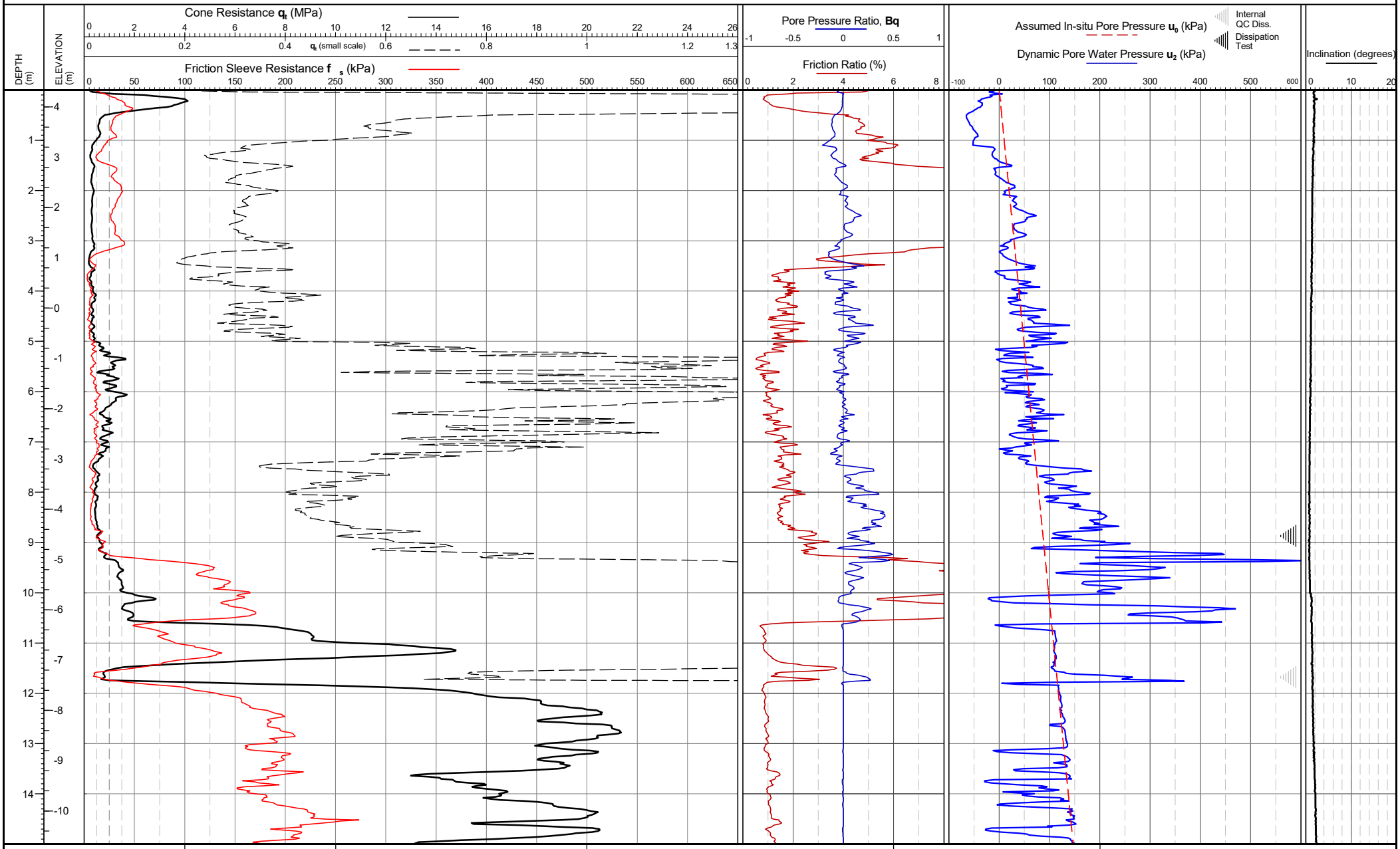
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by: Nick Mason

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 08/02/2024 09:51:02

Zero drift (Pre/post test)
q_c (kPa): 0.0
f_s (kPa): -0.5 ($f_{s\ drift}$ - $q_{c\ drift}$)
u_2 (kPa): -3.1

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
Coordinate system:

Remarks:
*Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark: Total reaction force

Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

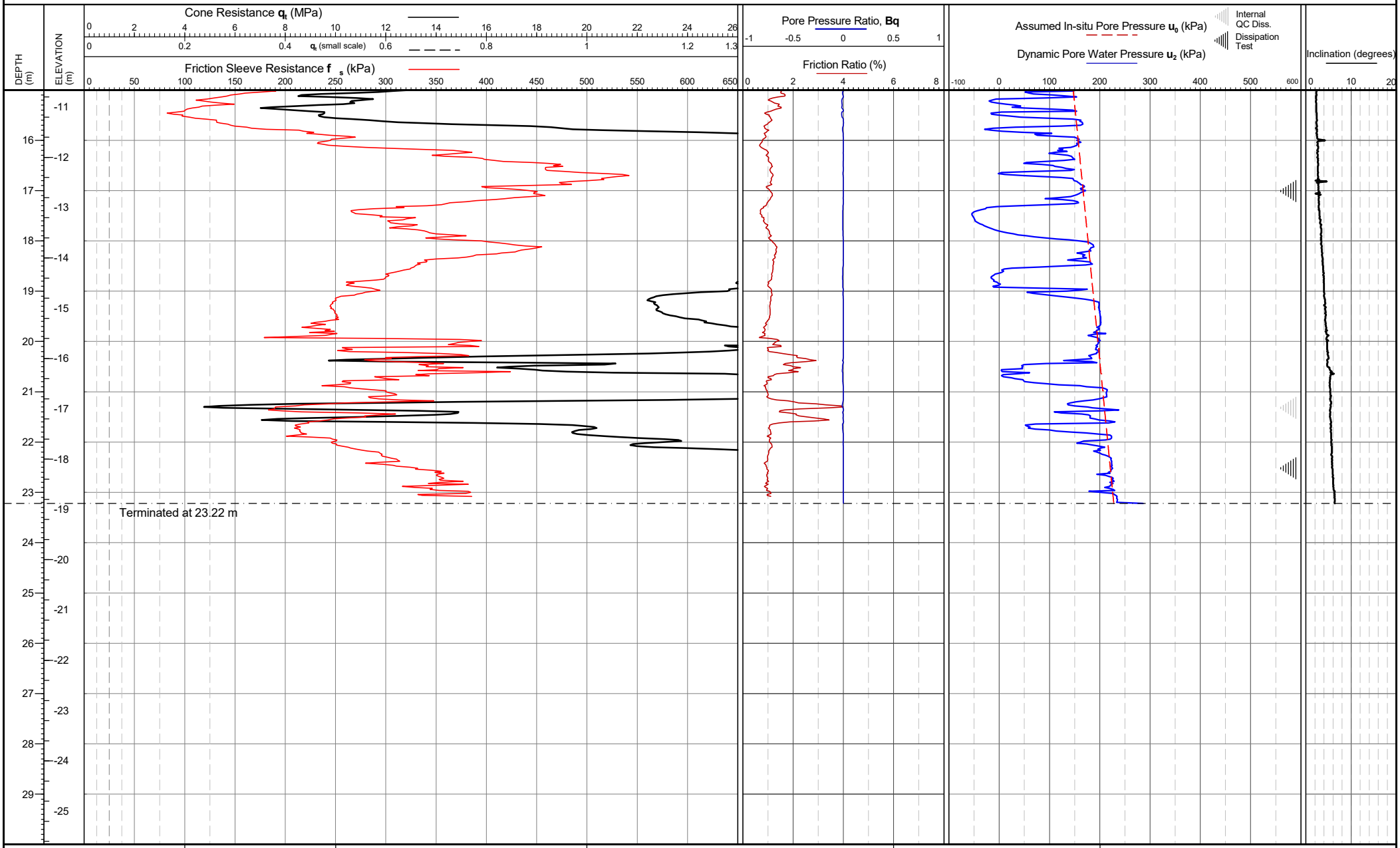
Checked by: Nick Mason

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA



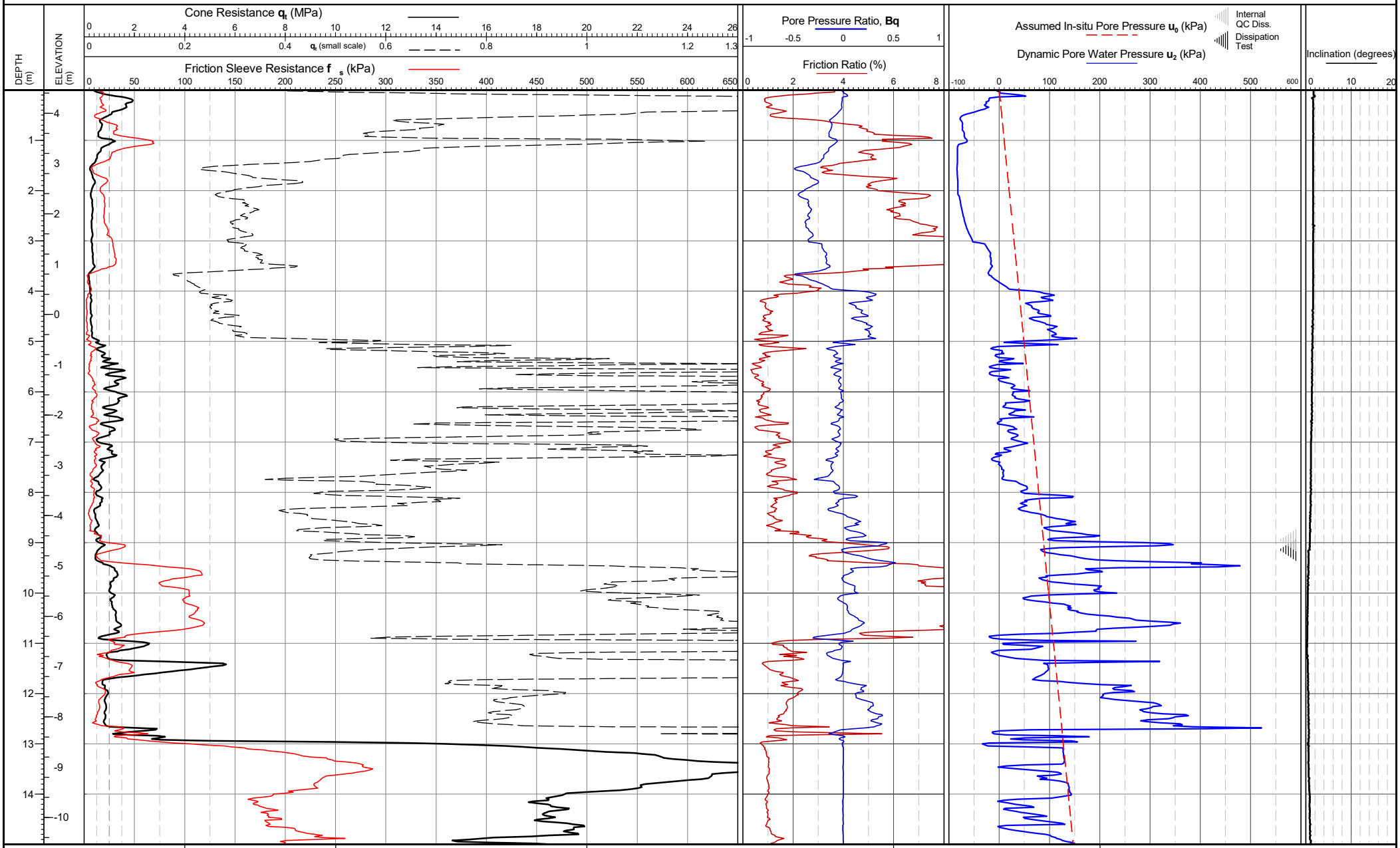
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 08/02/2024 09:51:02	Zero drift (Pre/post test) q_c (kPa): 0.0 f_s (kPa): -0.5 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): -3.1	Location: Cheshire, UK Coordinates: 346983.595, 376592.746 Elevation: 4.339 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 07/02/2024 08:02:24

Zero drift (Pre/post test)
q_c (kPa): 26.8
f_s (kPa): -2.8 ($f_{s\ drift}$ - $q_{c\ drift}$)
u_2 (kPa): -2.5

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
Coordinate system:

Remarks:
*Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations

Termination Remark: Total reaction force

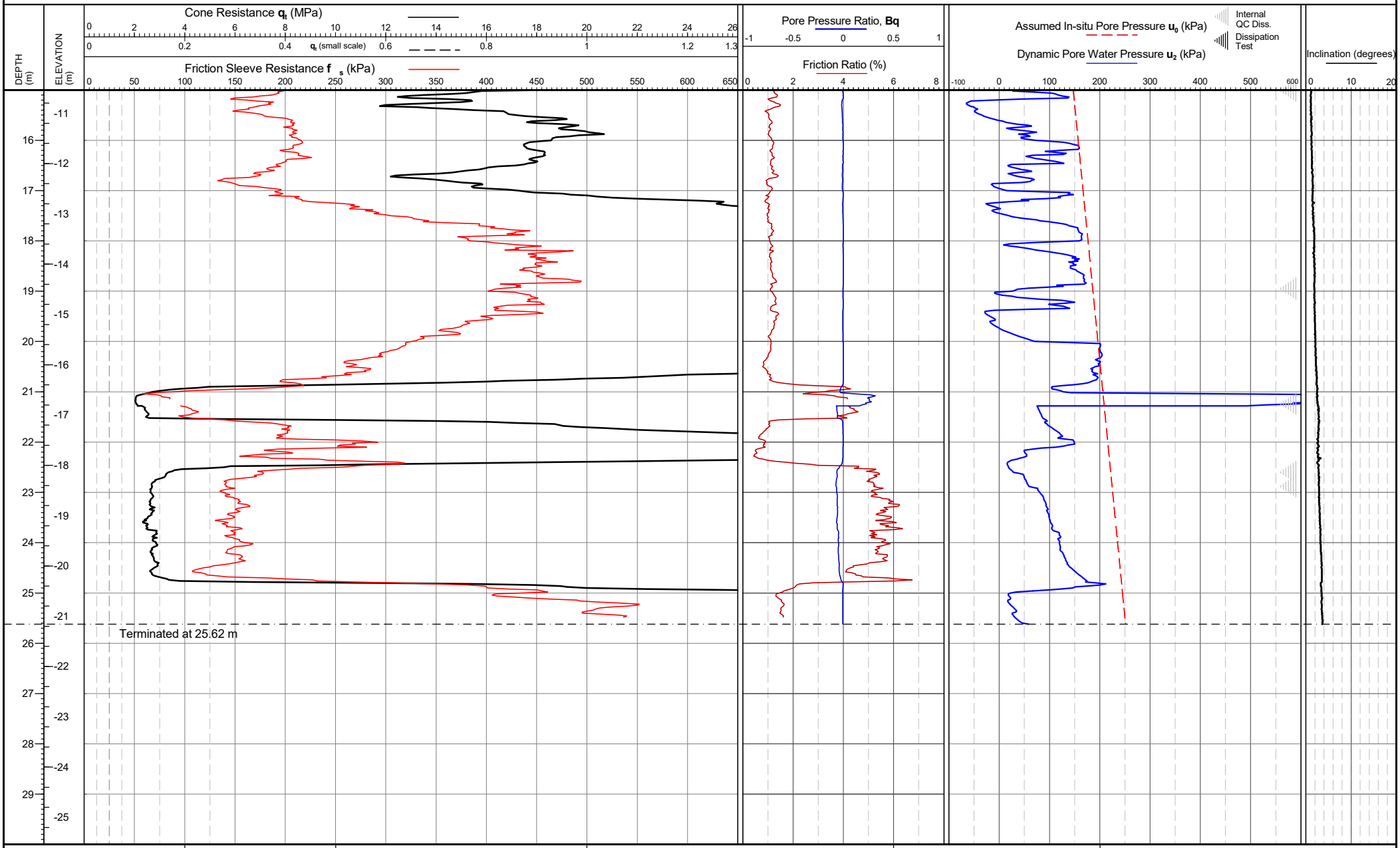
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by: Nick Mason

TEST ID: CPT227

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 07/02/2024 08:02:24	Zero drift (Pre/post test) q_c (kPa): 26.8 f_s (kPa): -2.8 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -2.5	Location: Cheshire, UK Coordinates: 346933.921, 376582.049 Elevation: 4.462 Coordinate system:	Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT227

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

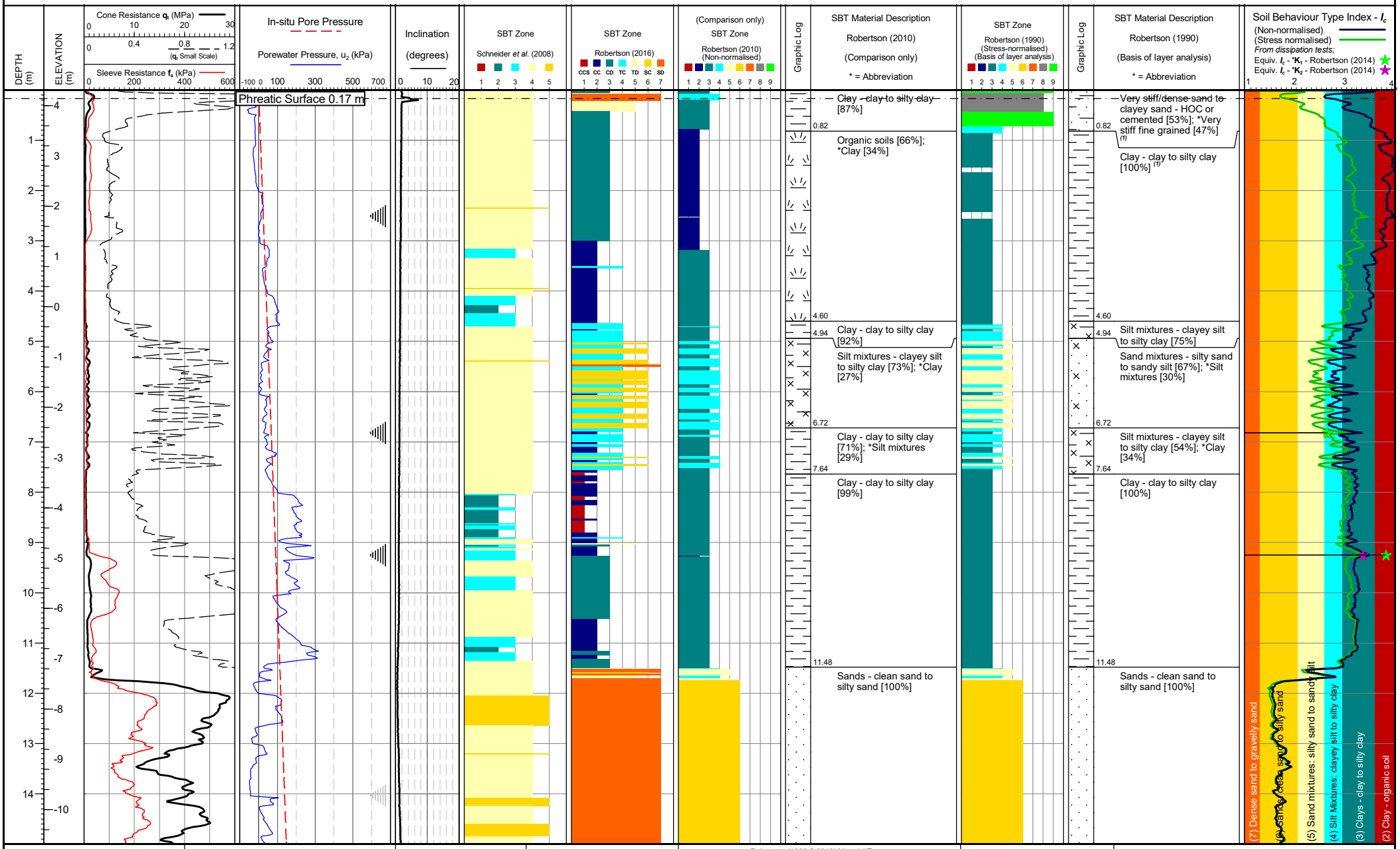
Robertson (1990) with aggregate layer descriptions

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 06/02/2024 09:13:28

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Coordinates: 346905.692, 376655.346
Elevation: 4.312

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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

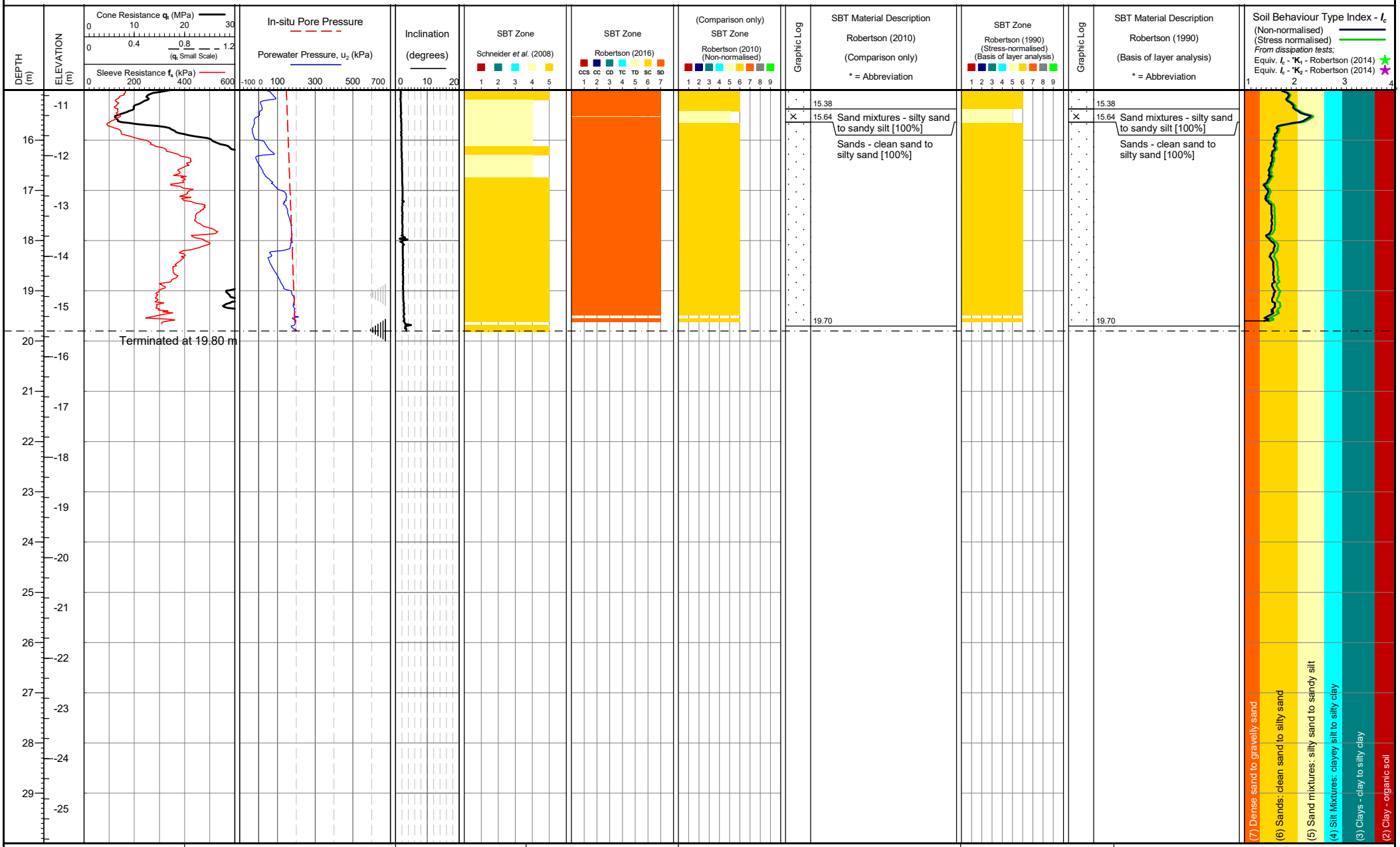
TEST ID: CPT222

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 06/02/2024 09:13:28

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Coordinates: 346905.692, 376655.346
Elevation: 4.312

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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

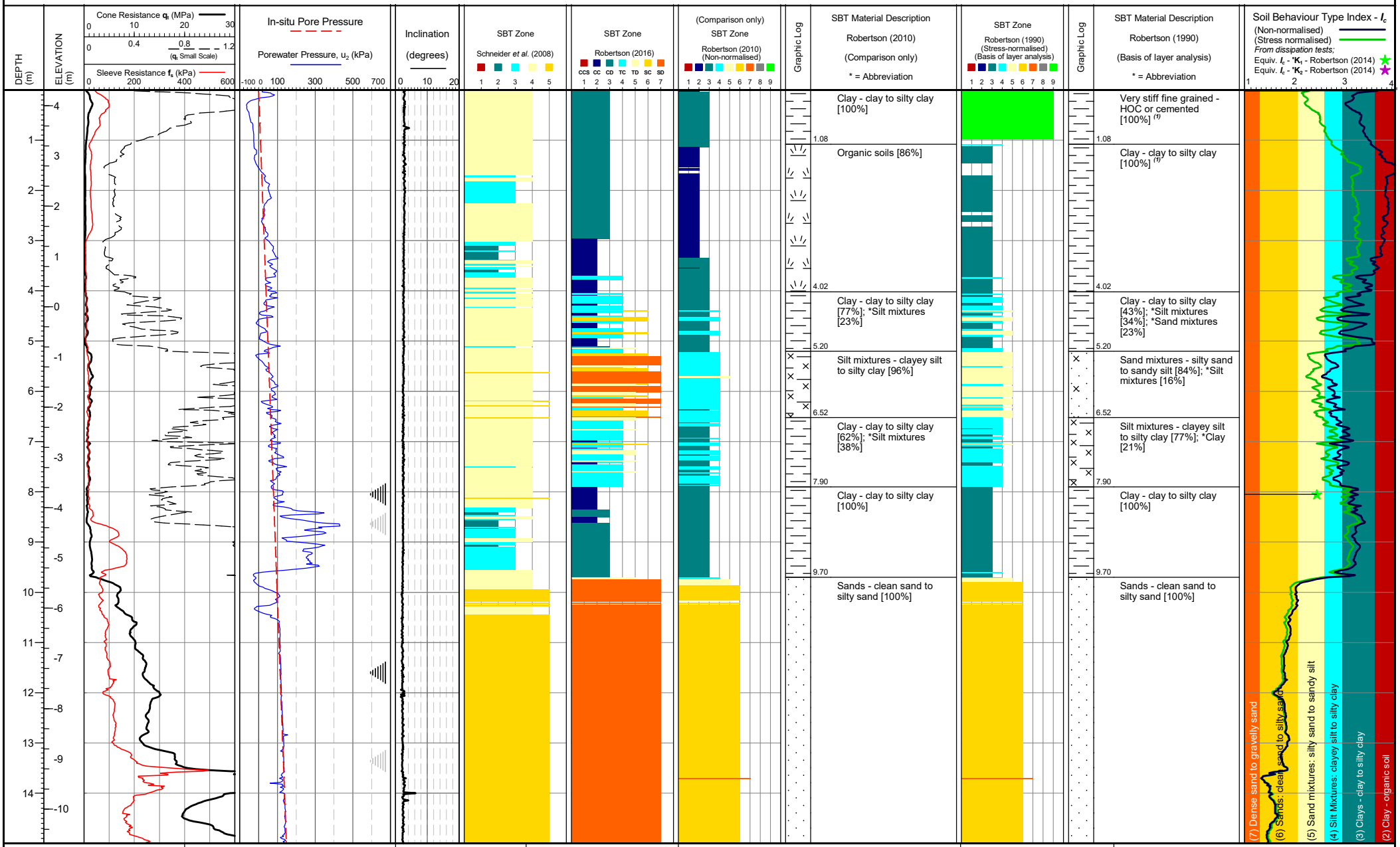
TEST ID: CPT222

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

Coordinates: 346995.306, 376696.366
Elevation: 4.316

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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8 - Very stiff/dense sand to clayey sand
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(1) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

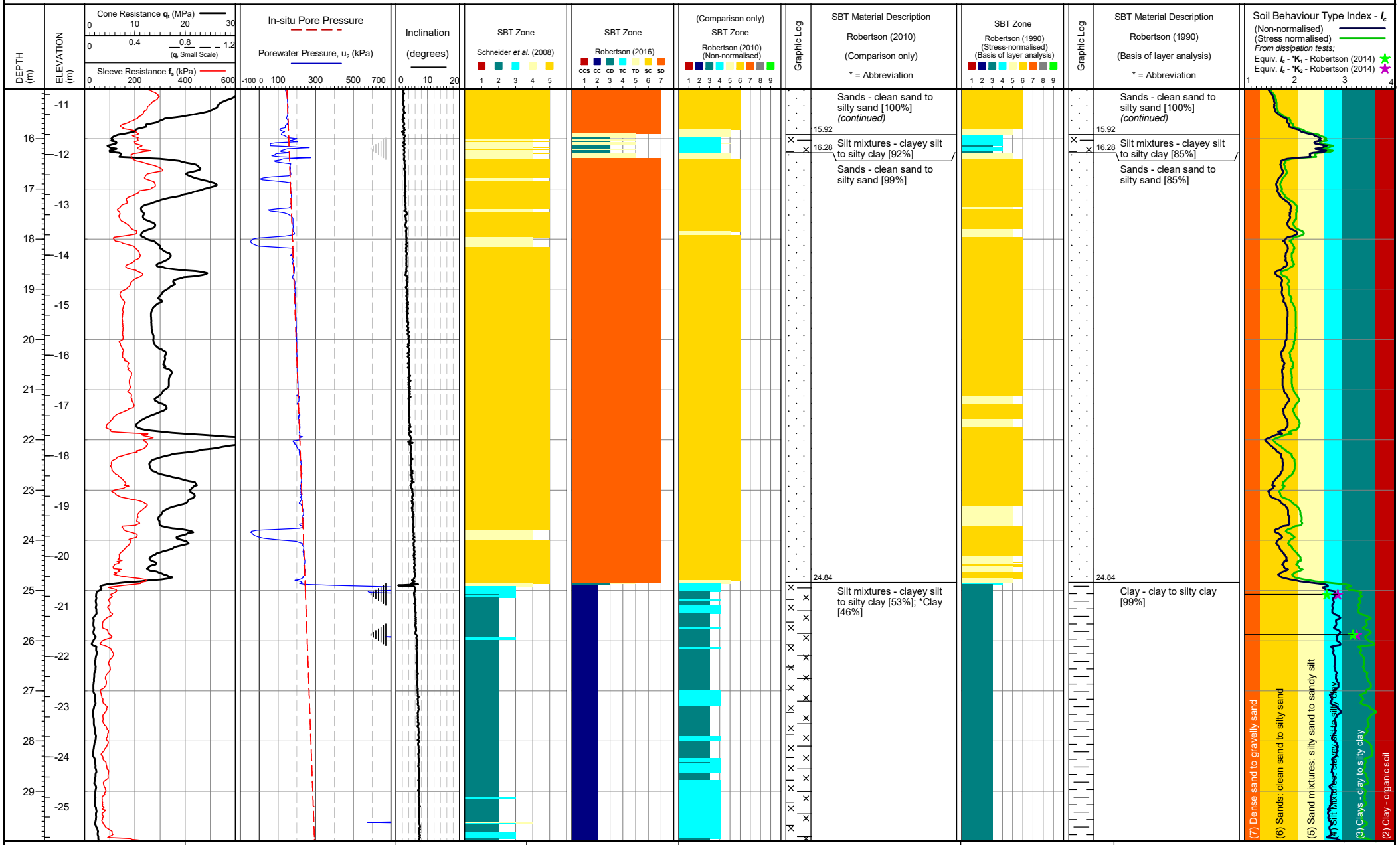
Internal QA Diss.
Dissipation Test

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

Coordinates: 346995.306, 376696.366
Elevation: 4.316

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
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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
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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

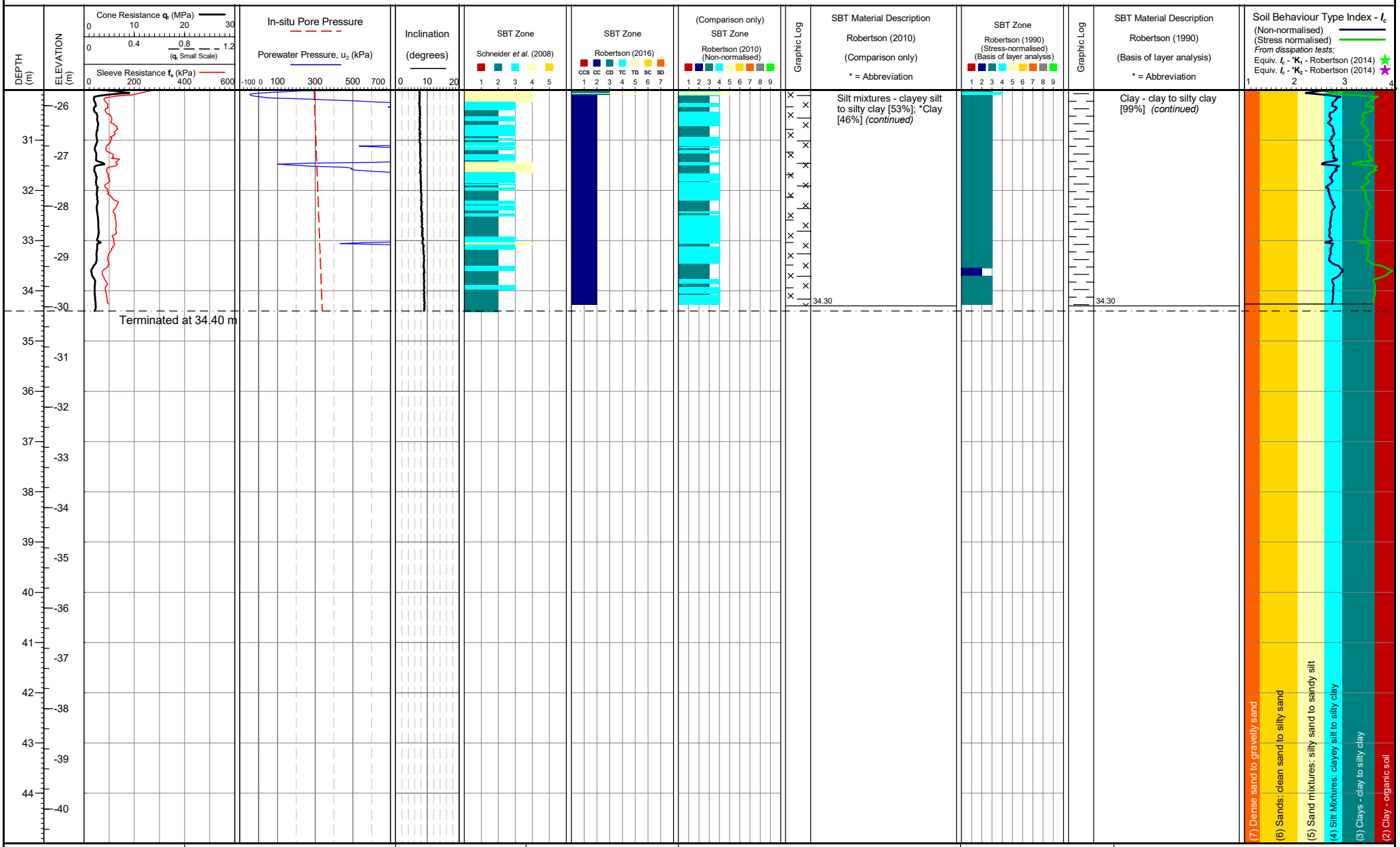
TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

Coordinates: 346995.306, 376696.366
Elevation: 4.316

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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(1) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss.
Dissipation Test

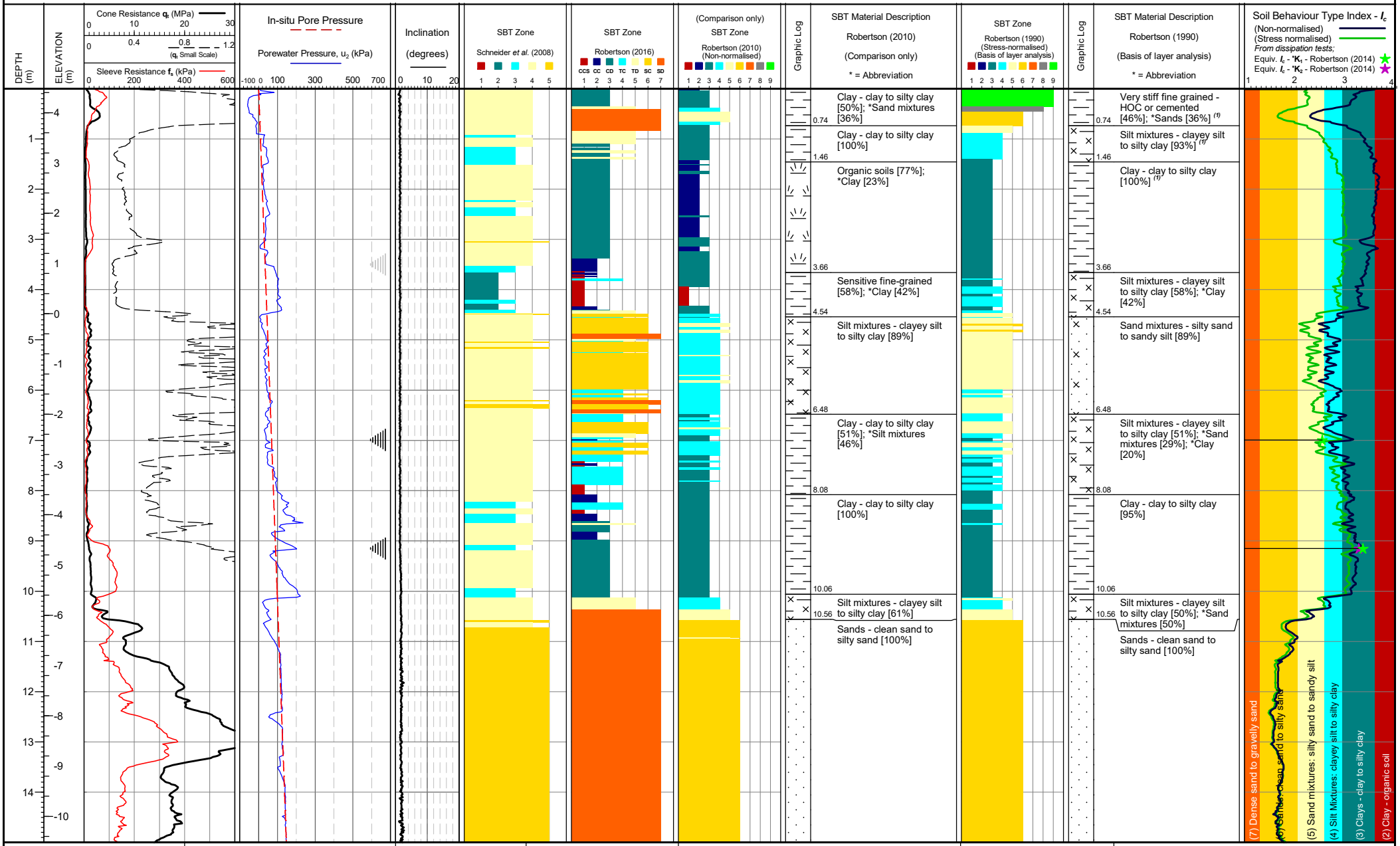
TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Coordinates: 347007.486, 376632.058
Elevation: 4.479

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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(1) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss. Dissipation Test

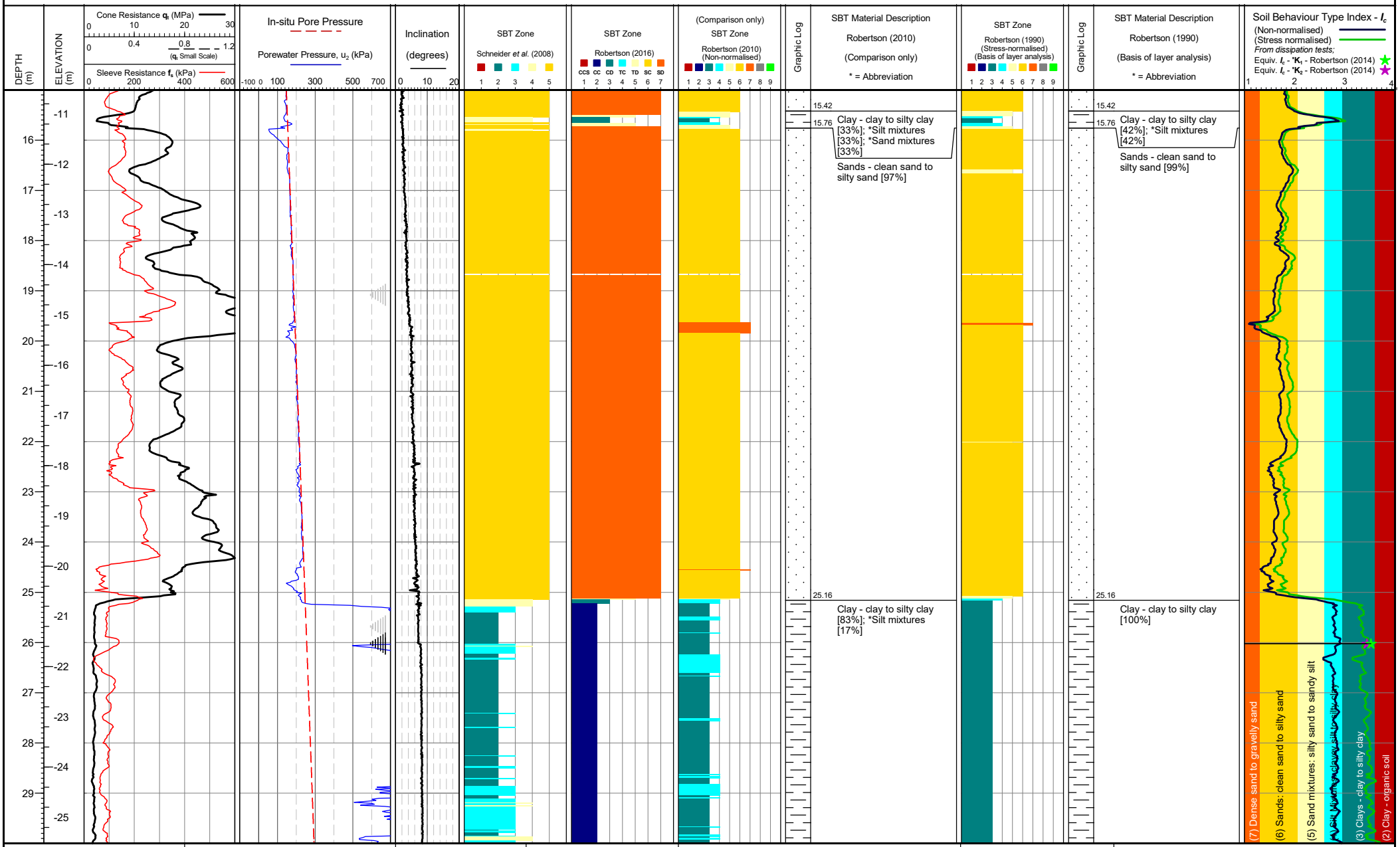
TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Coordinates: 347007.486, 376632.058
Elevation: 4.479

Schneider *et al.* (2008) Material Type
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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
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5 - **TD** - Transitional - Dilative
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7 - **SD** - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
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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

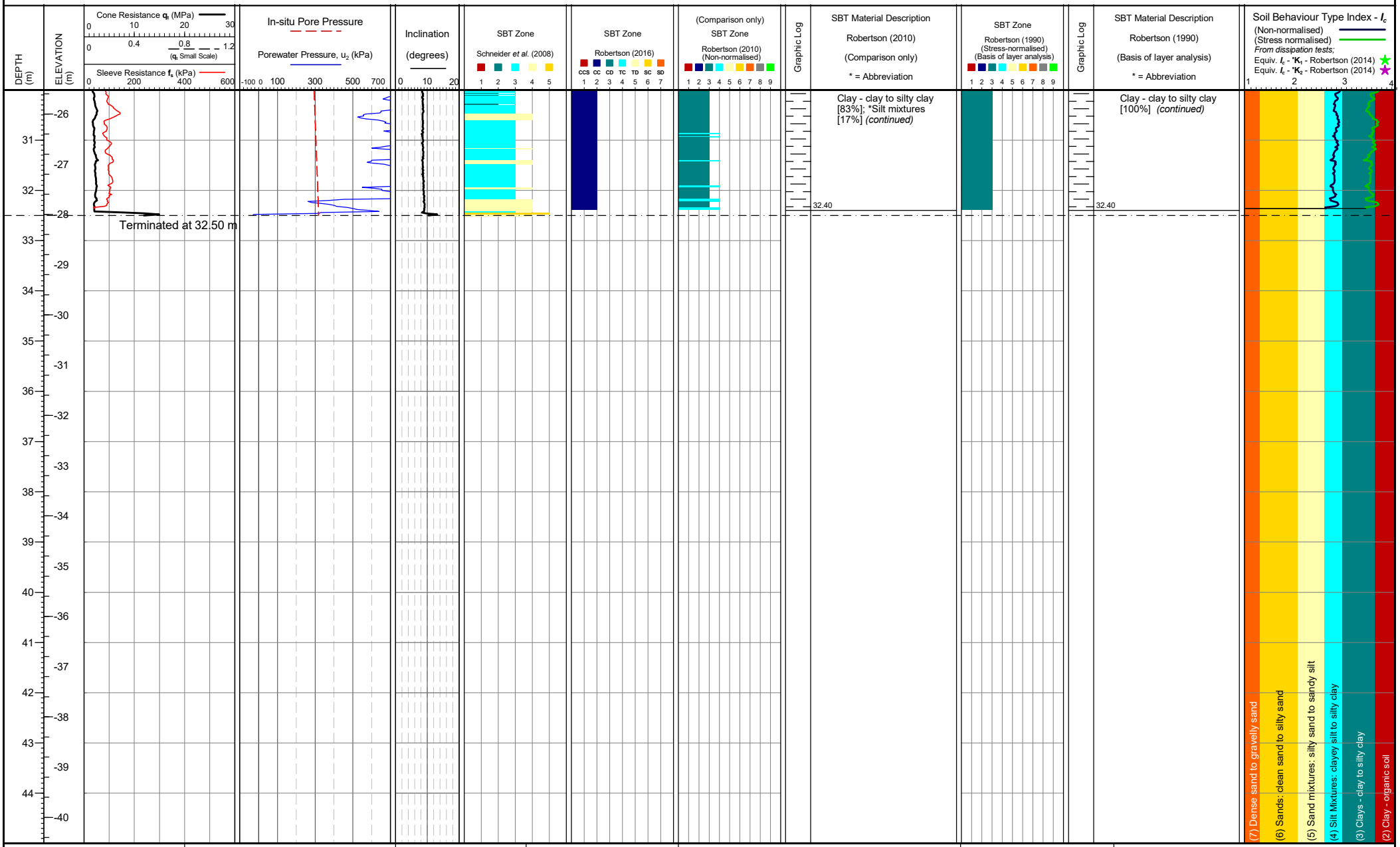
TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Location: Cheshire, UK
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Coordinates: 347007.486, 376632.058
Elevation: 4.479

Schneider *et al.* (2008) Material Type
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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
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[1] 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss.
Dissipation Test

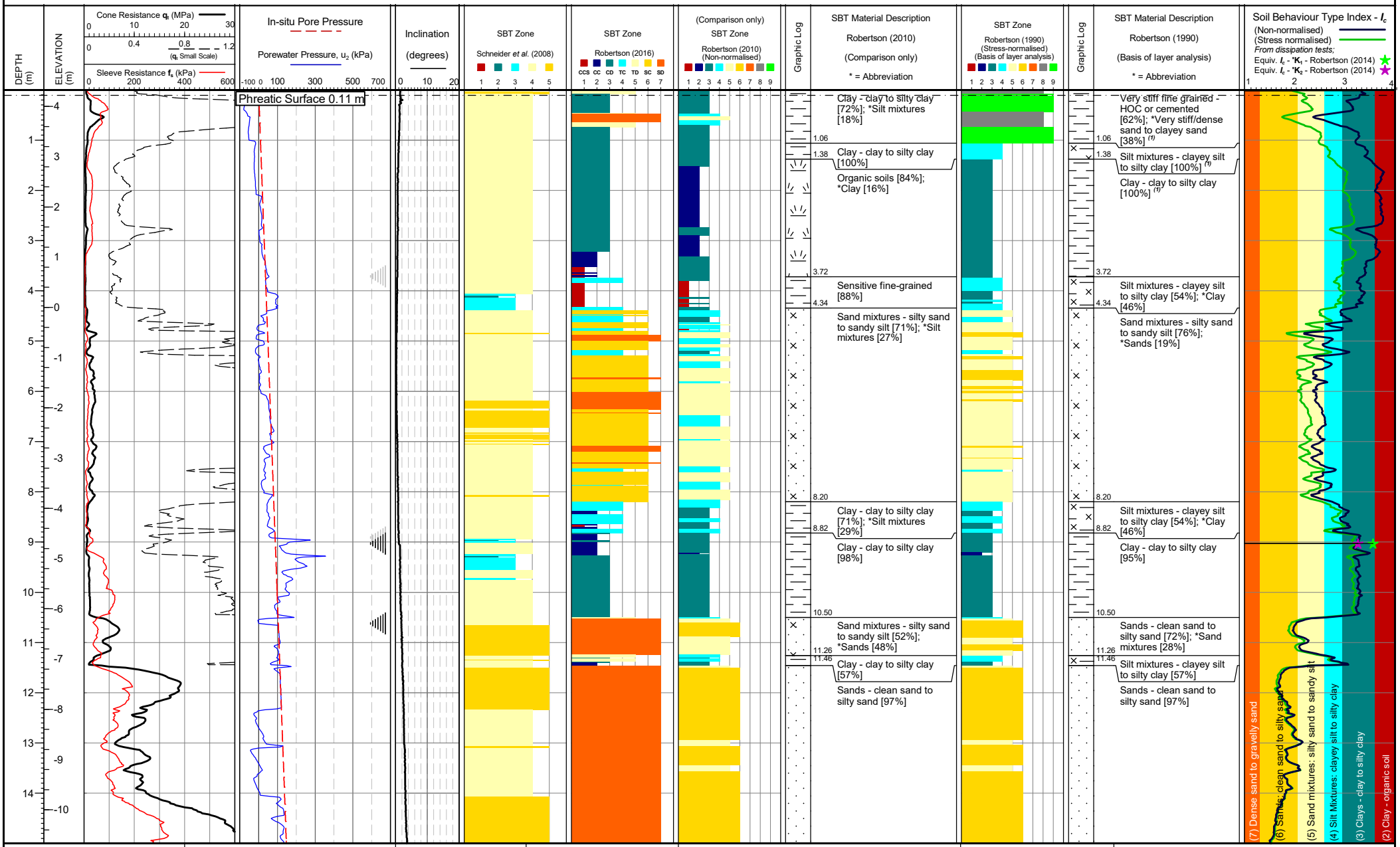
TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Coordinates: 346954.178, 376648.331
Elevation: 4.329

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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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

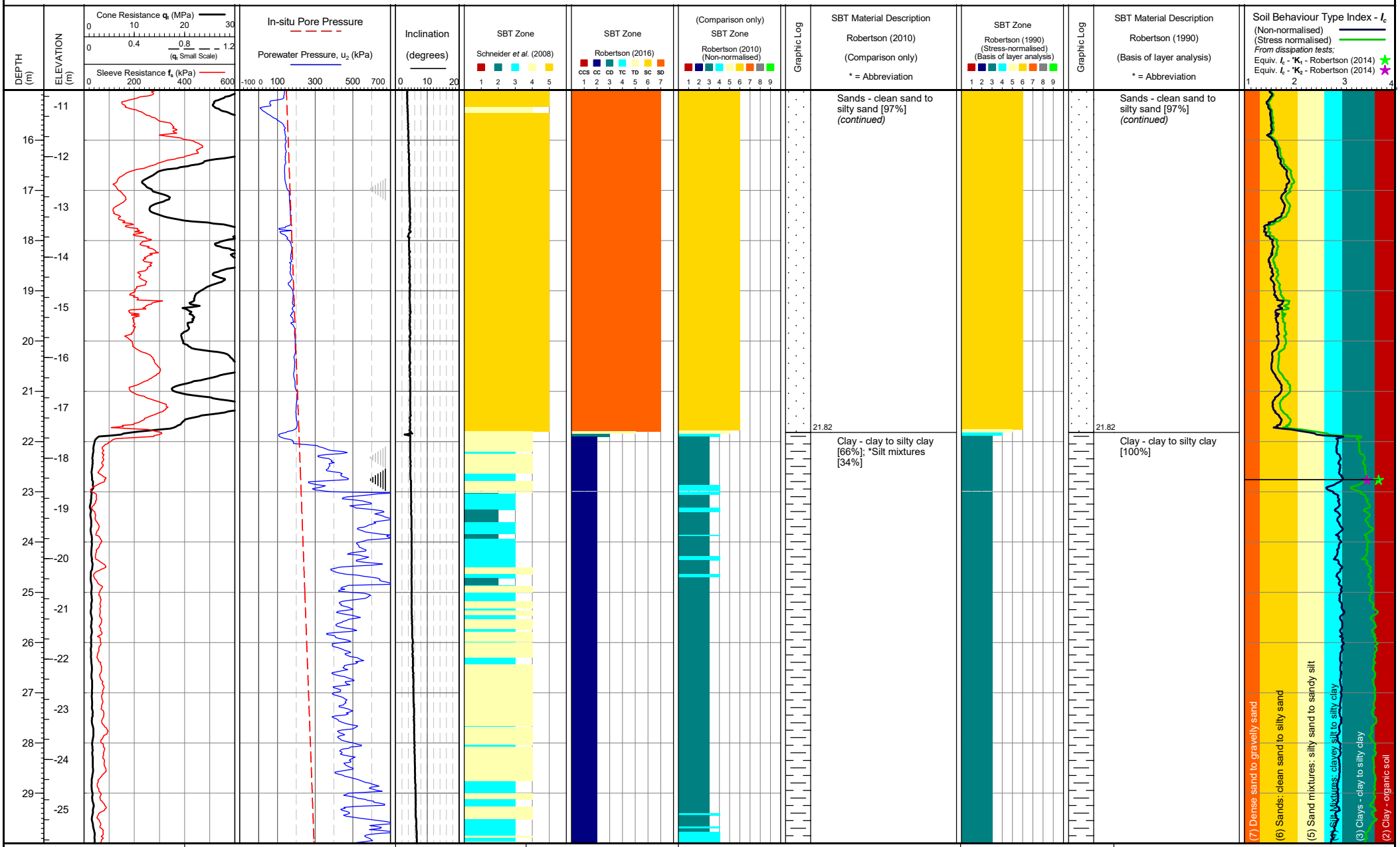
TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Coordinates: 346954.178, 376648.331
Elevation: 4.329

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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8 - Very stiff/dense sand to clayey sand
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(1) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

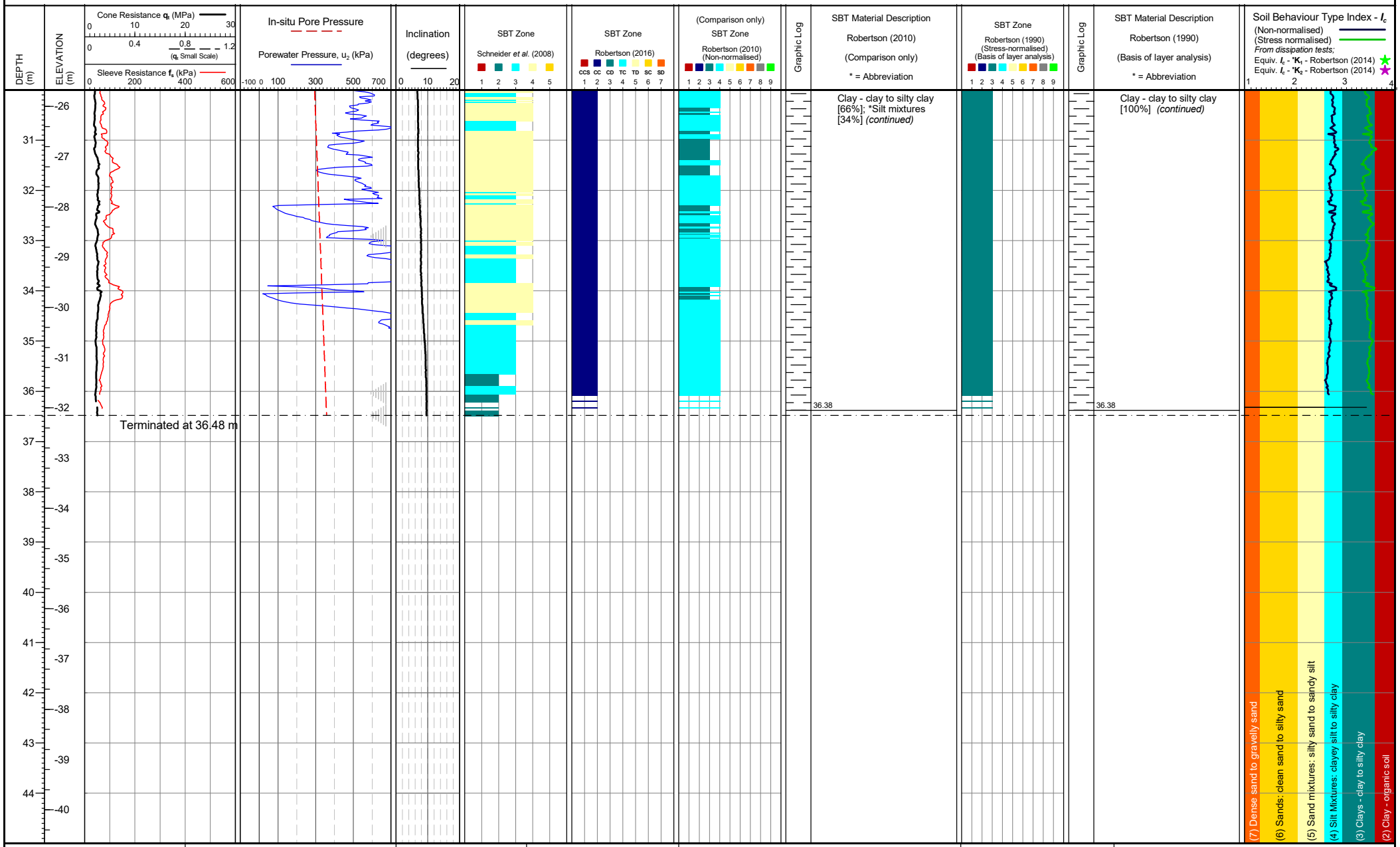
Internal QA Diss.
Dissipation Test

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Coordinates: 346954.178, 376648.331
Elevation: 4.329

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
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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
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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

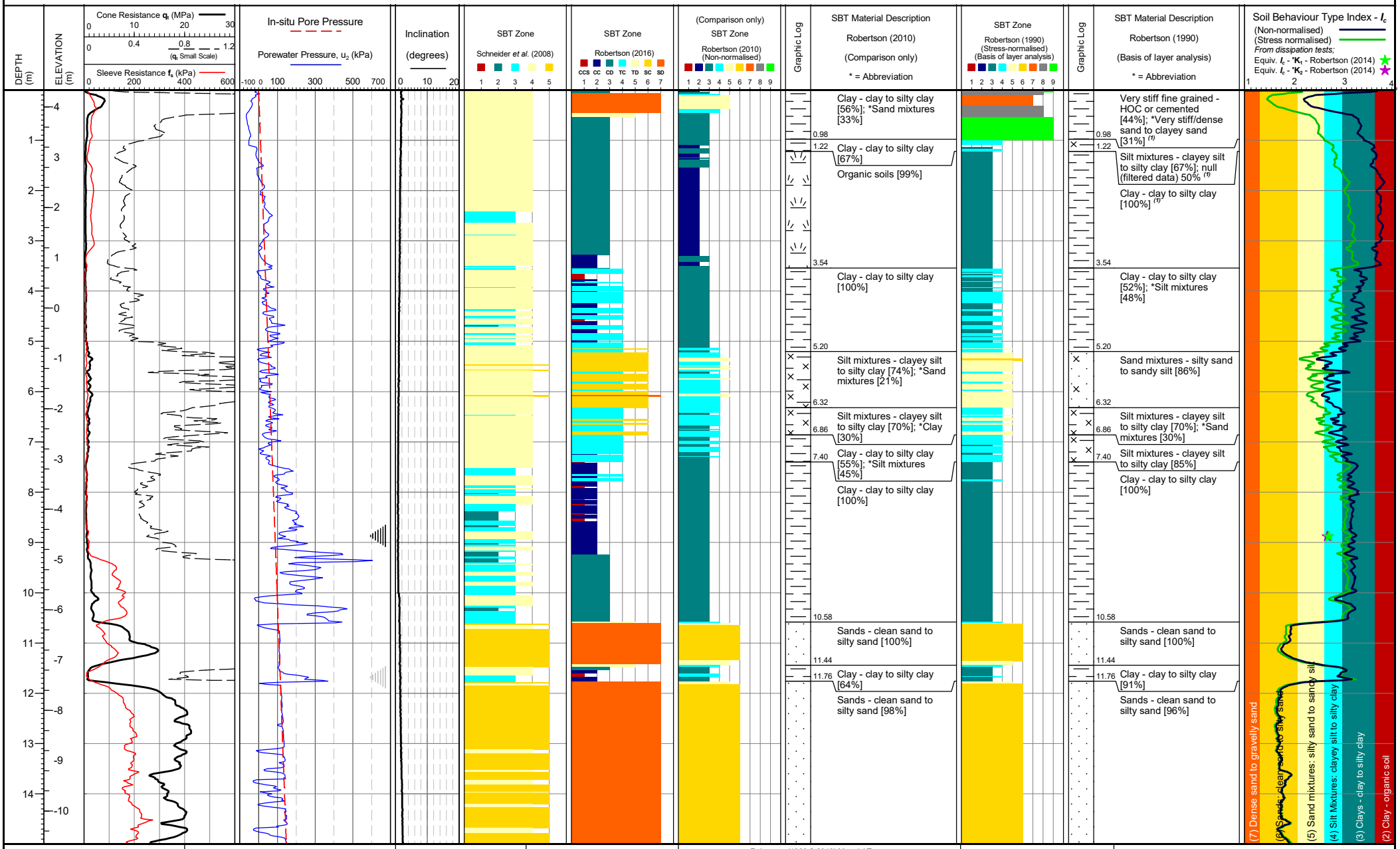
TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 08/02/2024 09:51:02

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Coordinates: 346983.595, 376592.746
Elevation: 4.339

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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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

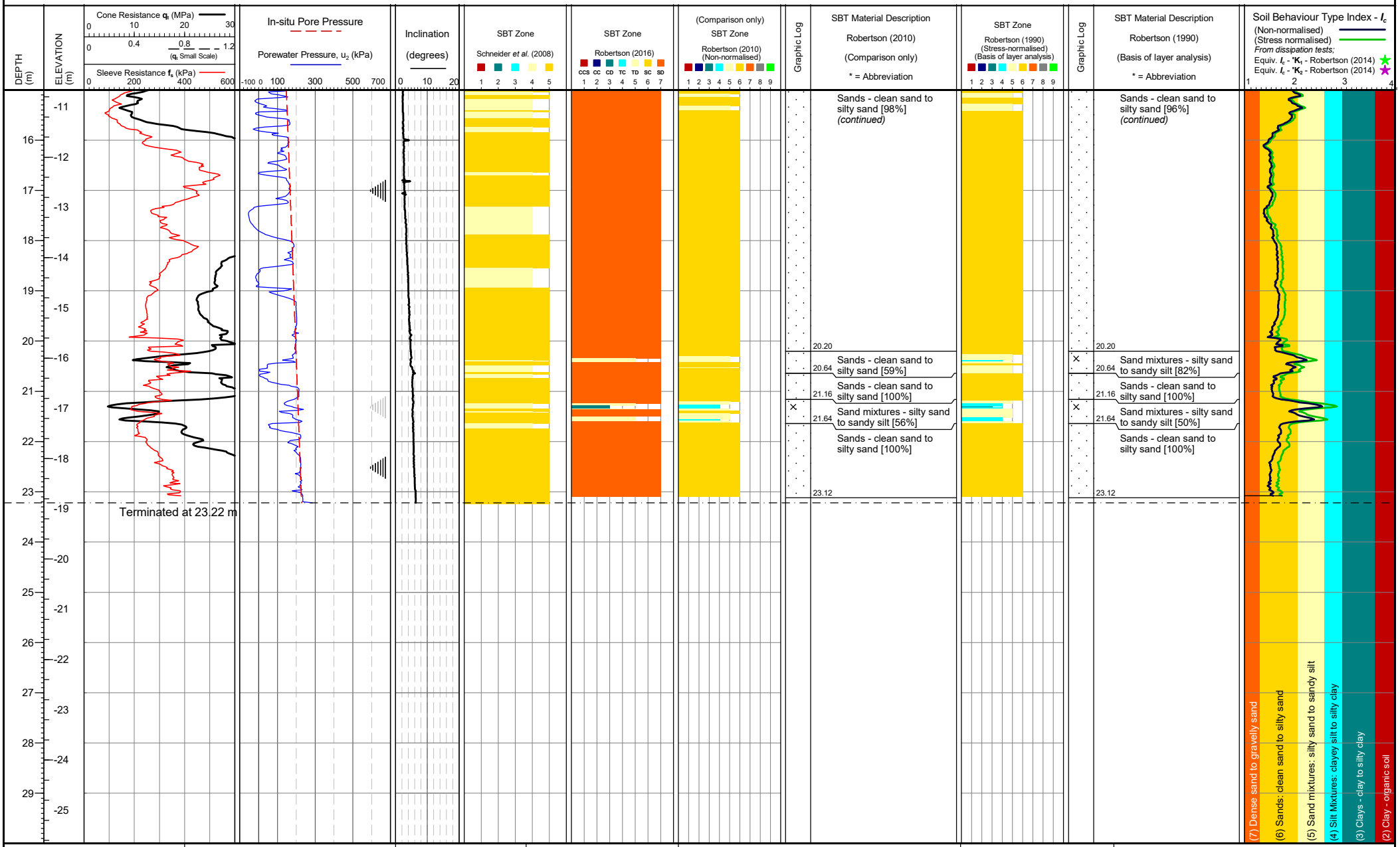
TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 08/02/2024 09:51:02

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Coordinates: 346983.595, 376592.746
Elevation: 4.339

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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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

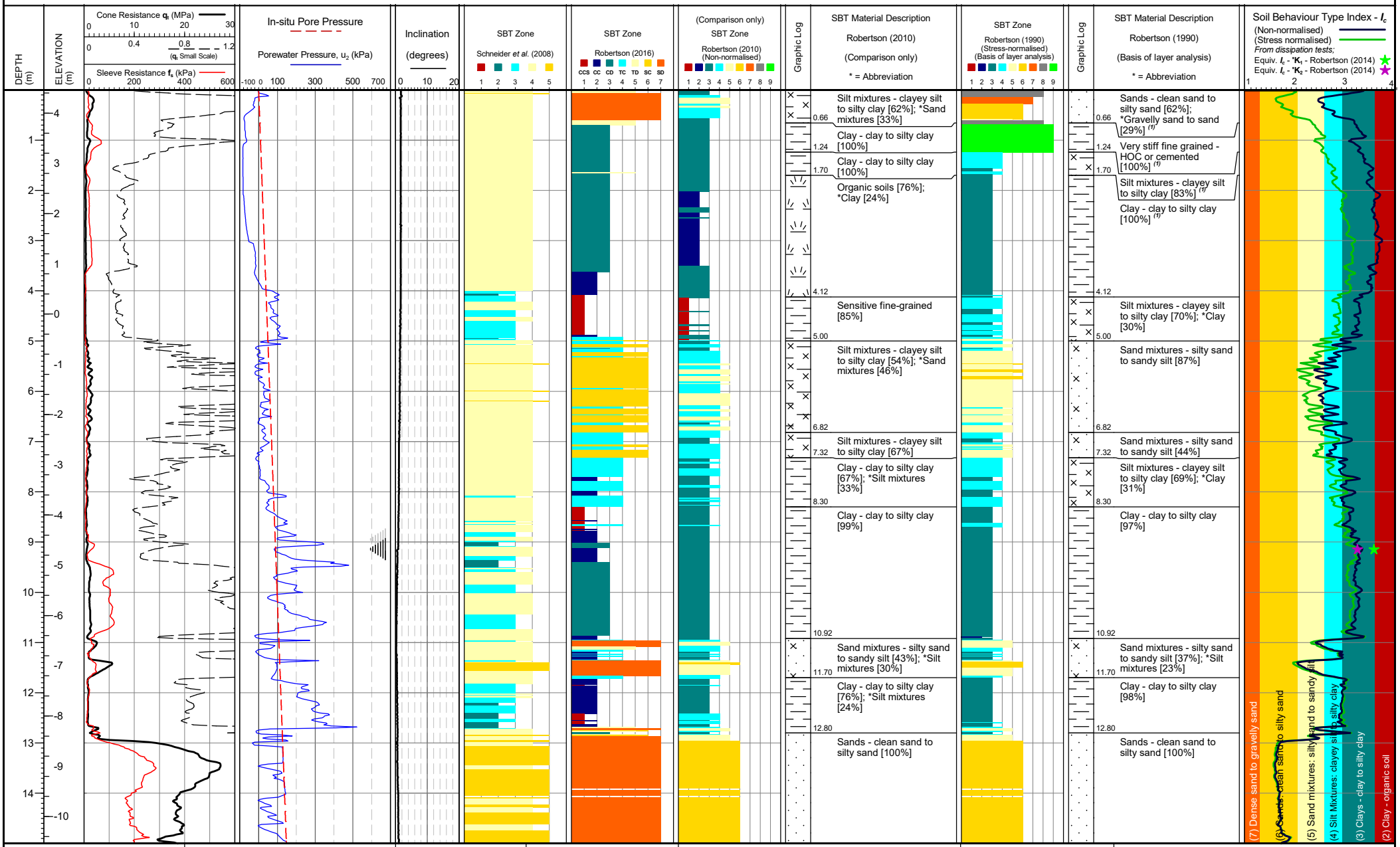
TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 07/02/2024 08:02:24

Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations

Coordinates: 346933.921, 376582.049
Elevation: 4.462

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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
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(1) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss.
Dissipation Test

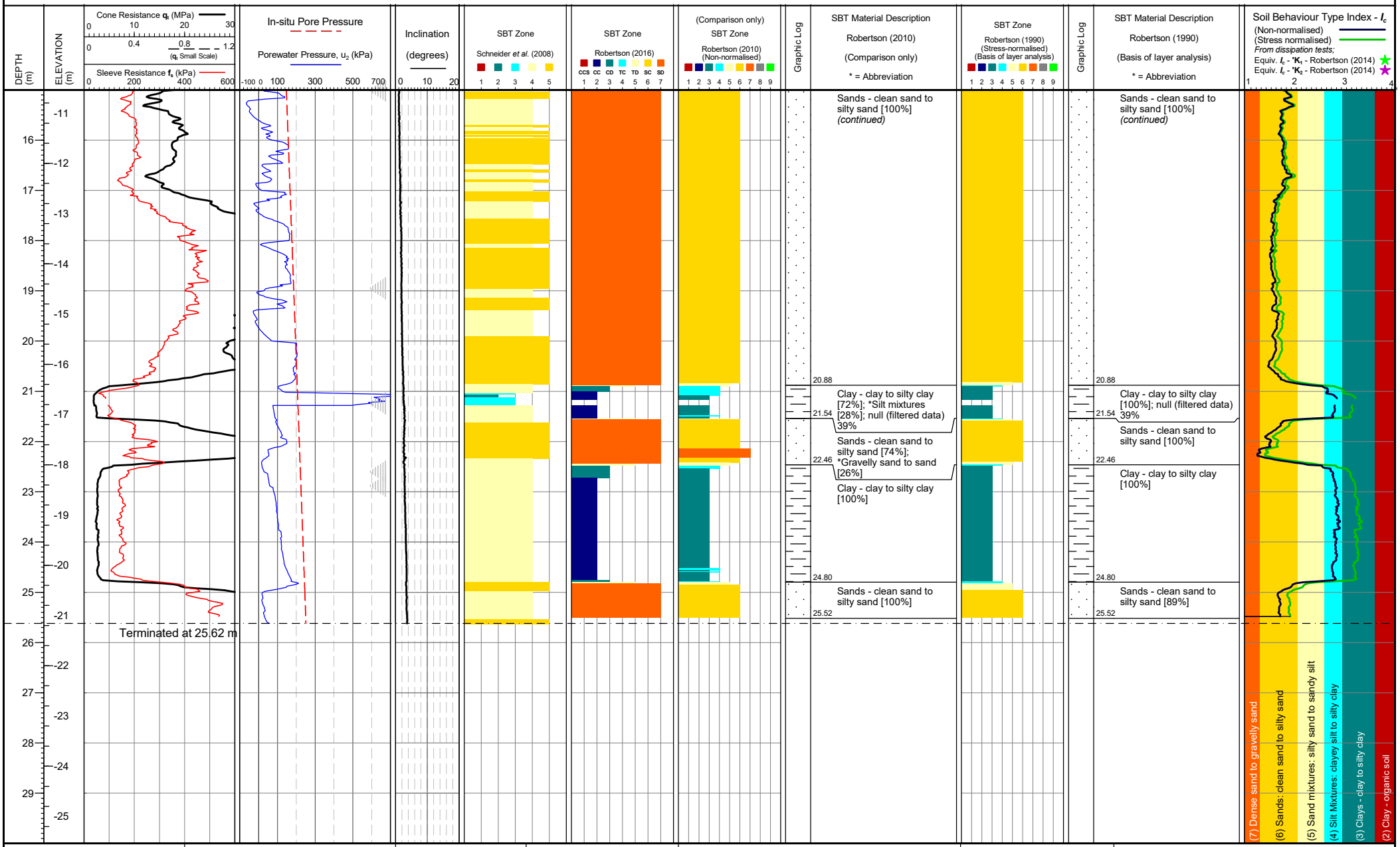
TEST ID: CPT227

LANKELMA

Project: PROTOS, INCE

Client: AYESA

Lankelma Project Ref: 27124-1



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Location: Cheshire, UK
Rig Used: UK23
Date of test: 07/02/2024 08:02:24

Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations

Coordinates: 346933.921, 376582.049
Elevation: 4.462

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low I, 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: CPT227

APPENDIX E PARAMETER RESULTS 1 – S_U, M_V, OCR, SBT, I_C

Undrained shear strength

Coefficient of volume change

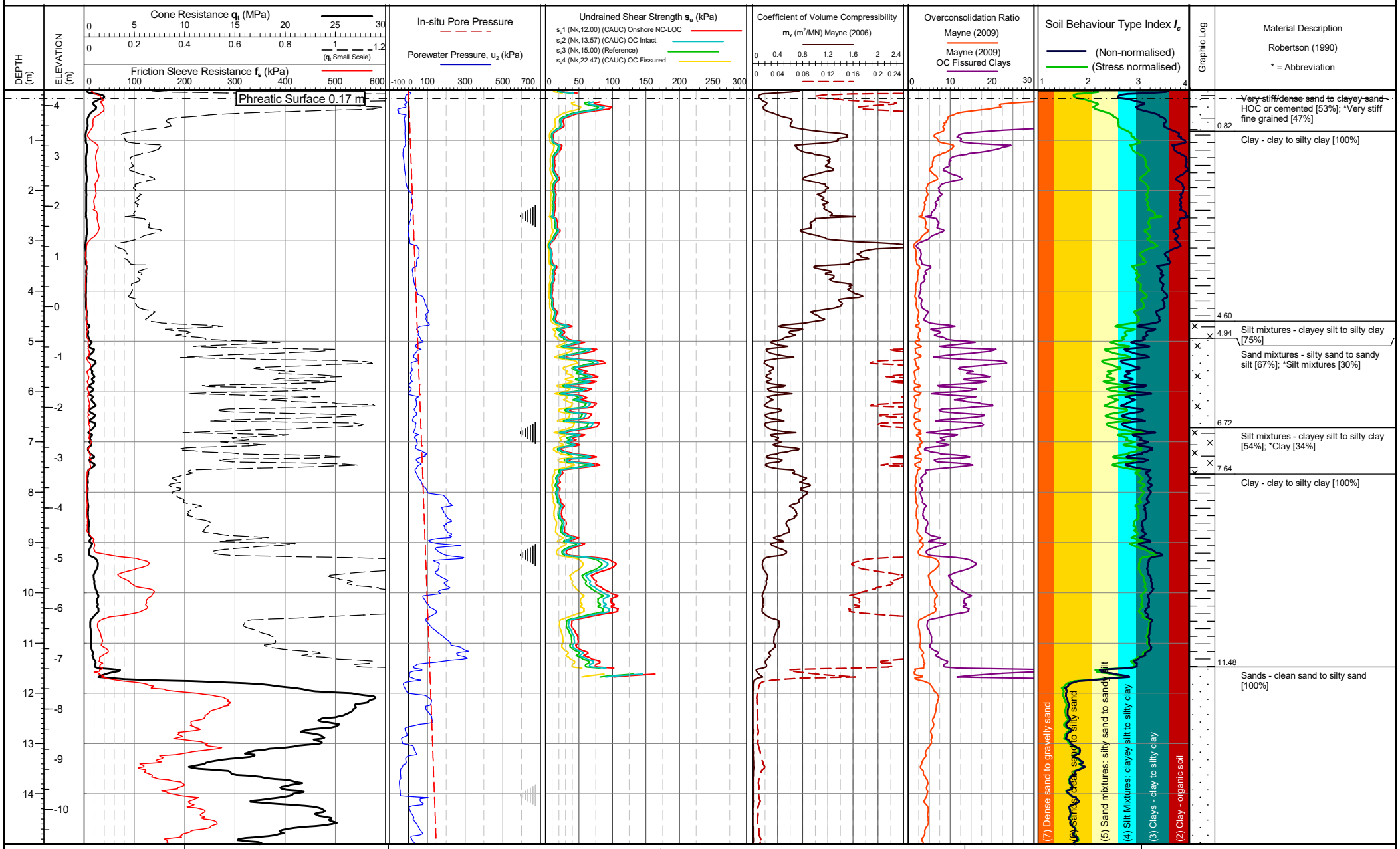
Overconsolidation ratio

Robertson 1990 SBT descriptions & SBT index I_c

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
Coordinate system:

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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: 26-02-24

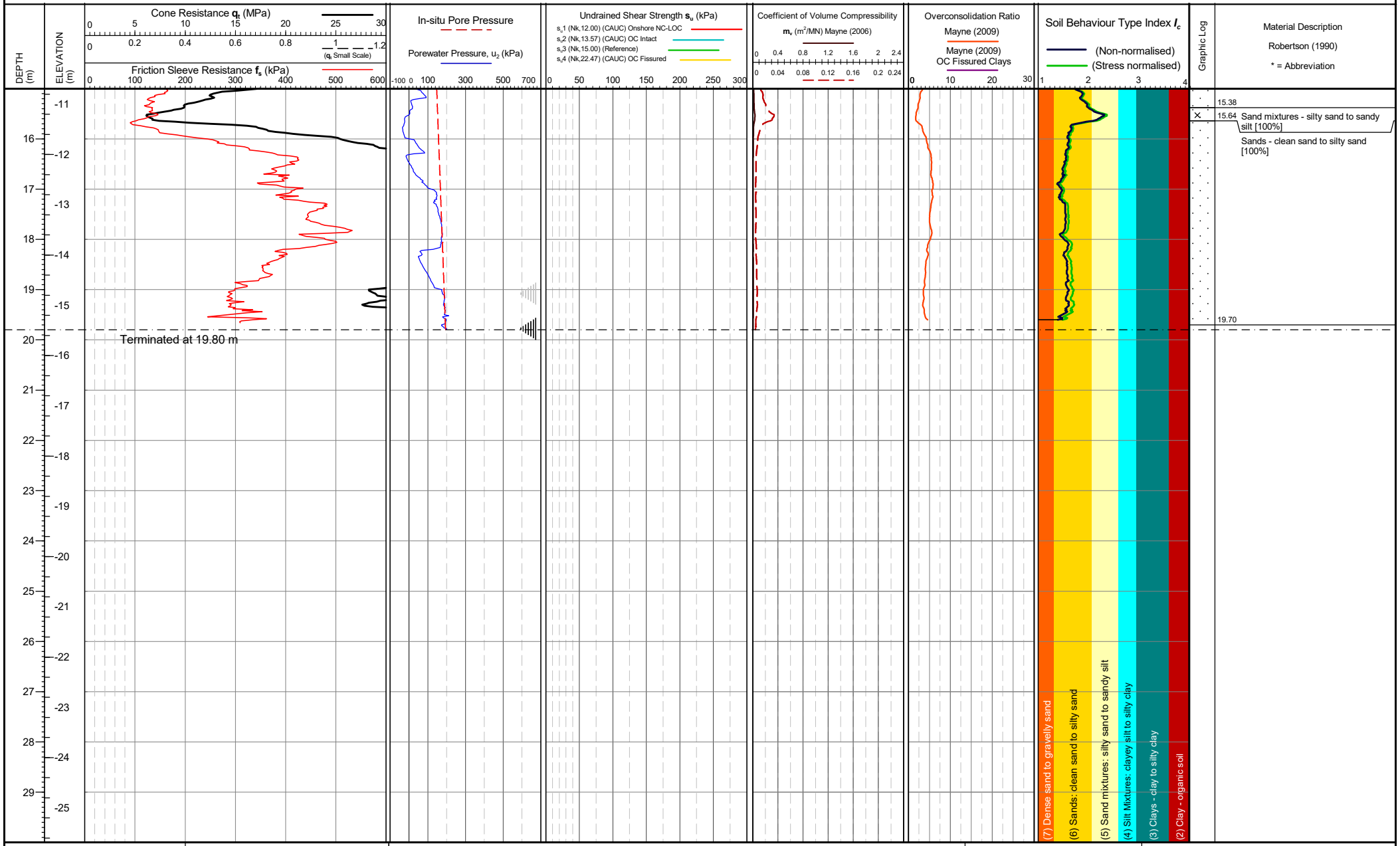
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
Coordinate system:

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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: 26-02-24
Lankelma Project Ref: 27124-1

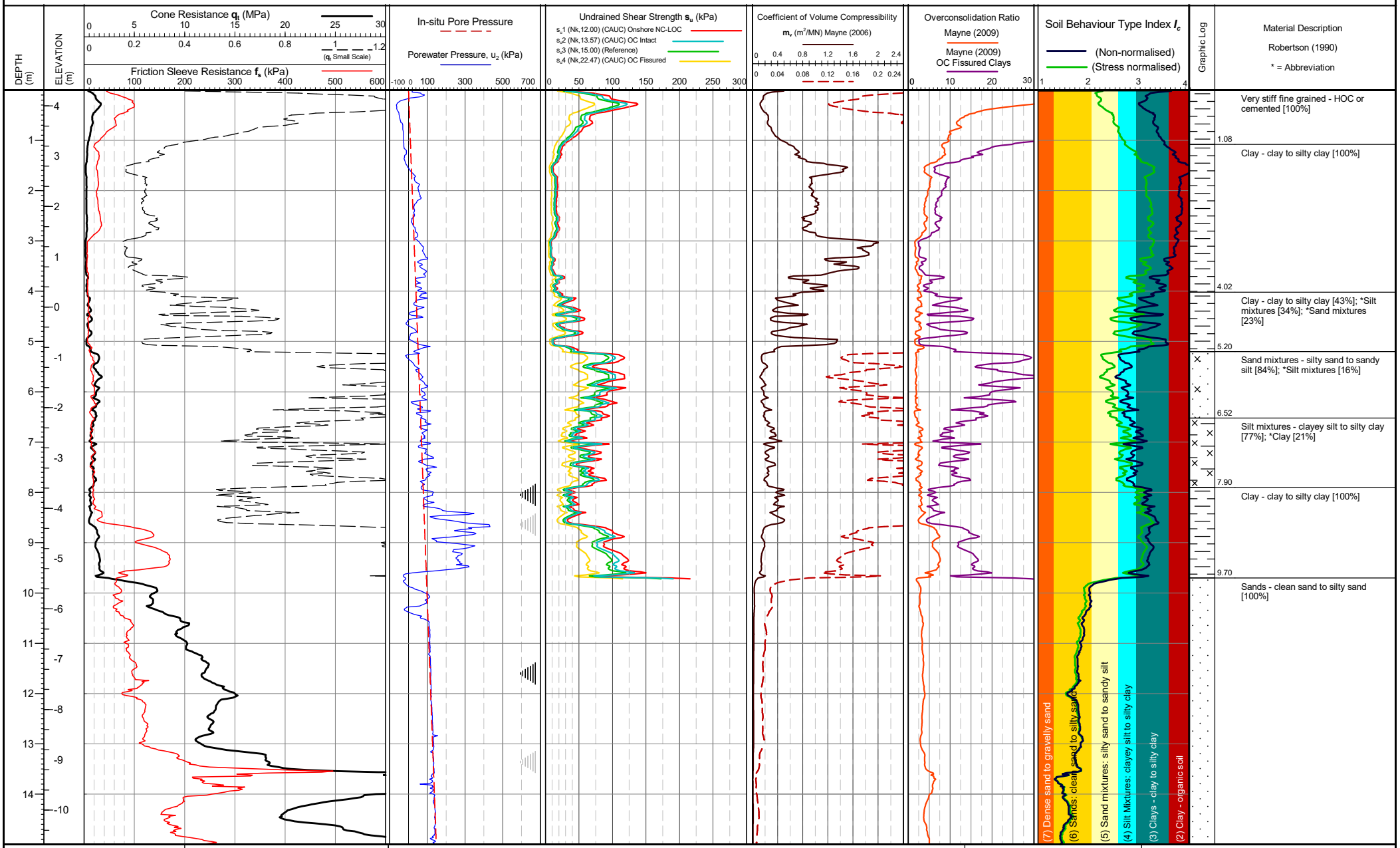
Checked by:
Nick Mason

TEST ID: CPT222

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Graphic Log

Material Description

Robertson (1990)

* = Abbreviation

- 1.08 — Very stiff fine grained - HOC or cemented [100%]
- 4.02 — Clay - clay to silty clay [100%]
- 5.20 — Clay - clay to silty clay [43%]; *Silt mixtures [34%]; *Sand mixtures [23%]
- 6.52 — Sand mixtures - silty sand to sandy silt [84%]; *Silt mixtures [16%]
- 7.90 — Silt mixtures - clayey silt to silty clay [77%]; *Clay [21%]
- 9.70 — Clay - clay to silty clay [100%]
- Sands - clean sand to silty sand [100%]

Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

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 = Ic 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot: 26-02-24

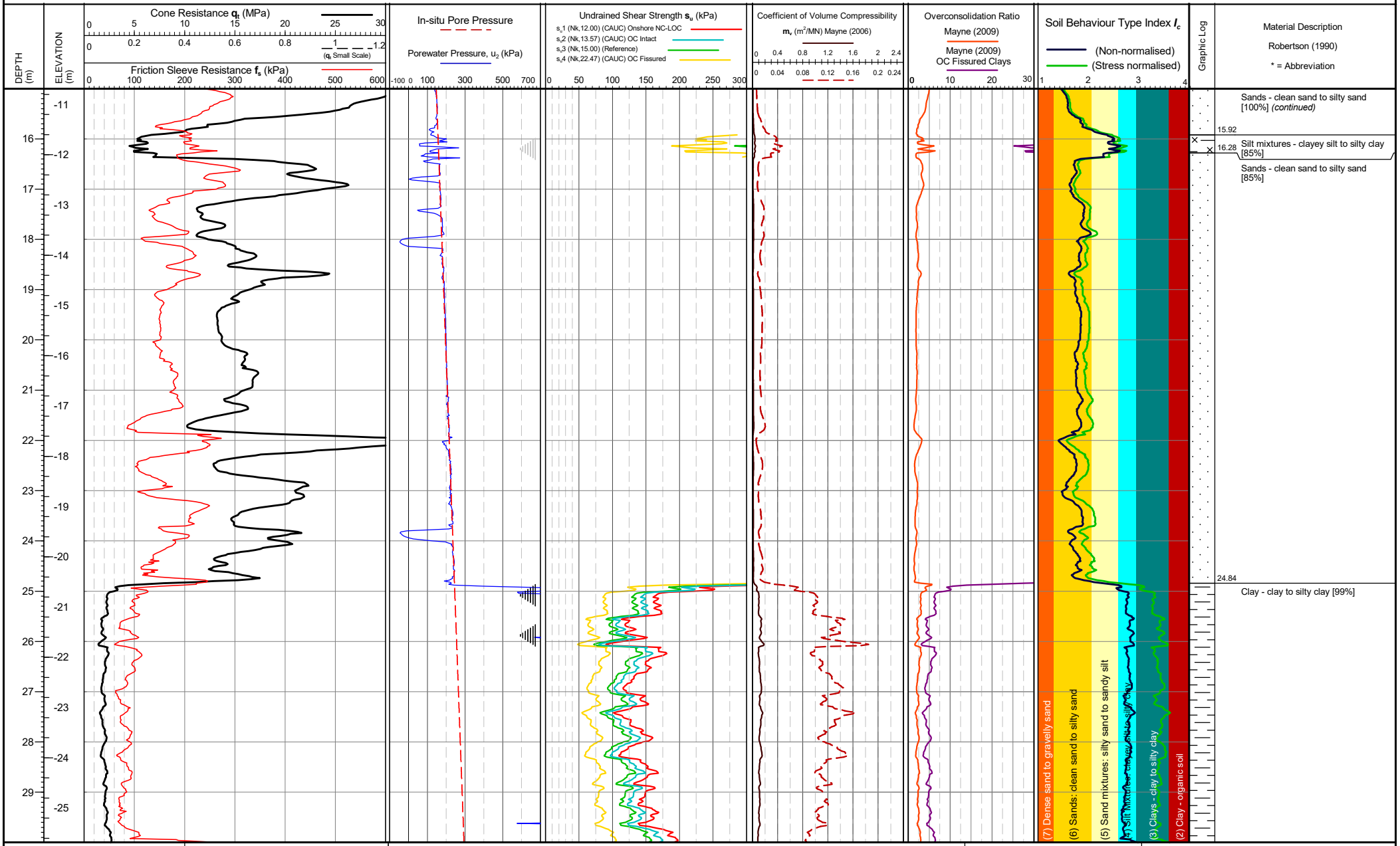
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

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 = Ic 2.40-2.70. See report text for methods and discussion of parameter evaluation.

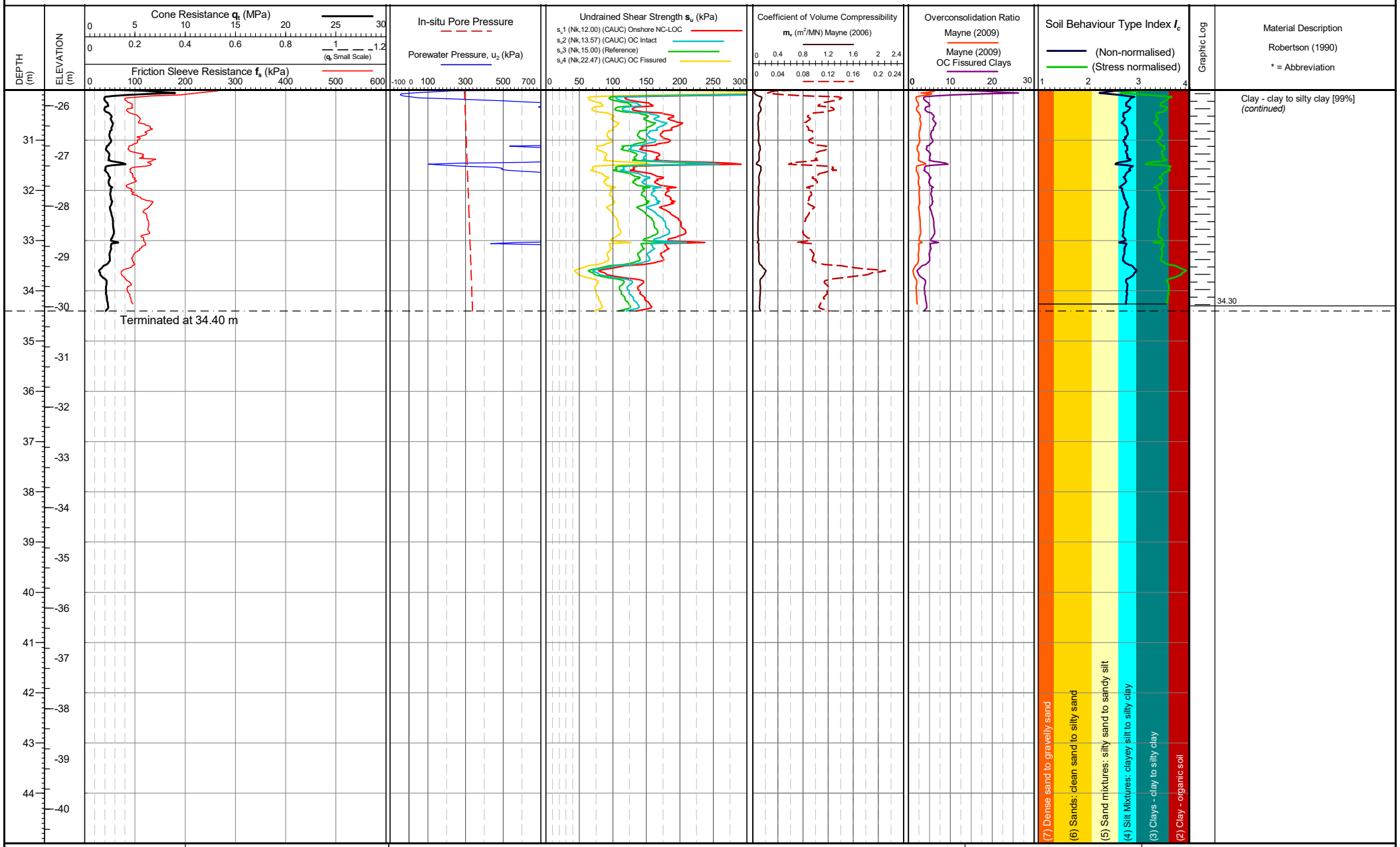
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl

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 = Ic 2.40-2.70. See report text for methods and discussion of parameter evaluation.

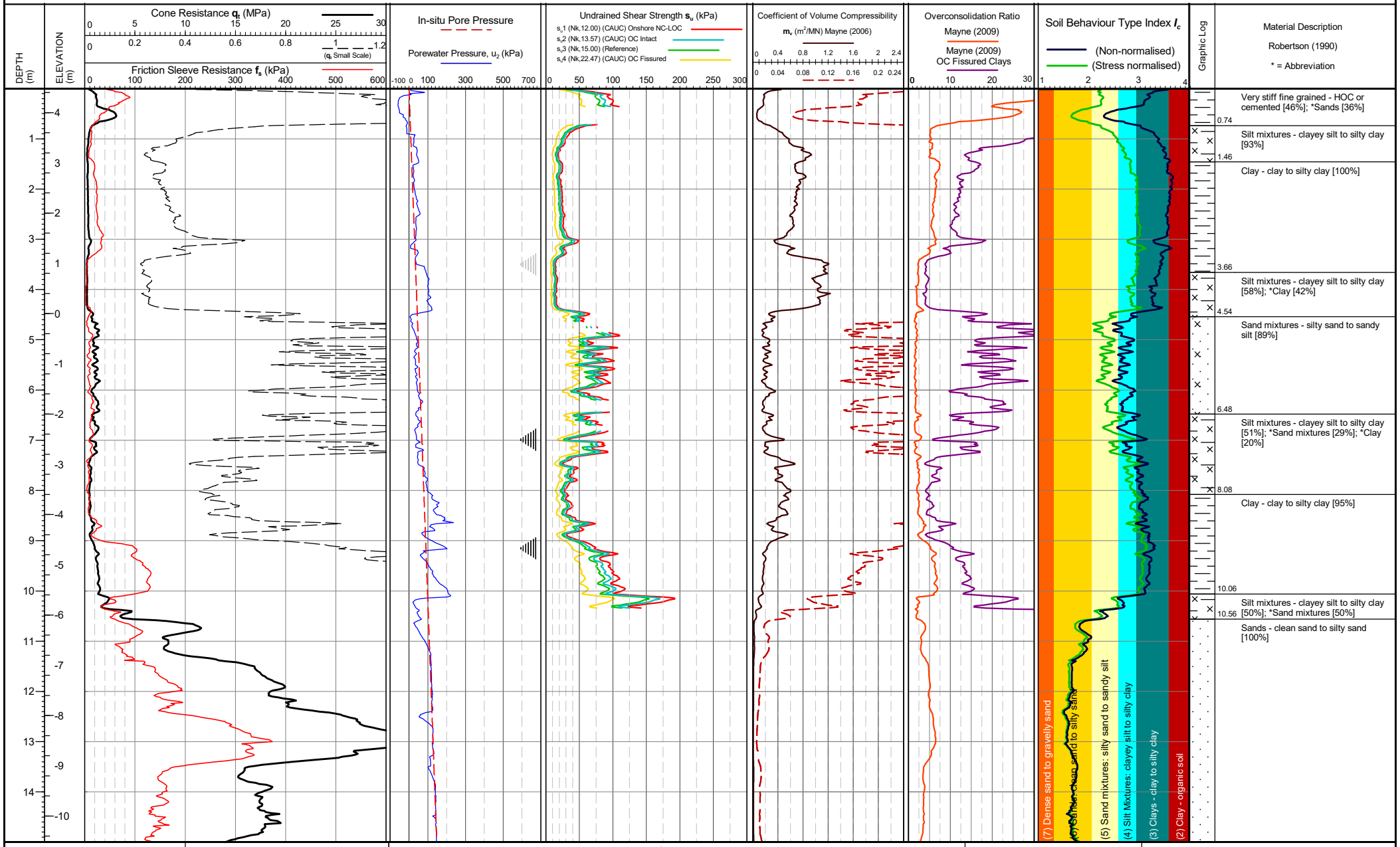
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK
Coordinates: 347007.486, 376632.058
Elevation: 4.479
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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: 26-02-24

Checked by: Nick Mason

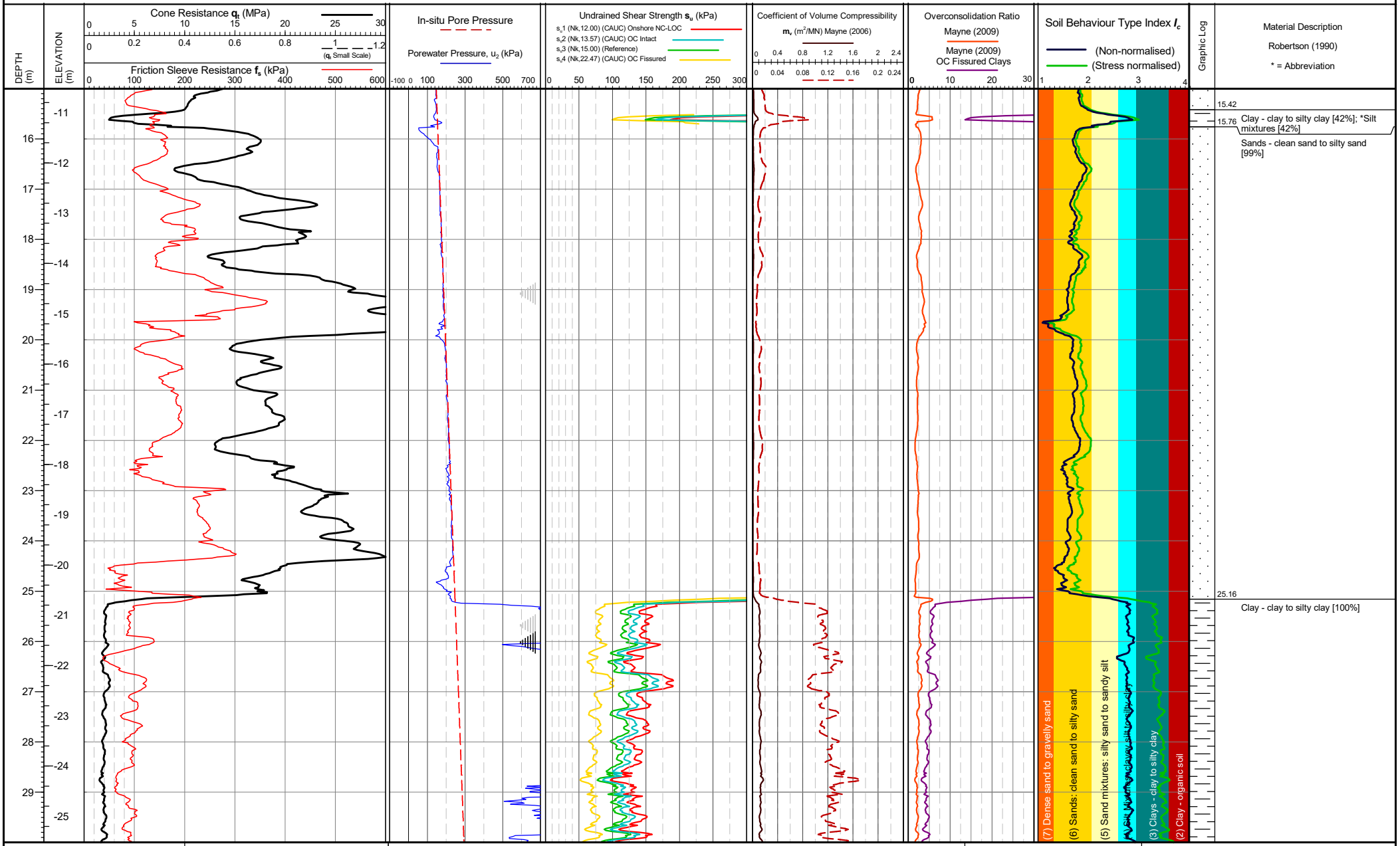
Lankelma Project Ref: 27124-1

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK
Coordinates: 347007.486, 376632.058
Elevation: 4.479
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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.

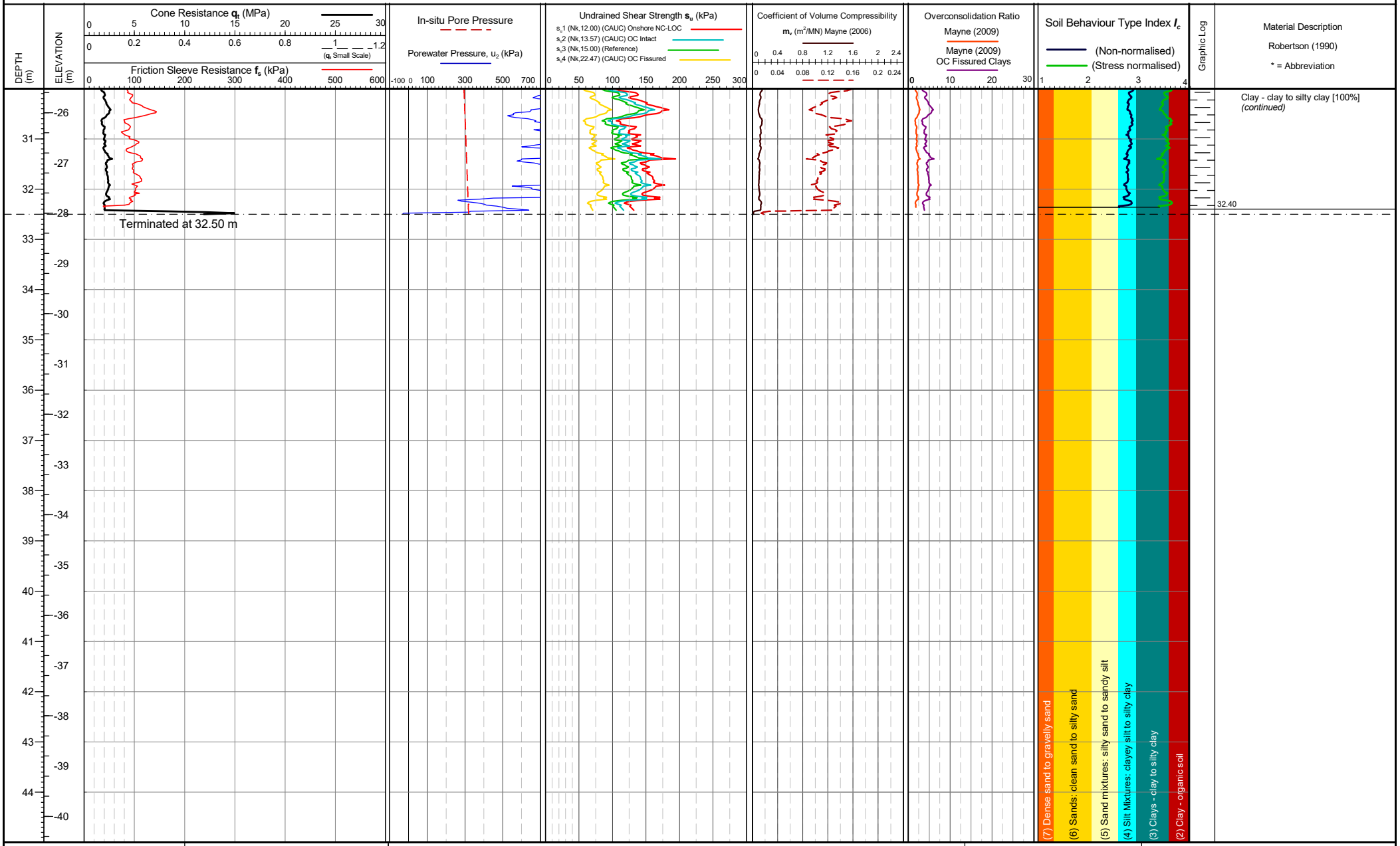
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK
Coordinates: 347007.486, 376632.058
Elevation: 4.479
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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.

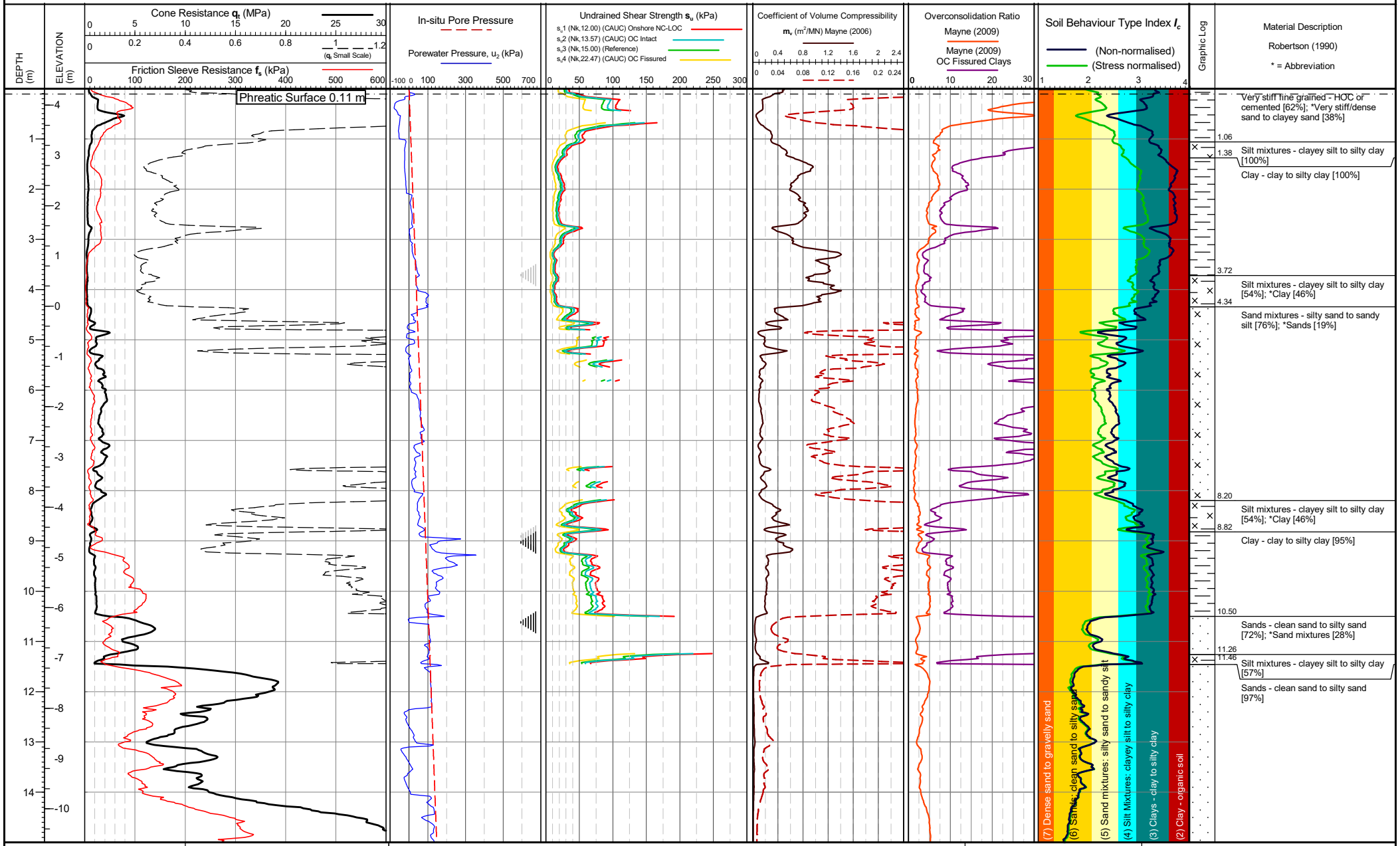
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
Coordinate system:

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark:
Tonnage + inclination

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: 26-02-24

Checked by: Nick Mason

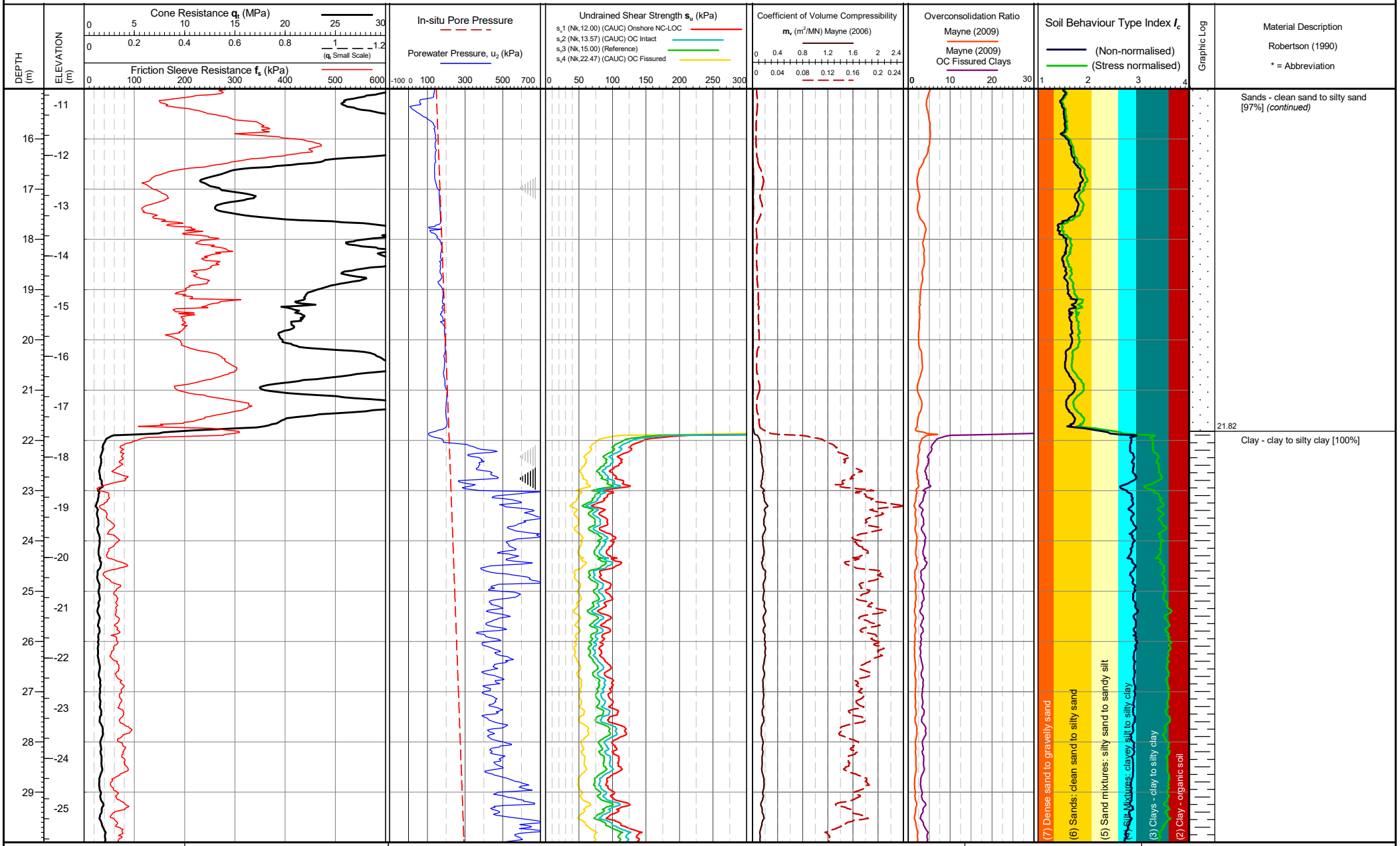
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
Coordinate system:

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark:
Tonnage + inclination

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.

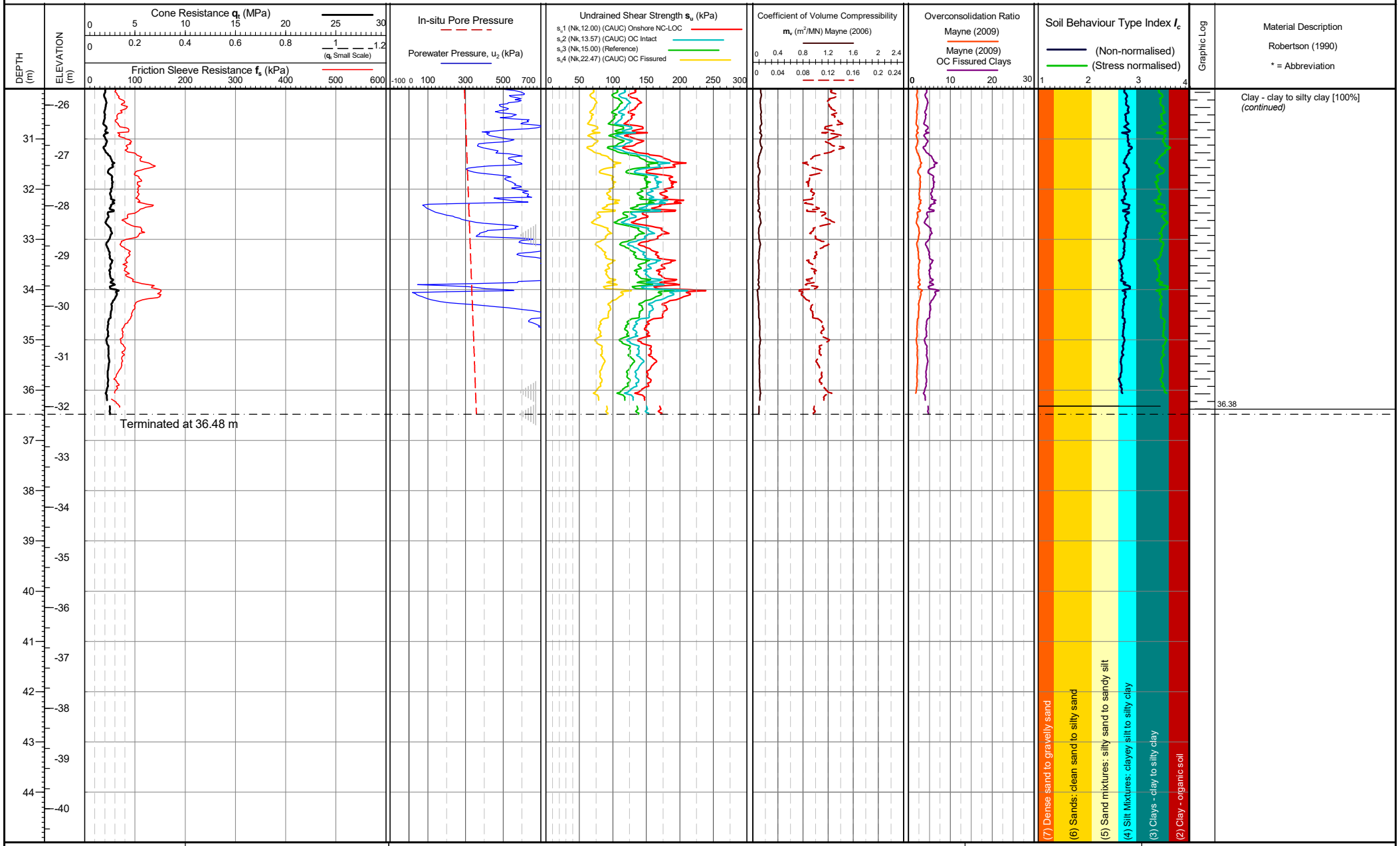
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
Coordinate system:

Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl

Termination Remark:
Tonnage + inclination

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: 26-02-24
Checked by: Nick Mason

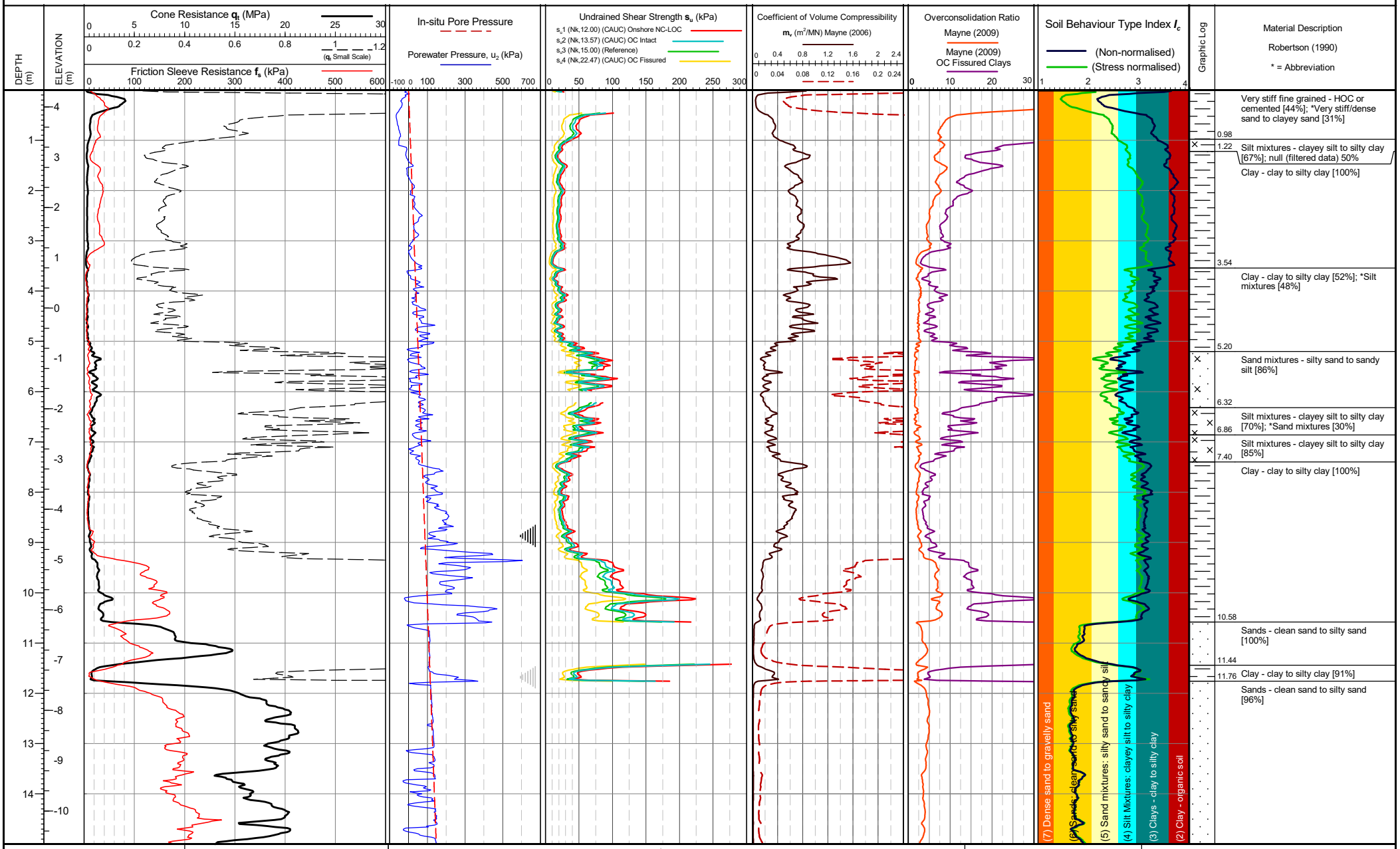
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Graphic Log

Material Description

Robertson (1990)

* = Abbreviation

0.98 Very stiff fine grained - HOC or cemented [44%]; *Very stiff/dense sand to clayey sand [31%]

1.22 Silt mixtures - clayey silt to silty clay [67%]; null (filtered data) 50%

Clay - clay to silty clay [100%]

3.54 Clay - clay to silty clay [52%]; *Silt mixtures [48%]

5.20 Sand mixtures - silty sand to sandy silt [86%]

6.32 Silt mixtures - clayey silt to silty clay [70%]; *Sand mixtures [30%]

6.86 Silt mixtures - clayey silt to silty clay [85%]

7.40 Clay - clay to silty clay [100%]

10.58 Sands - clean sand to silty sand [100%]

11.44 Clay - clay to silty clay [91%]

11.76 Sands - clean sand to silty sand [96%]

Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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: 26-02-24

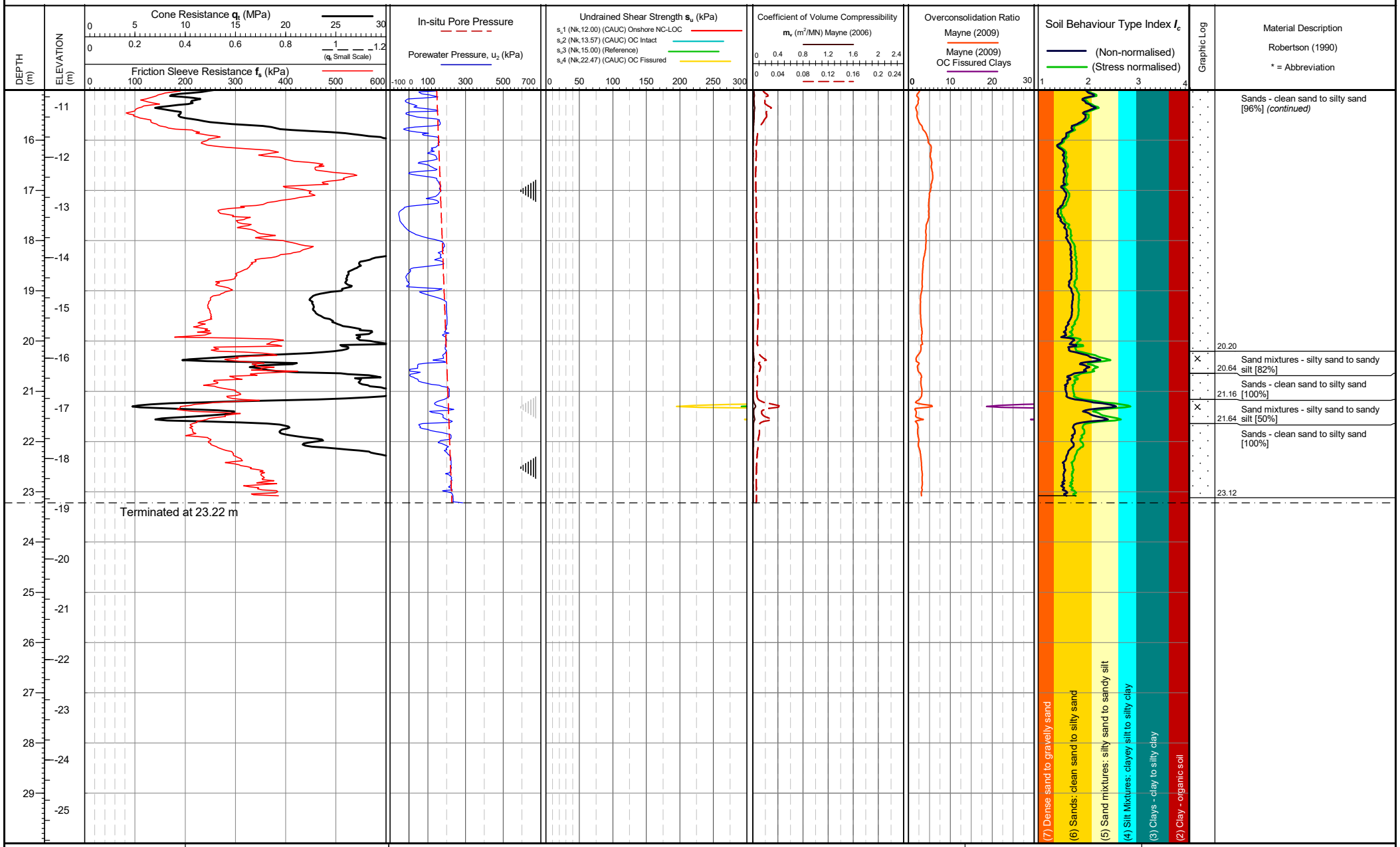
Lankelma Project Ref: 27124-1

Checked by: Nick Mason

TEST ID: CPT226

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
Coordinate system:

Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark:
Total reaction force

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.

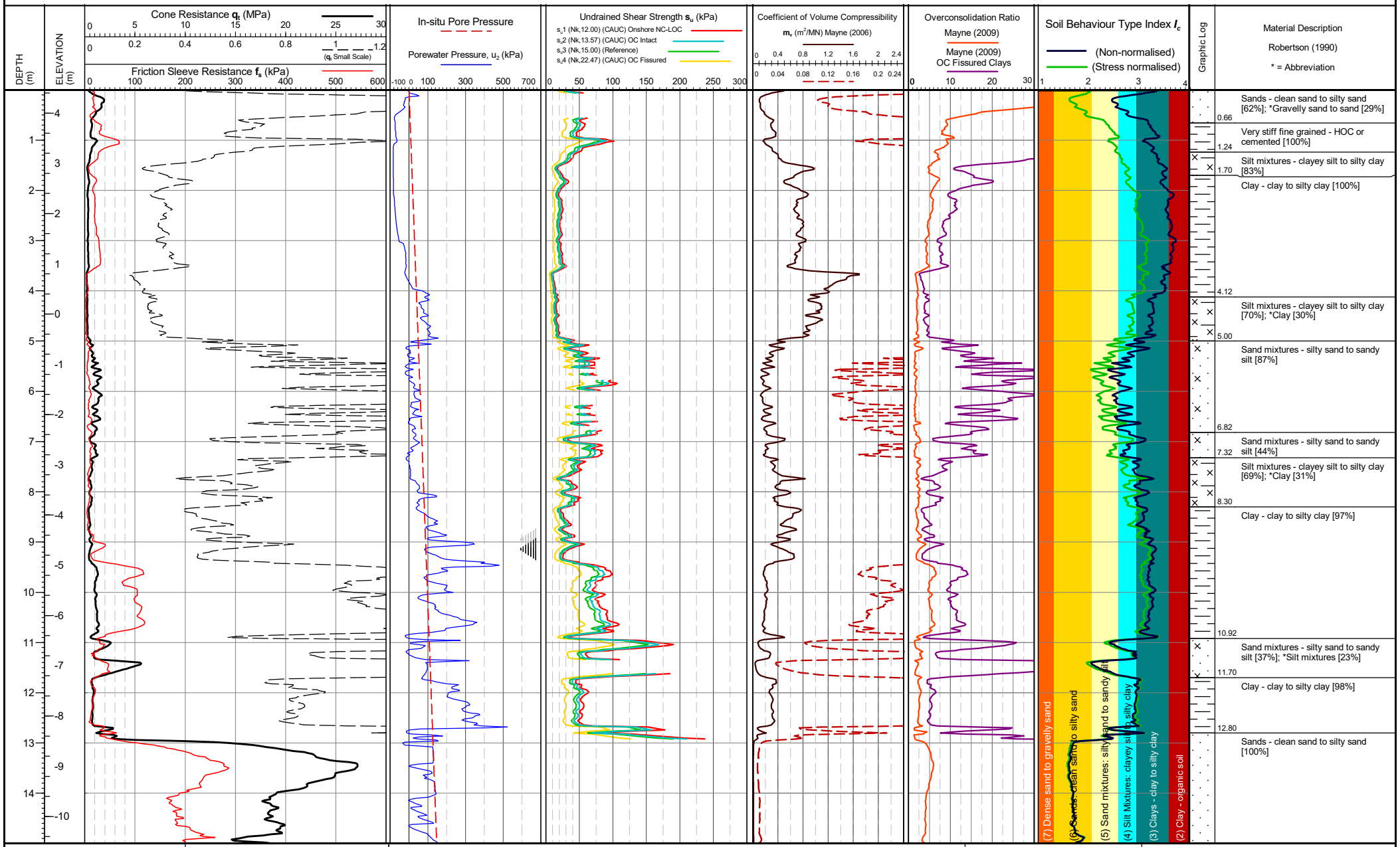
Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT226

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
Coordinate system:

Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations

Termination Remark:
Total reaction force

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: 26-02-24

Lankelma Project Ref: 27124-1

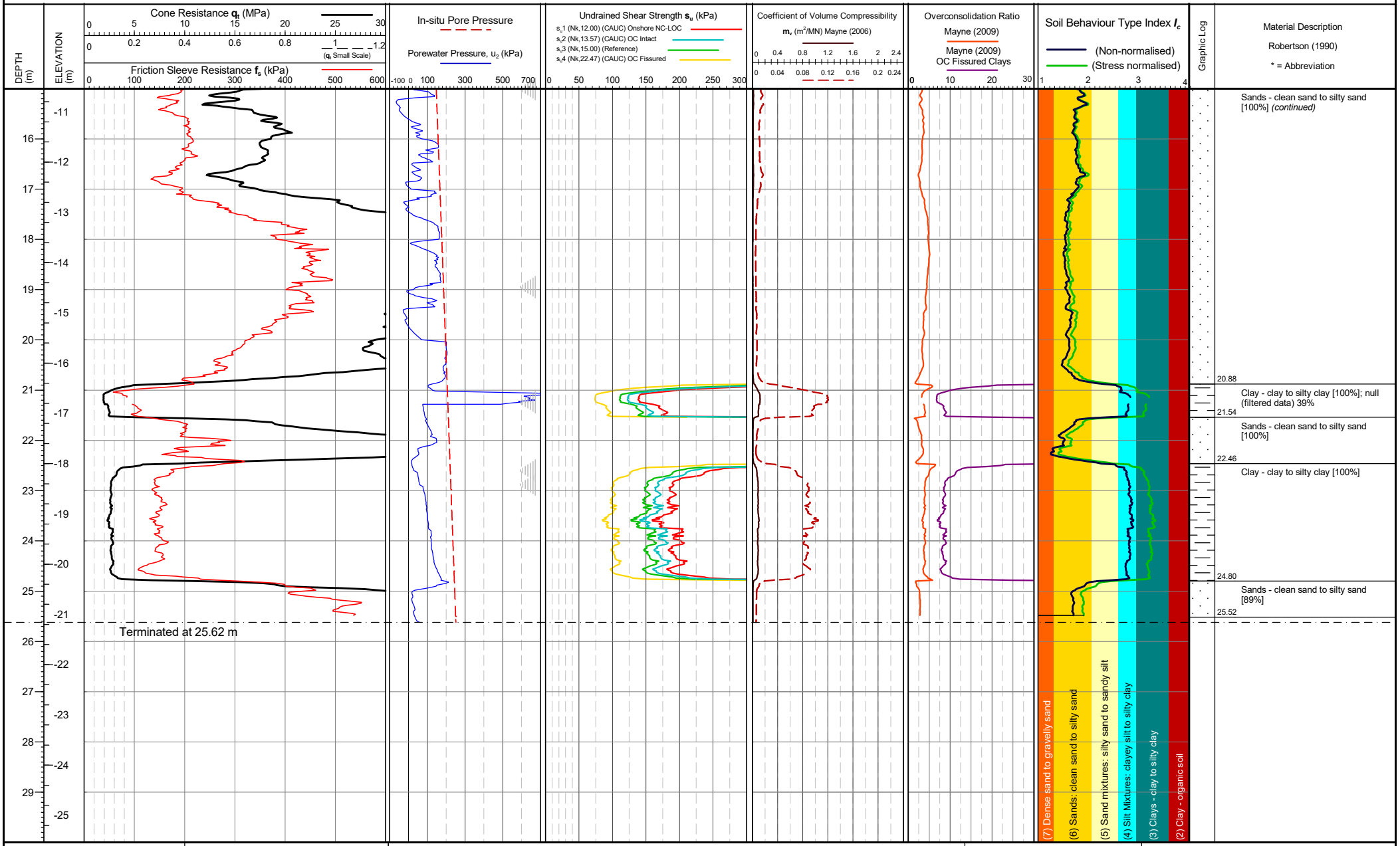
Checked by:
Nick Mason

TEST ID: CPT227

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
ConeID: S15-CFIPTT.1846
Operator: Paul Appleton
Rig Used: UK23
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
Coordinate system:

Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations

Termination Remark:
Total reaction force

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: 26-02-24
Lankelma Project Ref: 27124-1

Checked by:
Nick Mason

TEST ID: CPT227

APPENDIX F PARAMETER RESULTS 2 – SPT N60, PHI, D_R, E, I_C

Equivalent SPT N60

Peak friction angle

Relative density

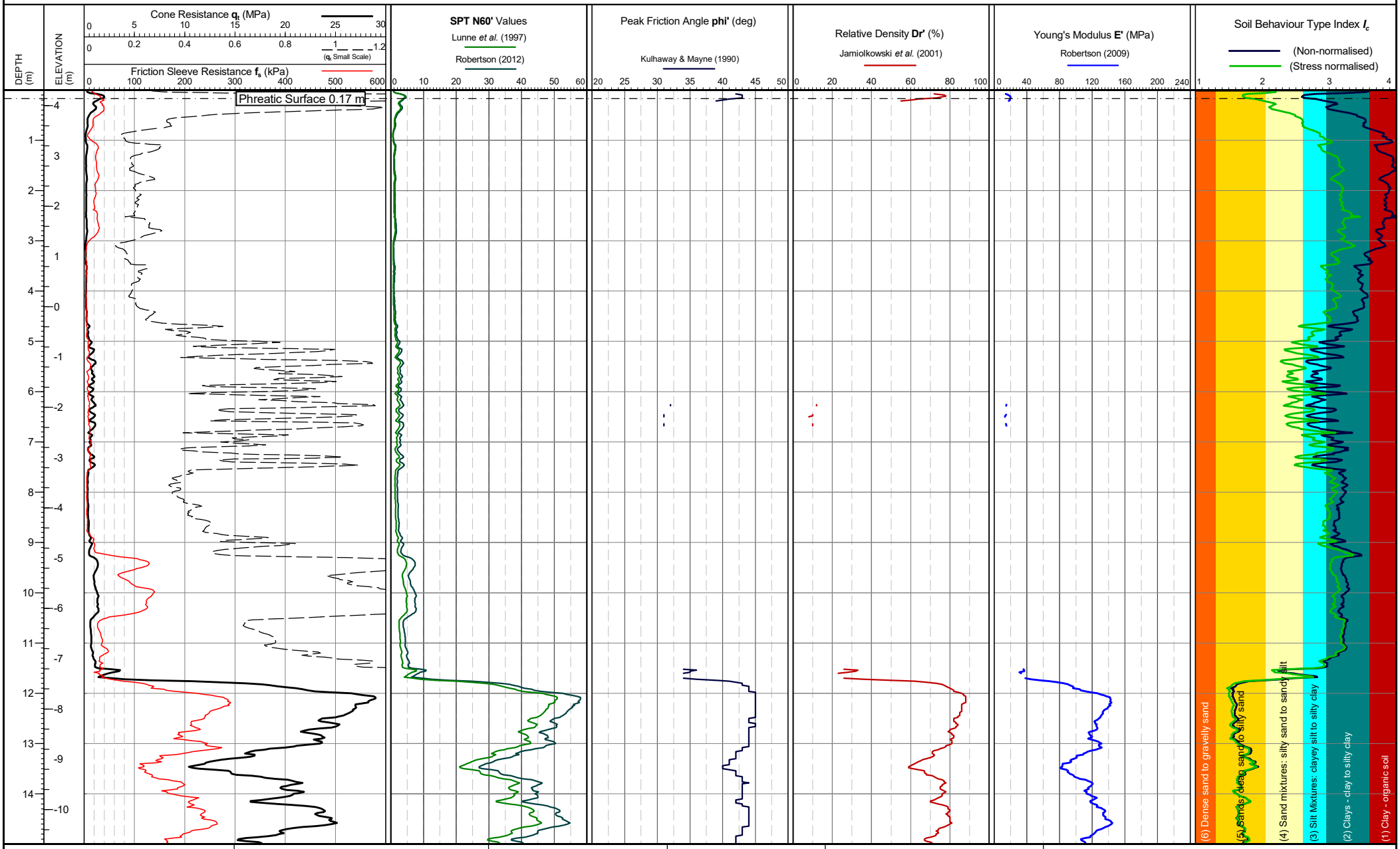
Young's modulus

SBT index I_c

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
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.

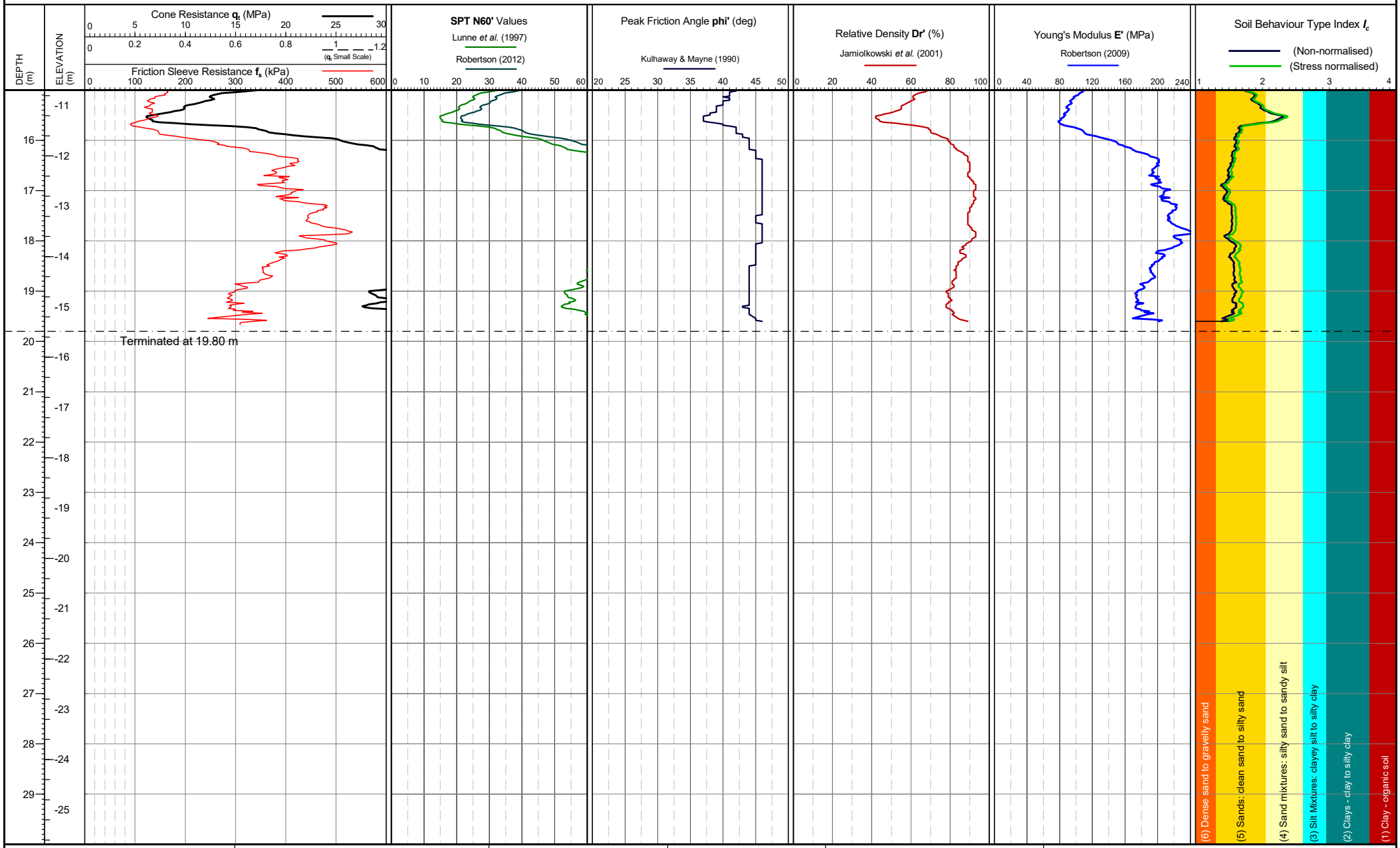
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
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.

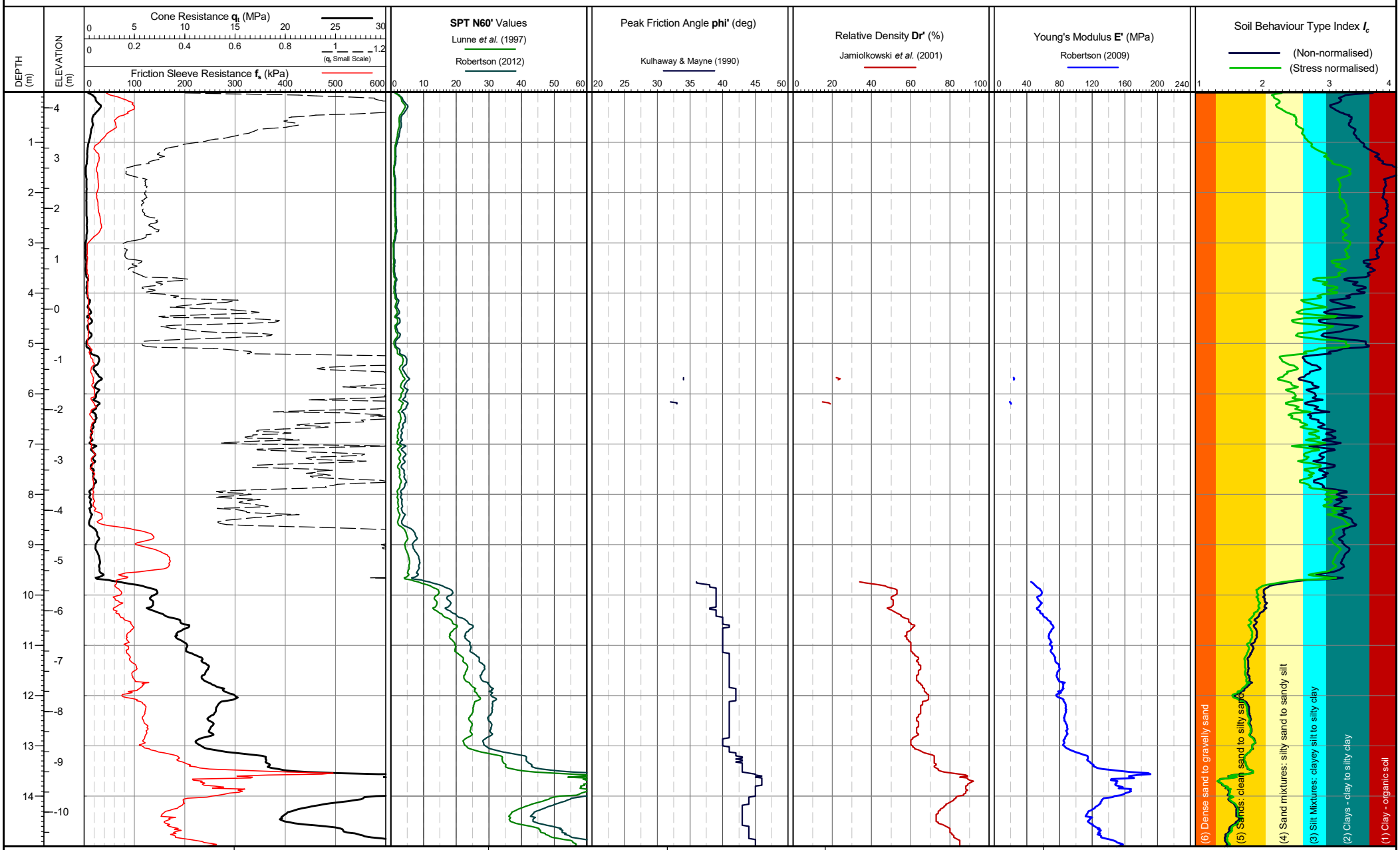
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
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: 26-02-24
Checked by: Nick Mason

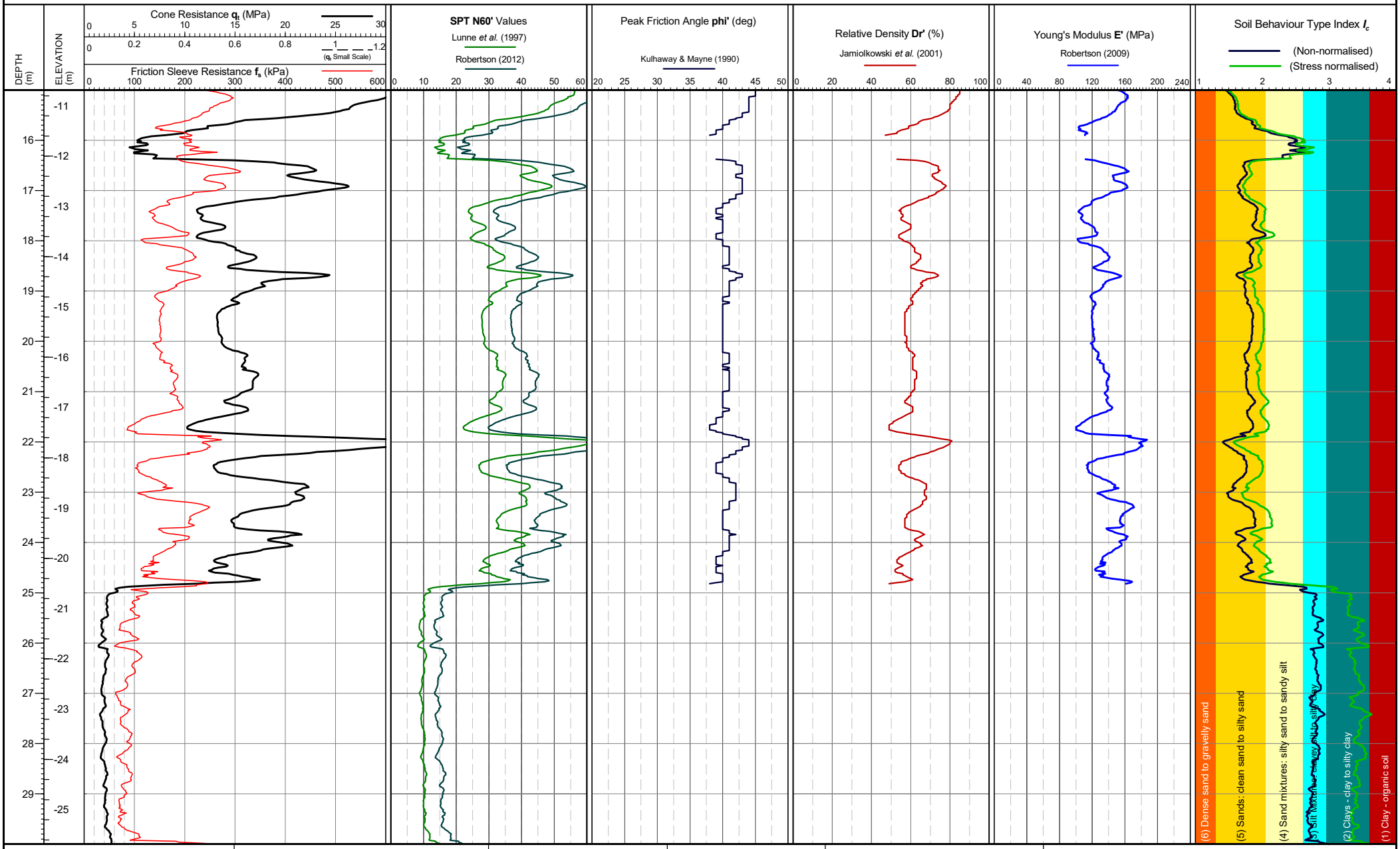
Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
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.

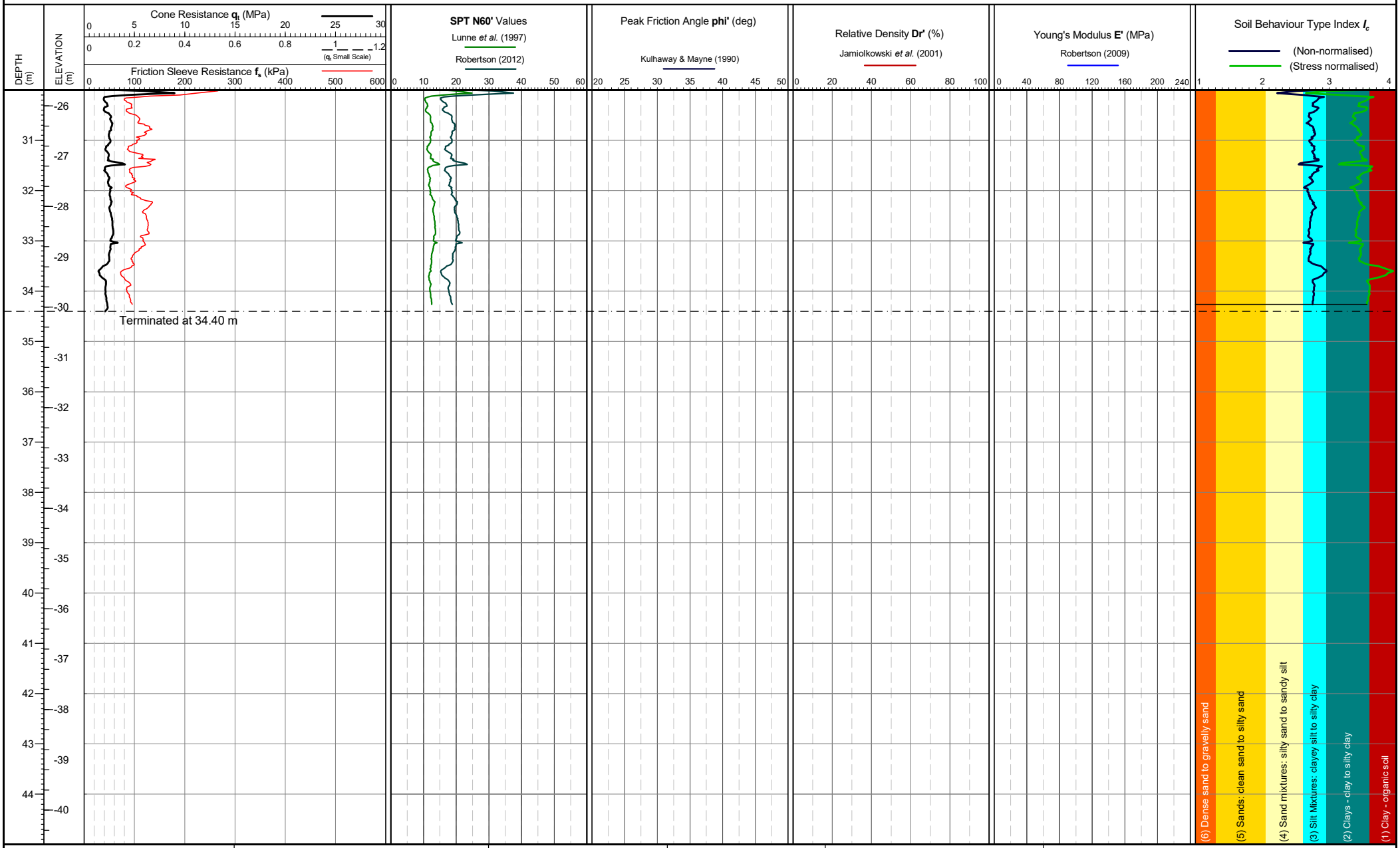
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
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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.

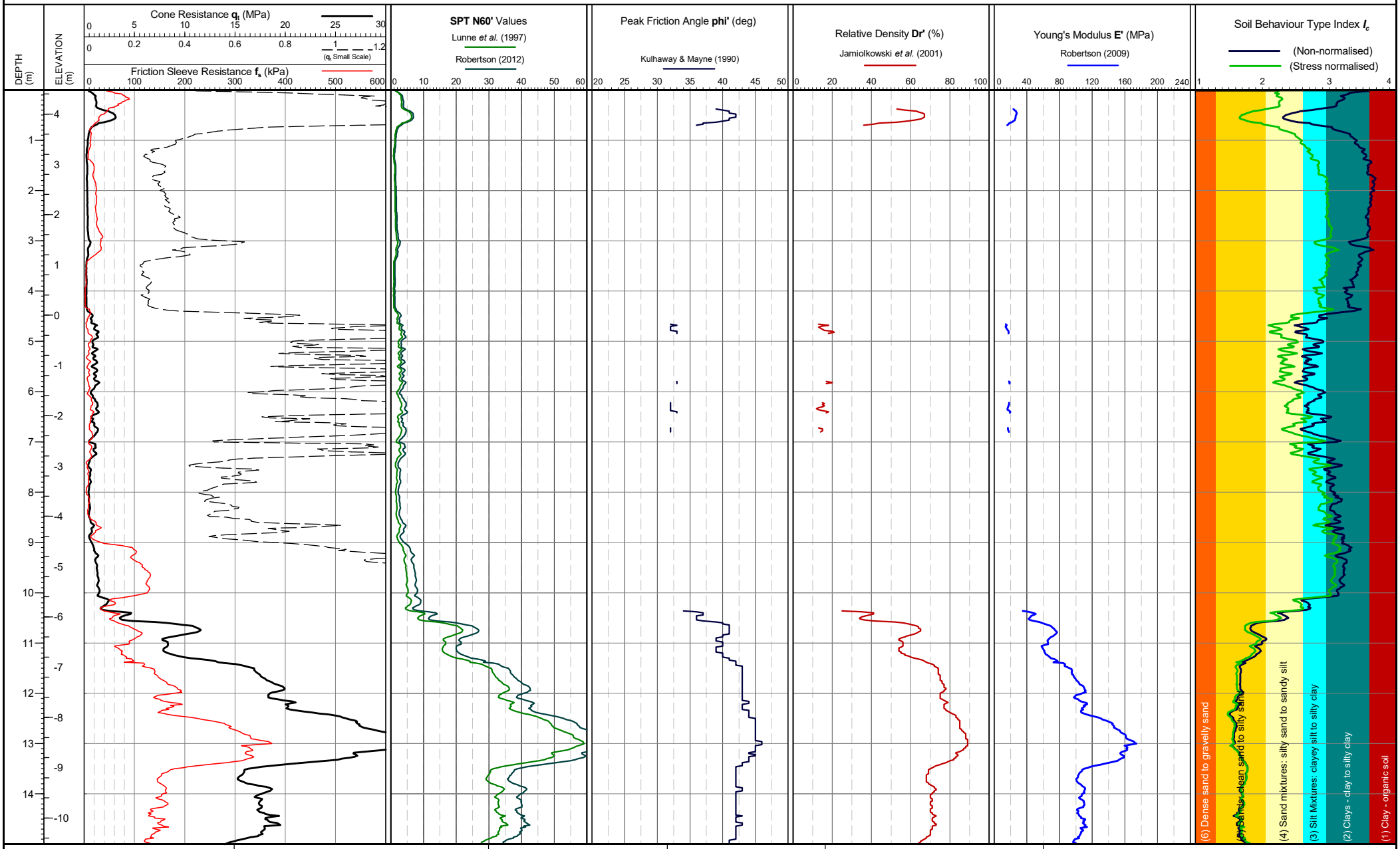
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK
Coordinates: 347007.486, 376632.058
Elevation: 4.479
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.

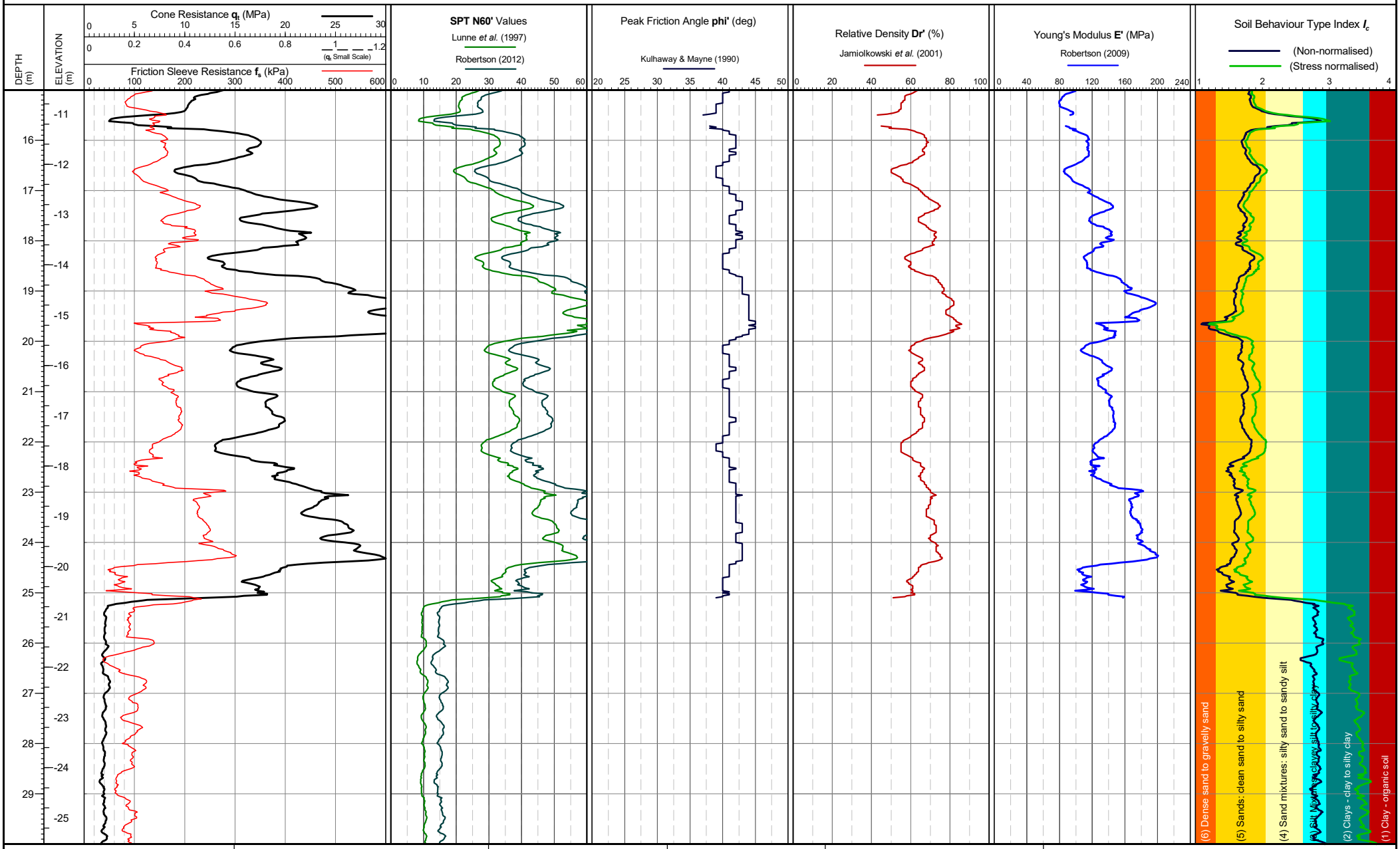
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK
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Elevation: 4.479
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.

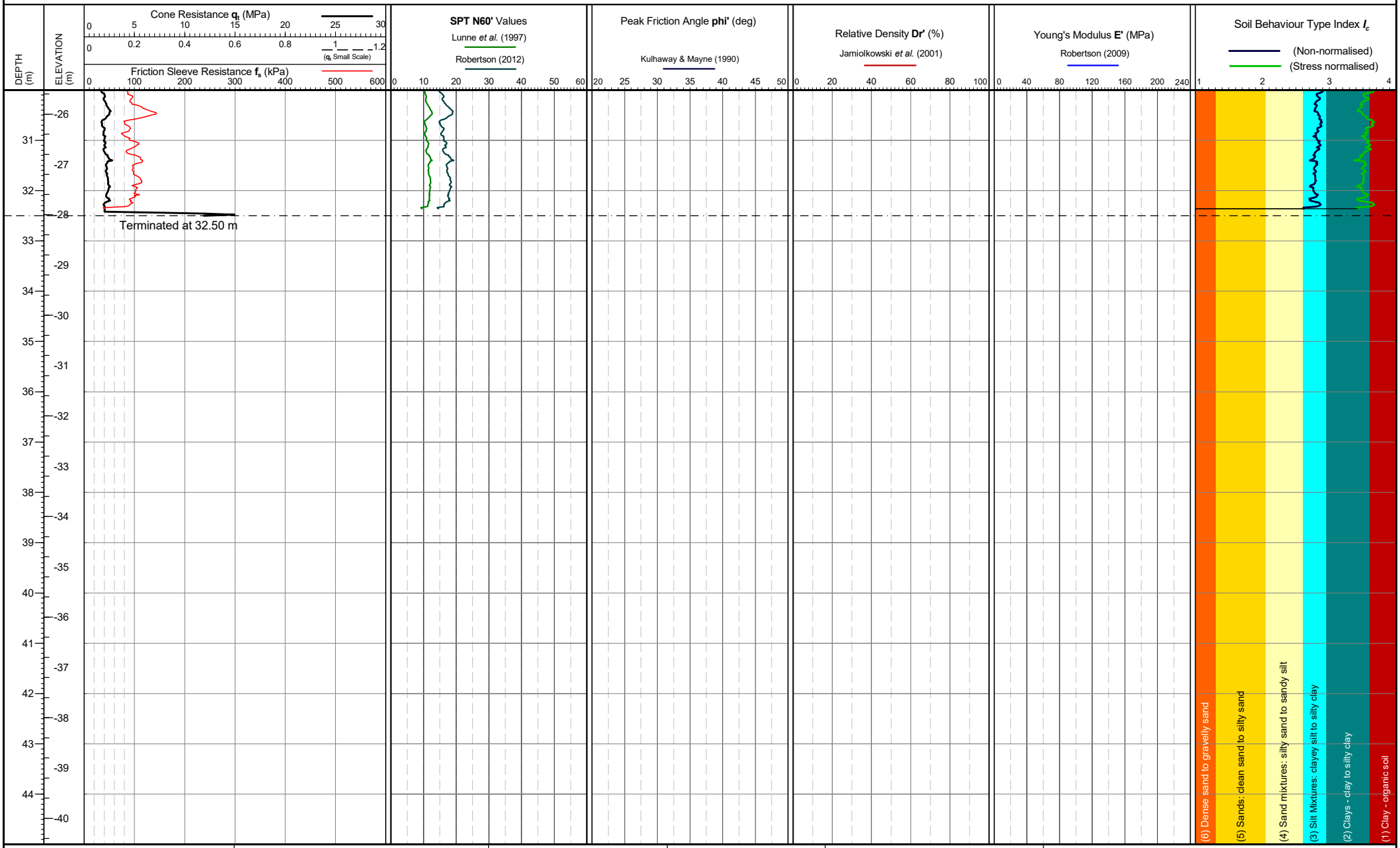
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
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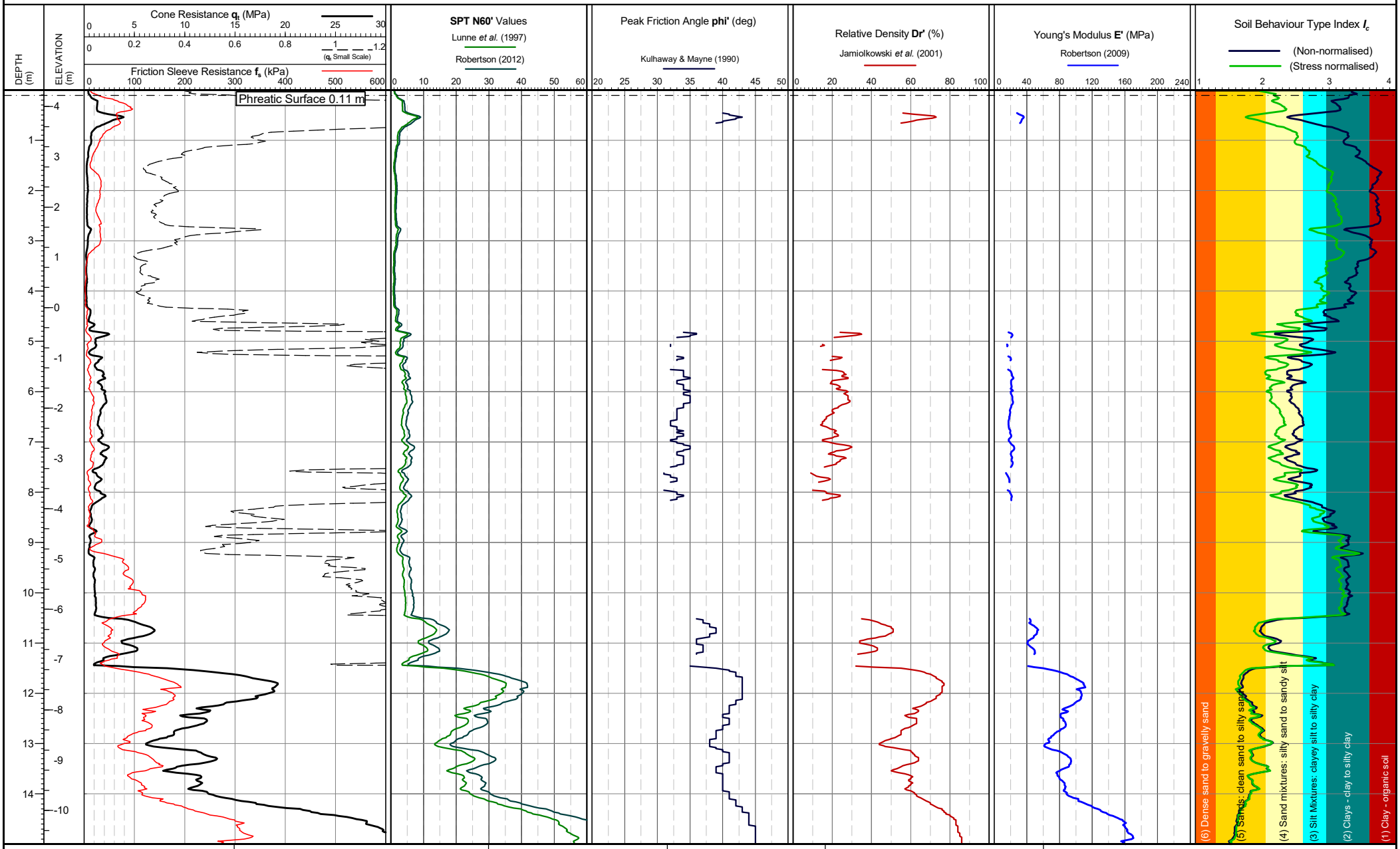
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):

Cone ID: S15-CFIPTT.1846

Operator: Paul Appleton

Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK

Coordinates: 346954.178, 376648.331

Elevation: 4.329

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: 26-02-24

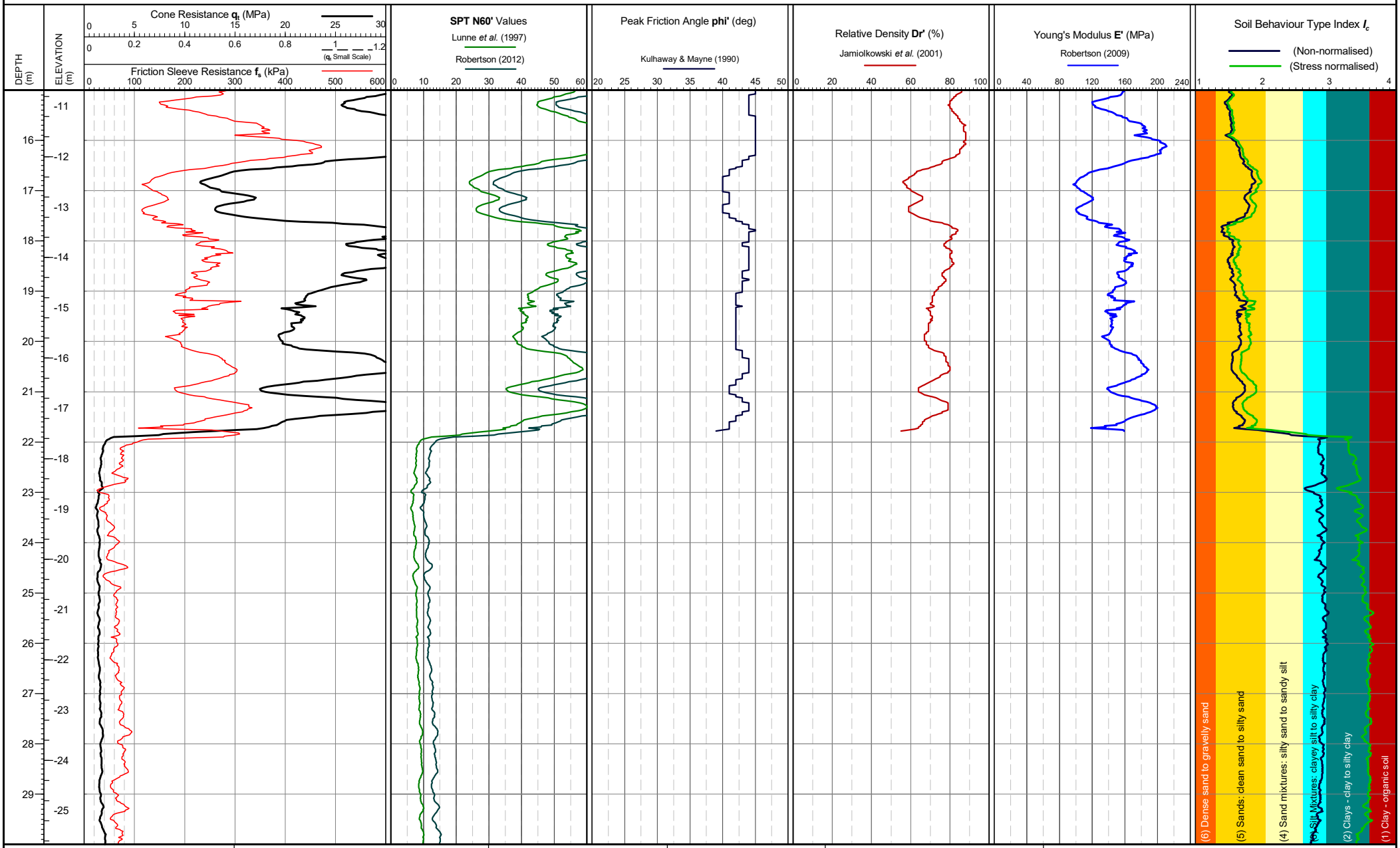
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
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: 26-02-24
Checked by: Nick Mason

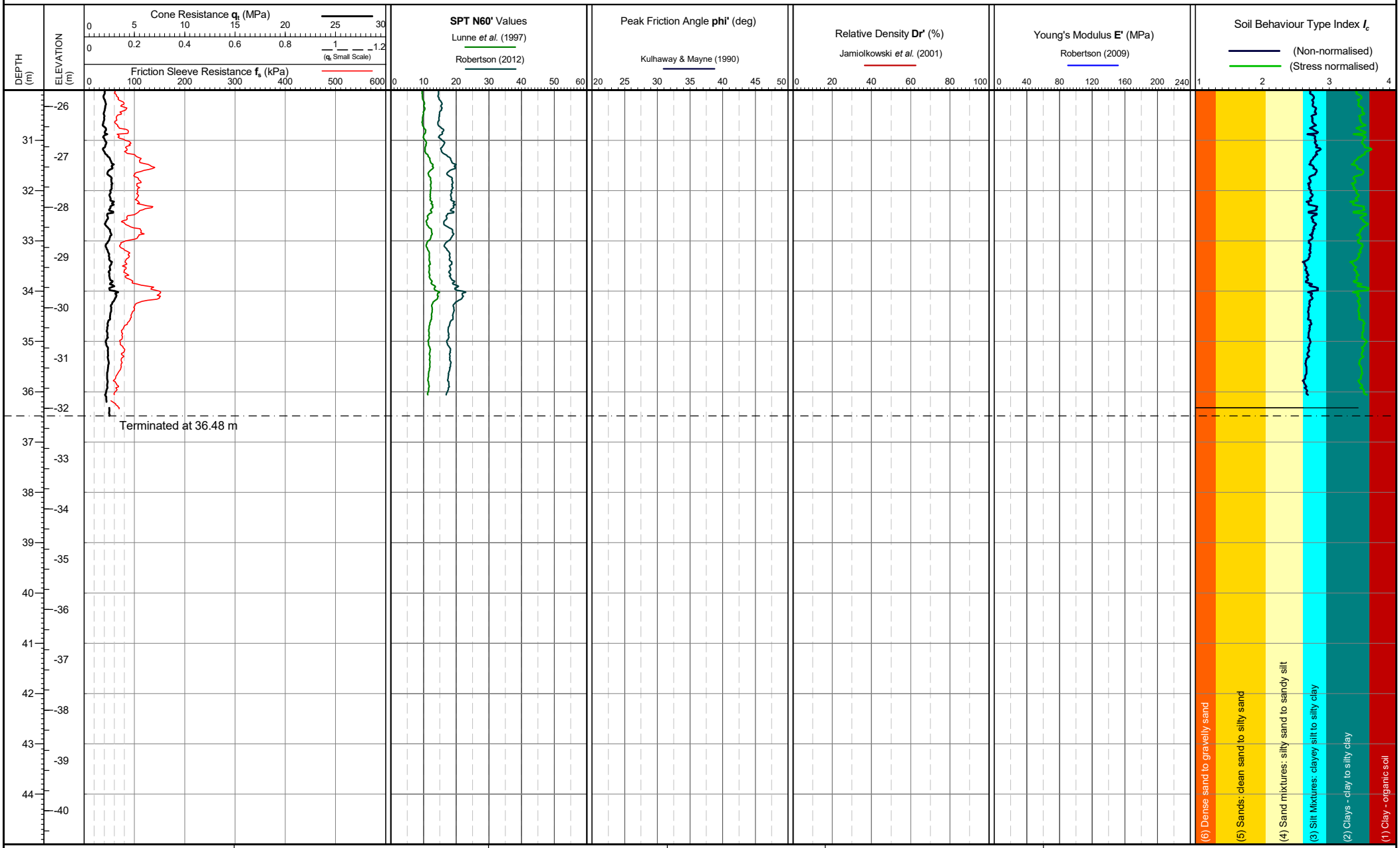
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
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.

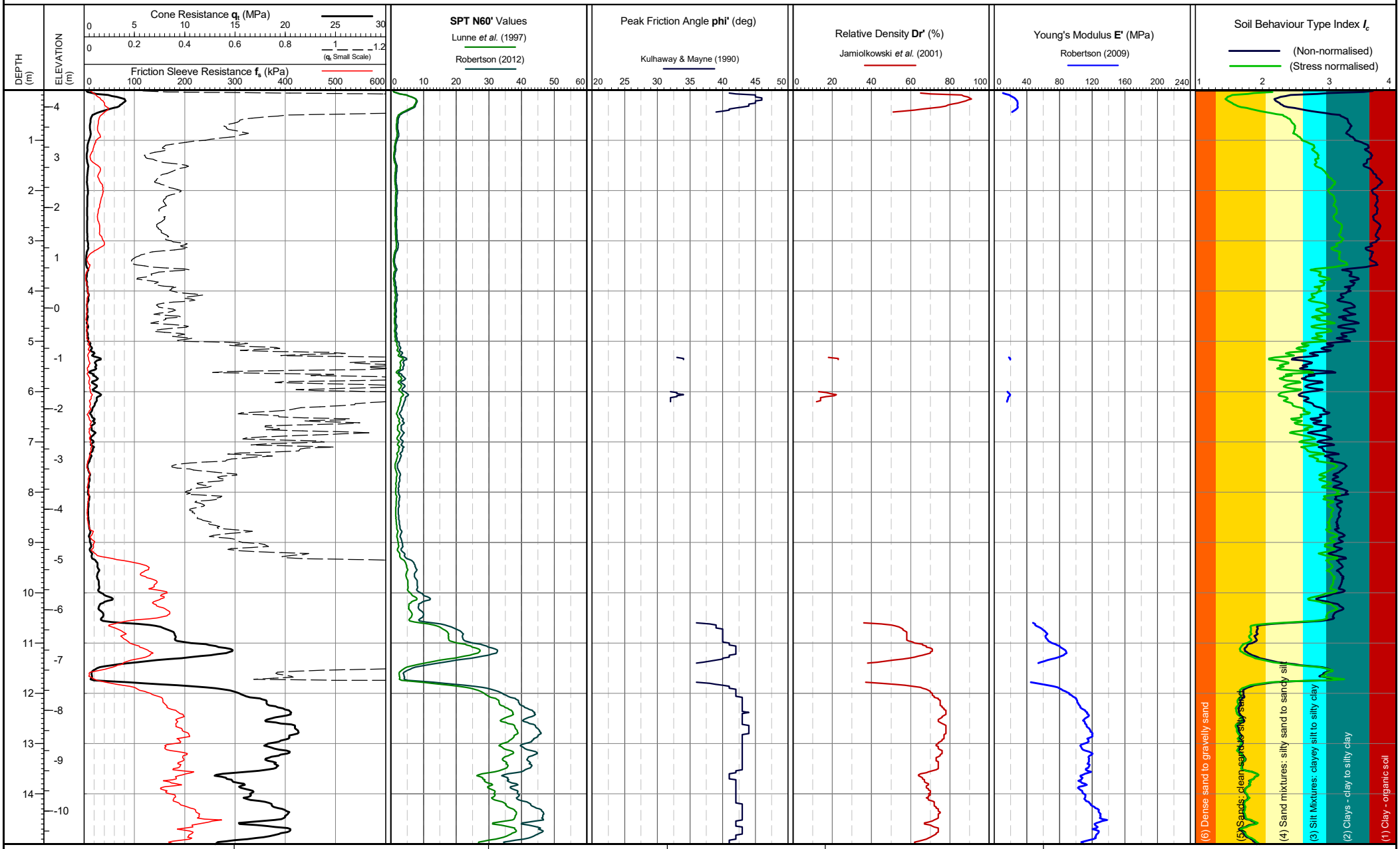
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
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.

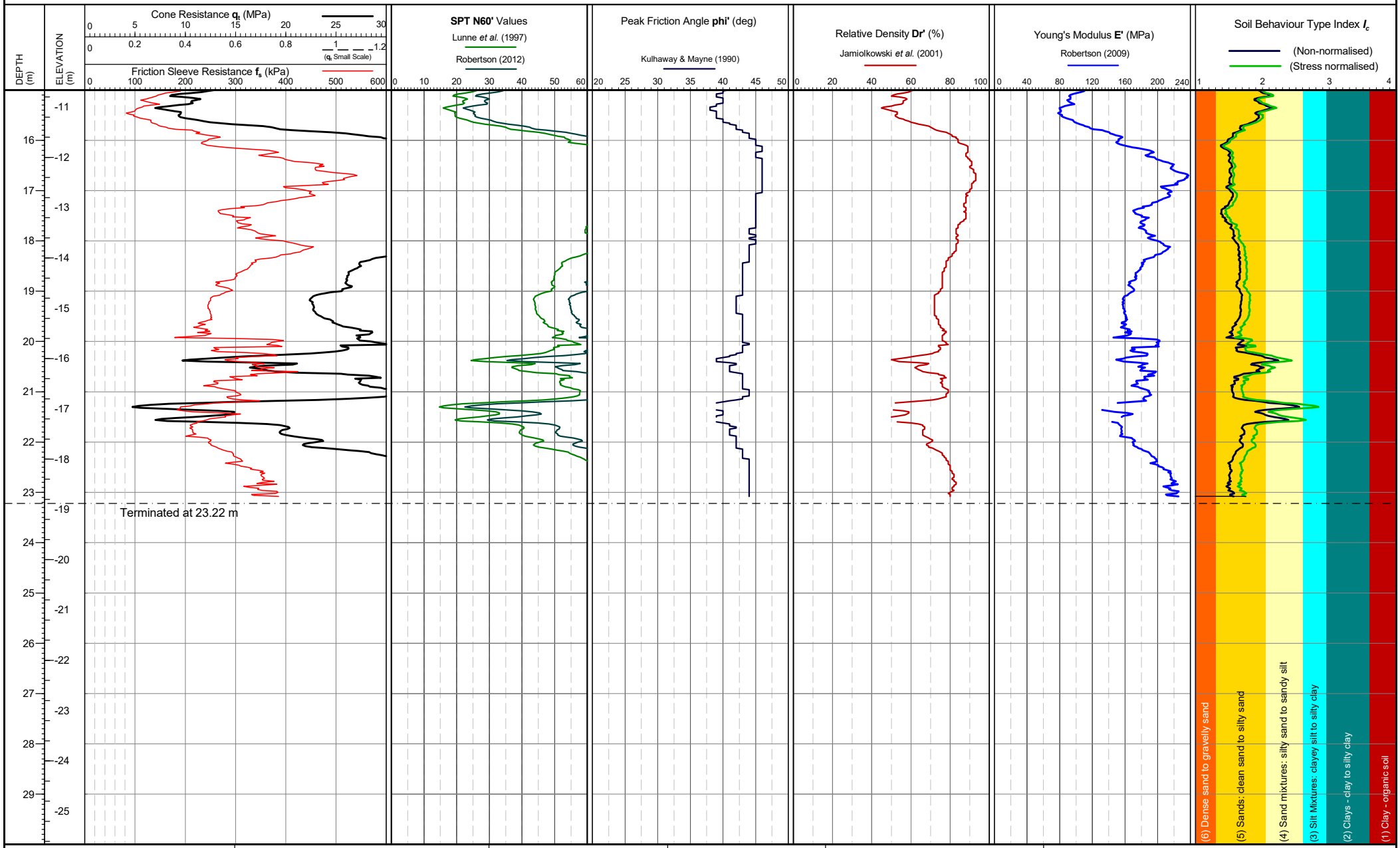
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT226

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
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.

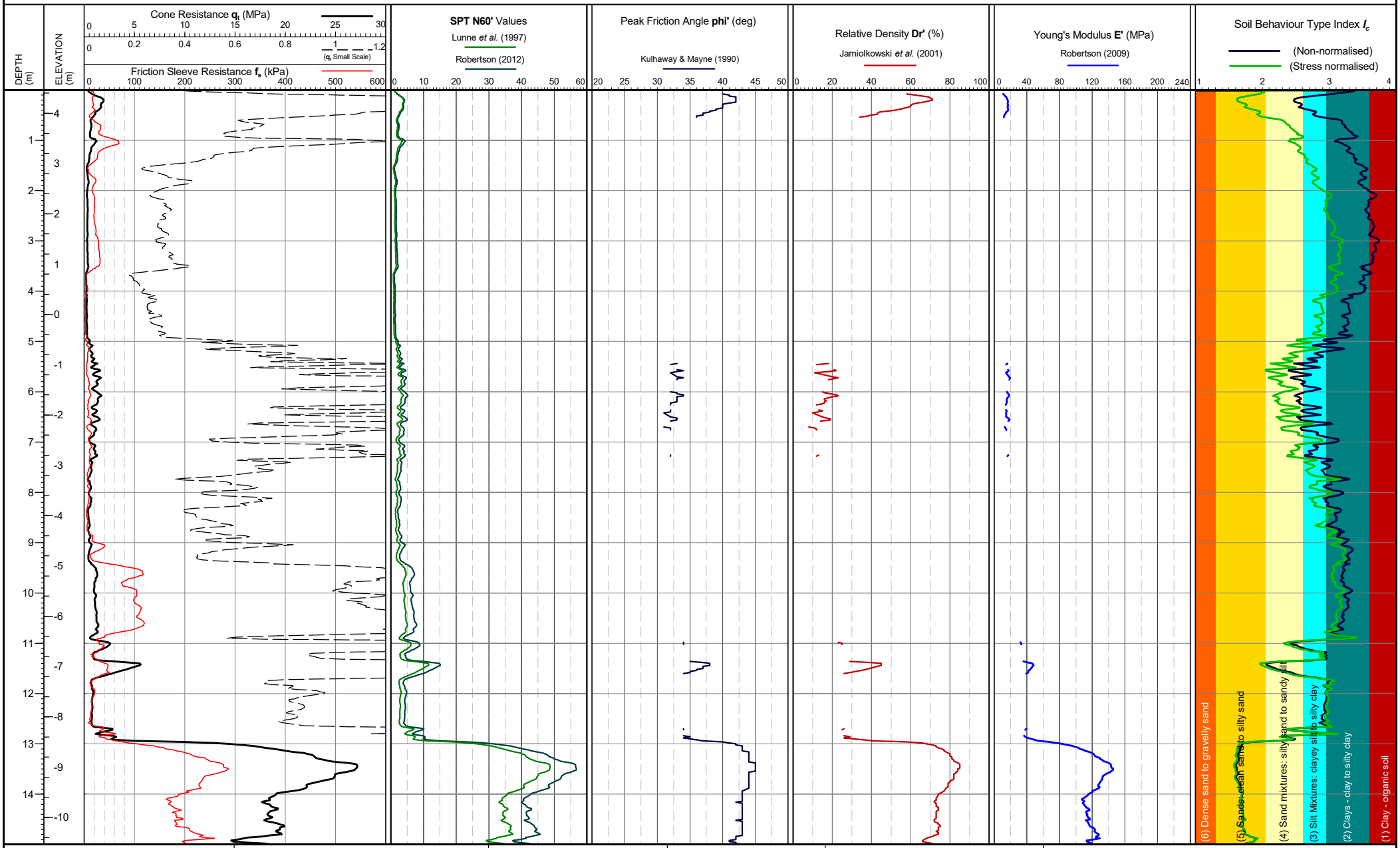
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT226

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
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.

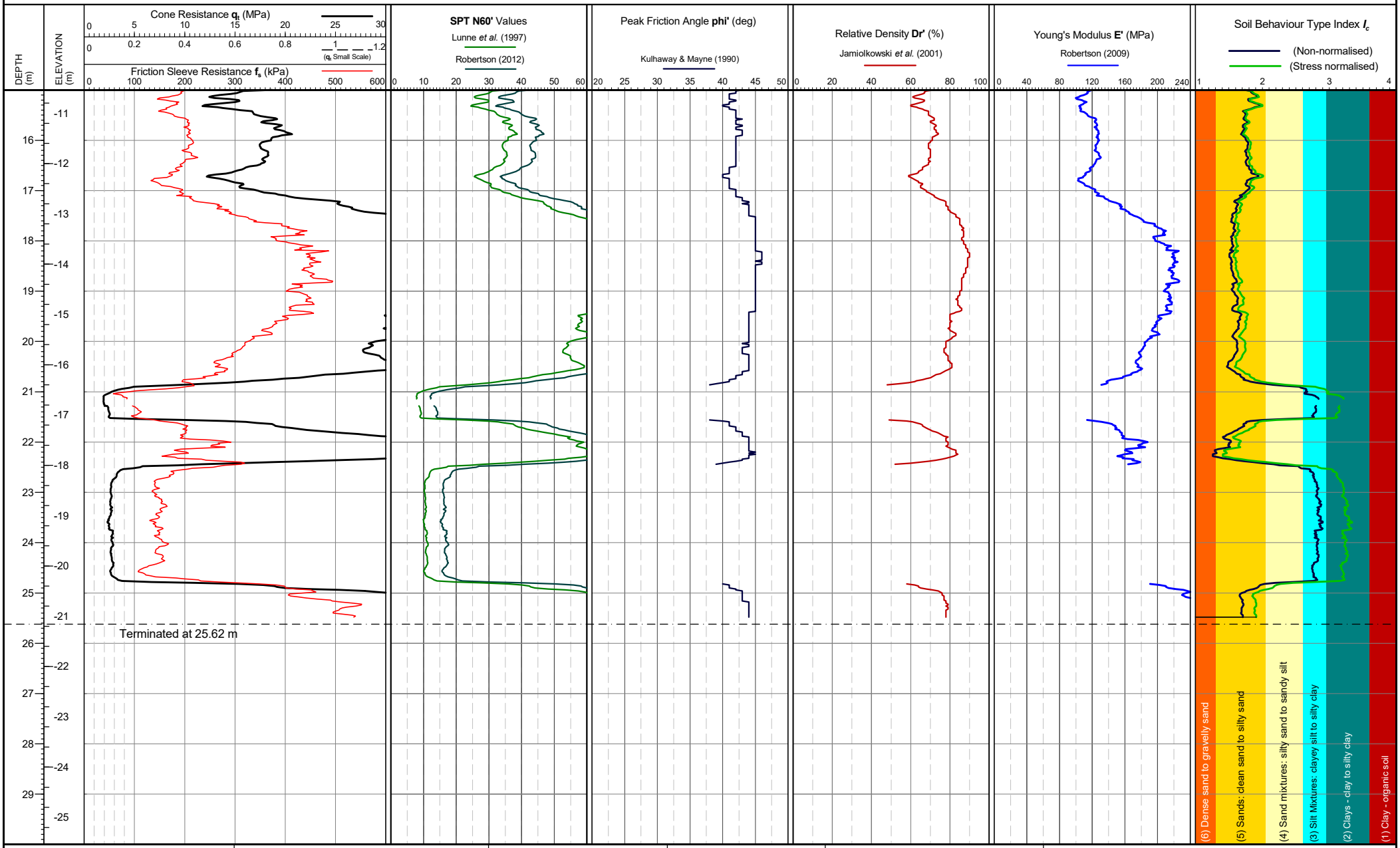
Date of plot: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT227

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
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: 26-02-24
Checked by: Nick Mason

Lankelma Project Ref: 27124-1

TEST ID: CPT227

APPENDIX G INTERPRETED DISSIPATION TEST RESULTS

Permeability

Coefficient of consolidation

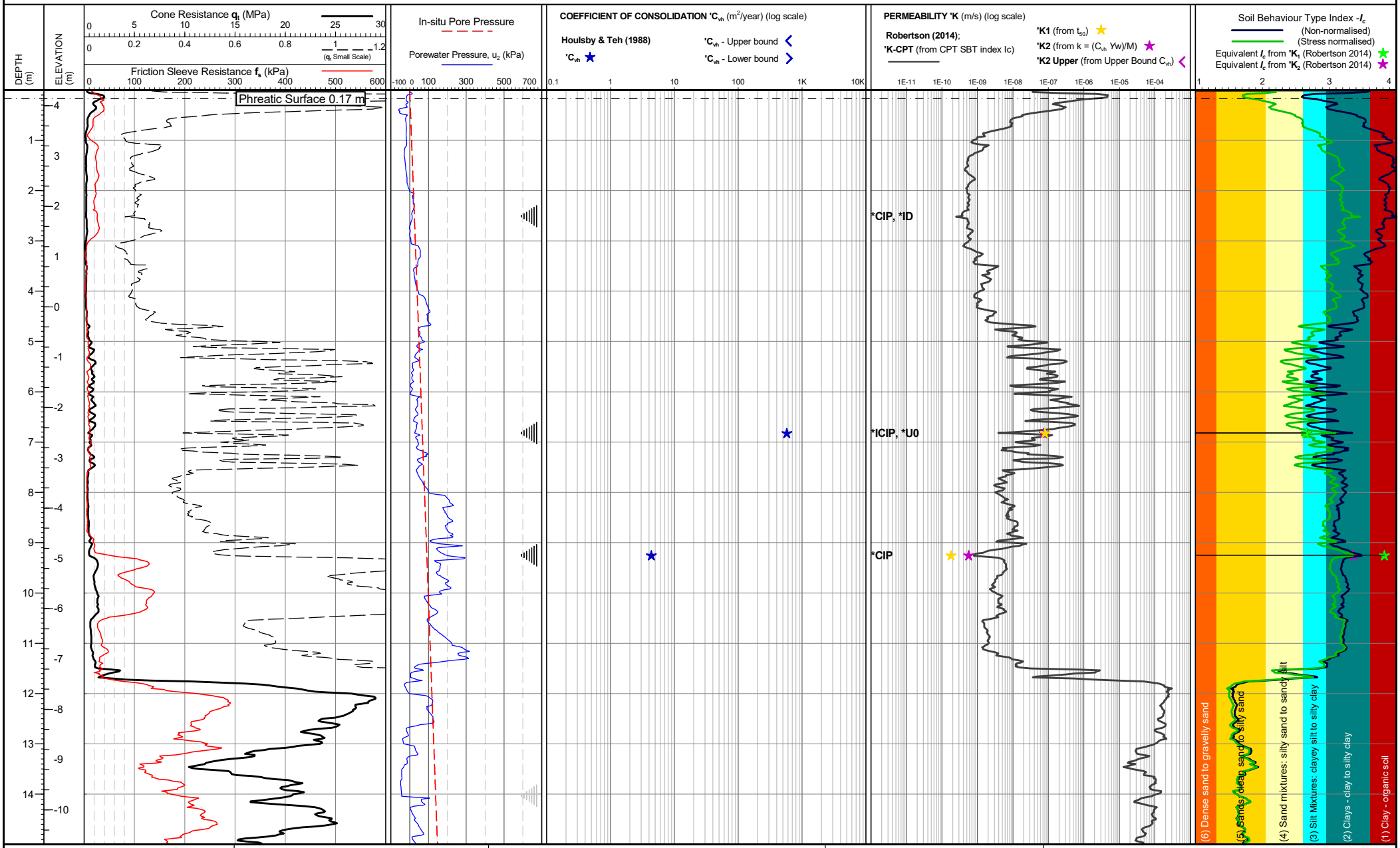
SBT index (I_c) derived from permeability

Plots are provided for all locations. Interpreted values are only provided for specified dissipation tests or QC dissipation data deemed to be suitable for interpretation.

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
Coordinate system:

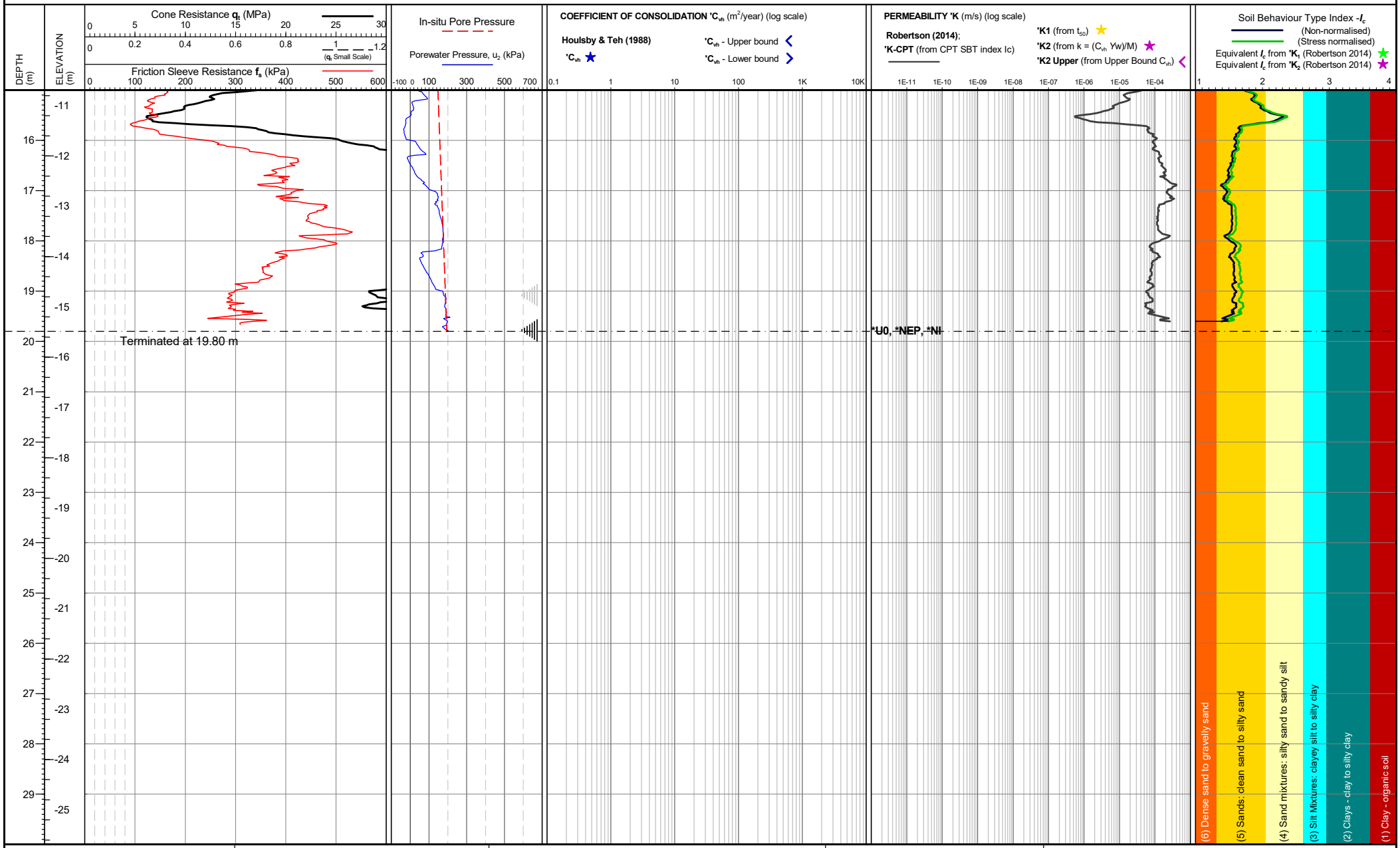
*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 06/02/2024 09:13:28

Location: Cheshire, UK
Coordinates: 346905.692, 376655.346
Elevation: 4.312
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
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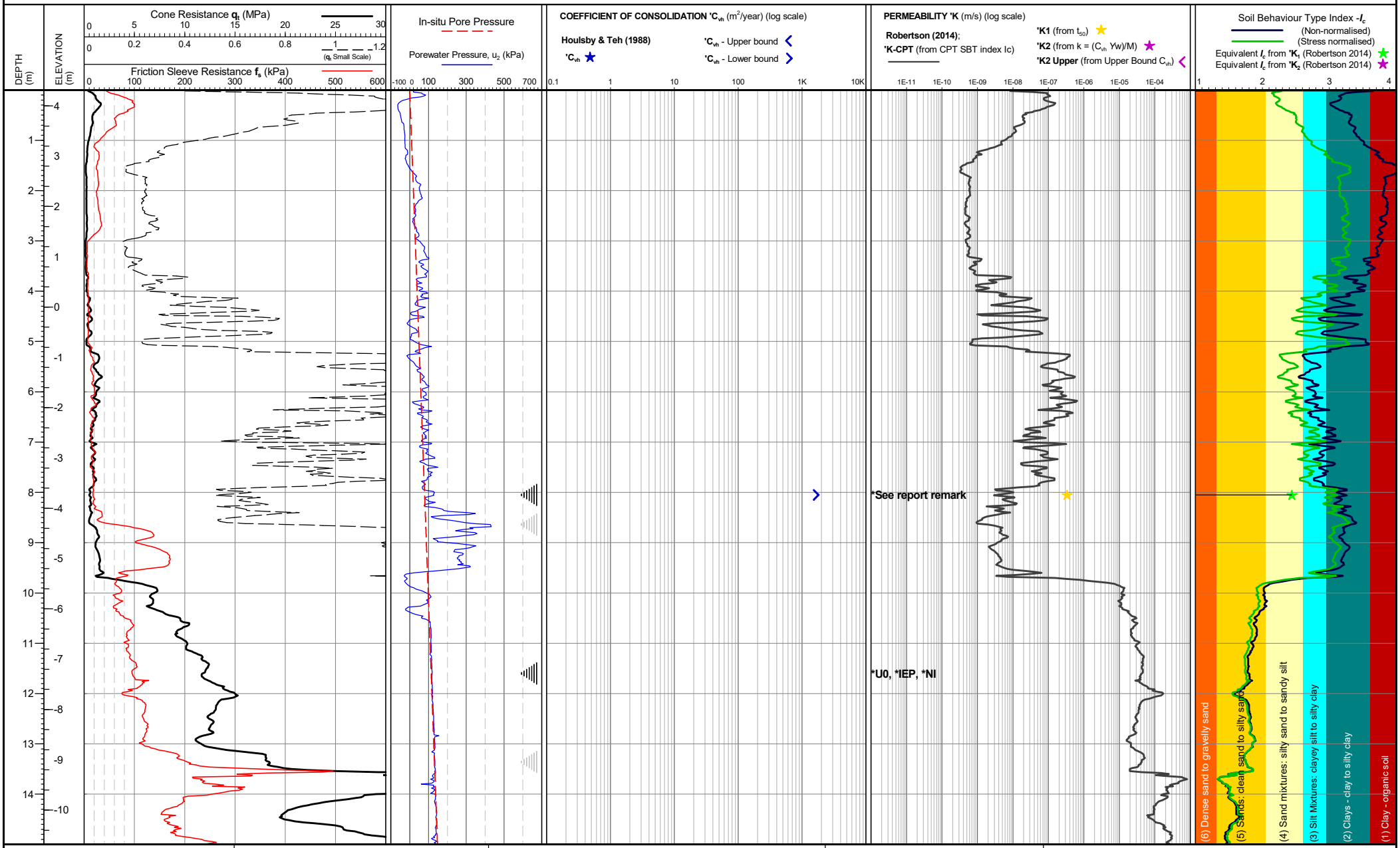
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT222

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
Elevation: 4.316
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
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MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

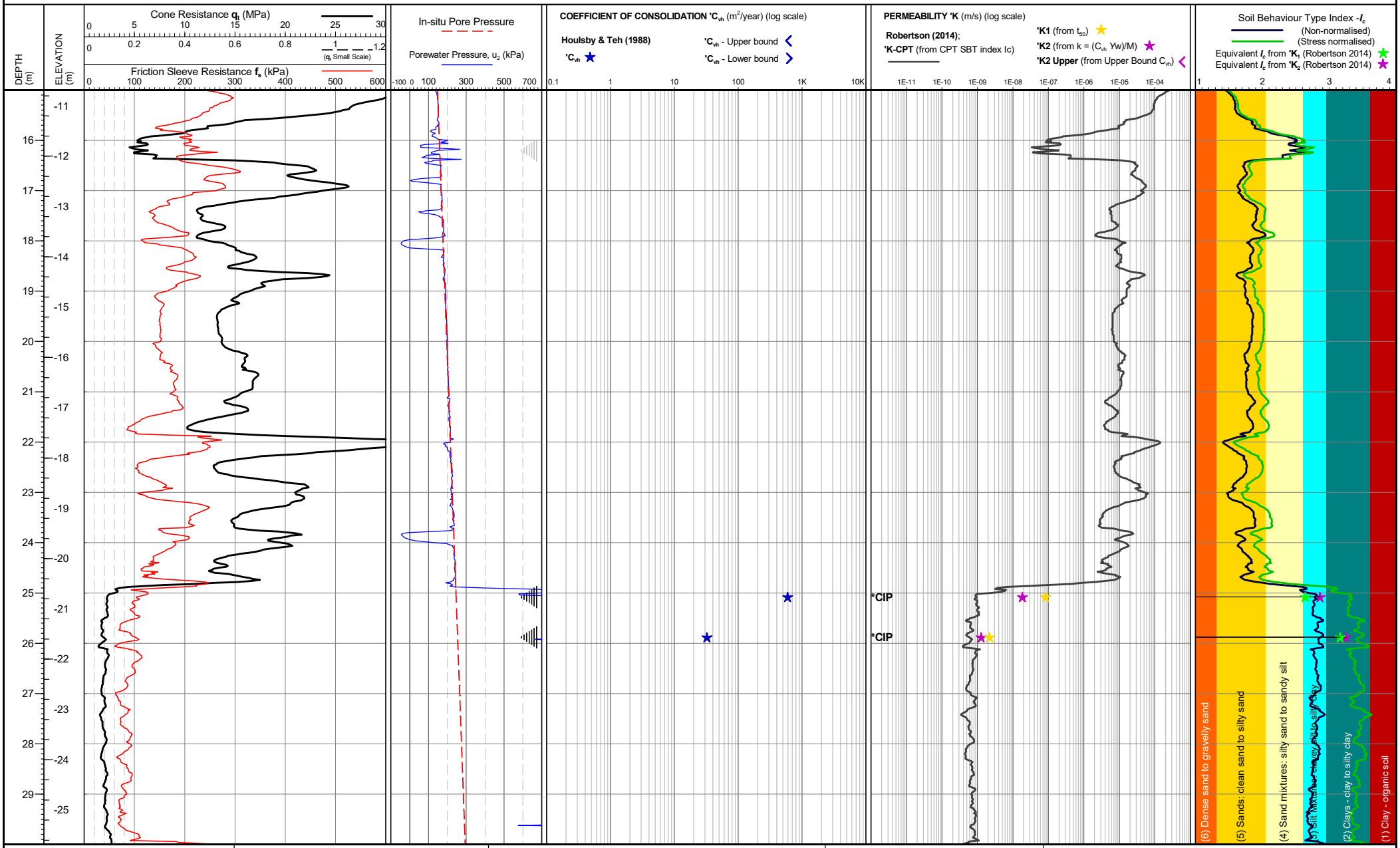
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Date of test: 12/02/2024 09:51:48

Location: Cheshire, UK
Coordinates: 346995.306, 376696.366
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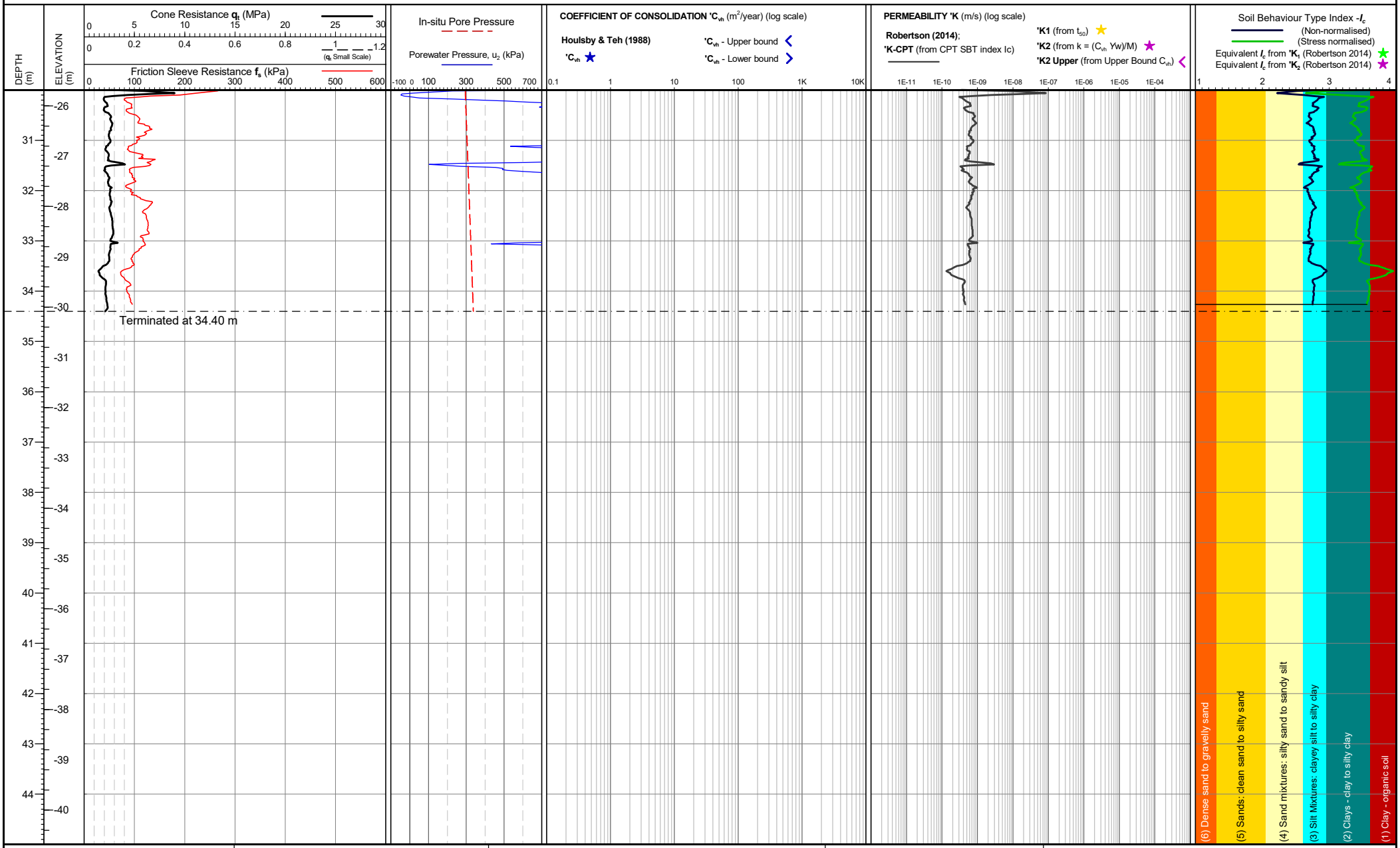
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



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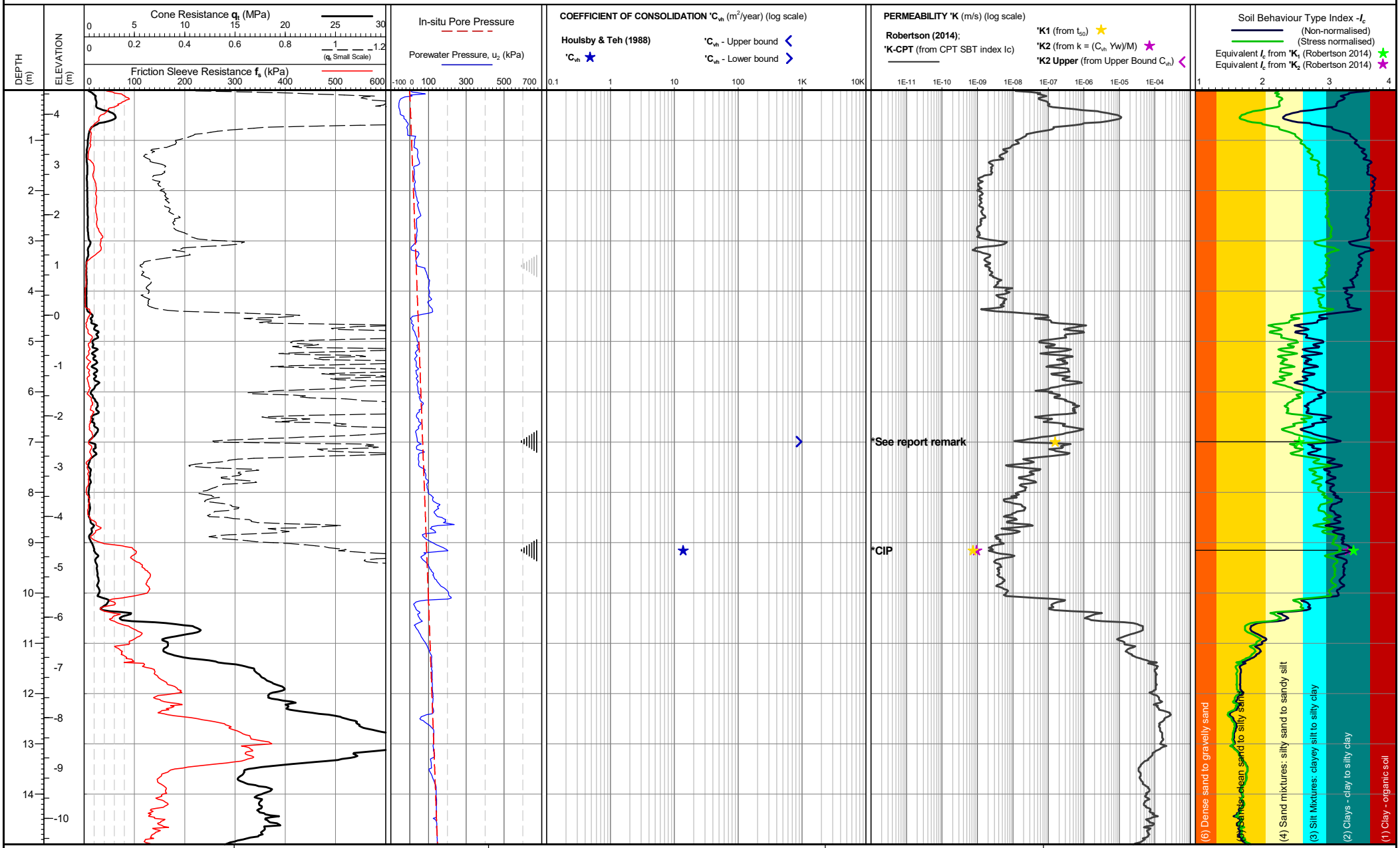
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):

Cone ID: S15-CFIPTTM250.2065

Operator: Paul Appleton

Date of test: 09/02/2024 08:14:21

Location: Cheshire, UK

Coordinates: 347007.486, 376632.058

Elevation: 4.479

Coordinate system:

*Abbreviations:
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DT: Disrupted test.
NI: No interpretation.

Date of plot: 26-02-24

Checked by: Nick Mason

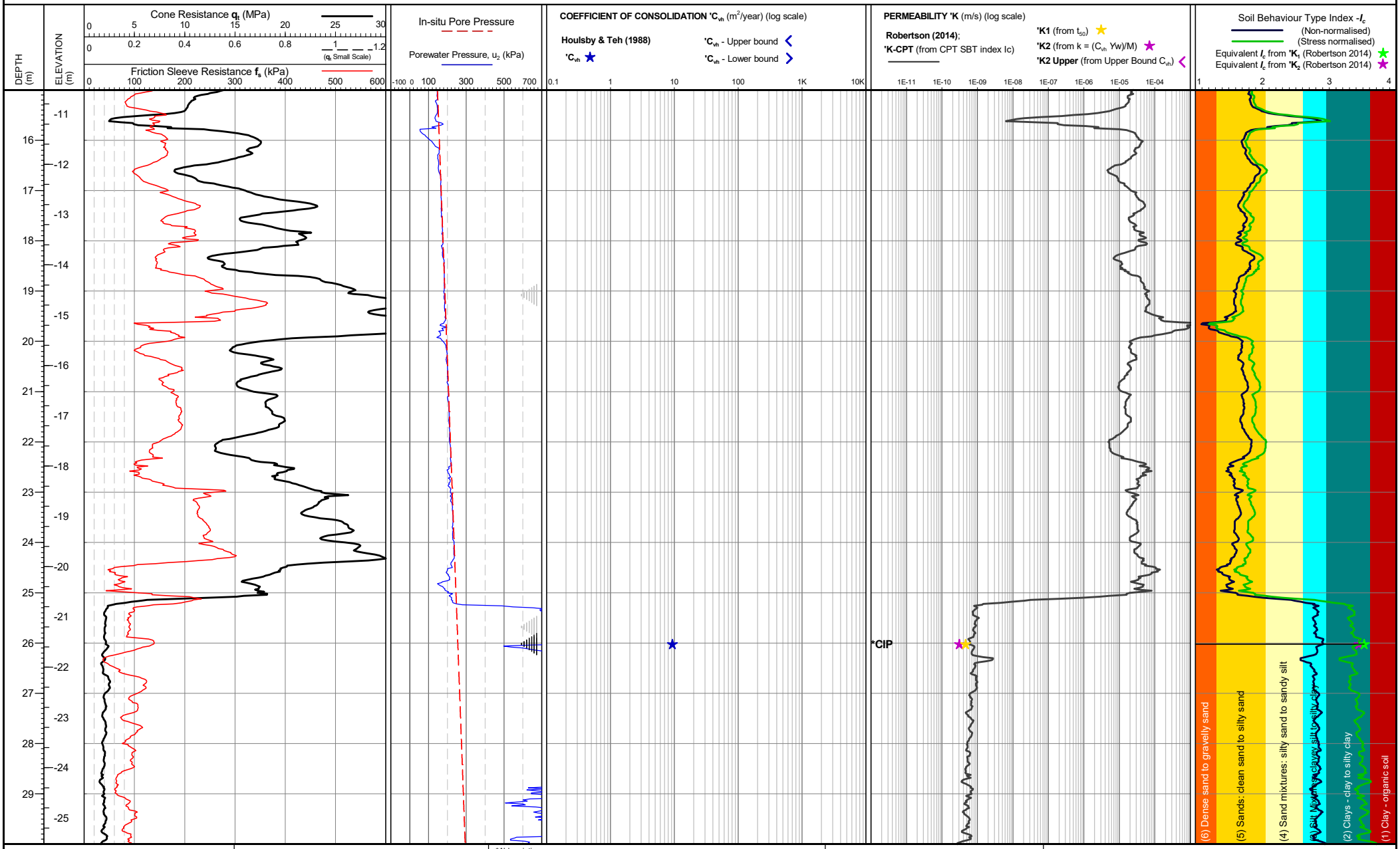
Lankelma Project Ref: 27124-1

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA



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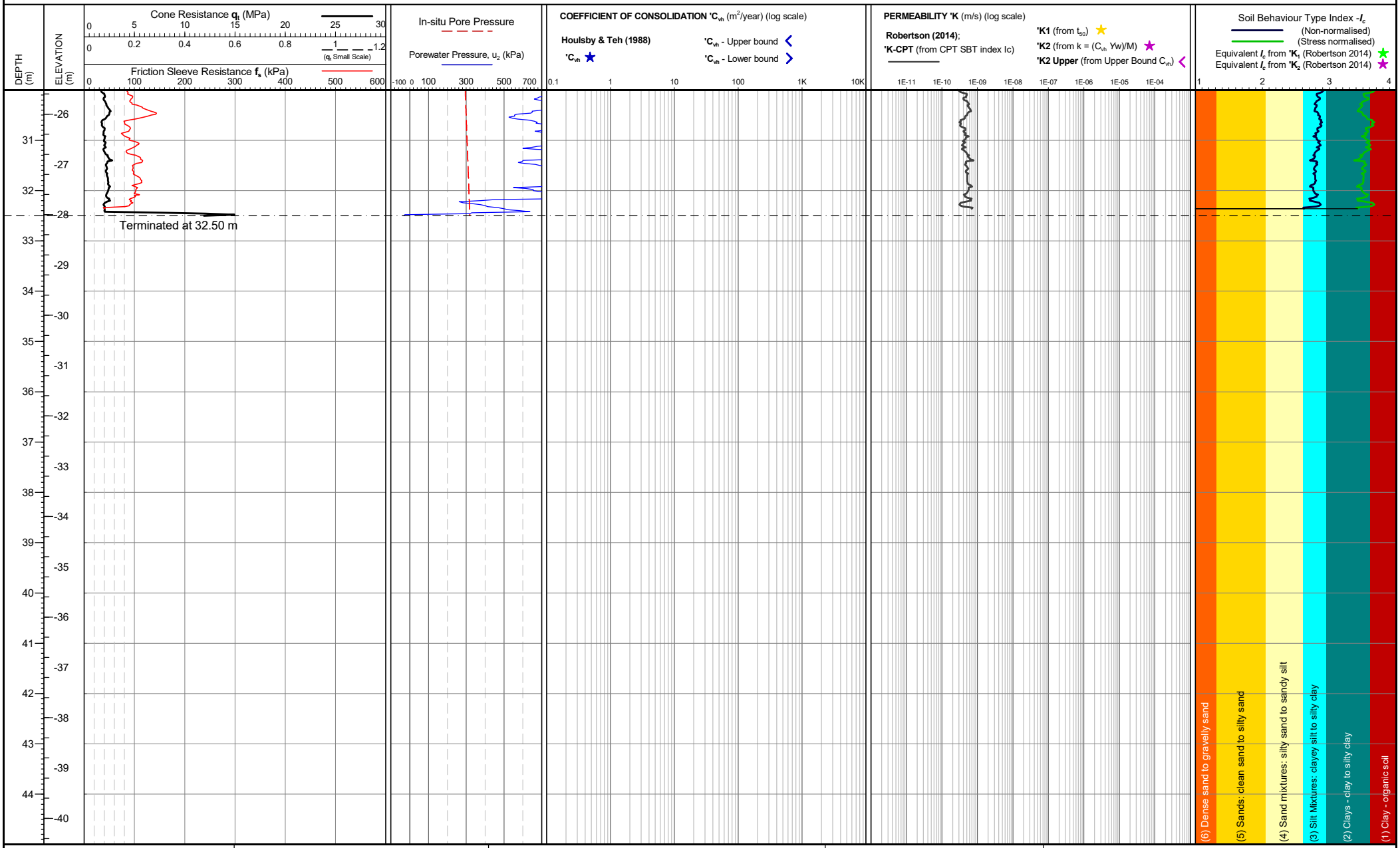
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT224

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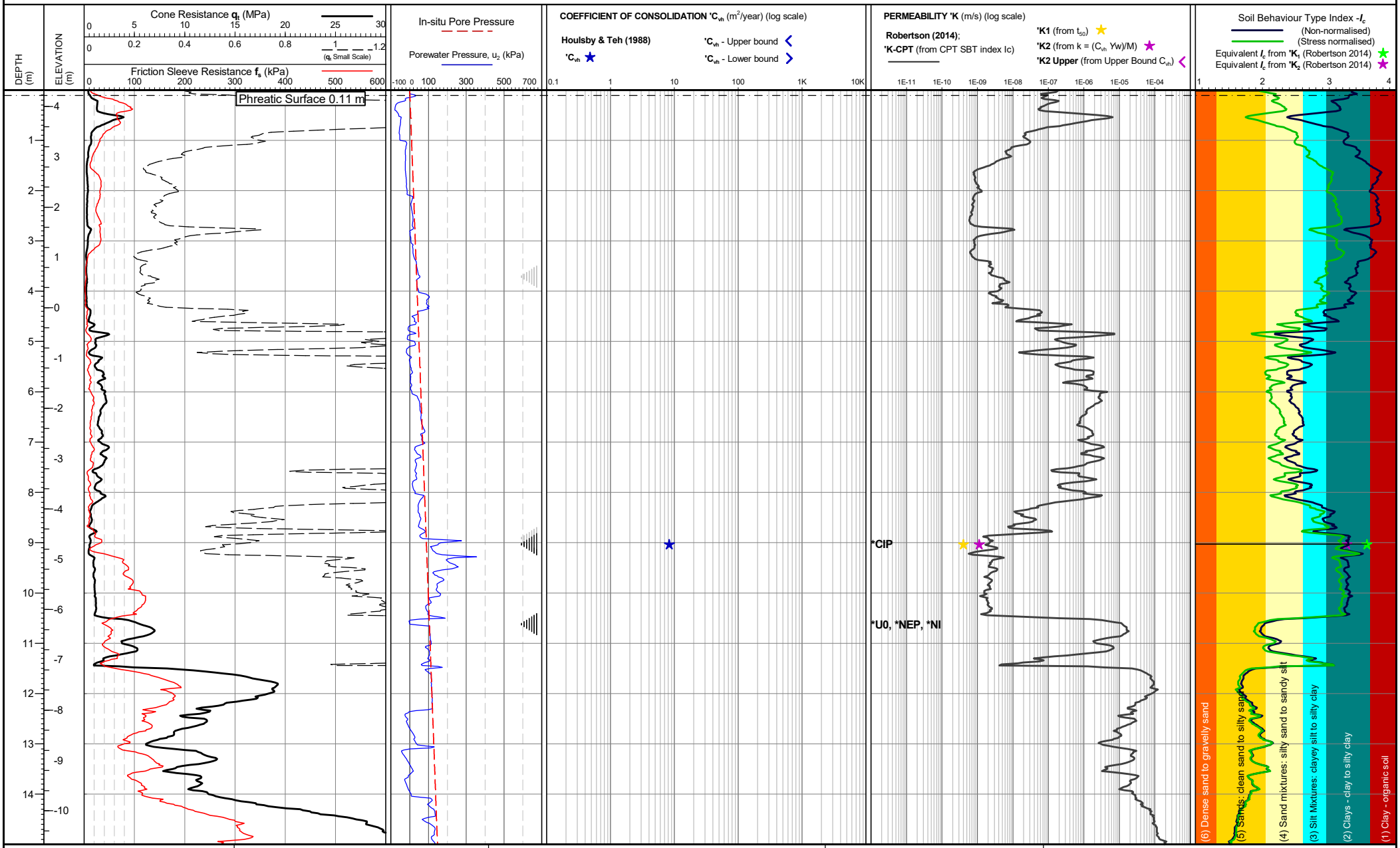
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Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 05/02/2024 09:38:43

Location: Cheshire, UK
Coordinates: 346954.178, 376648.331
Elevation: 4.329
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
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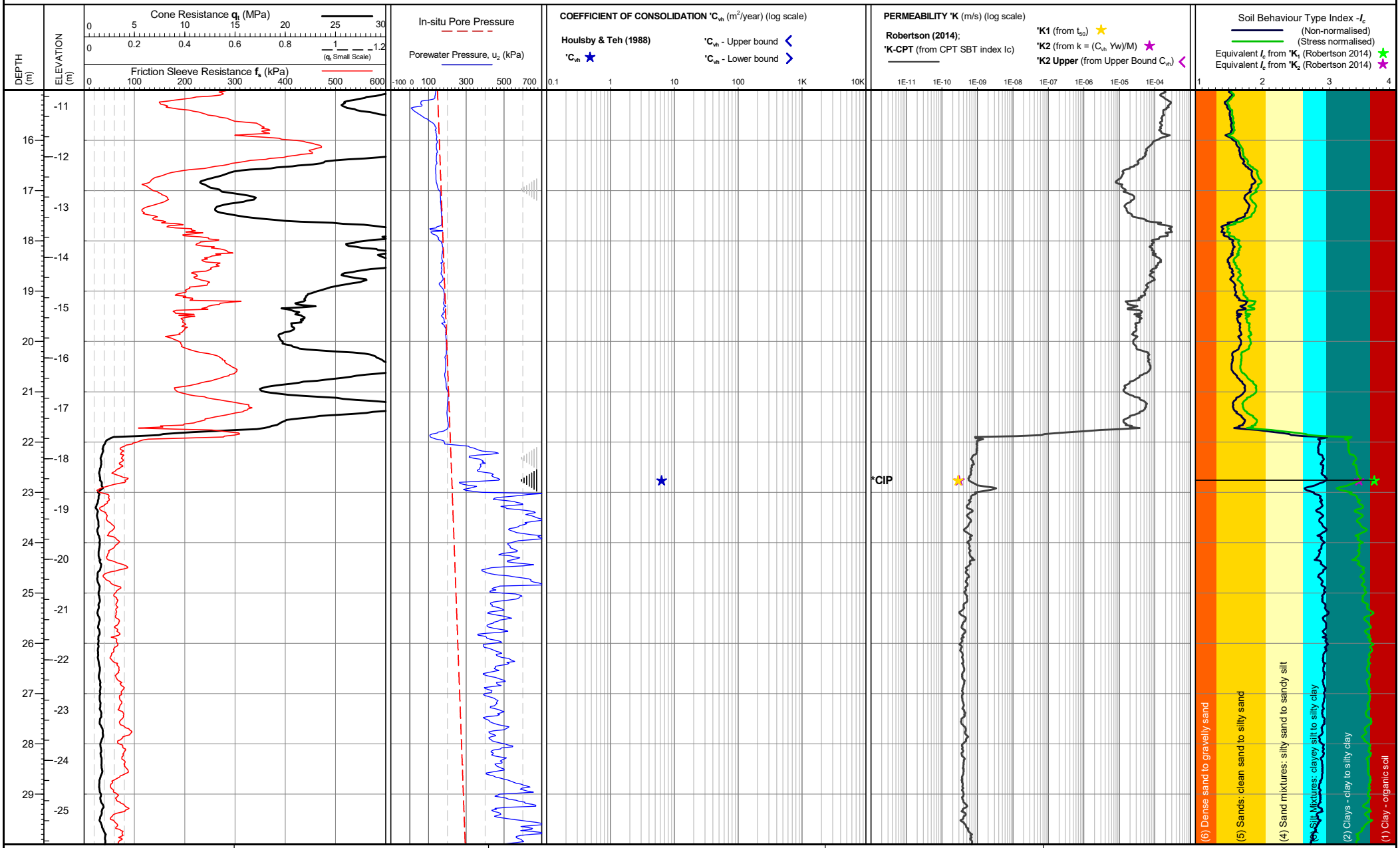
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
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Operator: Paul Appleton
Date of test: 05/02/2024 09:38:43

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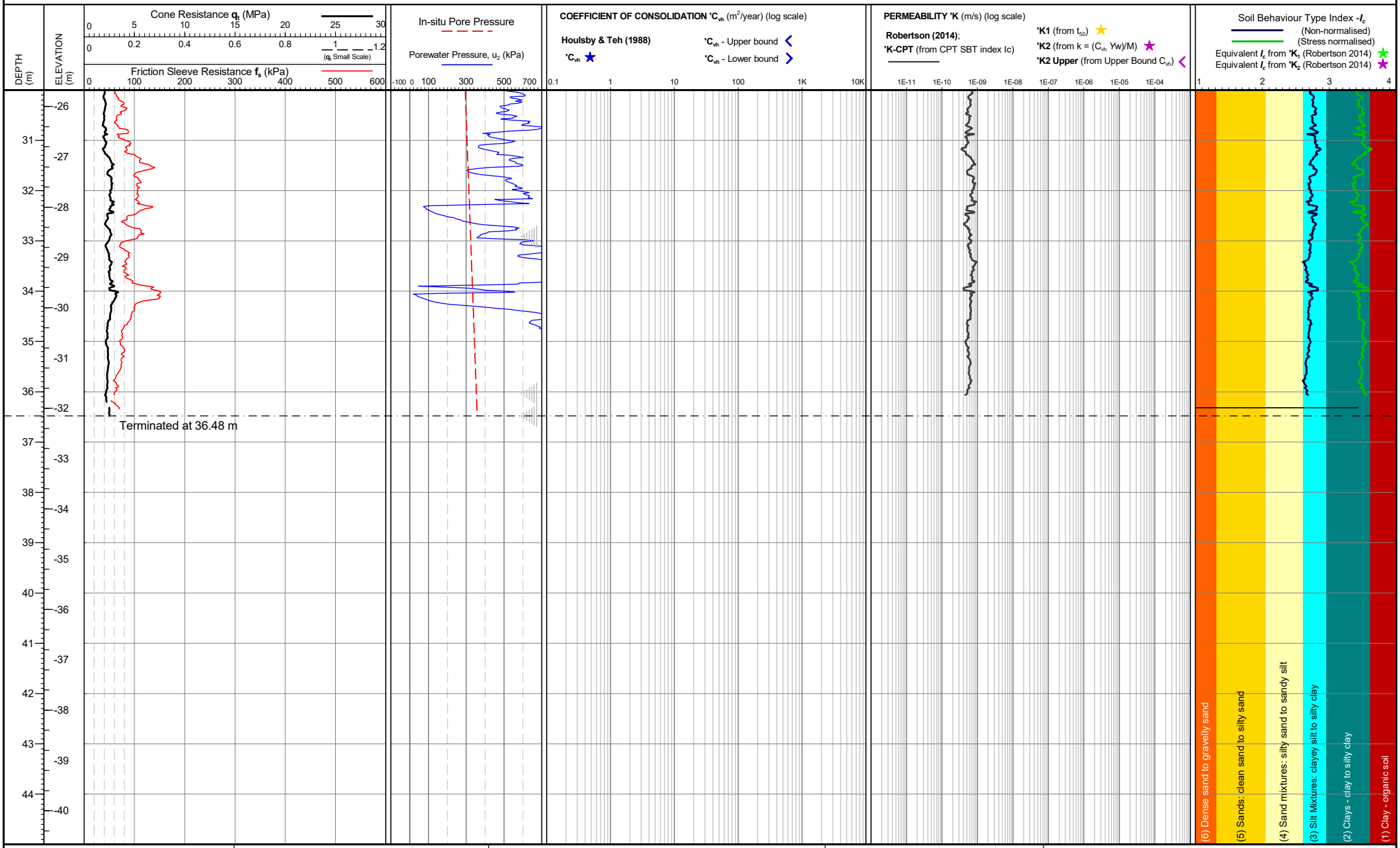
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
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ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

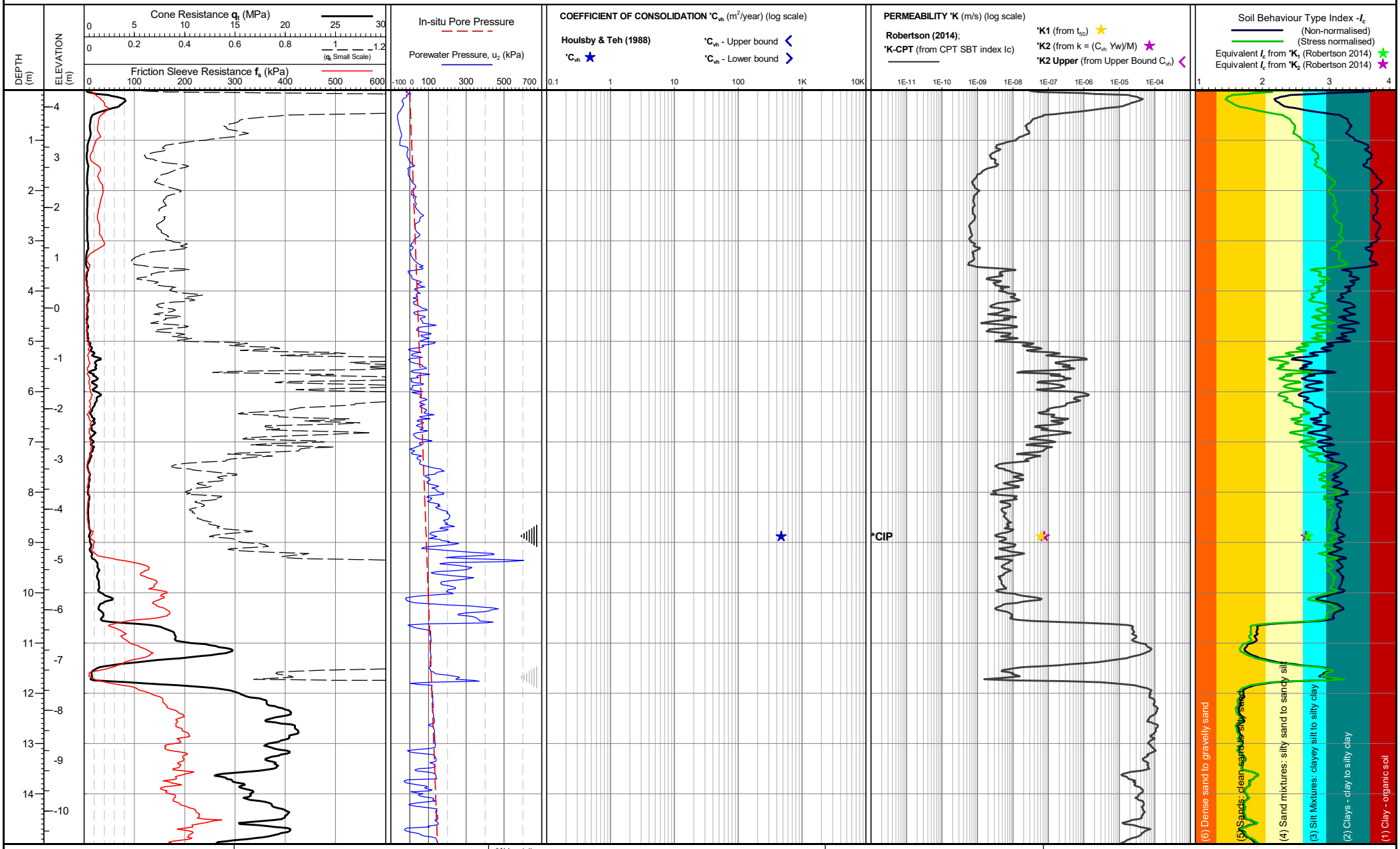
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

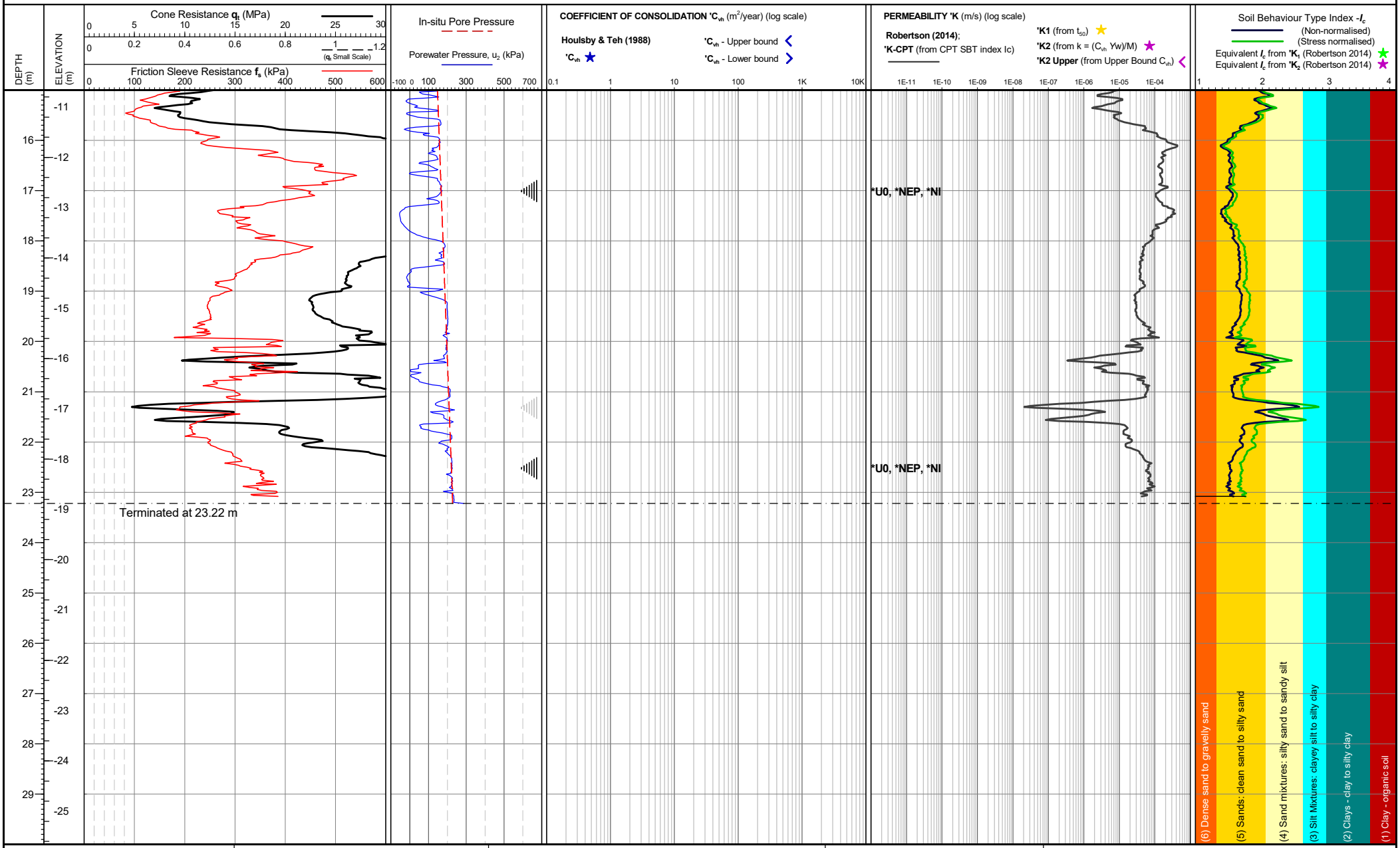
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 08/02/2024 09:51:02

Location: Cheshire, UK
Coordinates: 346983.595, 376592.746
Elevation: 4.339
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

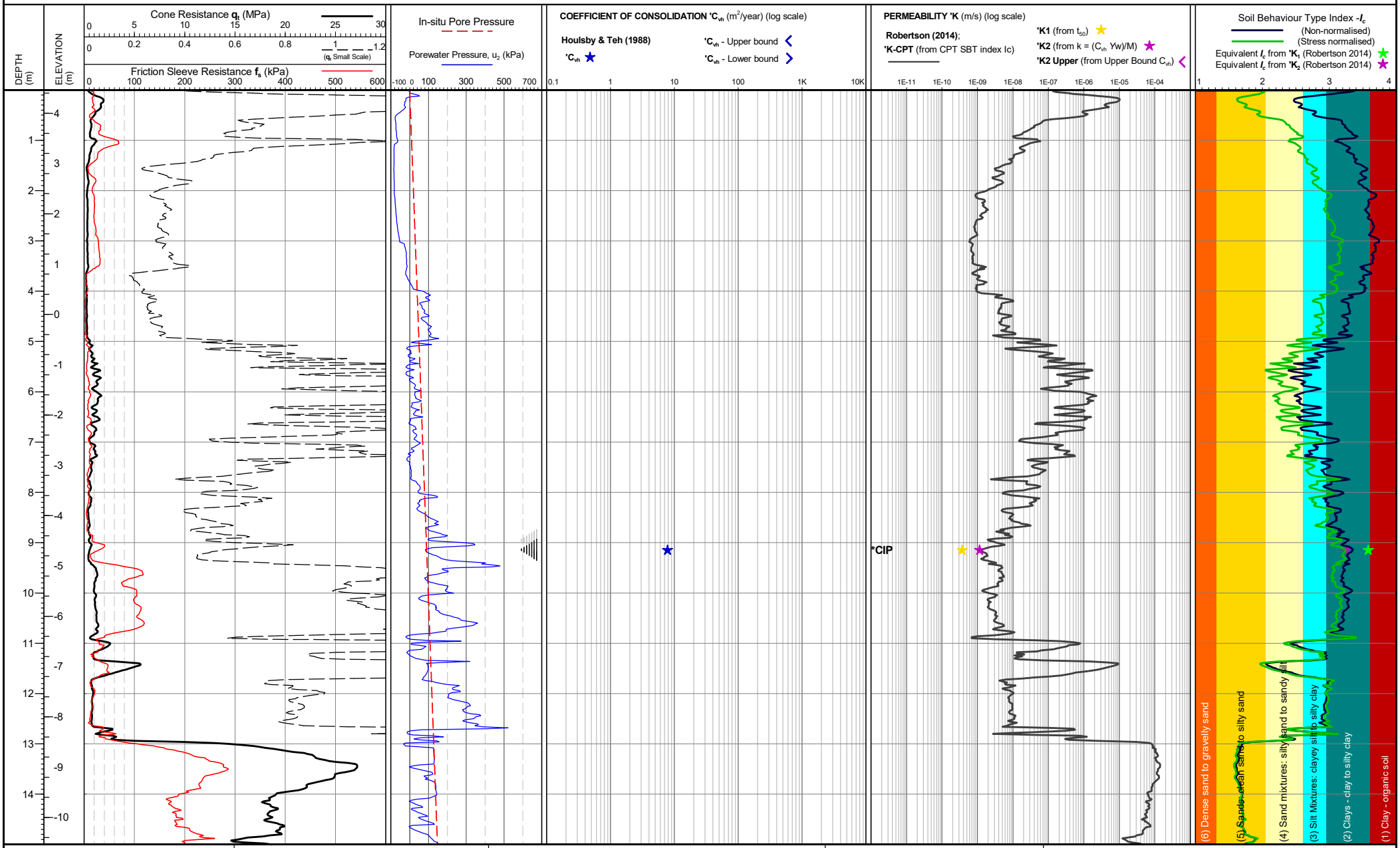
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

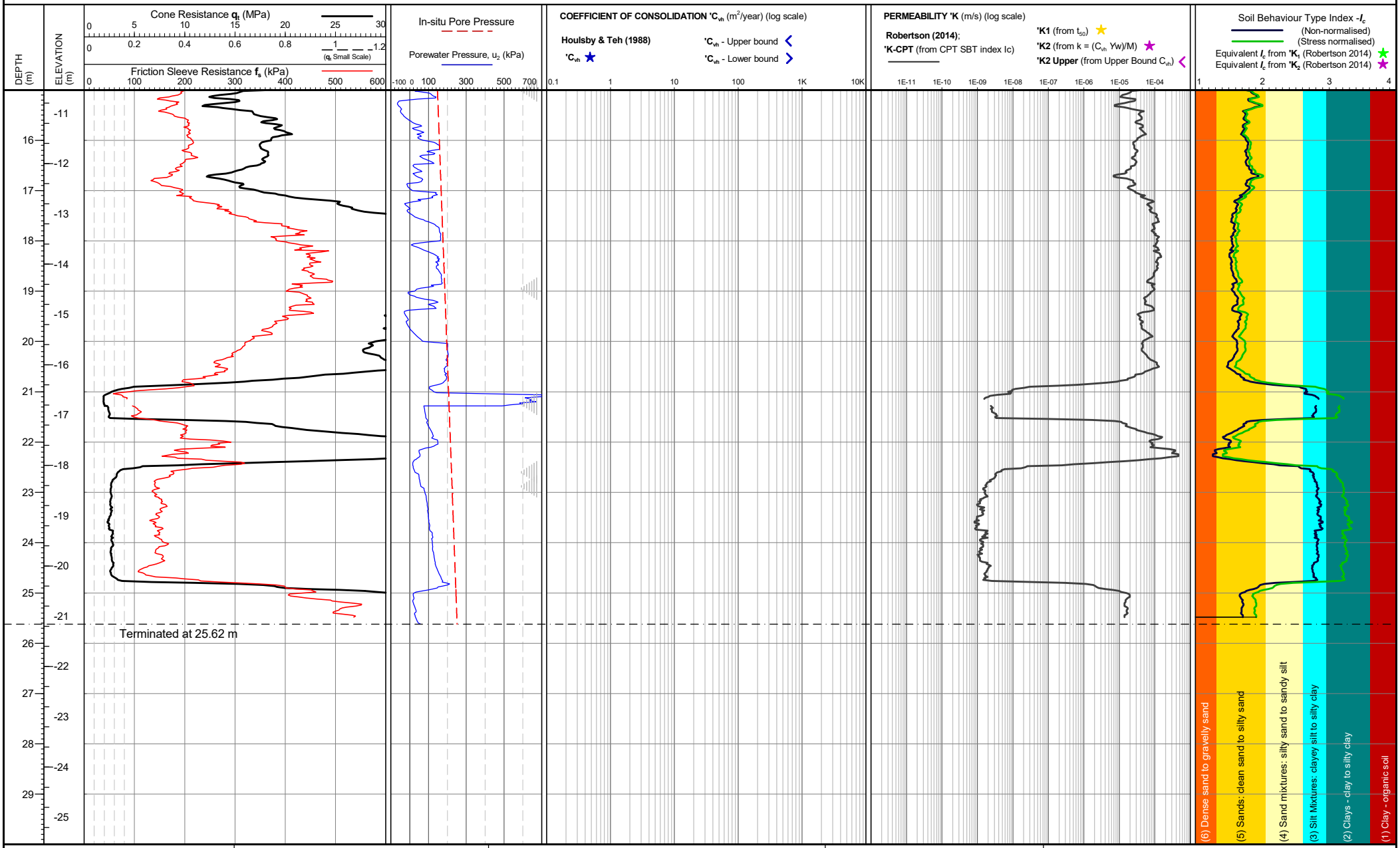
Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT227

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTT.1846
Operator: Paul Appleton
Date of test: 07/02/2024 08:02:24

Location: Cheshire, UK
Coordinates: 346933.921, 376582.049
Elevation: 4.462
Coordinate system:

*Abbreviations:
NEP: No excess pore pressures generated
ID: Insufficient test duration
UR: Uncharacteristic response
DR: Drained or partially drained response
A: Estimated/measured in-situ pore pressure corresponds to artesian conditions.
PUS: Potentially unsaturated soil.
MD: Monotonic decay.
IEP: Insufficient excess pressure generated.
LBI: Lower bound interpretation.
DT: Disrupted test.
NI: No interpretation.

Date of plot: 26-02-24
Checked by: Nick Mason
Lankelma Project Ref: 27124-1

TEST ID: CPT227

APPENDIX H DISSIPATION TEST CURVES & GRAPHICAL ANALYSIS

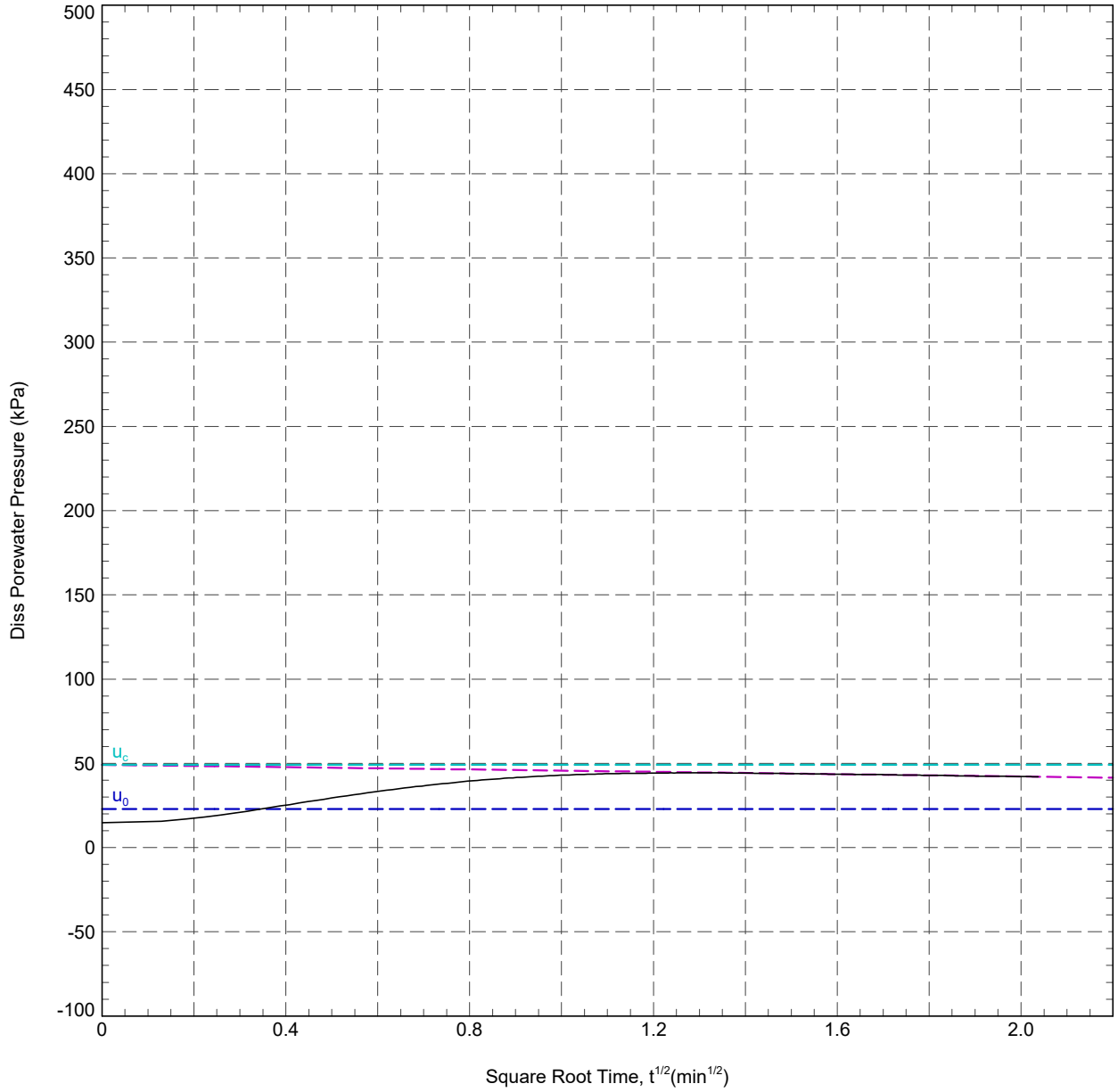
DISSIPATION TEST

LANKELMA

Test ID

CPT222 - 2.51 m

CLIENT : AYESA	EASTING : 346905.7 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376655.3 m	DATE : 06/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.31 m	



In Situ Pore Pressure, u_0: 22.96

Corrected Initial Pore Pressure, u_c
(back extrapolated from linear decay): 49.10

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP, *ID
OPERATOR : Paul Appleton	

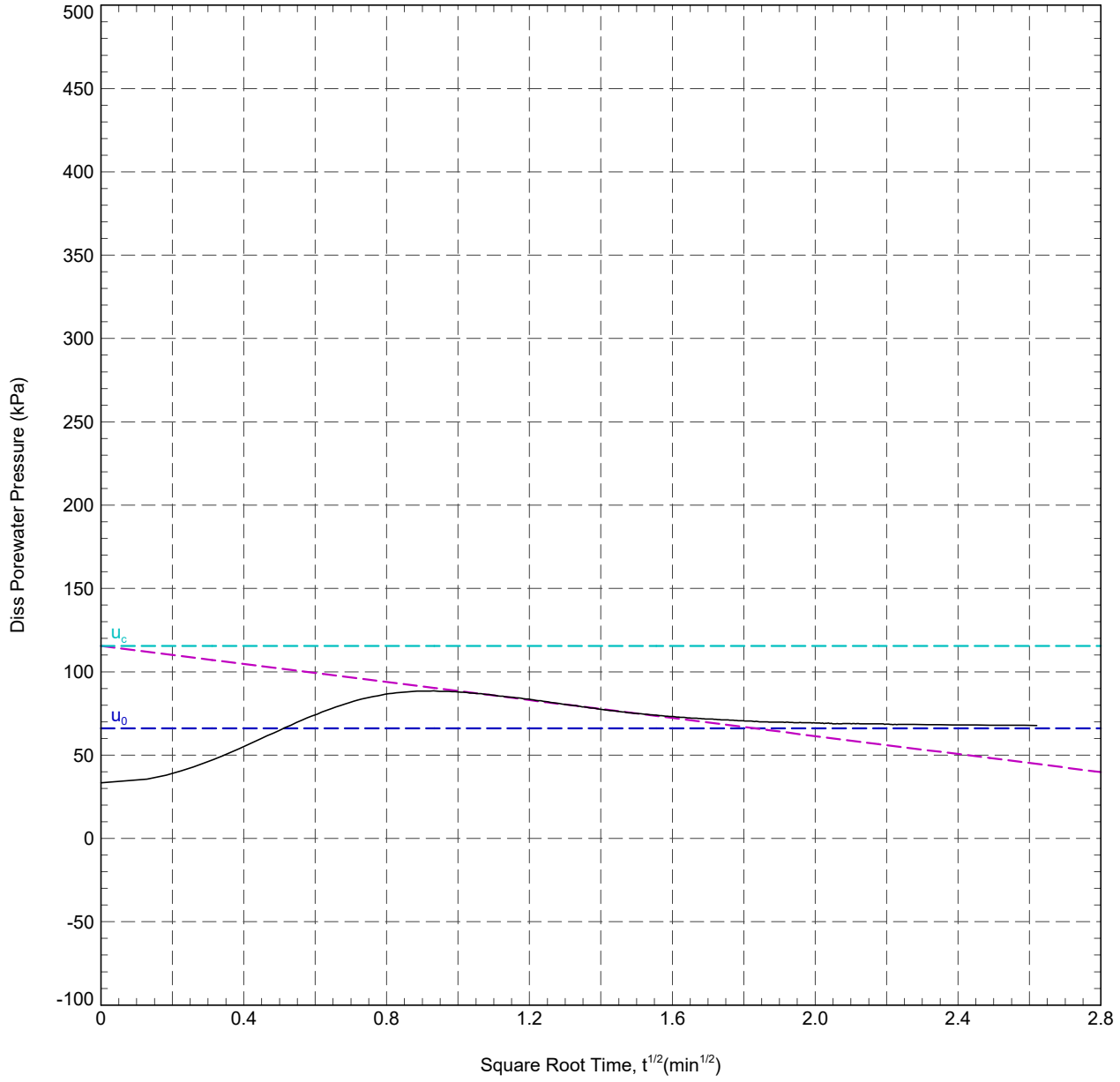
DISSIPATION TEST

LANKELMA

Test ID

CPT222 - 6.82 m

CLIENT : AYESA	EASTING : 346905.7 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376655.3 m	DATE : 06/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.31 m	



In Situ Pore Pressure, u_0:	66.00
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	115.50
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	1.10 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*ICIP, *U0
OPERATOR : Paul Appleton	

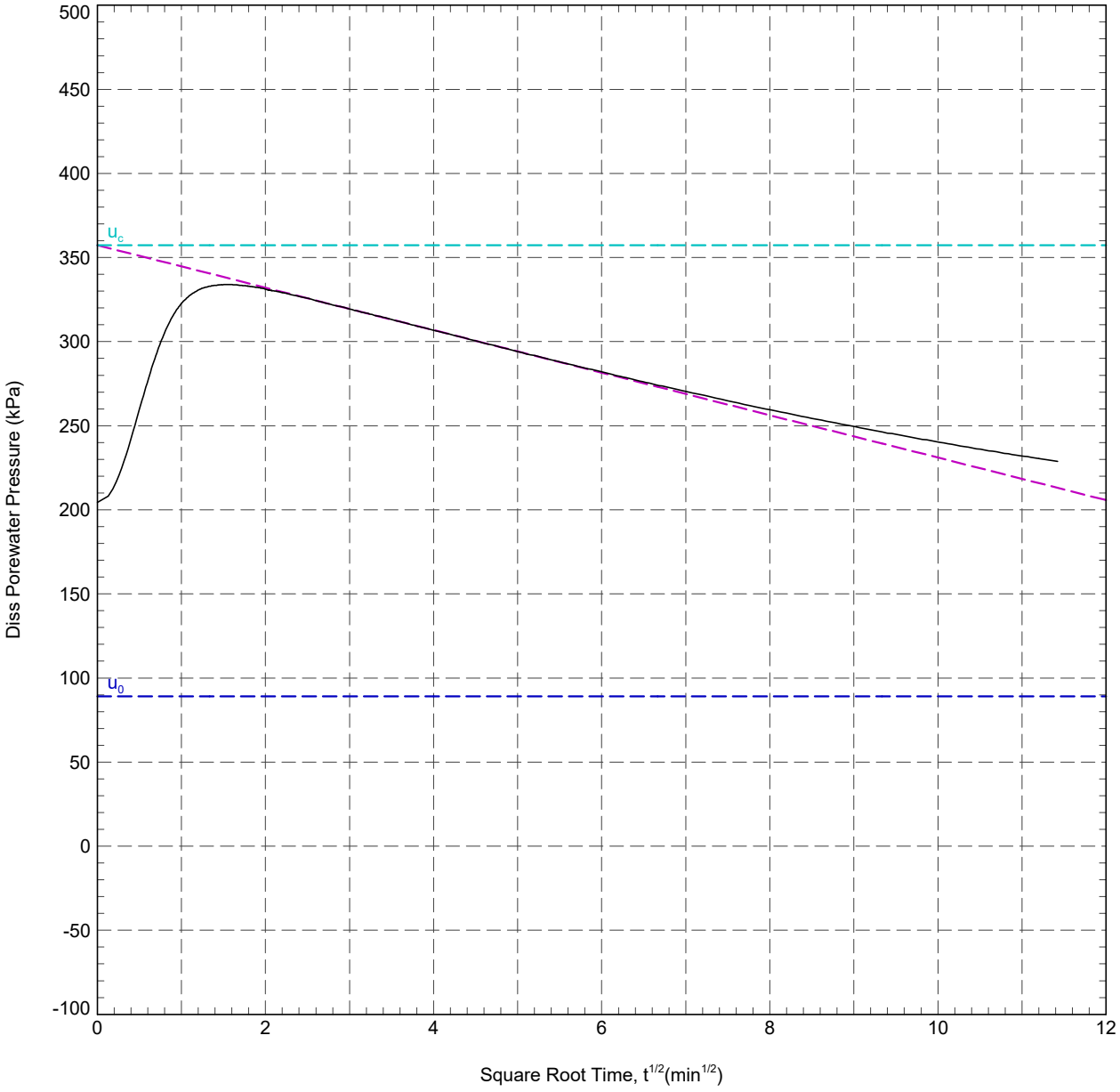
DISSIPATION TEST

LANKELMA

Test ID

CPT222 - 9.25 m

CLIENT : AYESA	EASTING : 346905.7 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376655.3 m	DATE : 06/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.31 m	



In Situ Pore Pressure, u_0:	89.07
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	357.30
Interpreted Degree Dissipation:	47.9 %
Time for 47.9% Dissipation, $t_{47.9}$:	130.49 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP
OPERATOR : Paul Appleton	

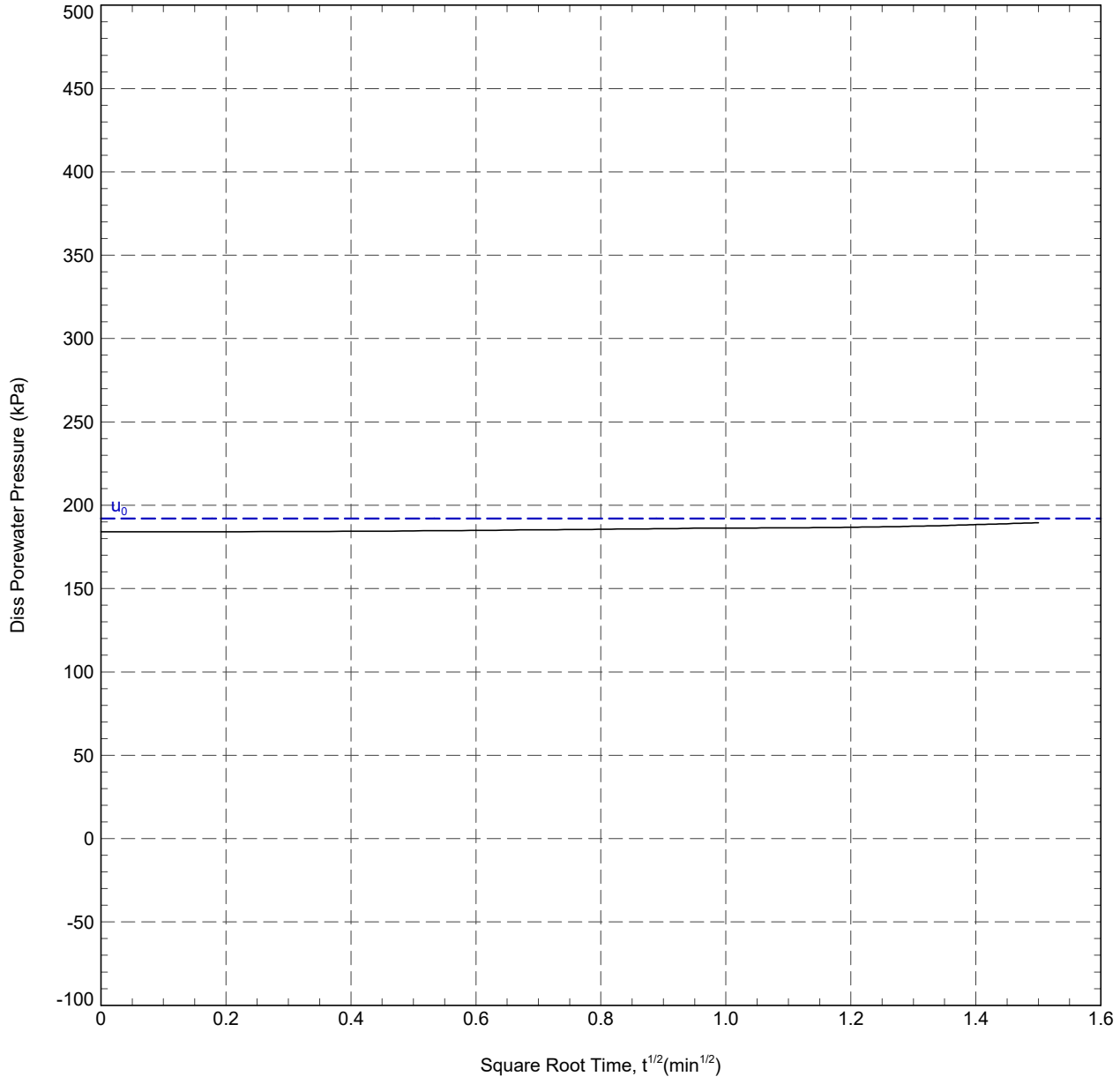
DISSIPATION TEST

LANKELMA

Test ID

CPT222 - 19.78 m

CLIENT : AYESA	EASTING : 346905.7 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376655.3 m	DATE : 06/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.31 m	



In Situ Pore Pressure, u_0: 192.00

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*U0, *NEP, *NI
OPERATOR : Paul Appleton	

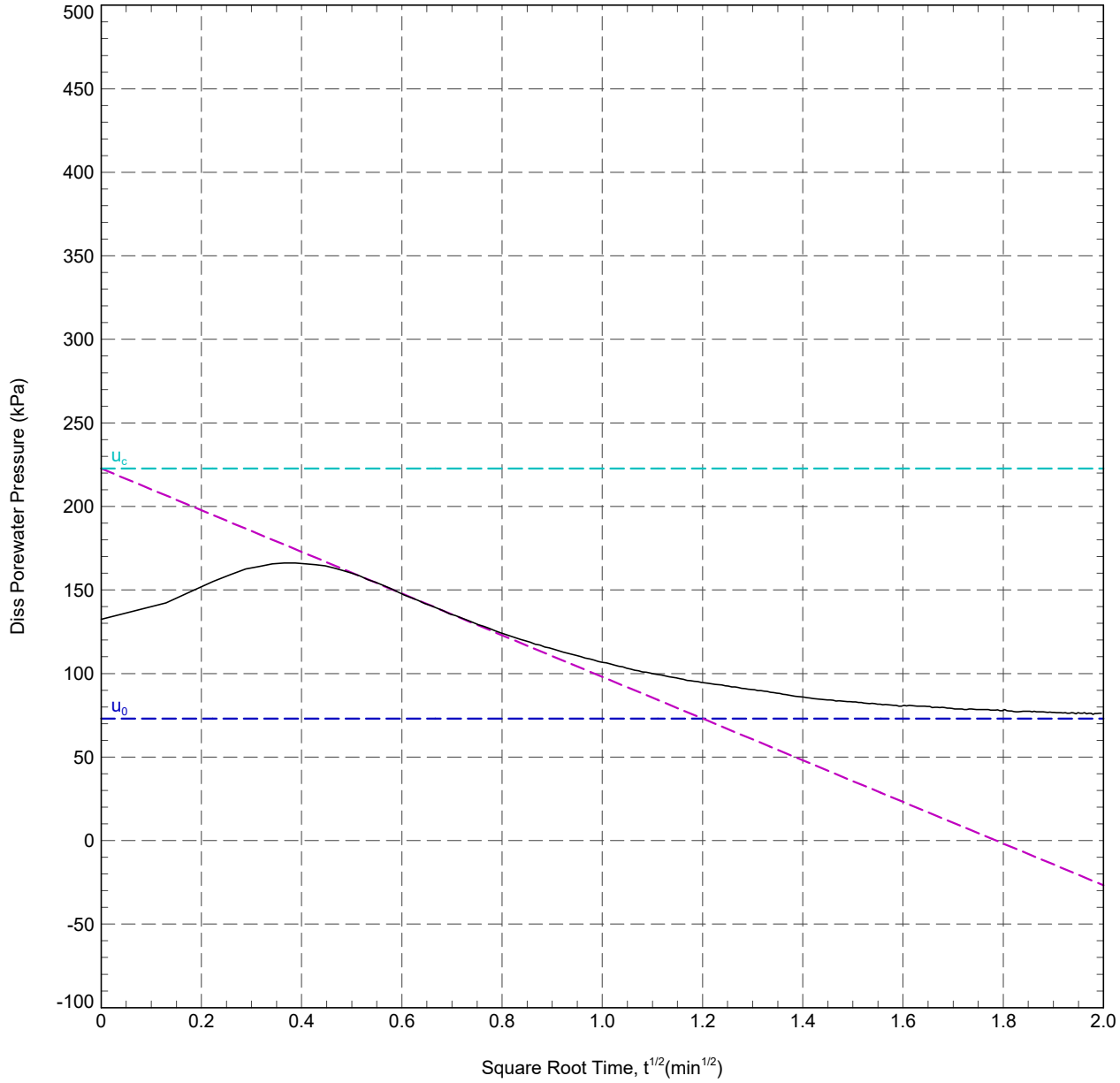
DISSIPATION TEST

LANKELMA

Test ID

CPT223 - 8.05 m

CLIENT : AYESA	EASTING : 346995.3 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376696.4 m	DATE : 12/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.32 m	



In Situ Pore Pressure, u_0:	73.00
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	222.70
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	0.35 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*ICIP, *PC, *LBI, *U0
OPERATOR : Paul Appleton	

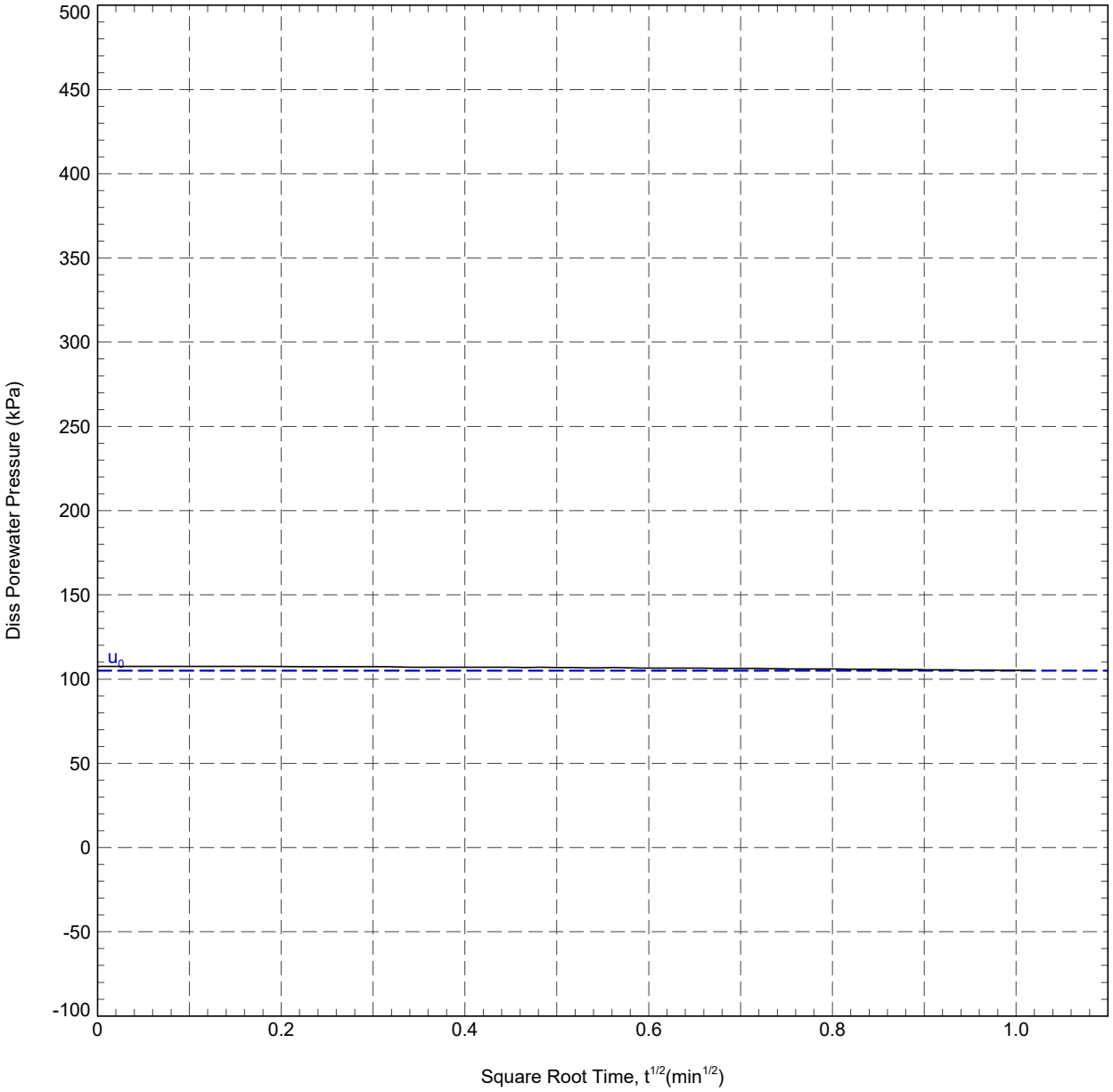
DISSIPATION TEST

LANKELMA

Test ID

CPT223 - 11.60 m

CLIENT : AYESA	EASTING : 346995.3 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376696.4 m	DATE : 12/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.32 m	



In Situ Pore Pressure, u_0: 105.00

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*U0, *IEP, *NI
OPERATOR : Paul Appleton	

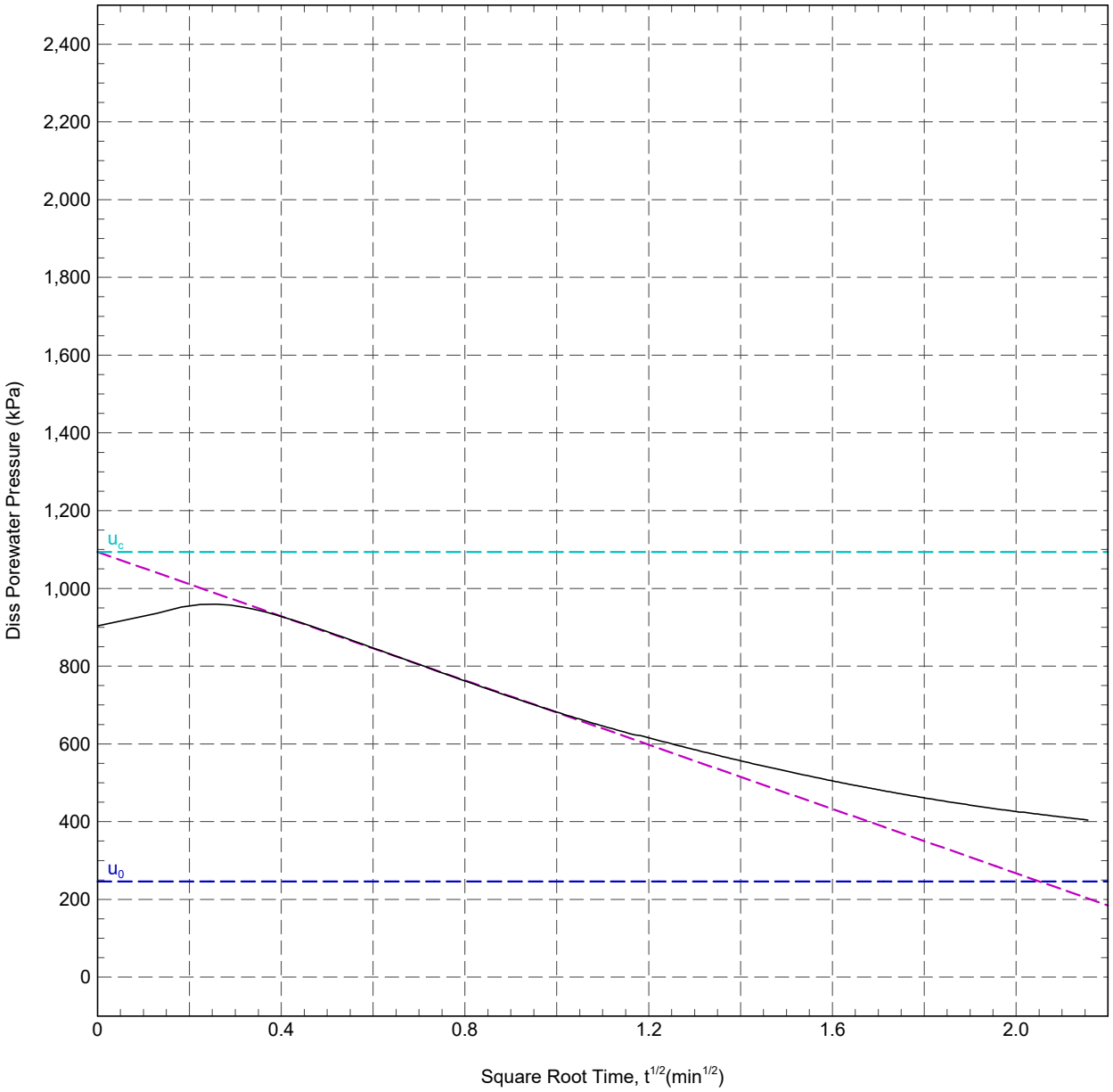
DISSIPATION TEST

LANKELMA

Test ID

CPT223 - 25.08 m

CLIENT : AYESA	EASTING : 346995.3 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376696.4 m	DATE : 12/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.32 m	



In Situ Pore Pressure, u_0:	246.03
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	1093.60
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	1.07 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*CIP
OPERATOR : Paul Appleton	

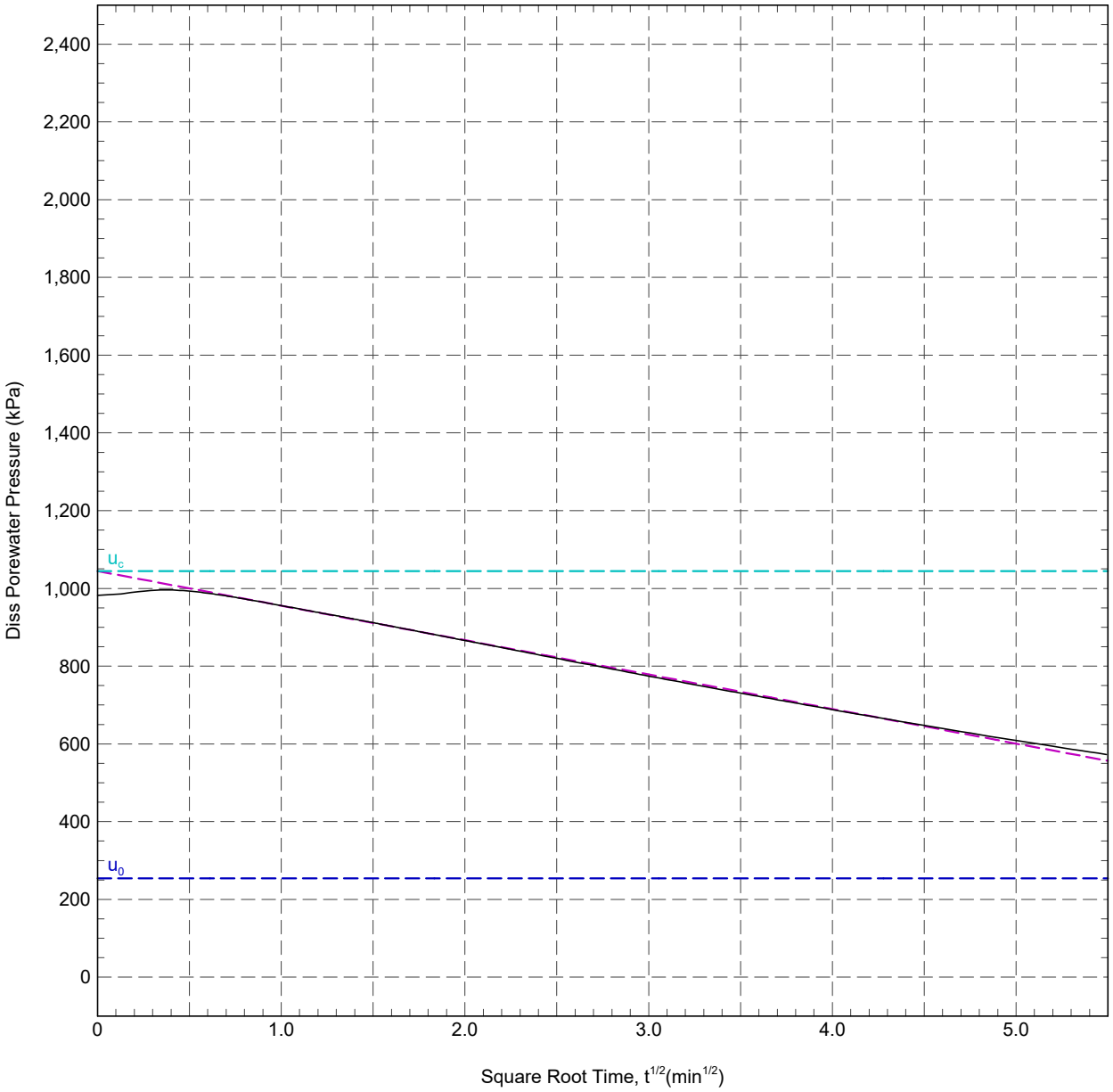
DISSIPATION TEST

LANKELMA

Test ID

CPT223 - 25.88 m

CLIENT : AYESA	EASTING : 346995.3 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376696.4 m	DATE : 12/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.32 m	



In Situ Pore Pressure, u_0:	253.88
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	1044.20
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	19.60 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*CIP
OPERATOR : Paul Appleton	

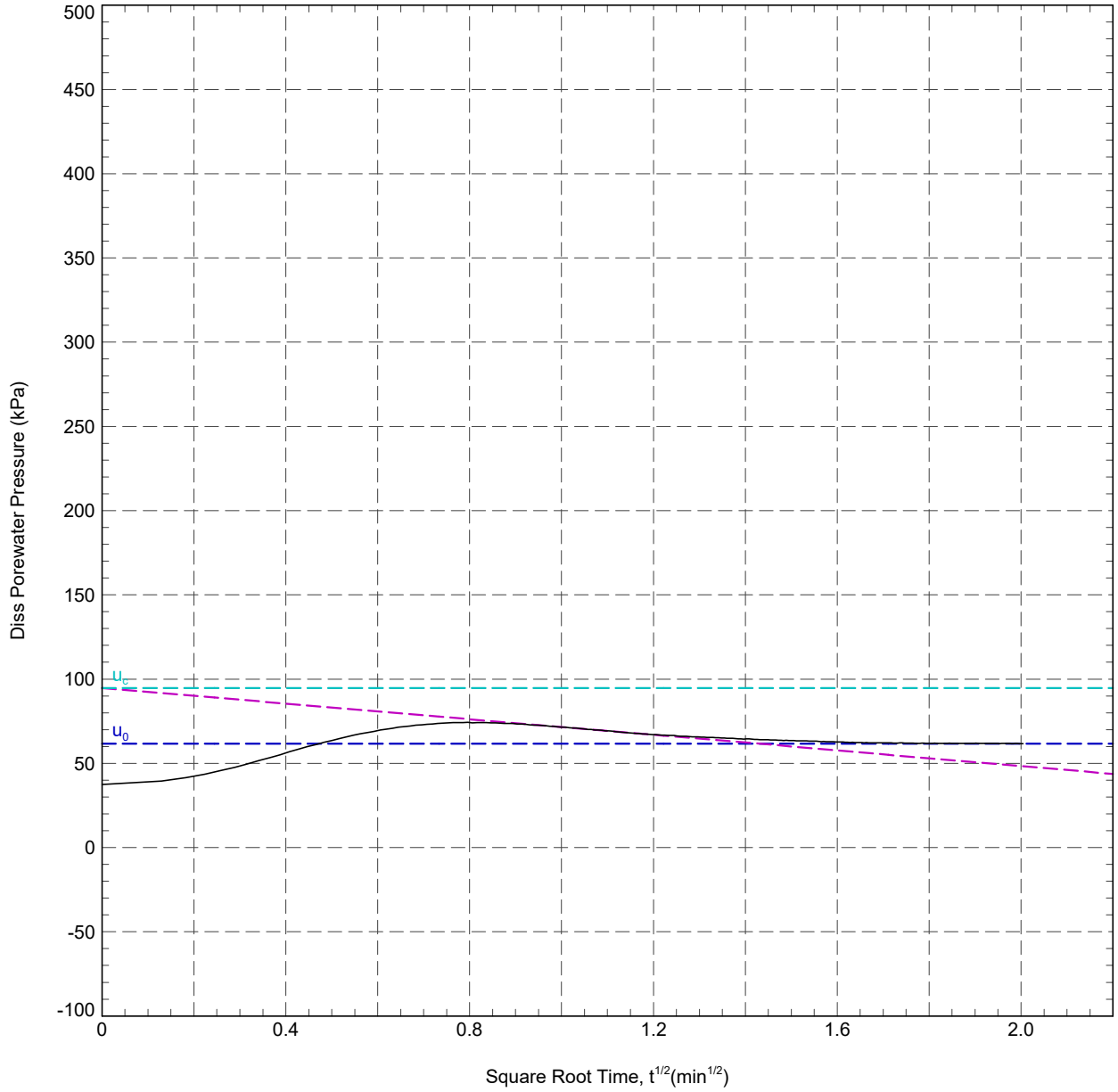
DISSIPATION TEST

LANKELMA

Test ID

CPT224 - 6.99 m

CLIENT : AYESA	EASTING : 347007.5 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376632.1 m	DATE : 09/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.48 m	



In Situ Pore Pressure, u_0:	61.70
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	94.70
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	0.65 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*ICIP, *PC, *LBI, *U0
OPERATOR : Paul Appleton	

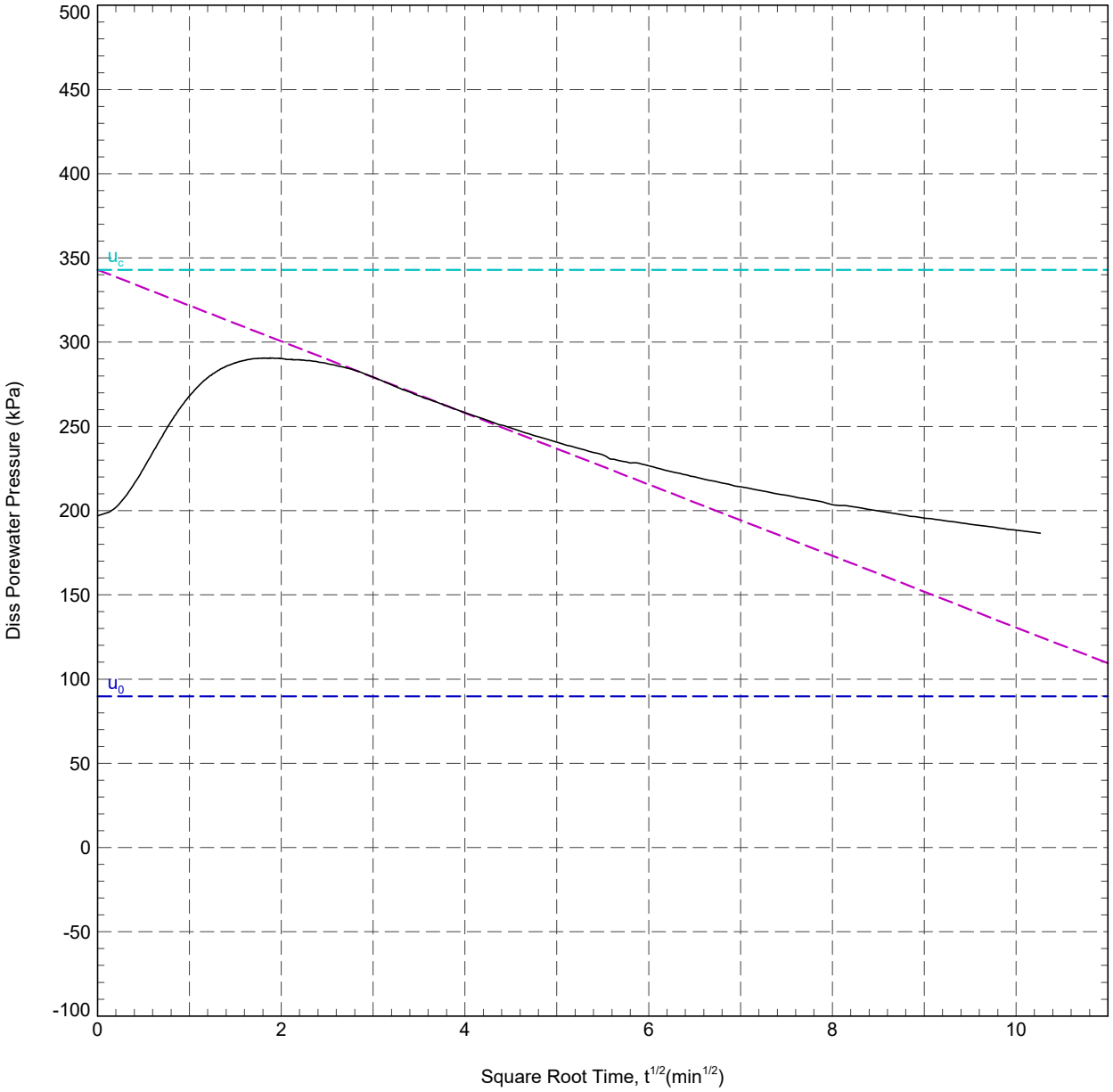
DISSIPATION TEST

LANKELMA

Test ID

CPT224 - 9.15 m

CLIENT : AYESA	EASTING : 347007.5 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376632.1 m	DATE : 09/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.48 m	



In Situ Pore Pressure, u_0:	89.76
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	342.90
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	46.18 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*CIP
OPERATOR : Paul Appleton	

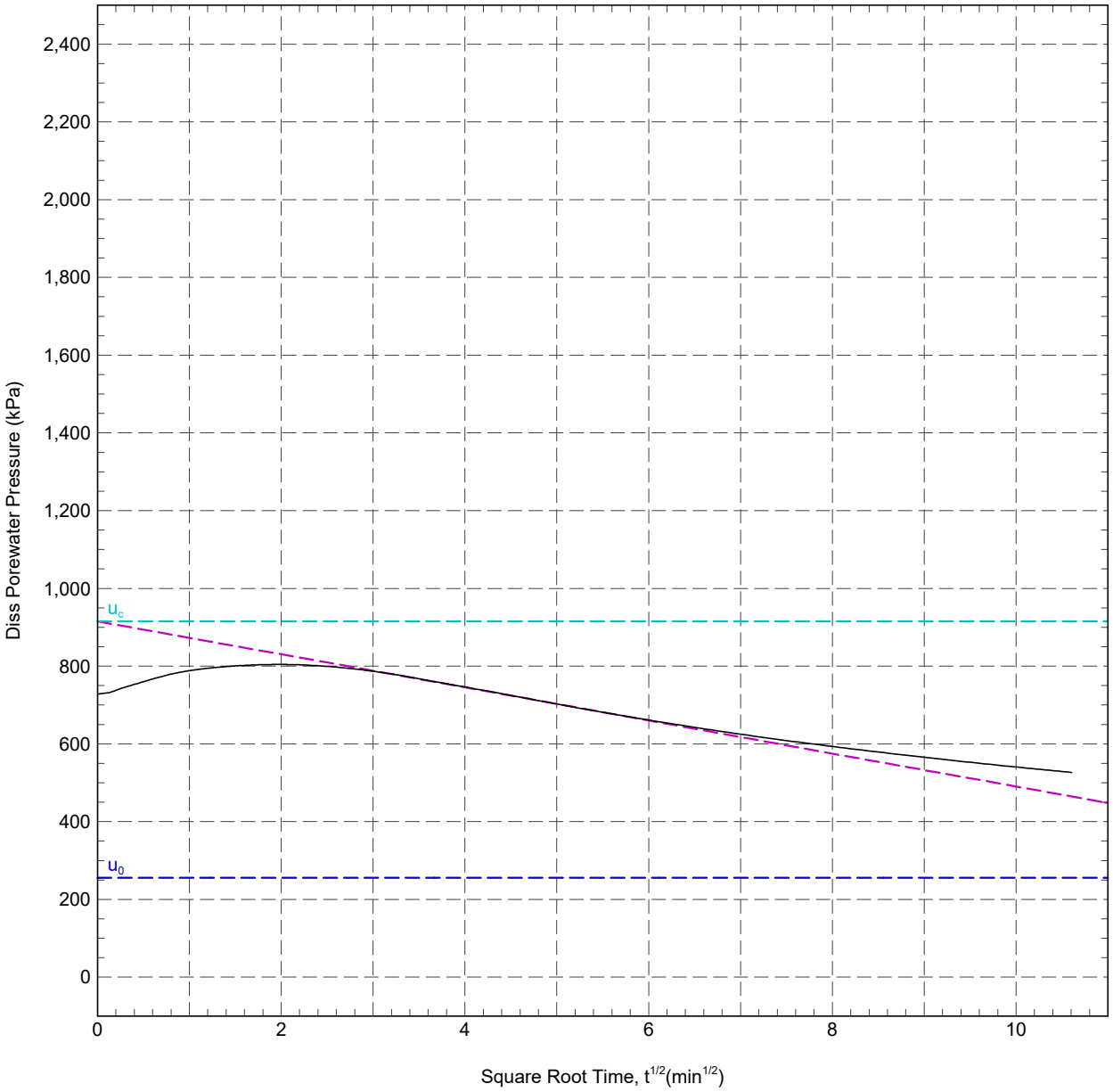
DISSIPATION TEST

LANKELMA

Test ID

CPT224 - 26.02 m

CLIENT : AYESA	EASTING : 347007.5 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376632.1 m	DATE : 09/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.48 m	



In Situ Pore Pressure, u_0:	255.26
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	915.50
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	68.23 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTTM250.2065	*CIP
OPERATOR : Paul Appleton	

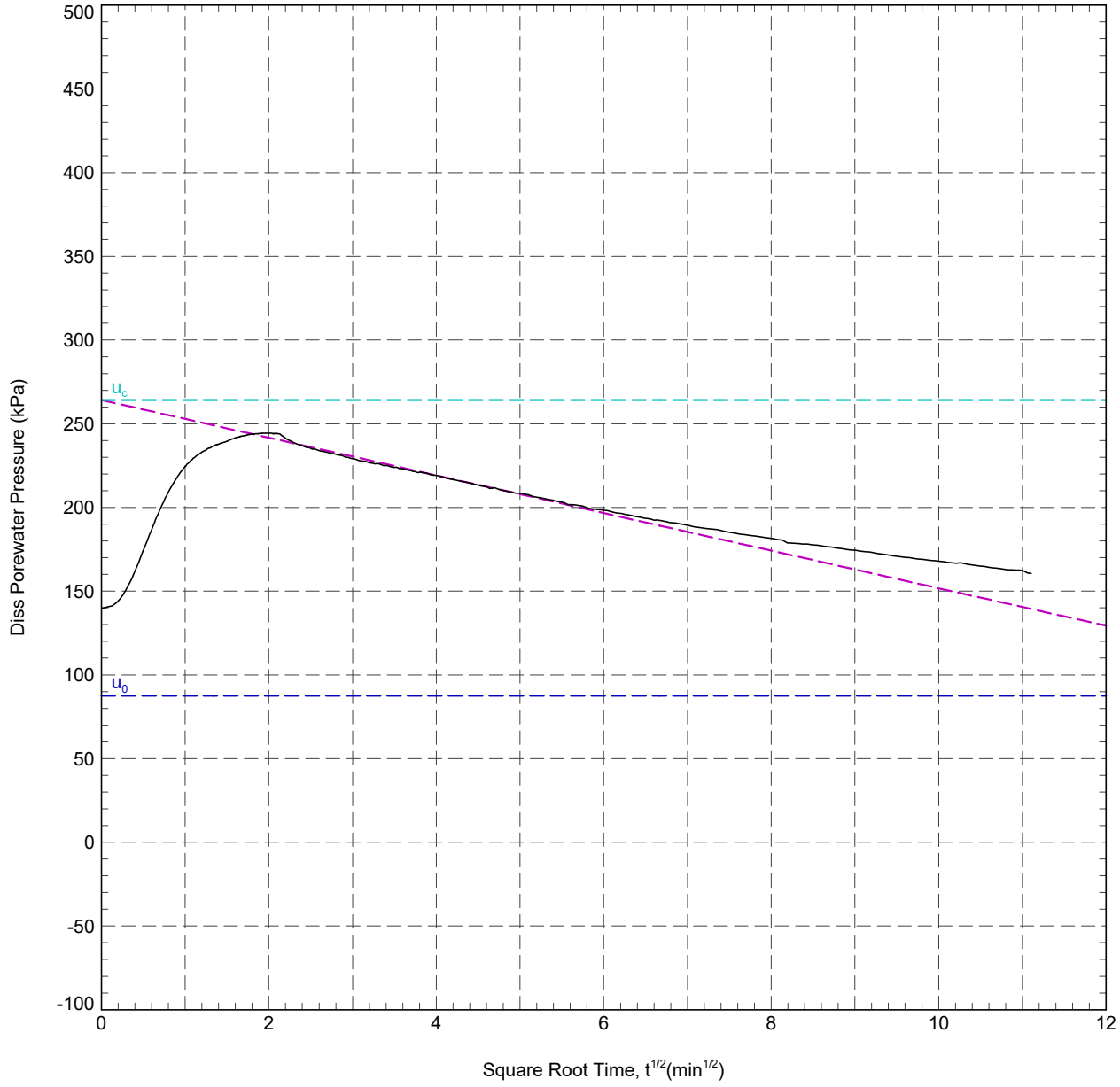
DISSIPATION TEST

LANKELMA

Test ID

CPT225 - 9.03 m

CLIENT : AYESA	EASTING : 346954.2 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376648.3 m	DATE : 05/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.33 m	



In Situ Pore Pressure, u_0:	87.51
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	264.10
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	76.15 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP
OPERATOR : Paul Appleton	

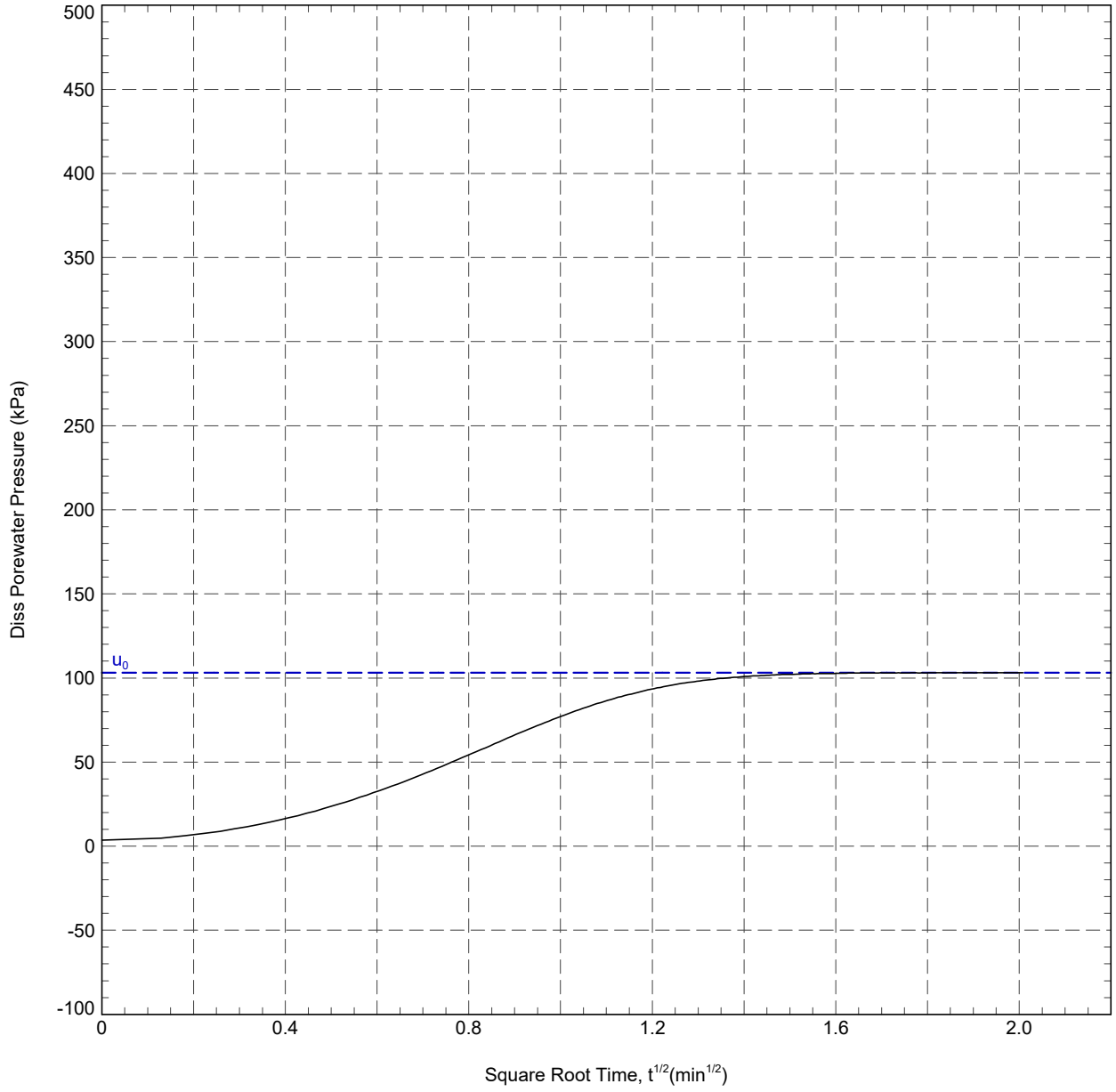
DISSIPATION TEST

LANKELMA

Test ID

CPT225 - 10.62 m

CLIENT : AYESA	EASTING : 346954.2 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376648.3 m	DATE : 05/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.33 m	



In Situ Pore Pressure, u_0: 103.10

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*U0, *NEP, *NI
OPERATOR : Paul Appleton	

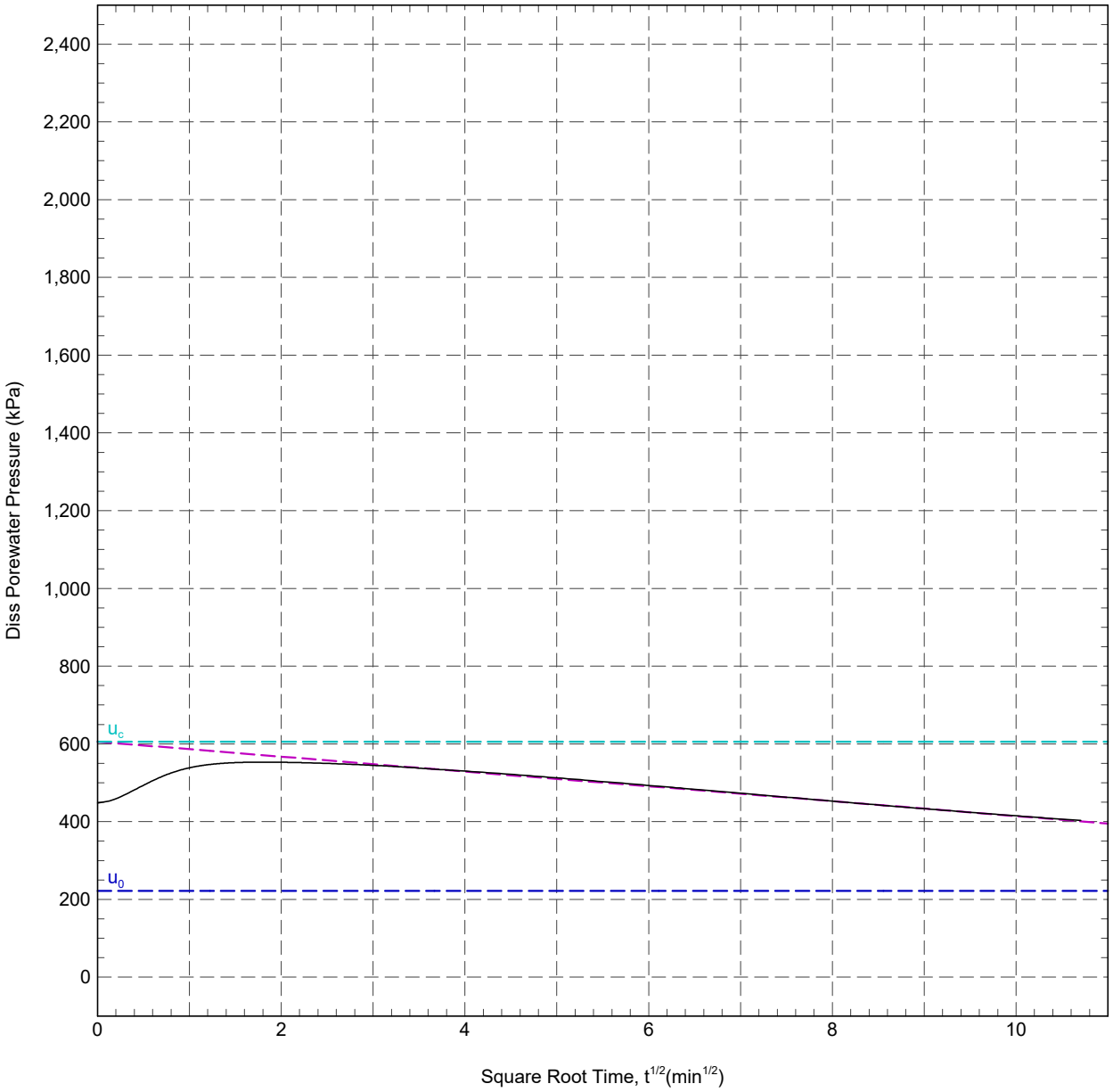
DISSIPATION TEST

LANKELMA

Test ID

CPT225 - 22.76 m

CLIENT : AYESA	EASTING : 346954.2 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376648.3 m	DATE : 05/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.33 m	



In Situ Pore Pressure, u_0:	222.20
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	605.60
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	100.53 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP
OPERATOR : Paul Appleton	

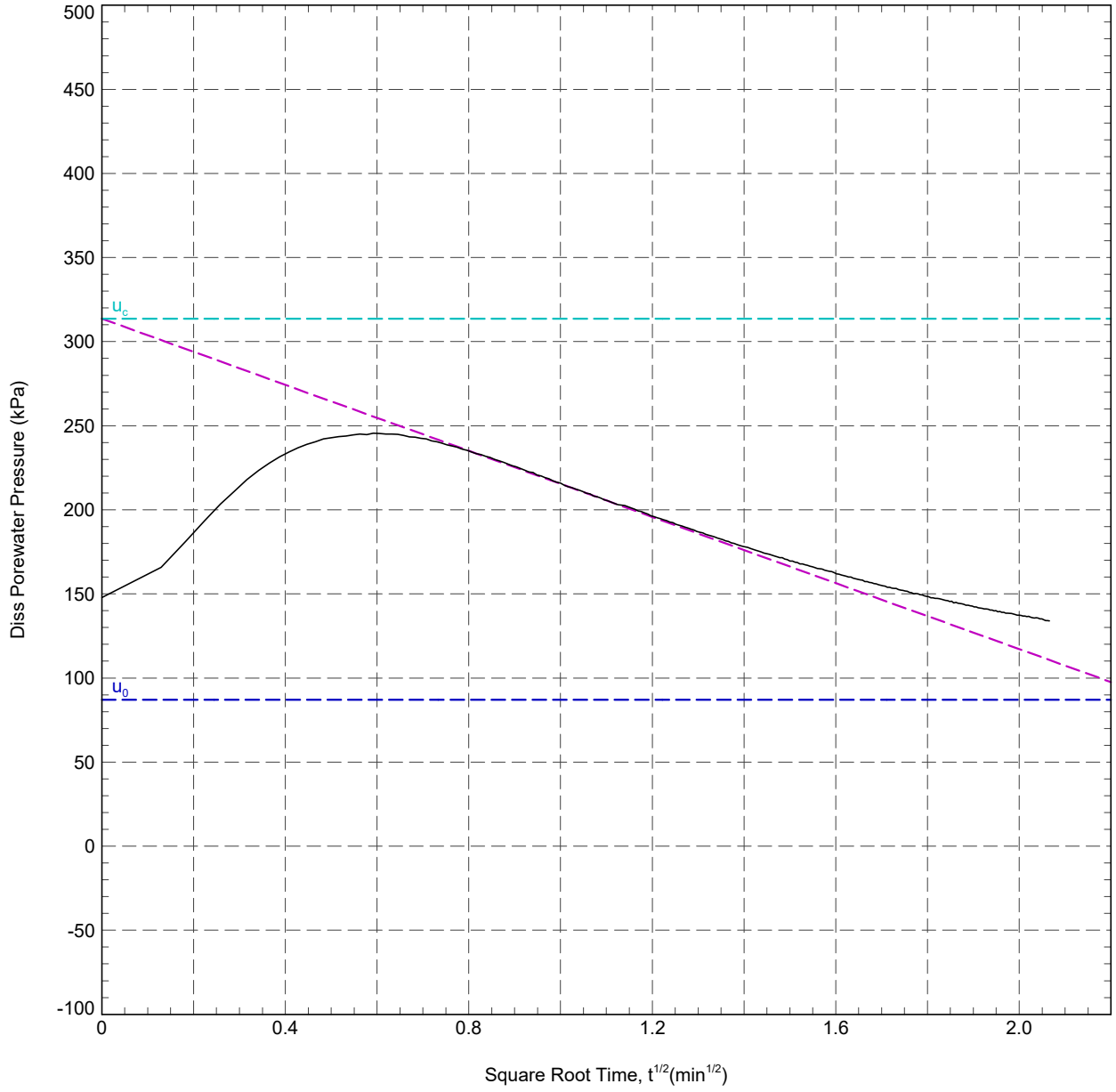
DISSIPATION TEST

LANKELMA

Test ID

CPT226 - 8.87 m

CLIENT : AYESA	EASTING : 346983.6 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376592.7 m	DATE : 08/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.34 m	



In Situ Pore Pressure, u_0:	87.01
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	313.60
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	1.35 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP
OPERATOR : Paul Appleton	

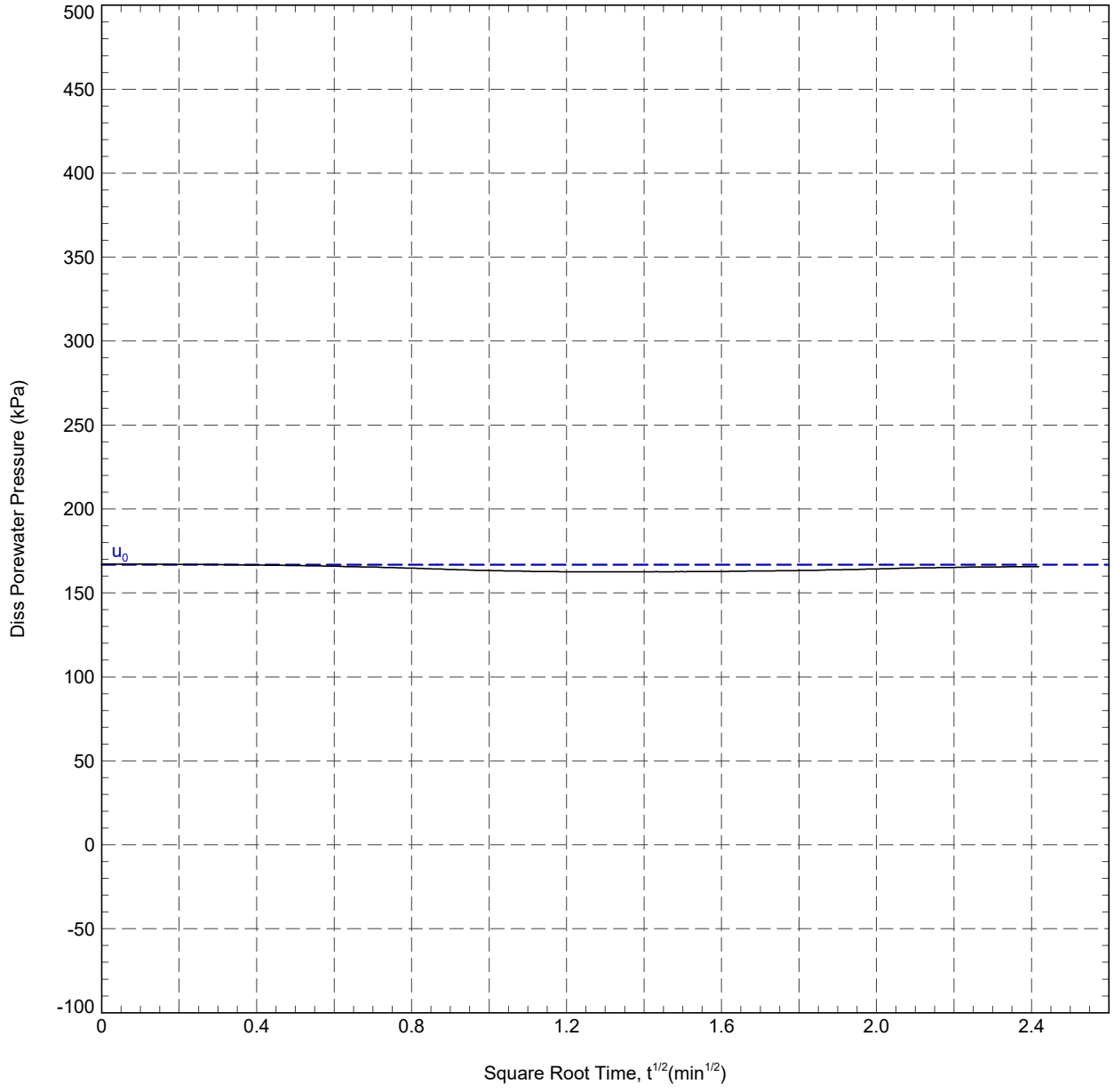
DISSIPATION TEST

LANKELMA

Test ID

CPT226 - 17.01 m

CLIENT : AYESA	EASTING : 346983.6 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376592.7 m	DATE : 08/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.34 m	



In Situ Pore Pressure, u_0: 166.87

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*U0, *NEP, *NI
OPERATOR : Paul Appleton	

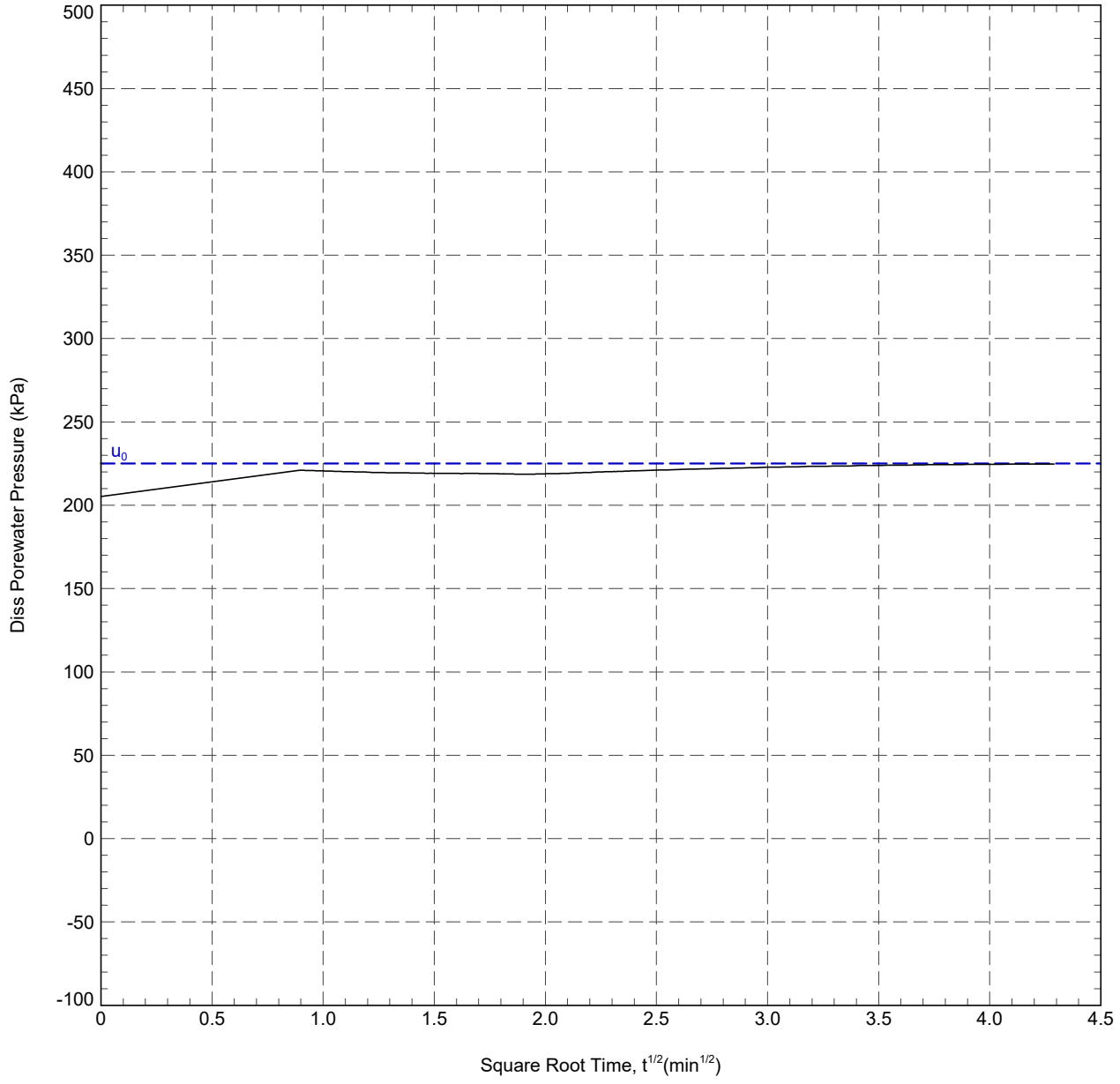
DISSIPATION TEST

LANKELMA

Test ID

CPT226 - 22.52 m

CLIENT : AYESA	EASTING : 346983.6 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376592.7 m	DATE : 08/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.34 m	



In Situ Pore Pressure, u_0: 225.00

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*U0, *NEP, *NI
OPERATOR : Paul Appleton	

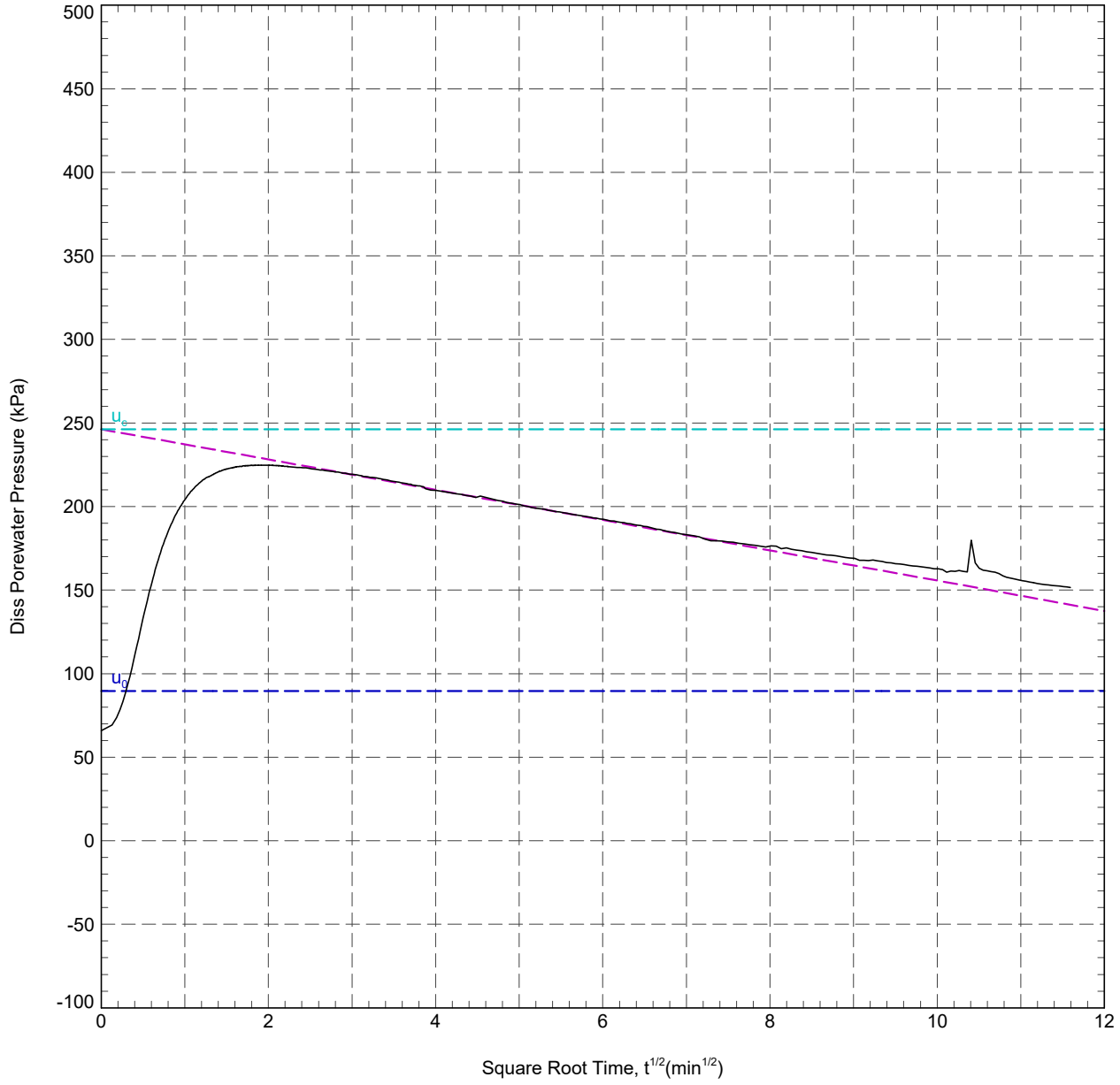
DISSIPATION TEST

LANKELMA

Test ID

CPT227 - 9.14 m

CLIENT : AYESA	EASTING : 346933.9 m	SHEET : 1 OF 1
PROJECT : PROTOS, INCE	NORTHING : 376582.0 m	DATE : 07/02/24
LOCATION : Cheshire, UK	COORD. SYS.:	
PROJECT No. : 27124-1	ELEVATION : 4.46 m	



In Situ Pore Pressure, u_0:	89.66
Corrected Initial Pore Pressure, u_c (back extrapolated from linear decay):	246.30
Interpreted Degree Dissipation:	50 %
Time for 50% Dissipation, t_{50}:	81.25 min

RIG : UK23_	REMARK
CONE ID : S15-CFIPTT.1846	*CIP
OPERATOR : Paul Appleton	

APPENDIX I PENETROMETER TEMPERATURE RESULTS

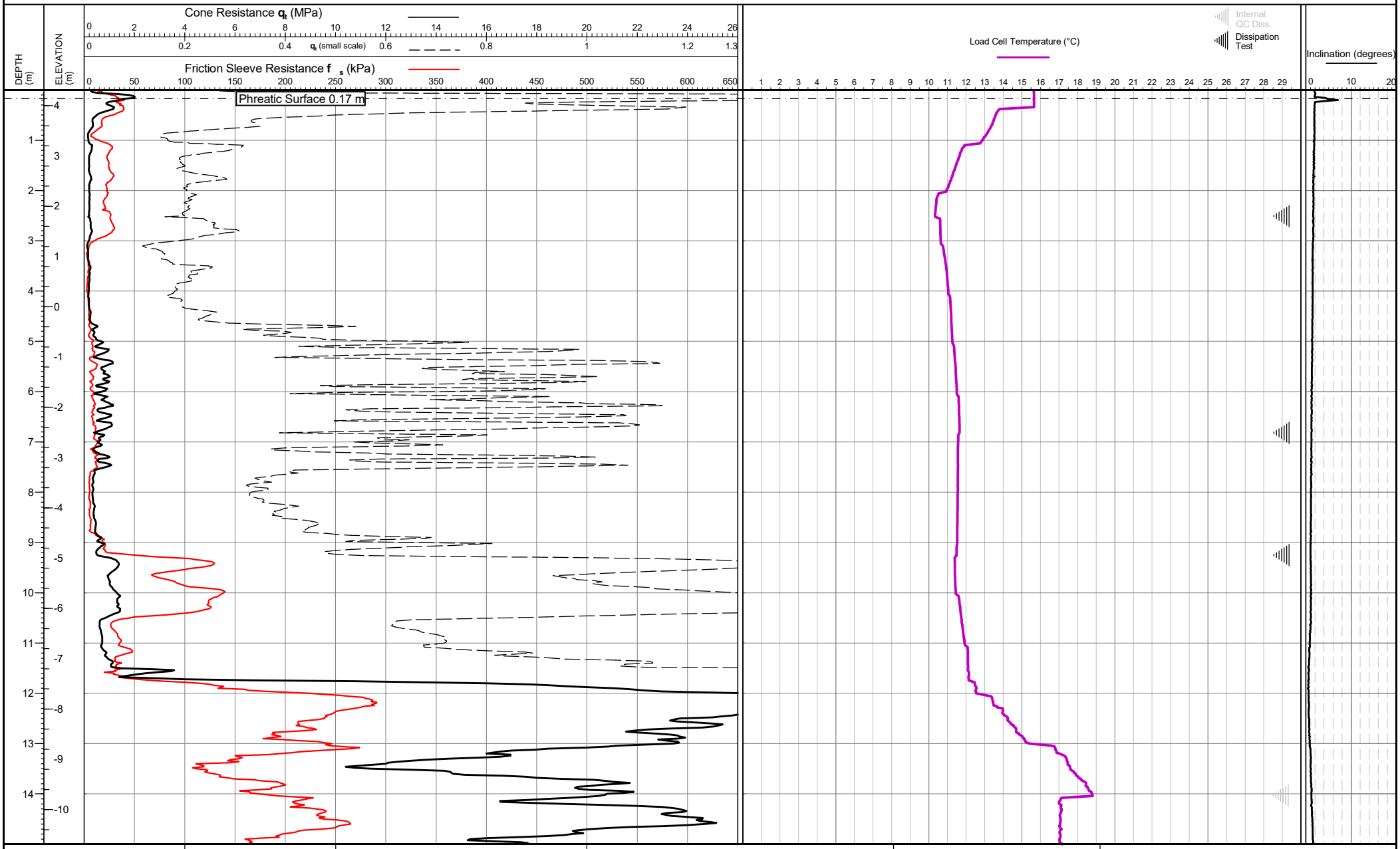
The temperature values in these logs represent the internal load cell temperature of the penetrometer and are used for QC purposes by comparison to the measured temperature response indicated on the calibration certificate. The CPT results have been corrected for transient and static temperature effects during post processing.

Ground temperature is only represented following a penetration pause of > 11 minutes.

Plots are provided for locations performed with a digital penetrometer measuring internal load cell temperature.

Project: PROTOS, INCE

Client: AYESA

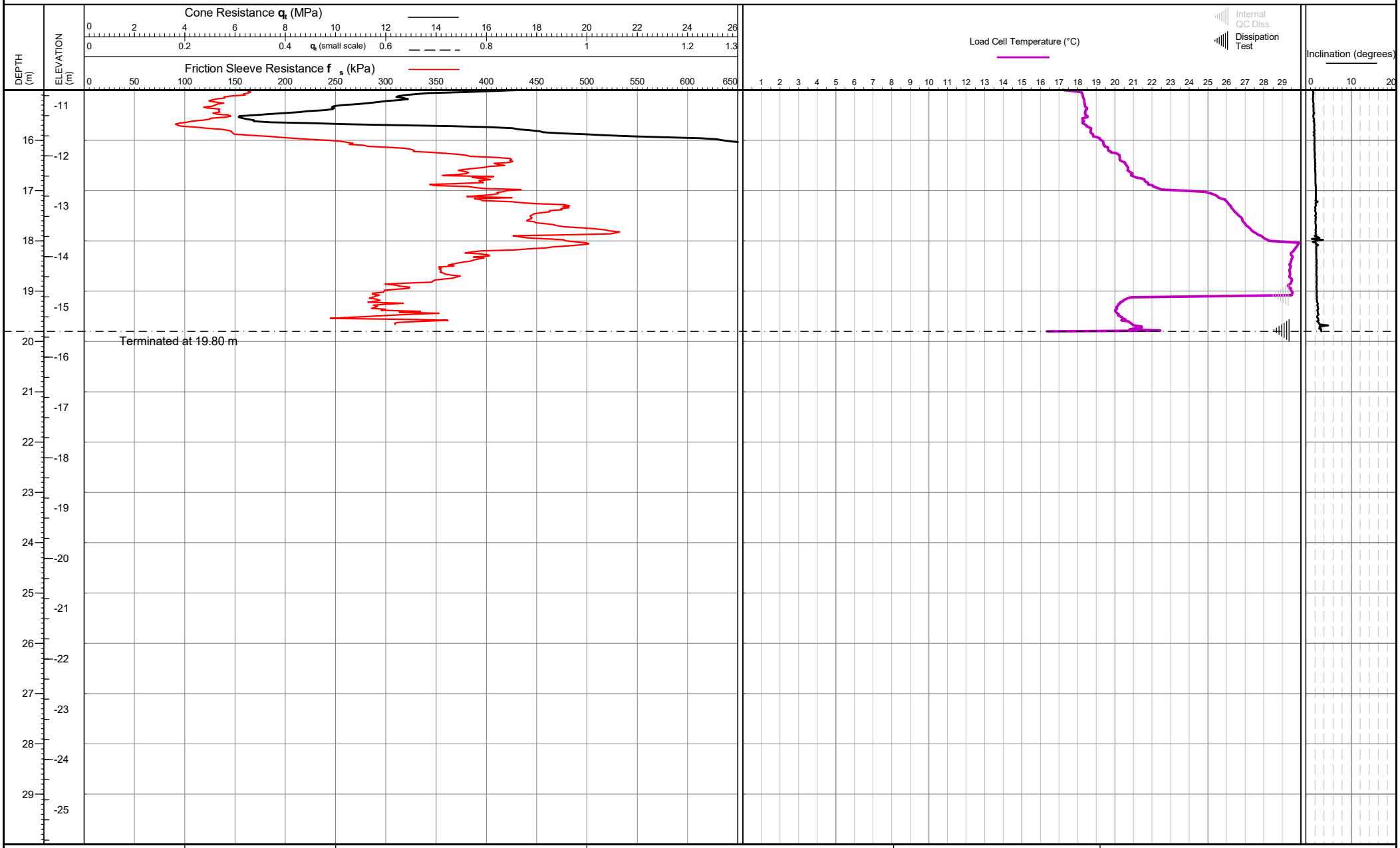


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 06/02/2024 09:13:28	Zero drift (Pre/post test) q_c (kPa): 22.4 f_s (kPa): -1.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): 2.1	Location: Cheshire, UK Coordinates: 346905.692, 376655.346 Elevation: 4.312 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA

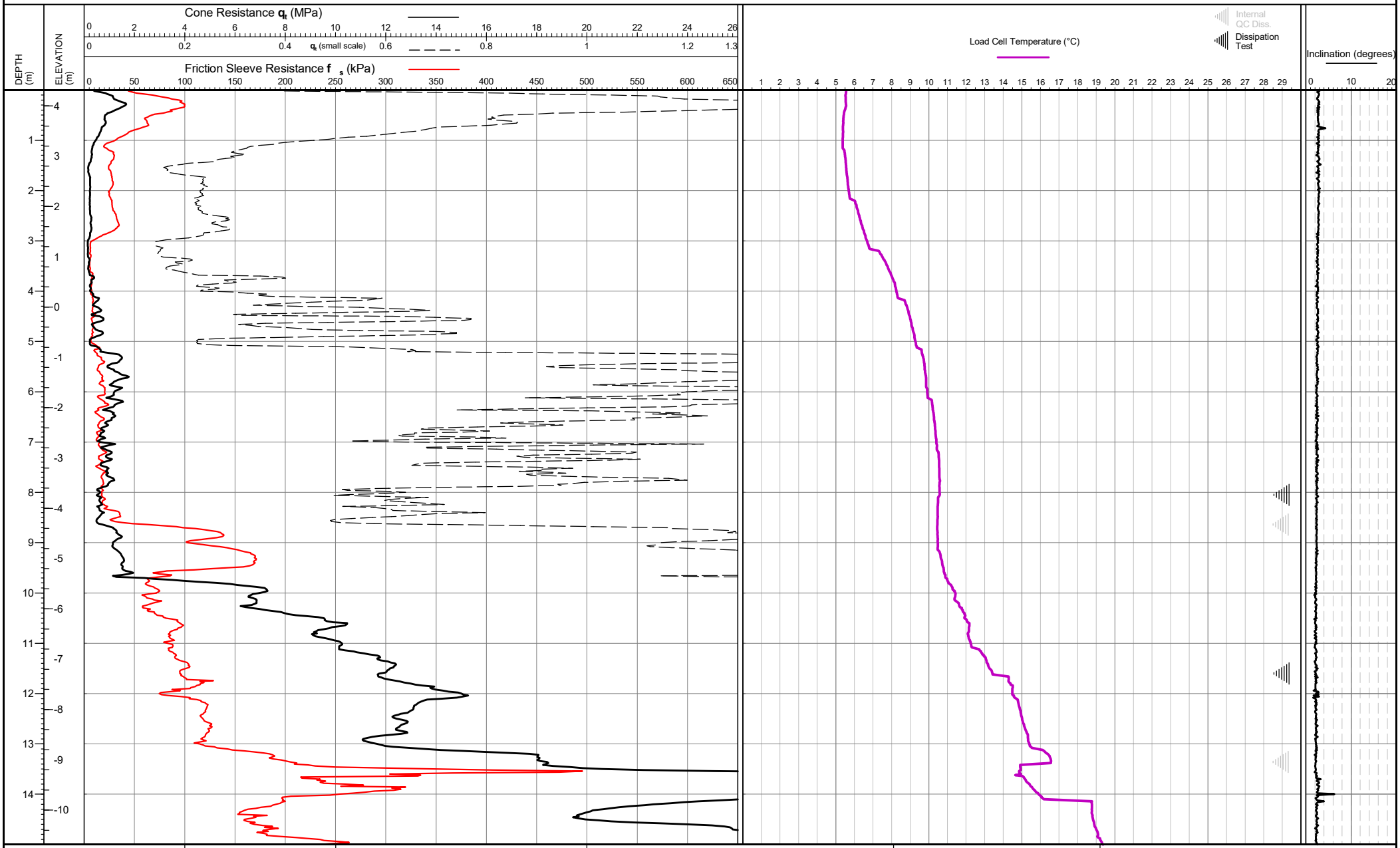


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 06/02/2024 09:13:28	Zero drift (Pre/post test) q_c (kPa): 22.4 f_s (kPa): -1.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): 2.1	Location: Cheshire, UK Coordinates: 346905.692, 376655.346 Elevation: 4.312 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT222

Project: PROTOS, INCE

Client: AYESA

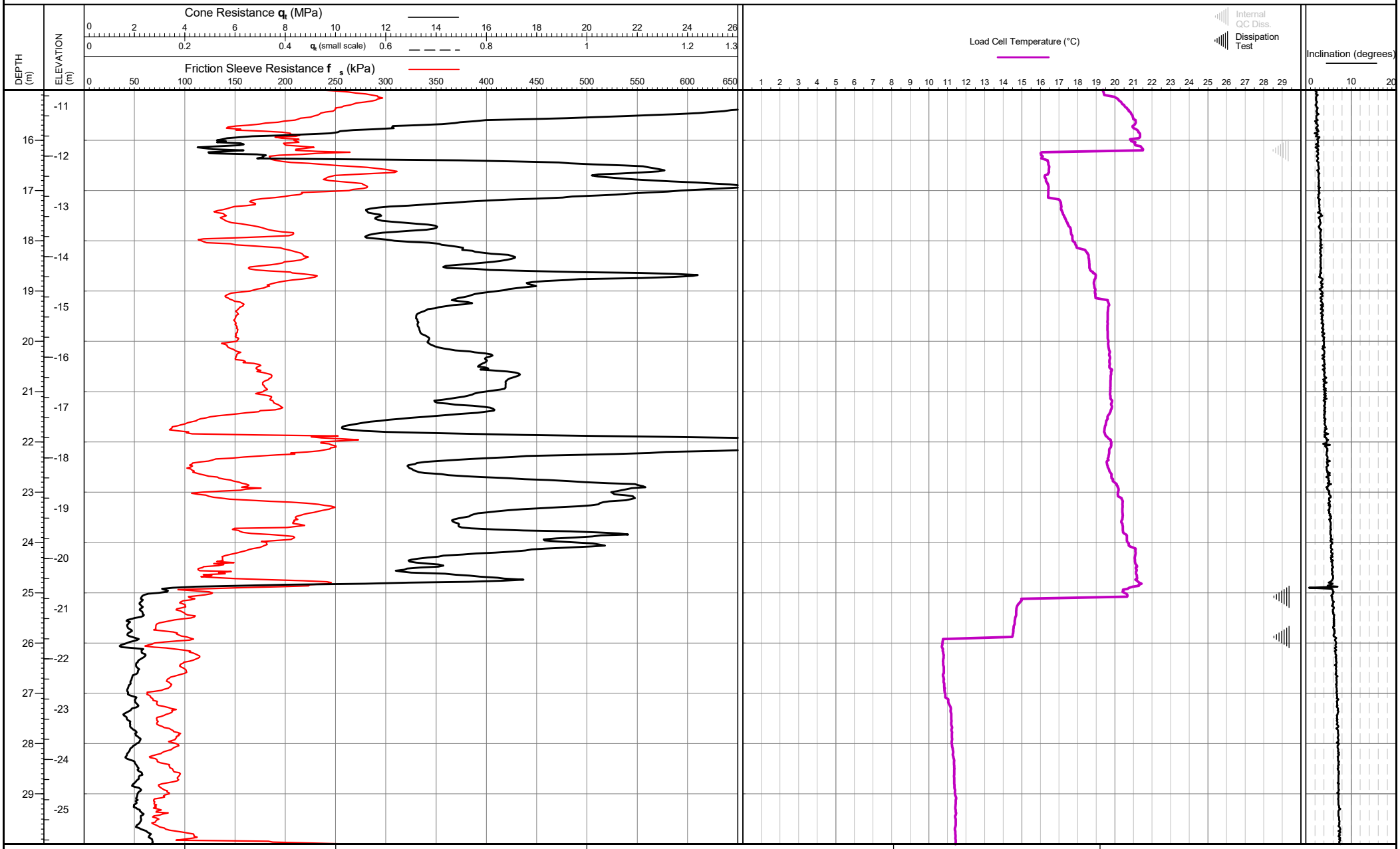


Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 12/02/2024 09:51:48	Zero drift (Pre/post test) q_c (kPa): -28.2 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.1	Location: Cheshire, UK Coordinates: 346995.306, 376696.366 Elevation: 4.316 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl Termination Remark: Lateral support at depth	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA

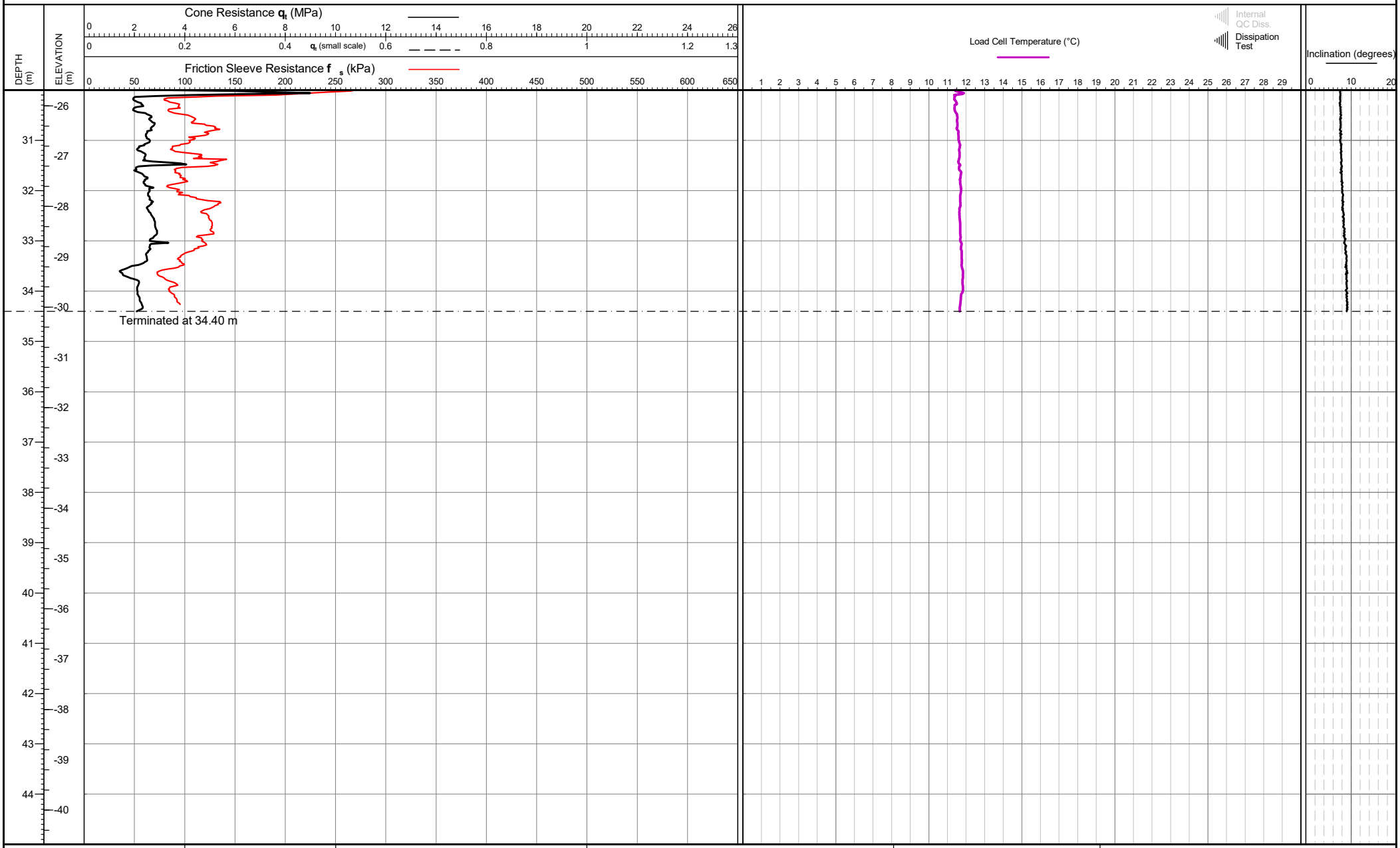


Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 12/02/2024 09:51:48	Zero drift (Pre/post test) q_c (kPa): -28.2 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.1	Location: Cheshire, UK Coordinates: 346995.306, 376696.366 Elevation: 4.316 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl Termination Remark: Lateral support at depth	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT223

Project: PROTOS, INCE

Client: AYESA



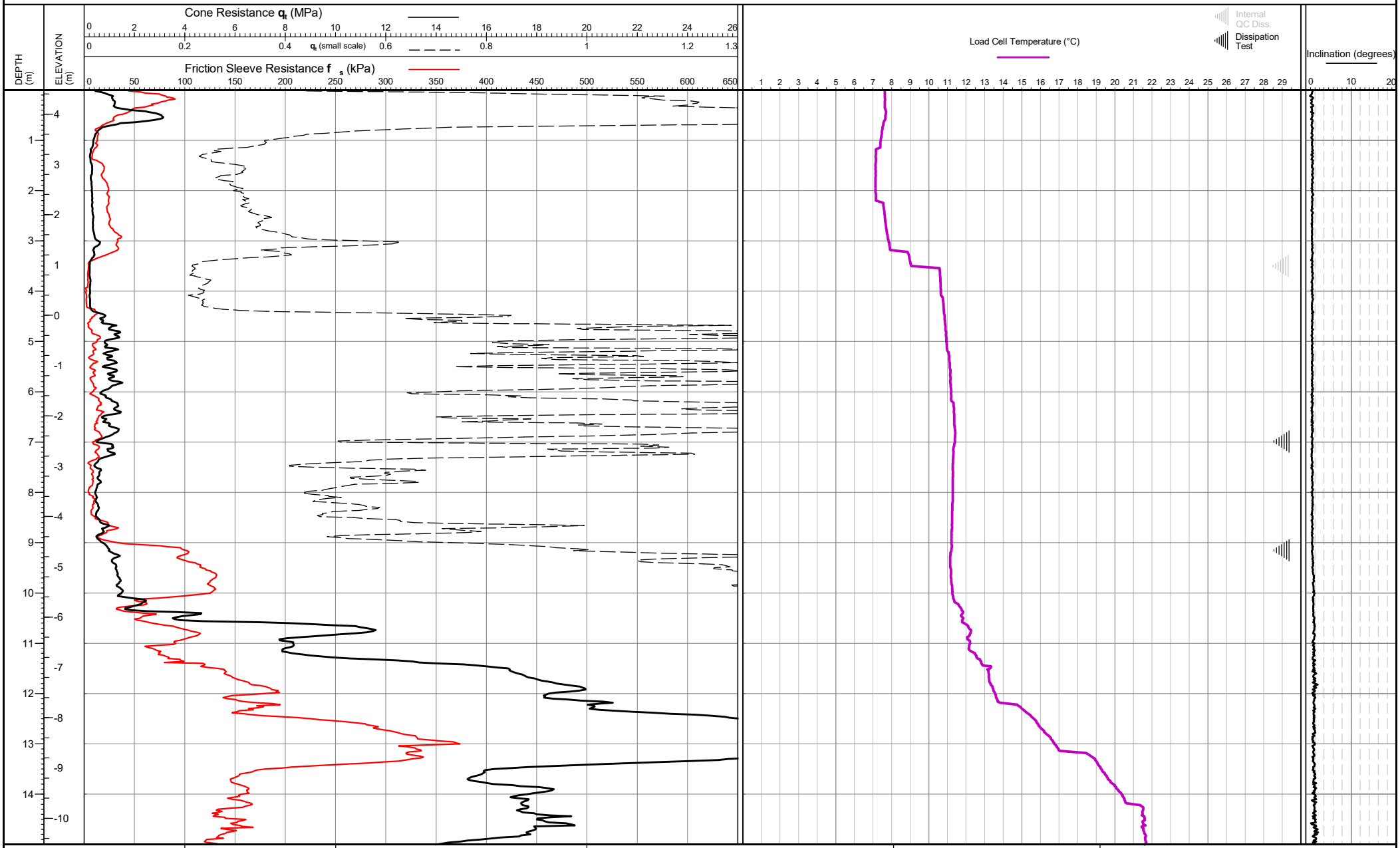
Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 12/02/2024 09:51:48	Zero drift (Pre/post test) q_c (kPa): -28.2 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.1	Location: Cheshire, UK Coordinates: 346995.306, 376696.366 Elevation: 4.316 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.8 mbgl Termination Remark: Lateral support at depth	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT223

LANKELMA

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2):
Cone ID: S15-CFIPTTM250.2065
Operator: Paul Appleton
Rig Used: UK23
Date of test: 09/02/2024 08:14:21

Zero drift (Pre/post test)
q_c (kPa): -46.6
f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$)
u_2 (kPa): -4.0

Location: Cheshire, UK
Coordinates: 347007.486, 376632.058
Elevation: 4.479
Coordinate system:

Remarks:
*Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl

Termination Remark: Total reaction force

Date of plot: 26-02-24
Lankelma Project Ref: 27124-1

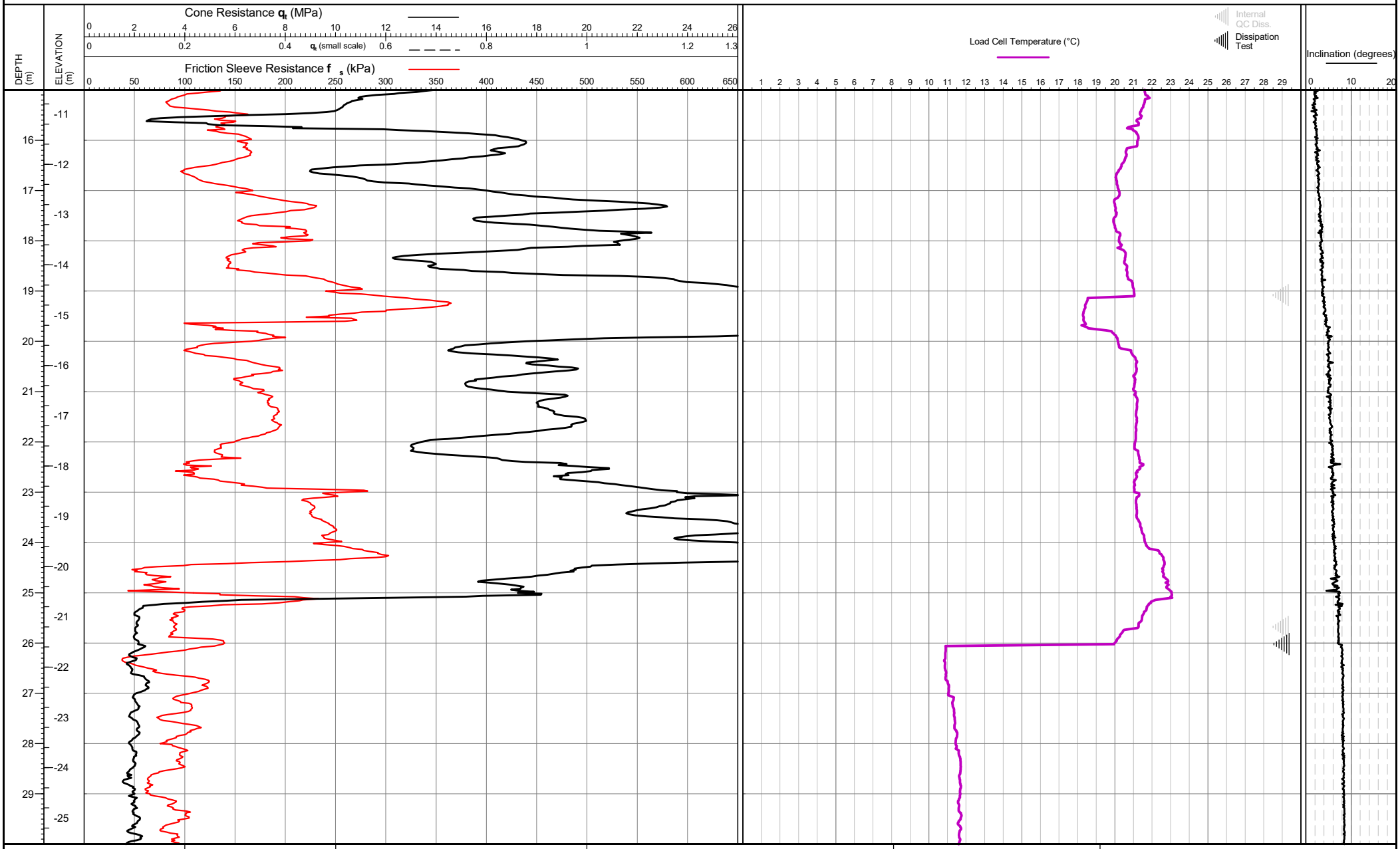
Checked by:
Nick Mason

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA

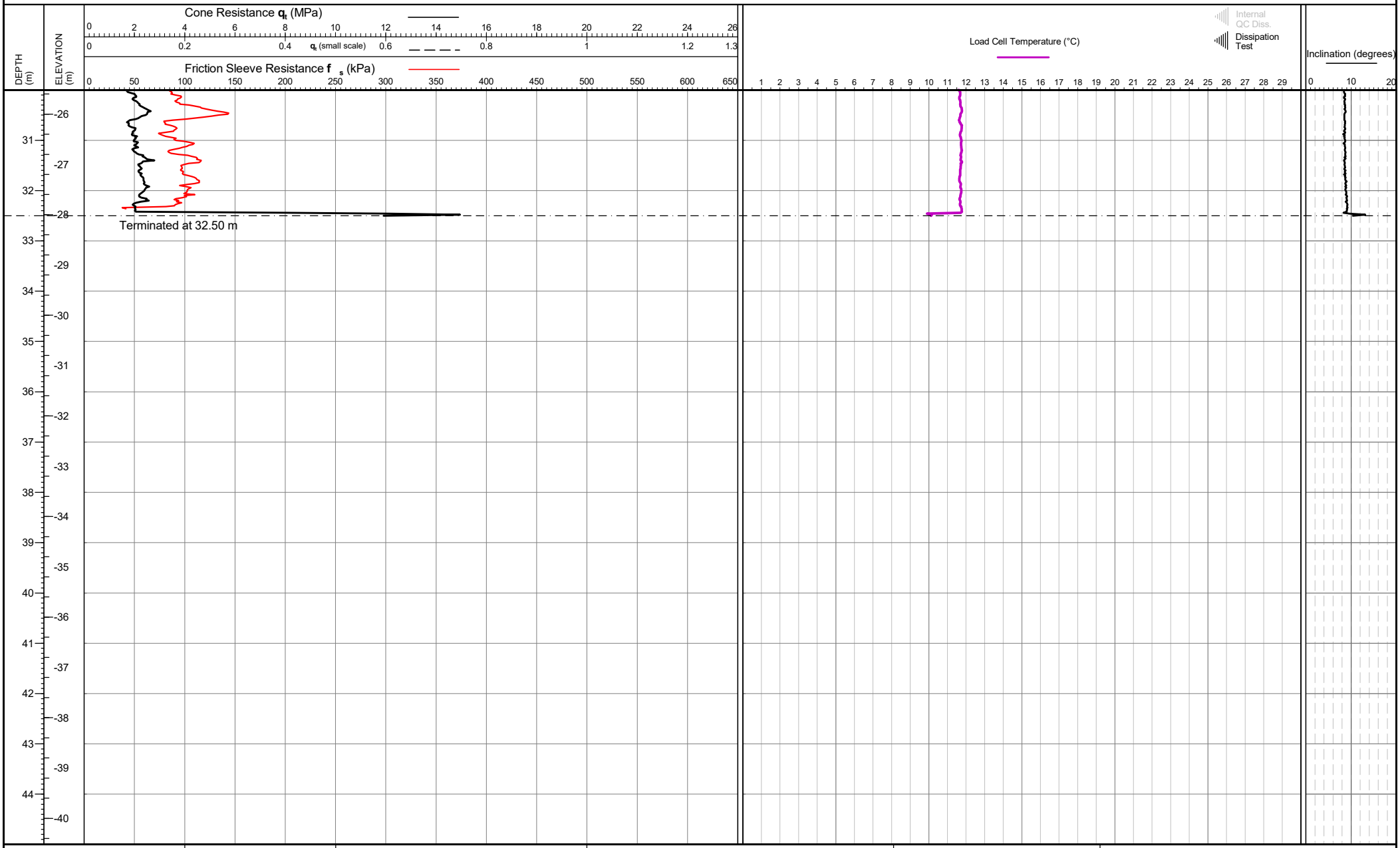


Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 09/02/2024 08:14:21	Zero drift (Pre/post test) q_c (kPa): -46.6 f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.0	Location: Cheshire, UK Coordinates: 347007.486, 376632.058 Elevation: 4.479 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT224

Project: PROTOS, INCE

Client: AYESA



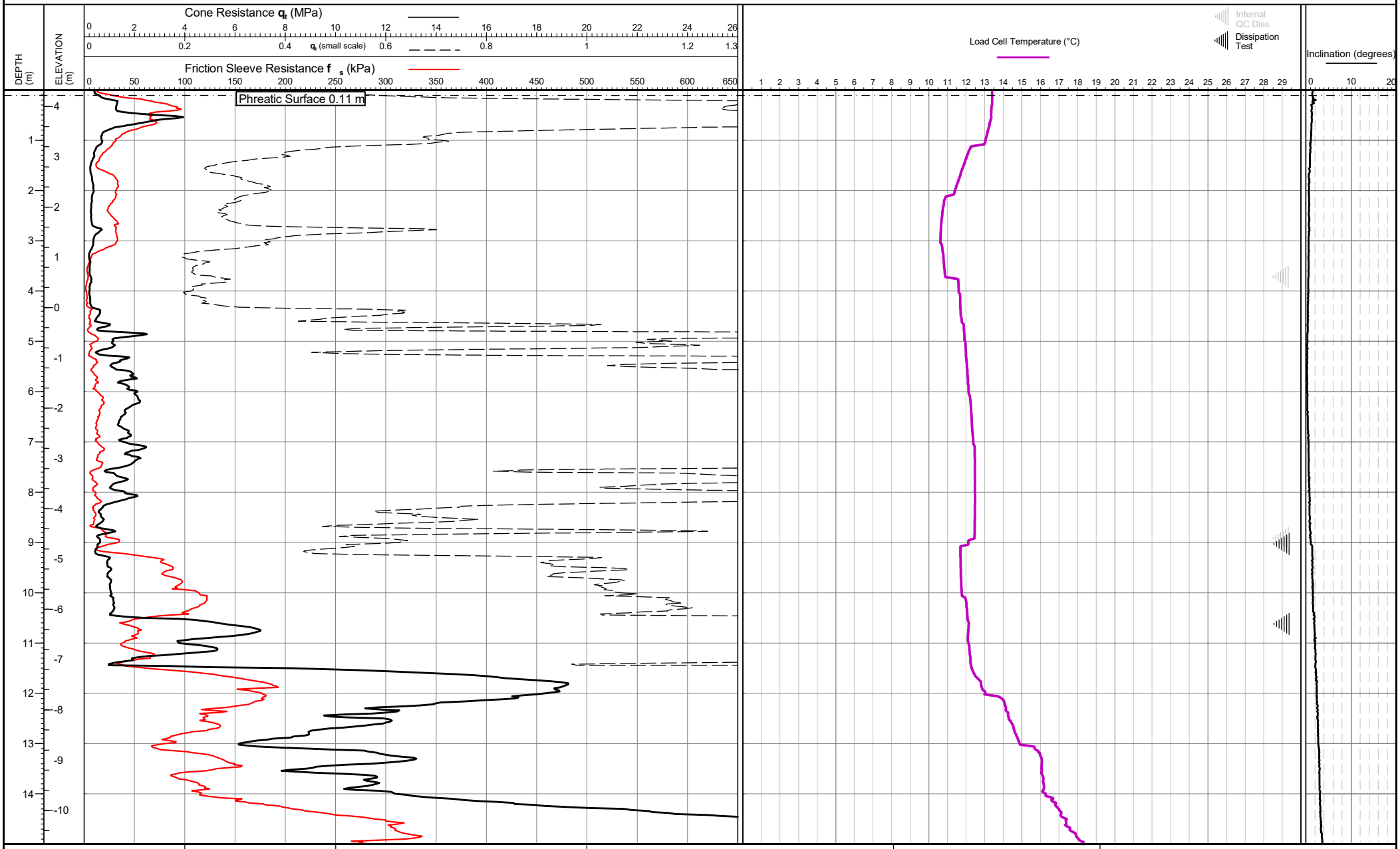
Cone area (mm2): Cone ID: S15-CFIPTTM250.2065 Operator: Paul Appleton Rig Used: UK23 Date of test: 09/02/2024 08:14:21	Zero drift (Pre/post test) q_c (kPa): -46.6 f_s (kPa): 2.6 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -4.0	Location: Cheshire, UK Coordinates: 347007.486, 376632.058 Elevation: 4.479 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT224

LANKELMA

Project: PROTOS, INCE

Client: AYESA



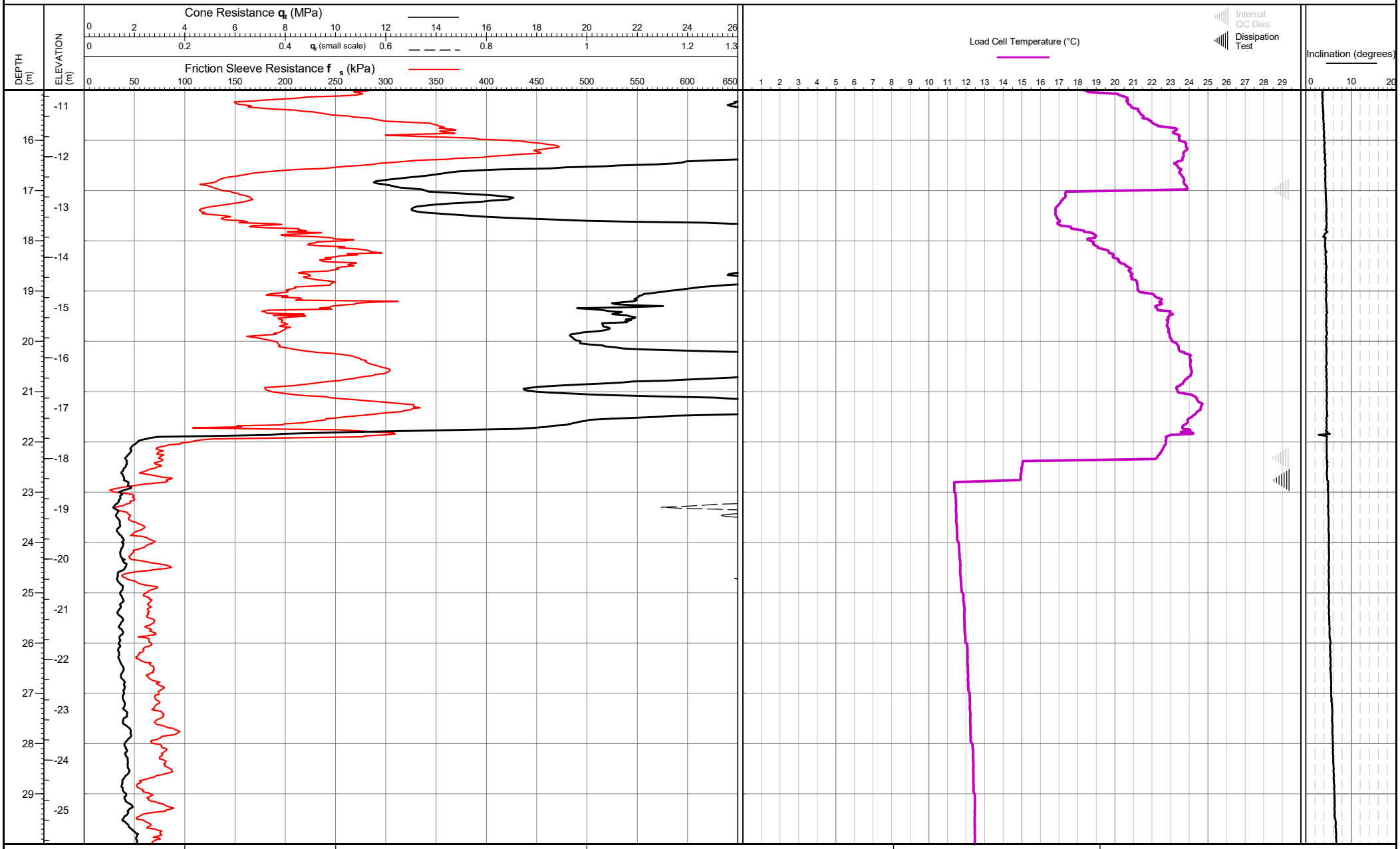
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 05/02/2024 09:38:43	Zero drift (Pre/post test) q_c (kPa): -10.8 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -3.6	Location: Cheshire, UK Coordinates: 346954.178, 376648.331 Elevation: 4.329 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Tonnage + inclination	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT225

LANKELMA

Project: PROTOS, INCE

Client: AYESA

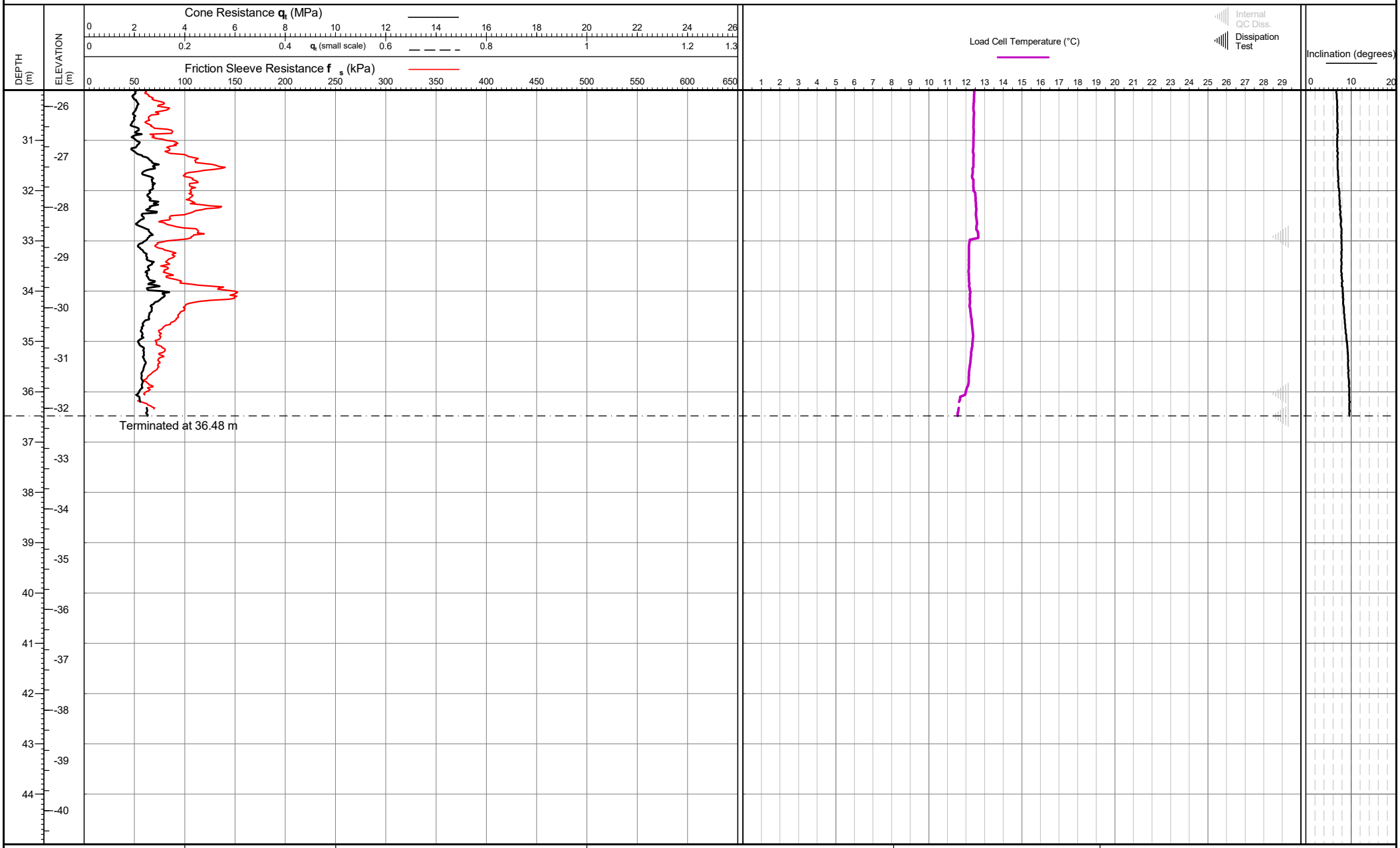


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 05/02/2024 09:38:43	Zero drift (Pre/post test) q_c (kPa): -10.8 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -3.6	Location: Cheshire, UK Coordinates: 346954.178, 376648.331 Elevation: 4.329 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Tonnage + inclination	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA

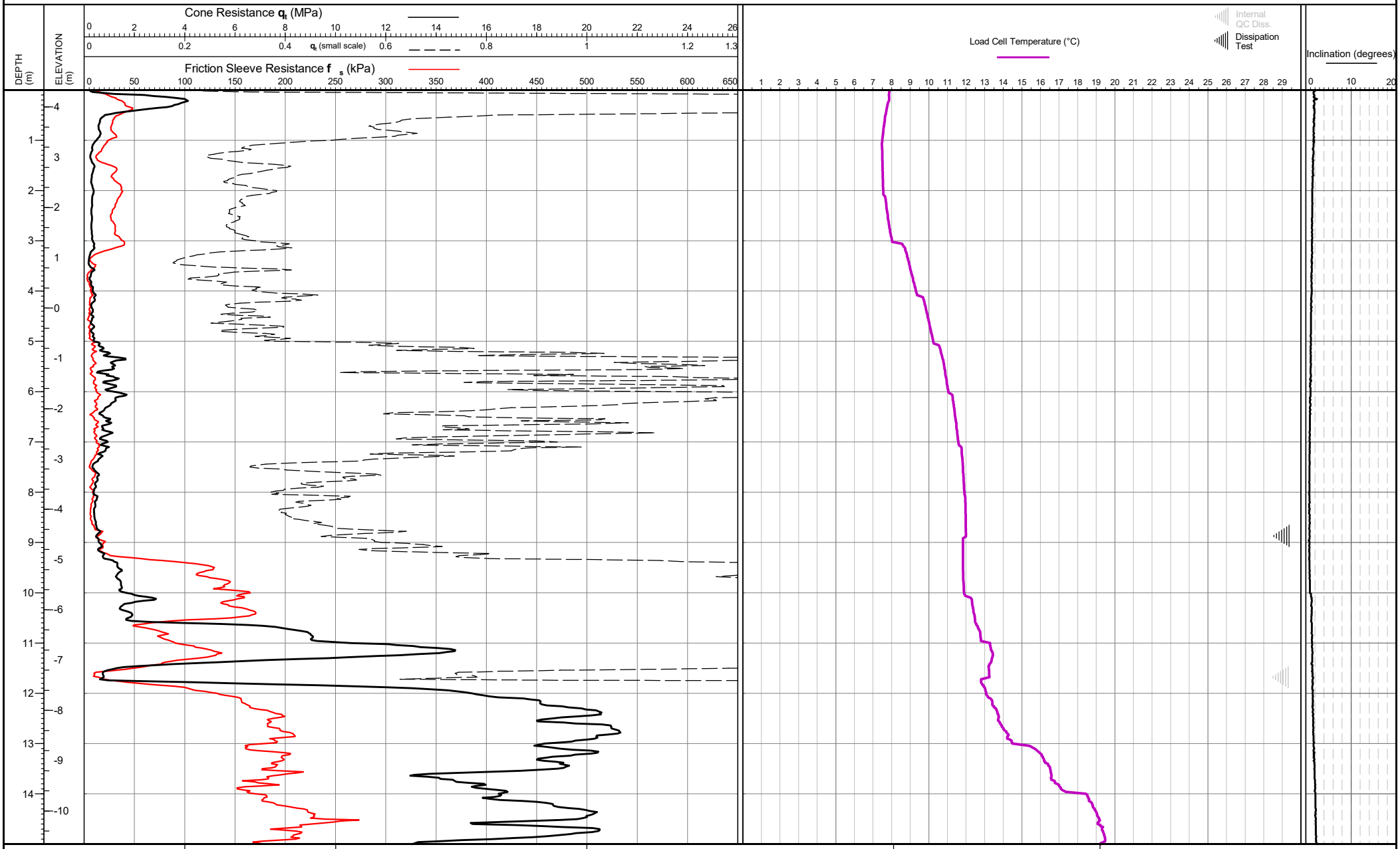


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 05/02/2024 09:38:43	Zero drift (Pre/post test) q_c (kPa): -10.8 f_s (kPa): 1.3 ($f_{s\,drift}$ - $q_{c\,drift}$) u_2 (kPa): -3.6	Location: Cheshire, UK Coordinates: 346954.178, 376648.331 Elevation: 4.329 Coordinate system:	Remarks: *Phreatic surface origin: Average measured piezometric depth at this location, approx. +- 0.7 mbgl Termination Remark: Tonnage + inclination	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT225

Project: PROTOS, INCE

Client: AYESA



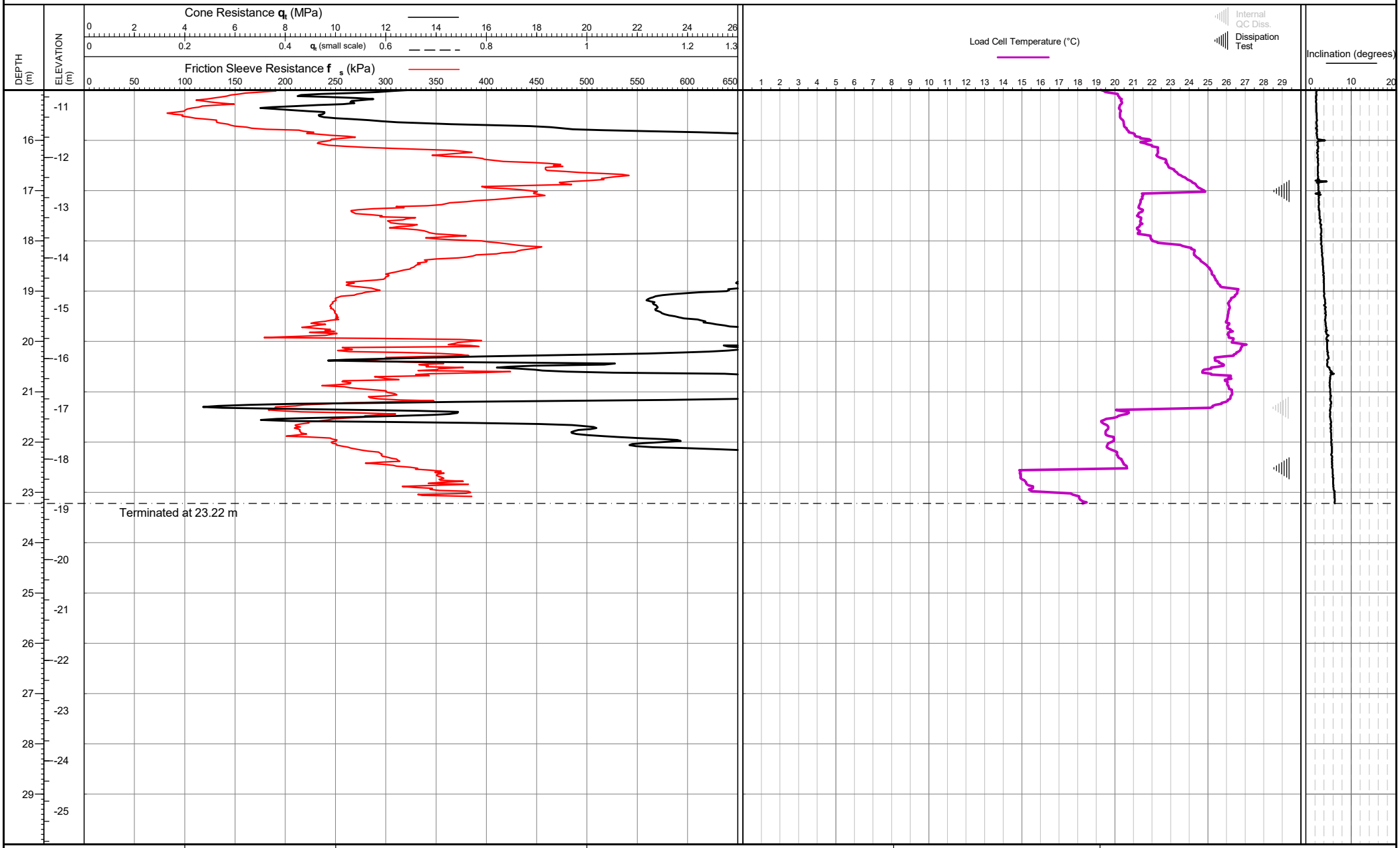
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 08/02/2024 09:51:02	Zero drift (Pre/post test) q_c (kPa): 0.0 f_s (kPa): -0.5 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): -3.1	Location: Cheshire, UK Coordinates: 346983.595, 376592.746 Elevation: 4.339 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA



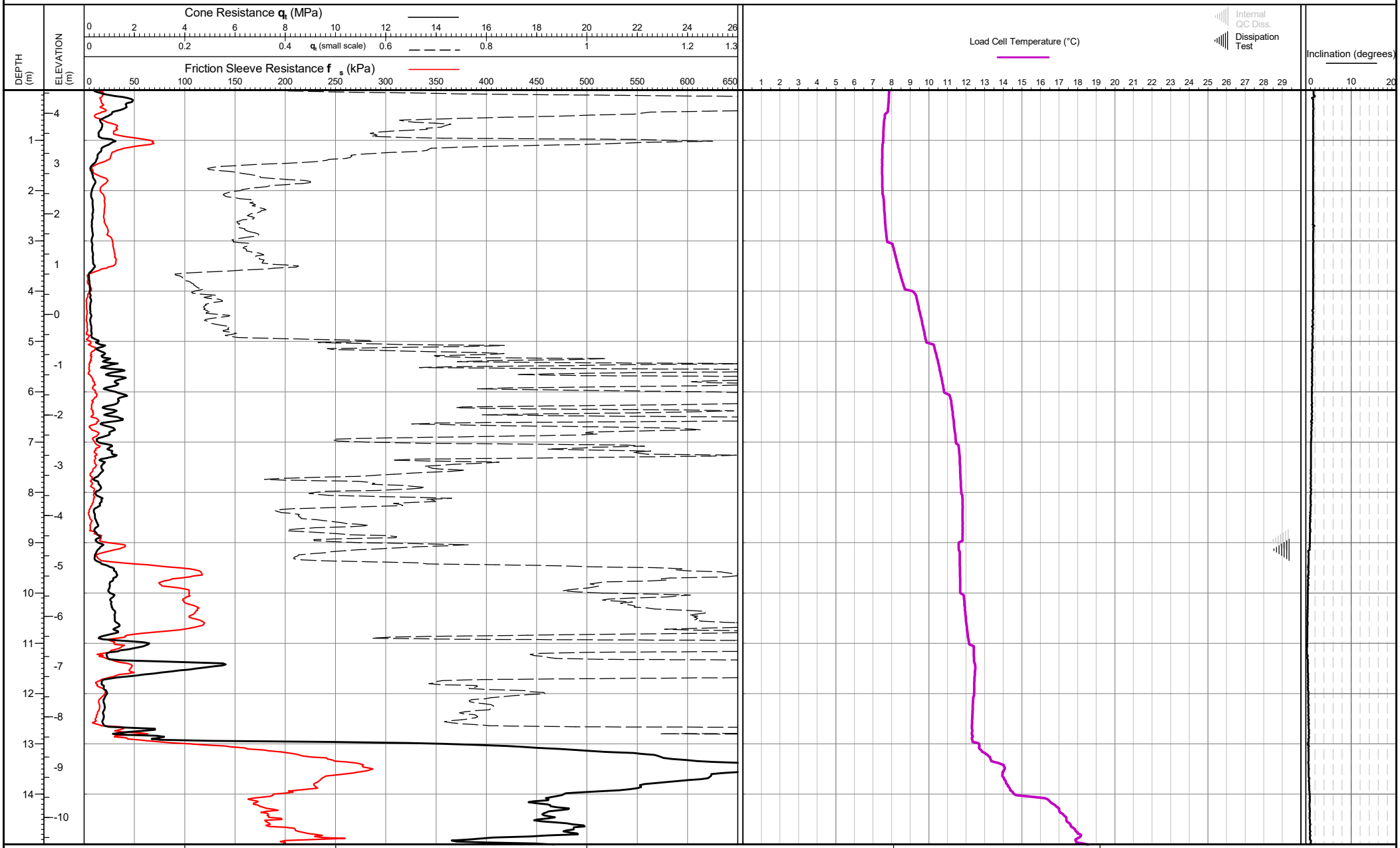
Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 08/02/2024 09:51:02	Zero drift (Pre/post test) q_c (kPa): 0.0 f_s (kPa): -0.5 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): -3.1	Location: Cheshire, UK Coordinates: 346983.595, 376592.746 Elevation: 4.339 Coordinate system:	Remarks: *Phreatic surface origin: Piezocone response in drained soils, approx. +- 0.7 mbgl Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT226

LANKELMA

Project: PROTOS, INCE

Client: AYESA

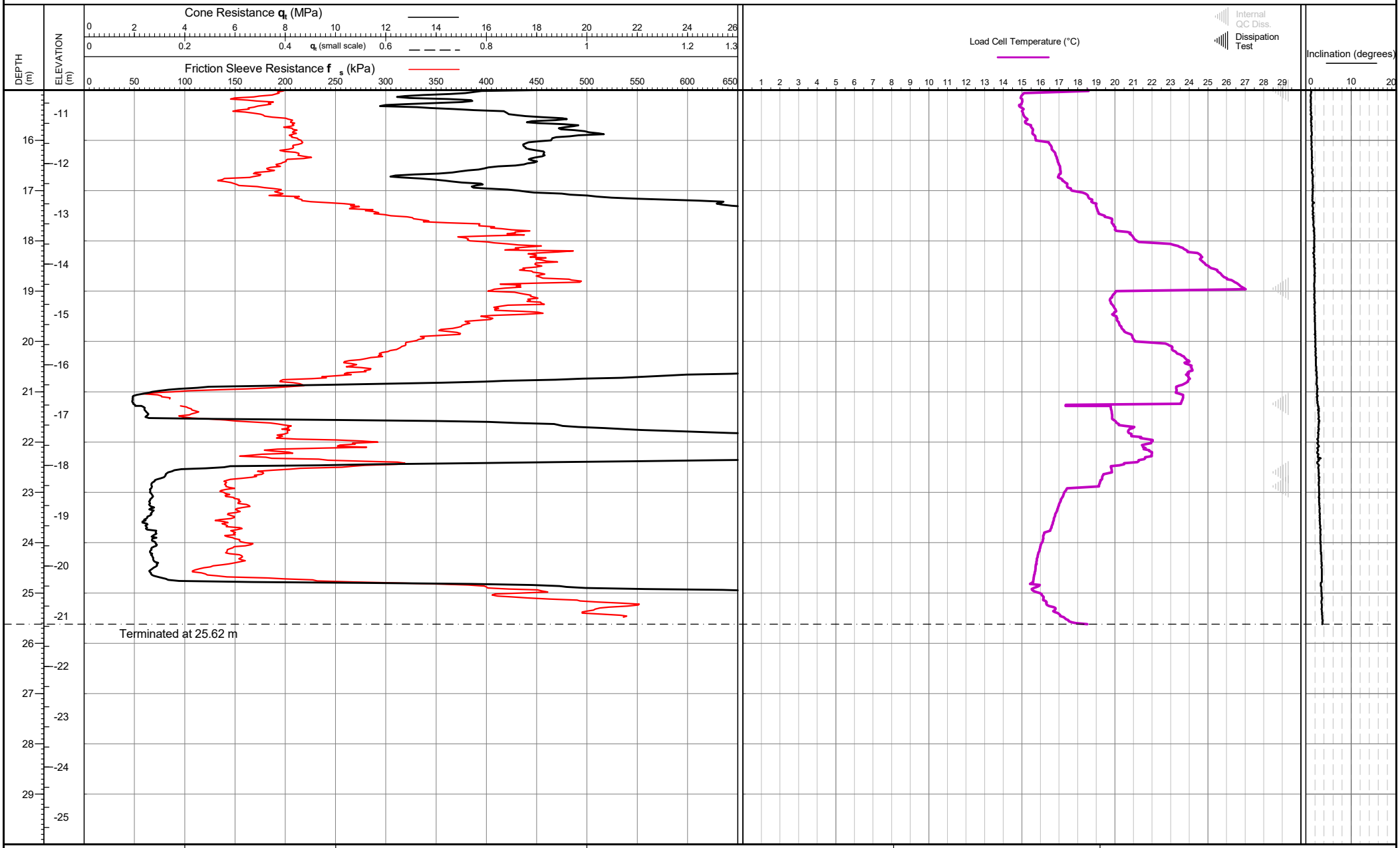


Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 07/02/2024 08:02:24	Zero drift (Pre/post test) q_c (kPa): 26.8 f_s (kPa): -2.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): -2.5	Location: Cheshire, UK Coordinates: 346933.921, 376582.049 Elevation: 4.462 Coordinate system:	Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

TEST ID: CPT227

Project: PROTOS, INCE

Client: AYESA



Cone area (mm2): Cone ID: S15-CFIPTT.1846 Operator: Paul Appleton Rig Used: UK23 Date of test: 07/02/2024 08:02:24	Zero drift (Pre/post test) q_c (kPa): 26.8 f_s (kPa): -2.8 ($f_{s\ drift}$ - $q_{c\ drift}$) u_2 (kPa): -2.5	Location: Cheshire, UK Coordinates: 346933.921, 376582.049 Elevation: 4.462 Coordinate system:	Remarks: *Phreatic surface origin: Estimated by inverse distance modelling of piezometric elevation observations at other locations Termination Remark: Total reaction force	Date of plot: 26-02-24 Checked by: Nick Mason	Lankelma Project Ref: 27124-1

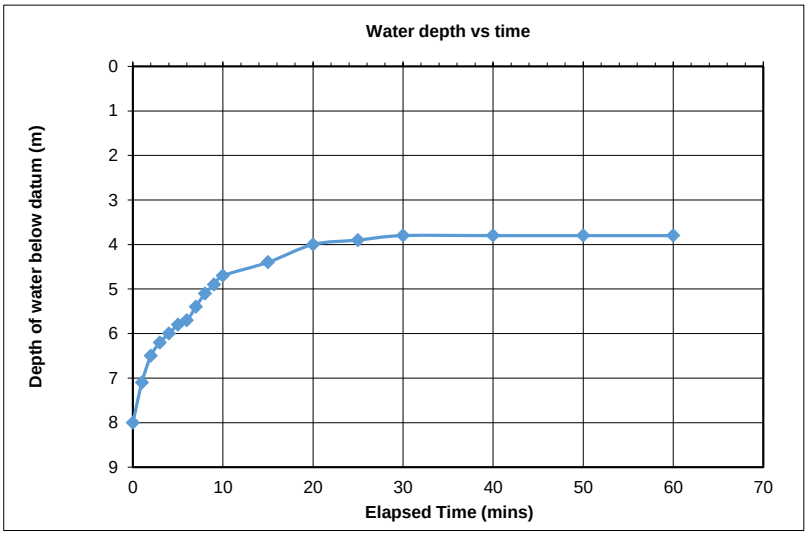
TEST ID: CPT227

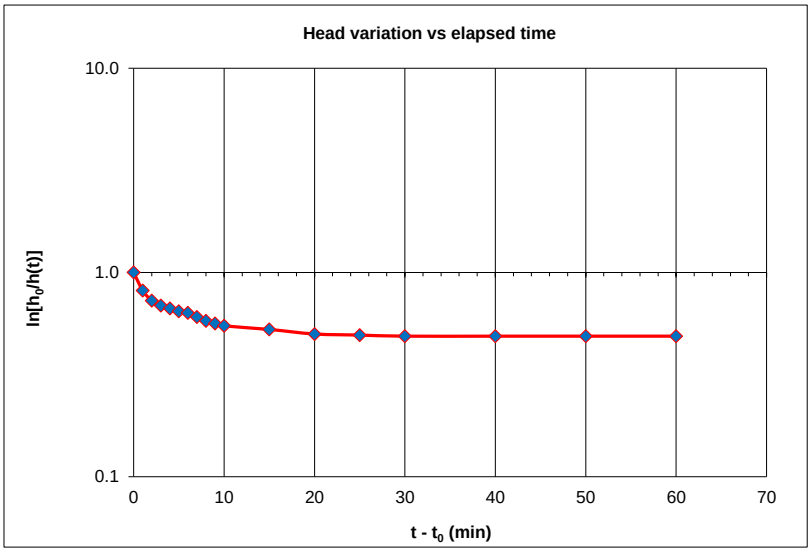
Variable Head Permeability Test Results

Date:	06/02/2024	Static water level (m)	4.00	Time (t_0)	0	mins
Test no:	1	Internal diameter *(D)* (m)	0.15	Time (t)	60	mins
Carried out by:	AS	Depth of borehole below ground level (m)	12.00			
Ground level:	4.36	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length of casing above ground level (m)	0.30	Initial head (h_0) at (t_0)	4.00	m
		Water level at start of test (m)	8.00	Final head (h(t)) at (t)	8.20	m
Test type:	Rising	Top of response zone (m)	10.50	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	12.00	Cross sectional area *(S)*	0.02	m^2

Strata description:	Grey very silty fine SAND (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	8.00	4.00
1	7.10	4.90
2	6.50	5.50
3	6.20	5.80
4	6.00	6.00
5	5.80	6.20
6	5.70	6.30
7	5.40	6.60
8	5.10	6.90
9	4.90	7.10
10	4.70	7.30
15	4.40	7.60
20	4.00	8.00
25	3.90	8.10
30	3.80	8.20
40	3.80	8.20
50	3.80	8.20
60	3.80	8.20





L/D = 10.00

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.14

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 1.12E-06 m/s

0

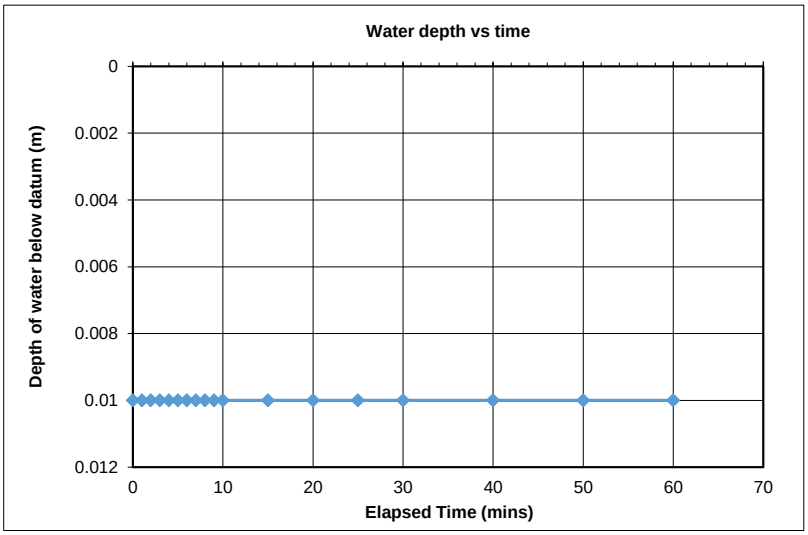
Calculated by:	EG	Project:	Protos CC	Exploratory position reference:
Checked by:	HP	Project No:	K0525	**BH202**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

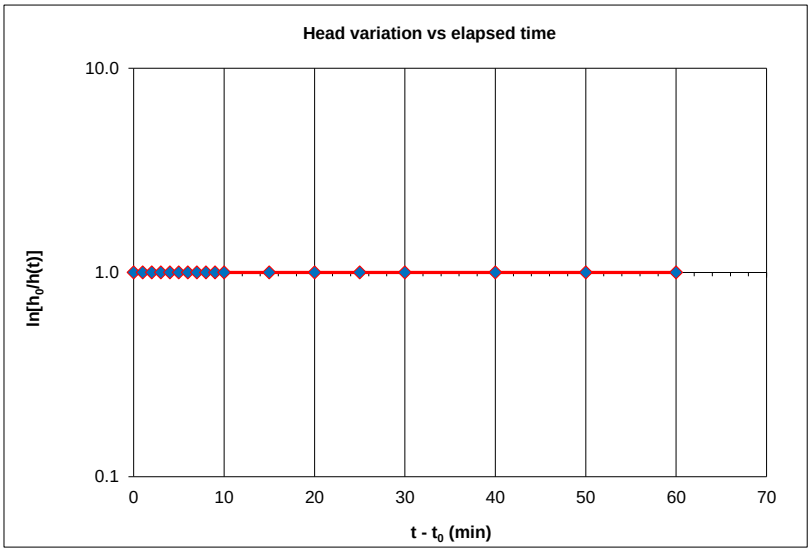
Variable Head Permeability Test Results

Date:	06/02/2024	Static water level (m)	4.00	Time (t_0)	0	mins
Test no:	2	Internal diameter *(D)* (m)	0.15	Time (t)	60	mins
Carried out by:	AS	Depth of borehole below ground level (m)	20.00			
Ground level:	4.36	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length ofcasing above ground level (m)	0.30	Initial head (h_0) at (t_0)	22.50	m
		Water level at start of test (m)	0.00	Final head (h(t)) at (t)	22.49	m
Test type:	Falling	Top of response zone (m)	21.00	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	22.50	Cross sectional area *(S)*	0.02	m^2

Strata description:	Stiff brown slightly sandy slightly gravelly CLAY (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	0.01	22.49
1	0.01	22.49
2	0.01	22.49
3	0.01	22.49
4	0.01	22.49
5	0.01	22.49
6	0.01	22.49
7	0.01	22.49
8	0.01	22.49
9	0.01	22.49
10	0.01	22.49
15	0.01	22.49
20	0.01	22.49
25	0.01	22.49
30	0.01	22.49
40	0.01	22.49
50	0.01	22.49
60	0.01	22.49





L/D = 10.00

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.14

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 6.94E-10 m/s

0

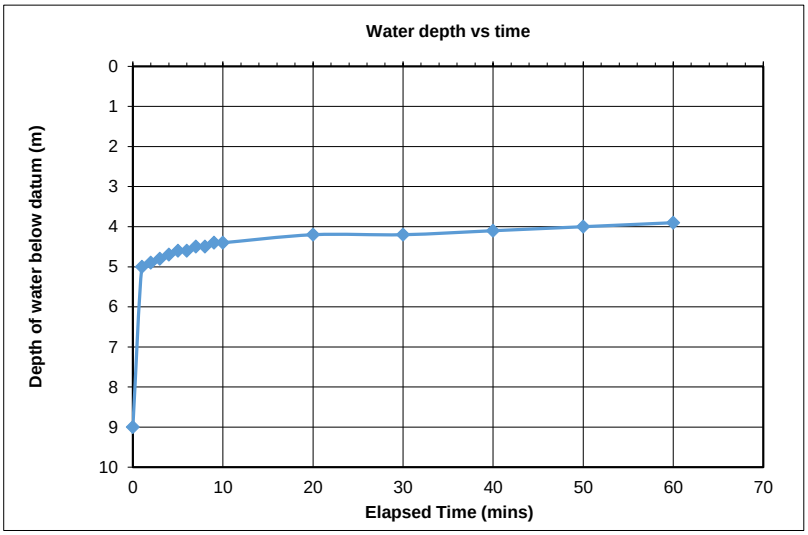
Calculated by:	EG	Project:	Protos CC	Exploratory position reference:
Checked by:	HP	Project No:	K0525	**BH202**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

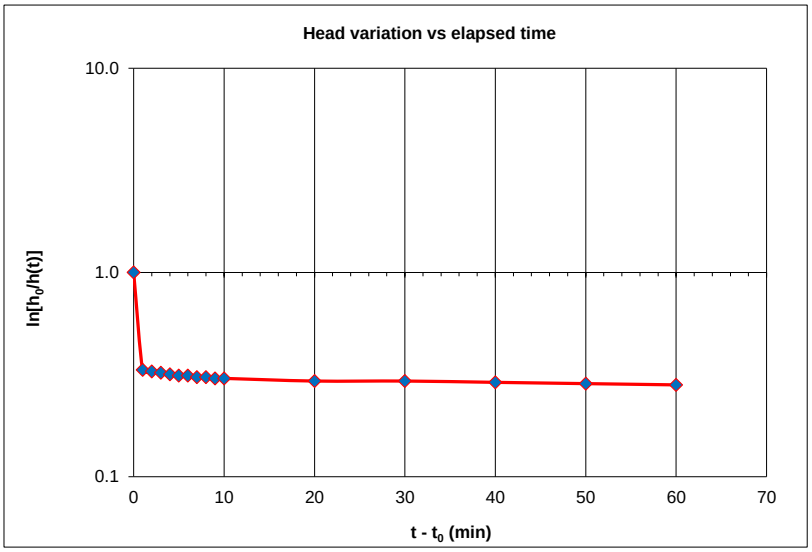
Variable Head Permeability Test Results

Date:	07/02/2024	Static water level (m)	4.20	Time (t_0)	0	mins
Test no:	1	Internal diameter *(D)* (m)	0.20	Time (t)	60	mins
Carried out by:	AS	Depth of borehole below ground level (m)	10.50			
Ground level:	4.33	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length of casing above ground level (m)	0.30	Initial head (h_0) at (t_0)	2.00	m
		Water level at start of test (m)	9.00	Final head (h(t)) at (t)	7.60	m
Test type:	Rising	Top of response zone (m)	9.50	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	11.00	Cross sectional area *(S)*	0.03	m^2

Strata description:	Firm black pseudo-fibrous PEAT (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	9.00	2.00
1	5.00	6.00
2	4.90	6.10
3	4.80	6.20
4	4.70	6.30
5	4.60	6.40
6	4.60	6.40
7	4.50	6.50
8	4.50	6.50
9	4.40	6.60
10	4.40	6.60
20	4.20	6.80
30	4.20	6.80
40	4.10	6.90
50	4.00	7.00
60	3.90	7.10





L/D = 7.50

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.47

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 3.35E-06 m/s

0

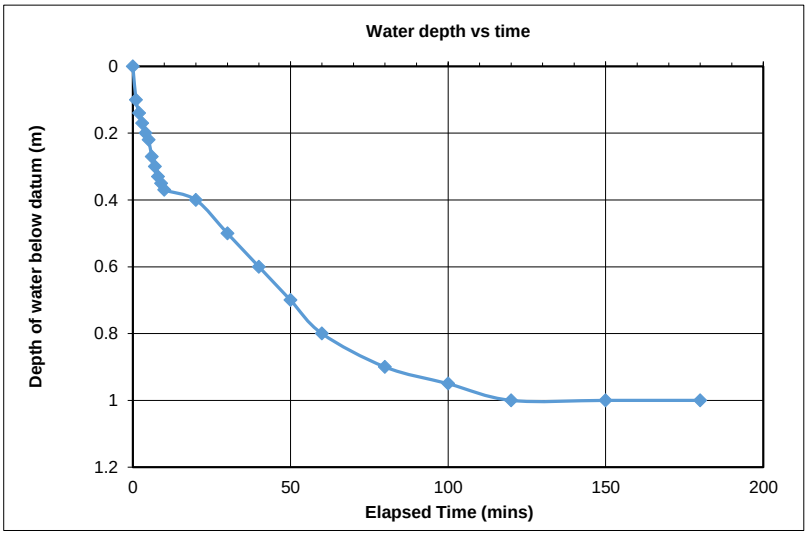
Calculated by:	EG	Project:	Protos CC	Exploratory position reference:
Checked by:	HP	Project No:	K0525	**BH204**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

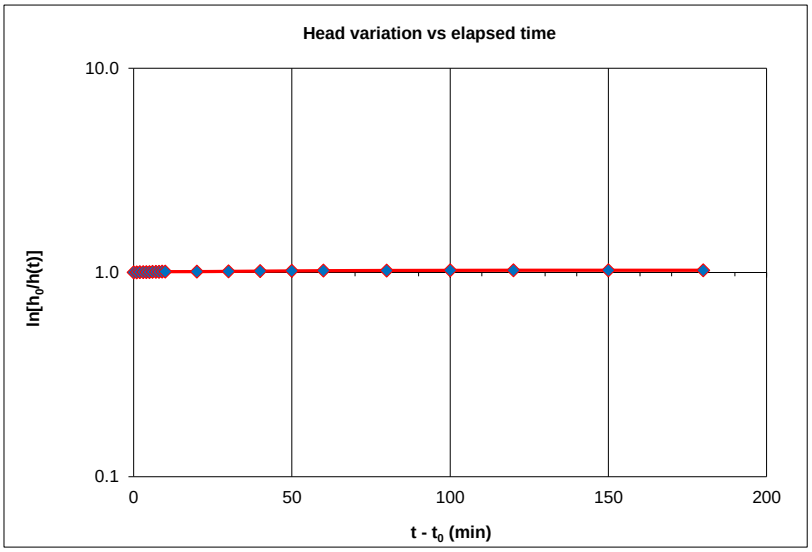
Variable Head Permeability Test Results

Date:	13/02/2024	Static water level (m)	4.20	Time (t_0)	0	mins
Test no:	2	Internal diameter *(D)* (m)	0.15	Time (t)	180	mins
Carried out by:	AS	Depth of borehole below ground level (m)	40.00			
Ground level:	4.33	Height of water above ground level (m)	n/a	Head of water		
(m OD)		Length of casing above ground level (m)	0.30	Initial head (h_0) at (t_0)	40.00	m
		Water level at start of test (m)	0.00	Final head (h(t)) at (t)	39.20	m
Test type:	Falling	Top of response zone (m)	38.50	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	40.00	Cross sectional area *(S)*	0.02	m^2

Strata description:	Dense brown silty very clayey fine to coarse SAND (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	0.00	40.00
1	0.10	39.90
2	0.14	39.86
3	0.17	39.83
4	0.20	39.80
5	0.22	39.78
6	0.27	39.73
7	0.30	39.70
8	0.33	39.67
9	0.35	39.65
10	0.37	39.63
20	0.40	39.60
30	0.50	39.50
40	0.60	39.40
50	0.70	39.30
60	0.80	39.20
80	0.90	39.10
100	0.95	39.05
120	1.00	39.00
150	1.00	39.00
180	1.00	39.00





L/D = 10.00

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.14

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 1.05E-08 m/s

0

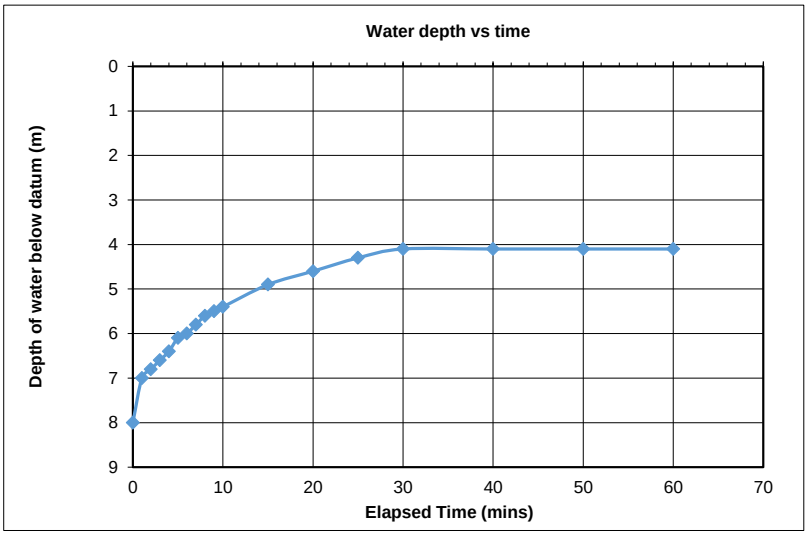
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Checked by:	HP	Project No:	K0525	**BH204**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

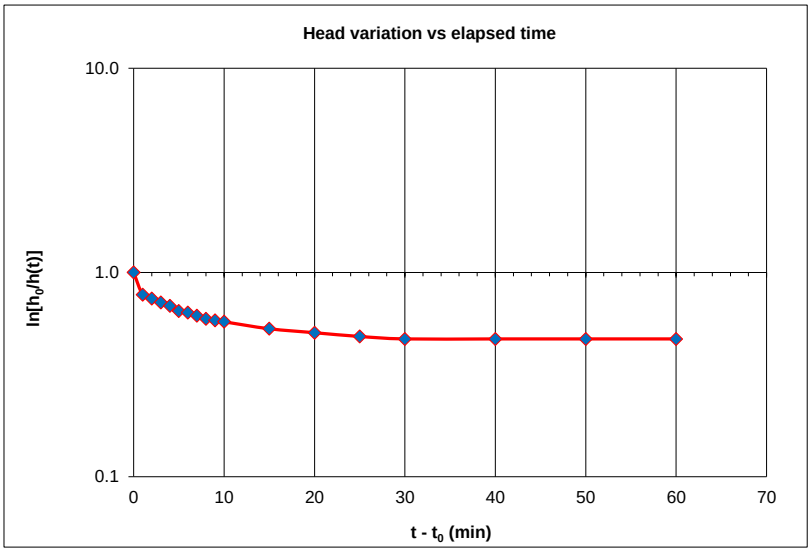
Variable Head Permeability Test Results

Date:	12/02/2024	Static water level (m)	4.00	Time (t_0)	0	mins
Test no:	1	Internal diameter *(D)* (m)	0.25	Time (t)	60	mins
Carried out by:	AS	Depth of borehole below ground level (m)	11.50			
Ground level:	4.28	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length of casing above ground level (m)	0.30	Initial head (h_0) at (t_0)	3.50	m
		Water level at start of test (m)	8.00	Final head (h(t)) at (t)	7.40	m
Test type:	Rising	Top of response zone (m)	10.00	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	11.50	Cross sectional area *(S)*	0.05	m^2

Strata description:	Firm black pseudo-fibrous PEAT (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	8.00	3.50
1	7.00	4.50
2	6.80	4.70
3	6.60	4.90
4	6.40	5.10
5	6.10	5.40
6	6.00	5.50
7	5.80	5.70
8	5.60	5.90
9	5.50	6.00
10	5.40	6.10
15	4.90	6.60
20	4.60	6.90
25	4.30	7.20
30	4.10	7.40
40	4.10	7.40
50	4.10	7.40
60	4.10	7.40





L/D = 6.00

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.78

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 2.70E-06 m/s

0

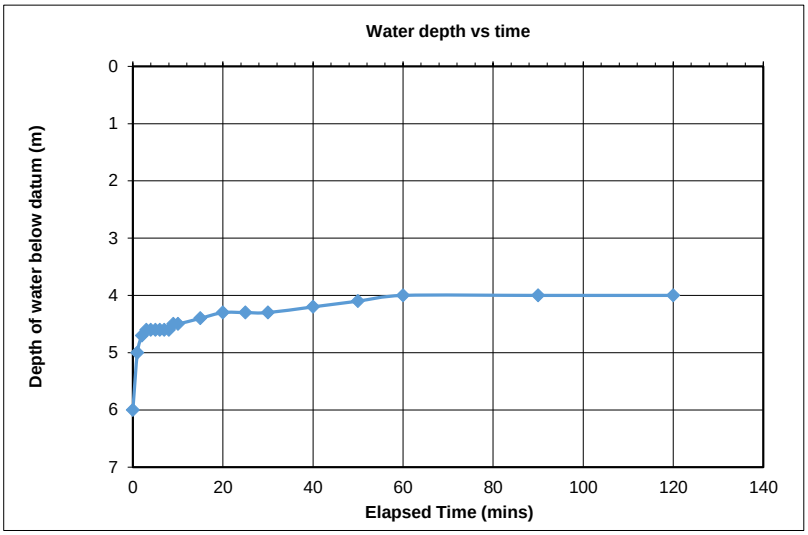
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Checked by:	HP	Project No:	K0525	**BH205**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

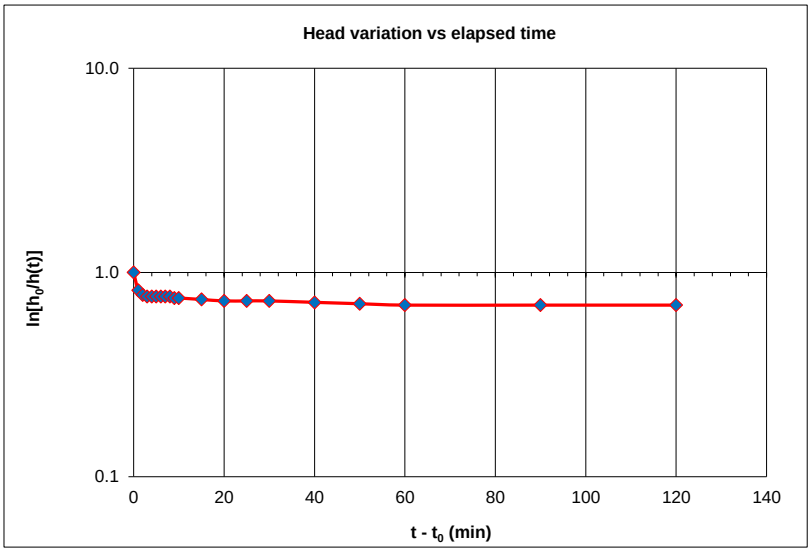
Variable Head Permeability Test Results

Date:	14/02/2024	Static water level (m)	4.30	Time (t_0)	0	mins
Test no:	1	Internal diameter *(D)* (m)	0.20	Time (t)	120	mins
Carried out by:	AS	Depth of borehole below ground level (m)	10.50			
Ground level:	4.53	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length of standpipe above ground level (m)	0.30	Initial head (h_0) at (t_0)	4.50	m
		Water level at start of test (m)	6.00	Final head (h(t)) at (t)	6.50	m
Test type:	Rising	Top of response zone (m)	9.00	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	10.50	Cross sectional area *(S)*	0.03	m^2

Strata description:	Spongy black pseudo-fibrous PEAT (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	6.00	4.50
1	5.00	5.50
2	4.70	5.80
3	4.60	5.90
4	4.60	5.90
5	4.60	5.90
6	4.60	5.90
7	4.60	5.90
8	4.60	5.90
9	4.50	6.00
10	4.50	6.00
15	4.40	6.10
20	4.30	6.20
25	4.30	6.20
30	4.30	6.20
40	4.20	6.30
50	4.10	6.40
60	4.00	6.50
90	4.00	6.50
120	4.00	6.50





L/D = 7.50

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.47

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 4.62E-07 m/s

0

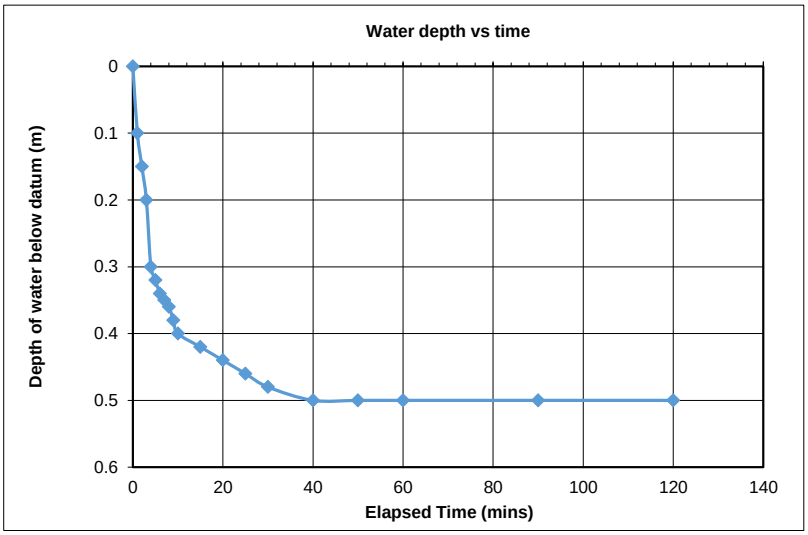
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Checked by:	HP	Project No:	K0525	**BH206**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

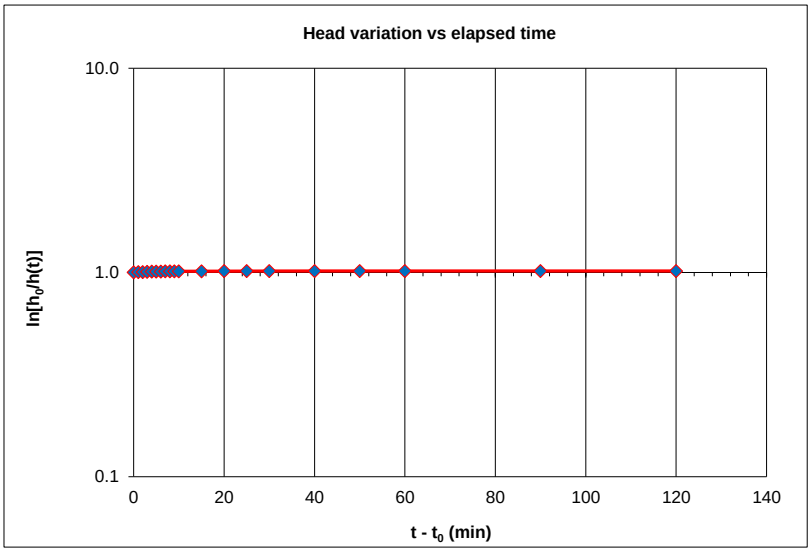
Variable Head Permeability Test Results

Date:	14/02/2024	Static water level (m)	4.30	Time (t_0)	0	mins
Test no:	2	Internal diameter *(D)* (m)	0.15	Time (t)	120	mins
Carried out by:	AS	Depth of borehole below ground level (m)	30.00			
Ground level:	4.53	Height of water above ground level (m)	0.00	Head of water		
(m OD)		Length of casing above ground level (m)	0.30	Initial head (h_0) at (t_0)	30.00	m
		Water level at start of test (m)	0.00	Final head (h(t)) at (t)	29.50	m
Test type:	Falling	Top of response zone (m)	28.50	Length of response zone *(L)*	1.50	m
Cavity type:	Cylindrical	Bottom of response zone (m)	30.00	Cross sectional area *(S)*	0.02	m^2

Strata description:	Stiff brown sandy slightly gravelly CLAY. (TIDAL FLAT DEPOSITS)

Elapsed time (mins)	Water below datum	Head of water
0	0.00	30.00
1	0.10	29.90
2	0.15	29.85
3	0.20	29.80
4	0.30	29.70
5	0.32	29.68
6	0.34	29.66
7	0.35	29.65
8	0.36	29.64
9	0.38	29.62
10	0.40	29.60
15	0.42	29.58
20	0.44	29.56
25	0.46	29.54
30	0.48	29.52
40	0.50	29.50
50	0.50	29.50
60	0.50	29.50
90	0.50	29.50
120	0.50	29.50





L/D = 10.00

Shape Factor (F) calculated according to ISO 22282-1:2012

F = 3.14

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

$$k = \frac{S \ln\left(h_0/h(t)\right)}{F(t - t_0)}$$

k = 1.31E-08 m/s

0

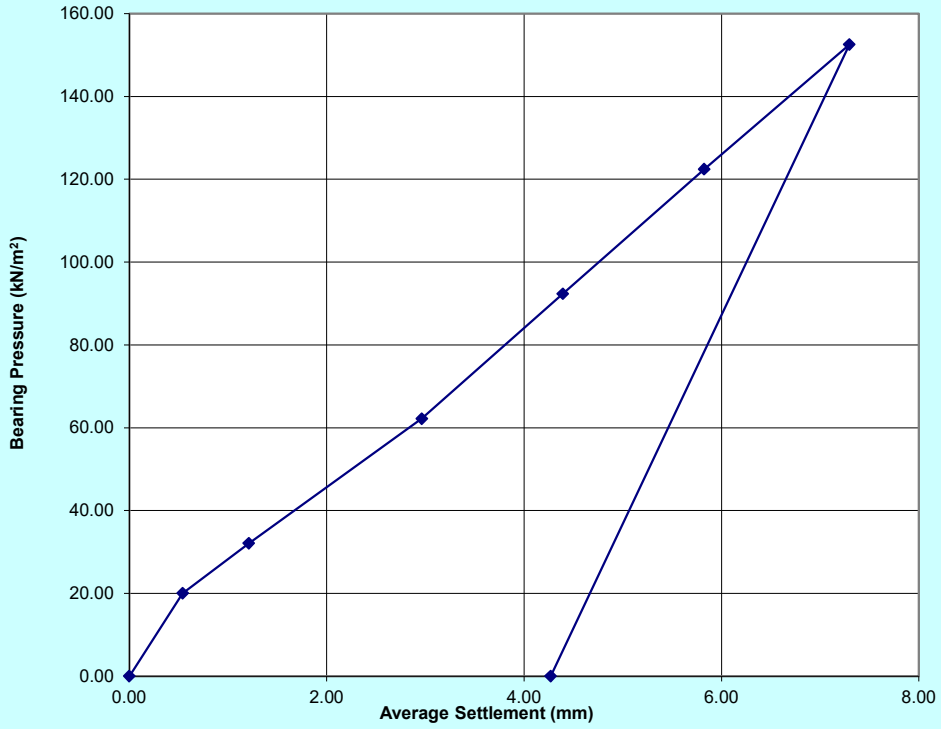
Calculated by:	EG	Project:	Protos CC	Exploratory position reference:
Checked by:	HP	Project No:	K0525	**BH206**
Issue:	DRAFT	Client:	Fichtner Consulting Engineers Ltd	

Plate Bearing Test

Project: Protos CC SI
Project No: K0525
Client: Protos ERF CC Ltd

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.273 mAOD Coordinates: 346946.901 mE 376646.444 mN	TP212	29/01/2024	Dry	Soft to firm brown mottled orangish brown silty CLAY.	460	20 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	**1.67E+04**
20.04	0.70	0.47	0.45	0.54	
32.09	1.50	0.99	1.14	1.21	
62.21	3.04	2.23	3.62	2.96	
92.33	5.19	3.59	4.40	4.39	
122.45	6.91	4.60	5.96	5.82	CBR Value %
152.57	8.56	5.65	7.67	7.29	
0.00	5.08	4.01	3.72	4.27	**1.3**

Notes: Test 0.3 mbgl

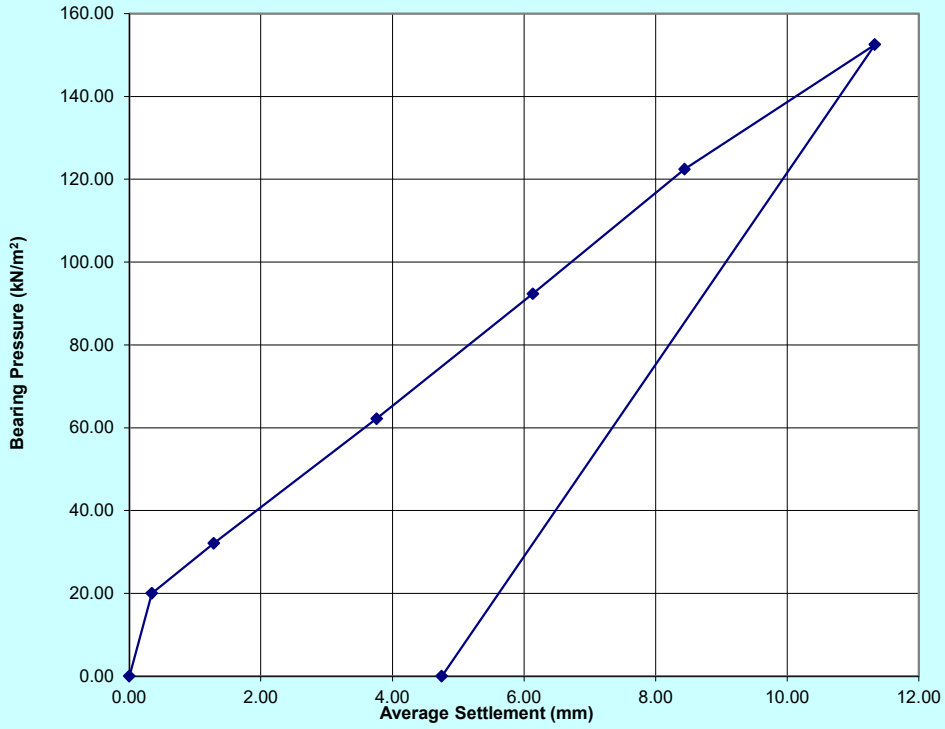
Carried out by:	Olivia Smith
Checked by:	HP

Plate Bearing Test

Project: Protos CC SI
Project No: K0525
Client: Protos ERF CC Ltd

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.501 mAOD Coordinates: 346998.292 mE 376704.758 mN	TP213	01/02/2023	Dry	Firm grey mottled orangish brown slightly sandy CLAY.	460	13 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	
20.04	0.36	0.37	0.30	0.34	**1.61E+04**
32.09	1.20	1.83	0.82	1.28	
62.21	3.10	4.46	3.72	3.76	
92.33	5.06	6.93	6.41	6.13	
122.45	7.10	9.21	9.00	8.44	CBR Value %
152.57	9.67	12.10	12.22	11.33	
0.00	2.86	5.74	5.64	4.75	**1.2**

Notes: Test 0.5 mbgl

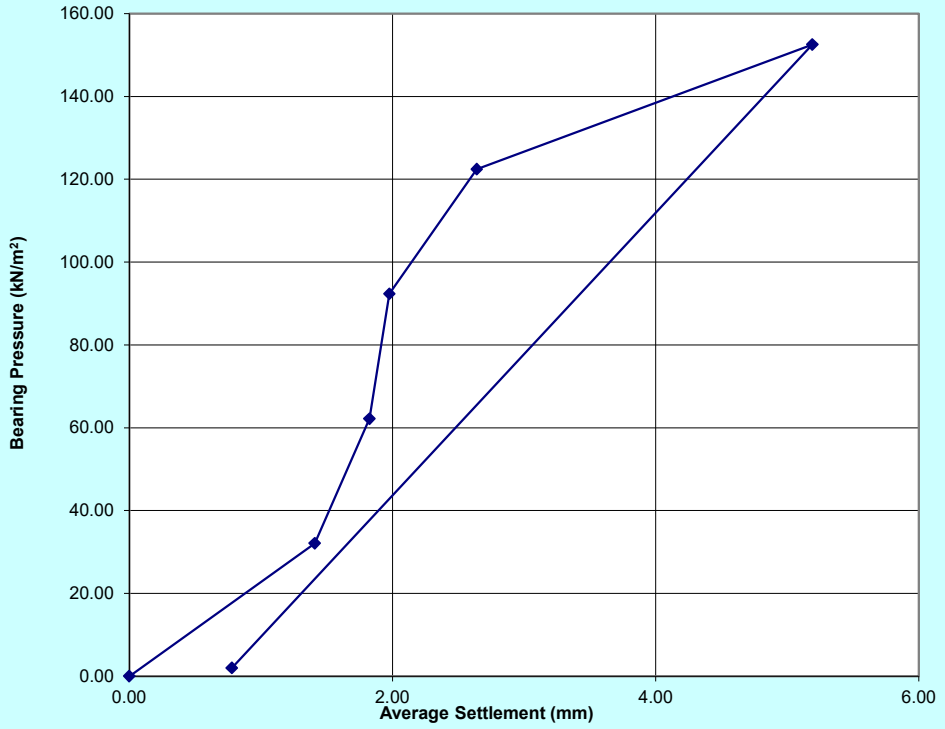
Carried out by:	Edward Gray
Checked by:	HP

Plate Bearing Test

Project: Protos CC SI **Client:** Protos ERF CC Ltd
Project No: K0525

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.352 mAOD Coordinates: 346884.953 mE 376632.998 mN	TP214	29/01/2024	Dry	Soft to firm light brown silty CLAY.	460	13 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	
32.09	1.57	1.59	1.07	1.41	**1.45E+04**
62.21	1.93	1.72	0.00	1.83	
92.33	2.97	1.90	1.06	1.98	
122.45	3.29	3.10	1.53	2.64	
152.57	7.94	4.54	3.09	5.19	CBR Value %
1.97	7.94	-3.41	-2.19	0.78	
					1.0

Notes: Test 0.3 mbgl

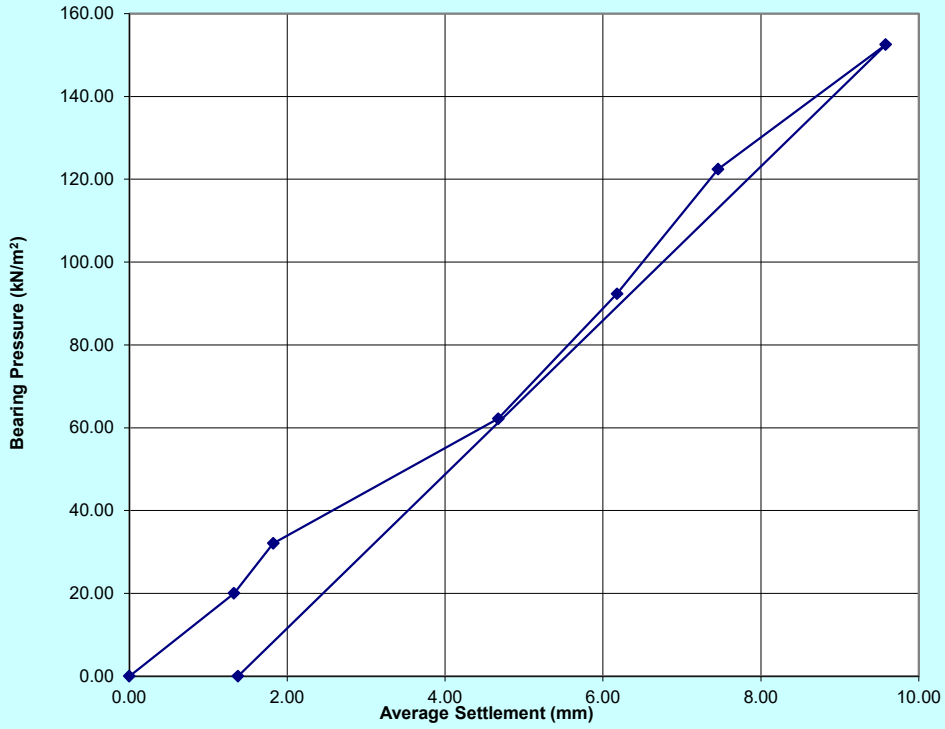
Carried out by:	Olivia Smith
Checked by:	HP

Plate Bearing Test

Project: Protos CC SI
Project No: K0525
Client: Protos ERF CC Ltd

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.496 mAOD Coordinates: 347009.037 mE 376667.835 mN	TP215	30/01/2024	Dry	Soft light brown silty CLAY.	460	13 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	
20.04	1.24	0.98	1.76	1.33	**9.59E+03**
32.09	1.49	1.11	2.87	1.82	
62.21	5.13	5.22	3.67	4.67	
92.33	7.86	6.30	4.37	6.18	
122.45	10.10	7.10	5.17	7.46	CBR Value %
152.57	13.39	9.05	6.30	9.58	
0.00	5.81	1.26	-2.94	1.38	**0.5**

Notes: Test 0.3 mbgl

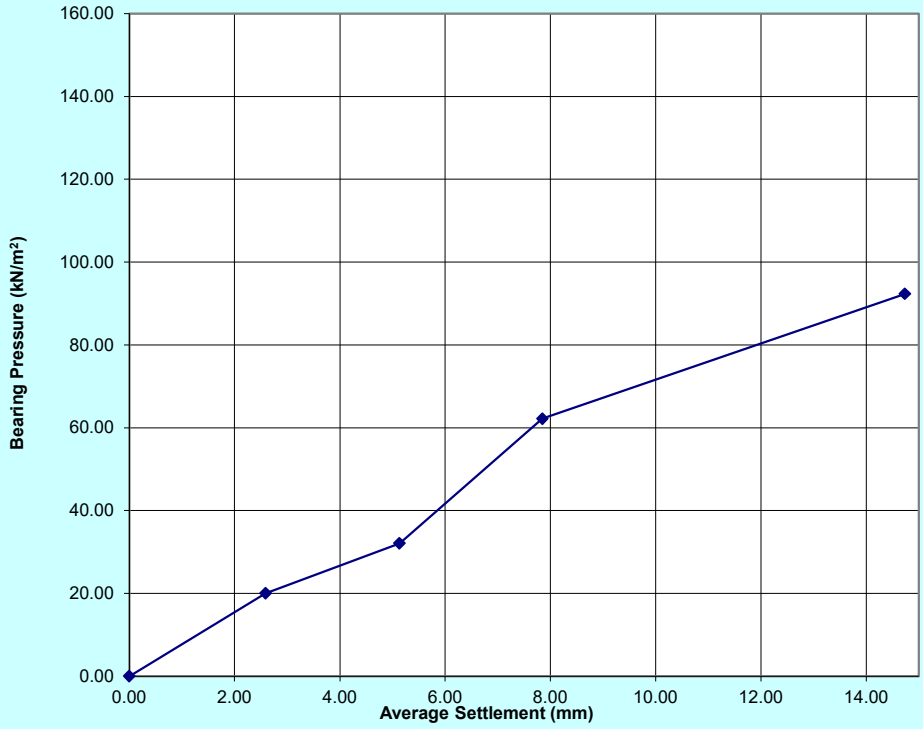
Carried out by:	Olivia Smith
Checked by:	HP

Plate Bearing Test

Project: Protos CC SI
Project No: K0525
Client: Protos ERF CC Ltd

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.315 mAOD Coordinates: 346981.748 mE 376580.878 mN	TP216	31/01/2024	Dry	Very soft to soft brown mottled orangish brown silty CLAY. Occassional fine subrounded gravel of siltstone.	460	13 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	
20.04	2.41	2.44	2.92	2.59	**4.92E+03**
32.09	5.19	5.14	5.07	5.13	
62.21	5.49	11.98	6.08	7.85	
92.33	0.00	14.73	0.00	14.73	
122.45	0.00	0.00	0.00	0.00	CBR Value %
152.57	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	**0.2**

Notes: Test 0.3 mbgl

NB: Greater loads were applied than those illustrated above, however settlement was greater than the maximum range of the dial gauge(s) used.

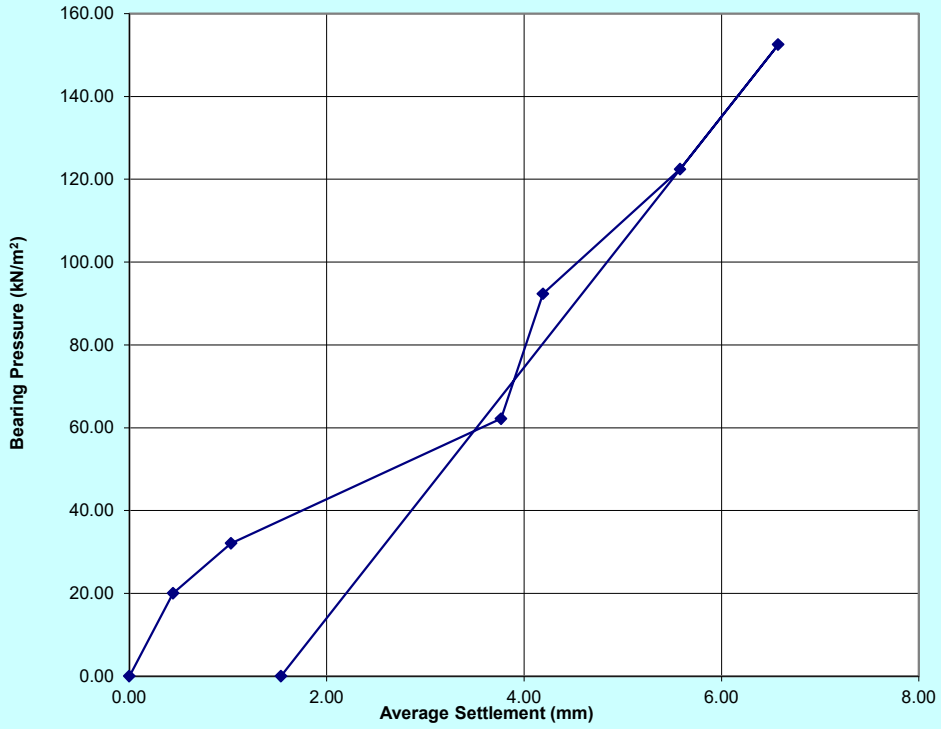
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Checked by:	HP

Plate Bearing Test

Project: Protos CC SI
Project No: K0525
Client: Protos ERF CC Ltd

Test Method: BS1377:1990 Part 9 and IAN 73/06 rev.1

Location	Test No	Date	Weather	Description of Material	Diameter of Plate (mm)	Reaction Load
Ground Level: 4.477 mAOD Coordinates: 346920.313 mE 376572.732 mN	TP217	30/01/2024	Dry	Soft light brown silty CLAY.	460	13 tonnes



Applied Bearing Pressure (kN/m²)	Settlement at Applied Bearing Pressure (mm)				Modulus of Subgrade Reaction K^{762} (kN/m²/m)
	1	2	3	**Mean**	
0.00	0.00	0.00	0.00	0.00	
20.04	0.46	0.23	0.64	0.44	**1.75E+04**
32.09	0.76	0.87	1.46	1.03	
62.21	4.43	2.61	4.26	3.77	
92.33	5.25	3.00	4.32	4.19	
122.45	6.50	4.52	5.72	5.58	CBR Value %
152.57	7.83	5.32	6.57	6.57	
0.00	4.62	-1.51	1.50	1.54	**1.4**

Notes: Test 0.3 mbgl

Carried out by:	Olivia Smith
Checked by:	HP

Resistivity Testing for Earthing Design

Site	**Protos CC**
Project No.	**K0525**
Date	**12/02/2024**
Test No	**SV01**
Test Location E	**346889.536m**
Test Location N	**376604.316m**
Level (AOD)	**5.27m**
Test 1 Orientation	**North-South**
Test 2 Orientation	**North South (Parallel)**
Weather	**Clear/Dry. Strong Winds**

Wenner Method of Soil Resistivity

Spacing (m)	Test 1 Resistance (Ohm)	Test 2 Resistance (Ohm)
0.5	11.700	11.600
1.0	4.130	4.420
1.5	2.100	3.190
2.0	1.190	1.170
3.0	0.520	0.480
4.5	0.170	0.160
6.0	0.090	0.100
9.0	0.060	0.050
13.5	0.040	0.040
18.0	0.030	0.030

Notes

Dry ground conditions.

Wet ground on northern 18m spacing probe.

Maximum space available fully used.

Resistivity Testing for Earthing Design

Site	**Protos CC**
Project No.	**K0525**
Date	**12/02/2024**
Test No	**SV02**
Test Location E	**346927.9m**
Test Location N	**376647.825m**
Level (AOD)	**4.629m**
Test 1 Orientation	**North-South**
Test 2 Orientation	**West-East (Cross Traverse)**
Weather	**Clear/Dry. Strong Winds**

Wenner Method of Soil Resistivity

Spacing (m)	Test 1 Resistance (Ohm)	Test 2 Resistance (Ohm)
0.5	10.100	10.300
1.0	4.820	4.800
1.5	2.260	2.250
2.0	1.040	1.050
3.0	0.360	0.370
4.5	0.160	0.110
6.0	0.080	0.080

Notes

Dry ground conditions.

Maximum space available fully used.

Resistivity Testing for Earthing Design

Site	**Protos CC**
Project No.	**K0525**
Date	**12/02/2024**
Test No	**SV03**
Test Location E	**346902.615m**
Test Location N	**376667.705m**
Level (AOD)	**4.366m**
Test 1 Orientation	**West-East**
Test 2 Orientation	**West-East (Parallel)**
Weather	**Clear/Dry. Strong Winds**

Wenner Method of Soil Resistivity

Spacing (m)	Test 1 Resistance (Ohm)	Test 2 Resistance (Ohm)
0.5	9.220	9.340
1.0	4.700	4.800
1.5	2.290	2.200
2.0	0.910	0.950
3.0	0.330	0.340
4.5	0.190	0.170
6.0	0.090	0.100
9.0	0.060	0.060

Notes

Dry ground conditions.

Maximum space available fully used.

Resistivity Testing for Earthing Design

Site	**Protos CC**
Project No.	**K0525**
Date	**15/02/2024**
Test No	**SV04**
Test Location E	**347016.382m**
Test Location N	**376652.718m**
Level (AOD)	**4.622m**
Test 1 Orientation	**North-South**
Test 2 Orientation	**North South (Parallel)**
Weather	**Clear/Dry**

Wenner Method of Soil Resistivity

Spacing (m)	Test 1 Resistance (Ohm)	Test 2 Resistance (Ohm)
0.5	13.20	13.16
1.0	5.43	5.44
1.5	2.28	2.29
2.0	1.44	1.42
3.0	0.54	0.54
4.5	0.20	0.19
6.0	0.09	0.09
9.0	0.06	0.06
13.5	0.05	0.05
18.0	0.05	0.04
27.0	0.04	0.04

Notes

Wet ground conditions.

Maximum space available fully used.

Resistivity Testing for Earthing Design

Site	**Protos CC**
Project No.	**K0525**
Date	**15/02/2024**
Test No	**SV05**
Test Location E	**347026.277m**
Test Location N	**376606.102m**
Level (m AOD)	**4.790m**
Test 1 Orientation	**North-South**
Test 2 Orientation	**West-East (Cross Traverse)**
Weather	**Rain**

Wenner Method of Soil Resistivity

Spacing (m)	Test 1 Resistance (Ohm)	Test 2 Resistance (Ohm)
0.5	26.00	25.90
1.0	10.70	10.80
1.5	4.99	5.00
2.0	2.52	2.52
3.0	1.01	1.02
4.5	0.23	0.30

Notes

Dry ground conditions.

Maximum space available fully used.

Trial Pit Soakaway Test

Based on BRE DG 365:2016

Project	Protos CC	Status	LOCATION ID
Project ID	K0525	PRELIMINARY	TP213

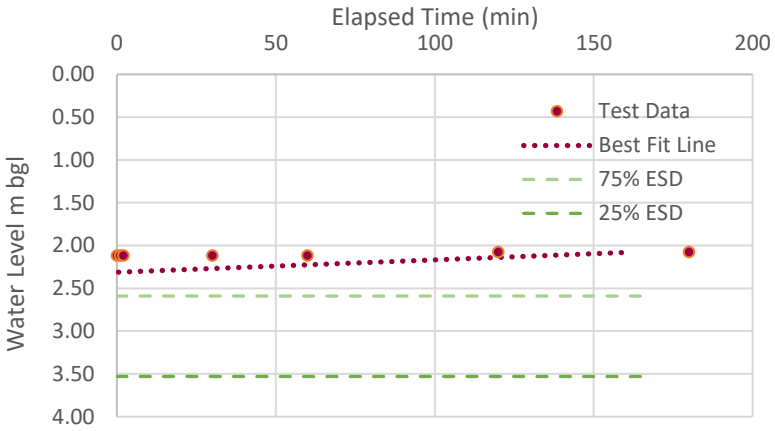
Trial Pit Details

	Test 1	Test 2	Test 3				
Depth	4.00			Ground Level	4.50	mAOD	Date Excavated 01/02/2024
Width	0.60			Coordinates	346998.29	mE	Date Tested 01/02/2024
Length	2.00				376704.76	mN	

Test 1

Time min	Depth to Water m bgl
0	2.12
1	2.12
2	2.12
30	2.12
60	2.12
120	2.08
180	2.08

Test Parameters	
75% esd (mbgl)	2.59
50% esd (mbgl)	3.06
25% esd (mbgl)	3.53
A_{s50} (m^2)	6.09
V_{p75-25} (m^3)	1.13
t_{75} (min)	1.0E-03
t_{25}(min)	Not reached
Data Fit R^2	0.488



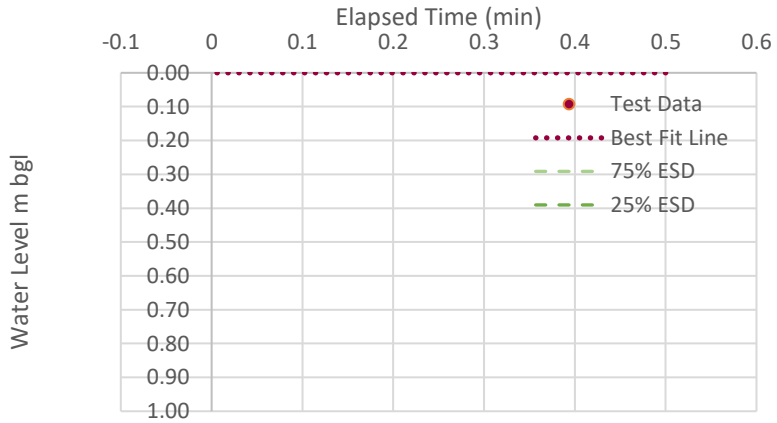
Infiltration rate f (ms^{-1}) **INSUFFICIENT INFILTRATION**

Total effective storage depth (esd) (m) 1.88

Test 2

Time min	Depth to Water m bgl

Test Parameters	
75% esd (mbgl)	
50% esd (mbgl)	
25% esd (mbgl)	
A_{s50} (m^2)	
V_{p75-25} (m^3)	
t_{75} (min)	
t_{25}(min)	
Data Fit R^2	



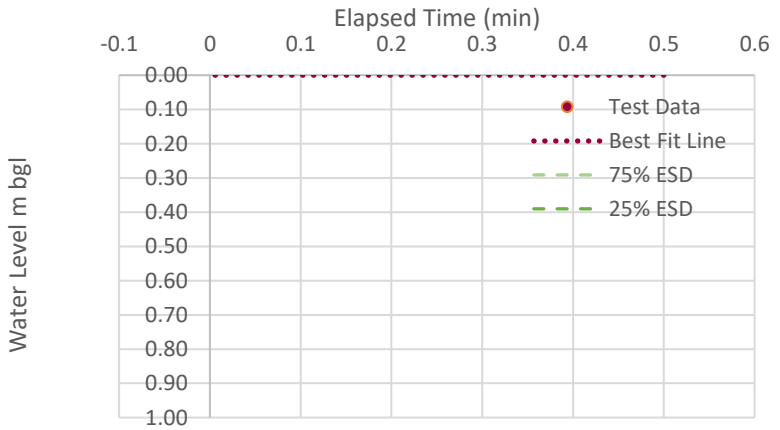
Infiltration rate f (ms^{-1}) **NO VALID DATA**

Total effective storage depth (esd) (m)

Test 3

Time min	Depth to Water m bgl

Test Parameters	
75% esd (mbgl)	
50% esd (mbgl)	
25% esd (mbgl)	
A_{s50} (m^2)	
V_{p75-25} (m^3)	
t_{75} (min)	
t_{25}(min)	
Data Fit R^2	



Infiltration rate f (ms^{-1}) **NO VALID DATA**

Total effective storage depth (esd) (m) 0.00

Carried out by	Notes:	Logged	Checked
Ayesa	Dry. No groundwater detected but surface water ingress was observed. Test not repeated due to slow infiltration.	EG	HP

Trial Pit Soakaway Test

Based on BRE DG 365:2016

Project	Protos CC	Status	LOCATION ID
Project ID	K0525	PRELIMINARY	TP217

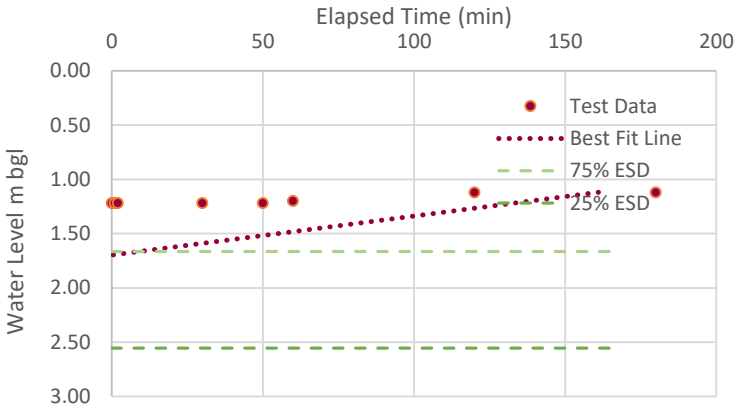
Trial Pit Details

	Test 1	Test 2	Test 3				
Depth	3.00			Ground Level	4.48	mAOD	Date Excavated 02/02/2024
Width	0.60			Coordinates	346920.31	mE	Date Tested 02/02/2024
Length	2.00				376572.73	mN	

Test 1

Time min	Depth to Water m bgl
0	1.22
1	1.22
2	1.22
30	1.22
50	1.22
60	1.20
120	1.12
180	1.12

Test Parameters	
75% esd (mbgl)	1.67
50% esd (mbgl)	2.11
25% esd (mbgl)	2.56
A_{s50} (m^2)	5.83
V_{p75-25} (m^3)	1.07
t_{75} (min)	6.4E-01
t_{25}(min)	Not reached
Data Fit R^2	0.452



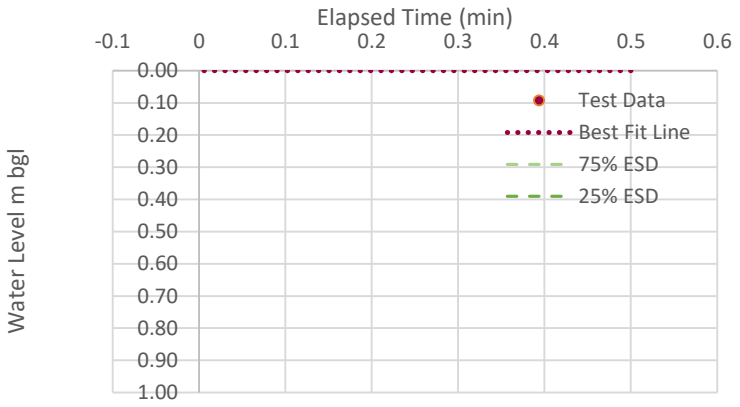
Infiltration rate f (ms^{-1}) **INSUFFICIENT INFILTRATION**

Total effective storage depth (esd) (m) 1.78

Test 2

Time min	Depth to Water m bgl

Test Parameters	
75% esd (mbgl)	
50% esd (mbgl)	
25% esd (mbgl)	
A_{s50} (m^2)	
V_{p75-25} (m^3)	
t_{75} (min)	
t_{25}(min)	
Data Fit R^2	



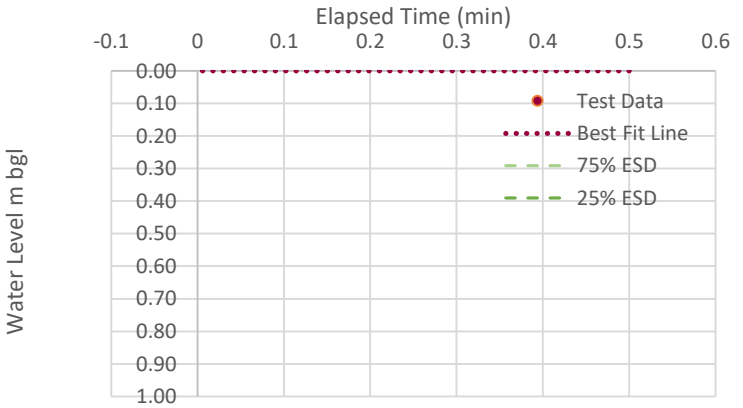
Infiltration rate f (ms^{-1}) **NO VALID DATA**

Total effective storage depth (esd) (m)

Test 3

Time min	Depth to Water m bgl

Test Parameters	
75% esd (mbgl)	
50% esd (mbgl)	
25% esd (mbgl)	
A_{s50} (m^2)	
V_{p75-25} (m^3)	
t_{75} (min)	
t_{25}(min)	
Data Fit R^2	



Infiltration rate f (ms^{-1}) **NO VALID DATA**

Total effective storage depth (esd) (m) 0.00

Carried out by	Notes:	Logged	Checked
Ayesa	Dry. Slow groundwater seepage at 1.1m bgl. Test not repeated due to slow infiltration.	EG	HP

Appendix F – Monitoring Records

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No: K0102

GROUNDWATER AND GROUND GAS MONITORING

Site: Protos Carbon Capture

Location	Date	Monitored by	Well Details		Groundwater		Gas											Weather		Comments
			Standpipe diameter (mm)	Depth to Base (m bgl)	Water Depth (m bgl)	Water Sample Taken?	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (mb)	Flow (l/h)	CH_4 (% v/v)	GSV CH_4 (l/hr)	CO_2 (% v/v)	GSV CO_2 (l/hr)	O_2 (% v/v)	CO (ppm)	H2S (ppm)	Conditions	Ambient Temp °C	
BH202	04/03/24	AS	50	13.25	0.05	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	13.30	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
			50																	
BH204	04/03/24	AS	50	40.00	0.00	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	40.00	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
			50																	
BH207	04/03/24	AS	50	24.50	0.00	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	24.30	0.20	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
			50																	

NOTES:
NM = Not Measured.
(x) = Peak value recorded.
[grey] = Below detection limit.

GSV (l/HR) = $\frac{\text{[gas concentration (\%v/v)] x [gas well flow rate (l/hr)}}{100}$

No: K0525

GROUNDWATER AND GROUND GAS MONITORING

Site: Protos Carbon Capture

Location	Date	Monitored by	Well Details		Groundwater		Gas											Weather		Comments
			Standpipe diameter (mm)	Depth to Base (m bgl)	Water Depth (m bgl)	Water Sample Taken?	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (mb)	Flow (l/h)	CH_4 (% v/v)	GSV CH_4 (l/hr)	CO_2 (% v/v)	GSV CO_2 (l/hr)	O_2 (% v/v)	CO (ppm)	H2S (ppm)	Conditions	Ambient Temp °C	
BH202	04/03/24	AS	50	13.25	0.05	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	13.30	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
	11/04/24	EG	50	13.30	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	18	
BH204	04/03/24	AS	50	40.00	0.00	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	40.00	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
	11/04/24	EG	50	40.00	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	18	
BH207	04/03/24	AS	50	24.50	0.00	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	8	Insufficent head space for gas monitoring
	18/03/24	EG	50	24.30	0.20	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	11	
	11/04/24	EG	50	24.30	0.10	Yes	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Dry	18	

NOTES:
NM = Not Measured.
(x) = Peak value recorded.
[grey] = Below detection limit.

$$GSV\ (l/HR) = \frac{[\text{gas concentration (\%v/v)}] \times [\text{gas well flow rate (l/hr)}]}{100}$$

Appendix G – Geotechnical Laboratory Testing Results

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envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/02474
Issue Number: 1 **Date:** 19 March, 2024

Client:
Murray Rix (Northern) Ltd
Andrew House
Hadfield Street
Dukinfield
Dukinfield
SK16 4QX

Project Manager: Enquires/Matt/Owain Davies
Project Name: Protos Carbon
Project Ref: Not specified
Order No: 24/099
Date Samples Received: 08/03/24
Date Instructions Received: 11/03/24
Date Analysis Completed: 18/03/24

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Envirolab Job Number: 24/02474

Client Project Name: Protos Carbon

Client Project Ref: Not specified

Lab Sample ID	24/02474/1	24/02474/2	24/02474/3	24/02474/4	24/02474/5	24/02474/6	24/02474/7	Units	Limit of Detection	Method ref
Client Sample No	435102	435106	435107	435109	435113	435114	435122			
Client Sample ID	BH202	BH202	BH203	BH203	BH204	BH204	BH205			
Depth to Top	2.00	27.00	2.00	9.00	2.00	4.00	4.00			
Depth To Bottom	2.45	27.45		9.45	2.45	4.45	4.45			
Date Sampled	01-Feb-24	01-Feb-24	01-Feb-24	01-Feb-24	01-Feb-24	01-Feb-24	01-Feb-24			
Sample Type	SOIL - U	SOIL - U	SOIL - U	SOIL - U	SOIL - U	SOIL - U	SOIL - U			
Sample Matrix Code	6E	3	6E	6E	6E	3	3			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	7.18	8.60	6.97	6.58	7.14	8.58	8.40	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	1780	46	1900	2620	691	218	227	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.61	0.04	0.64	0.81	0.27	0.10	0.14	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	2.35	0.03	2.06	1.56	0.84	0.36	0.67	% w/w	0.01	A-T-024s

Envirolab Job Number: 24/02474

Client Project Name: Protos Carbon

Client Project Ref: Not specified

Lab Sample ID	24/02474/8	24/02474/9	24/02474/10	24/02474/11				Units	Limit of Detection	Method ref
Client Sample No	435133	435144	435147	435154						
Client Sample ID	BH206	TP212	TP213	TP217						
Depth to Top	4.00	0.45	1.30	2.00						
Depth To Bottom	4.45	0.55		2.40						
Date Sampled	01-Feb-24	01-Feb-24	01-Feb-24	01-Feb-24						
Sample Type	SOIL - U	SOIL - B	SOIL - B	SOIL - B						
Sample Matrix Code	3E	6	6E	6E						
% Stones >10mm$_A$	<0.1	0.2	<0.1	<0.1				% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	7.87	7.70	6.20	6.58				pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	528	46	2740	201				mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	0.24	0.04	1.00	0.48				% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	1.32	0.04	2.57	2.03				% w/w	0.01	A-T-024s

Report Notes

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and Interpretations expressed are outside our scope of accreditation.
The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "^"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
N/A	Not applicable

Asbestos
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs
Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.					

Soil Chemical Analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Murray Rix (Northern) Ltd, Andrew House , Hadfield Street, Dukinfield , Dukinfield, SK16 4QX

Project: Protos Carbon

Clients Project No:

Project No: 24/02474

Date Received: 11/03/2024 (am)

Cool Box Temperatures (°C): 12.3

Lab Sample ID	24/02474/1	24/02474/2	24/02474/3	24/02474/4	24/02474/5	24/02474/6	24/02474/7	24/02474/8	24/02474/9	24/02474/10	24/02474/11
Client Sample No	435102	435106	435107	435109	435113	435114	435122	435133	435144	435147	435154
Client Sample ID/Depth	BH202 2.00-2.45m	BH202 27.00-27.45m	BH203 2.00m	BH203 9.00-9.45m	BH204 2.00-2.45m	BH204 4.00-4.45m	BH205 4.00-4.45m	BH206 4.00-4.45m	TP212 0.45-0.55m	TP213 1.30m	TP217 2.00-2.40m
Date Sampled	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24
Deviation Code											
F	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	24/02474/1	24/02474/2	24/02474/3	24/02474/4	24/02474/5	24/02474/6	24/02474/7	24/02474/8	24/02474/9	24/02474/10	24/02474/11
Client Sample No	435102	435106	435107	435109	435113	435114	435122	435133	435144	435147	435154
Client Sample ID/Depth	BH202 2.00-2.45m	BH202 27.00-27.45m	BH203 2.00m	BH203 9.00-9.45m	BH204 2.00-2.45m	BH204 4.00-4.45m	BH205 4.00-4.45m	BH206 4.00-4.45m	TP212 0.45-0.55m	TP213 1.30m	TP217 2.00-2.40m
Date Sampled	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24
Sulphate BRE (water sol 2:1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sulphate BRE (acid sol)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	24/02474/1	24/02474/2	24/02474/3	24/02474/4	24/02474/5	24/02474/6	24/02474/7	24/02474/8	24/02474/9	24/02474/10	24/02474/11
Client Sample No	435102	435106	435107	435109	435113	435114	435122	435133	435144	435147	435154
Client Sample ID/Depth	BH202 2.00-2.45m	BH202 27.00-27.45m	BH203 2.00m	BH203 9.00-9.45m	BH204 2.00-2.45m	BH204 4.00-4.45m	BH205 4.00-4.45m	BH206 4.00-4.45m	TP212 0.45-0.55m	TP213 1.30m	TP217 2.00-2.40m
Date Sampled	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24	01/02/24
A-T-024s	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024
A-T-026s	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
A-T-028s	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024	15/03/2024
A-T-031s	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
A-T-044	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/02655
Issue Number: 1 **Date:** 21 March, 2024

Client:
Murray Rix (Northern) Ltd
Andrew House
Hadfield Street
Dukinfield
Dukinfield
SK16 4QX

Project Manager: Matt/Owain Davies
Project Name: Protos Carbon
Project Ref: N/A
Order No: 24/099
Date Samples Received: 14/03/24
Date Instructions Received: 14/03/24
Date Analysis Completed: 21/03/24

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Envirolab Job Number: 24/02655

Client Project Name: Protos Carbon

Client Project Ref: N/A

Lab Sample ID	24/02655/1							Units	Limit of Detection	Method ref
Client Sample No	435119									
Client Sample ID	BH204									
Depth to Top	36.00									
Depth To Bottom	36.45									
Date Sampled	01-Feb-24									
Sample Type	SOIL - U									
Sample Matrix Code	6A									
% Stones >10mm$_A$	<0.1							% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	9.09							pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	26							mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	0.04							% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.04							% w/w	0.01	A-T-024s

Report Notes

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and Interpretations expressed are outside our scope of accreditation.
The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "^"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
N/A	Not applicable

Asbestos
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs
Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.					

Soil Chemical Analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Murray Rix (Northern) Ltd, Andrew House , Hadfield Street, Dukinfield , Dukinfield, SK16 4QX

Project: Protos Carbon

Clients Project No: N/A

Project No: 24/02655

Date Received: 14/03/2024 (am)

Cool Box Temperatures (°C): 14.7

Lab Sample ID	24/02655/1
Client Sample No	435119
Client Sample ID/Depth	BH204 36.00-36.45m
Date Sampled	01/02/24
Deviation Code	
F	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	24/02655/1
Client Sample No	435119
Client Sample ID/Depth	BH204 36.00-36.45m
Date Sampled	01/02/24
Sulphate BRE (water sol 2:1)	✓
Sulphate BRE (acid sol)	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	24/02655/1
Client Sample No	435119
Client Sample ID/Depth	BH204 36.00-36.45m
Date Sampled	01/02/24
A-T-024s	21/03/2024
A-T-026s	21/03/2024
A-T-028s	20/03/2024
A-T-031s	21/03/2024
A-T-044	19/03/2024

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

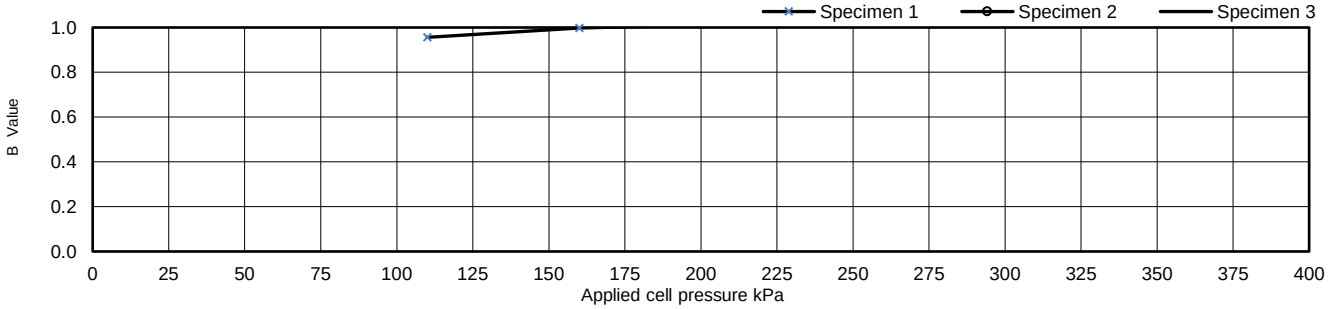
End of Report

GQF-008-42 Issue 01 - Oct 22	**Consolidated Undrained Triaxial Compression Test with measurement of pore pressure**			Job Ref	J265200
				Borehole/Pit No.	BH202
Project Name	K0525 - Protos Carbon Capture Site Investigation			Sample No.	435106
Soil Description				Depth m	27.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Very soft grey sandy clayey SILT.			KeyLAB ID	TTLP2024031920
Test Method	BS1377 : Part 8 : 1990, clauses 1 to 7				

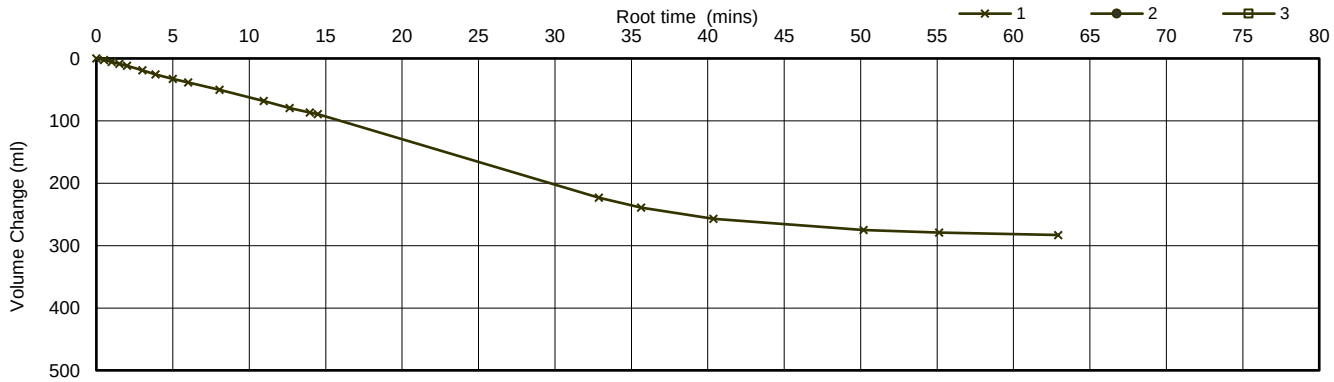
Specimen Type/Preparation	UNDISTURBED As BS 1377

Specimen Details			1	2	3
Initial	Height	mm	196.17		
	Diameter	mm	104.76		
	Bulk Density	Mg/m³	1.87		
	Water Content	%	35.8		
	Dry density	Mg/m³	1.38		
Final	Bulk Density	Mg/m³	2.04		
	Water Content	%	23.7		
	Dry density	Mg/m³	1.65		

Saturation Details		1	2	3
Method		Increments of cell pressure only		
Cell pressure increments	kPa	50		
Differential Pressure	kPa			
Final Cell Pressure	kPa	210		
Final pore water pressure	kPa			
Final B Value		1.01		



Consolidation Details	Specimen No.		1	2	3	
	Drainage Conditions		One end		#N/A	
	Cell Pressure applied		840			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		540			kPa
	Pore pressure at start of consolidation		840			kPa
	Pore pressure at end of consolidation		317			kPa
	Pore pressure dissipation at end of consolidation		97			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	11.50			m^2/year
	Coefficient of Compressibility	M_{vi}	0.32			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.1E-09			m/s



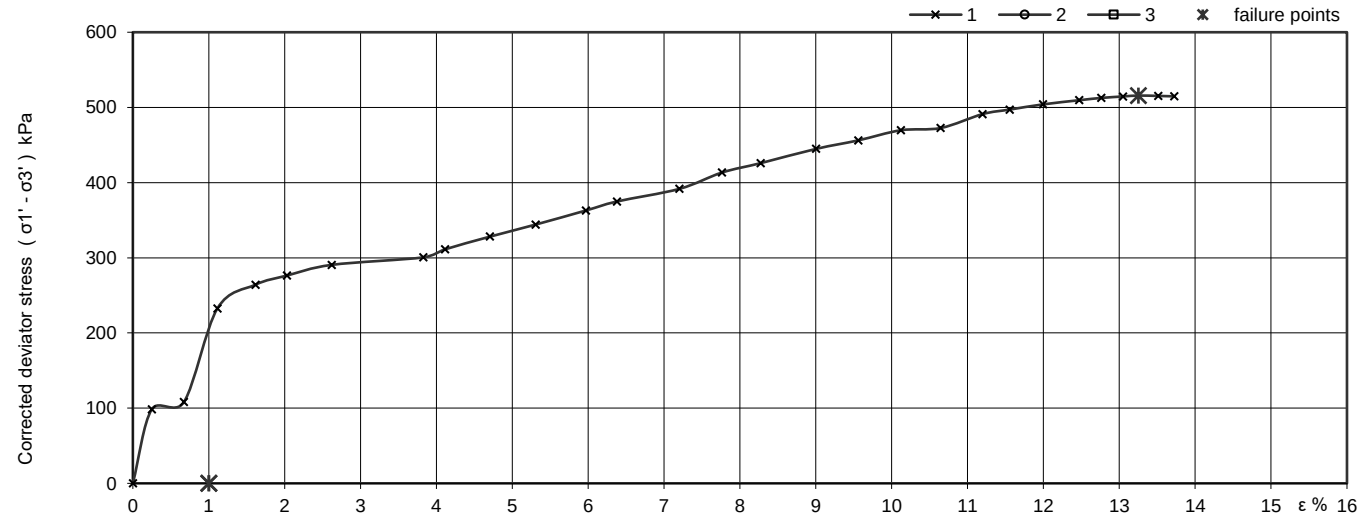
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25/03/2024

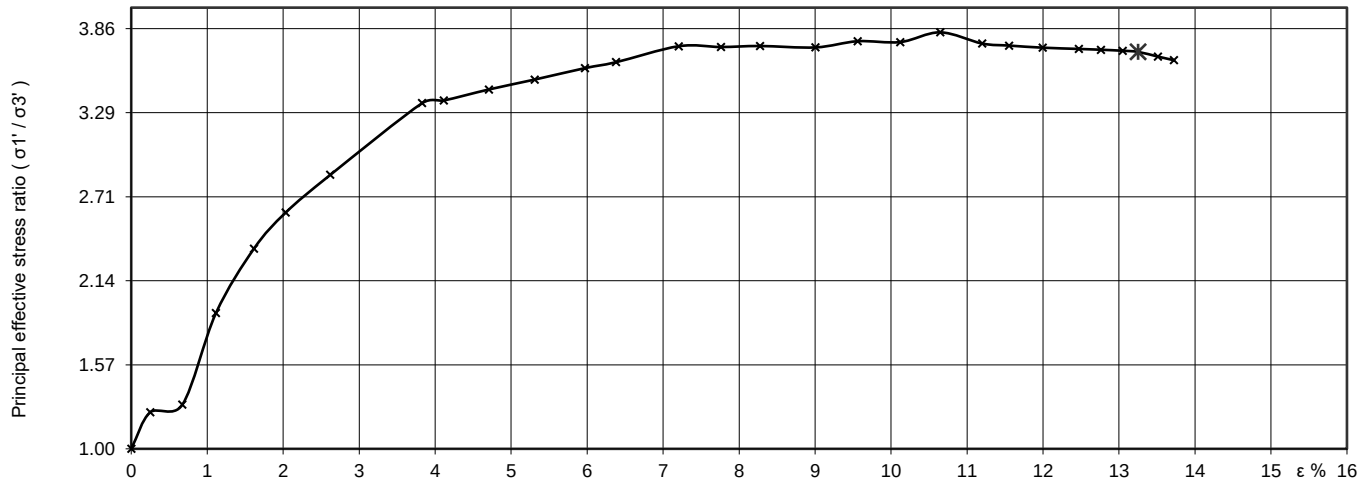
UKAS TESTING
7758

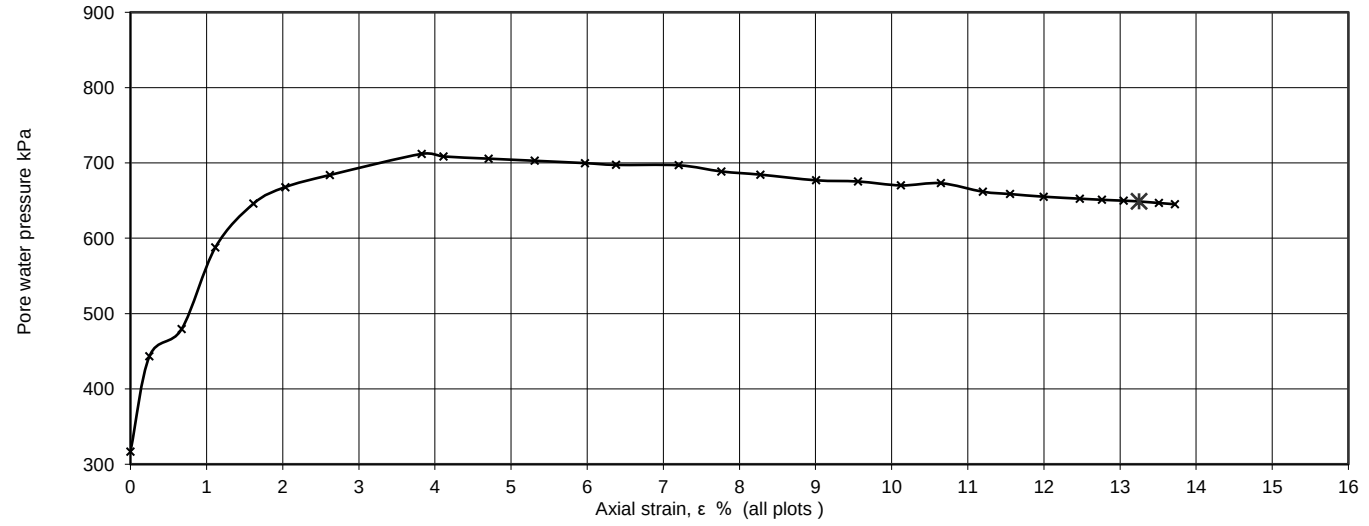
TTL

CU

	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH202
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435106
Specimen Reference		Specimen Depth		m	Depth m	27.00
Compression stages - graphical data					Sample Type	U
					KeyLAB ID	TTLP2024031920





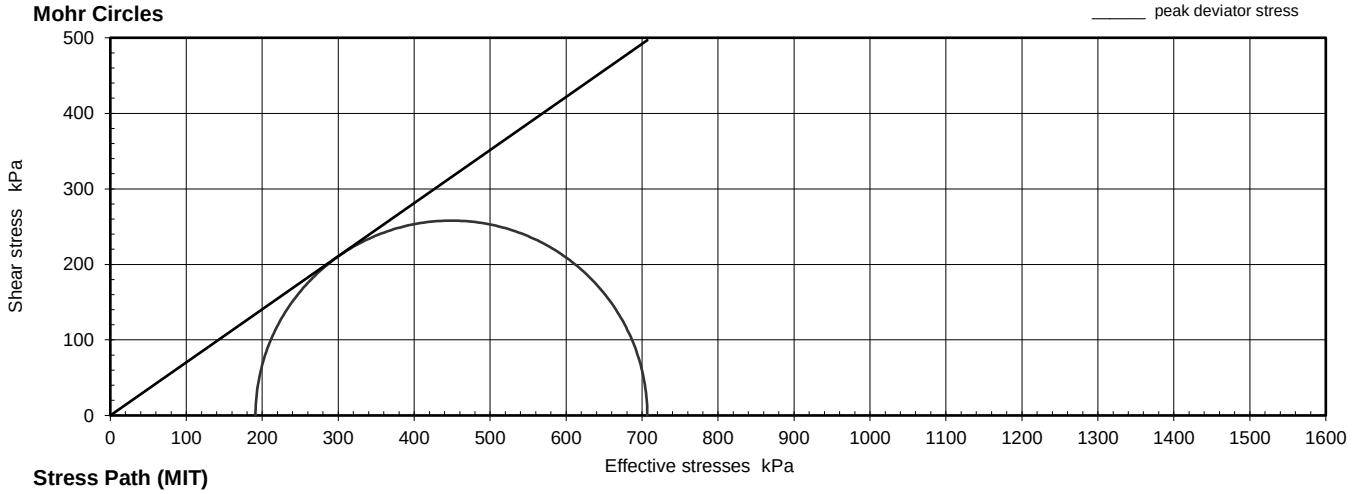


	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH202
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435106
Specimen Reference		Specimen Depth		m	Depth m	27.00
Compression stages - table of results and interpretation					Sample Type	U
					KeyLAB ID	TTLP2024031920

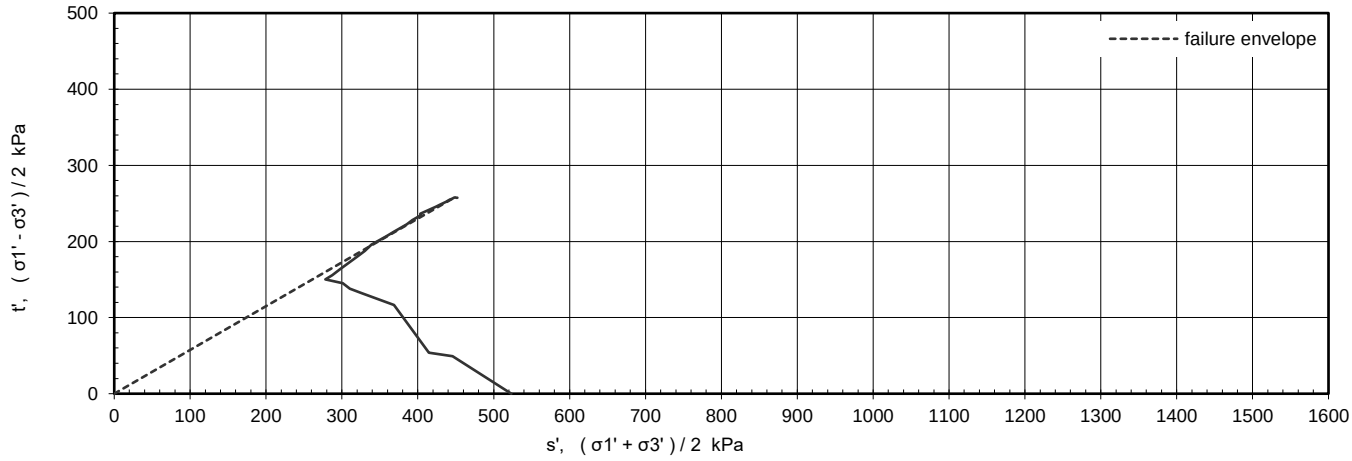
Failure criterion : Maximum deviator stress

Specimen	Cell pressure kPa	Initial pwp kPa	Initial σ_3' kPa	Rate of strain %/hr	Axial strain, ε_f %	$(\sigma_1'/\sigma_3')_f$	$(\sigma_1'-\sigma_3')_f$ kPa	u_f kPa	$\sigma_3'_f$ kPa	$\sigma_1'_f$ kPa	A_f
1	840	317	523	0.31	13.25	3.70	515.8	649	191	707	0.64
2											
3											

Mohr Circles



Stress Path (MIT)



Shear Strength Parameters			Linear regression	Manual re-assessment
At Maximum deviator stress	c '	kPa	0	-
	Ø '	degrees	35.1	-

Mode of failure



Compound

Remarks

General

Deviator stresses corrected for area change, and up to0.396 mm thick rubber membrane.

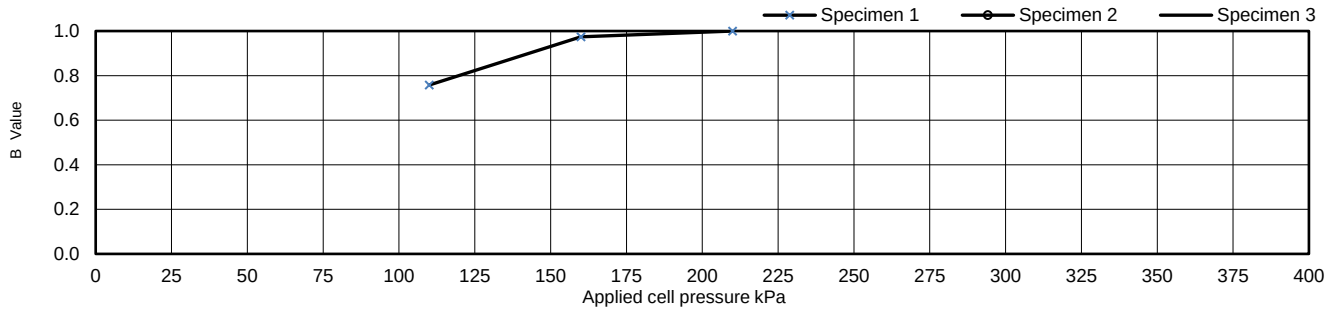
All symbols used above are defined in BS1377

GQF-008-42 Issue 01 - Oct 22	**Consolidated Undrained Triaxial Compression Test with measurement of pore pressure**			Job Ref	J265200
				Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation			Sample No.	435113
Soil Description				Depth m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Soft to firm dark brown organic CLAY.			KeyLAB ID	TTLP2024031921
Test Method	BS1377 : Part 8 : 1990, clauses 1 to 7				

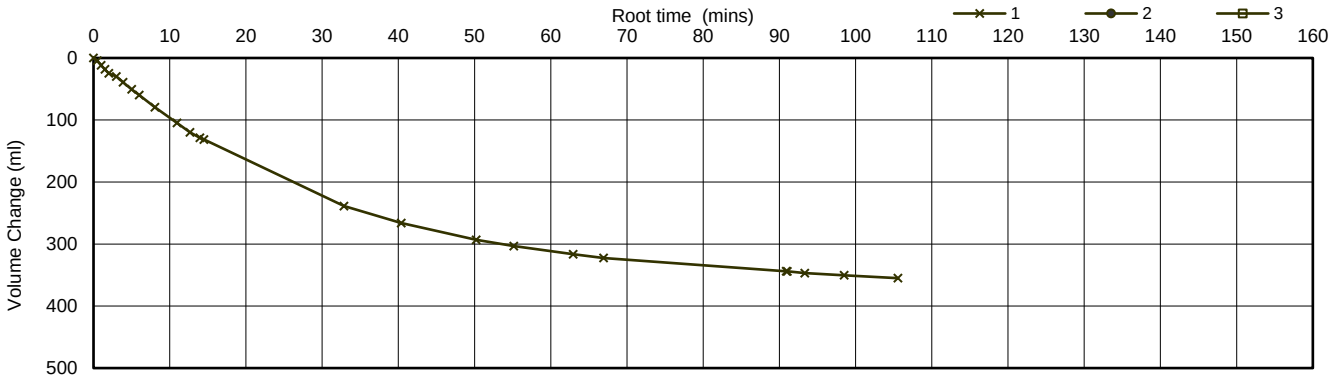
Specimen Type/Preparation	UNDISTURBED As BS 1377

Specimen Details			1	2	3
Initial	Height	mm	203.66		
	Diameter	mm	100.87		
	Bulk Density	Mg/m³	1.08		
	Water Content	%	597.6		
	Dry density	Mg/m³	0.16		
Final	Bulk Density	Mg/m³	1.11		
	Water Content	%	454.4		
	Dry density	Mg/m³	0.20		

Saturation Details		1	2	3
Method		Increments of cell pressure only		
Cell pressure increments	kPa	50		
Differential Pressure	kPa			
Final Cell Pressure	kPa	210		
Final pore water pressure	kPa			
Final B Value		1.00		



Consolidation Details	Specimen No.		1	2	3	
	Drainage Conditions		Radial+1 end		#N/A	
	Cell Pressure applied		350			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		50			kPa
	Pore pressure at start of consolidation		350			kPa
	Pore pressure at end of consolidation		302			kPa
	Pore pressure dissipation at end of consolidation		95			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.14			m^2/year
	Coefficient of Compressibility	M_{vi}	4.72			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.1E-10			m/s

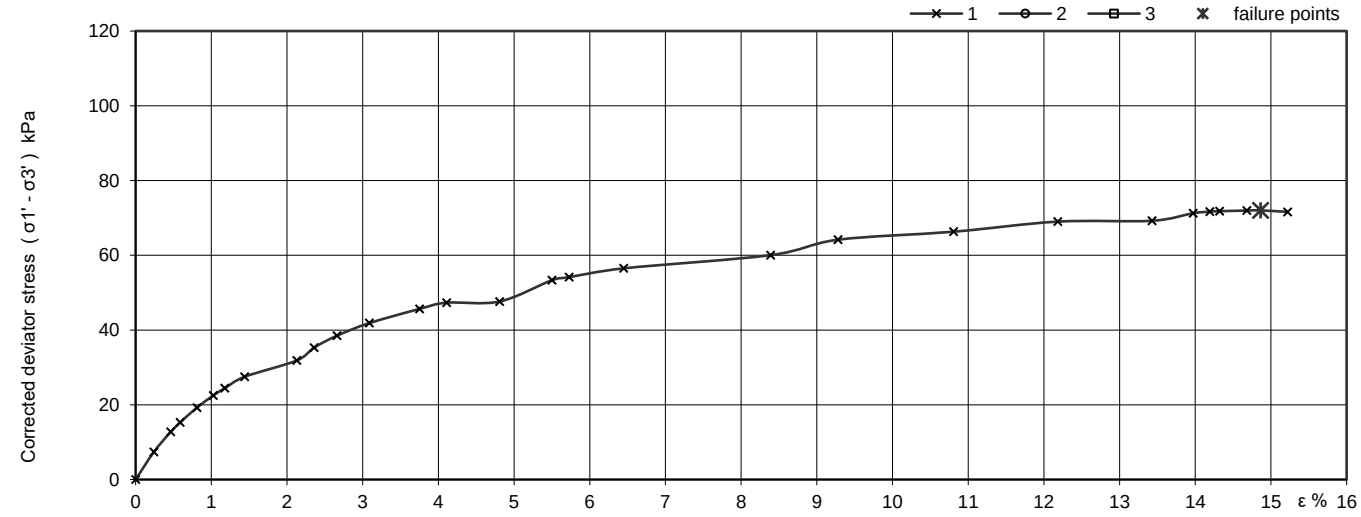


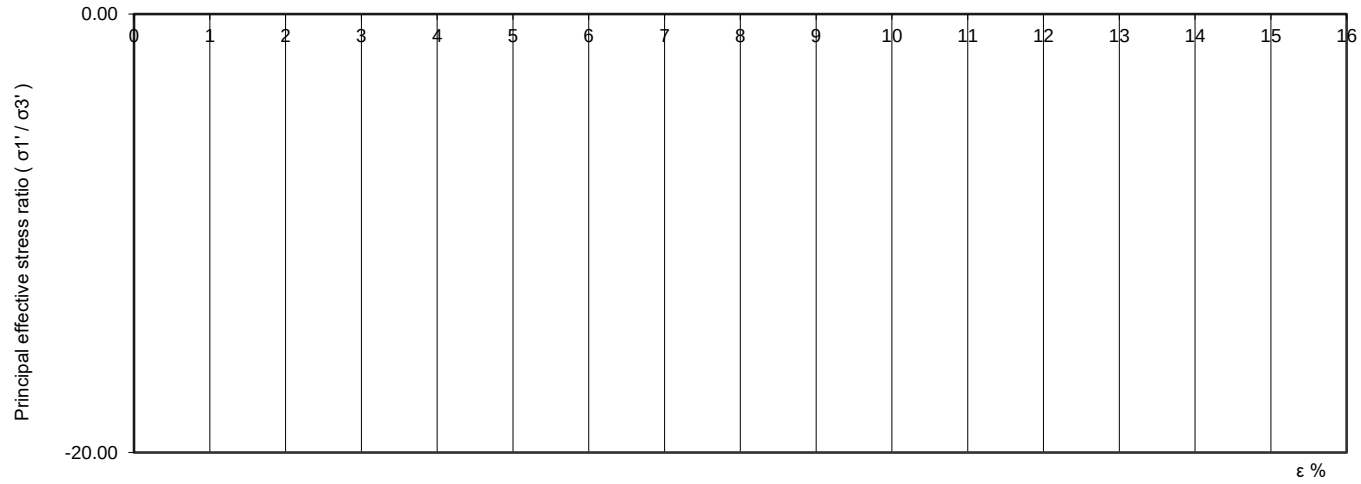
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28/03/2024

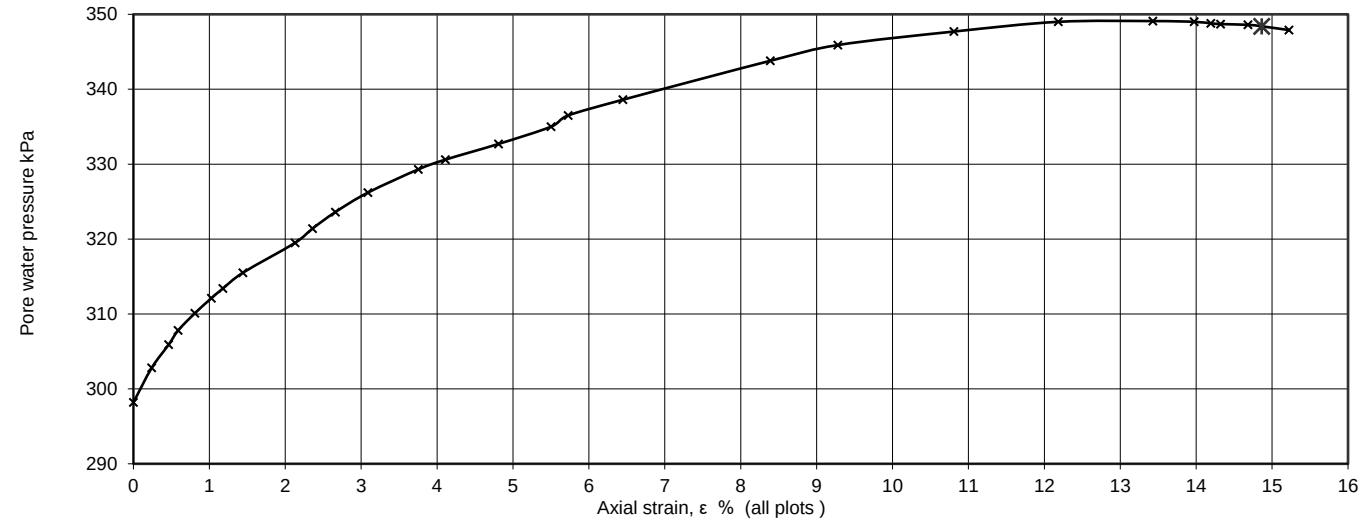
UKAS TESTING
7758

CU

	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure					Job Ref	J265200
						Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation					Sample No.	435113
Specimen Reference		Specimen Depth		m		Depth m	2.00
Compression stages - graphical data						Sample Type	U
						KeyLAB ID	TTLP2024031921





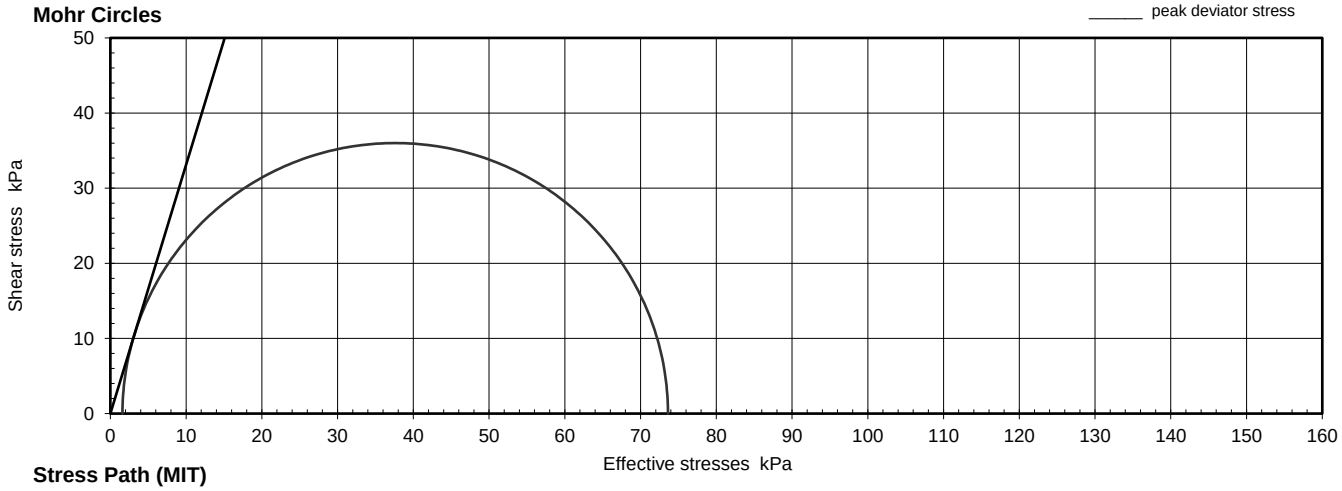


	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435113
Specimen Reference		Specimen Depth		m	Depth m	2.00
Compression stages - table of results and interpretation					Sample Type	U
					KeyLAB ID	TTLP2024031921

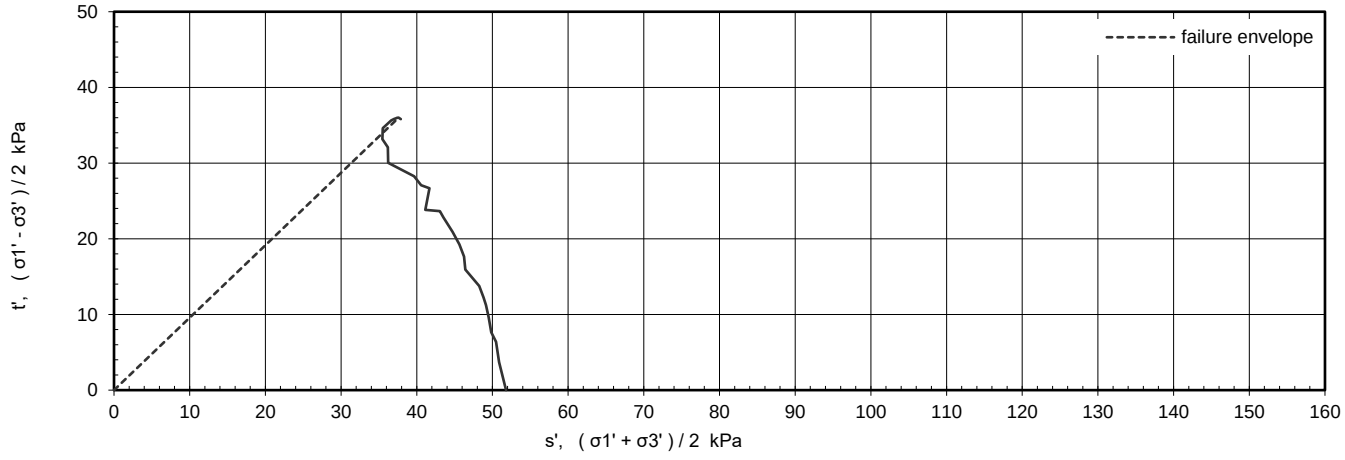
Failure criterion : Maximum deviator stress

Specimen	Cell pressure kPa	Initial pwp kPa	Initial σ_3' kPa	Rate of strain %/hr	Axial strain, ε_f %	$(\sigma_1'/\sigma_3')_f$	$(\sigma_1'-\sigma_3')_f$ kPa	u_f kPa	$\sigma_3'_f$ kPa	$\sigma_1'_f$ kPa	A_f
1	350	298	52	0.23	14.86	46.01	72.0	348	2	74	0.70
2											
3											

Mohr Circles



Stress Path (MIT)



Shear Strength Parameters			Linear regression	Manual re-assessment
At Maximum deviator stress	c '	kPa	0	-
	Ø '	degrees	73.2	-

Mode of failure



Compound

Remarks

General Deviator stresses corrected for area change, vertical side drains and up to0.396 mm thick rubber membrane.

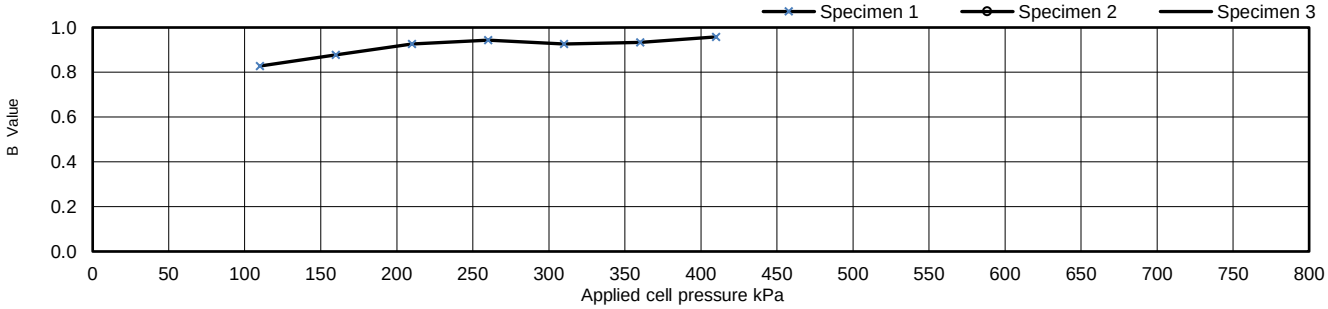
All symbols used above are defined in BS1377

GQF-008-42 Issue 01 - Oct 22	**Consolidated Undrained Triaxial Compression Test with measurement of pore pressure**			Job Ref	J265200
				Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation			Sample No.	435119
Soil Description				Depth m	36.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm brown slightly sandy slightly gravelly CLAY.			KeyLAB ID	TTLP2024031922
Test Method	BS1377 : Part 8 : 1990, clauses 1 to 7				

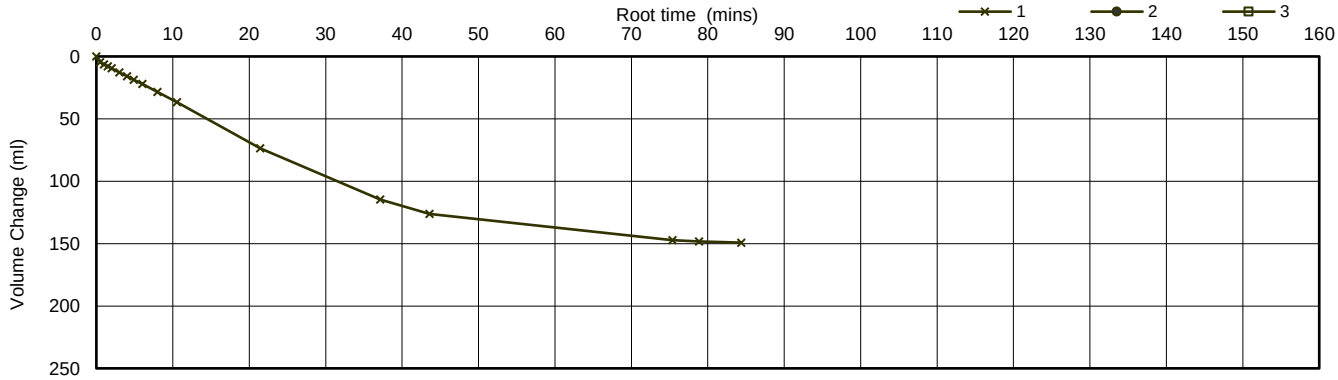
Specimen Type/Preparation	UNDISTURBED As BS 1377

Specimen Details			1	2	3
Initial	Height	mm	202.09		
	Diameter	mm	100.17		
	Bulk Density	Mg/m³	2.07		
	Water Content	%	16.9		
	Dry density	Mg/m³	1.77		
Final	Bulk Density	Mg/m³	2.16		
	Water Content	%	20.5		
	Dry density	Mg/m³	1.80		

Saturation Details		1	2	3
Method		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	410		
Final pore water pressure	kPa	350		
Final B Value		0.96		



Consolidation Details	Specimen No.		1	2	3	
	Drainage Conditions		Radial+1 end		#N/A	
	Cell Pressure applied		1070			kPa
	Back Pressure applied		350			kPa
	Effective Pressure		720			kPa
	Pore pressure at start of consolidation		1049			kPa
	Pore pressure at end of consolidation		378			kPa
	Pore pressure dissipation at end of consolidation		96			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.11			m^2/year
	Coefficient of Compressibility	M_{vi}	0.14			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	4.5E-12			m/s

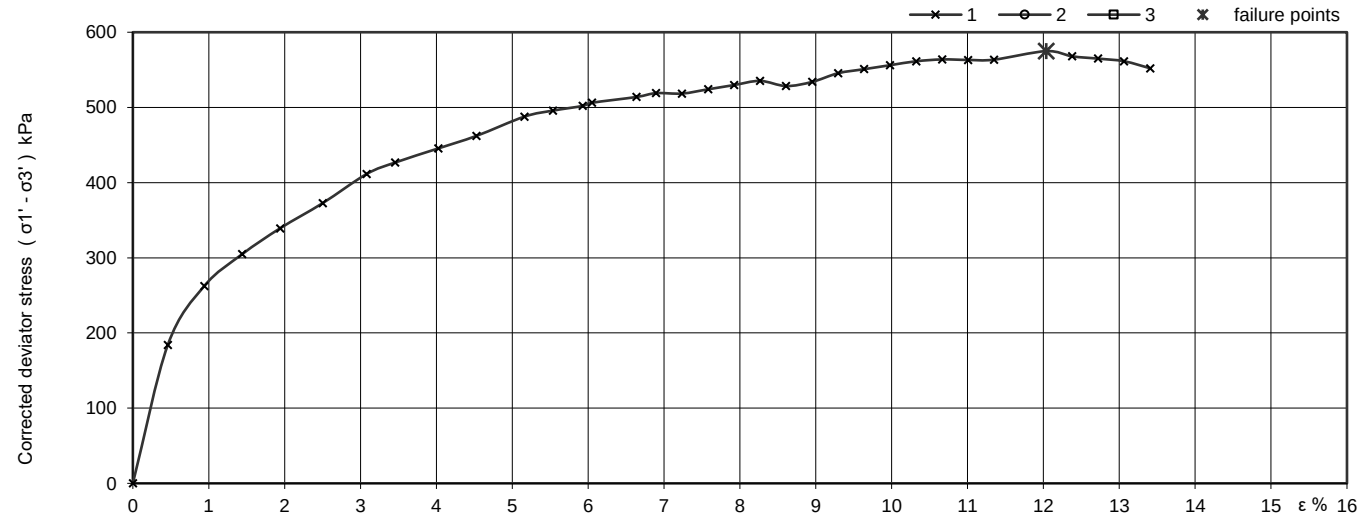


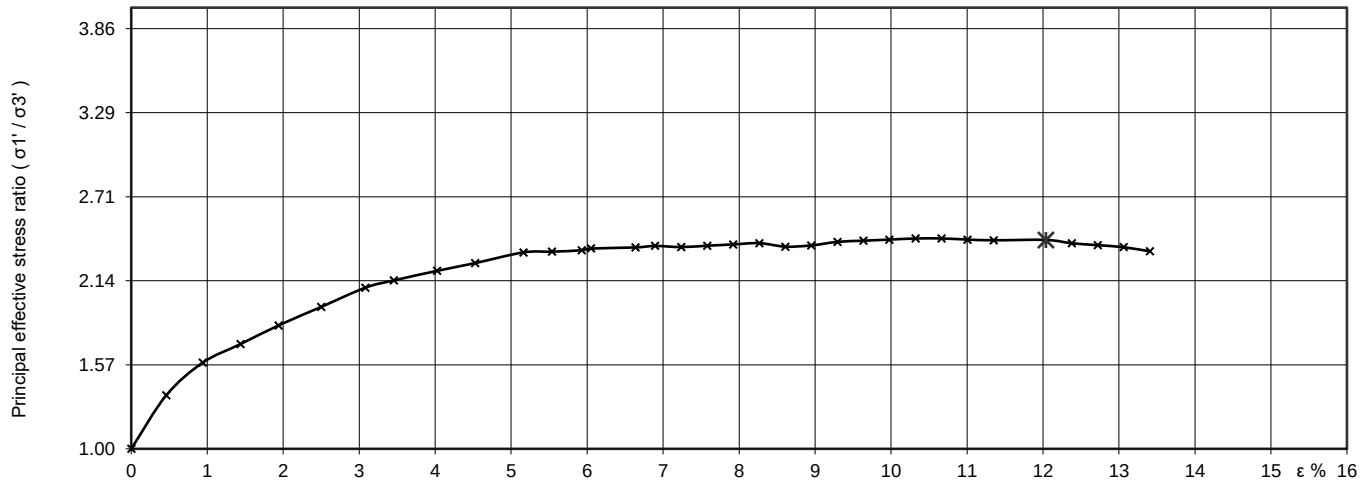
Date Printed:
27/03/2024

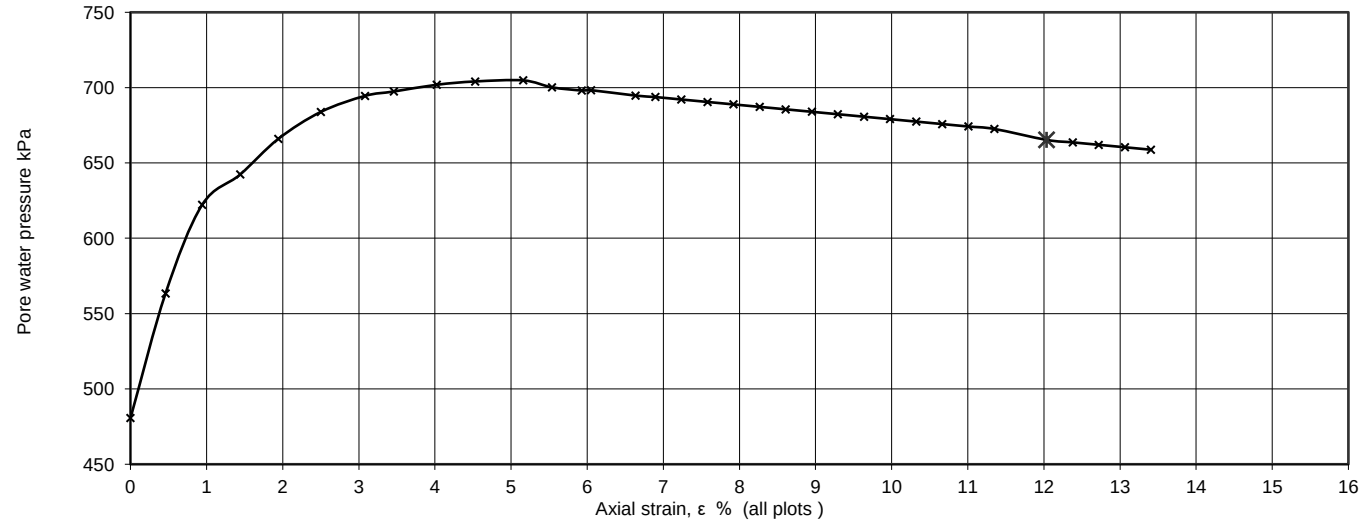
UKAS TESTING
7758

CU

	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435119
Specimen Reference		Specimen Depth		m	Depth m	36.00
Compression stages - graphical data					Sample Type	U
					KeyLAB ID	TTLP2024031922





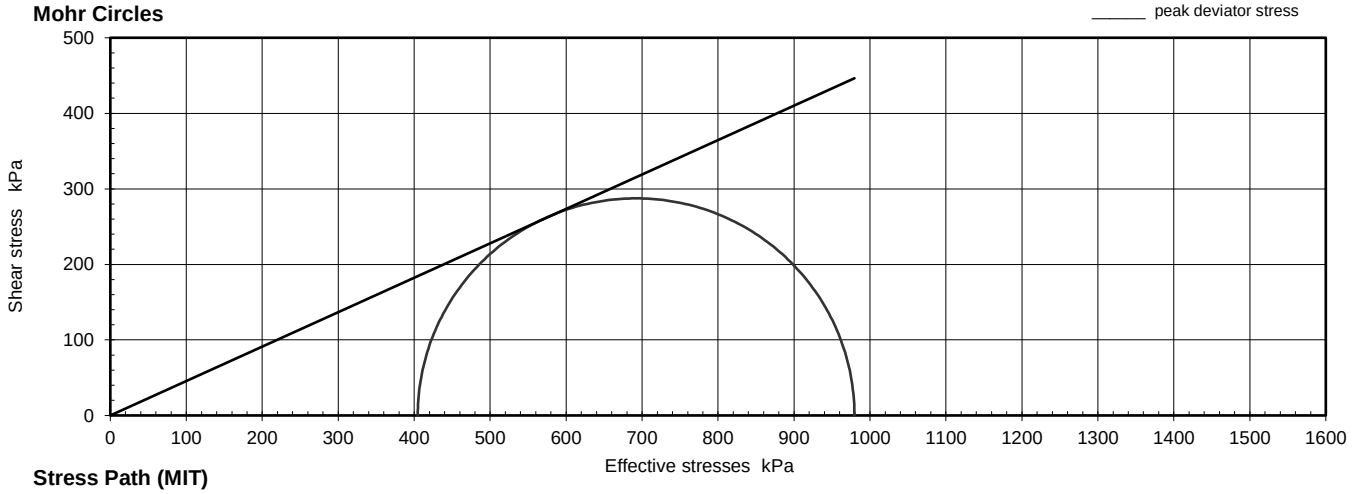


	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH204
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435119
Specimen Reference		Specimen Depth		m	Depth m	36.00
Compression stages - table of results and interpretation					Sample Type	U
					KeyLAB ID	TTLP2024031922

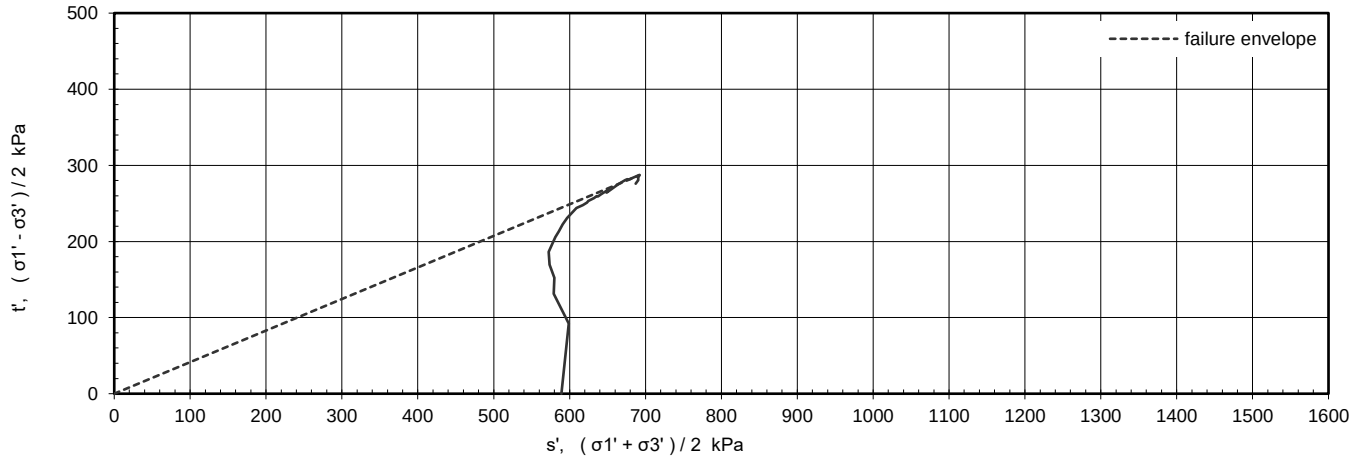
Failure criterion : Maximum deviator stress

Specimen	Cell pressure kPa	Initial pwp kPa	Initial σ_3' kPa	Rate of strain %/hr	Axial strain, ε_f %	$(\sigma_1'/\sigma_3')_f$	$(\sigma_1'-\sigma_3')_f$ kPa	u_f kPa	$\sigma_3'_f$ kPa	$\sigma_1'_f$ kPa	A_f
1	1070	481	589	0.17	12.04	2.42	574.9	665	405	980	0.32
2											
3											

Mohr Circles



Stress Path (MIT)



Shear Strength Parameters			Linear regression	Manual re-assessment
At Maximum deviator stress	c '	kPa	0	-
	Ø '	degrees	24.5	-

Mode of failure



Brittle

Remarks

General Deviator stresses corrected for area change, vertical side drains and up to0.396 mm thick rubber membrane.

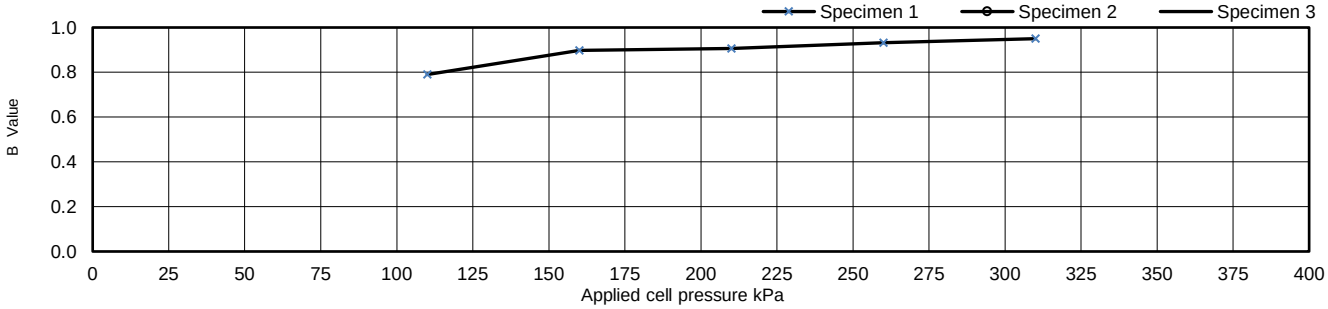
All symbols used above are defined in BS1377

GQF-008-42 Issue 01 - Oct 22	**Consolidated Undrained Triaxial Compression Test with measurement of pore pressure**			Job Ref	J265200
				Borehole/Pit No.	BH206
Project Name	K0525 - Protos Carbon Capture Site Investigation			Sample No.	435133
Soil Description				Depth m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm brown slightly sandy slightly gravelly CLAY.			KeyLAB ID	TTLP2024031923
Test Method	BS1377 : Part 8 : 1990, clauses 1 to 7				

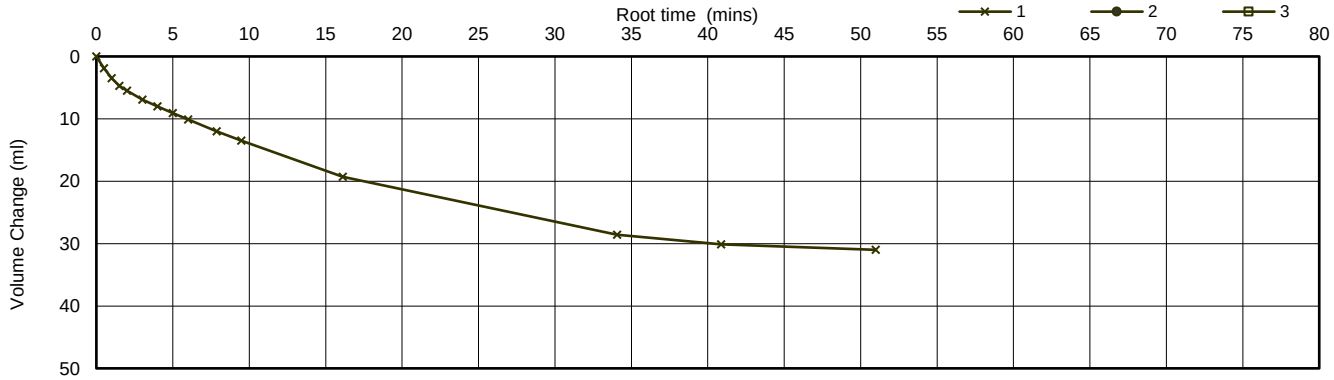
Specimen Type/Preparation	UNDISTURBED As BS 1377

Specimen Details			1	2	3
Initial	Height	mm	200.99		
	Diameter	mm	102.86		
	Bulk Density	Mg/m³	2.22		
	Water Content	%	16.0		
	Dry density	Mg/m³	1.92		
Final	Bulk Density	Mg/m³	2.24		
	Water Content	%	15.6		
	Dry density	Mg/m³	1.93		

Saturation Details		1	2	3
Method		Increments of cell and back pressure		
Cell pressure increments	kPa	50		
Differential Pressure	kPa	10		
Final Cell Pressure	kPa	310		
Final pore water pressure	kPa	250		
Final B Value		0.95		



Consolidation Details	Specimen No.		1	2	3	
	Drainage Conditions		Radial+1 end		#N/A	
	Cell Pressure applied		380			kPa
	Back Pressure applied		300			kPa
	Effective Pressure		80			kPa
	Pore pressure at start of consolidation		365			kPa
	Pore pressure at end of consolidation		301			kPa
	Pore pressure dissipation at end of consolidation		98			%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.32			m^2/year
	Coefficient of Compressibility	M_{vi}	0.29			m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.8E-11			m/s

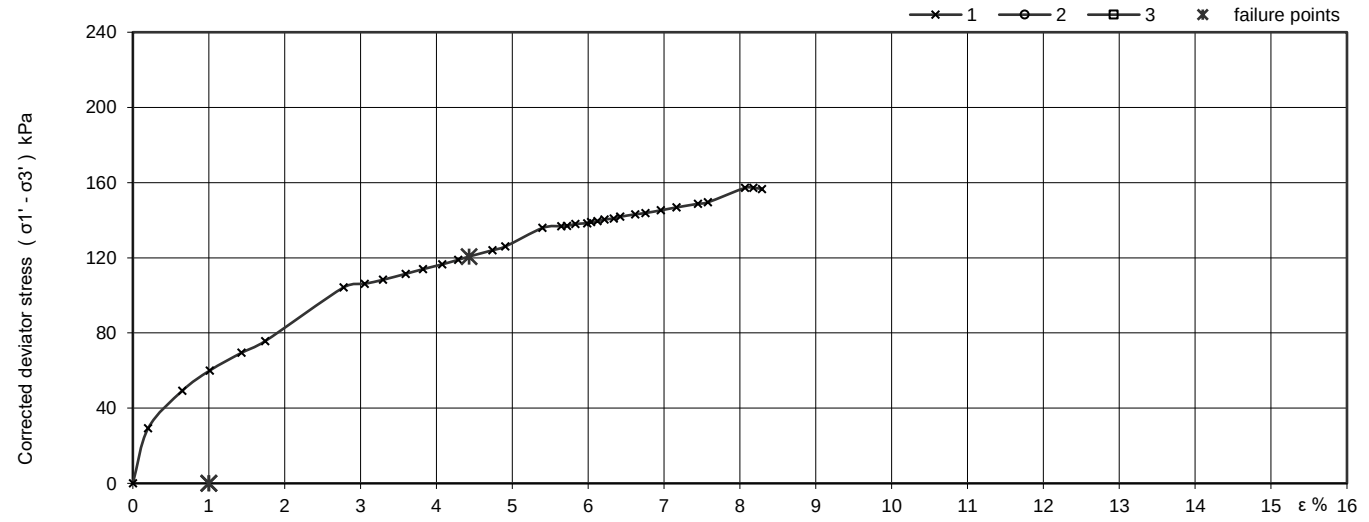


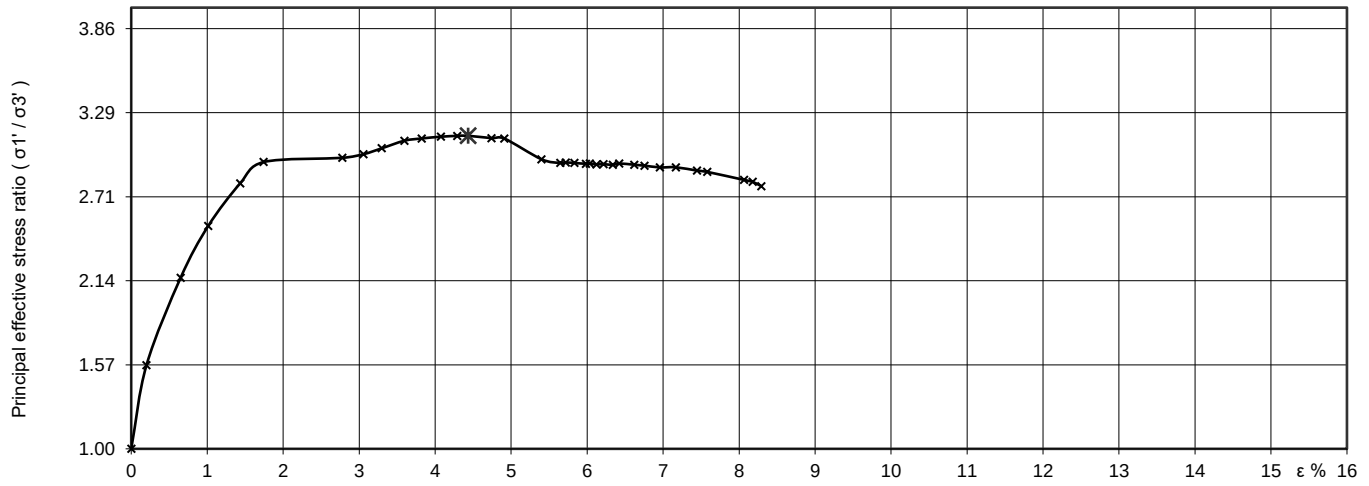
Date Printed:
22/03/2024

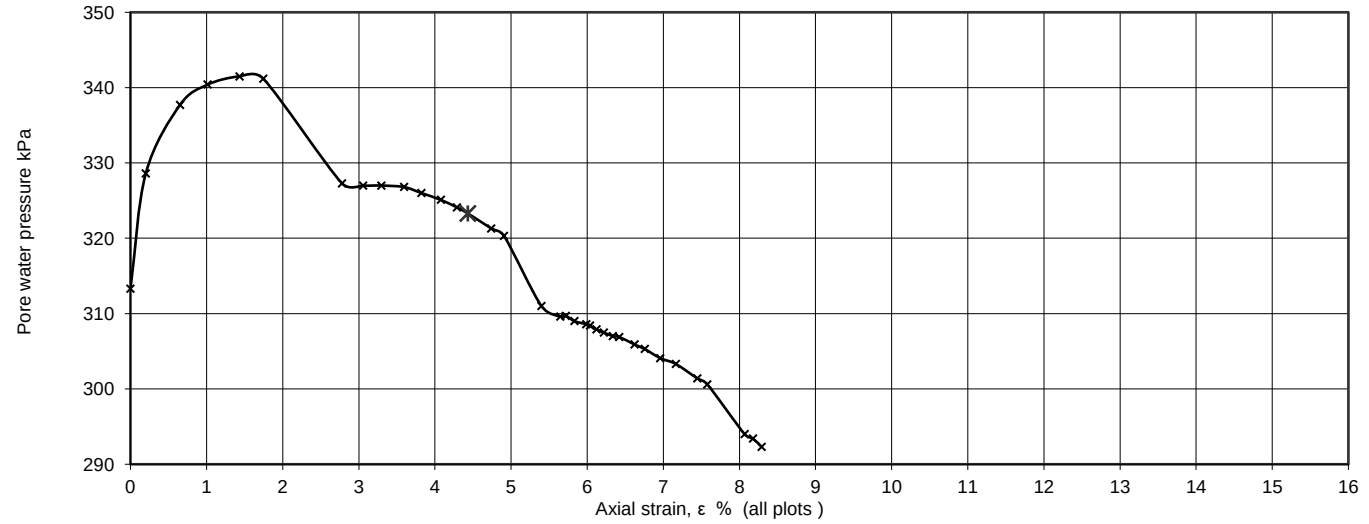
UKAS TESTING
7758

CU

	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH206
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435133
Specimen Reference		Specimen Depth		m	Depth m	4.00
Compression stages - graphical data					Sample Type	U
					KeyLAB ID	TTLP2024031923





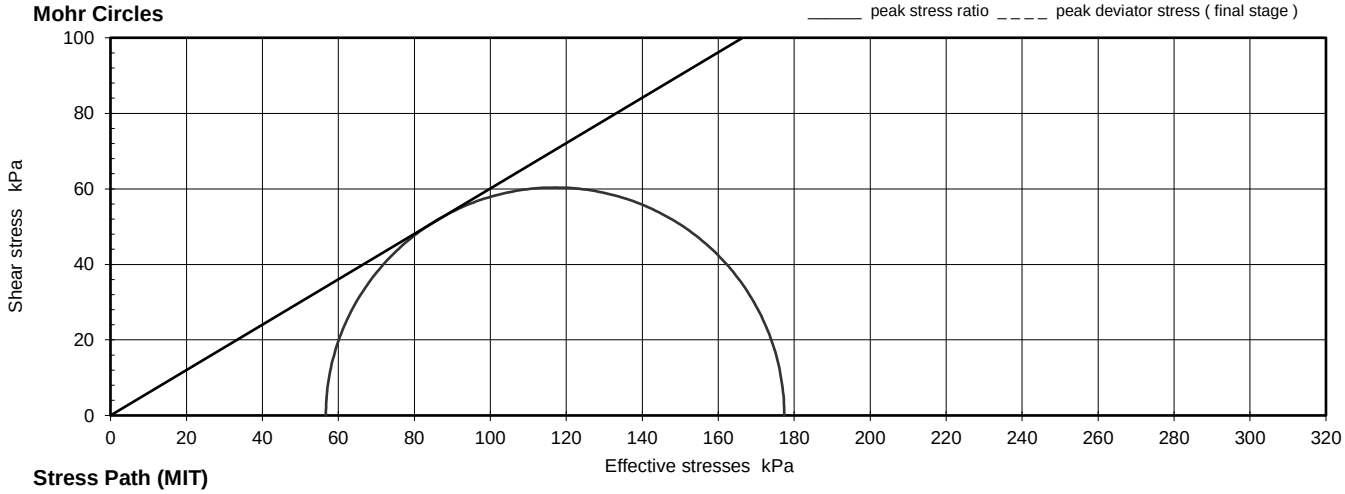


	Consolidated Undrained Triaxial Compression Test with measurement of pore pressure				Job Ref	J265200
					Borehole/Pit No.	BH206
Project Name	K0525 - Protos Carbon Capture Site Investigation				Sample No.	435133
Specimen Reference		Specimen Depth		m	Depth m	4.00
Compression stages - table of results and interpretation					Sample Type	U
					KeyLAB ID	TTLP2024031923

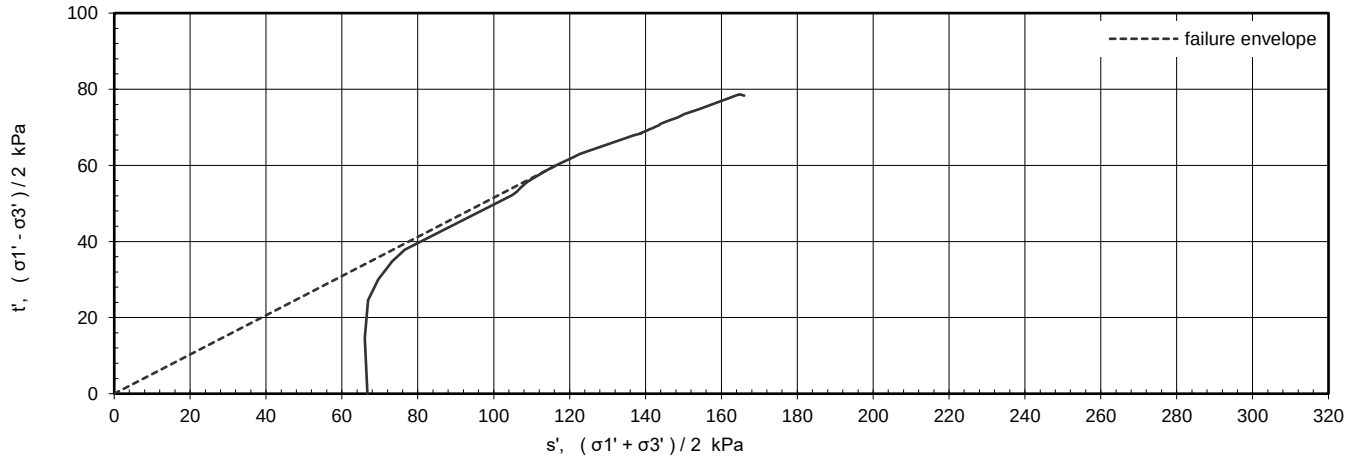
Failure criterion : Maximum effective principal stress ratio

Specimen	Cell pressure kPa	Initial pwp kPa	Initial σ_3' kPa	Rate of strain %/hr	Axial strain, ε_f %	$(\sigma_1'/\sigma_3')_f$	$(\sigma_1'-\sigma_3')_f$ kPa	u_f kPa	σ_{3f}' kPa	σ_{1f}' kPa	A_f
1	380	313	67	0.23	4.43	3.13	120.7	323	57	177	0.08
2											
3											

Mohr Circles



Stress Path (MIT)



Shear Strength Parameters			Linear regression	Manual re-assessment
At Maximum effective principal	c '	kPa	0	-
	Ø '	degrees	31.0	-

Mode of failure



Compound

Remarks

General Deviator stresses corrected for area change, vertical side drains and up to0.396 mm thick rubber membrane.

All symbols used above are defined in BS1377

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client Ayesa

Address Suite 104
Mere Grange Business Park
St Helens
WA9 5GG

Contract Protos Carbon Capture Site Investigation

Job Number MRN 24097/5
Date of Issue 31 March 2024

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

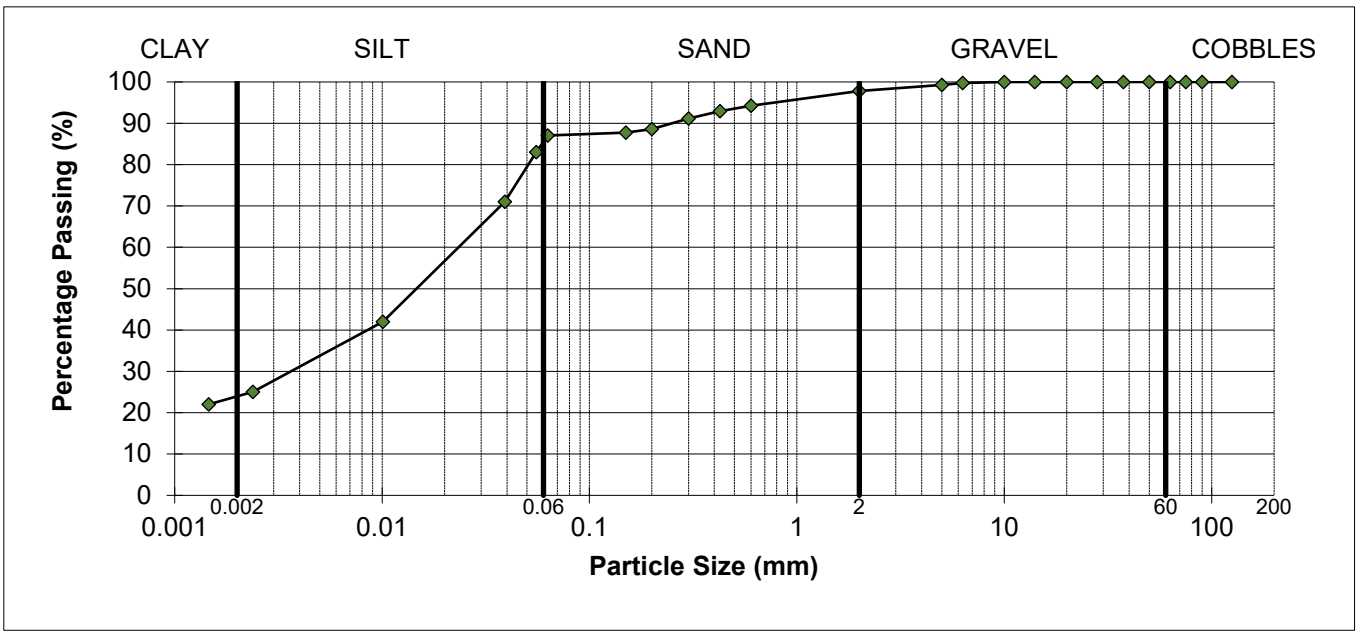
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 1.2-1.65m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435101	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	98	
90	100		0.6	94	
75	100		0.425	93	
63	100		0.3	91	
50	100		0.2	89	
37.5	100		0.15	88	
28	100		0.063	87	
20	100		0.055	83	
14	100		0.039	71	
10	100		0.010	42	
6.3	100		0.0024	25	
5	99		0.0015	22	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

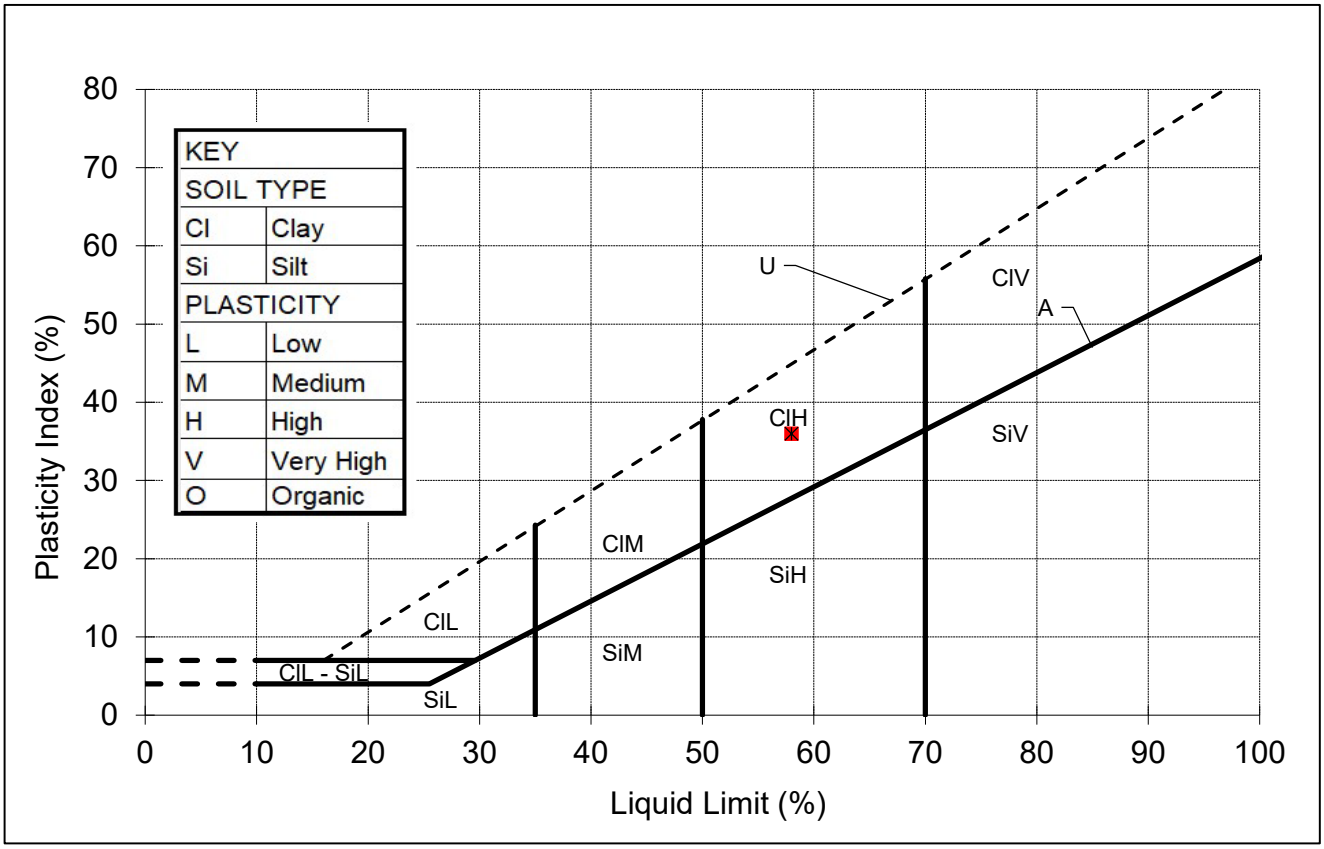
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 1.2-1.65m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435101	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
45.3	58	22	36	93



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

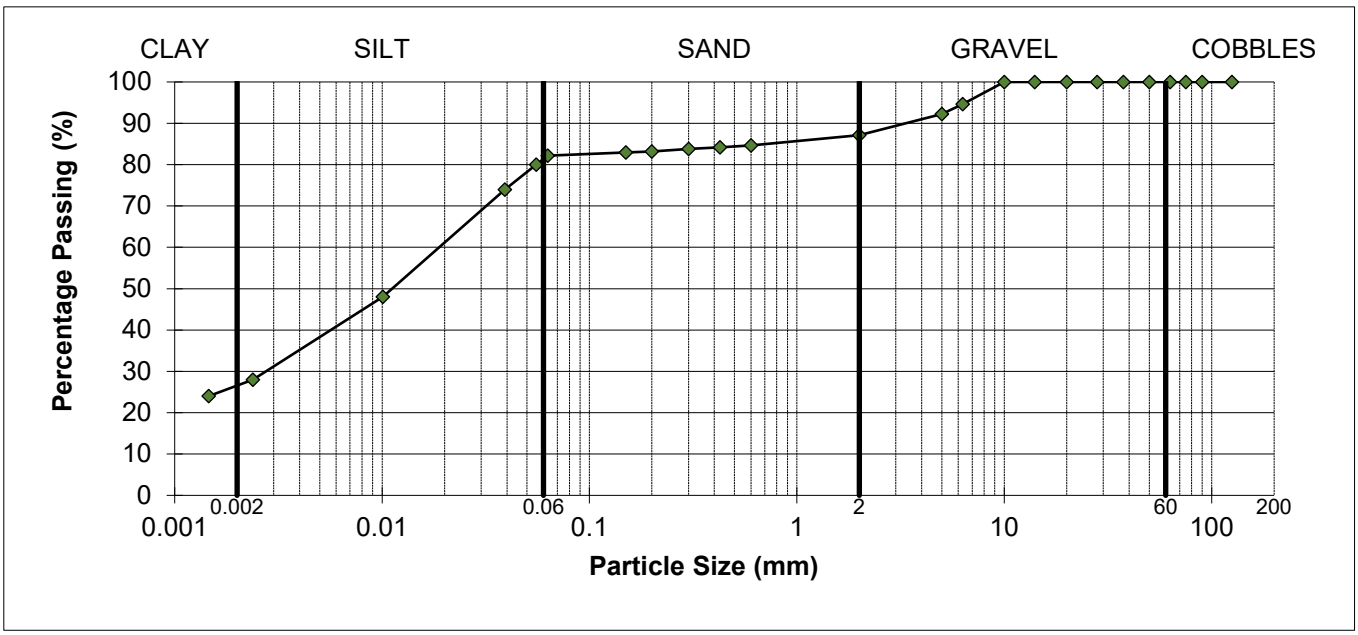
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 2.00-2.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435102	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown mottled silty slightly slightly sandy slightly gravelly organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	87	
90	100		0.6	85	
75	100		0.425	84	
63	100		0.3	84	
50	100		0.2	83	
37.5	100		0.15	83	
28	100		0.063	82	
20	100		0.055	80	
14	100		0.039	74	
10	100		0.010	48	
6.3	95		0.0024	28	
5	92		0.0015	24	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

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TEST CERTIFICATE

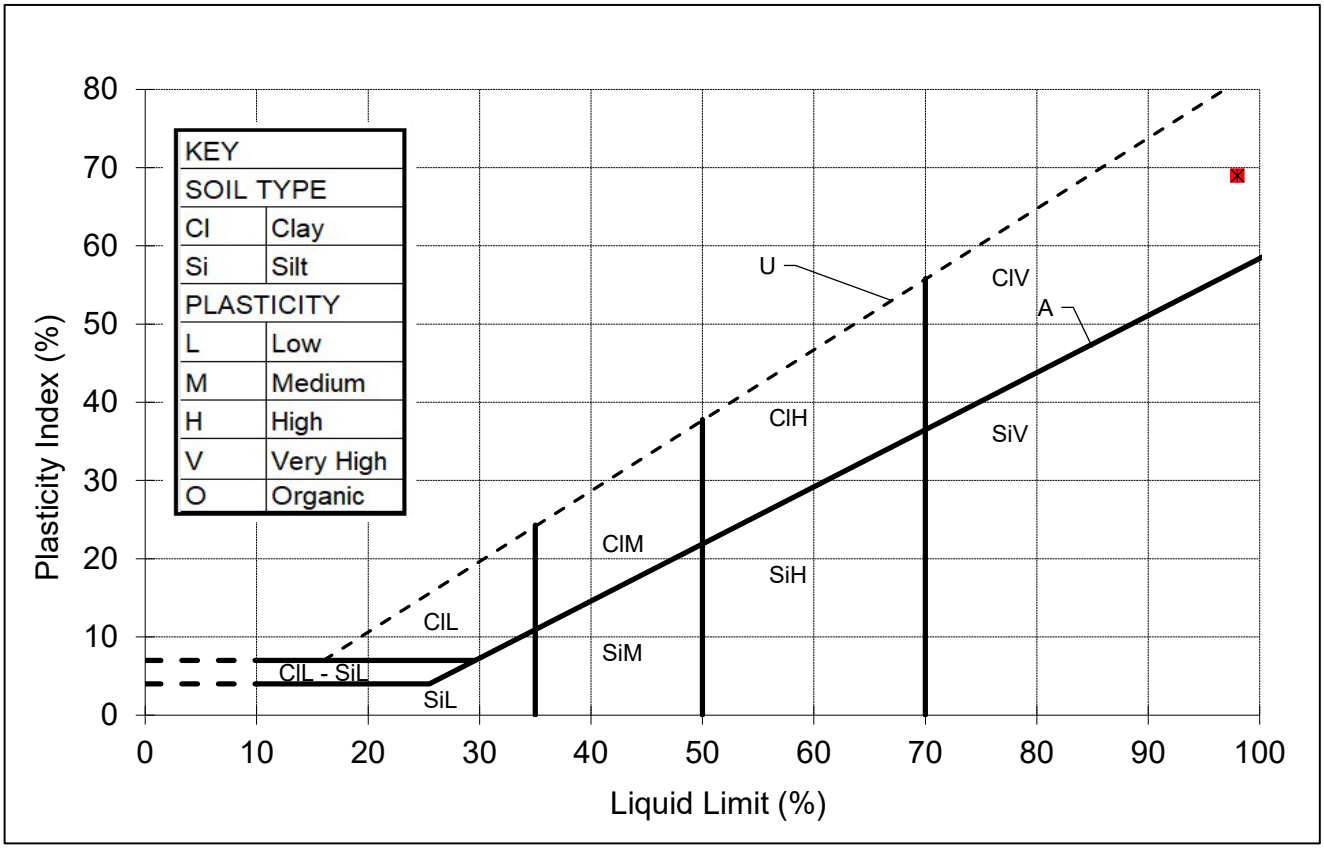
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 2.00-2.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435102	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown mottled silty slightly slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
91.3	98	29	69	84



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

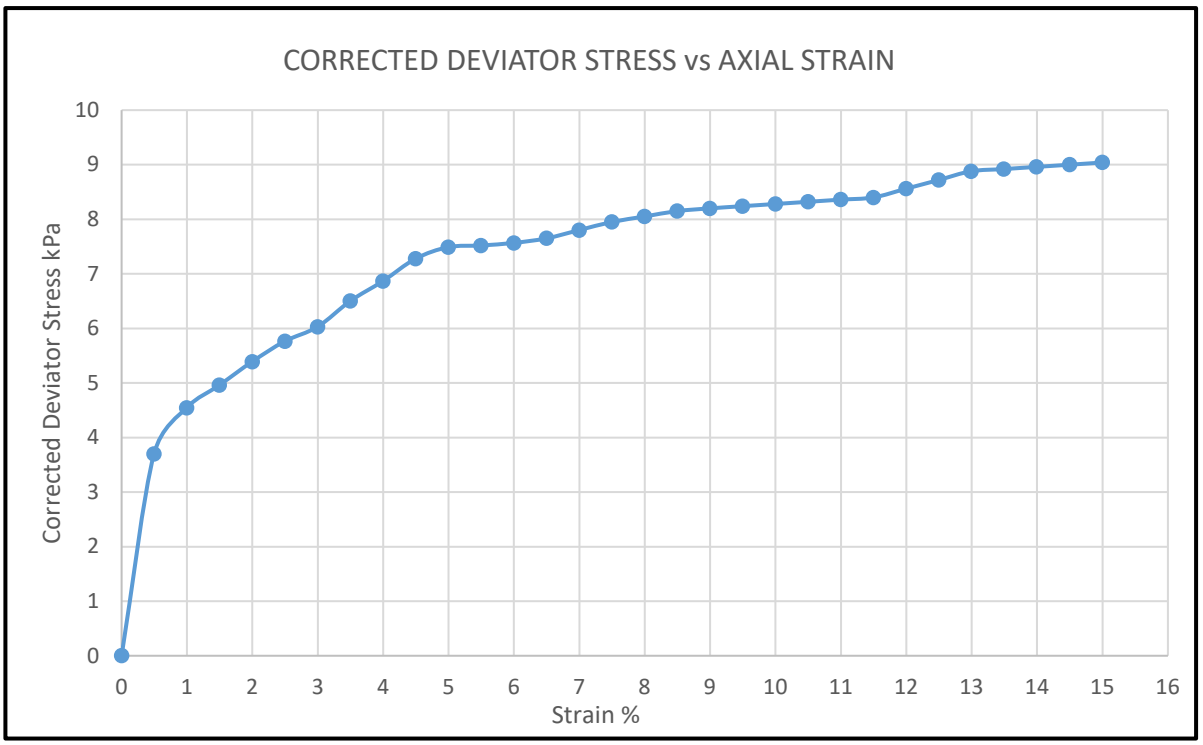
SAMPLE LABEL	BH 202 2.00-2.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435102	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Grey brown mottled silty slightly slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

Specimen Location

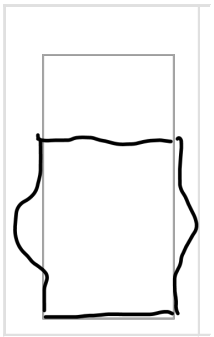


Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	91.3
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.18
Membrane Correction	2.91		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



BULGING

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
40	15.0	2.0	9	5

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed  Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

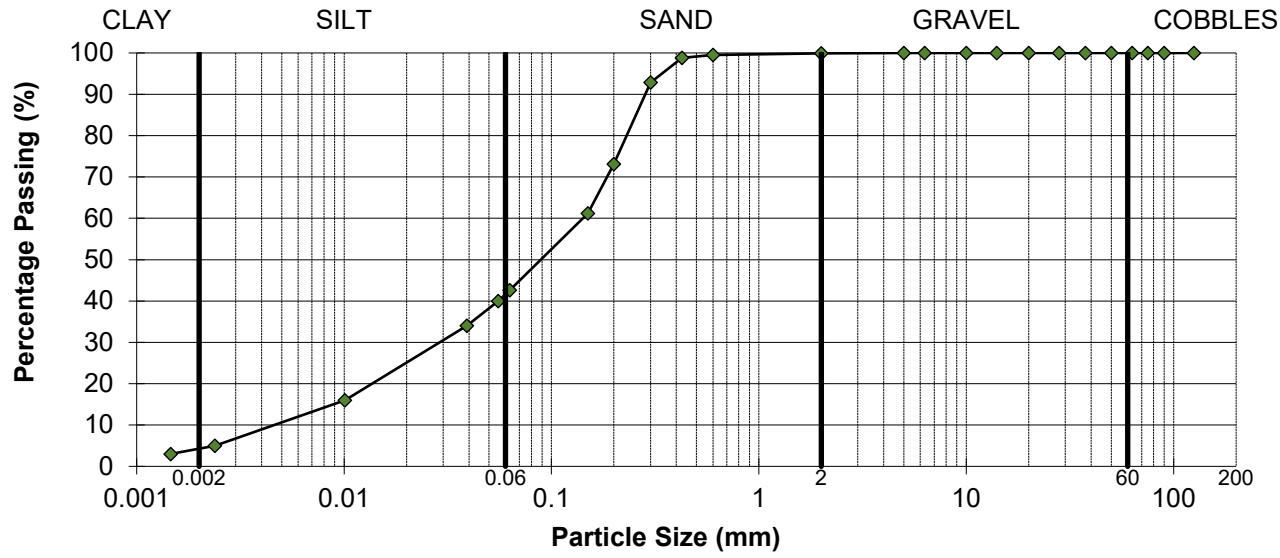
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 12.00-12.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435104	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown clayey silty SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	100	
75	100		0.425	99	
63	100		0.3	93	
50	100		0.2	73	
37.5	100		0.15	61	
28	100		0.063	43	
20	100		0.055	40	
14	100		0.039	34	
10	100		0.010	16	
6.3	100		0.0024	5	
5	100		0.0015	3	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

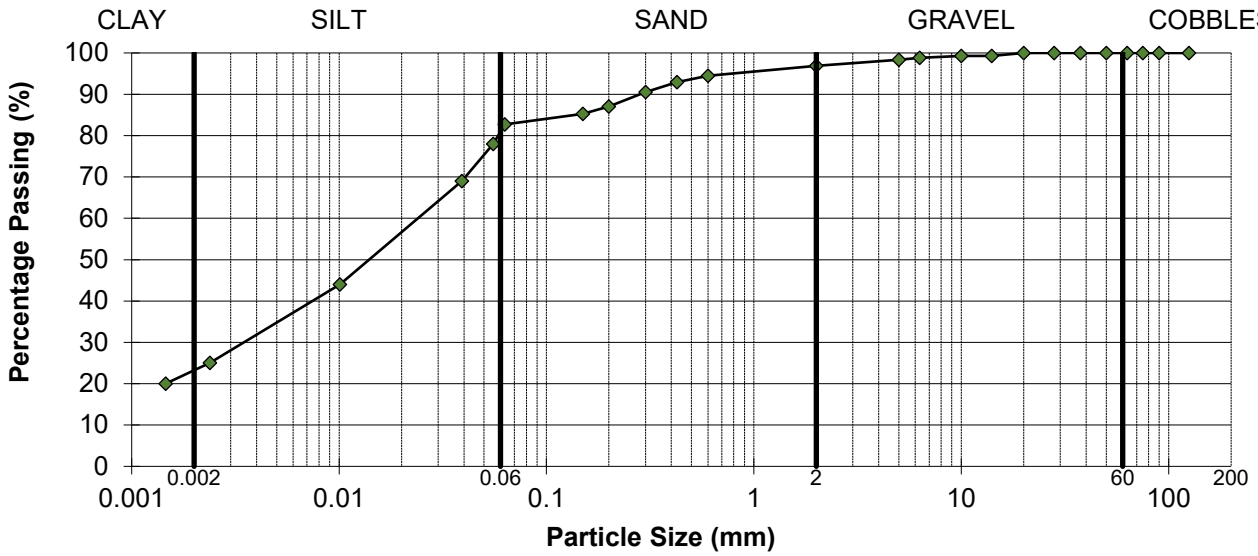
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 22.50-22.95m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435105	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	95	
75	100		0.425	93	
63	100		0.3	91	
50	100		0.2	87	
37.5	100		0.15	85	
28	100		0.063	83	
20	100		0.055	78	
14	99		0.039	69	
10	99		0.010	44	
6.3	99		0.0024	25	
5	98		0.0015	20	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

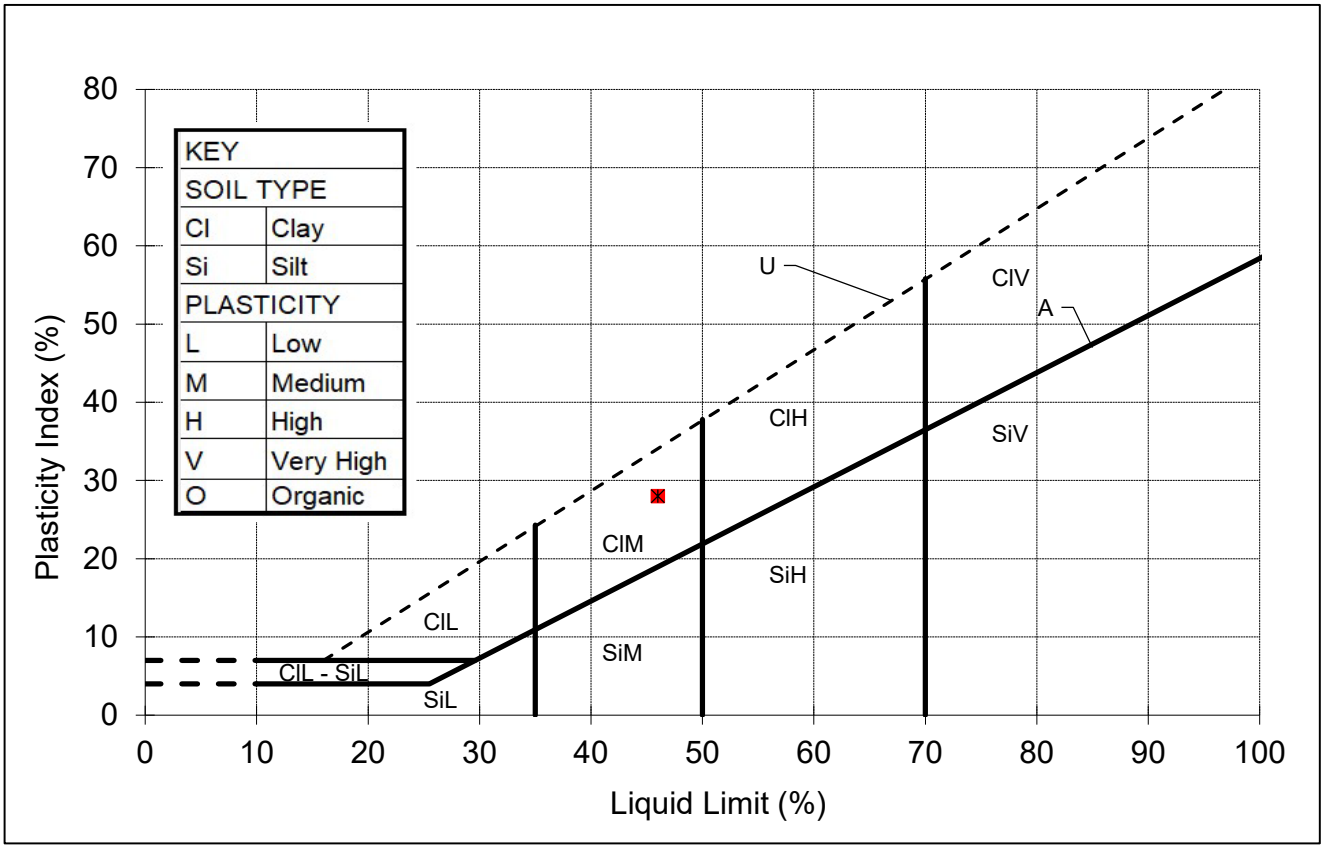
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 22.50-22.95m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435105	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21.7	46	18	28	93



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

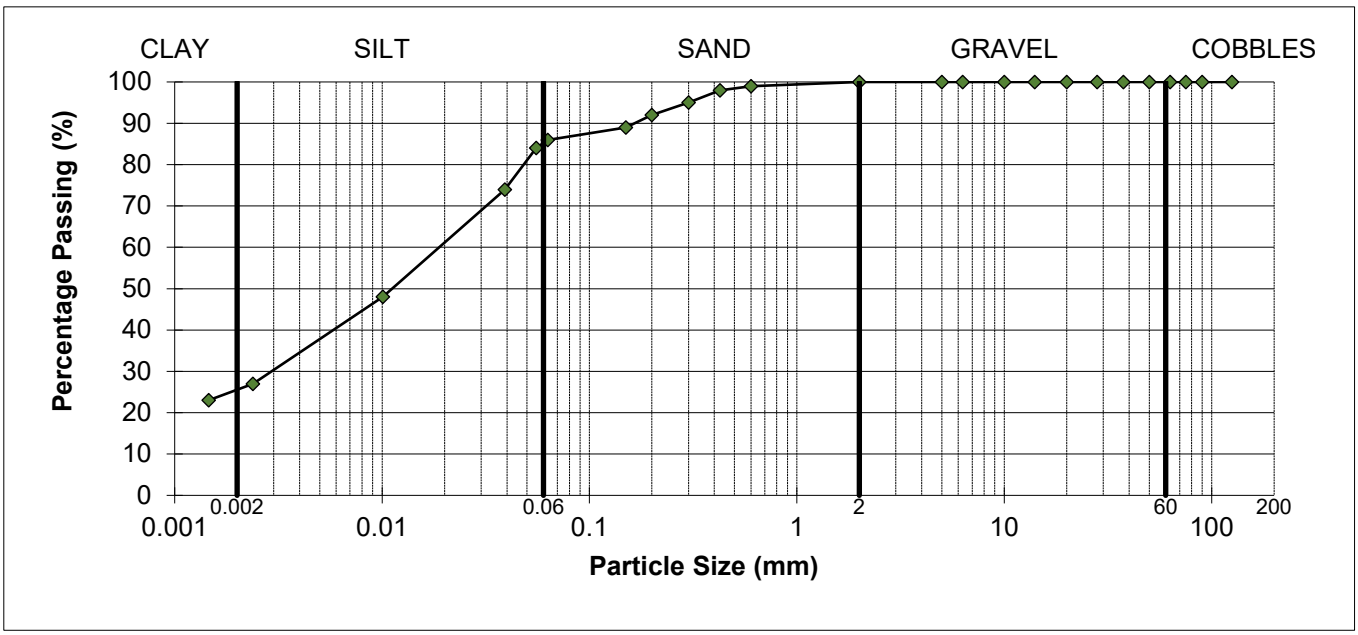
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 27-27.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435106	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	98	
63	100		0.3	95	
50	100		0.2	92	
37.5	100		0.15	89	
28	100		0.063	86	
20	100		0.055	84	
14	100		0.039	74	
10	100		0.010	48	
6.3	100		0.0024	27	
5	100		0.0015	23	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

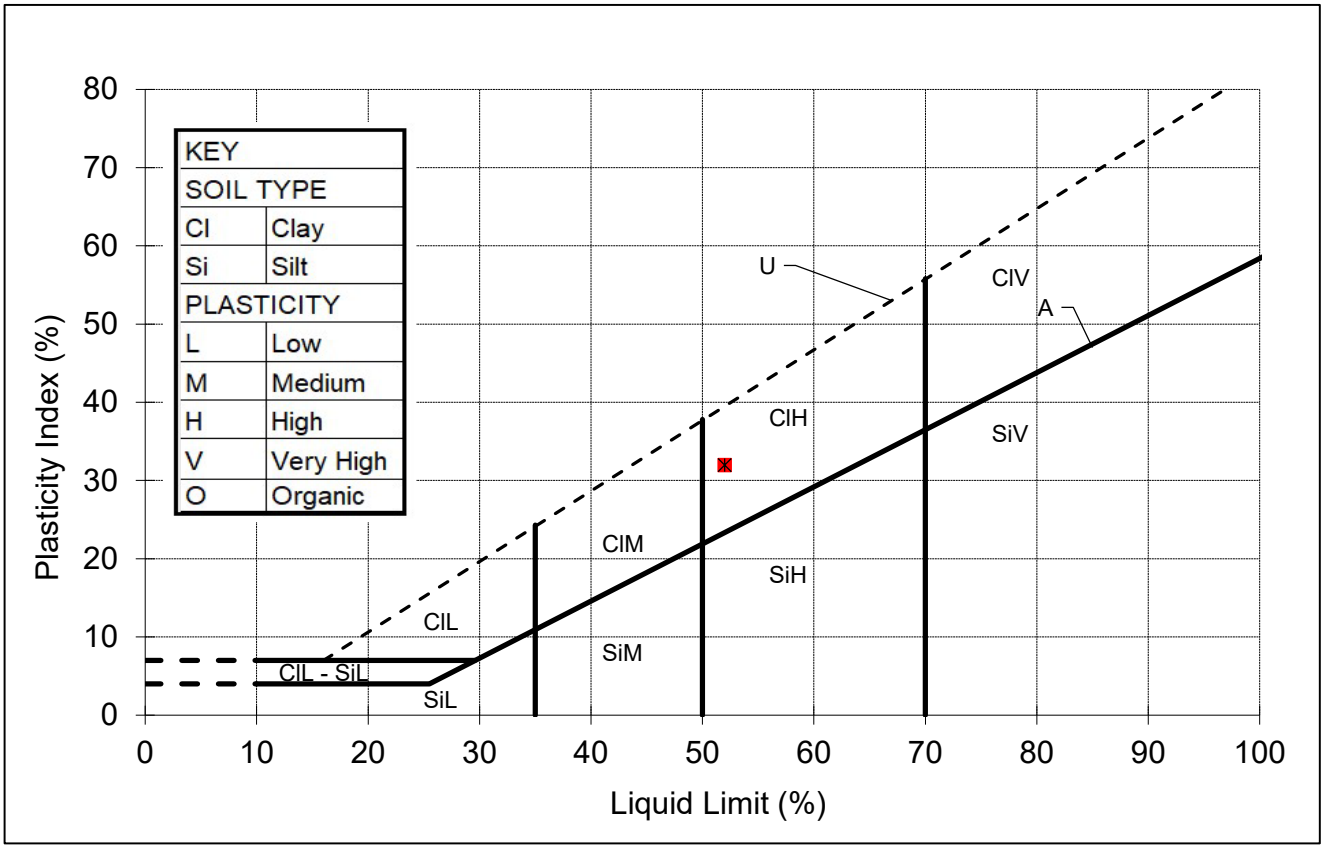
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 202 27-27.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435106	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23.2	52	20	32	98



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

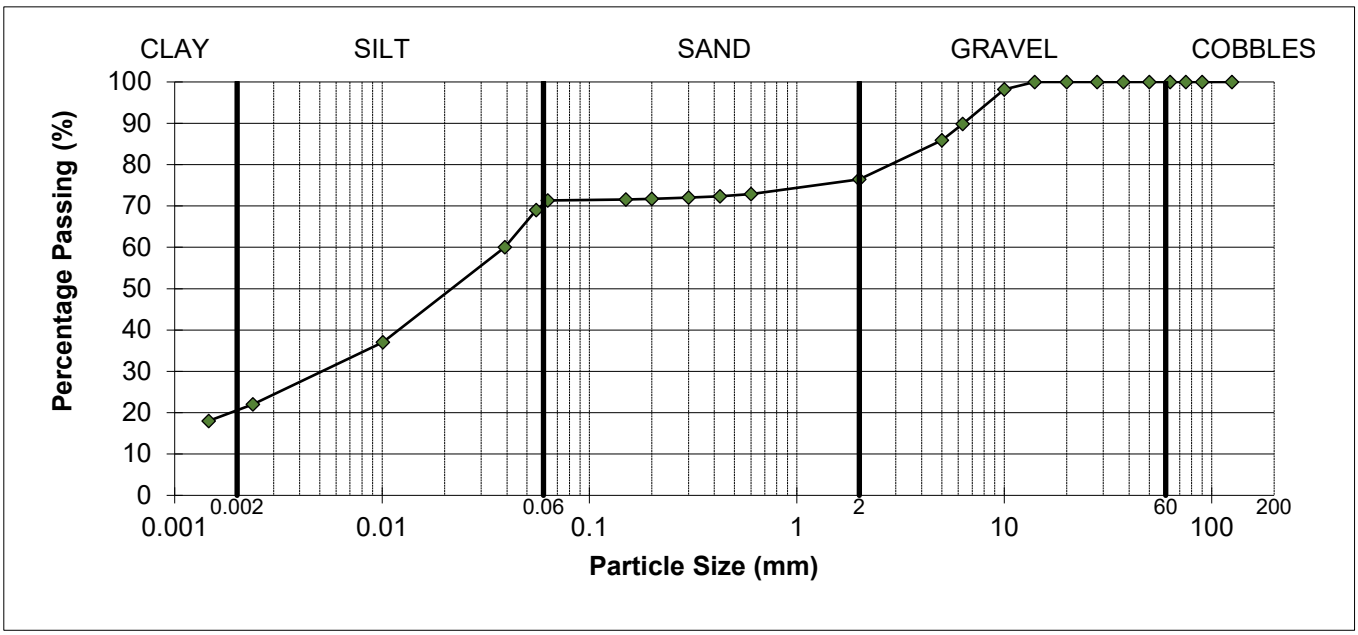
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 2.0m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435107	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	76	
90	100		0.6	73	
75	100		0.425	72	
63	100		0.3	72	
50	100		0.2	72	
37.5	100		0.15	72	
28	100		0.063	71	
20	100		0.055	69	
14	100		0.039	60	
10	98		0.010	37	
6.3	90		0.0024	22	
5	86		0.0015	18	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

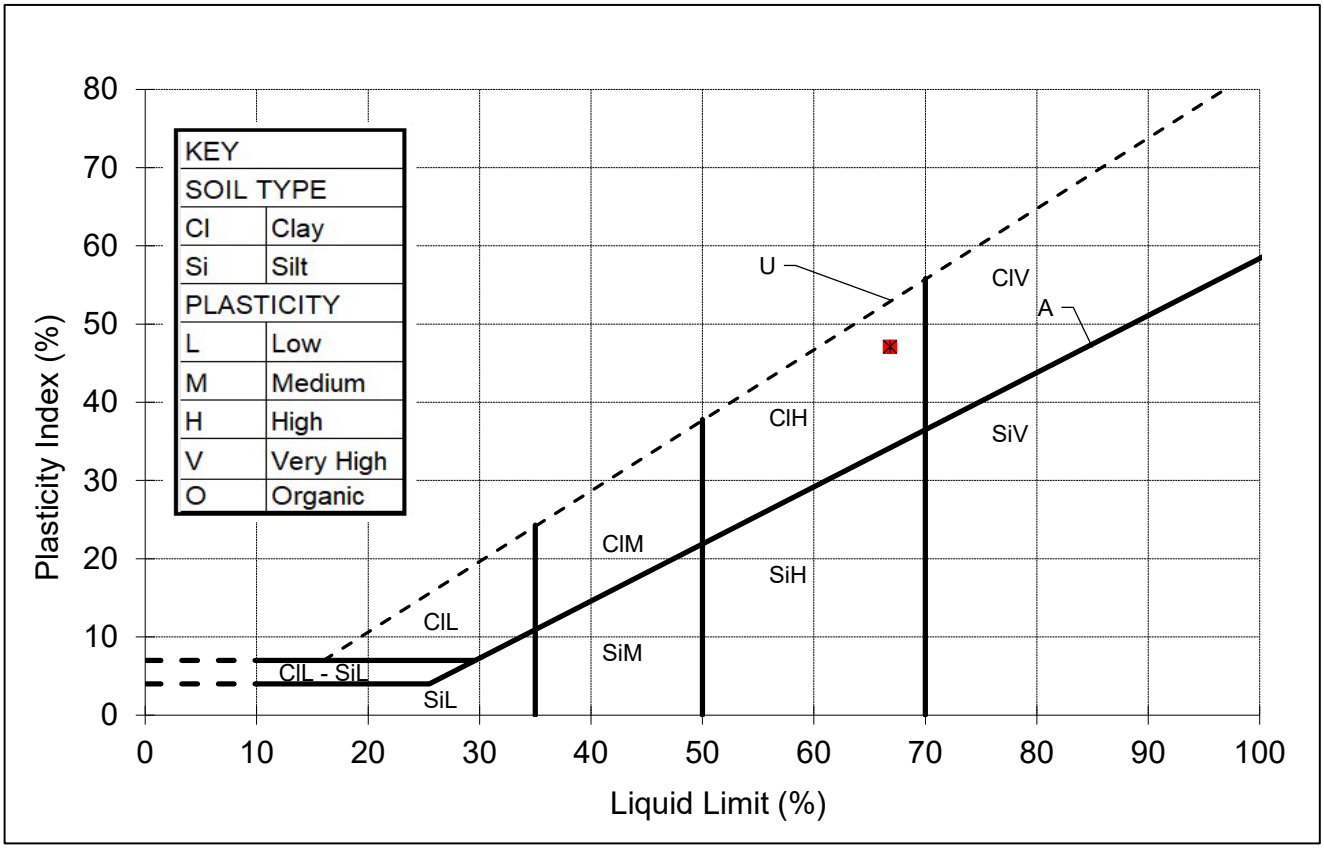
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 2.0m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435107	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
84.2	66	18	48	72



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

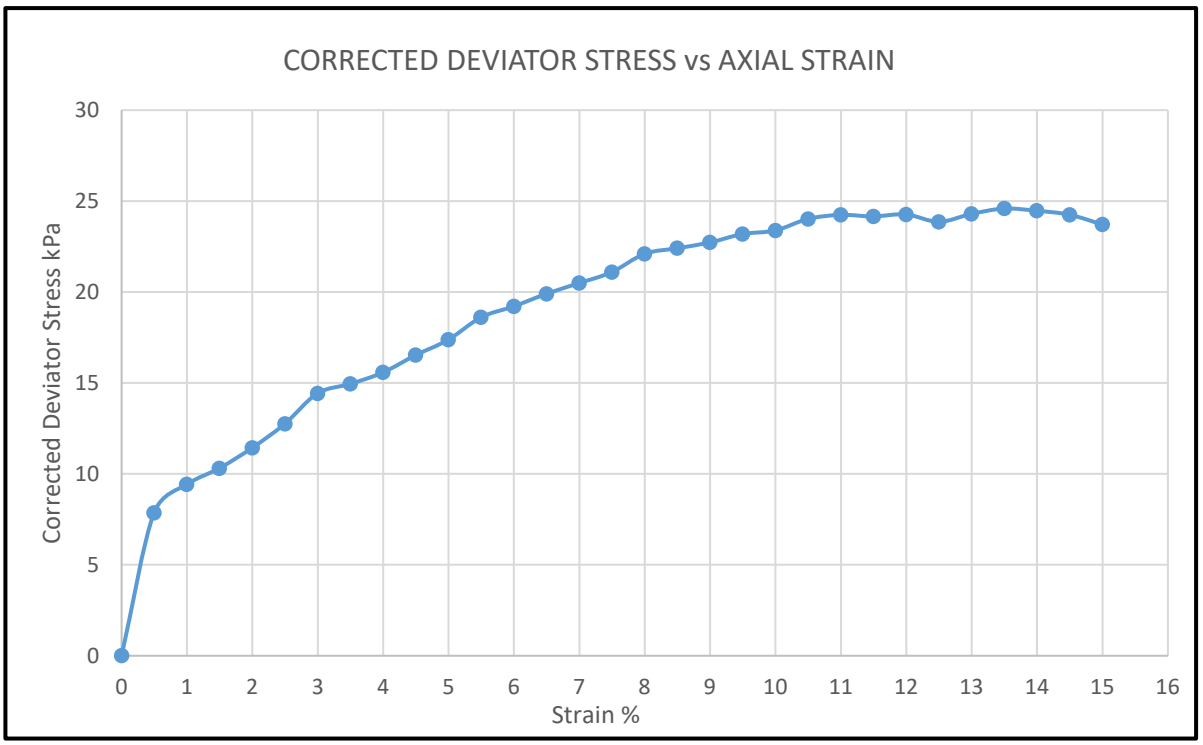
SAMPLE LABEL	BH 203 2.0m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435107	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

Specimen Location

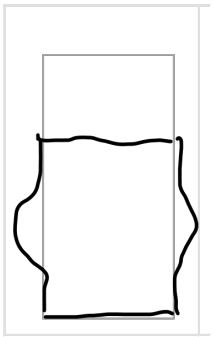


Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	84.2
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.22
Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



BULGING

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
50	13.5	2.0	25	12

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

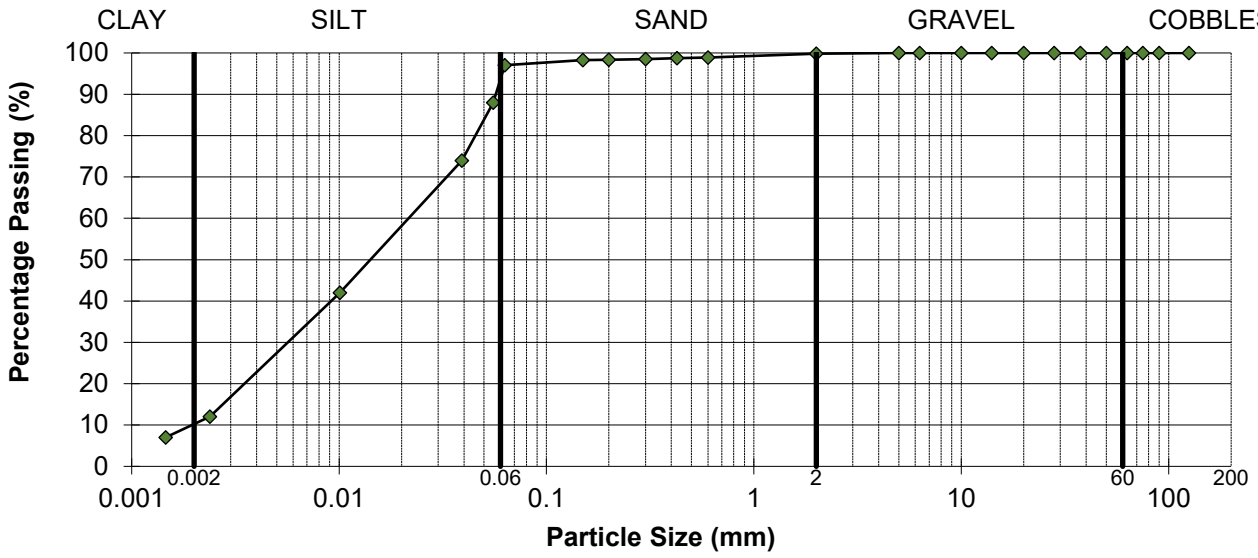
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 5.0m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435108	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey sandy SILT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	99	
63	100		0.3	99	
50	100		0.2	98	
37.5	100		0.15	98	
28	100		0.063	97	
20	100		0.055	88	
14	100		0.039	74	
10	100		0.010	42	
6.3	100		0.0024	12	
5	100		0.0015	7	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

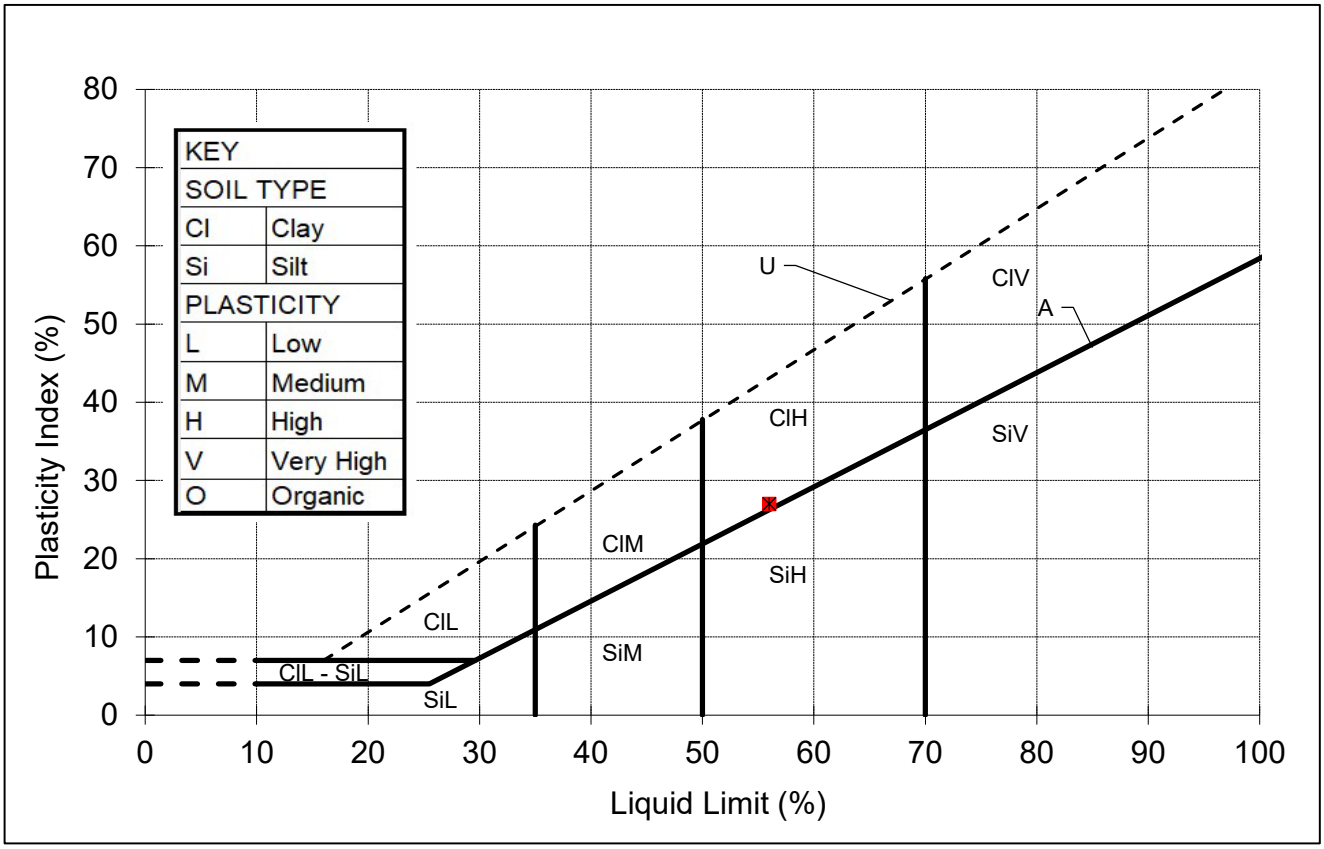
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 5.0m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435108	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey sandy SILT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
47.8	56	29	27	99



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

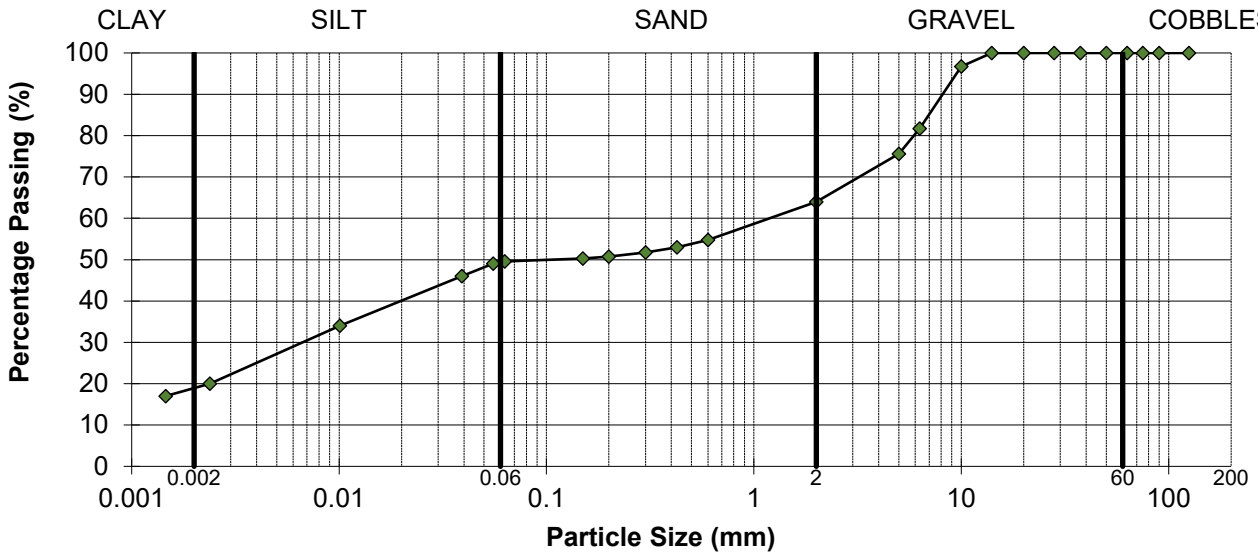
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 9.0-9.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435109	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	64	
90	100		0.6	55	
75	100		0.425	53	
63	100		0.3	52	
50	100		0.2	51	
37.5	100		0.15	50	
28	100		0.063	50	
20	100		0.055	49	
14	100		0.039	46	
10	97		0.010	34	
6.3	82		0.0024	20	
5	76		0.0015	17	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

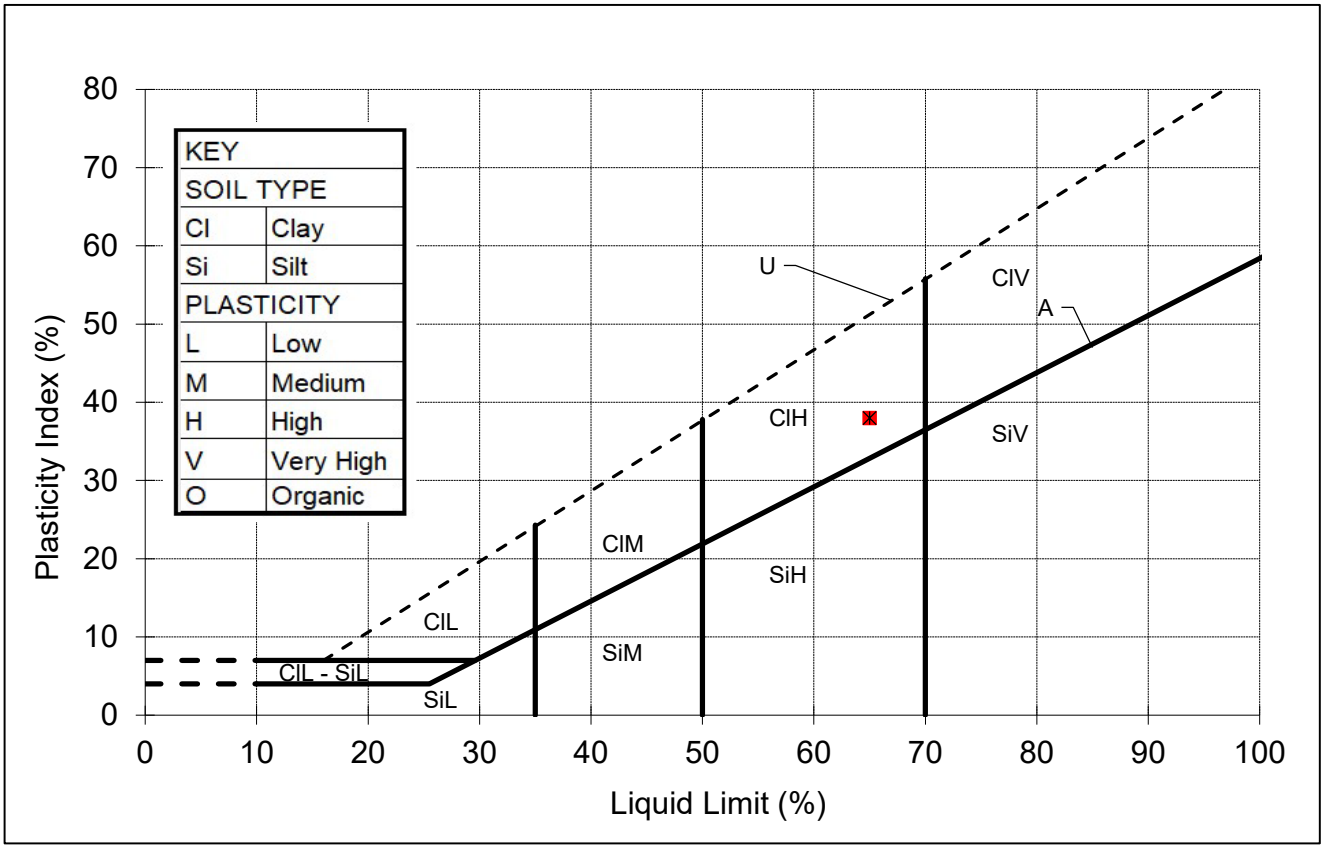
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 9.0-9.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435109	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
48.4	65	27	38	53



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

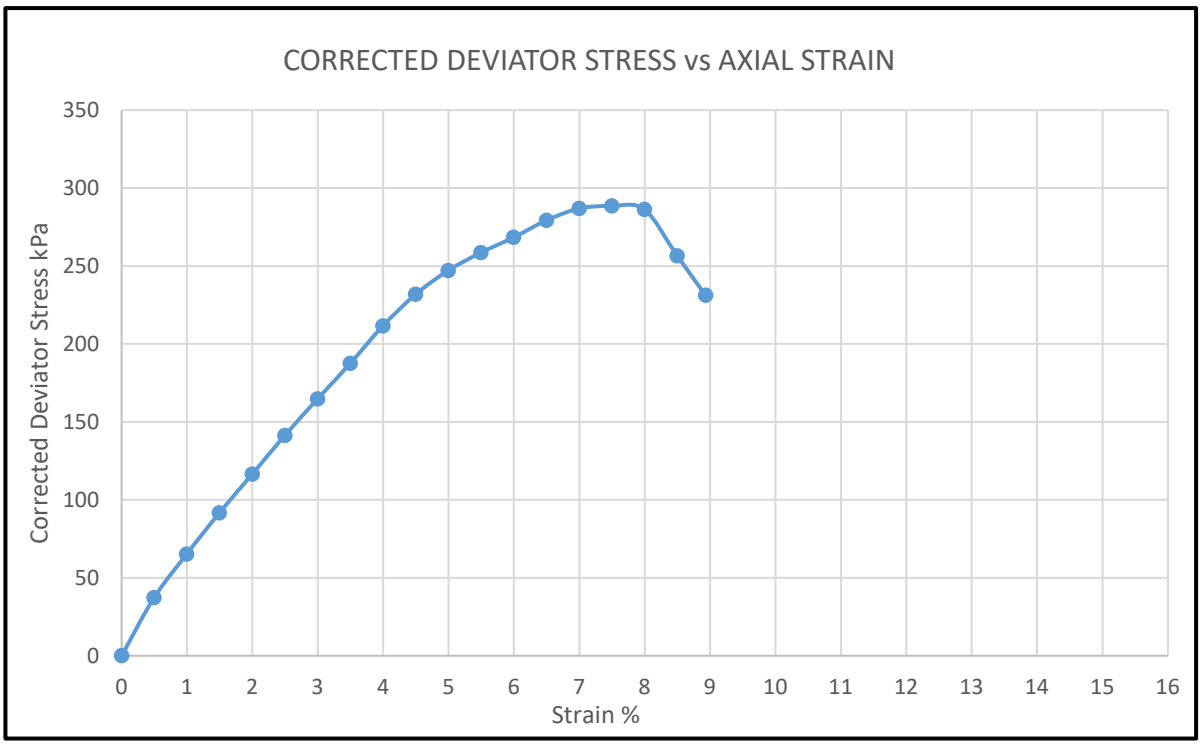
SAMPLE LABEL	BH 203 9.0-9.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435109	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown silty slightly sandy gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

Specimen Location

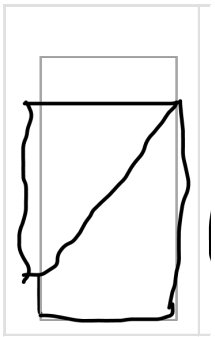


Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	48.4
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.52
Membrane Correction	2.02		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



SIMPLE_SHEAR

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
180	7.5	2.0	289	144

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

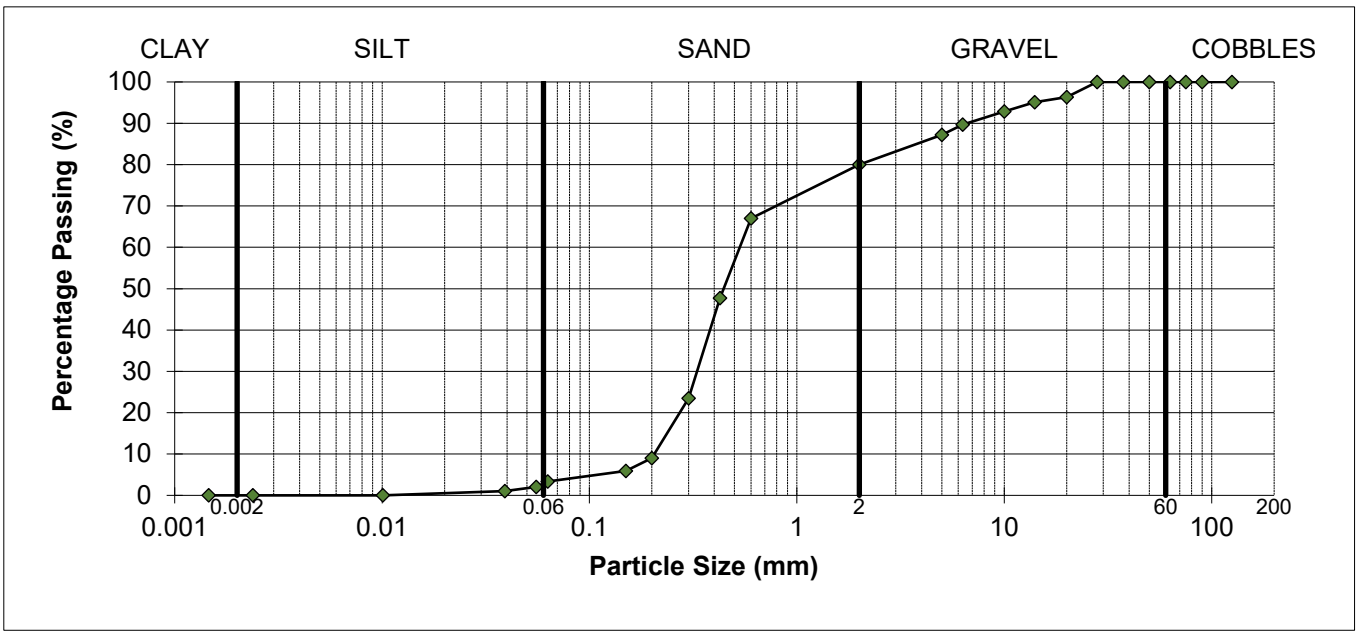
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 21.0-21.5m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435110	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown slightly silty gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	80	
90	100		0.6	67	
75	100		0.425	48	
63	100		0.3	23	
50	100		0.2	9	
37.5	100		0.15	6	
28	100		0.063	3	
20	96		0.055	2	
14	95		0.039	1	
10	93		0.010	0	
6.3	90		0.0024	0	
5	87		0.0015	0	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

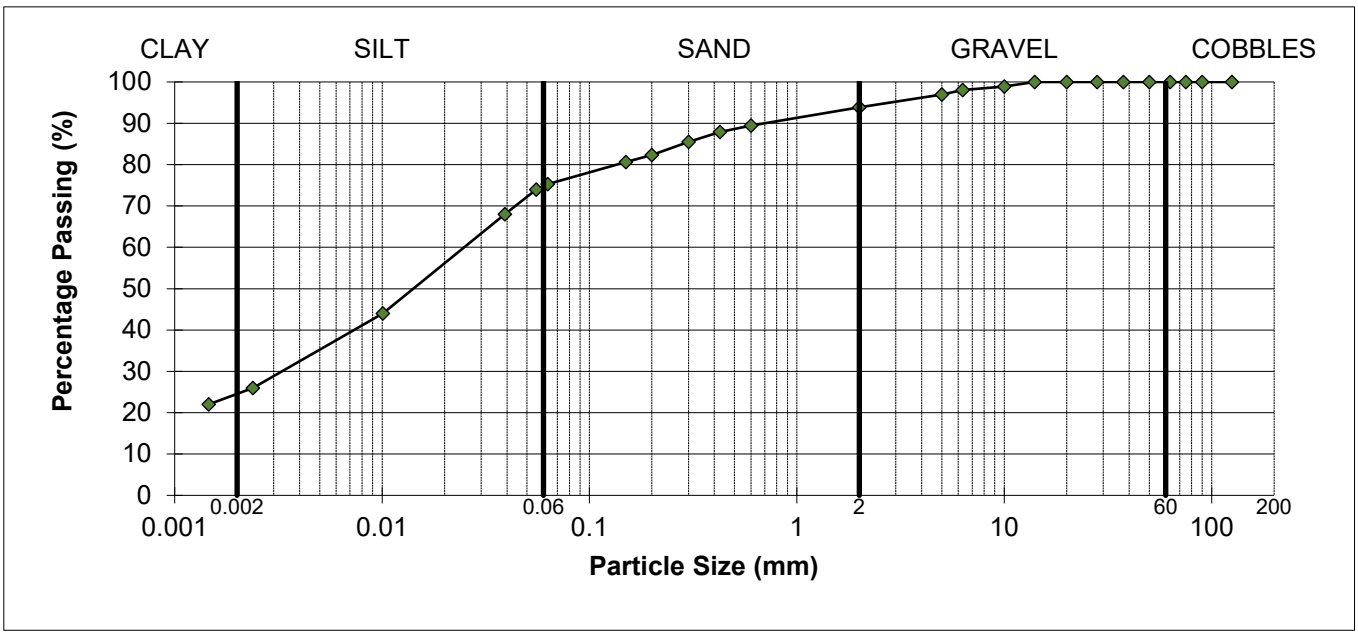
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 27.0-27.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435111	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	94	
90	100		0.6	89	
75	100		0.425	88	
63	100		0.3	86	
50	100		0.2	82	
37.5	100		0.15	81	
28	100		0.063	75	
20	100		0.055	74	
14	100		0.039	68	
10	99		0.010	44	
6.3	98		0.0024	26	
5	97		0.0015	22	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

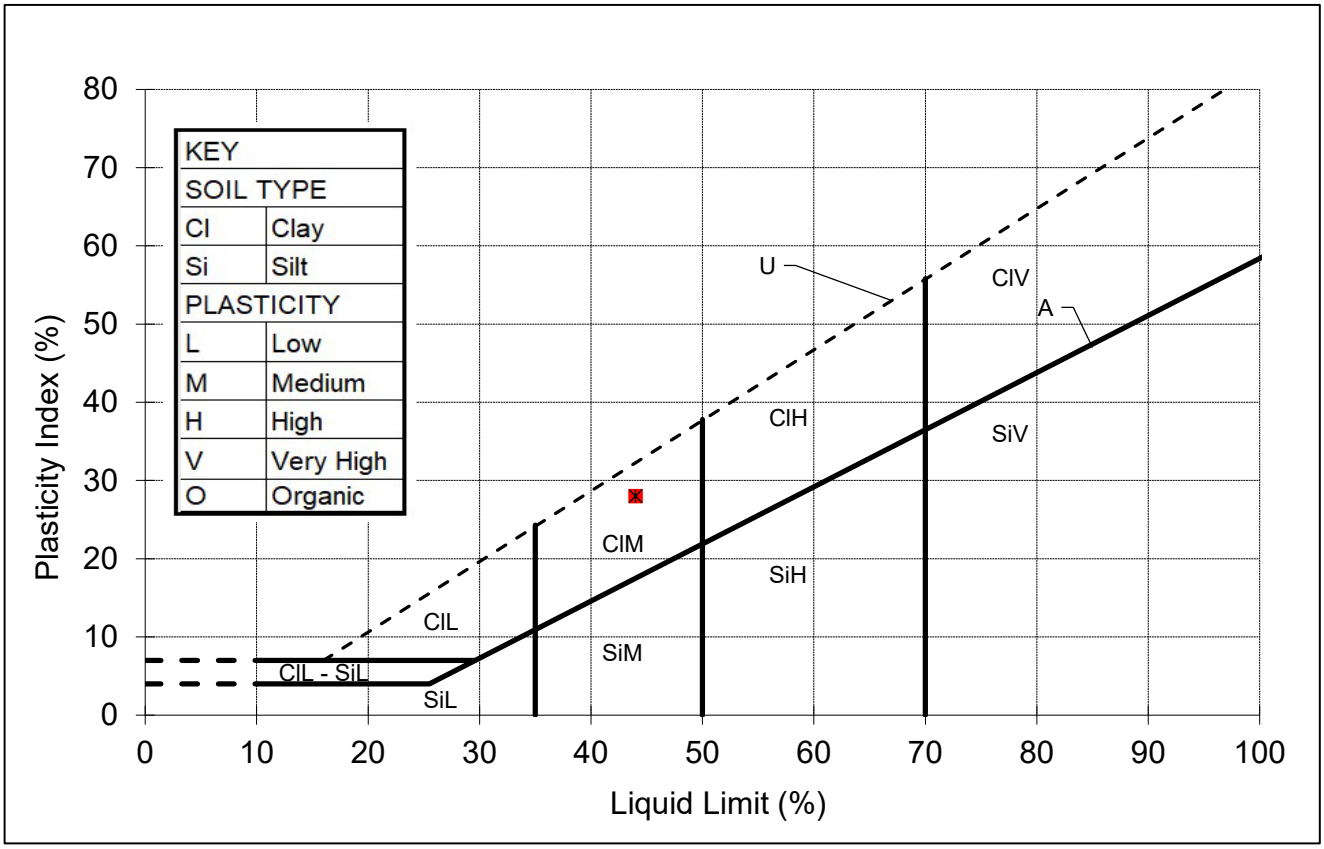
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 27.0-27.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435111	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.1	44	16	28	88



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

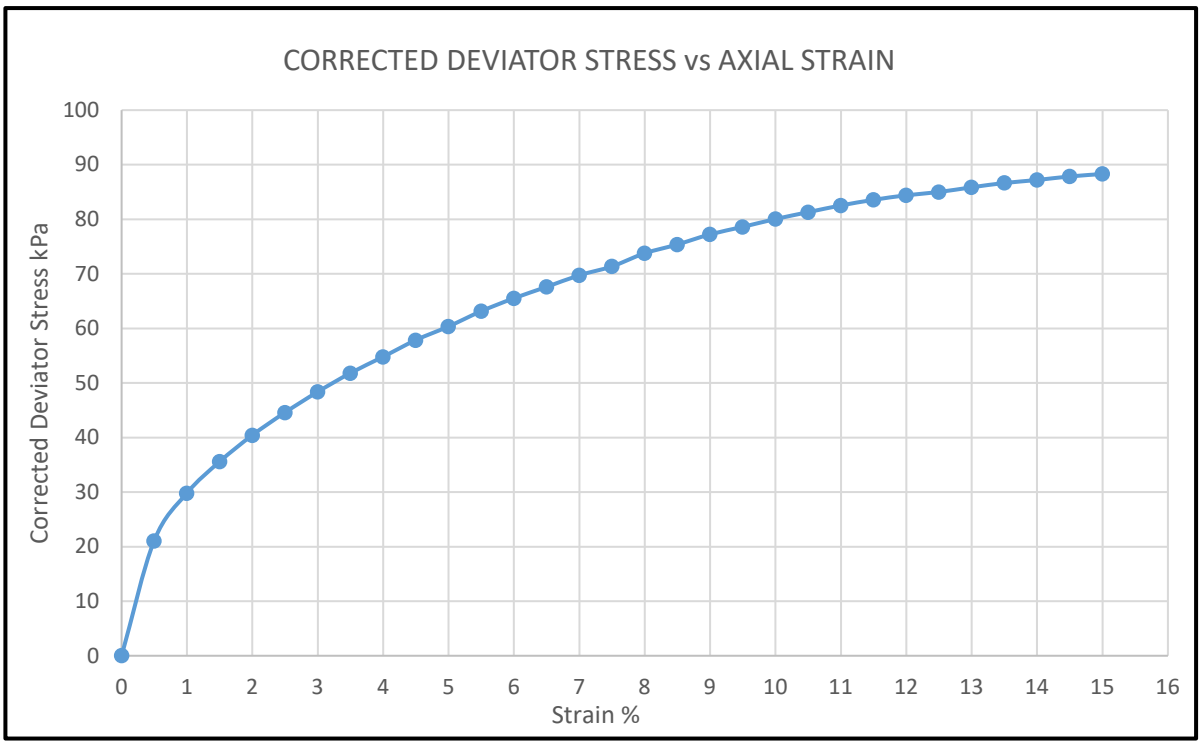
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 27.0-27.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435111	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

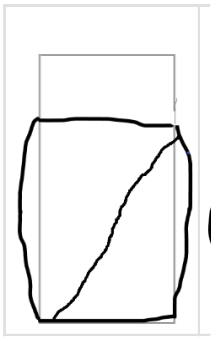
Specimen Location 

Sample Length (mm)	450	Specimen depth from top of Sample (mm)	60
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	19.1
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.89
Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
540	15.0	2.0	88	44

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

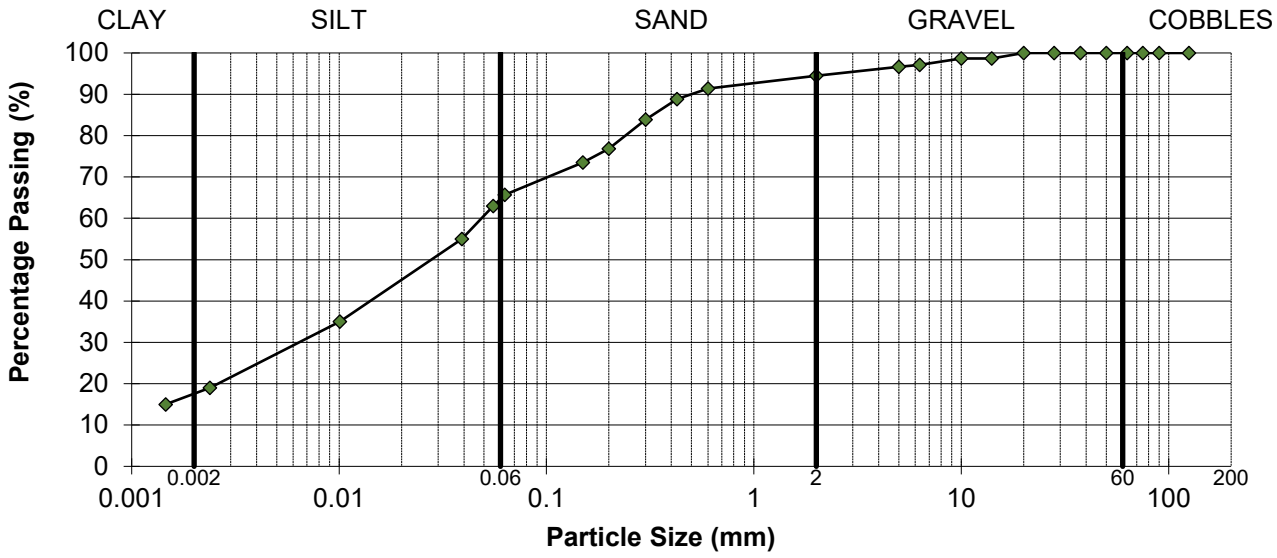
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 30-30.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435112	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	94	
90	100		0.6	91	
75	100		0.425	89	
63	100		0.3	84	
50	100		0.2	77	
37.5	100		0.15	74	
28	100		0.063	66	
20	100		0.055	63	
14	99		0.039	55	
10	99		0.010	35	
6.3	97		0.0024	19	
5	97		0.0015	15	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

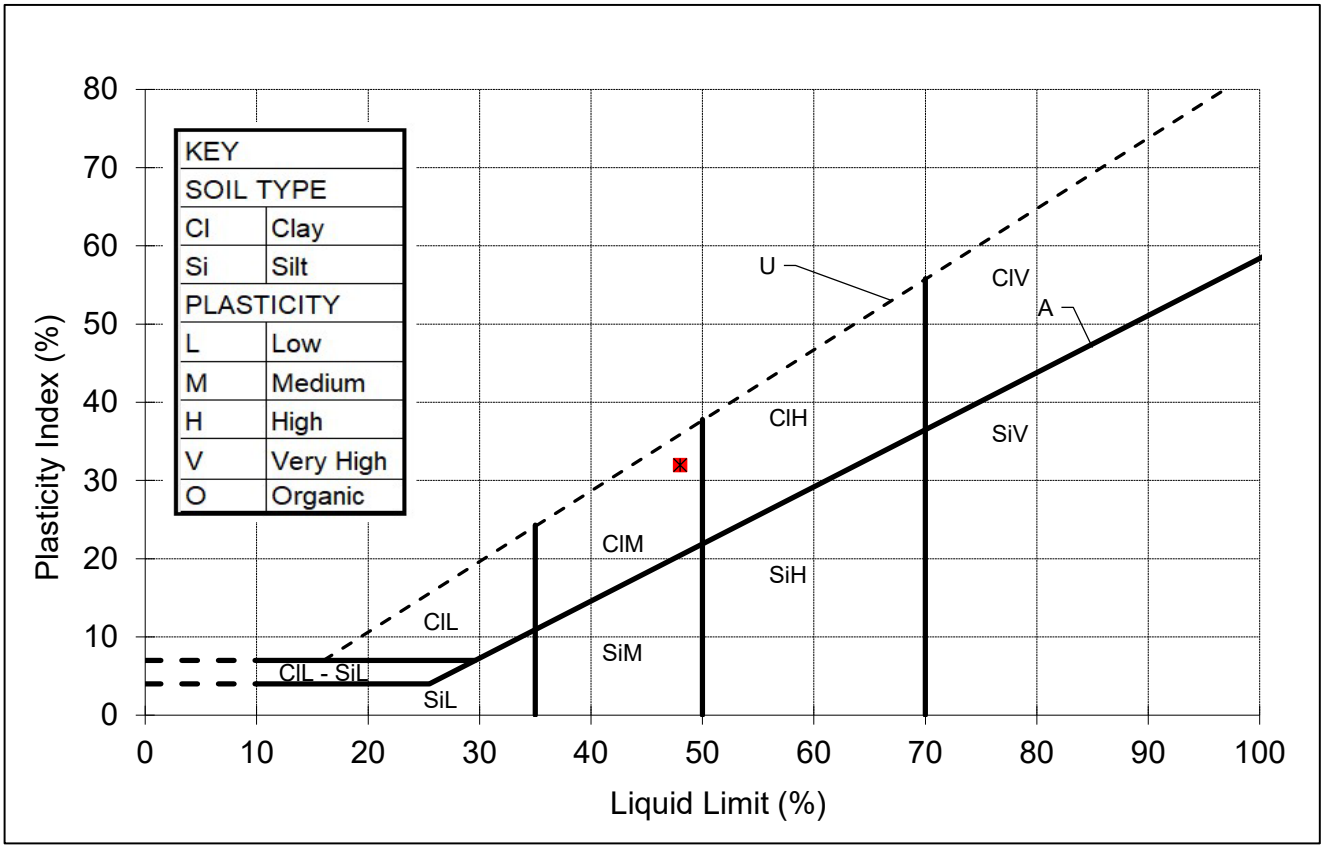
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 203 30-30.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435112	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.4	48	16	32	89



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

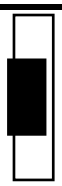
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

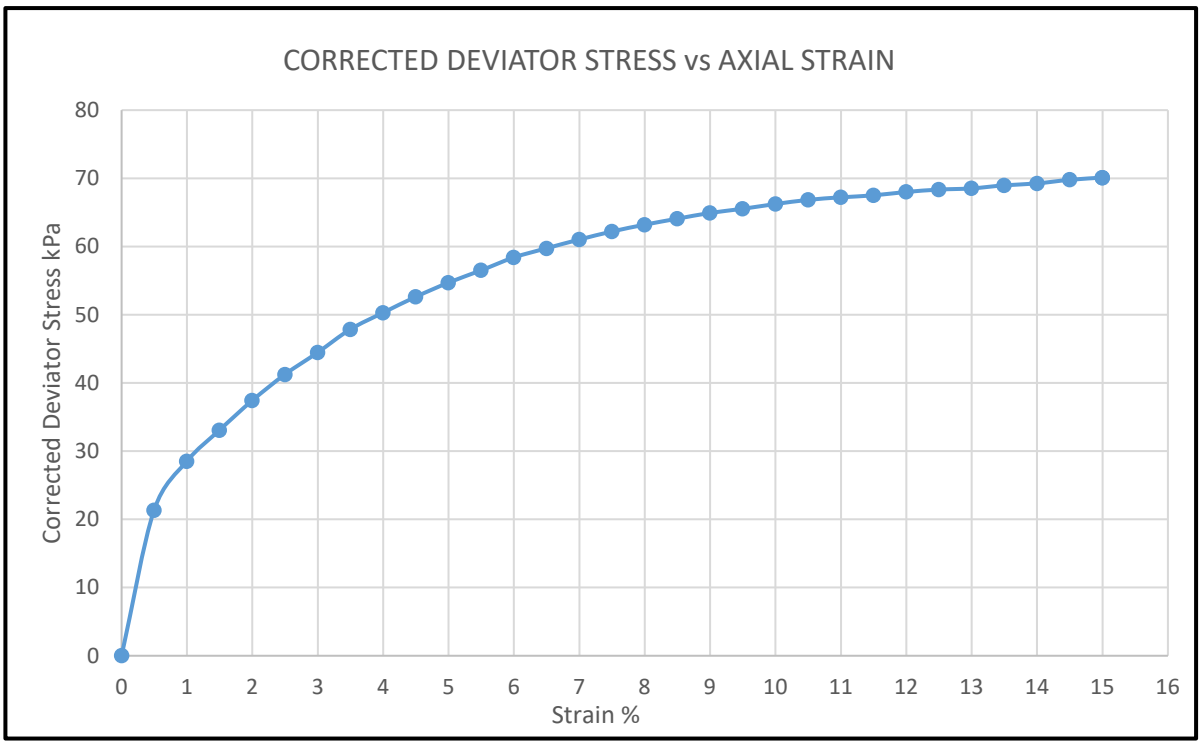
SAMPLE LABEL	BH 203 30-30.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435112	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

Specimen Location

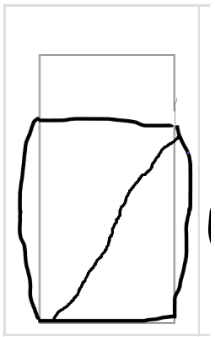


Sample Length (mm)	450	Specimen depth from top of Sample (mm)	100
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	14.4
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.97
Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
560	15.0	2.0	70	35

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

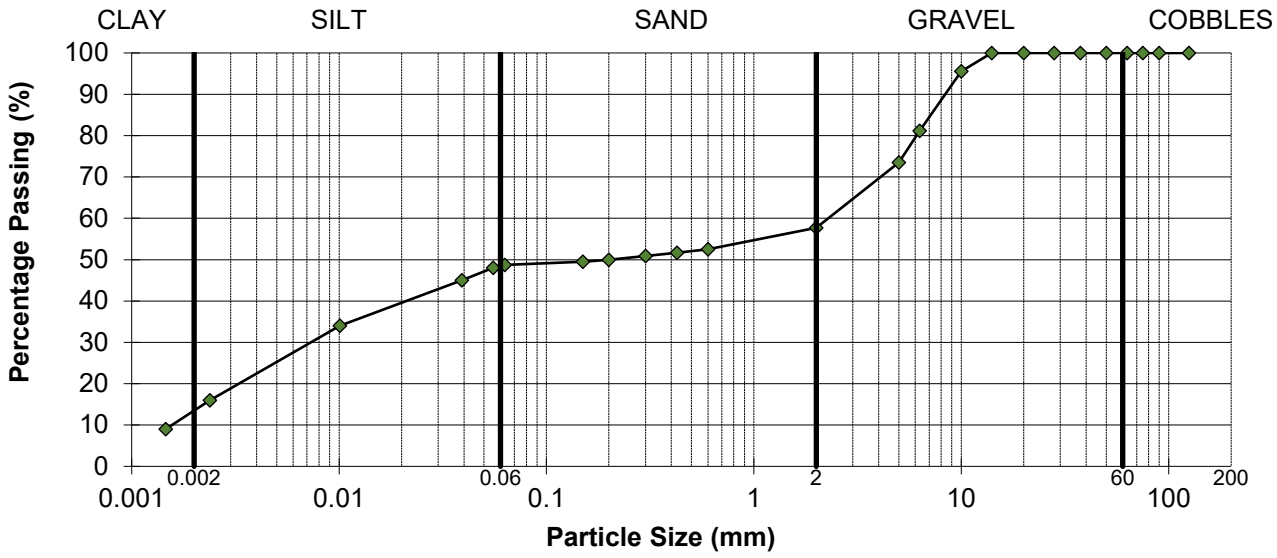
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 2.0-2.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435113	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	58	
90	100		0.6	52	
75	100		0.425	52	
63	100		0.3	51	
50	100		0.2	50	
37.5	100		0.15	50	
28	100		0.063	49	
20	100		0.055	48	
14	100		0.039	45	
10	96		0.010	34	
6.3	81		0.0024	16	
5	74		0.0015	9	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

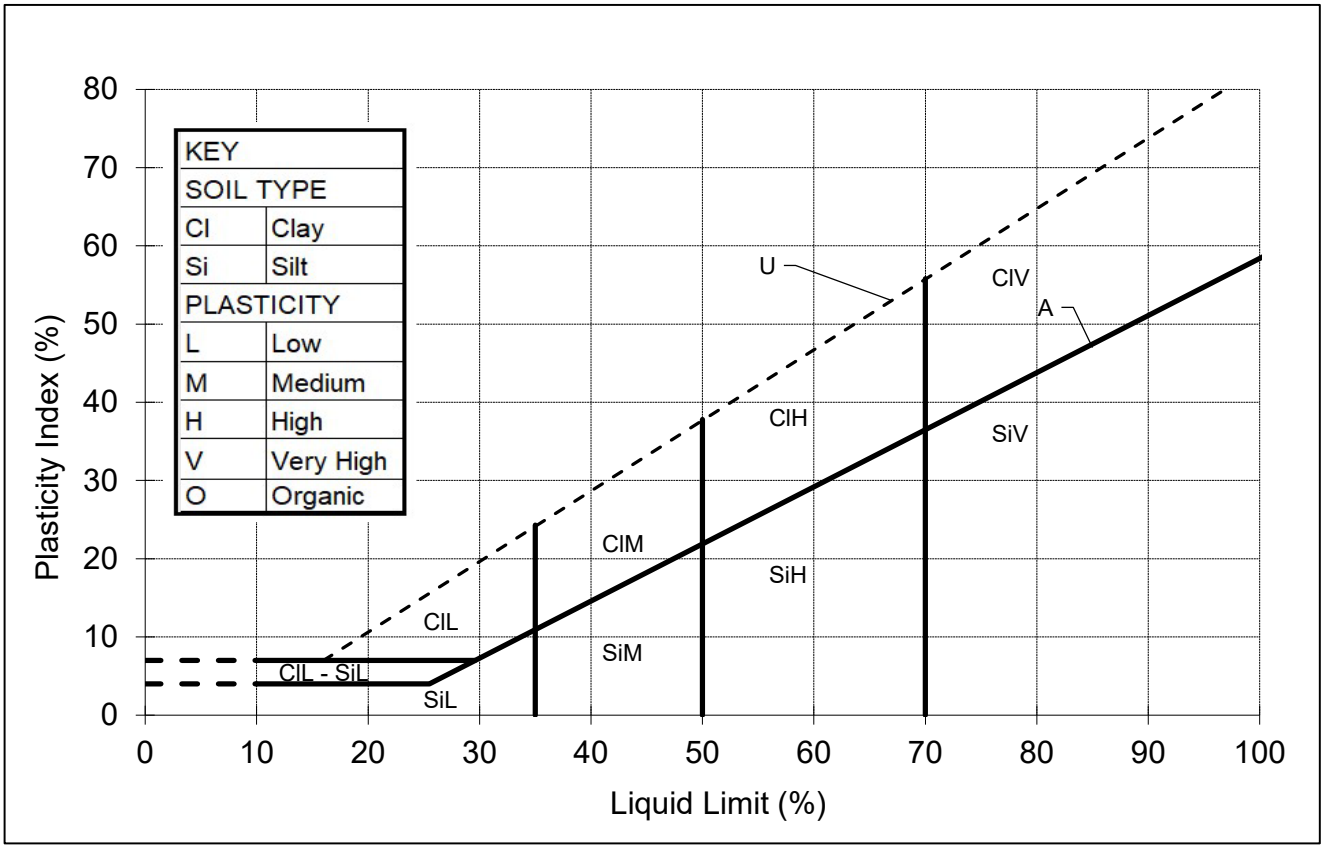
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 2.0-2.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435113	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
200.5	169	74	95	52



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

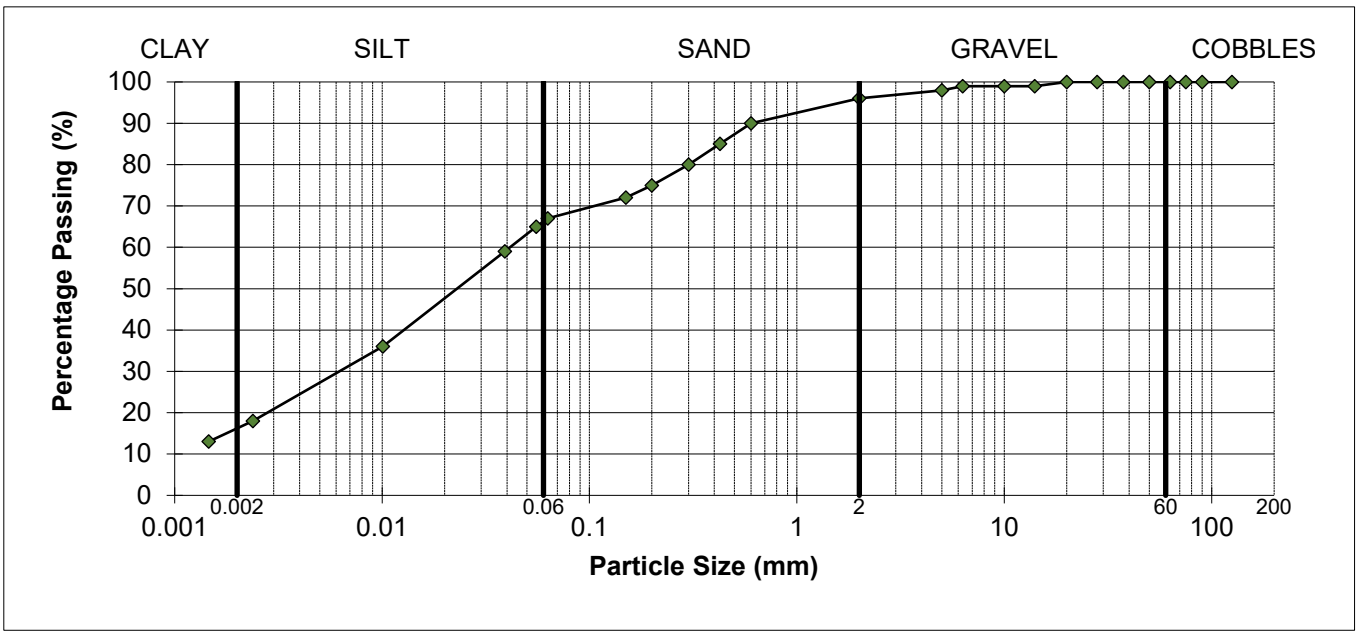
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 4.0-4.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435114	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	96	
90	100		0.6	90	
75	100		0.425	85	
63	100		0.3	80	
50	100		0.2	75	
37.5	100		0.15	72	
28	100		0.063	67	
20	100		0.055	65	
14	99		0.039	59	
10	99		0.010	36	
6.3	99		0.0024	18	
5	98		0.0015	13	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

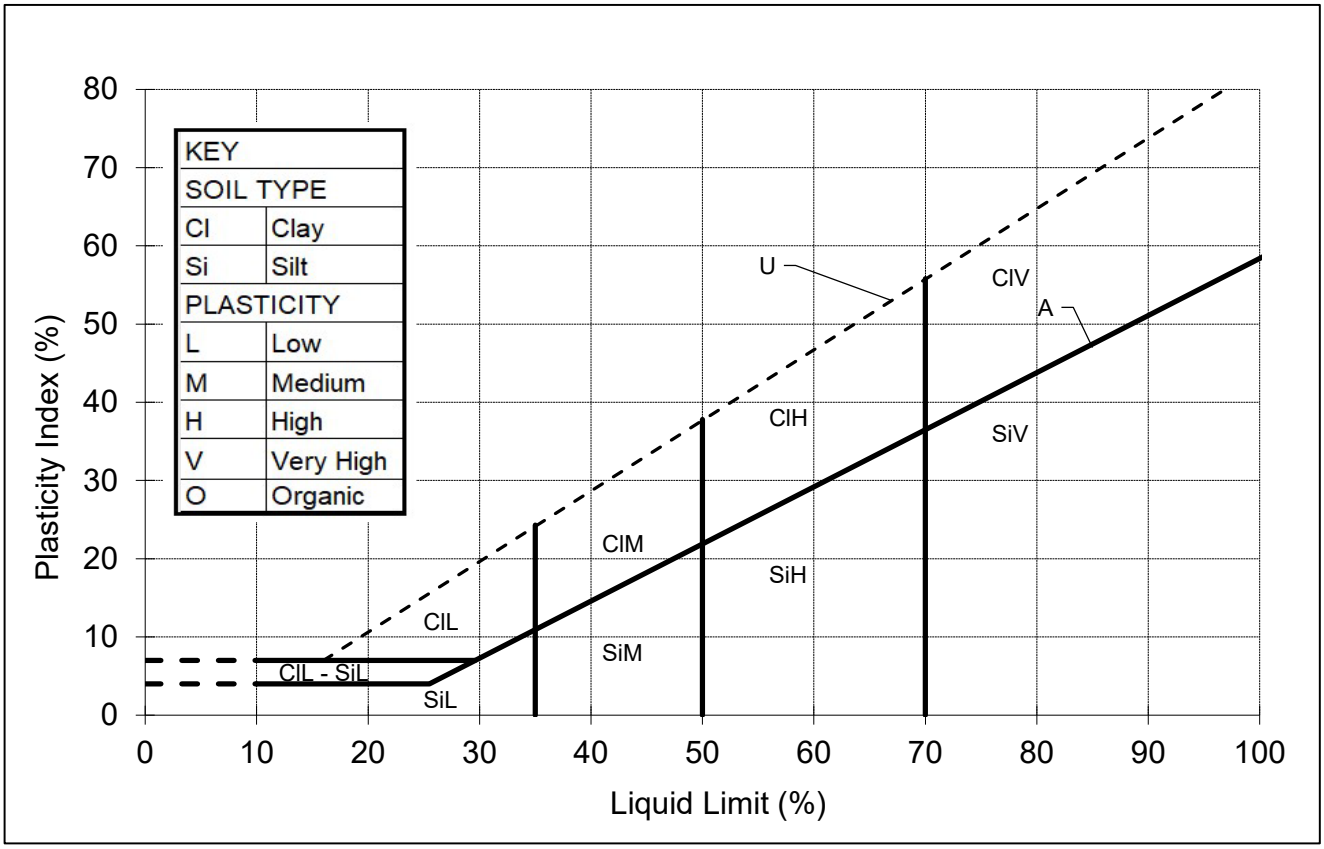
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 4.0-4.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435114	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
240.8	147	62	85	85



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

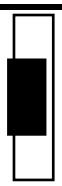
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

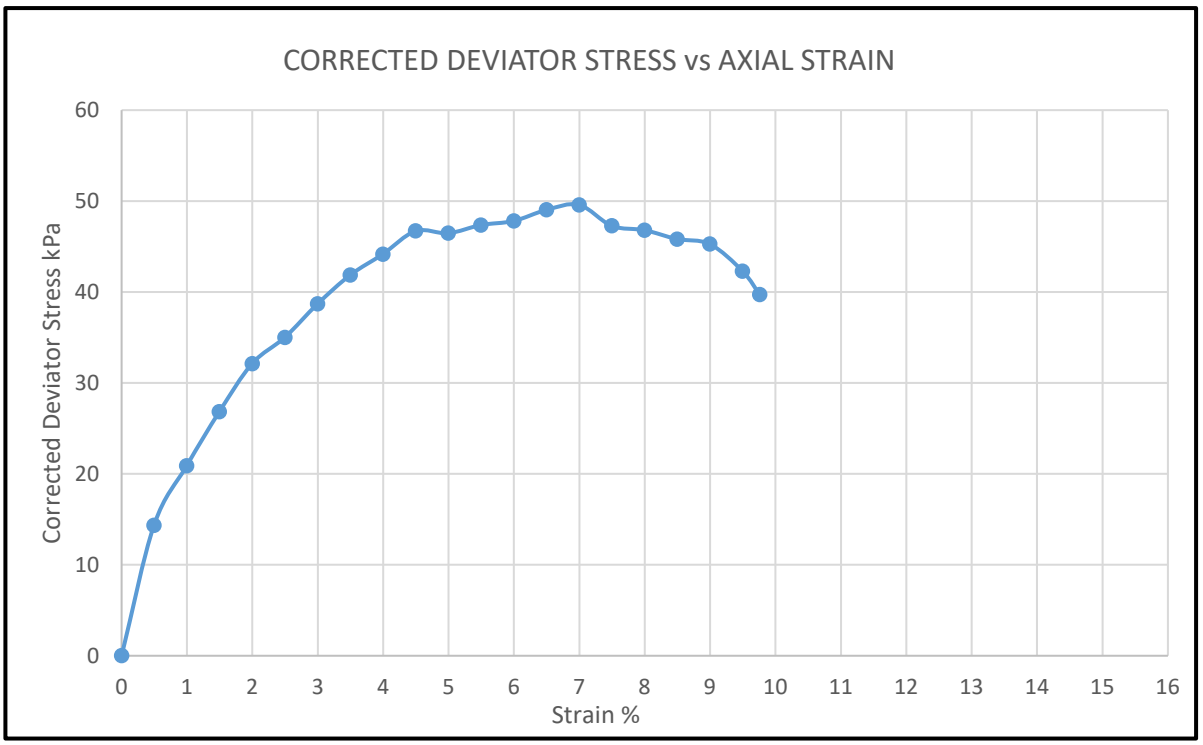
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 4.0-4.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435114	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

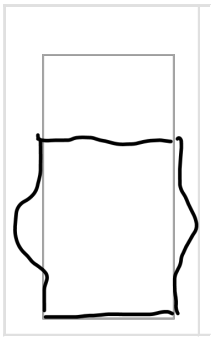
INITIAL CONDITIONS

Specimen Location 	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	100
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	240.8
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	0.66
	Membrane Correction	2.21		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



BULGING

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
40	7.0	2.0	50	25

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed  Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

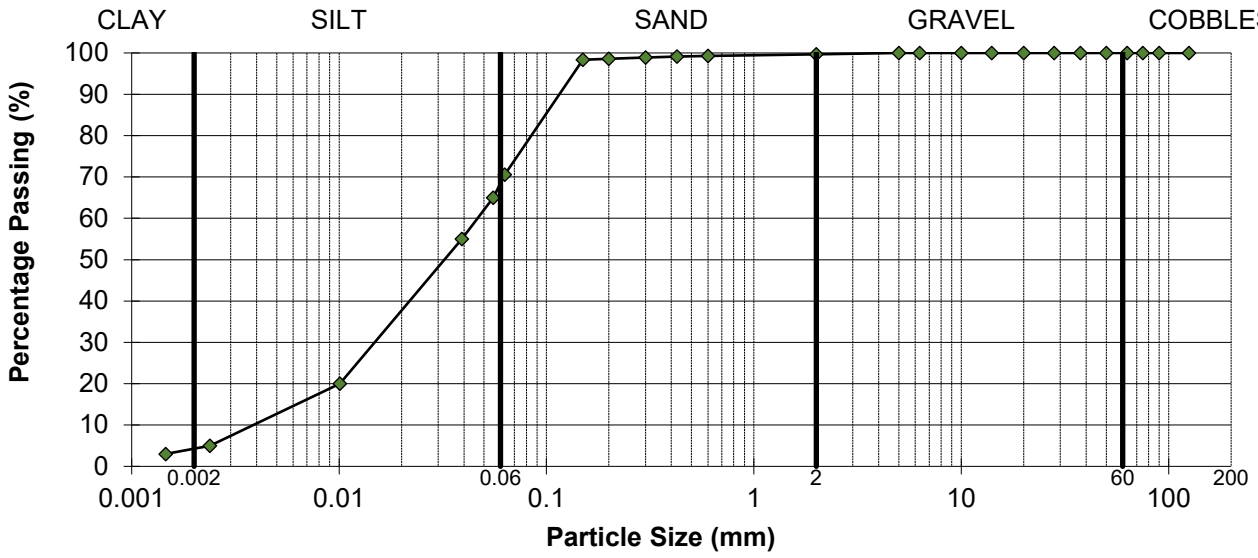
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 6.0-6.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435115	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey sandy SILT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	99	
63	100		0.3	99	
50	100		0.2	99	
37.5	100		0.15	98	
28	100		0.063	71	
20	100		0.055	65	
14	100		0.039	55	
10	100		0.010	20	
6.3	100		0.0024	5	
5	100		0.0015	3	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

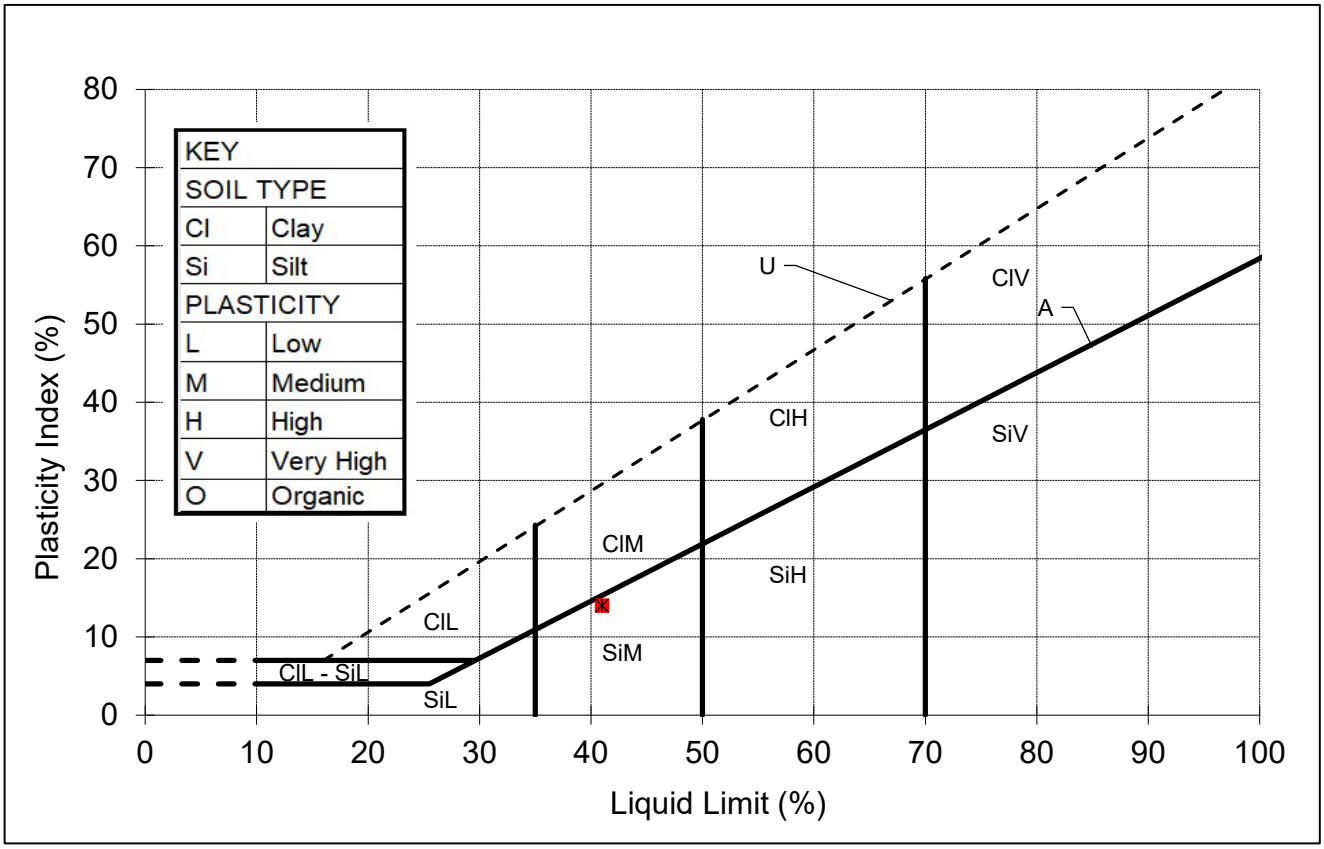
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 6.0-6.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435115	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey sandy SILT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
33.7	41	27	14	99



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

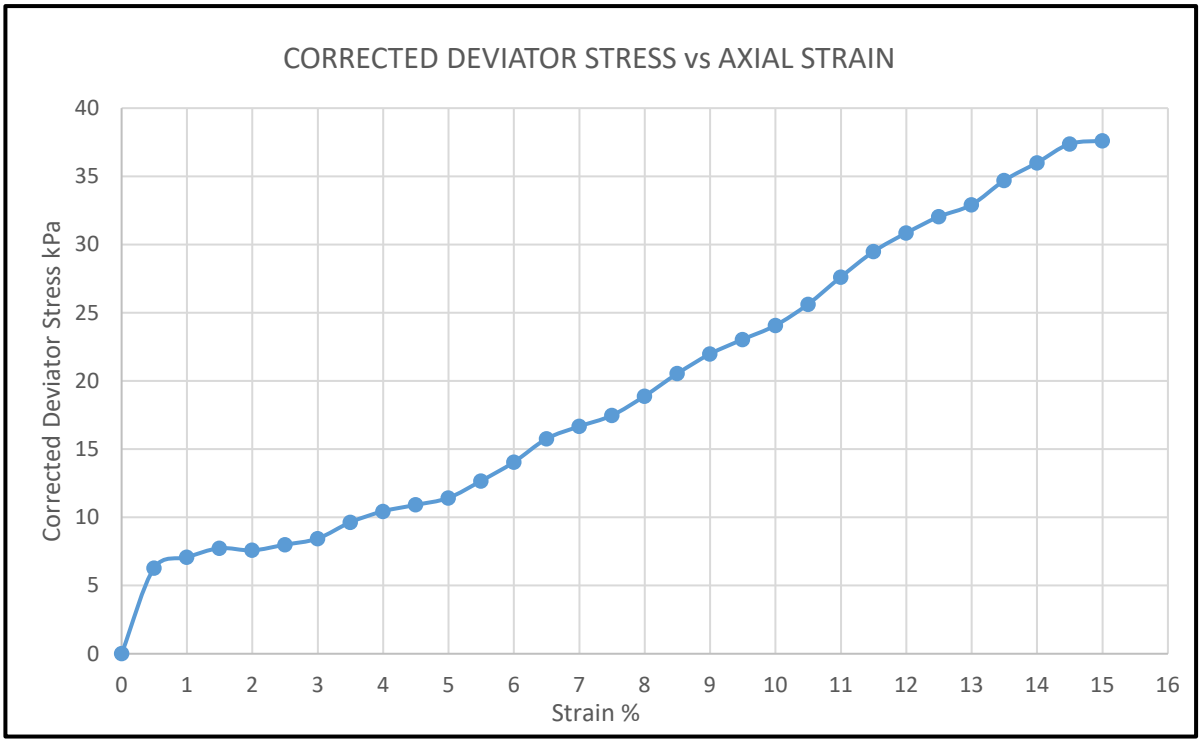
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 6.0-6.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435115	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark grey clayey sandy SILT		
ADVISED SOURCE	Site Investigation Sample		

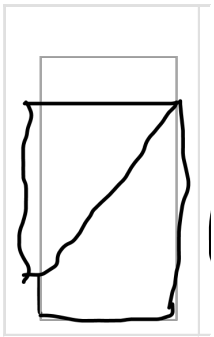
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	33.7
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.68
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



SIMPLE_SHEAR

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
80	15.0	2.0	38	19

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

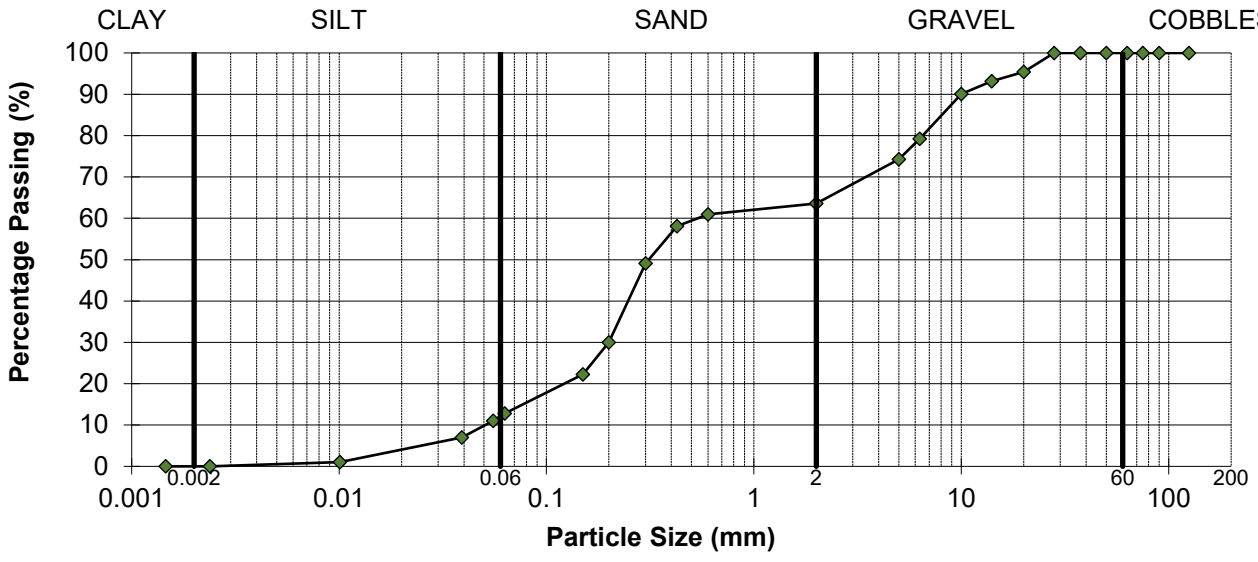
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 12.0-12.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435116	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown SAND & GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	64	
90	100		0.6	61	
75	100		0.425	58	
63	100		0.3	49	
50	100		0.2	30	
37.5	100		0.15	22	
28	100		0.063	13	
20	95		0.055	11	
14	93		0.039	7	
10	90		0.010	1	
6.3	79		0.0024	0	
5	74		0.0015	0	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

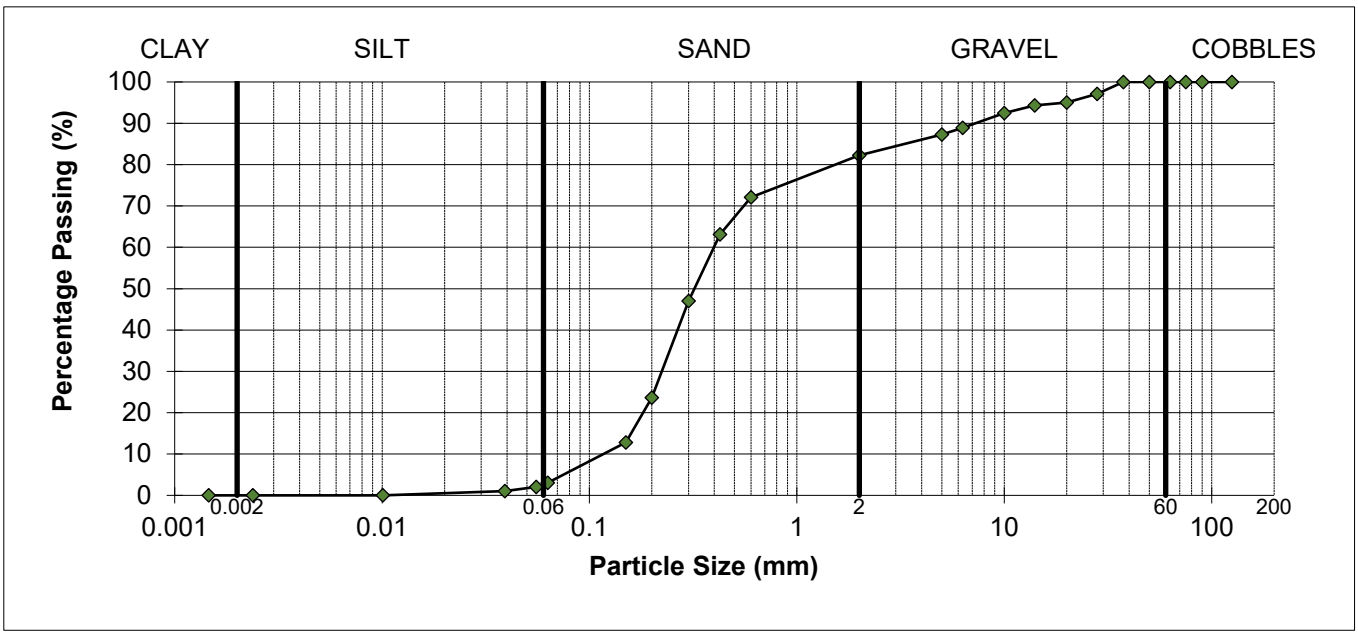
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 18.0-18.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435117	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	82	
90	100		0.6	72	
75	100		0.425	63	
63	100		0.3	47	
50	100		0.2	24	
37.5	100		0.15	13	
28	97		0.063	3	
20	95		0.055	2	
14	94		0.039	1	
10	93		0.010	0	
6.3	89		0.0024	0	
5	87		0.0015	0	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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TEL 0161 475 0870

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

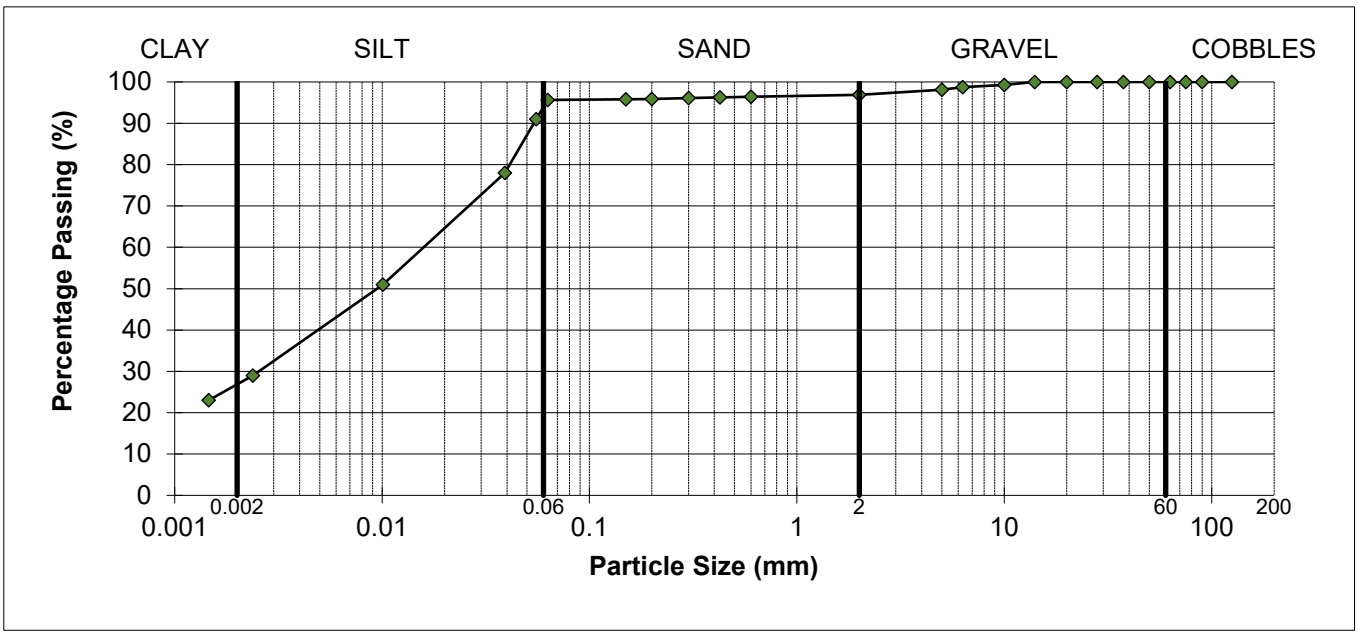
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 26.5-26.95m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435118	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	96	
75	100		0.425	96	
63	100		0.3	96	
50	100		0.2	96	
37.5	100		0.15	96	
28	100		0.063	96	
20	100		0.055	91	
14	100		0.039	78	
10	99		0.010	51	
6.3	99		0.0024	29	
5	98		0.0015	23	



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

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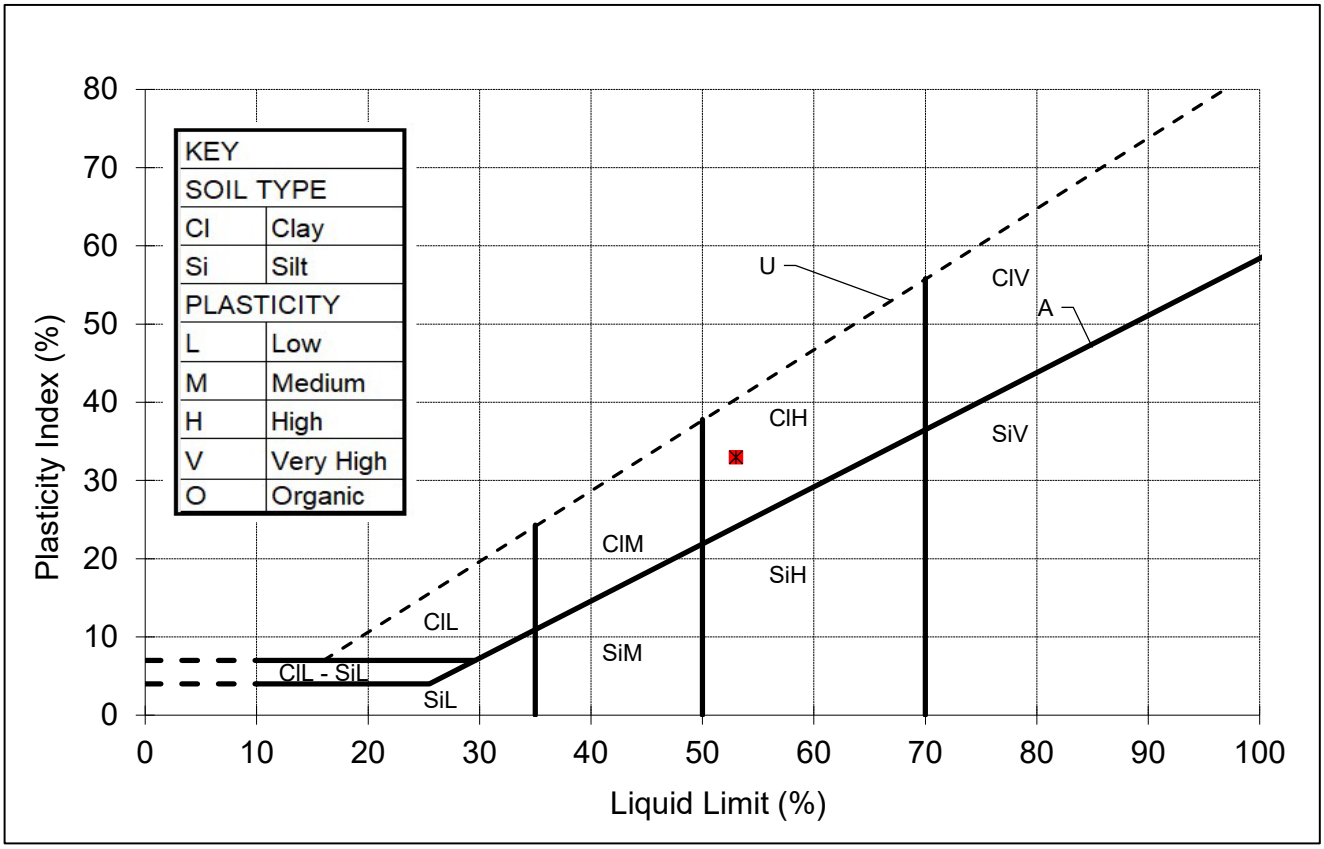
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 26.5-26.95m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435118	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.1	53	20	33	96



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PARTICLE SIZE DISTRIBUTION

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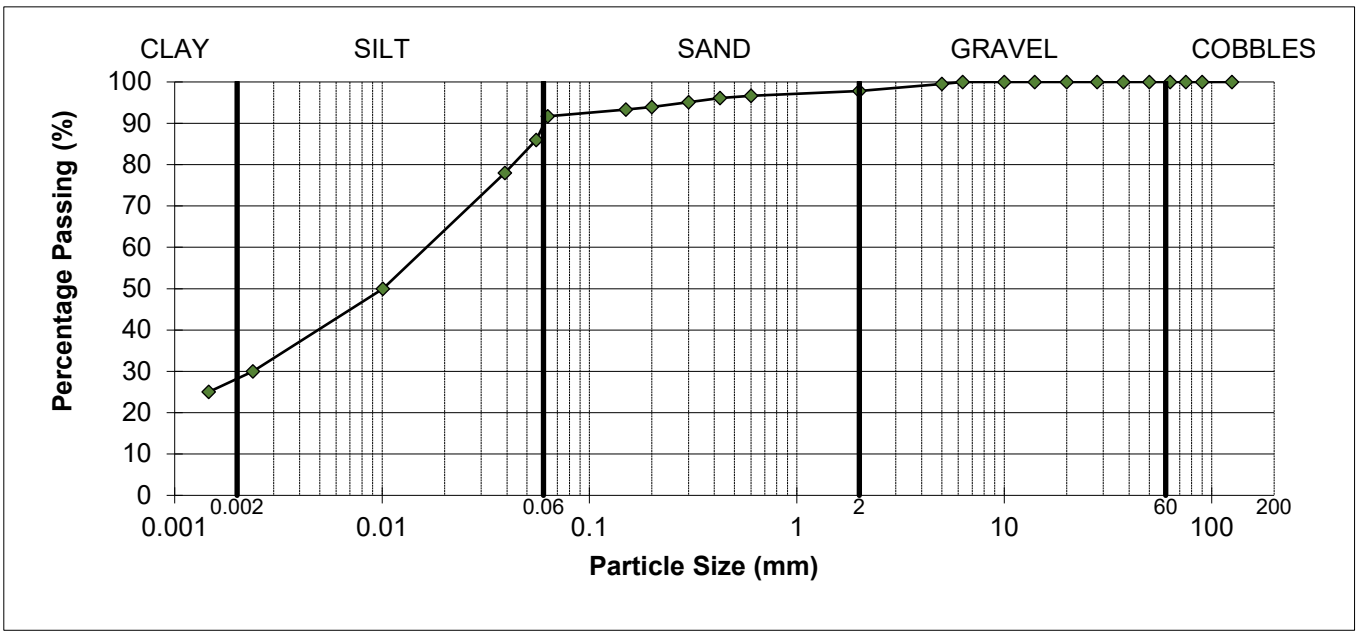
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 36.0-36.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435119	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	98	
90	100		0.6	97	
75	100		0.425	96	
63	100		0.3	95	
50	100		0.2	94	
37.5	100		0.15	93	
28	100		0.063	92	
20	100		0.055	86	
14	100		0.039	78	
10	100		0.010	50	
6.3	100		0.0024	30	
5	100		0.0015	25	



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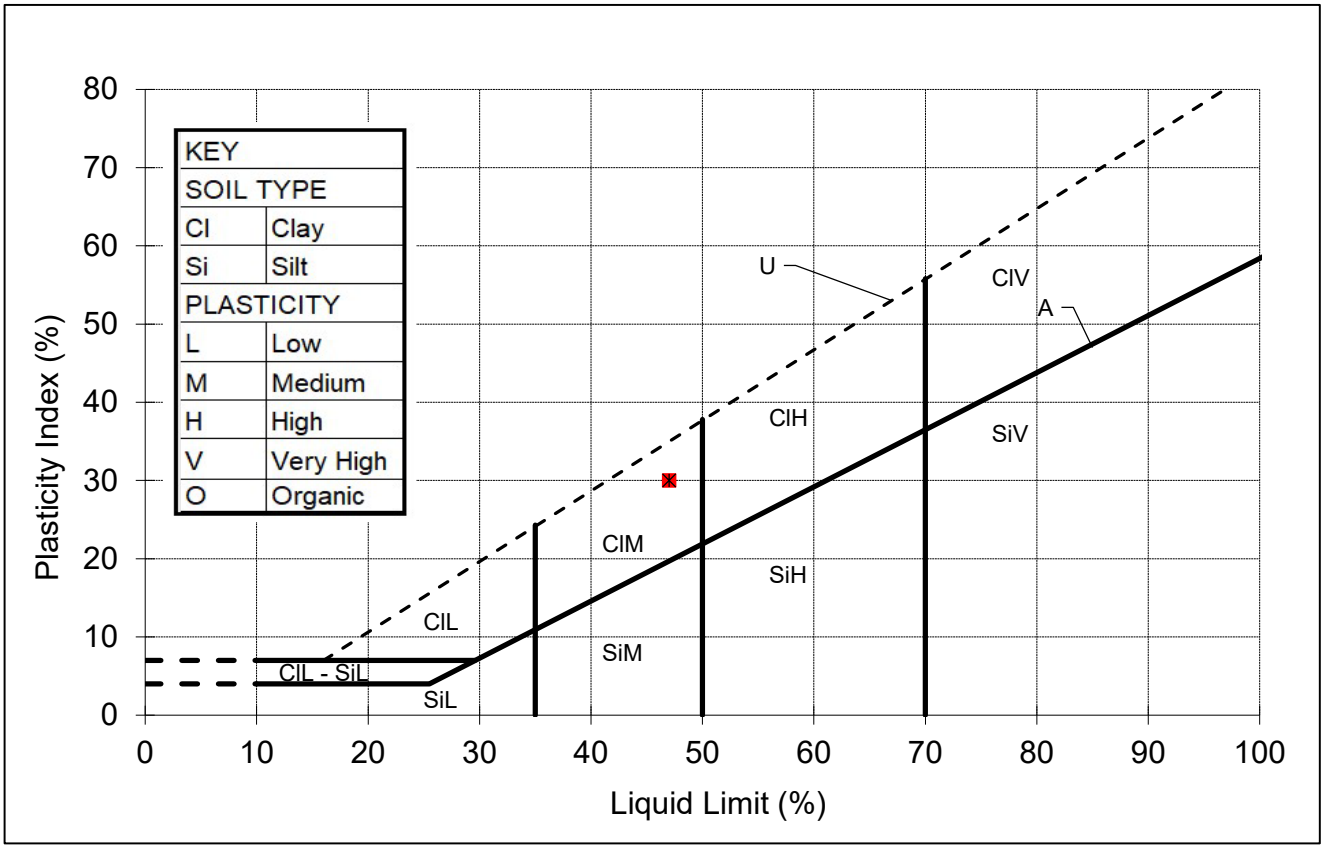
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 204 36.0-36.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435119	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17.9	47	17	30	96



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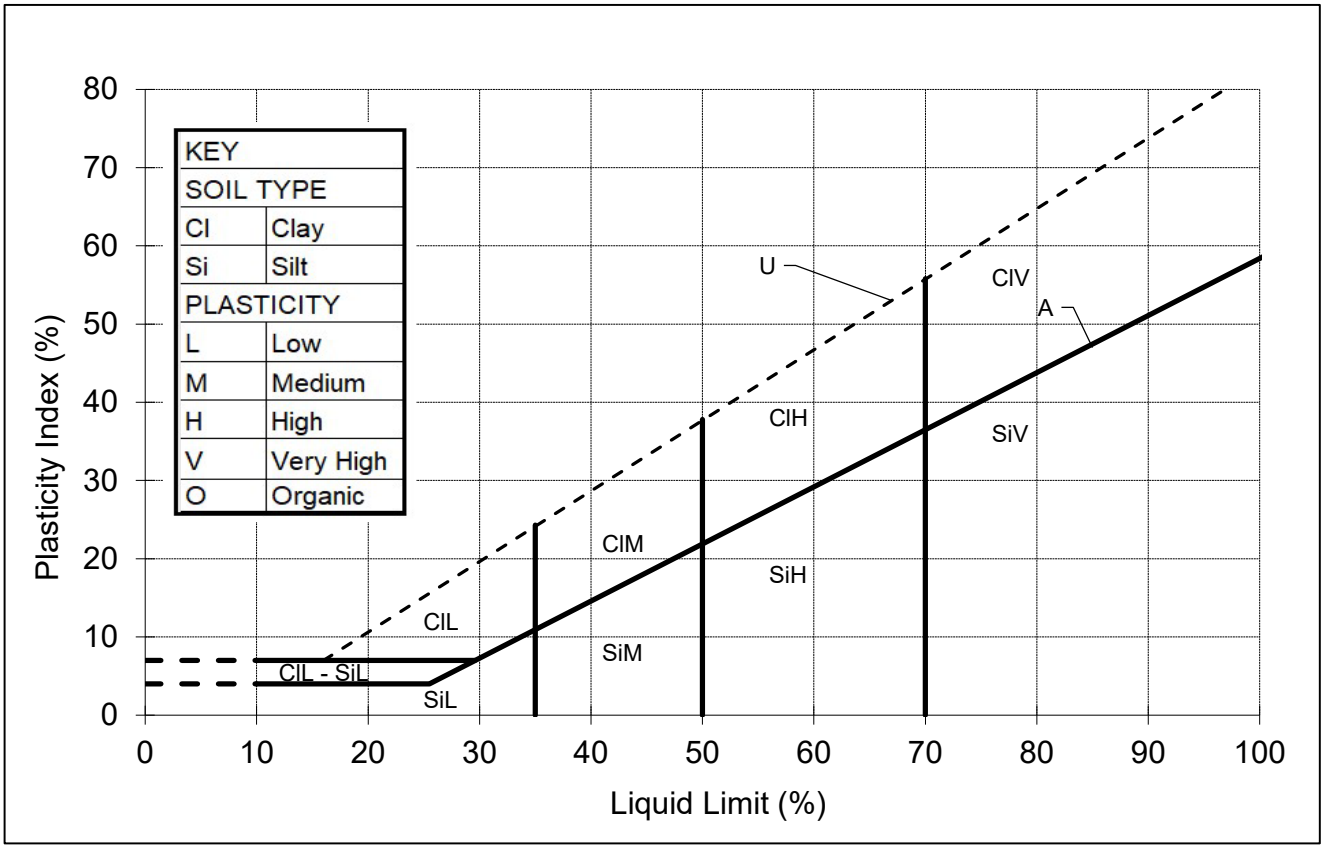
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 2.0-2.45m D	DATE SAMPLED	01-Feb-24
SAMPLE No.	435120	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
485.0	222	76	146	34



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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

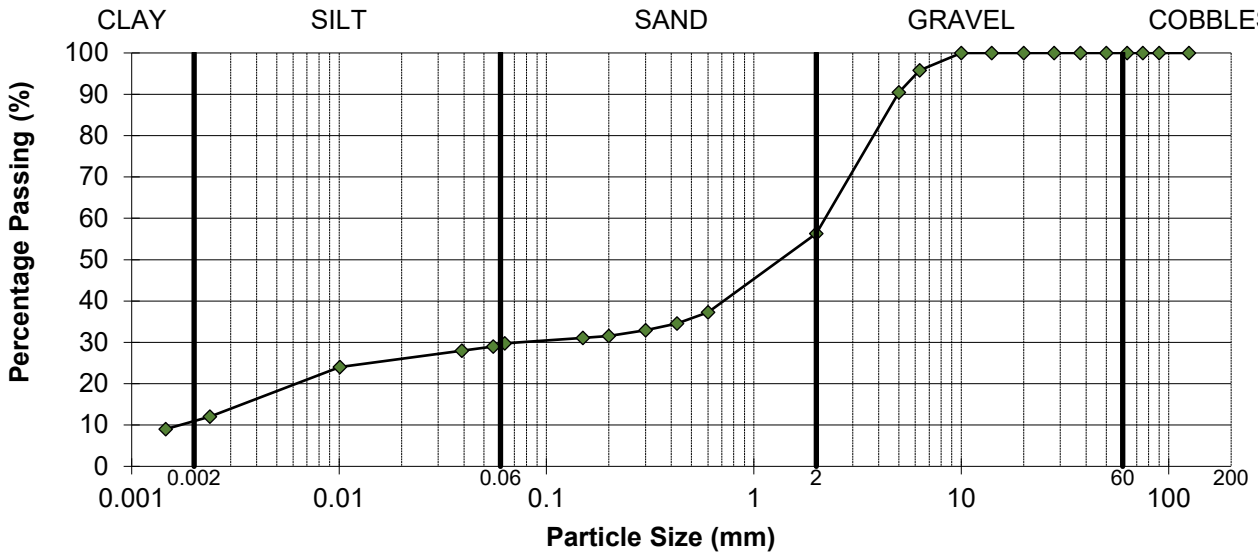
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 2.0-2.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435121	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	56	
90	100		0.6	37	
75	100		0.425	35	
63	100		0.3	33	
50	100		0.2	32	
37.5	100		0.15	31	
28	100		0.063	30	
20	100		0.055	29	
14	100		0.039	28	
10	100		0.010	24	
6.3	96		0.0024	12	
5	90		0.0015	9	



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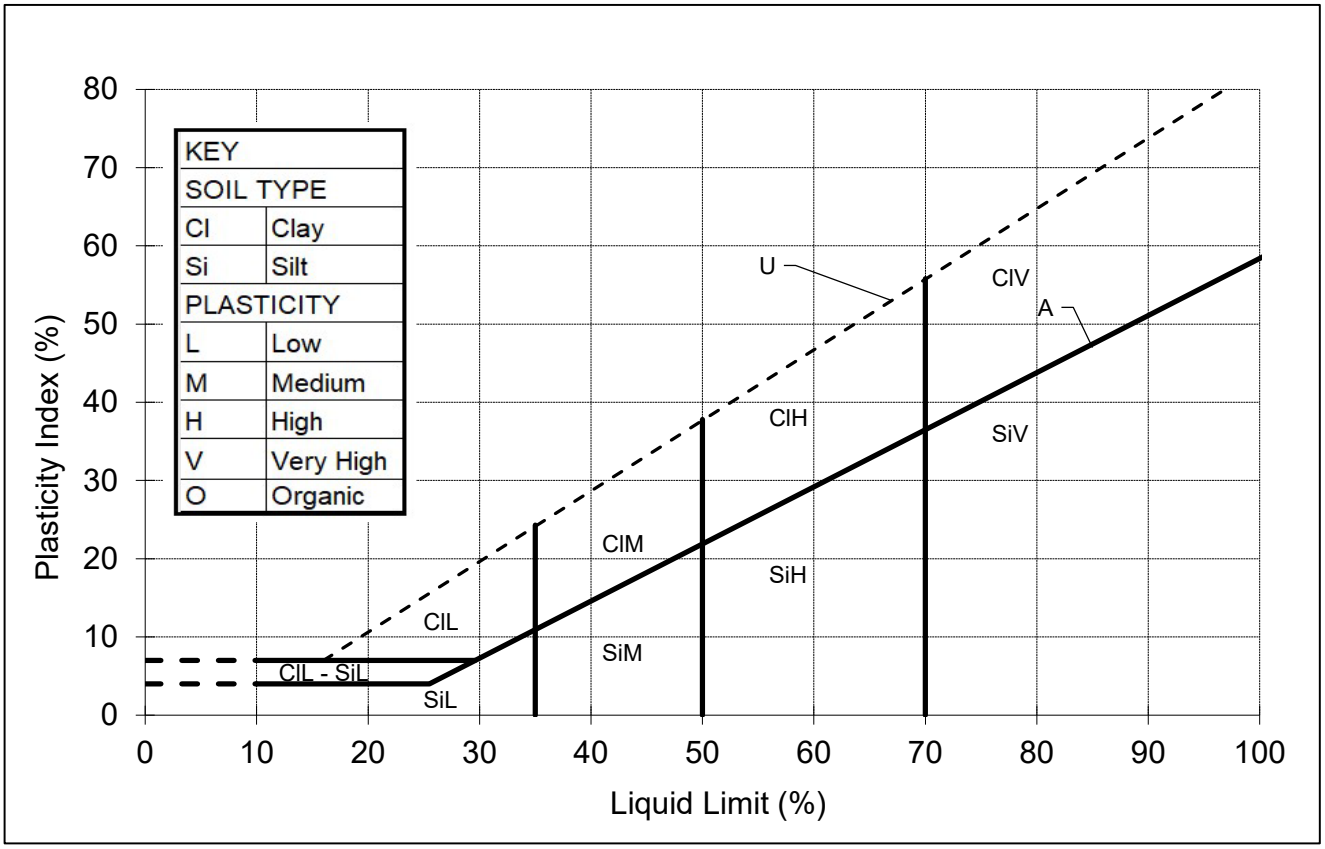
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 2.0-2.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435121	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
483.0	221	78	143	35



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

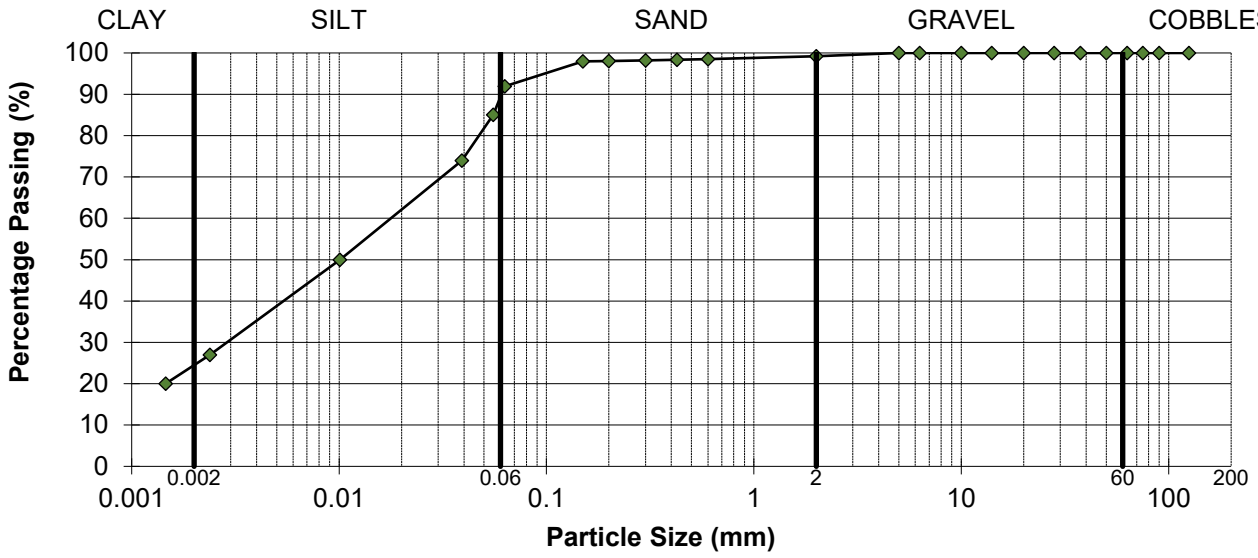
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 4.0-4.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435122	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	99	
90	100		0.6	98	
75	100		0.425	98	
63	100		0.3	98	
50	100		0.2	98	
37.5	100		0.15	98	
28	100		0.063	92	
20	100		0.055	85	
14	100		0.039	74	
10	100		0.010	50	
6.3	100		0.0024	27	
5	100		0.0015	20	



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

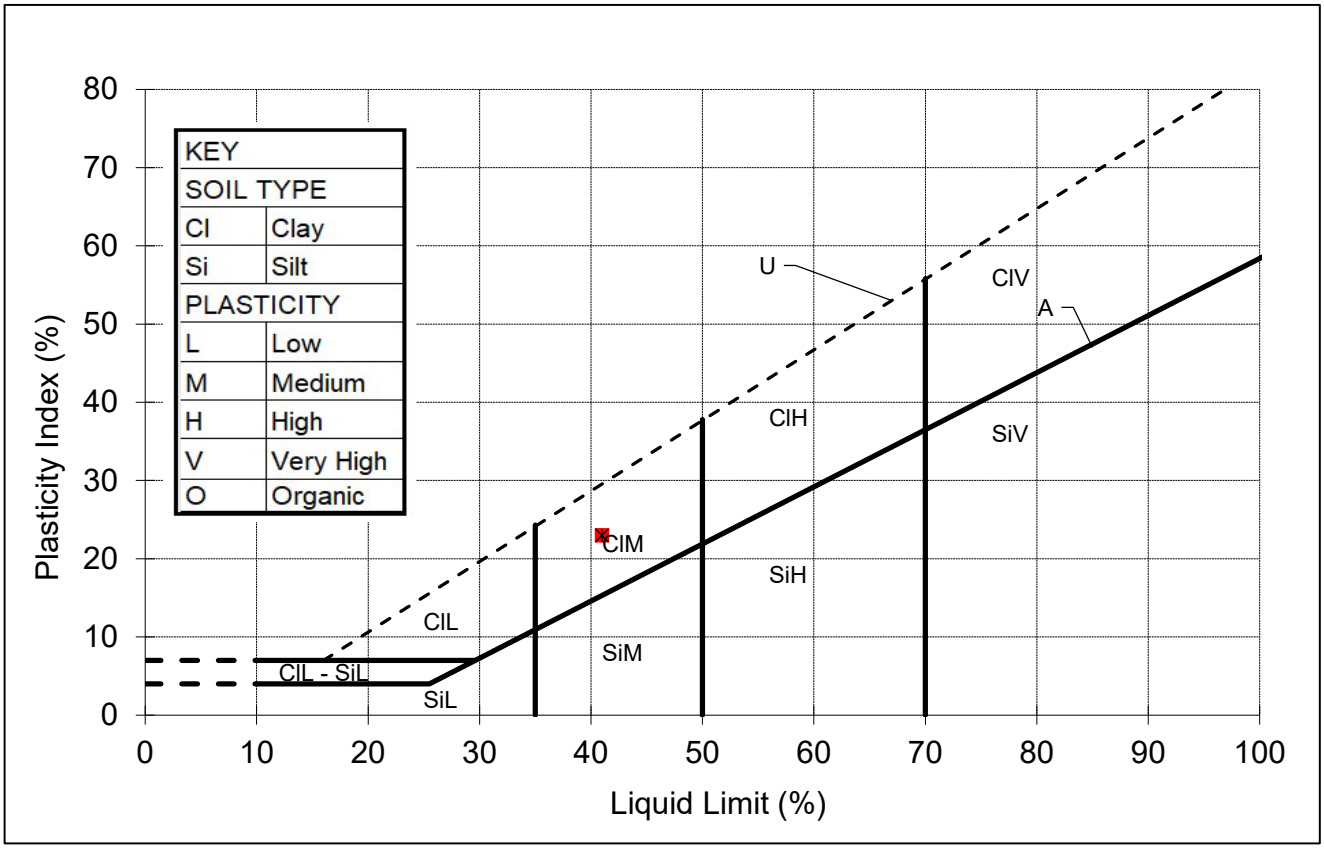
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 4.0-4.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435122	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
28.9	41	18	23	98



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

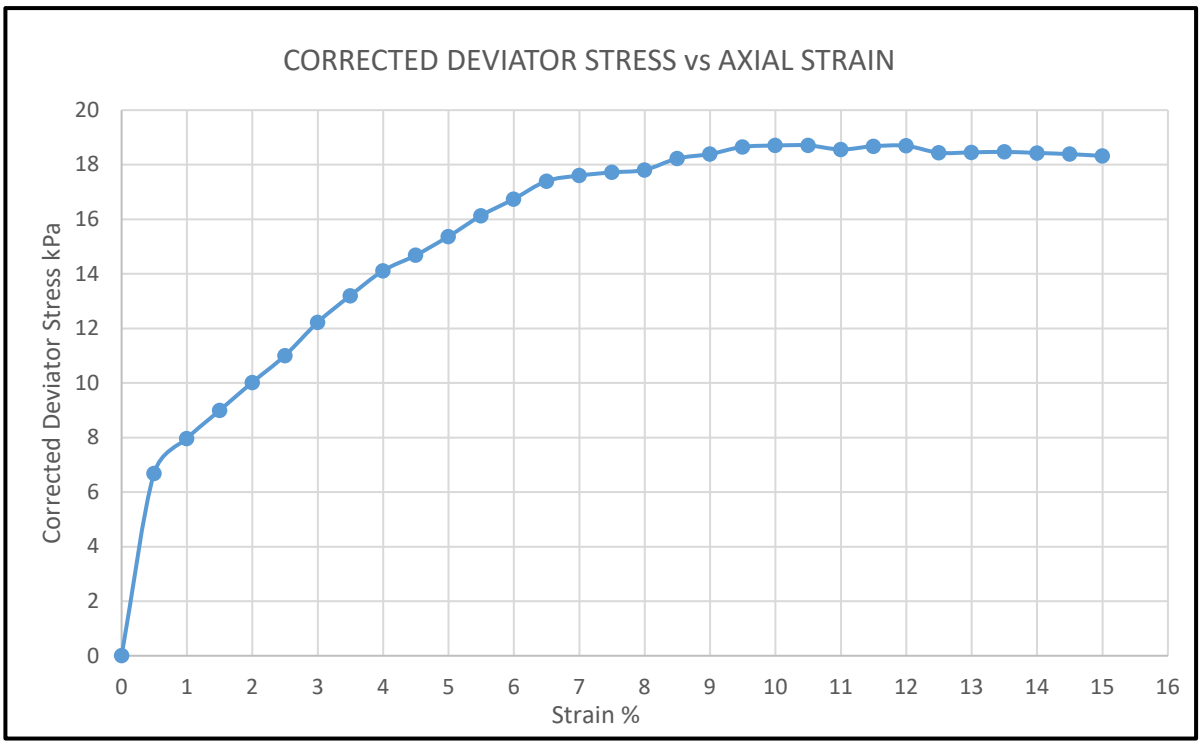
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 4.0-4.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435122	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark grey silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

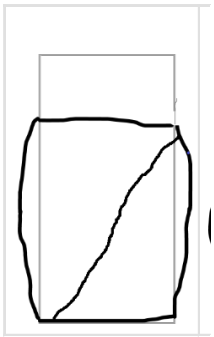
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	28.9
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.75
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
80	10.5	2.0	19	9

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

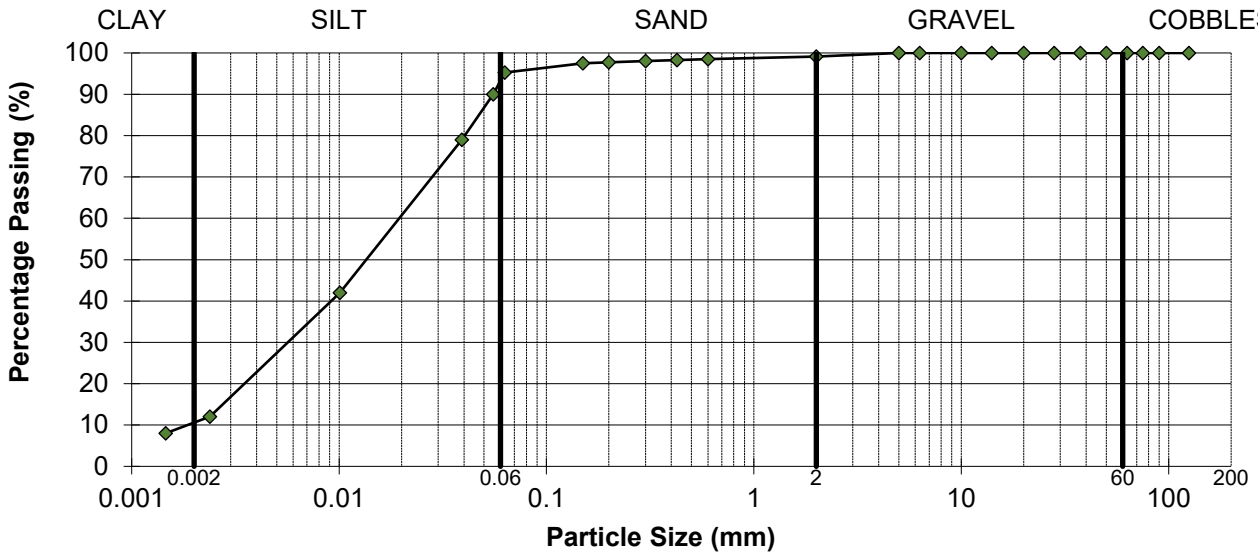
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 4.5m D	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435123	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey clayey sandy SILT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	99	
90	100		0.6	98	
75	100		0.425	98	
63	100		0.3	98	
50	100		0.2	98	
37.5	100		0.15	98	
28	100		0.063	95	
20	100		0.055	90	
14	100		0.039	79	
10	100		0.010	42	
6.3	100		0.0024	12	
5	100		0.0015	8	



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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TEST CERTIFICATE

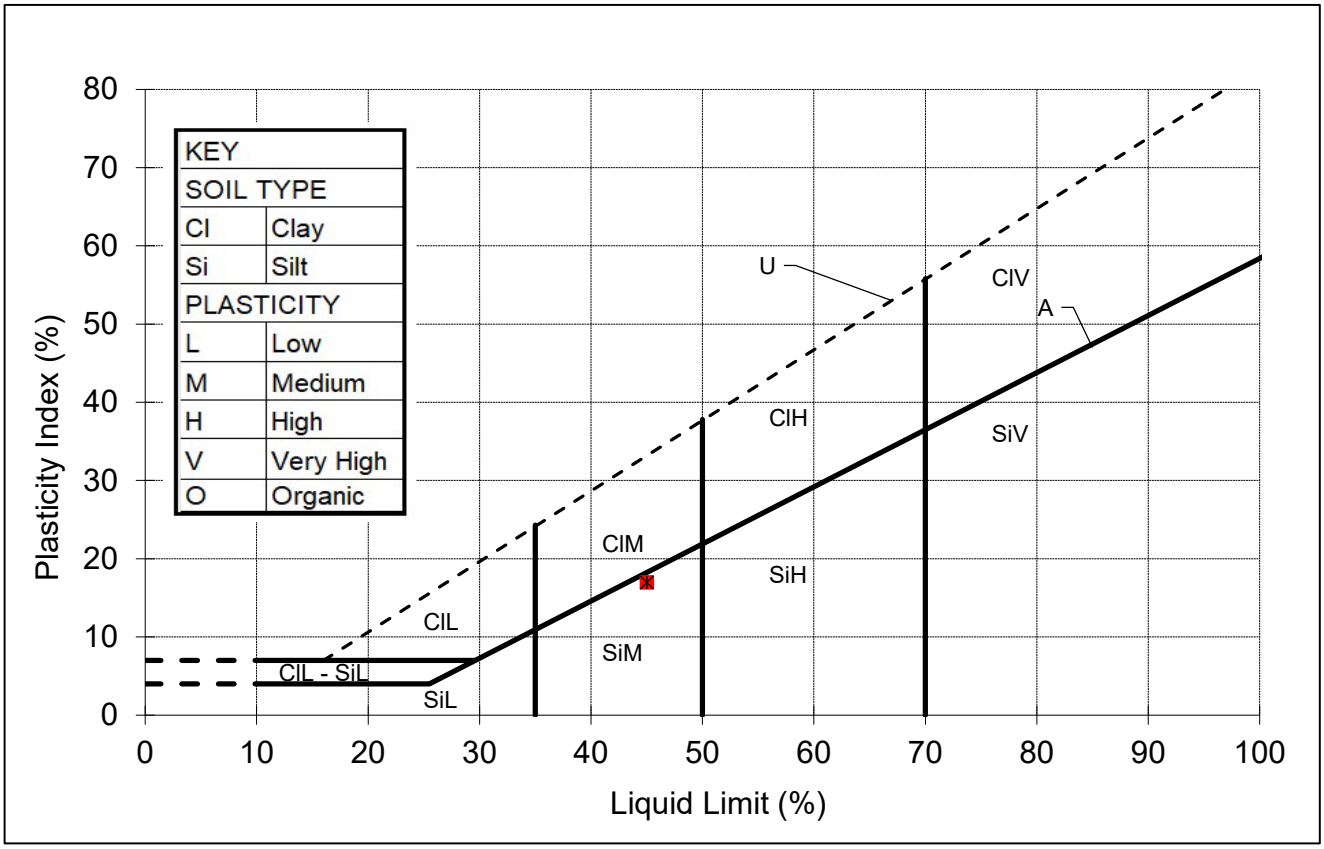
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 4.5m D	DATE SAMPLED	01-Feb-24
SAMPLE No.	435123	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey clayey sandy SILT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
40.8	45	28	17	98



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BS EN ISO 17892-4:2016

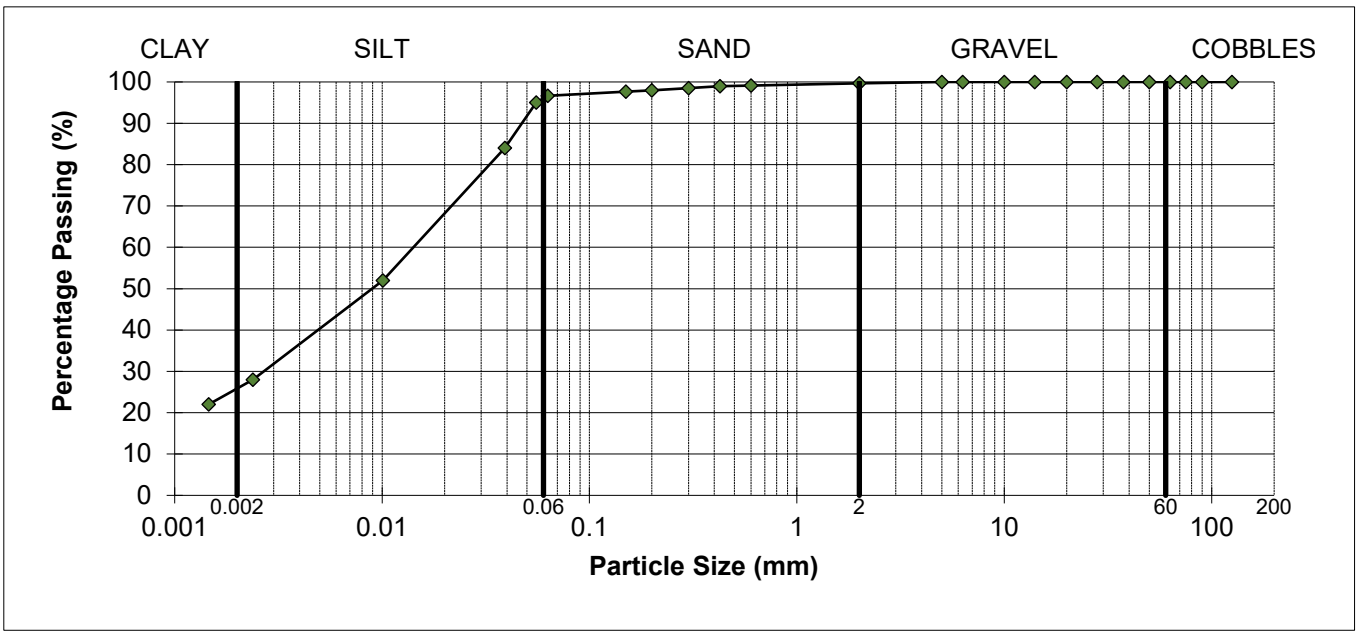
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 7.0-7.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435124	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	99	
63	100		0.3	98	
50	100		0.2	98	
37.5	100		0.15	98	
28	100		0.063	97	
20	100		0.055	95	
14	100		0.039	84	
10	100		0.010	52	
6.3	100		0.0024	28	
5	100		0.0015	22	



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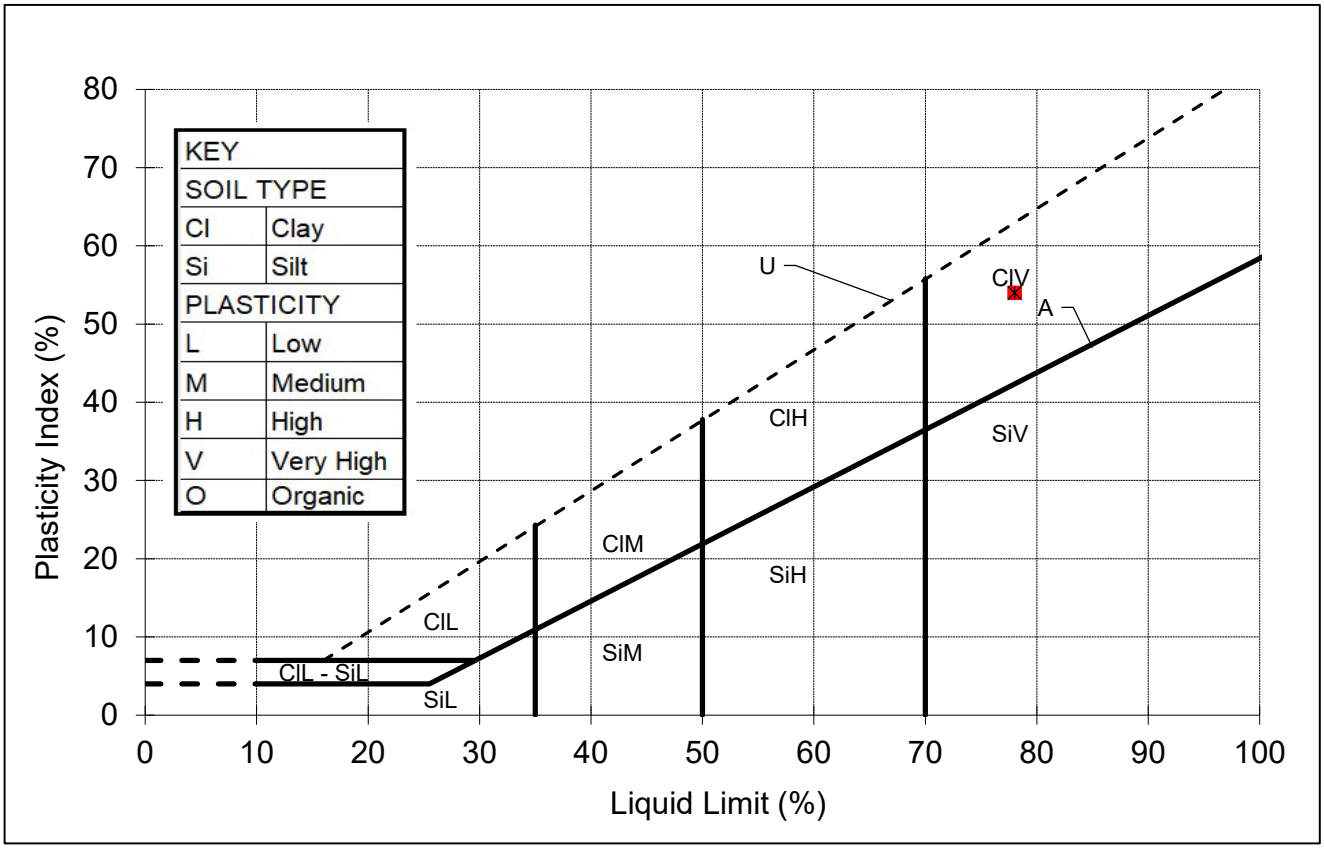
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 7.0-7.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435124	DATE RECEIVED	06-Mar-24
DATE TESTED	14-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
56.2	78	24	54	99



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

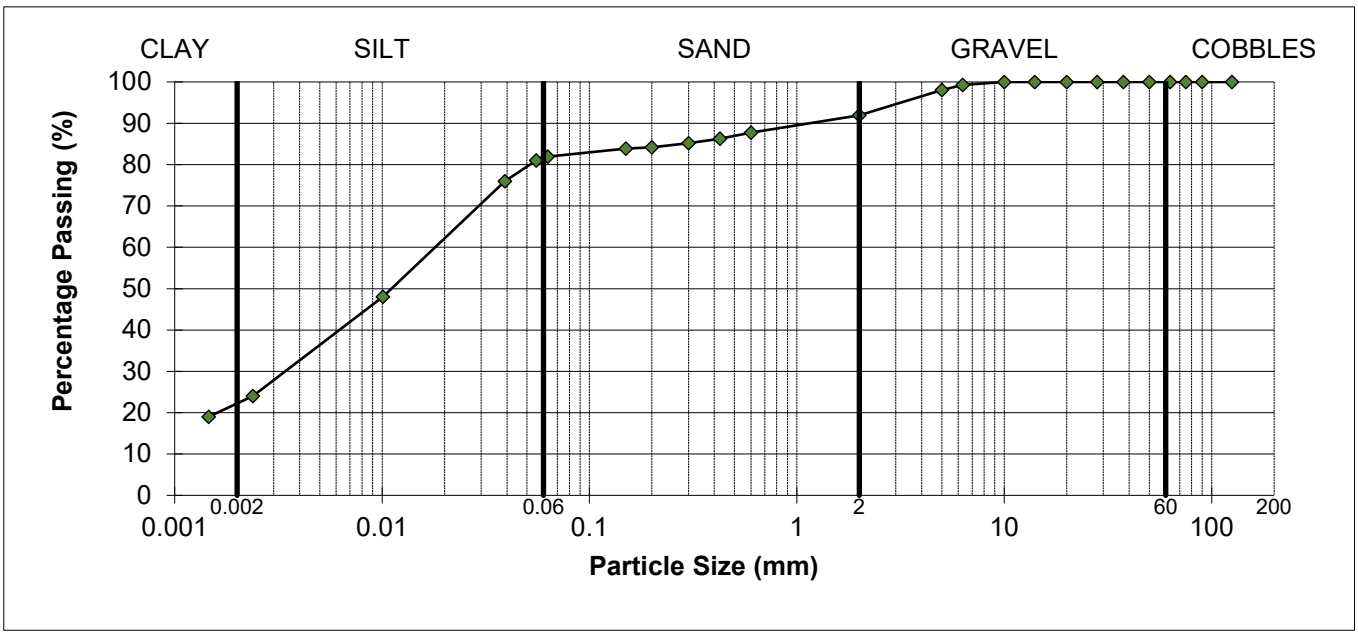
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 10-10.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435125	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	92	
90	100		0.6	88	
75	100		0.425	86	
63	100		0.3	85	
50	100		0.2	84	
37.5	100		0.15	84	
28	100		0.063	82	
20	100		0.055	81	
14	100		0.039	76	
10	100		0.010	48	
6.3	99		0.0024	24	
5	98		0.0015	19	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

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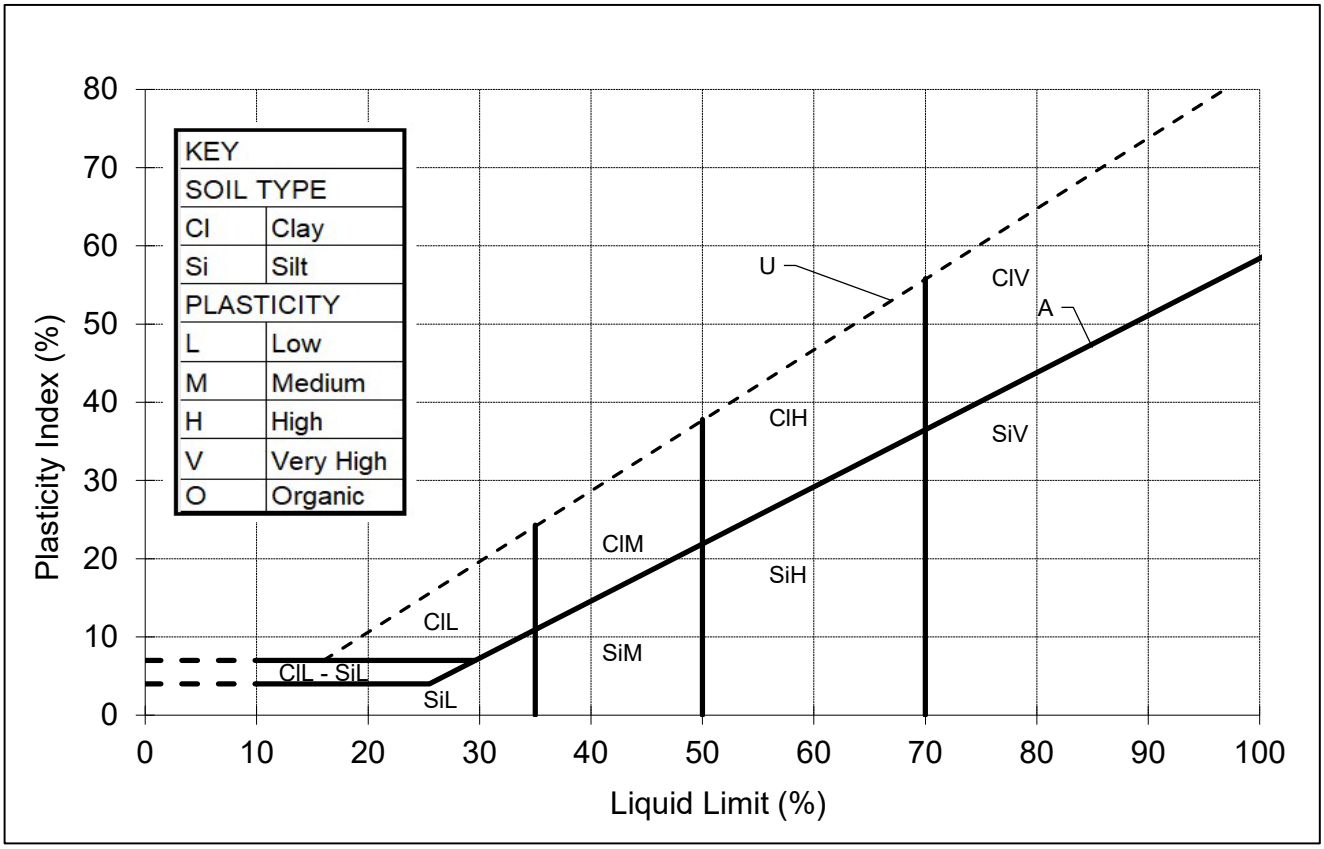
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205 10-10.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435125	DATE RECEIVED	06-Mar-24
DATE TESTED	14-Mar-24	SAMPLED BY	Client

MATERIAL	Dark grey silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
101.9	138	31	107	86



REMARKS

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

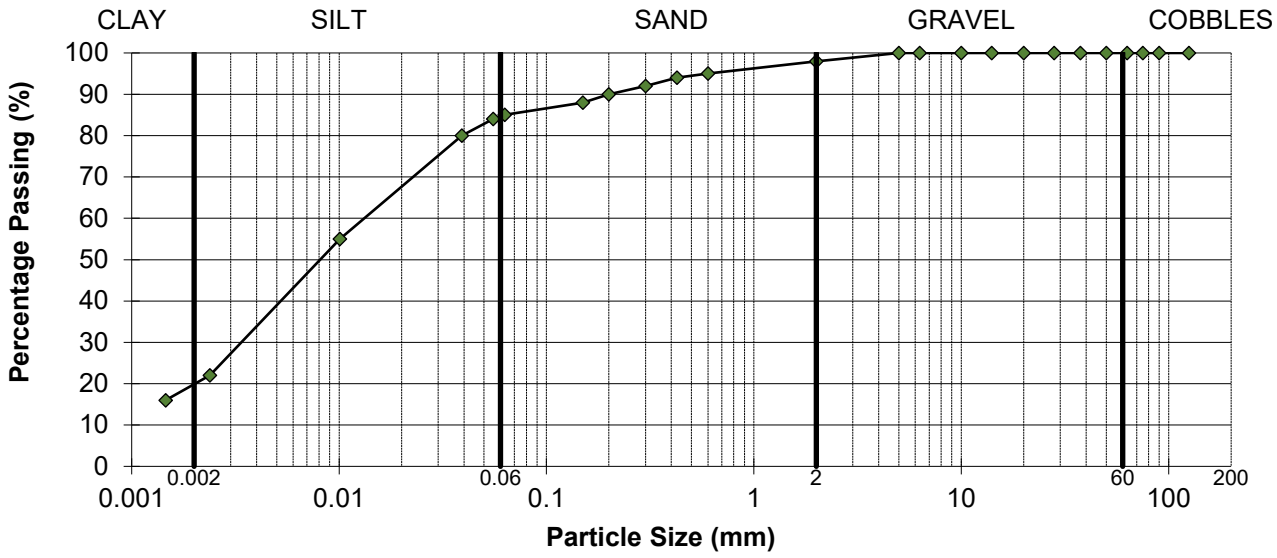
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 1.2-1.65m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435126	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	98	
90	100		0.6	95	
75	100		0.425	94	
63	100		0.3	92	
50	100		0.2	90	
37.5	100		0.15	88	
28	100		0.063	85	
20	100		0.055	84	
14	100		0.039	80	
10	100		0.010	55	
6.3	100		0.0024	22	
5	100		0.0015	16	



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

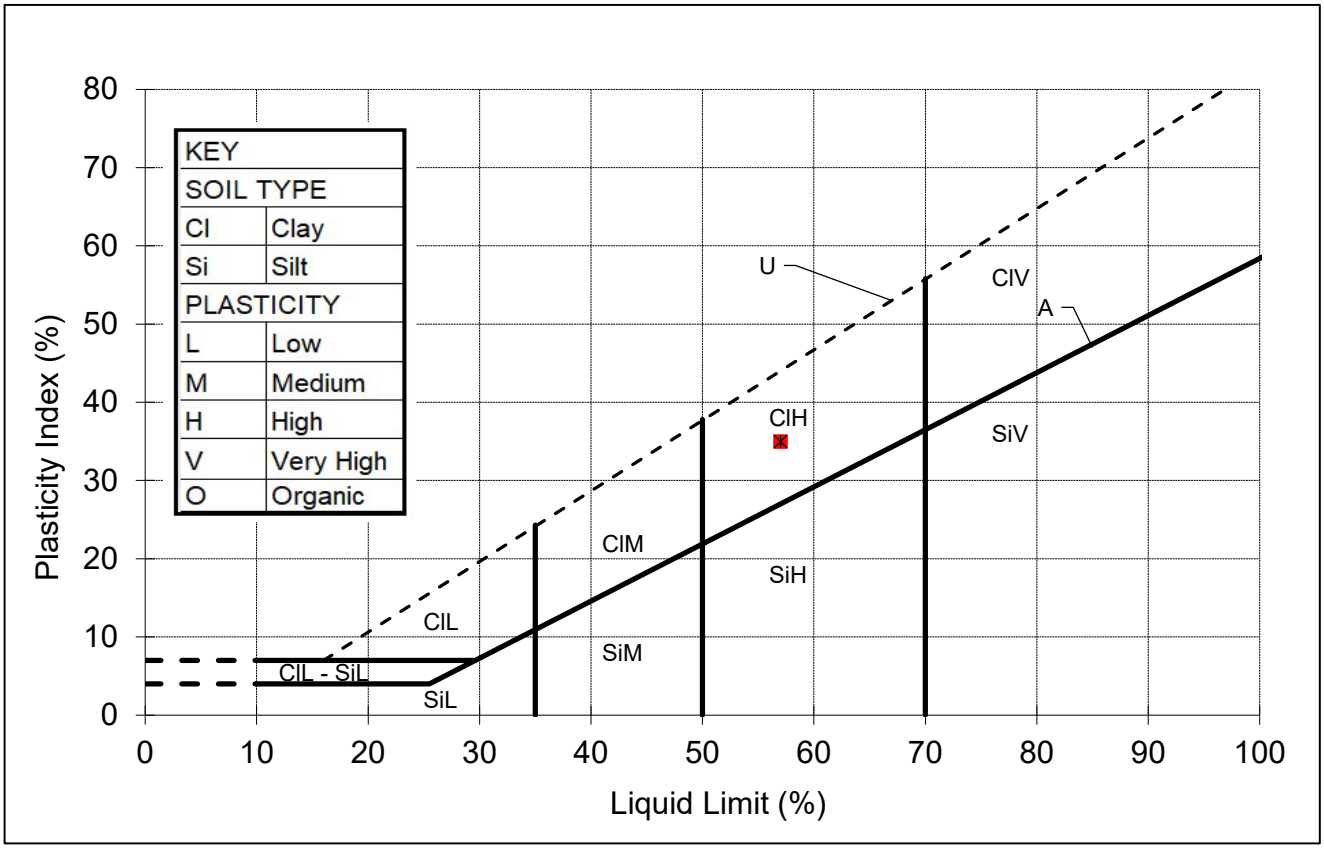
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 1.2-1.65m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435126	DATE RECEIVED	06-Mar-24
DATE TESTED	14-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.2	57	22	35	94



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

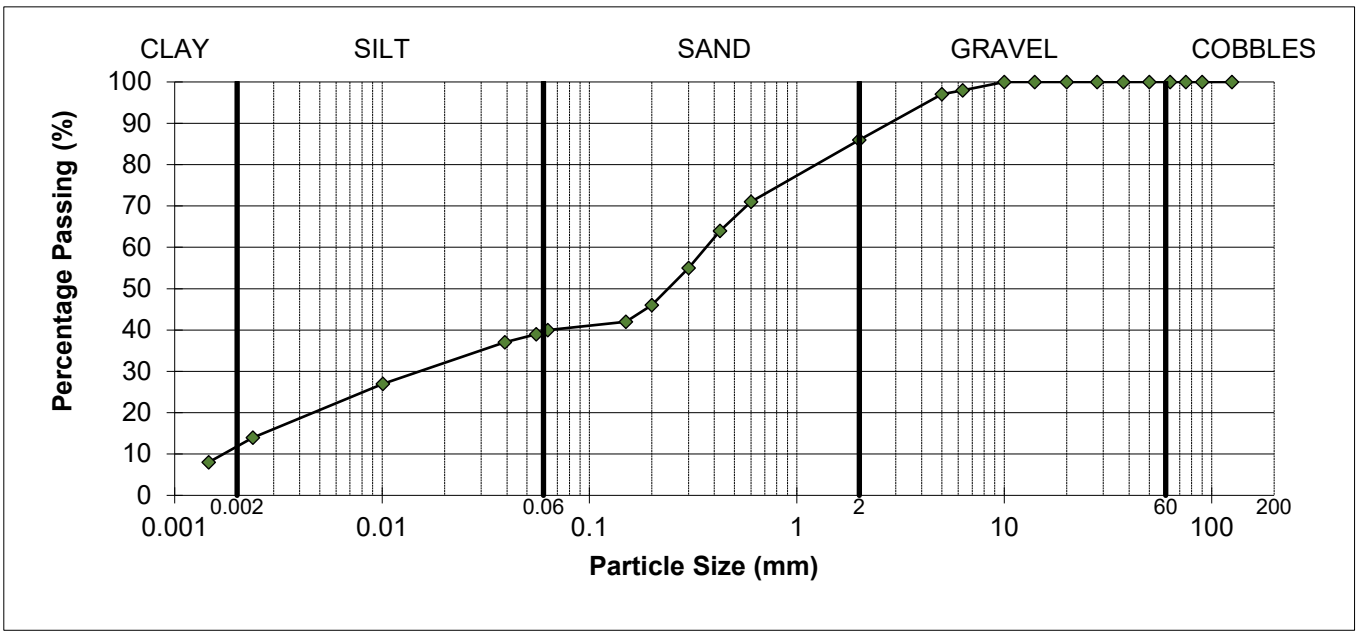
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 3.0-3.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435127	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	86	
90	100		0.6	71	
75	100		0.425	64	
63	100		0.3	55	
50	100		0.2	46	
37.5	100		0.15	42	
28	100		0.063	40	
20	100		0.055	39	
14	100		0.039	37	
10	100		0.010	27	
6.3	98		0.0024	14	
5	97		0.0015	8	



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TEST CERTIFICATE

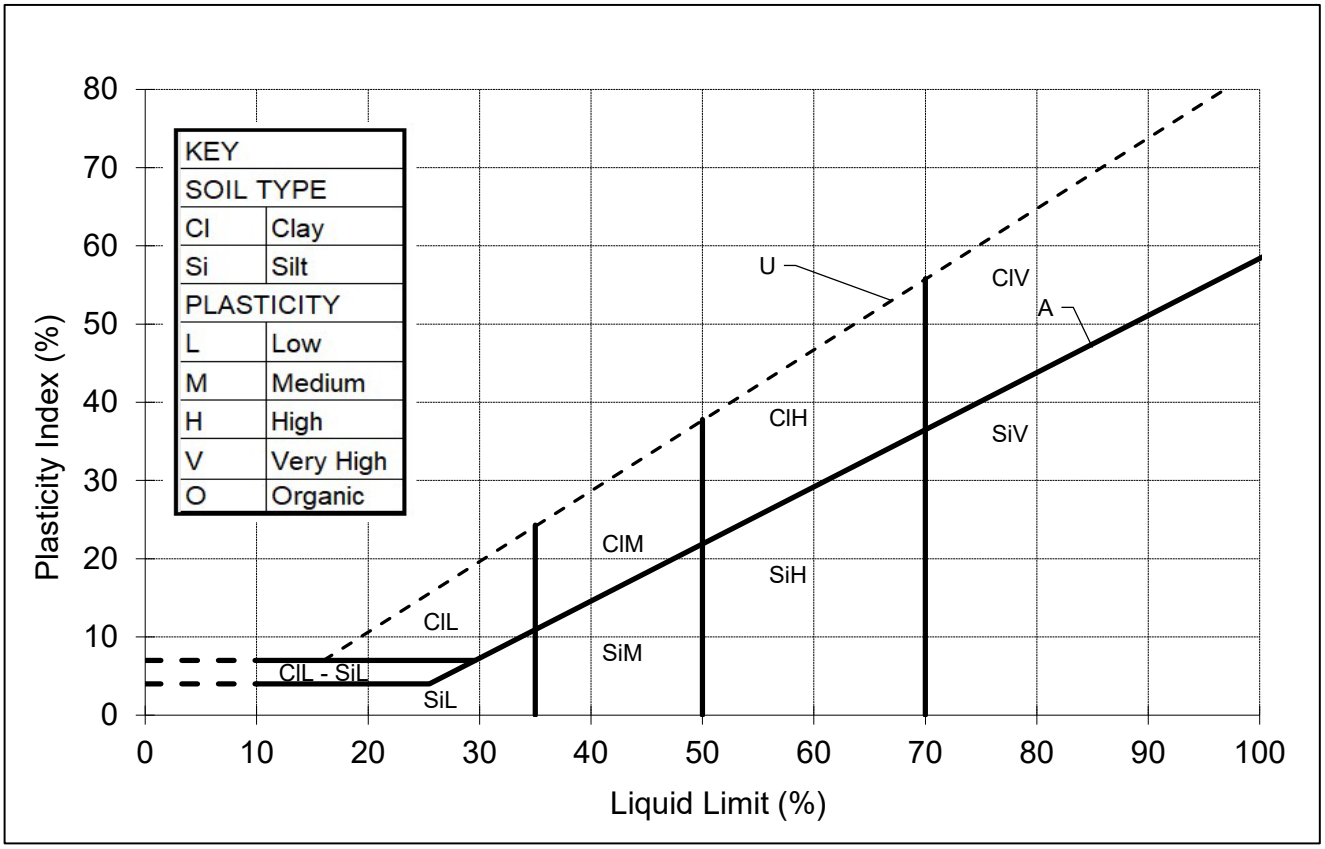
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 3.0-3.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435127	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
310.4	238	126	112	64



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

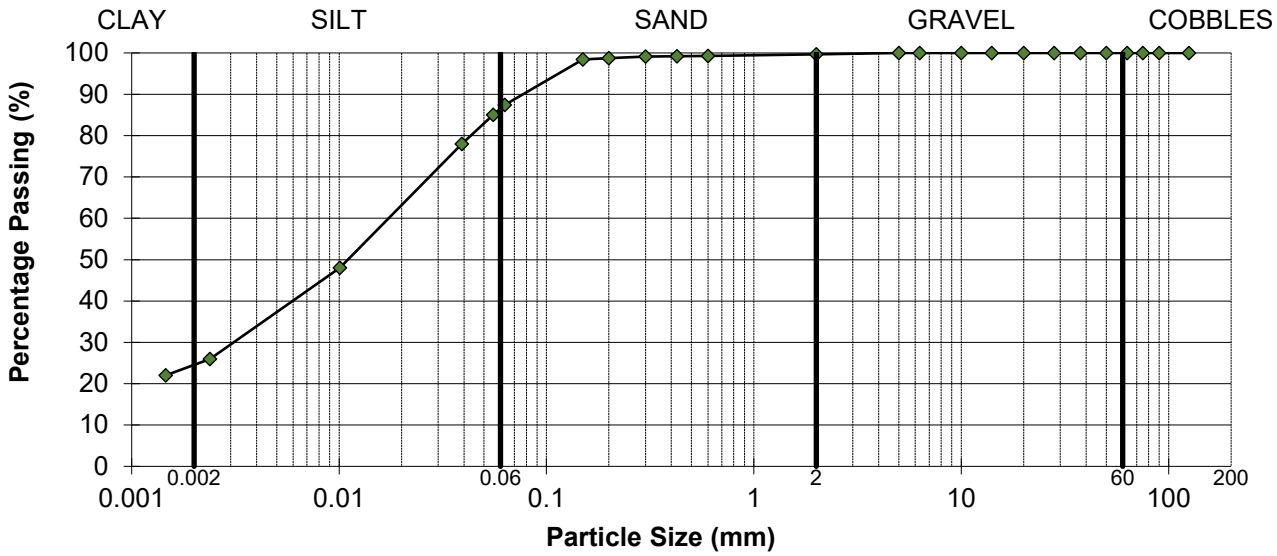
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 6.0-6.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435128	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown mottled silty slightly slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	99	
63	100		0.3	99	
50	100		0.2	99	
37.5	100		0.15	98	
28	100		0.063	87	
20	100		0.055	85	
14	100		0.039	78	
10	100		0.010	48	
6.3	100		0.0024	26	
5	100		0.0015	22	



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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

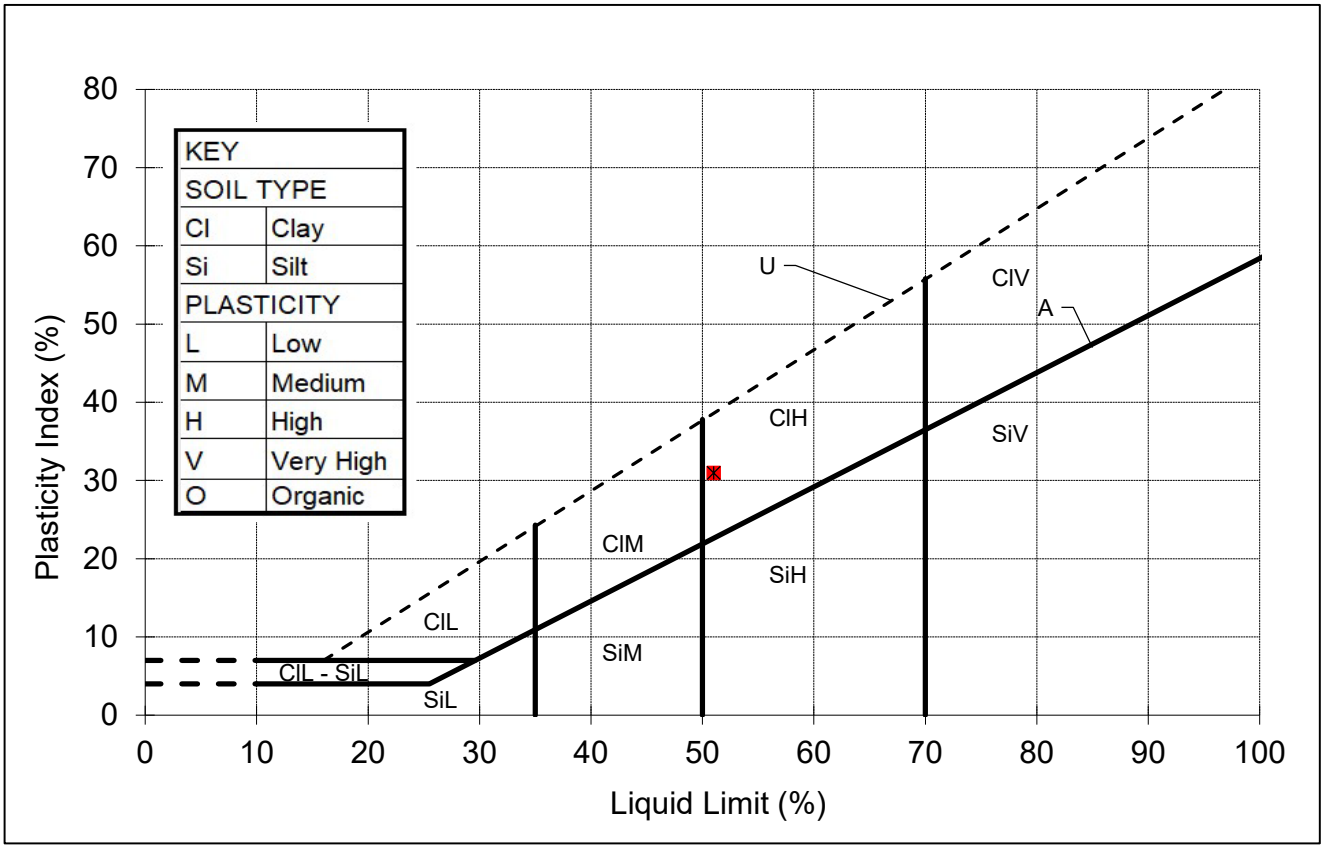
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 6.0-6.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435128	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown mottled silty slightly slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.8	51	20	31	99



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

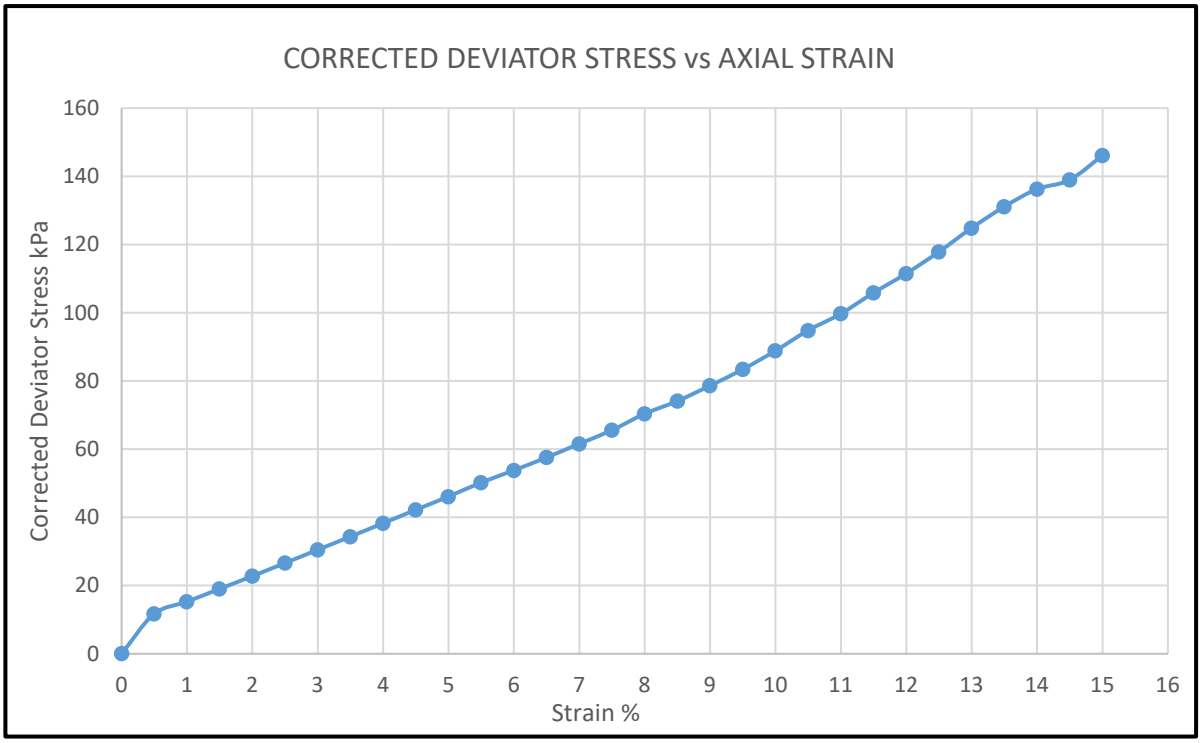
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 6.0-6.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435128	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Grey brown mottled silty slightly slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample		

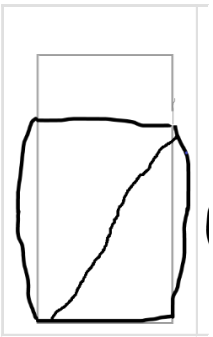
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	25.8
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.79
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
120	15.0	2.0	146	73

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

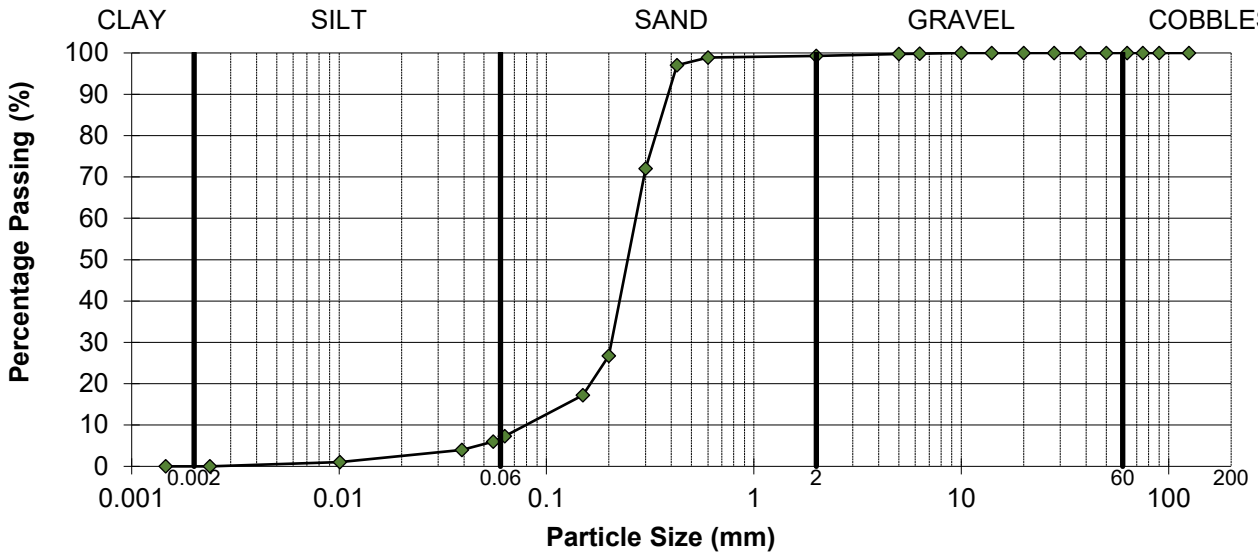
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 12-12.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435129	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Yellowish grey silty slightly gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	99	
90	100		0.6	99	
75	100		0.425	97	
63	100		0.3	72	
50	100		0.2	27	
37.5	100		0.15	17	
28	100		0.063	7	
20	100		0.055	6	
14	100		0.039	4	
10	100		0.010	1	
6.3	100		0.0024	0	
5	100		0.0015	0	



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

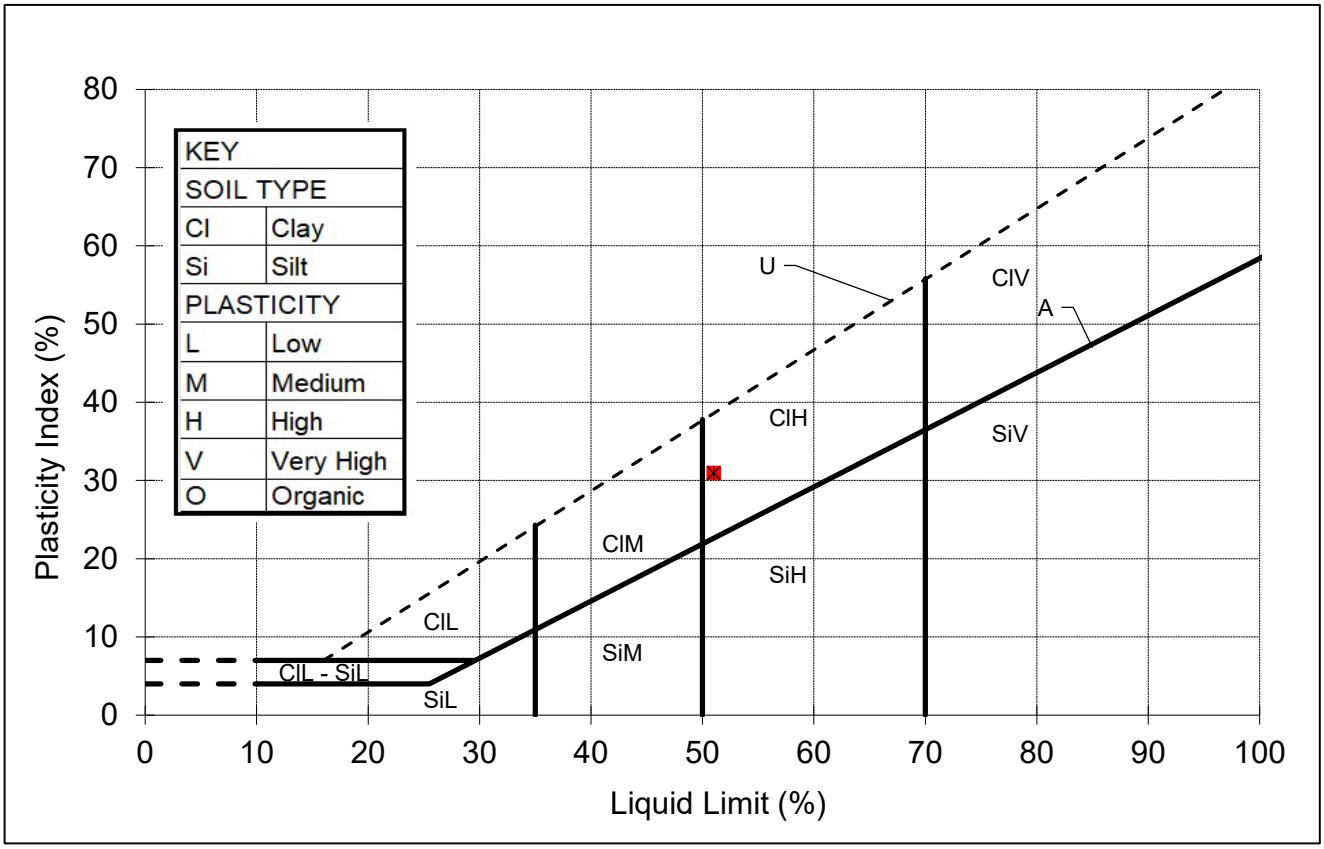
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 12-12.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435129	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Yellowish grey silty slightly gravelly SAND		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.1	51	20	31	97



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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PARTICLE SIZE DISTRIBUTION

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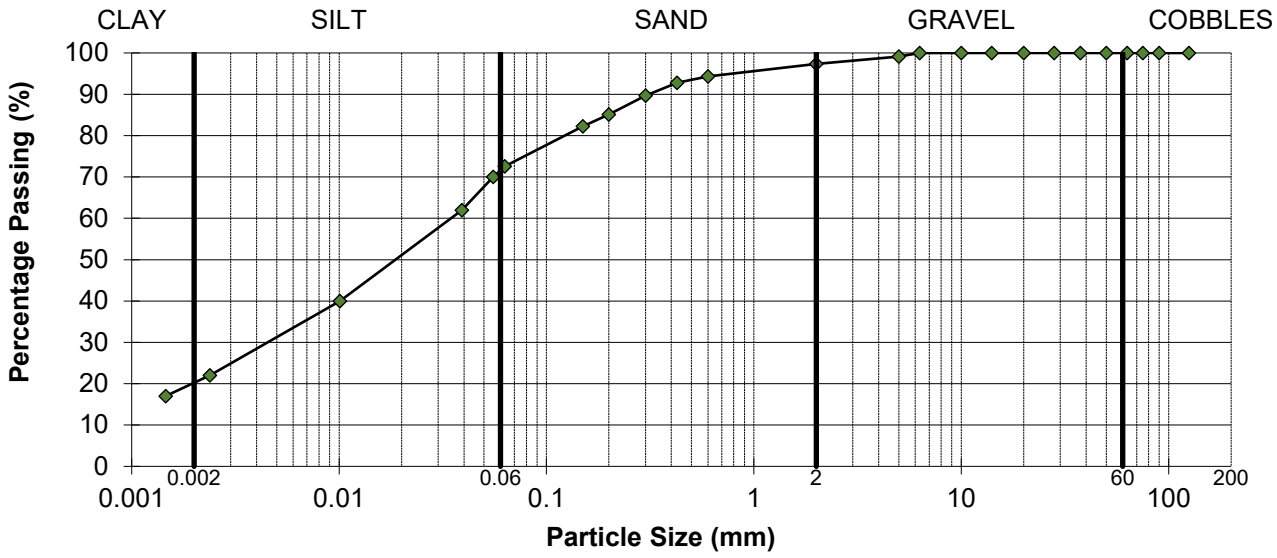
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 25.5-25.95m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435130	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	94	
75	100		0.425	93	
63	100		0.3	90	
50	100		0.2	85	
37.5	100		0.15	82	
28	100		0.063	73	
20	100		0.055	70	
14	100		0.039	62	
10	100		0.010	40	
6.3	100		0.0024	22	
5	99		0.0015	17	



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UKAS TESTING 1580

TEST CERTIFICATE

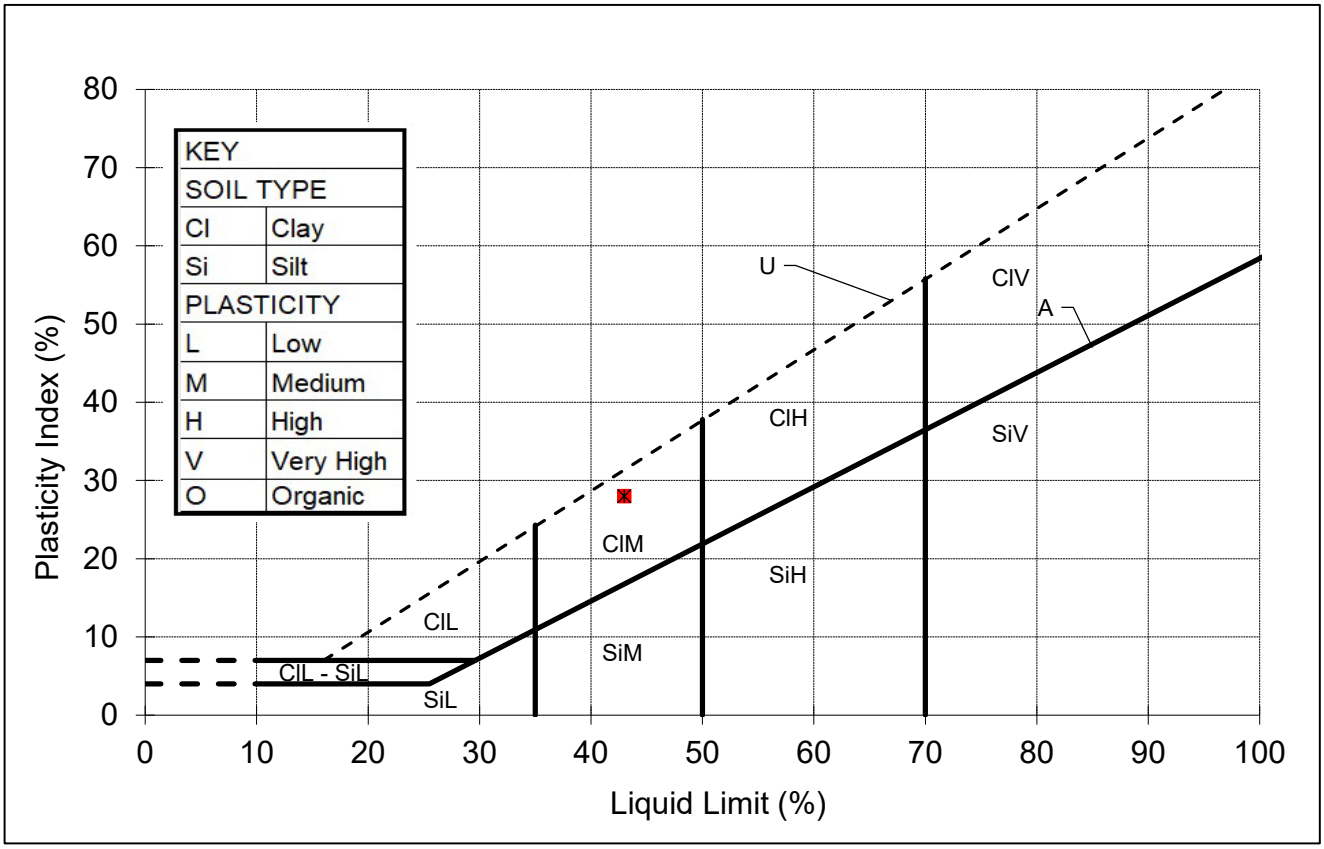
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PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 25.5-25.95m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435130	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.5	43	15	28	93



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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

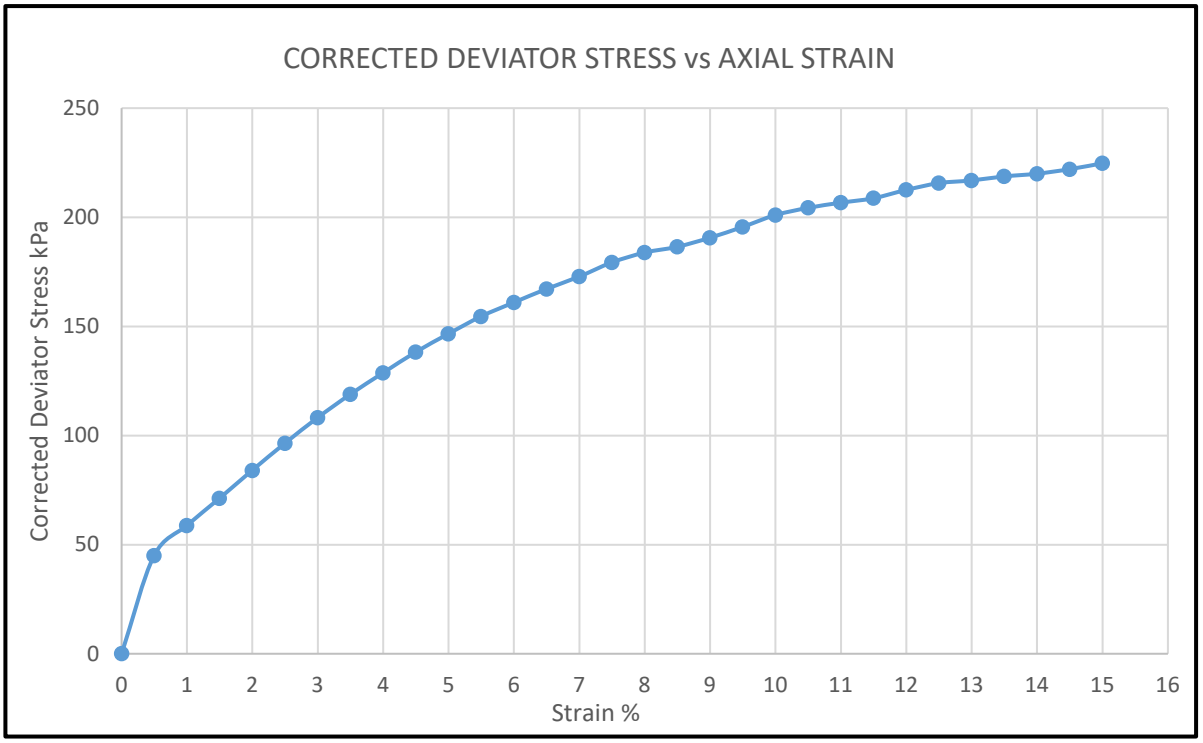
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 25.5-25.95m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435130	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

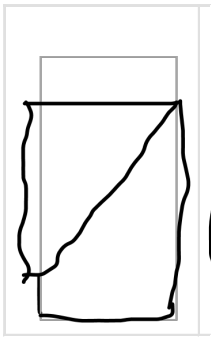
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	50
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	14.5
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.97
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



SIMPLE_SHEAR

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
510	15.0	2.0	225	112

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

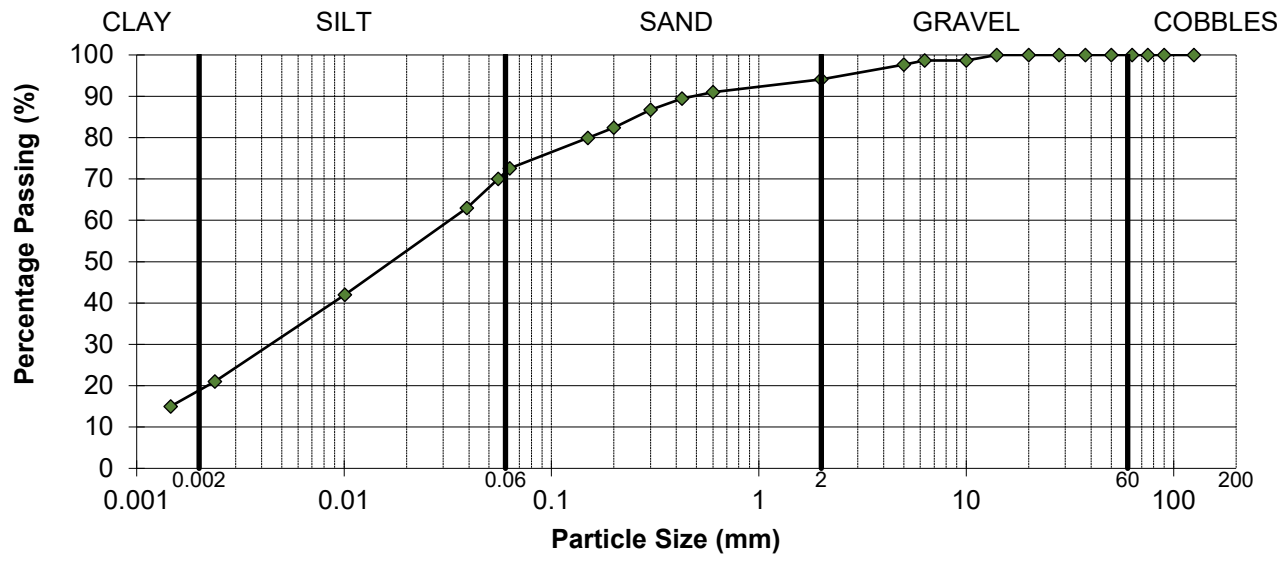
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 28.5-28.95m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435131	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	94	
90	100		0.6	91	
75	100		0.425	89	
63	100		0.3	87	
50	100		0.2	82	
37.5	100		0.15	80	
28	100		0.063	73	
20	100		0.055	70	
14	100		0.039	63	
10	99		0.010	42	
6.3	99		0.0024	21	
5	98		0.0015	15	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

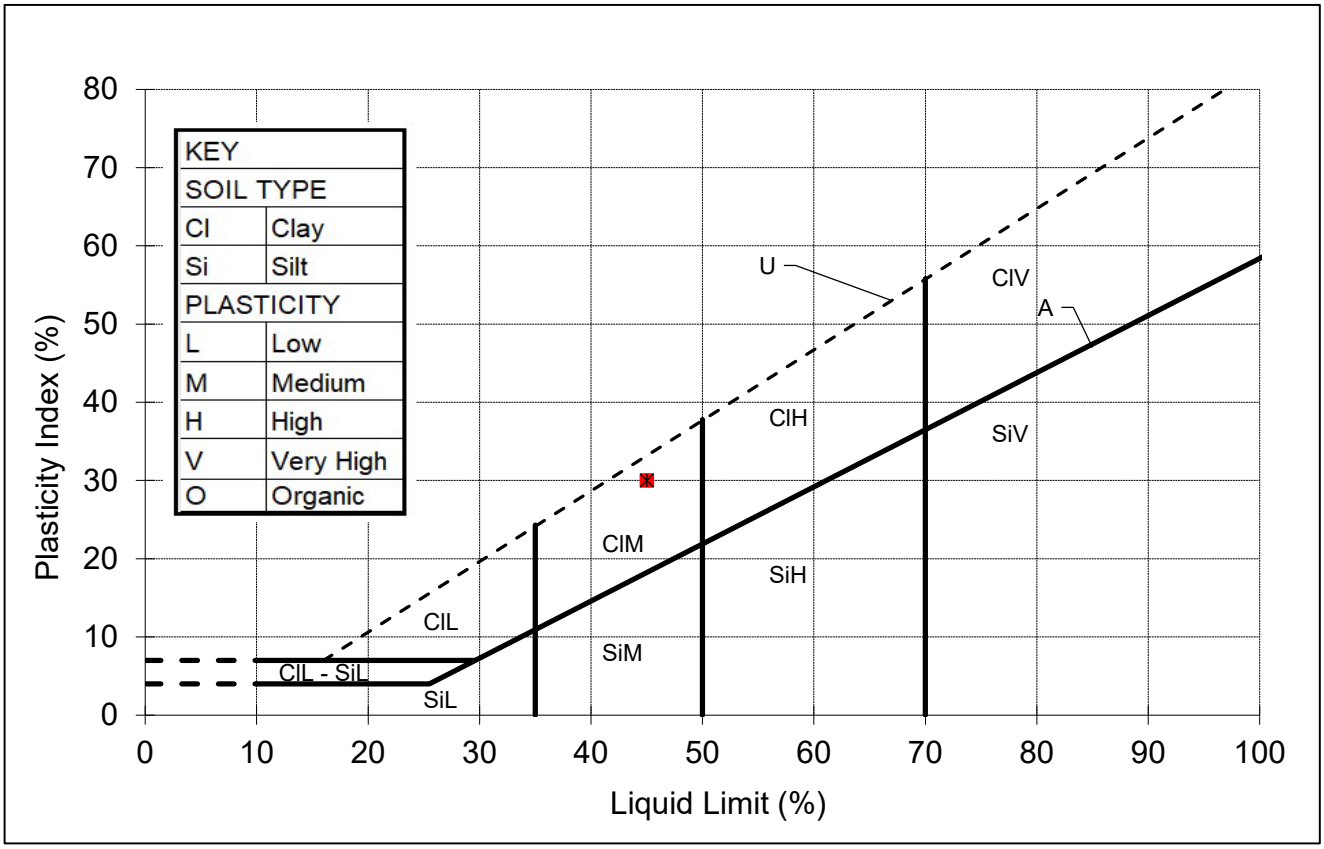
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 28.5-28.95m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435131	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16.0	45	15	30	89



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

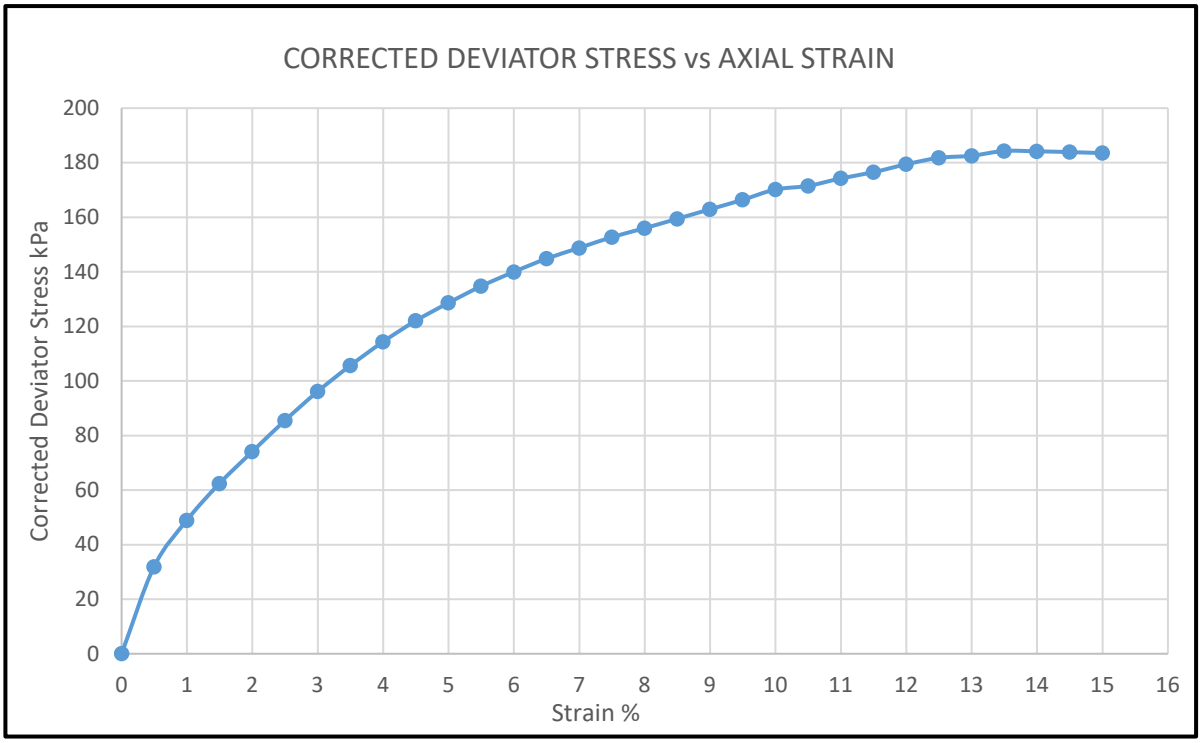
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 205a 28.5-28.95m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435131	**DATE RECEIVED**	06-Mar-24
DATE TESTED	14-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

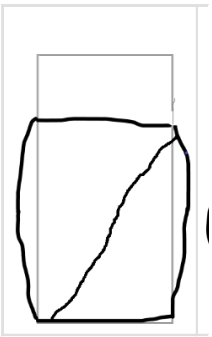
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	40
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	16.0
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.94
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
570	13.5	2.0	184	92

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

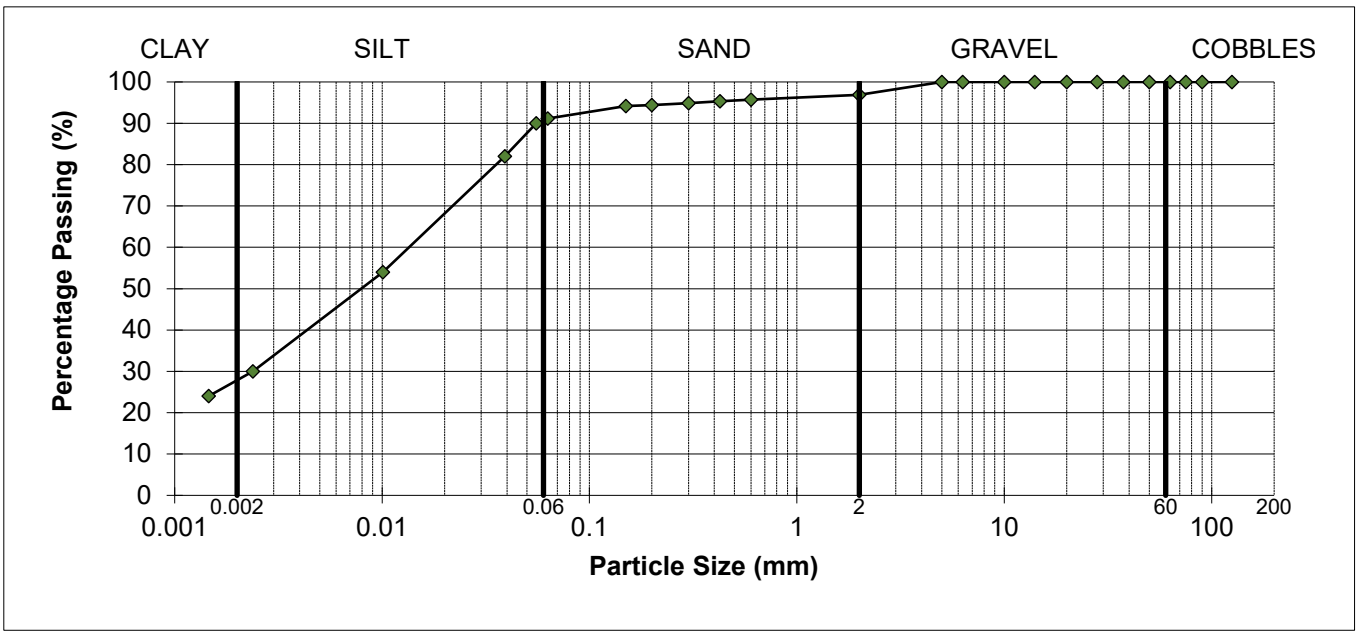
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 1.20-1.65m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435132	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	96	
75	100		0.425	95	
63	100		0.3	95	
50	100		0.2	94	
37.5	100		0.15	94	
28	100		0.063	91	
20	100		0.055	90	
14	100		0.039	82	
10	100		0.010	54	
6.3	100		0.0024	30	
5	100		0.0015	24	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

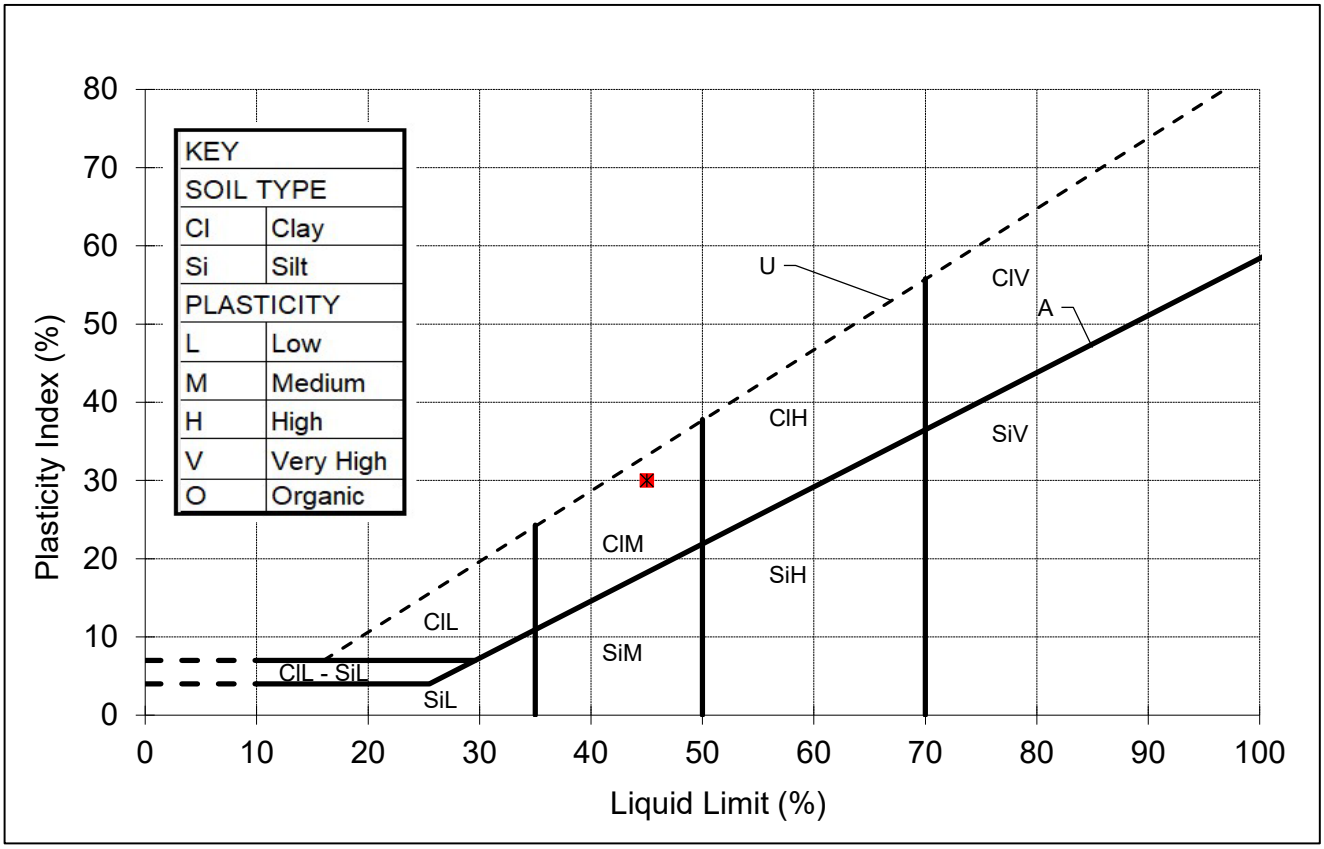
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 1.20-1.65m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435132	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
59.4	45	15	30	95



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

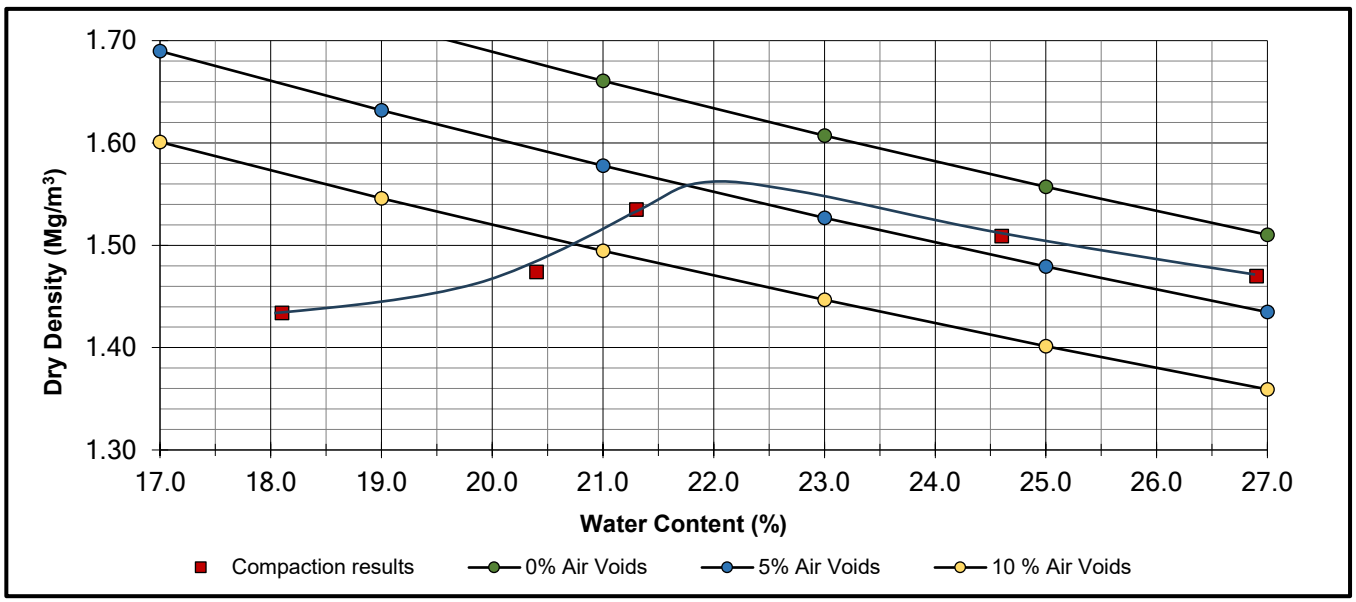
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 1.20-1.65m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435132	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.55 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	18.1	1.434
2	20.4	1.474
3	21.3	1.535
4	24.6	1.509
5	26.9	1.470



OPTIMUM WATER CONTENT	**22**	(%)
MAXIMUM DRY DENSITY	**1.56**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

CALIFORNIA BEARING RATIO (CBR)
BS 1377-2:2022 Cl. 15
DETERMINATION OF WATER CONTENT - BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

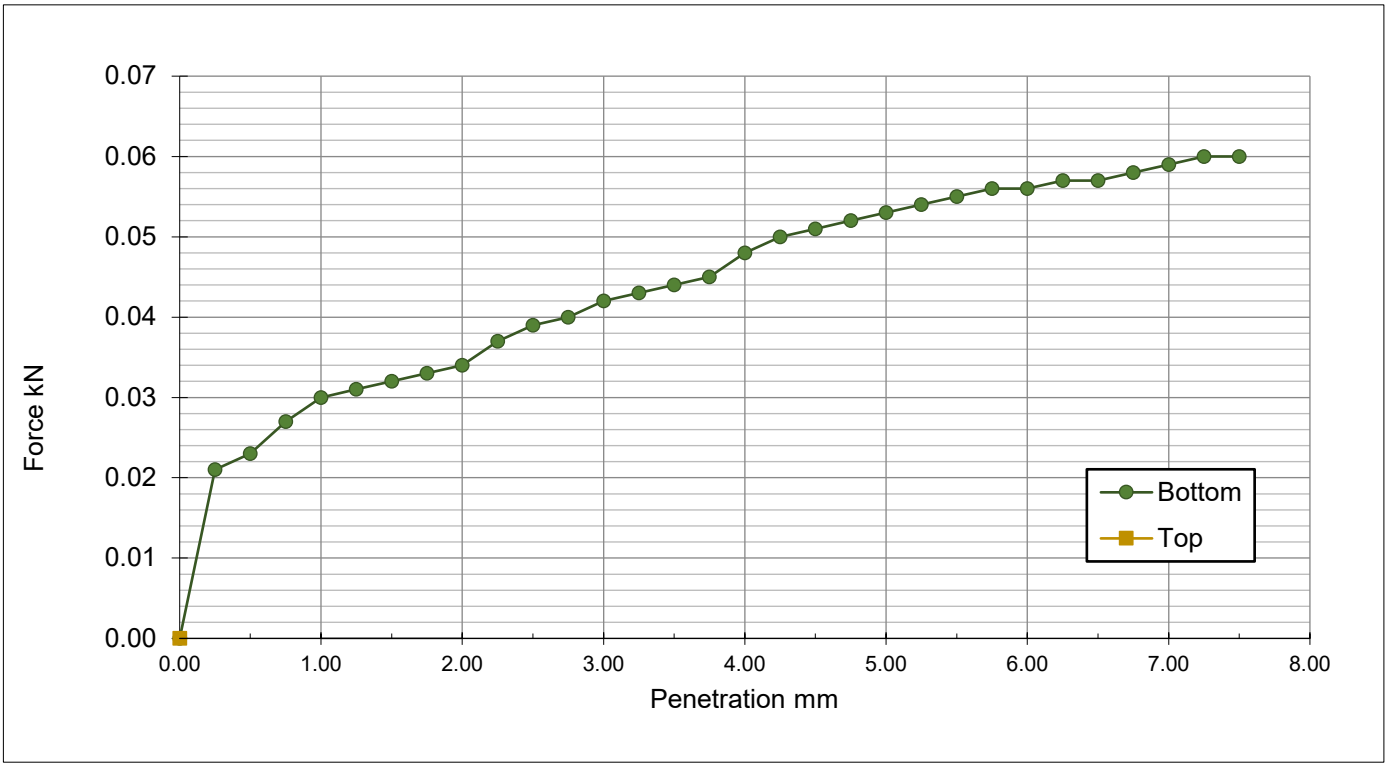
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 1.20-1.65m B	DATE SAMPLED	01-Feb-24
LAB SAMPLE No	435132	DATE RECEIVED	06-Mar-24
DATE TESTED	20-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.60 Mg/m3	MOISTURE CONTENT	59.4 %	DRY DENSITY	1.00 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	0.3	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	59.4	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

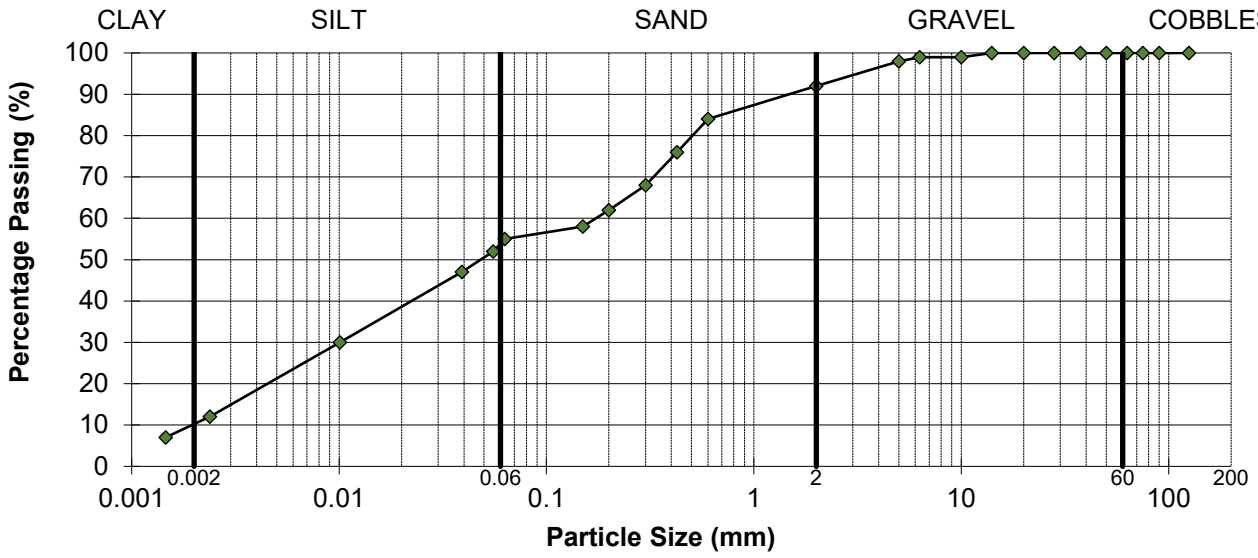
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 4.0-4.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435133	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	92	
90	100		0.6	84	
75	100		0.425	76	
63	100		0.3	68	
50	100		0.2	62	
37.5	100		0.15	58	
28	100		0.063	55	
20	100		0.055	52	
14	100		0.039	47	
10	99		0.010	30	
6.3	99		0.0024	12	
5	98		0.0015	7	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

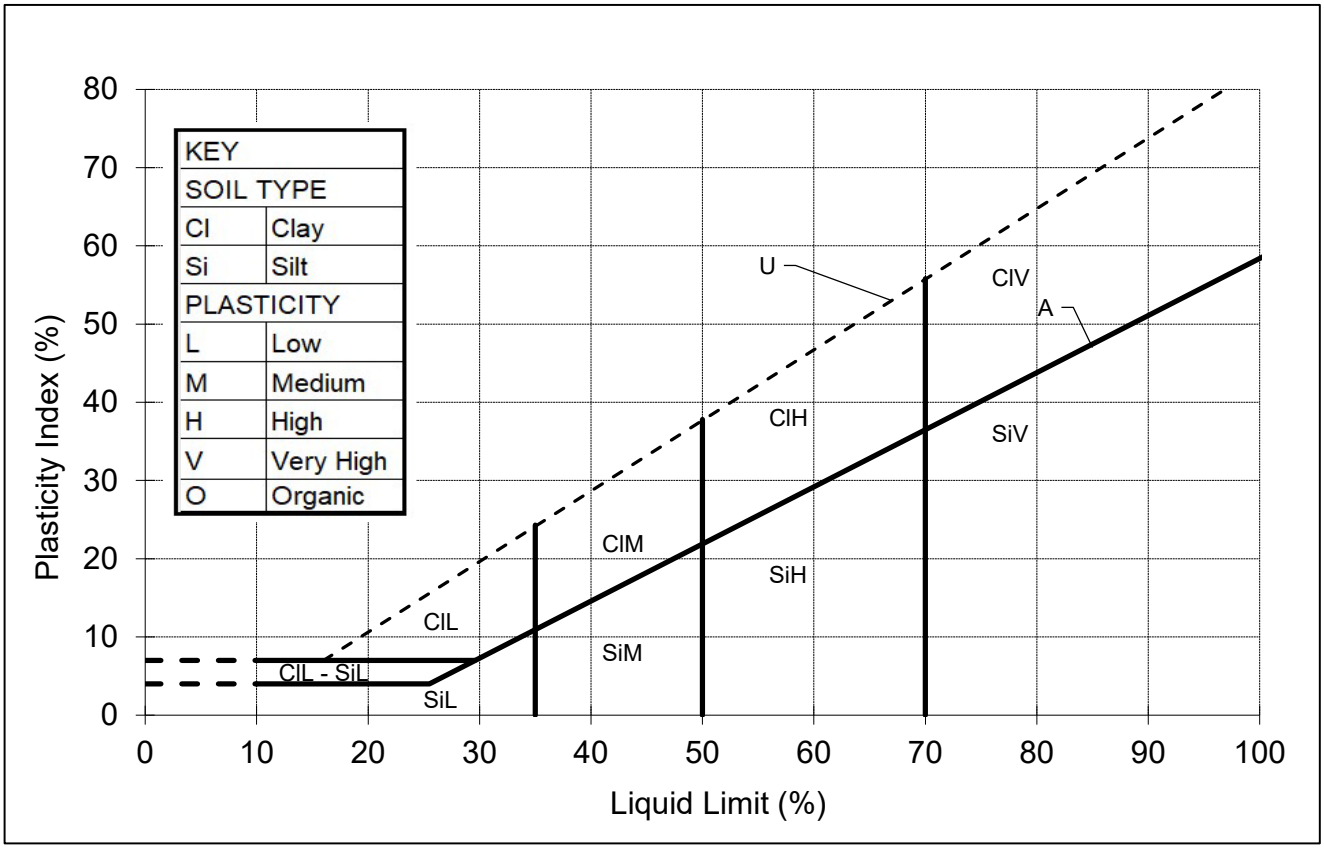
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 4.0-4.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435133	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
109.8	128	55	73	76



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

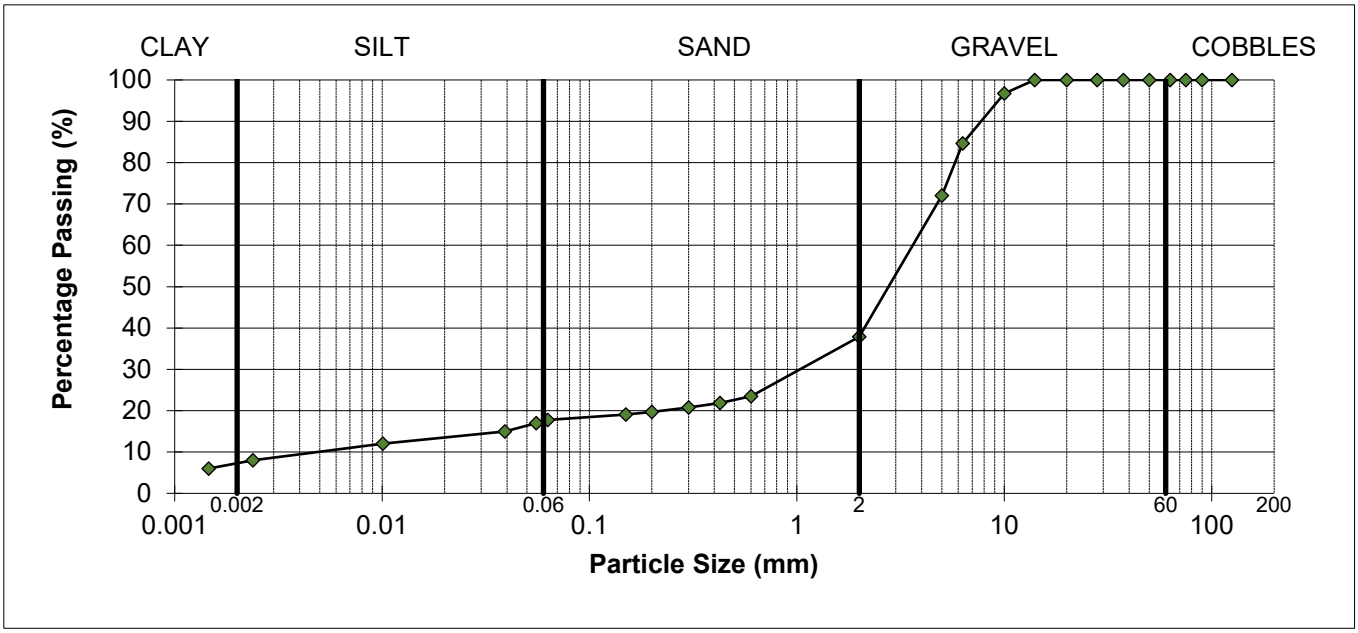
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 9.0-9.45m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435134	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	38	
90	100		0.6	23	
75	100		0.425	22	
63	100		0.3	21	
50	100		0.2	20	
37.5	100		0.15	19	
28	100		0.063	18	
20	100		0.055	17	
14	100		0.039	15	
10	97		0.010	12	
6.3	85		0.0024	8	
5	72		0.0015	6	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

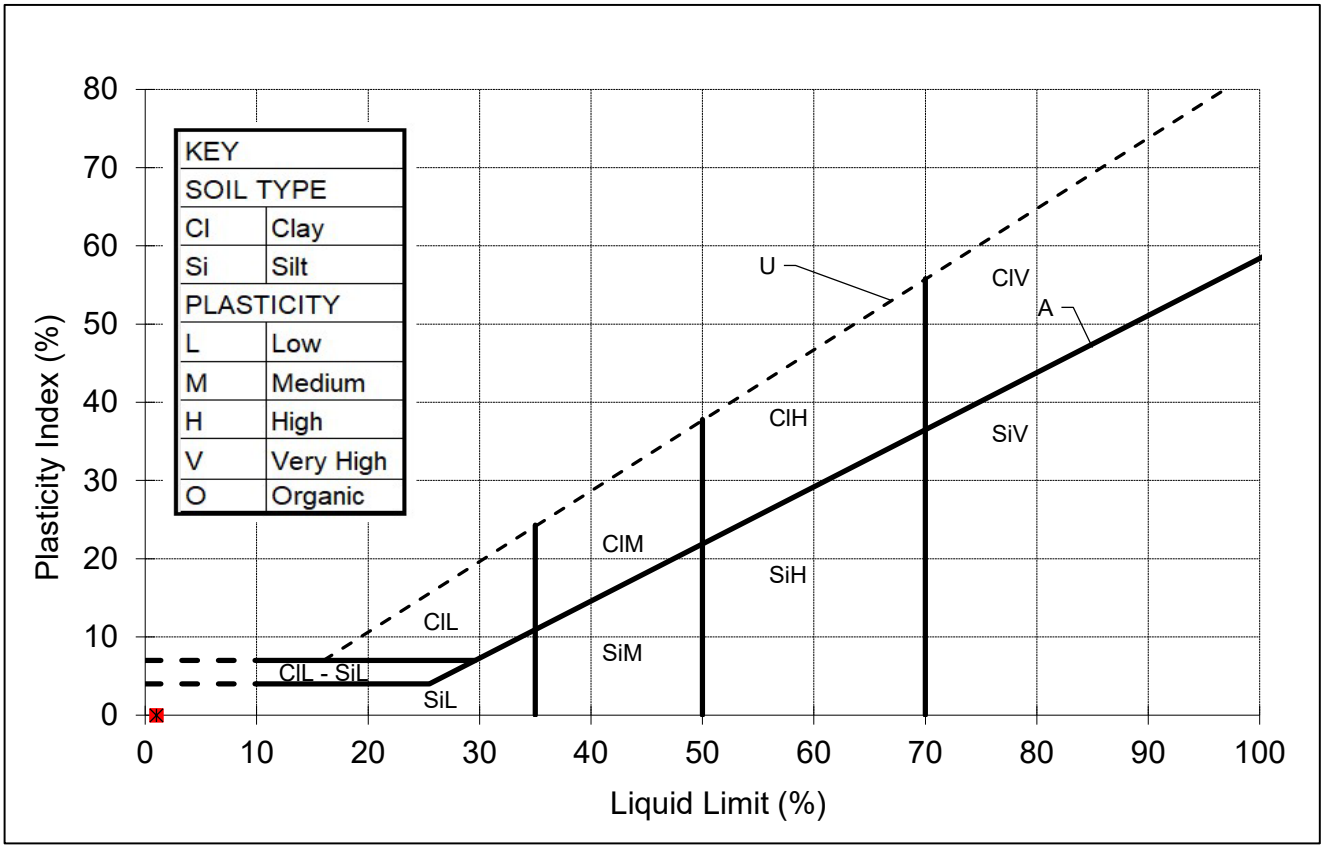
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 9.0-9.45m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435134	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
322.7	Non Plastic	N/A	Non Plastic	22



REMARKS
Sample did contain some plastic material but was found to be non plastic.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

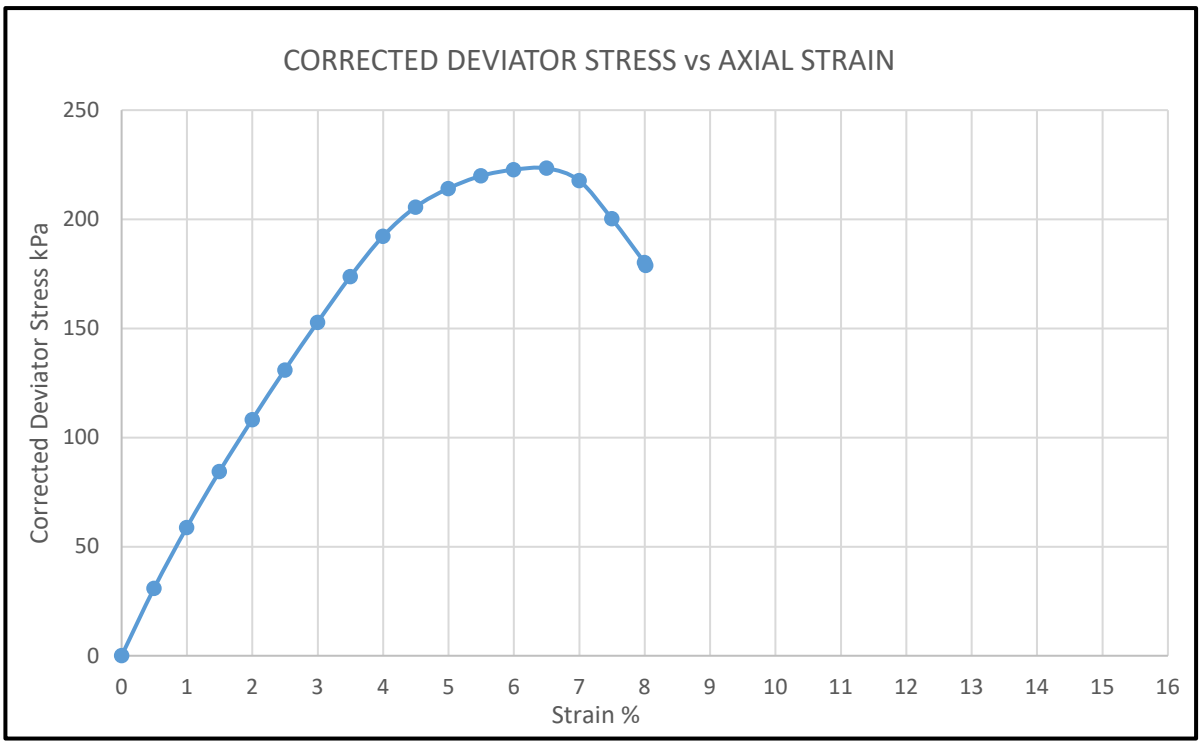
SAMPLE LABEL	BH 206 9.0-9.45m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435134	**DATE RECEIVED**	06-Mar-24
DATE TESTED	14-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

Specimen Location

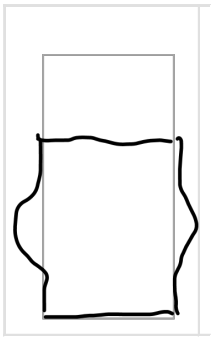


Sample Length (mm)	450	Specimen depth from top of Sample (mm)	40
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	322.7
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	0.53
Membrane Correction	1.81		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



BULGING

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
180	6.5	2.0	223	112

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

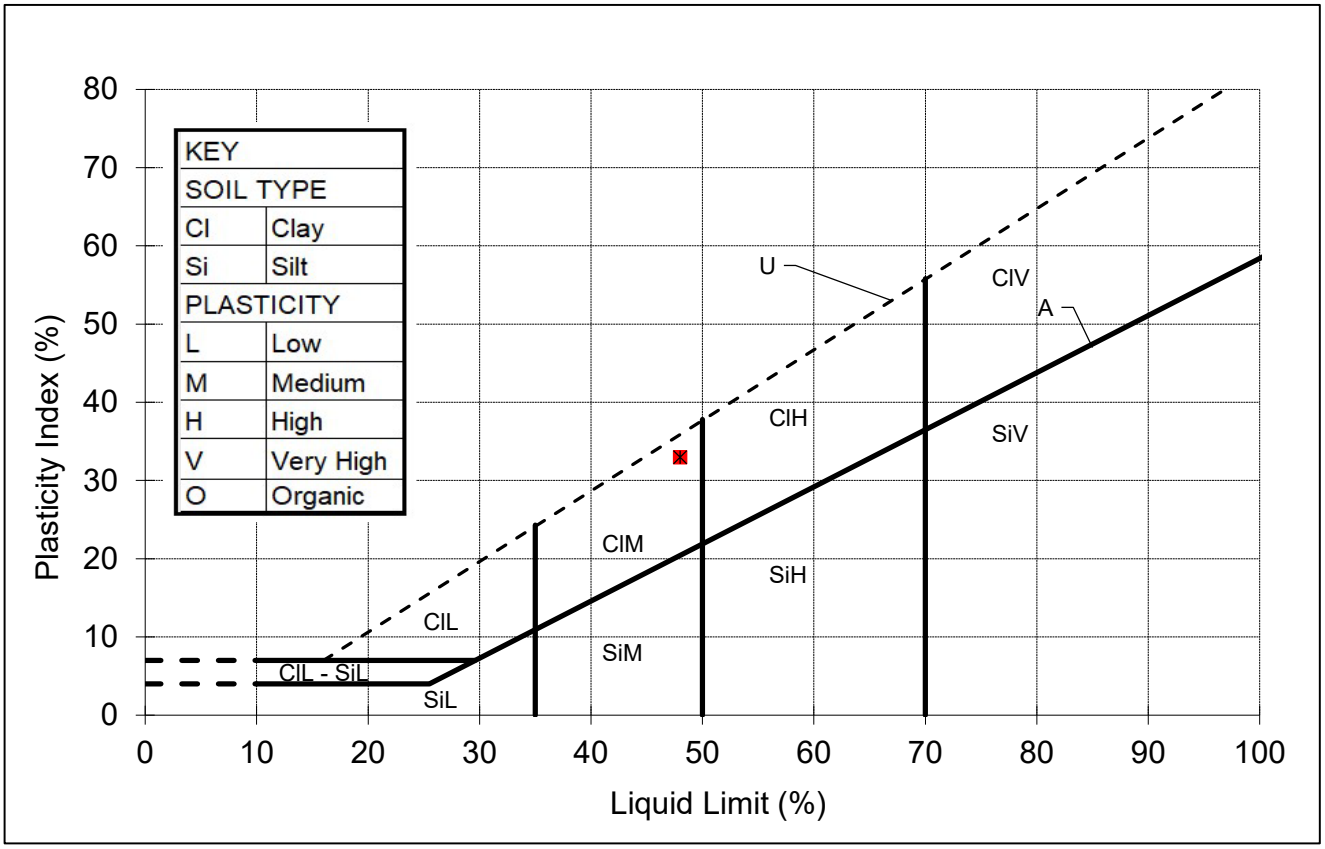
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 22.5-22.95m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435135	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16.4	48	15	33	89



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

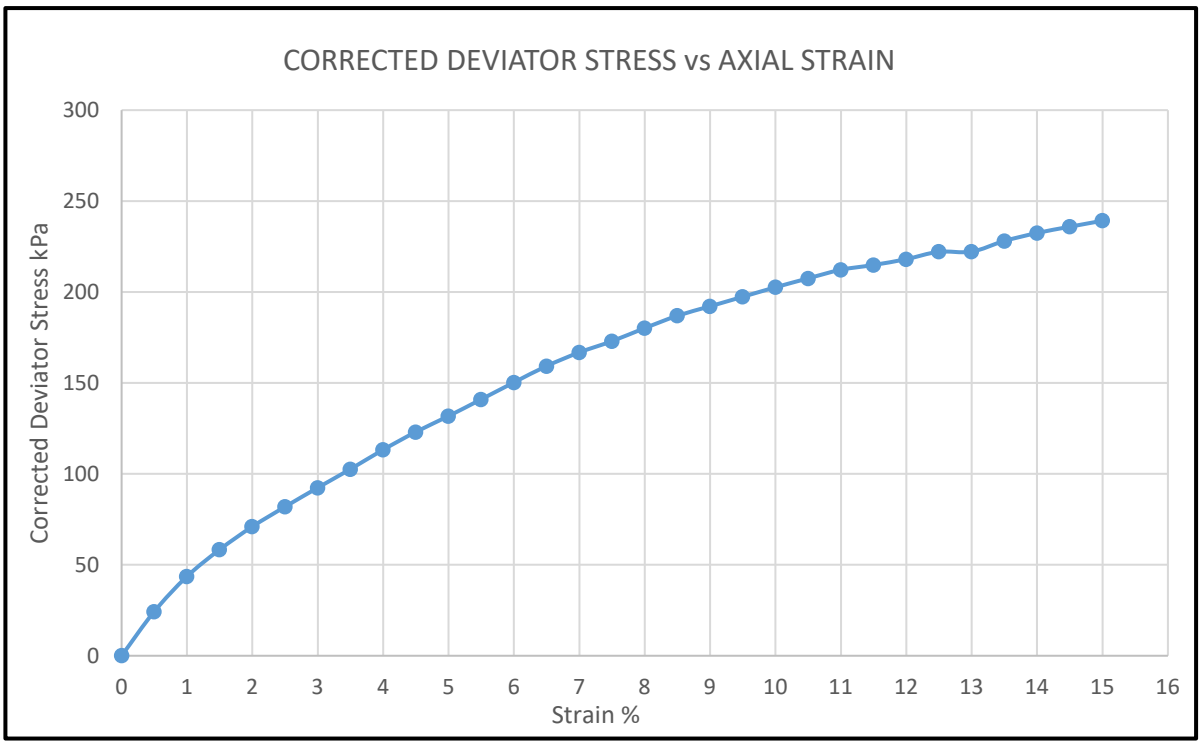
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 22.5-22.95m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435135	**DATE RECEIVED**	06-Mar-24
DATE TESTED	14-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

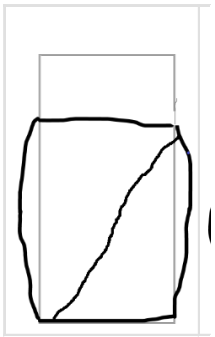
Specimen Location 

Sample Length (mm)	450	Specimen depth from top of Sample (mm)	10
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	16.4
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.93
Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
450	15.0	2.0	239	120

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

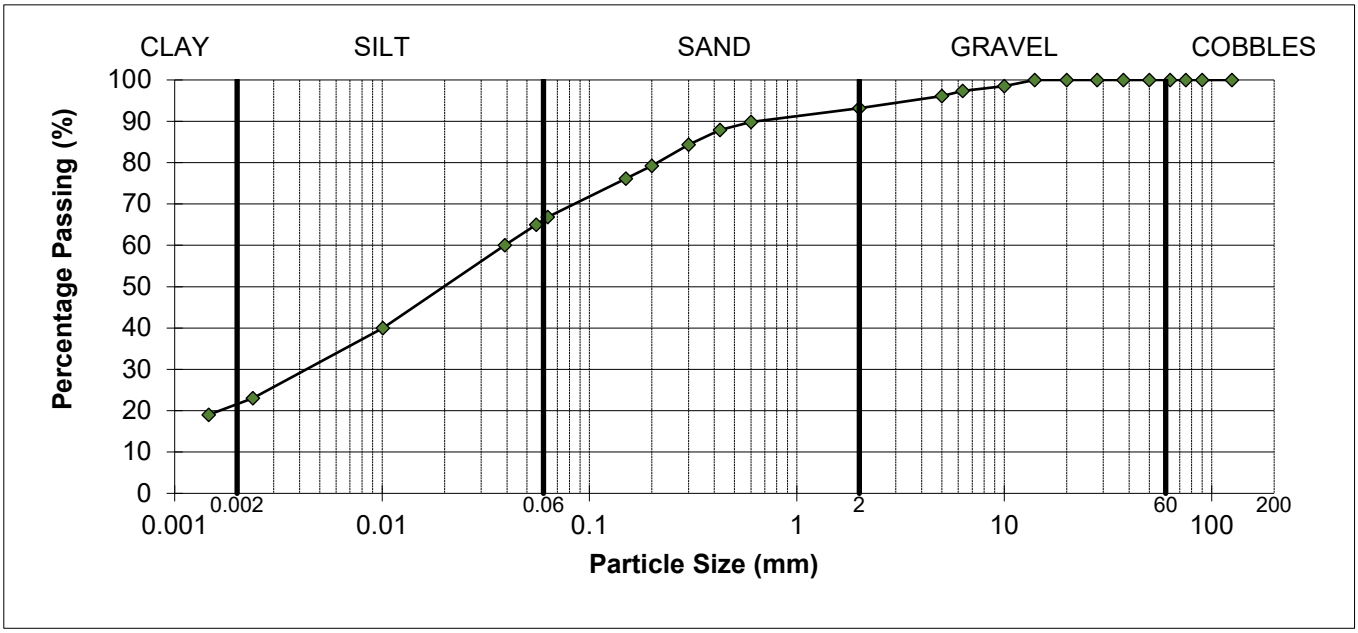
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 28.5-28.95m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435136	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	93	
90	100		0.6	90	
75	100		0.425	88	
63	100		0.3	84	
50	100		0.2	79	
37.5	100		0.15	76	
28	100		0.063	67	
20	100		0.055	65	
14	100		0.039	60	
10	99		0.010	40	
6.3	97		0.0024	23	
5	96		0.0015	19	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

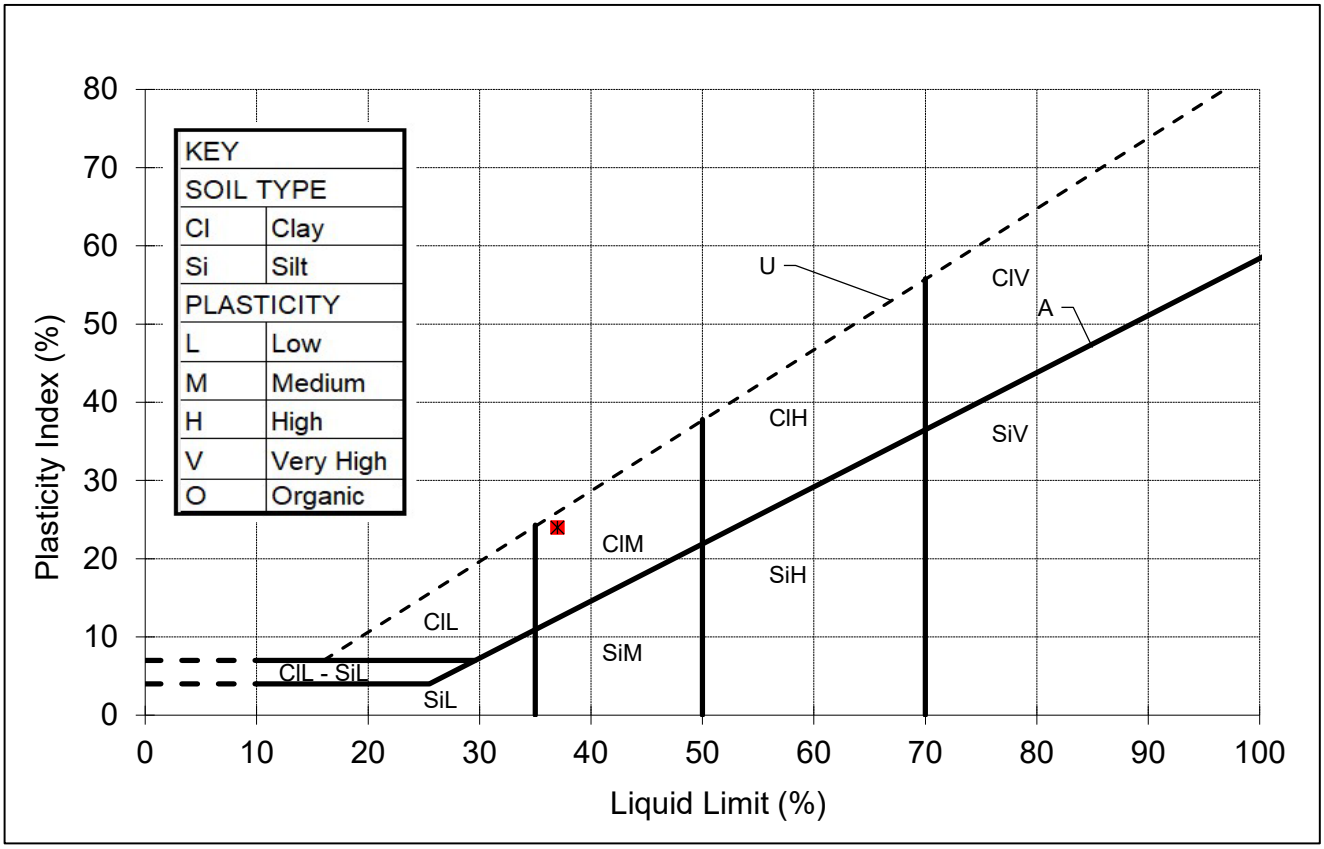
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 28.5-28.95m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435136	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16.6	37	13	24	88



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS EN ISO 17892-8:2018

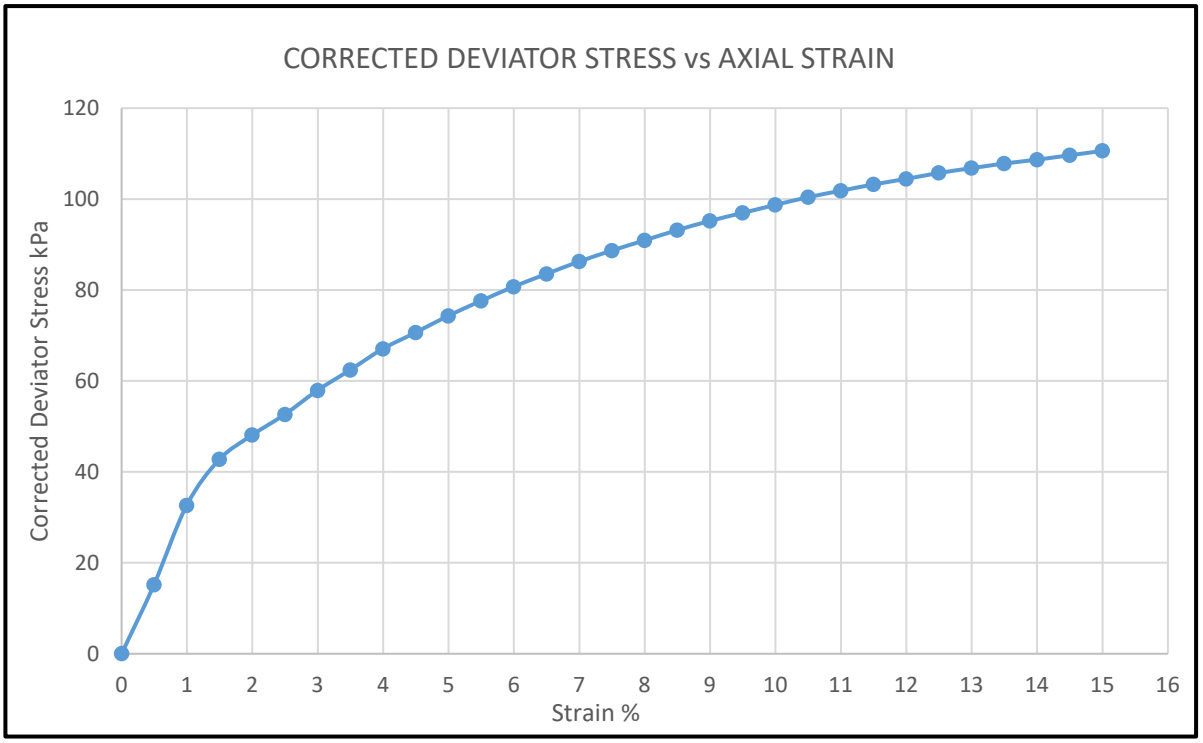
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 206 28.5-28.95m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435136	**DATE RECEIVED**	06-Mar-24
DATE TESTED	14-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

INITIAL CONDITIONS

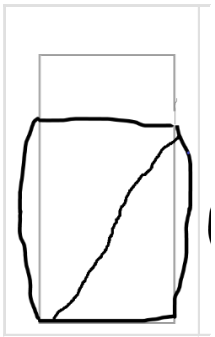
Specimen Location

Sample Length (mm)	450	Specimen depth from top of Sample (mm)	40
Sample Orientation	Vertical	Specimen Condition	Undisturbed
Specimen Length (mm)	200	Specimen Water Content (%)	16.6
Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.93
Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
570	15.0	2.0	111	55

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

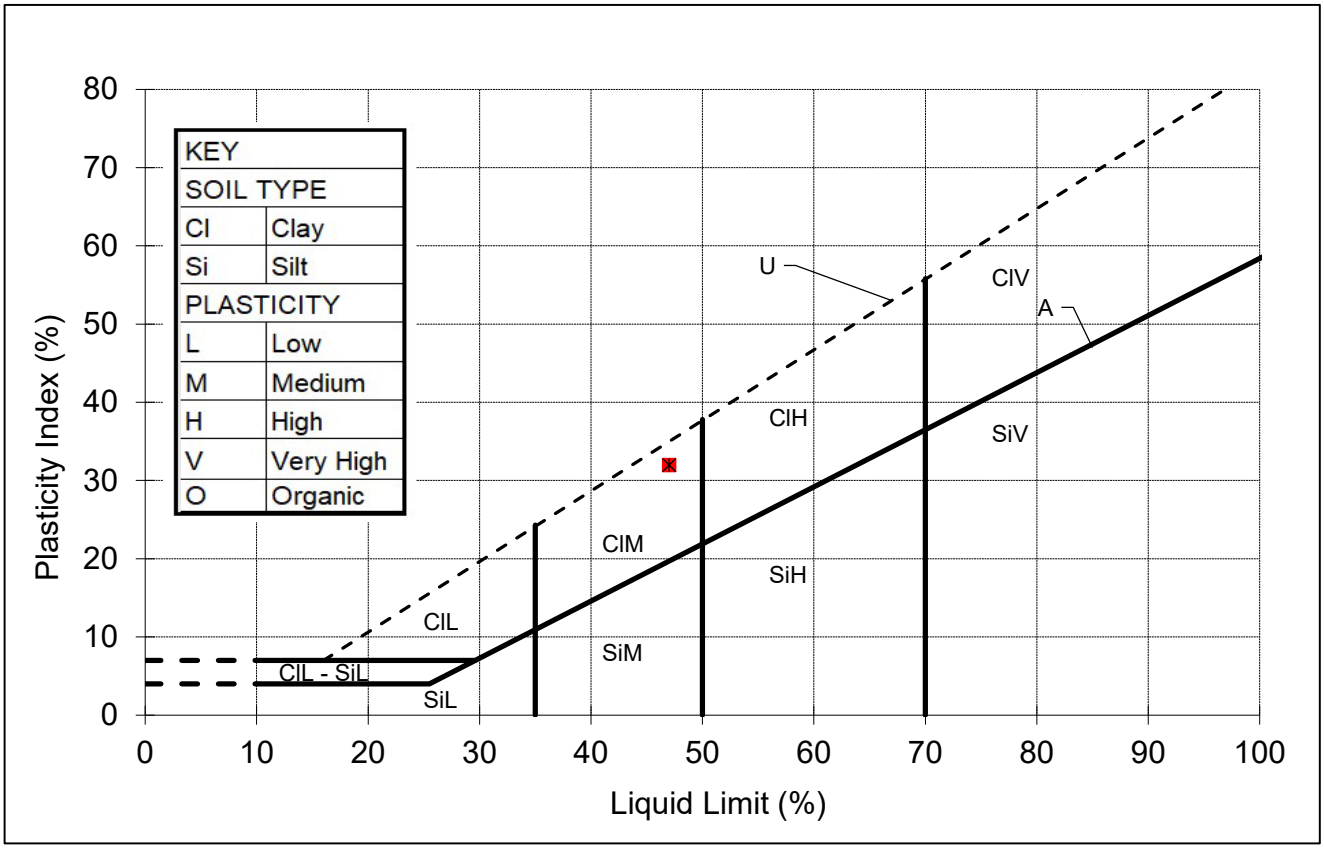
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 1.0m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435137	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21.2	47	15	32	92



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

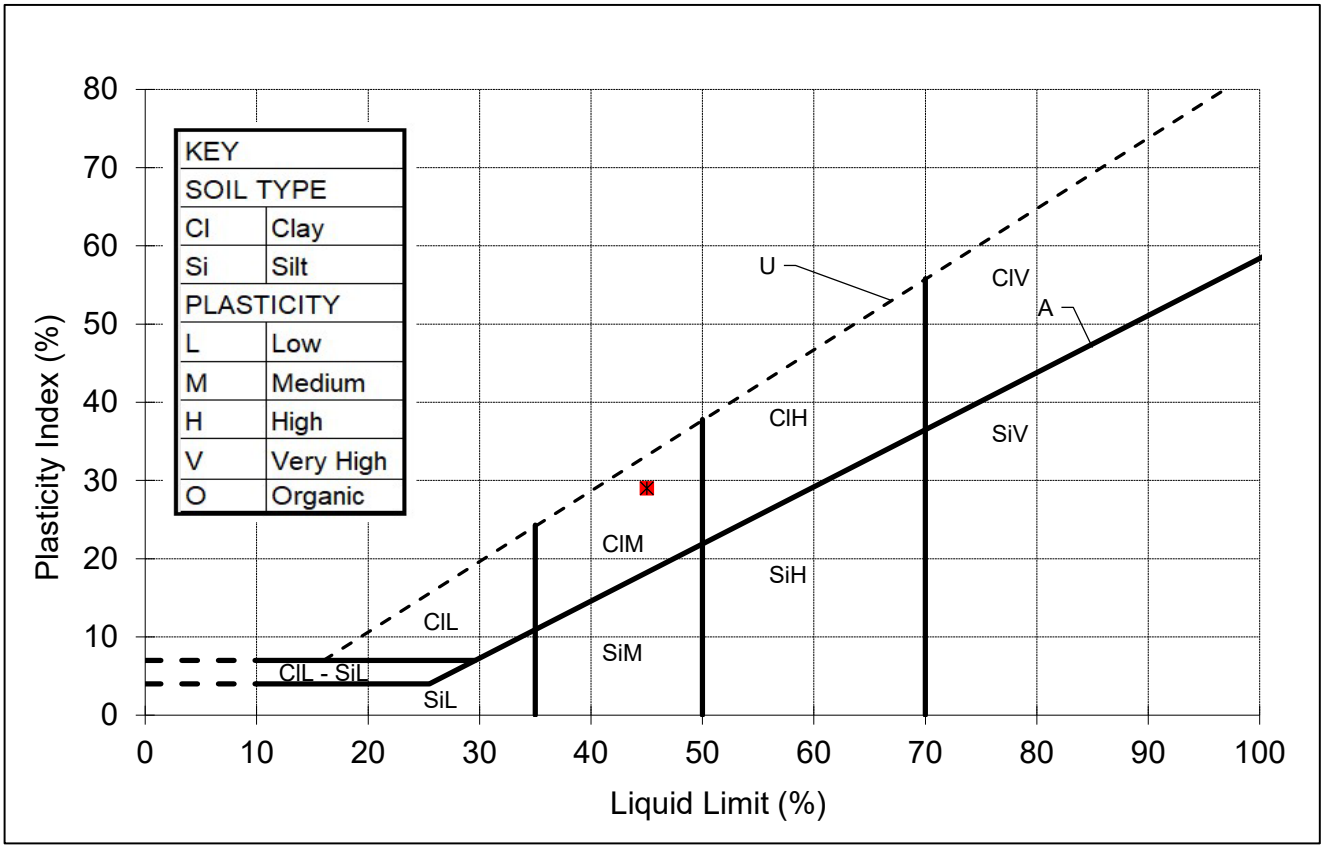
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 1.2-1.65m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435138	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22.5	45	16	29	95



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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TEST CERTIFICATE

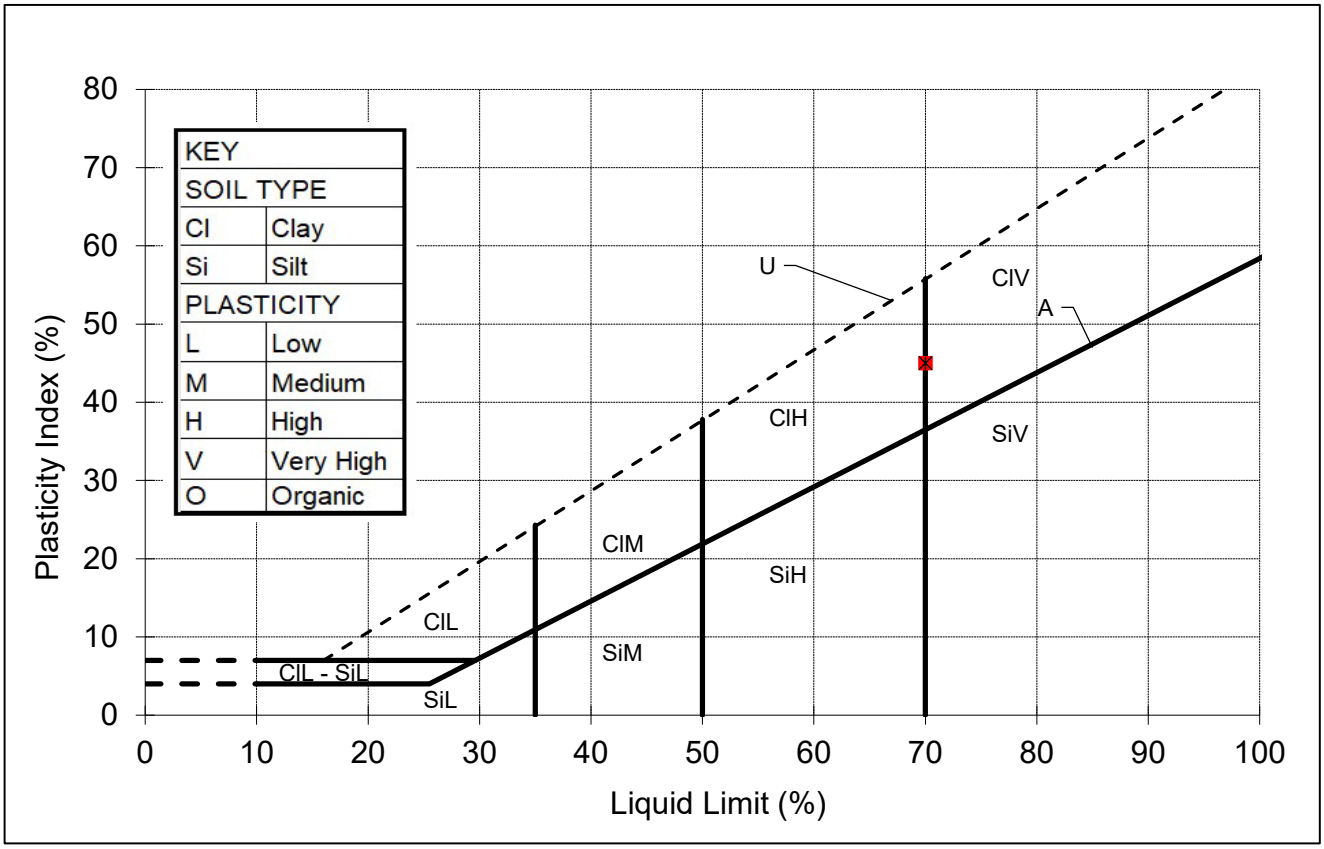
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 5.0-5.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435139	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
59.6	70	25	45	99



REMARKS

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NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

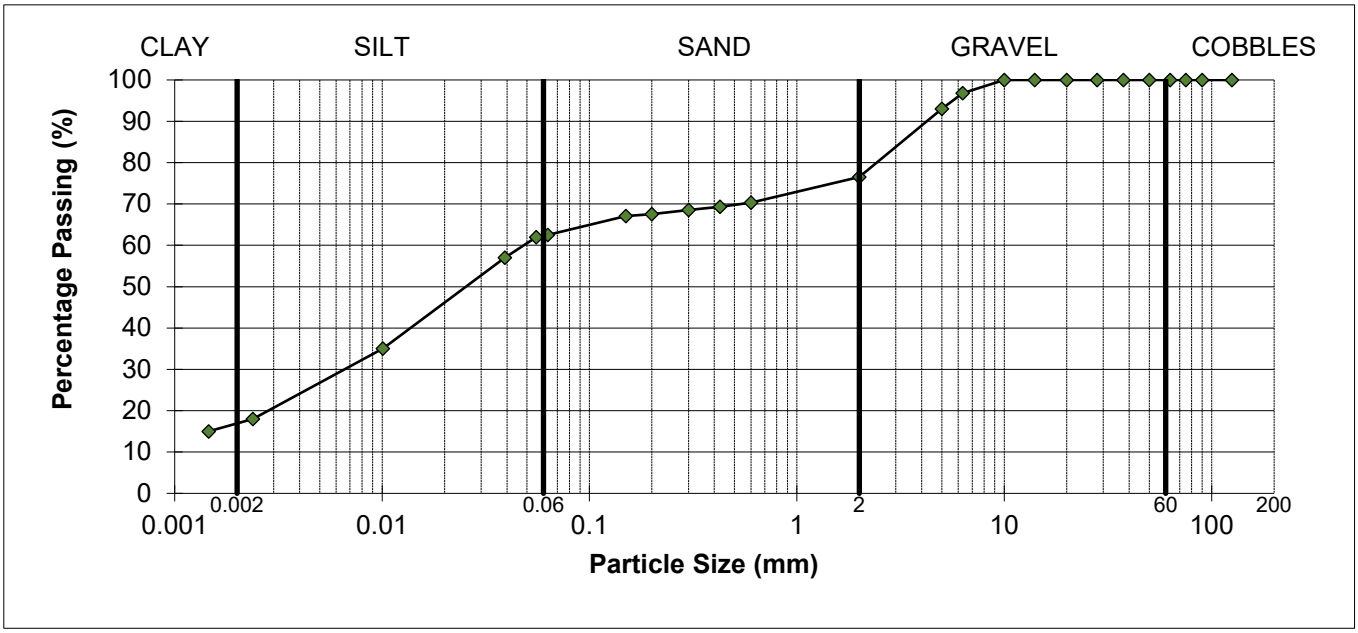
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 9.0-9.45m B	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435140	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy very organic CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	77	
90	100		0.6	70	
75	100		0.425	69	
63	100		0.3	69	
50	100		0.2	68	
37.5	100		0.15	67	
28	100		0.063	63	
20	100		0.055	62	
14	100		0.039	57	
10	100		0.010	35	
6.3	97		0.0024	18	
5	93		0.0015	15	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

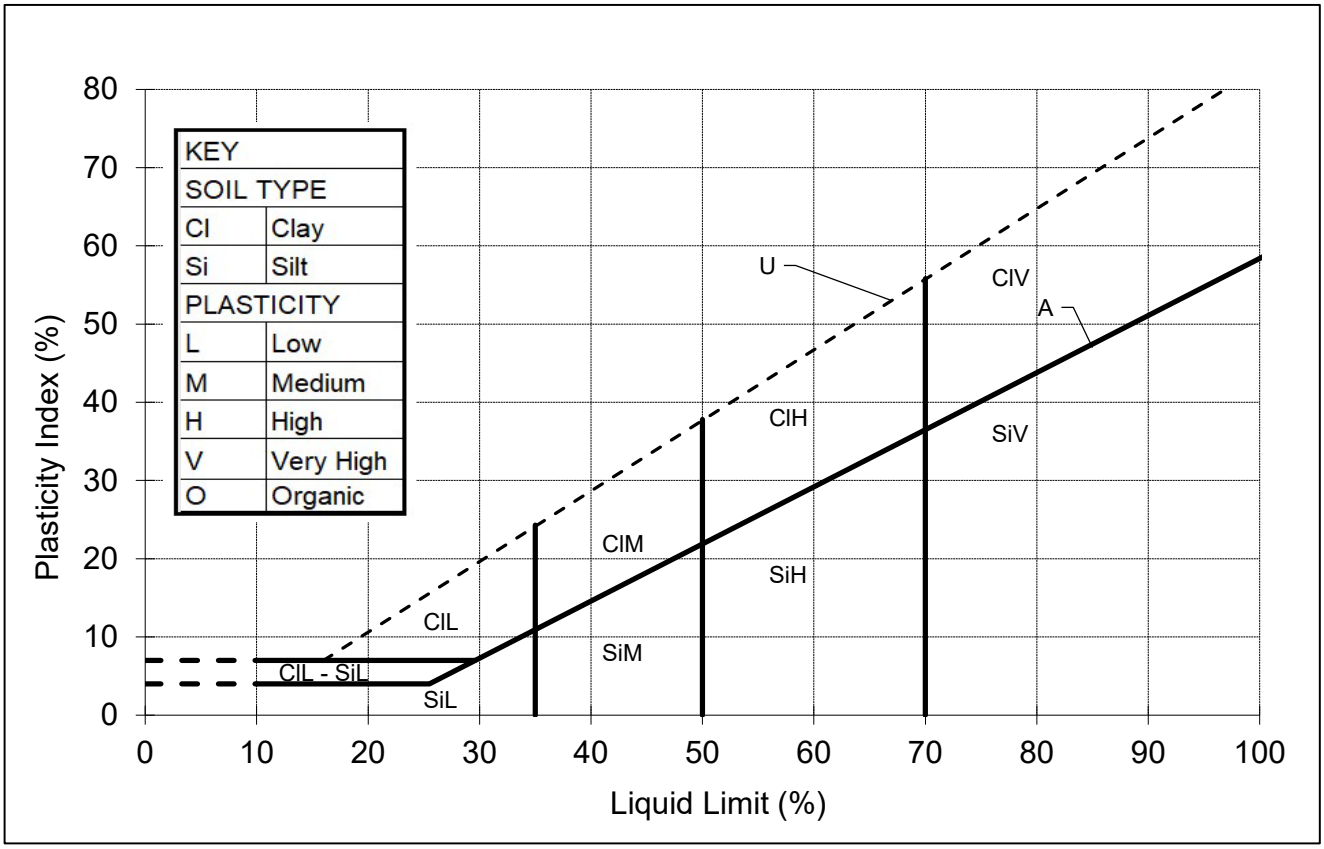
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 9.0-9.45m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435140	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy very organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
172.7	155	44	111	69



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

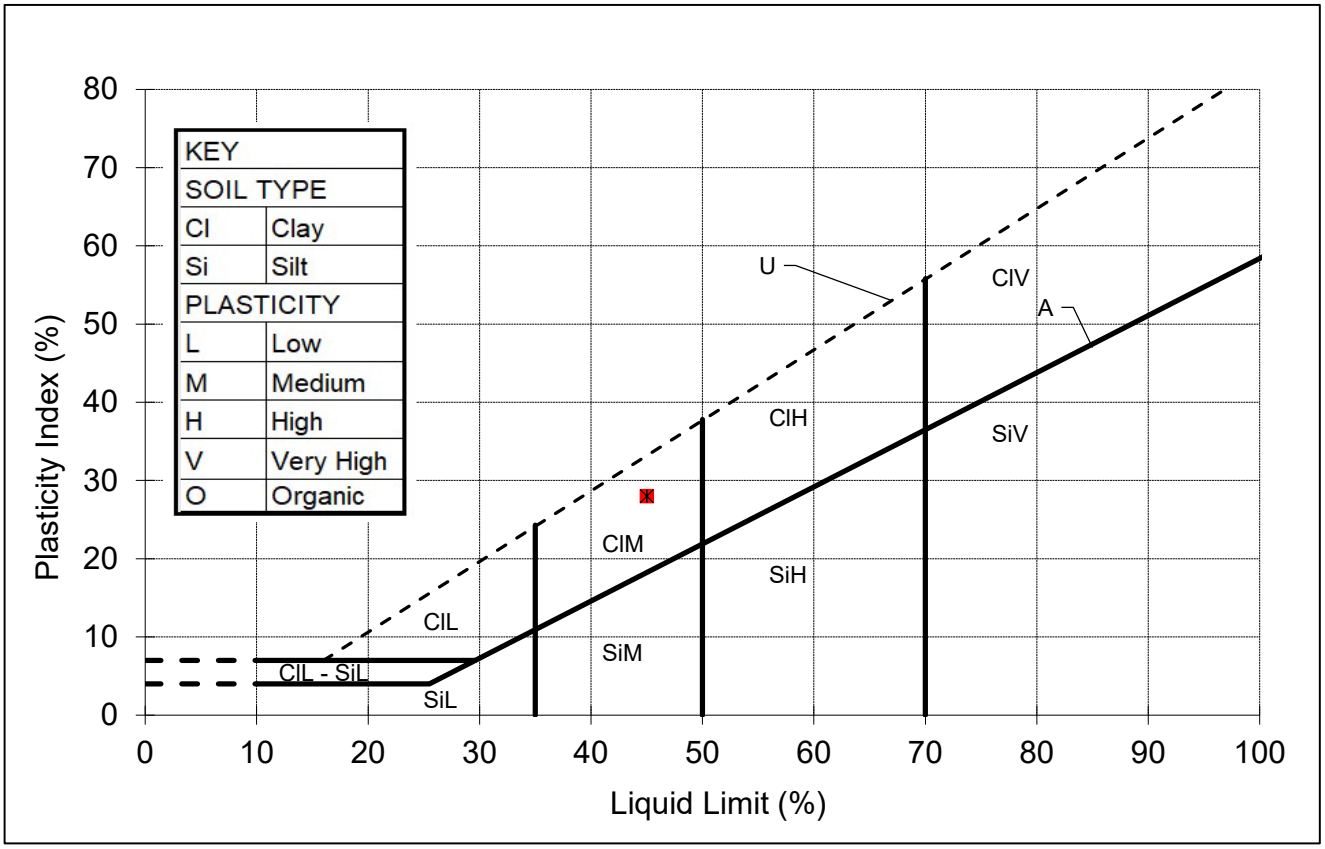
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 25.5m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435141	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.6	45	17	28	95



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

M U R R A Y R I X

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

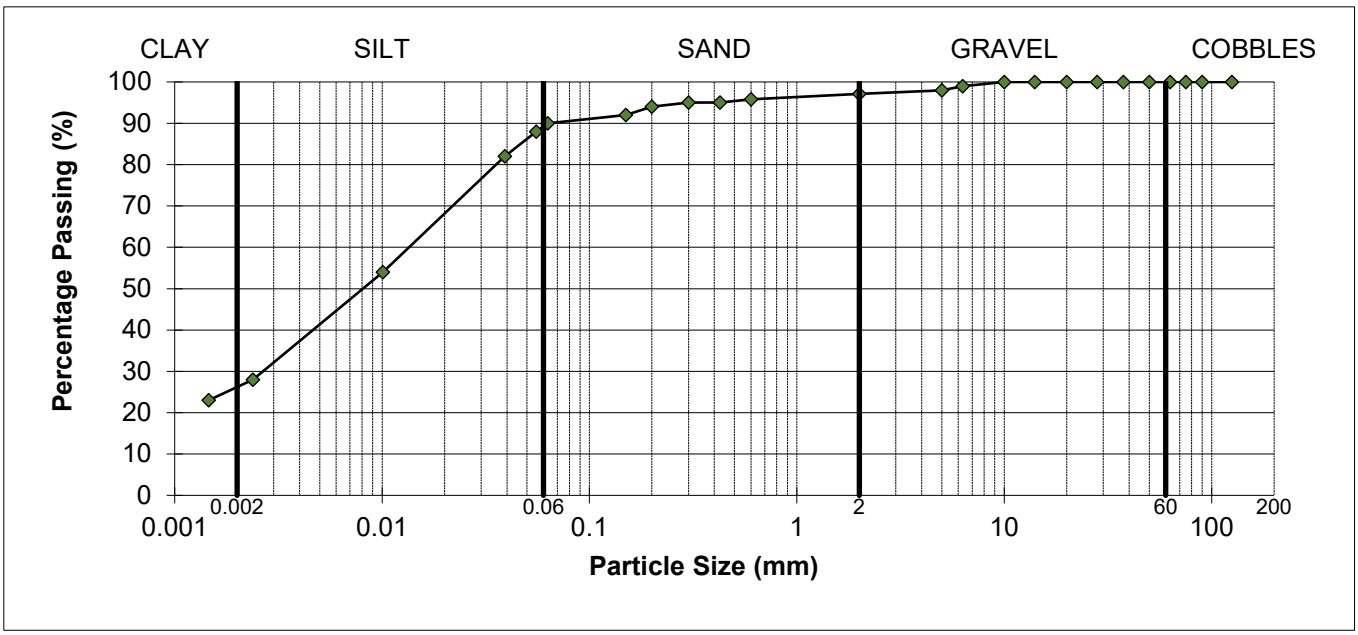
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 28.5-28.95m U	DATE SAMPLED	01-Mar-24
LAB SAMPLE No	435143	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	96	
75	100		0.425	95	
63	100		0.3	95	
50	100		0.2	94	
37.5	100		0.15	92	
28	100		0.063	90	
20	100		0.055	88	
14	100		0.039	82	
10	100		0.010	54	
6.3	99		0.0024	28	
5	98		0.0015	23	



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

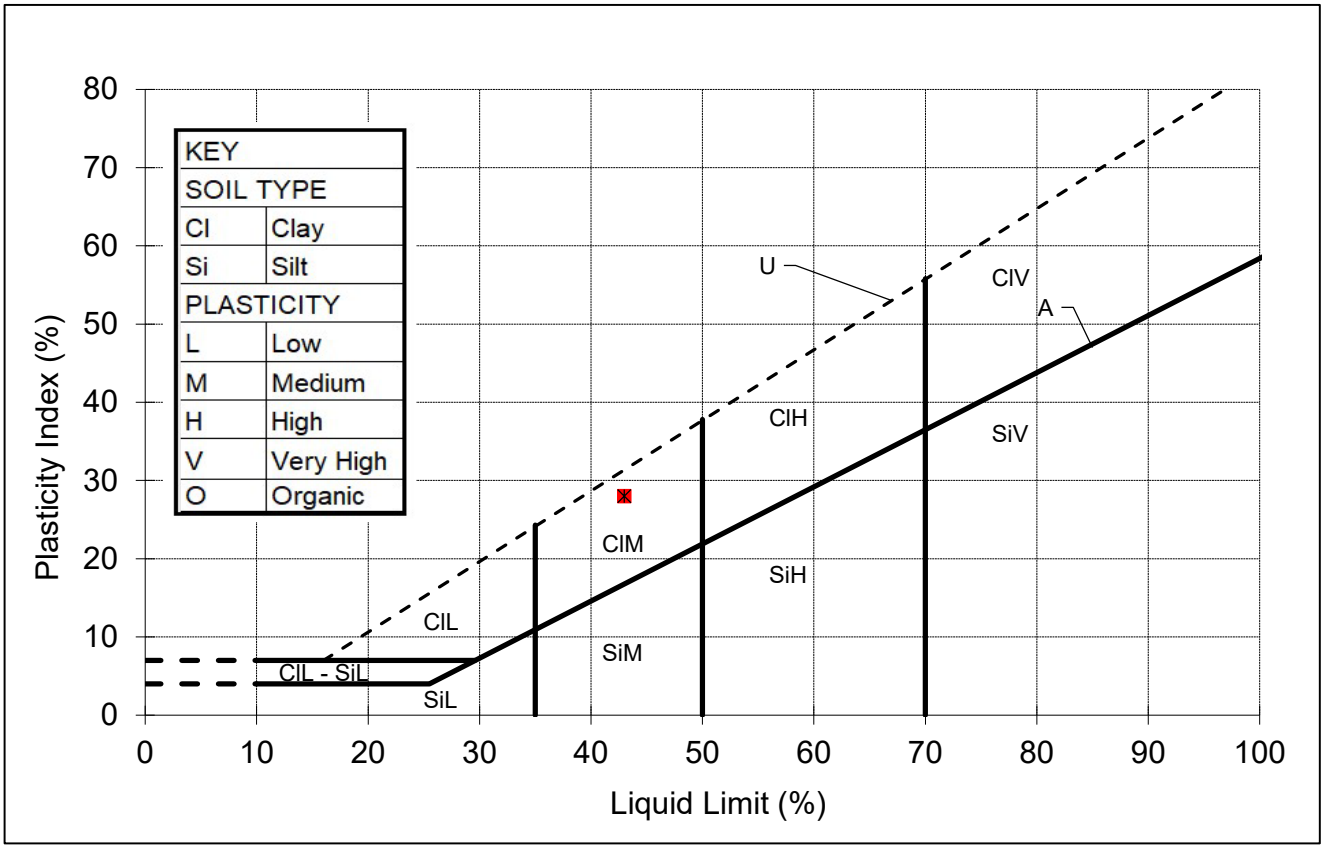
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 28.5-28.95m U	DATE SAMPLED	01-Feb-24
SAMPLE No.	435143	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.7	43	15	28	95



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

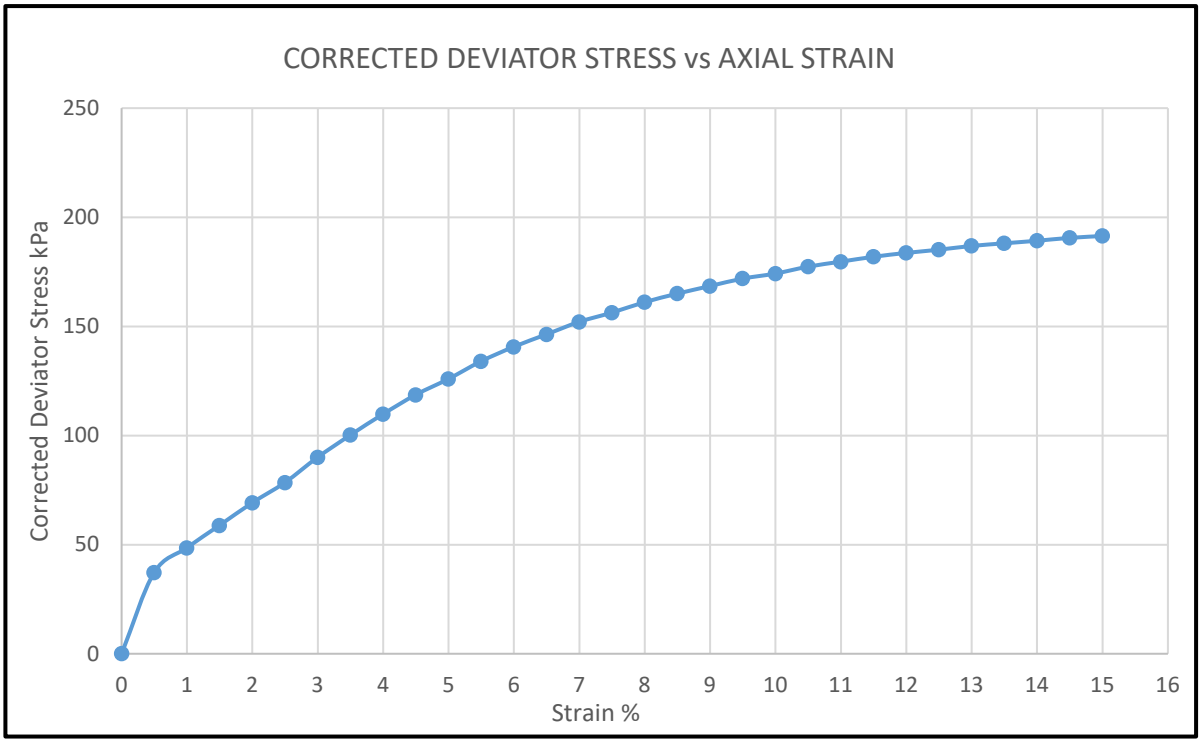
BS EN ISO 17892-8:2018

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	BH 207 28.5-28.95m U	**DATE SAMPLED**	01-Feb-24
LAB SAMPLE No.	435143	**DATE RECEIVED**	06-Mar-24
DATE TESTED	13-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

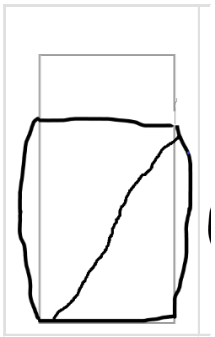
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	30
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	200	Specimen Water Content (%)	19.7
	Specimen Diameter (mm)	100	Specimen Bulk Density (Mg/m3)	2.25
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.88
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



COMBINED

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
570	15.0	2.0	191	96

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 31 March 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

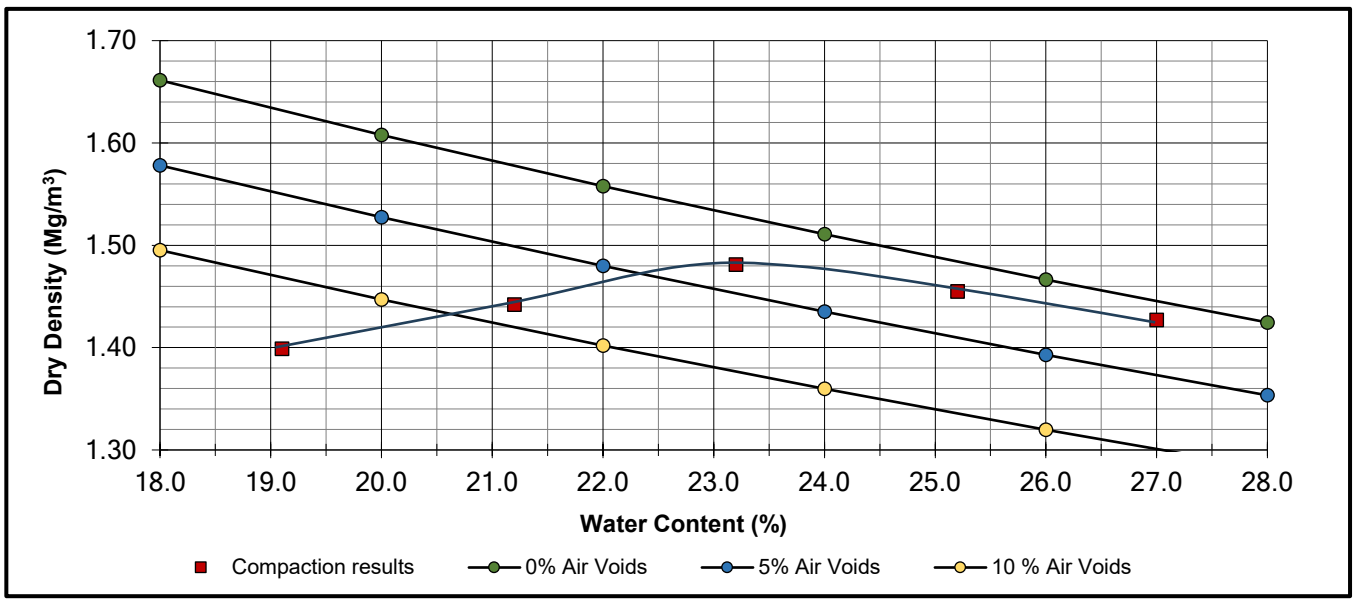
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 212 0.8-1.0m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435145	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.37 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	19.1	1.399
2	21.2	1.442
3	23.2	1.481
4	25.2	1.455
5	27.0	1.427



OPTIMUM WATER CONTENT	**23**	(%)
MAXIMUM DRY DENSITY	**1.48**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

CALIFORNIA BEARING RATIO (CBR)
BS 1377-2:2022 Cl. 15
DETERMINATION OF WATER CONTENT - BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

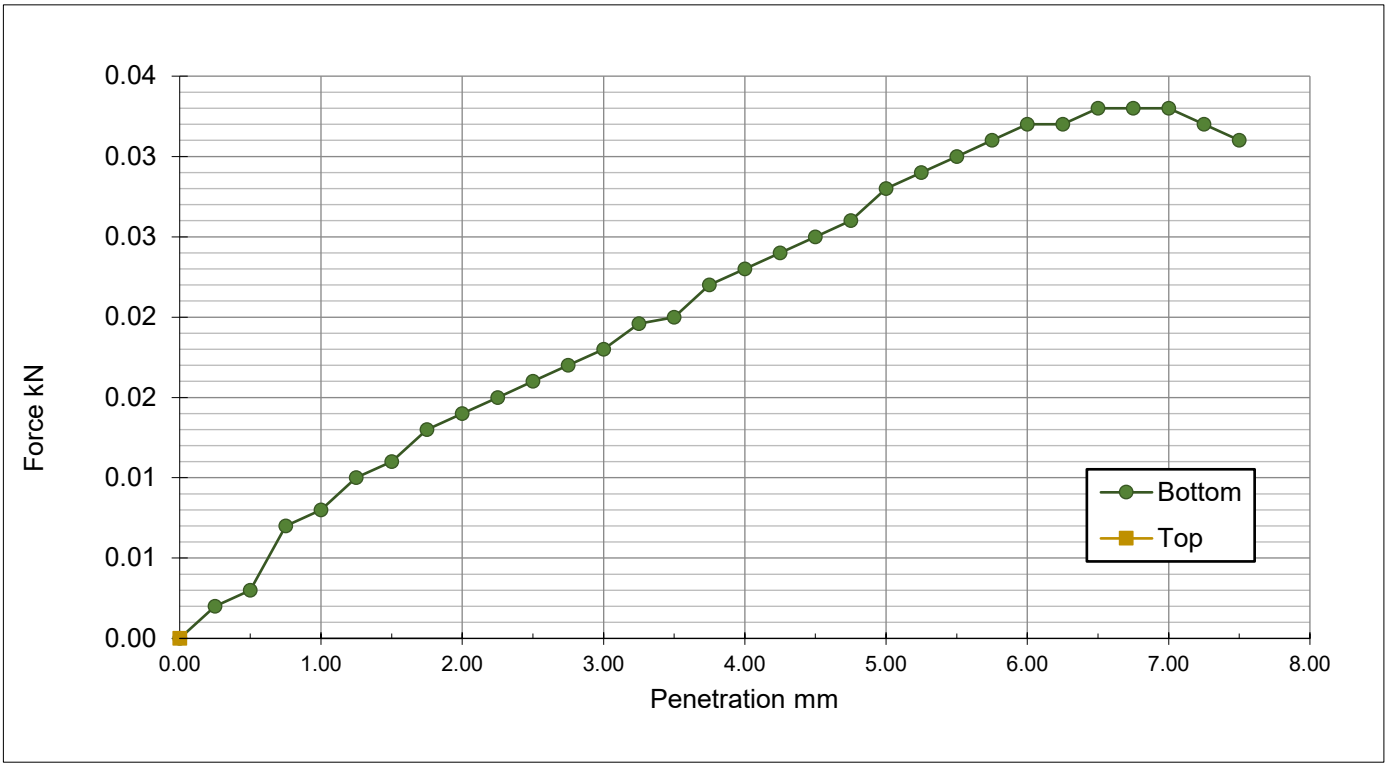
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 212 0.8-1.0m B	DATE SAMPLED	01-Feb-24
LAB SAMPLE No	435145	DATE RECEIVED	06-Mar-24
DATE TESTED	20-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.66 Mg/m3	MOISTURE CONTENT	43.0 %	DRY DENSITY	1.16 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	0.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	43.0	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

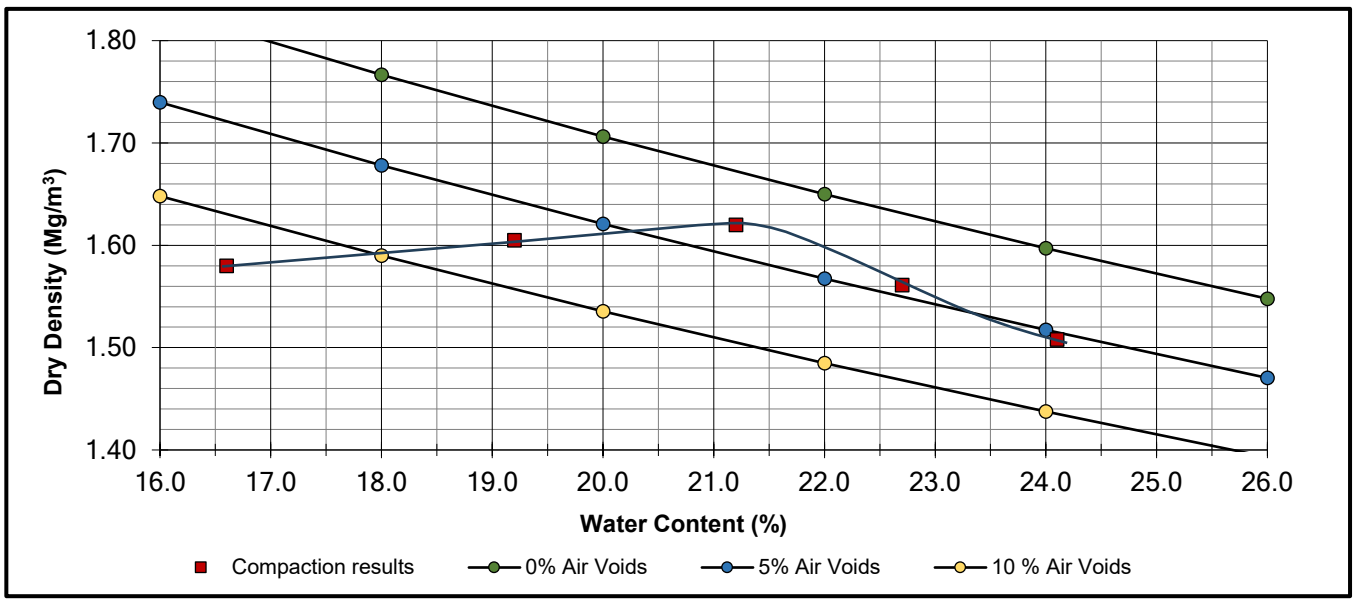
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 213 0.4m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435146	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.59 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	16.6	1.580
2	19.2	1.605
3	21.2	1.620
4	22.7	1.561
5	24.1	1.508



OPTIMUM WATER CONTENT	**21**	(%)
MAXIMUM DRY DENSITY	**1.62**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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TEST CERTIFICATE

CALIFORNIA BEARING RATIO (CBR)
BS 1377-2:2022 Cl. 15
DETERMINATION OF WATER CONTENT - BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

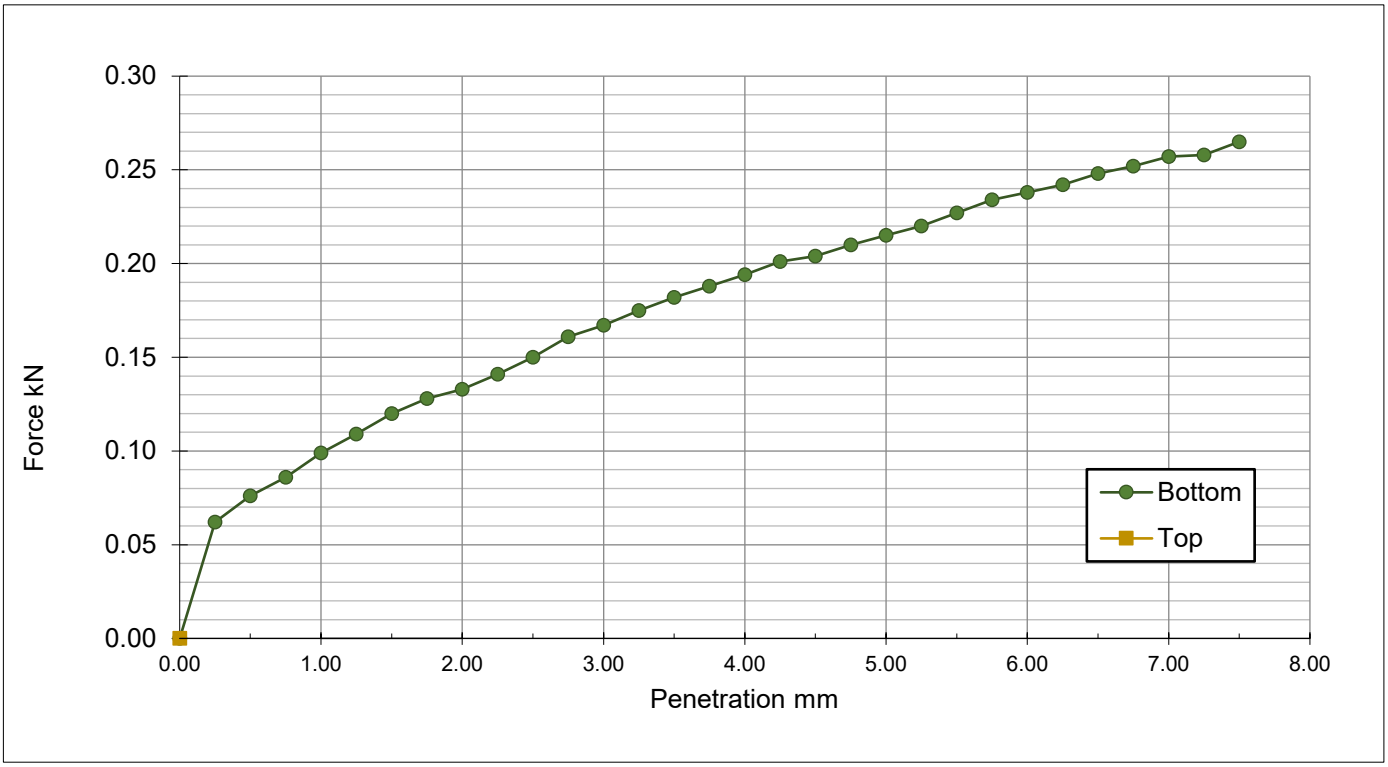
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 213 0.4m B	DATE SAMPLED	01-Feb-24
LAB SAMPLE No	435146	DATE RECEIVED	06-Mar-24
DATE TESTED	20-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.83 Mg/m3	MOISTURE CONTENT	31.6 %	DRY DENSITY	1.39 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	1.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	31.6	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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TEST CERTIFICATE

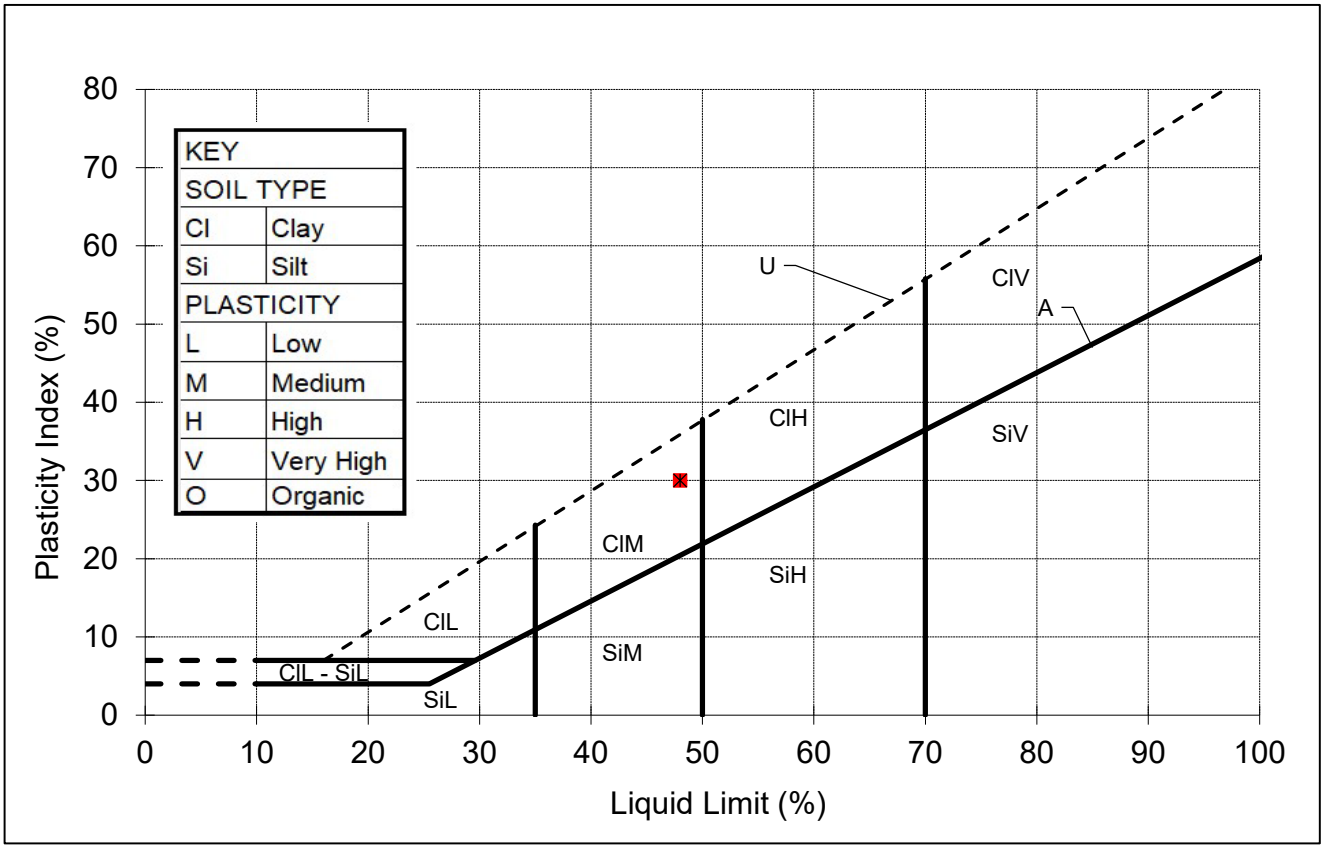
LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 4 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 214 0.4-0.5m B	DATE SAMPLED	01-Feb-24
SAMPLE No.	435148	DATE RECEIVED	06-Mar-24
DATE TESTED	13-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.5	48	18	30	95



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

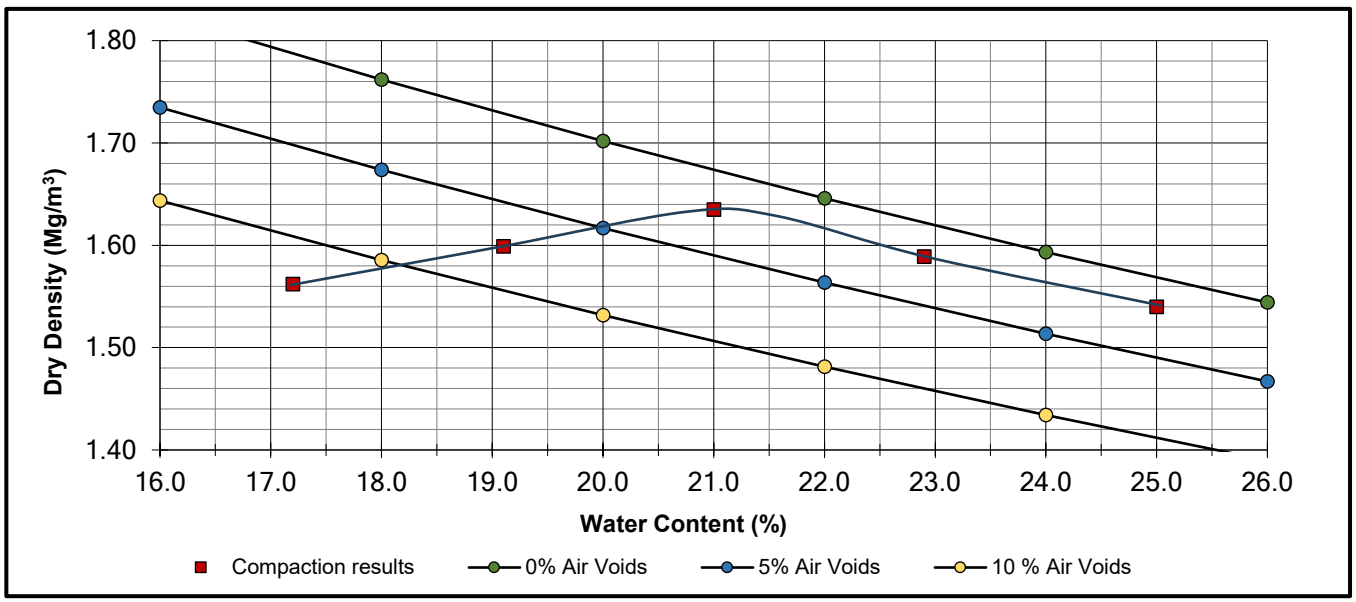
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 214 0.4-0.5m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435148	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.58 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	17.2	1.562
2	19.1	1.599
3	21.0	1.635
4	22.9	1.589
5	25.0	1.540



OPTIMUM WATER CONTENT	**21**	(%)
MAXIMUM DRY DENSITY	**1.63**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

MURRAY RIX

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UKAS TESTING 1580

TEST CERTIFICATE

CALIFORNIA BEARING RATIO (CBR)
BS 1377-2:2022 Cl. 15
DETERMINATION OF WATER CONTENT - BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

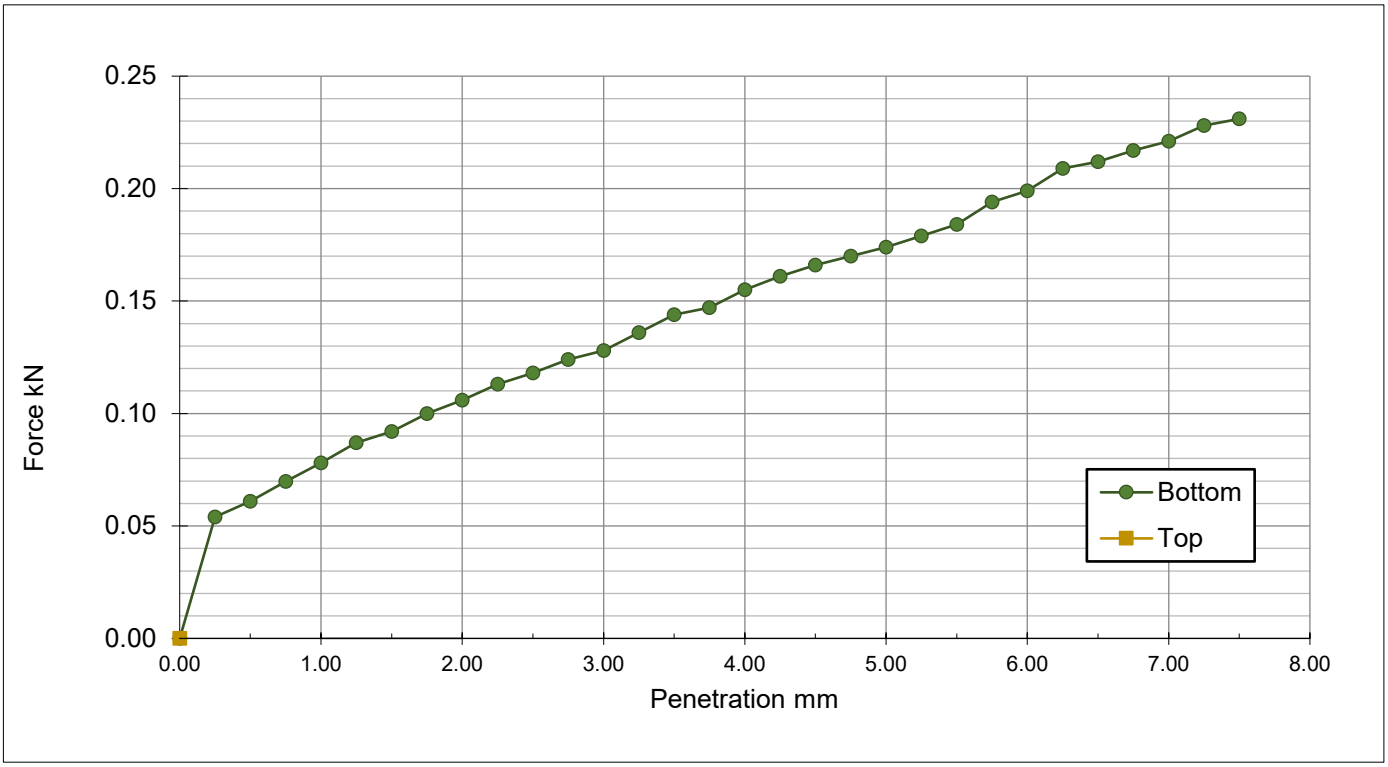
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 214 0.4-0.5m B	DATE SAMPLED	01-Feb-24
LAB SAMPLE No	435148	DATE RECEIVED	06-Mar-24
DATE TESTED	20-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.89 Mg/m3	MOISTURE CONTENT	25.5 %	DRY DENSITY	1.50 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	0.9	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	25.5	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

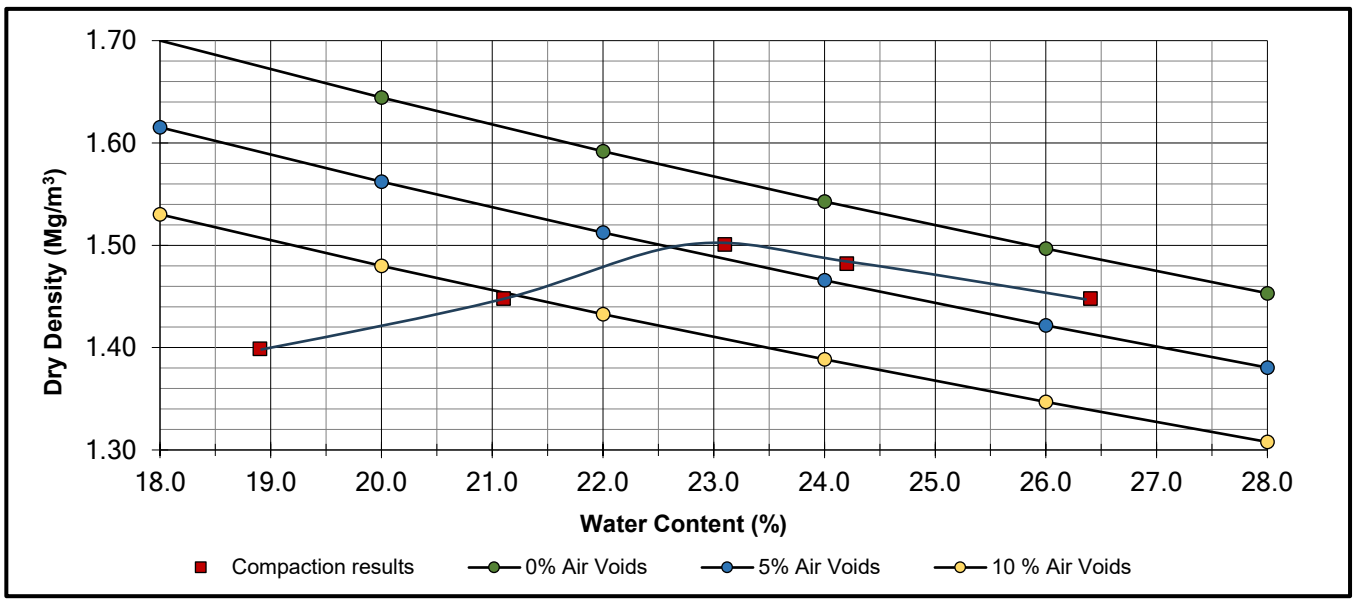
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 215 0.3m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435149	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.45 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	18.9	1.399
2	21.1	1.448
3	23.1	1.501
4	24.2	1.482
5	26.4	1.448



OPTIMUM WATER CONTENT	**23**	(%)
MAXIMUM DRY DENSITY	**1.50**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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TEST CERTIFICATE

CALIFORNIA BEARING RATIO (CBR)
BS 1377-2:2022 Cl. 15
DETERMINATION OF WATER CONTENT - BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

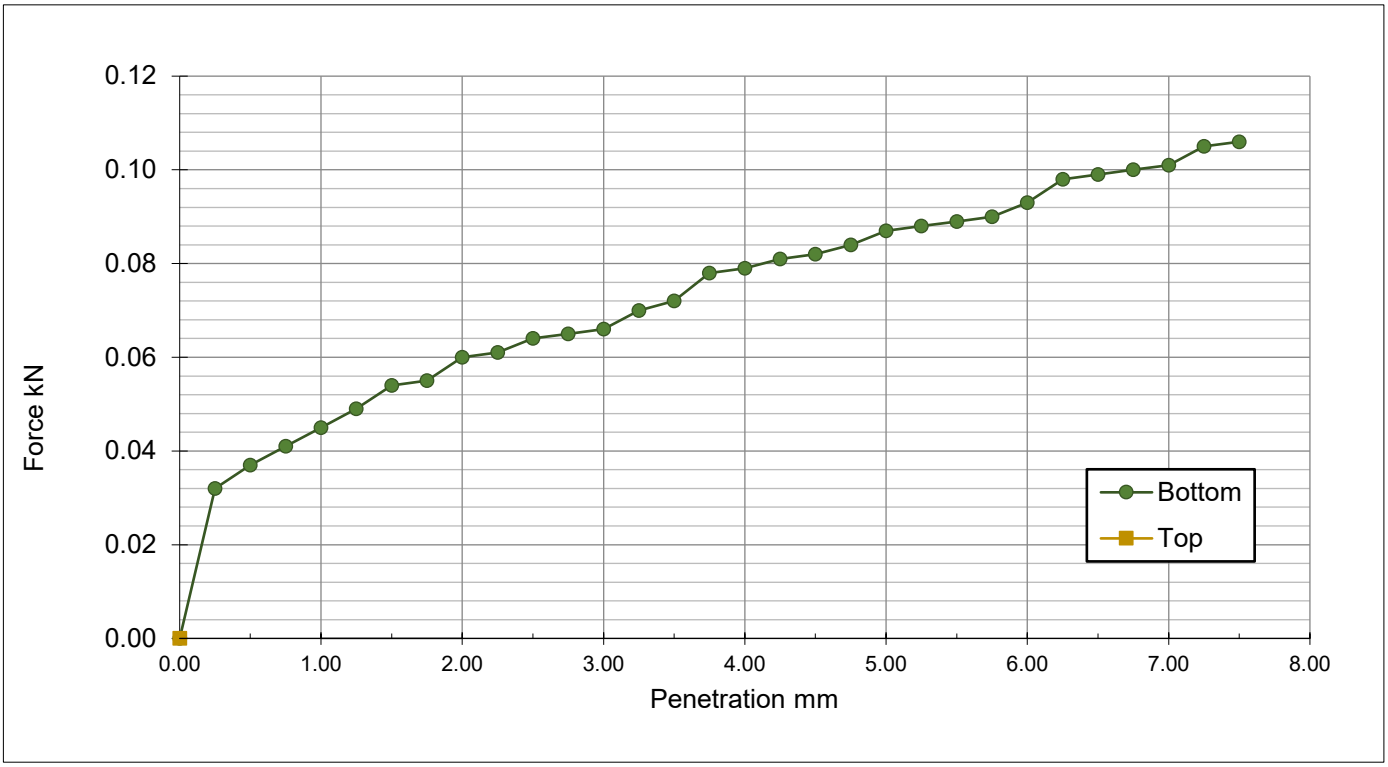
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 215 0.3m B	DATE SAMPLED	01-Feb-24
LAB SAMPLE No	435149	DATE RECEIVED	06-Mar-24
DATE TESTED	20-Mar-24	SAMPLED BY	Client

MATERIAL	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
ADVISED SOURCE	Site Investigation Sample

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.74 Mg/m3	MOISTURE CONTENT	34.8 %	DRY DENSITY	1.29 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	0.5	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	34.8	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

MURRAY RIX

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TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

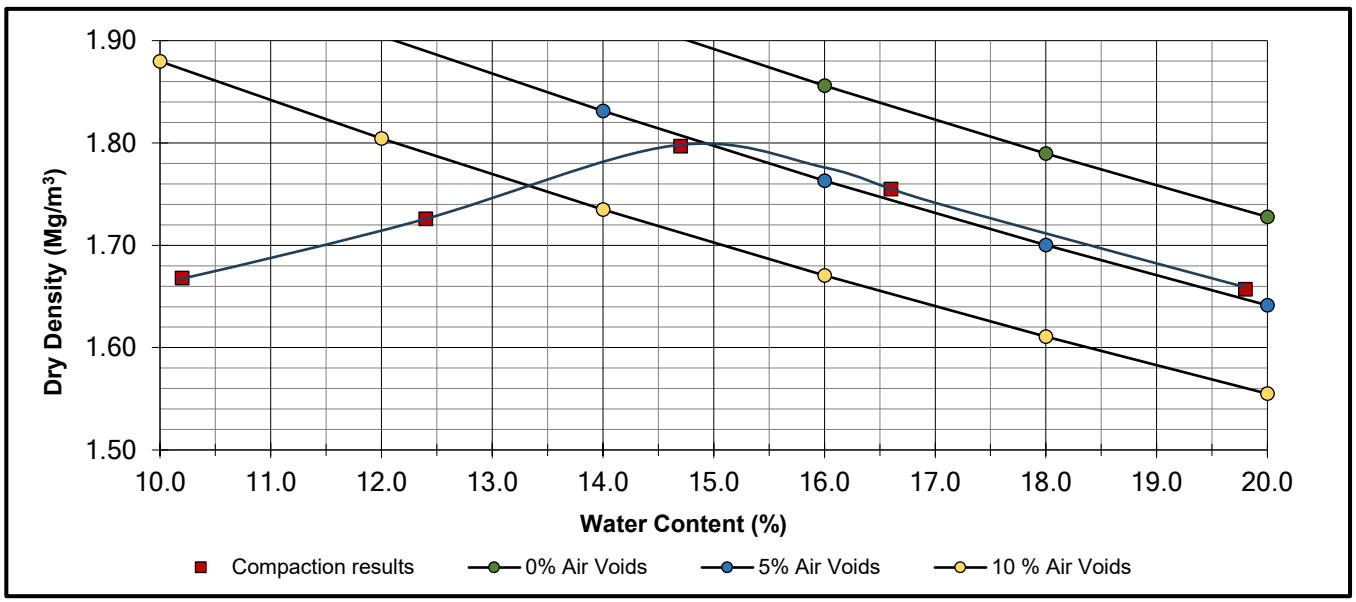
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 216 0.4-0.8m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435150	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.64 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	10.2	1.668
2	12.4	1.726
3	14.7	1.797
4	16.6	1.755
5	19.8	1.657



OPTIMUM WATER CONTENT	**15**	(%)
MAXIMUM DRY DENSITY	**1.80**	(Mg/m^3)

REMARKS
As received water content = 26.7%

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

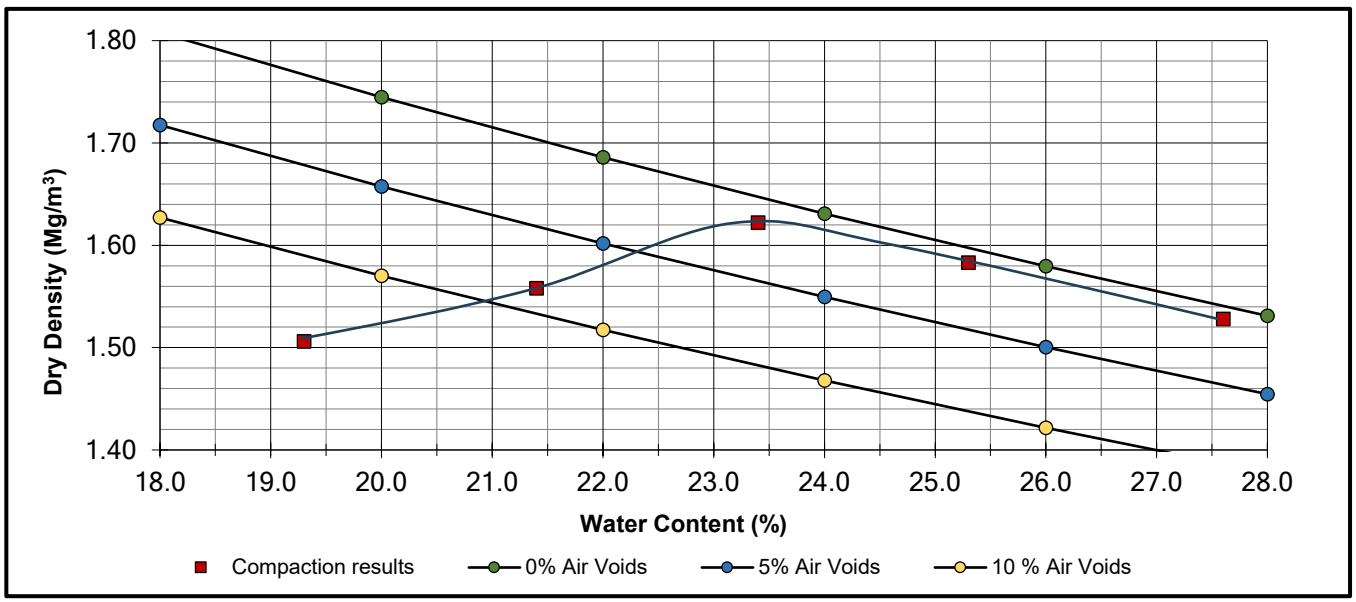
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 216 1.3-1.5m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435151	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.68 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	19.3	1.506
2	21.4	1.558
3	23.4	1.622
4	25.3	1.583
5	27.6	1.528



OPTIMUM WATER CONTENT	**23**	(%)
MAXIMUM DRY DENSITY	**1.62**	(Mg/m^3)

REMARKS
As received water content = 40.5%

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

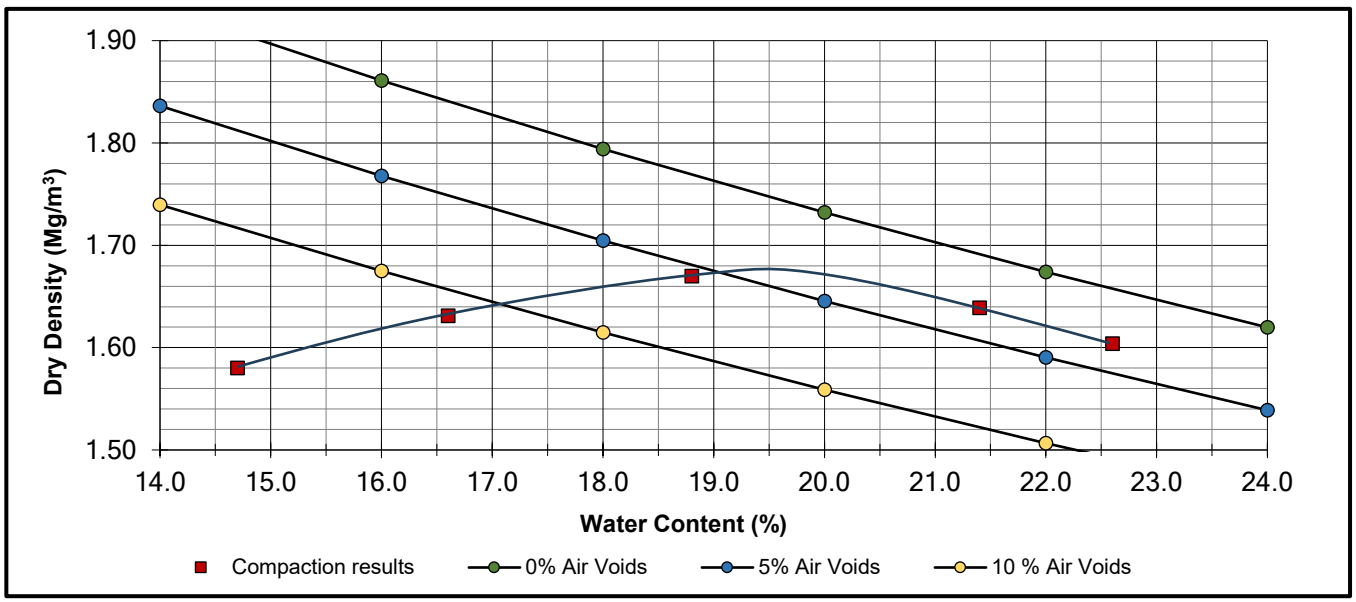
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 217 0.4-0.55m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435152	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.65 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	14.7	1.580
2	16.6	1.631
3	18.8	1.670
4	21.4	1.639
5	22.6	1.604



OPTIMUM WATER CONTENT	**20**	(%)
MAXIMUM DRY DENSITY	**1.67**	(Mg/m^3)

REMARKS
As received water content = 30.4%

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

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UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

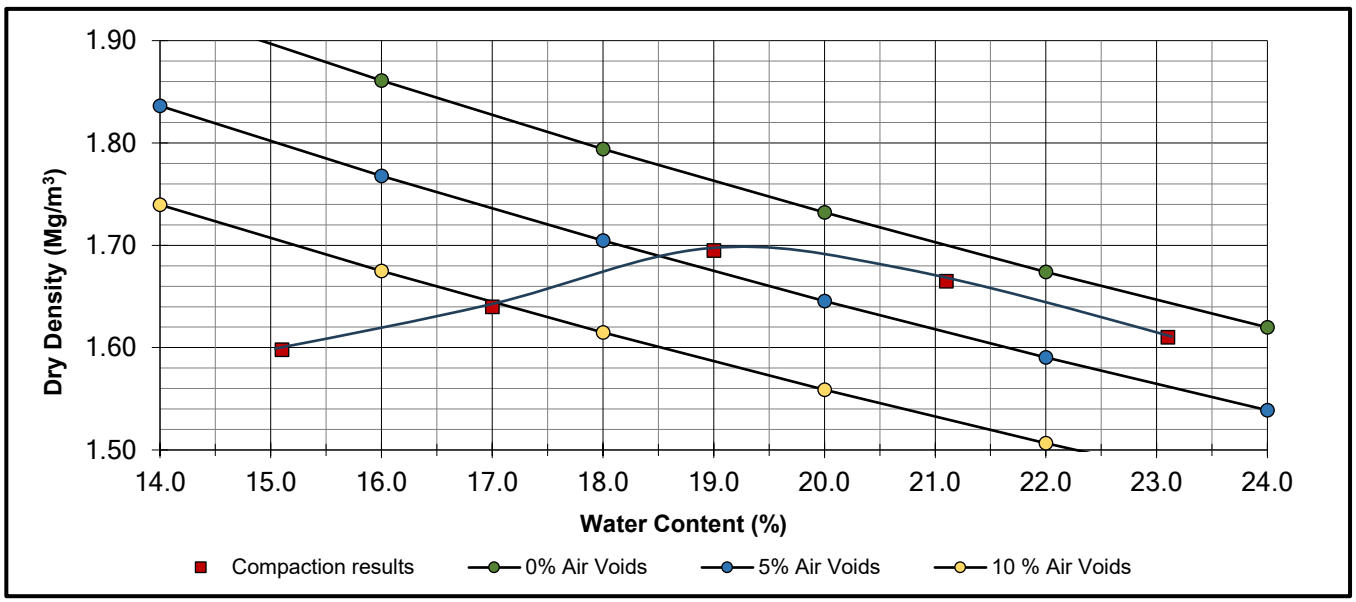
CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/5

SAMPLE LABEL	TP 217 0.9-1.2m B	DATE SAMPLED	01-Feb-24
SAMPLE NUMBER	435153	DATE RECEIVED	06-Mar-24
DATE TESTED	16-Mar-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Single Sample

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.65 Mg/m3 (Measured)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	15.1	1.598
2	17.0	1.640
3	19.0	1.695
4	21.1	1.665
5	23.1	1.610



OPTIMUM WATER CONTENT	**19**	(%)
MAXIMUM DRY DENSITY	**1.69**	(Mg/m^3)

REMARKS
As received water content = 33.7%

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Mar-24

435101	06-Mar	BH 202 1.2-1.65m B	Grey silty slightly slightly sandy slightly gravelly CLAY
435102	06-Mar	BH 202 2.00-2.45m U	Grey brown mottled silty slightly slightly sandy slightly gravelly organic
435104	06-Mar	BH 202 12.00-12.45m	Brown clayey silty SAND
435105	06-Mar	BH 202 22.50-22.95m	Brown silty slightly sandy slightly gravelly CLAY
435106	06-Mar	BH 202 27-27.45m U	Brown silty slightly sandy CLAY
435107	06-Mar	BH 203 2.0m U	Dark brown silty slightly sandy slightly gravelly organic CLAY
435108	06-Mar	BH 203 5.0m B	Dark grey clayey sandy SILT
435109	06-Mar	BH 203 9.0-9.45m U	Dark brown silty slightly sandy gravelly CLAY
435110	06-Mar	BH 203 21.0-21.5m B	Brown slightly silty gravelly SAND
435111	06-Mar	BH 203 27.0-27.45m U	Brown silty slightly sandy CLAY
435112	06-Mar	BH 203 30-30.45m U	Brown silty slightly sandy CLAY
435113	06-Mar	BH 204 2.0-2.45m U	Dark brown clayey PEAT
435114	06-Mar	BH 204 4.0-4.45m U	Dark brown clayey PEAT
435115	06-Mar	BH 204 6.0-6.45m U	Dark grey clayey sandy SILT
435116	06-Mar	BH 204 12.0-12.45m E	Brown SAND & GRAVEL
435117	06-Mar	BH 204 18.0-18.45m E	Brown SAND & GRAVEL
435118	06-Mar	BH 204 26.5-26.95m E	Brown silty slightly sandy slightly gravelly CLAY
435119	06-Mar	BH 204 36.0-36.45m U	Brown silty slightly sandy slightly gravelly CLAY
435120	06-Mar	BH 205 2.0-2.45m D	Dark grey clayey PEAT
435121	06-Mar	BH 205 2.0-2.45m B	Dark grey clayey PEAT
435122	06-Mar	BH 205 4.0-4.45m U	Dark grey silty slightly sandy slightly gravelly CLAY
435123	06-Mar	BH 205 4.5m D	Grey clayey sandy SILT
435124	06-Mar	BH 205 7.0-7.45m B	Dark grey silty slightly sandy slightly gravelly organic CLAY
435125	06-Mar	BH 205 10-10.45m B	Dark grey silty slightly sandy slightly gravelly organic CLAY
435126	06-Mar	BH 205a 1.2-1.65m U	Grey silty slightly slightly sandy slightly gravelly CLAY
435127	06-Mar	BH 205a 3.0-3.45m U	Dark brown clayey PEAT
435128	06-Mar	BH 205a 6.0-6.45m U	Grey brown mottled silty slightly slightly sandy CLAY
435129	06-Mar	BH 205a 12-12.45m B	Yellowish grey silty slightly gravelly SAND
435130	06-Mar	BH 205a 25.5-25.95m	Brown silty slightly sandy slightly gravelly CLAY
435131	06-Mar	BH 205a 28.5-28.95m	Brown silty slightly sandy slightly gravelly CLAY
435132	06-Mar	BH 206 1.20-1.65m B	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
435133	06-Mar	BH 206 4.0-4.45m U	Dark brown clayey PEAT
435134	06-Mar	BH 206 9.0-9.45m U	Dark brown clayey PEAT
435135	06-Mar	BH 206 22.5-22.95m U	Brown silty slightly sandy slightly gravelly CLAY
435136	06-Mar	BH 206 28.5-28.95m U	Brown silty slightly sandy slightly gravelly CLAY
435137	06-Mar	BH 207 1.0m B	Grey silty slightly slightly sandy slightly gravelly CLAY
435138	06-Mar	BH 207 1.2-1.65m B	Grey silty slightly slightly sandy slightly gravelly CLAY
435139	06-Mar	BH 207 5.0-5.45m B	Grey silty slightly slightly sandy organic CLAY
435140	06-Mar	BH 207 9.0-9.45m B	Grey silty slightly slightly sandy very organic CLAY
435141	06-Mar	BH 207 25.5m B	Brown silty slightly sandy slightly gravelly CLAY
435143	06-Mar	BH 207 28.5-28.95m U	Brown silty slightly sandy slightly gravelly CLAY
435145	06-Mar	TP 212 0.8-1.0m B	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
435146	06-Mar	TP 213 0.4m B	Grey silty slightly slightly sandy slightly gravelly CLAY
435148	06-Mar	TP 214 0.4-0.5m B	Grey silty slightly slightly sandy slightly gravelly CLAY
435149	06-Mar	TP 215 0.3m B	Grey silty slightly slightly sandy slightly gravelly slightly organic CLAY
435150	06-Mar	TP 216 0.4-0.8m B	Grey brown silty slightly sandy CLAY
435151	06-Mar	TP 216 1.3-1.5m B	Grey brown silty slightly sandy CLAY
435152	06-Mar	TP 217 0.4-0.55m B	Grey brown silty slightly sandy CLAY
435153	06-Mar	TP 217 0.9-1.2m B	Grey brown silty slightly sandy CLAY

CLAY

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client Ayesa

Address Suite 104
Mere Grange Business Park
St Helens
WA9 5GG

Contract Protos Carbon Capture Site Investigation

Job Number MRN 24097/6
Date of Issue 18 April 2024

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

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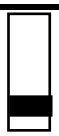
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 202 2.00-2.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435102	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Grey brown mottled silty slightly slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample		

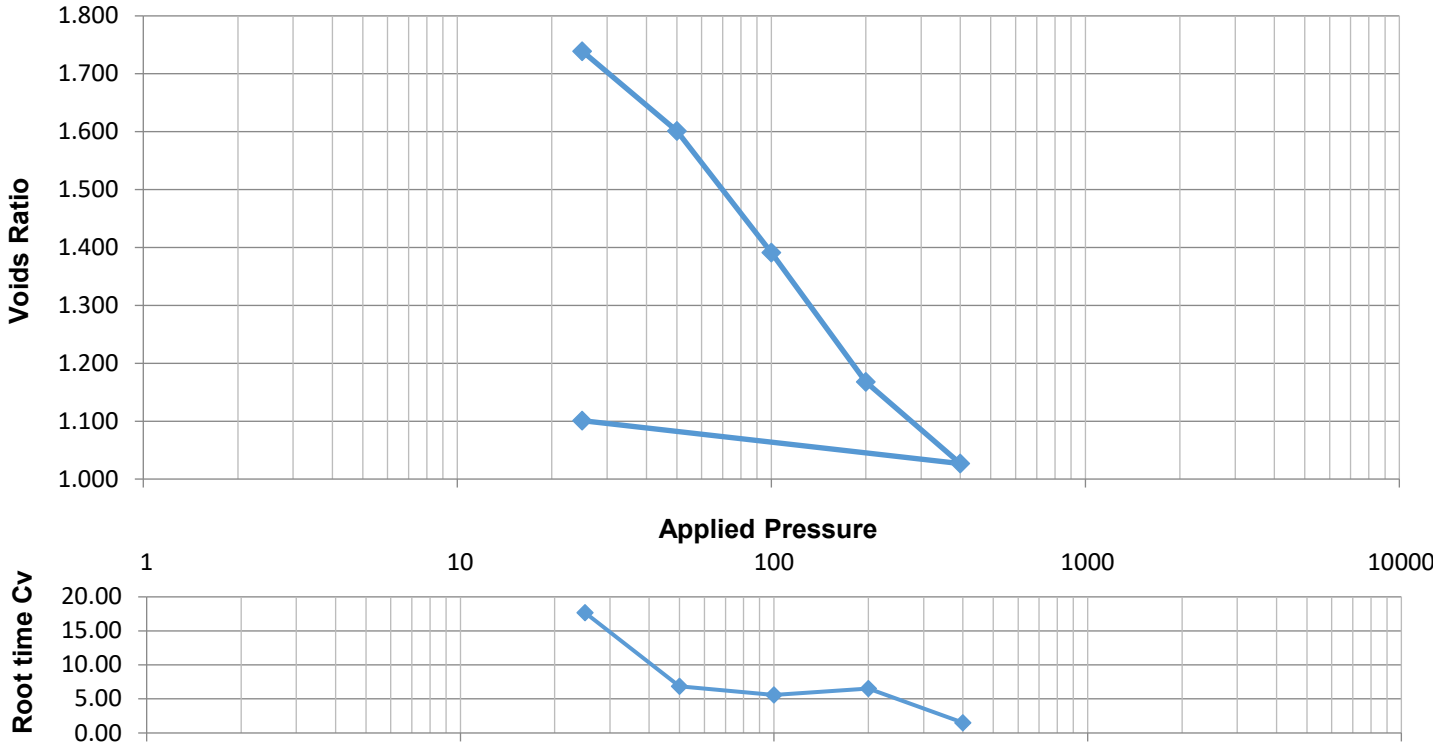
Specimen Location		Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
		Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.1	mm	Particle density	2.00	Ass
Diameter	70.1	mm	Initial void ratio	2.13	
Weight wet	94.5	g	Deg. of sat.	86	%
Water cont.*	91.3	%	Swell. press.	0	kN/m^2
Bulk Density	1.22	Mg/m^3	Dry density	0.64	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	17.55	1.739	5.01	20	17.66	17.60
2	50	16.67	1.601	2.01	20	6.88	7.39
3	100	15.32	1.391	1.61	20	5.57	4.57
4	200	13.89	1.168	0.93	20	6.53	6.64
5	400	12.98	1.027	0.33	20	1.52	0.97
6	25	13.46	1.101	0.10	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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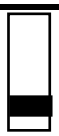
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TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 202 27-27.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435106	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

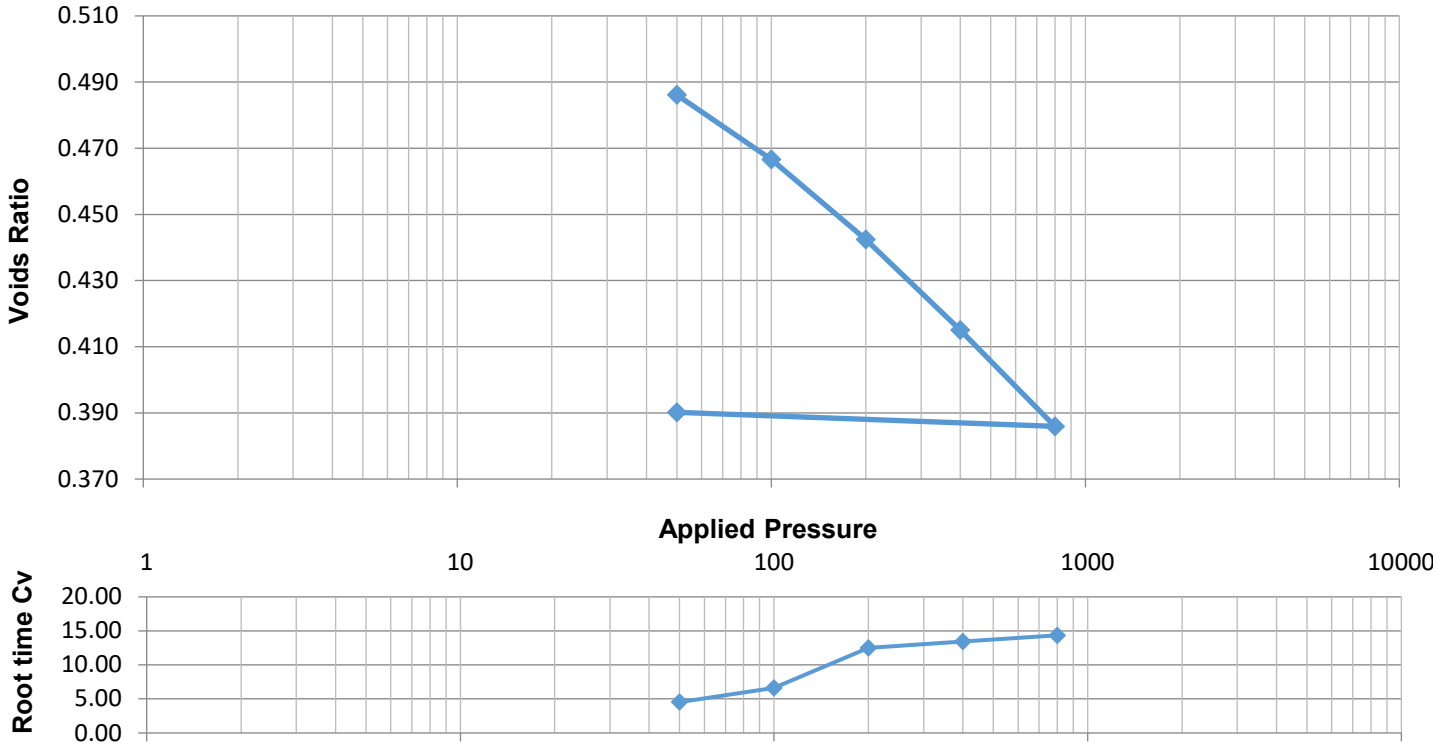
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.2	mm	Particle density	2.65	Ass
Diameter	70.0	mm	Initial void ratio	0.66	
Weight wet	153.2	g	Deg. of sat.	93	%
Water cont.*	23.1	%	Swell. press.	0	kN/m^2
Bulk Density	1.97	Mg/m^3	Dry density	1.60	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	50	18.12	0.486	2.06	20	4.53	3.94
2	100	17.88	0.467	0.26	20	6.64	7.17
3	200	17.59	0.442	0.17	20	12.51	13.00
4	400	17.26	0.415	0.09	20	13.46	14.02
5	800	16.90	0.386	0.05	20	14.35	14.37
6	50	16.95	0.390	0.00	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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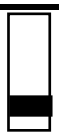
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TEST CERTIFICATE

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BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 203 2.0m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435107	**DATE RECEIVED**	06-Mar-24
DATE TESTED	12-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

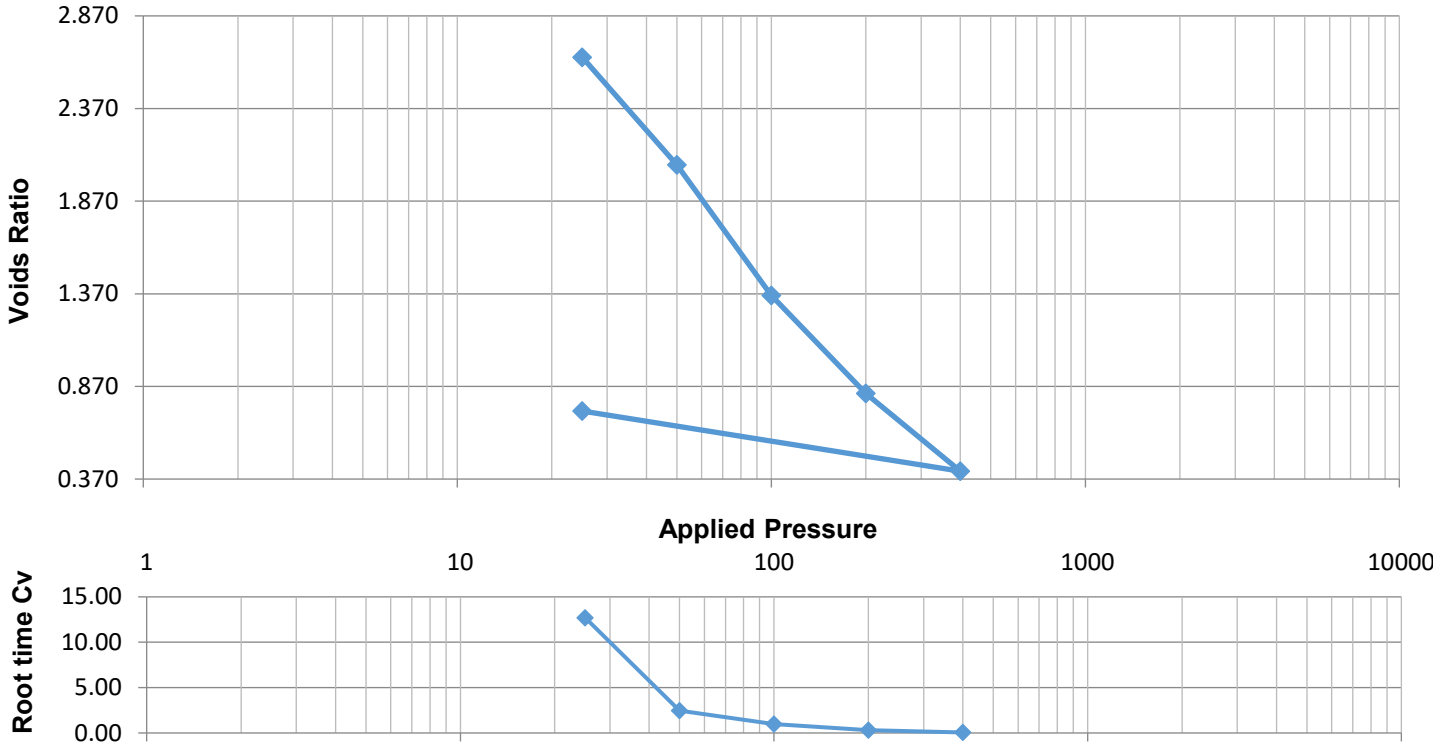
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.25	Ass
Diameter	69.8	mm	Initial void ratio	2.99	
Weight wet	79.2	g	Deg. of sat.	63	%
Water cont.*	84.2	%	Swell. press.	0	kN/m^2
Bulk Density	1.04	Mg/m^3	Dry density	0.56	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	18.22	2.647	3.48	20	12.71	12.72
2	50	15.31	2.065	6.38	20	2.47	1.34
3	100	11.79	1.361	4.60	20	0.97	0.32
4	200	9.15	0.833	2.24	20	0.32	0.14
5	400	7.06	0.412	1.15	20	0.06	0.05
6	25	8.68	0.737	0.61	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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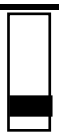
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 203 9.0-9.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435109	**DATE RECEIVED**	06-Mar-24
DATE TESTED	15-Mar-24	**SAMPLED BY**	Client
MATERIAL	Dark brown silty slightly sandy gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

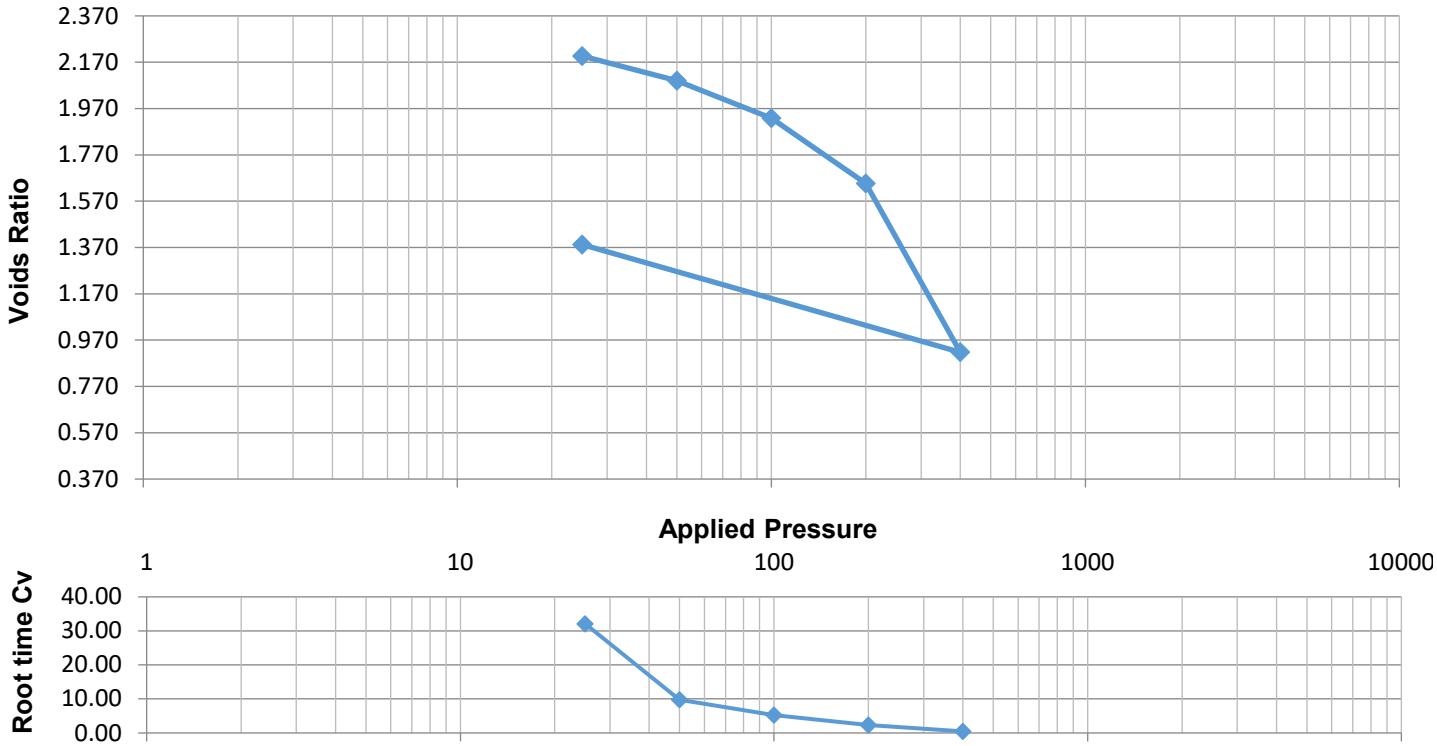
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.2	mm	Particle density	2.25	Ass
Diameter	70.0	mm	Initial void ratio	2.31	
Weight wet	78.4	g	Deg. of sat.	47	%
Water cont.*	48.4	%	Swell. press.	0	kN/m^2
Bulk Density	1.01	Mg/m^3	Dry density	0.68	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	19.49	2.197	1.40	20	32.10	32.89
2	50	18.84	2.089	1.34	20	9.80	10.08
3	100	17.86	1.928	1.04	20	5.23	5.32
4	200	16.14	1.647	0.96	20	2.38	1.11
5	400	11.69	0.917	1.38	20	0.47	0.45
6	25	14.53	1.383	0.65	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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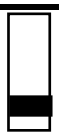
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TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 203 30-30.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435112	**DATE RECEIVED**	06-Mar-24
DATE TESTED	27-Mar-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

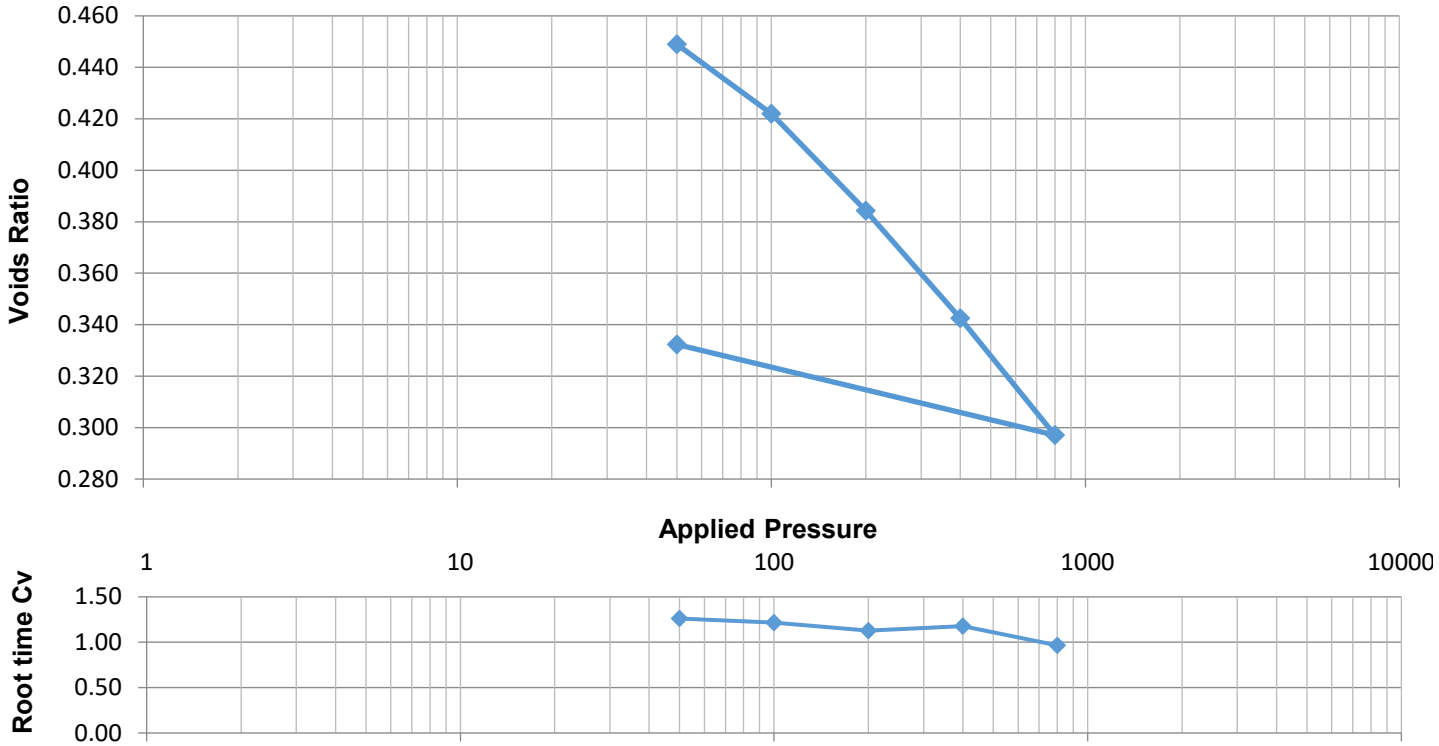
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.1	mm	Particle density	2.60	Ass
Diameter	70.1	mm	Initial void ratio	0.48	
Weight wet	155.9	g	Deg. of sat.	79	%
Water cont.*	14.4	%	Swell. press.	0	kN/m^2
Bulk Density	2.02	Mg/m^3	Dry density	1.76	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	50	19.70	0.449	0.36	20	1.26	1.01
2	100	19.33	0.422	0.37	20	1.22	0.89
3	200	18.82	0.384	0.27	20	1.13	1.01
4	400	18.25	0.343	0.15	20	1.18	1.08
5	800	17.63	0.297	0.08	20	0.97	1.20
6	50	18.11	0.332	0.04	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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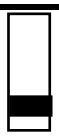
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TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 204 2.0-2.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435113	**DATE RECEIVED**	06-Mar-24
DATE TESTED	02-Apr-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

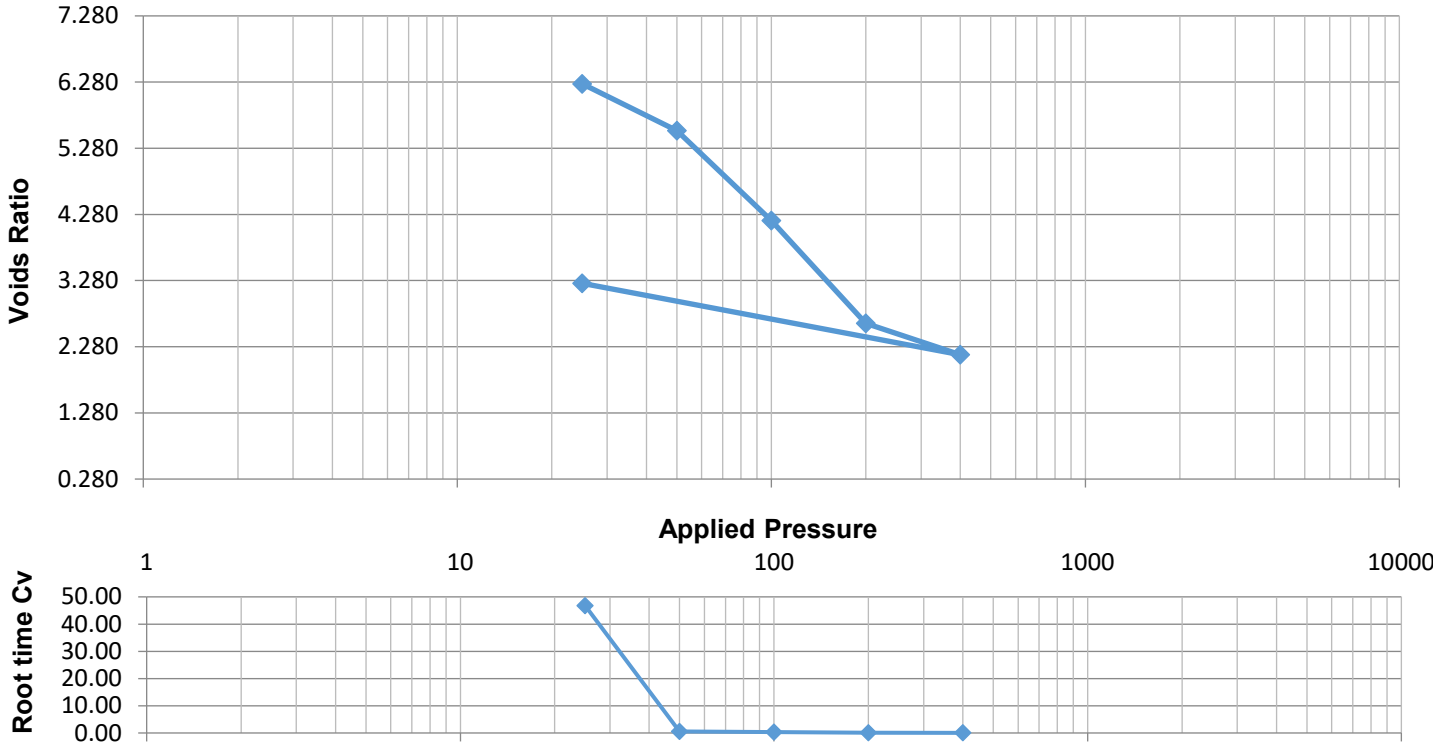
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.1	mm	Particle density	2.60	Ass
Diameter	70.1	mm	Initial void ratio	7.07	
Weight wet	74.7	g	Deg. of sat.	74	%
Water cont.*	200.0	%	Swell. press.	0	kN/m^2
Bulk Density	0.97	Mg/m^3	Dry density	0.32	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	18.03	6.253	4.06	20	46.77	46.94
2	50	16.27	5.547	3.90	20	0.60	0.38
3	100	12.89	4.187	4.15	20	0.33	0.26
4	200	9.02	2.631	3.00	20	0.06	0.06
5	400	7.85	2.159	0.65	20	0.04	0.06
6	25	10.54	3.239	0.91	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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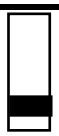
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TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 204 4.0-4.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435114	**DATE RECEIVED**	06-Mar-24
DATE TESTED	02-Apr-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

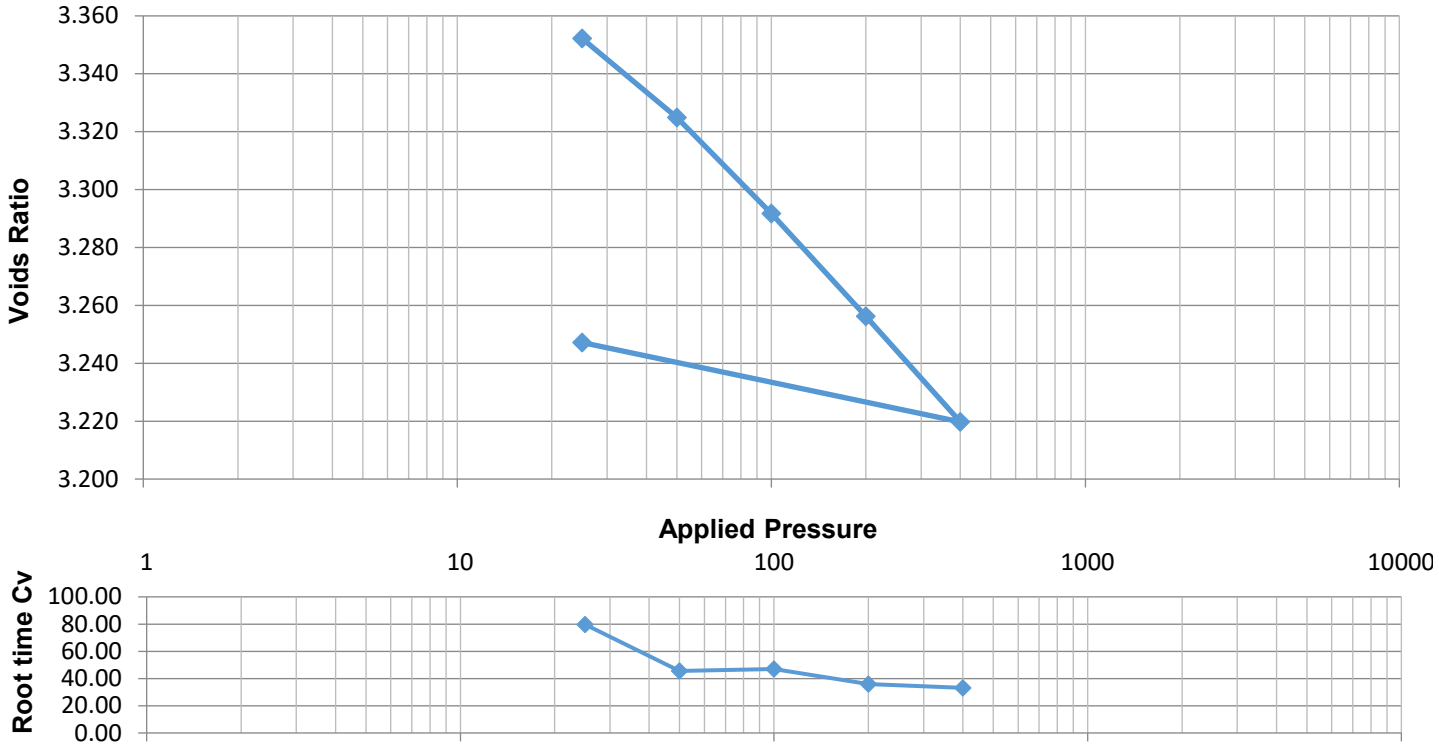
Specimen Location		Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
		Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.3	mm	Particle density	2.60	Ass
Diameter	70.0	mm	Initial void ratio	3.47	
Weight wet	154.9	g	Deg. of sat.	181	%
Water cont.*	241.0	%	Swell. press.	0	kN/m^2
Bulk Density	1.99	Mg/m^3	Dry density	0.58	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	19.75	3.352	1.01	20	79.67	79.68
2	50	19.62	3.325	0.25	20	45.59	45.59
3	100	19.47	3.292	0.15	20	46.91	47.10
4	200	19.31	3.256	0.08	20	35.90	36.05
5	400	19.15	3.220	0.04	20	33.16	33.00
6	25	19.27	3.247	0.02	20		
7							



Remarks/Abnormalities

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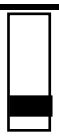
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 204 36.0-36.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435119	**DATE RECEIVED**	06-Mar-24
DATE TESTED	02-Apr-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

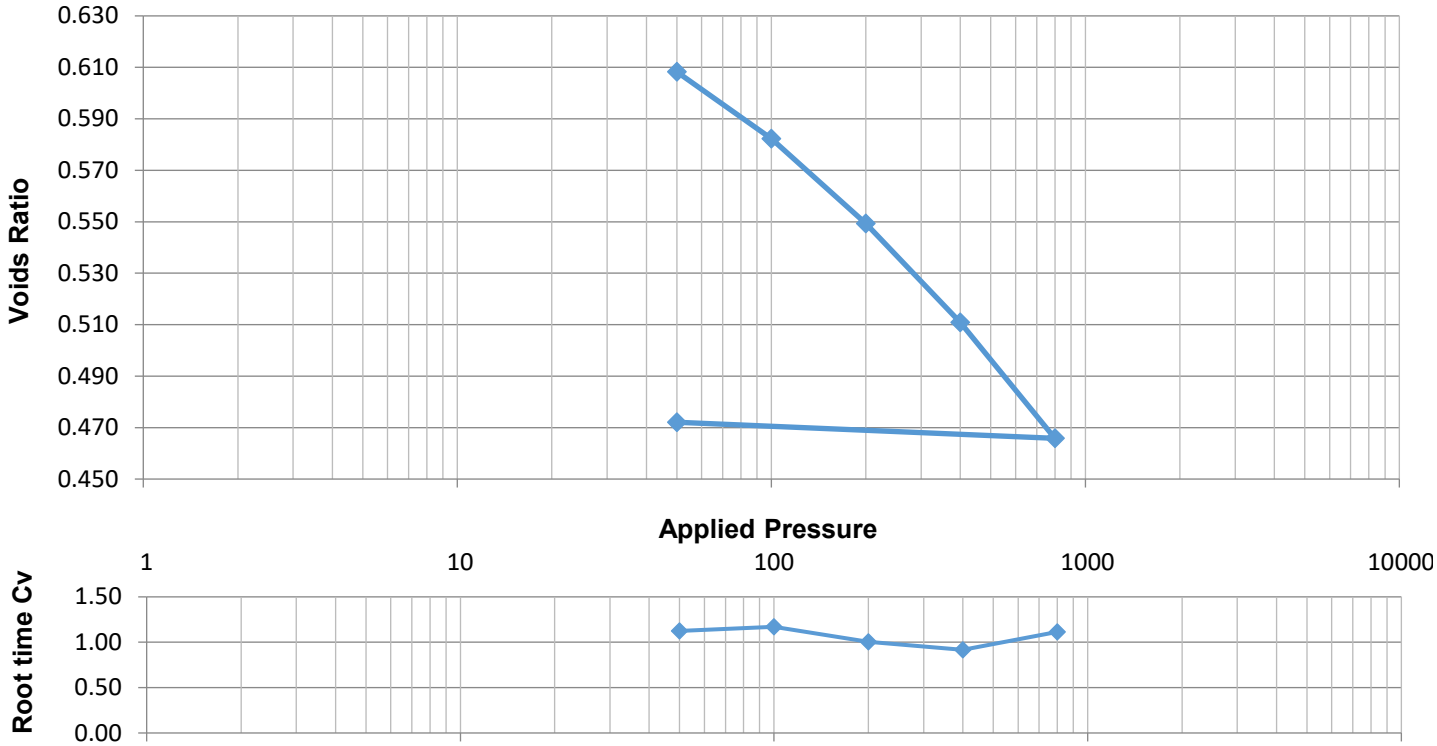
Specimen Location		Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
		Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.60	Ass
Diameter	70.0	mm	Initial void ratio	0.65	
Weight wet	150.7	g	Deg. of sat.	99	%
Water cont.*	24.9	%	Swell. press.	0	kN/m^2
Bulk Density	1.96	Mg/m^3	Dry density	1.57	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	50	19.40	0.608	0.55	20	1.12	0.94
2	100	19.09	0.582	0.32	20	1.17	0.87
3	200	18.69	0.549	0.21	20	1.01	0.73
4	400	18.23	0.511	0.12	20	0.92	0.76
5	800	17.69	0.466	0.07	20	1.11	0.99
6	50	17.76	0.472	0.01	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

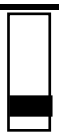
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 205 4.0-4.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435122	**DATE RECEIVED**	06-Mar-24
DATE TESTED	04-Apr-24	**SAMPLED BY**	Client
MATERIAL	Dark grey silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

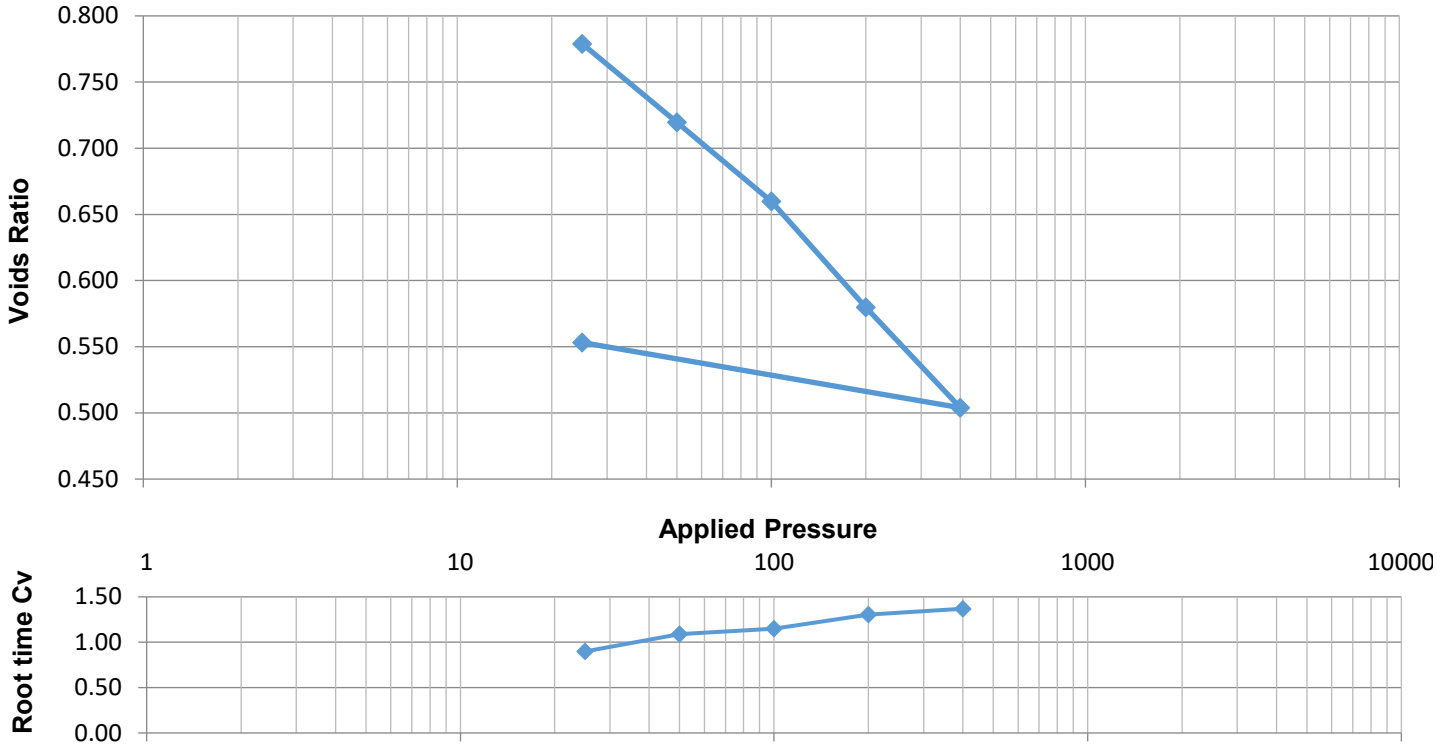
Specimen Location		Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
		Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.60	Ass
Diameter	69.7	mm	Initial void ratio	0.90	
Weight wet	133.9	g	Deg. of sat.	83	%
Water cont.*	28.9	%	Swell. press.	0	kN/m^2
Bulk Density	1.76	Mg/m^3	Dry density	1.37	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	18.64	0.779	2.63	20	0.90	1.19
2	50	18.02	0.720	1.34	20	1.09	0.95
3	100	17.39	0.660	0.69	20	1.15	1.03
4	200	16.55	0.580	0.48	20	1.30	1.20
5	400	15.76	0.504	0.24	20	1.37	1.41
6	25	16.27	0.553	0.09	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 205a 25.5-25.95m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435130	**DATE RECEIVED**	06-Mar-24
DATE TESTED	03-Apr-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

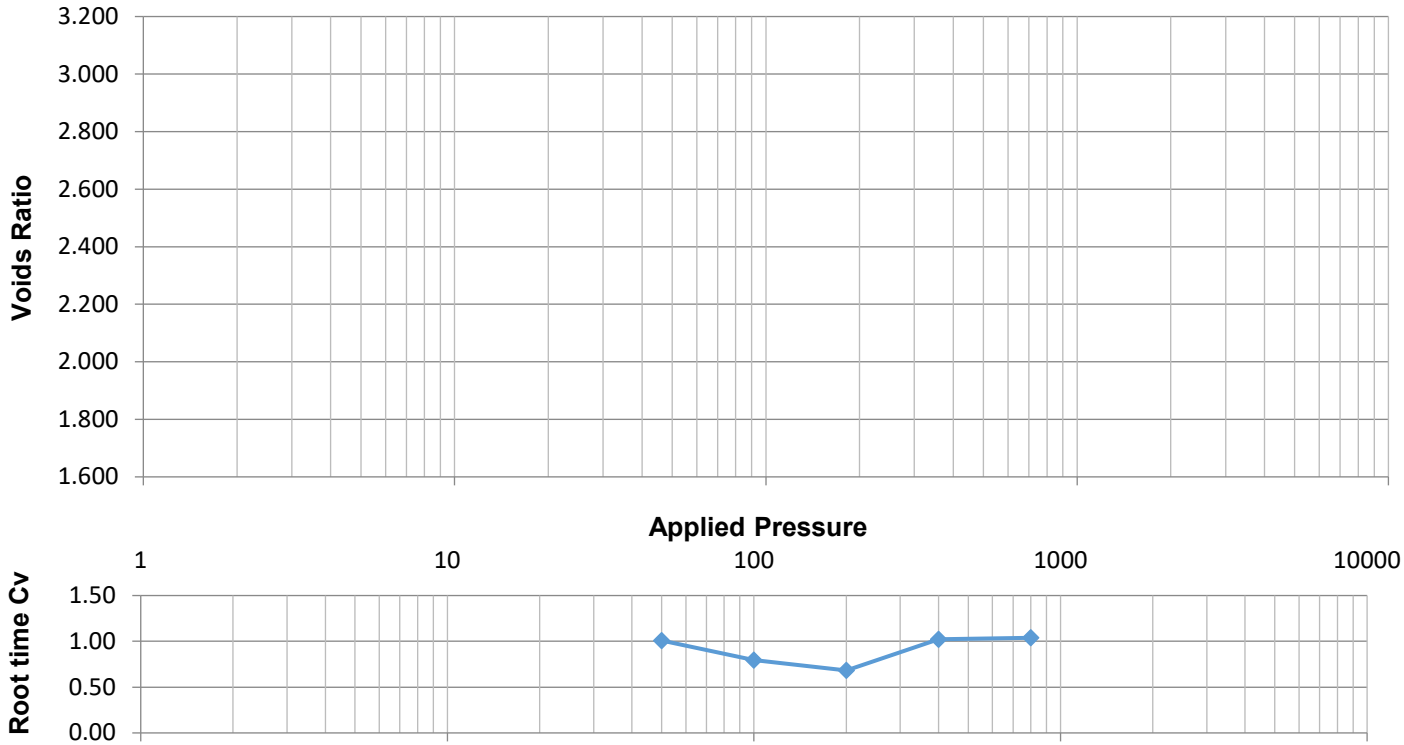
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	19.9	mm	Particle density	2.60	Ass.
Diameter	74.7	mm	Initial void ratio	0.43	
Weight wet	183.5	g	Deg. of sat.	92	%
Moist. cont.*	15.1	%	Swell. press.	0	kN/m2
Bulk Density	2.10	Mg/m3	Dry density	1.82	Mg/m3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m2/MN	Temp °C	Cv t90 root m2/yr	Cv t50 log m2/yr
1	50	19.54	0.398	0.38	20	1.01	0.63
2	100	18.92	0.354	0.63	20	0.79	0.74
3	200	18.56	0.328	0.19	20	0.68	0.76
4	400	18.14	0.298	0.11	20	1.02	0.93
5	800	17.64	0.262	0.07	20	1.04	1.17
6	50	18.16	0.300	0.04	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 205a 28.5-28.95m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435131	**DATE RECEIVED**	06-Mar-24
DATE TESTED	03-Apr-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

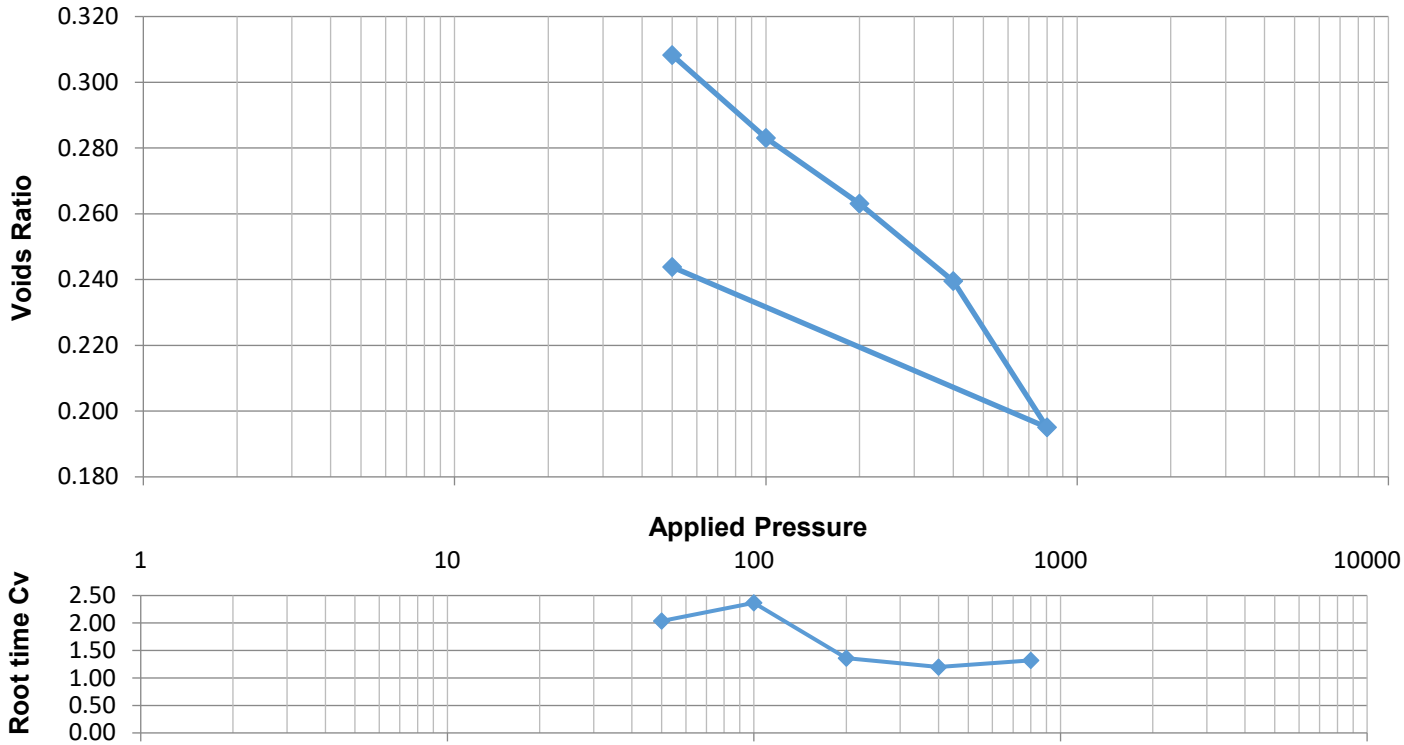
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.65	Ass.
Diameter	74.6	mm	Initial void ratio	0.38	
Weight wet	195.3	g	Deg. of sat.	112	%
Moist. cont.*	16.0	%	Swell. press.	0	kN/m2
Bulk Density	2.23	Mg/m3	Dry density	1.92	Mg/m3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m2/MN	Temp °C	Cv t90 root m2/yr	Cv t50 log m2/yr
1	50	19.00	0.308	1.02	20	2.04	3.88
2	100	18.63	0.283	0.39	20	2.37	1.73
3	200	18.34	0.263	0.16	20	1.36	1.50
4	400	18.00	0.240	0.09	20	1.20	1.26
5	800	17.35	0.195	0.09	20	1.32	1.43
6	50	18.06	0.244	0.05	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

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TEL 0161 475 0870

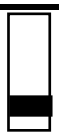
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 206 4.0-4.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435133	**DATE RECEIVED**	06-Mar-24
DATE TESTED	03-Apr-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

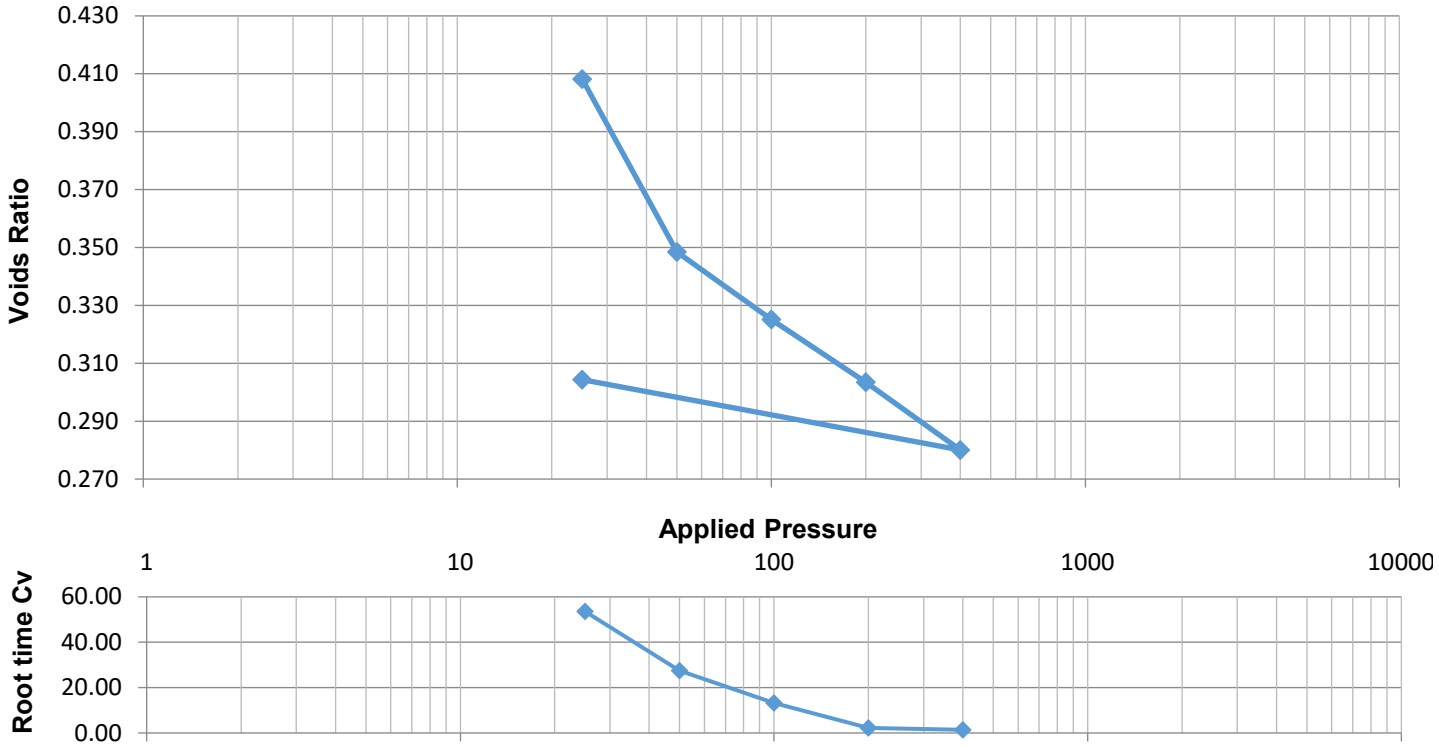
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.60	Ass
Diameter	69.7	mm	Initial void ratio	0.46	
Weight wet	158.4	g	Deg. of sat.	95	%
Water cont.*	16.6	%	Swell. press.	0	kN/m^2
Bulk Density	2.08	Mg/m^3	Dry density	1.79	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	25	19.29	0.408	1.32	20	53.54	53.87
2	50	18.47	0.348	1.70	20	27.45	27.97
3	100	18.15	0.325	0.35	20	13.23	12.32
4	200	17.86	0.303	0.16	20	2.25	1.22
5	400	17.54	0.280	0.09	20	1.39	1.28
6	25	17.87	0.304	0.05	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 206 9.0-9.45m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435134	**DATE RECEIVED**	06-Mar-24
DATE TESTED	03-Apr-24	**SAMPLED BY**	Client
MATERIAL	Dark brown clayey PEAT		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

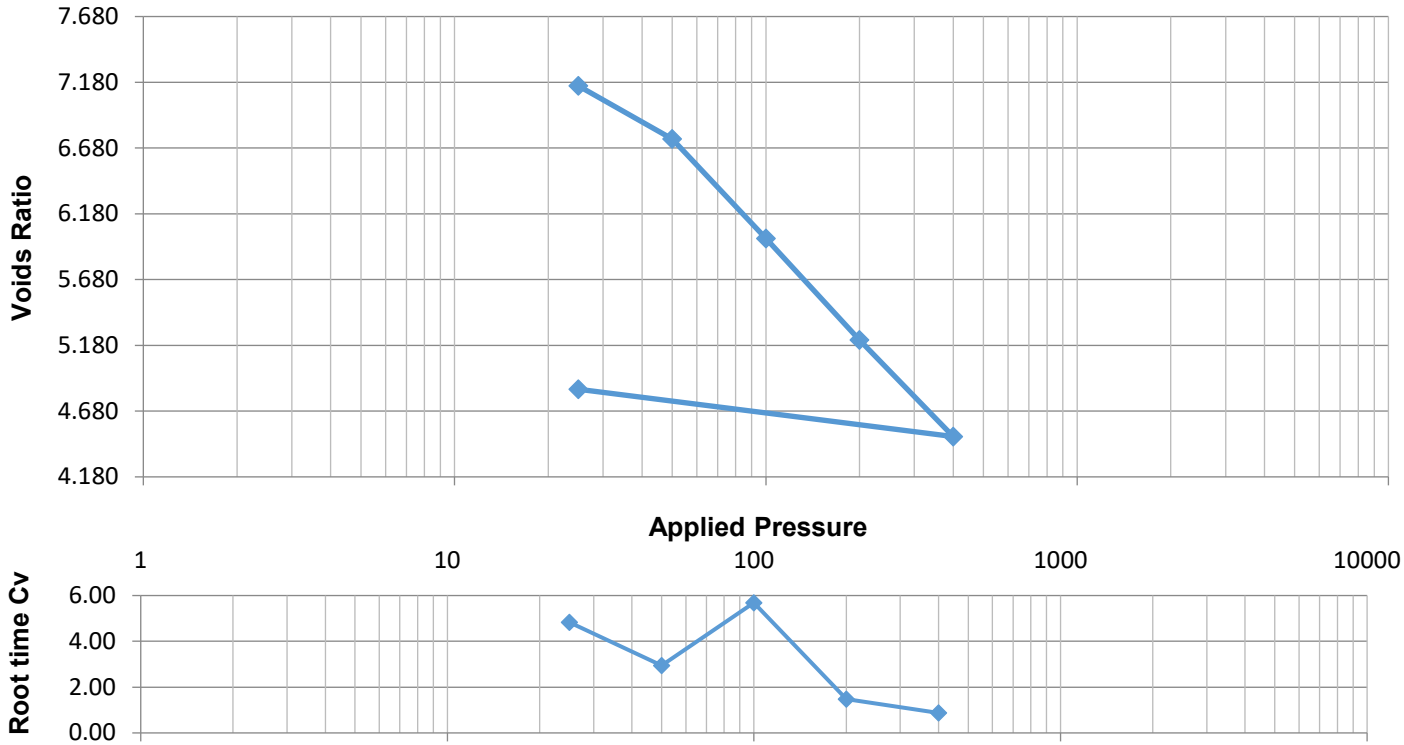
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.2	mm	Particle density	2.00	Ass.
Diameter	74.6	mm	Initial void ratio	7.50	
Weight wet	87.9	g	Deg. of sat.	86	%
Moist. cont.*	322.7	%	Swell. press.	0	kN/m2
Bulk Density	0.99	Mg/m3	Dry density	0.24	Mg/m3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m2/MN	Temp °C	Cv t90 root m2/yr	Cv t50 log m2/yr
1	25	19.37	7.152	1.64	20	4.83	5.28
2	50	18.41	6.748	1.98	20	2.95	2.36
3	100	16.61	5.992	1.95	20	5.68	4.96
4	200	14.78	5.221	1.10	20	1.48	1.56
5	400	13.04	4.487	0.59	20	0.87	0.92
6	25	13.89	4.847	0.18	20		
7							



Remarks/Abnormalities

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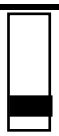
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 206 22.5-22.95m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435135	**DATE RECEIVED**	06-Mar-24
DATE TESTED	04-Apr-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

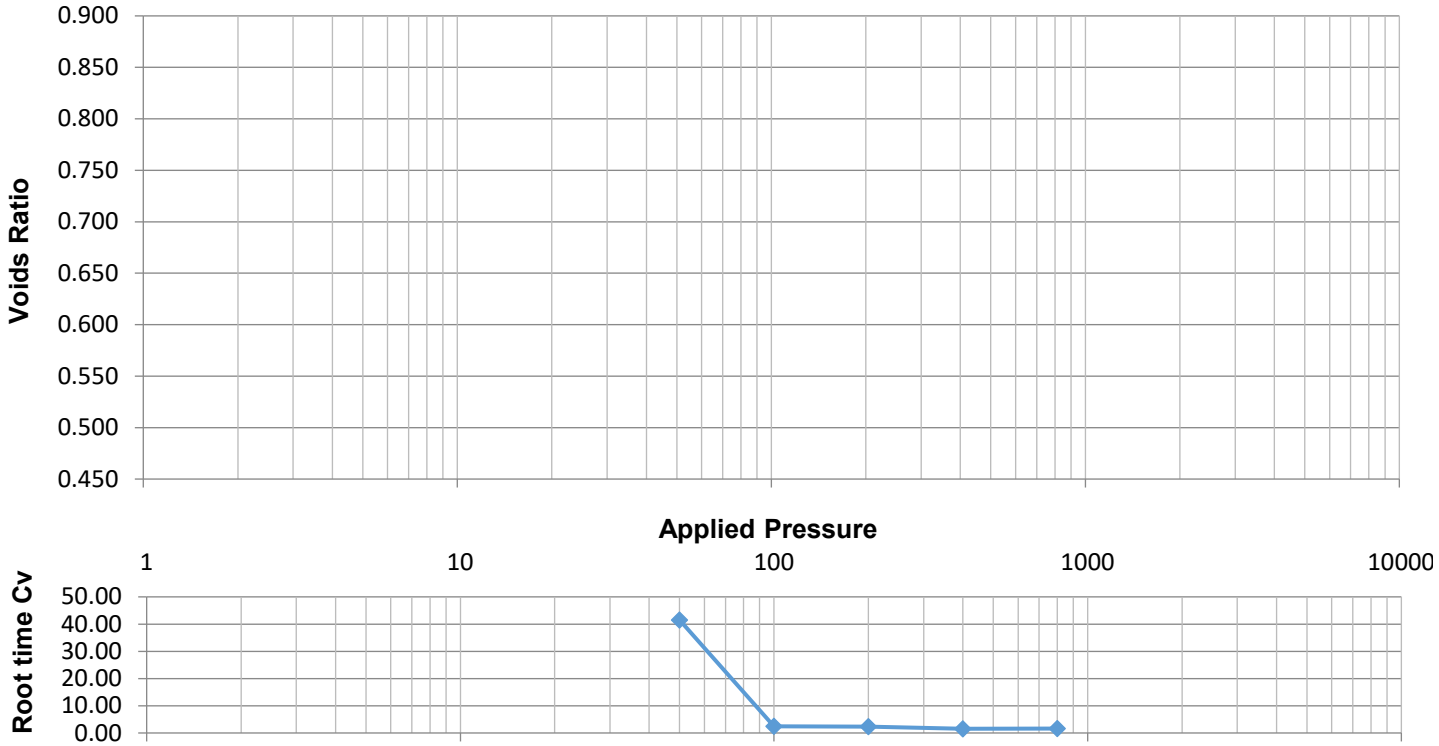
Specimen Location		Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
		Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.1	mm	Particle density	2.65	Ass
Diameter	70.1	mm	Initial void ratio	0.37	
Weight wet	174.3	g	Deg. of sat.	118	%
Water cont.*	16.4	%	Swell. press.	0	kN/m^2
Bulk Density	2.25	Mg/m^3	Dry density	1.94	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	50	19.61	0.338	0.44	20	41.50	40.75
2	100	19.36	0.321	0.26	20	2.47	1.16
3	200	19.11	0.304	0.13	20	2.33	1.42
4	400	18.82	0.284	0.08	20	1.55	1.42
5	800	18.47	0.260	0.05	20	1.64	1.65
6	50	18.84	0.285	0.03	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 18 April 2024

MURRAY RIX

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TEL 0161 475 0870

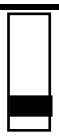
UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	Ayesa
SITE	Protos Carbon Capture Site Investigation
JOB NUMBER	MRN 24097/6

SAMPLE LABEL	BH 206 28.5-28.95m U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	435136	**DATE RECEIVED**	06-Mar-24
DATE TESTED	02-Apr-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location 

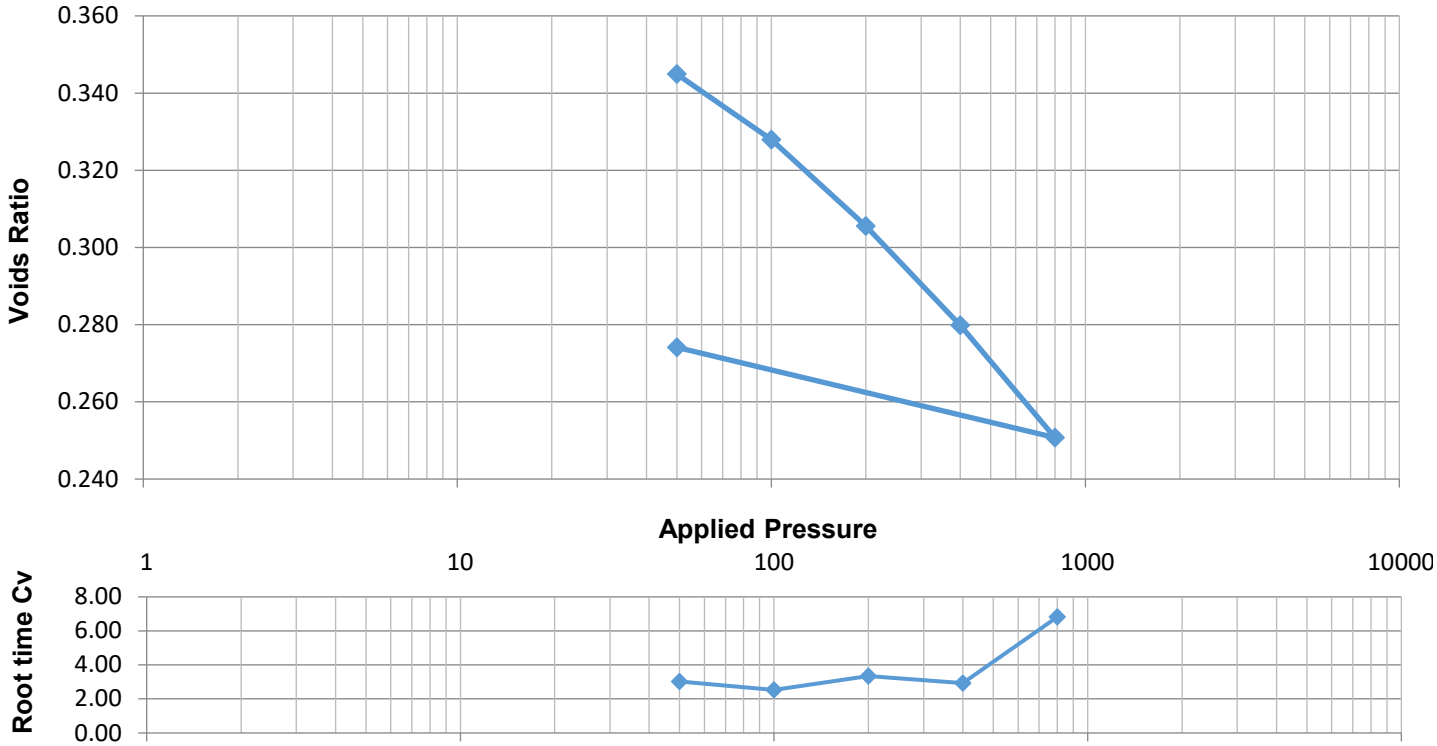
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	350
Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS

Height	20.2	mm	Particle density	2.68	Ass
Diameter	70.0	mm	Initial void ratio	0.40	
Weight wet	175.0	g	Deg. of sat.	117	%
Water cont.*	17.4	%	Swell. press.	0	kN/m^2
Bulk Density	2.25	Mg/m^3	Dry density	1.92	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	50	19.43	0.345	0.76	20	3.03	2.04
2	100	19.18	0.328	0.25	20	2.53	1.64
3	200	18.86	0.306	0.17	20	3.35	2.59
4	400	18.49	0.280	0.10	20	2.94	3.49
5	800	18.07	0.251	0.06	20	6.82	6.29
6	50	18.40	0.274	0.02	20		
7							



Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed  Date 18 April 2024

Appendix H – Geo-environmental Laboratory Testing Results

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ByrneLooby Partners (UK) Ltd
104 Mere Grange
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St. Helens
Merseyside

t: (01925) 291111

e: hannahplunkett@ayesa.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-001377

Project / Site name:	Protos CC	**Samples received on:**	05/02/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	05/02/2024
Your order number:	143175	**Analysis completed by:**	12/02/2024
Report Issue Number:	1	**Report issued on:**	12/02/2024
Samples Analysed:	11 soil samples		

Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108850	108851	108852	108853	108854
Sample Reference				BH203	BH203	BH207	BH207	TP212
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	1.50	0.10
Date Sampled				30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	38	17	24	23
Total mass of sample received	kg	0.1	NONE	0.8	0.7	1	1	0.8
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MWI	MWI	MWI	MWI	MWI
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.5	7.2	8.6	8.3	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	23	1100	45	93	63
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	11.6	530	22.2	46.5	31.4
Organic Matter (automated)	%	0.1	MCERTS	1.5	7.3	0.5	1.3	4.1
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.9	4.2	0.3	0.7	2.4
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.24	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.14	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.16	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.12	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.06	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	0.81	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108850	108851	108852	108853	108854
Sample Reference				BH203	BH203	BH207	BH207	TP212
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	1.50	0.10
Date Sampled				30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	21000	23000	6500	19000	15000
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	13	5.9	8.7	11
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.3	0.38	1	0.87
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	11	0.2	1.4	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	36	34	15	34	31
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	34	15	34	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	25	5	11	23
Iron (aqua regia extractable)	mg/kg	40	MCERTS	40000	32000	15000	38000	26000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	49	7.7	19	33
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	28	13	30	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	45	42	18	42	39
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	75	77	31	65	85
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0	2.2	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0	12	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	16	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	34	< 8.0	< 8.0	16
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	2.2
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	13	< 10	< 10	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	< 10	97	< 10	< 10	39
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	< 10	97	< 10	< 10	39

Analytical Report Number: 24-001377
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Lab Sample Number				108850	108851	108852	108853	108854
Sample Reference				BH203	BH203	BH207	BH207	TP212
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	1.50	0.10
Date Sampled				30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
Bromoform	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0##	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108850	108851	108852	108853	108854
Sample Reference				BH203	BH203	BH207	BH207	TP212
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	1.50	0.10
Date Sampled				30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108850	108851	108852	108853	108854
Sample Reference				BH203	BH203	BH207	BH207	TP212
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	1.50	0.10
Date Sampled				30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	< 0.007	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108855	108856	108857	108858	108859
Sample Reference				TP214	TP215	TP216	TP216	TP217
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.10	0.30	0.15
Date Sampled				29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	27	21	20	20	24
Total mass of sample received	kg	0.1	NONE	0.7	0.7	0.8	0.7	0.8
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MWI	MWI	MWI	MWI	MWI
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	7.7	7.4	8.2	8.4	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	60	71	42	27
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	55.6	30.1	35.7	21.2	13.3
Organic Matter (automated)	%	0.1	MCERTS	4.9	3.2	1	0.6	3.6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.8	1.9	0.6	0.4	2.1
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108855	108856	108857	108858	108859
Sample Reference				TP214	TP215	TP216	TP216	TP217
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.10	0.30	0.15
Date Sampled				29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	22000	16000	9300	11000	17000
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	12	8	8.3	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2	0.92	0.62	0.58	0.93
Boron (water soluble)	mg/kg	0.2	MCERTS	3.4	2	0.6	0.7	1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	40	31	21	19	31
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	40	31	21	19	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32	21	9.7	13	21
Iron (aqua regia extractable)	mg/kg	40	MCERTS	36000	28000	21000	25000	28000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	29	12	12	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	29	20	18	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	52	39	27	25	43
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	84	44	41	88
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	16	< 8.0	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	73	< 8.0	< 8.0	< 8.0	< 8.0
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	12	< 10	< 10	< 10	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	140	< 10	< 10	< 10	< 10
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	140	< 10	< 10	< 10	< 10

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108855	108856	108857	108858	108859
Sample Reference				TP214	TP215	TP216	TP216	TP217
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.10	0.30	0.15
Date Sampled				29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
Bromoform	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	NONE	< 5.0#	< 5.0#	< 5.0#	< 5.0#	< 5.0#
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108855	108856	108857	108858	108859
Sample Reference				TP214	TP215	TP216	TP216	TP217
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.10	0.30	0.15
Date Sampled				29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108855	108856	108857	108858	108859
Sample Reference				TP214	TP215	TP216	TP216	TP217
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.10	0.30	0.15
Date Sampled				29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108860
Sample Reference				TP213
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				01/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	21
Total mass of sample received	kg	0.1	NONE	1
Asbestos				
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MWI
General Inorganics				
pH (L099)	pH Units	N/A	MCERTS	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	32
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	16.2
Organic Matter (automated)	%	0.1	MCERTS	3.2
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.9
Total Phenols				
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
Speciated PAHs				
Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05
Total PAH				
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108860
Sample Reference				TP213
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				01/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	20000
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (III)	mg/kg	1	NONE	39
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	39
Copper (aqua regia extractable)	mg/kg	1	MCERTS	25
Iron (aqua regia extractable)	mg/kg	40	MCERTS	37000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	38
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	52
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100
Petroleum Hydrocarbons				
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	< 10
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	< 10

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108860
Sample Reference				TP213
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				01/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
VOCs				
Chloromethane	µg/kg	5	ISO 17025	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	< 5.0
Chloroform	µg/kg	5	ISO 17025	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0
Styrene	µg/kg	5	NONE	< 5.0#
Bromoform	µg/kg	5	NONE	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0
Isopropylbenzene	µg/kg	5	NONE	< 5.0#
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0
n-Propylbenzene	µg/kg	5	NONE	< 5.0#
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108860
Sample Reference				TP213
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				01/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3

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Analytical Report Number: 24-001377
Project / Site name: Protos CC
Your Order No: 143175

Lab Sample Number				108860
Sample Reference				TP213
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				01/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
PCBs by GC-MS				
PCB Congener 28	mg/kg	0.001	MCERTS	-
PCB Congener 52	mg/kg	0.001	MCERTS	-
PCB Congener 101	mg/kg	0.001	MCERTS	-
PCB Congener 118	mg/kg	0.001	MCERTS	-
PCB Congener 138	mg/kg	0.001	MCERTS	-
PCB Congener 153	mg/kg	0.001	MCERTS	-
PCB Congener 180	mg/kg	0.001	MCERTS	-
Total PCBs	mg/kg	0.007	MCERTS	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-001377
Project / Site name: Protos CC

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
108850	BH203	None Supplied	0.5	Brown clay and sand
108851	BH203	None Supplied	1.5	Brown clay and loam with peat and vegetation
108852	BH207	None Supplied	0.5	Brown sand with vegetation
108853	BH207	None Supplied	1.5	Brown clay
108854	TP212	None Supplied	0.1	Brown clay and loam with gravel and vegetation
108855	TP214	None Supplied	0.2	Brown clay and loam with gravel and vegetation
108856	TP215	None Supplied	0.1	Brown clay and loam with gravel and vegetation
108857	TP216	None Supplied	0.1	Brown clay and sand
108858	TP216	None Supplied	0.3	Brown clay and sand
108859	TP217	None Supplied	0.15	Brown clay and loam with gravel and vegetation
108860	TP213	None Supplied	0.2	Brown clay and loam with gravel and vegetation

Analytical Report Number : 24-001377
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE

Analytical Report Number : 24-001377
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised

- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised

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Analytical Report Number : 24-002442

Project / Site name:	Protos CC	**Samples received on:**	09/02/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	09/02/2024
Your order number:	143189	**Analysis completed by:**	15/02/2024
Report Issue Number:	1	**Report issued on:**	18/02/2024
Samples Analysed:	3 soil samples		

Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-002442
Project / Site name: Protos CC
Your Order No: 143189

Lab Sample Number				114155	114156	114157
Sample Reference				BH202	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.50
Date Sampled				07/02/2024	07/02/2024	07/02/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	27	20	82
Total mass of sample received	kg	0.1	NONE	1.6	1.7	1.6
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSA	DSA	DSA
General Inorganics						
pH (L099)	pH Units	N/A	MCERTS	7.8	8.3	U/S**
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	52	110	1200
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	25.7	52.7	623
Organic Matter (automated)	%	0.1	MCERTS	3.2	1.4	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.9	0.8	-
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	16
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.08
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.14
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 24-002442
Project / Site name: Protos CC
Your Order No: 143189

Lab Sample Number				114155	114156	114157
Sample Reference				BH202	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.50
Date Sampled				07/02/2024	07/02/2024	07/02/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	22000	17000	3900
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	14	3.6
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	0.96	0.25
Boron (water soluble)	mg/kg	0.2	MCERTS	4.1	1.8	270
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	U/S^^
Chromium (III)	mg/kg	1	NONE	37	30	U/S^^
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	37	30	8.3
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	13	5
Iron (aqua regia extractable)	mg/kg	40	MCERTS	38000	35000	8600
Lead (aqua regia extractable)	mg/kg	1	MCERTS	36	20	4.9
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	35	28	8.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	41	11
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	92	62	16
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	< 8.0	61
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	58
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10	< 10	28
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	< 10	< 10	200
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	< 10	< 10	200

Analytical Report Number: 24-002442
Project / Site name: Protos CC
Your Order No: 143189

Lab Sample Number				114155	114156	114157
Sample Reference				BH202	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.50
Date Sampled				07/02/2024	07/02/2024	07/02/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Chloroform	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0##	< 5.0##	< 5.0##
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0##	< 5.0##	< 5.0##
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Bromoform	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-002442
Project / Site name: Protos CC
Your Order No: 143189

Lab Sample Number				114155	114156	114157
Sample Reference				BH202	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.50
Date Sampled				07/02/2024	07/02/2024	07/02/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0
SVOCs						
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3

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Analytical Report Number: 24-002442
Project / Site name: Protos CC
Your Order No: 143189

Lab Sample Number				114155	114156	114157
Sample Reference				BH202	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.50
Date Sampled				07/02/2024	07/02/2024	07/02/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
PCBs by GC-MS						
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	-
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-002442
Project / Site name: Protos CC

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
114155	BH202	None Supplied	0.2	Brown clay and loam with gravel and vegetation
114156	BH204	None Supplied	0.5	Brown clay and sand with gravel
114157	BH204	None Supplied	1.5	Black loam and clay with vegetation and peat

Analytical Report Number : 24-002442
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L023B	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS

Analytical Report Number : 24-002442
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

**U/S - Unsuitable for analysis, sample absorbed all water used for extraction
^^U/S - Unsuitable for analysis due to sample matrix
- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised

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Analytical Report Number : 24-003121

Project / Site name:	Protos CC	**Samples received on:**	13/02/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	15/02/2024
Your order number:	143201	**Analysis completed by:**	20/02/2024
Report Issue Number:	1	**Report issued on:**	20/02/2024
Samples Analysed:	10:1 WAC sample		

Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117501				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	TP216				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.20						
Solid Waste Analysis							
TOC (%)**	2.4				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00828			0.0828	0.5	2	25
Barium *	0.00601			0.0601	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0014			0.014	0.5	10	70
Copper *	0.023			0.23	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0197			0.197	0.5	10	30
Nickel *	0.0012			0.012	0.4	10	40
Lead *	0.0032			0.032	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.013			0.13	4	50	200
Chloride *	98			980	800	15000	25000
Fluoride*	0.69			6.9	10	150	500
Sulphate *	26			260	1000	20000	50000
TDS*	260			2600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	55.7			557	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.8						
Dry Matter (%)	67						
Moisture (%)	33						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

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** = MCERTS accredited

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117502				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	TP217				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.40						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0136			0.136	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0058			0.058	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.000583			0.00583	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	0.0021			0.021	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0038			0.038	4	50	200
Chloride *	5.4			54	800	15000	25000
Fluoride*	0.38			3.8	10	150	500
Sulphate *	2.2			22	1000	20000	50000
TDS*	57			570	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	9.97			99.7	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.8						
Dry Matter (%)	77						
Moisture (%)	23						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117503				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	TP213				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.70						
Solid Waste Analysis							
TOC (%)**	0.9				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00261			0.0261	0.5	2	25
Barium *	0.00453			0.0453	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00047			0.0047	0.5	10	70
Copper *	0.0053			0.053	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00163			0.0163	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	0.0029			0.029	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0050			0.050	4	50	200
Chloride *	0.78			7.8	800	15000	25000
Fluoride*	0.62			6.2	10	150	500
Sulphate *	1.6			16	1000	20000	50000
TDS*	47			470	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	10.2			102	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.8						
Dry Matter (%)	74						
Moisture (%)	26						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117504				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	BH202				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	3.8				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00435			0.0435	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00046			0.0046	0.5	10	70
Copper *	0.0085			0.085	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0151			0.151	0.5	10	30
Nickel *	0.0026			0.026	0.4	10	40
Lead *	0.0029			0.029	0.5	10	50
Antimony *	0.0036			0.036	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0051			0.051	4	50	200
Chloride *	13			130	800	15000	25000
Fluoride*	0.53			5.3	10	150	500
Sulphate *	65			650	1000	20000	50000
TDS*	130			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	99.9			999	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	64						
Moisture (%)	36						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117505				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH204						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	2.0				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00106			0.0106	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0024			0.024	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.000727			0.00727	0.5	10	30
Nickel *	0.0014			0.014	0.4	10	40
Lead *	0.0028			0.028	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0031			0.031	4	50	200
Chloride *	15			150	800	15000	25000
Fluoride*	0.84			8.4	10	150	500
Sulphate *	18			180	1000	20000	50000
TDS*	96			960	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	90.1			901	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	61						
Moisture (%)	39						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117506				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	BH203				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	1.9				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00276			0.0276	0.5	2	25
Barium *	0.00679			0.0679	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0023			0.023	0.5	10	70
Copper *	0.0037			0.037	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	0.0017			0.017	0.4	10	40
Lead *	0.0034			0.034	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0030			0.030	4	50	200
Chloride *	5.4			54	800	15000	25000
Fluoride*	0.67			6.7	10	150	500
Sulphate *	9.8			98	1000	20000	50000
TDS*	68			680	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	33.4			334	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	71						
Moisture (%)	29						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117507				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	BH207				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00182			0.0182	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0016			0.016	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00216			0.0216	0.5	10	30
Nickel *	0.00081			0.0081	0.4	10	40
Lead *	0.0023			0.023	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0025			0.025	4	50	200
Chloride *	20			200	800	15000	25000
Fluoride*	0.71			7.1	10	150	500
Sulphate *	2.7			27	1000	20000	50000
TDS*	81			810	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	12.0			120	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	78						
Moisture (%)	22						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

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** = MCERTS accredited

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117508				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP212						
Depth (m)	0.40						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00294			0.0294	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0072			0.072	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	0.0033			0.033	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0047			0.047	4	50	200
Chloride *	13			130	800	15000	25000
Fluoride*	0.32			3.2	10	150	500
Sulphate *	2.2			22	1000	20000	50000
TDS*	64			640	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	11.1			111	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	82						
Moisture (%)	18						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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** = MCERTS accredited

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117509				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP214						
Depth (m)	0.40						
Solid Waste Analysis							
TOC (%)**	0.6				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00261			0.0261	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0043			0.043	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	0.0011			0.011	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0047			0.047	4	50	200
Chloride *	5.6			56	800	15000	25000
Fluoride*	0.48			4.8	10	150	500
Sulphate *	6.6			66	1000	20000	50000
TDS*	52			520	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	9.37			93.7	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	82						
Moisture (%)	18						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-003121**						
					Client:	**BYRNELOO**	
Location	**Protos CC**						
Lab Reference (Sample Number)	117510				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/01/2024						
Sample ID	TP215				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.40						
Solid Waste Analysis							
TOC (%)**	0.7				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00107			0.0107	0.5	2	25
Barium *	0.00824			0.0824	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0032			0.032	0.5	10	70
Copper *	0.0013			0.013	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00164			0.0164	0.5	10	30
Nickel *	0.0014			0.014	0.4	10	40
Lead *	0.0031			0.031	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0049			0.049	4	50	200
Chloride *	3.7			37	800	15000	25000
Fluoride*	0.69			6.9	10	150	500
Sulphate *	3.1			31	1000	20000	50000
TDS*	36			360	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	34.4			344	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	80						
Moisture (%)	20						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

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Analytical Report Number : 24-003121
Project / Site name: Protos CC

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
117501	TP216	None Supplied	1.2	Brown clay
117502	TP217	None Supplied	0.4	Brown clay and sand
117503	TP213	None Supplied	0.7	Brown clay and sand
117504	BH202	None Supplied	1	Brown clay
117505	BH204	None Supplied	1	Brown clay
117506	BH203	None Supplied	1	Brown clay
117507	BH207	None Supplied	1	Brown clay and sand
117508	TP212	None Supplied	0.4	Brown sandy clay
117509	TP214	None Supplied	0.4	Brown sandy clay
117510	TP215	None Supplied	0.4	Brown sandy clay

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Analytical Report Number : 24-003121
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
WAC Leachate 10:1		In-house method	L043B	W	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Sample Deviation Report

Analytical Report Number : 24-003121
Project / Site name: Protos CC

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH202	N/A	S	117504	c	BTEX and/or Volatile organic compounds in soil	L073B	c
BH202	N/A	S	117504	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
BH203	N/A	S	117506	c	BTEX and/or Volatile organic compounds in soil	L073B	c
BH203	N/A	S	117506	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
BH204	N/A	S	117505	c	BTEX and/or Volatile organic compounds in soil	L073B	c
BH204	N/A	S	117505	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
BH207	N/A	S	117507	c	BTEX and/or Volatile organic compounds in soil	L073B	c
BH207	N/A	S	117507	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP212	N/A	S	117508	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP212	N/A	S	117508	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP213	N/A	S	117503	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP213	N/A	S	117503	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP214	N/A	S	117509	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP214	N/A	S	117509	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP215	N/A	S	117510	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP215	N/A	S	117510	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP216	N/A	S	117501	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP216	N/A	S	117501	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c
TP217	N/A	S	117502	c	BTEX and/or Volatile organic compounds in soil	L073B	c
TP217	N/A	S	117502	c	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	c

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Analytical Report Number : 24-004506

Project / Site name:	Protos CC	**Samples received on:**	21/02/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	21/02/2024
Your order number:	143218	**Analysis completed by:**	27/02/2024
Report Issue Number:	1	**Report issued on:**	28/02/2024
Samples Analysed:	6 soil samples		

Izabela Wójcik

Signed:

Izabela Wójcik
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123683	123684	123685	123686	123687
Sample Reference				BH205	BH205	BH206	BH206	BH205a
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	1.00	0.30
Date Sampled				14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	23	24	22	26	23
Total mass of sample received	kg	0.1	NONE	1.1	1.2	1.2	1	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SPU	SPU	SPU	SPU	SPU
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.2	7.9	7.9	7.9	7.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	27	28	62	49	57
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	13.3	13.8	31.2	24.4	28.5
Organic Matter (automated)	%	0.1	MCERTS	1.1	1	2.4	2.3	4
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	0.6	1.4	1.4	2.3
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123683	123684	123685	123686	123687
Sample Reference				BH205	BH205	BH206	BH206	BH205a
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	1.00	0.30
Date Sampled				14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	15000	7100	21000	22000	14000
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	6.9	13	13	11
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.78	0.43	1.1	1.2	0.71
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.2	1.1	2.5	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	29	16	36	39	25
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	16	36	39	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	6.9	15	18	21
Iron (aqua regia extractable)	mg/kg	40	MCERTS	30000	16000	37000	38000	22000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	12	27	29	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	14	31	33	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36	20	47	50	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63	36	81	100	87
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
VOCs								
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0##	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123683	123684	123685	123686	123687
Sample Reference				BH205	BH205	BH206	BH206	BH205a
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	1.00	0.30
Date Sampled				14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0#	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0#	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0^	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0^	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0#	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0#	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromoform	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123683	123684	123685	123686	123687
Sample Reference				BH205	BH205	BH206	BH206	BH205a
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	1.00	0.30
Date Sampled				14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number	123688
Sample Reference	BH205a
Sample Number	None Supplied
Depth (m)	0.50
Date Sampled	14/02/2024
Time Taken	None Supplied

Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	27
Total mass of sample received	kg	0.1	NONE	0.8

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SPU

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	66
Water Soluble SO4 16hr extraction (2:1)	mg/l	1.25	MCERTS	33
Organic Matter (automated)	%	0.1	MCERTS	6.9
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	4

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123688
Sample Reference				BH205a
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				14/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	19000
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.99
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (III)	mg/kg	1	NONE	33
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29
Iron (aqua regia extractable)	mg/kg	40	MCERTS	31000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	43
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	45
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110
Petroleum Hydrocarbons				
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR_#1_#2	mg/kg	10	NONE	< 10
TPH (>C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0
TPH Total >C5 - C40 EH_CU+HS_1D_TOTAL_#1_#2	mg/kg	10	NONE	< 10
TPH (C10 - C40) EH_CU_1D_TOTAL_#1_#2	mg/kg	10	MCERTS	< 10
VOCs				
Chloromethane	µg/kg	5	ISO 17025	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123688
Sample Reference				BH205a
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				14/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
2,2-Dichloropropane	µg/kg	5	NONE	#
Chloroform	µg/kg	5	ISO 17025	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0
Carbontetrachloride	µg/kg	5	NONE	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0
Bromoform	µg/kg	5	NONE	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	NONE	< 5.0
Bromobenzene	µg/kg	5	NONE	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1

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Analytical Report Number: 24-004506
Project / Site name: Protos CC
Your Order No: 143218

Lab Sample Number				123688
Sample Reference				BH205a
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				14/02/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2
Azobenzene	mg/kg	0.3	NONE	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2
Hexachlorobenzene	mg/kg	0.2	MCERTS	< 0.20
Carbazole	mg/kg	0.3	MCERTS	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-004506
Project / Site name: Protos CC

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
123683	BH205	None Supplied	0.5	Brown sand with vegetation
123684	BH205	None Supplied	1	Brown sand with vegetation
123685	BH206	None Supplied	0.5	Brown clay and sand with vegetation
123686	BH206	None Supplied	1	Brown clay
123687	BH205a	None Supplied	0.3	Brown loam with vegetation
123688	BH205a	None Supplied	0.5	Brown loam with vegetation

Analytical Report Number : 24-004506
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS

Analytical Report Number : 24-004506
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised
- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised
^ - Data reported unaccredited due to quality control parameter failure associated with this result; The result should be considered as being deviating and may be compromised

Sample Deviation Report

Analytical Report Number : 24-004506
Project / Site name: Protos CC

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH205	N/A	S	123683	c	Complex Cyanide in soil	L080	c
BH205	N/A	S	123683	c	Free cyanide in soil	L080	c
BH205	N/A	S	123683	c	Total cyanide in soil	L080	c
BH205	N/A	S	123684	c	Complex Cyanide in soil	L080	c
BH205	N/A	S	123684	c	Free cyanide in soil	L080	c
BH205	N/A	S	123684	c	Total cyanide in soil	L080	c
BH205a	N/A	S	123687	c	Complex Cyanide in soil	L080	c
BH205a	N/A	S	123687	c	Free cyanide in soil	L080	c
BH205a	N/A	S	123687	c	Total cyanide in soil	L080	c
BH205a	N/A	S	123688	c	Complex Cyanide in soil	L080	c
BH205a	N/A	S	123688	c	Free cyanide in soil	L080	c
BH205a	N/A	S	123688	c	Total cyanide in soil	L080	c
BH206	N/A	S	123685	c	Complex Cyanide in soil	L080	c
BH206	N/A	S	123685	c	Free cyanide in soil	L080	c
BH206	N/A	S	123685	c	Total cyanide in soil	L080	c
BH206	N/A	S	123686	c	Complex Cyanide in soil	L080	c
BH206	N/A	S	123686	c	Free cyanide in soil	L080	c
BH206	N/A	S	123686	c	Total cyanide in soil	L080	c

UKAS TESTING
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Analytical Report Number : 24-007295

Project / Site name:	Protos CC	**Samples received on:**	05/03/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	06/03/2024
Your order number:	PO143264	**Analysis completed by:**	14/03/2024
Report Issue Number:	1	**Report issued on:**	15/03/2024
Samples Analysed:	3 water samples		

Signed:

Dominika Liana
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-007295
Project / Site name: Protos CC

Your Order No: PO143264

Lab Sample Number				136574	136575	136576
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				04/03/2024	04/03/2024	04/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
General Inorganics						
pH (L099)	pH Units	N/A	ISO 17025	7.9	8.3	8.2
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Sulphate as SO4	mg/l	0.045	ISO 17025	25.1	26.7	28.7
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	1700$$	65	390
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	16000	66	4500
Nitrate as N	mg/l	0.01	ISO 17025	0.06	< 0.01	< 0.01
Nitrate as NO3	mg/l	0.05	ISO 17025	0.26	< 0.05	< 0.05
Hardness - Total	mgCaCO3/l	1	ISO 17025	679	182	343
Total Phenols						
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10
Speciated PAHs						
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Total PAH						
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-007295
Project / Site name: Protos CC

Your Order No: PO143264

Lab Sample Number				136574	136575	136576
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				04/03/2024	04/03/2024	04/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (dissolved)	µg/l	0.15	ISO 17025	4.14	19.7	2.91
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.7	1.2	0.3
Copper (dissolved)	µg/l	0.5	ISO 17025	0.6	0.5	< 0.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	2	< 0.5	< 0.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	8.8	< 0.6	2.1
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.7	4.9	0.4
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.6	3.5	1.5
Boron (dissolved)	µg/l	10	ISO 17025	320	110	160
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Iron (dissolved)	µg/l	4	ISO 17025	730	5.7	5.9
Iron (Fe2+) (dissolved)	mg/l	0.2	NONE	< 0.20	< 0.20	< 0.20
Iron (Fe3+) (dissolved)	mg/l	0.2	NONE	0.73	< 0.20	< 0.20
Sodium (dissolved)	mg/l	0.01	ISO 17025	1200	73	240
Petroleum Hydrocarbons						
TPH - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C12 - C16 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C16 - C21 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C21 - C35 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C35 HS+EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C40 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C44 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C40 - C44 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C44 HS+EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 HS+EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC40 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC44 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC40 - EC44 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC44 HS+EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10

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Analytical i2 Environmental Science

Analytical Report Number: 24-007295
Project / Site name: Protos CC

Your Order No: PO143264

Lab Sample Number				136574	136575	136576
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				04/03/2024	04/03/2024	04/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-007295
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode	In-house method	L029	W	NONE
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Iron (II) and Iron (III) in water	Determination of Iron II and Iron III in water by coloration with phenanthroline and calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L079	W	NONE
Complex cyanide in water	Determination of complex cyanide by calculation. Accredited matrices SW, PW, GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chromium III in water	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW	L082B	W	ISO 17025

Analytical Report Number : 24-007295
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

$$ - Result was reported from high dilution. The result should be interpreted with caution

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Analytical i2 Environmental Science

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Analytical Report Number : 24-010450

Project / Site name:	Protos CC	**Samples received on:**	21/03/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	21/03/2024
Your order number:	143381	**Analysis completed by:**	02/04/2024
Report Issue Number:	1	**Report issued on:**	02/04/2024
Samples Analysed:	3 water samples		

Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-010450
Project / Site name: Protos CC

Lab Sample Number				151916	151917	151918
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				18/03/2024	18/03/2024	18/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
General Inorganics						
pH (L099)	pH Units	N/A	ISO 17025	7.1	7.9	7.7
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	7.75	26.9	30.3
Sulphide	µg/l	5	NONE	6.7	15	8.1
Chloride	mg/l	0.15	ISO 17025	2000	69	400
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	17000 $$	170	4400
Nitrate as N	mg/l	0.01	ISO 17025	0.06	0.07	0.04
Nitrate as NO_3	mg/l	0.05	ISO 17025	0.26	0.31	0.16
Hardness - Total	mgCaCO3/l	1	ISO 17025	636	164	301
Total Phenols						
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10
Speciated PAHs						
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Total PAH						
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

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Analytical Report Number: 24-010450
Project / Site name: Protos CC

Lab Sample Number				151916	151917	151918
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				18/03/2024	18/03/2024	18/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.37	2.79	0.41
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.5	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	0.5	< 0.5	0.8
Lead (dissolved)	µg/l	0.2	ISO 17025	0.5	0.4	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.7	0.8	0.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	6.7	0.9	3.3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	1.1	< 0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.8	0.6	3.4
Boron (dissolved)	µg/l	10	ISO 17025	280	100	150
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Iron (dissolved)	µg/l	4	ISO 17025	130	160	110
Iron (Fe^{2+}) (dissolved)	mg/l	0.2	NONE	< 0.20	< 0.20	< 0.20
Iron (Fe^{3+}) (dissolved)	mg/l	0.2	NONE	< 0.20	< 0.20	< 0.20
Sodium (dissolved)	mg/l	0.01	ISO 17025	1000	66	210
Petroleum Hydrocarbons						
TPH - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C44 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C40 - C44 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C44 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC44 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC40 - EC44 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC44 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10

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Analytical Report Number: 24-010450
Project / Site name: Protos CC

Lab Sample Number				151916	151917	151918
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				18/03/2024	18/03/2024	18/03/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-010450
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode	In-house method	L029	W	NONE
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Iron (II) and Iron (III) in water	Determination of Iron II and Iron III in water by coloration with phenanthroline and calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L079	W	NONE
Complex cyanide in water	Determination of complex cyanide by calculation. Accredited matrices SW, PW, GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chromium III in water	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW	L082B	W	ISO 17025

Analytical Report Number : 24-010450
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

$$ - Result was reported from high dilution. The result should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-010450
Project / Site name: Protos CC

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH202	N/A	W	151916	c	Ammoniacal Nitrogen as N in water	L082B	c
BH202	N/A	W	151916	c	pH at 20°C in water (automated)	L099	c
BH204	N/A	W	151917	c	Ammoniacal Nitrogen as N in water	L082B	c
BH204	N/A	W	151917	c	pH at 20°C in water (automated)	L099	c
BH207	N/A	W	151918	c	Ammoniacal Nitrogen as N in water	L082B	c
BH207	N/A	W	151918	c	pH at 20°C in water (automated)	L099	c

UKAS TESTING
4041

Analytical i2 Environmental Science

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Analytical Report Number : 24-013972

Project / Site name:	Protos CC	**Samples received on:**	15/04/2024
Your job number:	K0525	**Samples instructed on/ Analysis started on:**	15/04/2024
Your order number:	143409	**Analysis completed by:**	18/04/2024
Report Issue Number:	1	**Report issued on:**	18/04/2024
Samples Analysed:	3 water samples		



Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-013972
Project / Site name: Protos CC

Your Order No: 143409

Lab Sample Number				169799	169800	169801
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/04/2024	11/04/2024	11/04/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
General Inorganics						
pH (L099)	pH Units	N/A	ISO 17025	7.4	8.2	8.1
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	5.45	27.4	34.7
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	1500 $$	63	370
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	17000	73	21
Nitrate as N	mg/l	0.01	ISO 17025	0.02	0.02	0.02
Nitrate as NO_3	mg/l	0.05	ISO 17025	0.1	0.1	0.1
Hardness - Total	mgCaCO3/l	1	ISO 17025	574	176	312
Total Phenols						
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10
Speciated PAHs						
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Total PAH						
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

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Analytical Report Number: 24-013972
Project / Site name: Protos CC

Your Order No: 143409

Lab Sample Number				169799	169800	169801
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/04/2024	11/04/2024	11/04/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.24	18.7	0.71
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.5	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	0.8	0.5	1.2
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.6	< 0.5	< 0.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	-	< 0.6	3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.7	0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.6	1.5	0.9
Boron (dissolved)	µg/l	10	ISO 17025	280	110	160
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Iron (dissolved)	µg/l	4	ISO 17025	45	9.4	15
Iron (Fe^{2+}) (dissolved)	mg/l	0.2	NONE	< 0.20	< 0.20	< 0.20
Iron (Fe^{3+}) (dissolved)	mg/l	0.2	NONE	< 0.20	< 0.20	< 0.20
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	-	-
Sodium (dissolved)	mg/l	0.01	ISO 17025	980	64	230
Petroleum Hydrocarbons						
TPH - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C35 - C44 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C40 - C44 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aliphatic >C5 - C44 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0 ##	< 1.0 ##	< 1.0 ##
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC44 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC40 - EC44 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC44 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10 ##	< 10 ##	< 10 ##

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UKAS TESTING
4041

Analytical i2 Environmental Science

Analytical Report Number: 24-013972
Project / Site name: Protos CC

Your Order No: 143409

Lab Sample Number				169799	169800	169801
Sample Reference				BH202	BH204	BH207
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/04/2024	11/04/2024	11/04/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-013972
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode	In-house method	L029	W	NONE
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Iron (II) and Iron (III) in water	Determination of Iron II and Iron III in water by coloration with phenanthroline and calculation	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L079	W	NONE
Complex cyanide in water	Determination of complex cyanide by calculation. Accredited matrices SW, PW, GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chromium III in water	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW	L082B	W	ISO 17025

Analytical Report Number : 24-013972
Project / Site name: Protos CC

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised
$$ - Result was reported from high dilution. The result should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-013972
Project / Site name: Protos CC

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH202	N/A	W	169799	c	Ammoniacal Nitrogen as N in water	L082B	c
BH202	N/A	W	169799	c	pH at 20°C in water (automated)	L099	c
BH204	N/A	W	169800	c	Ammoniacal Nitrogen as N in water	L082B	c
BH204	N/A	W	169800	c	pH at 20°C in water (automated)	L099	c
BH207	N/A	W	169801	c	Ammoniacal Nitrogen as N in water	L082B	c
BH207	N/A	W	169801	c	pH at 20°C in water (automated)	L099	c

Appendix I - Summary of Chemical Analysis of Soils

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Site: Protos CC

CHEMICAL STATISTICAL ANALYSIS - based on CLEA v1.06 (Sandy Loam 1% SOM)

Job No: K0525 **Report No: K0525**

Analyte	Limit of Detection (LOD)	LOD Units	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Ayesa	Statistical Analysis						pC4SL		LQM/CIEH S4UL		LQM/CIEH S4UL	
																													Screening Criteria		Screening Criteria		Criteria Source	
			30/01/2024	30/01/2024	30/01/2024	30/01/2024	31/01/2024	29/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024	01/02/2024	07/02/2024	07/02/2024	07/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024	n	Standard Deviation	Minimum	Average	Maximum	Mean	Commercial	Pass / Fail	Commercial	Pass / Fail	Source of Screening Criteria	Source of Toxicological Data
			BH203	BH203	BH207	BH207	TP212	TP214	TP215	TP216	TP216	TP217	TP213	BH202	BH204	BH204	BH205	BH205	BH206	BH206	BH205a	BH205a												
			0.50	1.50	0.50	1.50	0.10	0.20	0.10	0.10	0.30	0.15	0.20	0.2	0.5	1.5	0.5	1	0.5	1	0.3	0.5												
Stone Content	0.1	%																						0.5	-	-	-		-	-	-	-	-	-
Asbestos Screen	Positive / Negative	NA	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative											-	-	-	-		-	-	-	-	-	-
Metals																																		
Alluminium	30	mg/kg	21000	23000	6500	19000	15000	22000	16000	9300	11000	17000	20000	22000	17000	3900	15000	7100	21000	22000	14000	19000												
Arsenic (total)	0.50	mg/kg	13	13	5.9	8.7	11	15	12	8	8.3	13	14	14	14	3.6	12	6.9	13	13	11	13	20	3.14	4	11	15	11.1	640	Pass	640	Pass	CLEA v1.06	LQM/CIEH 2014
Beryllium	0.06	mg/kg	1.1	1.3	0.38	1	0.87	1.2	0.92	0.62	0.58	0.93	1.2	1.1	0.96	0.25	0.78	0.43	1.1	1.2	0.71	0.99												
Boron (water soluble)	0.20	mg/kg	2.1	11	0.2	1.4	0.6	3.4	2	0.6	0.7	1	0.6	4.1	1.8	270	0.2	0.2	1.1	2.5	1.1	1.7	20	59.99	0	15	270	15.3	-	-	240000	Pass	CLEA v1.06	LQM/CIEH 2014
Cadmium (total)	0.10	mg/kg	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	20	0.00	0	0	0	0.2	420	Pass	190	Pass	CLEA v1.06	LQM/CIEH 2014
Chromium (hexavalent)	0.50	mg/kg	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	-	1.8	1.8	1.8	1.8	1.8	1.8	19	0.00	2	2	2		52	Pass	33	Pass	CLEA v1.06	LQM/CIEH 2014
Chromium (total) (III for S4ULs)	0.50	mg/kg	36	34	15	34	31	40	31	21	19	31	39	37	30	-	29	16	36	39	25	33	19	7.72	15	30	40	30.3	-	-	8600	Pass	CLEA v1.06	LQM/CIEH 2014
Copper (total)	0.50	mg/kg	15	25	5	11	23	32	21	9.7	13	21	25	21	13	5	12	6.9	15	18	21	29	20	7.75	5	17	32	17.1	-	-	68000	Pass	CLEA v1.06	LQM/CIEH 2014
Iron	40.00	mg/kg	40000	32000	15000	38000	26000	36000	28000	21000	25000	28000	37000	38000	35000	8600	30000	16000	37000	38000	22000	31000												
Lead (total)	0.50	mg/kg	21	49	7.7	19	33	51	29	12	12	40	38	36	20	4.9	21	12	27	29	40	43	20	13.80	5	27	51		6000	Pass	-		-	-
Mercury (total inorganic)	0.05	mg/kg	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	20	0.00	0	0	0	0.3	-	-	1100	Pass	CLEA v1.06	LQM/CIEH 2014
Nickel (total)	0.50	mg/kg	33	28	13	30	28	36	29	20	18	27	37	35	28	8.8	26	14	31	33	22	31	20	7.98	9	26	37	26.4	-	-	980	Pass	CLEA v1.06	LQM/CIEH 2014
Selenium (total)	0.25	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	0.00	1	1	1	1.0	-	-	120000	Pass	CLEA v1.06	LQM/CIEH 2014
Zinc (total)	3.00	mg/kg	75	77	31	65	85	120	84	44	41	88	100	92	62	16	36	20	47	50	33	45	20	28.60	16	61	120	60.6	-	-	730000	Pass	CLEA v1.06	LQM/CIEH 2014
Vanadium	1.00	mg/kg	45	42	18	42	39	52	39	27	25	43	52	49	41	11	36	20	47	50	33	45	20	11.87	11	38	52	37.8	-	-	9000	Pass	CLEA v1.06	LQM/CIEH 2014
Inorganic																													-	-	-	-		
pH Value	-	pH Units	8.5	7.2	8.6	8.3	7.7	7.7	7.4	8.2	8.4	7.4	7.2	7.8	8.3		8.2	7.9	7.9	7.9	7.6	7.3	19	0.45	7.2	8	8.6	7.9	-	-	-	-	-	-
Cyanide (total)	0.50	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	0.00	1	1	1.0	1	-	-	-	-	-	-
Chloride (2:1)	0.01	mg/l																					0	#DIV/0!	0.0	#DIV/0!	0.0							
Sulphate (2:1)	0.01	g/l	11.6	530	22.2	46.5	31.4	55.6	30.1	35.7	21.2	13.3	16.2	25.7	52.7	623	13.3	13.8	31.2	24.4	28.5	33	20	169.92	11.60	83	623	82.97	-	-	-	-	-	-
Sulphate (total)	0.01	mg/kg	23	1100	45	93	63	110	60	71	42	27	32										11	315.77	23.00	151	1100	151.45	-	-	-	-	-	-
Organic																													-	-	-	-		
Soil Organic Matter	0.4	%	1.5	7.3	0.5	1.3	4.1	4.9	3.2	1	0.6	3.6	3.2	3.2	1.4	-							13	1.97	0.5	3	7.30	2.8	-	-	-	-	-	-
TOC	0.2	%	0.9	4.2	0.3	0.7	2.4	2.8	1.9	0.6	0.4	2.1	1.9	1.9	0.8	-							13	1.13	0.3	2	4.20	1.6	-	-	-	-	-	-
Phenol (Total Monohydric)	0.1	mg/kg	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	20	0.00	1	1	1.0	1	-	-	760	Pass	CLEA v1.06	LQM/CIEH 2014
PAH																																		
Naphthalene	0.1	mg/kg	0.05	0.24	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	20	0.04	0.1	0	0.2	0.1	-	-	190	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthylene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	83000	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthene	0.1	mg/kg	0.05	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.01	0.1	0	0.1	0.1	-	-	84000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluorene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	63000	Pass	CLEA v1.06	LQM/CIEH 2014
Phenanthrene	0.1	mg/kg	0.05	0.14	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05	20	0.02	0.1	0	0.1	0.1	-	-	22000	Pass	CLEA v1.06	LQM/CIEH 2014
Anthracene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	520000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluoranthene	0.1	mg/kg	0.05	0.16	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.14	0.05	0.05	0.05	0.05	0.05	0.05	20	0.03	0.1	0	0.2	0.1	-	-	23000	Pass	CLEA v1.06	LQM/CIEH 2014
Pyrene	0.1	mg/kg	0.05	0.12	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.13	0.05	0.05	0.05	0.05	0.05	0.05	20	0.02	0.1	0	0.1	0.1	-	-	54000	Pass	CLEA v1.06	LQM/CIEH 2014
Benz(a)anthracene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	170	Pass	CLEA v1.06	LQM/CIEH 2014
Chrysene	0.1	mg/kg	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	350	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(b)fluoranthene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	44	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(k)fluoranthene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	1200	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(a)pyrene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	77	Pass	35	Pass	CLEA v1.06	LQM/CIEH 2014
Indeno(123cd)pyrene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	500	Pass	CLEA v1.06	LQM/CIEH 2014
Dibenzo(ah)anthracene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	3.5	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(ghi)perylene	0.1	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0.1	0	0.1	0.1	-	-	3900	Pass	CLEA v1.06	LQM/CIEH 2014
Total EPA-16 PAHs	1.6	mg/kg	0.8	0.81	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	20	0.00	0.8	1	0.8	0.8	-	-	-	-	-	-
BTEX																																		
Benzene	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000	#DIV/0!	100000	Pass	27000	Pass	CLEA v1.06	LQM/CIEH 2014
Toluene	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000	#DIV/0!	-	-	56000000	Pass	CLEA v1.06	LQM/CIEH 2014
Ethyl Benzene	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000	#DIV/0!	-	-	5700000	Pass	CLEA v1.06	LQM/CIEH 2014
Xylene (o)	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000	#DIV/0!	-	-	6600000	Pass	CLEA v1.06	LQM/CIEH 2014
Xylene (m)	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000		-	-	6200000	Pass	CLEA v1.06	LQM/CIEH 2014
Xylene (p)	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000		-	-	5900000	Pass	CLEA v1.06	LQM/CIEH 2014
MTBE	1.00	ug/kg																					0	#DIV/0!	0.000	#DIV/0!	0.000	#DIV/0!	-	-	-	-	-	-
Petroleum Hydrocarbons																																		
TPH (C_{10} - C_{40})	10	mg/kg																						-	-	-	-	#DIV/0!	-	-	-	-	-	-
Aliphatic >C_5 - C_6	0.02	mg/kg	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	20	0.00	0.02	0	0.0	0.02	-	-	3200	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_6 - C_8	0.02	mg/kg	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	20	0.00	0.02	0	0.0	0.02	-	-	7800	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_8 - C_{10}	0.05	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0	0	0.1	0	-	-	2000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{10} - C_{12}	1.00	mg/kg	1	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	0.27	1	1	2.2	1	-	-	9700	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{12} - C_{16}	2.00	mg/kg	2	12	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	2.24	2	3	12.0	3	-	-	59000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{16} - C_{21}	8.00	mg/kg	8	16	8	8	8	16	8	8	8	8	8	8	8	8	8	8	8	8	8	8	20	2.46	8	9	16.0		-	-	160000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{21} - C_{35}	8.00	mg/kg	8	34	8	8	16	73	8	8	8	8	8	8	8	61	8	8	8	8	8	8	20	18.66	8	16	73.0	16	-	-	160000	Pass	CLEA v1.06	LQM/CIEH 2014
Total Aliphatic >C_{10} - C_{40}	10.00	mg/kg																					0	#DIV/0!	0	#DIV/0!	0.0	#DIV/0!	-	-	-	-	-	
Aromatic C_5 - C_7	0.01	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	20	0.00	0	0	0.01	0.01	-	-	26000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic C_7 - C_8	0.01	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	20	0.00	0	0	0.01	0.01	-	-	56000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_8 - C_{10}	0.05	mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	20	0.00	0	0	0.1	0	-	-	3500	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{10} - C_{12}	1.00	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	0.00	1	1	1.0	1	-	-	16000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{12} - C_{16}	2.00	mg/kg	2	2	2	2	2.2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	0.04	2	2	2.2	2	-	-	36000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{16} - C_{21}	10.00	mg/kg	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	20	0.00	10	10	10.0	10	-	-	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{21} - C_{35}	10.00	mg/kg	10	13	10	10	10	12	10	10	10	10	10	10	10	58	10	10	10	10	10	10	20	10.70	10	13	58.0	13	-	-	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{35} - C_{40}	10.00	mg/kg	10	10	10	10	10	10	10	10	10	10	10	10	10	28	10	10	10	10	10	10	20	4.02	10	11	28.0		-	-	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Total Aromatic >C_5 - C_{35}	10.00	mg/kg																					0	#DIV/0!	0	#DIV/0!	0.0	#DIV/0!	-	-	28002	Pass	CLEA v1.08	LQM/CIEH 2016
VOC																													-	-				
Dichlorodifluoromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.11	LQM/CIEH 2019
Chloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.12	LQM/CIEH 2020
Vinyl Chloride	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	59	Pass	CLEA v1.13	LQM/CIEH 2021
Bromomethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.14	LQM/CIEH 2022
Chloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.15	LQM/CIEH 2023
Trichlorofluoromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.16	LQM/CIEH 2024
1,1-Dichloroethene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.17	LQM/CIEH 2025
Trans 1,2-Dichloroethene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-		-	CLEA v1.18	LQM/CIEH 2026
1,1-Dichloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.19	LQM/CIEH 2027
cis 1,2-Dichloroethene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.20	LQM/CIEH 2028
Bromochloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.21	LQM/CIEH 2029
Trichloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	99000	Pass	CLEA v1.22	LQM/CIEH 2030
1,1,1-Trichloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	660000	Pass	CLEA v1.23	LQM/CIEH 2031
Tetrachloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	2900	Pass	CLEA v1.24	LQM/CIEH 2032
1,1-Dichloropropene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.25	LQM/CIEH 2033
Benzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	27000	Pass	CLEA v1.26	LQM/CIEH 2034
1,2-Dichloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	670	Pass	CLEA v1.27	LQM/CIEH 2035

Trichloroethene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	1200	Pass	CLEA v1.28	LQM/CIEH 2036
1,2-Dichloropropane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.29	LQM/CIEH 2037
Dibromomethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.30	LQM/CIEH 2038
Bromodichloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.31	LQM/CIEH 2039
cis-1,3-Dichloropropene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.32	LQM/CIEH 2040
Toluene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	56000000	Pass	CLEA v1.33	LQM/CIEH 2041
Trans-1,3-Dichloropropene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.34	LQM/CIEH 2042
1,1,2-Trichloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.35	LQM/CIEH 2043
Tetrachloroethene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	19000	Pass	CLEA v1.36	LQM/CIEH 2044
1,3-Dichloropropane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.37	LQM/CIEH 2045
Dibromochloromethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.38	LQM/CIEH 2046
1,2-Dibromoethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.39	LQM/CIEH 2047
Chlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	56000	Pass	CLEA v1.40	LQM/CIEH 2048
1,1,1,2-Tetrachloroethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	110000	Pass	CLEA v1.41	LQM/CIEH 2049
Ethylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	5700000	Pass	CLEA v1.42	LQM/CIEH 2050
m & p-Xylene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	5900000	Pass	CLEA v1.43	LQM/CIEH 2051
o-Xylene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	6600000	Pass	CLEA v1.44	LQM/CIEH 2052
Styrene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.45	LQM/CIEH 2053
Tribromomethane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.46	LQM/CIEH 2054
Isopropylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.47	LQM/CIEH 2055
Bromobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.48	LQM/CIEH 2056
1,2,3-Trichloropropane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.49	LQM/CIEH 2057
N-Propylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.50	LQM/CIEH 2058
2-Chlorotoluene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.51	LQM/CIEH 2059
1,3,5-Trimethylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.52	LQM/CIEH 2060
4-Chlorotoluene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.53	LQM/CIEH 2061
Tert-Butylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.54	LQM/CIEH 2062
1,2,4-Trimethylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.55	LQM/CIEH 2063
Sec-Butylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.56	LQM/CIEH 2064
1,3-Dichlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	30000	Pass	CLEA v1.57	LQM/CIEH 2065
4-Isopropyltoluene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.58	LQM/CIEH 2066
1,4-Dichlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	4400000	Pass	CLEA v1.59	LQM/CIEH 2067
N-Butylbenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.60	LQM/CIEH 2068
1,2-Dichlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	2000000	Pass	CLEA v1.61	LQM/CIEH 2069
1,2-Dibromo-3-Chloropropane	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.62	LQM/CIEH 2070
1,2,4-Trichlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	220000	Pass	CLEA v1.63	LQM/CIEH 2071
Hexachlorobutadiene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	31000	Pass	CLEA v1.64	LQM/CIEH 2072
1,2,3-Trichlorobenzene	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	102000	Pass	CLEA v1.65	LQM/CIEH 2073
Methyl Tert-Butyl Ether	5.00	µg/kg	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	20	0.00	5	5	5.0	5.0	-	-	-	-	CLEA v1.66	LQM/CIEH 2074
Chlorinated Hydrocarbons																																				
Tetrachloromethane/Carbon Tetrachloride	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	2.9	Pass	CLEA v1.06	LQM/CIEH 2014
Tetrachloroethene (PCE)	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	19	Pass	CLEA v1.06	LQM/CIEH 2014
1,2 Dichloroethane	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	0.67	Pass	CLEA v1.06	LQM/CIEH 2014
1,1,1,2 Tetracchloroethane	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	110	Pass	CLEA v1.06	LQM/CIEH 2014
Trichloromethane	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	99	Pass	CLEA v1.06	LQM/CIEH 2014
1,1,1-Trichloroethane (TCA)	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	660	Pass	CLEA v1.06	LQM/CIEH 2014
Trichloroethene / Trichloroethylene (TCE)	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	1.2	Pass	CLEA v1.06	LQM/CIEH 2014
Vinylchloride	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	0.059	Pass	CLEA v1.06	LQM/CIEH 2014
1,2,3,4 Tetrachlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	1700	Pass	CLEA v1.06	LQM/CIEH 2014
1,2,4,5 Tetrachlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	42	Pass	CLEA v1.06	LQM/CIEH 2014
1,2,3,5 Tetrachlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	49	Pass	CLEA v1.06	LQM/CIEH 2014
1,2 Dichlorobenzene	0.1	mg/kg	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	20	0.00	0.10	0	0.10		-	-	2000	Pass	CLEA v1.06	LQM/CIEH 2014
1,3 Dichlorobenzene	0.2	mg/kg	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	20	0.00	0.20	0	0.20		-	-	30	Pass	CLEA v1.06	LQM/CIEH 2014
1,4 Dichlorobenzene	0.2	mg/kg	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	20	0.00	0.20	0	0.20		-	-	4400	Pass	CLEA v1.06	LQM/CIEH 2014
1,2,4 Trichlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	220	Pass	CLEA v1.06	LQM/CIEH 2014
1,3,5 Trichlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	23	Pass	CLEA v1.06	LQM/CIEH 2014
Pentachlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	640	Pass	CLEA v1.06	LQM/CIEH 2014
Hexachlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	110	Pass	CLEA v1.06	LQM/CIEH 2014
Chlorobenzene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	56	Pass	CLEA v1.06	LQM/CIEH 2014
Pentachlorophenol	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	400	Pass	CLEA v1.06	LQM/CIEH 2014
2 Chlorophenol	0.1	mg/kg	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	20	0.00	0.10	0	0.10		-	-	3500	Pass	CLEA v1.06	LQM/CIEH 2014
2,4 Dichlorophenol	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	3500	Pass	CLEA v1.06	LQM/CIEH 2014
2,4,6 Trichlorophenol	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	3500	Pass	CLEA v1.06	LQM/CIEH 2014
2,3,4,6 Tetrachlorophenol	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	3500	Pass	CLEA v1.06	LQM/CIEH 2014
sBiphenyls (total)(5) (10) (based on 5% SOM)	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	-	-		
Dibenzofuran	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00		-	-	-	-		
Hexachlorobutadiene	0.001	mg/kg																					0	#DIV/0!	0.00	#DIV/0!	0.00				31	Pass	CLEA v1.06	LQM/CIEH 2014
Pesticides																																				
Aldrin	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	170	-	CLEA v1.06	LQM/CIEH 2014
Dieldrin	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	170	-	CLEA v1.06	LQM/CIEH 2014
alpha Endosulfan	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	5600	-	CLEA v1.06	LQM/CIEH 2014
beta Endosulfan	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	6300	-	CLEA v1.06	LQM/CIEH 2014
Atrazine	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	9300	-	CLEA v1.06	LQM/CIEH 2014
Dichlorovos	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	140		CLEA v1.06	LQM/CIEH 2014
a-HCH	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	170		CLEA v1.06	LQM/CIEH 2014
b-HCH	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	65		CLEA v1.06	LQM/CIEH 2014
g-HCH	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	67		CLEA v1.06	LQM/CIEH 2014
Miscellaneous																																				
Carbon Disulphide	10.00	mg/kg																					0	#DIV/0!	0.000	#DIV/0!	0.00		-	-	11	-	CLEA v1.06	LQM/CIEH 2014

Below Detection Limits.
Exceeded GAC/SGV
Exceeded pC4SL / S4ULs
Assessment criteria for pH, Sulphide and Sulphate are not based on human health. Sulphate criteria assumes DS-1 ACEC classification for concrete.

Notes

1. Generic Qualitative Assessment Criteria have been used where appropriate based on the current CLEA 1.06 Model (default values, sandy loam 1%SOM). Where no CLEA generic guideline value has been calculated no assessment has been made. The results presented show maximum and mean concentrations. This is to provide a reasonable prediction of the range of data rather than to provide any detailed statistical appraisal.
2. Results lower than detection limit are shaded in grey.
3. When the test result is recorded as being less than the detection limit, the result used for the analysis is the detection limit.
4. Cyanide (total)*, in the absence of a GQAC based on current CLEA 1.06 Model, the Atrisk Soil Value for Cyanide (free) has been used.
5. For metals, where an SGV has been published, this value has been used. Note that the published SGVs do not include the residential without plant uptake scenario. CLEA v1.06 has therefore been used to derive GACs for this scenario. For organics, CLEA v1.06 has been used (as the SGV assumes 6% SOM)
6. pC4SL based on adjusted toxicology and expsoure assumptions
7. pC4SL for benzene assumes 6% SOM

Appendix J - Summary of Chemical Analysis of Water

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09 Apr 2024 (16:57:50)

Encyclis | Protos Carbon Capture (K0525)

Groundwater Quality

Substance		Screening Criteria		Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
		-	-						-
pH (pH units)	pH units	-	-	6	7.1	8.3	7.85	0.43	-
		-	-						-
Arsenic	mg/l	0.01	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	0.00041	0.02	0.0052	0.0072	1
Boron	mg/l	1	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	0.1	0.32	0.2	0.09	0
Cadmium	mg/l	0.005	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.00002	<0.00002	0.00002	0	0
Total Chromium	mg/l	0.05	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.0002	0.0012	0.00052	0.00039	0
Chromium III	mg/l	-	-	6	<0.0005	<0.0005	0.0005	0	-
Chromium VI	mg/l	-	-	6	<0.0005	<0.0005	0.0005	0	-
Copper	mg/l	2	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.0005	0.0008	0.00057	0.00012	0
Iron	mg/l	0.2	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	0.0057	0.73	0.19	0.27	1
Lead	mg/l	0.01	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.0002	0.0005	0.00028	0.00013	0
Mercury	mg/l	0.001	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.00005	<0.00005	0.00005	0	0
Nickel	mg/l	0.02	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.0005	0.002	0.001	0.00066	0
Selenium	mg/l	0.01	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.0006	0.0088	0.0037	0.0033	0
Vanadium	mg/l	-	-	6	<0.0002	0.0049	0.0013	0.0018	-
Zinc	mg/l	-	-	6	0.0006	0.0066	0.0032	0.0021	-
		-	-						-
Free Cyanide	mg/l	-	-	6	<0.01	<0.01	0.01	0	-
Total Cyanide	mg/l	0.05	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.01	<0.01	0.01	0	0
Complex Cyanide	mg/l	-	-	6	<0.01	<0.01	0.01	0	-
[illegible]	[illegible]								
		-	-						-
Sulphate	mg/l	250	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	7.75	30.3	24.2	8.28	0
Chloride	mg/l	250	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	65	2000	771	854	4
Sulphide	mg/l	-	-	6	<0.005	0.015	0.0075	0.0039	-
Total Sulpur	mg/l	-	-						-
Ammonia expressed as N	mg/L	0.39	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	0.066	17	7.02	7.6	4
Ammonia expressed as NH3	mg/L	-	-						-
Ammonia expressed as NH4	mg/L	0.5	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)						
Total Alkalinity as CaCO3	mgCaC	-	-	6	164	679	384	223	-
		-	-						-
		-	-						-
Naphthalene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Acenaphthylene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Acenaphthene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Fluorene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Phenanthrene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Anthracene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Fluoranthene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Pyrene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Benzo(a)anthracene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Chrysene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Benzo(b)fluoranthene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Benzo(k)fluoranthene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Benzo(a)pyrene	ug/l	0.01	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.01	<0.01	0.01	0	0
Indeno(1,2,3-cd)pyrene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Di-benz(a,h,)anthracene	ug/l	-	-	6	<0.01	<0.01	0.01	0	-
Benzo(g,h,i)perylene	mg/l	-	-	6	<0.01	<0.01	0.01	0	-
Total PAH (16)	mg/l	-	-	6	<0.16	<0.16	0.16	0	-
		-	-						-
TPH-CWG		-	-						-
Aliphatics C5-C6	mg/l	15	WHO DWQ 2017 (4th Edition)	6	0.001	0.001	0.001	0	0
Aliphatics >C10-C12	mg/l	0.3	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aliphatics >C12-C16	mg/l	0.3	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aliphatics >C16-C21	mg/l	-	-	6	0.01	0.01	0.01	0	-
Aliphatics >C21-C35	mg/l	-	-	6	0.01	0.01	0.01	0	-
Aliphatics >C35-C44	mg/l	-	-	6	0.01	0.01	0.01	0	-
Total Aliphatics >C5-44 Aqueous	mg/l	-	-	6	0.01	0.01	0.01	0	-
		-	-						-
Aromatics C5-7	mg/l	0.01	WHO DWQ 2017 (4th Edition)	6	0.001	0.001	0.001	0	0
Aromatics >EC10-EC12	mg/l	0.1	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aromatics >EC12-EC16	mg/l	0.1	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aromatics >EC16-EC21	mg/l	0.09	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aromatics >EC21-EC35	mg/l	0.09	WHO DWQ 2017 (4th Edition)	6	0.01	0.01	0.01	0	0
Aromatics >EC35-EC44	mg/l	-	-	6	0.01	0.01	0.01	0	-
Total Aromatics >C6-35 Aqueous	mg/l	-	-	6	0.01	0.01	0.01	0	-
		-	-						-
		-	-						-
Methyl Tertiary Butyl Ether	mg/l	-	-	6	0.003	0.003	0.003	4.75E-19	-
Benzene	mg/l	0.001	England and Wales DWS (2000 as amended 2001, 2002, 2005, 2007, 2010 and 2016)	6	<0.003	<0.003	0.003	4.75E-19	6
Toluene	mg/l	0.7	WHO DWQ 2017 (4th Edition)	6	0.003	0.003	0.003	4.75E-19	0
Ethylbenzene	mg/l	0.3	WHO DWQ 2017 (4th Edition)	6	0.003	0.003	0.003	4.75E-19	0
p/m-Xylene	mg/l	-	-	6	0.003	0.003	0.003	4.75E-19	-
o-Xylene	mg/l	-	-	6	0.003	0.003	0.003	4.75E-19	-
Sum of xylenes	mg/l	0.5	WHO DWQ 2017 (4th Edition)	6	0.003	0.003	0.003	4.75E-19	0
		-	-						-
Total Phenols	mg/l	-	-						-
		-	-						-
		-	-						-
Nitrate	mg/l			6	<0.01	0.07	0.042	0.026	0

Appendix K – Unforeseen Ground Contamination

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Unforeseen Ground Contamination

There is the potential for areas of previously unexpected contamination to be present, as is the case with any “brownfield” site. Any significant quantities of asbestos, significant ashy soils, unusual, brightly coloured or significantly oily or odorous material should be considered in this category. If unexpected contamination is found the following procedures should be adhered to:

1. All site works at the position of the suspected contamination will cease.
2. A suitably trained geo-environmental specialist should assess the visual and olfactory observations of the condition of the ground and the extent of contamination, and the Client and the Local Authority should be informed of the discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.
3. The suspected contaminated material will be investigated and tested appropriately in accordance with the assessed risks. The investigation works will be carried out in the presence of a suitably qualified geo-environmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.
4. The unexpected, contaminated material will either be left in situ or be stockpiled whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires to be disposed as appropriate.
5. Where the material is left in situ awaiting results it will be reburied or covered with plastic sheeting.
6. Where the potentially contaminated material is to be temporarily stockpiled it will either be placed either on a prepared surface of clayey Alluvium, or on 2000-gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
7. Any areas where unexpected visual or olfactory ground contamination will be surveyed, a photographic record kept, and testing results incorporated into the Verification Report.
8. A photographic recorded will be made of relevant observations.
9. The testing suite will be determined by the independent geo-environmental specialist on the basis of visual and olfactory observations.
10. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
11. The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority and if necessary the Environment Agency, materials should either be:

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- re-used in areas where test results indicate that it meets compliance targets so it can be reused without treatment; or
- treatment of material on site to meet compliance targets so it can be reused; or
- removal from site to a treatment centre or to a suitably licensed landfill or permitted treatment facility.

12. Verification Report will be produced for the work.

Asbestos

Asbestos cement products and asbestos fibres have not been encountered in the soils at the site but based on the age of the Made Ground material containing asbestos could be expected to be encountered. If non-notifiable asbestos (e.g., chrysotile asbestos cement board) is encountered in excavations then it will be dealt with in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and the HSE's ACoP for asbestos (2013). Finding non-notifiable asbestos is a very common occurrence on brownfield sites and is a relatively low risk activity and can be dealt with as a matter of routine. Therefore, it is not proposed that the Council will be notified but an appropriate record will be kept of confirmatory testing and disposal. This will be included in remediation verification reports.

If suspect notifiable asbestos is encountered then the Council and the HSE will be notified. An appropriate action plan will be agreed with the Council and the HSE in accordance with CAR 2012. The action plan will include the preparation of the Risk Assessment and Plan of Work in accordance with CAR and other statutory requirements including:

- Site mobilisation;
- Excavation methodology;
- Handling, movement and storage on-site of excavation arisings;
- Any processing of excavation arisings containing ACMs;
- Movement and placement of arisings to final destination;
- Placing of cover system over soils with and ACMs remaining on-site;
- Off-site disposal of ACMs;
- Licences;
- PPE & RPE; and,
- Dust and fibre monitoring.

Potential mitigation measures that would be required include:

-

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- Ensuring works are carried out by suitably trained and experienced personnel with working with asbestos;
- Site investigation and risk assessment;
- Removal or treatment of asbestos hotspots;
- Use of PPE and RPE by construction workers; and,
- Compliance monitoring.

Unexpected Tanks

No buried underground fuel storage tanks have been encountered during the site investigation works; however, there remains a low risk that tanks are present on-site. Should an underground tank be encountered, operations should cease in the area. Additionally, there may be pipework associated with these tanks which could have oily residues. The following procedures are to be adhered to if tanks and pipework are identified:

1. All site works at the position of the tanks/pipework should stop.
2. A description of the tank should be made by the geo-environmental engineer including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic recorded will also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. The independent geo-environmental engineer will inform Client and the Local Authority.
5. During the presence of the independent geo-environmental engineer, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined on the basis of visual and olfactory observations by independent geo-environmental engineer.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Degassing and removal of the tank by a suitably qualified contractor will be required, and a Naked Flame Certificate should be provided.
10. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be kept and included in the Verification Report.

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11. Excavation and remediation of any contaminated soils around the tank will be carried out.
12. Samples of the base and sides of the resultant hole will be sampled and supervised by the independent geo-environmental engineer to confirm whether risks to human health or controlled waters.

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