GEOENVIRONMENTAL GROUND INVESTIGATION

Plot B
The Airfields
Deeside

Reference	**4671-JPG-XX-XX-RP-G-0645-S2-P01**
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CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

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DOCUMENT HISTORY

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P01	17.06.2022	First Issue	Final	AJS	RJM

EXECUTIVE SUMMARY

Site Address	Plot B, The Airfields, Deeside
NGR	NGR 332560, 369979.
Current Site Use & Proposed Development	The site is irregular in shape and occupies an area of approximately 9.90 ha. Access to the site is via the road along the southern boundary of the site. The site comprises generally flat undeveloped, undulating grassland with some trees along the boundaries. It is proposed to develop the site for a commercial end-use.
Fieldwork	Fieldwork comprised the excavation of 13No trial pits, drilling of 2No cable percussive boreholes and 5No cone penetration tests. The works were carried out in order to obtain information on the general ground, groundwater and hazardous ground gas conditions across the site. Gas and groundwater monitoring wells were installed in both boreholes and monitored. Samples of soil and groundwater were obtained and submitted to the laboratory for analysis.
Ground and Groundwater Conditions	Made ground topsoil was encountered to depths of between 0.10m bgl and 0.30m bgl, this typically comprised dark brown silty sand with rootlets, plastic was noted in TP206. Also, in TP206 a thin band (0.10m to 0.35m) of grey sandy gravel of limestone was encountered. Natural Tidal Flat Deposits were found to underlie the made ground. This comprised light greyish brown medium dense to dense sand, with frequent disseminated shell fragments. This was proven to a maximum depth of 14.45m bgl. Horizons of clay were noted during the investigation at three exploratory hole locations. The underlying bedrock was not encountered during the site investigation. No visual and olfactory evidence of potential hydrocarbon contamination (i.e. sheens or odours) was encountered during the site investigation. During the ground investigation, seepages were noted in the trial pits at depths of between 2.00m bgl and 2.90m bgl. Groundwater was also encountered in both cable percussive borehole at depths of between 1.90m bgl and 2.00m bgl.
Geotechnical and Engineering Assessment	**Foundations -** Any made ground/topsoil would be unsuitable for the support of structural loads due to variations in material properties. The shallow natural ground (medium dense sand) is considered suitable to support structural loads, through the use of a shallow foundation solution such as pads. An allowable bearing capacity of 100kN/m^2 will be available for total settlements of less than 25mm at approximately 1m bgl. Should higher loading be required, ground improvement may be considered to increase the bearing capacity of the underlying granular strata. Alternatively, a piled foundation solution should be adopted. **Earthworks -** There will be a requirement to import materials in order to create a suitable development platform. Any earthworks should be carried out in accordance with the Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks. **Ground Floor Construction -** Based on the nature of the shallow underlying natural ground, the construction of ground floor slabs on the natural granular strata should be considered. Any deleterious or soft material should be removed and replaced with properly compacted fill. Any earthworks should be designed to provide a suitable bearing capacity for the proposed ground floor slab. **Roads, Pavements and Hardstanding Surfaces -** CBR values of between 8.5% and 15.8% can be achieved in the natural granular material. It is recommended that a CBR value of 5% is adopted for these materials. Any earthworks/ground improvement works should be designed in order to provide a suitable CBR value for the proposed development. **Excavations -** Based on the nature of the made ground and underlying natural strata, it is considered likely that if excavations were left unsupported, then over time collapse would occur. If foundation excavations extend below the water table, then running sands may be encountered. **Obstructions -** No significant obstructions are anticipated. **Chemical Attack on Buried Concrete -** It is recommended that concrete should be designed to Aggressive Chemical Environment for Concrete (ACEC) Design Sulphate Class DS-1 and ACEC Class AC-1, based on mobile ground conditions.
Environmental Risk Assessment	Based on the above environmental risk assessment, no active potential pollutant linkages have been identified. The site should therefore be considered to pose negligible risk to human health and controlled waters with respect to soil, groundwater and hazardous ground gases.
This sheet is intended as a summary only of the assessment of the site in relation to ground condition. It does not provide a definitive engineering analysis.	

1.0 INTRODUCTION

1.1 Instruction

JPG (Leeds) Limited has been instructed by Commercial Development Projects Limited to carry out a geoenvironmental ground investigation for a proposed commercial development on Plot B at The Airfields, Deeside.

1.2 Objectives

The main objective of the geoenvironmental ground investigation was to identify potential geotechnical and environmental issues that may represent constraints to the proposed development of the site.

1.3 Scope of Works

The scope of the investigation included the following works:

- A description of the ground investigation works carried out, i.e. factual reporting.
- A detailed description of the ground conditions encountered.

Interpretative reporting, including:

- Assessment of potential contaminants using generic assessment criteria specific to the proposed end use.
- A (Tier 2) generic quantitative risk assessment (GQRA) using source-pathway-receptor linkages, including a hazardous ground gas risk assessment.
- An assessment of the classification of materials for disposal off-site (not including WAC testing).
- Engineering assessment to include recommendations with respect to foundations, earthworks, ground floor and pavement design.
- Comments on the likely requirements for remedial measures on the site, to address potential contamination and hazardous ground gas issues.
- Recommendations for further work where appropriate; and,
- Presentation of the findings in a tabular non-technical summary.

1.4 Location

Plot B forms part of a large mixed-use development at The Airfields, Deeside. It is proposed to develop this plot for a commercial end-use. The site is located in the northern part of The Airfields development, approximately 6km northwest of Chester; the approximate centre of Plot B is located at NGR 332560, 369979.

A site location plan is provided as Figure 1 in Appendix A.

1.5 Site Description and Topography

The site is irregular in shape and occupies an area of approximately 9.90 ha. Access to the site is via the road along the southern boundary of the site.

The site comprises generally flat undeveloped, undulating grassland with some trees along the boundaries.

Adjacent land use comprises a large commercial unit to the east with the Chester Millenium Greenaway and smaller commercial units within Deeside Industrial Estate to the north. Surrounding land to the south and west is currently undeveloped.

The site is bound by a wooden post and wire fence to the north, east and west, and by an access road to the south.

An aerial photograph of the site is provided as Figure 2 in Appendix A.

1.6 Development Proposals

It is proposed to develop the site for a commercial end-use.

At the present time, no fixed development plan has been provided.

1.7 Previous Reports

JPG have carried out extensive investigative and remedial works across The Airfields development. A plot specific desk study report has been produced for Plot B this is referenced below.

- JPG (Leeds) Limited. Geoenvironmental Desk Study Report. Plot B, The Airfields, Deeside. Report Ref. 4671-JPG-XX-XX-RP-G-0645-S2-P01. Dated June 2022 for Commercial Development Projects Limited.

1.8 Limitations

The general limitations to the nature of the investigation are outlined in Appendix G.

2.0 FIELDWORK

The intrusive investigation was designed to provide information on the general ground, groundwater, and hazardous ground gas conditions across the site.

Gas and groundwater monitoring wells were installed in both cable percussion boreholes and monitored in order to assess the hazardous ground gas and groundwater regime beneath the site.

2.1 Fieldwork

Fieldwork was carried out between 20 August and 29 August 2018. The works undertaken are summarised in Table 2.1 below.

Table 2.1 – Summary of Ground Investigation Works

Investigation Method	No of Positions	Maximum Depth (m bgl)	Monitoring Wells	Monitoring
Trial Pits	13 (TP205 – TP209, TP218 – TP219, TP226 – TP228 and TP232 – TP234)	3.10	-	-
Cable Percussive Boreholes	2 (CP205 – CP206)	14.45	2 x 50mm	GG and WL
Cone Penetration Testing	5 (CPT205 – CPT206 and CPT210 – CPT212)	15.00	-	-

bgl – below ground level
GG – ground gas monitoring (methane, carbon dioxide, oxygen, hydrogen sulphide, gas flow and atmospheric pressure using a portable gas meter)
WL – standing groundwater level using an electric contact dip meter

The ground investigation was undertaken in general accordance with the techniques outlined in BS5930: 2015+A1: 2020 Code of Practice for Site Investigations.

Exploratory hole positions are shown on the exploratory hole location plan provided in Appendix A. The exploratory hole records are provided in Appendix B.

The investigation was carried out under the supervision of an engineer from JPG.

2.2 Surveying

Exploratory locations were surveyed using Leica GPS equipment (accuracy +/- 10mm). The surveyed positions were then transferred onto the survey drawing.

3.0 LABORATORY TESTING

3.1 Chemical Analysis

The chemical analysis suite was designed to:

- Characterise near surface contamination levels to provide an assessment of the risks associated with direct contact with soils on site in its current state.
- Provide information on the general contamination concentrations in the various strata across the site.
- Provide information on the solubility of contaminants and therefore the potential for impact on controlled waters; and
- Provide information on the quality of shallow groundwater beneath the site.

Chemical testing was carried out for the following determinands by Derwentside Environmental Testing Services Limited (DETS) in County Durham. Chemical analysis certificates are presented in Appendix C.

Soils – General
Selected samples of soil were analysed for the following potential contaminants on a total concentration basis:

Arsenic	Mercury	Copper
Cadmium	Lead	Nickel
Chromium	Zinc	Selenium
Cyanide (free)	Phenol	

Speciated Poly Aromatic Hydrocarbons (PAH)
Sulphate (water soluble) and pH
Asbestos Screen
Soil Organic Matter

In addition, the samples were also submitted for the following analysis:

- Hexavalent chromium, total chloride, total sulphate, total sulphide and ammoniacal nitrogen.

Soil Leachate and Groundwater
Selected samples of soil leachate and groundwater were analysed for the following contaminants:

Arsenic	Mercury	Copper
Cadmium	Lead	Nickel
Chromium	Zinc	Selenium
Cyanide (free)	Phenol	

Speciated Poly Aromatic Hydrocarbons (PAH)
Sulphate and pH

3.2 Geotechnical Testing

In-situ standard penetration tests (SPT's) were performed in both of the cable percussive boreholes. The results are presented on the exploratory hole logs provided in Appendix B.

Laboratory geotechnical testing was carried out in order to determine the physical characteristics of the substrata and comprised the following:

- Moisture content.
- Calculation of maximum/minimum dry density and particle density testing in order to determine the compaction properties of the soils.
- Particle size distributions (PSD)/sedimentations to confirm the field descriptions of the soils encountered.
- California Bearing Ratio (CBR) tests (2.5kg, unsoaked) to determine the bearing characteristics of the material; and
- Organic content, water soluble sulphate, water-soluble chloride, pH, total sulphur and total sulphate.

The geotechnical testing was carried out in accordance with BS1377:1990, "Methods of Test for Soils for Civil Engineering Purposes". The results of the geotechnical testing (which include the results for the adjacent Plot C) are provided in Appendix D.

4.0 GROUND AND GROUNDWATER CONDITIONS

4.1 Introduction

The ground and groundwater conditions encountered during the investigation were generally consistent with the anticipated sequence of strata indicated by the previous ground investigations.

4.2 Ground Conditions

Made Ground
Made ground topsoil was encountered to depths of between 0.10m bgl and 0.30m bgl. The made ground topsoil typically comprised dark brown silty sand with rootlets, plastic was noted in TP206. Also, in TP206 a thin band (0.10m to 0.35m) of grey sandy gravel of limestone was encountered.

Natural Strata - Granular
Natural Tidal Flat Deposits were found to underlie the reworked topsoil and made ground at all exploratory locations. The underlying natural deposits consisted of granular light greyish brown medium dense to dense sand, with frequent disseminated shell fragments. The granular strata was encountered to a maximum depth of 14.45m bgl.

Natural Strata – Cohesive
Horizons of clay were noted during the investigation at three exploratory hole locations. Generally, the cohesive natural strata was identified as lenses and thick laminations at depths of between 0.30m and 1.50m bgl.

The underlying bedrock was not encountered during the site investigation, all exploratory holes terminated within the underlying dense sand.

4.3 Visual and Olfactory Evidence of Hydrocarbon Contamination

No visual and olfactory evidence of potential hydrocarbon contamination (i.e. sheens or odours) was encountered during the site investigation.

4.4 In-Situ Testing

The results of the in-situ penetration testing have been plotted against depth (m bgl). The results have been corrected in accordance with the energy ratio of the testing equipment.

The plot is presented as Figure 3 in Appendix A and the SPT data (uncorrected) is included on the exploratory hole logs contained in Appendix B.

The results show a correlation of increasing strength/density with depth.

Cone Penetration Testing

5No. cone penetration tests (CPTs) were carried out across Plot B to a maximum depth of 15.00m bgl. A combined CPT/magnetometer was used.

Testing was carried out with a 20.5-tonne tracked-truck mounted CPT unit and was carried out in general accordance with BS ISO 22476-1:2012.

The testing generally indicated 'clean sand to silty sand' ranging from medium dense to dense, the density increasing with depth. The equivalent N values correlate well with the values obtained in the cable percussive boreholes.

The probes extended to depths of between 14.78m and 15.00m. It is assumed that the CPTs terminated within the dense sands.

The results of the cone penetration testing (which include the results for the adjacent Plot C) are provided in Appendix F.

4.5 Geotechnical Laboratory Testing

Six samples of granular natural ground were submitted for moisture content testing. The results are summarised in Table 4.5.1 below.

Table 4.5.1 – Summary of Moisture Content Testing

Material	Moisture Content (%)	
	No of samples	Range
Granular Natural Ground	6	19-28

Particle size distribution testing was carried out on four samples in order to confirm the field descriptions of the materials and determine the proportion of clay/silt minerals in the material. The results are summarised in Table 4.5.2 below.

Table 4.5.2 – Summary of Particle Side Distribution/Sedimentation Testing

Trial Pit	Depth (m bgl)	Material	Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
TP208	2.00	Sand	0	0	67	32	1
TP219	0.50 – 1.00	Sand	0	0	66	31	3
TP228	0.90 – 1.00	Sand	0	0	95	5	
TP233	0.60	Sand	0	0	70	28	2

One sample of natural granular material was submitted for particle density testing. A particle density of 2.66 Mg/m^3 was recorded.

Three samples of natural granular material were submitted for maximum and minimum dry density testing. The test results indicated that the materials could achieve a maximum dry density of 1.59 Mg/m^3 and 1.60 Mg/m^3 and a minimum dry density of 1.34 Mg/m^3 and 1.35 Mg/m^3.

Three samples of natural granular material were submitted for California Bearing Ratio testing, the samples were compacted with a 2.5kg rammer. The results are summarised in Table 4.5.3 below.

Table 4.5.3 – Summary of California Bearing Ratio Testing

Exp. Hole	Depth (m bgl)	Material	Initial Moisture Content (%)	CBR Value (%)	
				Top	Base
TP219	0.50 – 1.00	Sand	24	8.5	9.4
TP228	0.90 – 1.00	Sand	25	12.6	15.8
TP233	0.50 – 1.00	Sand	20	12.8	14.3

* To report a CBR average, the results for the top and base must be within 10%.

The results indicate CBR values of between 8.5% and 15.8% can be achieved in the natural granular material.

Groundwater

During the ground investigation, seepages were noted in the trial pits at depths of between 2.00m bgl and 2.90m bgl. Groundwater was also encountered in both cable percussive borehole at depths of between 1.90m bgl and 2.00m bgl.

Gas and groundwater monitoring wells were installed in both exploratory holes. Both of the monitoring wells were sealed in the natural ground. A summary of the monitored groundwater levels is provided in Table 4.5.4.

Table 4.5.4 – Summary of Monitored Groundwater Levels

Location	Water Level During Monitoring (m bgl)					
TIDE	N/A	Low	Low	N/A	N/A	High
CP205	1.51	1.55	1.58	1.45	1.40	1.28
CP206	1.73	1.63	1.63	1.76	1.77	1.47

Groundwater monitoring has been carried out on six occasions. Both monitoring wells were installed and sealed within the tidal flat deposits (water-bearing sands). Groundwater monitoring has been carried out on six occasions. Given the proximity of the site to the River Dee estuary, some groundwater monitoring visits were targeted at reported high and low tide times for Connah's Quay, to assess if the groundwater was tidally influenced.

The groundwater levels remained fairly consistent. However, slightly higher groundwater levels were recorded on the final visit which coincided with a high tide.

It should be noted that the groundwater conditions recorded are based on observations made at the time that site work was carried out. Groundwater levels are likely to vary owing to seasonal and weather-related effects.

4.6 Ground Gas

Ground gas monitoring has been undertaken on six occasions. The works were carried out using a portable gas meter in accordance with the standard JPG methodology and included measurements of methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, gas flows and atmospheric pressure.

The results of the gas monitoring are presented in Appendix E and are discussed in Section 6 of this report.

5.0 GEOTECHNICAL AND ENGINEERING ASSESSMENT

5.1 Development Proposals

It is proposed to develop the site for a commercial end-use.

At the present time, no fixed development plan has been provided.

5.2 Foundations

The ground conditions at the site typically comprise made ground of topsoil to a maximum depth of 0.30m bgl, underlain by Tidal Flat Deposits, generally comprising medium dense (1-5m bgl) to dense sands (>5m bgl) confirmed to a maximum depth of 15.00m bgl. The base of the Tidal Flat Deposits was not proven as part of this investigation and hence the depth to bedrock was not confirmed below the site.

Any made ground/topsoil would be unsuitable for the support of structural loads due to variations in material properties. If shallow spread foundations were to be used, the underlying materials would become overstressed, leading to significant settlements. It is therefore recommended that foundation loads are transferred to natural strata of suitable bearing capacity.

The shallow natural ground (medium dense sand) is considered suitable to support structural loads, through the use of a shallow foundation solution such as pads. An allowable bearing capacity of 100kN/m^2 will be available for total settlements of less than 25mm at approximately 1m bgl.

Given the shallow groundwater level, excavations extending below the groundwater level may cause a decrease in allowable bearing pressure and increased difficulties relating to groundwater control and excavation stability.

Should higher loading be required, ground improvement may be considered to increase the bearing capacity of the underlying granular strata. Any ground improvement method would have to consider the high groundwater table and the potential for dilation due to vibration. It is recommended that specialist ground improvement contractors are contacted to discuss possible methods that may be suitable on this site. Alternatively, a piled foundation solution should be adopted.

5.3 Earthworks

There will be a requirement to import materials in order to create a suitable development platform.

Any earthworks should be carried out in accordance with the Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks.

Proper selection and control of materials will be required during the earthworks. The materials should not be allowed to deteriorate, i.e. become wet, during excavation and compaction and must be sufficiently protected from traffic after placement.

5.4 Ground Floor Construction

Based on the nature of the shallow underlying natural ground, the construction of ground floor slabs on the natural granular strata should be considered.

Any deleterious or soft material should be removed and replaced with properly compacted fill.

Any earthworks should be designed to provide a suitable bearing capacity for the proposed ground floor slab.

5.5 Roads, Pavements and Hardstanding Surfaces

The results of laboratory testing indicate that CBR values of between 8.5% and 15.8% can be achieved in the natural granular material. Based on these results, it is recommended that a CBR value of 5% is adopted for these materials.

Any earthworks/ground improvement works should be designed in order to provide a suitable CBR value for the proposed development.

Materials with high fines content will deteriorate rapidly due to water ingress and tracking by construction plant. Adequate protection of formation levels will be required to maintain the strength of the material.

5.6 Excavations

Based on the nature of the made ground and underlying natural strata, it is considered likely that if excavations were left unsupported, then over time collapse would occur.

If foundation excavations extend below the water table, then running sands may be encountered. Excavations greater than 1.00m, e.g. for services/drainage may encounter standing water and/or running sands, especially if left open for prolonged periods. Groundwater control would be required in these circumstances.

Good working practice with respect to the drainage of excavations and formations will be required to protect materials. Any excavation for structural foundations must be covered without delay with blinding concrete to prevent softening by water.

The requirement for temporary support of excavations should be assessed on an individual basis and in any case, excavations of greater than 1.20m depth requiring man entry will require temporary support in accordance with HSE guidance. Alternatively, the sides of the excavation will need to be battered back for the safety of operatives. Guidance on safe batter slopes can be obtained from CIRIA Report 97 Trenching Practice.

5.7 Obstructions

Based on the findings of the ground investigation. No significant obstructions are anticipated.

5.8 Chemical Attack on Buried Concrete

Laboratory testing has been undertaken on samples of the made ground, natural strata, and groundwater to determine the sulphate content and acidity and hence the concrete class required for buried concrete.

Laboratory testing in the made ground recorded water-soluble sulphate contents ranging between 11mg/l and 21mg/l and pH values of between 7.3 and 8.0.

Laboratory testing in the natural ground recorded water-soluble sulphate contents ranging between 11mg/l and 230mg/l, pH values of between 8.3 and 8.9.

In the groundwater, a sulphate content of 27mg/l and a pH value of 8.0 were recorded.

The site has been assessed in accordance with BRE Special Digest 1:2005 'Concrete in Aggressive Ground'. Based on the history of the site, it has been assessed in accordance with the requirements for natural ground locations.

Foundations are likely to come into contact with made ground, natural strata and the underlying groundwater. On this basis it is recommended that concrete should be designed to Aggressive Chemical Environment for Concrete (ACEC) Design Sulphate Class DS-1 and ACEC Class AC-1, based on mobile ground conditions.

6.0 ENVIRONMENTAL RISK ASSESSMENT

6.1 Introduction

The statutory definition of contaminated land is given in the Environmental Protection Act, Part IIA, Section 78, 1990, which was introduced by the Environment Act, Section 57, Department of Environment, 1995 and is defined as:

Land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:

- Significant harm is being caused or there is a significant possibility of such harm being caused (where harm is defined as harm to health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property); and/or
- Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused (by the land).

The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists. The potential for harm to occur requires three conditions to be satisfied:

- **Sources** – The presence of substances (potential contaminants/pollutants), in or under the ground, that may cause harm or pollution.
- **Receptors** - The presence of a receptor which may be harmed, e.g. the water environment or humans, buildings, fauna and flora; and
- **Pathway** - The existence of a linkage between the Source and the Receptor.

In summary, the presence of measurable concentrations of contaminants within the ground and subsurface environment does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and an unacceptable risk of harm to available receptors.

The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the sensitivity of the intended end use of the site and the sites characteristics and environmental setting.

Legislation and guidance on the assessment of contaminated sites acknowledges the need for a tiered risk-based approach. This is set out in the Environment Agency's manual *Land contamination: risk management* (published in October 2020 and last updated on 19 April 2021) and comprises the following stages of risk assessment:

Tier 1: Preliminary risk assessment (PRA)	As part of this assessment, the overall site objectives are defined. Current and historical information about the site and the potential contaminants expected to be present are assessed and an outline conceptual model (CM) is developed. The risks are assessed qualitatively, and the findings reported in the PRA (or desk study). The report recommends what further works would be required in order to assess whether the site is suitable for its proposed use.
Tier 2: Generic quantitative risk assessment (GQRA)	The GQRA uses Generic Assessment Criteria and a standard set of generic assumptions based on specific end uses in order to assess the risks to receptors. It includes the collection of more detailed information including laboratory analysis of soil and water samples in order to inform and assess the risks.
Tier 3: Detailed quantitative risk assessment (DQRA)	If pollutant linkages are confirmed as part of the GQRA, these are known as relevant pollutant linkages (RPLs) and further detailed assessment is required. At this tier, detailed site-specific information is collected to estimate the risk or to develop site-specific assessment criteria (SSAC). This may include collecting information about the receptor.

A Tier 1 Assessment has been prepared for the site by JPG and reported in the Geoenvironmental Desk Study Report, referenced 4671-JPG-XX-XX-RP-G-0645-S2-P01. Dated June 2022 for Commercial Development Projects Limited.

This environmental risk assessment undertaken by JPG constitutes a Tier 2 Generic Quantitative Risk Assessment (GQRA) and has been carried out in accordance with the Environment Agency's *Land contamination: risk management guidance*.

6.2 Assessment Approach

The results of the chemical analysis for each determinand will be assessed against their respective GAC.

Human Health

These include the LQM/CIEH Suitable 4 Use Levels (S4UL) and Category 4 Screening Levels (C4SL) which were developed using the UK Contaminated Land Exposure Assessment (CLEA) Framework Documents and Software.

The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model (referred to as generic land use scenarios) for site conditions and human behaviour, to estimate child and adult exposures to soil contaminants for those living, working and/or playing on contaminated sites over long time periods.

The S4UL and C4SL screening levels have been derived for a variety of land uses including residential, allotments, commercial and public open space.

In the absence of S4UL and C4SL for potential contaminants, appropriate alternative GAC will be used.

Controlled Waters
The leachate and groundwater chemical test results have been compared against Generic Assessment Criteria (GAC) threshold values based on Drinking Water Standards and the Water Framework Directive threshold values.

In the absence of Drinking Water Standards GAC and Water Framework Directive thresholds, appropriate alternative GAC will be used.

An exceedance of a threshold value does not directly imply there is an unacceptable risk, however, it indicates that the exceedance should be further assessed via the qualitative source-pathway-receptor approach.

6.3 Evaluation of Soil Analysis

Initially, the results of the chemical analysis for each potential contaminant will be compared directly with their respective GAC. Based on the current development proposals for the site, i.e. commercial, the results of the chemical analysis for the soil samples have been assessed against GAC for a commercial end use.

If any significant exceedances of the GAC are noted, then the results will be subject to statistical analysis if appropriate. An outline of the methodology of the statistical analysis is presented in Appendix C.

Seven samples, comprising six of topsoil and one of shallow natural ground were submitted for chemical analysis. A summary of the results is provided below.

Human Health - Soils
The results have been compared directly with their respective GAC and are summarised in Table 6.3.1.

Table 6.3.1 – Summary of Chemical Analysis for Soil Samples

Determinand	GAC for Commercial End Use (mg/kg)	Sample Mean (mg/kg)	Range of Results (mg/kg)	Do any samples exceed the GAC?
Metals and Metalloids				
Arsenic	640(2)	10.40	5.1 to 13	No
Cadmium	190(2)	0.44	0.1 to 0.6	No
Chromium	8600(1)	15.79	9.5 to 19	No
Hexavalent Chromium	33(2)	<1.0	All <1.0	No
Copper	68000(1)	13.17	5.2 to 18	No
Lead	2330(2)	87.86	24 to 140	No
Mercury (Inorganic)	58(1)	0.07	0.05 to 0.10	No
Nickel	980(1)	12.13	7.9 to 16	No
Selenium	12000(1)	0.61	0.5 to 0.9	No
Zinc	730000(1)	148.57	40 to 190	No
Inorganics				
Cyanide (free)	20(2)	0.17	0.1 to 0.3	No
Phenols				
Total Phenols	440(1)	0.36	0.3 to 0.6	No
Poly Aromatic Hydrocarbons				
Naphthalene	190(1)	<0.1	All <0.1	No
Acenaphthylene	83000(1)	<0.1	All <0.1	No
Acenaphthene	84000(1)	<0.1	All <0.1	No
Fluorene	63000(1)	<0.1	All <0.1	No
Phenanthrene	22000(1)	<0.1	All <0.1	No
Anthracene	520000(1)	<0.1	All <0.1	No
Fluoranthene	23000(1)	<0.1	All <0.1	No
Pyrene	54000(1)	<0.1	All <0.1	No
Benzo(a)anthracene	170(1)	<0.1	All <0.1	No
Chrysene	350(1)	<0.1	All <0.1	No
Benzo(b)fluoranthene	44(1)	<0.1	All <0.1	No
Benzo(k)fluoranthene	1200(1)	<0.1	All <0.1	No
Benzo(a)pyrene	35(2)	<0.1	All <0.1	No
Indeno(123-cd) pyrene	500(1)	<0.1	All <0.1	No
Dibenzo(ah)anthracene	3.5(1)	<0.1	All <0.1	No
Benzo(ghi)perylene	3900(1)	<0.1	All <0.1	No

(1) S4UL
(2) C4SL
*** BASED ON 1% SOM**

None of the determinands were detected at concentrations in excess of their respective GAC.

All seven samples were submitted for an asbestos screen, no asbestos was detected in any of the samples submitted.

Evaluation of Controlled Waters Analysis

One sample of topsoil was submitted for leachability analysis. The results for each determinand were compared directly with their respective GAC, the results are summarised in Table 6.3.2.

Table 6.3.2 – Summary of Leachability Results

Determinand	GAC (µg/l)	TP227 (0 – 0.3m)
Arsenic	10 (1)	0.49
Cadmium	5 (1)	<0.03
Chromium	50 (1)	<0.25
Copper	2000 (1)	2.3
Lead	10 (1)	0.40
Mercury	1 (1)	<0.01
Nickel	20 (1)	<0.5
Selenium	10 (1)	<0.25
Zinc	5000 (1)*	2.1
pH	6.5-9.5	8.0
Cyanide Free	50 (1)	<20
Sulphate	250,000	600
Naphthalene	4.24 (2)	0.13
Anthracene	0.193 (2)	<0.01
Fluoranthene	0.0122 (2)	<0.01
Benzo(a)pyrene	0.1 (1)	<0.01
Sum of: Benzo (b) fluoranthene, Benzo (k) fluoranthene, Indeno (1,2,3-c,d) pyrene, and; Benzo (g,h,i) perylene	0.1 (1)	<0.04
Phenol	14.9 (2)	<0.50

(1) Water Supply (Water Quality) Regulations *Historical 1989 Threshold Value.
(2) Water Framework Directive 2015, Surface Water, Maximum Threshold Value.

No concentrations were recorded in excess of their respective GAC.

One sample of groundwater was submitted for chemical analysis. The results for each determinand were compared directly with their respective GAC. The results are summarised in Table 6.3.3.

Table 6.3.3 – Summary of Groundwater Results

DETERMINAND	GAC (µg/l)	CP206 1.47m
Metals and Metalloids		
Arsenic	50(1)	1.7
Cadmium	5(1)	< 0.03
Chromium (total)	50(1)	< 0.25
Copper	2000(1)	1.3
Lead	10(1)	< 0.09
Mercury	1(1)	< 0.01
Nickel	20(1)	1.1
Selenium	10(1)	< 0.25
Zinc	5000(1)	13
Inorganics		
Cyanide (Free)	50(1)	<20
Sulphate as SO_4	250,000(1)	27,000
pH	6.5-9.5(1)	8.0
PAHs		
Naphthalene	4.24(2)	<0.05
Anthracene	0.193(2)	<0.01
Fluoranthene	0.0122(2)	0.02
Benzo(a)pyrene	0.01(1)	<0.01
Sum of: Benzo (b) fluoranthene, Benzo (k) fluoranthene, Indeno (1,2,3-c,d) pyrene, and Benzo (g,h,i) perylene.	0.1 (1)	<0.04
Phenols		
Phenol	14.9(2)	<0.50

(1) Water Supply (Water Quality) Regulations *Historical 1989 Threshold Value.
(2) Water Framework Directive 2015, Surface Water, Maximum Threshold Value.

A slightly elevated concentration of fluoranthene was recorded.

None of the other determinands were detected at concentrations in excess of their respective GAC.

6.4 Evaluation of Hazardous Ground Gases

Based on the desk study information, it is considered that the site is low risk with respect to the presence of hazardous ground gases on the site.

In order to assess the potential risks posed to the proposed development from hazardous ground gases monitoring wells were installed in both of the cable percussion boreholes.

6.5 Summary of Results

The results of the hazardous ground gas monitoring are presented on the site visit record sheets in Appendix E and are summarised below:

- Maximum peak and steady methane (CH4) concentrations of 0.2% v/v were recorded in CP205 and CP206 during fifth monitoring visit
- A maximum peak carbon dioxide (CO2) concentration of 0.9% v/v and a maximum steady carbon dioxide (CO2) concentration of 0.4% v/v were recorded in CP205 during the first visit.
- No reduced oxygen concentrations (i.e. <16% v/v) were recorded.
- No elevated concentrations of hydrogen sulphide or carbon monoxide were recorded.
- A maximum peak flow of 0.3 l/hr was recorded in CP205 during the fifth monitoring visit. No other peak or steady flows in excess of 0.1 l/hr were recorded.

Two of the monitoring visits were carried out during a period of regionally falling atmospheric pressure, two were carried out during periods of regionally steady atmospheric pressure and two during rising atmospheric pressure. Barometric pressures during the monitoring period ranged between 1014mB and 1032mB.

6.6 Requirements for Gas Protection Measures

The results of the hazardous ground gas monitoring have been assessed in accordance with the following:

- BS8485:2015+A1:2019, 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

Based on worst case conditions (i.e. maximum peak methane/maximum peak flow and maximum steady carbon dioxide/maximum steady flow) gas screening values of 0.0006 l/hr and 0.0004 l/hr have been calculated for methane and carbon dioxide respectively.

Based on the results of the gas monitoring and the calculated GSVs the site would be classified as Characteristic Situation (CS) 1 in accordance with BS8485:2015+A1:2019.

6.7 Radon Risk

The Building Research Establishment publication BR211 states that the site is in a radon affected area, as between 1% and 3% of the homes are above the action level for radon gas. However, basic radon protective measures will not be necessary in the construction of new dwellings or extensions.

6.8 Summary of Potential Sources, Pathways and Receptors

Potential Sources
Based on the results of the analysis carried out, the following potential sources of contamination are considered to be present on the site:

- Slightly elevated concentration of fluoranthene in the groundwater.

Potential Pathways
Based on the available information and the anticipated redevelopment of the site for a commercial end use, the following potential exposure pathways will require consideration, both during the redevelopment works and on completion of the construction:

- Migration of potential contaminants into surface water and groundwater via surface water flow/infiltration and groundwater flow.

Potential Receptors
The potential receptors are considered to be:

- Controlled waters, i.e. surface waters and the underlying aquifers (Superficial Deposits Secondary A Aquifer, Bedrock Secondary A/Principal Aquifer)

6.9 Source – Pathway – Receptor Linkages

Based on the above sources, pathways and receptors, the following linkage assessments have been considered.

This assessment is based on current site conditions (unless stated) and does not consider exposure pathways following any remediation of the site.

Controlled waters, i.e. surface waters and the underlying aquifers (Superficial Deposits Secondary A aquifer, Bedrock Secondary A/Principal aquifer).

- Slightly elevated concentrations of fluoranthene in the groundwater.

An assessment of risk to controlled waters should also consider the assessment criteria and the environmental setting of the site, which are summarised below:

- The Water Supply (Water Quality) Regulations, from which many of the GAC for leachate/groundwater have been derived are based on the concentrations of potential contaminants at the point of use, i.e. consumers' taps. The adoption of this assessment criteria is considered to be conservative when applied to an assessment of risks to controlled waters.
- The proposed development is likely to comprise a large building, with associated areas of hardstanding and smaller areas of soft landscaping. The building and hardstanding will be impermeable, thereby reducing infiltration and limiting the potential for the generation of leachate and mobilisation of potential contaminants.

- The are no potable water abstractions within 2km of The Airfields development.
- The site does not lie within 500m of an Environment Agency Groundwater Source Protection Zone.

Based on the above factors, it is concluded that the risk to controlled waters is negligible.

6.10 Conceptual Site Model & Risk Rating

Based on the above environmental risk assessment, no active potential pollutant linkages have been identified.

The site should therefore be considered to pose negligible risk to human health and controlled waters with respect to soil, groundwater and hazardous ground gases.

6.11 Mitigation Measures

Although no sources of contamination have been identified on the site, consideration should be given to implementing the following mitigation measures for development and maintenance workers:

- Site workers involved in groundworks should use appropriate PPE, i.e. overalls and gloves and if appropriate, facemasks. Appropriate health and safety measures, e.g. washing hands prior to eating or drinking, should also be enforced.
- During development of the site, all workers should remain vigilant to the possible risk of encountering areas of potentially contaminated material. Should potentially contaminated material be encountered, site management should be informed. Further testing may then be required to assess the risk to health and safety of the site workers and the environment.
- Site workers involved in groundworks should take the necessary measures to ensure that all works in excavations and confined spaces are carried out in accordance with best practice.
- All employers involved in works at the site should produce an appropriate method statement and risk assessment, to which all employees should comply. Reference should also be made to appropriate HSE and other guidance for working on contaminated and potentially contaminated sites.

6.12 Classification of Materials for Disposal Offsite

Seven samples comprising six of made ground topsoil and one of natural ground were assessed using HazWasteOnline™ in order to determine the classification of the material for disposal off-site.

Based on the results of the chemical analysis, all samples can be classified as non-hazardous.

Details of the classification generated by HazWasteOnline[tm] are provided in Appendix C.

The results of the chemical analysis and the waste classification should be forwarded to the landfill operator to confirm this assessment and provide a price for disposal.

Appendix A Drawings and Figures

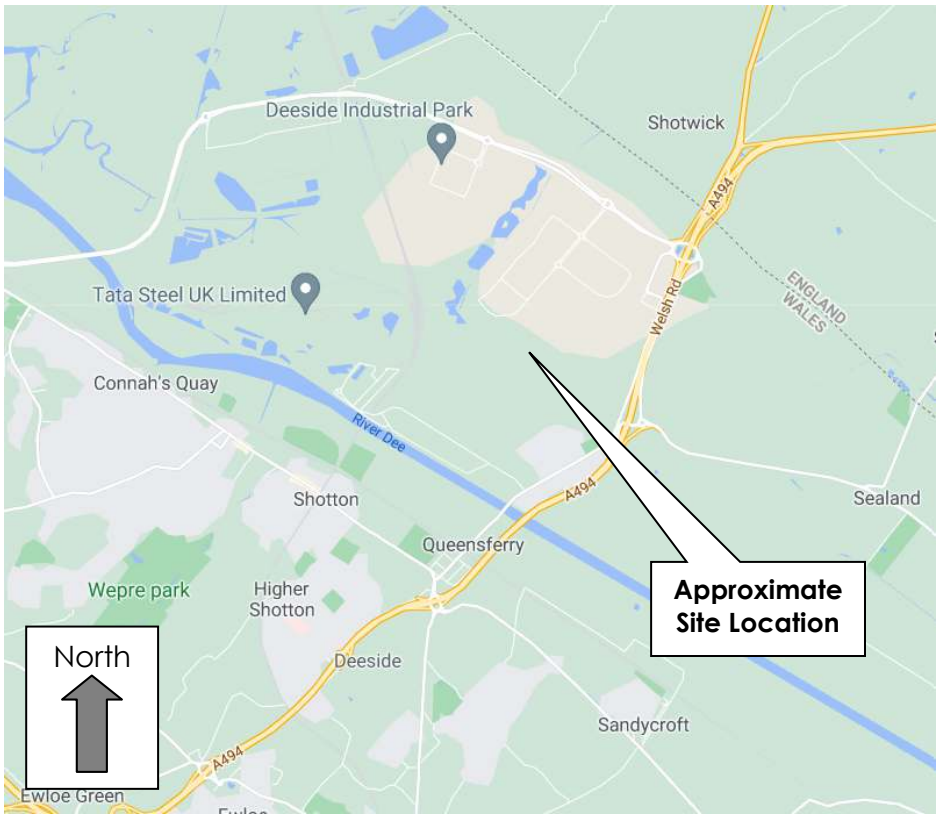
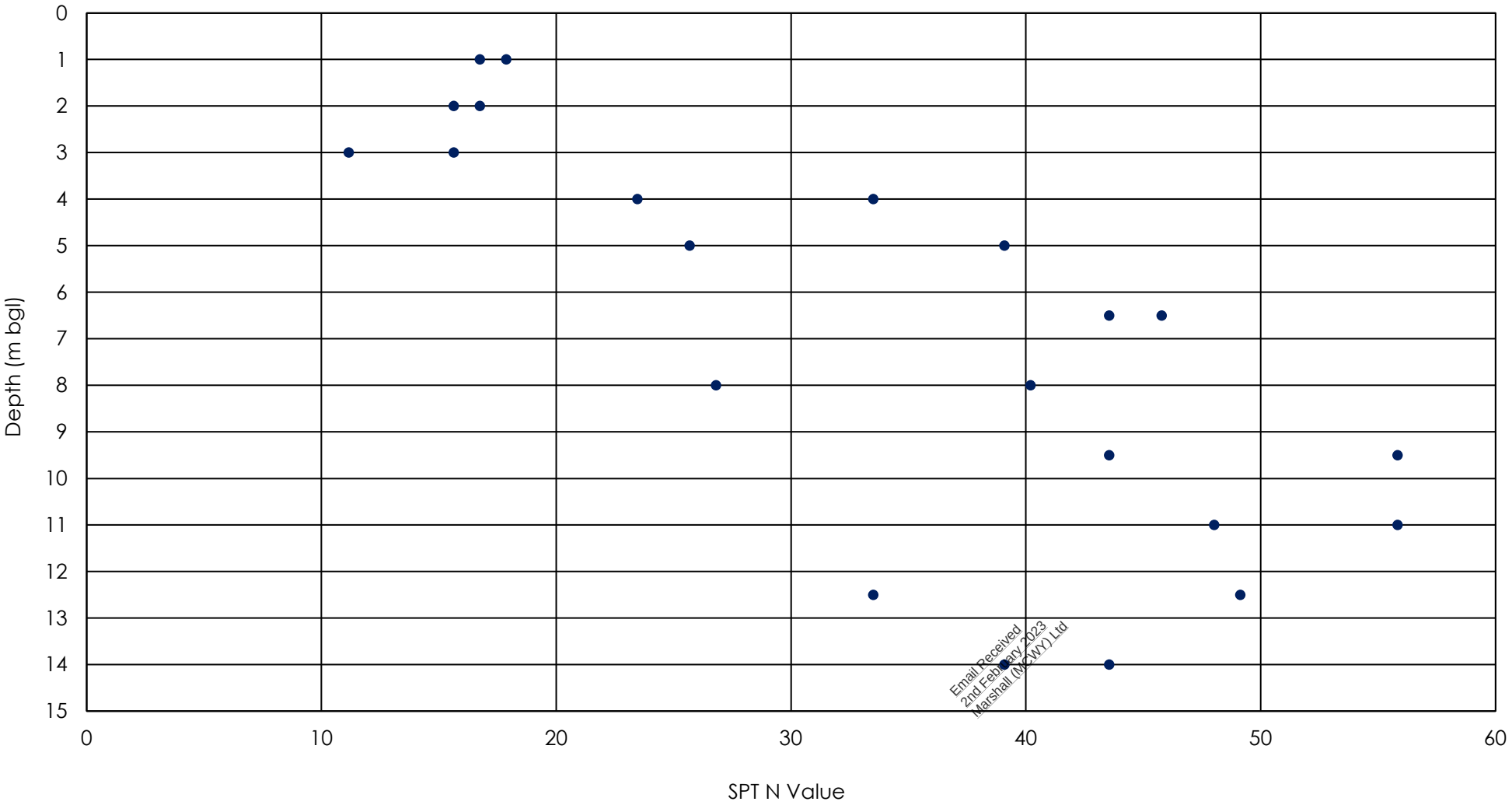


Figure 1 – Site Location Plan	
Site	**Plot B, The Airfields, Deeside**
Client	**Commercial Development Projects Limited**
Job Number	**4671**
Scale	**NTS**

Figure 2 – Aerial Photograph	
Site	**Plot B, The Airfields, Deeside**
Client	**Commercial Development Projects Limited**
Job Number	**4671**
Scale	**NTS**

Figure 3: Natural Ground - SPT N Value (corrected) vs Depth (m bgl)



DO NOT SCALE (A1)

NOTES

EHLP DATA

RAW DESC.	EASTING	NORTHING	LEVEL
CP205	332515.371	369952.824	4.554m
CP206	332736.520	370058.265	4.738m
CPT205	332523.000	369946.000	4.587m
CPT206	332746.000	370060.000	4.883m
CPT210	332492.000	370078.000	4.522m
CPT211	332724.000	369969.000	4.710m
CPT212	332583.000	370008.000	4.732m
TP205	332396.418	370121.190	4.025m
TP206	332544.623	370132.225	4.742m
TP207	332708.000	370093.000	4.439m
TP208	332588.323	370079.110	4.479m
TP209	332466.591	370088.772	4.291m
TP218	332533.000	369998.000	4.651m
TP219	332390.954	370032.215	4.522m
TP226	332458.640	369960.127	4.670m
TP227	332579.188	369945.506	4.569m
TP228	332721.267	369941.739	4.712m
TP232	332504.182	369881.661	4.584m
TP233	332594.512	369856.278	4.432m
TP234	332705.539	369837.907	4.495m

EHLP LEGEND

- CP — CABLE PERCUSSIVE BOREHOLE
- CPT — CONE PENETRATION TEST
- TP — TRIAL PIT

0m 25m 50m

SCALE 1:1000

P01	FIRST ISSUE.	10/06/22	RMR	JAC
REV	DESCRIPTION	DATE	CHK	BY

Project
THE AIRFIELDS, DEESIDE

Drawing Title
PLOT B
EXPLORATORY HOLE LOCATION PLAN

Email Received
2nd February 2023
Marshall (MCWM) Ltd

INFORMATION ISSUE

JPG
www.jpg.group
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4671-JPG-ZZ-ZZ-DR-G-1100 | S2 | P01

Appendix B Exploratory Hole Logs

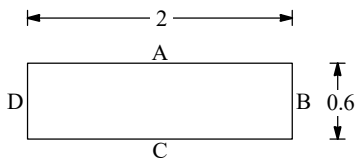
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP205
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	21-08-18 21-08-18	4.01	E 332,396.4 N 370,121.2	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.20	ES			3.81		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
						(1.20)	Light brown moist silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				2.61		1.40			
						(1.20)	Dark grey moist slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				1.41		2.60	2.50 … groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable 0.6m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2.5m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

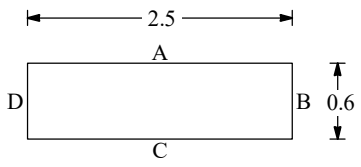
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP206
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.76	E 332,544.6 N 370,132.2	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.66		0.10	MADE GROUND. Dark brown silty SAND with rootlets and plastic fragments. Sand is fine to medium. (TOPSOIL)		
				4.41		(0.25) 0.35	MADE GROUND. Light grey sandy GRAVEL. Gravel is angular to subangular of limestone. (SUB-BASE TYPE MATERIAL)		
0.50-0.60	ES					(1.25)	Light orangish brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 0.35 … piece of fabric membrane.		
				3.16		1.60			
						(1.50)	Dark grey slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.00 … groundwater seepage. 2.90 … groundwater seepage.		
				1.66		3.10			
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable 0.35m bgl



Email Received 2nd February 2023 Marshall (MCWV) Ltd

GENERAL REMARKS

Groundwater seepage encountered at 2m and 2.9m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

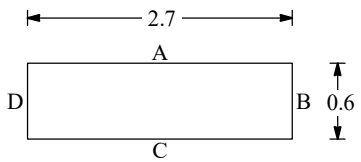
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP207
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.44	E 332,708.0 N 370,093.0	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.20	ES			4.24		(0.20) 0.20	MADE GROUND. Dark brown slightly gravelly silty SAND with rootlets. Sand is fine. Gravel is angular, of ceramics. (TOPSOIL)		
				3.14		(1.10) 1.30	Light orangish brown silty SAND. Sand is fine to medium. Assessed as very loose as very easy to excavate with a spade. (TIDAL FLAT DEPOSITS)		
				2.14		(1.00) 2.30	Dark and light grey slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.00 … groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable from 1m bgl



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GENERAL REMARKS

Groundwater seepage encountered at 2m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

TP VOG V9 4671 AIRFIELDS DEESIDE PLOTS B & C.GPJ GINT STD AGS 3_1.GDT 11/12/18

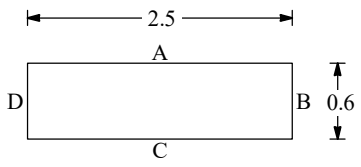
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP208
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.49	E 332,588.3 N 370,079.1	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.29		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
						(1.20)	Orangish brown mottled grey silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				3.09		1.40			
						(0.80)	Dark and light grey moist silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
2.00	D						2.00 … groundwater seepage.		
				2.29		2.20	… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable from 0.4m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

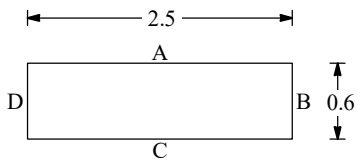
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP209
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.30	E 332,466.6 N 370,088.8	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.00		(0.30) 0.30	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
				3.10		(0.90) 1.20	Light orangish brown moist silty SAND. Sand is fine to medium. Assessed as loose as fairly easy to excavate with a spade. (TIDAL FLAT DEPOSITS)		
1.60	D			1.50		(1.60) 2.80	Dark grey moist organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.00 … groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable from 0.4m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

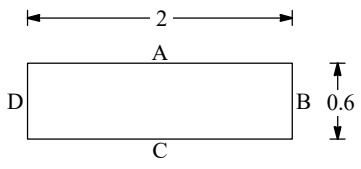
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP218
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	21-08-18 21-08-18	4.66	E 332,533.0 N 369,998.0	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.20	ES			4.46		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
						(1.40)	Light orangish brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				3.06		1.60			
						(1.00)	Dark grey moist slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.20 … becoming light grey and no longer organic.		
				2.06		2.60	2.50 … groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable from 1m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2.5m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

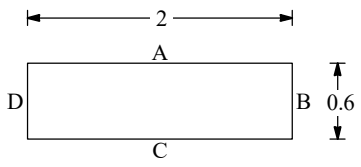
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP219
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	21-08-18 21-08-18	4.58	E 332,391.0 N 370,032.2	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.38		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
0.50-1.00	B					(1.50)	Light orangish brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				2.88		1.70			
						(0.90)	Grey moist silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				1.98		2.60			
							… groundwater seepage.		

Shoring/Support: None
Stability: Sides unstable from 0.2m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2.6m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

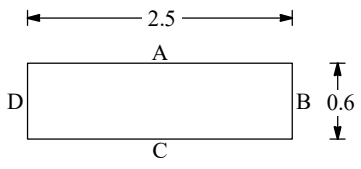
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP226
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.66	E 332,458.6 N 369,960.1	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.41		(0.25) 0.25	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
						(1.75)	Light orangish brown moist silty SAND. Sand is fine to medium. [Tidal Flat Deposit]		
				2.66		2.00			
				2.16		(0.50) 2.50	Light grey moist silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.00 … groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable at 1.2m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

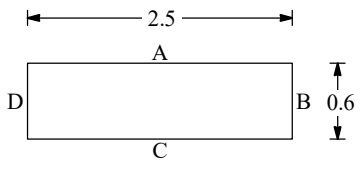
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP227
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.54	E 332,579.2 N 369,945.5	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.30	ES			4.24		(0.30) 0.30	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
				3.04		(1.20) 1.50	Light orangish brown silty SAND with occasioanal thick laminations of slightly sandy silty clay. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				1.74		(1.30) 2.80	Dark grey moist silty SAND with rare bivalve fragments. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
							… groundwater seepage.		

Shoring/Support: None
Stability: Sides unstable at 1m bgl



Email Received 2nd February 2023 Marshall (MCWV) Ltd

GENERAL REMARKS

Groundwater seepage encountered at 2.8m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

TP VOG V9 4671 AIRFIELDS DEESIDE PLOTS B & C.GPJ GINT STD AGS 3_1.GDT 11/12/18

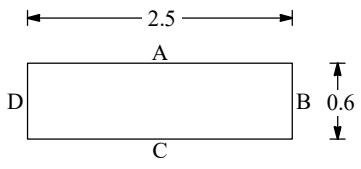
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP228
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.74	E 332,721.3 N 369,941.7	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.54		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
0.90-1.00	B			2.44		(2.10) 2.30	Light orangish brown silty SAND with rare bivalve fragments. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
				1.74		(0.70) 3.00	Dark grey slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable at 0.2m bgl



Email Received 2nd February 2023 Marshall (MCWV) Ltd

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

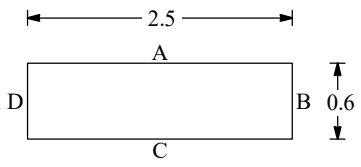
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP232
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	21-08-18 21-08-18	4.56	E 332,504.2 N 369,881.7	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.20	ES			4.36		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
						(2.00)	Light orangish brown silty SAND occasional dark orangish brown staining. Sand is fine to medium. Assessesd as loose as fairly easy to excavate with a spade. (TIDAL FLAT DEPOSITS) 0.60 - 0.70 … firm dark brown slightly sandy silty clay. 0.75 - 0.80 … firm thinly bedded dark brown silty sandy silty clay. 1.20 … becoming light brown.		
				2.36		2.20			
						(0.80)	Light grey moist silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.90 … groundwater seepage.		
				1.56		3.00			
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable at 1m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2.9m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

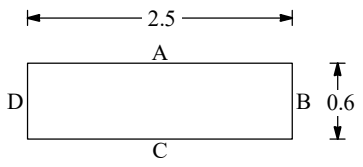
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP233
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.46	E 332,594.5 N 369,856.3	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.26		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
0.50-1.00 0.60	B D					(1.90)	Light orangish brown silty SAND. Sand is fine to medium. Assessed as loose as fairly easy to excavate with a spade. (TIDAL FLAT DEPOSITS) 0.90 … becoming light greyish brown.		
				2.36		2.10			
				2.26		2.20	Dark grey silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) … groundwater seepage.		

Shoring/Support: None
Stability: Sides unstable at 0.2m bgl



GENERAL REMARKS

Groundwater seepage encountered at 2.2m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

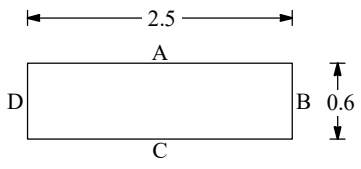
JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

TRIAL PIT LOG

Project				TP No
Plot B, The Airfields				TP234
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.50	E 332,705.5 N 369,837.9	
Contractor				Sheet
AH Plant				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.20	ES			4.30		(0.20) 0.20	Dark brown silty SAND with rootlets. Sand is fine to medium. (TOPSOIL)		
0.50		73				(2.00)	Light orangish brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 0.45 - 0.55 … brown medium strength dark brown slightly sandy silty clay. 1.50 … becoming light greyish brown.		
				2.30		2.20			
				1.50		(0.80) 3.00	Dark grey slightly organic silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS) 2.80 …groundwater seepage.		
							… hole terminated due to instability.		

Shoring/Support: None
Stability: Sides unstable at 0.3m bgl



Email Received 2nd February 2023 Marshall (MCWV) Ltd

GENERAL REMARKS

Groundwater seepage encountered at 2.8m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:25	Client Praxis Real Estate Management Ltd	Method/ Plant Used 360 Tracked Excavator	Logged By JAM

JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

BOREHOLE LOG

Project				BOREHOLE No
Plot B, The Airfields				CP205
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	21-08-18 22-08-18	4.52	E 332,515.4 N 369,952.8	
Contractor				Sheet
DP Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.22		0.30	Dark brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is angular fine of mixed lithology. (TOPSOIL)		
1.00		N15					Medium brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
2.00		N15				(3.70)			
3.00		N14							
				0.52		4.00			
4.00		N30					Dense brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
5.00		N35							
6.50		N39							
8.00		N36							
						(10.45)			
9.50		N39							
11.00		N43							
12.50		N44							
14.00		N39		-9.93		14.45	14.00 - 14.45 … rare shell fragments.		

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To
									1.5	15

GENERAL REMARKS

Groundwater encountered at 2.30m bgl, rose to 1.8m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:100	Client Praxis Real Estate Management Ltd	Method/ Plant Used	Logged By MHP

JPG (Leeds) Limited
5 John Charles Way
LEEDS LS12 6QD
Telephone: 0113 263 1155

BOREHOLE LOG

Project				BOREHOLE No
Plot B, The Airfields				CP206
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4671	20-08-18 20-08-18	4.72	E 332,736.5 N 370,058.2	
Contractor				Sheet
DP Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				4.42		0.30	Dark brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is angular fine of mixed lithology. (TOPSOIL)		
1.00		N16					Medium dense brown silty SAND. Sand is fine to medium. (TIDAL FLAT DEPOSITS)		
2.00		N14				(4.70)			
3.00		N10							
4.00		N21							
				-0.28		5.00			
5.00		N23					Dense brown silty SAND with rare shell fragments. Sand is fine to medium. Rare organic matter (TIDAL FLAT DEPOSITS)		
6.60		N41							
8.00		N24					8.00 - 8.45 ... rare wood/ organic matter.		
9.50		N50/ 260 mm				(9.45)			
11.00		N50/ 245 mm							
12.50		N30							
14.00		N35		-9.73		14.45			

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth

Chiselling

From	To	Hours

Water Added

From	To
2	15

GENERAL REMARKS

Groundwater encountered at 2.50m bgl. No visual or olfactory evidence of potential hydrocarbon contamination.

All dimensions in metres Scale 1:100	Client Praxis Real Estate Management Ltd	Method/ Plant Used	Logged By MHP

Appendix C Chemical Analysis Certificates and HazWasteOnline Waste Classification

STATISTICAL ASSESSMENT OF CHEMICAL ANALYSIS

The results of the chemical analysis have been assessed in accordance with CL:AIRE (Contaminated Land: Applications in Real Environments) 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' published by the CIEH, May 2008.

This guidance provides a statistical approach to objectively evaluate the evidence for and against particular propositions/hypothesis and has the useful attribute of enabling decision makers to reach conclusions about the available evidence, with at least some understanding of the validity of the results.

The guidance approaches this in the context of assessing the results from two different perspectives, the Planning Scenario and Part 2A.

When assessing in terms of the Planning Scenario, the key question would be 'can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk?' Under Part 2A, the question would be 'can we confidently say that the level of contamination is high relative to some appropriate measure of risk?'

These questions are addressed through the use of formal hypothesis – the "Null Hypothesis" and the "Alternative Hypothesis".

This assessment will be carried out in accordance with the Planning Scenario, where the aim is to demonstrate 'suitability for use'. The Null Hypothesis is that the level of contamination is the same as, or higher than the critical concentration/GAC. The Alternative Hypothesis is that the level of contamination is lower than the critical concentration/GAC. Under Part 2A the opposite set of propositions are applicable.

By convention, the Null Hypothesis is the starting proposition against which the key question, as expressed by the Alternative Hypothesis, can be tested.

The assessment of the results relies on there being a normal distribution of results for a particular contaminant and that the data set under consideration is representative of the particular material which is being assessed. If more than one dataset is present, then the hypothesis should be applied individually for each data set.

Under the Planning Scenario, the statistical test is used to demonstrate that there is a 95% probability that the true population mean falls below the critical concentration/GAC.

Appropriate data sets must be created to enable the statistical testing to be carried out and three key elements must be considered prior to statistical analysis. These are as follows:

- Dealing with non-detects;
- Understanding the statistical distribution of data; and
- Dealing with outliers.

The results can then be assessed, and the results will be compared against the following:

- Sample Mean – if the sample mean of the data set is in excess of the GAC then the Upper Confidence Limit of the true population mean will be higher than the critical concentration.
- 95% of the Upper Confidence Limit.
- One Sample T Test (parametric test) carried out at the 95% confidence level.

On the basis of these tests, the validity of the Null Hypothesis can be assessed.

Certificate of Analysis

Certificate Number 18-20109

29-Aug-18

Client JPG (Leeds) LTD
Civil & Structural Engineers
5 John Charles Way
Leeds
LS12 6QA

Our Reference 18-20109

Client Reference 4671

Order No (not supplied)

Contract Title Airfields, Deeside

Description 4 Soil samples, 1 Leachate sample.

Date Received 22-Aug-18

Date Started 22-Aug-18

Date Completed 29-Aug-18

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

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

Approved By

Adam Fenwick
Contracts Manager

Email Received 2nd February 2023 Marshall (MCWT) Ltd

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 18-20109
Client Ref 4671
Contract Title Airfields, Deeside

			Lab No	1382901	1382902	1382903	1382904
			Sample ID	TP207	TP227	TP206	TP234
			Depth	0.00-0.20	0.00-0.30	0.50-0.60	0.00-0.20
			Other ID	TOPSOIL	TOPSOIL	TOPSOIL	NATURAL
			Sample Type	D	D	D	D
			Sampling Date	20/08/18	20/08/18	20/08/18	20/08/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	9.7	12	5.1	10
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.5	< 0.1	0.4
Chromium	DETSC 2301#	0.15	mg/kg	17	19	9.5	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	17	5.2	13
Lead	DETSC 2301#	0.3	mg/kg	89	110	24	73
Mercury	DETSC 2325#	0.05	mg/kg	0.06	0.06	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	14	16	7.9	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.5
Zinc	DETSC 2301#	1	mg/kg	140	180	40	130
Inorganics							
pH	DETSC 2008#			8.0	7.3	8.7	7.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.1	0.2	< 0.1	0.1
Organic matter	DETSC 2002#	0.1	%	5.0	6.3	0.4	4.8
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	7.3	9.4	3.4	6.2
Chloride	DETSC 2055	1	mg/kg	13.9	10.0	13.9	10.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	20	19	11	16
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	32
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.08	0.11	0.02	0.08
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.4	0.6	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 18-20109
Client Ref 4671
Contract Title Airfields, Deeside

Lab No	1382905
Sample ID	TP227
Depth	0.00-0.30
Other ID	TOPSOIL
Sample Type	D
Sampling Date	20/08/18
Sampling Time	n/s

Test	Method	LOD	Units	
Preparation				
NRA Leachate Preparation	DETS 036*			Y
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.49
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.40
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	2.1
Inorganics				
pH	DETSC 2008			8.0
Cyanide, Free	DETSC 2130	20	ug/l	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	0.60
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	0.13
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	0.13
Phenols				
Phenol	DETSC 3451*	0.5	ug/l	< 0.50

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 18-20109
Client Ref 4671
Contract Title Airfields, Deeside

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1382901	TP207 TOPSOIL 0.00-0.20	SOIL	NAD	none	Michael Kay
1382902	TP227 TOPSOIL 0.00-0.30	SOIL	NAD	none	Michael Kay
1382903	TP206 TOPSOIL 0.50-0.60	SOIL	NAD	none	Michael Kay
1382904	TP234 NATURAL 0.00-0.20	SOIL	NAD	none	Michael Kay

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

Information in Support of the Analytical Results

Our Ref 18-20109
Client Ref 4671
Contract Airfields, Deeside

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1382901	TP207 0.00-0.20 SOIL	20/08/18	GJ 250ml, GJ 60ml, PT 1L		
1382902	TP227 0.00-0.30 SOIL	20/08/18	GJ 250ml, GJ 60ml, PT 1L		
1382903	TP206 0.50-0.60 SOIL	20/08/18	GJ 250ml, GJ 60ml, PT 1L		
1382904	TP234 0.00-0.20 SOIL	20/08/18	GJ 250ml, GJ 60ml, PT 1L		
1382905	TP227 0.00-0.30 LEACHATE	20/08/18	GJ 250ml, GJ 60ml, PT 1L		

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

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

Certificate of Analysis

Certificate Number 18-20319

03-Sep-18

Client JPG (Leeds) LTD
Civil & Structural Engineers
5 John Charles Way
Leeds
LS12 6QA

Our Reference 18-20319

Client Reference 4671

Order No (not supplied)

Contract Title Airfields, Deeside

Description 3 Soil samples.

Date Received 24-Aug-18

Date Started 24-Aug-18

Date Completed 03-Sep-18

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

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

Approved By

Adam Fenwick
Contracts Manager

Email Received 2nd February 2023 Marshall (MCWT) Ltd

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Summary of Chemical Analysis
Soil Samples

Our Ref 18-20319
Client Ref 4671
Contract Title Airfields, Deeside

	Lab No	1383905	1383906	1383907
	Sample ID	TP205	TP218	TP232
	Depth	0.00-0.20	0.00-0.20	0.00-0.20
	Other ID			
	Sample Type	SOIL	SOIL	SOIL
	Sampling Date	21/08/18	21/08/18	21/08/18
	Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	12	11	13
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.5	0.6
Chromium	DETSC 2301#	0.15	mg/kg	16	15	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13	11	15
Lead	DETSC 2301#	0.3	mg/kg	140	79	100
Mercury	DETSC 2325#	0.05	mg/kg	0.10	0.09	0.10
Nickel	DETSC 2301#	1	mg/kg	10	12	13
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.9	0.9
Zinc	DETSC 2301#	1	mg/kg	180	190	180
Inorganics						
pH	DETSC 2008#			7.9	7.9	7.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.2	0.3
Organic matter	DETSC 2002#	0.1	%	4.6	3.5	5.1
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	6.4	3.3	5.2
Chloride	DETSC 2055	1	mg/kg	17.5	6.6	11.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	21	11	20
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.07	0.06	0.10
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 18-20319
Client Ref 4671
Contract Title Airfields, Deeside

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1383905	TP205 0.00-0.20	SOIL	NAD	none	Rebecca Burgess
1383906	TP218 0.00-0.20	SOIL	NAD	none	Rebecca Burgess
1383907	TP232 0.00-0.20	SOIL	NAD	none	Rebecca Burgess

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

Information in Support of the Analytical Results

Our Ref 18-20319
Client Ref 4671
Contract Airfields, Deeside

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1383905	TP205 0.00-0.20 SOIL	21/08/18	GJ 250ml, GV, PT 1L		
1383906	TP218 0.00-0.20 SOIL	21/08/18	GJ 250ml, GV, PT 1L		
1383907	TP232 0.00-0.20 SOIL	21/08/18	GJ 250ml, GV, PT 1L		

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

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number	18-25361	31-Oct-18
Client	JPG (Leeds) LTD Civil & Structural Engineers 5 John Charles Way Leeds LS12 6QA	

Our Reference	18-25361
Client Reference	4671
Order No	(not supplied)
Contract Title	4671 The Airfeilds Deeside
Description	1 Water sample.
Date Received	25-Oct-18
Date Started	25-Oct-18
Date Completed	31-Oct-18
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

Email Received 2nd February 2023 Marshall (MCWT) Ltd

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 18-25361
Client Ref 4671
Contract Title 4671 The Airfeilds Deeside

Lab No	1411663
Sample ID	CP206
Depth	1.47
Other ID	
Sample Type	WATER
Sampling Date	23/10/18
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.7
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.1
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	13
Inorganics				
pH	DETSC 2008			8.0
Cyanide, Free	DETSC 2130	20	ug/l	< 20
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	11
Chloride	DETSC 2055	0.1	mg/l	24
Sulphate as SO4	DETSC 2055	0.1	mg/l	27
Sulphide	DETSC 2208	10	ug/l	< 10
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02
Pyrene	DETSC 3304	0.01	ug/l	0.05
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20
Phenols				
Phenol	DETSC 3451*	0.5	ug/l	< 0.50

Email received 2nd February 2023 Marshall (MCW) Ltd

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 18-25361
Client Ref 4671
Contract 4671 The Airfeilds Deeside

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1411663	CP206 WATER	23/10/18	GB 1L, GV, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

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Disposal

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

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

CW9CN-FVK4Z-RCHAX

Job name

4671 Plot B, The Airfields, Deeside

Description/Comments

Project

4671

Site

Classified by

Name:
Alice Sharman
Date:
06 Jun 2022 09:59 GMT
Telephone:
07706239435

Company:
JPG (LEEDS) Ltd
5 John Charles Way
Leeds
LS12 6QA

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	21 Apr 2022

Next 3 year Refresher due by Apr 2025

Job summary

Related documents

#	Name	Description
1	JPG WASTE STREAM V21	waste stream template used to create this Job

Report

Created by: Alice Sharman

Created date: 06 Jun 2022 09:59 GMT

Classification of sample: TP205

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP205
Sample Depth:
0.00-0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12 mg/kg	1.32	15.844 mg/kg	0.00158 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.6 mg/kg	1.142	0.685 mg/kg	0.0000685 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	23.385 mg/kg	0.00234 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		13 mg/kg	1.126	14.637 mg/kg	0.00146 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	140 mg/kg	1.56	218.374 mg/kg	0.014 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		0.1 mg/kg	1.16	0.116 mg/kg	0.0000116 %	✓	
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		10 mg/kg	2.976	29.763 mg/kg	0.00298 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<LOD
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		180 mg/kg	2.774	499.346 mg/kg	0.0499 %	✓	
11	pH			PH		7.9 pH		7.9 pH	7.9 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.2 mg/kg	1.884	0.377 mg/kg	0.0000377 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
29		phenol				0.3	mg/kg		0.3	mg/kg	0.00003 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0729 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP218

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP218
Sample Depth:
0.00-0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11 mg/kg	1.32	14.524 mg/kg	0.00145 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5 mg/kg	1.142	0.571 mg/kg	0.0000571 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15 mg/kg	1.462	21.923 mg/kg	0.00219 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		11 mg/kg	1.126	12.385 mg/kg	0.00124 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	79 mg/kg	1.56	123.225 mg/kg	0.0079 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		0.09 mg/kg	1.16	0.104 mg/kg	0.0000104 %	✓	
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		12 mg/kg	2.976	35.715 mg/kg	0.00357 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.9 mg/kg	1.405	1.265 mg/kg	0.000126 %	✓	
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		190 mg/kg	2.774	527.088 mg/kg	0.0527 %	✓	
11	pH			PH		7.9 pH		7.9 pH	7.9 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.2 mg/kg	1.884	0.377 mg/kg	0.0000377 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
29		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0697 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP232

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP232
Sample Depth:
0.00-0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		13 mg/kg	1.32	17.164 mg/kg	0.00172 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.6 mg/kg	1.142	0.685 mg/kg	0.0000685 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	24.846 mg/kg	0.00248 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<**LOD**
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		15 mg/kg	1.126	16.888 mg/kg	0.00169 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	100 mg/kg	1.56	155.982 mg/kg	0.01 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		0.1 mg/kg	1.16	0.116 mg/kg	0.0000116 %	✓	
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		13 mg/kg	2.976	38.691 mg/kg	0.00387 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.9 mg/kg	1.405	1.265 mg/kg	0.000126 %	✓	
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		180 mg/kg	2.774	499.346 mg/kg	0.0499 %	✓	
11	pH			PH		7.8 pH		7.8 pH	7.8 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.3 mg/kg	1.884	0.565 mg/kg	0.0000565 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
29		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0703 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP207

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP207
Sample Depth:
0.00-0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.7 mg/kg	1.32	12.807 mg/kg	0.00128 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.4 mg/kg	1.142	0.457 mg/kg	0.0000457 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	24.846 mg/kg	0.00248 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18 mg/kg	1.126	20.266 mg/kg	0.00203 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	89 mg/kg	1.56	138.824 mg/kg	0.0089 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		0.06 mg/kg	1.16	0.0696 mg/kg	0.00000696 %	✓	
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14 mg/kg	2.976	41.668 mg/kg	0.00417 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<LOD
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		140 mg/kg	2.774	388.381 mg/kg	0.0388 %	✓	
11	pH			PH		8 pH		8 pH	8pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.188 mg/kg	0.0000188 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
29		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0582 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP227

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP227
Sample Depth:
0.00-0.30 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12 mg/kg	1.32	15.844 mg/kg	0.00158 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5 mg/kg	1.142	0.571 mg/kg	0.0000571 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	27.77 mg/kg	0.00278 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17 mg/kg	1.126	19.14 mg/kg	0.00191 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	110 mg/kg	1.56	171.58 mg/kg	0.011 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		0.06 mg/kg	1.16	0.0696 mg/kg	0.00000696 %	✓	
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		16 mg/kg	2.976	47.62 mg/kg	0.00476 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<LOD
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		180 mg/kg	2.774	499.346 mg/kg	0.0499 %	✓	
11	pH			PH		pH		7.3 pH	7.3 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.2 mg/kg	1.884	0.377 mg/kg	0.0000377 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
29		phenol				0.4	mg/kg		0.4	mg/kg	0.00004 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0725 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP206

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP206
Sample Depth:
0.50-0.60 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.1 mg/kg	1.32	6.734 mg/kg	0.000673 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1 mg/kg	1.142	<0.114 mg/kg	<0.0000114 %		<LOD
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		9.5 mg/kg	1.462	13.885 mg/kg	0.00139 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		5.2 mg/kg	1.126	5.855 mg/kg	0.000585 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	24 mg/kg	1.56	37.436 mg/kg	0.0024 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		<0.05 mg/kg	1.16	<0.058 mg/kg	<0.0000058 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		7.9 mg/kg	2.976	23.512 mg/kg	0.00235 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5 mg/kg	1.405	<0.703 mg/kg	<0.0000703 %		<LOD
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		40 mg/kg	2.774	110.966 mg/kg	0.0111 %	✓	
11	pH			PH		8.7 pH		8.7 pH	8.7 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
29		phenol				0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.019 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP234

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP234
Sample Depth:
0.00-0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10 mg/kg	1.32	13.203 mg/kg	0.00132 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.4 mg/kg	1.142	0.457 mg/kg	0.0000457 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	24.846 mg/kg	0.00248 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		13 mg/kg	1.126	14.637 mg/kg	0.00146 %	✓	
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	73 mg/kg	1.56	113.867 mg/kg	0.0073 %	✓	
7	mercury { mercury(II) sulfide }		215-696-3	1344-48-5		<0.05 mg/kg	1.16	<0.058 mg/kg	<0.0000058 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		12 mg/kg	2.976	35.715 mg/kg	0.00357 %	✓	
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.5 mg/kg	1.405	0.703 mg/kg	0.0000703 %	✓	
10	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		130 mg/kg	2.774	360.639 mg/kg	0.0361 %	✓	
11	pH			PH		7.8 pH		7.8 pH	7.8 pH		
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.188 mg/kg	0.0000188 %	✓	
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
29		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0527 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **mercury(II) sulfide** (EC Number: 215-696-3, CAS Number: 1344-48-5)

Description/Comments: Data from ECHA's C&L and SDS Sigma Aldrich V6 dated 17/9/2019 Threshold for EUH031 based on calculation method in WM3 Box C12.1
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/8530
Data source date: 14 May 2020
Hazard Statements: EUH031 >= 1 % , EUH031 , Skin Sens. 1; H317 , STOT RE 2; H373

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings.

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides.

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass.

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight.

mercury {mercury(II) sulfide}

Worst case CLP species based on hazard statements/molecular weight.

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight.

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide]

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.146.5158.9719 (26 May 2022)
HazWasteOnline Database: 2022.146.5158.9719 (26 May 2022)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021

Appendix D Geotechnical Testing Results

LABORATORY REPORT

4043

Contract Number: PSL18/4597

Report Date: 02 October 2018

Client's Reference: 4671

Client Name: JPG
5 John Charles Way
Leeds
West Yorkshire
LS12 6QD

For the attention of: Molly Peckham

Contract Title: Airfields Deeside

Date Received: 13/9/2018
Date Commenced: 13/9/2018
Date Completed: 2/10/2018

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)

A Watkins (Director)

R Berriman (Quality Manager)

L Knight (Senior Technician)

S Eyre (Senior Technician)

A Fry (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP215		D	0.50	1.00	Brown very silty SAND.
TP215		B	1.00	1.50	Brown very silty SAND.
TP229		B	0.50	1.00	Brown slightly silty SAND.
TP222		B	0.90	1.30	Brown mottled grey slightly gravelly slightly clayey very sandy SILT.
TP224		B	1.90	2.20	Brown slightly silty SAND.
TP224		D	1.90	2.20	Brown slightly silty SAND.
TP225		B	0.80	1.10	Brown very sandy CLAY.
TP225		D	0.80	1.10	Brown very sandy CLAY.
TP219		B	0.50	1.00	Brown very silty SAND.
TP204		B	0.50	1.00	Brown slightly silty SAND.
TP233		B	0.50	1.00	Brown very silty SAND.
TP233		D	0.60		Brown very silty SAND.
TP228		B	0.90	1.00	Brown silty SAND.
TP202		D	1.00	1.20	Brown silty SAND.
TP208		D	2.00		Brown very silty SAND.
TP209		D	1.60		Brown very silty SAND.
TP210		D	1.00	1.50	Brown very silty SAND.
TP211		D	2.50		Brown very silty SAND.
TP212		D	1.50	2.00	Brown very silty SAND.

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP213		D	0.50	1.00	Brown very silty SAND.
TP216		D	0.80	1.00	Brown very silty SAND.
TP220		D	1.00	1.50	Brown silty SAND.
TP221		D	0.90	1.00	Brown silty SAND.
TP223		D	0.80	1.00	Brown silty SAND.
TP235		D	0.80	1.00	Brown very silty SAND.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP215		D	0.50	1.00	22		2.67					
TP215		B	1.00	1.50	24							
TP229		B	0.50	1.00	9.4							
TP222		B	0.90	1.30	24				NP			
TP224		D	1.90	2.20	23		2.66					
TP225		D	0.80	1.10	28		2.62					
TP219		B	0.50	1.00	24							
TP204		B	0.50	1.00	15							
TP233		B	0.50	1.00	20		2.66					
TP233		D	0.60		19							
TP228		B	0.90	1.00	25							
TP202		D	1.00	1.20	20							
TP208		D	2.00		24							
TP209		D	1.60		28							
TP210		D	1.00	1.50	25							
TP211		D	2.50		27							
TP212		D	1.50	2.00	27							
TP213		D	0.50	1.00	13							
TP216		D	0.80	1.00	21							

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP220		D	1.00	1.50	15							
TP221		D	0.90	1.00	12							
TP223		D	0.80	1.00	15							
TP235		D	0.80	1.00	26							

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No:

PSL18/4597

Client Ref:

4671

PARTICLE SIZE DISTRIBUTION TEST

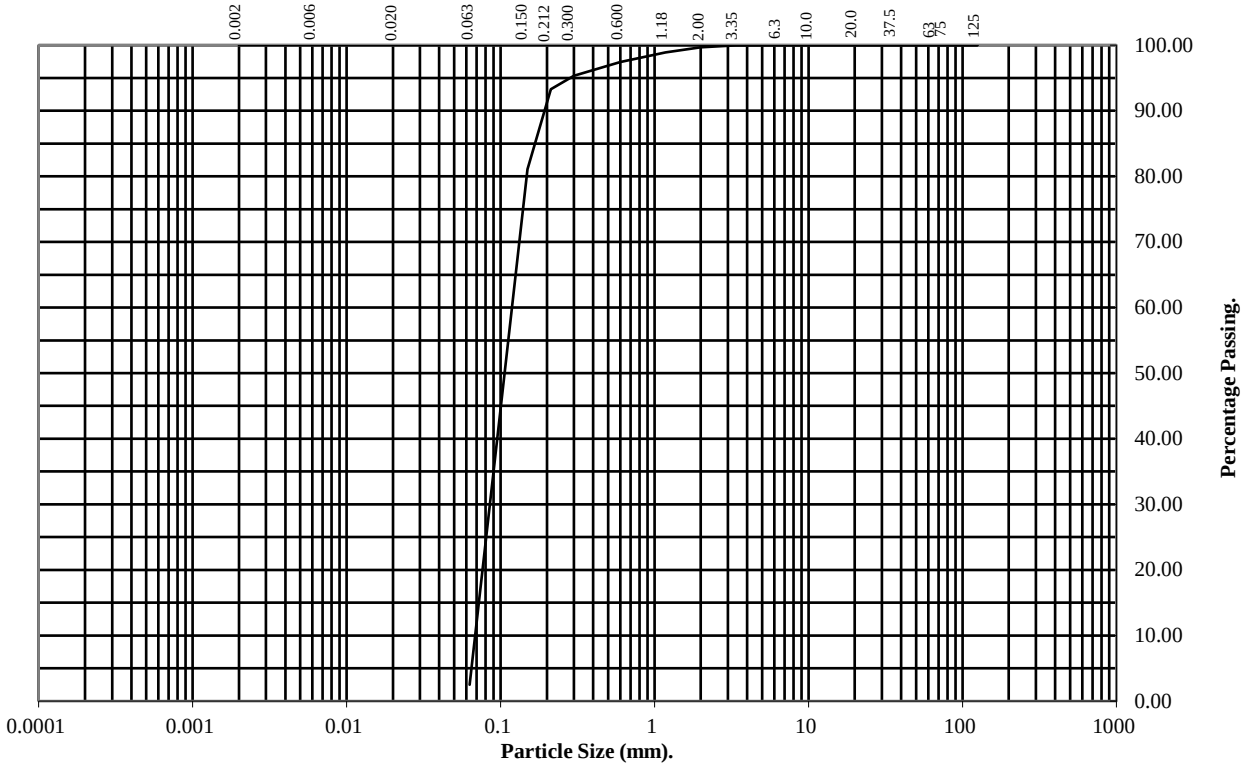
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP204** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	97
0.3	95
0.212	93
0.15	81
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	98
Silt/Clay	2

Email Received 2nd February 2023 Marshall (CWJ) Ltd

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**AIRFIELDS DEESIDE**	**Contract No:** PSL18/4597 **Client Ref:** 4671

PARTICLE SIZE DISTRIBUTION TEST

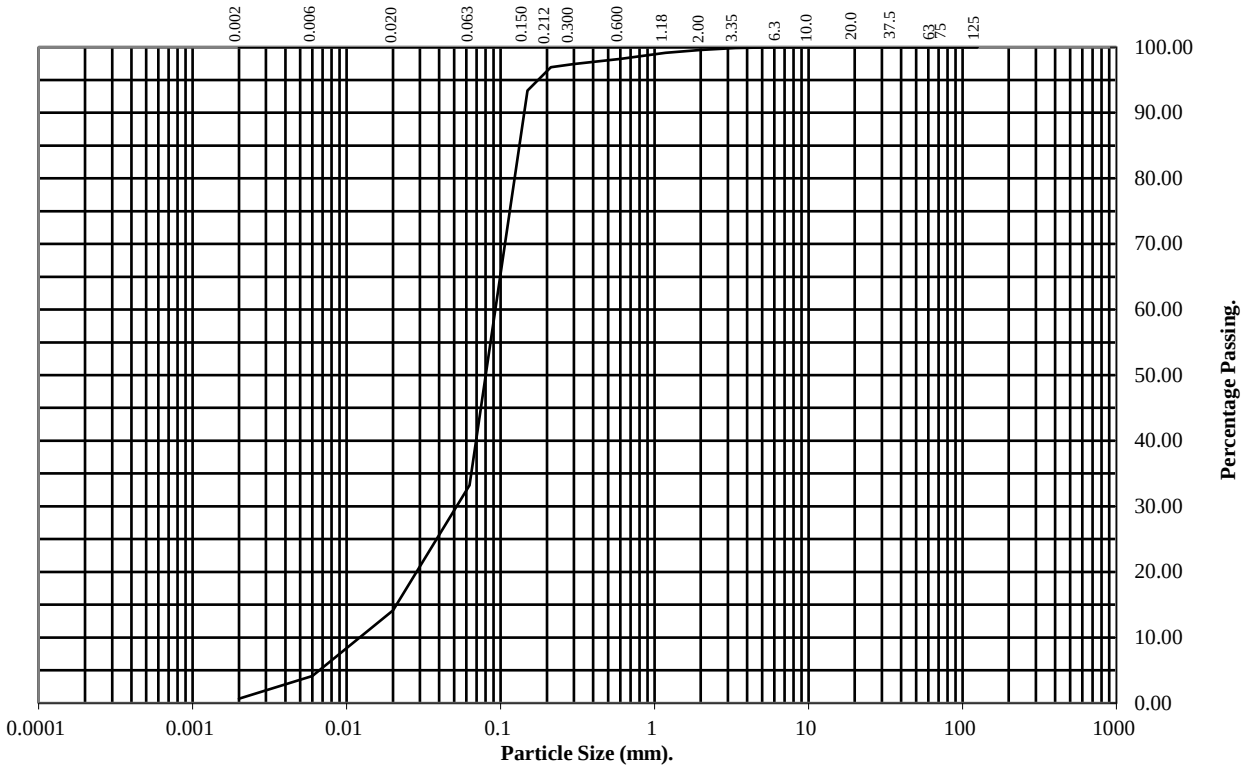
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP208** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	98
0.3	97
0.212	97
0.15	93
0.063	33

Particle Diameter	Percentage Passing
0.02	14
0.006	4
0.002	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	67
Silt	32
Clay	1

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

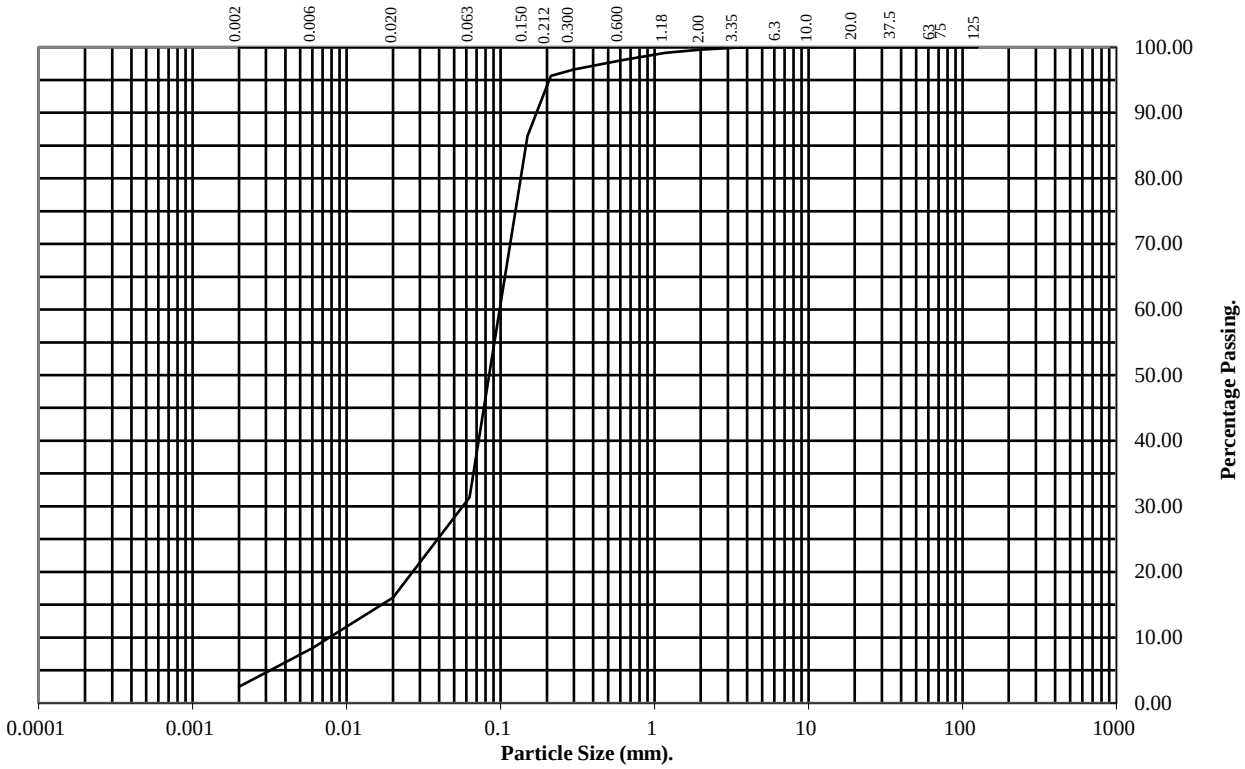
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP213** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	98
0.3	97
0.212	96
0.15	86
0.063	31

Particle Diameter	Percentage Passing
0.02	16
0.006	8
0.002	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	69
Silt	29
Clay	2

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

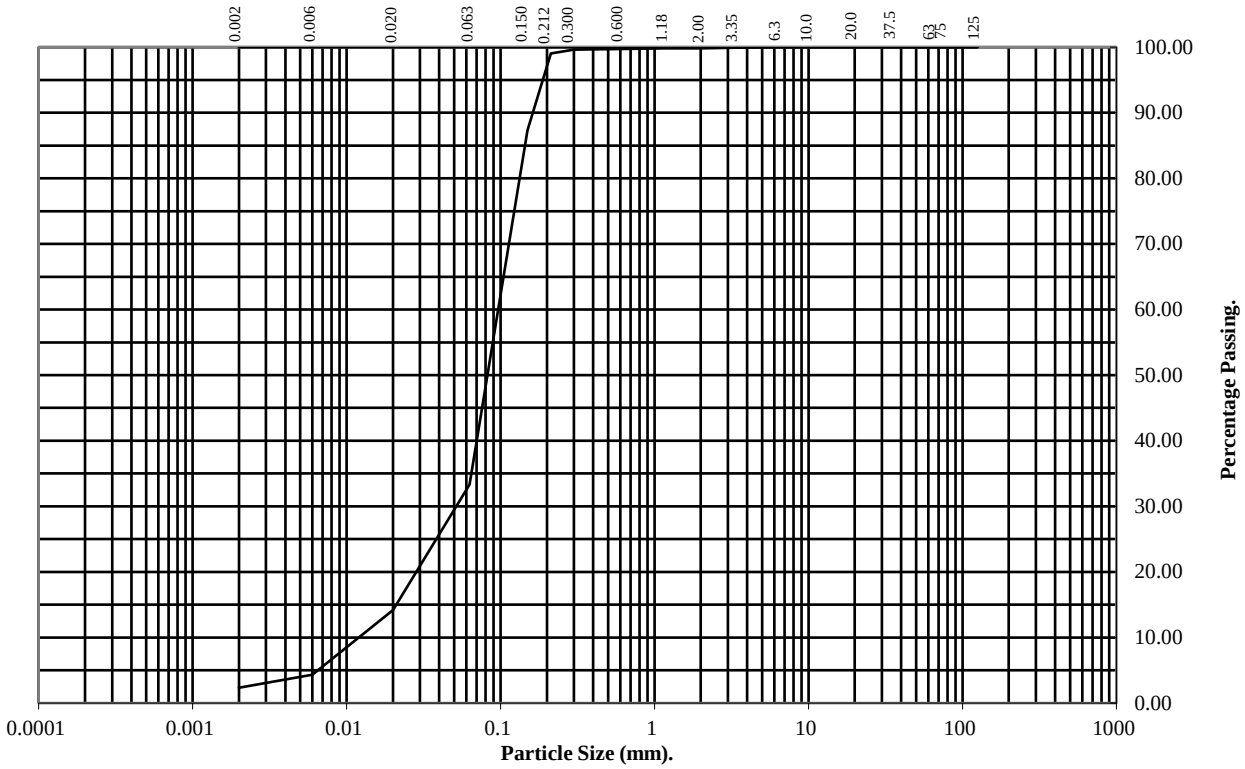
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP215** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):** **1.50**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	99
0.15	87
0.063	33

Particle Diameter	Percentage Passing
0.02	14
0.006	4
0.002	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	67
Silt	31
Clay	2

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

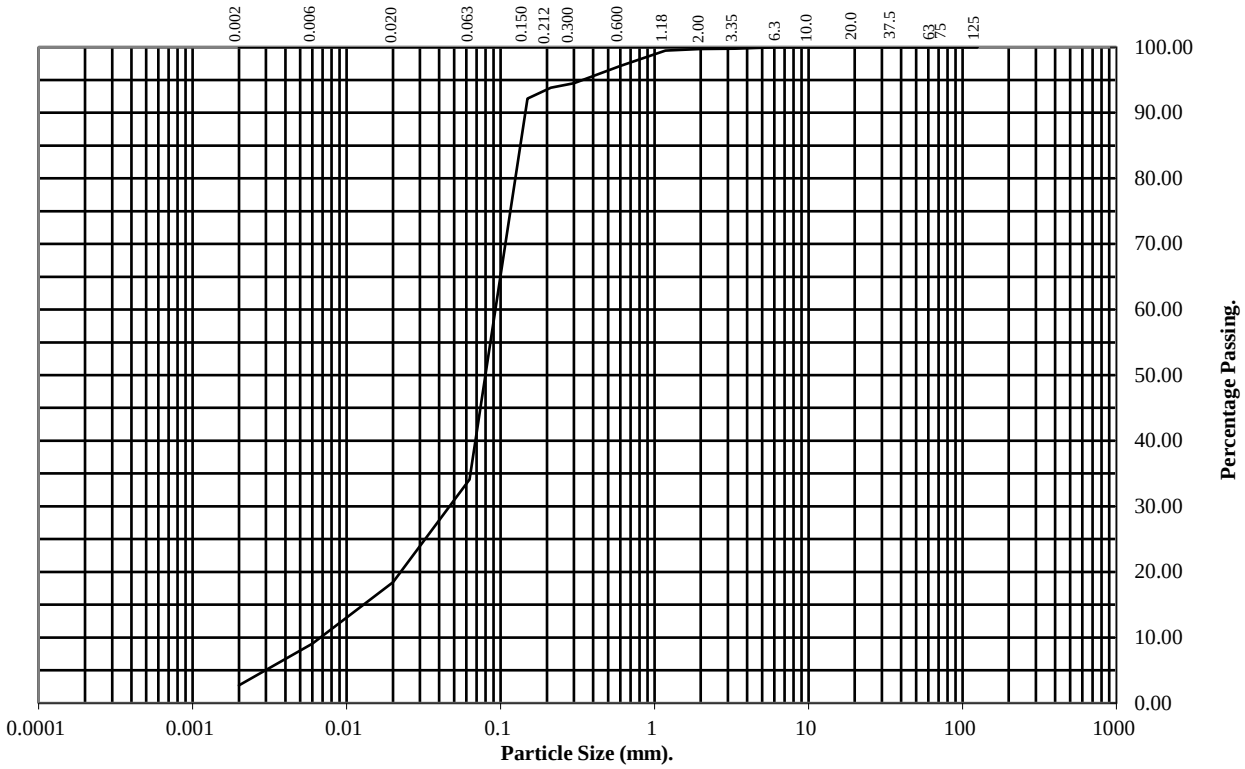
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP219** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	97
0.3	95
0.212	94
0.15	92
0.063	34

Particle Diameter	Percentage Passing
0.02	18
0.006	9
0.002	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	66
Silt	31
Clay	3

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

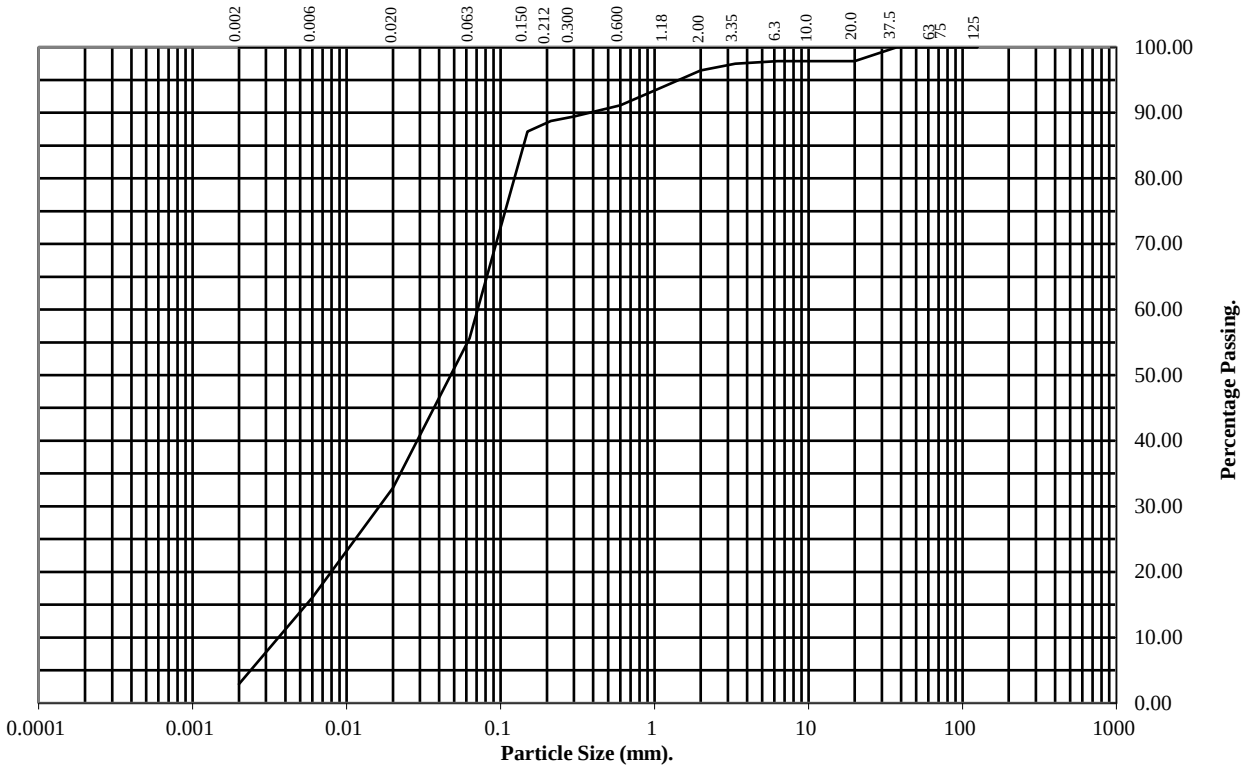
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP222** **Top Depth (m):** **0.90**

Sample Number: **Base Depth(m):** **1.30**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	98
6.3	98
3.35	97
2	96
1.18	94
0.6	91
0.3	89
0.212	89
0.15	87
0.063	56

Particle Diameter	Percentage Passing
0.02	33
0.006	16
0.002	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	40
Silt	53
Clay	3

Remarks:

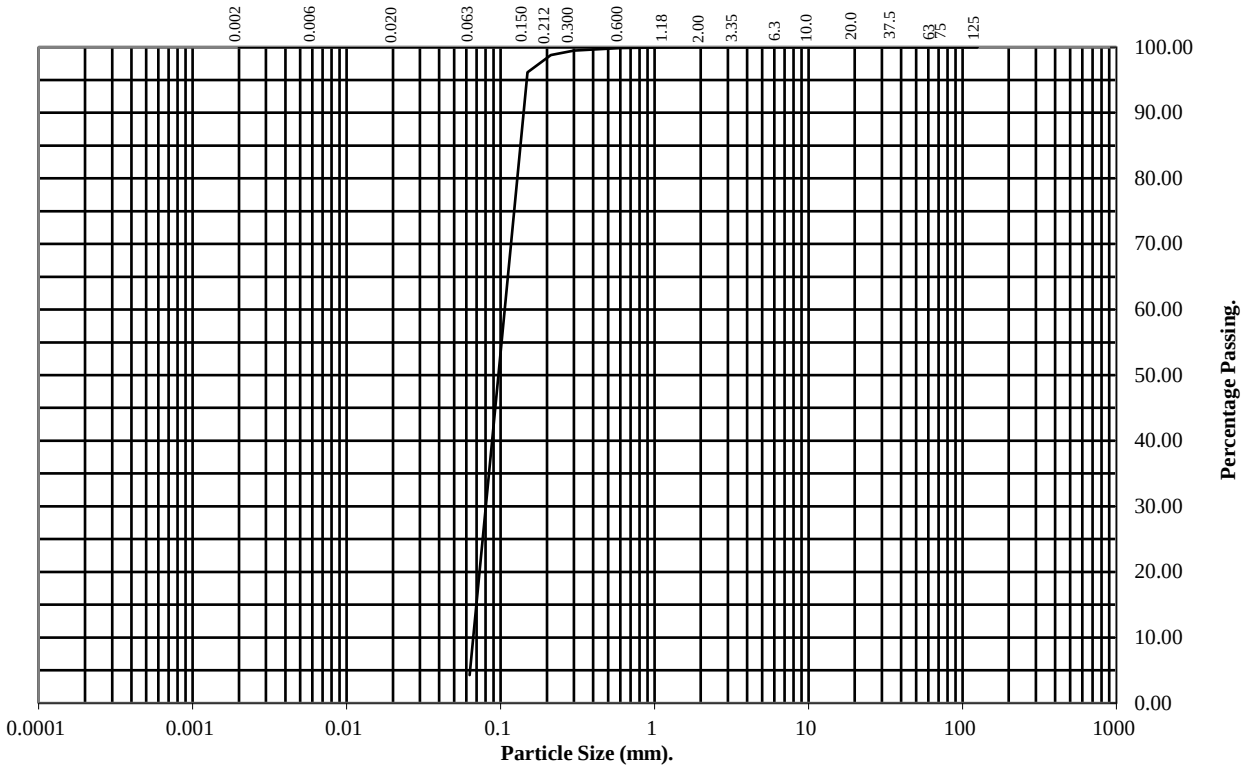
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**TP224**	**Top Depth (m):**	**1.90**
Sample Number:		**Base Depth(m):**	**2.20**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	99
0.212	99
0.15	96
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	96
Silt/Clay	4

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

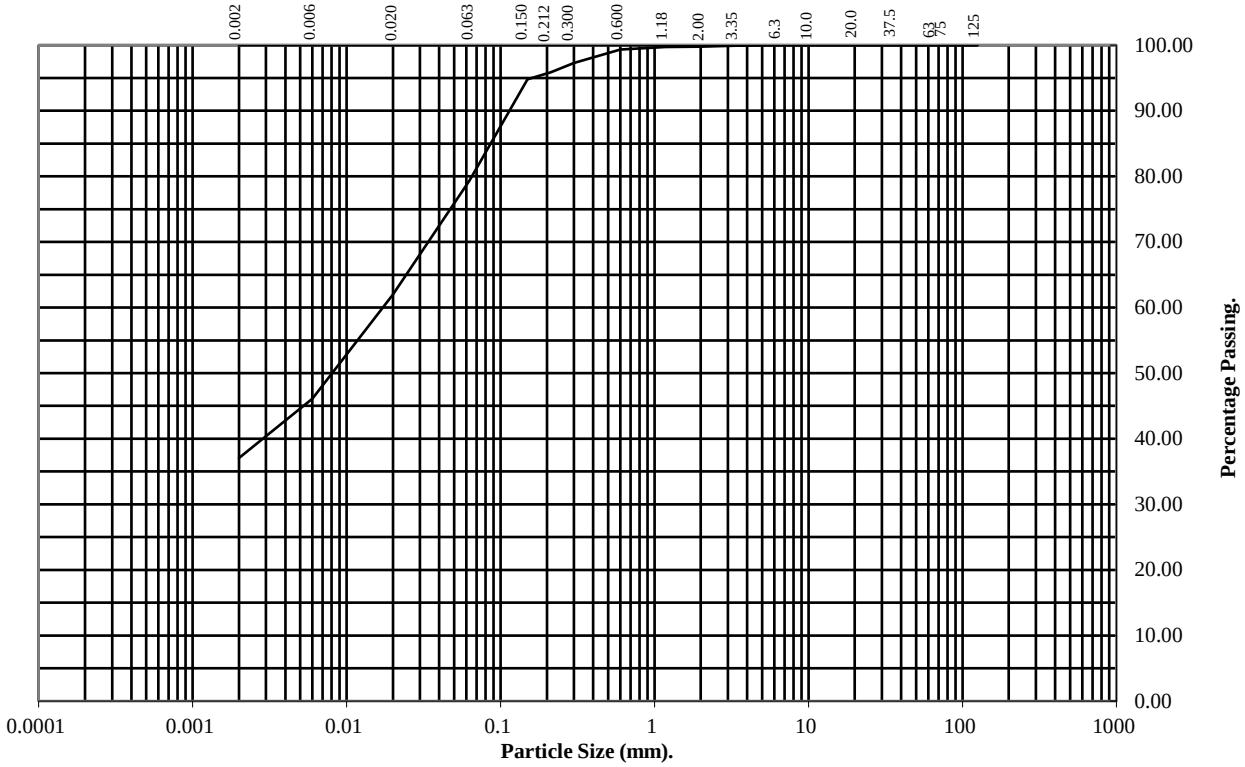
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP225** **Top Depth (m):** **0.80**

Sample Number: **Base Depth(m):** **1.10**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	97
0.212	96
0.15	95
0.063	79

Particle Diameter	Percentage Passing
0.02	62
0.006	46
0.002	37

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	21
Silt	42
Clay	37

Remarks:

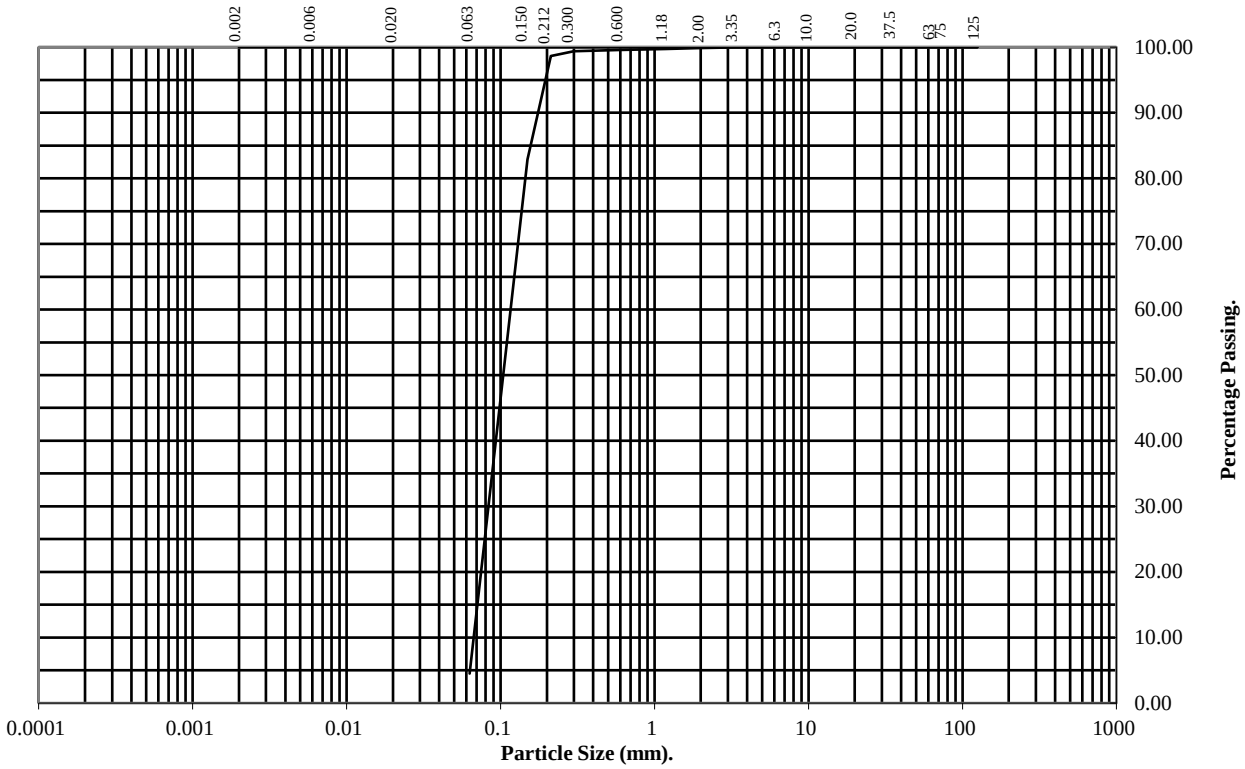
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**TP228**	**Top Depth (m):**	**0.90**
Sample Number:		**Base Depth(m):**	**1.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	99
0.212	99
0.15	83
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	95
Silt/Clay	5

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

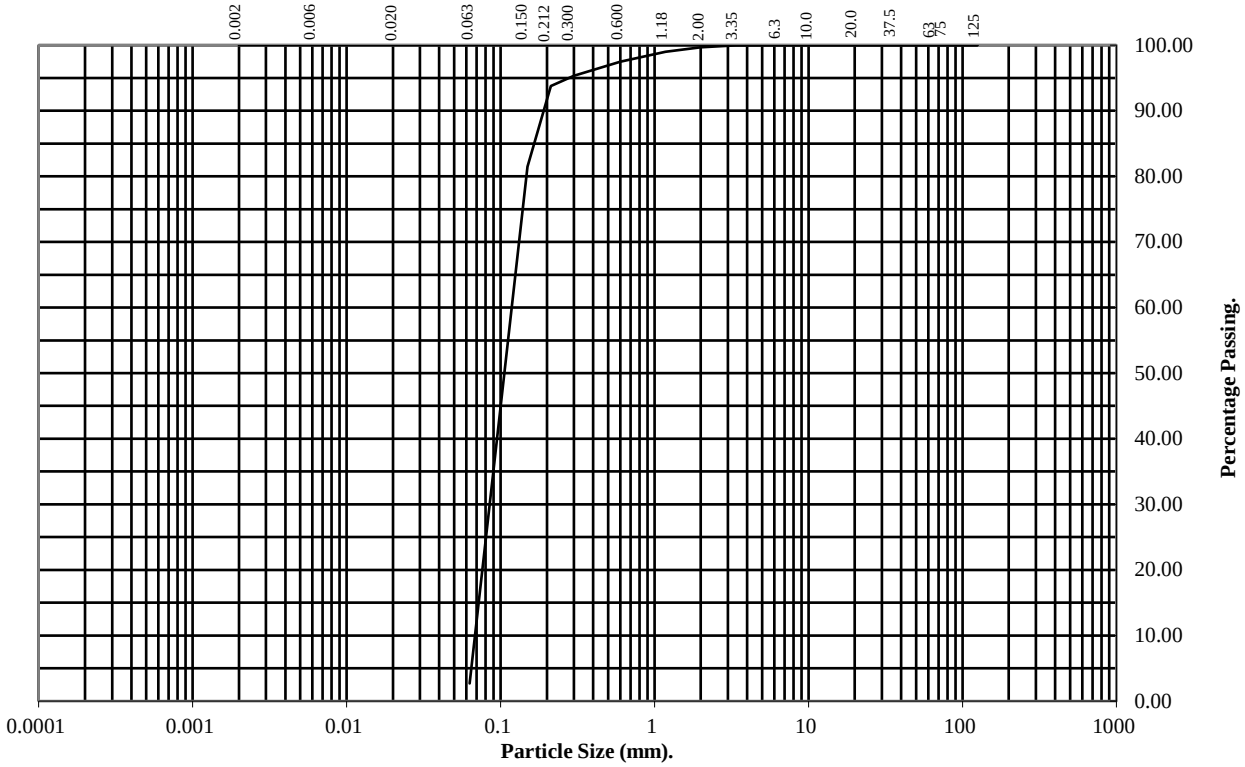
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP229** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	97
0.3	95
0.212	94
0.15	81
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	97
Silt/Clay	3

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

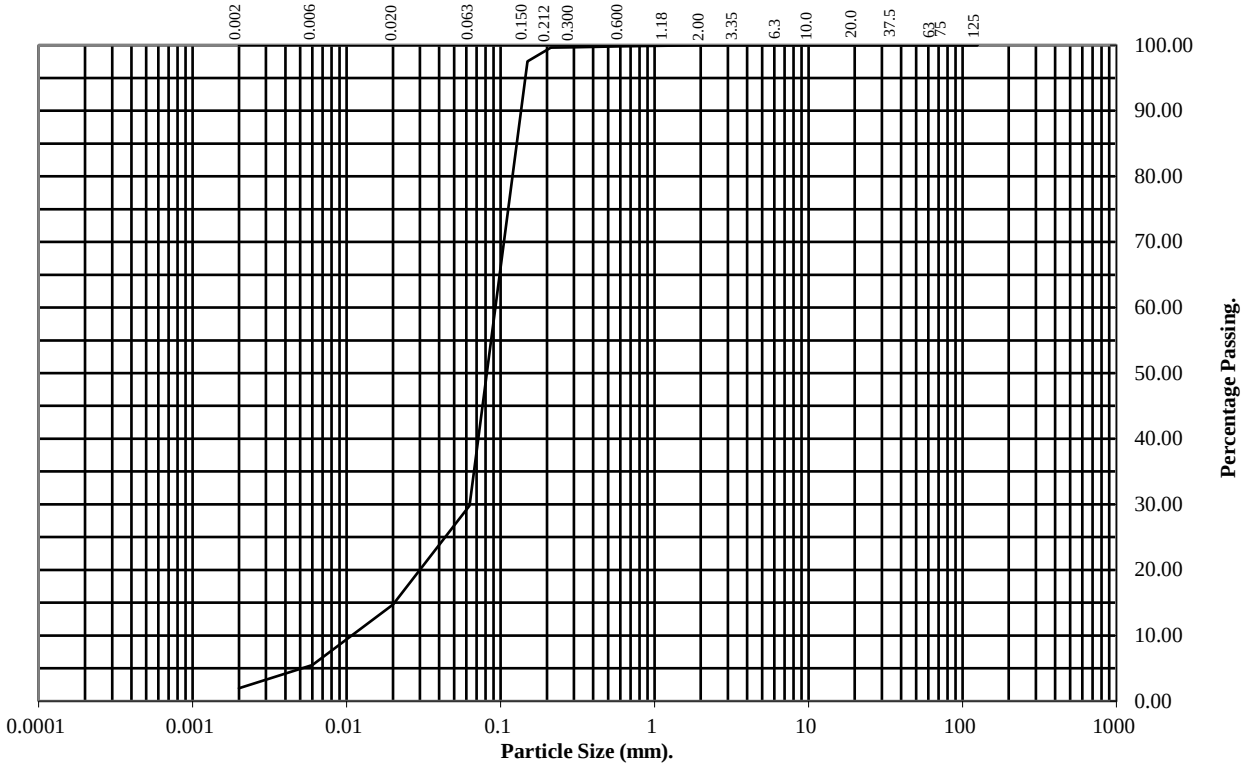
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP233** **Top Depth (m):** **0.60**

Sample Number: **Base Depth(m):**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	98
0.063	30

Particle Diameter	Percentage Passing
0.02	15
0.006	5
0.002	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	70
Silt	28
Clay	2

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

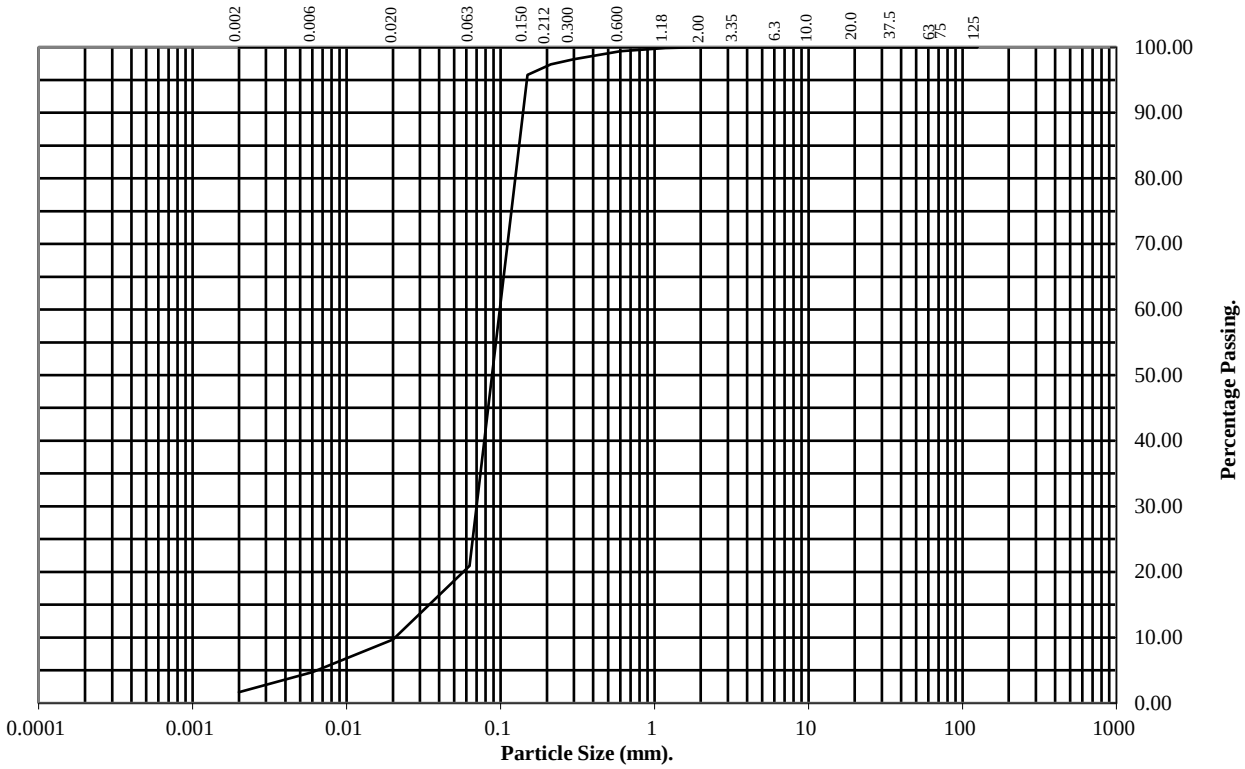
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP235** **Top Depth (m):** **0.80**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **D**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	98
0.212	97
0.15	96
0.063	21

Particle Diameter	Percentage Passing
0.02	10
0.006	5
0.002	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	79
Silt	19
Clay	2

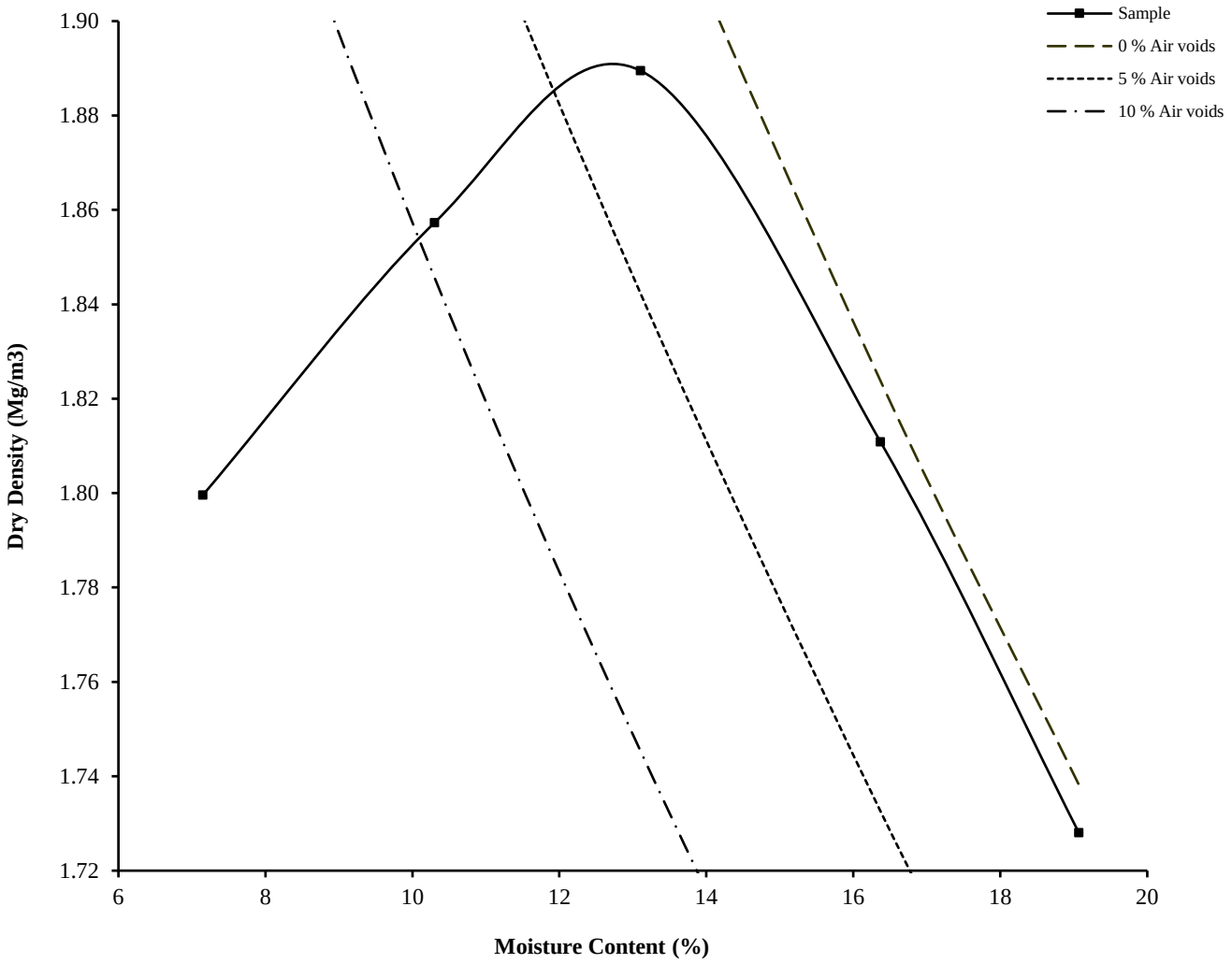
Remarks:

See Summary of Soil Descriptions

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number:	**TP225**	**Top Depth (m) :**	**0.80**
Sample Number:		**Base Depth (m) :**	**1.10**
Sample Type:	**B**		



Initial Moisture Content:		28	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.60	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.89	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		13			
Remarks See summary of soil descriptions.					

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UKAS TESTING 4043	PSL Professional Soils Laboratory	**AIRFIELD DEESIDE**	**Contract** **PSL18/4597** **Client Ref** **4671**

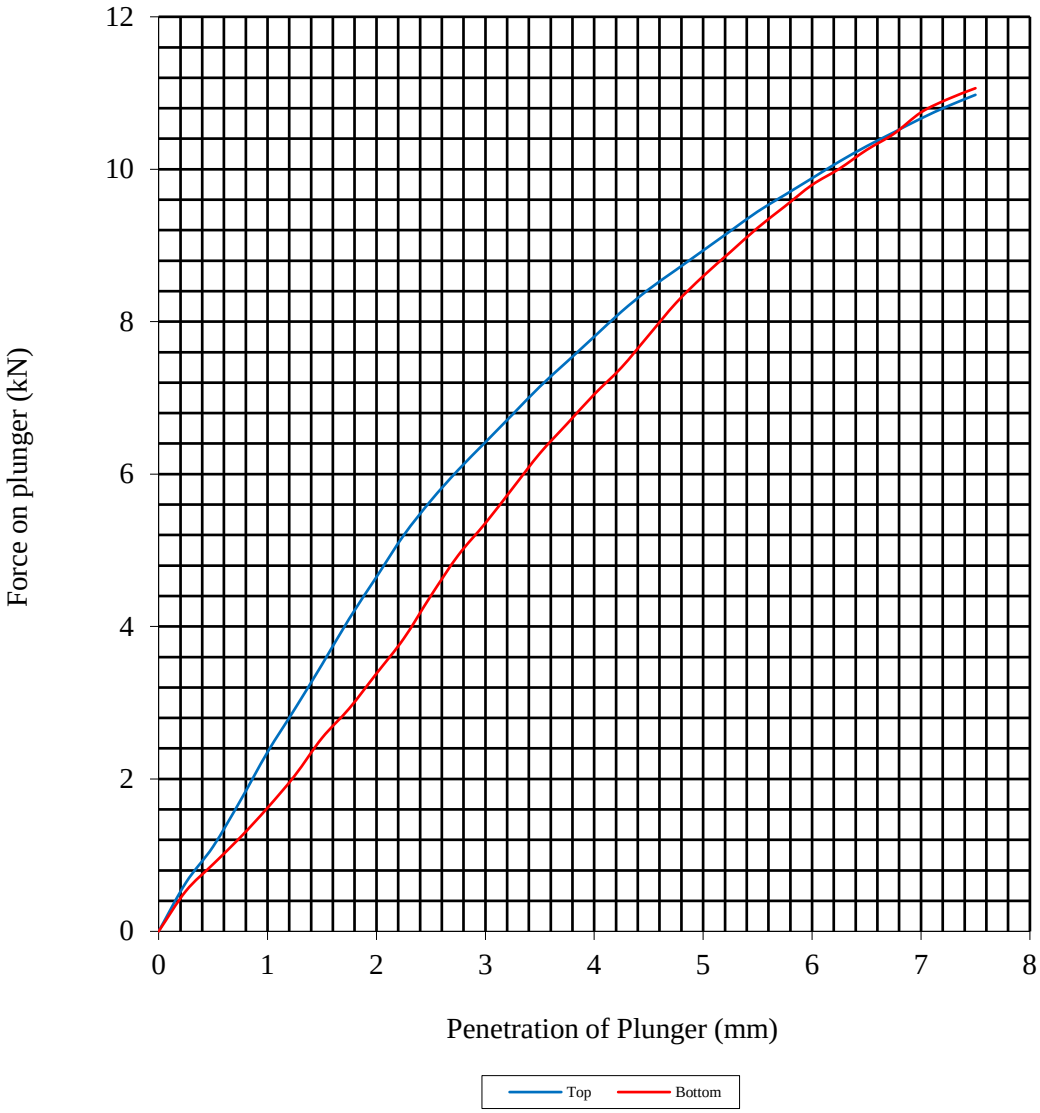
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP204 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):** 1.00

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	15	Surcharge Kg:	4.20	Sample Top	15	Sample Top	44.7
Bulk Density Mg/m3:	1.79	Soaking Time hrs	0	Sample Bottom	15	Sample Bottom	43.0
Dry Density Mg/m3:	1.55	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

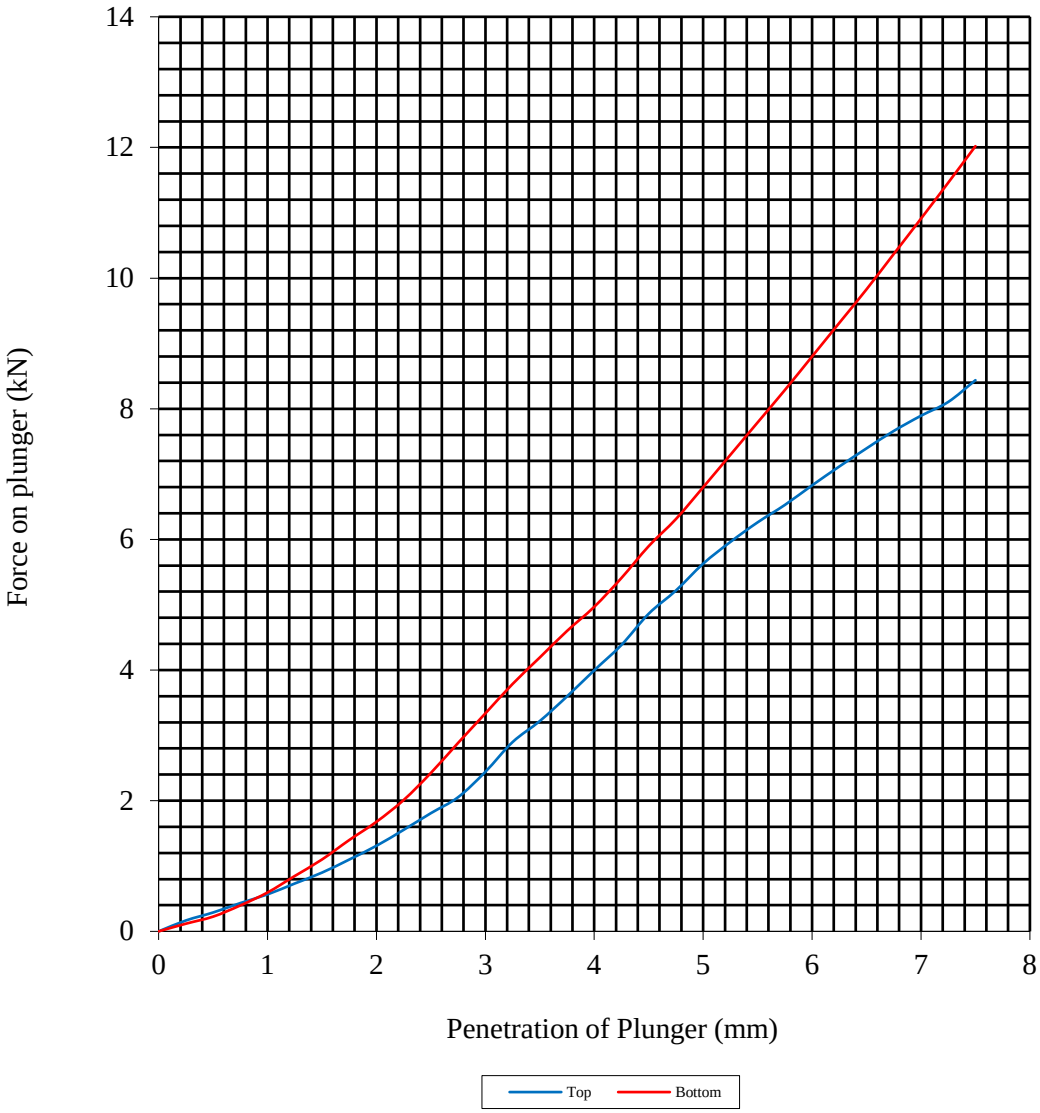
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP215 **Top Depth (m):** 1.00

Sample Number: **Base Depth (m):** 1.50

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	24	Sample Top	28.1
Bulk Density Mg/m3:	1.84	Soaking Time hrs	0	Sample Bottom	24	Sample Bottom	34.0
Dry Density Mg/m3:	1.48	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

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UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

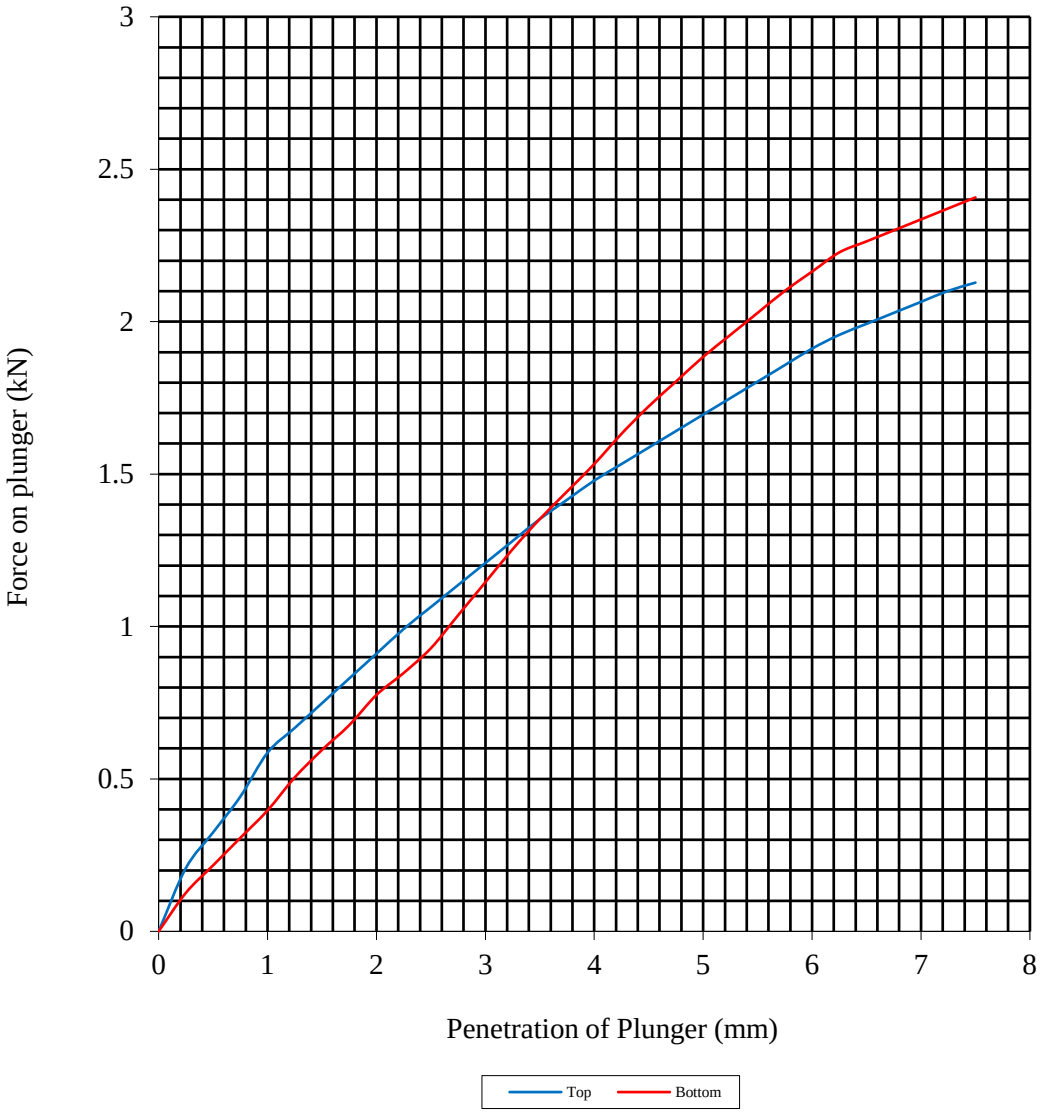
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP219 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):** 1.00

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	24	Sample Top	8.5
Bulk Density Mg/m3:	1.81	Soaking Time hrs	0	Sample Bottom	24	Sample Bottom	9.4
Dry Density Mg/m3:	1.46	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

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UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

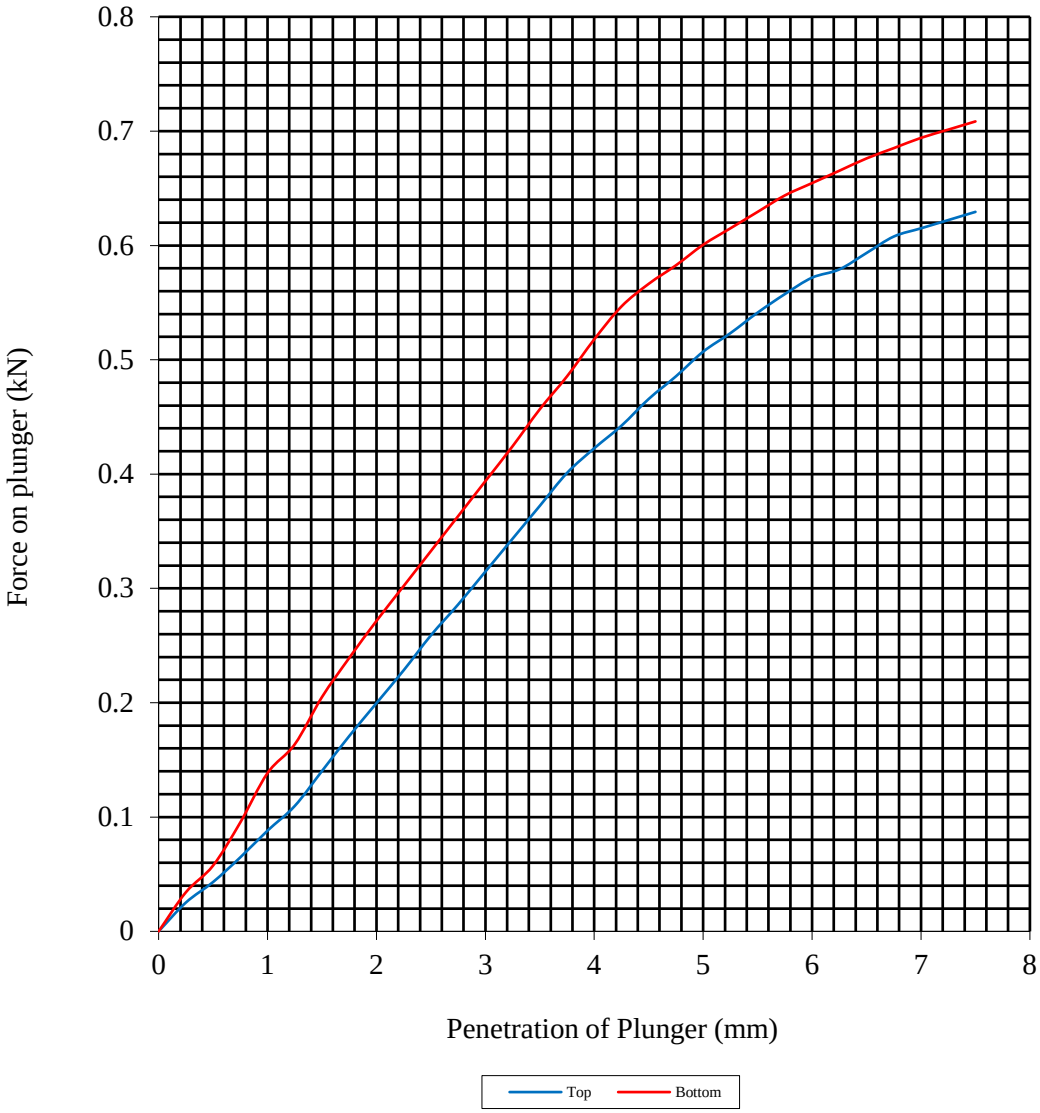
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP222 **Top Depth (m):** 0.90

Sample Number: **Base Depth (m):** 1.30

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	24	Sample Top	2.5
Bulk Density Mg/m3:	1.85	Soaking Time hrs	0	Sample Bottom	24	Sample Bottom	3.0
Dry Density Mg/m3:	1.49	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			2				
Compaction Conditions		2.5kg					

Final Received 2nd February 2022 Marshall Milnes LLP

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

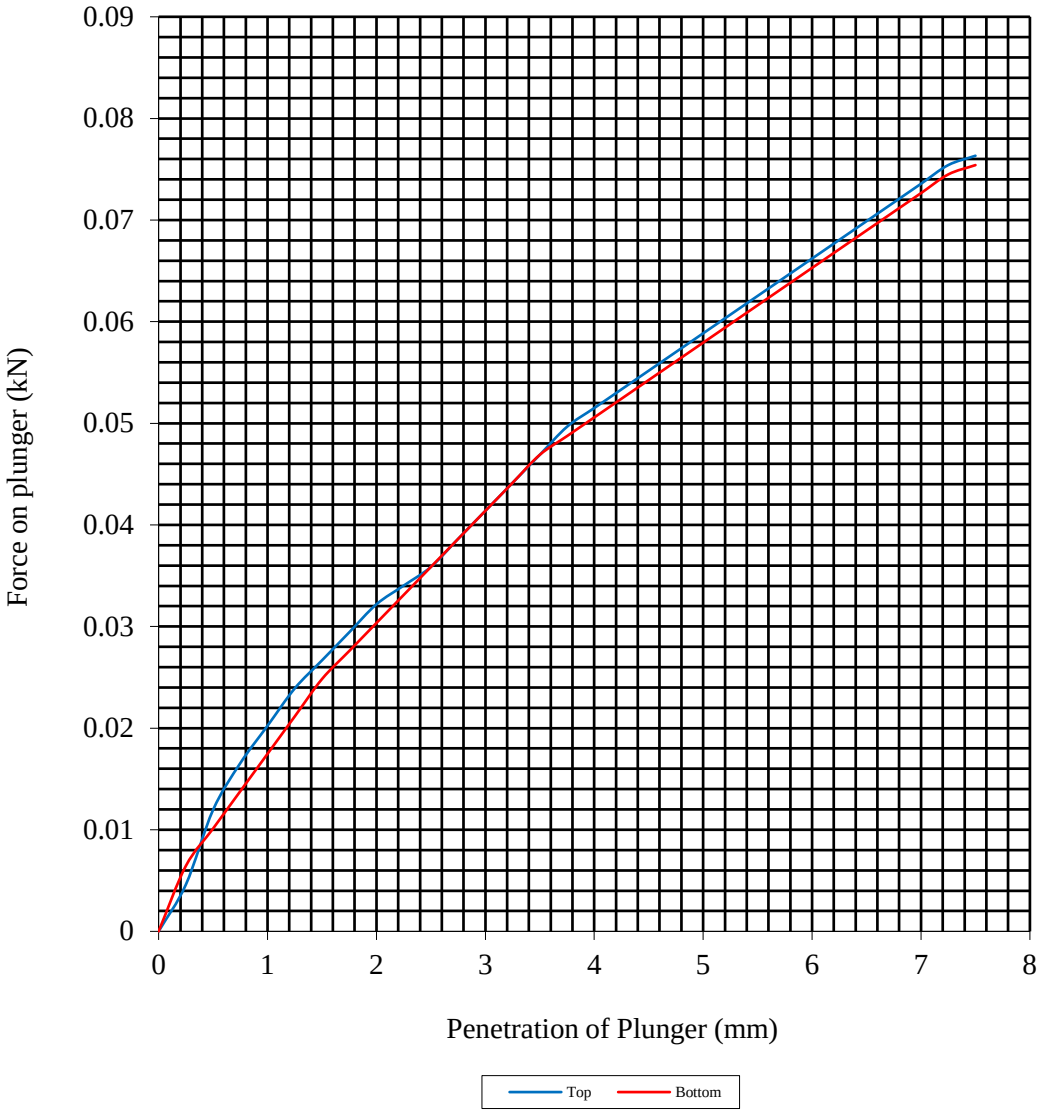
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP225 **Top Depth (m):** 0.80

Sample Number: **Base Depth (m):** 1.10

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	28	Surcharge Kg:	4.20	Sample Top	28	Sample Top	0.3
Bulk Density Mg/m3:	1.92	Soaking Time hrs	0	Sample Bottom	28	Sample Bottom	0.3
Dry Density Mg/m3:	1.49	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

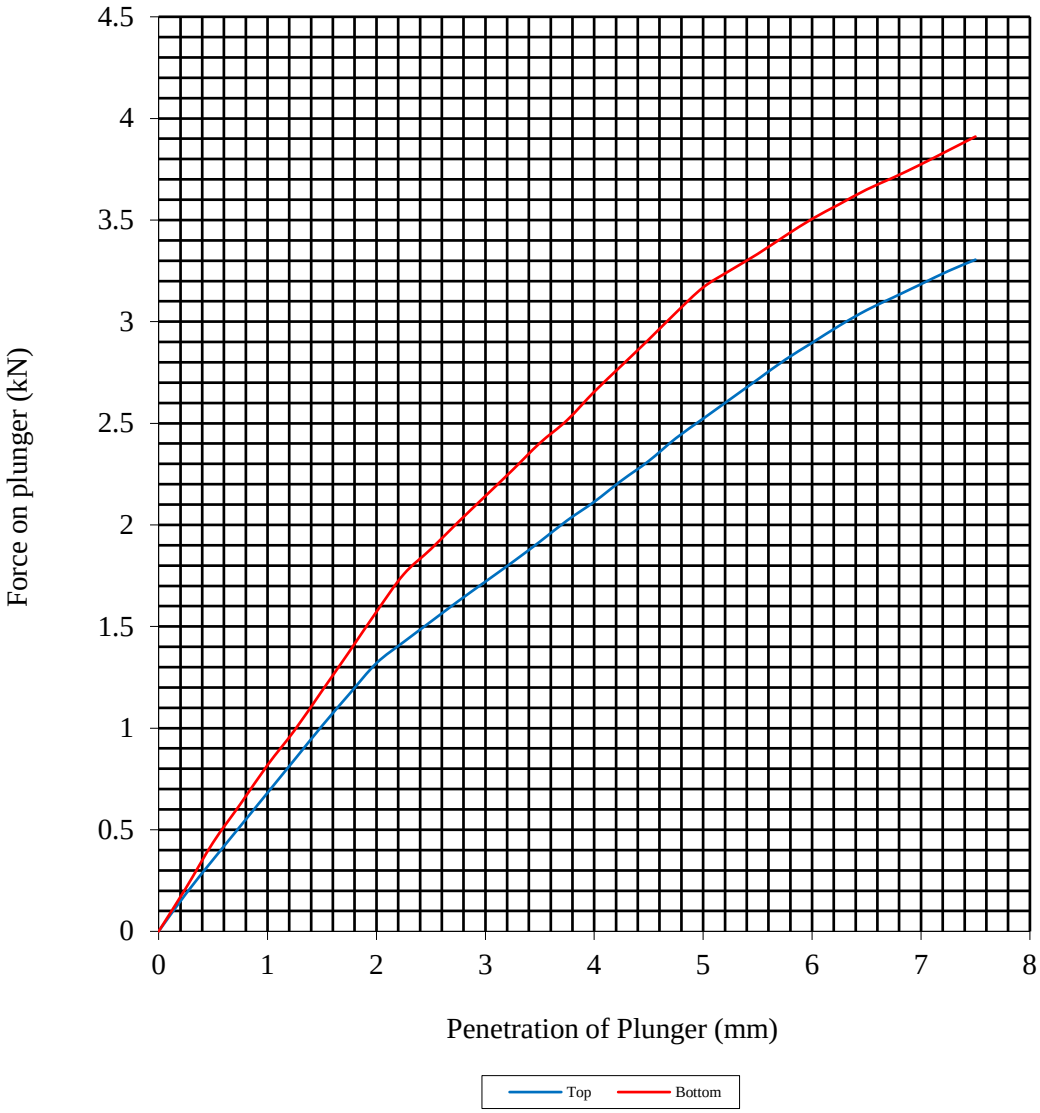
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP228 **Top Depth (m):** 0.90

Sample Number: **Base Depth (m):** 1.00

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	25	Surcharge Kg:	4.20	Sample Top	25	Sample Top	12.6
Bulk Density Mg/m3:	1.82	Soaking Time hrs	0	Sample Bottom	25	Sample Bottom	15.8
Dry Density Mg/m3:	1.45	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

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PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

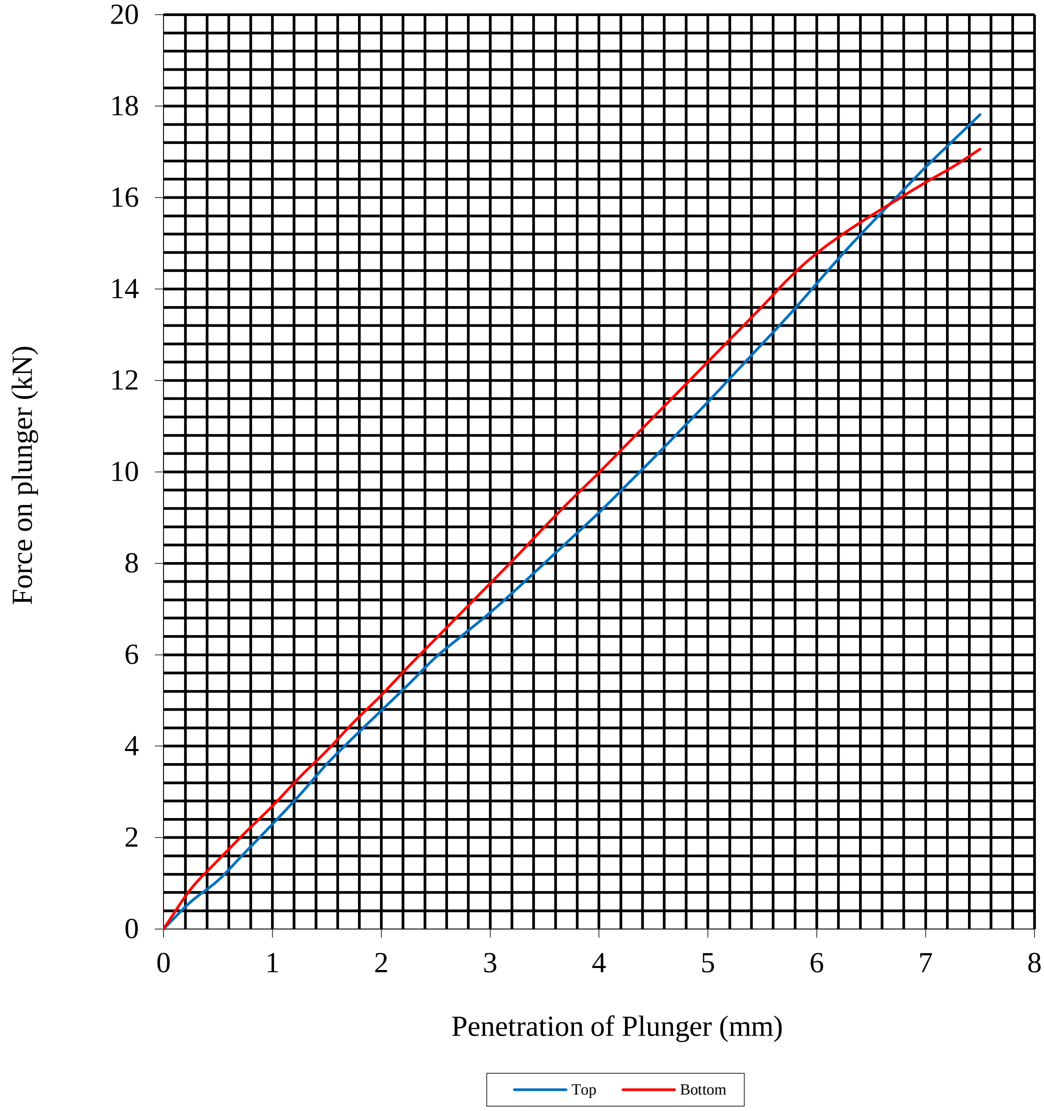
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: **TP229** **Top Depth (m):** **0.50**

Sample Number: **Base Depth (m):** **1.00**

Sample Type: **B**



Initial Sample Conditions		**Sample Preparation**		**Final Moisture Content %**		**C.B.R. Value %**	
Moisture Content:	9.4	Surcharge Kg:	4.20	Sample Top	9.2	Sample Top	57.6
Bulk Density Mg/m3:	1.65	Soaking Time hrs	0	Sample Bottom	9.7	Sample Bottom	62.0
Dry Density Mg/m3:	1.51	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: **PSL18/4597**

Client Ref: **4671**

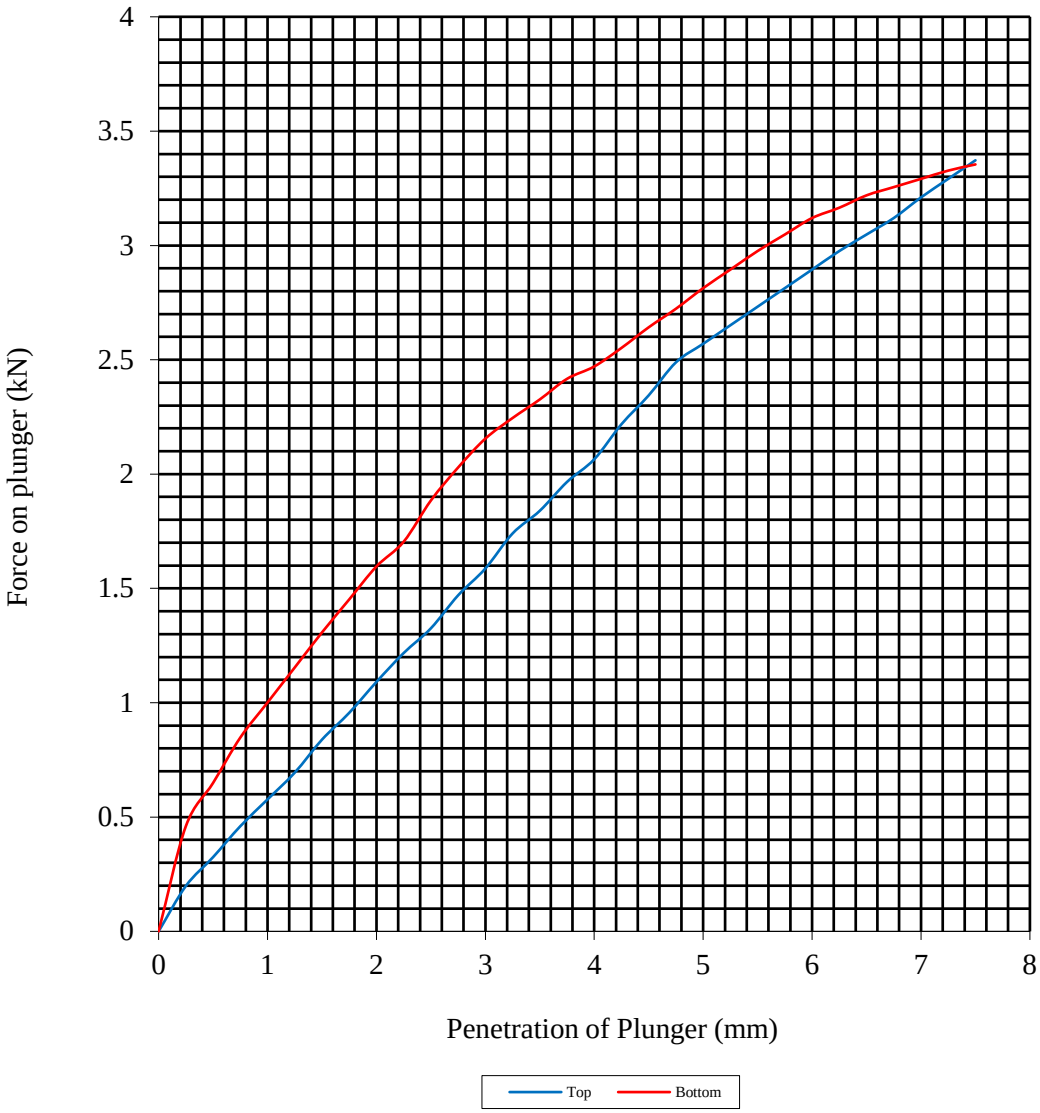
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP233 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):** 1.00

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	20	Surcharge Kg:	4.20	Sample Top	20	Sample Top	12.8
Bulk Density Mg/m3:	1.87	Soaking Time hrs	0	Sample Bottom	20	Sample Bottom	14.3
Dry Density Mg/m3:	1.55	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

Final Received 2nd February 2022 Marshall Milnes LLP

UKAS TESTING 4043

PSL Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No: PSL18/4597

Client Ref: 4671

SUMMARY OF SOIL DENSITY RELATED TESTS

(BS1377 : PART 2 & 4 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content %	Bulk Density Mg/m^3	Dry Density Mg/m^3	Retained 20mm %	Retained 37.5mm %	Method of compaction kg	Maximum Dry Density Mg/m^3	Minimum Dry Density Mg/m^3	Remarks
TP215		B	1.00	1.50	24		0.00				1.60	1.34	
TP229		B	0.50	1.00	9.4		0.00				1.50	1.35	
TP222		B	0.90	1.30	24		0.00				1.61	1.34	
TP224		B	1.90	2.20	23		0.00				1.61	1.34	
TP219		B	0.50	1.00	24		0.00				1.60	1.35	
TP204		B	0.50	1.00	15		0.00				1.49	1.37	
TP233		B	0.50	1.00	20		0.00				1.59	1.34	
TP228		B	0.90	1.00	25		0.00				1.60	1.35	

UKAS TESTING
4043

PSL
Professional Soils Laboratory

AIRFIELDS DEESIDE

Contract No:
PSL18/4597
Client Ref:
4671

Certificate of Analysis

Certificate Number 18-22468

27-Sep-18

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 18-22468

Client Reference PSL18/4597

Order No (not supplied)

Contract Title AIRFEILDS DEESIDE

Description 18 Soil samples.

Date Received 21-Sep-18

Date Started 21-Sep-18

Date Completed 27-Sep-18

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

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

Approved By

Adam Fenwick
Contracts Manager

Email Received 2nd February 2023 Marshall (MCWT) Ltd

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 18-22468
Client Ref PSL18/4597
Contract Title AIRFEILDS DEESIDE

	Lab No	1395609	1395610	1395611	1395612	1395613	1395614	1395615	1395616	1395617	1395618	1395619
	Sample ID	TP125	TP229	TP222	TP224	TP204	TP233	TP233	TP228	TP208	TP209	TP210
	Depth	1.00-1.50	0.50-1.00	0.90-1.30	1.90-2.20	0.50-1.00	0.50-1.00	0.60-0.00	0.90-1.00	2.00-0.00	1.60-1.60	1.00-1.50
	Other ID											
	Sample Type	B	B	B	B	B	B	D	B	D	D	D
	Sampling Date	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**									
Inorganics												
pH	DETSC 2008#			8.8	8.9	8.0	8.9			8.9	8.7	8.9	8.3	8.7
Organic matter	DETSC 2002#	0.1	%	0.2	0.1		< 0.1	0.3	0.1					
Chloride Aqueous Extract	DETSC 2055	1	mg/l	8.2	4.9	6.2	6.5			11	6.0	9.7	6.8	12
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	21	19	490	36			23	17	33	230	28
Sulphur as S, Total	DETSC 2320	0.01	%	0.01	0.01		0.01			< 0.01	0.02	0.01	0.08	
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.02	0.02		0.02			0.01	0.04	0.02	0.06	

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-22468
Client Ref PSL18/4597
Contract Title AIRFEILDS DEESIDE

	Lab No	1395620	1395621	1395622	1395623	1395624	1395625	1395626
	Sample ID	TP212	TP213	TP216	TP220	TP221	TP223	TP235
	Depth	1.50-2.00	0.50-1.00	0.80-1.00	1.00-1.50	0.90-1.00	0.80-1.00	0.80-1.00
	Other ID							
	Sample Type	D	D	D	D	D	D	D
	Sampling Date	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18	13/09/18
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
pH	DETSC 2008#			9.0	8.6	8.9	8.9	8.9	8.9	
Organic matter	DETSC 2002#	0.1	%							
Chloride Aqueous Extract	DETSC 2055	1	mg/l	5.6	8.4	11	9.5	4.6	9.2	8.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	18	22	18	< 10	19	
Sulphur as S, Total	DETSC 2320	0.01	%	< 0.01				< 0.01		
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.02				0.02		

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 18-22468
Client Ref PSL18/4597
Contract AIRFEILDS DEESIDE

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1395609	TP125 1.00-1.50 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395610	TP229 0.50-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395611	TP222 0.90-1.30 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395612	TP224 1.90-2.20 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395613	TP204 0.50-1.00 SOIL	13/09/18	PT 500ml		
1395614	TP233 0.50-1.00 SOIL	13/09/18	PT 500ml		
1395615	TP233 0.60-0.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395616	TP228 0.90-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395617	TP208 2.00-0.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395618	TP209 1.60-1.60 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395619	TP210 1.00-1.50 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395620	TP212 1.50-2.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395621	TP213 0.50-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395622	TP216 0.80-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395623	TP220 1.00-1.50 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395624	TP221 0.90-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395625	TP223 0.80-1.00 SOIL	13/09/18	PT 500ml	pH + Conductivity (7 days)	
1395626	TP235 0.80-1.00 SOIL	13/09/18	PT 500ml		

Key: P-Plastic T-Tub

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

Appendix E Gas and Groundwater Monitoring Results

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside

Job No: 4671 **Client:** Praxis Real Estate Management Ltd

Visit No: 1 **Date:** 07/09/2018

CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.0	0.9	0.0	0.0	0.4	0.0	0.0	19.0	0.1	0.1	1.51	4.54
CP206	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	21.2	0.1	0.1	1.73	12.02
				1030	1015								

Ambient Concentration (% volume): **CH_4** 0.0 %v/v **CO_2** 0.0 %v/v **O_2** 20.1 %v/v

Barometric Pressure: **Start** 1014 **End** 1015

Barometric Pressure Trend: Steady.

Weather: Overcast, slight breeze and light rain.

Monitoring Equipment: GA5000

Serial Number of Equipment: G505491

Date of Last Calibration: 24.May.2018

Operator: MHP

Key	Remarks
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside
Job No: 4671 **Client:** Praxis Real Estate Management Ltd
Visit No: 2 **Date:** 13/09/2018

JPG
CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest	Litre/Hour			
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2				
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.0	0.7	0.0	0.0	0.2	0.0	0.0	19.8	0.1	0.1	1.55	4.54
CP206	0.0	0.0	0.1	0.0	0.0	0.1	0.0	1.0	21.4	0.1	0.1	1.63	12.02
				1030	1015								

Ambient Concentration (% volume):		**CH_4**	0.0	%v/v	**CO_2**	0.0	%v/v
		O_2	21.4	%v/v			
Barometric Pressure:	**Start** 1022				**Monitoring Equipment:**	GA5000	
	End 1022				**Serial Number of Equipment:**	G505491	
Barometric Pressure Trend:	Falling.				**Date of Last Calibration:**	24.May.2018	
Weather:	Overcast, slightly windy.				**Operator:**	MHP	

Key	**Remarks**
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.
	Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside
Job No: 4671 **Client:** Praxis Real Estate Management Ltd
Visit No: 3 **Date:** 20/09/2018

CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest	Litre/Hour			
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2				
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.1	0.1	1.58	4.54
CP206	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	20.1	0.0	0.0	1.63	12.02
				1030	1015								

Ambient Concentration (% volume): CH_4 0.0 %v/v; O_2 20.2 %v/v; CO_2 0.0 %v/v

Barometric Pressure: Start 1015; End 1015
Barometric Pressure Trend: Falling.
Weather: Raining.

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 24.May.2018
Operator: MHP

Key	Remarks
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.
	Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside
Job No: 4671 **Client:** Praxis Real Estate Management Ltd
Visit No: 4 **Date:** 26/09/2018

CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.0	0.7	0.0	0.0	0.2	0	0	20.3	0.1	0.1	1.45	4.54
CP206	0.0	0.0	0.0	0.0	0.0	0.0	0	1	21.5	-3.0	0.1	1.76	12.02
				1030	1015								

Ambient Concentration (% volume): CH_4 0.0 %v/v; O_2 21.1 %v/v; CO_2 0.0 %v/v

Barometric Pressure: Start 1030; End 1031
Barometric Pressure Trend: Rising
Weather: Overcast, slightly breezy and warm.

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 24.May.2018
Operator: MHP

Key	Remarks
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.
	Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside
Job No: 4671 **Client:** Praxis Real Estate Management Ltd
Visit No: 5 **Date:** 05/10/2018

CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest	Litre/Hour			
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2				
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.2	0.1	0.0	0.2	0.1	0.0	0.0	20.9	0.3	0.1	1.40	4.54
CP206	0.0	0.2	0.3	0.0	0.2	0.3	0.0	0.0	20.6	0.0	0.1	1.77	12.02
				1030	1015								

Ambient Concentration (% volume): CH_4 0.0 %v/v; O_2 20.1 %v/v; CO_2 0.0 %v/v

Barometric Pressure: Start 1015; End 1014
Barometric Pressure Trend: Steady.
Weather: Bright, slightly windy.

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 24.May.2018
Operator: MHP

Key	Remarks
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.
	Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Plot B, The Airfields, Deeside

Job No: 4671 **Client:** Praxis Real Estate Management Ltd

Visit No: 6 **Date:** 23/10/2018

CIVIL & STRUCTURAL ENGINEERING

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	
CP205	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	20.7	0.1	0.1	1.28	4.54
CP206	0.0	0.1	0.3	0.0	0.0	0.3	0.0	0.0	20.2	-10.9	-2.6	1.47	12.02
				1030	1015								

Ambient Concentration (% volume):			**CH_4**	0.0	%v/v	**CO_2**	0.0	%v/v
			O_2	20.3	%v/v			
Barometric Pressure:	**Start**	1032				**Monitoring Equipment:**	GA5000	
	End	1032				**Serial Number of Equipment:**	G505491	
Barometric Pressure Trend:		Rising				**Date of Last Calibration:**	24.May.2018	
Weather:		High tide, extremely windy.				**Operator:**	MHP	

Key	**Remarks**
NR - Not Recorded NA - Not Applicable	Potentially tidal influence on groundwater levels.
	Checked: **Approved:**

SUMMARY OF GROUND GAS MONITORING

BH NO.	Peak CH4	Peak CH4	Steady CH4	Steady CH4	Peak CO2	Peak CO2	Steady CO2	Steady CO2	H_2S	CO	O2	O2	max limiting	max limiting	Peak Flow	Steady Flow	SWL	SWL
	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	ppm	ppm	(% v/v)	(% v/v)	bh flow	bh flow	(l/hr)	(l/hr)	(m bgl)	(m bgl)
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MAX	MAX	MIN	MAX	rate for CH4	rate for CO2*	MAX	MAX	MIN	MAX
CP205	0	0.2	0	0.2	0	0.9	0	0.4	0	0	19	20.9	0.0006	0.0004	0.3	0.1	1.28	1.58
CP206	0	0.2	0	0.2	0	0.3	0	0.3	0	1	20.1	21.5	0.0002	0.0003	0.1	0.1	1.47	1.77

* Based on peak CO2 and steady flows.

	VISIT 1	VISIT 2	VISIT 3	VISIT 4	VISIT 5	VISIT 6
MB Start	1014	1022	1015	1030	1015	1032
MB Finish	1015	1022	1015	1031	1014	1032
Pressure Change	Steady.	Falling.	Falling.	Steady.	Rising	Rising

Appendix F Cone Penetration Testing

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DEESIDE

SOIL INVESTIGATION

CPT REPORT

Cone penetration test
Magnetometer test
Geotechnical data interpretation

Project ref.: P-106982-7




PROJECT:	Deeside

CLIENT:	JPG Group

FIELDWORK

CPT rig(s)	20.5 tonne track-truck mounted CPT unit (UK15)
Date fieldwork started	29th August 2018
Date fieldwork completed	29th August 2018
Lankelma's representative	Paul Dimelow
Client's representative	Molly Peckham

REPORT

Status	Revision	Action	Date	Name
Revised	00	**Completed**	30/08/18	Chris Player
		Checked	31/08/18	Emma Stickland
		Approved	31/08/18	Joseph Hobbs
Final	01	**Completed**	11/09/18	Chris Player
		Checked	11/09/18	Emma Stickland
		Approved	11/09/18	Joseph Hobbs

CONTENTS

1 INTRODUCTION

At the request of JPG Group, a CPT led soils investigation was carried out on project *Deeside*.

Site location:

Sandy Lane
Garden City
Deeside
CH5 2JF

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, care and diligence 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 appropriateness of any assumptions, derived soil parameters or soil units contained in this report.

3 COMPLETED WORKS

- 12 nr. cone penetration tests (CPT) without piezo measurement; and
- Factual report plus additional geotechnical data interpretation.

The *Summary Tables* section contains tabulated summaries of the works completed together with analysis results where necessary.

4 FIELDWORK

4.1 CONE PENETRATION TESTING

Cone penetration tests were performed with a 20.5-tonne track-truck mounted CPT unit (UK15) equipped with a 17-tonne capacity hydraulic ram set. Testing was carried out in general accordance with BS ISO 22476-1:2012.

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

The penetrometer was calibrated in accordance with BS8422:2003 and ASTM E74-13a. The management of calibration records is in accordance with ISO 10012. Copies of all calibration certificates for the cones used are presented in Appendix A. Penetrometer details and calibration certificates are reported in Table 1 and Appendix A respectively.

4.2 MAGNETOMETER TESTING

A combined CPT/magnetometer was used at prescribed locations in order to provide the data for in-site safety management of UXO risk. As such, no data has been processed or reported here in.

The magnetometer used in the Lankelma magcone system comprises a Bartington Instruments 3-axis flux gate magnetometer that is capable of measuring disturbances in the Earth's field of less than 1 part in a million. Buried ferrous items, such as UXO, result in localized distortions of the magnetic field. The detection radius of the works undertaken was dependent upon the level of magnetic field distortion noise and the size of the ferrous object(s) of interest. The UXO data was reviewed real-time.

The magnetometer probe was pushed into the soil using a standard CPT rig up to a maximum applied pressure of 15 Tonnes.

4.3 POSITIONING AND TEST TERMINATION DEPTHS

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

The target depth for the investigation was 15m below ground level. Table 1 details the final test depths and reasons for test termination (*refusal factor)*. *W*here penetration refusal was encountered the termination depth was advised to, and agreed with, the Client's on-site representative.

5 RAW DATA REDUCTION AND PRESENTATION

The CPT results are presented in Appendix B. The corrected cone resistance (q_t), local side friction (f_s), friction ratio (R_f) and inclination are all presented against depth and elevation in accordance with recommendations of the BS ISO 22476-1:2012. CPT data and the associated derived geotechnical parameters are included in the AGS 3.1 and 4.0 data files provided.

The cone tip resistance and sleeve force measurements have been converted to pressures using the nominal dimensions of the penetrometer.

For tests without u_2 pore pressure measurement it is not possible to derive the corrected tip resistance which is found from 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 cone 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 soils with large excess pore pressures. The relationship between measured resistance, excess pressure and correction difference is described by the curves in the following chart for alpha factor of 0.8:

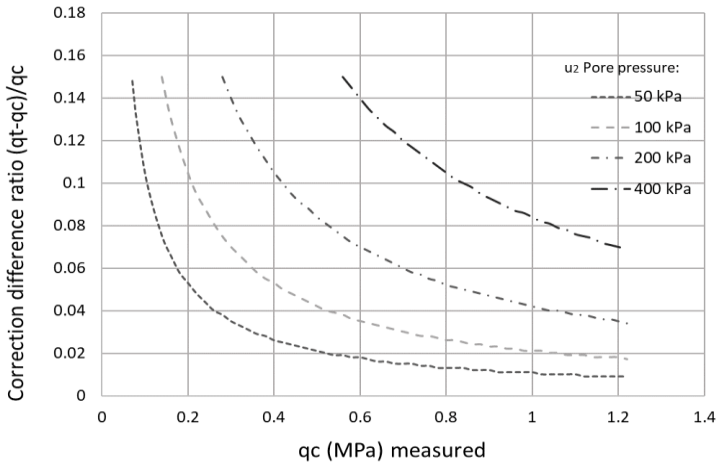

Figure 5-1 corrected tip resistance fraction with measured tip resistance

Penetration length readings are corrected for inclination and sleeve readings are depth corrected for the dimensional offset between cone tip and sleeve during post processing. An additional shift of -80mm is applied to the sleeve to account for tip failure zone offset (see 'CPT Interpretation Notes'). 'Rod spikes' (artefacts of the 1m interval pause for rod string addition) are filtered from the cone tip and sleeve data.

The raw (or corrected) data are presented in Appendix B.

6 INTERPRETATION

Geotechnical parameters appropriate for drained and undrained cone penetration conditions are derived for corresponding drained and undrained derived soil behaviour types (SBTs) respectively, however to account for uncertainty in the SBT correlation with drainage behaviour, all parameters are derived over the range of mixed soil types 'silt mixtures' and 'sand mixtures' or *Ic* 2.05-2.95 (Robertson, 2010).

Note: All derived parameters, soil type interpretation and assumptions should be regarded as provisional and subject to review by an appropriately qualified person.

6.1 IN-SITU STRESS CONDITIONS

The in-situ total and effective stress state has been calculated based on an assumed total unit weight of 17kN/m^3 above the principal phreatic surface and 18kN/m^3 below.

The depth of the principal phreatic surface, or groundwater table, has been assumed at an arbitrary value of 1.5mBGL for parameter calculations.

Note: The term phreatic surface is used here, however when it is based on piezocone measurements it is assumed that the piezometric level (under hydrostatic conditions) and groundwater table coincide. The phreatic or piezometric surface reported is only intended to provide information about the assumed pore pressure distribution for calculation of relevant derived parameters from the CPT and may not represent the true position of the groundwater table or perched water bodies. Complex groundwater pressure distributions, if they are observed from the measurements, will be applied to relevant derived parameters.

6.2 SOIL BEHAVIOUR TYPE

The soil behaviour type (SBT) has been interpreted using the Robertson (1990) classification system based on the normalised cone resistance (Qt) and normalised friction sleeve resistance (Fr). A copy of the chart is given in Appendix A titled 'CPT Soil Behaviour Type Chart'.

The results are presented on the plots of Appendix C – *Standard interpretation results (set 1)*.

6.3 SOIL BEHAVIOUR TYPE – *IC* INDEX

The SBT is presented as the soil behaviour type index, I_c, for both stress-normalised and non-normalised evaluations according to the charts of Robertson (1998 & 2010) applicable to predominantly silicate soils.

The index provides a continuous profile of SBT variation with depth allowing the selection of appropriate layer boundaries. The basis of I_c and its approximation of the original chart classification zones may be seen from Appendix A figure 'CPT Soil Behaviour Type Chart'. The method does not identify zones 1 (*sensitive fine grained)* and zones 8 & 9 (*overconsolidated or cemented*).

Non-stress normalised SBT index I_c:

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

Stress-normalised SBT index I_c:

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

(See glossary of terms and symbols Appendix A).

The results are presented on the plots of Appendix C – *Standard interpretation results (set 1)*.

6.4 GEOTECHNICAL PARAMETERS

6.4.1 RELATIVE DENSITY

The relative density of sands is 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. The expected accuracy may be evaluated from the figures presented below.

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

(See glossary of terms and symbols appendix A – *General information*)

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.

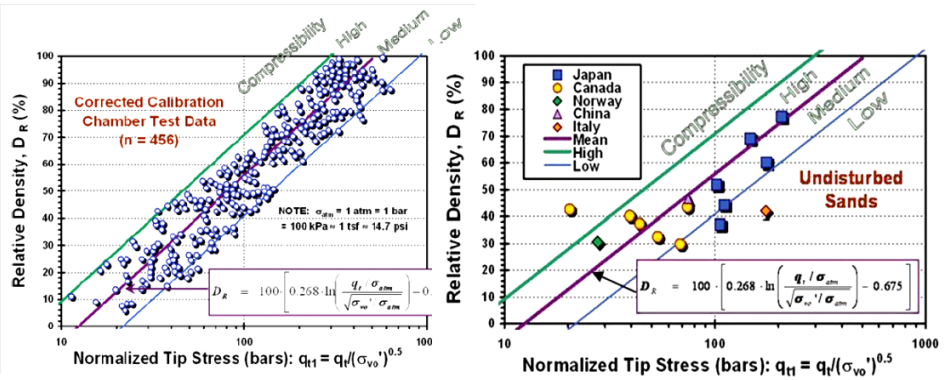

Figure 6-1 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

The results are presented on the plots of Appendix D – *Standard interpretation results (set 2)*.

6.4.2 UNDRAINED SHEAR STRENGTH

S_u is usually estimated as a factor of net cone tip resistance (Lunne *et al*, 1981):

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

where N_k is an empirical cone factor.

(See glossary of terms and symbols appendix A – *General information*)

S_U values are presented for N_{kt} factors of 15 and 20 as standard.

Mayne and Peuchen (2018) performed and evaluation of 407 high-quality triaxial compression tests against net tip resistance and proposed N_{kt} factors with regression analysis details for five categories of clays shown in Table 1.

Table 1 Summary of CAUC s_u versus q_{net} for clays. Reproduced from Mayne and Peuchen (2018).

Clay Group	Number of sites	No. 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 Bq, applicable for Bq values of > -0.01. The equation below is proposed by Mayne and Peuchen 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 Nk and correlation coefficient of 0.645.

The estimate based on B_q is presented as 'S_U3' on the parameter plots and is only suitable and calculated for tests that have a high-quality pore pressure data, often indicated by a positive, repeatable and dynamic response. For tests that have a reliable pore pressure response throughout the evaluation on a point by point basis is warranted. For projects with variable response quality and with possible piezo desaturation (for example in the unsaturated zone or by dilation/cavitation) it is preferable to identify zones with reliable pore pressure response for representative soils and select a characteristic value of B_q for evaluation of N_{kt}. Lankelma are not always in view of the effort that has been made in preparation of the test location to maintain saturation of the piezo sensor.

Note: N_{kt} (with subscript 't') indicates an Nk factor that has been established using the corrected tip resistance qt. Nkt can be applied to the uncorrected tip resistance (qc) of non-piezocone tests but will result in a slightly lower estimate of Su depending on the correction magnitude qc - qt relevant to lower strength soils.

All undrained shear strength derivations are presented on the plots of Appendix C – *Standard interpretation results (set 1).*

6.4.3 OVERCONSOLIDATION RATIO

The preconsolidation stress of clays is calculated based on the method proposed by Mayne (1995) and Demers and Leroueil (2002):

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

$$OCR = \sigma_p'/\sigma_{v0}'$$

(See glossary of terms and symbols Appendix A)

The factor k may be expected to lie within the range 0.2 to 0.5. A first order value of 0.33 represents the trend proposed by Mayne (1995). Higher values of k are recommended for fissured heavily overconsolidated clays. Figure 6-2 illustrates the expected accuracy of the estimate.

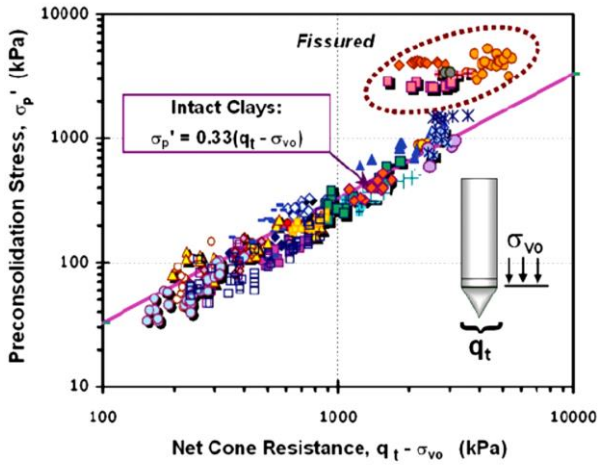

Figure 6-2 Preconsolidation stress from net cone resistance in clays (reproduced from Mayne (2007)).

6.4.4 SENSITIVITY

The approximate sensitivity of the soil, as defined by the ratio of undrained shear strength to remoulded shear strength, is calculated using the factored normalised cone resistance (S_u) and remoulded shear strength taken as equal to the direct friction sleeve measurement:

$$s_t = 0.073 \cdot \frac{q_t - \sigma_{v0}}{f_s}$$ Mayne (2007)

(See glossary of terms and symbols Appendix A – *General information*)

The derived sensitivity is only indicative for sensitive soils because the sensitivity to error of the friction sleeve and tip increases markedly at the very low range.

The results are presented on the plots of Appendix C – *Standard interpretation results (set 1).*

6.4.5 SPT N60 VALUES

Equivalent SPT N60 Values defined as the non-normalised SPT blow count over a 30cm interval. The results of the two correlations below are presented together in the results section for comparison.

$$N_{60} = \frac{q_t}{8.5 \cdot \sigma_{atm} \cdot (1 - \frac{I_C}{4.6})}$$ Lunne *et al.* (1997)

$$\frac{\left(\frac{q_t}{p_a}\right)}{N_{60}} = 10^{(1.268 - 0.2817 I_c)}$$ Robertson (2012)

(See glossary of terms and symbols Appendix A)

The correlation is intended for clays, silts and sands and not for cemented geo-materials i.e. chalk.

The results are presented in Appendix D – *Standard interpretation results (set 2).*

6.4.6 FRICTION ANGLE

Sands

The peak friction angle of granular materials is calculated using the Kulhawy and Mayne (1990) method and is an empirical relationship as a function of stress normalised cone tip resistance. The relationship is based on a calibration chamber database from 24 sands of varying mineralogy. The relationship has the form:

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

Where:

ϕ' = Peak friction angle (degrees)

q_{t1} = stress normalised cone resistance = $(\frac{q_t}{\sigma_{atm}})/(\frac{\sigma_{v0}'}{\sigma_{atm}})^{0.5}$

The expected error with respect to the sand types used in development of the relationship may be assessed from the figure below. It can be seen that the presence of compressible minerals results in a conservative estimate of friction angle.

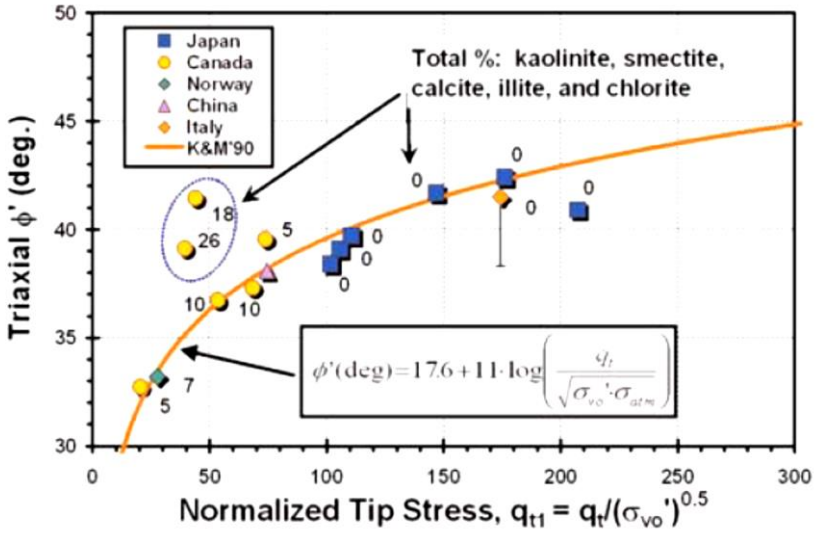

Figure 6-3 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

File grained soils

The effective friction angle for fine grained soils been calculated based on the Senneset *et al.* (1988, 1989) Norwegian Institute of Technology (NTH) using an approximate solution by Mayne & Campanella (2005) as a direct function of the pore pressure parameter Bq and normalised tip resistance Q. The method is applicable where $0.1 < B_q < 1.0$ and $20^\circ < \phi' < 45^\circ$ and generally appropriate for non-cemented NC-LOC soft to stiff soils.

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

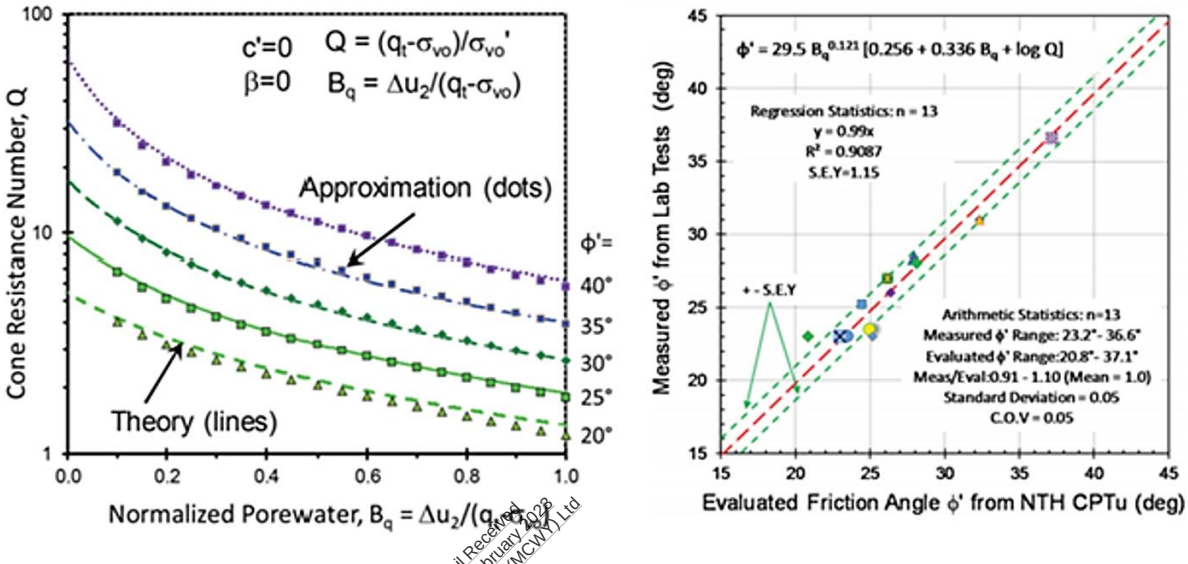

Figure 6-4 ([Left] Theoretical curves with function approximation (dots) overlay [Right] calibration data from geotechnical centrifuge tests for a variety of soils. Redrawn from Ouyang & Mayne (2018).

The results are presented in Appendix D – *Standard interpretation results (set 2).*

6.4.7 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) applicable to the present state of vertical effective stress up to the pre-consolidation stress.

$$m_v = \frac{1}{M}$$

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.

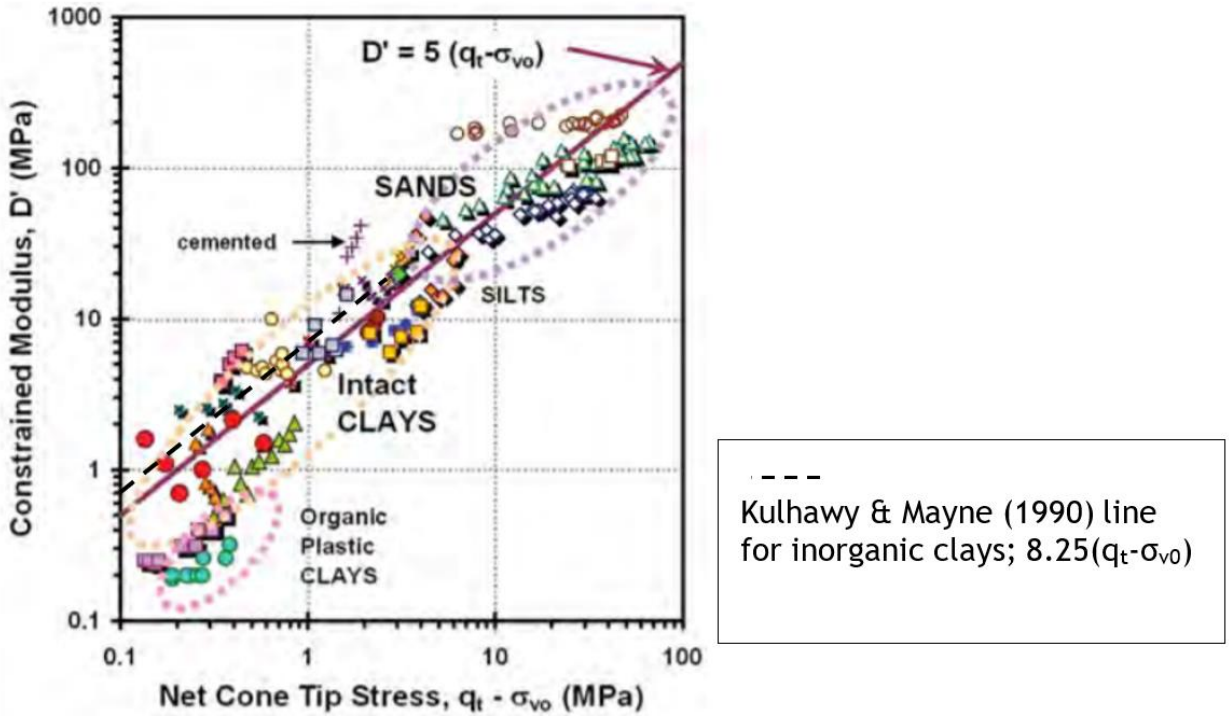

Figure 6-5 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

The results are presented on the plots of Appendix C – *Standard interpretation results (set 1).*

6.4.8 YOUNG'S MODULUS

The Young's Modulus at 25% strain (FOS = 4) calculated using the general empirical formula (Robertson, 2009):

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

Where:

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

(See glossary of terms and symbols Appendix A)

Using methods described in Robertson (2009) this formula may be adapted to estimate E' for loading at different percentages of yield stress.

The results are presented in Appendix D – *Standard interpretation results (set 2)*.

7 CPT DATA 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.

SOIL BEHAVIOUR TYPE

The soil behaviour type (SBT) as defined by Robertson *et al.* (1986) is not intended to replace soil classification based on particle size fractions. Rather, the SBT will generally show bias in the classification towards the soil fraction that dominates soil behaviour in response to penetration. In general, the normalised SBT will be more accurate, but may be less reliable at very shallow depths (1-2m) due to very low vertical effective stresses (applied in normalisation) relative to variable horizontal stresses affecting penetration resistance.

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 range of mixed soil types 'silt mixtures' and 'sand mixtures' or *Ic* 2.05-2.95 (Robertson, 2010). For partially drained conditions in low permeability soils, error will be introduced within derived parameters.

Piezocone dynamic pore water pressures behaviour, dissipations or other site-specific information may be used to identify the appropriate limits of application. Dissipations to t_{50} exceeding 50 seconds indicate undrained penetration behaviour based on findings of Kim *et al.*, 2010.

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

DYNAMIC PORE PRESSURE DATA (CPTu)

During penetration, dilation pressures at the cone shoulder may result in desaturation of the piezo sensor which may or may not re-saturate at higher excess pressures. The pore pressure response in saturated contractive soils normally have a dynamic 'peaky' appearance.

The tip resistance in lower strength contractive soils without pore pressure measurement in the u2 position is likely to be significantly lower than the equivalent corrected tip resistance depending on the magnitude of pore pressure acting in the gap between cone tip and cone body.

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 seen as sharp spikes or drops at boundaries. The friction ratio is often inaccurate in heavily disturbed soils with a 'blocky' macro fabric.

For this investigation a friction sleeve depth offset correction of -80mm was applied together with a 5-point moving average on the friction ratio to minimise the influence of this effect.

CONE TYPE

The reference cone type has a 10cm^2 projected cone tip area and 150cm^2 friction sleeve area, however it is common to use the larger 15cm^2 cone with 225cm^2 friction sleeve area for improved sensitivity and penetration depth potential. Use of the 15cm^2 cone will produce more pronounced transitions zones and thin layer effects (larger zone of influence and failure 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 mobilization 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 (<~0.5m) the true stiffness will not be fully mobilised. The effect for thin low stiffness layers is less significant. Procedures for thin-layer effect correction are provided by Robertson and Wride (1998). In choosing characteristic values of the tip, sleeve and derived parameter results, large scale peak and trough values may be more representative of the local value.

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 sharp reductions in pore water readings due to dilation effects. Frequent gravels in soft or loose soils may generate erroneous friction ratio values. Where gravels are matrix supported the tip and sleeve peaks may be ignored or filtered in choosing characteristic values for bulk behaviour.

This report has been completed based on current standards and the best information available at the time of preparation. Any data in this report that has been derived using incorrect or inappropriate assumption(s) or inappropriate methods must be rejected or adjusted at the discretion of the appropriately qualified person interpreting the data for design or recommendation.

8 REFERENCES

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SUMMARY TABLES

Table 1 CPT test summary

Test ID	Final depth (mBGL)	Cone ID {C=Cone tip; F=Friction Sleeve; I= Inclination; P = Piezo; S=Subtraction cone; 15/10 = cone projected area (cm2))}	CPT rig	Pre-drilled / inspection pit (m)	Casing depth (m)	Refusal factor	Dissipations	Seismic cone	Samples	Easting	Northing	Elevation (m)	Date of test	Remarks
CPT201	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT202	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT203	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT204	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT205	14.78	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT206	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT207	14.42	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT208	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT209	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT210	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT211	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	
CPT212	15.00	S15-CFIP.1528	UK15			Target depth							29/08/2018	

CPT test plots are presented in Appendices B, C & D

APPENDIX A GENERAL INFORMATION

LIST OF FIGURES

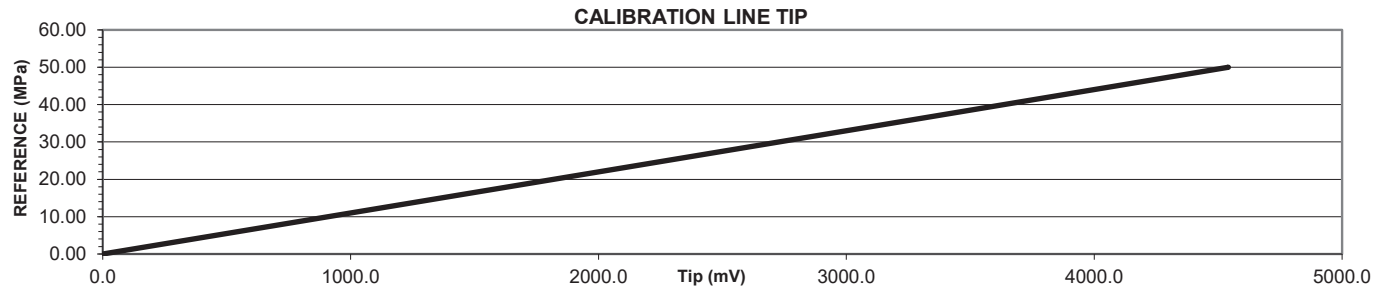
Description	Pages included
Cone calibration certificate: S15-CFIP.1528	1
Data sheet: 20.5 tonne track-truck mounted CPT unit (UK15)	1
CPT soil behaviour type chart	1
Glossary of terms	1

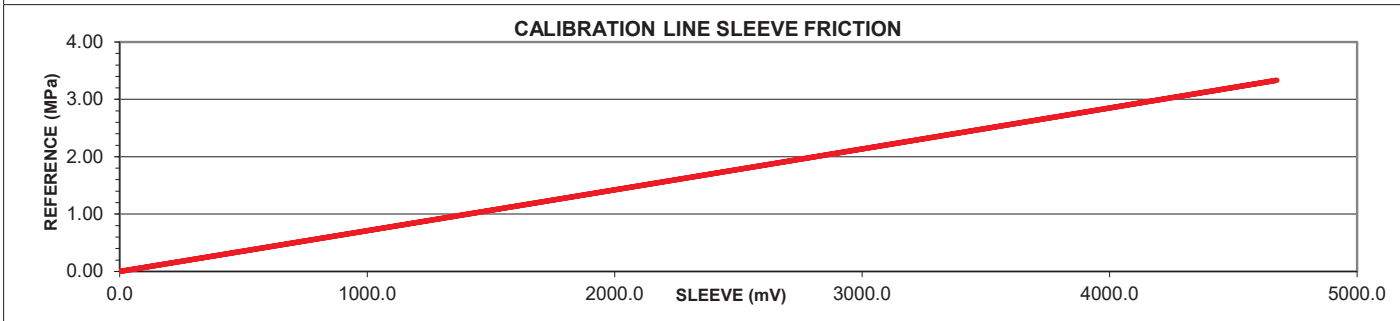
CALIBRATION CERTIFICATE

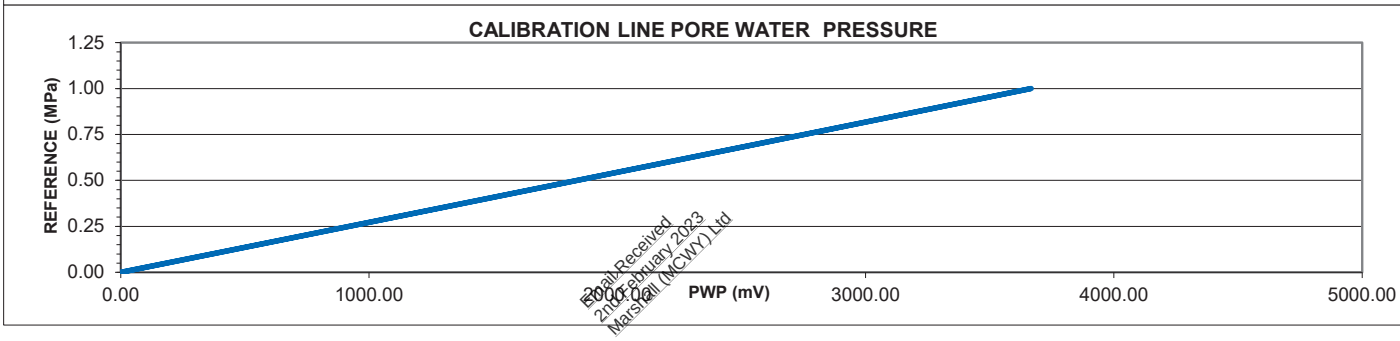
Geopoint -S15-150kN-2MPa

Cone Serial Number: S15.CFIIP-1528

REFERENCE INSTRUMENTS:	CONE END RESISTANCE	SLEEVE FRICTION	PORE WATER PRESSURE
ID	51998	51998	4009509
TYPE	AM DSCC-100kN	AM DSCC-100kN	Druck DPI 104
UNCERTAINTY (±%)	0.024	0.024	0.05
Nominal pressure (MPa,MPa,MPa)	50.00	3.33	1.00
Maximum pressure (MPa,MPa,MPa)	100.00	6.67	2.00
Area (cm²)	15	225	N/A
Sensitivity (mV/MPa)	90.84	1403.12	3666.51
Calibration file scaling factor:			
Nominal cal force (kN, kN, BAR)	75	75	10
Calibration number (mV)	4542	4677	3667
Zero point (mV)	340	189	263
Sensitivity (mV/kN, mV/kN, mV/BAR)	60.562	62.361	366.651
Inclination factors (mV)	X -20°= 408, 0°= 2577, 20°= 4239	/ Y -20°= 498, 0°= 2503, 20°= 4176	
Measured alpha factor:	0.69		
Uncertainty (%):			
Reproducibility	0.17	0.07	0.03
Linearity	0.12	0.09	0.12
Hysteresis	0.05	0.06	0.06
Combined expanded (k=2)	0.38	0.56	0.20
Application class	1	1	1







Instrument:	S15-150kN	Location:	Lankelma Calibration Laboratory
Serial Number:	S15.CFIIP-1528	Temperature(° C)	21.0
Manufacturer:	Geopoint	Calibration Engineer	ed f. white
Date of calibration:	12/07/2018	Calibration Expiry	11/10/2018

Calibration signed and dated by:	Calibration checked and dated by:
Digitally signed by Ed f. white DN: cn=Ed f. white, o=Lankelma, ou, email=edmundforder-white@lankelma.co.uk, c=GB Date: 2018.07.12 14:50:25 +01'00'	Paul Dimelow 2018.07.12 15:15:50 +01'00'

UK15
TRACK-TRUCK RIG

Our track-truck is suitable for most geotechnical sites. This rig is driven as a self-contained HGV to site where it can deploy its tracks to cope with soft or uneven terrain.

The track-truck can be driven from the front and back, and complies with Euro 4 emission standards for use in London's low emissions zones (LEZ).

Performance Rates

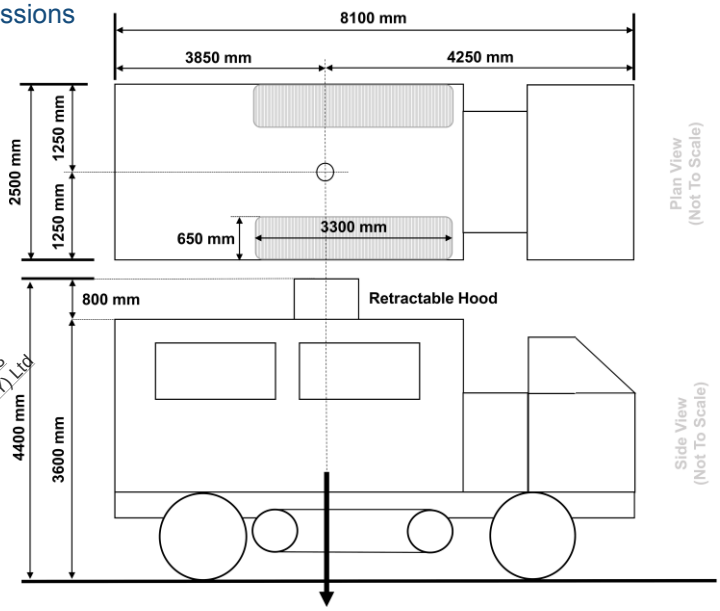
An expected 100m+ of standard CPTu testing can be executed in a day (dependent on site conditions and access).

Applications

- Specialist testing
  - Seismic
  - Pressuremeter
  - Magnetometer
  - Videocone
  - Wing cone
  - Push-in Vane
- Installations
  - VWP
  - Piezometer
  - Inclinometer
- Sampling
  - MOSTAP
  - Shelby

TECHNICAL DETAILS

Rig Weight	20.5 T
Maximum Operating Ram Capacity	17 T
Maximum Travelling Speed	86 km/h
Track Material	Steel
Track Length	3.30 m
Track Width	0.65 m
Jack Plate Dimensions	Tracks act as jacks
Jack Arrangements	1 on each side
Maximum Ground Clearance On Jacks	0.21 m
Maximum Ground Bearing Pressure	Tracking / Pushing – 51 kPa Pulling – 95 kPa
Maximum Testing Gradient	10 degrees
Maximum Traversing Gradient	30 degrees (operator assessed)
Noise Output at 2 m	Testing – 81 dBA Driving – 89 dBA
Clamp Arrangement	Hydraulic Dial Clamp
Ram Stroke	1.24 m
Maximum Casing Size	60 mm



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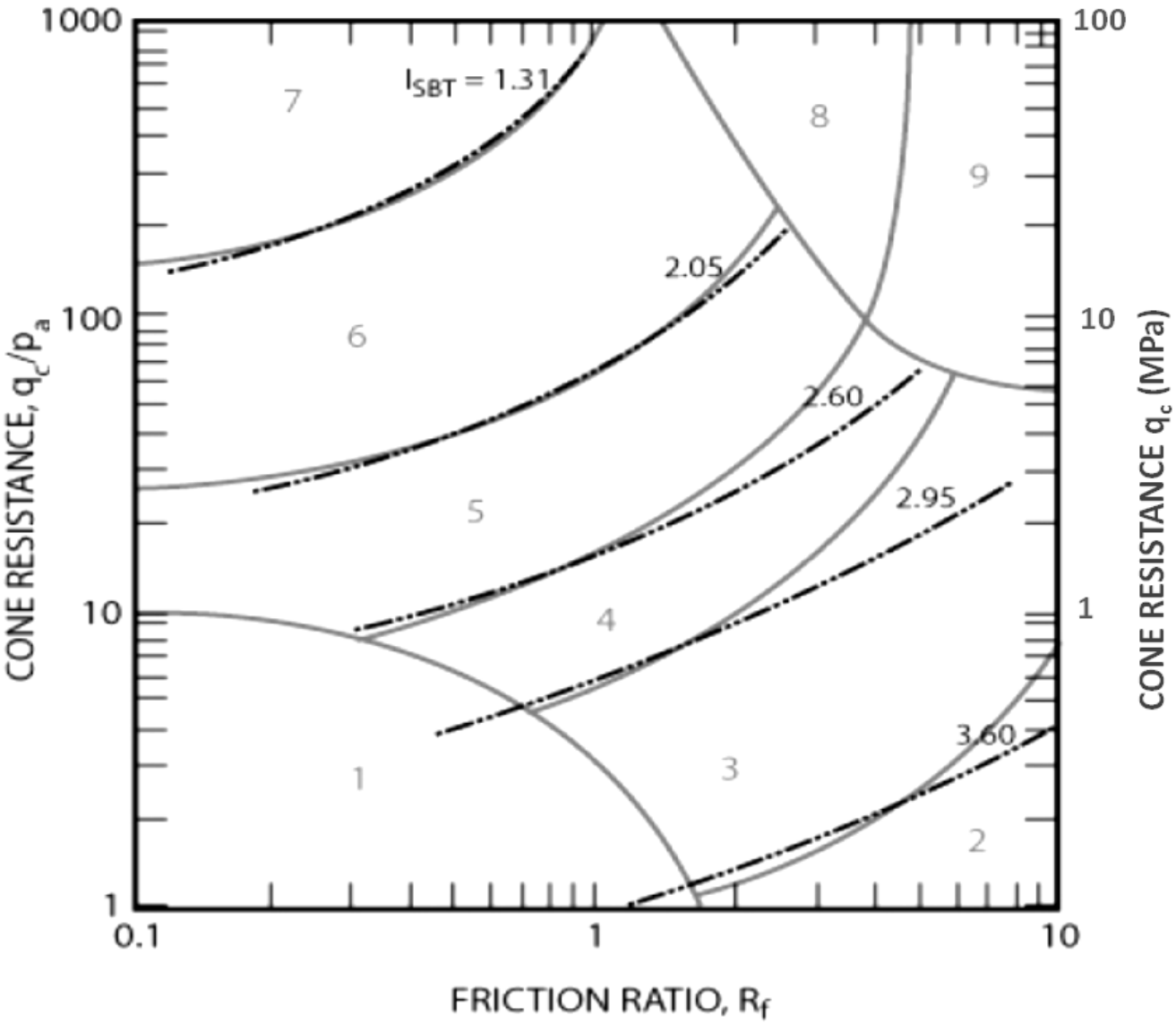
CPT SOIL BEHAVIOUR TYPE CHART



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

Zone	Soil Behaviour Type (SBT)		
1	Sensitive fine-grained	6	Sands: clean sand to sandy silt
2	Clay – organic soil	7	Dense sand to gravelly sand
3	Clays: Clay to silty clay	8	Stiff sand to clayey sand*
4	Silt mixtures: clayey silt to silty clay	9	Stiff fine grained*
5	Sand mixtures: Silty sand to sandy silt	*Overconsolidated or cemented	

GLOSSARY OF CPT TERMS AND SYMBOLS

SYMBOLS

q_c :- **Cone resistance.** The total force acting on the cone Q_c, divided by the projected area of the cone, A_c; **(q_c=Q_c/A_c)**.

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.**

q_t :- **Corrected cone resistance.** The cone resistance q_c corrected for unequal pore water pressure effects on the cone face and shoulder.

R_f :- **Friction ratio** The ratio, expressed as a percentage, of the sleeve friction, f_s, to the cone resistance, q_c, both measured at the same depth; **[R_f= (f_s/q_c) · 100].**

Q_t :- **Stress normalised cone resistance** (Method 1) **= (q_c – σ_v)/σ'_v**

q_{t1}:- **Stress normalised cone resistance** (Method 2) **= (q_t)/(σ'_v)$^{0.5}$**

F_r:- **Normalised friction sleeve resistance = f_s /(q_c- σ_v)**

σ_v:- **Total overburden stress**

σ'_v:- **Effective overburden stress**

σ_{atm}, or, P_a:- **Reference atmospheric stress = 100kPa**

***I_c*:-** **Soil Behaviour Type Index**

B_q :- **Pore pressure ratio.** The net pore pressure normalized with respect to the net cone resistance. = **(u_2 – u_0)/(q_t .σ_v)**

TERMS

Cone tip:- The conical tip section of the cone penetrometer.

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

Piezocone:- A cone penetrometer with a pore pressure measurement system.

Dynamic pore pressure:- The pore pressure generated during penetration and measured by a pore pressure sensor. u_1 when measured on the conical tip face, u_2 when measured just behind the conical tip.

APPENDIX B CONE PENETRATION TEST RESULTS

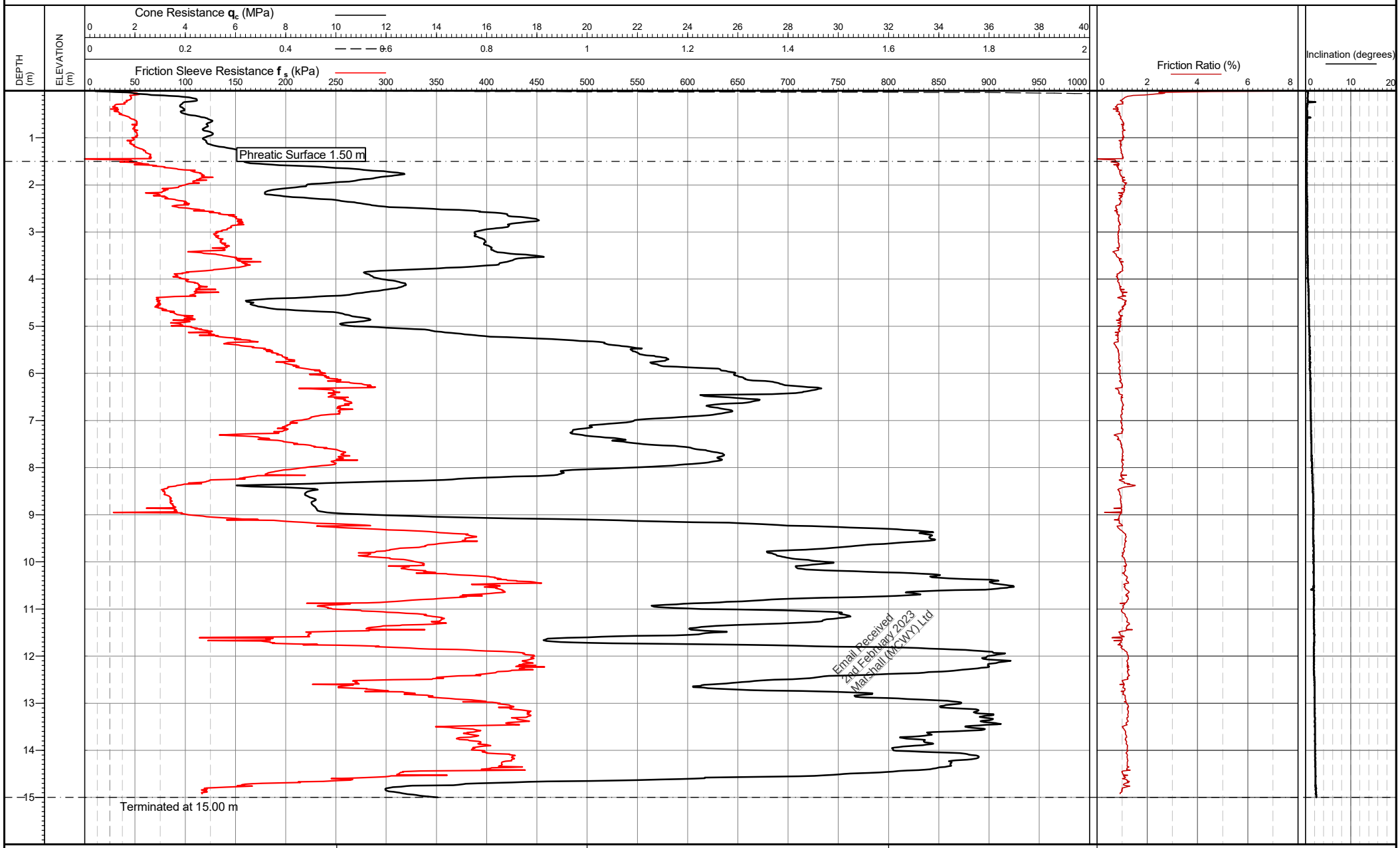
RAW DATA PLOTS

LIST OF FIGURES:

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 11:06:25

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

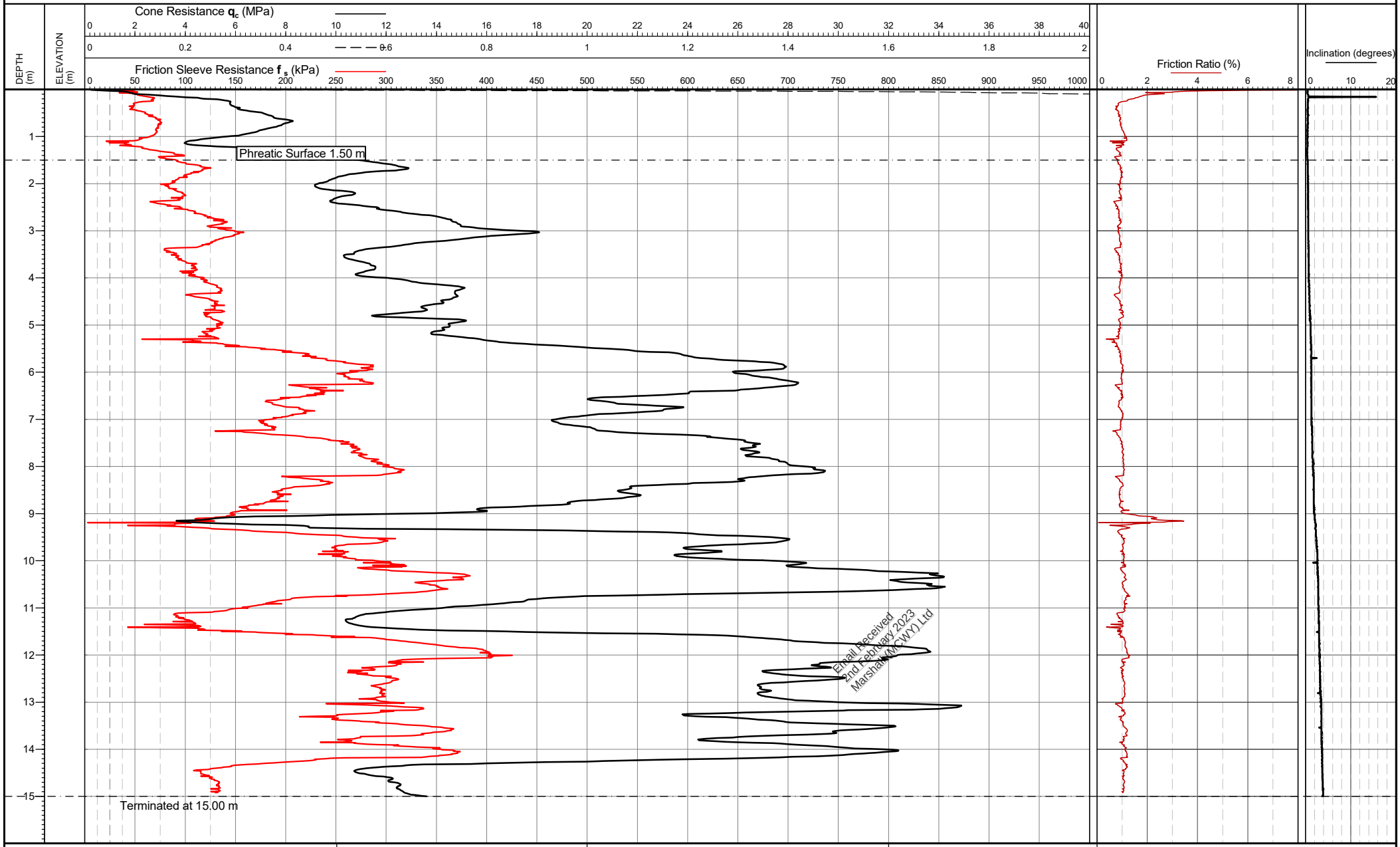
Checked by: Chris Player

TEST ID: CPT201

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
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Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 12:47:28

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
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Refusal criteria: Target depth

Date of plot: 29-08-18

Checked by: Chris Player

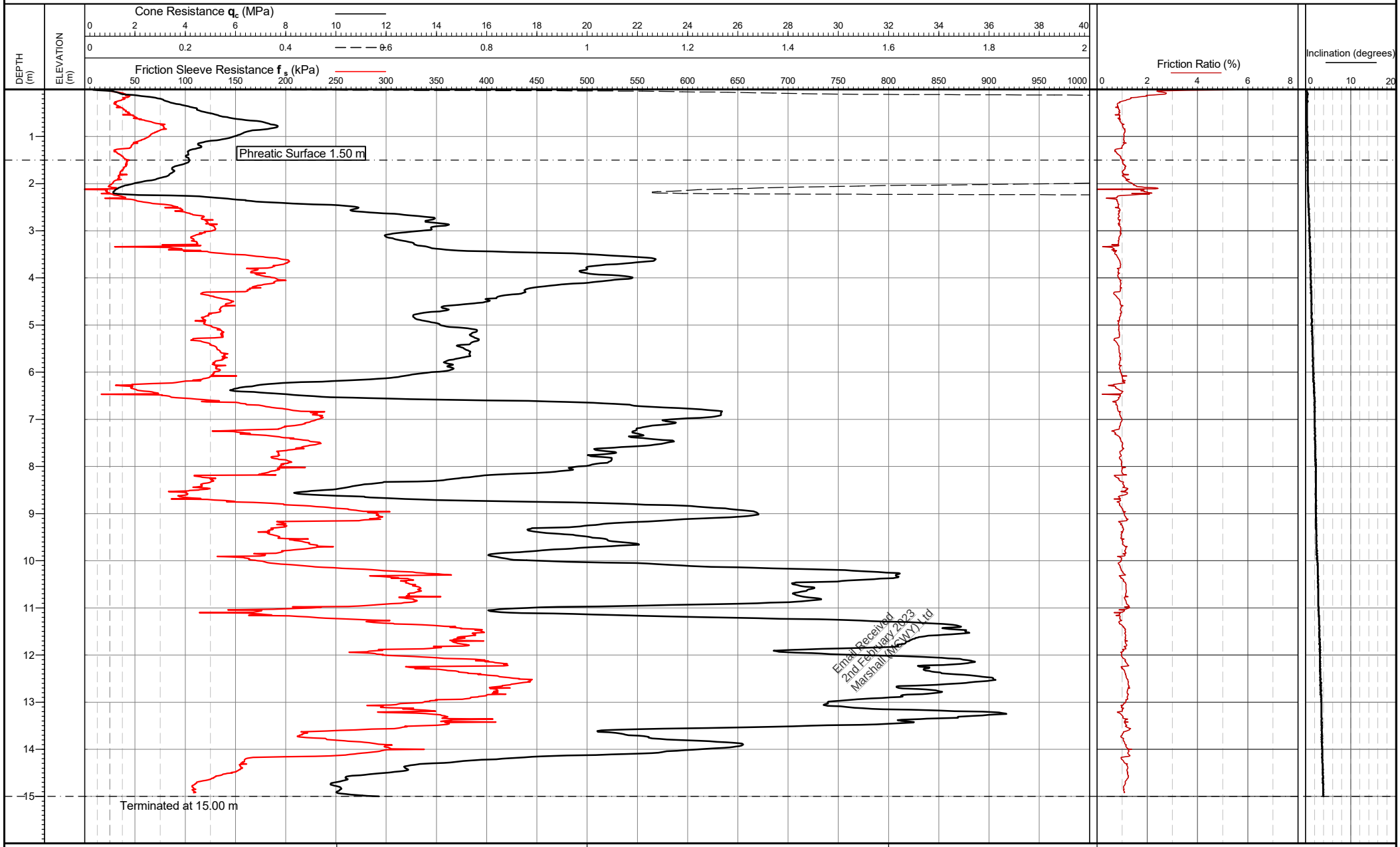
Lankelma Project Ref: P-106982-7

TEST ID: CPT202

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 13:58:17

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
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Refusal criteria: Target depth

Date of plot: 29-08-18

Checked by: Chris Player

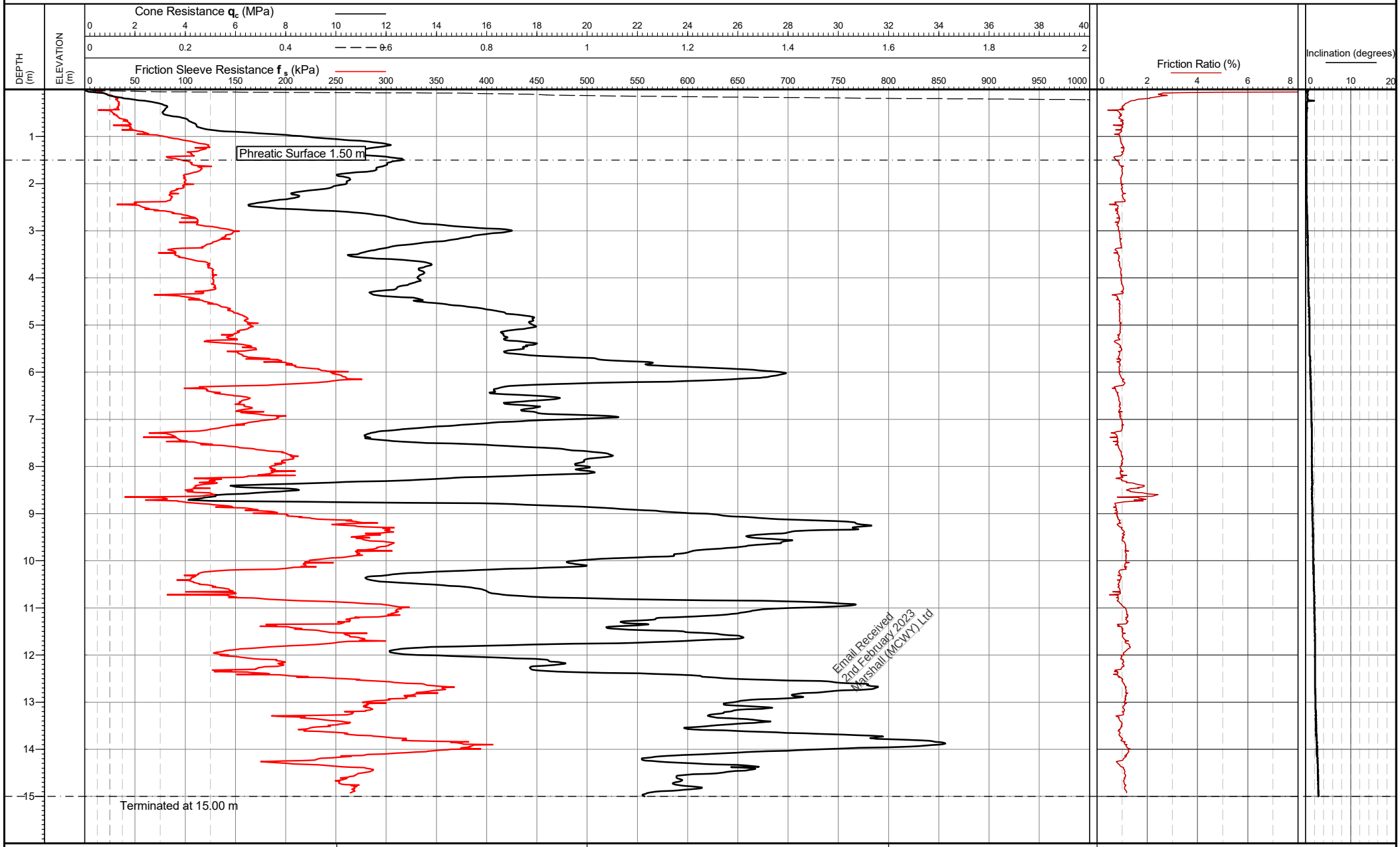
Lankelma Project Ref: P-106982-7

TEST ID: CPT203

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 12:14:55

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

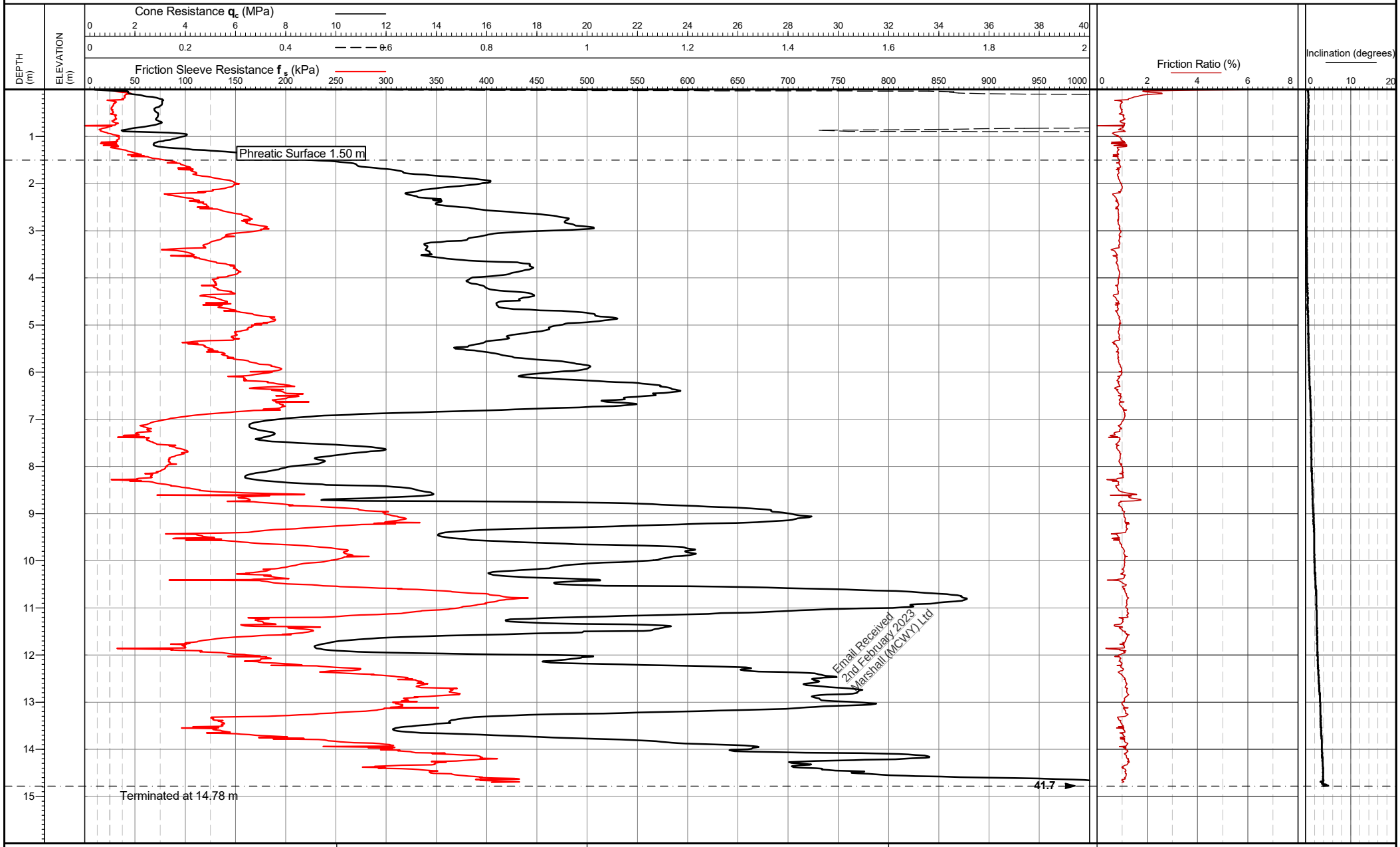
Checked by: Chris Player

TEST ID: CPT204

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 10:04:16

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot: 29-08-18

Checked by: Chris Player

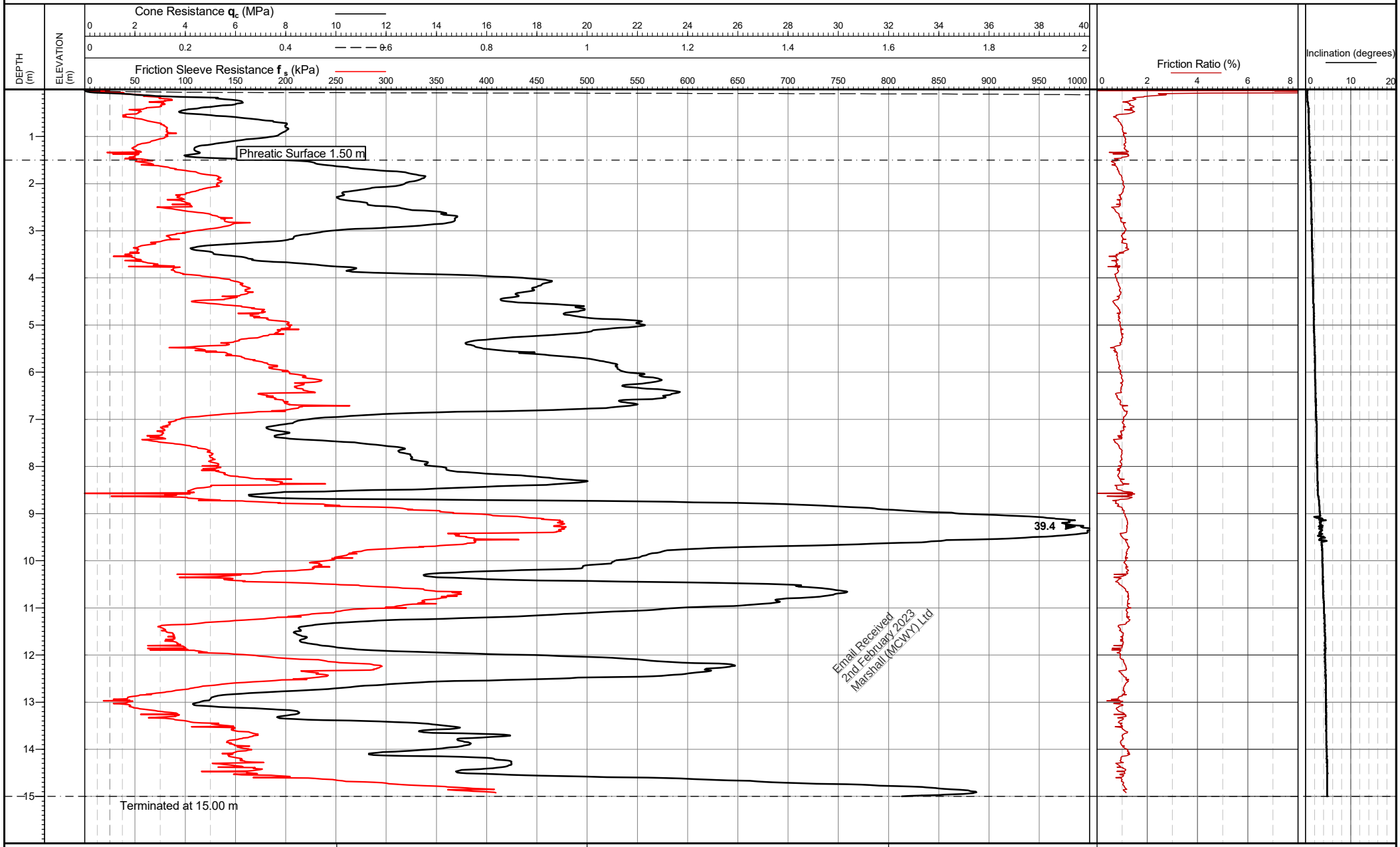
Lankelma Project Ref: P-106982-7

TEST ID: CPT205

Client: JPG GROUP

Project: DEESIDE

LANKELMA



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Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 09:04:30

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

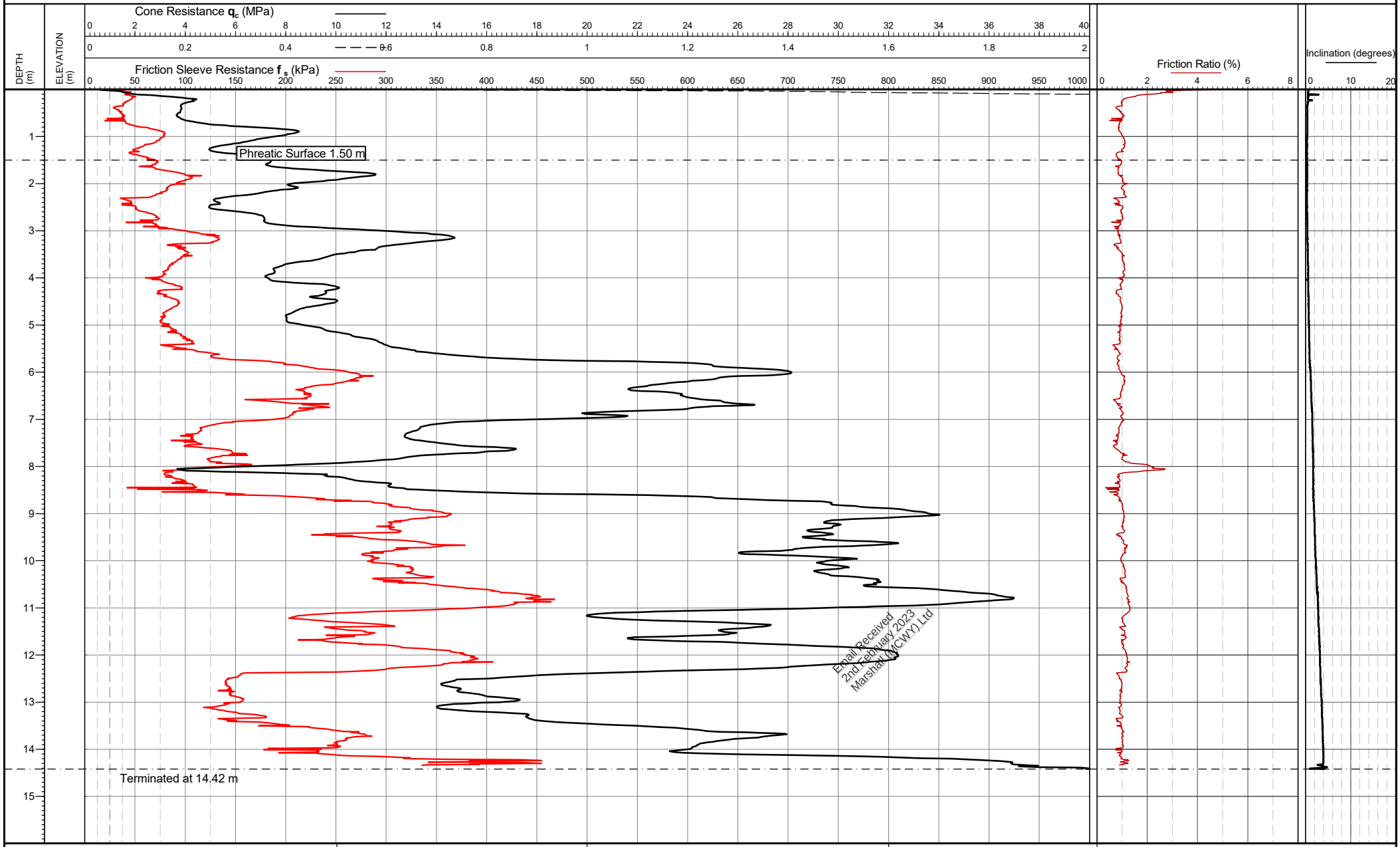
Checked by: Chris Player

TEST ID: CPT206

Client: JPG GROUP

Project: DEESIDE

LANKELMA



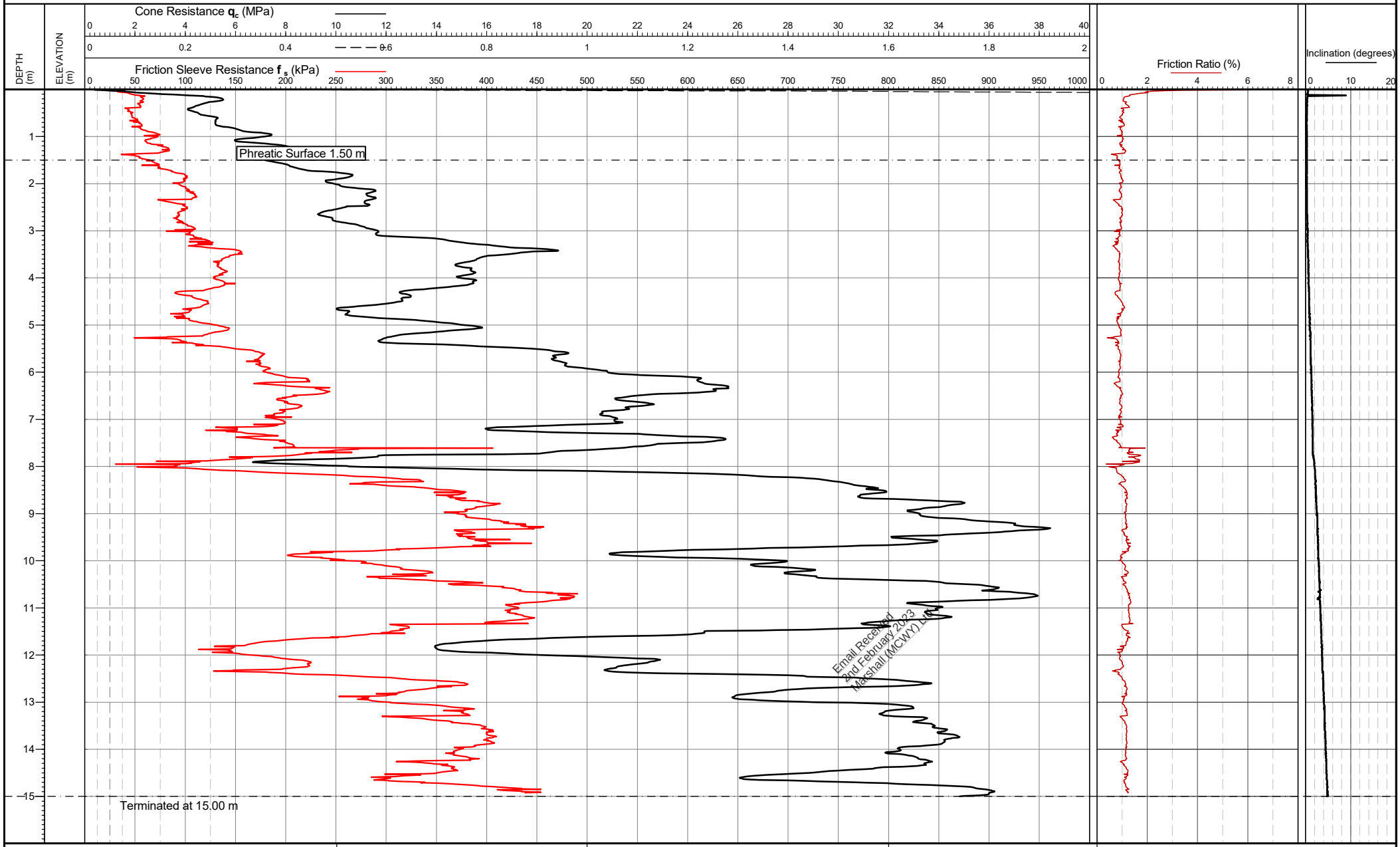
Cone area (mm2):1500 Cone ID: S15-CFIP.1528 Operator: Walter Geddes Rig Used: UK15 Date of test: 29/08/2018 11:39:31	Location: Flintshire, UK Coordinates: , Elevation:	Remarks: *Phreatic surface origin: Arbitrary value Refusal criteria: Target depth	Date of plot: 29-08-18 Checked by: Chris Player	Lankelma Project Ref: P-106982-7

TEST ID: CPT207

Client: JPG GROUP

Project: DEESIDE

LANKELMA



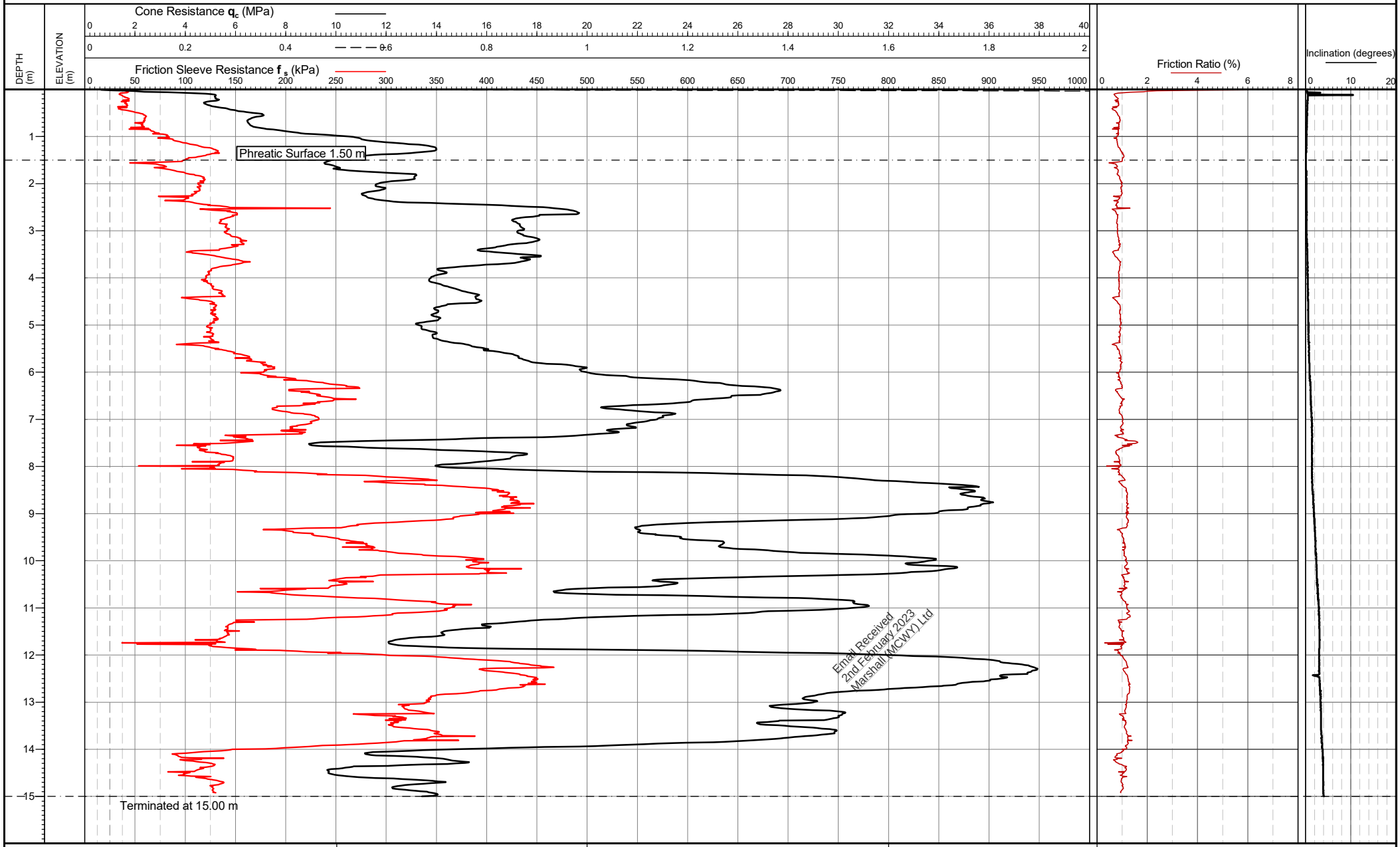
Cone area (mm2):1500 Cone ID: S15-CFIP.1528 Operator: Walter Geddes Rig Used: UK15 Date of test: 29/08/2018 13:20:03	Location: Flintshire, UK Coordinates: , Elevation:	Remarks: *Phreatic surface origin: Arbitrary value Refusal criteria: Target depth	Date of plot: 29-08-18 Checked by: Chris Player	Lankelma Project Ref: P-106982-7

TEST ID: CPT208

Client: JPG GROUP

Project: DEESIDE

LANKELMA



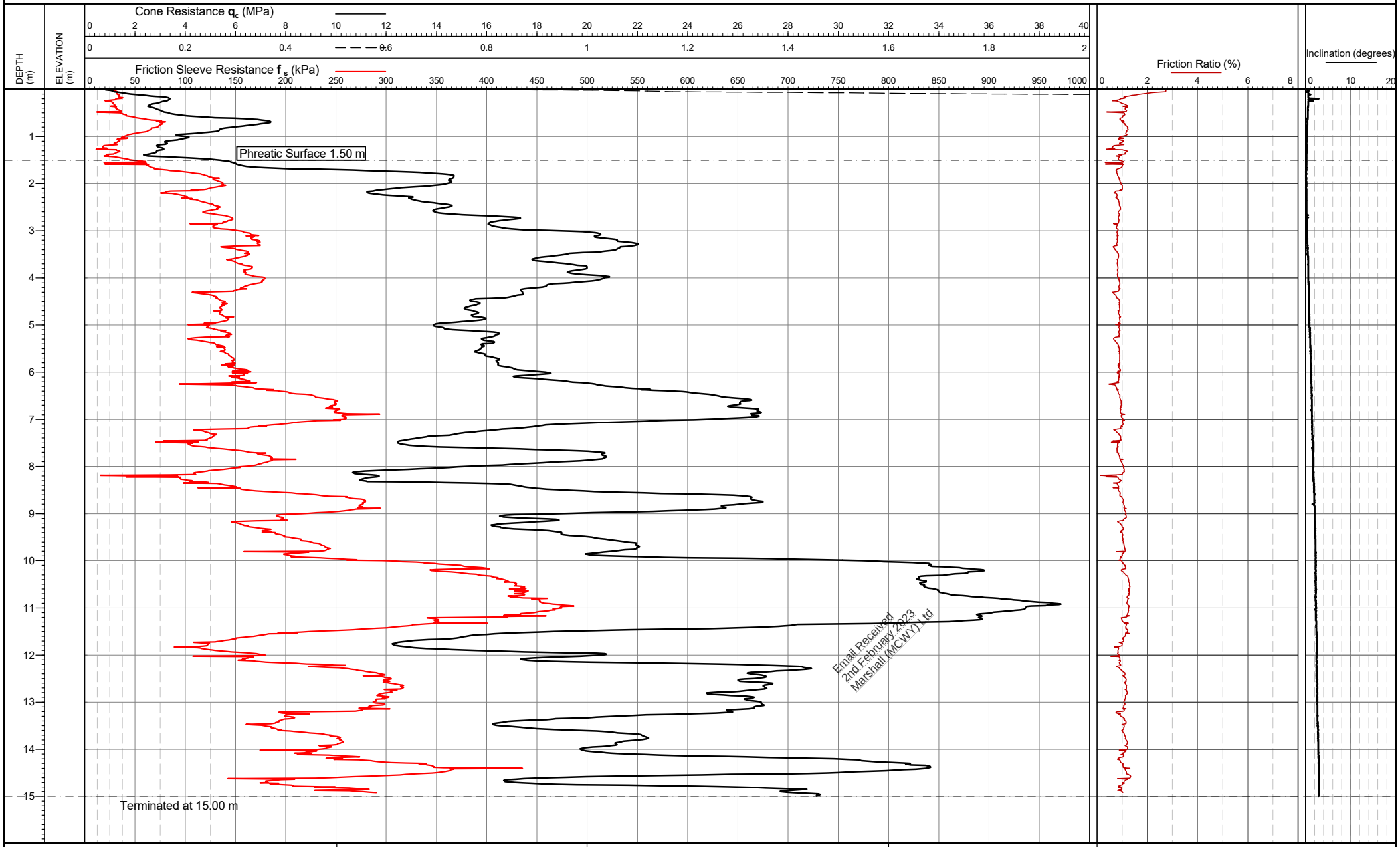
Cone area (mm2):1500 Cone ID: S15-CFIP.1528 Operator: Walter Geddes Rig Used: UK15 Date of test: 29/08/2018 10:32:17	Location: Flintshire, UK Coordinates: , Elevation:	Remarks: *Phreatic surface origin: Arbitrary value Refusal criteria: Target depth	Date of plot: 29-08-18 Checked by: Chris Player	Lankelma Project Ref: P-106982-7

TEST ID: CPT209

Client: JPG GROUP

Project: DEESIDE

LANKELMA



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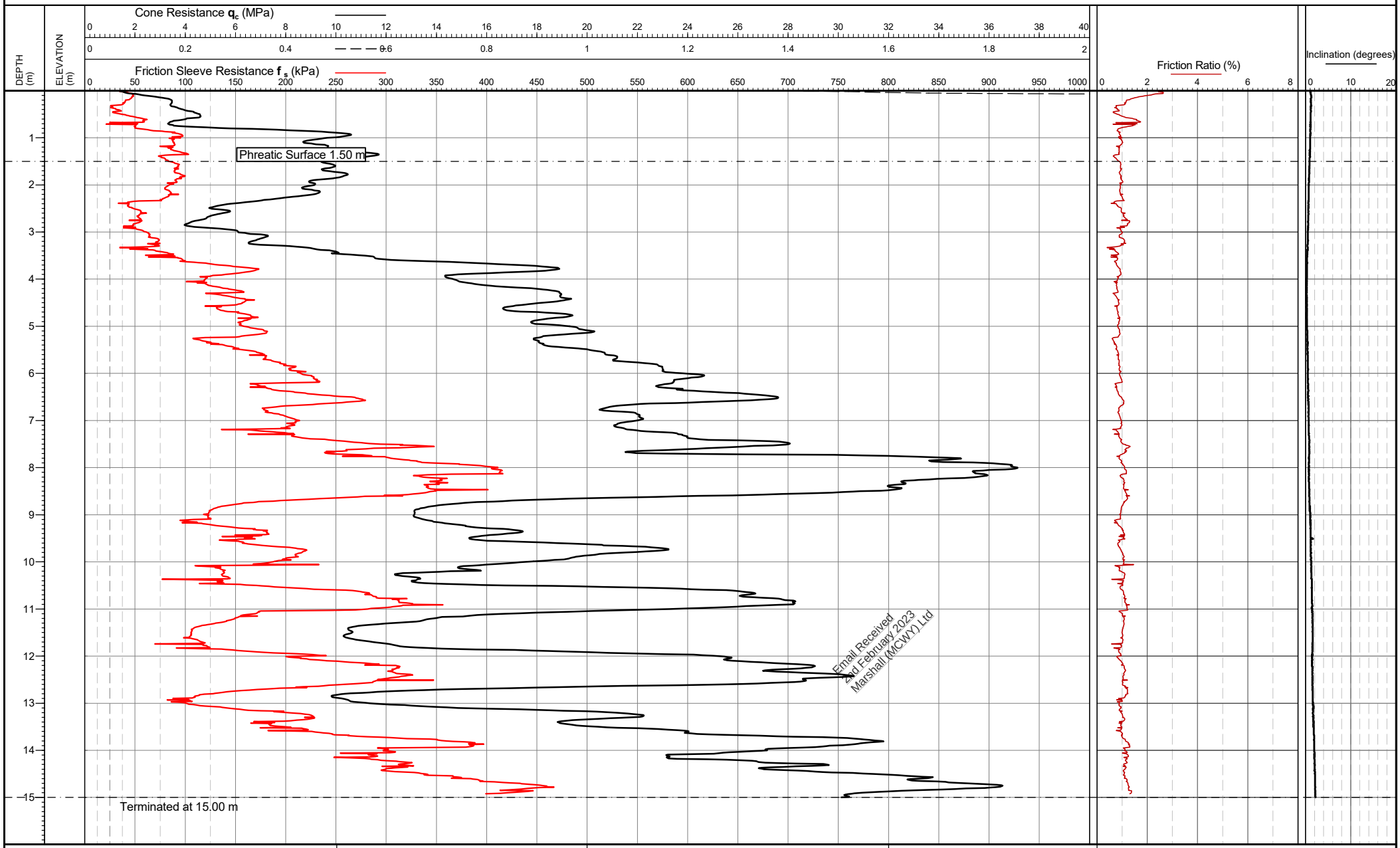
TEST ID: CPT210

Client: JPG GROUP

Project: DEESIDE

LANKELMA



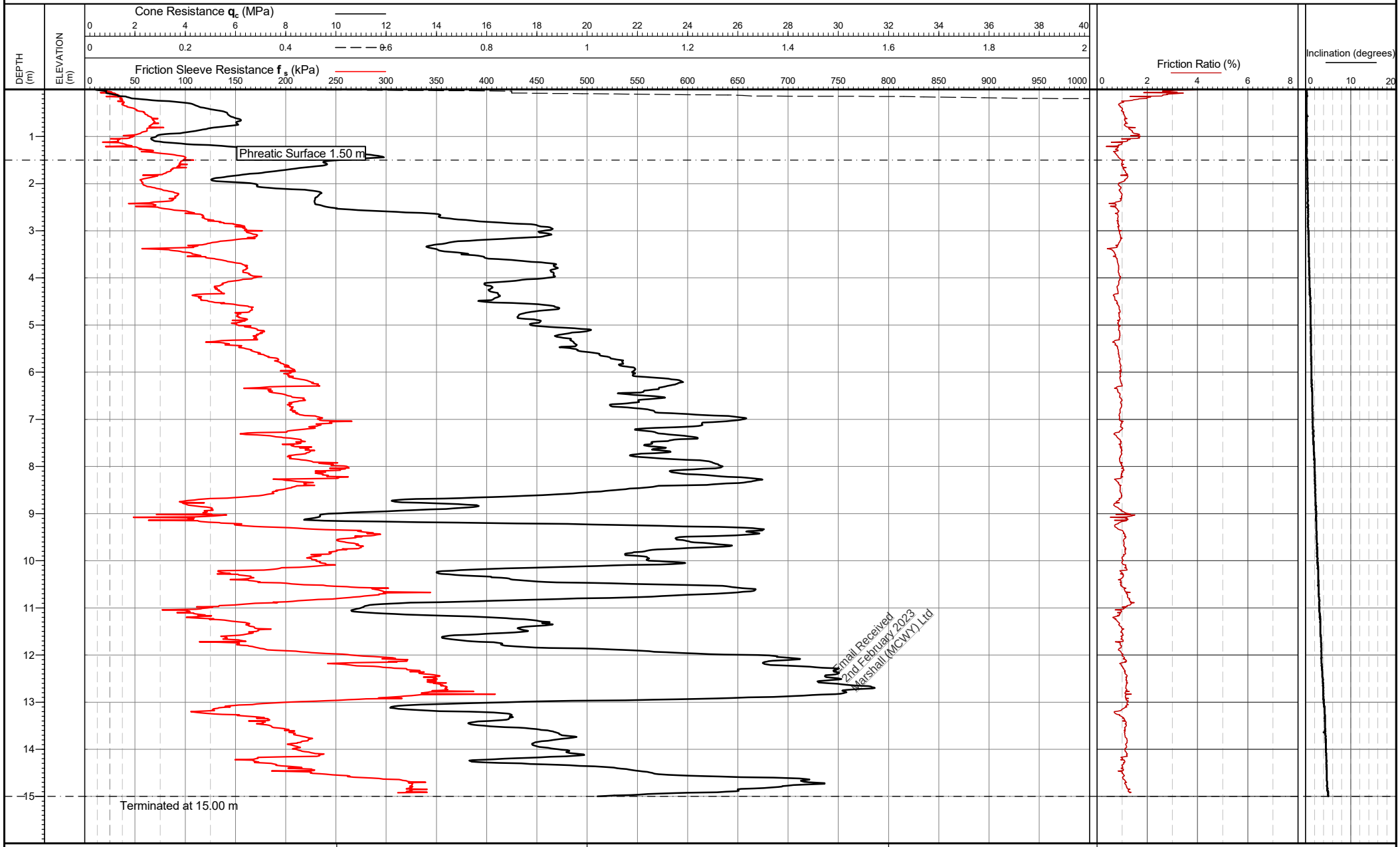
Cone area (mm2):1500 Cone ID: S15-CFIP.1528 Operator: Walter Geddes Rig Used: UK15 Date of test: 29/08/2018 15:02:55	Location: Flintshire, UK Coordinates: , Elevation:	Remarks: *Phreatic surface origin: Arbitrary value Refusal criteria: Target depth	Date of plot: 29-08-18 Checked by: Chris Player	Lankelma Project Ref: P-106982-7

TEST ID: CPT211

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 09:34:03

Location: Flintshire, UK

Coordinates: ,
Elevation:

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

Checked by: Chris Player

TEST ID: CPT212

APPENDIX C STANDARD INTERPRETATION RESULTS (SET 1)

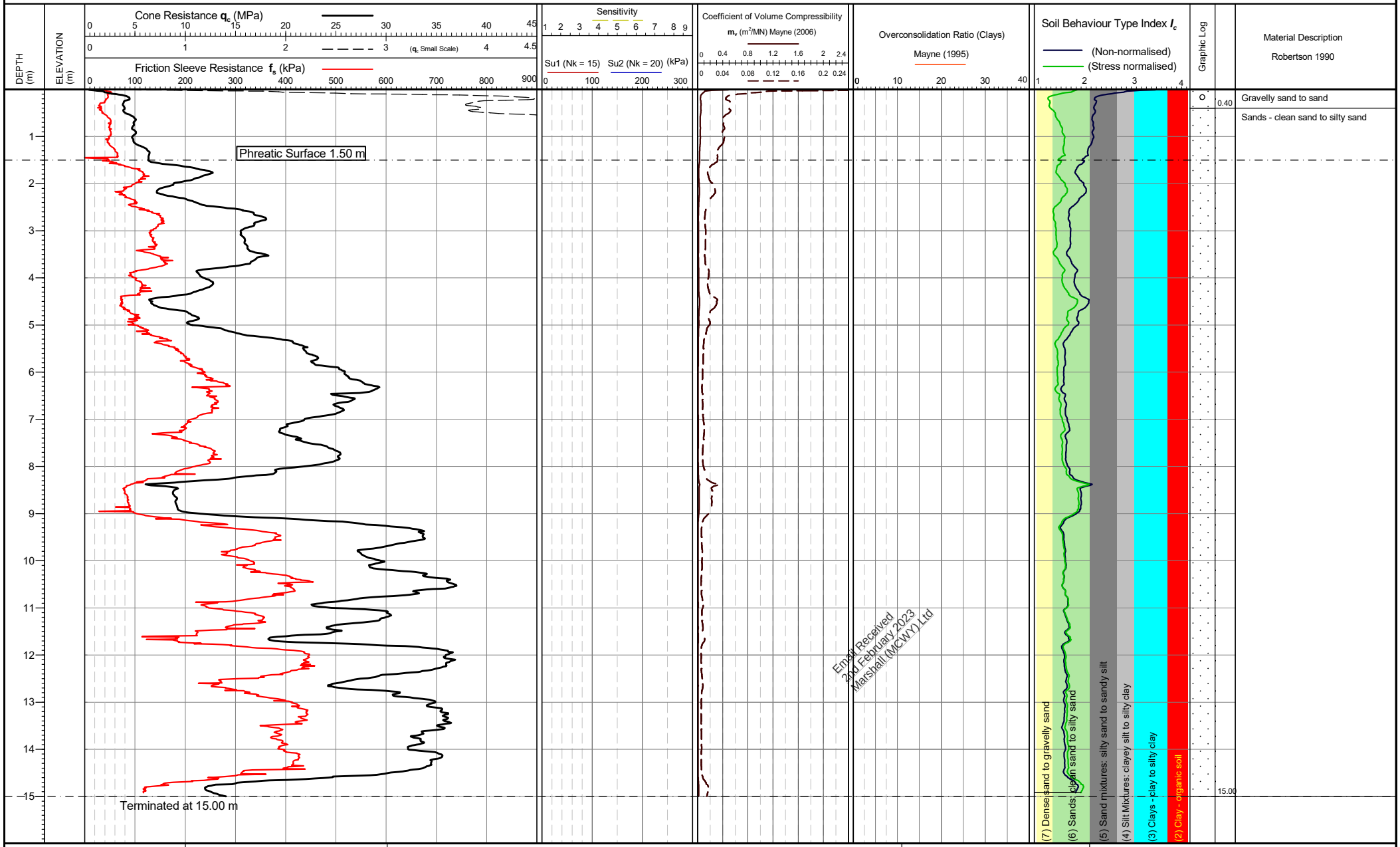
UNDRAINED SHEAR STRENGTH
SENSITIVITY
COEFFICIENT OF VOLUME CHANGE
OVERCONSOLIDATION RATIO

LIST OF FIGURES:

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 11:06:25

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

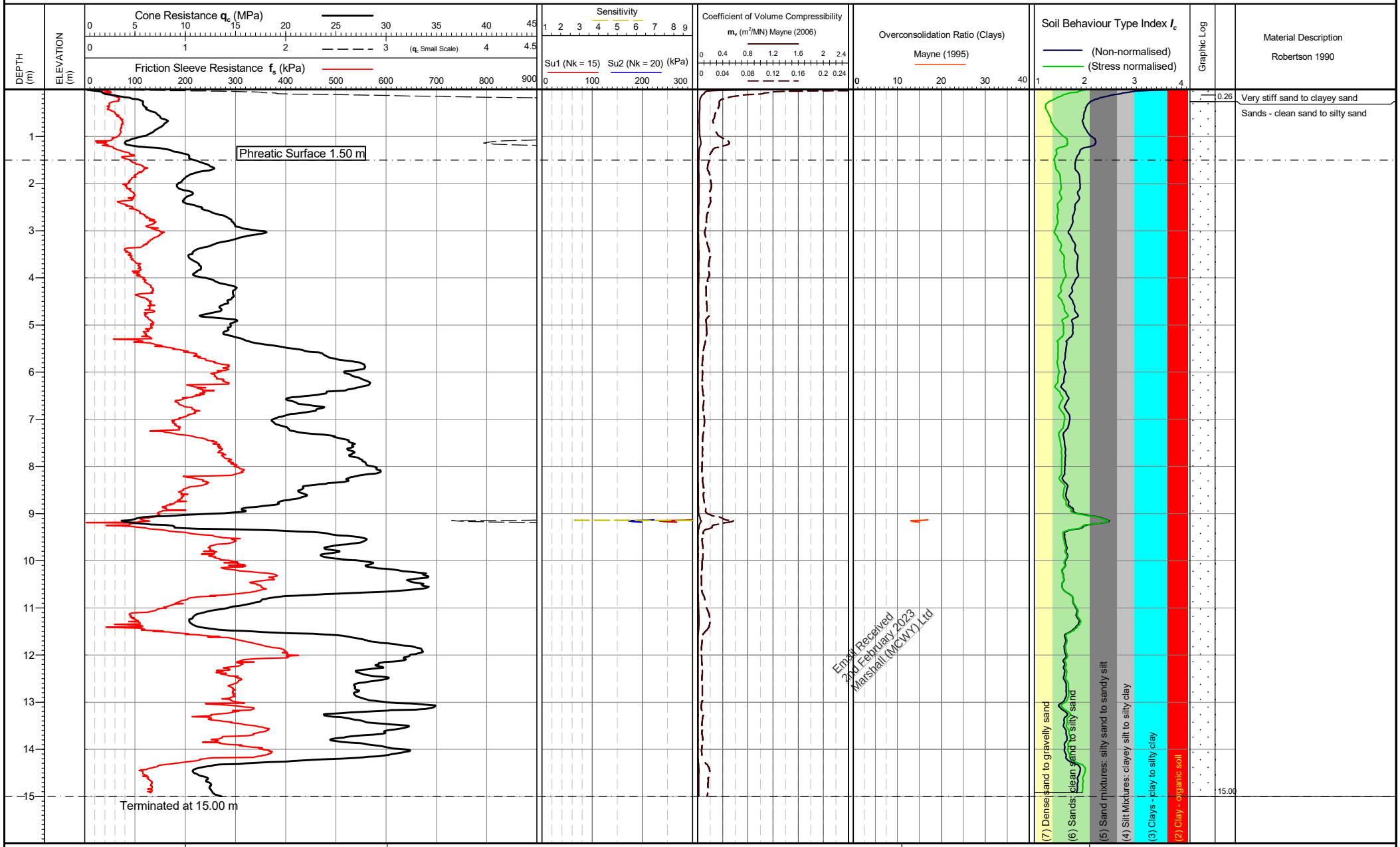
Checked by: Chris Player

TEST ID: CPT201

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 12:47:28

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

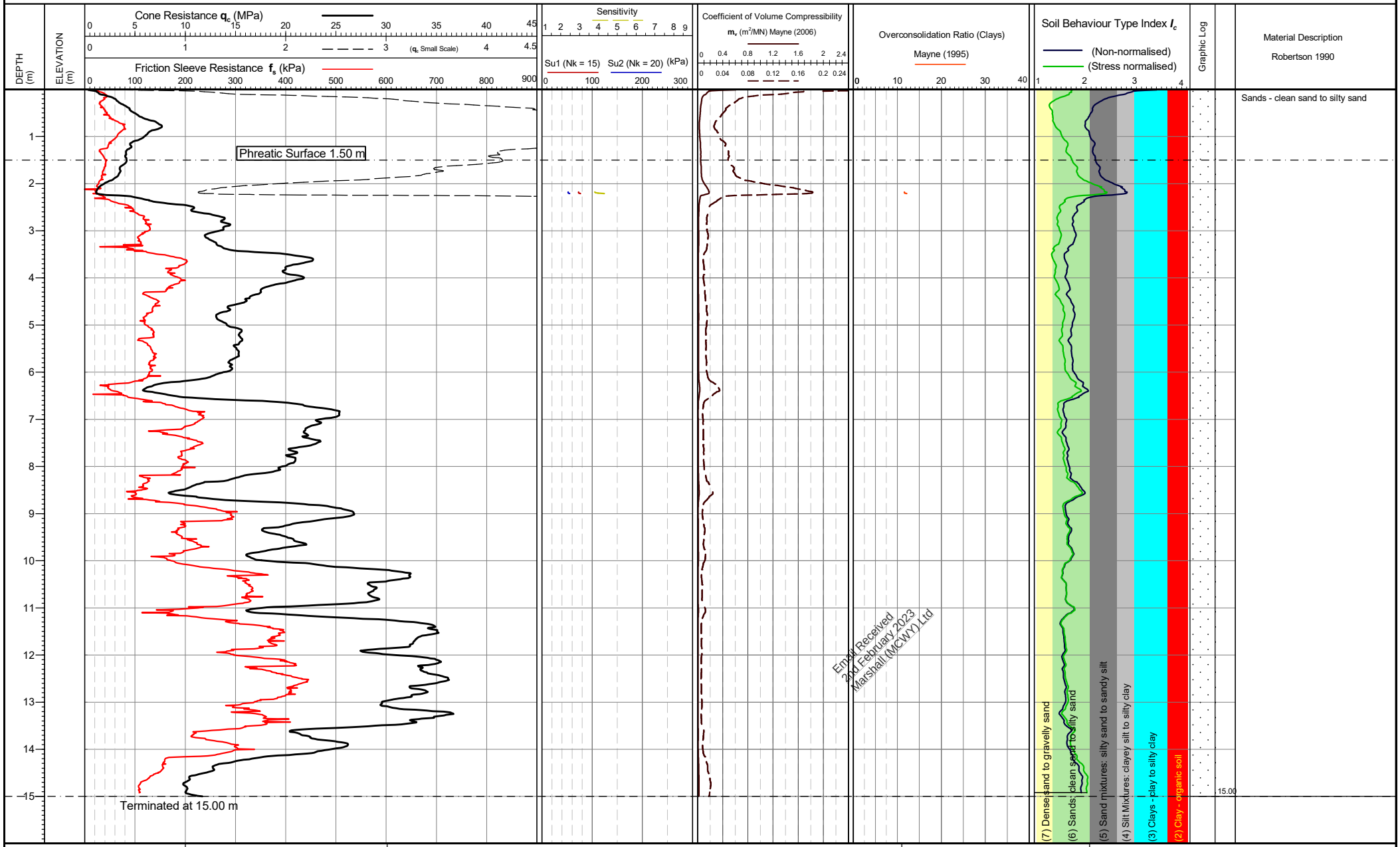
Checked by: Chris Player

TEST ID: CPT202

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 13:58:17

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

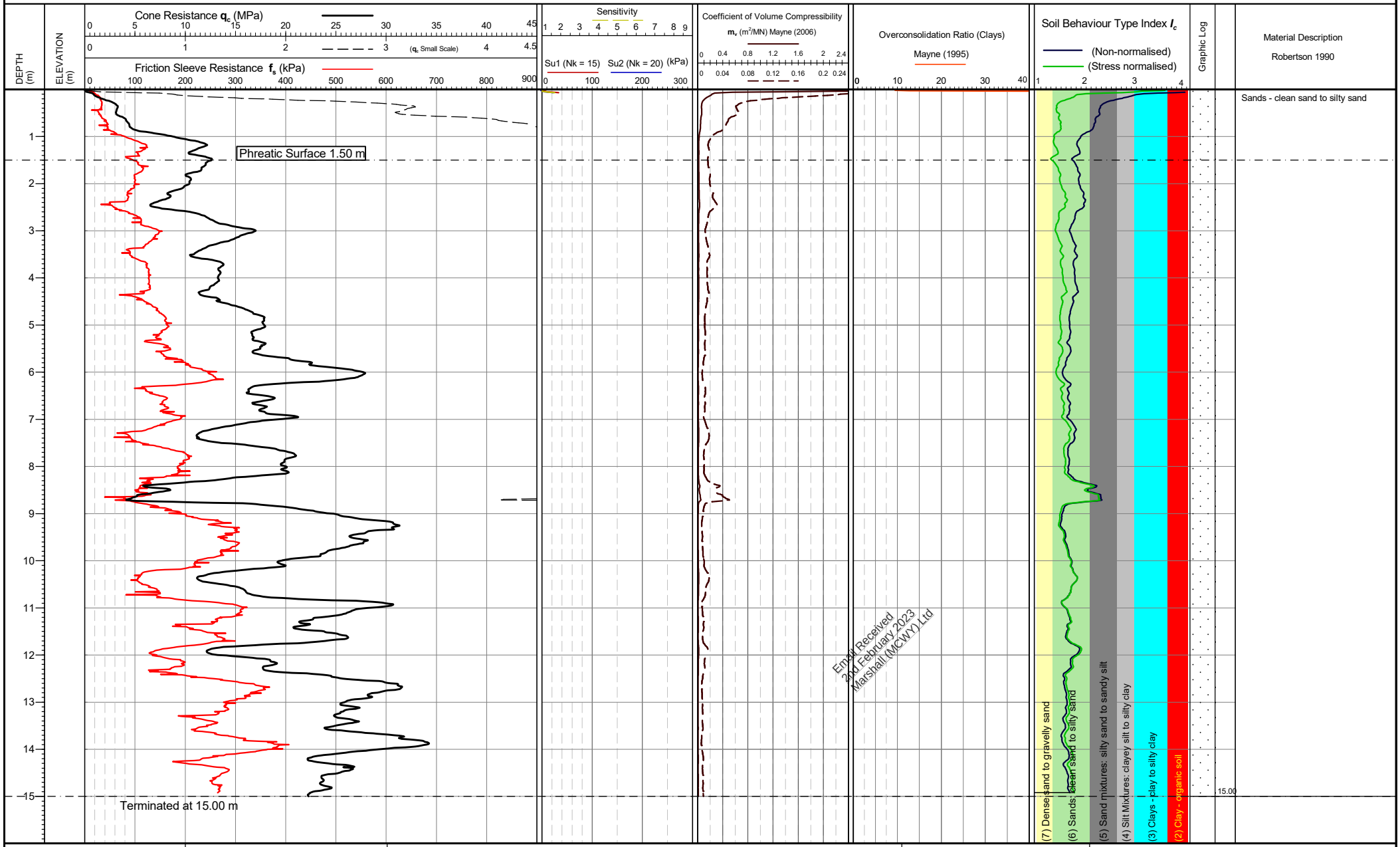
Checked by: Chris Player

TEST ID: CPT203

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 12:14:55

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

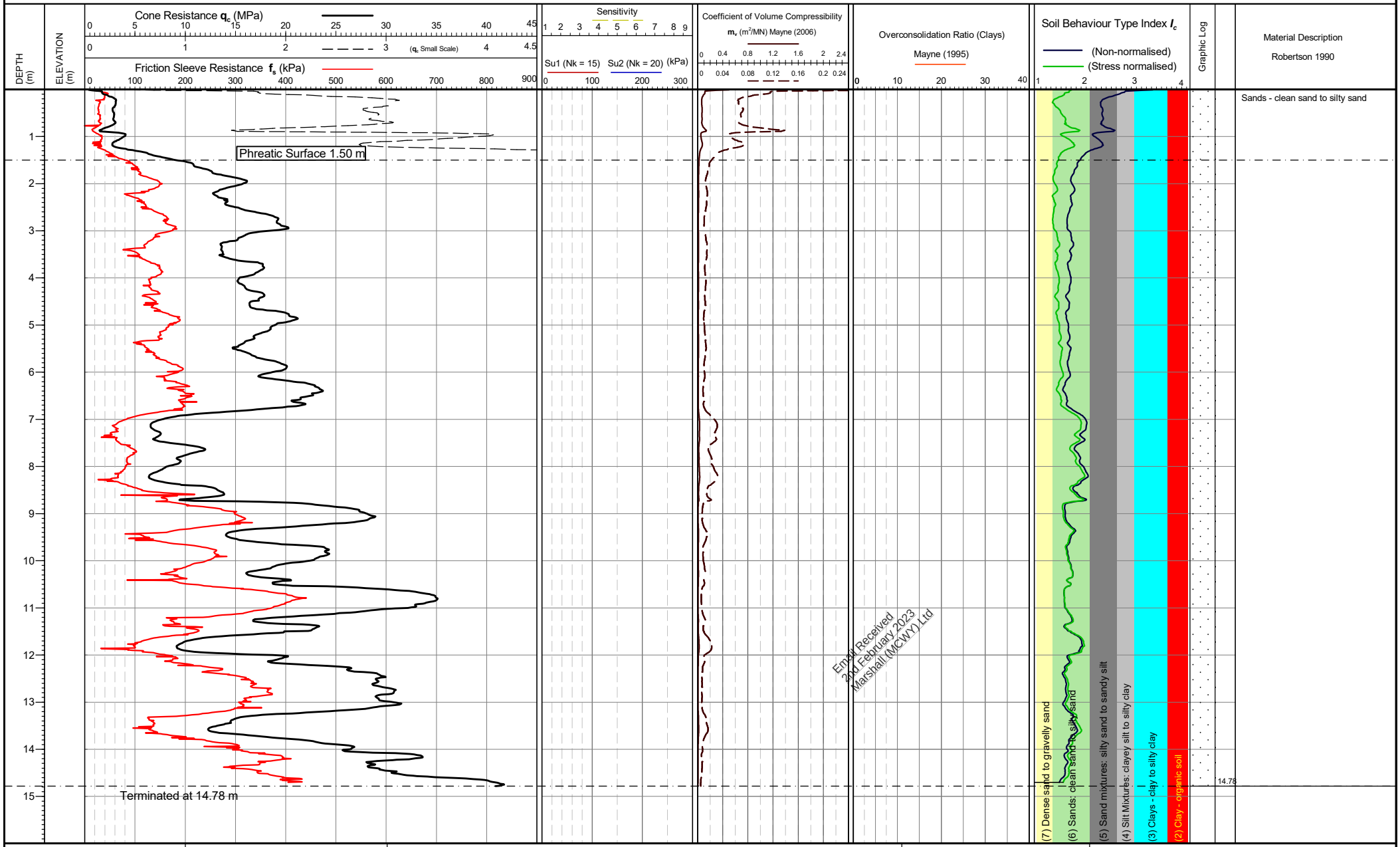
Checked by: Chris Player

TEST ID: CPT204

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 10:04:16

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

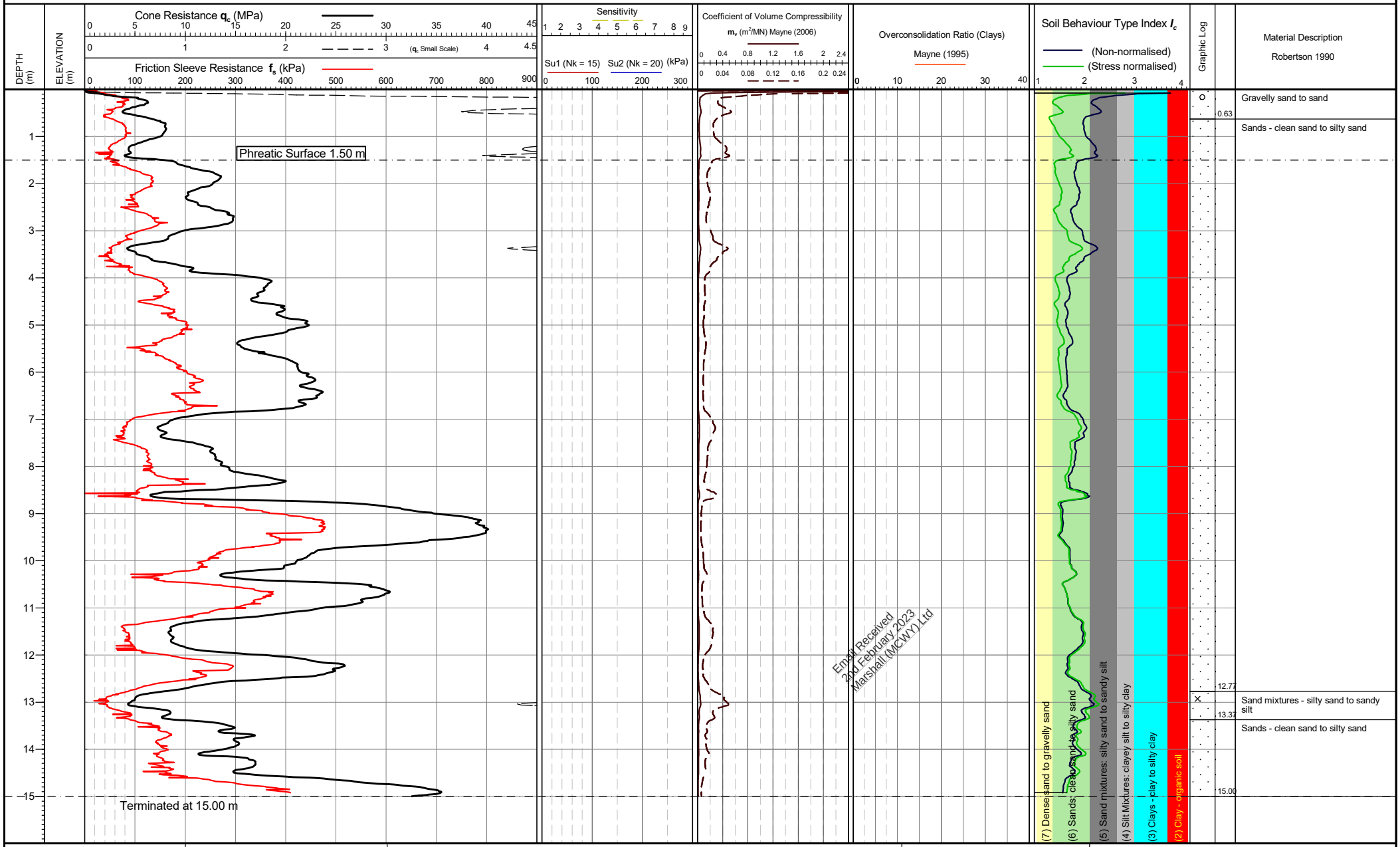
Checked by: Chris Player

TEST ID: CPT205

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 09:04:30

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

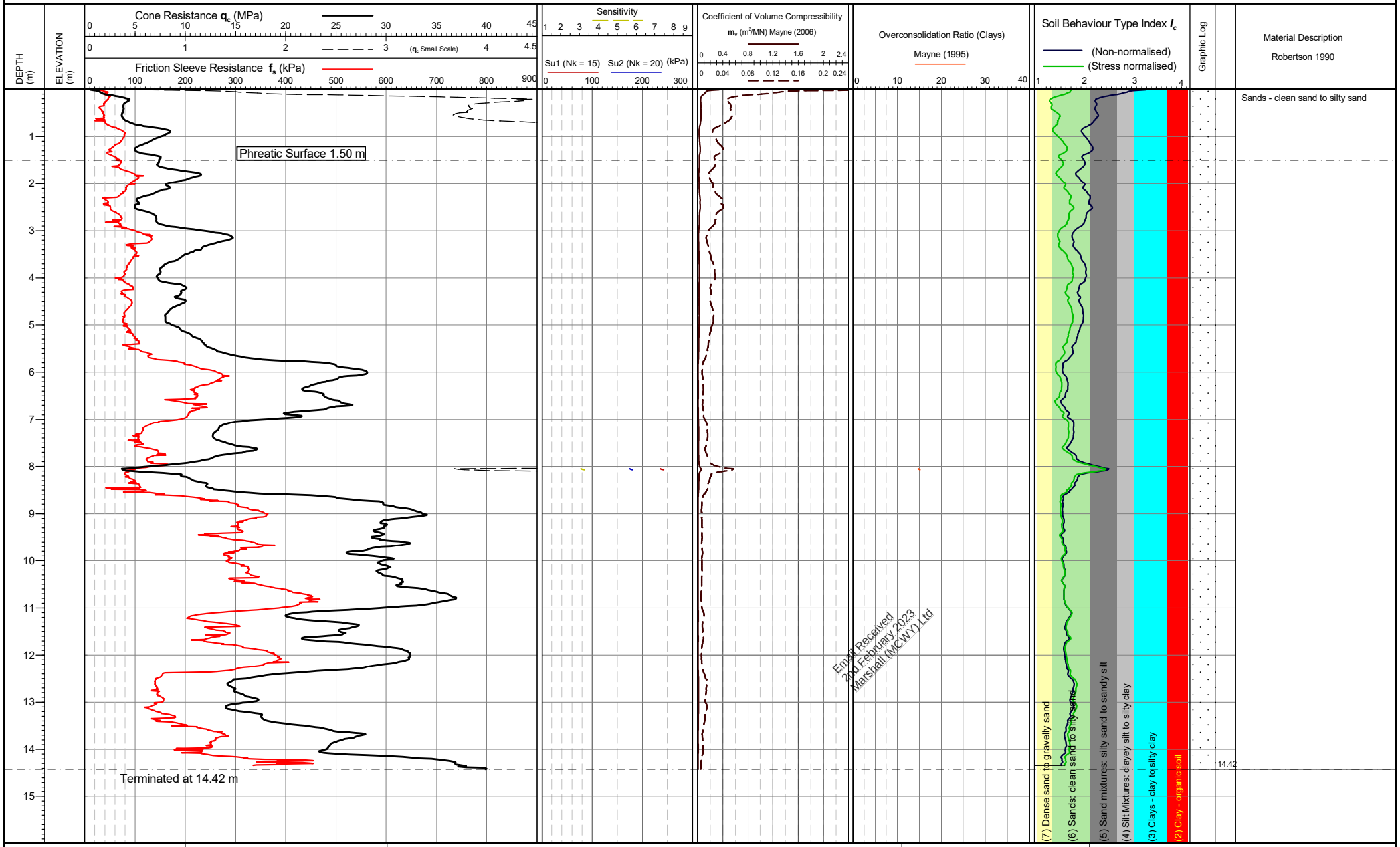
Checked by: Chris Player

TEST ID: CPT206

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 11:39:31

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

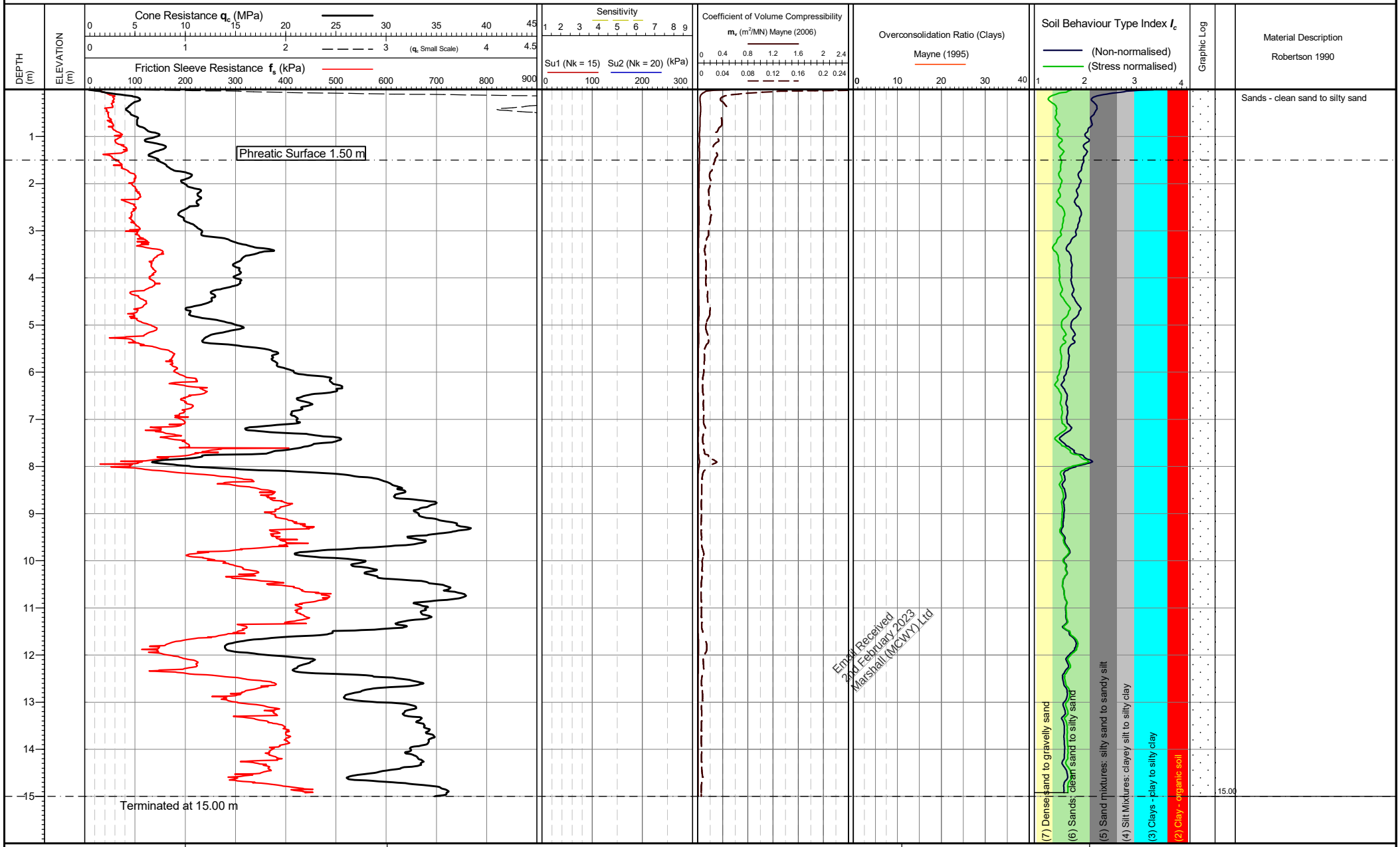
Checked by: Chris Player

TEST ID: CPT207

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 13:20:03

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

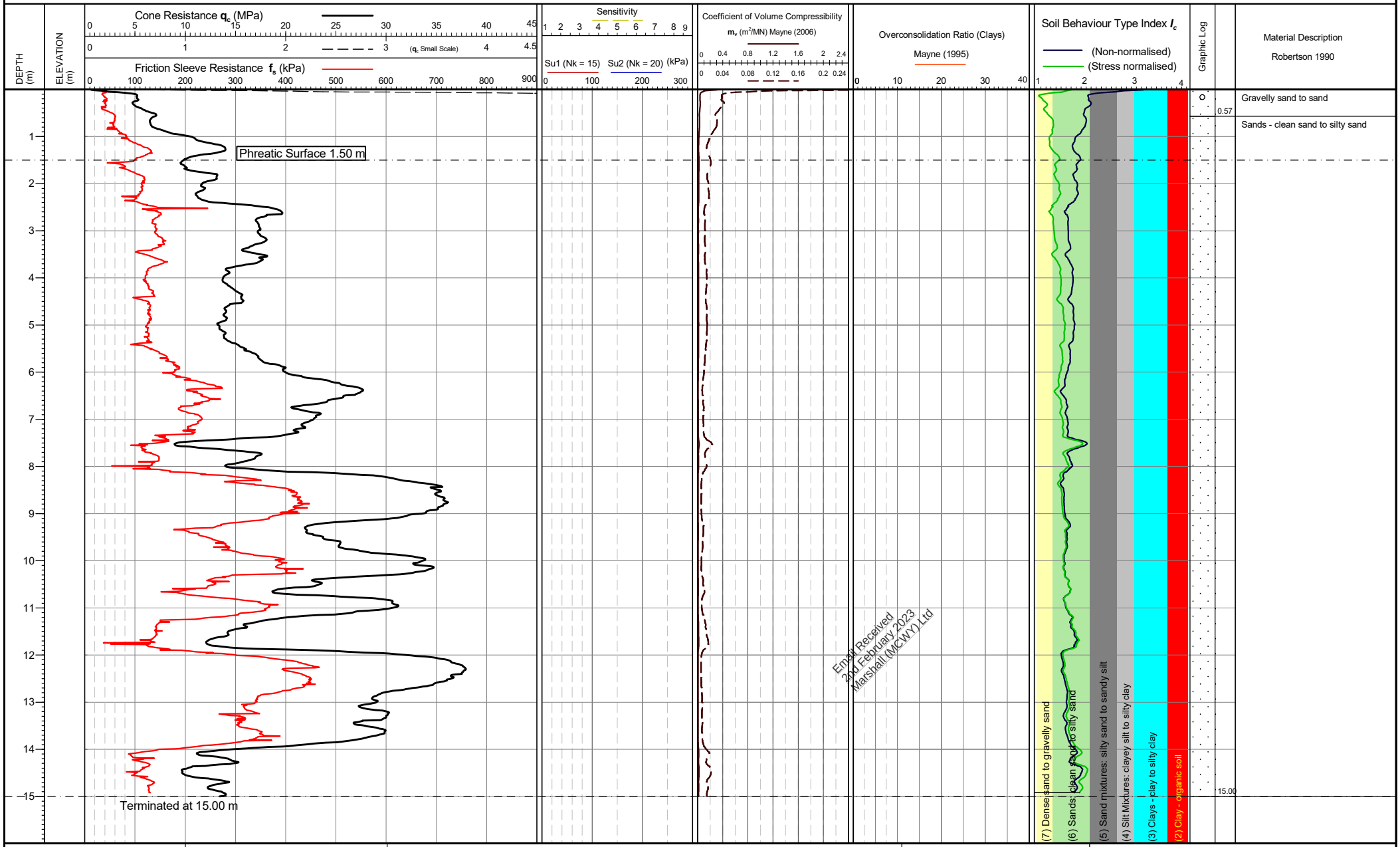
Checked by: Chris Player

TEST ID: CPT208

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 10:32:17

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

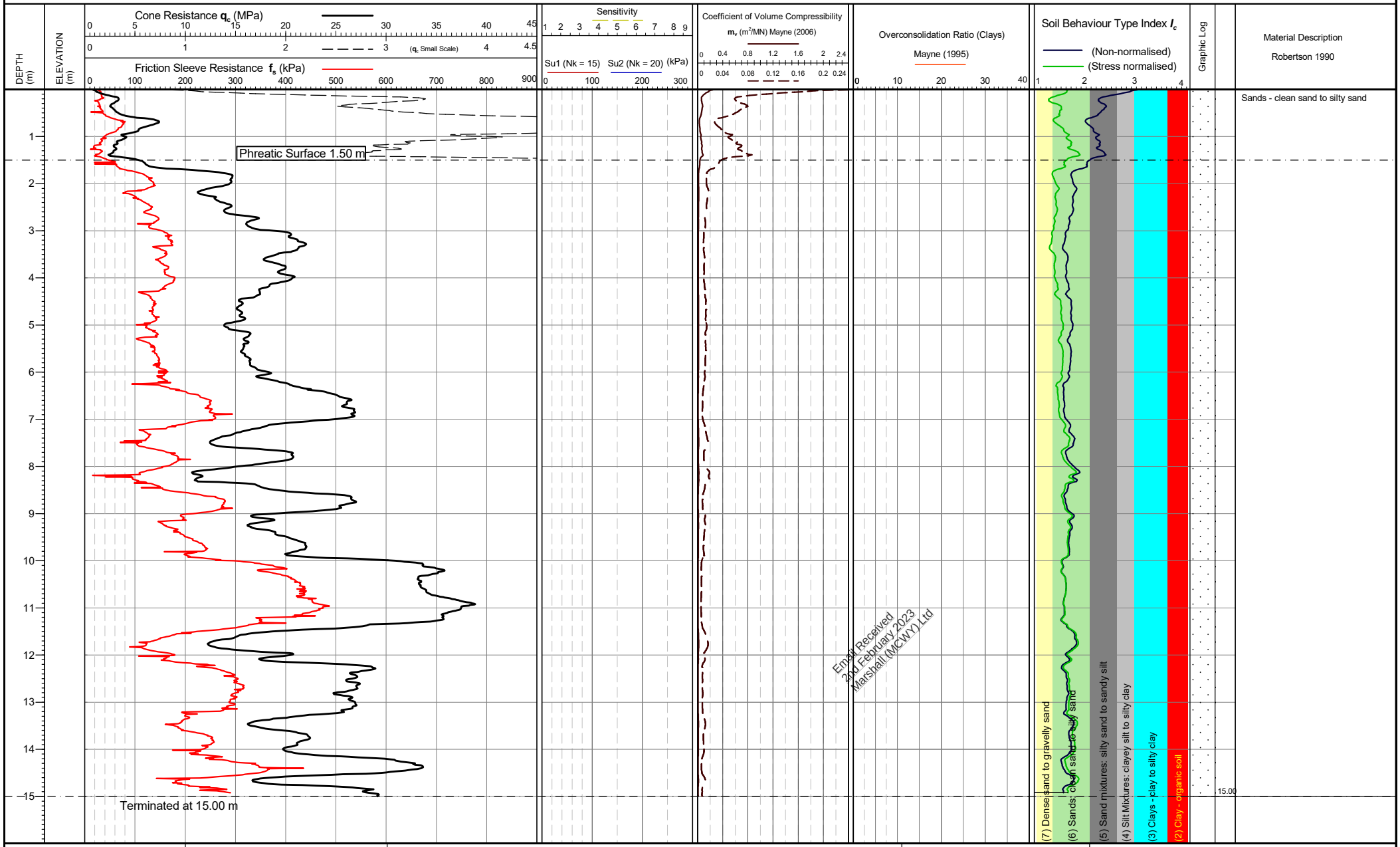
Checked by: Chris Player

TEST ID: CPT209

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 14:33:43

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

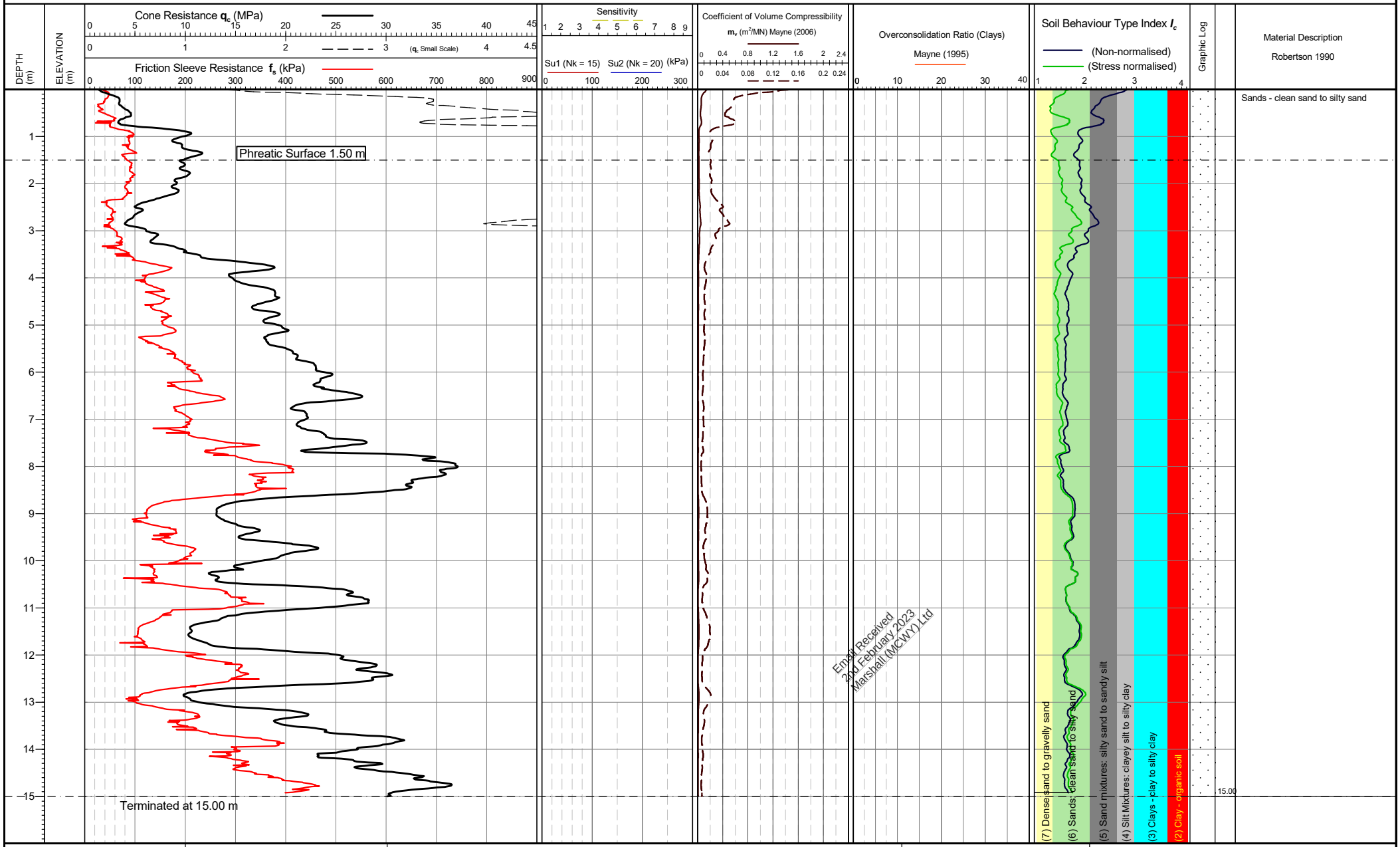
Checked by: Chris Player

TEST ID: CPT210

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 15:02:55

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

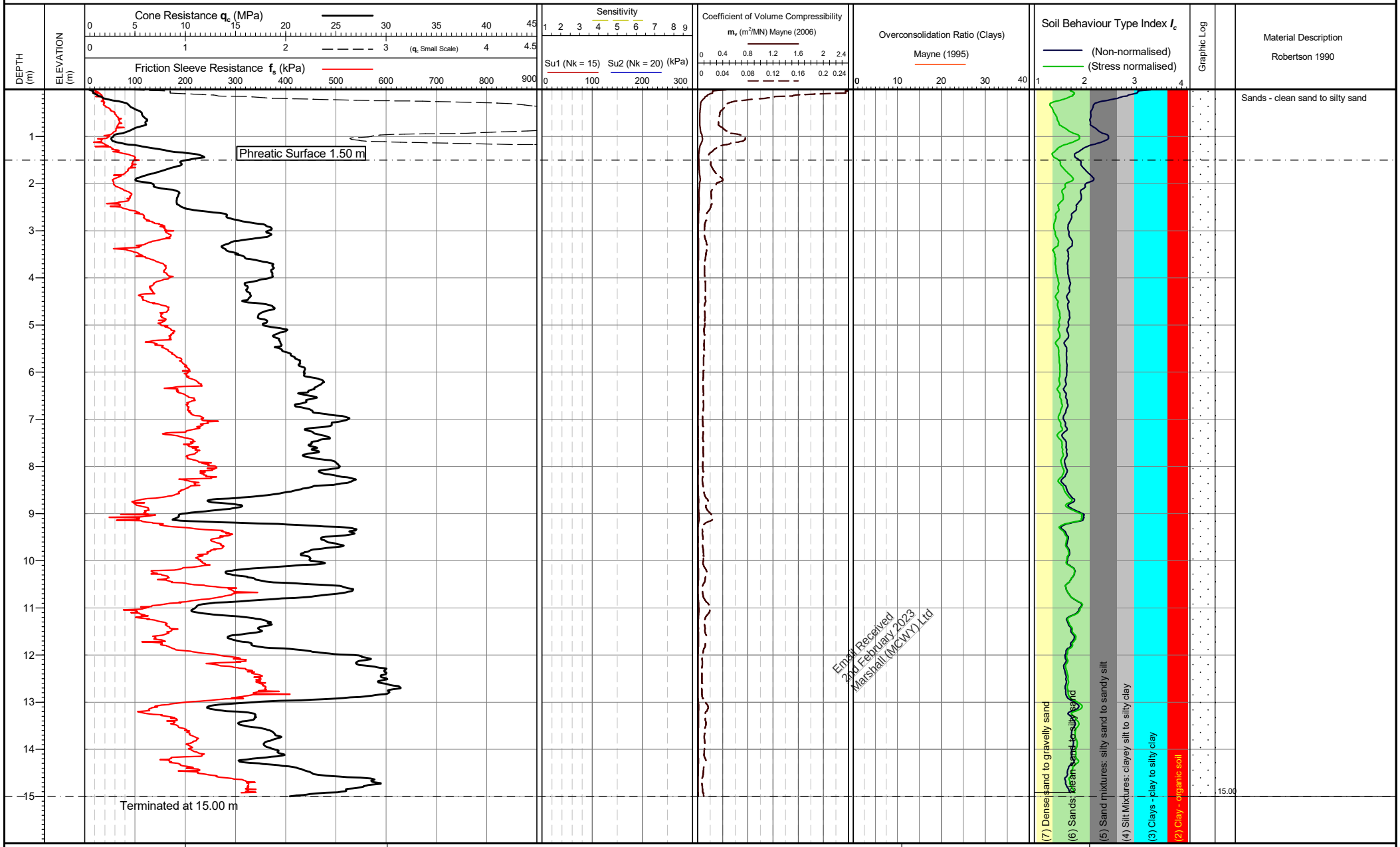
Checked by: Chris Player

TEST ID: CPT211

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
ConeID: S15-CFIP.1528
Operator: Walter Geddes
Rig Used: UK15
Date of test: 29/08/2018 09:34:03

Location: Flintshire, UK

Coordinates: ,

Elevation:

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark: Target depth

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 29-08-18

Lankelma Project Ref: P-106982-7

Checked by: Chris Player

TEST ID: CPT212

APPENDIX D STANDARD INTERPRETATION RESULTS (SET 2)

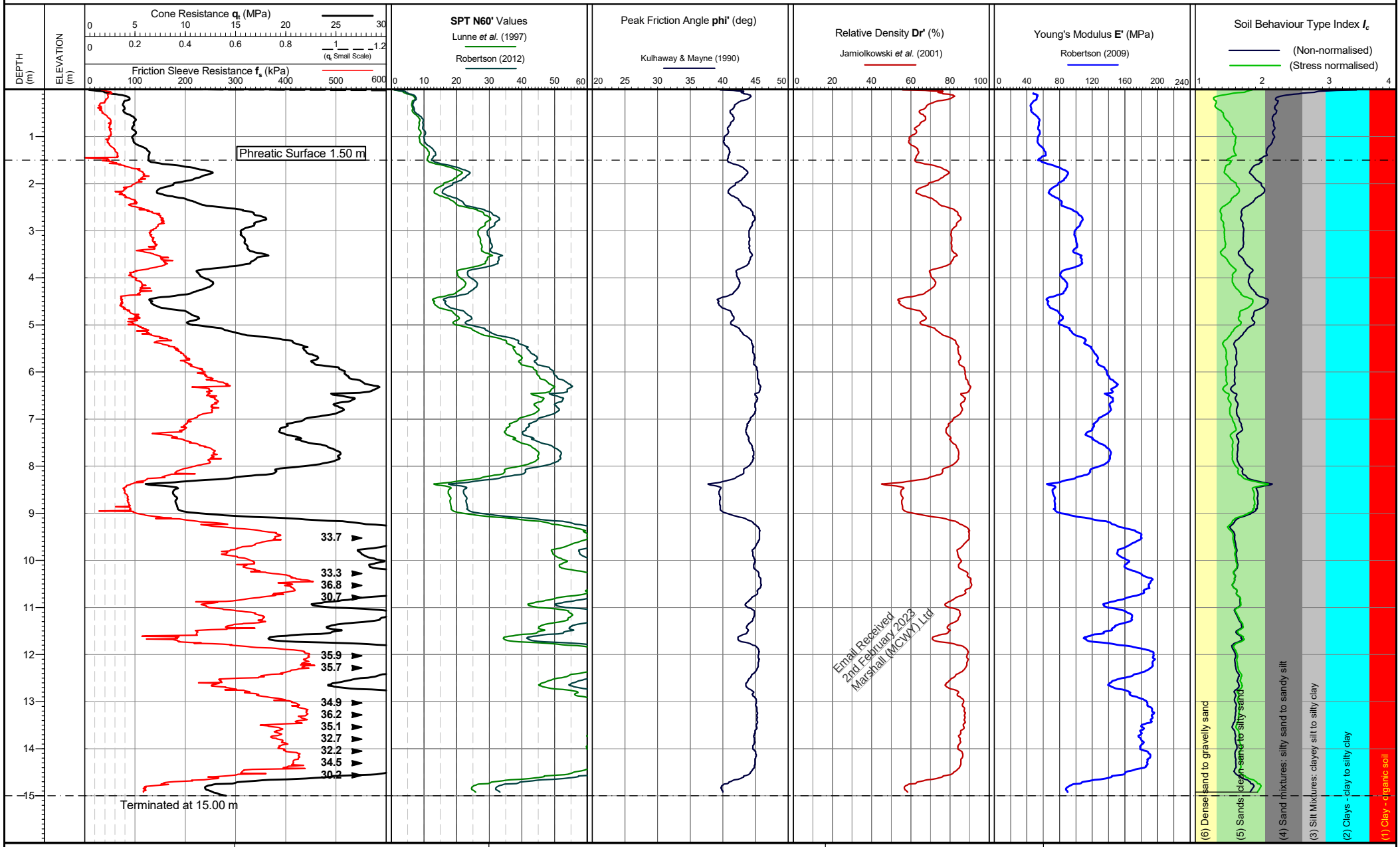
SPT N60
PEAK FRICTION ANGLE
RELATIVE DENSITY
YOUNG'S MODULUS

LIST OF FIGURES:

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 11:06:25

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

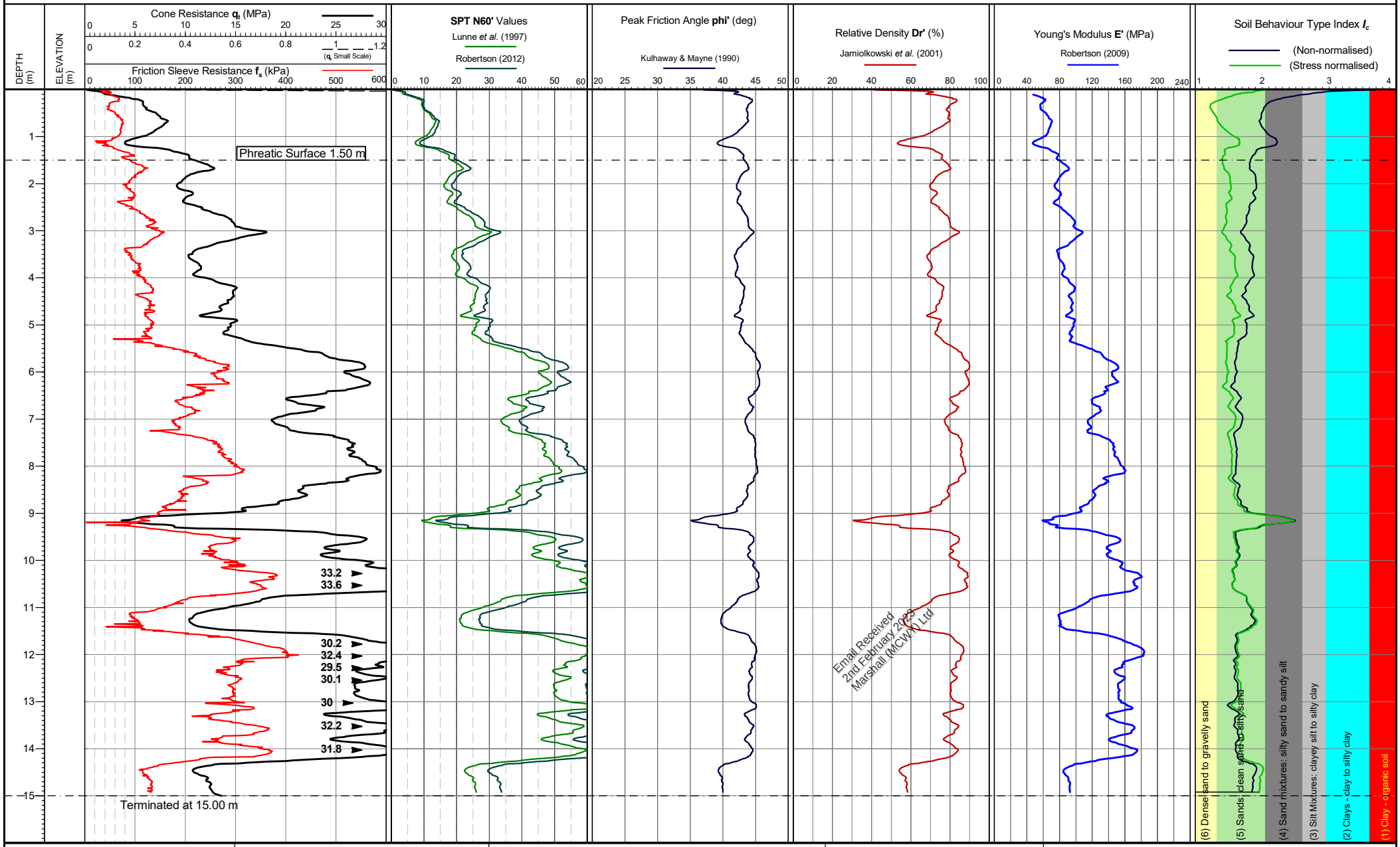
Lankelma Project Ref: P-106982-7

TEST ID: CPT201

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 12:47:28

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

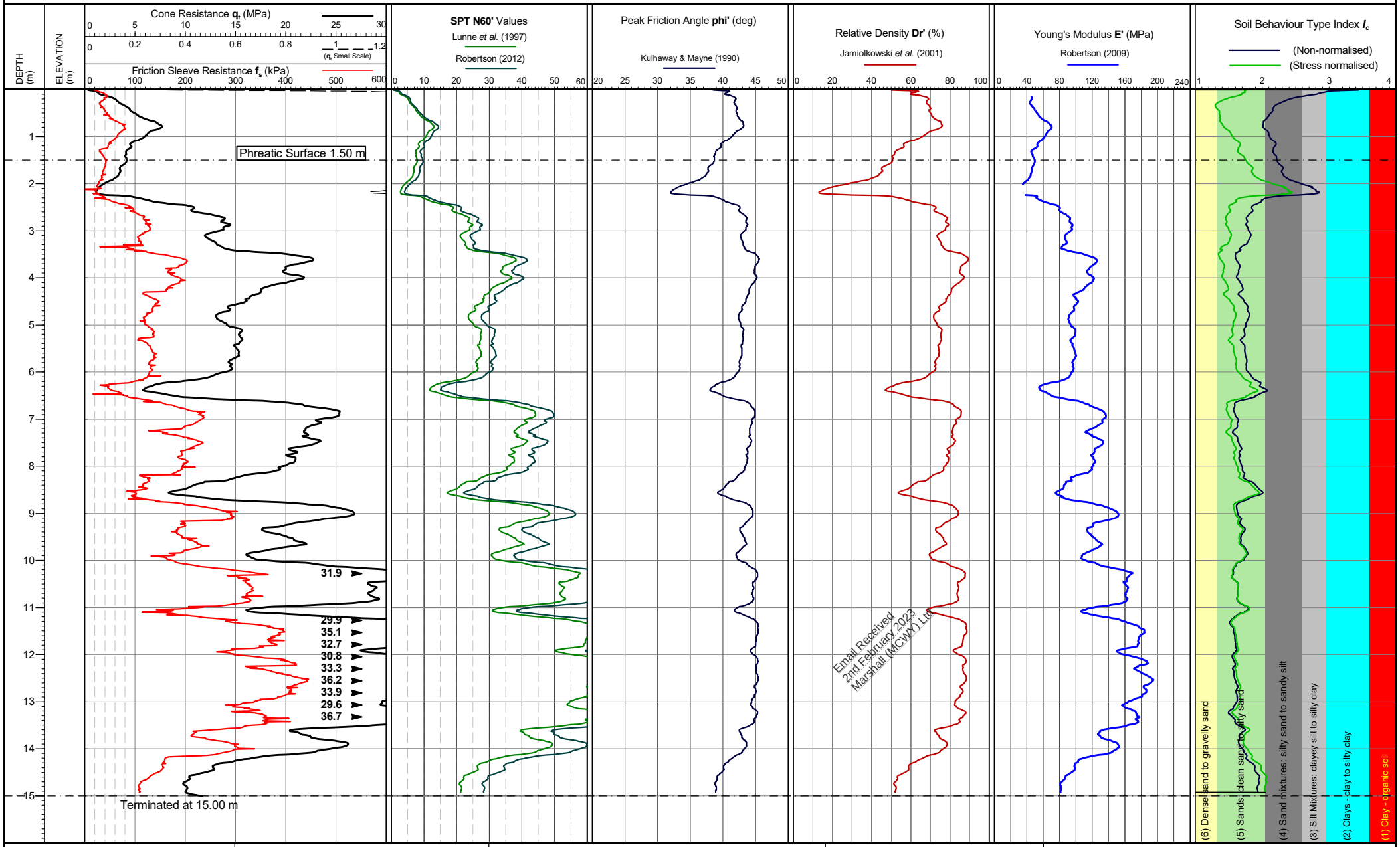
Lankelma Project Ref: P-106982-7

TEST ID: CPT202

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 13:58:17

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

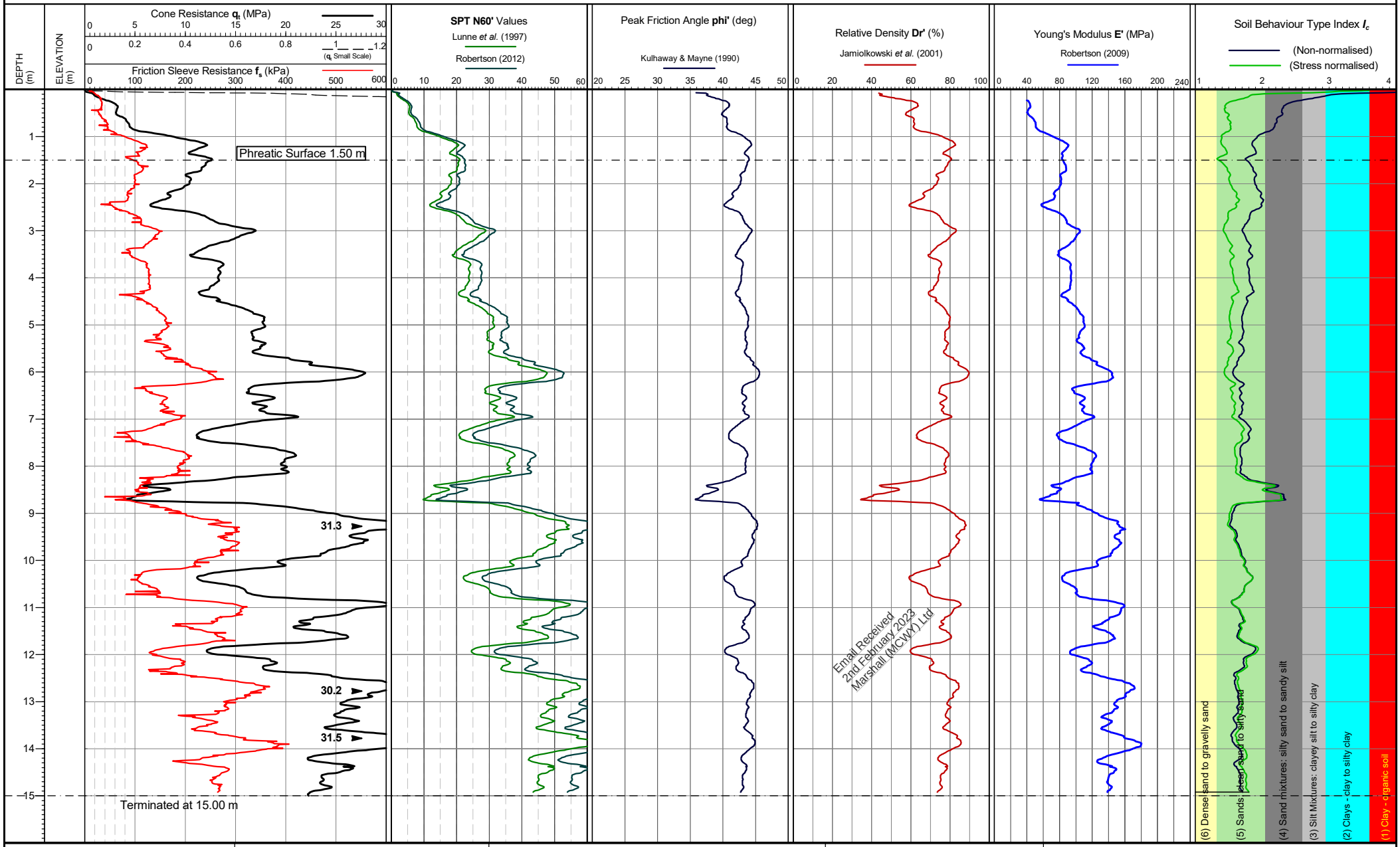
Lankelma Project Ref: P-106982-7

TEST ID: CPT203

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 12:14:55

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

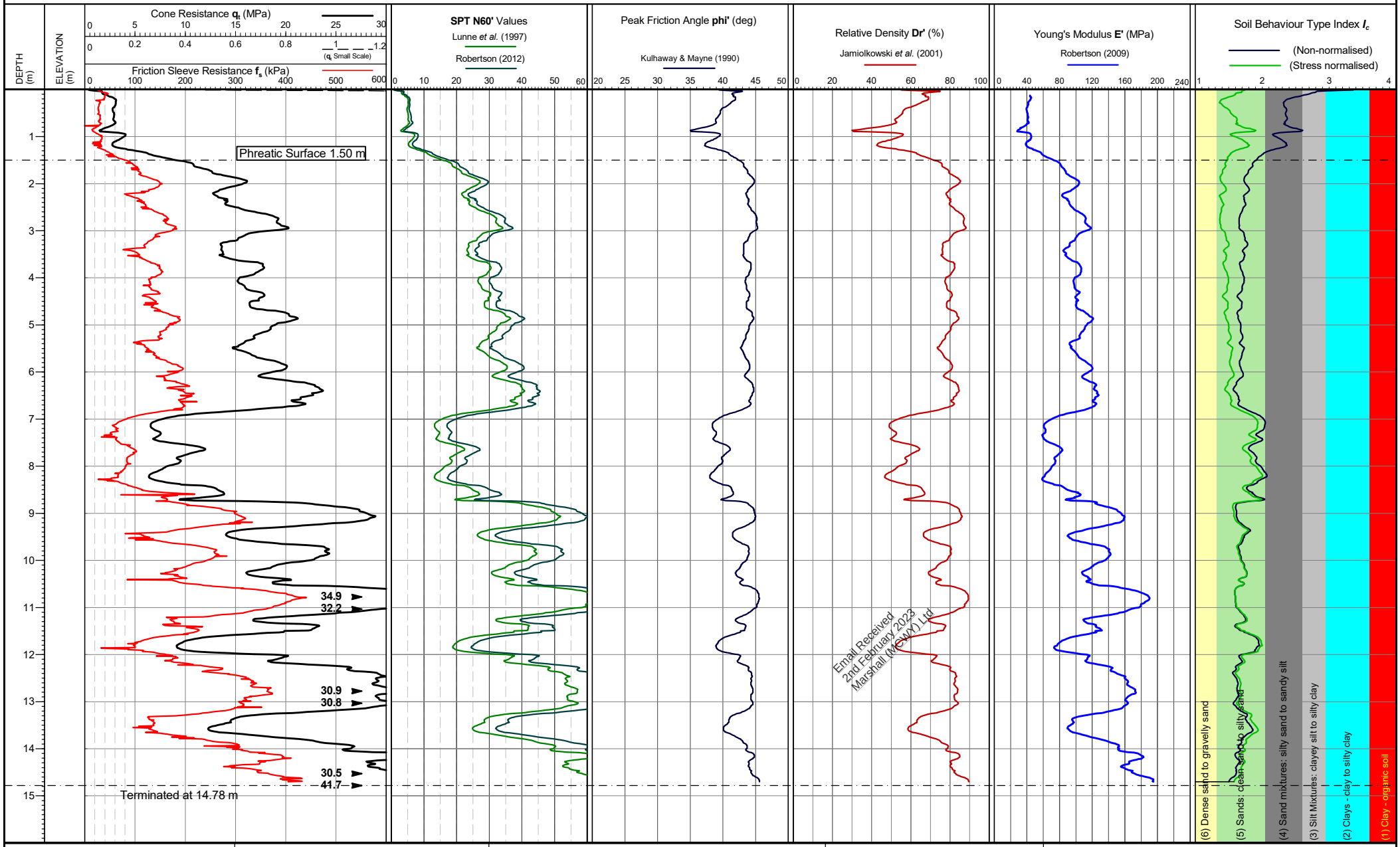
Lankelma Project Ref: P-106982-7

TEST ID: CPT204

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 10:04:16

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

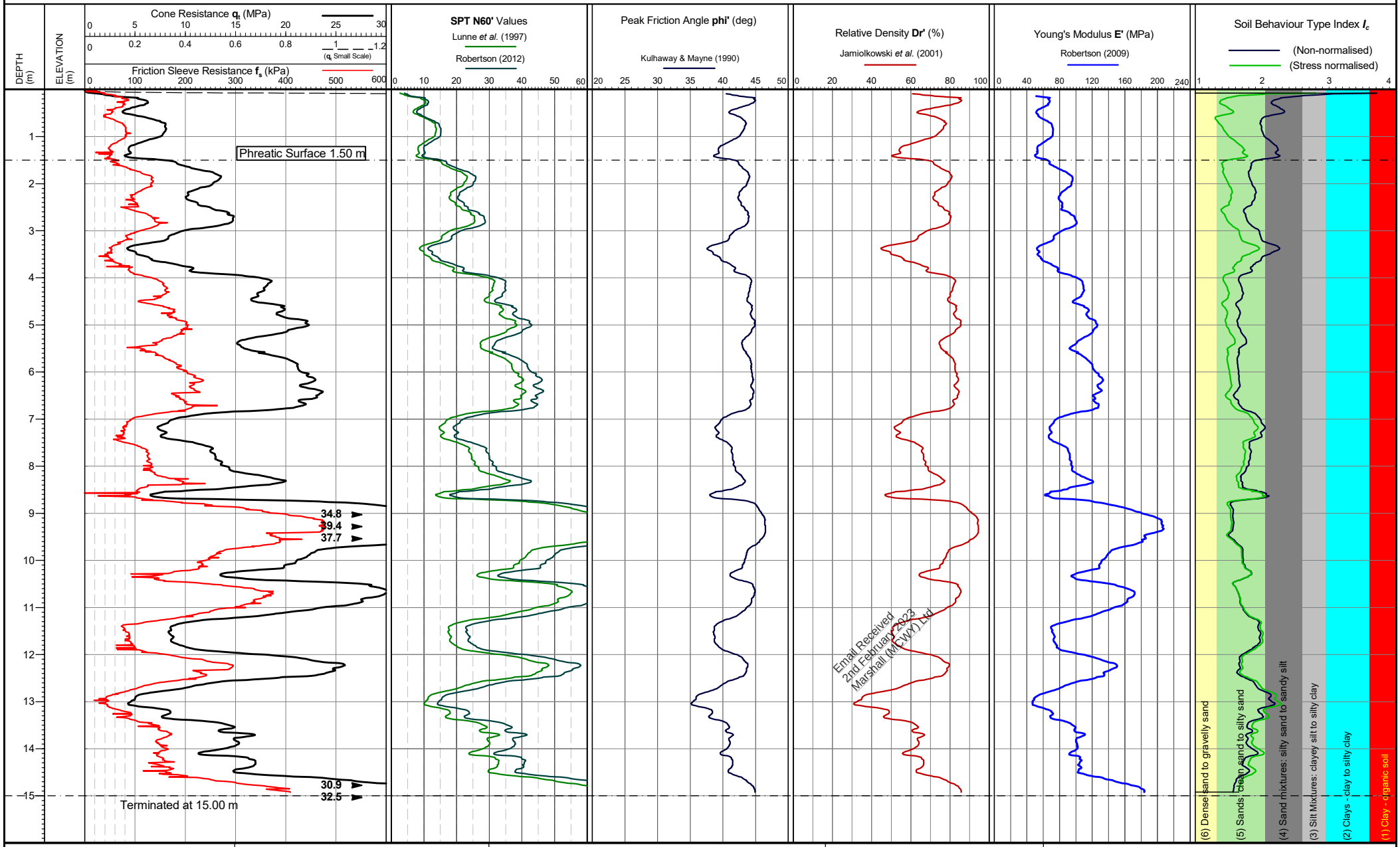
Lankelma Project Ref: P-106982-7

TEST ID: CPT205

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 09:04:30

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

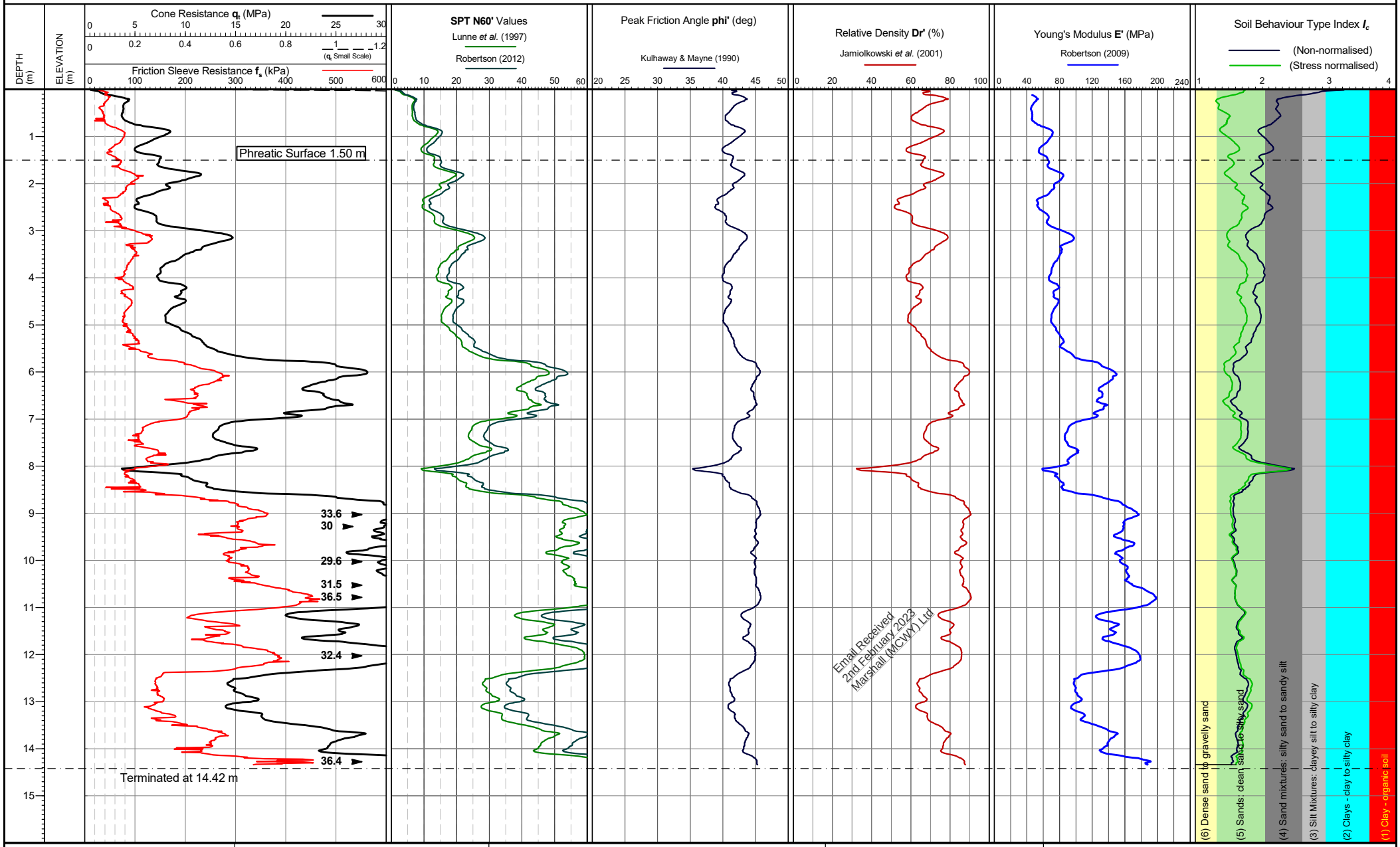
Lankelma Project Ref: P-106982-7

TEST ID: CPT206

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 11:39:31

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

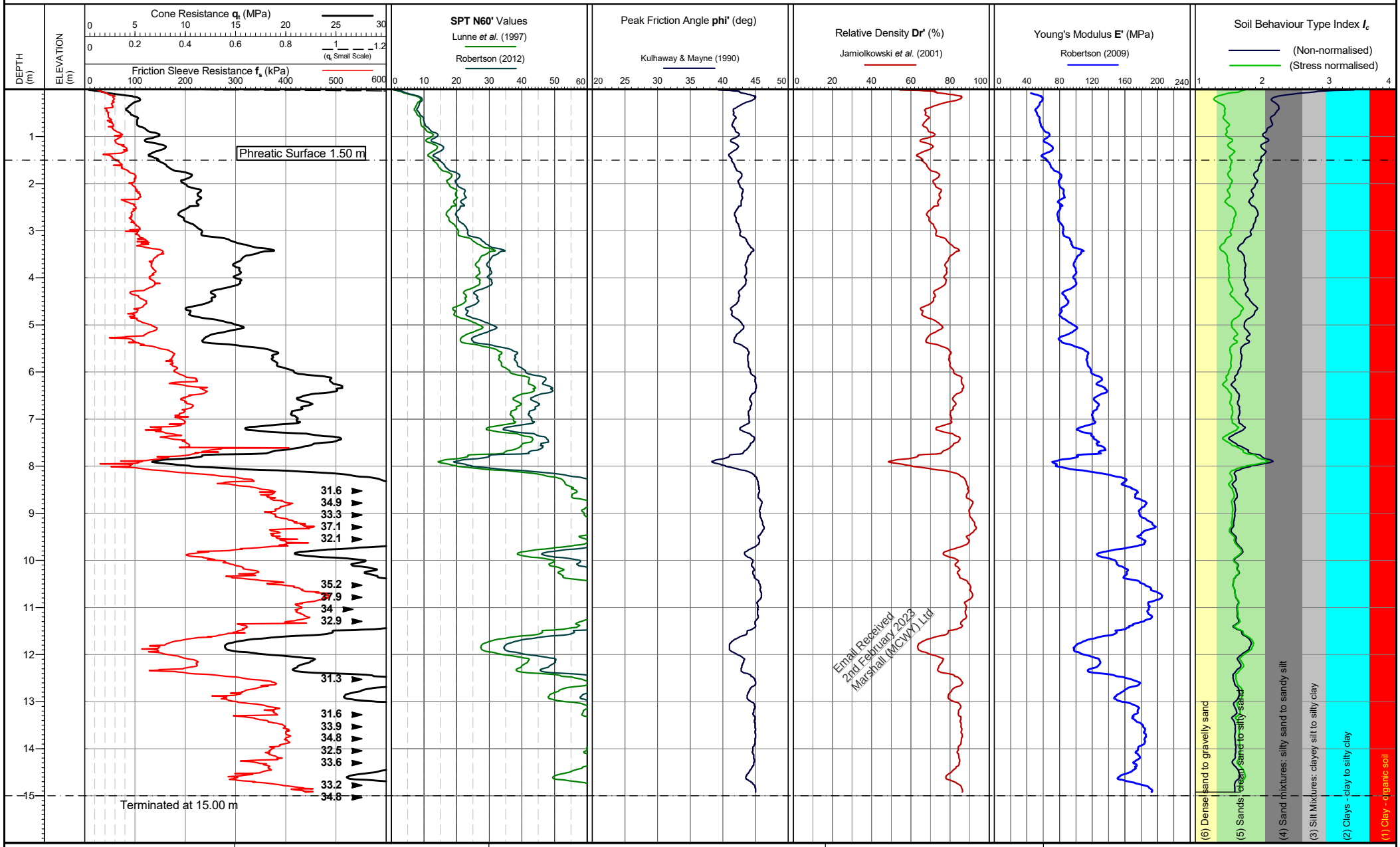
Lankelma Project Ref: P-106982-7

TEST ID: CPT207

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 13:20:03

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

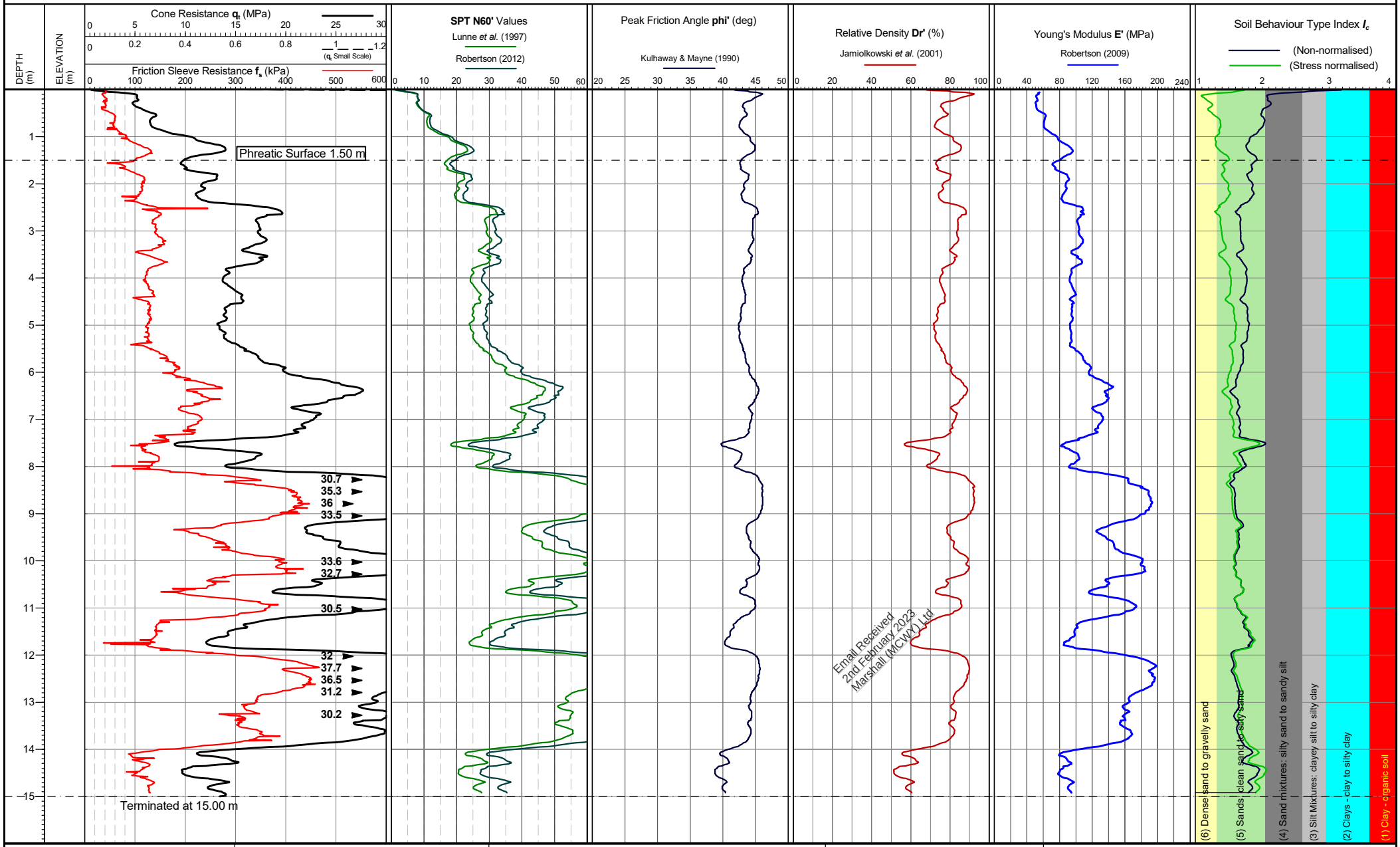
Lankelma Project Ref: P-106982-7

TEST ID: CPT208

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 10:32:17

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

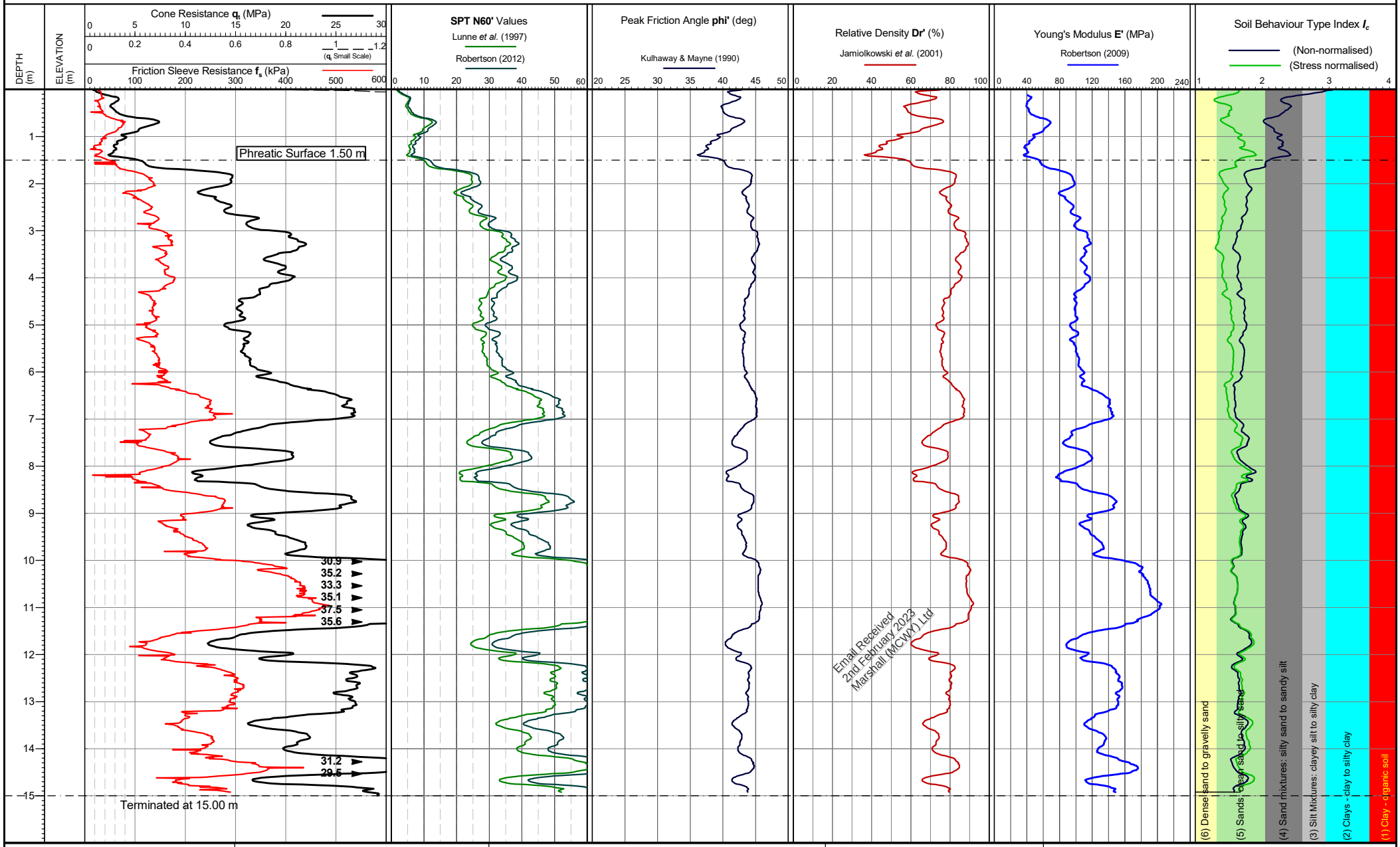
Lankelma Project Ref: P-106982-7

TEST ID: CPT209

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 14:33:43

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

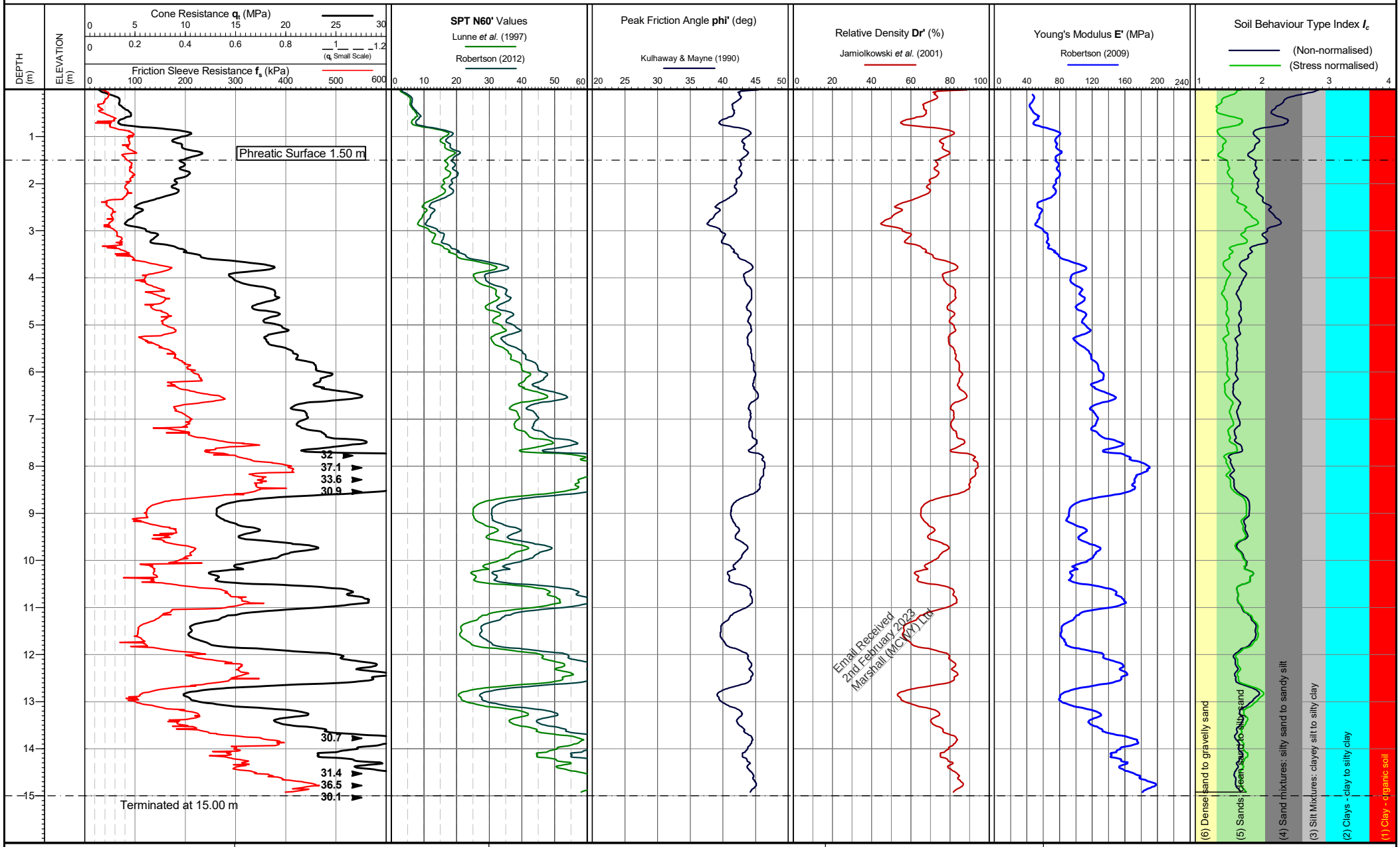
Lankelma Project Ref: P-106982-7

TEST ID: CPT210

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 15:02:55

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

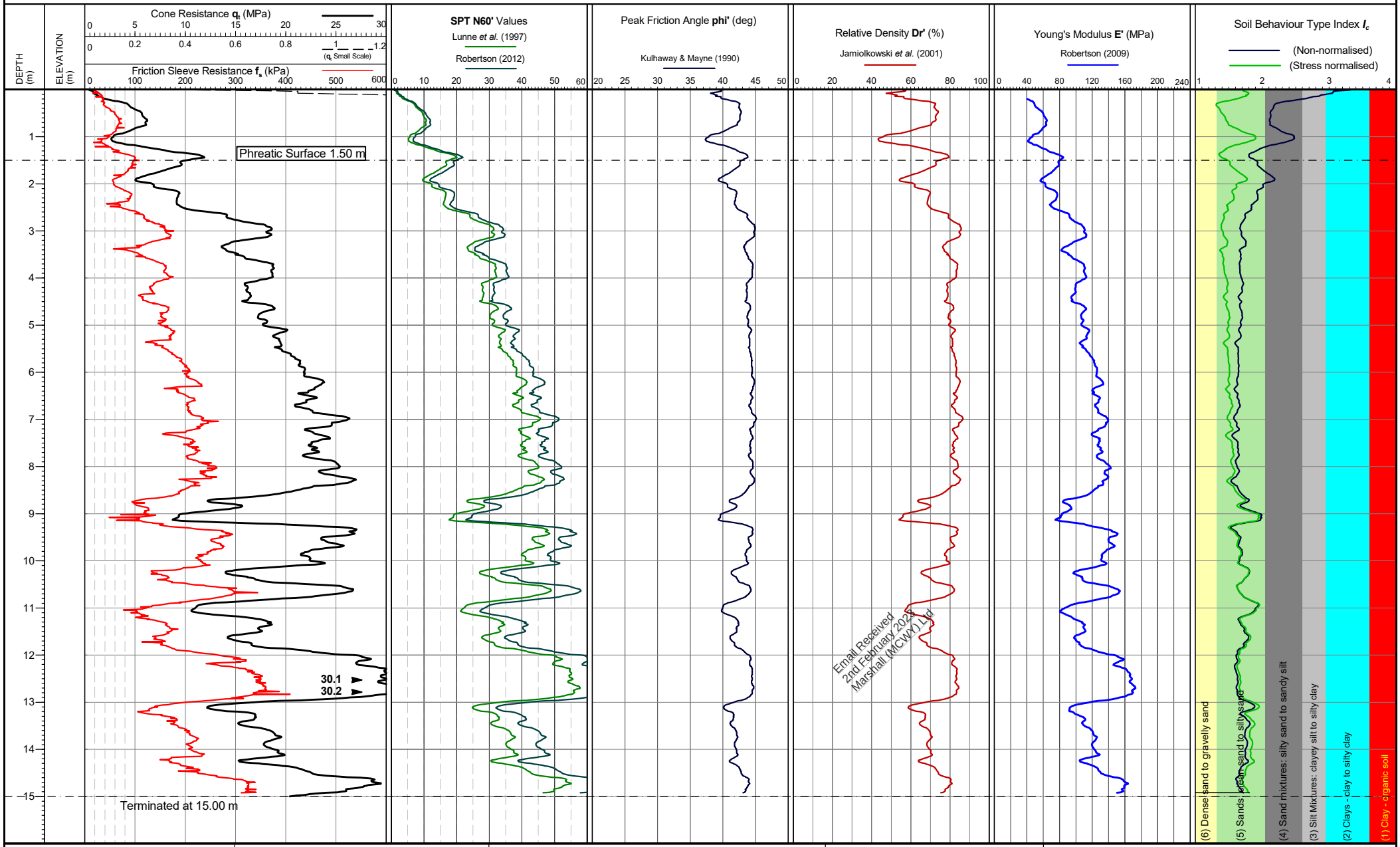
Lankelma Project Ref: P-106982-7

TEST ID: CPT211

Client: JPG GROUP

Project: DEESIDE

LANKELMA



Cone area (mm2):1500
Cone ID: S15-CFIP.1528
Operator: Walter Geddes
Date of test: 29/08/2018 09:34:03

Location: Flintshire, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.05-2.95. See report section 'Drained and Undrained Behaviour' for discussion.

See report section 'Interperative Data' for methods and discussion of parameter evaluation.

Date of plot: 11-09-18

Checked by: Chris Player

Lankelma Project Ref: P-106982-7

TEST ID: CPT212

Appendix G Notes on Limitations

General
JPG (Leeds) Limited have prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from JPG (Leeds) Limited; a charge may be levied against such approval.

JPG (Leeds) Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
b) this document to any third party with whom an agreement has not been executed.

Phase I Desk Study Reports
The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JPG (Leeds) Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Geo-Environmental Investigations
The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics and ground and groundwater conditions to allow a reasonable assessment of the environmental risks together with engineering and development implications. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

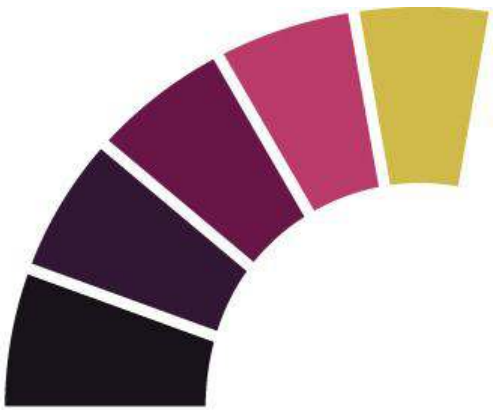
The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather-related effects.

The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance values relating to acceptable contamination concentrations. No liability can be accepted for the retrospective effects of any future changes or amendments to these values.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.



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