GEOENVIRONMENTAL GROUND INVESTIGATION

Plot D
The Airfields
Deeside

Reference	**4671-JPG-XX-XX-RP-G-0651-S2-P01**
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DOCUMENT HISTORY

Rev	Date	Revision Details	Status	Author(s)	Approved
P01	05.12.2022	First Issue	Information	DMH	RJM

EXECUTIVE SUMMARY

Site Address	**Plot D, The Airfields, Deeside**
NGR	Approximate NGR 331950, 369590
Current Site Use & Proposed Development	The site is currently unoccupied and comprises an open grassed field. A disused telecommunications tower is located in the north-western corner of the site. It is proposed to develop Plot D for a commercial end use.
Fieldwork	Fieldwork comprised the excavation of 23 trial pits, drilling of four cable percussive boreholes and two cone penetration tests. Samples of soil and groundwater were obtained and submitted for chemical analysis and geotechnical testing. All four boreholes were installed with gas and groundwater monitoring wells which have been monitored on six occasions.
Ground and Groundwater Conditions	Ground conditions at the site typically comprise a layer of topsoil (made ground) to depths of between 0.10m and 0.40m, average depth 0.25m. This is underlain by drift deposits comprising tidal flat deposits of medium dense, locally loose, brown silty sand with occasional shells, becoming dense to very dense with depth. Bedrock was not encountered. Groundwater was encountered in the granular deposits during the investigation. During March groundwater was monitored at approximately 1.00m bgl. In July groundwater levels in BH101 and BH102 were approximately 0.60m lower. BH103 and BH104 were dry.
Geotechnical and Engineering Assessment	**Foundations** - Where the shallow natural ground comprises medium dense sand, then this is considered suitable to support 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 1.00m bgl. Where loose deposits are encountered, foundations will require extending through these materials to found in the underlying medium dense sand. Excavations extending below groundwater may cause a decrease in allowable bearing pressure and increased difficulties relating to groundwater control and excavation stability. If greater bearing capacities are required, then consideration could be given to ground improvement, e.g. vibro-compaction (bottom feed method) or a piled foundation solution. 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. If it is proposed to raise site levels, then earthworks should be designed in order to achieve a suitable bearing capacity with limitations on settlement to enable a shallow foundation solution, e.g. reinforced strip/pad foundation or raft, to be utilised across the site. **Ground Floor Construction** - Based on the strength and consistency of the underlying natural ground, which will be exposed at formation level, a ground bearing floor slab could be utilised on this material. The formation level should be proof rolled and inspected. Any soft or loose spots should be removed and replaced with suitably compacted granular materials. Any earthworks or ground improvement, (where required), should be designed in order to accommodate the required allowable bearing capacity and tolerable settlements for the proposed ground bearing floor slab. **Earthworks** - 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. Laboratory compaction testing has been carried out in order to assess the suitability of the natural ground on site for use in earthworks. Suitability for compaction is defined as achieving >95% of the maximum dry density and <5% air voids. Based on the results of the laboratory compaction and moisture content testing, the granular materials are too wet to achieve suitable compaction and may require improvement, e.g. by the addition of cement, prior to use. Any materials placed and compacted on the site should consider the groundwater level and potential dilation of the underlying sand during compaction. Dilation of the sand may be minimised by the use of dead rollers in preference to vibratory rollers. **Roads, Pavements and Hardstanding Surfaces** - For the natural sand material, it is considered reasonable to adopt a CBR value of approximately 5% for preliminary design of roadways and hardstanding. **Obstructions** – No obstructions were encountered. **Chemical Attack on Buried Concrete** - Based on the laboratory test results it is considered that a Design Sulphate Class of DS-1 and an ACEC of AC-1 class may adopted for the site.
Environmental Risk Assessment	Based on the results of the ground gas monitoring and chemical analysis, the following potential sources of contamination are considered to be present on the site: • Localised potentially airborne asbestos fibres associated with the topsoil in TP101 (north-western corner of the site). • Slightly elevated concentrations of potentially leachable PAH species in the made ground (in TP103 and TP116). Based on the identified potential source of contamination and available pathways and receptors, the following potential linkage assessment has been considered. This assessment is based on

current site conditions (unless stated) and does not consider exposure pathways following any remediation of the site.

Development and Maintenance Workers - Based on the potential sources of contamination which have been identified on the site, there is a risk to development and maintenance workers involved in groundworks at the site. There is the potential for exposure to potentially airborne asbestos fibres in the north-west of the site.

Future Site End Users - It is unlikely that future site end users will come into contact with the site in its current condition. However, based on the potential sources of contamination which have been identified on the site, there will be a risk to site end users from exposure to potentially airborne asbestos fibres in the north-west of the site.

Controlled Waters – Slightly elevated concentrations of potentially leachable PAH species were recorded in the topsoil. No elevated concentrations of potential contaminants were detected in the underlying groundwater. Based on the environmental setting of the site and the absence of elevated concentrations of potential contaminants in the underlying groundwater, the risk to controlled waters is considered to be negligible.

In order to mitigate the risks posed by the potential contaminants which have been identified on the site, consideration should be given to the following mitigation measures.

Development and Maintenance Workers

- Site workers involved in groundworks should use appropriate PPE, i.e. overalls and gloves. Appropriate health and safety measures, e.g. washing hands prior to eating or drinking, should also be enforced.
- To protect against the inhalation of asbestos fibres the contractor should provide a soils risk assessment. Employees should also receive asbestos awareness training in order to avoid exposure.
- To inform the soils risk assessment, air monitoring for asbestos fibres may be required.
- Any monitoring and analysis of asbestos in air should be carried out in accordance with the Control of Asbestos Regulations (CAR) 2012 and by a suitably accredited organisation (ISO/IEC 17025:2005).
- The risk assessment and recommendations for mitigation will need to be completed by a suitably qualified specialist.
- The method statements and risk assessment should also include any mitigation measures which are required for the excavation of these materials.

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 site workers and the environment.

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.

Future Site Users - It is unlikely that future site end users will come into contact with the site in its current condition. However, based on the potential source of contamination which has been identified on the site, there is a risk to site end users from exposure to the localised potentially airborne asbestos fibres associated with the topsoil in TP101 (north-western corner of the site).

Prior to commencing development, it is likely that the topsoil across the site will be excavated and stockpiled for later use or disposed of off-site. Prior to commencing these works, it is recommended that the topsoil in the vicinity of TP101 is excavated and removed off-site to a suitably licenced landfill facility. Alternatively, consideration could be given to the possible re-use of these materials elsewhere on site in accordance with a robust risk assessment and implementation of the CL: AIRE Definition of Waste: Development Industry Code of Practice (CoP) and a suitable Materials Management Plan (MMP).

On completion of the excavation of this material, validation samples should be obtained from the sides and base of the excavation in order to confirm the absence of asbestos fibres in the remaining materials.

Basic radon gas protective measures will be required for new buildings on the site.

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 Introduction

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

1.2 Objectives

The main objective of the geoenvironmental ground investigation is 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.

Interpretative reporting, including:

- Assessment of potential contaminants using generic assessment criteria specific to the proposed end use.
- A qualitative (Tier 1) screening assessment using source-pathway-receptor linkages.
- An assessment of the classification of materials for disposal off-site (not including WAC testing).
- Engineering assessment to include recommendations with respect to foundations, ground floor and pavement design.
- Comments on the likely requirements for remedial measures on the site, to address potential contamination and/or ground gas issues.
- Recommendations for further work where appropriate; and
- Presentation of the findings in a tabular non-technical summary.

1.4 Location

Plot D forms part of a large mixed-use development at The Airfields, Deeside approximately 6km north-west of Chester. The site is located in the northern part of The Airfields development, the approximate centre of Plot D is located at NGR 331887, 369596. It is proposed to develop this plot for a commercial end-use.

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 a 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 Millennium 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 included 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 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 ground gas conditions at the site.

Trial pits were excavated across the site to assess the shallow ground conditions. Cable percussive boreholes were drilled to assess the deeper ground conditions and to provide in-situ strength/density data and to also obtain soil samples for laboratory testing.

Two trial pits were also excavated just off-site to assess shallow ground conditions for the proposed highway, which would link Plot D to the rest of 'The Airfields' development.

Gas and groundwater monitoring wells were installed in all four cable percussive boreholes in order to assess the ground gas and groundwater regime in the natural ground beneath the site.

In addition, cone penetration tests (CPTs) were carried out on the site to obtain geotechnical parameters.

The rationale behind each exploratory location is summarised in Table 2.0 below.

Table 2.0 – Exploratory Hole Rationale

Potential Issue	Exploratory Holes
General coverage to assess ground conditions across the site, and to obtain soil samples to submit for chemical analysis and geotechnical testing.	TP101 to TP118 and TP121 to TP123
Targeted to assess shallow ground conditions for the proposed highway and to obtain soil samples to submit for geotechnical testing.	TP119 and TP120
Cable percussive boreholes to assess deeper ground conditions and obtain in-situ strength/density data.	BH101 – BH104
Cone penetration testing to assess deeper ground conditions and provide geotechnical data.	CPT101 – CPT102

2.1 Fieldwork

The fieldwork was carried out by JPG (Leeds) Ltd between 3 February and 12 February 2020. 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	23 (TP101 to TP123)	3.40	-	-
Cable Percussive Boreholes	4 (BH101 to BH104)	15.45	4 x 50mm	GG and WL
Cone Penetration Testing	2 (CPT101 to CPT102)	15.06	-	-

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

The ground investigation has been undertaken in general accordance with the techniques outlined in BS5930: 2015 Code of Practice for Site Investigations at the positions shown on the Exploratory Hole Location Plan, which is presented as Figure 3 in Appendix A.

The investigation was carried out under the full-time supervision of an engineer from JPG and a UXO clearance engineer from MACC. The exploratory hole logs are provided in Appendix B.

Due to the risk of unexploded ordnance (UXO) below the site, all exploratory hole locations were inspected and cleared by a qualified UXO Engineer using a magnetometer, to a maximum depth of 6.0m bgl.

Gas and groundwater monitoring standpipes were installed in all four cable percussive boreholes. The installations were sealed in the natural ground.

Cone Penetration Testing was performed on the site. The CPT logs are contained in Appendix C.

2.2 Surveying

Exploratory hole 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; and
- Provide information on the solubility of contaminants and therefore the potential for impact on controlled waters.

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

Soils – General

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

Arsenic	Mercury	Copper
Cadmium	Lead	Nickel
Chromium	Zinc	Selenium
Cyanide (free)	Phenol	
Speciated Poly Aromatic Hydrocarbons (PAH)		
Soil Organic Matter		
Sulphate (water soluble) and pH		
Asbestos screen		

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

- Hexavalent chromium, total chloride, total sulphate, total sulphide and ammoniacal nitrogen.
- Organophosphorus pesticides, organochlorine pesticides, triazine herbicides.
- Asbestos quantification.

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	Sulphate and pH
Speciated Poly Aromatic Hydrocarbons (PAHs)		

3.2 Geotechnical Testing

In-situ standard penetration tests (SPTs) were carried out in all the cable percussive boreholes. The results are presented on the exploratory hole logs provided in Appendix B and presented graphically on Figure 4 in Appendix A.

In-situ cone penetration tests (CPTs) were performed across the proposed development area. The results are presented in Appendix C.

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

- Moisture content.
- Particle size distributions (PSD) and sedimentations to confirm the field descriptions of the soils.
- Compaction test (2.5kg and 4.5kg rammer) and particle density testing in order to determine the compaction properties of the soils.
- California Bearing Ratio (CBR) (2.5kg remoulded unsoaked) to determine the bearing characteristics of the soils.
- pH, 2:1 water extract soluble sulphate to determine the potential for aggressive ground and inform the design of buried concrete.
- Water-soluble chloride, water-soluble sulphate, pH, total sulphur, total sulphate and organic matter.

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 are contained in Appendix E.

4.0 GROUND AND GROUNDWATER CONDITIONS

4.1 Introduction

The proven ground conditions encountered during the investigation were generally consistent with the anticipated sequence of strata indicated by previous ground investigations undertaken across 'The Airfields'.

4.2 Ground Conditions

A summary of the ground conditions encountered is provided below. The sequence of strata generally comprises a layer of topsoil (made ground) underlain by drift deposits comprising tidal flat deposits of brown or grey silty sand. Bedrock was not encountered.

4.3 Topsoil and Made Ground

Topsoil was encountered in all of the exploratory locations to depths of between 0.10m and 0.40m, average depth 0.25m. The topsoil generally comprised a soft dark brown slightly sandy silty clay with rootlets.

In TP120, which was located on the route of the proposed access road beyond the boundary of Plot D, made ground was encountered to a depth of 1.90m bgl. The made ground comprised light brown slightly gravelly silty sand with cobbles and boulders. The granular constituents comprised sandstone, concrete, brick and fragments of an old land drain.

4.4 Natural Strata

Tidal flat deposits were encountered at all exploratory locations immediately beneath the topsoil and were proven to a maximum depth of 15.45m bgl (BH104). The underlying bedrock was not encountered.

The tidal flat deposits typically comprised medium dense, locally loose, brown silty sand with occasional shells, becoming dense to very dense grey silty sand with frequent shells with depth.

Geological cross-sections through the site are presented as Subsurface Sections A-A' to C-C' in Appendix A.

4.5 In-Situ Testing

Standard Penetration Testing

The results of the in-situ penetration testing, which was carried out in the cable percussive boreholes, has been plotted against level (m AOD). The results have been corrected in accordance with the energy ratio of the testing equipment.

The results for tests which refused prior to the required depth have been extrapolated based on the penetration which was recorded at refusal.

The plot is presented as Figure 4 in Appendix A and the SPT data (uncorrected) is included on the exploratory hole logs contained in Appendix B. No results in excess of 100 are included on the plot.

There is a general correlation of increasing density with depth in the natural strata.

Cone Penetration Testing

Two cone penetration tests (CPT101 to CPT102) were carried out on the site to a maximum depth of 15.06m bgl, using a combined CPT/magnetometer probe.

Testing was carried using an 18-tonne rubber tracked CPT unit (UK8) in general accordance with BS ISO 22476-1:2012.

The testing indicated that the material comprised 'clean sand to silty sand'.

The results of the cone penetration tests have been used to calculate SPT N60 values. Plots showing the results profile with depth in accordance with Lunne et al (1997) and Robertson (2012), are provided in Appendix A. The plots show an increase in density with depth.

4.6 Laboratory Testing

Five samples, comprising four of natural ground and one of made ground (TP120, located off-site) were submitted for geotechnical testing.

Moisture Content Testing

All five samples were submitted for moisture content testing. The results are summarised in Table 4.6.1 below:

Table 4.6.1 – Summary of Moisture Content

Material	Moisture Content (%)	
	No of samples	Range
Natural Ground	4	22 - 26
Made Ground	1	20

Particle Size Distribution Testing

Particle size distribution/sedimentation testing was carried out on two samples of natural ground and one sample of made ground. The tests were carried out to confirm the field description of the materials and inform the earthworks classification. The results are provided in Table 4.6.2.

Table 4.6.2 – Summary of Particle Size Distribution/Sedimentation Testing

Trial Pit	Depth (m bgl)	Material	Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
TP102	1.00	Brown slightly silty medium to coarse SAND.	0	0	69	18	13
TP112	1.65	Light brown silty medium to coarse SAND.	0	0	74	13	13
TP120	0.10-0.50	MADE GROUND: Light brown slightly gravelly silty SAND with medium cobble and low boulders content	0	7	61	21	11

Compaction Testing

One sample of natural ground was submitted for dry density/moisture content relationship testing using both a 2.5kg and 4.5kg rammer to assess its suitability for re-use in earthworks. The results are summarised in Table 4.6.3.

Table 4.6.3 - Summary of Compaction Test Results

Exp. Hole	Depth (m bgl)	Material	Particle Density (Mg/m3)	Natural Moisture Content (NMC)	Weight of Rammer	Max. Dry Density (Mg/m3)	Optimum Moisture Content (OMC)	Suitability for Compaction and Range of Acceptable Moisture Contents*
TP112	1.65	Light brown silty medium to coarse SAND.	2.60	26	2.5kg	1.73	18	Unsuitable, too wet, 17% - 21.5%
					4.5kg	1.81	16	Unsuitable, too wet, 14.5% - 19%

*** To achieve >95% of maximum dry density and <5% air voids**

Suitability for compaction is defined as achieving >95% of the maximum dry density and <5% air voids.

Based on the results of the compaction test and the moisture contents of similar samples (22% to 25%), the granular drift deposits are considered too wet to achieve suitable compaction.

California Bearing Ratio

Remoulded California Bearing Ratio (CBR) tests were carried out on two samples of natural ground and one sample of made ground at their as received moisture contents using the 2.5kg rammer. The results are summarised in Table 4.6.4 below.

Table 4.6.4 – Summary of CBR Results

Sample	Material	As Received Moisture Content (%)	CBR Value (%)		Average* (%)
			Sample Top	Sample Bottom	
TP108 1.25m	Light brown and brown slightly silty SAND with occasional gravel sized shells/shell fragments.	22	12.4	19.6	-
TP117 0.2-0.5m	Light brown silty SAND with abundant shells.	24	5.4	7.6	-
TP120 0.1-0.5m	MADE GROUND: Light brown slightly gravelly silty SAND with medium cobble and low boulders content	20	25.8	28	26.9

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

CBR values obtained from the samples of granular natural ground ranged between 5.4% and 19.6%. The CBR values for the sample of made ground were between 25.8% and 28%.

4.7 Groundwater

During the investigation, perched groundwater was recorded in five trial pits and one cable percussive borehole. This was typically recorded at depths of between 1.60m and 3.00m bgl.

A summary of monitored groundwater levels is presented in Table 4.7.

Table 4.7 – Summary of Monitored Groundwater Levels

Location	Water Level During Monitoring (m bgl)					
	02.03.2020	09.03.2020	18.03.2020	23.03.2020	03.07.2020	08.07.2020
BH101	0.70	0.94	1.61	1.28	1.95	1.97
BH102	0.60	1.03	1.06	1.19	1.85	1.85
BH103	0.50	0.94	1.02	1.16	DRY	DRY
BH104	0.20	0.79	0.85	1.09	DRY	DRY

All four monitoring wells were sealed within the natural ground.

Groundwater monitoring was carried out on four occasions during March, prior to lockdown due to the Covid-19 virus. The final two monitoring visits were carried out in early July.

Groundwater was encountered in the granular deposits during the investigation and was initially monitored at approximately 1.00m bgl. Recorded groundwater levels in July were over 0.60m lower than those recorded in March. BH103 and BH104 were found to be dry.

It should be noted that the groundwater conditions which have been 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.

4.8 Ground Gas

Ground gas monitoring has been undertaken on six occasions. Four visits were completed in March, prior to lockdown due to the Covid-19 virus. The final two monitoring visits were carried out in early July. 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 to date are presented in Appendix F and are discussed in Section 6 of this report.

4.9 Stability

Based on the ground conditions encountered in the trial pits, the stability of the shallow natural granular ground is considered to be poor. With increased instability due to the presence of shallow groundwater, typically below 1.00m bgl.

It is considered likely that if excavations were left unsupported, then collapse would occur, and this is likely to increase in the presence of groundwater.

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

Ground conditions typically comprise topsoil to 0.25m, underlain by tidal flat deposits comprising medium dense, locally loose, brown silty sand with occasional shells, becoming dense to very dense with increasing depth.

Where the shallow natural ground comprises medium dense sand then this 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 1.00m bgl.

Where loose deposits are encountered, foundations will require extending through these materials to found in the underlying medium dense sand.

Excavations extending below groundwater may cause a decrease in allowable bearing capacity and increased difficulties relating to groundwater control and excavation stability.

If greater bearing capacities are required, then consideration could be given to ground improvement, e.g. vibro-compaction (bottom feed method) or a piled foundation solution. 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.

If it is proposed to raise site levels, then earthworks should be designed in order to achieve a suitable bearing capacity with limitations on settlement to enable a shallow foundation solution, e.g. reinforced strip/pad foundation or raft, to be utilised across the site.

5.3 Ground Floor Construction

Based on the strength and consistency of the underlying natural ground, which will be exposed at formation level, a ground bearing floor slab could be utilised on this material. The formation level should be proof rolled and inspected. Any soft or loose spots should be removed and replaced with suitably compacted granular materials.

Any earthworks or ground improvement, (where required), should be designed in order to accommodate the required allowable bearing capacity and tolerable settlements for the proposed ground bearing floor slab.

5.4 Earthworks

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.

Laboratory compaction testing has been carried out in order to assess the suitability of the natural ground on site for use in earthworks. Suitability for compaction is defined as achieving >95% of the maximum dry density and less than 5% air voids. Based on the results of the laboratory compaction and moisture content testing, the granular materials are too wet to achieve suitable compaction and may require improvement, e.g. by the addition of cement, prior to use.

Any materials placed and compacted on the site should consider the groundwater level and potential dilation of the underlying sand during compaction. Dilation of the sand may be minimised by the use of dead rollers in preference to vibratory rollers.

5.5 Roads, Pavements and Hardstanding Surfaces

The structural design of a road or hard standing is based on the strength of the subgrade, which is assessed on the California Bearing Ratio (CBR).

Based on the results of the CBR testing for the granular natural ground, it is considered reasonable to adopt a CBR value of approximately 5% for preliminary design of roadways and hardstanding.

Formations should be proof rolled and any areas of soft/loose or otherwise deleterious material should be excavated, i.e. any areas where clayey/silty soils are present and replaced with a properly compacted granular fill.

The compaction method used should take into consideration of the groundwater level and possible dilation of the sand. This may exclude the use of vibratory rollers.

Any earthworks resulting in an increase in levels should be designed in order to achieve a suitable CBR value for the proposed development.

5.6 Excavations

The stability of the trial pits was poor in the natural strata. Excavations would prove to be unstable, especially if left open for long periods of time.

It may be possible to deal with small volumes of water by pumping from sumps. Deeper excavations are likely to encounter larger volumes of water ingress and pumping from dedicated well points may be required.

Good working practice with respect to 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 1.2m 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

During the intrusive ground investigation, no obstructions were encountered within Plot D. However, a concrete boulder was encountered in TP120, off-site to the south-east.

5.8 Chemical Attack on Buried Concrete

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

Laboratory testing of the samples of made ground recorded water-soluble sulphate contents of between 15mg/l and 23mg/l and pH values of between 7.6 and 8.2.

Laboratory testing of the samples of natural ground recorded water-soluble sulphate contents of between <10mg/l and 26mg/l and pH values of between 7.5 and 8.4.

In the groundwater, sulphate contents of 5.5mg/l and 11mg/l and pH values of 7.3 and 7.5 were recorded.

Foundations are likely to come into contact with the made ground and natural strata. It is therefore recommended that concrete should be designed to Aggressive Chemical Environment for Concrete (ACEC) Design Sulphate Class DS-1 and ACEC Class AC-1.

This assessment has been made in accordance with BRE Special Digest 1: 2005, entitled 'Concrete in Aggressive Ground'.

6.0 ENVIRONMENTAL RISK ASSESSMENT

6.1 Introduction

Legislation and guidance on the assessment of contaminated sites acknowledges the need for a tiered risk-based approach comprising:

Tier 1 Assessment Comparison of site contaminant concentrations against generic assessment criteria (GAC), i.e. a generic quantitative risk assessment (GQRA). Including an assessment of risk using the source-pathway-receptor model.

Tier 2 Assessment Derivation of site-specific risk assessment criteria and calculation of site specific clean up goals, i.e. a detailed quantitative risk assessment (DQRA).

A Tier 1 Assessment has been completed; however, a Tier 2 Assessment has not been undertaken as part of this report.

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 order to assess the contamination risk at the site, the above rationale has been applied and is discussed in the context of Contamination Sources and Potential Pollutant Linkages.

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.

6.2 Assessment Approach

Human Health

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

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

No standards currently exist in the UK which provide threshold values for potential contamination in groundwater. Alternative guidance is therefore used, against which the significance of potential contaminants can be assessed. For this site, based on the conceptual site model, Drinking Water Standards (DWS) are considered the most appropriate screening values when considering groundwater and leachate results.

6.3 Evaluation of Soils 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. An outline of the methodology of the statistical analysis is presented in Appendix D.

In total, seven samples comprising six of made ground (topsoil) and one of natural ground, were submitted for chemical analysis. All of the samples were submitted for an asbestos screen; two of these were also submitted for leachability analysis. The results of the chemical analysis are summarised below.

Human Health

The results have been compared directly with their respective GAC and are summarised in Table 6.3 below.

Table 6.3 – Summary of Chemical Analysis for Samples of Made and Natural Ground

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(1)	13.3	12 to 14	No
Cadmium	190(1)	1.6	0.7 to 2.4	No
Chromium	8600(1)	14.4	14 to 15	No
Chromium, hexavalent	33 (1)	All <1.0	All <1.0	No
Copper	68000(1)	21.4	20 to 23	No
Lead	2300(2)	140	100 to 350	No
Mercury (Inorganic)	1100(1)	1.9	0.08 to 12	No
Nickel	980(1)	12.6	12 to 13	No
Selenium	12000(1)	0.56	0.5 to 0.7	No
Zinc	730000(1)	298.6	190 to 400	No
Inorganics				
Cyanide (free)	20(3)	All <0.1	All <0.1	No
Phenols				
Total Phenols	3200(1)	All <0.3	All <0.3	No
Poly Aromatic Hydrocarbons				
Naphthalene	190*(1)	All <0.03	All <0.03	No
Acenaphthylene	83000*(1)	All <0.03	All <0.03	No
Acenaphthene	84000*(1)	All <0.03	All <0.03	No
Fluorene	63000*(1)	All <0.03	All <0.03	No
Phenanthrene	22000*(1)	0.03	0.03 to 0.05	No
Anthracene	520000*(1)	All <0.03	All <0.03	No
Fluoranthene	23000*(1)	0.04	0.03 to 0.07	No
Pyrene	54000*(1)	0.04	0.03 to 0.05	No
Benzo(a)anthracene	170*(1)	0.03	0.03 to 0.04	No
Chrysene	350*(1)	All <0.03	All <0.03	No
Benzo(b)fluoranthene	44*(1)	0.03	0.03 to 0.05	No
Benzo(k)fluoranthene	1200*(1)	0.03	0.03 to 0.04	No
Benzo(a)pyrene	35*(1)	All <0.03	All <0.03	No
Indeno(123-cd)pyrene	500*(1)	All <0.03	All <0.03	No
Dibenzo(ah)anthracene	3.5*(1)	All <0.03	All <0.03	No
Benzo(ghi)perylene	3900*(1)	All <0.03	All <0.03	No

(1) S4UL (2) C4SL (3) DUTCH
*** BASED ON 1% SOM**

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

Three samples were tested for organophosphorus pesticides, organochlorine pesticides and triazine herbicides. None of the determinands were detected above their limit of detection.

Asbestos fibres, comprising bundles of amosite, were identified in the sample of topsoil from TP101 at 0.20m. In order to more accurately assess the percentage of asbestos by mass, the sample was submitted for gravimetric analysis in order to calculate the total mass (%) of asbestos.

The Control of Asbestos Regulations (2012) state the following with respect to working with asbestos: 'worker exposure must be below the airborne exposure limit (control limit) of 0.1 fibres per cm³ (0.001%). A control limit is a maximum concentration of asbestos fibres in the air (averaged over any continuous four-hour period) that must not be exceeded'. In addition, 'short term exposure must not exceed 0.6 fibres per cm³ over any continuous ten-minute period'.

The total mass of asbestos in the sample was recorded at a concentration of 0.004%. Based on this result and the nature of the asbestos encountered, i.e. isolated bundles within a soil mass, it is considered likely that there is the potential for the airborne exposure limit to be exceeded.

6.4 Evaluation of Controlled Waters Analysis

Leachate Analysis

Two samples comprising made ground were submitted for leachability analysis. The results have been compared directly with their respective GAC. The results are summarised in Table 6.4.

Table 6.4 – Summary of Leachability Analysis

Determinands	GAC (ug/l)	TP103 (0.10m)	TP116 (0.20m)
pH	6.5 – 9.5	8.0	7.1
Arsenic	50(1)	0.53	0.47
Cadmium	5(1)	0.04	<0.03
Chromium	50(1)	0.51	<0.25
Copper	2000(1)	2.3	0.8
Lead	10(1)	0.78	0.29
Mercury	1(1)	0.01	<0.01
Nickel	20(1)	0.6	<0.5
Selenium	10(1)	1.0	0.53
Zinc	5000(1)*	4.2	2.7
Cyanide free	50(1)	< 20	< 20
Sulphate as SO4	250,000(1)	1300	900
Naphthalene	4.24 (2)	< 0.05	< 0.05
Anthracene	0.193(2)	< 0.01	0.01
Fluoranthene	0.0122(2)	0.02	0.12
Sum of benzo(b)fluoranthene, benzo(k)fluoranthene, indeno (1,2,3-c, d) pyrene benzo (g, h, i) perylene	0.1(1)	All <0.01	0.26
Benzo(a)pyrene	0.01(1)	< 0.01	0.08
Phenol	14.9 (2)	<0.50	<0.50

(1) Water Supply (Water Quality) Regulations 2001 (UKWSWQR)
(2) Environmental Quality Standards (EQS)

Slightly elevated concentrations of potentially leachable PAH species were recorded in the sample obtained from TP116. A single slightly elevated concentration of potentially leachable flouranthene was recorded in the sample from TP103.

6.5 Groundwater Analysis

Two natural groundwater samples were submitted for analysis. The results of the chemical analysis have been compared directly with their respective GAC. The results are summarised in Table 6.5.

Table 6.5 – Summary of Groundwater Results

Determinand	GAC (µg/l)	BH101 (1.61m)	BH103 (1.02m)
Arsenic	50(1)	1.3	4.3
Cadmium	5(1)	<0.03	<0.03
Chromium	50(1)	<0.25	<0.25
Copper	2000(1)	<0.4	<0.4
Lead	10(1)	<0.09	0.29
Mercury	1(1)	<0.01	<0.01
Nickel	20(1)	2.2	2.5
Selenium	10(1)	0.56	0.31
Zinc	5000(1)	3.3	2.7
pH	6.5-9.5(1)	7.5	7.3
Cyanide Free	50(1)	<20	<20
Sulphate as SO4	250000(1)	11000	5500
Naphthalene	4.24(2)	<0.05	<0.05
Anthracene	0.193(2)	<0.01	<0.01
Fluoranthene	0.0122(2)	<0.01	<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)	<0.01	<0.01
Benzo(a)pyrene	0.01(1)	<0.01	<0.01
Phenol	14.9(2)	<0.05	<0.05

(1) Water Supply (Water Quality) Regulations 2001 (UKWSWQR)
(2) Environmental Quality Standards (EQS)

No concentrations of potential contaminants were detected in excess of their respective GAC.

6.6 Evaluation of Hazardous Gases

Based on the desk study information and ground conditions encountered, it is considered unlikely that there will be any significant concentrations of hazardous ground gases on the site.

6.7 Ground Gas Monitoring

In order to assess the potential risks posed to the proposed development from hazardous gases, monitoring wells were sealed within the natural ground in all four of the cable percussive boreholes.

Ground gas monitoring has been undertaken on six occasions. Four visits were completed in March, prior to lockdown due to the Covid-19 virus. The final two monitoring visits were carried out in early July.

The works were carried out using a portable infrared gas meter in accordance with the standard JPG methodology and included the measurement of methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, gas flows and atmospheric pressure.

6.8 Summary of Results

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

- Peak concentrations of methane of 0.1% v/v were recorded in BH101, BH102 and BH104. Steady concentrations of 0.1% v/v were recorded in BH101 and BH102. No concentrations of >1% v/v were recorded.
- Peak and steady concentrations of carbon dioxide were recorded in all four installations. Maximum peak and steady concentrations ranged between 0.7% v/v and 3.0% v/v . No concentrations of >5% v/v were recorded.
- No significantly elevated concentrations of carbon monoxide or hydrogen sulphide were recorded.
- Reduced oxygen concentrations (i.e. <16%v/v) were recorded in BH102 (10.1% v/v) and BH104 (14.3% v/v) both during the fourth visit.
- Positive peak and/or steady flows of 0.1 l/hr were recorded in BH101, BH102 and BH104.

Two of the monitoring visits were carried out during a period of regionally falling atmospheric pressure, three visits were carried during regionally steady atmospheric pressure, and one was carried out during regionally rising atmospheric pressure.

Barometric pressures during the monitoring period ranged between 989mB and 1027mB.

6.9 Requirements for Gas Protection Measures

The results of the gas monitoring have been assessed in accordance with 'BS8485:2015+A1:2019 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' and CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings'.

No significant hazardous gas concentrations have been recorded. Based on the absence of significantly elevated gas concentrations and flows it is recommended that Characteristic Situation 1 is adopted for Plot D, i.e. no gas protection measures will be required.

6.10 Radon Risks

The site is located in an area where between 5% and 10% of buildings are affected by radon. Therefore, basic radon protective measures are required.

6.11 Summary of Sources, Pathways and Receptors

Sources

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

- Localised potentially airborne asbestos fibres associated with the topsoil in TP101 (north-western corner of the site).
- Slightly elevated concentrations of potentially leachable PAH species in the made ground (in TP103 and TP116).

Pathways

Based on the available information and the proposed development of the site for a commercial end-use, the following potential exposure pathways will require consideration, both during the development works and in relation to the end use scenario:

- Inhalation of asbestos fibres.
- Leaching/migration of contaminants into groundwater and surface water via groundwater and surface water flow.

Receptors

The potential receptors considered are:

- Development workers and future maintenance workers involved in excavations, e.g. foundations or where services are being installed or repaired following development.
- Future end users of the site (i.e. employees).
- Groundwater in the underlying Secondary A Aquifer (tidal flat deposits) and Secondary A/Principal Aquifers (bedrock).
- Surface watercourses i.e. drains around the perimeter of the site and the River Dee located approximately 400m south-west of the site.

6.12 Source – Pathway – Receptor Linkages

Based on the above sources, pathways and receptors, the following linkage assessments have been considered. A conceptual site model illustrating the potential pollutant linkages at the site is presented as Figure 5 in Appendix A.

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

Development and Maintenance Workers

Based on the potential source of contamination which has been identified on the site, there is a risk to development and maintenance workers involved in groundworks at the site.

There is the potential for exposure to potentially airborne asbestos fibres in the north-west of the site.

Future Site End Users

It is unlikely that future site end users will come into contact with the site in its current condition.

However, based on the potential source of contamination which has been identified on the site, there will be a risk to site end users from exposure to potentially airborne asbestos fibres in the north-west of the site.

Controlled Waters

Slightly elevated concentrations of potentially leachable PAH species were recorded in the topsoil.

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

- The proposed development will comprise a building surrounded by hardstanding and car parking with limited 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. In addition, due to the commercial nature of the proposed development, surface water runoff is likely to be intercepted by on-site drainage before reaching the watercourse.
- There are no groundwater source protection zones within 500m of 'The Airfields' development.
- The are no groundwater abstractions within 500m of 'The Airfields' development.
- The nearest major surface water feature is the River Dee located approximately 400m to the south-west of the site.
- No elevated concentrations of potential contaminants were detected in the underlying shallow groundwater.

The above factors, i.e. nature of the proposed development, absence of nearby receptors and absence of any elevated concentrations of potential contaminants in the underlying groundwater, indicate that there are no plausible linkages to controlled water receptors. Therefore, the risk to controlled waters is considered to be negligible.

6.13 Mitigation Measures

In order to mitigate the risks posed by the potential contaminants which have been identified on the site, consideration should be given to the following mitigation measures.

Development and Maintenance Workers

- Site workers involved in groundworks should use appropriate PPE, i.e. overalls and gloves. Appropriate health and safety measures, e.g. washing hands prior to eating or drinking, should also be enforced.
- 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.
- To protect against the inhalation of asbestos fibres the contractor should provide a soils risk assessment. Employees should also receive asbestos awareness training in order to avoid exposure.
- To inform the soils risk assessment, air monitoring for asbestos fibres may be required.
- Any monitoring and analysis of asbestos in air should be carried out in accordance with the Control of Asbestos Regulations (CAR) 2012 and by a suitably accredited organisation (ISO/IEC 17025:2005).
- If air monitoring is to be carried out as the main source of air concentration data for exposure estimation, then some monitoring should be carried out during periods of dry weather, i.e. when dust is being generated.
- The risk assessment and recommendations for mitigation will need to be completed by a suitably qualified specialist.
- The method statements and risk assessment should also include any mitigation measures which are required for the excavation of these materials.

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 site workers and the environment.

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.

Future Site Users

It is unlikely that future site end users will come into contact with the site in its current condition.

However, based on the potential source of contamination which has been identified on the site, there is a risk to site end users from exposure to the localised potentially airborne asbestos fibres associated with the topsoil in TP101 (north-western corner of the site).

Prior to commencing development, it is likely that the topsoil across the site will be excavated and stockpiled for later use or for disposal off-site. Prior to commencing the works, it is recommended that the topsoil in the vicinity of TP101 is excavated and removed off-site to a suitably licenced landfill facility.

Alternatively, consideration could be given to the possible re-use of these materials elsewhere on site in accordance with a robust risk assessment and implementation of the CL: AIRE Definition of Waste: Development Industry Code of Practice (CoP) and a suitable Materials Management Plan (MMP).

On completion of the excavation of this material, validation samples should be obtained from the sides and base of the excavation in order to confirm the absence of asbestos fibres in the remaining materials.

Basic radon gas protection measures will be required across Plot D.

6.14 Classification of Materials for Disposal Offsite

In total, seven samples (six of made ground and one of the underlying natural ground) were assessed using HazWasteOnline^{tm} in order to determine the classification of the materials if these required disposals off-site.

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

Details of the classification generated by HazWasteOnline^{tm} are presented in Appendix D.

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 Figures/Drawings

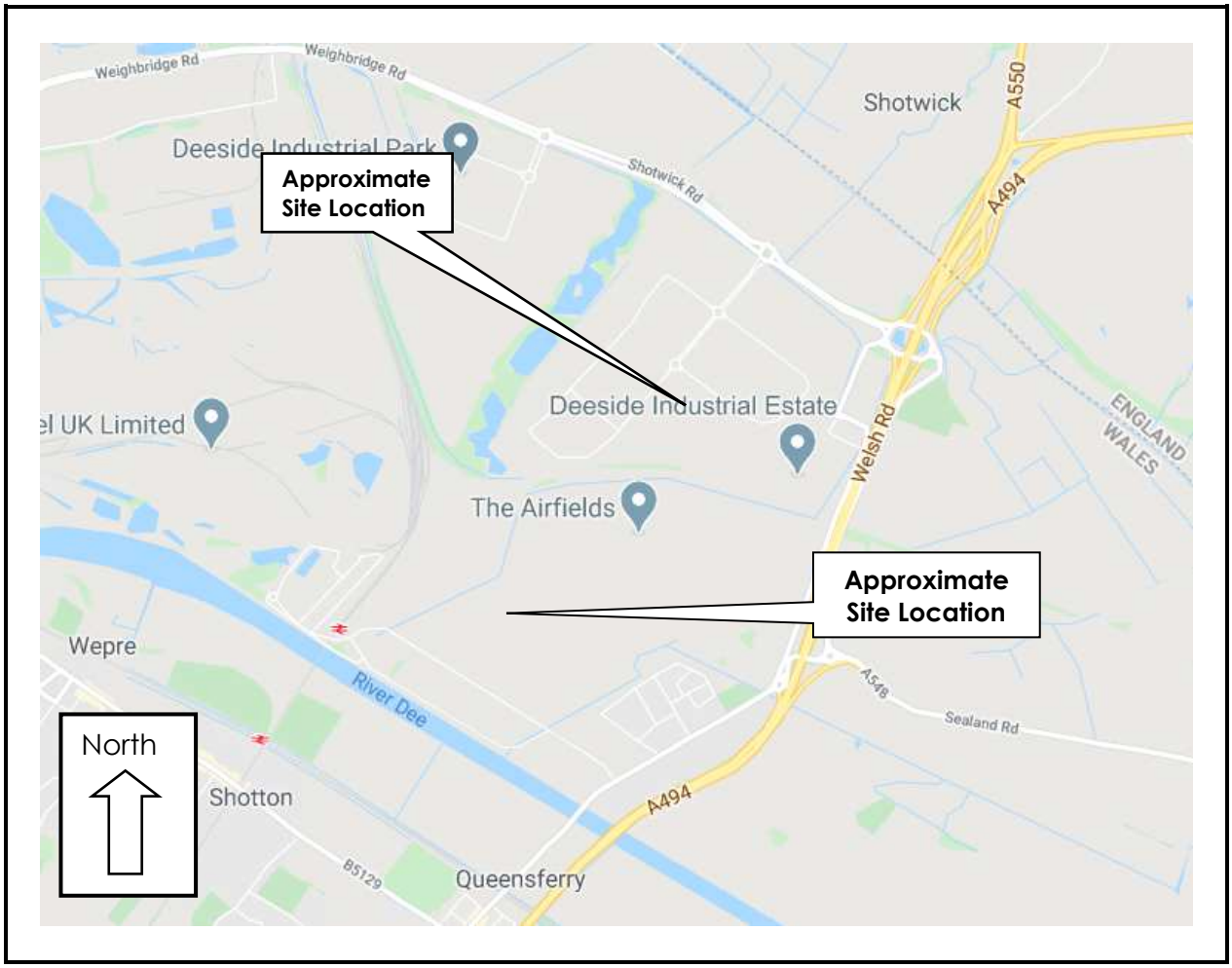


Figure 1 – Site Location Plan	
Site	**Plot D, The Airfields, Deeside**
Client	**Commercial Development Projects Limited**
Job Number	**4671**
Scale	**NTS**

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

DO NOT SCALE

NOTES

LEGEND

- SITE BOUNDARY
- BH101 — JPG AS BUILT CABLE PERCUSSIVE BOREHOLE
- TP117 — JPG AS BUILT TRIAL PIT
- CPT101 — JPG AS BUILT CONE PENETROMETER TEST

NOTE
SURVEY OF BURIED SERVICES CARRIED OUT BY AVOIN MAA SURVEYS (FEB 2020)

EXISTING SHOTWICK BROOK

PLOT D SITE BOUNDARY

BURIED ELECTRICAL SERVICES

SURVEYED TWIN 300mm RISING MAINS (SEWAGE) HIGH PRESSURE PUMPING FROM DEESIDE TO QUEENSFERRY SEWAGE WORKS

TP101 TP102 TP103 TP104 TP105 TP106 TP107 TP108 TP109 TP110 TP111 TP112 TP113 TP114 TP115 TP116 TP117 TP118 TP119 TP120 TP121 TP122 TP123

BH101 BH102 BH103 BH104

CPT101 CPT102

REV	DESCRIPTION	DATE	BY
P03	DRAWING RENAMED TO INCLUDE FIGURE. LEGEND AMENDED.	28.04.20	LSG
P02	CPT LOCATIONS ADDED	02.04.20	LSG
P01	FIRST ISSUE.	25.02.20	LSG

Project
PLOT D
THE AIRFIELDS
DEESIDE

Drawing Title
FIGURE 3: EXPLORATORY HOLE LOCATION PLAN (AS BUILT)

INFORMATION ISSUE

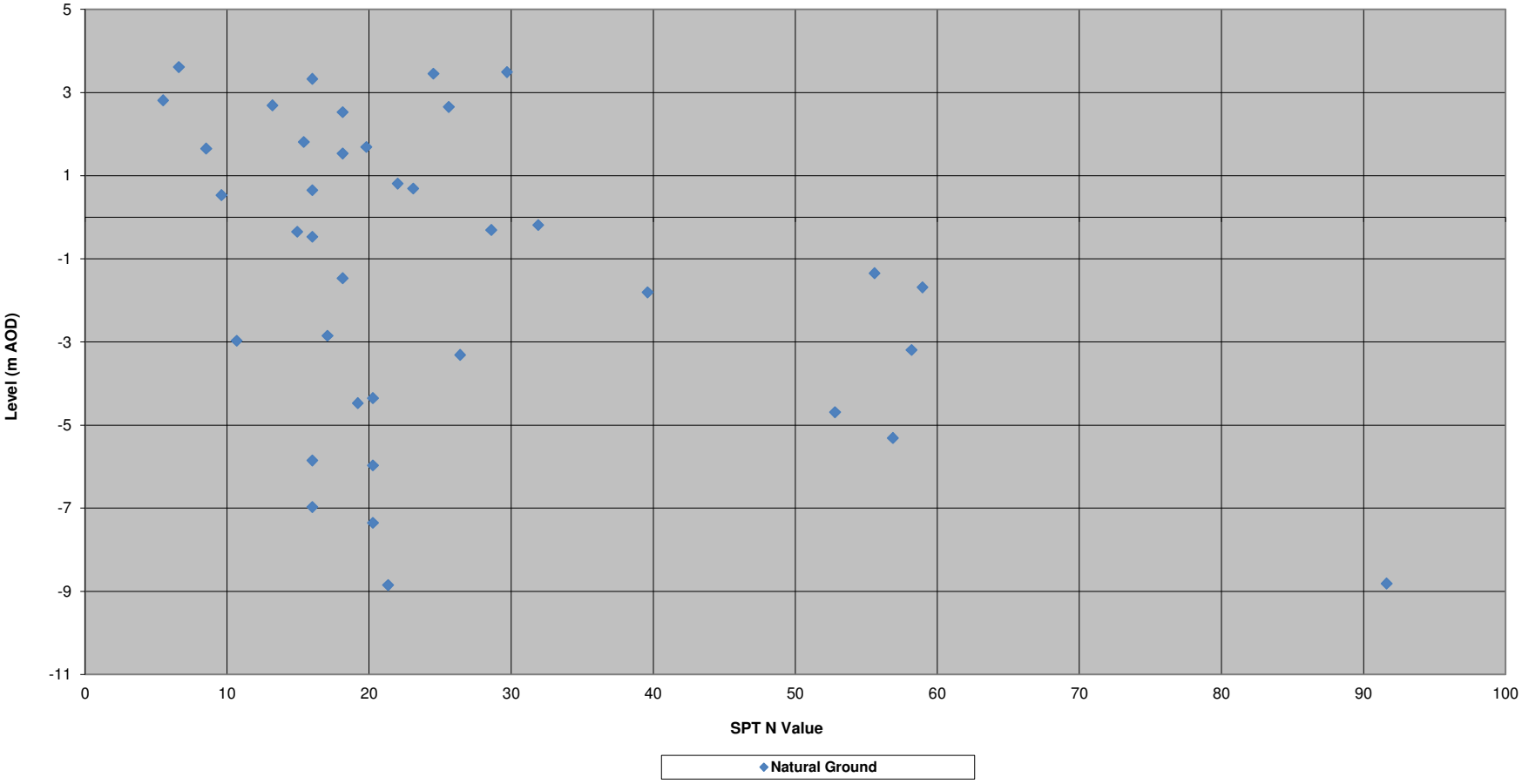
Architect

JPG
www.jpg.group
Leeds London Birmingham 0113 263 1155

JPG Project Ref	Scale at A1	Date	Checked	Drawn
4671	1:1000	25.02.20	RDM	LSG

4671 - JPG - SW - XX - DR - G - 1103 | S2 | P03

Figure 4: SPT N Value vs Level (m AOD)



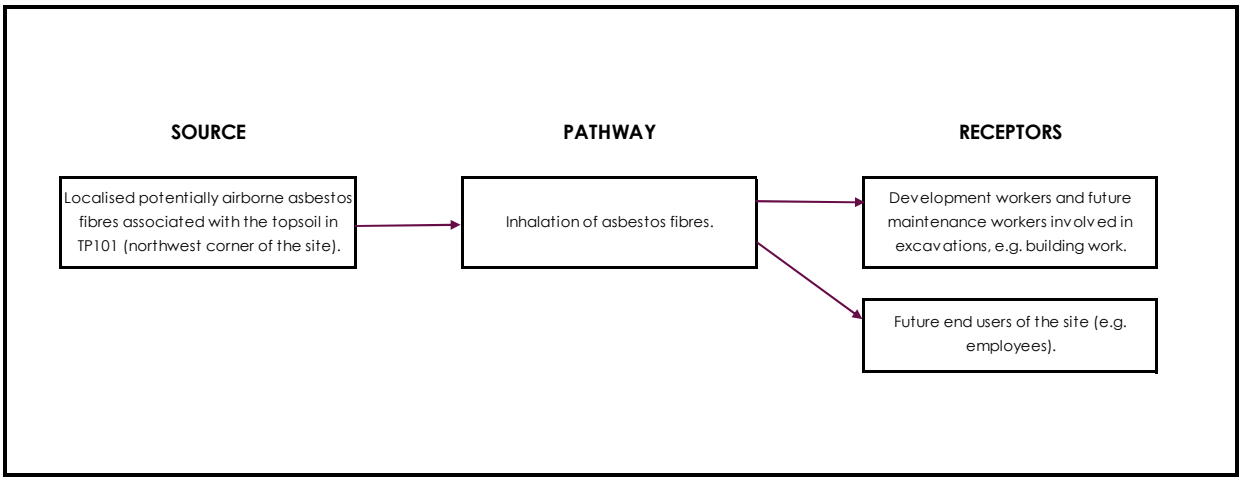
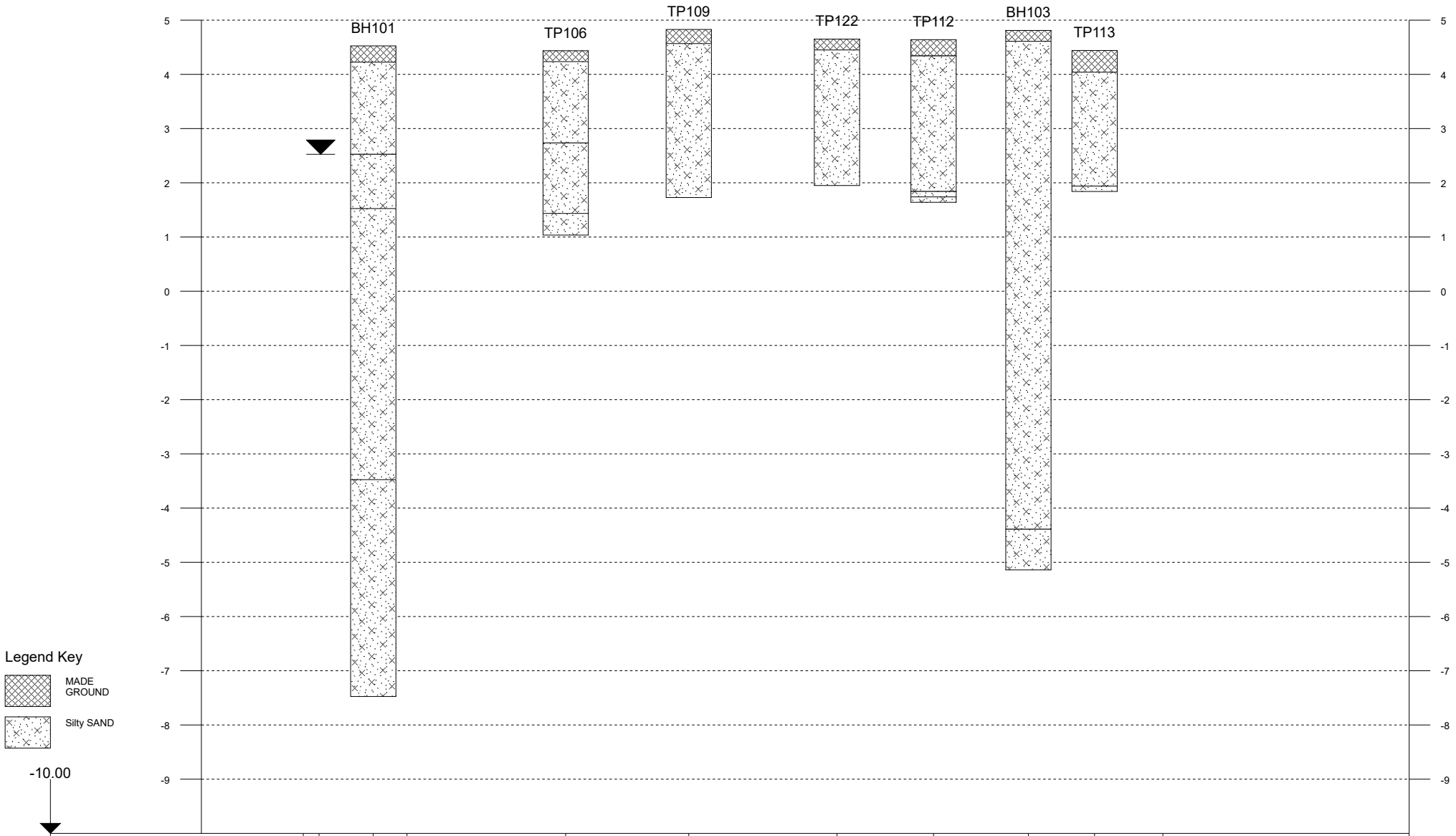


Figure 5 – Conceptual Site Model	
Site	**Plot D, The Airfields, Deeside**
Client	**Commercial Development Projects Limited**
Job Number	**4671**
Scale	**NTS**

Project Id: 4671 - Plot D
Project Title: Airfields Deeside Plot D
Location: Deeside
Client: Praxis Real Estate Management Limited

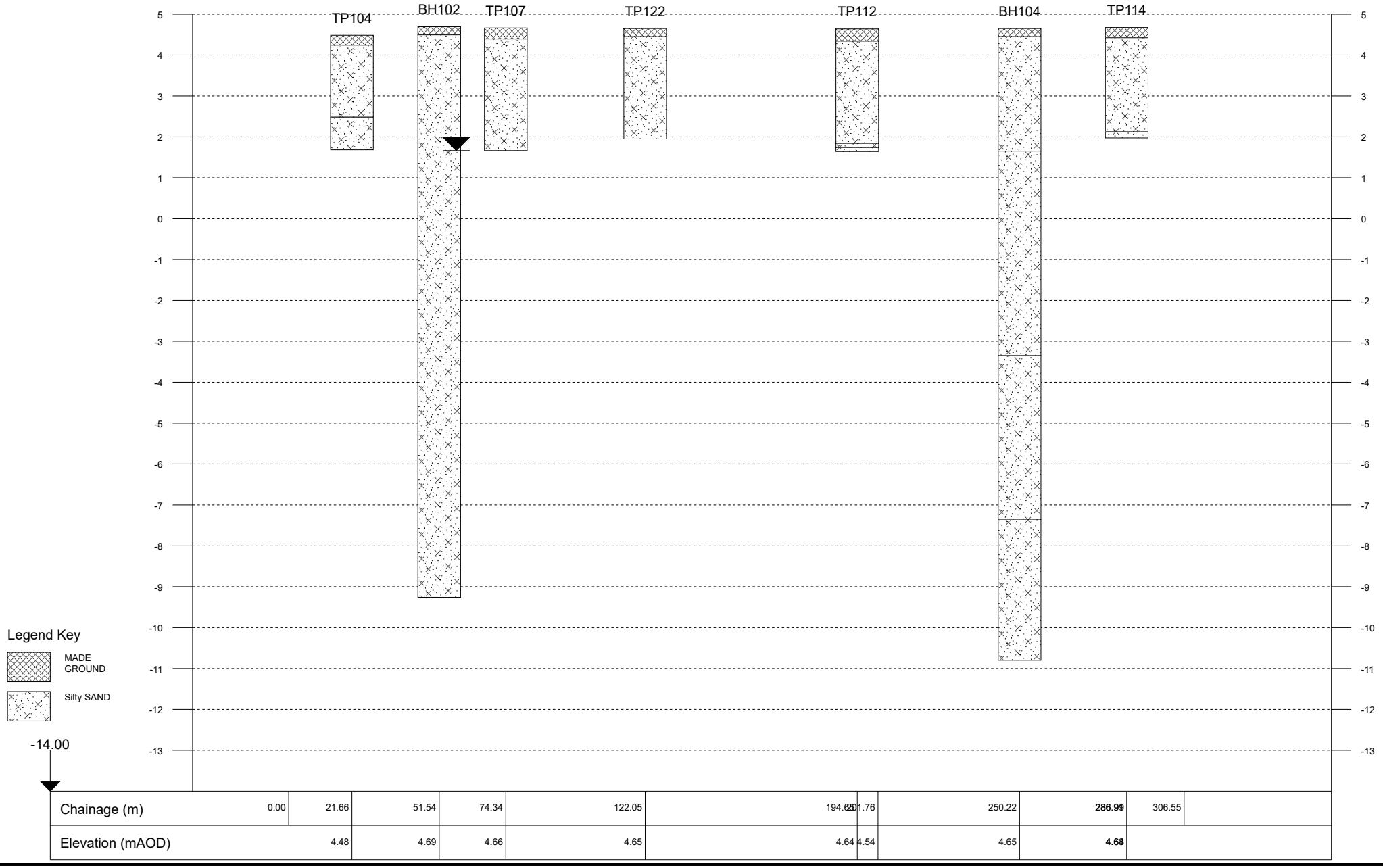
Title: Subsurface Section A-A'
Vertical Scale: 1:100
Horizontal Scale: 1:2500
Engineer: RDM



Chainage (m)	0.00	27	32.27	47.82	121.00	177.76	246.10	290.64	334.38	364.89	396.39
Elevation (mAOD)	4.73		4.53	4.69	4.44	4.83	4.65	4.64	4.81	4.44	

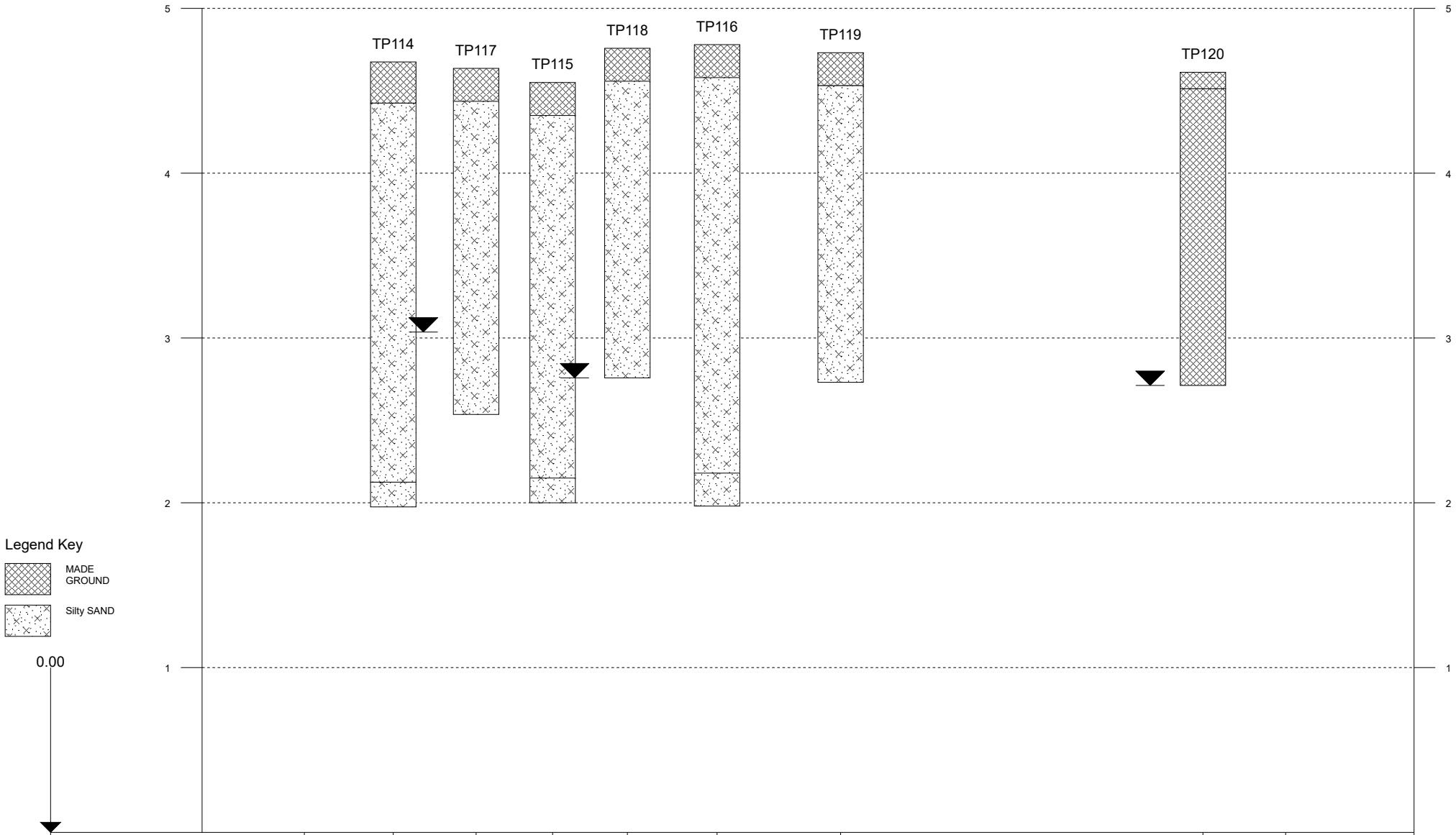
Project Id: 4671 - Plot D
Project Title: Airfields Deeside Plot D
Location: Deeside
Client: Praxis Real Estate Management Limited

Title: Subsurface Section B-B'
Vertical Scale: 1:125
Horizontal Scale: 1:1750
Engineer: RDM



Chainage (m)	0.00	21.66	51.54	74.34	122.05	194.62	201.76	250.22	286.99	306.55
Elevation (mAOD)	4.48	4.69	4.66	4.65	4.64	4.54	4.65	4.68		

Project Id: 4671 - Plot D	Title: Subsurface Section C-C'
Project Title: Airfields Deeside Plot D	Vertical Scale: 1:33
Location: Deeside	Horizontal Scale: 1:2500
Client: Praxis Real Estate Management Limited	Engineer: RDM



Chainage (m)	0.00	40.87	78.94	114.10	148.45	189.67	246.45	412.95	450.95
Elevation (mAOD)		4.68	4.64	4.55	4.76	4.78	4.73	4.61	

Appendix B Exploratory Hole Logs

JPG
5 John Charles Way
Leeds
LS12 6QA

Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331703.72 N369591.73
Project No. : 4671 - Plot D	Crew Name: DMW Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH101	BH	4.53m AoD	DMH	1:50	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30	4.22		MADE GROUND: Soft dark brown sandy CLAY with rootlets. (TOPSOIL).
								Medium dense light brown silty medium to coarse SAND with rare gravel sized shell fragments.
		1.20 - 1.65 1.20	D SPT	N=15 (3,4/5,4,3,3)				
	▼	2.00 - 2.65 2.00	D SPT	N=17 (2,3/4,5,4,4)	2.00	2.52		Medium dense brown slightly silty medium to coarse SAND with occasional gravel sized shell fragments.
		3.00 - 3.45 3.00	B SPT	N=17 (2,3/4,5,4,4)	3.00	1.52		Medium dense grey silty medium to coarse SAND with occasional shells and shell fragments.
		4.00 - 4.45 4.00	D SPT	N=9 (2,2/1,3,3,2)				Becoming Loose.
		5.00 - 5.45 5.00	D SPT	N=15 (4,4/3,3,4,5)				
		6.00 - 6.45 6.00	B SPT	N=17 (2,2/4,4,4,5)				
		8.00	D		8.00	-3.48		Medium dense dark grey silty fine to medium SAND with occasional clay lenses.
		9.00 - 9.45 9.00	B SPT	N=18 (2,4/4,4,5,5)				

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
11.95	200	11.50	200					0.00	11.95	90	

Remarks

Groundwater encountered at 2.00m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

JPG
5 John Charles Way
Leeds
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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331703.72 N369591.73
Project No. : 4671 - Plot D	Crew Name: DMW Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH101	BH	4.53m AoD	DMH	1:50	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.50 - 10.95 10.50	D SPT	N=19 (2,3/4,5,5,5)				Medium dense dark grey silty fine to medium SAND with occasional clay lenses.
		11.50 - 11.95 11.50	D SPT	N=15 (3,3/4,4,4,3)	11.95	-7.42		End of Borehole at 11.95m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
11.95	200	11.50	200					0.00	11.95	90	

Remarks

Groundwater encountered at 2.00m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331873.83 N369644.15
Project No. : 4671 - Plot D	Crew Name: RD Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH102	BH	4.69m AoD	DMH	1:50	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20	4.49		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
								Medium dense light brown, brown and greyish brown slightly silty fine to medium SAND.
		1.20 - 1.65 1.20	D SPT	N=27 (4,5/6,6,7,8)				
		2.00 - 2.45 2.00	D SPT	N=12 (2,3/3,3,3,3)				
		3.00 - 3.45 3.00	D SPT	N=18 (3,3/4,4,4,6)				
		4.00 - 4.45 4.00 - 5.00 4.00	B D SPT	N=21 (3,4/4,5,6,6)				
		5.00 - 5.45 5.00	D SPT	N=26 (4,5/6,6,6,8)				
		6.50 - 6.95 6.50	D SPT	N=36 (6,8/8,9,9,10)				Becoming Dense.
		8.00 - 8.45 8.00	D SPT	N=24 (3,4/5,6,6,7)	8.10	-3.41		Medium dense dark grey silty fine to medium SAND with occasional clay lenses.
		9.00 - 10.00	B					
		9.95 10.00 - 10.45	D D					

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
13.95	200	13.50	200	12.00	13.50	02:00		0.00	13.95	90	

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331873.83 N369644.15
Project No. : 4671 - Plot D	Crew Name: RD Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH102	BH	4.69m AoD	DMH	1:50	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00	SPT	N=50 (10,11/50 for 290mm)				Medium dense dark grey silty fine to medium SAND with occasional clay lenses. Becoming Very Dense.
		11.50 - 11.95 11.50	D SPT	50 (25 for 145mm/50 for 115mm)				
		13.50 - 13.95 13.50	D SPT	50 (8,9/50 for 180mm)				
					13.95	-9.26		End of Borehole at 13.95m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
13.95	200	13.50	200	12.00	13.50	02:00		0.00	13.95	90	

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332003.64 N369554.94
Project No. : 4671 - Plot D	Crew Name: RD Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH103	BH	4.81m AoD	DMH	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20	4.61		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
								Loose grey and brownish grey silty fine to medium SAND.
		1.20 - 1.65 1.20	D SPT	N=6 (1,1/2,1,1,2)				
		2.00 - 2.45 2.00	D SPT	N=5 (1,2/1,1,2,1)				
		3.00 - 3.45 3.00	D SPT	N=14 (3,3/4,2,3,5)	3.00	1.81		Medium dense grey and brownish grey silty fine to medium SAND.
		4.00 - 4.45 4.00	D SPT	N=20 (3,4/5,4,5,6)				
		5.00 - 5.45 5.00	D SPT	N=29 (4,6/7,7,8,7)				
		6.50 - 6.95 6.50	D SPT	N=50 (8,10/50 for 280mm)				Becoming Very Dense.
		8.00 - 8.45 8.00	D SPT	N=52 (6,6/52 for 295mm)				
		9.50 - 9.95 9.50	D SPT	N=48 (6,7/10,11,13,14)	9.20	-4.39		Dense dark grey silty fine to medium SAND with occasional clay lenses.
					9.95	-5.14		End of Borehole at 9.95m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
9.95	200	9.50	200	9.00	9.50	01:30		0.00	9.50	90	

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331937.49 N369455.87
Project No. : 4671 - Plot D	Crew Name: DMW Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH104	BH	4.65m AoD	DMH	1:50	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.00 - 0.20	D		0.20	4.45		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
		0.30 - 0.50	B					Medium dense light brown silty fine to medium SAND.
		1.20 - 1.65	D					
		1.20	SPT	N=23 (4,4/7,5,5,6)				
		2.00	SPT	N=24 (5,5/5,7,6,6)				
		3.00 - 4.00	B					Becoming Grey.
		3.00	SPT	N=8 (2,2/2,2,2,2)				Becoming Loose.
		4.00 - 4.45	D					
		4.00	SPT	N=15 (2,3/2,4,4,5)				
		5.00 - 5.45	D					
		5.00	SPT	N=14 (2,3/3,4,4,3)				
		6.00	SPT	N=50 (5,7/50 for 285mm)				
		7.50 - 7.95	D					
		7.50	SPT	N=16 (1,2/3,4,4,5)				
					8.00	-3.35		Medium dense grey silty fine to medium SAND with occasional lenses of clay and occasional gravel sized shells and shell fragments.
		9.00 - 9.50	B					
		9.00	SPT	N=19 (2,4/5,4,5,5)				

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
15.45	200	15.00	200					0.00	15.45	90	

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Cable Percussion Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331937.49 N369455.87
Project No. : 4671 - Plot D	Crew Name: DMW Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH104	BH	4.65m AoD	DMH	1:50	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.50 - 10.95 10.50	D SPT	N=15 (1,1/2,4,4,5)				Medium dense grey silty fine to medium SAND with occasional lenses of clay and occasional gravel sized shells and shell fragments.
		12.00 - 12.45 12.00	B SPT	N=19 (1,2/4,5,5,5)	12.00	-7.35		Medium dense grey slightly gravelly silty fine to coarse SAND with occasional gravel sized shells and shell fragments.
		13.50	SPT	N=20 (2,3/5,5,5,5)				
					15.45	-10.80		End of Borehole at 15.45m

11 12 13 14 15 16 17 18 19 20

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
15.45	200	15.00	200					0.00	15.45	90	

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331683.27 N369586.60
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP101	TP	4.73m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.27	4.46		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
								Brown slightly silty medium to coarse SAND with occasional gravel sized shell fragments.
								Sand is becoming damp.
					2.50	2.23		End of Trial Pit at 2.50m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331747.61 N369625.42
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP102	TP	4.65m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
					0.30	4.35		Brown slightly silty medium to coarse SAND with occasional gravel sized shells and shell fragments.
		1.00	BB					Sand is becoming damp.
					2.00	2.65		End of Trial Pit at 2.00m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331807.67 N369654.98
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP103	TP	4.35m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES					MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
					0.20	4.15		Brown slightly silty medium to coarse SAND with occasional gravel sized shells and shell fragments.
								Sand is becoming damp.
					2.40	1.95		End of Trial Pit at 2.40m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331875.89 N369676.06
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP104	TP	4.48m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.24	4.24		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
		0.60	BB					Light brown slightly silty fine to coarse SAND with occasional gravel sized shell fragments.
								Sand is becoming damp.
					2.00	2.48		Brown slightly silty medium to coarse SAND with occasional gravel sized shells and shell fragments.
					2.80	1.68		End of Trial Pit at 2.80m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331715.87 N369566.77
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP105	TP	4.69m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.27	4.42		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
		0.40	ES					Light brown slightly silty fine to coarse SAND with occasional gravel sized shell fragments.
	▼				2.60	2.09		Grey slightly silty medium to coarse SAND with occasional gravel sized shell fragments.
					2.75	1.94		Light brown medium to coarse SAND with occasional gravel sized shells and shell fragments.
					3.10	1.59		End of Trial Pit at 3.10m

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4

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

Groundwater was encountered at 2.00m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331791.95 N369582.00
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP106	TP	4.43m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20	4.24		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
								Light brown and brown slightly silty fine to coarse SAND with occasional gravel sized shell fragments.
								Sand is becoming damp.
		1.50	BB					
					1.70	2.74		Brown slightly silty medium to coarse SAND with occasional gravel sized shells and shell fragments.
					3.00	1.44		Grey slightly silty medium to coarse SAND with occasional gravel sized shell fragments.
		3.10	D					
					3.40	1.03		End of Trial Pit at 3.40m

1
2
3
4

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331863.33 N369617.06
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP107	TP	4.66m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.27	4.39		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
		0.50	ES					Light brown and brown slightly silty fine to coarse SAND with occasional gravel sized shells and shell fragments.
	▼				3.00	1.66		End of Trial Pit at 3.00m

1
2
3
4

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

Groundwater was encountered at 3.00m bgl., in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331777.13 N369505.24
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP108	TP	4.56m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15	ES		0.20	4.36		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
		1.25	BB					Light brown and brown slightly silty fine to coarse SAND with occasional gravel sized shells and shell fragments.
								Sand is becoming damp.
					2.90	1.66		End of Trial Pit at 2.90m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331846.55 N369562.82
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP109	TP	4.83m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.26	4.57		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets. (TOPSOIL).
								Light brown and brown slightly silty fine to medium SAND with occasional gravel sized shells and shell fragments.
								Sand is becoming damp.
					3.10	1.73		End of Trial Pit at 3.10m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331968.30 N369599.24
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP110	TP	4.72m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	4.53		MADE GROUND: Soft dark brown slightly sandy CLAY with rootlets. (TOPSOIL).
								Light brown silty medium to coarse SAND with occasional shells.
								Sand is becoming damp.
					2.50	2.22		Dark grey silty medium to coarse SAND.
					2.70	2.02		End of Trial Pit at 2.70m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331814.59 N369471.01
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP111	TP	4.59m AoD	DMH	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.30	ES		0.33	4.26		MADE GROUND: Soft brown slightly sandy silty CLAY with rootlets and rare gravel sized porcelain and ceramic. (TOPSOIL).
					1.30	3.29		Greyish brown, light brown and brown slightly silty fine to medium SAND.
					2.70	1.89		Brown slightly silty fine to medium SAND. Sand is becoming damp.
					3.00	1.59		Grey slightly silty medium to coarse SAND with occasional gravel sized shell fragments.
								End of Trial Pit at 3.00m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable, sides collasping in.	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331954.36 N369519.23
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP112	TP	4.64m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	4.34		MADE GROUND: Soft dark brown slightly silty sandy CLAY with occasional shells and rootlets. (TOPSOIL)
								Light brown silty medium to coarse SAND.
		1.65	BB					Sand is becoming damp.
					2.80	1.84		Dark grey silty medium to coarse SAND.
					2.90	1.74		Light brown silty medium to coarse SAND.
					3.00	1.64		End of Trial Pit at 3.00m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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LS12 6QA

Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332029.13 N369517.59
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP113	TP	4.44m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40 - 2.50	BB		0.40	4.04		MADE GROUND: Soft dark brown slightly silty slightly sandy CLAY with rootlets. (TOPSOIL).
								Light brown silty medium to coarse SAND with occasional shells.
								Sand is becoming damp.
					2.50	1.94		Dark grey silty medium to coarse SAND.
					2.60	1.84		End of Trial Pit at 2.60m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331929.35 N369414.97
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP114	TP	4.68m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.25	ES					MADE GROUND: Soft dark brown slightly gravelly slightly silty sandy CLAY with rootlets. Gravel is fine to coarse angular of brick. (TOPSOIL).
					0.25	4.42		Light brown silty medium to coarse SAND with occasional shells.
								Sand is becoming damp.
		2.55 - 2.70	D		2.55	2.12		Dark grey silty medium to coarse SAND.
					2.70	1.98		End of Trial Pit at 2.70m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331993.66 N369450.01
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP115	TP	4.55m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	4.35		MADE GROUND: Soft dark brown slightly gravelly slightly silty slightly sandy CLAY with rootlets. Gravel is angular, fine to coarse of brick and clay pipe. (TOPSOIL).
								Light brown silty medium to coarse SAND.
		0.90 - 1.00	BB					
								Sand is becoming damp.
					2.40	2.15		Dark grey silty medium to coarse SAND.
					2.55	2.00		End of Trial Pit at 2.55m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332061.78 N369483.04
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP116	TP	4.78m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES					MADE GROUND: Soft dark brown sandy CLAY with rootlets and occasional shells. (TOPSOIL).
					0.20	4.58		Light brown silty medium to coarse SAND with occasional shells.
								Sand is becoming damp.
					2.60	2.18		Dark grey silty medium to coarse SAND with occasional shells.
					2.80	1.98		End of Trial Pit at 2.80m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331966.59 N369426.38
Project No. : 4671 - Plot D	Crew Name: D. Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP117	TP	4.64m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.50	BB		0.20	4.44		MADE GROUND: Soft dark brown slightly gravelly sandy CLAY with rootlets. Pieces of glass encountered. Gravel is angular, fine to coarse of rare mudstone and rare brick. (TOPSOIL).
	▼							Light brown silty medium to coarse SAND with abundant shells.
					2.10	2.54		End of Trial Pit at 2.10m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides stable	None				

Remarks

Groundwater was encountered at 1.60m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332029.35 N369456.58
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP118	TP	4.76m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 1.00	BB		0.20	4.56		MADE GROUND: Soft dark brown slightly gravelly sandy CLAY with rootlets. Gravel is angular, fine to coarse of brick and sandstone. (TOPSOIL).
								Light brown silty medium to coarse SAND.
	▼				2.00	2.76		End of Trial Pit at 2.00m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides stable	None				

Remarks

Groundwater was encountered at 2.00m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332116.42 N369501.67
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP119	TP	4.73m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 1.05	BB		0.20	4.53		MADE GROUND: Soft dark brown sandy CLAY with rootlets. (TOPSOIL).
								Light brown silty medium to coarse SAND with occasional shells.
					2.00	2.73		End of Trial Pit at 2.00m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides stable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E332256.18 N369592.86
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP120	TP	4.61m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.50	BB		0.10	4.51		MADE GROUND: Soft dark brown sandy CLAY with rootlets. (TOPSOIL).
								MADE GROUND: Light brown slightly gravelly silty medium to coarse SAND with medium cobble and low boulder content. Gravel is fine to coarse angular of sandstone, concrete, brick and pieces of an old land drain. Cobbles are angular of brick, concrete and pieces of an old land drain. Boulders are angular of concrete, 0.4x0.35x0.2m.
	▼				1.90	2.71		End of Trial Pit at 1.90m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides stable	None				

Remarks

Groundwater was encountered at 1.90m bgl, in the natural ground. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331930.27 N369641.50
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP121	TP	4.58m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	4.38		MADE GROUND: Soft dark brown sandy CLAY with rootlets. (TOPSOIL).
								Light brown silty medium to coarse SAND with occasional shells.
					2.00	2.58		Dark grey silty medium to coarse SAND.
					2.10	2.48		End of Trial Pit at 2.10m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331918.63 N369584.19
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP122	TP	4.65m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	4.45		MADE GROUND: Soft dark brown sandy CLAY with rootlets (TOPSOIL)
								Light brown silty medium to coarse SAND with occasional shells.
					2.70	1.95		End of Trial Pit at 2.70m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

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Trial Pit Log

Project Name: Airfields Deeside Plot D	Client: Commercial Development Projects Limited	Date:
Location: Deeside	Contractor:	Co-ords: E331891.46 N369492.39
Project No. : 4671 - Plot D	Crew Name: D Morgan	Equipment: 13 Tonne 360 Rubber Tracked Excavator with a 2ft bucket

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP123	TP	4.54m AoD	RDM	1:20	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50 - 0.70	BB		0.20	4.34		MADE GROUND: Soft dark brown sandy CLAY with rootlets. (TOPSOIL).
								Light brown silty medium to coarse SAND with occasional shells.
					2.30	2.24		End of Trial Pit at 2.30m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Sides unstable	None				

Remarks

No groundwater encountered. No visual or olfactory evidence of potential hydrocarbon contamination.

AGS

Appendix C Cone Penetrating Testing Report

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DEESIDE

SOIL INVESTIGATION

CPT REPORT

Cone penetration test
Magnetometer test
Geotechnical data interpretation

Project ref.: P-107422-7




PROJECT:	Deeside

CLIENT:	JPG

FIELDWORK

CPT rig(s)	18.0-tonne rubber-tracked CPT unit (UK8)
Date fieldwork started	23rd March 2020
Date fieldwork completed	23rd March 2020
Lankelma's representative	Paul Dimelow
Client's representative	Rebecca Morgan

REPORT

Status	Revision	Action	Date	Name
Revised	00	**Completed**	01/04/20	Chris Player
		Checked	01/04/20	Emma Stickland
		Approved	01/04/20	Joseph Hobbs
Final	01	**Completed**	29/11/22	Chris Player
		Checked	29/11/22	Emma Stickland
		Approved	29/11/22	Joseph Hobbs

CONTENTS

1 INTRODUCTION

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

Site location:

(In the general region of)

The Airfields
Deeside
CH5 2RD

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, soil descriptions or soil unit boundaries contained in this report.

3 COMPLETED WORKS

- 2 nr. combined magnetometer-cone penetration tests (CPTu) with piezo measurement; and
- Factual report including point data interpretation of selected parameters

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

4 FIELDWORK GENERAL

Fieldwork was performed with an 18.0-tonne rubber-tracked CPT unit (UK8) equipped with a 15-tonne capacity hydraulic ram set.

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

The target depth for the investigation was between 10 m and 15 m below ground level. Table 1 details the final test depths and reasons for test termination (*refusal factor)*. Where penetration refusal was encountered the termination depth was advised to, and agreed with, the Client's on-site representative.

5 CONE PENETRATION TESTS

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

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

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 provided in Appendix B.

The piezometer filter element was in the u_2 position and was vacuum saturated. The pore pressure system was saturated with de-aired 10000 cSt silicone oil.

5.1 GLOSSARY OF CPT TERMS AND SYMBOLS

SYMBOLS & ABBREVIATIONS

q_c :-	**Cone resistance.** The total force acting on the cone Q_c, divided by the projected area of the cone, A_c: $q_c = Q_c/A_c$.
q_t :-	**Corrected tip resistance.** The cone tip resistance q_c corrected for pore water pressure effects on the cone shoulder.
f_s :-	**Friction sleeve resistance.** The total frictional force acting on the friction sleeve, F_s, divided by its surface area A_s: $f_s = F_s/A_s$.
u_2, u_1	**Pore pressure.** Dynamic water pressure measured at the shoulder position (u_2) or cone face (u_1) during penetration or pause in penetration for a dissipation test.
u_0	**Equilibrium pore pressure**
V_s, V_p	**Shear wave velocity, V_s, and pressure wave velocity, V_p.** Measured with use of a seismic receiver.
z	**Depth below ground level.** Depth below ground level as penetration length without correction for inclination or true depth after correction for inclination.
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: $R_f = (f_s/q_c) \cdot 100$
γ	**Unit weight of soil**
ρ	**Volumetric mass density (or specific mass) of soil**
γ_w	**Unit weight of water**

Gs	**Specific gravity of solids**
G	**Shear modulus**
G_0	**Small strain shear modulus**
g	**Gravitational constant:** g = 9.81 m/s^2
σ_v:-	**Total overburden stress**
σ'_v:-	**Effective overburden stress**
σ_{atm}, or, P_a	**Reference atmospheric stress:** σ_{atm} = 100kPa
$q_{t\text{-}net}$:-	**Net cone resistance:** $q_{t\text{-}net} = q_t - \sigma_v$. Where q_t is unavailable q_c is applied.
Q_t :-	**Normalised cone resistance** (Method 1): $Q_t = (q_c - \sigma_v)/\sigma'v$
q_{t1}:-	**Normalised cone resistance** (Method 2): $q_{t1} = (q_t)/(\sigma'_v)^{0.5}$
F_r:-	**Normalised friction sleeve resistance:** $F_r = f_s /(q_c - \sigma_v)$
***I_c*:-**	**Soil Behaviour Type Index**
SBT or SBTn:	**Soil behaviour type classification**
B_q :-	**Pore pressure ratio.** The net pore pressure normalized with respect to the net cone resistance: $B_q = (u_2 - u_0)/(q_t - \sigma_v)$

TERMS

Cone or 'tip': The conical tip 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 sensor (u_2 / u_1)

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

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

Soil behaviour type: Soil classification scheme or classified soil type according to Robertson (1990, 2016) often abbreviated to SBT or SBTn.

5.2 CPT DATA REDUCTION AND PRESENTATION

The CPT results are presented in Appendix C. The corrected cone resistance (q_t), local side friction (f_s), dynamic pore water pressure (u_2), friction ratio (R_f) and inclination are all presented against depth and elevation in accordance BS ISO 22476-1:2012. CPT data and the associated derived geotechnical parameters are included in the AGS 3.1 and 4.0 data files provided.

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

For piezocone tests the corrected tip resistance was calculated according to the formula:

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

Where a is the 'area ratio' and (1- a) is the proportion of cross-sectional area between the cone tip and 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 percentage adjustment is described by the curves in the following chart for alpha factor of 0.8:

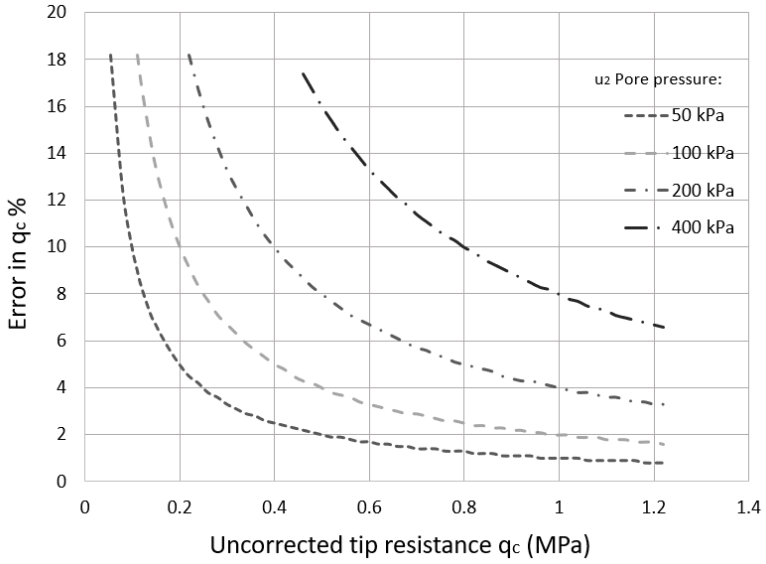

Figure 5-1 Uncorrected tip with measured tip resistance

Penetration length readings were corrected for inclination and sleeve readings were depth corrected for the dimensional offset between cone tip and sleeve during post processing. 'Rod spikes', artefacts of the pause for push rod addition, were filtered from the cone tip and sleeve data. The data was re-sampled from 10 mm resolution to 20 mm to reduce the size of the data set to a more manageable size for end users. A 20 mm resolution is well within the intrinsic influence zone of the cone tip measurement and the loss of meaningful resolution is negligible.

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

Geotechnical parameters appropriate for drained and undrained cone penetration conditions were derived for corresponding drained and undrained derived soil behaviour types (SBTs) respectively, however, to account for uncertainty in the SBT correlation with drainage behaviour, all parameters were derived over a range of transitional soils within the range 2.4 < *Ic* < 2.7 (see section 6.3).

In general, the engineering parameters derived are intended for non-cemented predominantly silicate soils.

5.3 IN-SITU STRESS CONDITIONS

An estimate of the vertical in-situ stress states is necessary as they are applied in many derived parameters obtained from the CPT and dissipation test.

The total vertical stress with depth was calculated as the sum of the calculated soil unit weight above a given depth. See section **Error! Reference source not found.** for information on the empirical estimate of soil unit weight.

The depth of the principal phreatic surface, or groundwater table, was estimated for each location based on interpretation of piezocone measurements in drained soils.

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 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 will be applied if they are observed from the measurements and are sufficiently well defined.

5.4 SOIL UNIT WEIGHT

The soil unit weight was estimated using the following method proposed by Robertson (2010).

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

Throughout pre-drilled zones (inspection pits or drill-out) the soil unit weight was assumed as 18 kN/m^3.

For depths where the friction sleeve measurement falls below zero, the friction sleeve was substituted with an artificial nominal 1.0 kPa resistance for the purpose of obtaining an approximate soil unit weight necessary for estimation of total vertical stress over the entire profile.

5.5 SOIL BEHAVIOUR TYPE

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

While the classification based on normalised parameters is considered more accurate, particularly at depths exceeding 15-20 m, the classification is often significantly in error (artificially granular/drained) at very shallow depth (< 1-3 m). The error at shallow depth is associated with the potentially large difference between the estimated vertical effective stress (applied in normalisation) and the unknown horizontal stress influencing penetration resistance.

Robertson (2010) proposed a non-normalised version of the 1990 chart which uses dimensionless cone resistance (q_c/Pa) and friction ratio, Rf. The classification according to this chart can be more reliable at shallow depth and has been plotted as an approximate SBT index (discussed below) for comparison to the normalised classification.

The SBT chart is provided in Appendix B – *General Information,* titled 'CPT Soil Behaviour Type Chart'.

It should be noted that the SBT classification provides the general soil 'type' which typically provides a similar CPT measurement range of q_c and f_s. Correspondingly, it will also show biased towards the soil fraction that dominates the mechanical behaviour. While the repeatability and behavioural bias of the SBT is usually beneficial, the classification is not always an appropriate substitute for classification based on grain-size distribution.

The results are presented in Appendix D.

5.6 SOIL BEHAVIOUR TYPE INDEX - I_C

The main trend in soil behaviour type (SBT) variation can be expressed by a continuous index, I_C, proposed by Robertson and Wride (1998) based on a similar index proposed by Jefferies and Davies (1993). The index provides a continuous profile of SBT variation with depth for end-user analysis of soil units and variation within units.

The equivalent non-normalised version, as proposed by Robertson (2010), is provided for comparison.

The basis of I_c and its approximation of the original chart classification zones may be seen from Appendix B figure 'CPT Soil Behaviour Type Chart'. The method does not identify zones 1 (*sensitive fine grained)* and zones 8 & 9 (*overconsolidated or cemented*).

Normalised SBT index I_C (Robertson and Wride, 1998)*:*

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

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

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

The results are presented in Appendix D.

5.7 RELATIVE DENSITY

The relative density of sands was calculated based on an empirical relationship proposed by Jamiolkowski *et al.* (2001) based on a large database of undisturbed frozen samples and calibration chamber tests. The expected accuracy may be evaluated from the figures presented below.

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

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.

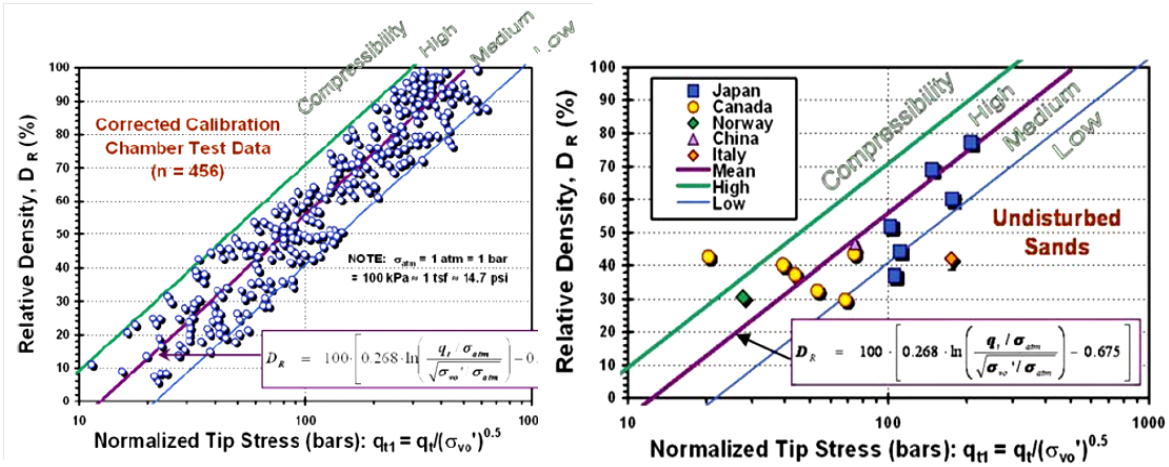

Figure 5-2 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

The results are presented in Appendix E- *Standard interpretation results (set 2)*.

5.8 UNDRAINED SHEAR STRENGTH

The 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 which varies with soil type, stress history, structure/fabric, plasticity and the mode of shearing.

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 B_q, applicable for B_q values of > -0.01. The following equation proposed by Mayne and Peuchen is based on the same database evaluation:

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

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

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

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

The estimate based on B_q is presented as 's_u5' on the parameter plots and is only suitable for tests that have a high-quality pore pressure data, often indicated by a positive, repeatable and dynamic response. 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 a N_k factor that has been established using the corrected tip resistance q_t. N_{kt} can be applied to the uncorrected tip resistance q_c (non-piezocone tests) but results in a slightly lower estimate of s_u depending on the correction magnitude (q_c - q_t) in lower strength soils.

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

5.9 OVERCONSOLIDATION RATIO

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

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

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

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

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

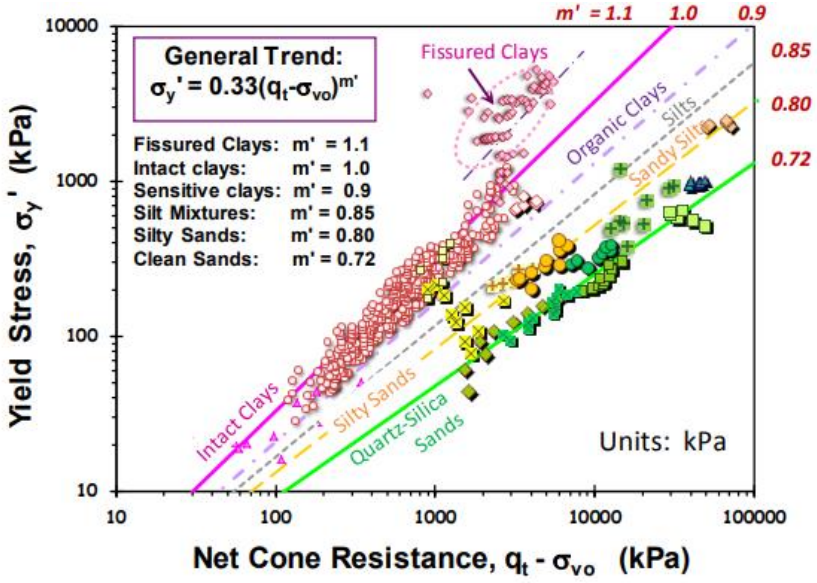

Figure 5-3 Preconsolidation stress with net cone resistance power law, reproduced from Mayne (2014).

An additional σ_p' and OCR was calculated for m' = 1.1 to reflect the upper trend for over consolidated fissured clays not captured by the soil behaviour type index I_c

5.10 SPT N60 VALUES

Equivalent SPT N60 values, defined as the non-normalised SPT blow count over a 30 cm interval, were derived for two correlations and are presented together in the results section for comparison.

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

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

Method 2 - Robertson (2012)

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

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

The results are presented in Appendix D.

5.11 FRICTION ANGLE

Sands

The peak friction angle of granular materials was 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:

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

Where:

ϕ' = Peak friction angle (degrees)

q_{t1} = stress normalised cone resistance =

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

The presence of compressible minerals tends to reduce tip resistance resulting in lower estimate of friction angle, while very coarse (sand) or larger grain size tends to increase tip resistance resulting in higher estimate. High k_0 values will also result in an overestimate of friction angle.

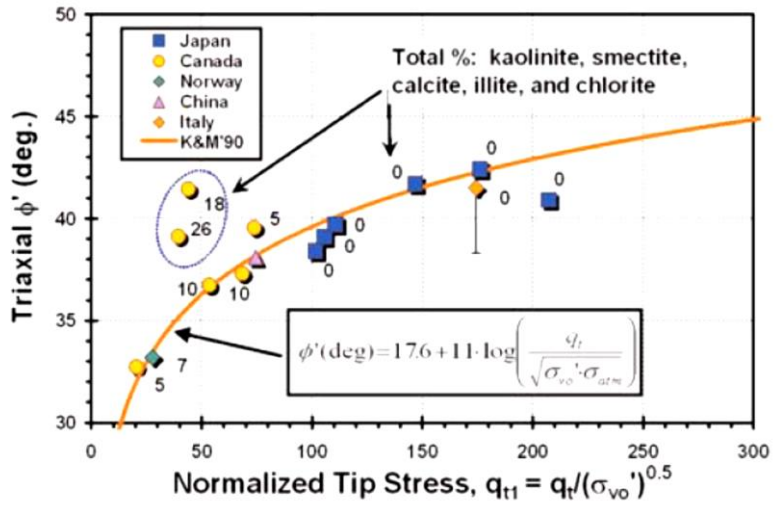

Figure 5-4 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

Fine grained soils

The effective friction angle for fine grained soils was calculated based on the Senneset *et al.* (1988, 1989) method by applying the approximate closed form 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° < ϕ′< 45°and generally appropriate for non-cemented NC-LOC soils.

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

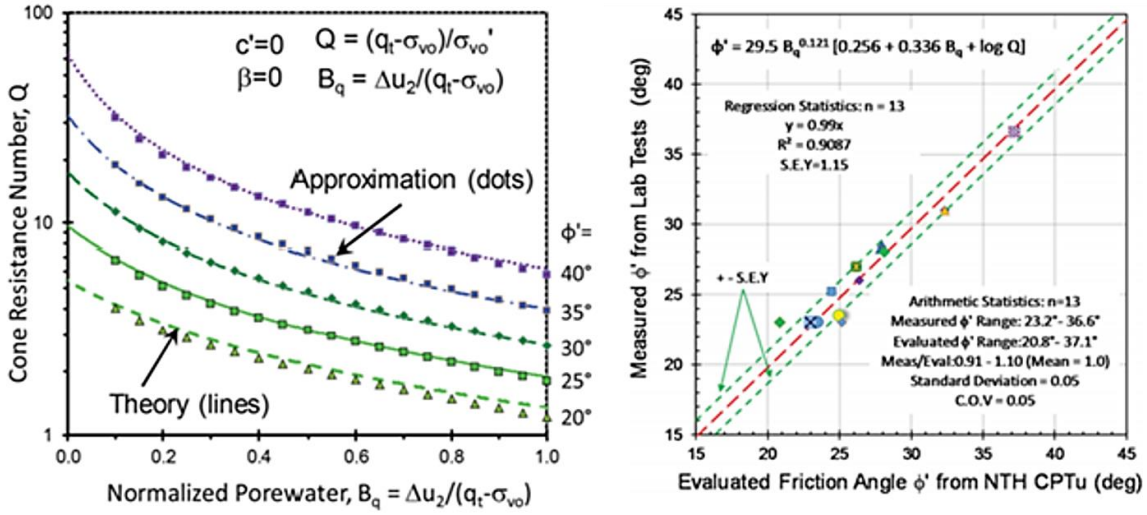

Figure 5-5 [Left] Theoretical curves with function approximation (dots) overlay [Right] calibration data from geotechnical centrifuge tests for a variety of soils. Redrawn from Ouyang & Mayne (2018).

The results are presented in Appendix E.

5.12 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.

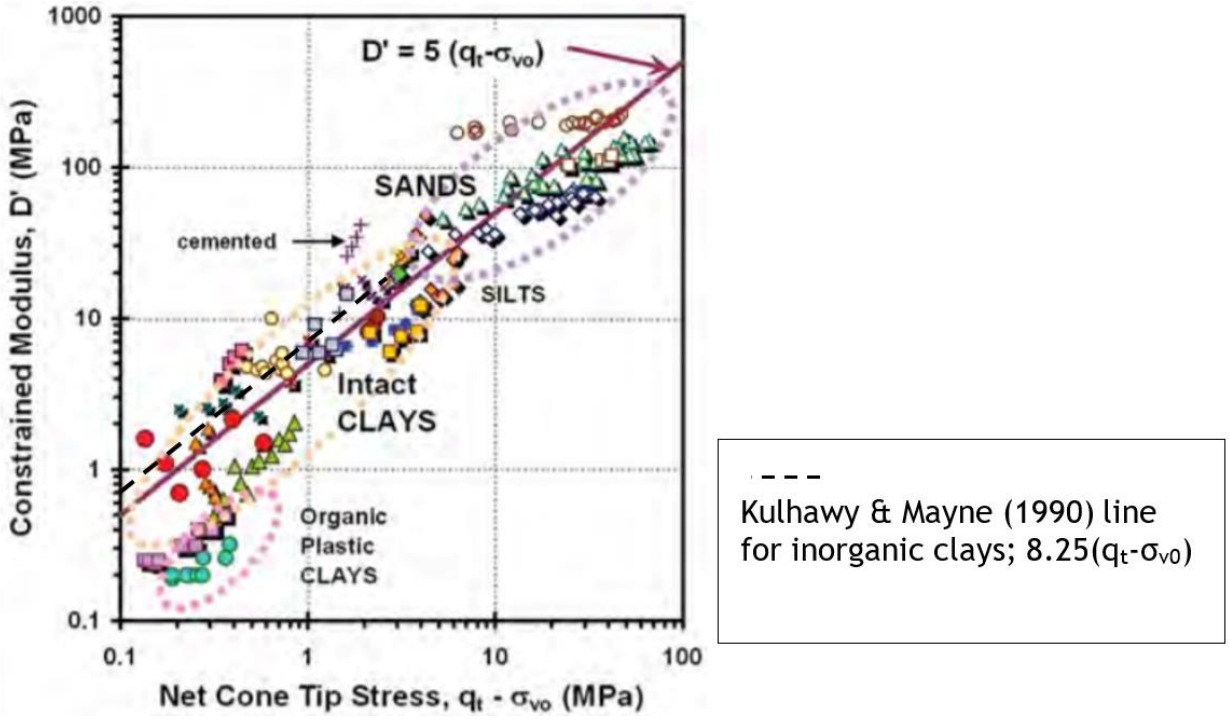

Figure 5-6 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

The results are presented in Appendix D.

5.13 YOUNG'S MODULUS

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

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

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

The method described by Robertson may be adapted to estimate E' for loading at different percentages of yield stress.

The results are presented in Appendix E.

6 CPT INTERPRETATION NOTES

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

DRAINED AND UNDRAINED SOIL BEHAVIOUR

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

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

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

DYNAMIC PORE PRESSURE (CPTu)

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

If the system becomes desaturated it may or may not re-saturate at higher excess pressures later in the test. 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 u_2 position is likely to be significantly lower than the equivalent corrected tip resistance depending on the magnitude of excess pore pressure generated during penetration.

CONE TIP AND SLEEVE OFFSET

The accuracy of the SBT over thin layers and at layer boundaries is sensitive to offset error in the friction ratio often resulting in sharp peaks or troughs at boundaries. The friction ratio is often inaccurate in heavily disturbed soils with a 'blocky' macro fabric.

FRICTION SLEEVE DATA

There are two common causes of artificially low or negative friction sleeve measurement; 1) Sudden unequal pore pressure effects at strata boundaries often resulting in a negative spike and 2) very sensitive soils where the measured resistance falls to zero or lower due to instrument limitations or temperature effects. The latter can often be mitigated by temperature stabilisation during the test and at the time of zero output measurement.

CONE TYPE

The reference cone type has a 10 cm^2 projected cone tip area and 150 cm^2 friction sleeve area, however it is common to use the larger 15 cm^2 cone with 225 cm^2 friction sleeve area for improved sensitivity and penetration depth potential. Use of the 15 cm^2 cone will produce more pronounced transitions zones and thin layer effects (larger 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 mobilisation of the true soil stiffness. These should be cautiously ignored in assessment of soil behaviour type and parameter evaluation. Where the stiff layer is thin (<~0.75 m) mobilised resistance may be significantly less than that of an equivalent thick layer. The effect for thin low stiffness layers is less significant. Procedures for thin-layer effect correction are provided by Robertson and Wride (1998).

GRAVELS

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

7 MAGNETOMETER TESTING

A combined CPT/magnetometer was used at prescribed locations 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 magnetometer data was reviewed in real-time.

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

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APPENDICES

APPENDIX A SUMMARY TABLES

Table 1 CPT 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)	Refusal factor	Easting	Northing	Elevation (m)	Date of test	Remarks
CPT01	15.06	S15-CFIP.1493	UK8		Target depth				23/03/2020	Intermittent inclination data loss
CPT02	10.20	S15-CFIP.1493	UK8		Total reaction force				23/03/2020	

CPT test plots are presented in Appendix C.

APPENDIX B GENERAL INFORMATION

LIST OF FIGURES

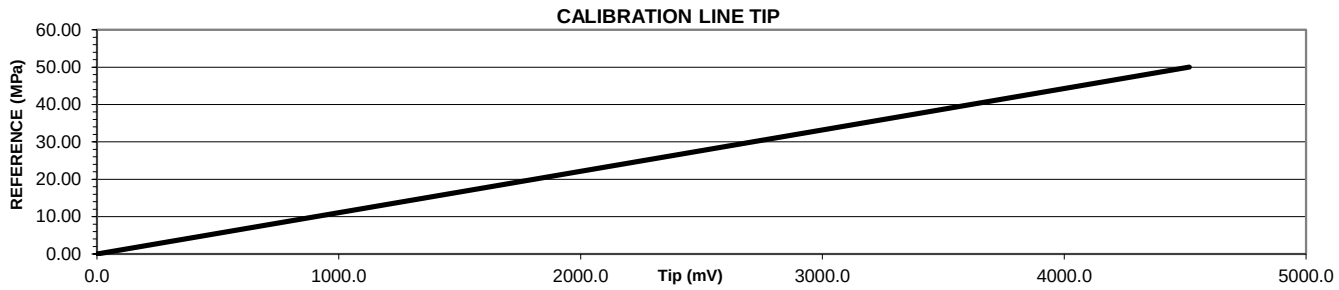
LANKELMA

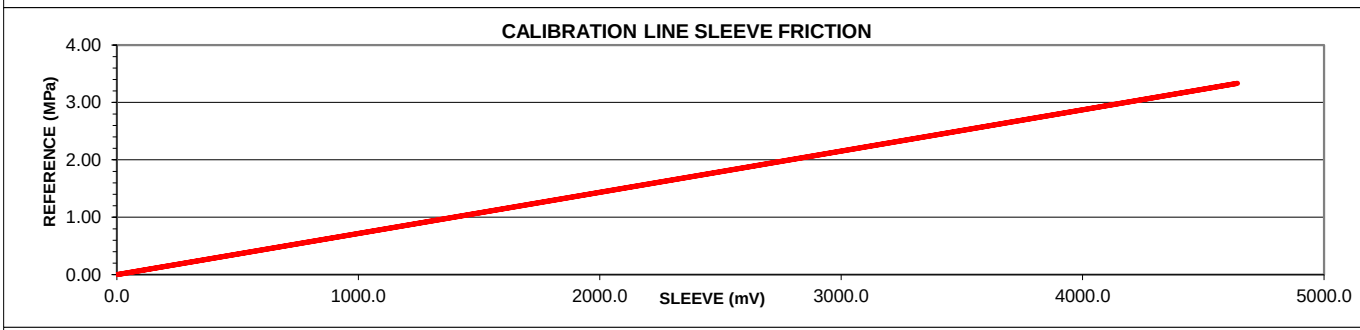
CALIBRATION CERTIFICATE

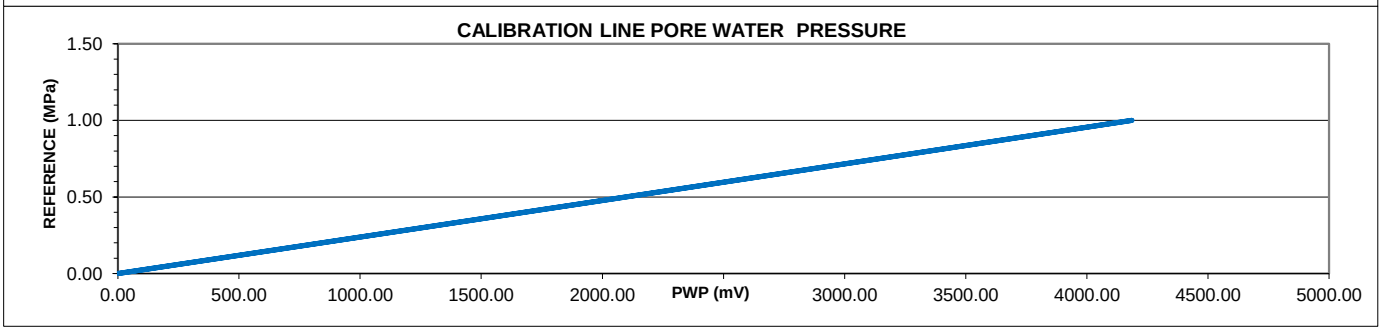
Geopoint-S15-150kN-2MPa

Cone Serial Number: S15-CFIIP.1493

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 (±%)	0.01	0.01	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)	90.35	1392.49	4186.19
Calibration file scaling factor:			
Nominal cal force (kN, kN, BAR)	75	75	10
Calibration number (mV)	4518	4642	4186
Zero point (mV)	311	338	37
Sensitivity (mV/kN, mV/kN, mV/BAR)	60.234	61.888	418.619
Inclination factors (mV)	X -20°= XXX, 0°= XXX, 20°= XXX / Y -20°= XXX, 0°= XXX, 20°= XXX		
Measured alpha factor:	0.80		
Uncertainty (%):			
Reproducibility	0.02	0.01	0.02
Linearity	0.04	0.05	0.06
Hysteresis	0.09	0.09	0.07
Combined expanded (k=2)	0.19	0.37	0.19
Application class	1	1	1







Instrument:	**S15-150kN**	**Location:**	**Lankelma Calibration Laboratory**
Serial Number:	**S15-CFIIP.1493**	**Temperature(° C)**	**17.8**
Manufacturer:	**Geopoint**	**Calibration Engineer**	**ed f. white**
Date of calibration:	**17/01/2020**	**Calibration Expiry**	**16/04/2020**

Calibration signed and dated by:	Calibration checked and dated by:
Ed F. White	AN Harman

UK8
Tracked crawler

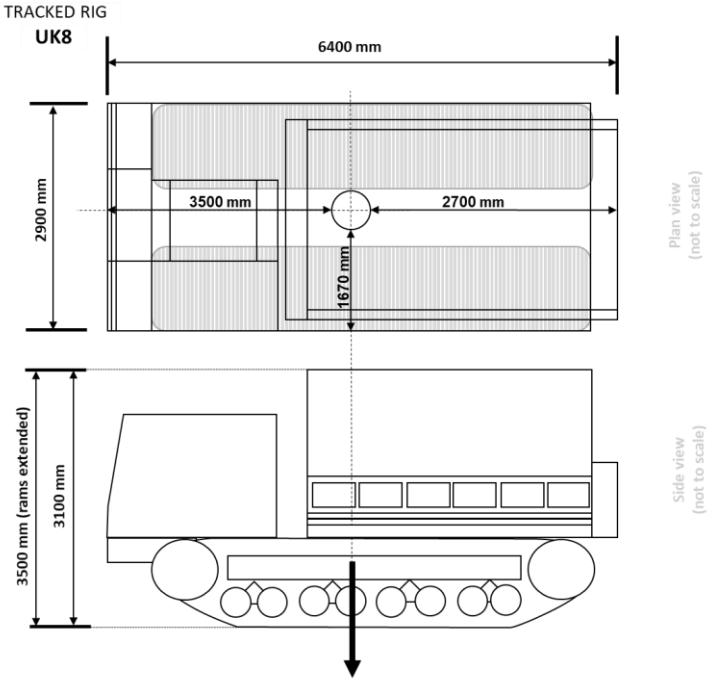
Rig weight	18.5 T
Max. operating ram capacity	15 T
Max. travelling speed	15 km/h
Track material	Rubber
Track length	3.40 m
Track width	0.75 m
Max. ground clearance on jacks	0.21 m
Max. ground bearing pressure	Tracking/pushing – 35 kPa Pulling – 63 kPa
Max. testing gradient	Flat – no self levelling
Max. traversing gradient	35 degrees (operator assessed)
Noise output at 2 m	Testing – 74 dBA Driving – 95 dBA
Clamp arrangement	36/55 push-pull clamp
Ram stroke	0.70 m
Max. casing size	55 mm
Fuel type	Biodegradable diesel
Typical production	100m+ of standard CPTu testing per day (depending on site conditions and access)

The low ground bearing pressures, large footprint and high ground clearance of our ‘bogskipper’ tracked crawler makes it perfect for working on sites with boggy or very soft ground conditions.

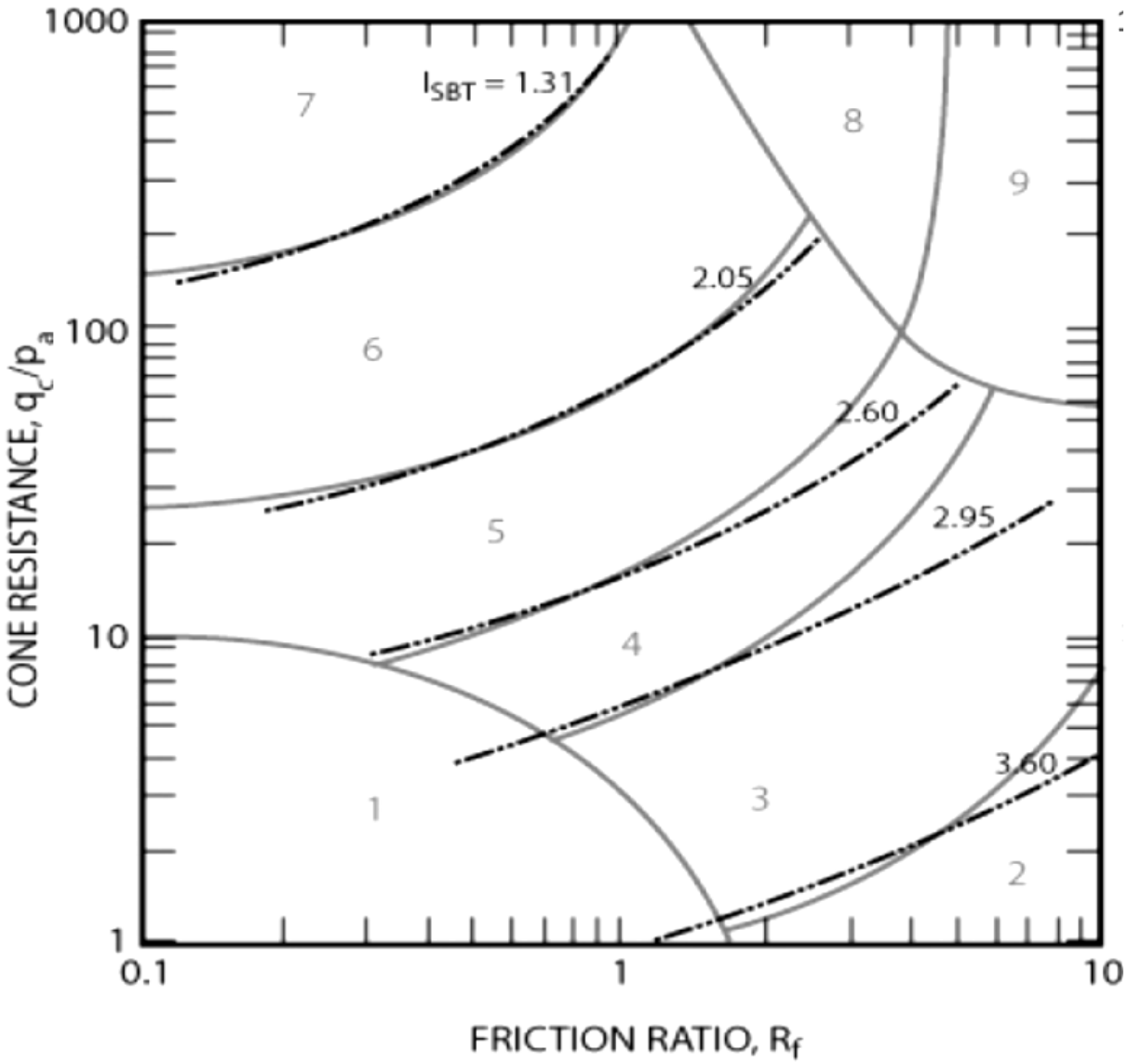
This unique rig has experience working on intertidal projects, peat bogs and weight-sensitive sites.

The rubber tracks minimize the potential for any damage to delicate infrastructure, such as a sea wall.

Biodegradable diesel and hydraulic oil for working on environmentally sensitive sites.



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 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	*Heavily overconsolidated or cemented	

APPENDIX C CONE PENETRATION TEST RESULTS

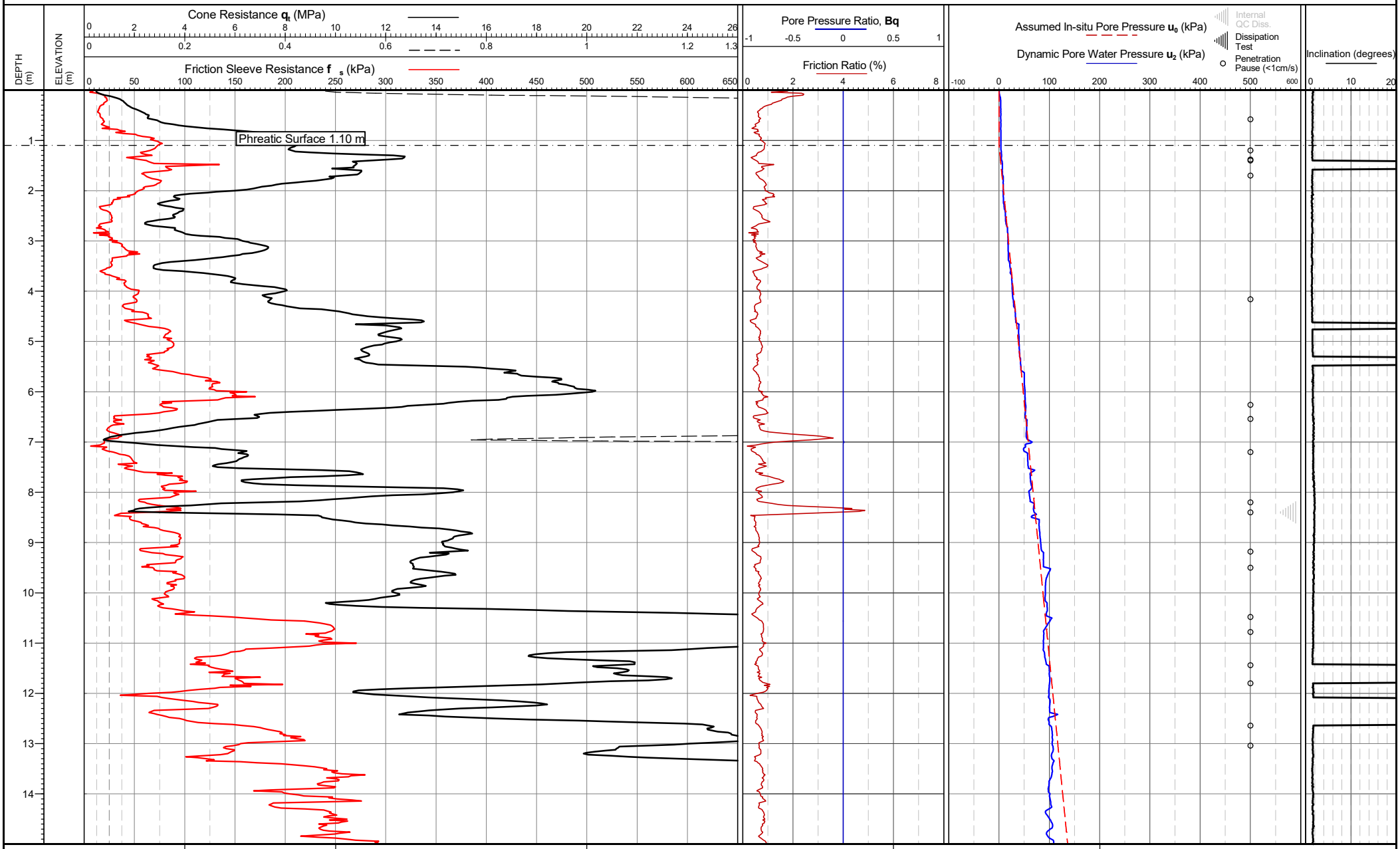
RAW DATA PLOTS

LIST OF FIGURES:

LANKELMA

Project: DEESIDE

Client: JPG GROUP

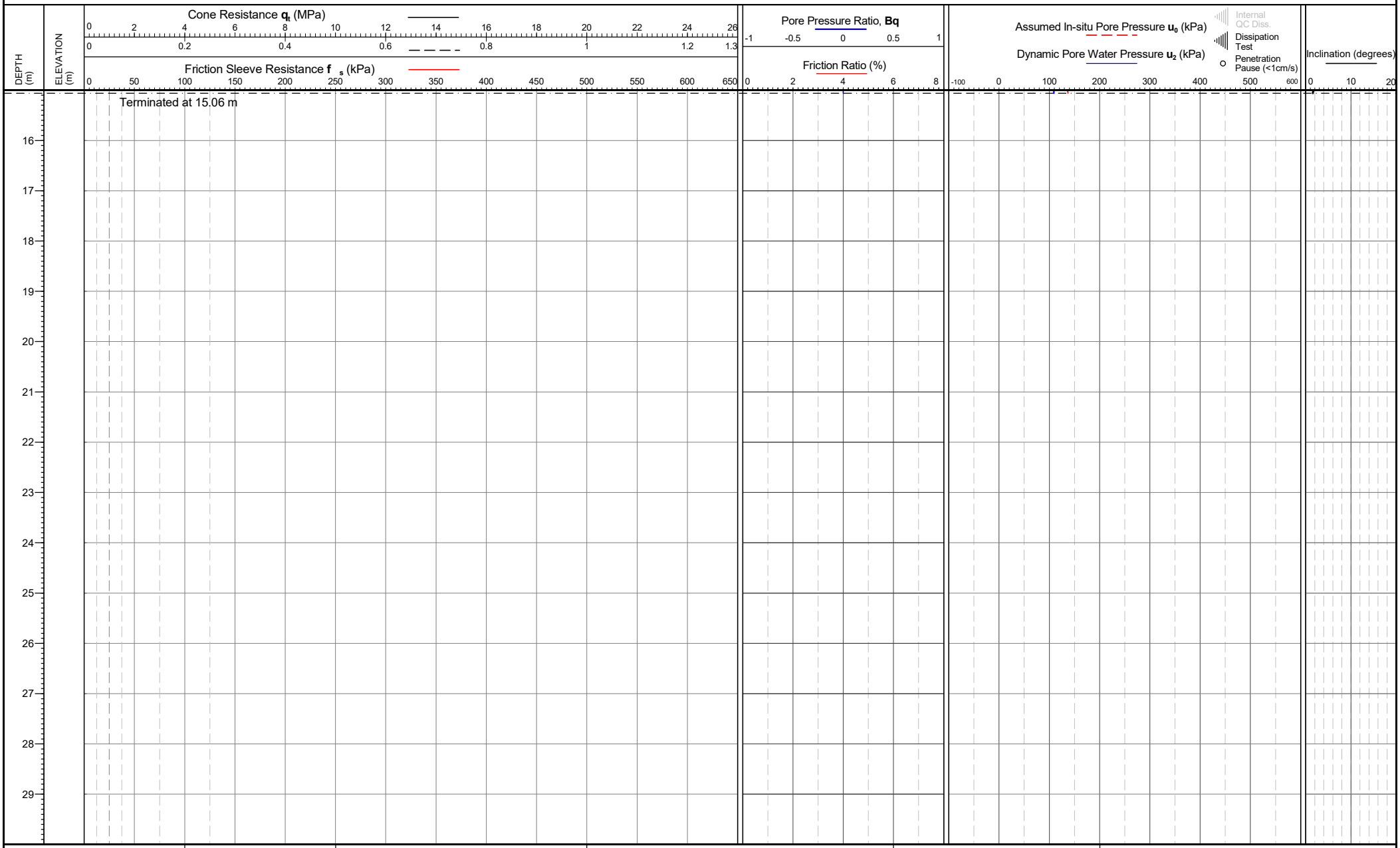


Cone area (mm2):1500 Cone ID: S15-CFIP.1493 Operator: Jamie Butterworth Rig Used: UK8 Date of test: 23/03/2020 11:10:00	Zero drift (Pre/post test) q_c (kPa): 22.1 f_s (kPa): -0.8 ($f_{s\,drift}$ - $q_{c\,drift}$) U_2 (kPa): 2.6	Location: North Wales, UK Coordinates: , Elevation: Coordinate system:	Remarks: Intermittent inclination data loss. *Phreatic surface origin: Estimate from u2 piezo data Termination Remark: Target depth	Date of plot: 01-04-20 Checked by: Chris Player	Lankelma Project Ref: P-107422-7

TEST ID: CPT01

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
Cone ID: S15-CFIP.1493
Operator: Jamie Butterworth
Rig Used: UK8
Date of test: 23/03/2020 11:10:00

Zero drift (Pre/post test)
q_c (kPa): 22.1
f_s (kPa): -0.8 ($f_{s\ drift}$ - $q_{c\ drift}$)
U_2 (kPa): 2.6

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
Intermittent inclination data loss. *Phreatic surface origin: Estimate from u2 piezo data

Termination Remark: Target depth

Date of plot: 01-04-20

Lankelma Project Ref: P-107422-7

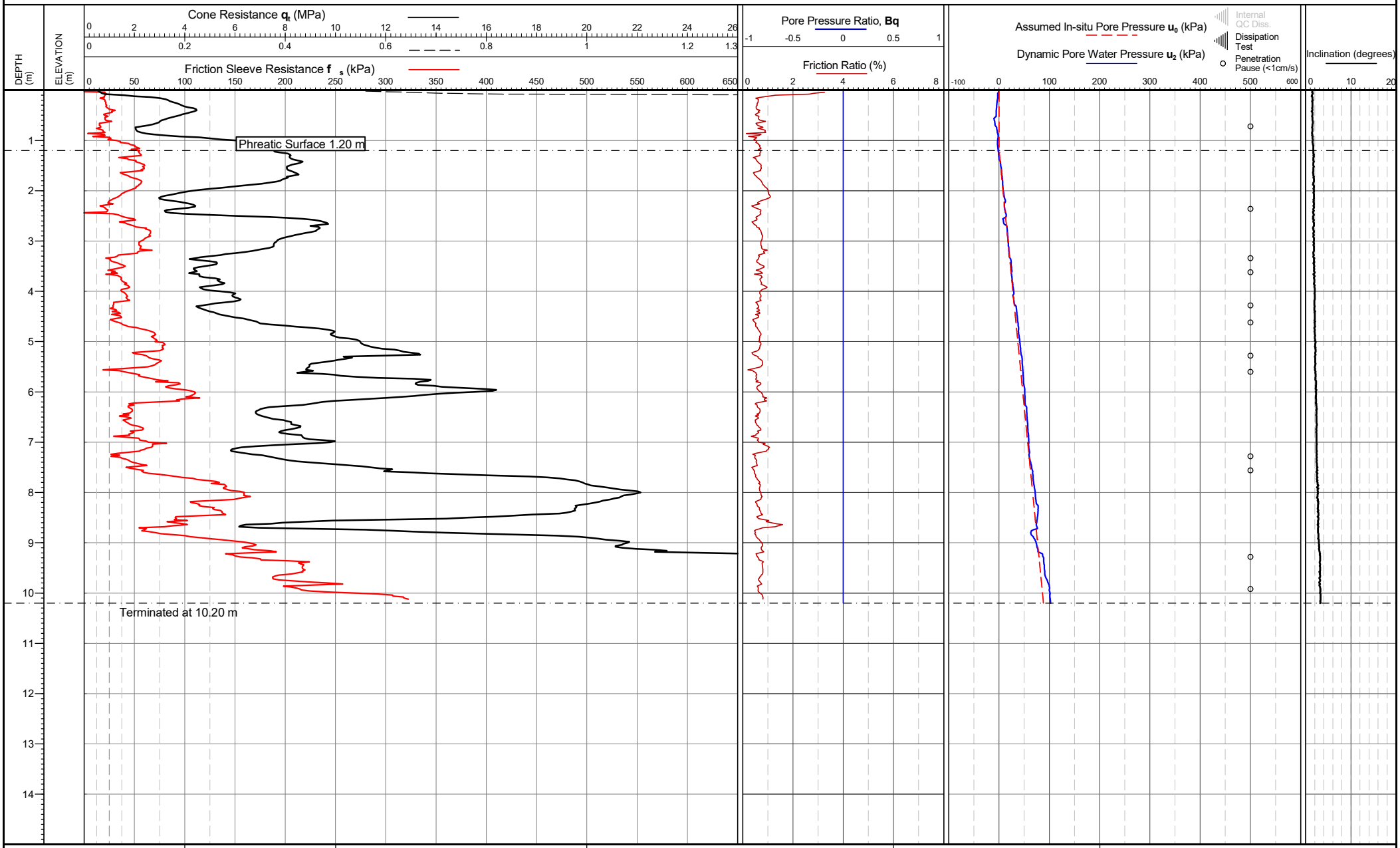
Checked by: Chris Player

TEST ID: CPT01

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500 Cone ID: S15-CFIP.1493 Operator: Jamie Butterworth Rig Used: UK8 Date of test: 23/03/2020 12:15:00	Zero drift (Pre/post test) q_c (kPa): 11.1 f_s (kPa): -2.9 ($f_{s\,drift}$ - $q_{c\,drift}$) U_2 (kPa): 0.5	Location: North Wales, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Estimate from u2 piezo data Termination Remark: Total reaction force	Date of plot: 01-04-20 Checked by: Chris Player	Lankelma Project Ref: P-107422-7

TEST ID: CPT02

APPENDIX D STANDARD INTERPRETATION RESULTS - SET 1

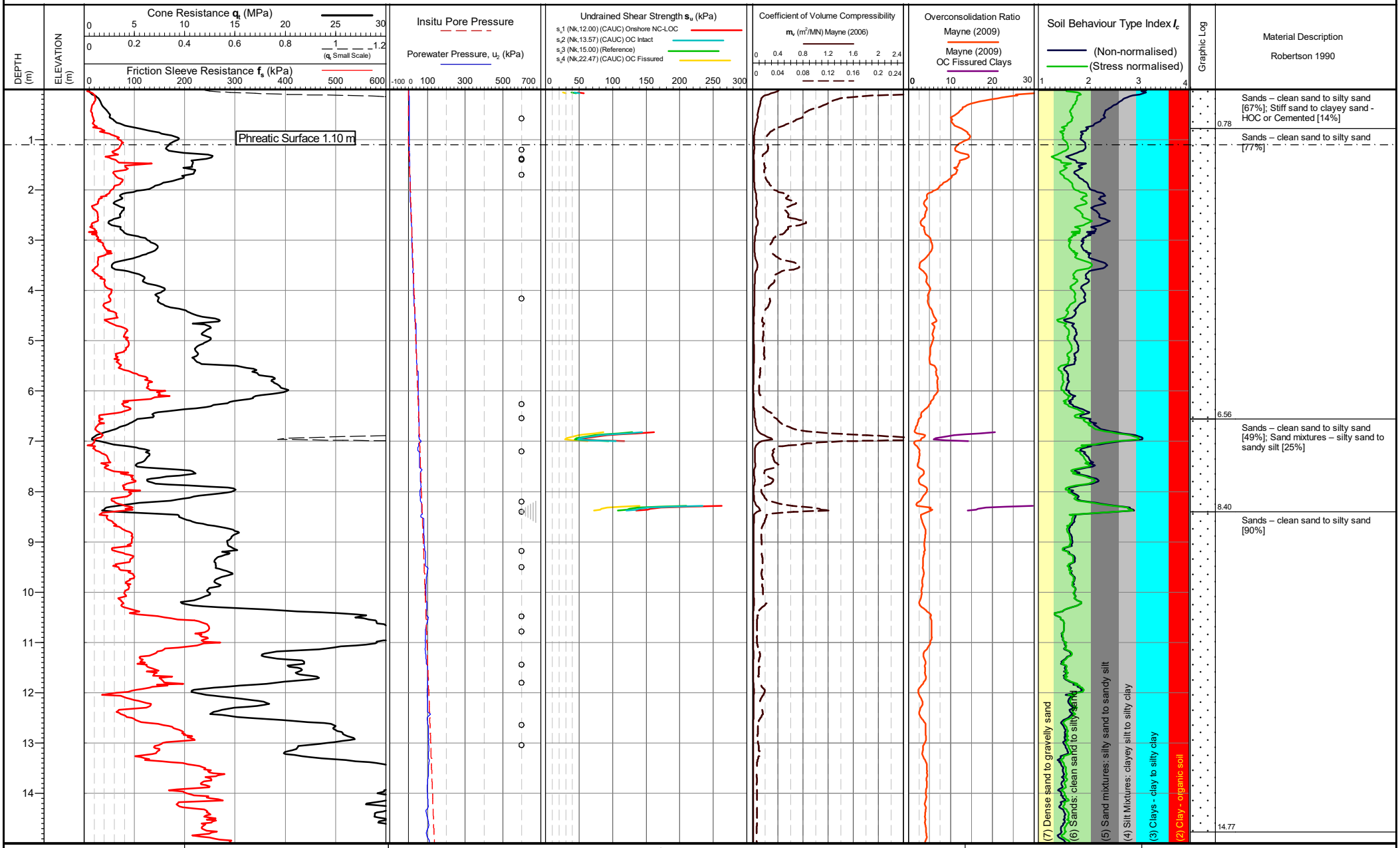
UNDRAINED SHEAR STRENGTH
COEFFICIENT OF VOLUME CHANGE
OVERCONSOLIDATION RATIO
SOIL BEHAVIOUR TYPE (SBT) DESCRIPTIONS

LIST OF FIGURES:

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
ConeID: S15-CFIP.1493
Operator: Jamie Butterworth
Rig Used: UK8
Date of test: 23/03/2020 11:10:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: Intermittent inclination data loss. *Phreatic surface origin: Estimate from u2 piezo data

Termination Remark: Target depth

Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.

See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

Date of plot: 01-04-20

Checked by: Chris Player

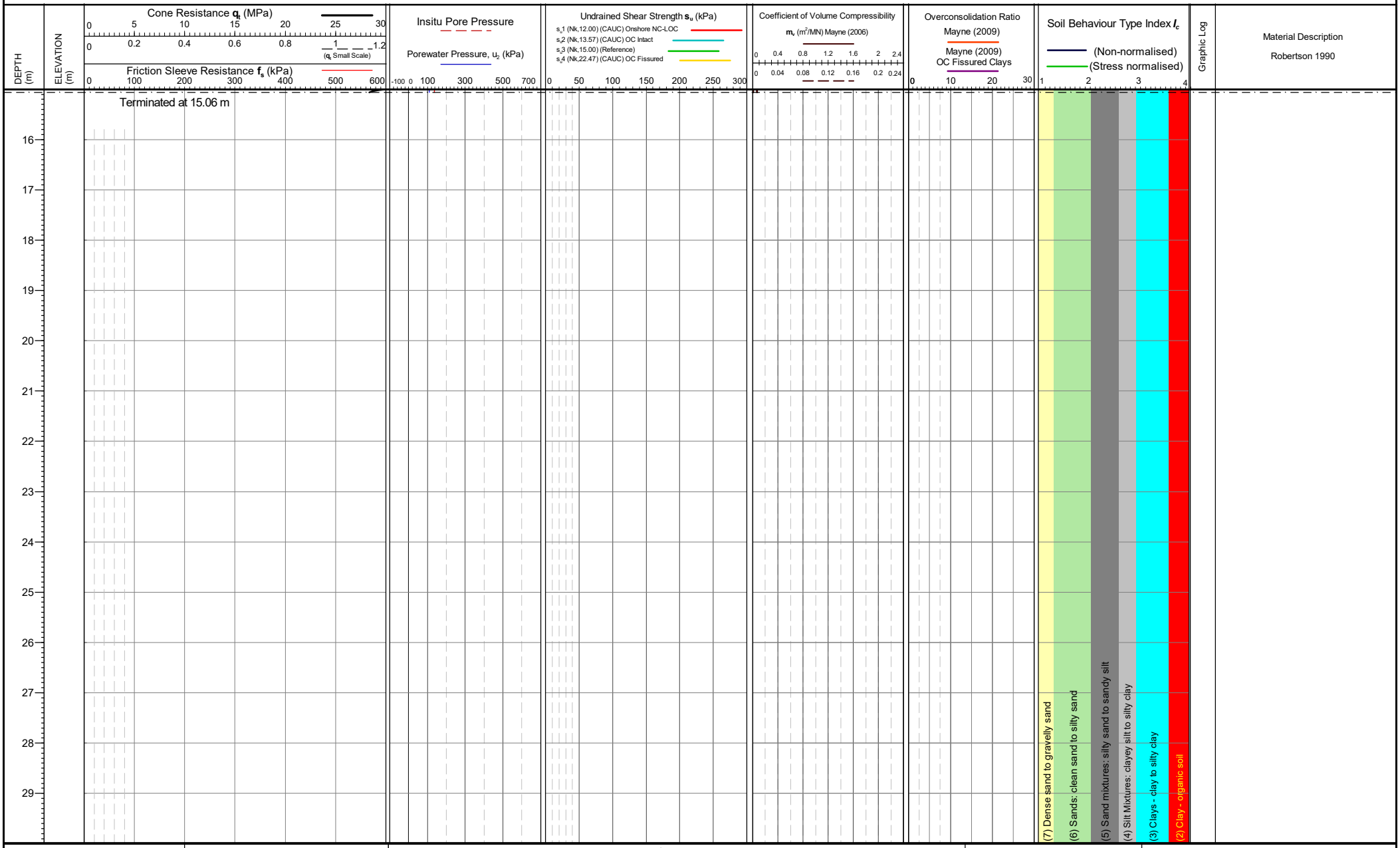
Lankelma Project Ref: P-107422-7

TEST ID: CPT01

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
ConeID: S15-CFIP.1493
Operator: Jamie Butterworth
Rig Used: UK8
Date of test: 23/03/2020 11:10:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: Intermittent inclination data loss. *Phreatic surface origin: Estimate from u2 piezo data

Termination Remark: Target depth

Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.

See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

Date of plot: 01-04-20

Checked by: Chris Player

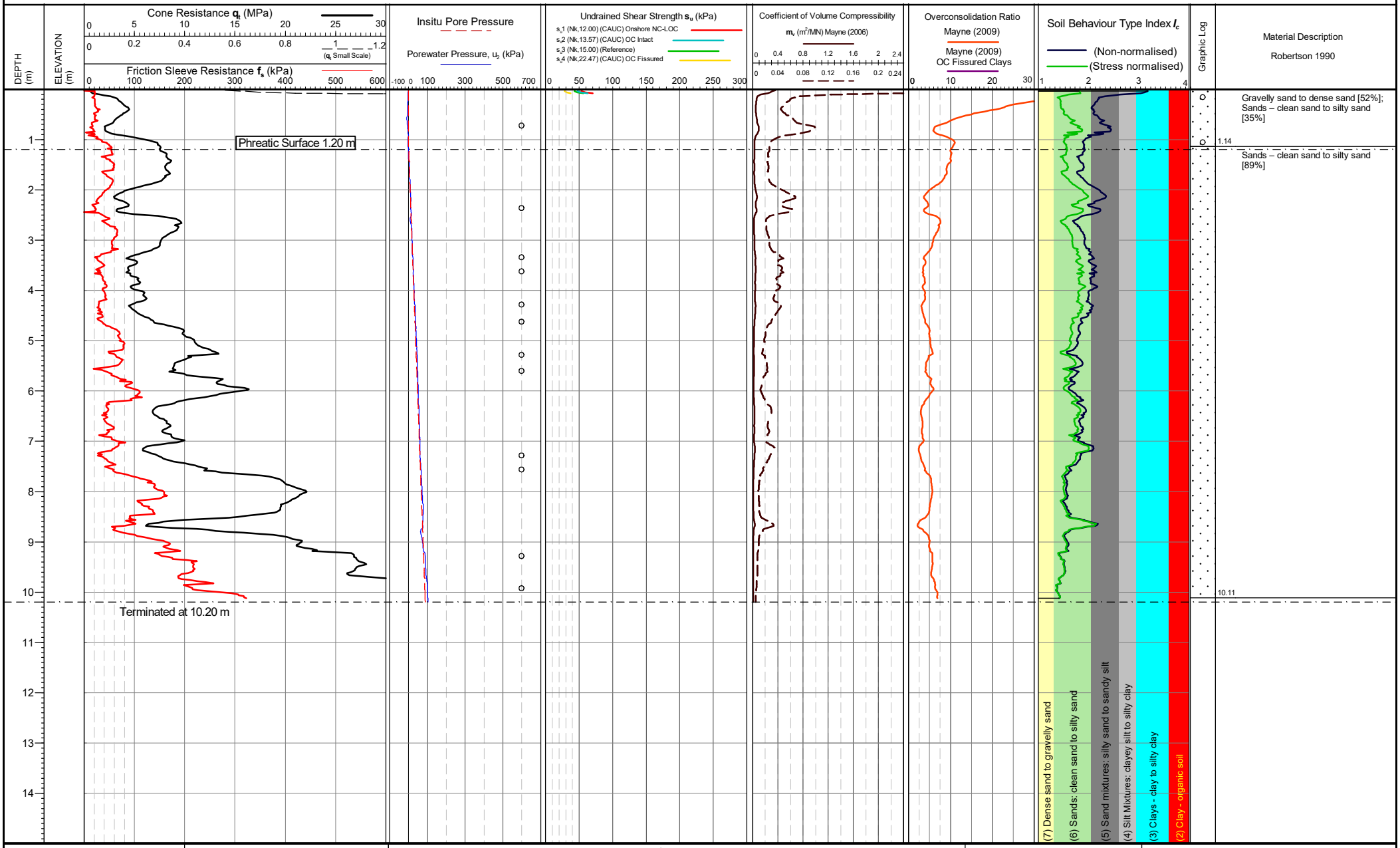
Lankelma Project Ref: P-107422-7

TEST ID: CPT01

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
ConeID: S15-CFIP.1493
Operator: Jamie Butterworth
Rig Used: UK8
Date of test: 23/03/2020 12:15:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks: *Phreatic surface origin: Estimate from u2 piezo data

Termination Remark:
Total reaction force

Internal QA Diss.
Dissipation Test
Penetration Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.

See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

Date of plot: 01-04-20

Checked by: Chris Player

Lankelma Project Ref: P-107422-7

TEST ID: CPT02

APPENDIX E STANDARD INTERPRETATION RESULTS - SET 2

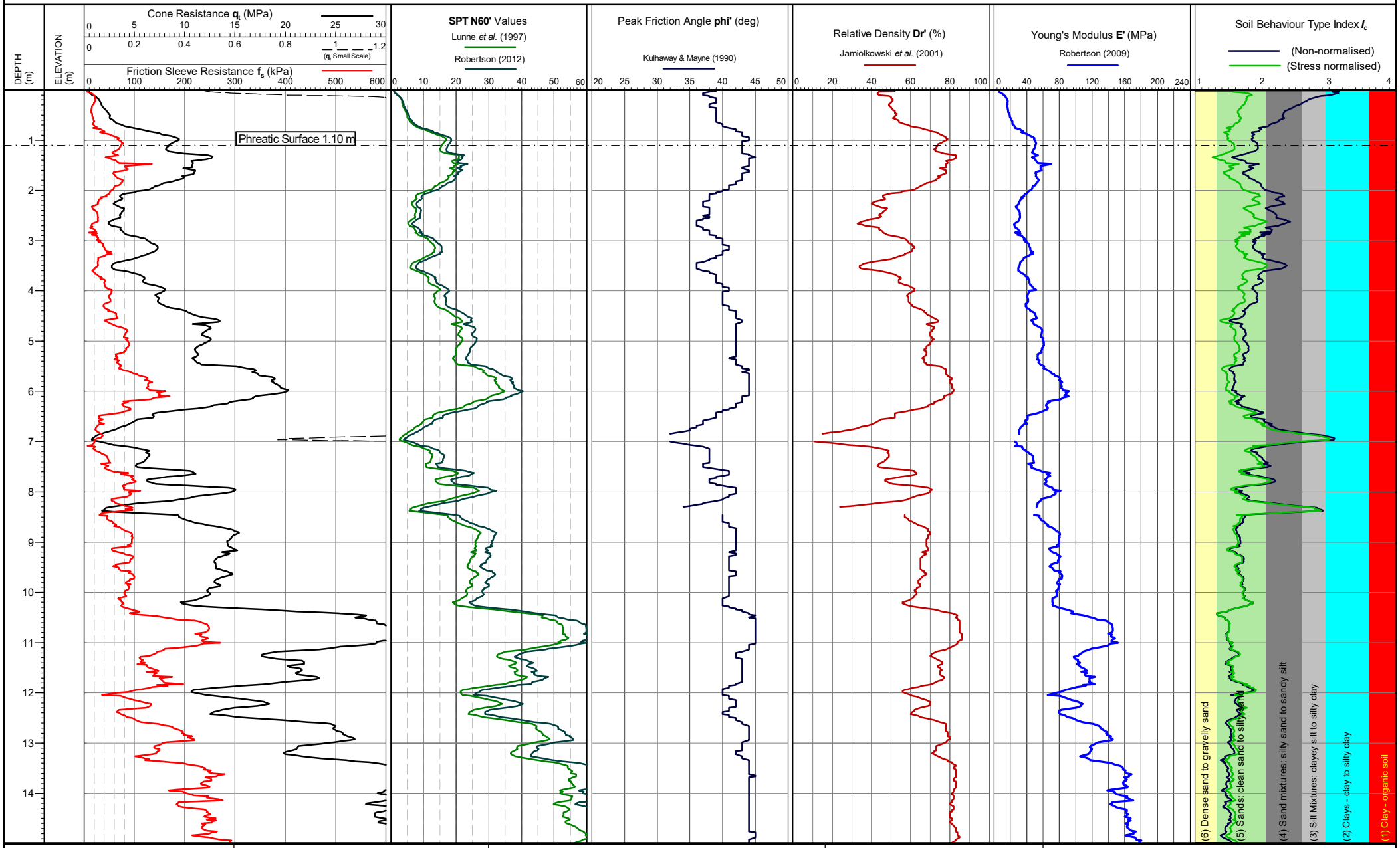
EQUIVALENT SPT N60
PEAK FRICTION ANGLE
RELATIVE DENSITY
YOUNG'S MODULUS

LIST OF FIGURES:

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
Cone ID: S15-CFIP.1493
Operator: Jamie Butterworth
Date of test: 23/03/2020 11:10:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.
See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

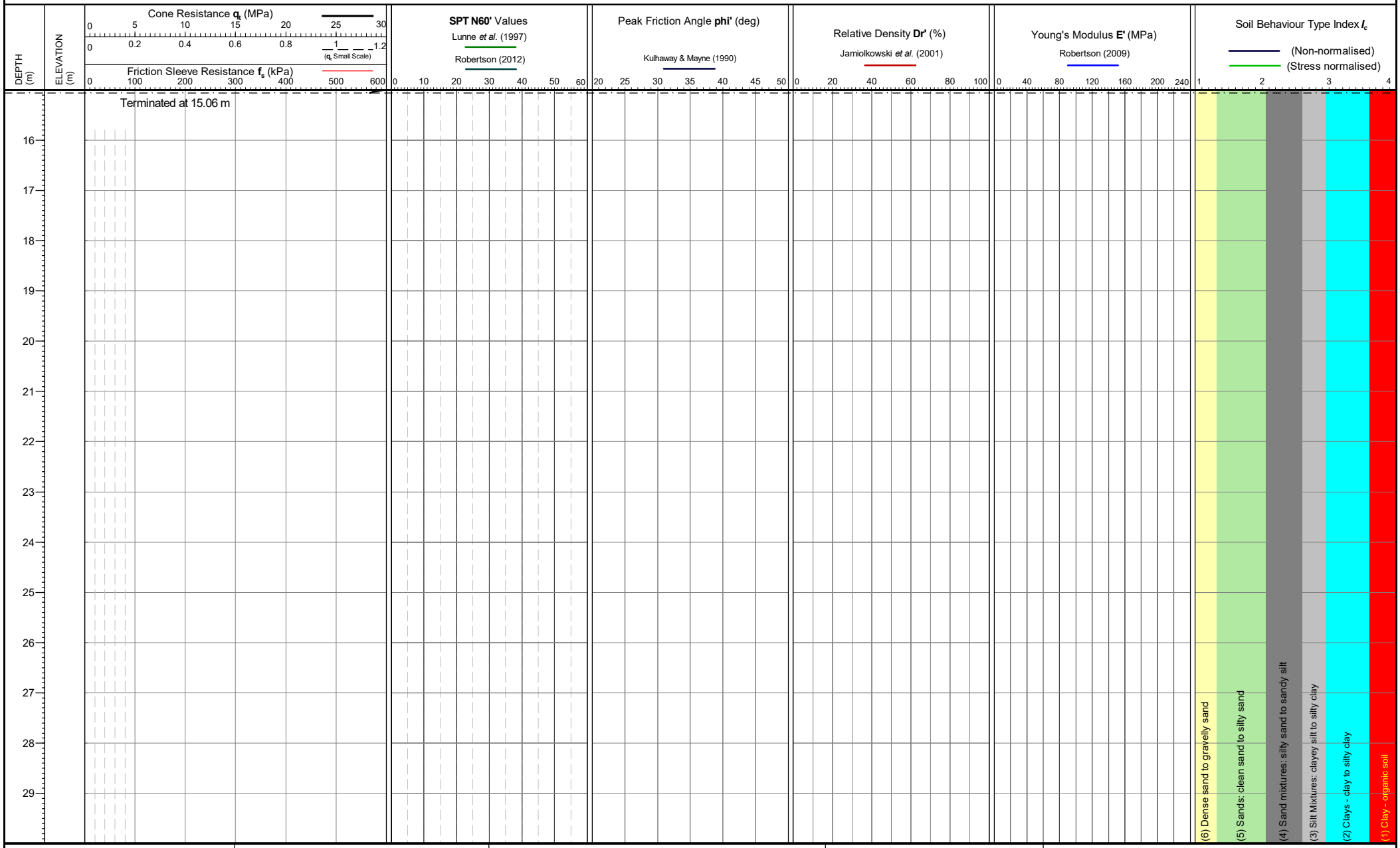
Date of plot: 01-04-20
Checked by: Chris Player

Lankelma Project Ref: P-107422-7

TEST ID: CPT01

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
Cone ID: S15-CFIP.1493
Operator: Jamie Butterworth
Date of test: 23/03/2020 11:10:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.
See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

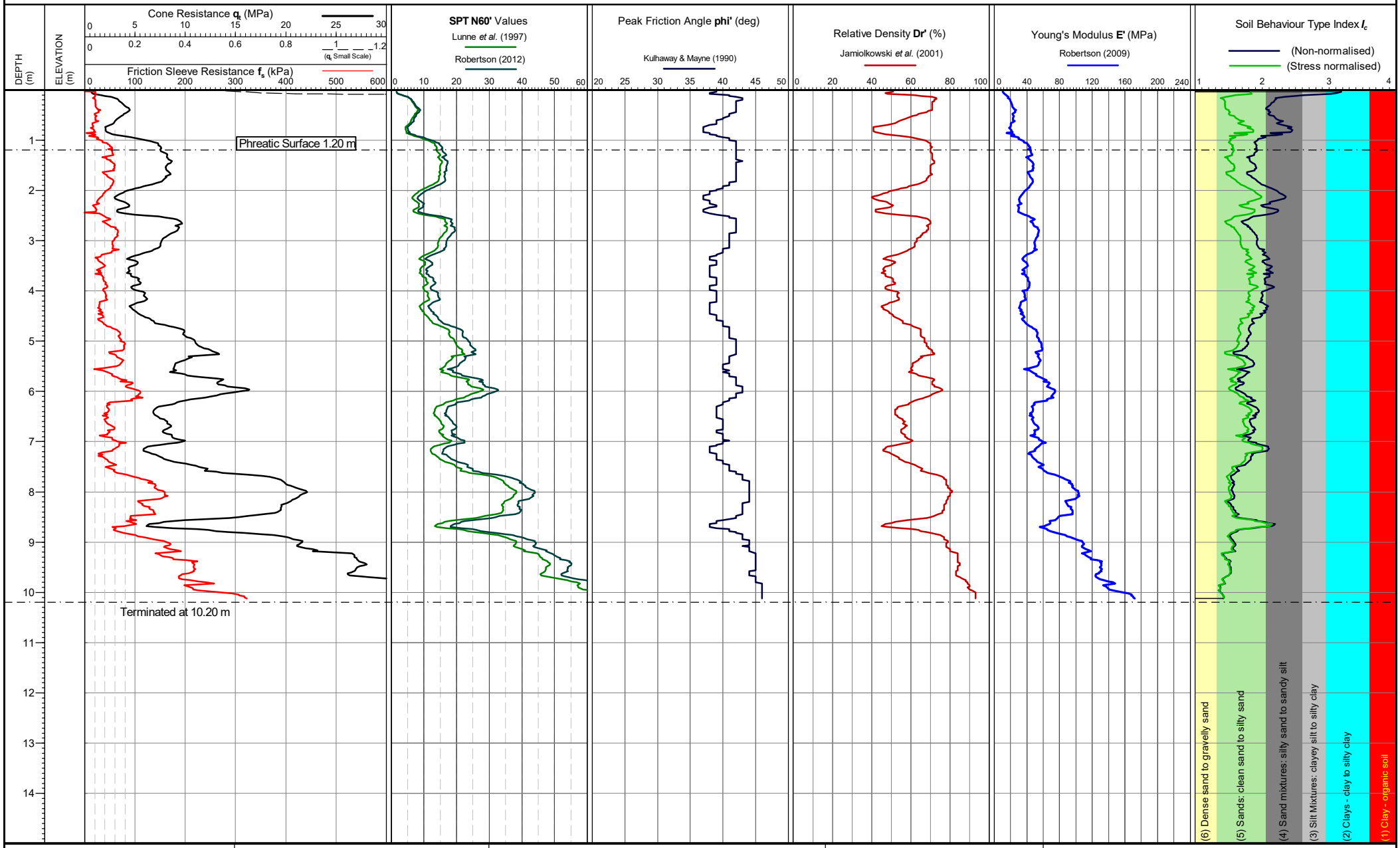
Date of plot: 01-04-20
Checked by: Chris Player
Lankelma Project Ref: P-107422-7

TEST ID: CPT01

LANKELMA

Project: DEESIDE

Client: JPG GROUP



Cone area (mm2):1500
Cone ID: S15-CFIP.1493
Operator: Jamie Butterworth
Date of test: 23/03/2020 12:15:00

Location: North Wales, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report section 'CPT INTERPRETATION NOTES' for discussion.
See report section 'CONE PENETRATION TESTS' for methods and discussion of parameter evaluation.

Date of plot: 01-04-20
Checked by: Chris Player

Lankelma Project Ref: P-107422-7

TEST ID: CPT02

Appendix D Chemical Testing Results and Hazwaste 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 20-02726-1

26-Feb-20

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

Our Reference 20-02726-1

Client Reference 4671

Order No (not supplied)

Contract Title Deeside Plot D

Description 7 Soil samples, 2 Leachate samples.

Date Received 11-Feb-20

Date Started 11-Feb-20

Date Completed 26-Feb-20

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

Notes **This report supersedes 20-027256, extra testing.**

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

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

				Lab No	1636379	1636380	1636381	1636382	1636383	1636384
				Sample ID	TP101	TP103	TP107	TP108	TP110	TP114
				Depth	0.20	0.10	0.50	0.15	0.20	0.00-0.25
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0.001	%	0.004					
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	14	14	12	13	13	14
Cadmium	DETSC 2301#	0.1	mg/kg	2.3	1.8	1.8	2.4	0.7	0.7
Chromium	DETSC 2301#	0.15	mg/kg	15	14	14	15	14	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0		< 1.0		< 1.0
Copper	DETSC 2301#	0.2	mg/kg	23	20	21	21	20	23
Lead	DETSC 2301#	0.3	mg/kg	110	110	100	110	100	350
Mercury	DETSC 2325#	0.05	mg/kg	0.87	0.08	12	0.08	0.09	0.25
Nickel	DETSC 2301#	1	mg/kg	13	13	12	13	12	13
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	0.7	< 0.5	< 0.5	0.5
Zinc	DETSC 2301#	1	mg/kg	380	310	330	400	190	190
Inorganics										
pH	DETSC 2008#		pH	8.0	7.9	7.8	8.2	7.6	7.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	3.6	3.4	4.1	3.4	3.8	3.8
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg		2.7		4.3		3.5
Chloride	DETSC 2055	1	mg/kg		36.2		89.0		34.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	23	19	26	18	15	15
Sulphide	DETSC 2024*	10	mg/kg		52		64		52
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg		628		629		567
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	< 0.03	< 0.03	0.04
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.07	0.05	< 0.03	0.05	< 0.03	0.05
Pyrene	DETSC 3303#	0.03	mg/kg	0.05	0.04	< 0.03	0.04	< 0.03	0.05
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.04	< 0.03	< 0.03	< 0.03	0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.26	< 0.10	< 0.10	< 0.10	< 0.10	0.14
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
OCPs										

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

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

			Lab No	1636379	1636380	1636381	1636382	1636383	1636384
			Sample ID	TP101	TP103	TP107	TP108	TP110	TP114
			Depth	0.20	0.10	0.50	0.15	0.20	0.00-0.25
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
alpha-BHC	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
beta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
delta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Heptachlor	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Aldrin	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
4,4-DDE	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Dieldrin	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endrin	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
4,4-DDT	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Methoxychlor	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Endrin ketone	DETSC 3441*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
OPPs									
Dichlorvos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Mevinphos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Demeton-O	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Ethoprop	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Naled	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Phorate	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Demeton-S	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Diazinon	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Disulfoton	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Methylparathion	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Ronnel	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Fenthion	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Chlopyrifos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Trichlorinate	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Merphos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Stirofos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Tokuthion	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Fensulfothion	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Bolstar	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Azinphos methyl	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Coumaphos	DETSC 3443*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Triazines									

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

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

			Lab No	1636379	1636380	1636381	1636382	1636383	1636384
			Sample ID	TP101	TP103	TP107	TP108	TP110	TP114
			Depth	0.20	0.10	0.50	0.15	0.20	0.00-0.25
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Atraton	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Prometon	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Simazine	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Atrazine	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Propazine	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Terbuthylazine	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Secbumeton	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Symetryn	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Ametryn	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Prometryne	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1
Terbutryn	DETSC 3445*	0.1	mg/kg	< 0.1				< 0.1	< 0.1

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	1636385
Sample ID	TP116
Depth	0.20
Other ID	
Sample Type	SOIL
Sampling Date	06/02/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Asbestos Quantification	DETSC 1102	0.001	%	
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	13
Cadmium	DETSC 2301#	0.1	mg/kg	1.3
Chromium	DETSC 2301#	0.15	mg/kg	14
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	
Copper	DETSC 2301#	0.2	mg/kg	22
Lead	DETSC 2301#	0.3	mg/kg	100
Mercury	DETSC 2325#	0.05	mg/kg	0.09
Nickel	DETSC 2301#	1	mg/kg	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Zinc	DETSC 2301#	1	mg/kg	290
Inorganics				
pH	DETSC 2008#		pH	7.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1
Organic matter	DETSC 2002#	0.1	%	3.9
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	
Chloride	DETSC 2055	1	mg/kg	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	16
Sulphide	DETSC 2024*	10	mg/kg	
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3
OCPs				

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

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	1636385
Sample ID	TP116
Depth	0.20
Other ID	
Sample Type	SOIL
Sampling Date	06/02/2020
Sampling Time	n/s

Test	Method	LOD	Units	
alpha-BHC	DETSC 3441*	0.1	mg/kg	
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	
beta-BHC	DETSC 3441*	0.1	mg/kg	
delta-BHC	DETSC 3441*	0.1	mg/kg	
Heptachlor	DETSC 3441*	0.1	mg/kg	
Aldrin	DETSC 3441*	0.1	mg/kg	
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	
4,4-DDE	DETSC 3441*	0.1	mg/kg	
Dieldrin	DETSC 3441*	0.1	mg/kg	
Endrin	DETSC 3441*	0.1	mg/kg	
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	
4,4-DDT	DETSC 3441*	0.1	mg/kg	
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	
Methoxychlor	DETSC 3441*	0.1	mg/kg	
Endrin ketone	DETSC 3441*	0.1	mg/kg	
OPPs				
Dichlorvos	DETSC 3443*	0.1	mg/kg	
Mevinphos	DETSC 3443*	0.1	mg/kg	
Demeton-O	DETSC 3443*	0.1	mg/kg	
Ethoprop	DETSC 3443*	0.1	mg/kg	
Naled	DETSC 3443*	0.1	mg/kg	
Phorate	DETSC 3443*	0.1	mg/kg	
Demeton-S	DETSC 3443*	0.1	mg/kg	
Diazinon	DETSC 3443*	0.1	mg/kg	
Disulfoton	DETSC 3443*	0.1	mg/kg	
Methylparathion	DETSC 3443*	0.1	mg/kg	
Ronnel	DETSC 3443*	0.1	mg/kg	
Fenthion	DETSC 3443*	0.1	mg/kg	
Chlopyrifos	DETSC 3443*	0.1	mg/kg	
Trichlorinate	DETSC 3443*	0.1	mg/kg	
Merphos	DETSC 3443*	0.1	mg/kg	
Stirofos	DETSC 3443*	0.1	mg/kg	
Tokuthion	DETSC 3443*	0.1	mg/kg	
Fensulfothion	DETSC 3443*	0.1	mg/kg	
Bolstar	DETSC 3443*	0.1	mg/kg	
Azinphos methyl	DETSC 3443*	0.1	mg/kg	
Coumaphos	DETSC 3443*	0.1	mg/kg	
Triazines				

Summary of Chemical Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	1636385
Sample ID	TP116
Depth	0.20
Other ID	
Sample Type	SOIL
Sampling Date	06/02/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Atraton	DETSC 3445*	0.1	mg/kg	
Prometon	DETSC 3445*	0.1	mg/kg	
Simazine	DETSC 3445*	0.1	mg/kg	
Atrazine	DETSC 3445*	0.1	mg/kg	
Propazine	DETSC 3445*	0.1	mg/kg	
Terbuthylazine	DETSC 3445*	0.1	mg/kg	
Secbumeton	DETSC 3445*	0.1	mg/kg	
Symetryn	DETSC 3445*	0.1	mg/kg	
Ametryn	DETSC 3445*	0.1	mg/kg	
Prometryne	DETSC 3445*	0.1	mg/kg	
Terbutryn	DETSC 3445*	0.1	mg/kg	

Summary of Chemical Analysis
Leachate Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	1636390	1642877
Sample ID	TP103	TP116
Depth	0.10	0.20
Other ID		
Sample Type	LEACHATE	LEACHATE
Sampling Date	06/02/2020	06/02/2020
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Preparation					
NRA Leachate Preparation	DETSC 1009*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.53	0.47
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.51	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.3	0.8
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.78	0.29
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.6	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.0	0.53
Zinc, Dissolved	DETSC 2306	1.3	ug/l	4.2	2.7
Inorganics					
pH	DETSC 2008		pH	8.0	7.1
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	1.3	0.90
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.02
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02	0.08
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02	0.12
Pyrene	DETSC 3304	0.01	ug/l	0.01	0.11
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.06
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	0.07
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.13
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.06
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.08
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.06
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	0.82
Phenols					
Phenol	DETSC 3451*	0.5	ug/l	< 0.50	< 0.50

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1636379	TP101 0.20	SOIL	Amosite	Amosite present in bundles	Lee Kerridge
1636380	TP103 0.10	SOIL	NAD	none	Lee Kerridge
1636381	TP107 0.50	SOIL	NAD	none	Lee Kerridge
1636382	TP108 0.15	SOIL	NAD	none	Lee Kerridge
1636383	TP110 0.20	SOIL	NAD	none	Lee Kerridge
1636384	TP114 0.00-0.25	SOIL	NAD	none	Lee Kerridge
1636385	TP116 0.20	SOIL	NAD	none	Lee Kerridge

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

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 20-02726-1
Client Ref 4671
Contract Title Deeside Plot D

Lab No	1636379
Sample ID	TP101
Depth	0.20
Other ID	
Sample Type	SOIL
Sampling Date	06/02/2020
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.004**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.004
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	486.78
ACMs present*		type	
Mass of ACM in sample		g	
% ACM by mass		%	
% asbestos in ACM		%	
% asbestos in sample		%	
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	0.004
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

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

Information in Support of the Analytical Results

Our Ref 20-02726-1
Client Ref 4671
Contract Deeside Plot D

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1636379	TP101 0.20 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636380	TP103 0.10 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636381	TP107 0.50 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636382	TP108 0.15 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636383	TP110 0.20 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636384	TP114 0.00-0.25 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636385	TP116 0.20 SOIL	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1636390	TP103 0.10 LEACHATE	06/02/20	GJ 250ml, GJ 60ml, PT 1L		
1642877	TP116 0.20 LEACHATE	06/02/20	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 20-06140

17-Apr-20

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

Our Reference 20-06140

Client Reference 4671

Order No (not supplied)

Contract Title (not supplied)

Description 5 Water samples.

Date Received 20-Mar-20

Date Started 20-Mar-20

Date Completed 17-Apr-20

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

UKAS TESTING
2139

Summary of Chemical Analysis

Water Samples

Our Ref 20-06140
Client Ref 4671
Contract Title

			Lab No	1657844	1657845
			Sample ID	BH103	BH101
			Depth		
			Other ID		
			Sample Type	WATER	WATER
			Sampling Date	18/03/2020	18/03/2020
			Sampling Time	1240	1300
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	4.3	1.3
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.4	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.29	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.5	2.2
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.31	0.56
Zinc, Dissolved	DETSC 2306	1.3	ug/l	2.7	3.3
Inorganics					
pH	DETSC 2008		pH	7.3	7.5
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	5.5	11
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol	DETSC 3451*	0.5	ug/l	< 0.50	< 0.50

Key: * -not accredited.

Information in Support of the Analytical Results

Our Ref 20-06140
Client Ref 4671
Contract

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1657844	BH103 WATER	18/03/20	GB 1L, GV, PB 1L	pH/Cond/TDS (1 days)	
1657845	BH101 WATER	18/03/20	GB 1L, GV, PB 1L	pH/Cond/TDS (1 days)	

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

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.

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

SQNNM-FQHCC-UPHFE

Job name

Plot D, Deeside

Description/Comments

Project

4671

Site

Deeside

Related Documents

#	Name	Description
None		

Waste Stream Template

JPG WASTE STREAM V20

Classified by

Name:
Dominic Horne
Date:
12 Mar 2020 15:01 GMT
Telephone:
07814008742

Company:
JPG Leeds
5 John Charles Way
Leeds
LS12 6QA

HazWasteOnline™ Training Record:

Course	Date
Hazardous Waste Classification	14 Mar 2018
Advanced Hazardous Waste Classification	11 Mar 2020

Report

Created by: Dominic Horne
Created date: 12 Mar 2020 15:01 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	TP101	0.2	Non Hazardous		2
2	TP103	0.1	Non Hazardous		4
3	TP107	0.5	Non Hazardous		6
4	TP108	0.15	Non Hazardous		8
5	TP110	0.2	Non Hazardous		10
6	TP114	0.00-0.25	Non Hazardous		12
7	TP116	0.2	Non Hazardous		14

Classification of sample: TP101

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

Sample details

Sample Name:
TP101
Sample Depth:
0.2 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% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	arsenic { arsenic trioxide }		14 mg/kg	1.32	18.485 mg/kg	0.00185 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
2	cadmium { cadmium oxide }		2.3 mg/kg	1.142	2.627 mg/kg	0.000263 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }		15 mg/kg	1.462	21.923 mg/kg	0.00219 %		
	215-160-9 / 1308-38-9							
4	copper { dicopper oxide; copper (I) oxide }		23 mg/kg	1.126	25.895 mg/kg	0.00259 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
5	lead { lead chromate }	1	110 mg/kg	1.56	171.58 mg/kg	0.011 %		
	082-004-00-2 / 231-846-0 / 7758-97-6							
6	mercury { mercury(II) sulphide }		0.87 mg/kg	1.16	1.009 mg/kg	0.000101 %		
	215-696-3 / 1344-48-5							
7	nickel { nickel chromate }		13 mg/kg	2.976	38.691 mg/kg	0.00387 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<LOD
	034-002-00-8							
9	zinc { zinc oxide }		380 mg/kg	1.245	472.991 mg/kg	0.0473 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
10	pH		8 pH		8 pH	8pH		
	PH							
11	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 }		<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
	006-007-00-5							
12	naphthalene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	601-052-00-2 / 202-049-5 / 91-20-3							
13	acenaphthylene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	205-917-1 / 208-96-8							
14	acenaphthene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	201-469-6 / 83-32-9							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
			201-695-5	86-73-7									
16		phenanthrene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			201-581-5	85-01-8									
17		anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
			204-371-1	120-12-7									
18		fluoranthene				0.07	mg/kg		0.07	mg/kg	0.000007 %		
			205-912-4	206-44-0									
19		pyrene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		**<LOD**
			205-883-8	191-24-2									
28		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
29		asbestos				40	mg/kg		40	mg/kg	0.004 %		
		650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5									
										Total:	0.0734 %		

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: TP103

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

Sample details

Sample Name:
TP103
Sample Depth:
0.1 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% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	arsenic { arsenic trioxide }		14 mg/kg	1.32	18.485 mg/kg	0.00185 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
2	cadmium { cadmium oxide }		1.8 mg/kg	1.142	2.056 mg/kg	0.000206 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }		14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
	/ 215-160-9 / 1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
	024-001-00-0 / 215-607-8 / 1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }		20 mg/kg	1.126	22.518 mg/kg	0.00225 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
6	lead { lead chromate }	1	110 mg/kg	1.56	171.58 mg/kg	0.011 %		
	082-004-00-2 / 231-846-0 / 7758-97-6							
7	mercury { mercury(II) sulphide }		0.08 mg/kg	1.16	0.0928 mg/kg	0.00000928 %		
	/ 215-696-3 / 1344-48-5							
8	nickel { nickel chromate }		13 mg/kg	2.976	38.691 mg/kg	0.00387 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		0.7 mg/kg	2.554	1.788 mg/kg	0.000179 %		
	034-002-00-8 / /							
10	zinc { zinc oxide }		310 mg/kg	1.245	385.861 mg/kg	0.0386 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
11	pH		7.9 pH		7.9 pH	7.9 pH		
	/ / 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 }		<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
	006-007-00-5 / /							
13	naphthalene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	601-052-00-2 / 202-049-5 / 91-20-3							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-917-1	208-96-8									
15		acenaphthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			205-912-4	206-44-0									
20		pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**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:	0.0603 %		

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: TP107

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

Sample details

Sample Name:
TP107
Sample Depth:
0.5 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% No Moisture Correction applied (MC)

#	Determinand	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		1.8	mg/kg	1.142	2.056	mg/kg	0.000206 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		14	mg/kg	1.462	20.462	mg/kg	0.00205 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		21	mg/kg	1.126	23.644	mg/kg	0.00236 %		
5	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 %		
6	mercury { mercury(II) sulphide }		215-696-3	1344-48-5		12	mg/kg	1.16	13.918	mg/kg	0.00139 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		12	mg/kg	2.976	35.715	mg/kg	0.00357 %		
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.7	mg/kg	2.554	1.788	mg/kg	0.000179 %		
9	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		330	mg/kg	1.245	410.756	mg/kg	0.0411 %		
10	pH			PH		7.8	pH		7.8	pH	7.8 pH		
11	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**
12	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
13	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
14	acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
16		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
17		anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
18		fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-912-4	206-44-0									
19		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-927-3	129-00-0									
20		benzo[a]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-883-8	191-24-2									
28		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0625 %		

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: TP108

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

Sample details

Sample Name:
TP108
Sample Depth:
0.15 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% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	arsenic { arsenic trioxide }		13 mg/kg	1.32	17.164 mg/kg	0.00172 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
2	cadmium { cadmium oxide }		2.4 mg/kg	1.142	2.742 mg/kg	0.000274 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }		15 mg/kg	1.462	21.923 mg/kg	0.00219 %		
	215-160-9 / 1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
	024-001-00-0 / 215-607-8 / 1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }		21 mg/kg	1.126	23.644 mg/kg	0.00236 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
6	lead { lead chromate }	1	110 mg/kg	1.56	171.58 mg/kg	0.011 %		
	082-004-00-2 / 231-846-0 / 7758-97-6							
7	mercury { mercury(II) sulphide }		0.08 mg/kg	1.16	0.0928 mg/kg	0.00000928 %		
	215-696-3 / 1344-48-5							
8	nickel { nickel chromate }		13 mg/kg	2.976	38.691 mg/kg	0.00387 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<LOD
	034-002-00-8							
10	zinc { zinc oxide }		400 mg/kg	1.245	497.886 mg/kg	0.0498 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
11	pH		8.2 pH		8.2 pH	8.2 pH		
	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 }		<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
	006-007-00-5							
13	naphthalene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	601-052-00-2 / 202-049-5 / 91-20-3							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-917-1	208-96-8									
15		acenaphthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			205-912-4	206-44-0									
20		pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**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:	0.0716 %		

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: TP110

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

Sample details

Sample Name:
TP110
Sample Depth:
0.2 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% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	arsenic { arsenic trioxide }		13 mg/kg	1.32	17.164 mg/kg	0.00172 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
2	cadmium { cadmium oxide }		0.7 mg/kg	1.142	0.8 mg/kg	0.00008 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }		14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
	215-160-9 / 1308-38-9							
4	copper { dicopper oxide; copper (I) oxide }		20 mg/kg	1.126	22.518 mg/kg	0.00225 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
5	lead { lead chromate }	1	100 mg/kg	1.56	155.982 mg/kg	0.01 %		
	082-004-00-2 / 231-846-0 / 7758-97-6							
6	mercury { mercury(II) sulphide }		0.09 mg/kg	1.16	0.104 mg/kg	0.0000104 %		
	215-696-3 / 1344-48-5							
7	nickel { nickel chromate }		12 mg/kg	2.976	35.715 mg/kg	0.00357 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<LOD
	034-002-00-8							
9	zinc { zinc oxide }		190 mg/kg	1.245	236.496 mg/kg	0.0236 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
10	pH		7.6 pH		7.6 pH	7.6 pH		
	PH							
11	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 }		<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
	006-007-00-5							
12	naphthalene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	601-052-00-2 / 202-049-5 / 91-20-3							
13	acenaphthylene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	205-917-1 / 208-96-8							
14	acenaphthene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	201-469-6 / 83-32-9							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
16	●	phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
17	●	anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
18	●	fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-912-4	206-44-0									
19	●	pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-927-3	129-00-0									
20		benzo[a]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
25	●	indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
27	●	benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-883-8	191-24-2									
28		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0436 %		

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: TP114

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

Sample details

Sample Name:
TP114
Sample Depth:
0.00-0.25 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% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	arsenic { arsenic trioxide }		14 mg/kg	1.32	18.485 mg/kg	0.00185 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
2	cadmium { cadmium oxide }		0.7 mg/kg	1.142	0.8 mg/kg	0.00008 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }		15 mg/kg	1.462	21.923 mg/kg	0.00219 %		
	215-160-9 / 1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }		<1 mg/kg	1.923	<1.923 mg/kg	<0.000192 %		<LOD
	024-001-00-0 / 215-607-8 / 1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }		23 mg/kg	1.126	25.895 mg/kg	0.00259 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
6	lead { lead chromate }	1	350 mg/kg	1.56	545.935 mg/kg	0.035 %		
	082-004-00-2 / 231-846-0 / 7758-97-6							
7	mercury { mercury(II) sulphide }		0.25 mg/kg	1.16	0.29 mg/kg	0.000029 %		
	215-696-3 / 1344-48-5							
8	nickel { nickel chromate }		13 mg/kg	2.976	38.691 mg/kg	0.00387 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		0.5 mg/kg	2.554	1.277 mg/kg	0.000128 %		
	034-002-00-8							
10	zinc { zinc oxide }		190 mg/kg	1.245	236.496 mg/kg	0.0236 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
11	pH		7.9 pH		7.9 pH	7.9 pH		
	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 }		<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
	006-007-00-5							
13	naphthalene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
	601-052-00-2 / 202-049-5 / 91-20-3							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-917-1	208-96-8									
15		acenaphthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			201-581-5	85-01-8									
18		anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			205-912-4	206-44-0									
20		pyrene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**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: TP116

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

Sample details

Sample Name:
TP116
Sample Depth:
0.2 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% No Moisture Correction applied (MC)

#	Determinand	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		1.3	mg/kg	1.142	1.485	mg/kg	0.000149 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		14	mg/kg	1.462	20.462	mg/kg	0.00205 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		22	mg/kg	1.126	24.77	mg/kg	0.00248 %		
5	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 %		
6	mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.09	mg/kg	1.16	0.104	mg/kg	0.0000104 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		12	mg/kg	2.976	35.715	mg/kg	0.00357 %		
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.5	mg/kg	2.554	<1.277	mg/kg	<0.000128 %		<LOD
9	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		290	mg/kg	1.245	360.967	mg/kg	0.0361 %		
10	pH			PH		7.9	pH		7.9	pH	7.9 pH		
11	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
12	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
13	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
14	acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-695-5	86-73-7									
16	●	phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
17	●	anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-371-1	120-12-7									
18	●	fluoranthene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			205-912-4	206-44-0									
19	●	pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			204-927-3	129-00-0									
20		benzo[a]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
25	●	indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
27	●	benzo[ghi]perylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-883-8	191-24-2									
28		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0563 %		

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 CLP determinands

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

Conversion factor: 1.462
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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

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

Conversion factor: 1.16
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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT RE 2 H373 , Acute Tox. 2 H300 , Acute Tox. 1 H310 , Acute Tox. 3 H331

- **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**

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - 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: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

- **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: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

- **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 Chronic 1 H410 , Aquatic Acute 1 H400

- **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: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

- **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

- **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

- **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

- **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 Chronic 1 H410 , Aquatic Acute 1 H400

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}

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

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) sulphide}

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 oxide}

Insufficient chromium within the soil sample.

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]

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

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2020.52.4178.8324 (21 Feb 2020)
HazWasteOnline Database: 2020.52.4178.8324 (21 Feb 2020)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
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 Wastes 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
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

Appendix E Geotechnical Testing Results

LABORATORY REPORT

4043

Contract Number: PSL20/0958

Report Date: 06 April 2020

Client's Reference: 4671

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

For the attention of: Dominic Horne

Contract Title: Deeside Plot D

Date Received: 14/2/2020
Date Commenced: 14/2/2020
Date Completed: 12/3/2020

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)	S Royle (Laboratory Manager)

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Doncaster DN4 0AR
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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
TP102	1	B	1.00		Brown very silty SAND.
TP108	3	B	1.25		Brown SAND.
TP112	4	B	1.65		Brown very silty SAND.
TP117	6	B	0.20	0.50	Brown SAND.
TP120	7	B	0.10	0.50	Brown slightly gravelly 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
TP102	1	B	1.00		25							
TP108	3	B	1.25		22							
TP112	4	B	1.65		26		2.60					
TP117	6	B	0.20	0.50	24							
TP120	7	B	0.10	0.50	20							

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

UKAS TESTING 4043

PSL Professional Soils Laboratory

Deeside Plot D

Contract No: PSL20/0958

Client Ref: 4671

PARTICLE SIZE DISTRIBUTION TEST

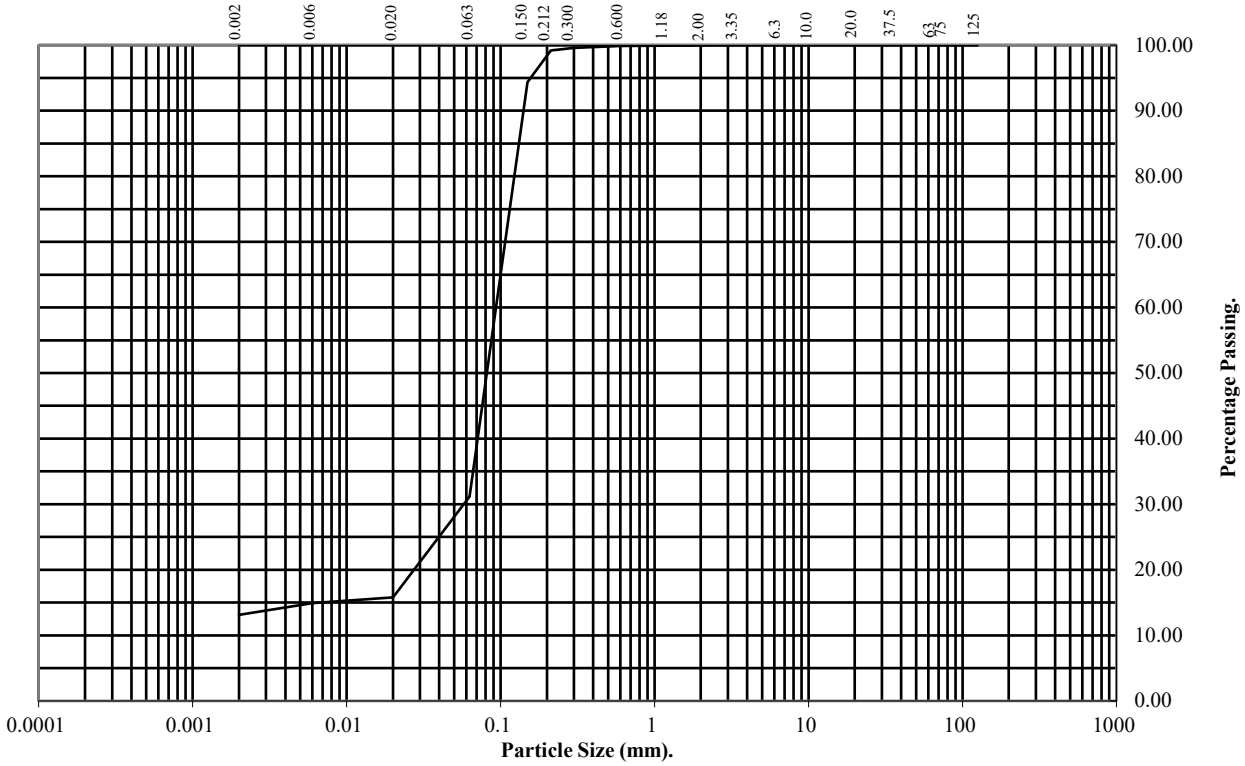
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP102 **Top Depth (m):** 1.00

Sample Number: 1 **Base Depth(m):**

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	94
0.063	31

Particle Diameter	Percentage Passing
0.02	16
0.006	15
0.002	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	69
Silt	18
Clay	13

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

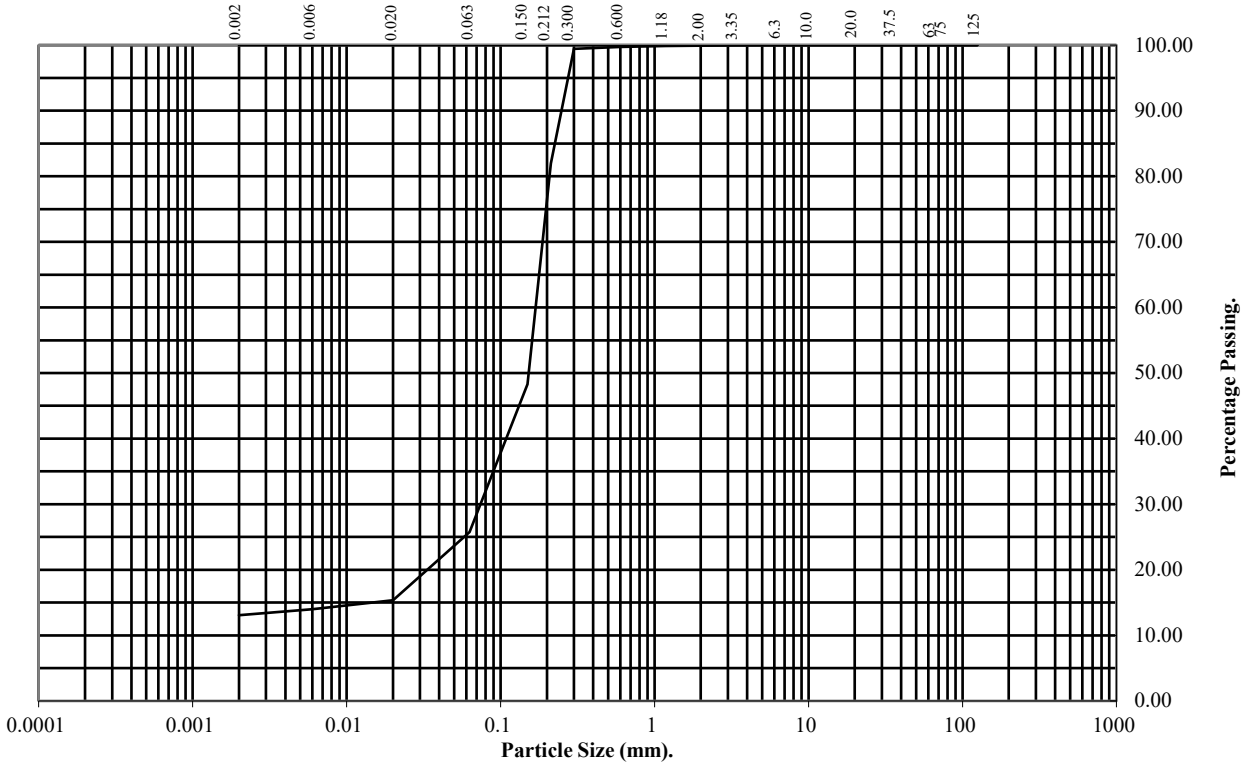
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP112 **Top Depth (m):** 1.65

Sample Number: 4 **Base Depth(m):**

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	82
0.15	48
0.063	26

Particle Diameter	Percentage Passing
0.02	15
0.006	14
0.002	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	74
Silt	13
Clay	13

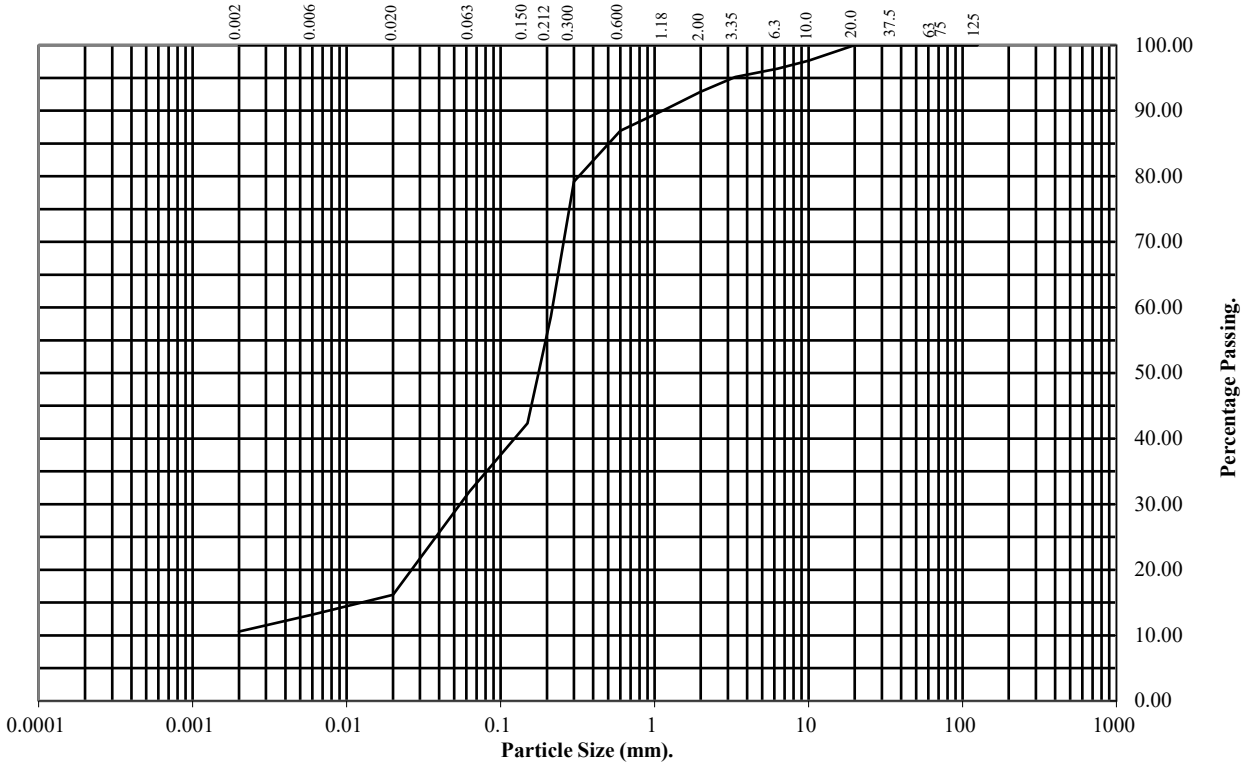
Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**TP120**	**Top Depth (m):**	**0.10**
Sample Number:	**7**	**Base Depth(m):**	**0.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	98
6.3	96
3.35	95
2	93
1.18	90
0.6	87
0.3	79
0.212	59
0.15	42
0.063	32

Particle Diameter	Percentage Passing
0.02	16
0.006	13
0.002	11

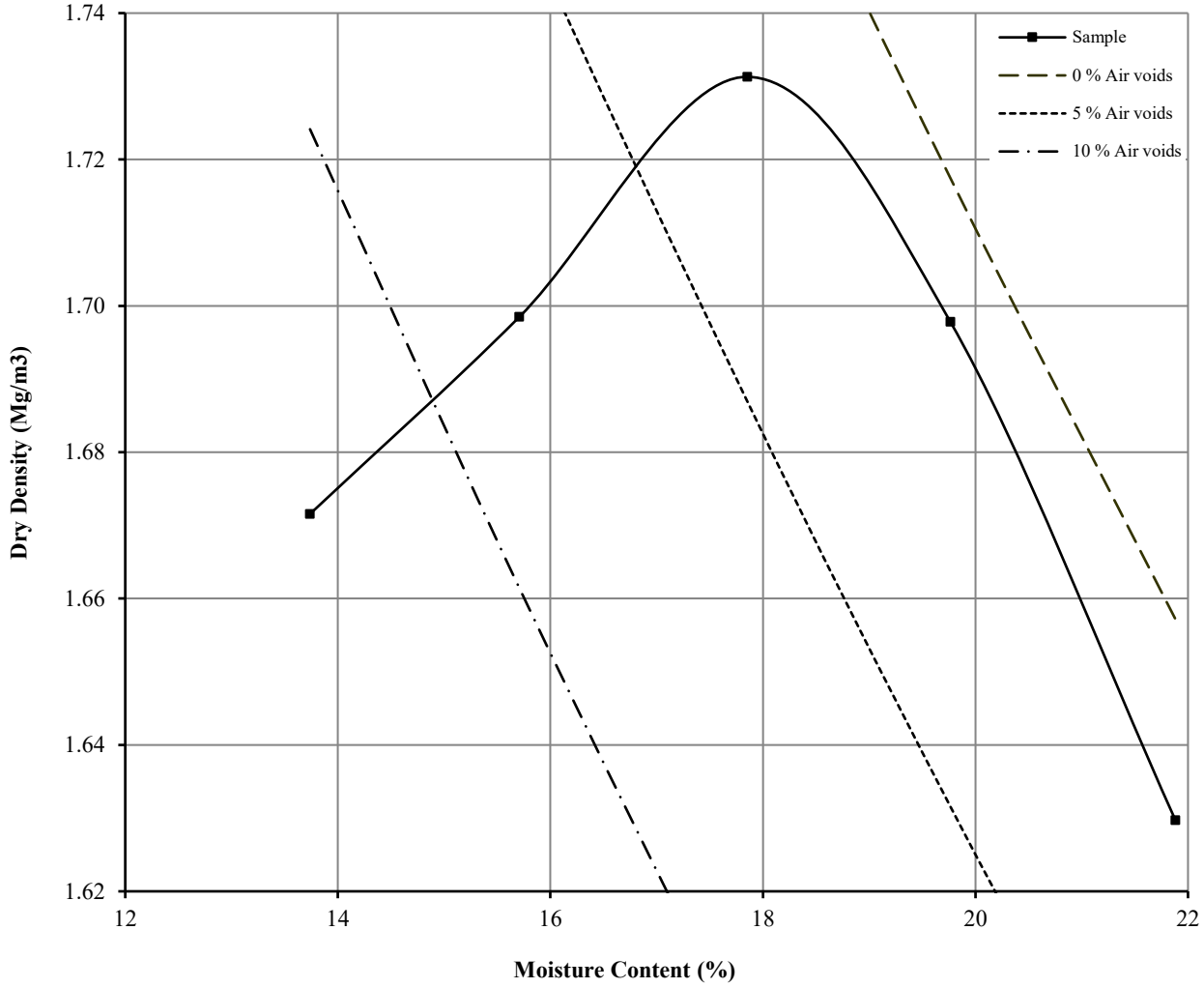
Soil Fraction	Total Percentage
Cobbles	0
Gravel	7
Sand	61
Silt	21
Clay	11

Remarks:
See Summary of Soil Descriptions

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**TP112**	**Top Depth (m) :**	**1.65**
Sample Number:	**8**	**Base Depth (m) :**	
Sample Type:	**B**		

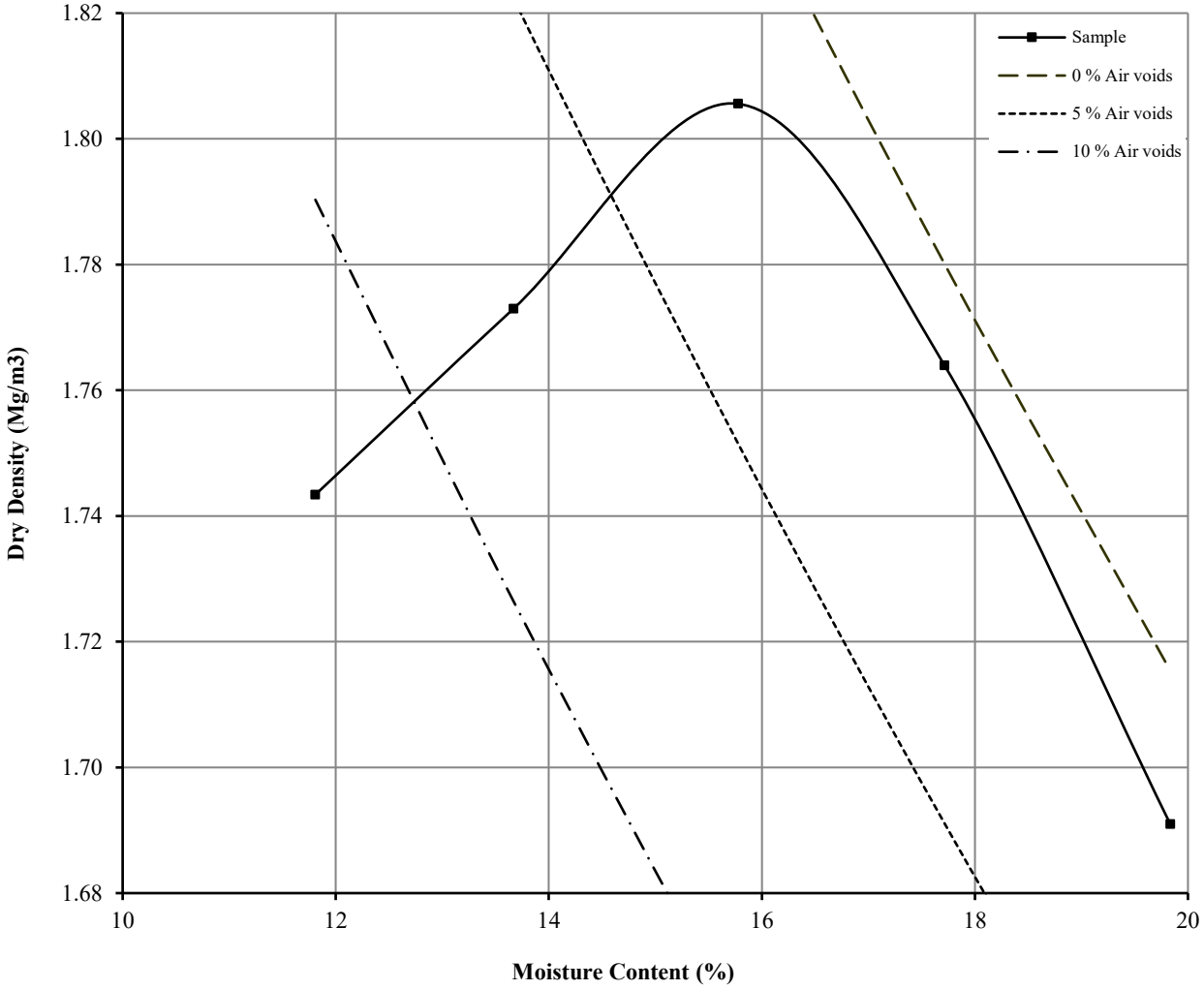


Initial Moisture Content:		26	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.60	Measured	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.73	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		18			
Remarks See summary of soil descriptions.					

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.5 : 1990

Hole Number:	**TP112**	**Top Depth (m) :**	**1.65**
Sample Number:	**8**	**Base Depth (m) :**	
Sample Type:	**B**		



Initial Moisture Content:		26	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.60	Measured	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.81	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions.					

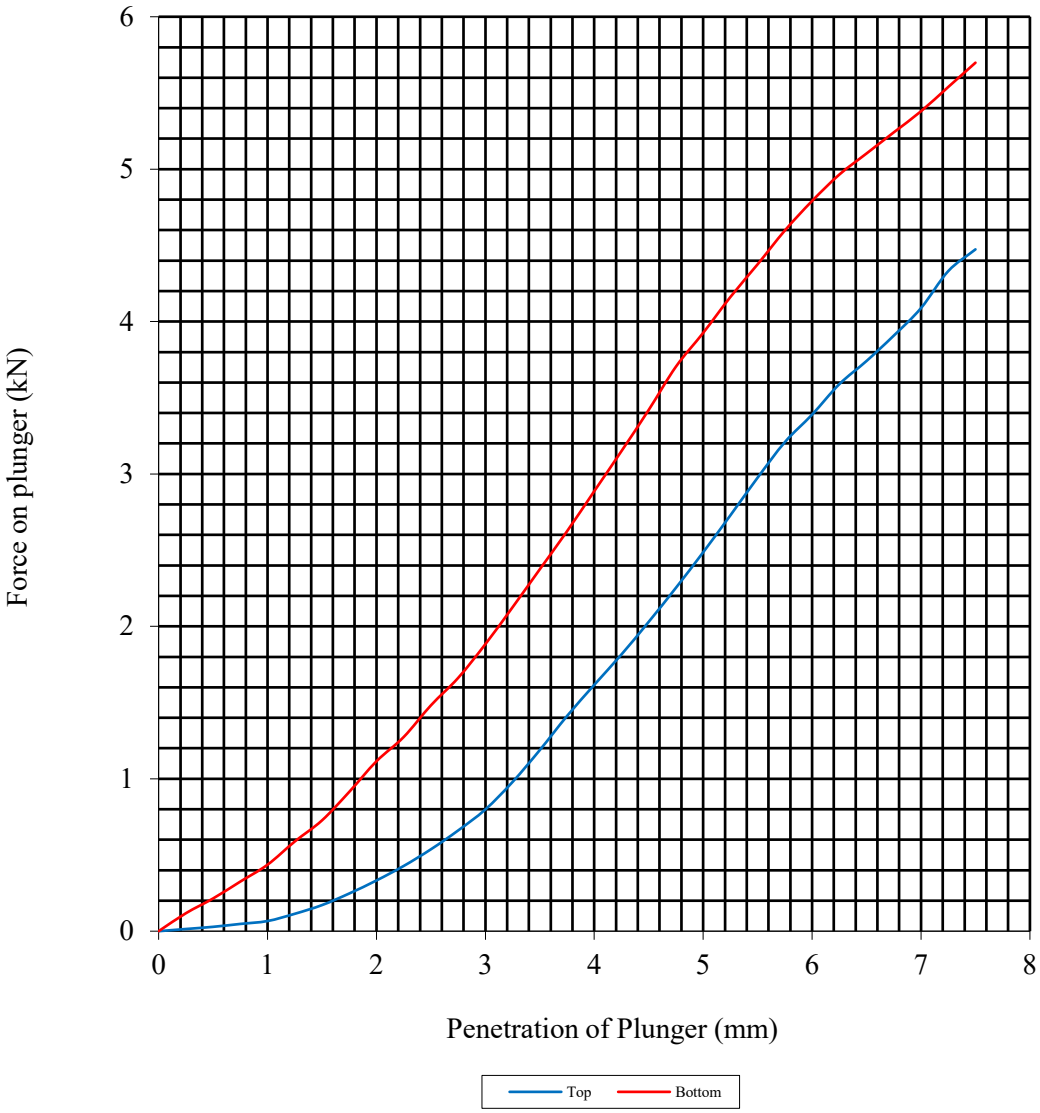
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP108 **Top Depth (m):** 1.25

Sample Number: 3 **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	22	Surcharge Kg:	4.20	Sample Top	22	Sample Top	12.4
Bulk Density Mg/m3:	1.88	Soaking Time hrs	0	Sample Bottom	22	Sample Bottom	19.6
Dry Density Mg/m3:	1.54	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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Deeside Plot H3 amd H5

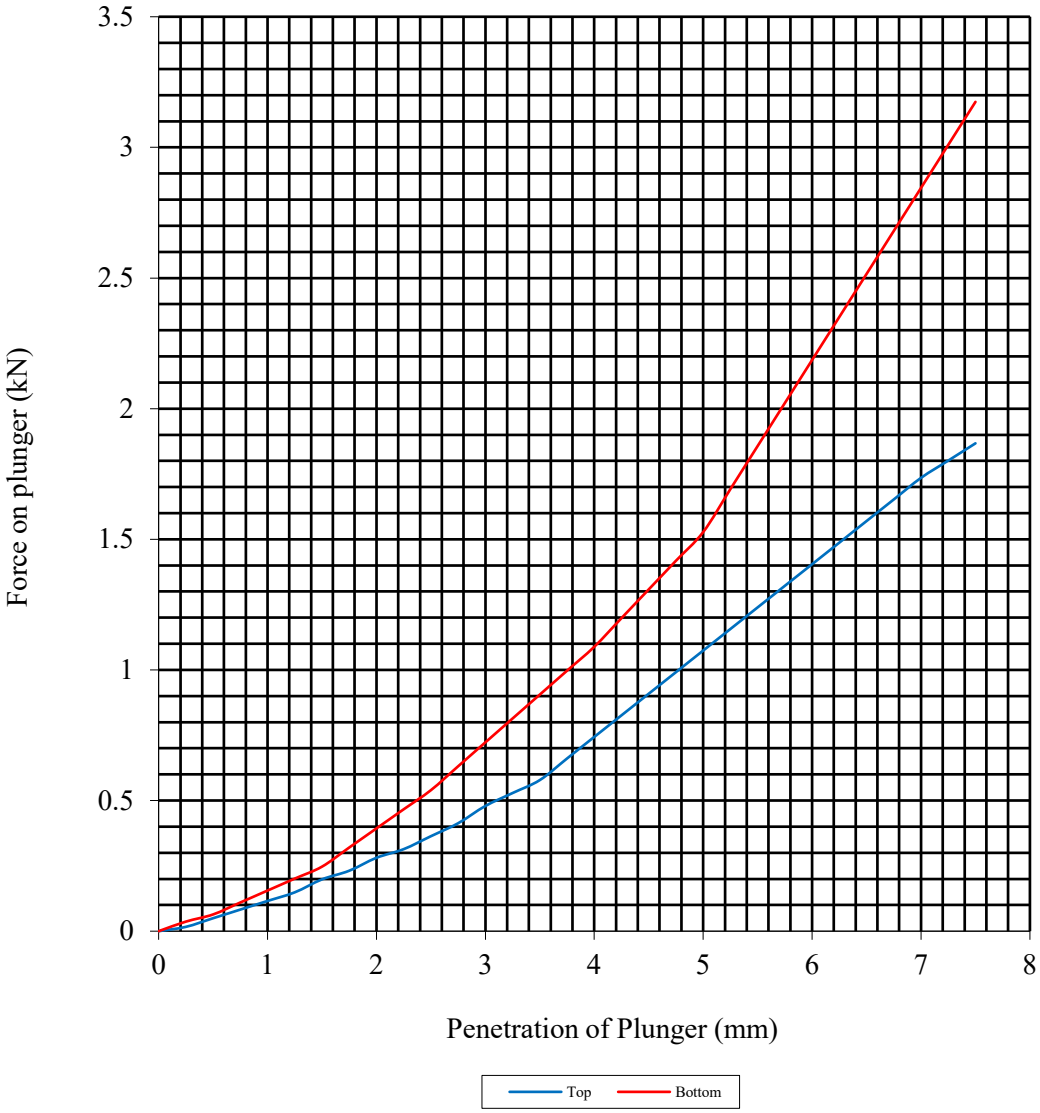
Contract No: PSL20/0958

Client Ref: 4671

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number:	**TP117**	**Top Depth (m):**	**0.20**
Sample Number:	**6**	**Base Depth (m):**	**0.50**
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	5.4
Bulk Density Mg/m3:	1.87	Soaking Time hrs	0	Sample Bottom	24	Sample Bottom	7.6
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

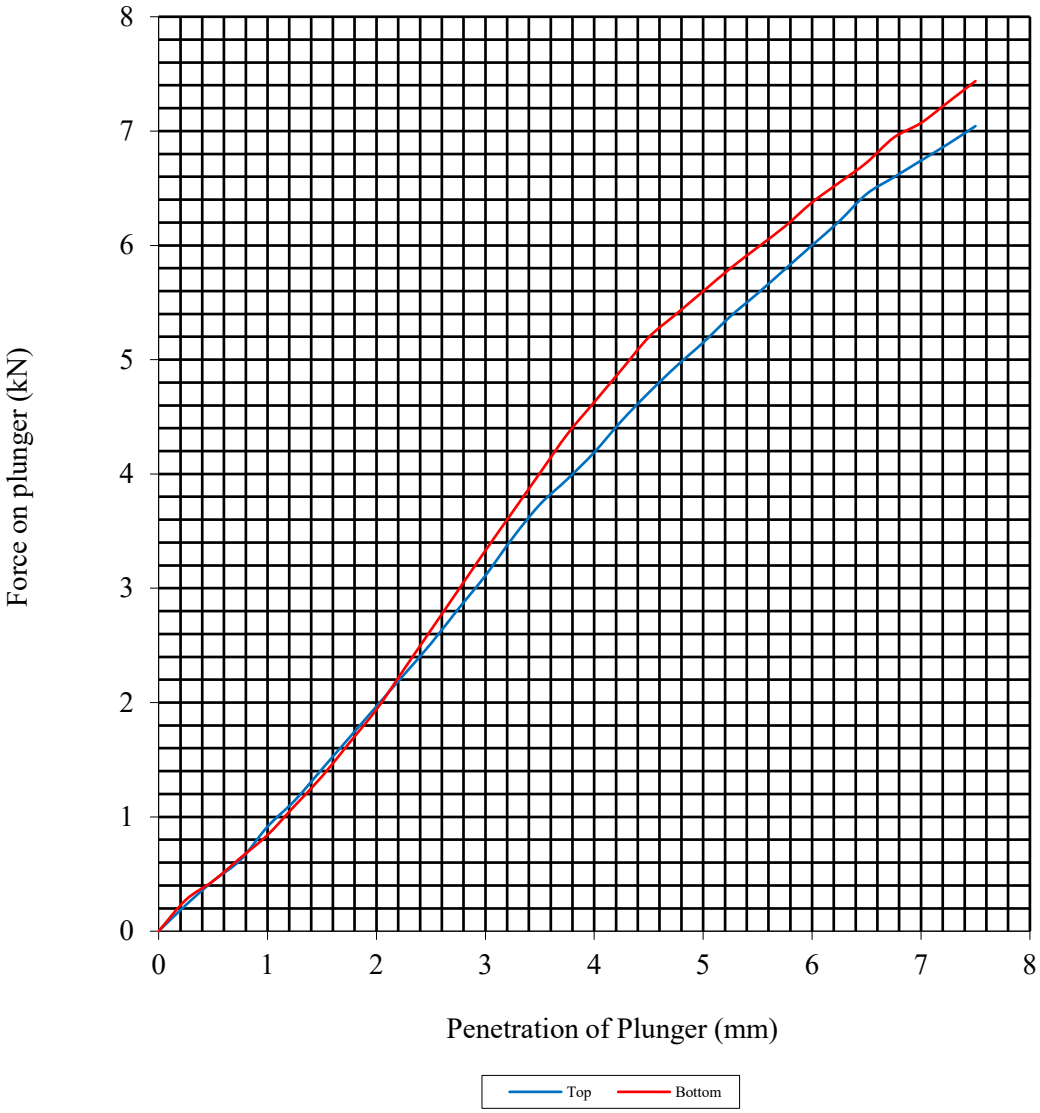
Deeside Plot H3 amd H5

Contract No:
PSL20/0958
Client Ref:
4671

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number:	**TP120**	**Top Depth (m):**	**0.10**
Sample Number:	**3**	**Base Depth (m):**	**0.50**
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	25.8
Bulk Density Mg/m3:	1.89	Soaking Time hrs	0	Sample Bottom	20	Sample Bottom	28.0
Dry Density Mg/m3:	1.57	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

Deeside Plot H3 amd H5

Contract No:
PSL20/0958
Client Ref:
4671

Certificate of Analysis

Certificate Number	20-04577	09-Mar-20
Client	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR	

Our Reference	20-04577
Client Reference	PSL20/0958
Order No	(not supplied)
Contract Title	Deeside Plot H3 and H5
Description	5 Soil samples.
Date Received	03-Mar-20
Date Started	03-Mar-20
Date Completed	09-Mar-20
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

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-04577
Client Ref PSL20/0958
Contract Title Deeside Plot H3 and H5

	Lab No	1648685	1648686	1648687	1648688	1648689
	Sample ID	TP103	TP107	TP111	TP115	TP124
	Depth	0.30-1.30	1.90-2.20	1.60-1.70	1.80-2.50	1.65-1.70
	Other ID	2	3	5	6	8
	Sample Type	B	B	D	B	B
	Sampling Date	n/s	n/s	n/s	n/s	n/s
	Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Inorganics						
pH	DETSC 2008#		pH	8.4	8.4	8.4	8.4	7.5
Organic matter	DETSC 2002#	0.1	%			0.4		
Chloride Aqueous Extract	DETSC 2055	1	mg/l			1.9		
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	< 10	< 10	< 10	12
Sulphur as S, Total	DETSC 2320	0.01	%			0.02		
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06	0.07	0.07	0.07	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 20-04577
Client Ref PSL20/0958
Contract Deeside Plot H3 and H5

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1648685	TP103 0.30-1.30 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	
1648686	TP107 1.90-2.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	
1648687	TP111 1.60-1.70 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
1648688	TP115 1.80-2.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	
1648689	TP124 1.65-1.70 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	

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 F Groundwater and Gas Monitoring Results

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 1
Client: Praxis Real Estate Management Limited
Date: 02.03.2020

CIVIL & STRUCTURAL ENGINEERING

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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	
BH101	0.0	0.0	0.6	0.0	0.0	0.6	2	1	21.1	-0.1	-0.1	0.70	11.00
BH102	0.0	0.0	0.4	0.0	0.0	0.4	2	1	20.8	-0.1	-0.1	0.60	13.50
BH103	0.0	0.0	0.1	0.0	0.0	0.1	2	1	20.8	0.0	0.0	0.50	8.50
BH104	0.0	0.0	0.5	0.0	0.0	0.5	2	1	21.1	0.0	0.0	0.20	15.00

Ambient Concentration (% volume): CH_4 0.0 %v/v; CO_2 0.1 %v/v; O_2 20.9 %v/v

Barometric Pressure: Start 989; End 992
Barometric Pressure Trend: Rising (Regionally Steady)
Weather: Overcast

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: R.Morgan

Key	Remarks
NR - Not Recorded NA - Not Applicable	

	Checked:		Approved:				

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 2

Client: Praxis Real Estate Management Limited
Date: 09.03.2020

CIVIL & STRUCTURAL ENGINEERING

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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	
BH101	0.0	0.0	0.4	0.0	0.0	0.4	0	1	20.7	0.1	0.1	0.94	11.00
BH102	0.0	0.0	0.4	0.0	0.0	0.4	1	0	20.6	0.1	0.1	1.03	13.50
BH103	0.0	0.0	0.8	0.0	0.0	0.8	1	0	19.9	0.0	0.0	0.94	8.50
BH104	0.0	0.0	0.4	0.0	0.0	0.3	1	0	20.6	0.0	0.0	0.79	15.00

Ambient Concentration (% volume): CH_4 0.1 %v/v; CO_2 0.1 %v/v; O_2 20.4 %v/v

Barometric Pressure: Start 1011; End 1012
Barometric Pressure Trend: Rising (Regionally Falling)
Weather: Overcast/Sunny

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: D. Horne

Key	Remarks
NR - Not Recorded NA - Not Applicable	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 3

Client: Praxis Real Estate Management Limited
Date: 18.03.2020

CIVIL & STRUCTURAL ENGINEERING

0

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	
BH101	0.0	0.0	0.1	0.0	0.0	0.1	0	0.0	21.0	0.1	0.1	1.61	11.00
BH102	0.0	0.0	1.0	0.0	0.0	1.0	0	0.0	16.1	0.0	0.0	1.06	13.50
BH103	0.0	0.0	1.8	0.0	0.0	1.8	0	0.0	18.3	0.0	0.0	1.02	8.50
BH104	0.0	0.0	0.2	0.0	0.0	0.2	0	0.0	20.4	0.0	0.0	0.85	15.00

Ambient Concentration (% volume): CH_4 0.0 %v/v; CO_2 0.1 %v/v; O_2 20.9 %v/v

Barometric Pressure: Start 1024; End 1025
Barometric Pressure Trend: Rising (Regionally Steady)
Weather: Overcast

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: B.Whitaker

Key	Remarks
NR - Not Recorded NA - Not Applicable	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 4

Client: Praxis Real Estate Management Limited
Date: 23.03.2020

CIVIL & STRUCTURAL ENGINEERING

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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	
BH101	2.0	0.1	0.7	2.0	0.1	0.7	0	0	19.8	0.0	0.0	1.28	11.00
BH102	2.0	0.1	1.3	2.0	0.1	1.3	1	0	14.3	0.1	0.1	1.19	13.50
BH103	0.0	0.0	2.6	0.0	0.0	2.3	0	0	16.1	0.0	0.0	1.16	8.50
BH104	0.0	0.1	2.5	0.0	0.0	2.5	0	0	10.1	0.1	0.0	1.09	15.00

Ambient Concentration (% volume): **CH4** 0.1 %v/v **CO2** 0.2 %v/v
O2 20.1 %v/v

Barometric Pressure: **Start** 1027
End 1027
Barometric Pressure Trend: Steady (Regionally Steady)
Weather: Sunny/Overcast

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: D. Horne

Key	Remarks
NR - Not Recorded NA - Not Applicable	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 5
Client: Praxis Real Estate Management Limited
Date: 03/07/2020

CIVIL & STRUCTURAL ENGINEERING

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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	
BH101	0.0	0.0	1.5	0.0	0.0	1.5	0	0	20.2	0.0	0.0	1.95	11.00
BH102	2.0	0.1	2.6	2.0	0.1	2.3	1	1	17.9	0.0	0.0	1.85	13.50
BH103	0.0	0.0	2.1	0.0	0.0	2.1	0	0	20.2	0.0	0.0	DRY	8.50
BH104	0.0	0.0	3.0	0.0	0.0	3.0	0	0	19.5	0.0	0.0	DRY	15.00

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

Barometric Pressure: **Start** 1009
End 1010
Barometric Pressure Trend: Rising (Regionally Falling)
Weather: Falling

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: BW

Key	Remarks
NR - Not Recorded NA - Not Applicable	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Deeside Plot D
Job No: 4671
Visit No: 6

Client: Praxis Real Estate Management Limited
Date: 08/07/2020

CIVIL & STRUCTURAL ENGINEERING

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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	
BH101	0.0	0.0	2.4	0.0	0.0	2.4	1	0	20.0	0.0	0.0	1.97	11.00
BH102	2.0	0.1	2.1	2.0	0.1	2.1	1	1	19.1	0.0	0.0	1.85	13.50
BH103	0.0	0.0	2.1	0.0	0.0	2.1	1	0	20.5	0.0	0.0	DRY	8.50
BH104	0.0	0.0	3.0	0.0	0.0	3.0	1	0	17.9	0.0	0.0	DRY	15.00

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

Barometric Pressure: **Start** 1014
End 1015
Barometric Pressure Trend: Rising (Regionally Rising)
Weather: Overcast

Monitoring Equipment: GA5000
Serial Number of Equipment: G505491
Date of Last Calibration: 13.Nov.2019
Operator: BW

Key	Remarks
NR - Not Recorded NA - Not Applicable	

Checked: **Approved:**

SUMMARY OF GROUND GAS MONITORING

BH NO.	Peak CH4 (% v/v) MIN	Peak CH4 (% v/v) MAX	Steady CH4 (% v/v) MIN	Steady CH4 (% v/v) MAX	Peak CO2 (% v/v) MIN	Peak CO2 (% v/v) MAX	Steady CO2 (% v/v) MIN	Steady CO2 (% v/v) MAX	H_2S ppm MAX	CO ppm MAX	O2 (% v/v) MIN	O2 (% v/v) MAX	max limiting bh flow rate for CH4*	max limiting bh flow rate for CO2**	Peak Flow (l/hr) MAX	Steady Flow (l/hr) MAX	SWL (m bgl) MIN	SWL (m bgl) MAX
BH101	0	0.1	0	0.1	0.1	2.4	0.1	2.4	2	1	19.8	21.1	0.0001	0.0024	0.1	0.1	0.70	1.97
BH102	0	0.1	0	0.1	0.4	2.6	0.4	2.3	2	1	14.3	20.8	0.0001	0.0023	0.1	0.1	0.60	1.85
BH103	0	0	0	0	0.1	2.6	0	2.1	2	1	16.1	20.8	0	0	0	0	0.50	1.16
BH104	0	0.1	0	0	0.2	3	0.2	3	2	1	10.1	21.1	0.0001	0	0.1	0	0.20	1.09

* Based of peak CH4 and peak flows.

** Based on steady CO2 and steady flows.

	VISIT 1	VISIT 2	VISIT 3	VISIT 4	VISIT 5	VISIT 6
MB Start	989	1011	1024	1027	1009	1014
MB Finish	992	1012	1025	1027	1010	1015
Pressure Change	Rising (Regionally Steady)	Rising (Regionally Falling)	Rising (Regionally Steady)	Steady (Regionally Steady)	Rising (Regionally Falling)	Rising (Regionally Rising)

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) the use of this document by 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 any information provided by 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 where appropriate. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for 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 receptors, building materials, the environment (including adjacent land) and controlled waters (surface water and groundwater).

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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