



GROUND INVESTIGATION REPORT FOR DEACON PARK, KNOWSLEY

TE1704-TE-00-XX-RP-GE-002-V02

21 AUGUST 2026

FINAL

Prepared for:

EEIP Arundel Propco 2 Holdings Ltd

Prepared by: Stuart Milne & Stefani Ellis

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EXECUTIVE SUMMARY

Introduction	Tier Environmental was commissioned by EEP Arundel Propco 2 Holdings Ltd to undertake a Ground Investigation of Deacon Park. The purpose of the investigation was to determine the nature and extent of soil, bedrock and groundwater beneath the site for the purposes of environmental and geotechnical assessment.
Proposed land use	It is proposed that the site will be developed with a large commercial unit in the centre of the site, with a HGV yard and parking along the east of the site and car parking to the west. The existing entry road to the north will be amended for two-way traffic, whilst the access road in the south will be retained as a fire access track/access to the offsite carpark to the southeast. An attenuation pond will be constructed to the south of this, with soft landscaped areas shown along the northern, western and southern peripheries of the site.
Site location and surrounding land uses	The site is located at Deacon Business Park, Moorgate Road, Kirkby, Knowsley, L33 7RX, which is located within the existing Knowsley Industrial Estate. The surrounding Site uses comprise of commercial/industrial developments to the north, east and south with residential developments to the west.
Site history	The Site remained undeveloped from earliest available mapping (1890) as assumed agricultural land, with the 'Britain Plantation' shown in the north east quadrant of the Site. A factory appeared on Site on mapping from 1960 and the Site was redeveloped as an engineering works by 1968. The land surrounding the Site was predominantly undeveloped fields (assumed agricultural) associated with multiple farms, until the start of the development of the Kirkby Industrial Estate, later Knowsley Industrial Estate, in 1960 to the north, east and south of the Site. No map evidence is available for the Site area during World War II, however publicly available online photographs show that the Royal Ordnance Factory (ROF) Kirkby was situated approx. 245m north of Site during this time period. A residential area (Southdene) appeared on mapping from 1960 to the west of Site. Within the Knowsley Industrial Estate multiple businesses (works, vehicle repair depots, warehouses, engineering works, television repair depots, depots and body repair works) are shown between 80m and 165m south east.
Potential contaminative features	Prior to commencing intrusive investigation: Anticipated widespread Made Ground. Although not recorded on mapping – it was considered possible, due to the fact the Site was detailed as an engineering works on 1966 mapping and a factory prior to this, that unrecorded features associated with these land uses such as tanks, boiler rooms and / or fuel storage area etc may be present, or may have been present, on site. In total, 2 No. circular buildings are shown in the southeast corner of site between 1966 and 2001 which, although not labelled as such, could be tanks or similar storage infrastructure. Within the vicinity of these features, a slight hydrocarbon odour was noted within the bedrock at 4.00m to the base at 4.20m bgl, however testing did not record hydrocarbons to be present in concentrations in excess of the general assessment criteria. An electric substation in the northern part of the Site has been in existence since 1968, although testing undertaken within the previous 2022 ground investigation did not record PCBs to be present within the vicinity. Within the 2022 ground investigation, chrysotile and amosite fibre bundles and bitumen products asbestos was recorded within the Made Ground in a localised area in the north east of the site, at a concentration of 0.006%w/w.
Mining and quarrying	The site is not located within a mining area or an area subject to historic quarrying.
Previous investigations	Tier Environmental have previously undertaken a Preliminary Risk Assessment for the Site, referenced TE1704-TE-00-XX-RP-GE-001-V01 and dated 21 st November 2022. In addition, following this a Preliminary Ground Investigation Report was undertaken, referenced TE1704-TE-00-XX-RP-GE-002-V01 and dated 3 rd January 2023.
Fieldwork	The additional ground investigation was conducted between 2nd and 5th February 2026 and comprised the following: • 9 No. Trial pits to depths of between 0.65m and 3.60m bgl; • 8 No. window sample holes to depths of between 0.98m and 3.40m bgl; • 3 No. cable percussion boreholes to depths of between 3.55m and 5.90m bgl; • 6 No. hand dug pits for asbestos delineation surrounding WS103, to depths of between 0.43m and 0.60m bgl; • 12 No. hand dug pits for cone penetration testing to 1.20m bgl, of which 8 No. were progressed with cone penetration testing to depths of between 3.68m and 5.26m
Laboratory testing	Samples of soil, soil leachate and groundwater were submitted for analysis of a range of metal, other inorganic and organic components including asbestos. Geotechnical testing was scheduled on selected samples. All testing was undertaken at accredited laboratories.
Ground conditions	Made Ground was encountered to varying depths across the site, generally of limited thickness within the north (0.20m to 0.60m), deepening towards the centre (0.60m to 0.75m), further deepening towards the south (up to 4.65m bgl), potentially associated with infilling of a former watercourse in this area of the site. Made Ground generally comprised granular deposits in the north, and granular and cohesive deposits in the south. The Made Ground is underlain by the Chester Sandstone Formation, which is weathered in the upper horizons, with solid bedrock encountered within the majority of the exploratory holes that achieved refusal from depths of between 0.30m at WS101 in the north west and 5.15m bgl in WS106A in the south.



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Foundations and floor slabs	The most suitable foundation and floor slab solutions for the site would likely be a hybrid pad and vibro stone column solution, founded upon the Chester Sandstone Formation to avoid differential settlement. Where bedrock is shallow in the north, pad foundations could be utilised, founding within the competent Chester Sandstone bedrock, with vibro stone columns utilised beneath the majority of the building footprint. The approximate anticipated extent of pads/vibro stone columns beneath the site is shown in Drawing no TE1704-TE-00-XX-DR-GE-008-V01. The clay across site (where encountered) is expected to have been in situ since the construction of the current building in the 1970s and is therefore unlikely to cause any consolidation issues with the use of VSCs. It should be noted that pre-auguring at vibrostone column locations may be required due to the high SPT values recorded within the Made Ground and weathered Chester Sandstone Formation. A turnover would also be required to remove the foundations of the existing building and obstructions recorded in Table 6 1. It should be noted that the variable ground conditions recorded beneath the centre and south of the proposed building footprint may be representative of naturally occurring competent strata at approximately 1.00m bgl. Vibro Stone Columns have been recommended for this area; however it may be beneficial to undertake further delineation via trial pitting between the Made Ground and natural soils within this area when greater access is available (i.e. following demolition of the existing building and removal of the floor slab). The findings may show pads could be utilised instead of VSCs further southward within a portion of the central area currently shown within Drawing no. TE1704-TE-00-XX-DR-GE-008-V01. The undertaking of ground improvement techniques is a specialist job and the advice of a reputable local contractor familiar with the type of ground and groundwater conditions encountered on this site should be sought prior to finalising the design.
Sulphate class	It is considered that a Design Sulphate Class of DS-2 and ACEC Class AC-2 is appropriate for buried concrete at the site in contact with the Made Ground, whilst DS-1 AC-1 is applicable for buried concrete in contact with natural ground only.
Contamination – human health	Chrysotile and amosite fibre bundles and bitumen products asbestos were recorded at a concentration of 0.006%/w/w within the Made Ground within WS103 during the 2022 investigation. Asbestos was not recorded within the hand dug pits undertaken 1.00m and 5.00m north, east and south of this location, suggesting the concentrations are localised to WS103 only. All future works in this area, locally, will need to be undertaken in accordance with CAR2012 regulations. Other than the localised presence of asbestos, no measured soil concentrations of potential contaminants of concern have been reported in excess of Generic Assessment Criteria (GACs) protective of human health appropriate to the proposed land use. Neither of the samples of asphalt tested recorded the presence of coal tar, and PCBs were not recorded above the laboratory detection limits in samples taken from the vicinity of the electric substation.
Contamination – controlled waters	The majority of the Site (with the exception of the far western boundary) is shown to be underlain by an artificial deposit of Made Ground. The majority of the Site is shown to be underlain by superficial deposits of the Shirdley Hill Sand Formation (a Secondary A Aquifer) and the far southern extent of the Site is shown to be underlain by Diamicton Devensian Till (a Secondary Unproductive Aquifer). The bedrock beneath the Site and surrounding area is the Chester Sandstone Formation (a Principal Aquifer). The Site is situated within a Source Protection Zone; Type 3 – Total Catchment. There are no recorded potable or non-potable abstractions within 250m of the Site. The nearest surfaced water feature is an unnamed inland river not influenced by normal tidal action located 247m south of Site. Groundwater flow is assumed to be in a south / south-westerly direction based upon the topography of the Site. On this basis the controlled waters sensitivity is regarded as being moderate. The previous Tier 2023 investigation recorded measured groundwater concentrations of arsenic, copper, nickel, zinc, fluoranthene, benzo(a)pyrene, sum PAHs and ammonia in excess of the WQS protective of the controlled waters environment by either the same order of magnitude or one order of magnitude. Given the marginal nature of these exceedances, the potential for significant dilution between the Site and the nearest surface water receptor (an unnamed pond located 115m southeast) or the nearest running water feature (an unnamed inland river located 247m south), the absence of a continuous groundwater body beneath the site, the fact that the Site will incorporate buildings / hardstanding and a dedicated drainage system that shall reduce infiltration rates through the soils, the historical commercial/industrial heritage of the site, and the moderate sensitivity of the controlled waters environment, and that the distance to the nearest active groundwater abstraction point is 845m north and none within 1km hydraulically downgradient, these exceedances are not expected to have pose a significant risk to controlled waters beneath the site; however, it is recommended that this conclusion is reviewed and pre-agreed with the Contaminated Land Officer at the Local Authority / Environment Agency otherwise further investigation and risk assessment may be necessary.
Gas protection	Gas Screening Value of 0.1118 l/hr has been calculated for the site, based on a maximum carbon dioxide concentration of 7.7% v/v, a maximum methane concentration of 8.6% v/v and a maximum representative flow rate of 1.3 l/hr. Whilst this places the site within Characteristic Situation 2 –low risk, further consideration has been undertaken to demonstrate that when taking into account the wider ground gas regime, the effect of groundwater pumping, and the conceptual site model, it is not considered necessary to increase the Characteristic Situation beyond that of a CS1-Very Low Risk scenario as has been determined via the borehole hazardous gas flow rates. Therefore, no gas protection measures are required for the proposed building.



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Radon requirements	Basic radon protection measures are not required for the proposed development on this site.
Waste soils classification	Basic waste characterisation has determined that Made Ground soils are non-hazardous requiring disposal to a non-hazardous landfill with the following exceptions: - The Made Ground at WS108 at 0.90m bgl is classed as hazardous due to an elevated TPH concentration. - The Made Ground at WS107 at 3.60m bgl, WS109 at 0.40m bgl and WS205 at 0.25m bgl is classed as suitable for disposal at an inert waste landfill It should be noted that the natural sandstone within WS105 at 4.00m bgl is classed as hazardous waste due to an elevated TPH concentration. A hydrocarbon odour was recorded for this material at this depth, which was not encountered within this material elsewhere across the site, and is therefore considered to be limited to this location only. The remainder of natural deposits and bedrock materials are expected to be suitable for disposal as inert waste.
Materials re-use	Subject to volumetric cut and fill requirements the majority of Made Ground materials and all of natural soil materials and may be considered chemically suitable for potential re-use without remediation or special considerations (excluding the asbestos hotspot recorded within the surrounding 1.00m vicinity of WS103 – see recommendations below) and in line with an appropriate end-of-waste protocol such as WRAP Quality Protocol for Aggregates from Inert Waste, U1 Exemption or a Materials Management Plan in accordance with the CL:AIRE Definition of Waste Code of Practice (DoWCoP). Suitability for re-use would also be subject to confirmation of the geotechnical suitability depending on whether the materials are to be re-used in load bearing areas. This would need to be detailed in a supporting document. Please note that any previously landfilled or mining waste materials may not be appropriately subject to consideration under DoWCoP and may not be re-used under DoWCoP unless sufficient lines of evidence and agreement with the local Environment Agency Waste Team can be sought beforehand. In addition, Section 13.3 of this report includes statements with respect to re-use of excavated and stockpiled clean naturally occurring soils within the site and re-use on other sites. These statements are designed to provide a clear intention to reuse any clean, naturally occurring soils derived from future excavations at this site (which may also include temporary future stockpiling these materials).
Further Recommended Works	The following recommendations have been made: - It may be beneficial to undertake further delineation via trial pitting between the Made Ground and natural soils within the central area of the site, when greater access is available (i.e. following demolition of the existing building and removal of the floor slab). The findings may show pads could be utilised further southward instead of VSCs within a portion of the central area currently shown as requiring vibro stone columns (see Drawing no. TE1704-TE-00-XX-DR-GE-008-V01). - Alternatively, if detailed records are made regarding the depth and position of existing foundations during the grubbing out/demolition works, it may be possible to determine the extent of competent strata for pads within this area from this information. - The asbestos containing Made Ground within 1.00m vicinity of WS103 (Chrysotile and amosite fibre bundles and bitumen products asbestos at 0.006%w/w) will require removal and disposal to a suitably licensed landfill. Alternatively, if no excavation is to occur within this area, it could remain in situ if the area is to be covered by hardstanding (subject to approval from the contaminated land officer). All works in this area will need to be undertaken in accordance with CAR:2012 regulations



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1. INTRODUCTION

Tier Environmental was commissioned by EEIP Arundel Propco 2 Holdings Ltd to undertake a Land Contamination Risk Management (LCRM) Ground Investigation for an area of land referred to as Deacon Park, located at Deacon Business Park, Moorgate Road North, Knowsley, Liverpool L33 7RX (the "site").

The title of this report is in accordance with that described in the Land Contamination Risk Management guidance (available at <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>) which has superseded CLR 11:

Stage 1:

- LCRM Tier 1 Preliminary Risk Assessment Report
- LCRM Tier 2 Generic Quantitative Risk Assessment Report

1.1. Proposed Development

Under current proposals the development will comprise a large commercial unit in the centre of the site, with a HGV yard and parking along the east of the site and car parking to the west. The existing entry road to the north will be amended for two-way traffic, whilst the access road in the south will be retained as a fire access track/access to the offsite carpark to the southeast. An attenuation pond will be constructed to the south of this, with soft landscaped areas shown along the northern, western and southern peripheries of the site. The proposed layout drawing is presented in Appendix A.

As such, in accordance with the '*Updated technical background to the CLEA model*' (Environment Agency, 2009) and '*Suitable 4 Use Levels*' (LQM / CIEH 2015) the proposed generic land use for this development is commercial/industrial).

1.2. Previous Reports

Tier Environmental have previously completed the following reports (on behalf of EEIP Arundel Propco 2 Holdings Ltd):

- A Preliminary Risk Assessment Report (Ref:TE1704-TE-00-XX-GE-RP-001-V01, dated 21st November 2022)
- A Preliminary Ground Investigation Report (Ref: TE1704-TE-00-XX-GE-RP-002-V01, dated 3rd January 2023)

1.3. Objectives

Taking into account the proposed development of the site, the objectives of this appraisal were:

- To determine the historical and current land use.
- To establish the environmental setting of the site.
- To evaluate whether past mining or other extractive industries could have an influence on the site.
- To review previous pertinent reports;
- To determine current ground and groundwater conditions.
- To determine the potential risks to human health and the wider environment.
- To provide a preliminary waste soils classification.



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- To determine potential risks posed to the site from hazardous ground gases and / or vapours.
- Provide preliminary outline remedial measures to manage any identified risks.
- To provide preliminary geotechnical parameters to inform floor slab and foundation recommendations.

1.4. Assumptions

The following assumptions are made in this report:

- It is assumed that ground levels will not change significantly from those described in this report or as shown on proposed development drawings. If this is not the case, then amendments to the recommendations made in this report may be required.
- The ground investigation has been designed with due consideration of known or suspected constraints (including underground services and access constraints).
- Any references to observations of suspected asbestos-containing materials are for information only and should be verified by a suitably qualified asbestos specialist and/or confirmed by laboratory analysis.
- The use of the term 'Topsoil' within this report is based on a visual identification only and that these materials have not been classified in accordance with BS3882:2015.
- The use of the terms 'shallow' and 'deep' within this report (from a geotechnical perspective) assume *typically* between ground level to circa 3.00m below ground level (bgl) for 'shallow' and greater than 3.00m bgl regarded as 'deep';
- The comments and opinions presented in this report are based on the findings of the desk study, ground conditions encountered during intrusive investigation works performed by Tier Environmental (during 2022 and 2026) and the results of tests carried out within one or more laboratories. There may be other conditions prevailing on the site which have not been revealed by this investigation and which have not been taken into account by this report.
- Responsibility cannot be accepted for any conditions not revealed by this investigation. Any diagram or opinion on the possible configuration of the findings is conjectural and given for guidance only. Confirmation of intermediate ground conditions should be undertaken if deemed necessary.

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2. SITE DETAILS AND DESCRIPTION

Table 2-1 Current Site Overview.

Site name	Deacon Business Park, Knowsley.
Site address	Deacon Business Park, Moorgate Road, Southdene, Kirkby, Knowsley, L33 7RX. A site location plan is included as Drawing No. TE1704-TE-00-XX-DR-GE-001-V01 within Appendix A.
National Grid Reference (NGR)	342534, 397564.
Approximate Site area	9.38 ha.
Site shape	The site is broadly rectangular in shape.
Current land use on the Site	The Site is currently occupied by a now empty commercial warehouse development, with associated offices, ancillary buildings and roadways/parking. Tier Environmental conducted a Site walkover on 9th November 2022 and highlighted the following: • 3 No above ground diesel tanks in the southwest of Site to supply site buildings including a lab, cardboard manufacturer, call centre and offices (2No. remain on site in 2026). • LPG tank in northwest corner used for forklifts for B&M (no longer on site in 2026 ground investigation). • Hydraulically operated weighbridges at northwest site entrance (no longer in use in 2026). • Grease interceptor in the canteen of B&M which drains into foul sewer (no longer in use in 2026). • Water tank in north of the Site used to supply on site sprinklers. • Electrical substation along northern Site boundary, with additional ones inside main factory building (recorded to be on first floor) • On site waste storage area (rubbish and recycling, no longer on site in 2026). • Potential asbestos roofs on warehouse. No obvious contamination was noted during the site walkover or the 2026 ground investigation.
Surrounding land uses	The surrounding site uses comprise of commercial/industrial developments to the north, east and south with residential developments to the west.
General topography and ground levels	OS Mapping shows the north east corner of the site situated approx. 35m AOD, sloping away to 30m AOD in the southwest corner. The majority of the site area is relatively level (built up in the south and southwest). The surrounding area's topography also follows this pattern and generally slopes off towards the south / southwest.

An aerial photograph (from the Groundsure report) of the site and site boundary is shown below. Relevant site photographs are presented in Appendix F.



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Figure 2.1 2022 Aerial Photograph from Groundsure





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3. PREVIOUS INVESTIGATION FINDINGS

Table 3-1 Tier 2023 GIR Summary

Introduction	Tier Environmental was commissioned by EEIP Arundel Propco 2 Holdings Ltd to undertake a Preliminary Ground Investigation of Deacon Business Park, Knowsley. The purpose of the investigation was to determine the nature and extent of soil, bedrock and groundwater beneath the Site for the purposes of environmental and geotechnical assessment. The Site was occupied at the time of the investigation thereby limiting the nature and extent of the ground investigation works possible at this stage.
Proposed land use	It is proposed that the existing buildings on site will be demolished, and the site will be developed as warehouse (use class B8) with ancillary offices, reconfigured points of access, new security gatehouses and associated works. Areas of proposed soft landscaping are located in the perimeter parts of the south, west and north of the Site.
Site location and surrounding land uses	The site is located at Deacon Business Park, Moorgate Road, Kirkby, Knowsley, L33 7RX, which is located within the existing Knowsley Industrial Estate. The surrounding Site uses comprise of commercial/industrial developments to the north, east and south with residential developments to the west.
Site history	The Site remained undeveloped from earliest available mapping (1890) as assumed agricultural land, with the 'Britain Plantation' shown in the north east quadrant of the Site. A factory appeared on Site on mapping from 1960 and the Site was redeveloped as an engineering works by 1968. The land surrounding the Site was predominantly undeveloped fields (assumed agricultural) associated with multiple farms, until the start of the development of the Kirkby Industrial Estate, later Knowsley Industrial Estate, in 1960 to the north, east and south of the Site. No map evidence is available for the Site area during World War II, however publicly available online photographs show that the Royal Ordnance Factory (ROF) Kirkby was situated approx. 245m north of Site during this time period. A residential area (Southdene) appeared on mapping from 1960 to the west of Site. Within the Knowsley Industrial Estate multiple businesses (works, vehicle repair depots, warehouses, engineering works, television repair depots, depots and body repair works) are shown between 80m and 165m south east.
Potential contaminative features	Anticipated widespread Made Ground. Although not recorded on mapping – it is possible, due to the fact the Site was detailed as an engineering works on 1966 mapping and a factory prior to this, that unrecorded features associated with these land uses such as tanks, boiler rooms and / or fuel storage area etc may be present, or may have been present, on site. In total, 2 No. circular buildings are shown in the southeast corner of site between 1966 and 2001 which, although not labelled as such, could be tanks or similar storage infrastructure. An electric substation in the northern part of the Site has been in existence since 1968 and may present a potential source of PCBs. The Phase 1 Preliminary Risk Assessment has determined a moderate to moderate/low risk to human health and a low to medium/low risk to controlled waters at the Site with respect to potential contamination and a moderate / low risk to high risk to human health with respect to hazardous ground gases.
Mining and quarrying	The site is not located within a mining area or an area subject to historic quarrying.
Previous investigations	Tier Environmental have previously undertaken a Preliminary Risk Assessment for the Site, referenced TE1704-TE-00-XX-RP-GE-001-V01 and dated 21 st November 2022.
Fieldwork	A total of 9 no. window sample holes were undertaken across the site, 7 no. of which have been installed with gas and groundwater monitoring wells.
Laboratory testing	Samples of soil and groundwater were submitted for analysis of a range of metal, other inorganic and organic components including asbestos. Geotechnical testing was scheduled on selected samples. All testing was undertaken at accredited laboratories.
Ground conditions	Made Ground was encountered across the site, comprising asphalt, concrete or block paving at the surface and generally overlying granular Made Ground to depths of between 0.28m and 4.65m bgl, generally recorded to deepen towards the south west. Cohesive Made Ground was encountered within the south of the site. Made Ground was generally underlain by a limited thickness of weathered bedrock recovered as sand, overlying sandstone bedrock of the Chester Sandstone Formation. The groundwater flow is understood to flow towards the south west based on Tier Environmental's knowledge of the surrounding area, however, groundwater encountered during this preliminary ground investigation appears to be relatively discontinuous beneath the site. Groundwater strikes during the ground investigation and subsequent groundwater monitoring visits demonstrate a range between 0.35m and 4.55m bgl, seemingly independent of topography.
Ground stability	The south and west of the site appears to have been built up by around up to 4 to 5m to form a relatively level development platform for the current building. No signs of slope instability were observed in these areas during the ground investigation.



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Foundations and floor slabs	Several possibilities are considered for foundations and floor slabs including: pads founded within the Chester Sandstone and excavation and compaction of Made Ground (with possible conditioning/lime stabilisation of soft clays) or vibro stone columns beneath the building footprint in order to utilise a ground bearing floor slab; a hybrid pad foundation where shallow bedrock is present with a piled foundation where deeper Made Ground is present, again with excavation and compaction of Made Ground (with possible conditioning/lime stabilisation of soft clays) or vibro stone columns beneath the building footprint in order to utilise a ground bearing floor slab; Vibro Stone Columns for both foundations and a ground bearing floor slab; or Rapid Impact Compaction beneath pad foundations and Rolling Dynamic Compaction of the Made Ground in order to utilise a ground bearing floor slab. Specialist ground improvement contractors have been contacted to advise on the suitability of ground improvement techniques.
Sulphate class	Based on the results of the preliminary ground investigation, a Design Sulphate Class of DS-1 and ACEC Class AC-1 is appropriate for buried concrete at the Site.
Contamination – Human Health	Chrysotile and amosite fibre bundles and bitumen products asbestos has been recorded within the Made Ground in a localised area in the north east of the site, at a concentration of 0.006%w/w. Works in this area will need to be undertaken in accordance with CAR:2012 regulations. Other than the localised presence of asbestos, no measured soil concentrations of potential contaminants of concern have been reported in excess of Generic Assessment Criteria (GACs) protective of human health appropriate to the proposed land use. On this basis, it is not considered that the site represents a potential risk to end-users. Neither of the samples of asphalt tested recorded the presence of coal tar, and PCBs were not recorded above the laboratory detection limits in samples taken from the vicinity of the electric substation.
Contamination – Controlled Waters	The majority of the Site (with the exception of the far western boundary) is shown to be underlain by an artificial deposit of Made Ground. The majority of the Site is shown to be underlain by superficial deposits of the Shirdley Hill Sand Formation (a Secondary A Aquifer) and the far southern extent of the Site is shown to be underlain by Diamicton Devensian Till (a Secondary Unproductive Aquifer). The bedrock beneath the Site and surrounding area is the Chester Sandstone Formation (a Principal Aquifer). The Site is situated within a Source Protection Zone; Type 3 – Total Catchment. There are no recorded potable or non-potable abstractions within 250m of the Site. The nearest surfaced water feature is an unnamed inland river not influenced by normal tidal action located 247m south of Site. Groundwater flow is assumed to be in a south / south-westerly direction based upon the topography of the Site. On this basis the controlled waters sensitivity is regarded as being moderate. Measured groundwater concentrations of arsenic, copper, nickel, zinc, fluoranthene, benzo(a)pyrene, sum PAHs and ammonia have been reported in excess of the WQS protective of the controlled waters environment by either the same order of magnitude or one order of magnitude. Given the marginal nature of these exceedances, the potential for significant dilution between the Site and the nearest surface water receptor (an unnamed pond located 115m southeast) or the nearest running water feature (an unnamed inland river located 247m south), the absence of a continuous groundwater body beneath the site, the fact that the Site will incorporate buildings / hardstanding and a dedicated drainage system that shall reduce infiltration rates through the soils, the historical commercial/industrial heritage of the site, and the moderate sensitivity of the controlled waters environment, and that the distance to the nearest active groundwater abstraction point is 845m north and none within 1km hydraulically downgradient, these exceedances are not expected to have pose a significant risk to controlled waters beneath the site; however, it is recommended that this conclusion is reviewed and pre-agreed with the Contaminated Land Officer at the Local Authority / Environment Agency otherwise further investigation and risk assessment may be necessary.
Gas protection	A worst-case preliminary Gas Screening Value (GSV) of 0.147 l/hr has been calculated for the Site after 2 No. preliminary ground gas monitoring visits based on a maximum elevated reported peak carbon dioxide concentration of 4.2 % v/v and a maximum reported peak flow rate of 3.5 l/hr. These places the Site in a Characteristic Situation 2 – Low Risk Scenario and given that the maximum reported carbon monoxide concentration has been reported in excess of the workplace long term exposure limit and WHO long term (24 hours) indoor exposure guideline value, it is considered that there the preliminary assessment indicates the possibility that basic ground gas protection measures may be required for the Site. However, this should be reassessed upon the completion of any future additional ground gas monitoring visits required to achieve the minimum requirements under CIRIA C665.
Radon Requirements	Basic radon protection measures are not currently required for the proposed development on this Site.
Soakaways	Future supplementary ground investigation could also include infiltration testing to assess the suitability of the underlying weathered sandstone bedrock for the use of soakaways.
Further works	The following is recommended for the Site: - A supplementary ground investigation (likely post demolition) to target areas of the site that were inaccessible during this investigation, including areas within the current building footprint; - This should include additional gas monitoring, targeting areas beneath the building footprint and that have recorded atypical results during this investigation, to provide a total of 4no. monitoring visits.. - Future supplementary ground investigation should also include infiltration testing to assess the suitability of the underlying weathered sandstone bedrock for the use of soakaways.



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	- Further geotechnical testing, including compaction testing, should be undertaken to aid earthworks design. - Further assessment and/or delineation, excavation and reuse under hardstanding/the building footprint or suitable disposal of asbestos impacted Made Ground within the north east of the site. Works in this area will need to be undertaken in accordance with CAR:2012 regulations. - A clean cover system is not required following the above recommendations for the asbestos impacted Made Ground are followed. However a minimum 300mm of suitable growing medium may be required for areas of soft landscaping to allow sufficient plant growth – this should be confirmed by a landscape specialist.
Waste Soils Classification	Basic waste characterisation has demonstrated that 2 No. of the samples of the Made Ground (WS108 at 0.90m and WS109 at 0.40m bgl) and 1 no. sample of the bedrock (WS105 at 4.00m bgl where hydrocarbon contamination was observed) tested have been classified as hazardous waste. The remaining samples tested have been classified as non-hazardous. The 2 No. samples of granular and cohesive Made Ground that were submitted for Waste Acceptance Criteria testing demonstrate that both materials tested are suitable for disposal to an inert waste landfill.
Materials re-use	Subject to volumetric cut and fill requirements the majority of Made Ground materials and natural soil materials may be considered chemically suitable for potential re-use subject to the implementation of remedial measures summarised below and to careful management and placement of materials and in line with an appropriate end-of-waste protocol such as WRAP Quality Protocol for Aggregates from Inert Waste, U1 Exemption or a Materials Management Plan in accordance with the CL:AIRE Definition of Waste Code of Practice (DoWCoP). Suitability for re-use would also be subject to confirmation of the geotechnical suitability depending on whether the materials are to be re-used in load bearing areas. This would need to be detailed in a supporting document. Please note that any previously landfilled or mining waste materials may not be appropriately subject to consideration under DoWCoP and may not be re-used under DoWCoP unless sufficient lines of evidence and agreement with the local Environment Agency Waste Team can be sought beforehand. In addition, Section 13.3 of this report includes statements with respect to re-use of excavated and stockpiled clean naturally occurring soils within the site and re-use on other sites. These statements are designed to provide a clear intention to reuse any clean, naturally occurring soils derived from future excavations at this Site (which may also include temporary future stockpiling these materials).
Outline Remediation Strategy	The following remediation activities are required: - Further assessment and/or delineation, excavation and reuse under hardstanding/the building footprint or suitable disposal of asbestos impacted Made Ground within the north east of the site. Works in this area will need to be undertaken in accordance with CAR:2012 regulations. - A clean cover system is not required following the above recommendations for the asbestos impacted Made Ground are followed. However a minimum 300mm of suitable growing medium may be required for areas of soft landscaping to allow sufficient plant growth – this should be confirmed by a landscape specialist. The above recommendations are subject to reassessment upon the completion of any future supplementary ground investigation works and identification of any additional or previously undiscovered contamination.



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4. REGULATOR PROVIDED INFORMATION

As part of this phase of works relevant searches for the site have been conducted by the Fire Service, Petroleum Licensing authority, Environmental Agency and. The Petroleum Licensing authority response is still outstanding however all other responses pertinent information has been summarised below:

Fire Service

Tier Environmental submitted a request under the Freedom of Information Act. The Merseyside Fire & Rescue Service has supplied redacted, confirmation-only disclosure information. After review of the site historical files and records, the Merseyside Fire & Rescue Service has identified:

- An overheating of a JCB within the warehouse which was put out using Water Delivery - Hosereel – high pressure, CO2 (2009).
- A fire incident up to 5m due to Combustible articles too close to heat source (or fire) within the call centre, first floor canteen which required no firefighting (2012).
- A fire incident of between 11-20 meters due to faulty fuel supplies of a 20 tonne articulated digger within an animal a food cereal production and storage warehouse which was put out using Water Delivery - Hosereel – high pressure, Water Delivery - Main line/jet (2009).
- A fire incident up to 5m due to accumulation of flammable material at a purpose built single storey factory in the external compaction unit which was put out using Water Delivery - Hosereel – high pressure (2010).

It should be noted however, that the GMFRS are unlikely to possess any records of heating oil tanks that may be present on site.

Environment Agency

A review of the information by the Environment Agency and pertinent information is summarised below:

- 1 No. instance of shallow diesel contamination excavated in 1998 at QVC (ex-bus depot), Hornhouse lane, Knowsley industrial park, Kirkby, Knowsley located as close as 305m northeast of site. No major groundwater contamination was recorded during the excavation and the distance from site is greater than 250m therefore there isn't a contamination pathway on to site.
- 1 No. pollution incident recorded of elevated levels of TCE & DCE in the groundwater in 2005 after a TCE spillage in 1995 at Yorkshire Copper Tube Ltd (formerly IMI Kynoch Ltd) located 660m southeast of the site. This contamination is much more than 250m from site and therefore there isn't a contamination pathway.

Local Authority

A review of the information by the Knowsley Council and pertinent information is summarised below:

- Historical maps indicate an engineering works, electricity substation, embankments/earthworks associated with historical development, and drainage ditches (on site and off site) which are all consistent with the findings of the preliminary risk assessment.



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5. PRELIMINARY CONCEPTUAL SITE MODEL

Based on the information provided in the previous sections of this report a combined preliminary conceptual site model and conceptual exposure model has been developed for the proposed future land use. This summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors. In assessing the likely contaminants of concern present at the site, reference has also been made to Defra and Environment Agency supporting documentation. A preliminary qualitative risk assessment has also been made of the likelihood of the linkage operating and its potential significance in accordance with CIRIA C552.

The potential pollutant linkages identified and the qualitative risk assessment for these are presented in Table 5-1 below. The terms used in the preliminary qualitative risk assessment are defined in Appendix I.

5.1. Uncertainties

The following uncertainties exist in the preliminary conceptual model:

- The presence of any features unrecorded by the historic maps.
- Any unrecorded geological features.
- Any unrecorded pollution events during the site's history.



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Table 5-1 Preliminary Assessment of Potential Pollutant Linkages (Continued on Next Page).

Justification / Comments
- The Site is currently occupied by a commercial warehouse development, with associated offices, ancillary buildings and roadways and parking. The surrounding Site uses comprise of commercial/industrial developments to the north, east and south with residential developments to the west. - Site walkover detailed: 3 No diesel tanks in the southwest of Site to supply site buildings including a lab, cardboard manufacturer, call centre and offices, LPG tank in northwest corner used for forklifts for B&M, hydraulically operated weighbridges at northwest site entrance, grease interceptor in the canteen of B&M which drains into foul sewer, water tank in north of the Site used to supply on site sprinklers, electrical substation along northern Site boundary, with additional ones inside main factory building, on site waste storage area (rubbish and recycling) and asbestos roofs on warehouse, with likely more unrecorded asbestos around Site. - The Site remained undeveloped from earliest available mapping (1890) as assumed agricultural land, with the 'Britain Plantation' shown in the north east quadrant of the Site. A Factory appeared on Site on mapping from 1960 (labelled as an engineering works on the 1966 maps) The land surrounding the Site was predominantly undeveloped fields (assumed agricultural) associated with multiple farms, until the development of the Kirkby, later Knowsley, Industrial Estate started being developed in 1960 to the north, east and south of the Site. A residential area (Southdene) appeared on mapping from 1960 to the west of Site. within the Knowsley Industrial estate multiple businesses (works, vehicle repair depots, warehouses, engineering works, television repair depots and body repair works) are shown between 80m and 165m south east on 1966 map, on Faraday Road and Abercrombie Road. An electric substation is shown in the north of the Site (from 1968) that may represent a potential source of Poly Chlorinated Biphenyls. - The Site is shown to be located within an area of artificial ground, and given the history of development on Site, Made Ground is anticipated. GroundSure mapping shows Made Ground present across the majority of the Site, with only the very western edge shown not to have any artificial ground The Site walkover highlighted that the site has been raised up, which can be seen along the western edge of Site by a raised grass verge up to Site. - Superficial deposits of Devensian (Diamicton) Till are shown to cover the majority of the Site. The southeast of the Site is shown to have superficial deposits of the Shirdley Hill Sand Formation. - The Site is shown as underlain by Bedrock of the Chester Sandstone Formation. 3 No. aquifers are present on Site. The Superficial Shirdley Hill Sand Formation and Till deposits are classed as a Secondary A Aquifer and a Secondary Undifferentiated Aquifer respectively. The bedrock is classed as a Principal Aquifer. The superficial and the bedrock aquifers are all classed as high vulnerability. It is assumed based on topography, that groundwater flow is south / southwest. - There are no potable water abstractions within 1km, or non-potable abstractions recorded within 500m of the Site. A pump was shown associated with Gore's Farm (470m northeast of Site) on mapping until 1966, after which it no longer appears. The Site is situated within a 'Type 3 – Total Catchment' Source Protection Zone. - The nearest surface water feature is shown 115m southeast of the Site as an unnamed pond. The nearest running water feature is shown 247m south as an unnamed inland river not influenced by normal tidal action. - There are no active or recent landfills recorded within 250m of Site. There is 1 No. historical waste site located 214m north. There is 1 No. waste exemption on site for CGL – Knowsley Integrated Recovery Service for treating waste. A further 8 No. waste exemptions are in place between 150m to 171m east of the Site for storing, treating and using waste. - Less than 1% of the properties in the Site area are above the radon action level. - It is anticipated that Made Ground and relict roots, tree stumps and organic rich materials beneath the Site in the northeast associated with the former plantation may present potential sources of ground gas. - The Site is situated within a Nitrate Vulnerable Zone. The Site is not located within an ecologically sensitive area.



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Source	Potential Contaminants of Concern	Pathway	Receptor	Consequence	Probability	Qualitative Risk Assessment
Anticipated widespread Made Ground associated with the site's former use as an unspecified factory, engineering works, site levels being raised as shown along the western site boundary and current land uses.	Metals PAHs pH Hexavalent chromium	Direct contact, dust inhalation and ingestion	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits	Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
		Migration via water pipes	Future site users (commercial)	Severe	Likely	High Risk
		Lateral and/or vertical migration of mobile contaminants.	Aquifer 1 - Secondary A Aquifer associated with Shirdley Hill Sand Formation	Medium	Low Likelihood	Moderate / Low Risk
			Aquifer 2 - Secondary (Undifferentiated) Aquifer associated with Till.	Mild	Low Likelihood	Low Risk
			Aquifer 3 - Principal Aquifer associated with Chester Sandstone Formation	Medium	Low Likelihood	Moderate / Low Risk
			Pond 115m southeast and Inland River not influenced by tidal action located approximately 247m south	Medium	Unlikely	Low Risk
	Naphthalene (a semi-volatile PAH) TPH / BTEX / MTBE VOCs / SVOCs Phenols PolyChlorinated Biphenyls (PCBs)	Vapour inhalation, direct contact, dust inhalation and ingestion	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits	Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
		Migration via water pipes	Future site users (commercial)	Severe	Likely	High Risk
		Lateral and/or vertical migration of mobile contaminants.	Aquifer 1 - Secondary A Aquifer associated with Shirdley Hill Sand Formation	Medium	Low Likelihood	Moderate / Low Risk
			Aquifer 2 - Secondary (Undifferentiated) Aquifer associated with Till.	Mild	Low Likelihood	Low Risk
			Aquifer 3 - Principal Aquifer associated with Chester Sandstone Formation	Medium	Low Likelihood	Moderate / Low Risk
			Inland River not influenced by tidal action located approximately 247m south	Medium	Low Likelihood	Moderate / Low Risk
	Asbestos	(Dust migration and) dust inhalation	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate / Low Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate / Low Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
Electric substation in the north of the site (present since Circa 1968, 3 No. diesel tanks, LPG tank) and potential unrecorded tanks / boiler rooms / fuel storage areas etc based on the sites historic use as an engineering works – 4 No. circular buildings were shown in the southeast corner of site on maps between 1966 and 2001	PAHs pH	Direct contact, dust inhalation and ingestion	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits	Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
		Migration via water pipes	Future site users (commercial)	Severe	Likely	High Risk
		Lateral and/or vertical migration of mobile contaminants.	Aquifer 1 - Secondary A Aquifer associated with Shirdley Hill Sand Formation	Medium	Low Likelihood	Moderate / Low Risk
			Aquifer 2 - Secondary (Undifferentiated) Aquifer associated with Till.	Mild	Low Likelihood	Low Risk
			Aquifer 3 - Principal Aquifer associated with Chester Sandstone Formation	Medium	Low Likelihood	Moderate / Low Risk
			Inland River not influenced by tidal action located approximately 247m south	Medium	Low Likelihood	Moderate / Low Risk
		Vapour inhalation, direct contact, dust inhalation and ingestion	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk



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Source	Potential Contaminants of Concern	Pathway	Receptor	Consequence	Probability	Qualitative Risk Assessment
	Naphthalene (a semi-volatile PAH) TPH / BTEX / MTBE VOCs / SVOCs Phenols PolyChlorinated Biphenyls (PCBs)		Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits	Adjacent site users (commercial)	Severe	Low Likelihood	Moderate Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate Risk
		Migration via water pipes	Future site users (commercial)	Severe	Likely	High Risk
		Lateral and/or vertical migration of mobile contaminants.	Aquifer 1 - Secondary A Aquifer associated with Shirdley Hill Sand Formation	Medium	Low Likelihood	Moderate / Low Risk
			Aquifer 2 - Secondary (Undifferentiated) Aquifer associated with Till.	Mild	Low Likelihood	Low Risk
			Aquifer 3 - Principal Aquifer associated with Chester Sandstone Formation	Medium	Low Likelihood	Moderate / Low Risk
			Inland River not influenced by tidal action located approximately 247m south	Medium	Low Likelihood	Moderate / Low Risk
	Asbestos (from any potential lagging etc surrounding any tank or similar infrastructure)	(Dust migration and) dust inhalation	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate / Low Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate / Low Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
Anticipated Made Ground located beneath the site and relict roots, tree stumps and organic rich materials beneath the site in the northeast associated with the former plantation.	Hazardous ground gasses (methane, carbon dioxide, hydrogen sulphide, carbon monoxide and depleted oxygen)	Inhalation (indoor and outdoor)	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate / Low Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate / Low Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk
		Migration of hazardous ground gases from beneath the Site to adjacent sites along services or other preferential conduits	Adjacent site users (commercial)	Severe	Low Likelihood	Moderate / Low Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate / Low Risk
		Migration of ground gas / explosion	Buildings and services	Severe	Low Likelihood	Moderate / Low Risk

For definition of the terms used in the qualitative risk assessment, please see Appendix I.



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6. FIELDWORK

The information contained in this report is limited to areas of land accessible during the ground investigation within the site boundary, as indicated on the site plan, presented in Appendix A as Drawing No. TE1704-TE-00-XX-DR-GE-005-V04.

Tier Environmental scoped the intrusive ground investigation using guidance presented in:

- BS 10175:2011+A2:2017;
- Land Contamination Risk Management (LCRM) - <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>;
- BS 5930:2015+A1:2020;
- BS EN 1997:2004 and 2007.

Tier Environmental's standard strata description criteria are compliant with the above guidance.

6.1. Scope of Ground Investigation

The ground investigation was conducted between 2nd and 5th February 2026 and was supervised by a suitably qualified Tier Environmental engineer. Table 6-1 below provides a summary of the exploratory holes completed and rationale. Exploratory hole locations are presented on Drawing No. TE1704-TE-00-XX-DR-GE-005-V04.

Table 6-1 Scope of Ground Investigation and Rationale

Exploratory Hole Type	Exploratory Hole Reference	Exploratory Hole Depths (m bgl)	Rationale
Trial pits	TP01 to TP09	0.65m to 3.60m bgl	To confirm the shallow ground conditions across the site, relatively shallow groundwater presence and rate of inflow, stability of excavations, and to enable shallow soil sampling for geotechnical and geoenvironmental parameters.
Window sample boreholes	WS201 to WS208	0.98m to 3.40m bgl	To confirm the shallow ground conditions across the site, conduct <i>in situ</i> geotechnical tests, facilitate soil sampling for geotechnical and geoenvironmental parameters and installation of gas and groundwater monitoring wells.
Cable percussion boreholes	CP01 to CP03	3.55m to 5.90m bgl	To confirm the deeper ground conditions across the existing building footprint, , conduct <i>in situ</i> geotechnical tests, and to facilitate soil sampling for geotechnical and geoenvironmental parameters.
Hand dug pits	HDP201, HDP202, HDP205 to HDP208	0.43m to 0.60m bgl	To obtain samples for asbestos delineation surrounding WS103.
Cone Penetration Testing	CPT01 to CPT12	1.20m to 5.26m bgl	Hand dug pits were excavated to 1.20m bgl for service clearance. Locations CPT01 to CPT03, CPT05, CPT07 to CPT10 were progressed to refusal depth with cone penetration testing.

The following constraints were identified during the ground investigation works:

- Existing services were present across the site. Whilst the majority were no longer live, live HV electricity cables were present within the north of the building and within the northeast, leading from the northeast of the building over to an adjacent premises.



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- The existing roofing rafters and joists (and overhead services) limited the locations that the Trial Pits and Cable Percussion Boreholes could be located to allow sufficient clearance.
- The southern portion of main the building (hatched red on Drawing No. TE1704-TE-00-XX-DR-GE-005-V04) was not accessible during the ground investigation due to restricted headroom and low lighting conditions.
- The western half of the building was not accessible to the CPT rig due to width restriction at the limited access points between the eastern and western halves of the building.
- CPT locations CPT04, CPT06, CPT11 and CPT12 were undertaken as hand dug pits to 1.20m bgl only. Cone penetration testing was not undertaken in these locations due to time constraints.
- Hand dug pits to allow CPT testing within the western car park were started, however could not progress generally beyond 0.30m bgl due to groundwater ingress causing repeated side collapse preventing further hand digging beyond this depth.
- Hand dug pits surrounding WS103 were proposed at 1m and 5m intervals north, east, south and west of the original WS103 location were asbestos was recorded. However due to services within the footpath, HDP203 (1m west of WS103) could not be undertaken. The proposed location HDP204 (5m west of WS103) could also not be undertaken due to the proximity of services within the footpath and the building walls.

Table 6-2 Scope of Monitoring Installations

Exploratory Hole Location	Strata Targeted	Slotted Response Zone (m bgl)	Rationale
WS202	Weathered Chester Sandstone Formation	0.50m to 1.00m	Targeting shallow groundwater monitoring body.
WS203	Made Ground and Weathered Chester Sandstone Formation	0.50m to 1.00m	Targeting shallow Made Ground and groundwater monitoring body.
WS204	Made Ground and Weathered Chester Sandstone Formation	0.50m to 1.00m	Targeting shallow Made Ground and groundwater monitoring body.
WS205	Made Ground	0.50m to 2.00m	Targeting shallow Made Ground and groundwater monitoring body.
WS206	Made Ground	0.50m to 2.00m	Targeting shallow Made Ground and groundwater monitoring body.
WS103 (2022 investigation)	Made Ground and Weathered Chester Sandstone Formation	0.30 to 0.70	Targeting shallow ground gas Made Ground source and potential perched groundwater body
WS104 (2022 investigation)	Made Ground and Weathered Chester Sandstone Formation	0.40 to 1.10	Targeting shallow ground gas Made Ground source and potential perched groundwater body
WS105 (2022 investigation)	Made Ground and Weathered Chester Sandstone Formation	1.00 to 4.00	Targeting shallow ground gas Made Ground source and potential perched groundwater body
WS106A (2022 investigation)	Made Ground and Weathered Chester Sandstone Formation	1.00 to 4.90	Targeting shallow ground gas Made Ground source and deeper groundwater body
WS107 (2022 investigation)	Made Ground	0.50 to 4.40	Targeting shallow ground gas Made Ground source and perched groundwater body
WS108 (2022 investigation)	Made Ground	0.40 to 1.40	Targeting shallow ground gas Made Ground source and potential perched groundwater body
WS109 (2022 investigation)	Made Ground, Weathered Chester Sandstone Formation, Chester Sandstone Formation	0.70 to 1.70	Targeting shallow ground gas Made Ground source and potential perched groundwater body



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Depths and accurate descriptions of strata and groundwater observations made during investigation works, together with details of the samples recovered, are presented on the Engineer's exploratory hole records in Appendix B.

6.2. Geoenvironmental Testing

Sampling and QA/QC protocols are presented in Appendix M. Tier Environmental's schedule of chemical laboratory testing is presented in Table 6-3. The testing was carried out by Element Materials Technology, a UKAS and MCerts (where appropriate for soils analysis) accredited laboratory.

Human Health and Preliminary Waste Classification Laboratory Testing

Based upon the conclusions of the preliminary risk assessment, Tier Environmental scheduled chemical laboratory testing on selected soil samples. The purpose of the testing was to:

- Determine the concentration and spatial distribution of potential contaminants of concern in the Made Ground;
- Determine the chemical composition and properties of the shallow natural soils;
- Determine the nature and extent of any hydrocarbon impacts in the vicinity of the above ground tanks;
- Delineate the extent of asbestos contamination previously recorded within the Made Ground within WS103 in the northeast of the site;
- Undertake a *preliminary* soils waste classification and waste disposal route determination.

Table 6-3 Schedule of Chemical Testing for Human Health Risk Assessment and Preliminary Waste Soils Assessment.

Laboratory analysis	Made Ground 1	Made Ground 2	Made Ground 3	Made Ground 4
Tier Environmental soil suite*	1	1	3	2
Asbestos screen	3	7	3	4
Speciated TPH / BTEX / MTBE	1	1	2	2
VOCs / SVOCs	1	1	2	1
PCBs	2	1	2	1
Total, free and complex cyanides	-	1	2	-
Glycols	1	-	2	-
Waste Acceptance Criteria (WAC)	1	1	1	-

*For definition of Tier Environmental analytical suites, please see Appendix M. NA - not applicable.

Controlled Waters Laboratory Testing

Groundwater testing was undertaken during the 2022 preliminary ground investigation, and was not considered necessary within this supplementary ground investigation. The 2022 results will be summarised within the relevant sections of this report.



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6.3. Geotechnical Testing

Geotechnical laboratory testing was scheduled by Tier Environmental on selected samples as presented in Table 6-4. The testing was performed by Murray Rix Ltd, a UKAS accredited laboratory. Test certificates including details of appropriate testing standards are presented in Appendix D and discussed in Section 8, below.

Table 6-4 Geotechnical Laboratory Testing Schedule.

Test	Stratum type	Number of tests	Rationale
1. General			
Moisture content	MG4	3	a) Assist with the determination of consistency of soil with depth. b) Assess desiccation of soils. c) Suitability of materials for reuse within earthworks.
2. Classification			
Atterberg limit	MG4	3	a) Volume change potential. b) Plasticity assessment (comply with Eurocode 7 description) c) Consistency Index. d) Determine soil type (e.g., clay/silt). e) Use as an empirical guide to soil shear strength
Particle size distribution (wet/dry sieve)	MG1	1	a) Classify soils for earthworks purposes.
	MG2	1	b) Establish type of soil (comply with Eurocode 7 description).
	MG4	1	
	Weathered Chester Sandstone Formation	2	
3. Chemical tests			
pH (soil)	MG1	1	Determine correct class of concrete for both natural and made ground with specific tests for sites potentially containing sulphides (e.g., pyrites) or at low ph.
	MG2	1	
	MG3	3	
	MG4	2	
Water-soluble sulphate (soil)	MG1	1	
	MG2	1	
	MG3	3	
	MG4	2	
4. Compaction			
2.5 kg rammer dry density/moisture content relationship test	MG1	1	Establish maximum dry density and optimum moisture content of materials to assess suitability for reuse within earthworks
	MG4	1	
	Chester Sandstone Formation	1	
4.5 kg rammer dry density/moisture content relationship test	MG1	1	
	Weathered Chester Sandstone Formation	1	



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7. GROUND CONDITIONS

The following section provides a summary of the ground conditions encountered during the ground investigation including strata profile, obstructions and visual / olfactory evidence of contamination. Exploratory hole logs are provided in Appendix B.

Photographs of ground investigation works are provided in Appendix F.

7.1. Strata Descriptions

Ground conditions were recorded to be broadly consistent with the 2022 ground investigation findings (which have been included within the strata descriptions below).

Made Ground – Hardstanding

Concrete Strong greyish brown CONCRETE with medium to high aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar approx Ø10mm generally around 0.10m bgl	
Locations encountered	CP02, CP03, WS201 to WS204, WS206, WS207, TP01, TP03 to TP07, TP09, HDP208 (beneath asphalt) (WS102, WS104, WS109 from 2022 investigation)
Depths encountered from top of stratum (range)	Ground level to 0.09
Depths encountered to base of stratum (range)	0.10m to 0.59m bgl
Thickness (range)	0.10m to 0.59m, typically around 0.25m to 0.30m
Spatial location on site	All locations within the building footprint, within the loading yard in the east of the site (2022 investigation)
ASPHALT 1 no. layer within WS101, WS102, WS106 and WS107 (all 2022), whilst within HDP201, HDP202, HDP205 to HDP208, and WS103 (2022) an upper layer of around 0.05m thickness and lower dark grey layer of further approx 0.15m thickness was encountered).	
Locations encountered	CP01, WS208, TP08, HDP201, CPT01 to CPT06 WS101, WS102, WS103, WS106, WS107
Depths encountered from top of stratum (range)	Ground level (and 0.80m bgl within WS106 (2022) only)
Depths encountered to base of stratum (range)	0.06m to 0.29m bgl (1.00m bgl within WS106(2022))
Thickness (range)	0.06m to 0.29m
Spatial location on site	North, east, south of building, west only in road immediately west of the existing building. Within the south of the Site gravel of asphalt was encountered within WS106 (2022) only
BLOCK PAVING	
Locations encountered	WS205, TP02 WS108, WS109
Depths encountered from top of stratum (range)	Ground level
Depths encountered to base of stratum (range)	0.05m to 0.15m bgl
Thickness (range)	0.05m to 0.15m
Spatial location on site	Western car park



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Made Ground Topsoil

Locations encountered	WS105, WS106, WS106A
Depths encountered from top of stratum (range)	Ground level
Depths encountered to base of stratum (range)	0.1m to 0.35m bgl
Thickness (range)	0.1m to 0.35m
Spatial location on site	South and south east within limited soft landscaped areas
General description	MADE GROUND: Dark brown slightly clayey SAND with frequent rootlets, dark brown sandy CLAY within WS105 only.

Made Ground – MG1

Locations encountered	CP01, WS201, WS203, WS206, WS208, TP01 to TP09, HDP201, HDP202, HDP205 to HDP207, CPT01 to CPTCPT10, CPT12 WS103 to WS106, WS106A, TO WS109 (2022)
Depths encountered from top of stratum (range)	0.05m to 1.00m bgl
Depths encountered to base of stratum (range)	0.15m to 1.55m bgl
Thickness (range)	0.02 to 0.65m (>0.80m in TP08 - base not proven)
Spatial location on site	Widespread across the Site, no strong spatial correlation with thickness observed
General description	MADE GROUND: Grey slightly sandy to sandy, slightly clayey, fine to coarse angular to subangular GRAVEL of limestone (visually consistent with MOT Type 1). MADE GROUND: Grey to brown sandy to sandy, slightly clayey, fine to coarse angular to subangular GRAVEL of limestone and mixed lithologies including brick, concrete, sandstone and occasional clinker/ash.

Made Ground – MG2

Locations encountered	CP01, WS202, WS203, TP03, TP06, TP07, TP09, HDP201, HDP202, HDP205 to HDP208, CPT01 to CPT12 WS102, WS103 (2022)
Depths encountered from top of stratum (range)	0.18 to 0.50m bgl
Depths encountered to base of stratum (range)	0.40m to 1.00m bgl (>1.20 in CPT11 and CPT12 - base not proven)
Thickness (range)	0.02m to 0.80m (>1.08m where base not proven)
Spatial location on site	Mostly within the east of the building, to the north east and south within external areas
General description	MADE GROUND: Dense brownish red/ red grey and brown sandy, fine to coarse angular to subangular GRAVEL of possible burnt shale and brick with ash inclusions towards the south of the site.



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Made Ground – MG3

Locations encountered	CP01, WS207, WS208, TP02, TP04, TP05, TP09, HDP201, HDP202, HDP205 to HDP208, CPT02 to CPT06 WS108 (2022)
Depths encountered from top of stratum (range)	0.20m to 0.85m bgl
Depths encountered to base of stratum (range)	0.45m to 1.70m bgl (base not proven in multiple shallow excavations)
Thickness (range)	0.06m to 1.10m (base not proven in multiple shallow excavations)
Spatial location on site	Widespread across the site
General description	MADE GROUND: Dark brownish grey, slightly gravelly fine grained SAND. Gravel is fine to medium angular to subangular of brick and sandstone with occasional clinker, burnt shale and coal.

Made Ground – MG4

Locations encountered	CP01, WS201, WS204 to WS206, TP02, TP05, CPT01 to CPT05 WS105, WS106A, WS107 (2022)
Depths encountered from top of stratum (range)	0.20 to 1.00m bgl
Depths encountered to base of stratum (range)	0.62m to 4.65m bgl
Thickness (range)	0.20m to 3.90m
Spatial location on site	Predominantly in the southern half of the site
General description	MADE GROUND: Soft to firm or friable brownish grey to reddish brown, slightly sandy to sandy, gravelly CLAY. Gravel is fine to coarse, angular to subangular of brick, limestone, sandstone, occasional coal, clinker and metal. MADE GROUND: Stiff, dark grey, sandy organic CLAY (TP02 only).

Weathered Bedrock – Chester Sandstone Formation (Granular)

Weathered Chester Sandstone Formation - Sand/ Sandy Gravel	
Locations encountered	CP02, CP03, WS201 to WS204, WS207, WS208, TP01 to TP07, TP09, CPT07 to CPT10 WS101, WS103 to WS105, WS106A, WS107 to WS109 (2022)
Depths encountered from top of stratum (range)	0.20m to 4.65 bgl
Depths encountered to base of stratum (range)	0.30m to 5.15m bgl
Thickness (range)	0.02m to 1.45m
Spatial location on site	Widespread across the Site, no strong spatial correlation with thickness observed
General description	Very loose becoming medium dense to dense reddish brown, occasionally slightly gravelly to gravelly, fine to medium grained SAND. Gravel is medium to coarse, subangular of sandstone. Reddish brown, slightly clayey, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of sandstone



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Weathered Bedrock – Chester Sandstone Formation (Cohesive)

Weathered Chester Sandstone Formation – Sandy Gravelly Clay	
Locations encountered	CP02, WS205, WS207, WS208, TP06, TP07, TP09
Depths encountered from top of stratum (range)	0.80m to 2.30 bgl
Depths encountered to base of stratum (range)	1.60m to 3.40m bgl
Thickness (range)	0.60m to 2.40m
Spatial location on site	Southern third of the building footprint
General description	Firm to stiff, reddish brown, slightly sandy to sandy, slightly gravelly, CLAY. Gravel is fine to medium, angular to subangular of sandstone. Sand is fine.

Bedrock – Chester Sandstone Formation

Extremely weak to weak reddish brown fine to medium grained SANDSTONE.	
Locations encountered	CP01 to CP03, WS201 to WS205, WS208, TP01 to TP05 WS01 to WS106, WS106A, WS107 to WS109 (2022)
Depths encountered from top of stratum (range)	0.30 to 5.15m bgl
Depths encountered to base of stratum (range)	Base not encountered
Thickness (range)	Base not encountered
Spatial location on site	Widespread across the Site, reported to be shallowest in north and deepest in south west, indicating a south westerly dip direction
General description	Extremely weak to weak red to yellowish brown fine to medium grained SANDSTONE, often recovered as sand and gravel.

7.2. Obstructions

The following potential obstructions/ underground services were encountered during the ground investigation works.

Table 7-1 Obstructions and Underground Services Summary Table

Exploratory Hole Location	Location on Site	Depths recorded from (m bgl)	Depth of Base of Feature (m bgl)	General description and comments
WS206	Centre (within building)	2.00	>2.11	Concrete. SPT was able to penetrate 0.11m suggesting weak/weathered concrete at surface of obstruction.
WS207	Southeast	0.40	0.55	Clay pipe within concrete floor slab.
TP02	Northwest (adjacent to WS109 – see below)	0.25	0.30	Concrete slab with occasional rebar approx. diameter of 5mm, within eastern end of pit only. Assumed to be associated with nearby bike/din shelter footings.
TP08	South	0.90	>1.00	Plastic pipe approx. diameter of 100mm at 0.90m bgl. Concrete obstruction with rebar approx. diameter of 15mm in the northern half of the pit
WS109 (2022)	North west	0.20	0.30	Concrete slab



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7.3. Visual and Olfactory Evidence of Contamination

A summary of visual and/or olfactory evidence of contamination, ash and organic rich materials noted during both the current and 2022 Tier Environmental investigations is summarised in Table 7-2 below:

Table 7-2 Visual and/or Olfactory Evidence of Contamination, Ash and Organic Rich Materials Summary

Exploratory Hole Location	Depth Range (m bgl) Encountered From	Depth Range (m bgl) Encountered To	Location on Site	Description
CP01	0.20	0.60	South	Ash present within Made Ground
CP02	1.00		Southwest	Pockets of black organic material around 1.00m bgl (natural sand/clay boundary)
TP02	0.50	0.70	Northwest	MADE GROUND: Stiff, dark grey, sandy, organic CLAY with slight organic odour and occasional organic fragments (vegetation)
CPT01	0.20	1.00	South	Ash present within Made Ground
CPT02	0.22	0.70	South	Ash present within Made Ground
CPT03	0.18	0.75	South	Ash present within Made Ground
CPT05	0.15	0.52	South	Ash present within Made Ground
	0.52	0.72	Southwest	MADE GROUND: Black / dark grey, slightly sandy, slightly clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of clinker and ash. Occasional cobbles of clinker Slight hydrocarbon odour.
CPT06	0.17	0.85	Southwest	Ash present within Made Ground
WS105 (2022)	4.00	>4.20	North of the offsite tanks	Slight hydrocarbon odour in bedrock
WS106A (2022)	1.60	2.10	South of site	Slight organic odour in Made Ground, and black in colour
WS106A (2022)	2.10	3.30	South of site	Occasional rootlets and organic (wood) fragments

7.4. Groundwater Observations During Fieldwork

Table 7-3 below provides a summary of the groundwater observations during the fieldworks. Further information of groundwater observed is presented in the exploratory hole logs in Appendix B.

Table 7-3 Field Observations of Groundwater.

Exploratory hole	Strike (m bgl)	Rise in groundwater after 20 mins. (m bgl)	Formation	Observations
WS206	1.50	No rise	Made Ground	Perched groundwater within Made Ground
TP02	0.50	No rise	Made Ground	Slow drip. Perched groundwater within Made Ground
	0.75	No rise	Made Ground	Slow drip. Perched groundwater within Made Ground



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Exploratory hole	Strike (m bgl)	Rise in groundwater after 20 mins. (m bgl)	Formation	Observations
	1.60	No rise	Base of weathered sandstone	Slow drip. Discontinuous groundwater body
TP03	1.60	1.55	Base of weathered sandstone	Slow trickle. Discontinuous groundwater body
TP06	3.60	No rise	Within weathered sandstone	Slow drip within eastern and western trial pit faces. Discontinuous groundwater body
TP08	0.90	No rise	Made Ground	Slow seepage from pocket of brick rubble in southeastern corner of trial pit. Perched groundwater within Made Ground.
WS106 (2022)	0.60	0.60	Made Ground	Perched groundwater body
WS106A (2022)	0.65	0.65	Made Ground	Perched groundwater body
WS107 (2022)	0.40	0.40	Made Ground	Perched groundwater body

7.5. Groundwater Monitoring

Table 7-4 below provides a summary of the groundwater monitoring results conducted to date. In total, 4 No. visits have been carried out, inclusive of the 2 No. visits undertaken during the 2022 investigation (28th November and 12th December 2022) and the 2 No. visits undertaken during the additional works (3rd March and 13th March 2026). The 2022 locations were monitored during the 2026 visits, with the exception of WS105 and WS106A which could not be located, and were presumed to have been destroyed.

Table 7-4 Groundwater Monitoring Results Summary

Exploratory hole	Response Zone	Depth range (m bgl)	Formation	Observations
WS202	0.50 to 1.00	ND	Weathered Chester Sandstone Formation	None
WS203	0.50 to 1.00	ND	Made Ground and Weathered Chester Sandstone Formation	None
WS204	0.50 to 1.00	ND	Made Ground and Weathered Chester Sandstone Formation	None
WS206	1.00 to 2.00	1.67 to 1.72	Made Ground	Perched groundwater body
WS103 (2022 location)	0.30 to 0.70	0.66 to ND	Made Ground and Weathered Chester Sandstone Formation	Perched groundwater body, not recorded during 2022 monitoring
WS104 (2022 location)	0.40 to 1.10	1.04 to ND	Made Ground and Weathered Chester Sandstone Formation	Perched groundwater body, not recorded during 2022 monitoring
WS105 (2022 location)	1.00 to 4.00	2.90 to 3.98	Weathered Chester Sandstone Formation	Discontinuous groundwater body
WS106A (2022 location)	1.00 to 4.90	4.55	Made Ground	Perched groundwater body
WS107 (2022 location)	0.50 to 4.40	0.25 to 0.42	Made Ground	Perched groundwater body
WS108 (2022 location)	0.40 to 1.40	1.12 to 1.92	Made Ground	Perched groundwater body
WS109 (2022 location)	0.70 to 1.70	1.20 to 1.65	Chester Sandstone Formation	Discontinuous groundwater body

ND – None Detected



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8. PRELIMINARY GEOTECHNICAL ASSESSMENT

8.1. Determination of pH and Water-Soluble Sulphate

Consideration of Chloride and Nitrate

In accordance with BRE SD1 for ground suspected of containing mineral acids of industrial origin, a determination must be made as to whether Chloride (Cl) and Nitrate (NO₃) need to be analysed. In the event that they do, and elevated concentrations of Cl and NO₃ are reported, this may indicate that hydrochloric and nitric acids (HCl and HNO₃) are present. The effect of these acids on concrete is likely to be similar to that of sulfuric acid; so, for classification purposes, their chemically equivalent sulphate concentration should be calculated and added to any actual soluble sulphate present (as SO₄ mg/l) in the respective samples: SO₄ equivalent of Cl = Cl x 1.35mg/l SO₄ equivalent of NO₃ = NO₃ x 0.77mg/l.

Firstly a determination has been made as to whether a significant number of reported pH values are lower than pH 5.5. If they are, then amounts of chloride and nitrate (NO₃) should also be determined (in mg/l) in addition to sulphate content.

The conclusion of this assessment is that a significant number of pH values are not lower than pH 5.5 and so no further consideration of Chloride (Cl) and Nitrate (NO₃) needs to be conducted.

Consideration of Magnesium Levels

In accordance with BRE SD1, when the water soluble sulphate concentration or groundwater sulphate concentration is greater than 3000mg/l, an additional consideration of the level of magnesium is required.

In this instance, no reported concentrations of water soluble sulphate or sulphate in groundwater have been reported above 3,000mg/l and therefore no further consideration of magnesium has been made.

In accordance with BRE SD1, there is no need to take magnesium levels into account for natural ground – the 'm' suffix Design Sulphate Classes only apply to brownfield locations. This is because, in natural ground conditions in the UK, magnesium levels are invariably well below values that may significantly affect concrete.

Sulphide Bearing / Pyritic Ground Assessment

In accordance with 'Concrete in aggressive ground' Special Digest 1:2005 (Third Edition), Tier Environmental has first sought to establish whether the site lies within an area where pyrite bearing natural ground exists that could result in additional sulphate being converted from sulphides (particularly pyrite) during enabling works, earthworks and/or construction activities.

Firstly, the site location has been plotted on the extracted figure from BRE SD1 that shows the Principal Sulphate and Sulphide Bearing Strata in England and Wales, as shown on Figure 8.1 below.



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Figure 8.1 Site Location Plotted on Principal Sulphate and Sulphide Bearing Strata in England and Wales (Extracted from BRE SD1)

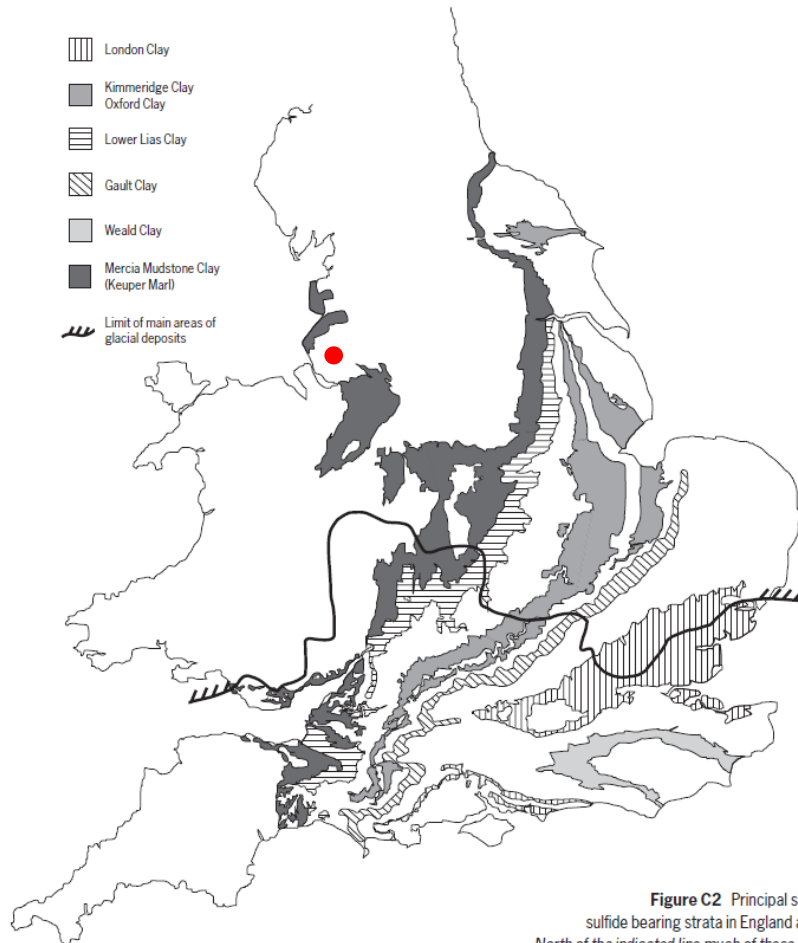


Figure C2 Principal sulfate and sulfide bearing strata in England and Wales
North of the indicated line much of these strata are covered by glacial deposits which, if partly derived from the indicated strata, may also contain sulfates and sulfides

Secondly, an assessment has been made of the site's location relative to coal mining areas of Great Britain on the figure below. This has been done because these represent areas where sulphate bearing coal mining wastes and metal processing slags are most likely to be encountered.

Figure 8.2 Site Location Plotted Relative to Coal Mining Areas of Great Britain (Extracted from BRE SD1)

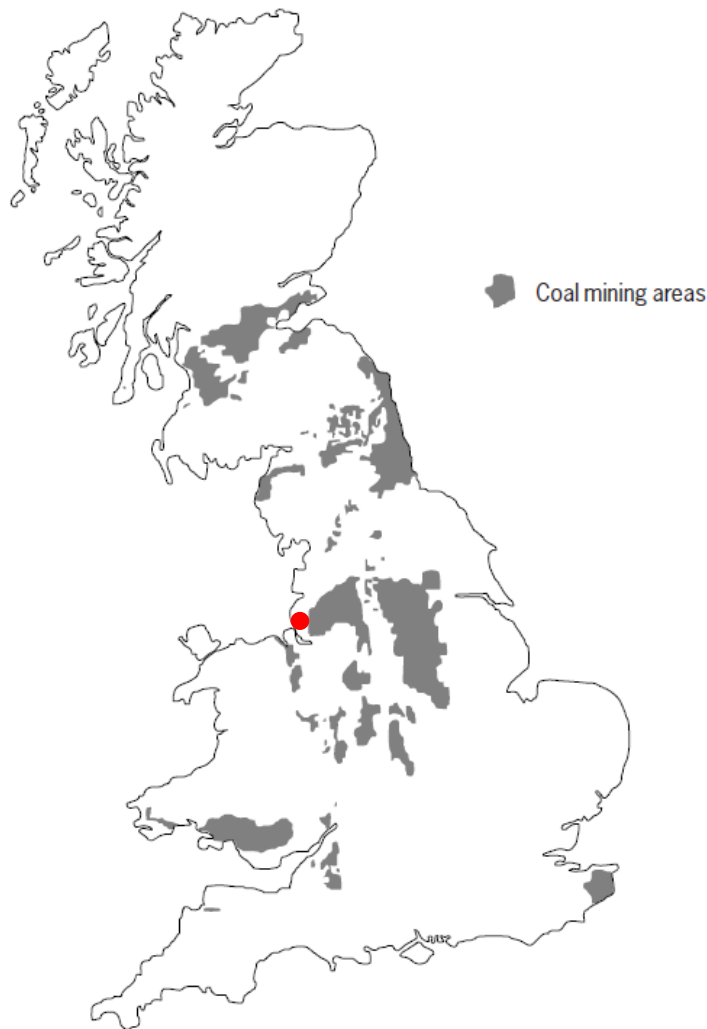


Figure C3 Coal mining areas of Great Britain where sulfate bearing, coal mining wastes and metal processing slags are most likely to be encountered

The table below has been developed to determine whether, based on the above assessment whether there is a possibility of sulphides in the ground (e.g. pyritic ground):



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Table 8-1 Assessment for Potential Sulphide Bearing (e.g. Pyritic) Ground

Question 1:	Question 2:	Question 3 (only relevant if answer to Question 2 is 'Yes'):	Question 4:	Conclusion of Assessment for Potential Sulphide Bearing Ground
From Figure 8.1, Does the Site Lie Within a Principal Sulphate and Sulphide Bearing Area?	From Figure 8.1, Does the Site Lie <u>North</u> of the Black Line Indicating Extent of Glacial Deposits ?	Is it considered that the Glacial Deposits beneath the Site are Derived from Principal Sulphate and Sulphide Bearing Strata (even if the answer to Question 1 is 'No')?	From Figure 8.2, Does the Site Lie Within a Coal Mining Area?	
No	Yes	No	No	The conclusion of the assessment is that there is no potential for sulphide (e.g. pyritic) bearing ground and in which case the Design Sulphate Class may be determined solely on soil and groundwater sulphate concentrations and pH in accordance with BRE SD-1.

Design Sulphate Classification

Representative samples of the soils and groundwater encountered during the Tier Environmental ground investigations, were tested to determine their pH and concentrations of water-soluble sulphate (SO_4^{2-}). The results are presented in Appendix C and summarised in Table 8-2 below. It is assumed that the site is a 'brownfield' site, and the groundwater is 'mobile' in accordance with BRE SD1.

The conclusion of the assessment is that a DS-2 and ACEC Class AC-2 is appropriate for buried concrete design purposes driven by elevated water soluble sulphate within Made Ground in the vicinity of CP01 and CP02 at 0.30m bgl, and with due consideration of the sub-sections above (which include consideration of chloride, nitrate, magnesium and potential for sulphide bearing (e.g. pyritic) ground). Based on the other results it is likely that should this shallow soil be removed as part of the development that a DS-1 AC-1 would be suitable for the site.

Whilst no evidence of gross hydrocarbon contamination has been observed at the site, it is a concrete specialist should review the TPH results and ground conditions summary within this report to ensure appropriate concrete design against retardation / degradation due to hydrocarbons.

Table 8-2 Results of Soil pH Testing and Water-Soluble Sulphate Determination

Exploratory Hole Location	Depth (m bgl)	pH	Water-soluble sulphate (mg/l)	Design sulphate class	ACEC sulphate class
MADE GROUND					
WS102	0.30	8.49	129.2	>10 No. values to mean of the highest 20% of values used as characteristic value: 1,032mg/l DS-2	>10 No. values to mean of the lowest 20% of values used as characteristic value: 7.8 AC-2
WS103	0.35	9.18	122		
WS104	0.30	10.07	39.99		
WS105	0.70	8.74	22.6		
WS106	0.50	9	55.8		
WS106A	0.80	7.09	15.9		
WS107	3.60	7.94	49.9		
WS108	0.90	9.84	122.8		
WS109	0.40	12.23	213.2		



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Exploratory Hole Location	Depth (m bgl)	pH	Water-soluble sulphate (mg/l)	Design sulphate class	ACEC sulphate class
CP01	0.30	7.91	1579		
CP02	0.30	10.14	1340		
CPT05	0.70	9.44	417.9		
WS201	0.40	8.26	794		
WS204	0.25	10.27	147.2		
WS205	0.10	10.07	177.9		
WS208	0.25	8.71	47.9		
WEATHERED BEDROCK					
WS101	0.35	8.51	335.8	DS-1	AC-1
GROUNDWATER					
WS105	3.00	7.57	114.7	(Using characteristic values as detailed in BRE SD1) DS-1	(Using characteristic values as detailed in BRE SD1) AC-1
WS107	2.00	7.77	249.9		
WS108	1.99	7.62	60		

ACEC - Aggressive Chemical Environment for Concrete (see BRE, 2005).

8.2. Geotechnical Parameters

The data obtained during the Ground Investigation has been assessed for the recorded soil and rock types in order to provide characteristic values in order to aid the final foundation design.

Soil Classification

Cohesive Soils

Moisture content and Atterberg Limit testing was undertaken on 3 No. samples from cohesive Made Ground material at the site. A summary of the results is shown in Table 8-3 below.

Table 8-3 Moisture Content and Atterberg Limits

Exploratory hole	Depth (m bgl)	Stratum	MC (%)	LL (%)	PL (%)	PI (%) (Modified)	Class	Volume Change Potential	Consistency Index
CP01	1.10	Cohesive Made Ground	15.5	35	14	16	Medium	Low	0.92
CP01	1.20-1.65	Cohesive Made Ground	15.7	38	14	21	Medium	Low	0.92
TP05	0.50	Cohesive Made Ground	13.4	35	13	18	Low	Low	0.98

ND - Not determined; MC - Moisture content, LL - Liquid limit, PL - Plastic limit, PI - Plasticity index.

Consistency index (CI) is obtained from Atterberg limits and is allowed by Eurocode 7 as a scientific means of determining consistency of clays over and above an engineer merely sticking a thumb in ($CI = (LL-MC)/PI$) using unmodified PI).



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3 No. Atterberg Limit Tests were performed on samples of identified cohesive soil. The results show the cohesive Made Ground to be of low volume change potential.

Granular Soils

A total of 3 No. samples of granular Made Ground and 2 No. samples of natural granular strata were submitted for Particle Size Distribution tests. The test results are summarised in the table below.

Exploratory hole	Depth (m bgl)	Stratum	Classification in Accordance with Series 600 Specification For Highways Works
TP02	1.10	Weathered Chester Sandstone (sand)	1A, 1B, 6E&6R, 6I&J, 6K, 6M, 6N&6P, 6S
TP03	0.50	Made Ground (MG2)	2A&2B, 7A, 7E, 7F, 7I
TP08	0.50	Made Ground (MG1)	1A, 1B, 6A, 6E&6R, 6F1, 6F2, 6F3, 6I&J, 6M, 6N&6P
CP01	1.70-2.00	Made Ground (MG4)	2A&2B, 7A, 7E, 7F, 7I
CP03	0.60-1.00	Weathered Chester Sandstone (sand)	2A&2B, 7A, 7E, 7F, 7I

Density Parameters

The results of the 3 No. Standard Penetration Tests undertaken within the granular Made Ground were recorded as N = 30, N = 41 and N = >50, falling in the medium dense/ dense and very dense categories. Due to the limited presence/thickness of this stratum beyond the depth of the hand dug pit (1.20m bgl), only a limited number of SPT tests were undertaken fully within this material. Whilst only limited results are available for the Granular Made Ground, the variability within these *in situ* standard penetration tests may indicate that these materials may have been placed with limited engineering control. Based on these results a conservative SPT N value of N = 30 (medium dense/ dense) is tentatively proposed for the Granular Made Ground strata; however, this value should be used with caution.

The results of 8 No. Standard Penetration Tests undertaken within the Weathered Chester Sandstone Formation range from N = 2 to N = >50, falling in the very loose to very dense categories, although it should be noted that the majority of N values are recorded as N = 20 (medium dense) and above. The lower N values were recorded where arisings were observed to be wet. Based on these results a moderately conservative design SPT N value of N = 20 has been selected for the Weathered Chester Sandstone Formation strata, although it should be noted that this is based off of limited results.

Rock Classification

Strength Classification of Weathered Rock Strata using SPT N Value Results

Standard Penetration Tests (SPT) were carried out in 17 No. boreholes within the Chester Sandstone Formation across both the 2022 and 2026 ground investigations. Refusal of the Standard Penetration Tests range was recorded at all locations (N = >50).

The results show notable variation over the depth range of the tests with extrapolated N values ranging between N = 52 and N = 375, with the majority ranging between N = 52 and N = 250.



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Based on the above results a preliminary safe bearing capacity of 200kPa can be given to the Chester Sandstone bedrock.

Cone Penetrometer Testing

Cone Penetrometer Testing (CPT) was completed within accessible areas within the south of the proposed building footprint. The purpose of completing CPTs was to provide information for ground improvement contractors, and to identify suitable soils for foundations/ bedrock depth within the south of the site where rockhead was recorded at increased depths.

The depth of bedrock, both proven within exploratory holes and inferred from the CPT testing, is shown on Drawing Ref TE1704-TE-00-XX-DR-GE-006-V02 within Appendix A.

Full results are enclosed in Appendix D.

8.3. Foundation and Floor Slab Recommendations

Ground conditions encountered across the site include Made Ground, generally of limited thickness within the north (0.20m to 0.60m), deepening towards the centre (0.60m to 0.75m), further deepening towards the south (up to 4.65m bgl). Made Ground generally comprised granular deposits in the north, and granular and cohesive deposits in the south.

The Made Ground is underlain by the Chester Sandstone Formation, which is weathered in the upper horizons. The weathering of the Chester Sandstone strata decreases with depth, with solid bedrock encountered within the majority of the exploratory holes that achieved refusal from depths of between 0.30m at WS101 in the north west and 5.15m bgl in WS106A in the south. SPT N values of between N=2 and N= >50 have been recorded within the Weathered Chester Sandstone, although it should be noted that the majority of N values are recorded as N = 20 (medium dense) and above.

Perched groundwater was encountered within the Made Ground at positions WS206, TP02, WS106, WS106A and WS107 predominantly located in the south of the site, from depths of between 0.40m to 1.50m bgl. Groundwater was encountered within the weathered Chester Sandstone from depths of between 1.60m to 3.60m bgl, and in the Chester Sandstone at a depth of 5.35m bgl within WS106A only. The groundwater body within the weathered zone and within the Chester Sandstone Formation is considered to be discontinuous. Groundwater monitoring recorded standing groundwater levels of between 0.25m and 3.98m bgl across the 2022 and 2026 monitoring visits.

Portions of the site are covered by former or existing facilities on the site, including hard standing, floor slabs and foundations. In addition, concrete obstructions were encountered within the northwest of the site (between WS109 and TP02, 0.20m and 0.30m bgl), within WS206 (at 2.00m bgl, not possible to determine extent due to site constraints) and TP08 (at 0.90m bgl within northern half of pit, with possible services preventing further excavation). This material is unsuitable for foundations and relict foundations and floor slabs should be broken out to avoid the formation of hard spots.

Made Ground is considered an unsuitable founding stratum due to its relatively low density and uncontrolled nature of placement. The Chester Sandstone provides the best founding solution options.

Using extrapolated N values from *in situ* testing, the competent rock of the Chester Sandstone has been attributed a conservative preliminary safe bearing capacity of 200kPa (subject to further ground investigation).

The most suitable foundation and floor slab solutions for the site would be a hybrid pad and vibro stone column solution, founded upon the Chester Sandstone Formation to avoid differential settlement. Where bedrock is shallow in the north, pad foundations could be utilised, founding within the



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competent Chester Sandstone bedrock, with vibro stone columns utilised beneath the majority of the building footprint. The approximate anticipated extent of pads/vibro stone columns beneath the site is shown in Drawing no. TE1704-TE-00-XX-DR-GE-008-V01 included within Appendix A.

The clay across site (where encountered) is expected to have been *in situ* since the construction of the current building in the 1970s and is therefore unlikely to cause any consolidation issues with the use of VSCs. It should be noted that pre-auguring at vibro stone column locations may be required due to the high SPT values recorded within the Made Ground and weathered Chester Sandstone Formation. A turnover would also be required to remove the foundations of the existing building and obstructions recorded in Table 7-1.

A specialist ground improvement contractor attended site during the 2026 ground investigation to assess ground conditions regarding the suitability of this ground improvement method, and have provided the below response:

'...We could offer a vibro solution to the areas of the site where the made ground is deeper and where the loose natural sands exist above the bedrock. We have worked on similar schemes previously and have basically installed the columns where possible (i.e., c. 1mbgl plus), and tightened our spacings close to the vibro/non-vibro area and gradually widened the spacings away from this interface so the differential settlements at the interface are as close as possible. Once we have the full ground investigation logs available we can work on putting a design together covering all scenarios to ensure the settlements are within tolerable limits. Looking at the ground conditions on site, due to the loose nature of the sands and the presence of the water in areas we feel a bottom feed method of installation may be required, especially in the deeper areas'.

Following this, Tier Environmental have provided the full ground investigation logs to the specialist contractor and await any further updated advice.

It should be noted that the variable ground conditions recorded beneath the centre and south of the proposed building footprint may be representative of naturally occurring competent strata at approximately 1.00m bgl. Vibro Stone Columns have been recommended for this area; however it may be beneficial to undertake further delineation via trial pitting between the Made Ground and natural soils within this area when greater access is available (i.e. following demolition of the existing building and removal of the floor slab). The findings may show pads could be utilised further southward instead of VSCs within a portion of the central area currently shown as requiring vibro stone columns (see Drawing no. TE1704-TE-00-XX-DR-GE-008-V01).

Alternatively, if detailed records are made regarding the depth and position of existing foundations during the grubbing out/demolition works, it may be possible to determine the extent of competent strata for pads within this area from this information.

The undertaking of ground improvement techniques is a specialist job and the advice of a reputable local contractor familiar with the type of ground and groundwater conditions encountered on this site should be sought prior to finalising the design.

8.4. Earthworks

Compaction test data has been assessed by comparing the results against criteria commonly used in earthworks to achieve an adequate density for engineered fills. The criteria indicate whether the samples could achieve in excess of 95% of Maximum Dry Density (MDD – a requirement often included in highways specifications) and whether they could be compacted to less than 5% air voids ratio (a requirement applied where raft foundations are to be adopted). The results are presented in the table below.



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Table 8-4 Compaction Test Results

Sample Location and Depth (m bgl)	Material	Natural Moisture Content (%)	Optimum Moisture Content (%)	Moisture Content at 95% Maximum Dry Density	Conditioning Required?
TP03 @ 0.50	Made Ground (MG2 – gravel)	26	10	16.0	Yes – too wet
CP01 @ 1.70-2.00	Made Ground (MG4 – cohesive)	15.4	10	12.6	Yes – too wet
CP01 @ 4.70-5.00	Chester Sandstone Formation	14.9	11	16.0	No conditioning required
TP08 @ 0.50	Made Ground (MG1 – gravel)	6.9	7.2	12.0	Yes – too dry
CP03 @ 0.60-1.00	Weathered Chester Sandstone Formation (sand)	22.4	8.9	15.0	Yes – too wet

The results of compaction testing undertaken on samples Made Ground and natural granular materials indicate that it could be recompacted to achieve >95% of MDD and <5% air voids if the moisture content is decreased, with the exception of MG1 (Made Ground comprising limestone subbase), which would need the moisture content increasing slightly to achieve >95% of MDD and <5% air voids, and the Chester Formation of Sandstone, which could achieve >95% of MDD and <5% air voids with no conditioning required.

It should be noted that suitability for compaction is highly dependent on the initial moisture content of the material to be compacted. Some processing of the material (including screening and crushing of unsuitable elements) may be required during the enabling works phase to remove over-sized or unsuitable material, such as metal, plastic, fabric and timber. Where Made Ground is to be reused as an engineered fill, it would be recommended to preferentially select granular fills only and subject them to a confirmatory testing regime where they were required to achieve a compaction specification as a structural fill.

Some processing of Made Ground/ Demolition Material (including screening and crushing of unsuitable elements) may be required during the enabling works phase to remove over-sized or unsuitable material, such as metal, plastic, fabric and timber, or during a turnover (dependent on the chosen foundation option). Where Made Ground is to be reused as an engineered fill, it would be sensible to select granular fills only and subject them to a confirmatory testing regime where they were required to achieve a compaction specification as a structural fill.

Further testing may also be required for materials that include burnt shale, which has the potential to degrade concrete if it contains a high sulphate content, to ensure its suitability for reuse beneath the building footprint.

Construction plant should be provided with an adequate working platform in line with the requirements of BRE report, “BR 470: Working Platforms for Tracked Plant”. Again, further advice should be sought from the temporary works designer. However, the following factors should be considered.

It would be expected that the existing Made Ground at the Site is to be excavated and re-engineered to remove buried obstructions. Excavated materials could then be processed and re-engineered as an Engineered Fill. The new Design CBR should be assumed to be equivalent to 2.5%, however values of between 10% and 20% should be achievable given the material present at the Site.

During construction, the in situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.



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8.5. Groundworks, Excavation Stability and Groundwater Dewatering

In our opinion, there should be no particular difficulties in excavating the strata indicated in the boreholes utilising an appropriate and suitably sized mechanical excavator. Excavations into existing Made Ground and the underlying natural soils should be assumed to be unstable. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 097 (1983) should be made to establish suitable means of support or battering of excavation sides.

It is recommended that all excavations to greater than 1.20 metres depth, or for shallower excavations where groundwater is encountered above this level are closely supported, especially where man entry is required. Alternatively, where space permits, the excavations might be battered back to an appropriate angle. Standing groundwater levels of between 0.25m and 3.98m were encountered. Should groundwater seepages occur, and water accumulate in shallow excavations it should be able to be removed by pumping from a filtered sump. However, groundwater control by more robust means, such as well pointing, may be required locally.

Great care will need to be taken if reducing groundwater levels to ensure that adjoining nearby buildings, structures and services are not affected.

8.6. Pavements and Highways

Based on a visual examination of the soil and Atterberg test results, a CBR value of 5% is suggested for granular Made Ground and the weathered bedrock, and 2.5% for cohesive Made Ground (present locally).

Once the design layout is known and demolition/remediation is complete, then *in situ* testing should be carried out to confirm CBR values.

The design of pavements, highways, and embankments should be discussed with the relevant local authority if highways are to be subject to Section 38 agreement.



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9. HUMAN HEALTH RISK ASSESSMENT

Results of chemical analysis are presented in full in Appendix C.

9.1. Data Interpretation Approach

The analytical data obtained were reviewed for completeness and consistency. The data for each sample type was then compiled, screened against the Generic Assessment Criteria (GACs) for a commercial/industrial use and those potential contaminants of concern which were found to exceed the GACs were then subjected to detailed analysis as described below.

Previously, it was possible for results from soil (and leachate) samples to be subject to statistical assessment in accordance with a 2008 guidance document (CL:AIRE / CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration). This guidance has now been withdrawn and replaced with the following document:

- Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (CL:AIRE 2020)

The purpose behind statistical assessment is ultimately to determine whether concentrations of contaminants are at levels that present potential risk to the future site users (and the wider environment if the statistical assessment is conducted on leachate test results).

The new guidance places even greater emphasis and reliance on the desk study being carried out first, appropriately detailed sampling strategies, collection and testing of samples for contamination and use of appropriate screening criteria.

The guidance requires an increased number of criteria to be met before a robust statistical assessment can be conducted and introduces the principle of the Central Limit Theorem (CLT); a key tool of statistics that is used in the comparison of confidence intervals with the critical concentration. A common 'rule of thumb' is that the CLT will apply provided your sample size is between 20 and 50.

On this basis, Tier Environmental considers that statistical assessment in accordance with the CL:AIRE 2020 guidance may not be applied in this instance given that the number of samples obtained is below 20 No. for any given identified soil population.

Due consideration of the ground conditions, distinct identifiable populations of soil and proposed development layout has been undertaken and, where appropriate, laboratory results associated with discrete populations or 'hotspots' have been assessed separately.

9.2. Selection of Generic Assessment Criteria (GAC)

In short, for the majority of the contaminants of concern, LQM/CIEH Suitable 4 Use Levels (S4ULs) published in 2015 have been adopted as GACs for a commercial/industrial land use; however, further details on the hierarchical approach for the selection of the GACs used as screening criteria for this assessment is provided in Appendix J.

These values are considered as appropriate screening criteria as they incorporate updated assumption exposures derived for the production of C4SLs but within the context of deriving screening criteria above which assessment of the risks or remedial action may be needed (i.e. within the context of the planning regime rather than Part 2A context for which C4SLs were derived).

For those potential contaminants of concern where the selected GAC is dependent on Soil Organic Matter content (SOM), an assumed SOM of 2.5% has been selected based on the reported Total Organic Carbon (TOC) concentrations (which have been converted to SOM by dividing by a conversion



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factor of 0.58). It should be noted; however, that for any soil samples where the TOC may be artificially driven by the presence of petroleum hydrocarbons, that these TOC results have been removed from the data set when determining an appropriate characteristic SOM. For this purpose, Tier Environmental have notionally considered that any TOC results from soil samples where the measured total TPH concentration exceeds 500mg/kg should be removed.

9.3. Human Health Risk Assessment

No measured concentrations of potential contaminants of concern have been reported in excess of the respective GACs protective of human health for a commercial/industrial land use.

Measured Potential Contaminant of Concern Concentrations without Publicly Available GACs

Table 9-1 summarises the measured concentrations of potential contaminants of concern have been reported in excess of the laboratory method detection limit for which there are no current publicly available GACs and provides qualitative commentary / discussion as to whether they may represent a potential risk to human health with due consideration of the Conceptual Site Model.



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Table 9-1 Measured Concentrations of Potential Contaminants of Concern Reported in Excess of the Laboratory Method Detection Limit

Contaminant of Concern	Exploratory Hole Location	Depth (m bgl)	Soil Population	Units	Measured Concentration	Comments
VOCs/SVOCs						
2-Methylnaphthalene	CP01	0.30	MG2	mg/kg	0.229	PAHs assessed via US EPA priority 16 PAHs assessment, including naphthalene.
	CPT05	0.70	MG1	mg/kg	0.064	
	WS201	0.40	MG1	mg/kg	0.129	
	WS208	0.25	MG3	mg/kg	0.071	
Carbazole	CP01	0.30	MG2	mg/kg	0.014	Preliminary research has indicated that for carbazole, Texas PCLs are the only up-to-date numerical soil criteria published for carbazole as a discrete analyte. No other national scheme now carries carbazole values. Most agencies streamlined their tables to the 16-PAH set or rely on indicator compounds (BaP), and heterocyclic PAHs such as carbazole were removed. The maximum reported carbazole concentration of is below the Texas residential PCL value of 230 mg/kg, which has been conservatively applied in this instance.
Dibenzofuran	CP01	0.30	MG2	mg/kg	0.102	Maximum reported concentration below the 73 mg/kg USEPA RSL used in the high profile Grenfell Tower Investigation for a more conservative residential with homegrown produce land use.
	WS201	0.40	MG1	mg/kg	0.076	
	WS208	0.25	MG3	mg/kg	0.031	



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Asbestos

Asbestos can be present in soil as fragments of bulk Asbestos Containing Materials (ACMs) (e.g. asbestos cement sheeting) and also as discrete asbestos fibres within the soil matrix. This investigation has carried out assessments to determine whether both bulk fragments and / or fibres are present in the soil at the site. The asbestos assessment commenced on site with inspection of the Made Ground by our suitably qualified supervising engineer for the presence of bulk ACMs.

During the fieldwork no suspected ACMs were identified.

During the previous 2022 Preliminary Ground Investigation by Tier Environmental, asbestos was recorded within WS103 in the northeast of the site, recorded to be present as fibre bundles and bitumen products at a concentration of 0.006% w/w. Hand dug pits were undertaken to delineate the extent of the asbestos surrounding WS103 as detailed within below.

Table 9-2 Summary of Asbestos Delineation

Exploratory Hole Location	Depth (m bgl)	Location on Site	Soil Population	Asbestos Type	Quantification (% w/w)
Asbestos in Soil Samples Recorded During Tier Environmental 2022 Ground Investigation					
WS103	0.35	North east	MG2	Amosite and chrysotile	Fibre bundles and bitumen products 0.006%
Delineation Undertaken During 2026 Supplementary Ground Investigation					
HDP201	0.37 to 0.45	1m north of WS103	MG2	None recorded	
HDP202	0.34 to 0.42	5m north of WS103	MG2	None recorded	
HDP203	-	1m of west WS103	Not undertaken due to proximity of services		
HDP204	-	5m of west WS103	Not undertaken due to proximity of services/building		
HDP205	0.36 to 0.47	1m south of WS103	MG2	None recorded	
HDP206	0.48 to 0.50	5m south of WS103	MG2	None recorded	
HDP207	0.40	1m east of WS103	MG2	None recorded	
HDP208	0.30 to 0.50	5m east of WS103	MG2	None recorded	

Of the 17 No. of Made Ground samples submitted for asbestos screening during this more recent phase of investigative works, none were reported to contain asbestos. This includes the hand dug pits undertaken to delineate the asbestos hotspot recorded within the Made Ground (MG2) for which samples were undertaken within the same material type/ similar depths as detailed in Table 9-2 above.

Groundwater

Groundwater samples were not taken during this ground investigation. The results of groundwater testing undertaken within the 2022 Preliminary Ground Investigation by Tier Environmental were compared to the commercial General Assessment Criteria (GAC) detailed in the SOBRA document 'Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater'. No exceedances against the commercial GACs were recorded in any of the samples.



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9.4. Utilities

It is recommended that the results of the chemical testing and details of the proposed remedial works are provided to the appropriate utility companies to determine the necessity for service protection.

9.5. Construction and Maintenance Workers

Contamination may pose a short-term (acute) or long-term (chronic) risk to workers during construction and maintenance. The potential risks must be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislative requirements and follow appropriate guidance (e.g., HSE, 1991; CIRIA, 1996).

On the basis of the results obtained, the following potential exposure risks to construction and maintenance workers have been highlighted:

- Localised asbestos recorded at WS103 at 0.35m bgl within the previous Tier Environmental ground investigation (2022). This was recorded to be present as fibre bundles and bitumen products at a concentration of 0.006% w/w.

As asbestos has been reported at concentrations potentially above 0.001% w/w (i.e. above 'trace' levels), the Control of Asbestos Regulations 2012 should be adhered to in the localised area surrounding WS103. A summary of complying with CAR: risk assessments, licensing and training is provided in Appendix O.



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10. CONTROLLED WATERS RISK ASSESSMENT

10.1. Introduction

In order to assess whether there is a potentially unacceptable risk of pollution of controlled waters, samples of groundwater submitted for laboratory chemical analysis as part of the 2022 investigation. Analytical data from groundwater sample testing undertaken by Tier Environmental was evaluated against Water Quality Standard (WQS) values appropriate to the Conceptual Site Model.

In accordance with Part 2A of the Environmental Protection Act 1990, Tier Environmental has made regard to all of the WQS values that are relevant to the site and a judgment has been made against the most stringent of those relevant standards. Further details are provided, along with the approach for selection of TPH / BTEX WQS values, in Appendix K.

In some instances, the laboratory method detection limit is greater than the appropriate WQS value. In these instances, only measured concentrations in excess of the laboratory method detection limit have been considered likely to potentially represent a possible significant risk to controlled waters. For those potential contaminants of concern for which the WQS values are dependent on hardness (e.g. cadmium EQS values), a hardness of 100-200 mg CaCO₃/l was selected based on the reported values in the groundwater beneath the site.

10.2. Controlled Waters Environment Conceptual Site Model Summary

From a conceptual site model perspective, although not encountered directly beneath site during the ground investigation, the surrounding Till is a Secondary Undifferentiated Aquifer, and the surrounding Shirdley Hill Sand is a Secondary A Aquifer (both are shown beneath areas of the site on geological mapping). The Chester Sandstone Formation bedrock is classified as a Principal Aquifer. Groundwater flow direction beneath the Site is understood to be towards the south west. The Site is situated within a 'Type 3 – Total Catchment' Source Protection Zone, there are no potable water extractions within 1km and no non-potable water abstractions within 500m of the site. The nearest surface water receptor is an unnamed pond located 115m southeast, the nearest running water feature is shown 247m south as an unnamed inland river. The Site is set within an area of significant wider historical commercial/industrial heritage. On this basis the controlled waters sensitivity for the Secondary A and Secondary Undifferentiated aquifers is regarded as being low whilst the Principal Aquifer is moderate.

10.3. Groundwater Testing

A Controlled Waters Risk Assessment was undertaken following the review of groundwater test data during the 2022 Preliminary Ground Investigation undertaken by Tier Environmental. This concluded the following:

'Measured groundwater concentrations of arsenic, copper, nickel, zinc, fluoranthene, benzo(a)pyrene, sum PAHs and ammonia have been reported in excess of the WQS protective of the controlled waters environment by either the same order of magnitude or one order of magnitude. Given the marginal nature of these exceedances, the potential for significant dilution between the Site and the nearest surface water receptor (an unnamed pond located 115m southeast) or the nearest running water feature (an unnamed inland river located 247m south), the absence of a continuous groundwater body beneath the site, the fact that the Site will incorporate buildings/hardstanding and a dedicated drainage system that shall reduce infiltration rates through the soils, the historical commercial/industrial heritage of the surrounding area, the moderate sensitivity of the controlled waters environment, and that the distance to the nearest active groundwater abstraction point is 845m north and none within 1km hydraulically downgradient, these exceedances are not expected to have pose a significant risk to controlled waters beneath the site.'

The risk to controlled waters is not considered to have changed since the 2022 assessment.



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11.GROUND GAS RISK ASSESSMENT

11.1. Introduction

The ground gas risk assessment has been undertaken in accordance with the following guidance:

- BS 8485:2015+A1:2019;
- CIRIA C665, 2007;
- A Pragmatic Approach to Ground Gas Risk Assessment RB17. CL:AIRE, 2012; and,
- Ground Gas Monitoring and 'Worst-Case' Conditions TB17, CL:AIRE, 2018

It should be noted that the Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide Are Present, NHBC, 2007 was withdrawn on 1st July 2025. A position statement issued by the NHBC made it clear that the "traffic lights" approach to ground gas assessment has been officially withdrawn and that the NHBC approach is now that BS 8485:2015+A1:2019 should be followed for ground gas risk assessment.

The ground gas risk assessment has been conducted with full consideration of the viable sources, pathways and receptors included within the Preliminary Conceptual Site Model presented in Section 0.

Ground gas monitoring was conducted in conjunction with groundwater monitoring (and sampling); however, it should be noted during the gas monitoring was conducted first, prior to any groundwater monitoring / sampling works. The monitoring well locations and construction were designed with due consideration of the proposed development layout and preliminary conceptual site model. Further information pertaining to monitoring wells is provided in Table 6-2.

11.2. Groundwater Conditions

BS 8576:2013 states "Where practical and reasonable, the response zone for permanent gas monitoring wells should be located in an unsaturated zone. (Such a zone might exist below perched water tables and could form a migration pathway.) This is subject to intercepting all potential gas sources. For example, peat layers in alluvium might be below the groundwater table but pockets of gas can be trapped within the peat. In this case, it would be desirable for the well to penetrate below the groundwater. If there is doubt, it is useful to install wells with response zones above and below the water table."

Groundwater was not recorded in all locations during drilling works and installations were completed in some cases within soils thought to be unsaturated. Some wells have since recorded groundwater whilst others remain dry.

11.3. Gas Monitoring Data Quality

The calibration certificate for the Geotech GA5000 unit used on site for the reported gas monitoring results in Appendix E, is also provided in Appendix E. Field checks were conducted to ensure accuracy during the monitoring events. The locations for the monitoring wells are considered adequate to assess the current ground gas regime.

Flow rates and gas concentrations were allowed to fully stabilise during the monitoring.



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11.4. Ground Gas Monitoring Results

The full ground gas monitoring results from the installations are presented in Appendix E and summarised below:



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Table 11-1 Ground Gas Monitoring Results Summary Tier 2022 Investigation – 2 No. of Monitoring Programme of 2 No. Visits

Strata Targetted by Response Zone	Monitoring Well Reference	Maximum peak gas flow rate (l/h)	Maximum steady state gas flow (l/h)	Maximum peak CH ₄ (%v/v)	Maximum steady state CH ₄ (%v/v)	Maximum peak CO ₂ (%v/v)	Maximum steady state CO ₂ (%v/v)	Lowest O ₂ recorded (%v/v)
MG & Weathered CSF	WS103	0.1	0.1	0.2	0.1	0.8	0.8	18.6
MG & Weathered CSF	WS104	0.1	0.1	0.3	0.1	1.0	0.2	18.3
MG & Weathered CSF	WS105	0.1	0.1	1.3	1.1	3.4	0.9	13.8
MG & Weathered CSF	WS106A	0.1	0.1	1.5	1.5	4.2	4.2	13.3
MG	WS107	1.8	1.5	0.3	0.3	0.7	0.7	2.7
MG	WS108	3.5	1.3	0.4	0.4	0.1	0.1	0.4
MG & Weathered CSF	WS109	0.1	0.1	0.3	0.2	0.2	0.1	11.4

Table 11-2 Ground Gas Monitoring Results Summary Tier 2026 Investigation – 2 No. of Monitoring Programme of 2 No. Visits

Strata Targetted by Response Zone	Monitoring Well Reference	Maximum peak gas flow rate (l/h)	Maximum steady state gas flow (l/h)	Maximum peak CH ₄ (%v/v)	Maximum steady state CH ₄ (%v/v)	Maximum peak CO ₂ (%v/v)	Maximum steady state CO ₂ (%v/v)	Lowest O ₂ recorded (%v/v)
MG & Weathered CSF	WS103	0.1	0.1	0.1	0.1	0.5	0.5	19.8
MG & Weathered CSF	WS104	-1.6	0.1	0.1	0.1	0.5	0.5	19.5
MG	WS107	19.0	15.7	0.1	0.1	0.2	0.2	15.9
MG	WS108	0.1	0.1	8.6	8.6	7.7	7.7	0.1
MG & Weathered CSF	WS109	0.1	0.1	0.1	0.1	0.1	0.1	20.9
Weathered CSF	WS202	0.1	0.1	0.1	0.1	1.4	1.4	18.6
MG & Weathered CSF	WS203	0.1	0.1	0.1	0.1	0.8	0.1	20.2
MG & Weathered CSF	WS204	0.1	0.1	2.0	0.1	2.4	0.8	20.6
MG	WS206	0.1	0.1	0.1	0.1	0.5	0.5	16.6

Bold = maximum value reported across all visits.

For information: gas analyser instrument limits of detection are as follows: Methane 0.1% v/v, Carbon Dioxide 0.1% v/v, Oxygen 0.1% v/v, Hydrogen Sulphide 1ppm, Carbon Monoxide 1ppm and flow rate 0.1 l/hr



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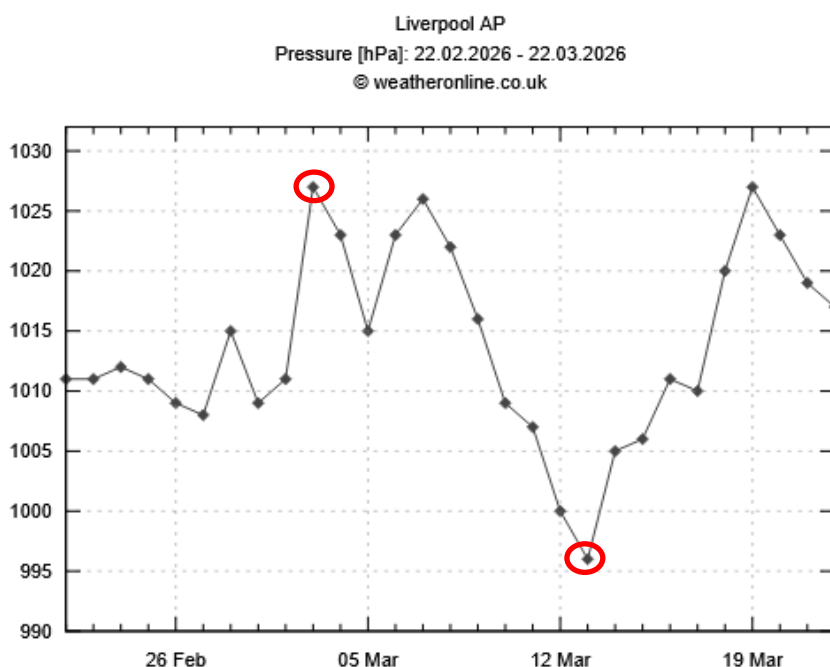
11.5. Ground Gas Risk Assessment

The periods and frequency of monitoring have been selected for the site in accordance with CIRI C665.

The total atmospheric pressure range of the ground gas monitoring data included in this report was between 990 mbar and 1023 mbar. This range covers low to high atmospheric pressures. Monitoring events included periods of falling and rising pressure trends.

The pressure graphs information is from the *nearest* available weather station (relative to the site) and therefore indicative of *regional* pressure trends. The below does not represent direct atmospheric pressure conditions on the site.

Visit 1 – 03.03.26 and Visit 2 – 13.03.26



BS8576:2013 states that gas monitoring does not necessarily need to be carried out under worst case conditions. It does not necessarily need to be at low or falling atmospheric pressure, but rather should be continued until it is unlikely that additional data will change the interpretation of the data, the outcome of the risk assessment and proposed remedial actions. One of the main considerations is to assess whether gas flow rates or concentrations could possibly increase and thereby affect the risk assessment and hence the choice of protective measures. On the basis of the above results, Tier Environmental does not consider that additional data is necessary.

Consideration of Groundwater Effects

An assessment has been made to determine whether groundwater levels beneath the site lie at a shallow depth at, or above, the plain section of the monitoring well or within cohesive strata. In those instances where shallow groundwater is located within the plain section of the monitoring well pipe or within cohesive strata this can result in 'groundwater pumping' or a 'piston effect' where the measured peak (and in some cases steady) flow rates reported at these monitoring well locations are significantly (and artificially) influenced by the pressures formed in the void above the groundwater in the plain section of the pipe or within the pipework installed within cohesive strata, as opposed to being truly representative of the



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ground gas flow rates. In such instances, this scenario can create 'artificial' negative and /or relatively high peak positive readings depending on whether the groundwater levels have increased or decreased in between monitoring events or since installation of the monitoring wells.

The results of the ground gas monitoring within this report have indicates that artificial groundwater pumping is likely to have occurred at WS107 during all 4 No. visits across 2022 and 2024, where groundwater levels were recorded to range between 0.25m bgl to 0.42m bgl. The response zone at this location lies between 0.50m to 4.40m bgl, and is therefore flooded. As such, the elevated peak and steady flow rates (up to 19.0l/hr) recorded for this location across all 4 No. gas monitoring visits are not considered to be representative as they are likely to have been impacted by the groundwater pumping effect. The groundwater pumping effect is also likely to have occurred during the first 2 No. visits at WS108, where groundwater levels of 1.12m bgl were recorded (meaning groundwater lay partially within the response zone of 0.40m to 1.40m bgl). The peak flow concentrations of 3.3 l/hr and 3.5l hr are therefore not considered to be representative of the true flow rate at this location. This is supported in both cases by an absence of significant concentrations of both carbon dioxide and methane.

In addition to the above, consideration has been made as to whether waterlogged ground or frozen ground conditions may have led to gas becoming trapped and then emitted into the monitoring wells causing a rapid gas release. There was no evidence of waterlogged or frozen ground conditions during monitoring.

The results of the ground gas monitoring have been assessed in accordance with the criteria specified for this site, which were derived as described in Appendix L.

Ground Gas Risk Assessment

Methodology

In accordance with Section 6.3.1 in BS 8485:2015 +A1:2019, the development of the GSV for the site or the zone follows a process in which:

1. borehole hazardous gas flow rates are calculated for each borehole standpipe for each monitoring event and included in a database;
2. the reliability of the measured gas flow rates and concentrations is assessed taking into account borehole construction, etc;
3. decisions are made as to whether to use peak gas flow rates or steady-state rates in each calculation;
4. decisions are made about how to deal with any temporal or spatial shortages in the data;
5. a decision is made about whether the site might be zoned or not; and
6. judgements are made about what GSV to use for design purposes taking all relevant information into account.

Subsequently to the above, the calculated borehole hazardous gas flow rates are considered to determine a Gas Screening Value (GSV) either for the site as a whole, or for site zones, if applicable.

Additionally, CIRIA C665 indicates that in the event that the reported methane concentrations are 'typically' >1% v/v and/or the reported carbon dioxide concentrations are 'typically' >5% then *consideration* should be made to increase the determination of the site to a Characteristic Situation 2 – Low Risk scenario.

Consideration of Peak Gas Flow Rates

In accordance with BS 8485:2015 +A1:2019 it may be appropriate to robustly discount *"peak instantaneous flows and negative flows that have been judged to be unrepresentative of a possible worst case"*. In addition, it is stated that *"peak flow measurements might result in a disproportionately high gas hazard prediction, and assignment of an over-precautionary CS"*.



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Tier Environmental has conducted a review of the peak flow rates reported at the site. A maximum peak gas flow rate of 19.0 l/hr was reported at WS107 on the first gas monitoring visit of 2026. This well is from the initial 2022 investigation. Peak values for the same location were noted to drop to 5.0 l/hr on the second visit and did not exceed 1.8 l/hr during the 2022 monitoring. Similarly, within the 2022 investigation, WS108 recorded a peak flow of 3.3 l/hr during the first monitoring visit and 3.5 l/hr during the second. At both locations, these elevated peak flow rates have been attributed to shallow groundwater levels causing a 'piston' effect.

Given the robust nature of the monitoring data that these instantaneous peak flow rates are not resultant of the ground gases at the site and may be confidently discounted in the calculation of the borehole hazardous gas flow rates.

Consideration of Peak Ground Gas Concentrations

An assessment has been made as to whether peak flow rates or steady flow rates should be applied for the purposes of calculating the borehole hazardous gas flow rates.

Peak and steady carbon dioxide levels of 7.7%v/v and methane levels of 8.6%v/v were recorded in WS108 only on the second visit of the 2026 monitoring rounds. For context, this location recorded a maximum peak concentration of 0.7%v/v and 0.3%v/v for carbon dioxide and methane respectively during the 2022 visits. Given the isolated nature of these concentrations and absence of significant elevated readings on other visits, it is not considered that these peak concentrations are representative of 'typical' ground gas concentrations for the site in accordance with CIRIA C665, as discussed further below Table 11-3. Although not considered 'typical' concentrations for the ground gas at the site, they have however been included within the borehole hazardous gas flow rate calculations at this stage, as they represent a 'worst case' scenario.

Borehole Hazardous Gas Flow Rates

Calculated borehole hazardous gas flow rates have been determined and are presented in Appendix E.

In light of the above conclusions regarding whether peak or steady flow rates and peak or steady gas concentrations should be included within the borehole hazardous gas flow rate calculations, it shows that although some elevated peak and steady concentrations of methane and carbon dioxide have been recorded at concentrations that would trigger *consideration* for increasing the CS to a Characteristic Situation CS2, across the whole site in all deposit types the *typical* Borehole Hazardous Gas Flow Rates are below the limit for Characteristic Situation CS1 (as discussed further below).

'Worst-Case' GSV Check Calculation – Carbon Dioxide and Methane

In accordance with BS8485, Tier Environmental has conducted a 'worst-case' check by calculating the Gas Screening Value (GSV) for the site:

"Irrespective of the apparent comprehensiveness of the dataset, the plausible worst case condition should be calculated for each hazardous gas by multiplying the maximum recorded flow in any standpipe in that strata (and zone) with the maximum gas concentration in any other standpipe in that strata (and zone), but discounting any peak instantaneous flows and negative flows that have been judged to be unrepresentative of a possible worst case."

Therefore, the following process has been followed:

- the maximum reported methane or carbon dioxide concentration (whichever is highest) from any monitoring well and during any ground gas monitoring visit; and,
- the remaining maximum peak positive flow rate (after any negative flow rates or 'artificially' high flow rates have been discounted as described above) from any monitoring well and during any ground gas monitoring visit.



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Table 11-3 Worst-Case GSV Check Calculation

Ground Gas	Maximum Reported Peak Concentration (% v/v)				
Methane (CH ₄)	8.6	}	→	8.6	X
Carbon dioxide (CO ₂)	7.7				
					1.3
					=
					0.1118

Historically, CIRIA C665 provided two separate methods to 'characterise' a site that firstly requires the assessor to distinguish between two fundamental development 'situations' ('Situation A' and 'Situation B'); however, the Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide Are Present, NHBC, 2007 was withdrawn on 1st July 2025. A position statement issued by the NHBC made it clear that the "traffic lights" approach to ground gas assessment has been officially withdrawn and that the NHBC approach is now that BS 8485:2015+A1:2019 should be followed for ground gas risk assessment such that consideration of a 'Situation A' or 'Situation B' designation is no longer required.

Table 11-3 demonstrates that the site is placed in a Characteristic Situation 2 - low risk scenario on the basis of the 'worst case' GSV alone.

CIRIA C665 indicates that in the event that the reported methane concentrations are '*typically*' >1% v/v and/or the reported carbon dioxide concentrations are '*typically*' >5% then consideration should be made to increase the determination of the site to a Characteristic Situation 2 – Low Risk scenario.

As the maximum reported carbon dioxide concentrations exceed these thresholds, Tier Environmental has conducted further consideration of whether the site should be classified as a Characteristic Situation 2 – Low Risk scenario below:

Peak and steady carbon dioxide levels of 7.7%v/v were recorded in WS108 only on the second visit of the 2026 monitoring rounds. For context, this location recorded a maximum peak and steady of 0.1%v/v during the 2022 visits. Taking into account the wider ground gas regime, the effect of groundwater pumping, and the conceptual site model, it is not considered necessary to increase the Characteristic Situation beyond that of a CS1 - Very Low Risk scenario as has been determined via the borehole hazardous gas flow rates.

Carbon Monoxide and Hydrogen Sulphide

There is no current UK risk assessment guidance available for carbon monoxide and hydrogen sulphide derived from ground gases.

A maximum peak carbon monoxide concentration of 7 ppm has been reported which is below the workplace long term exposure limit (30ppm) and the workplace short term exposure limit (200ppm) published by the Health and Safety Executive (EH40/2005 Workplace Exposure Limits) though above the WHO long term (24 hours) indoor exposure guideline value (5.68 ppm). Carbon monoxide levels will be reviewed further following completion of the monitoring programme.

A maximum peak hydrogen sulphide concentration of 1 ppm has been reported which is below the workplace long term exposure limit (5ppm) and the workplace short term exposure limit (10ppm) published by the Health and Safety Executive (EH40/2005 Workplace Exposure Limits).



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Consideration of Foundation Types and Floor Slab Design

BS 8485 states that deeper foundations can influence or change ground gas pathways and gas generation rates. This might be due to the creation or alteration of flow paths for existing ground gases or be the result of the introduction of oxygen at depth (e.g. in peaty soils) promoting the generation of ground gas. The guidance states that the foundations adopted for a building can influence the generation of gas and/or the pathways through which the gas might move and thus impact on the gas protection measures required. This could be a result of changing the permeability of the underlying strata, possible changes to the groundwater regime and the creation of preferential pathways due to the proposed foundation solution.

The guidance also states that assumptions made during initial gas risk assessments, including gas flow rates, are re-evaluated during the design of the foundations for the building.

Tier Environmental has considered the proposed foundation types within the ground gas risk assessment. Vibro stone columns can act as a potential pathway for ground gases to reach the end user of the site, however given that both the GSV and maximum carbon dioxide and methane concentrations lie below the CS2 threshold, it is not expected that the recommended foundations will impact the characteristic situation for the site.

Considerations for Construction and Maintenance Workers

During engineering and construction activities, the ground gas data indicate that the following aspects are to be considered during the preparation of relevant site H&S plans, method statements and related documents, and appropriate working methods adopted :

- **Carbon dioxide concentrations in ground gas:** The measured CO₂ concentrations in ground gas reported are elevated relative to background levels and could present an asphyxiation risk in excavations and other confined spaces. The Health & Safety Executive has published information defining safe occupational exposure levels for CO₂ and the latest guidance must be consulted to determine whether the ground gas regime necessitates specific precautions during site works.
- **Methane concentrations in ground gas:** The measured methane concentrations in ground gas reported are elevated relative to background levels and could give rise to explosive mixtures in confined spaces. Safe working methods should be adopted to mitigate this risk.

11.6. Radon Gas

Basic radon protection measures are not currently required for the proposed development on this site.

In addition to the above, basements represent areas that are more at risk because the walls are in contact with the ground as well as the floor. This, coupled with reduced natural ventilation below ground level, increases the risk of elevated radon levels. All basements are therefore considered under BR 211 to be at increased risk of elevated levels of radon regardless of geographic location.

Currently, no basements or converted cellars / basements are proposed for the development and therefore no additional consideration of potential increased risk needs to be made; however, this should be revisited in the event that the proposals change to include for a basement.



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12. REVISED CONCEPTUAL SITE MODEL AND GENERIC QUANTITATIVE RISK ASSESSMENT OF POLLUTANT LINKAGES

The preliminary combined conceptual site model and conceptual exposure model, developed from the desk study information and presented in Section 0, has been revised in light of the ground investigation and the chemical analysis results presented above in Table 12-1, below.

A revised qualitative risk assessment has also been made of the likelihood of the linkage operating and its potential significance in accordance with CIRIA C552.



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Table 12-1 Revised Assessment of Potential Pollutant Linkages (Continued on Next Page).

Justification / Comments
- No measured concentrations of potential contaminants of concern have been reported in excess of the respective GACs protective of human health for a commercial/industrial land use. - During the previous 2022 Preliminary Ground Investigation by Tier Environmental, asbestos was recorded within WS103 in the northeast of the site, recorded to be present as fibre bundles and bitumen products at a concentration of 0.006% w/w. Hand dug pits were undertaken to delineate the extent of the asbestos surrounding WS103, with asbestos screening undertaken as detailed below. - Of the 17 No. of Made Ground samples submitted for asbestos screening from the 2026 ground investigation, none were reported to contain asbestos. This includes the hand dug pits undertaken within 1.00m north, east and south of WS103 to delineate the asbestos hotspot recorded within the Made Ground (MG2) for which samples were undertaken within the same material type/ similar depths as detailed in Table 8 2 above. - The conclusion of a controlled waters risk assessment completed by Tier as part of the 2022 investigation determined that measured groundwater concentrations of arsenic, copper, nickel, zinc, fluoranthene, benzo(a)pyrene, sum PAHs and ammonia have been reported in excess of the WQS protective of the controlled waters environment by either the same order of magnitude or one order of magnitude. Given the marginal nature of these exceedances, the potential for significant dilution between the Site and the nearest surface water receptor (an unnamed pond located 115m southeast) or the nearest running water feature (an unnamed inland river located 247m south), the absence of a continuous groundwater body beneath the site, the fact that the Site will incorporate buildings / hardstanding and a dedicated drainage system that shall reduce infiltration rates through the soils, the historical commercial/industrial heritage of the surrounding area, the moderate sensitivity of the controlled waters environment, and that the distance to the nearest active groundwater abstraction point is 845m north and none within 1km hydraulically downgradient, these exceedances are not expected to have pose a significant risk to controlled waters beneath the site. - A Gas Screening Value of 0.063 l/hr has been calculated for the site, based on a maximum representative carbon dioxide concentration of 4.2% v/v, a maximum representative methane concentration of 1.5% v/v and a maximum representative flow rate of 1.5 l/hr. this places the site within Characteristic Situation 1 – very low risk, for which no gas protection measures are required. Gas Screening Value of 0.1118 l/hr has been calculated for the site, based on a maximum carbon dioxide concentration of 7.7% v/v, a maximum methane concentration of 8.6% v/v and a maximum representative flow rate of 1.3 l/hr. Whilst this places the site within Characteristic Situation 2 – low risk, further consideration has been undertaken to demonstrate that when taking into account the wider ground gas regime, the effect of groundwater pumping, and the conceptual site model, it is not considered necessary to increase the Characteristic Situation beyond that of a CS1 -Very Low Risk scenario as has been determined via the borehole hazardous gas flow rates. Therefore, no gas protection measures are required.



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Source	Potential Contaminants of Concern	Pathway	Receptor	Consequence	Probability	Qualitative Risk Assessment
Localised asbestos recorded at WS103 at 0.35m bgl within the previous Tier Environmental ground investigation (2022) as fibre bundles and bitumen products at a concentration of 0.006% w/w.	Asbestos	(Dust migration and) dust inhalation	Future site users (commercial)	Severe	Likely	High Risk
			Adjacent site users (commercial)	Severe	Low Likelihood	Moderate / Low Risk
			Adjacent site users (residential)	Severe	Low Likelihood	Moderate / Low Risk
			Construction, site investigation, demolition and future maintenance workers	Severe	Likely	High Risk

For definition of the terms used in the qualitative risk assessment, please see Appendix I.



13. PRELIMINARY WASTE MATERIALS CLASSIFICATION AND WASTE DISPOSAL ROUTE DETERMINATION

13.1. Introduction

If the site is to be redeveloped and materials are disposed off site, the material exported from the site to Landfill should be hauled by a register waste carrier in accordance with Duty of Care Regulations 1991 and the Hazardous Waste Regulations 2005.

There will be requirement for the waste producer to provide appropriate Waste Acceptance Criteria (WAC) testing of the Soils for disposal to ensure that the soils are appropriately classified and that the landfill is licensed to receive such soils. Mixing of hazardous and non-hazardous waste is not permitted. For any hazardous wastes, a consignment note shall be completed, signed, and retained by all parties involved. The consignment note shall state the volume of waste, a physical description of the material and statement of its chemical composition. The waste consignment notes shall be kept by the contractor for a period of at least two years. For non-hazardous wastes, a Waste Transfer Note (WTN) shall be completed. The WTN should be signed and a copies should be kept by the contractor for a period of at least two years. Finally, consignment notes and WTNs shall be shown to an enforcement officer from the local council or the Environment Agency, if asked.

Approach to Assessing Hazard Properties

Flammability and Oxidisability

For any samples flagged as possessing hazardous properties flammability and oxidisability, for which there are no thresholds, Tier Environmental has used professional judgment and on-site observations to decide whether the waste soil, as a whole, is likely to be flammable or oxidising. It should be noted that flammability/oxidisability alone are unlikely to result in a hazardous classification for waste soil.

Worst Case Metal Compounds

The choice of an appropriate worst case metal compound in soil has been made on the basis of the available lines of evidence. For example, if laboratory chemical analysis has demonstrated that no measured concentrations of hexavalent chromium have been reported in excess of the laboratory method detection limit, there it would be regarded as evidence of an absence of a soil source of hexavalent chromium. In such an instance, the worst case metal chromates may be replaced in favour of the next worst case metal compound.

pH

For samples that have been determined as hazardous based on pH alone and cement/concrete has been identified in the sample, Tier Environmental may assume that the high pH was due to the crushing process in the laboratory and is not representative of the waste as a whole. If further detailed determination of this is required then Tier Environmental recommend that such assessment is carried out on these results in a manner described in the AGS Waste Classification for Soils – A Practitioners' Guide (dated 2019):

- Consideration of the acid/alkali reserve to be conducted (as described in WM3 Appendix C4 and C8).
- If large enough, the cement/concrete fraction may be separated manually before testing. Waste concrete from construction and demolition which doesn't contain hazardous substances is non-hazardous (LoW code 17-01-01).
- If cement/concrete has been identified in the sample, a second analysis may be conducted on an 'as received' sample, avoiding the need for crushing before testing. The high pH is typically associated with the finer fractions of cement. If the 'as received' sample has an



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acceptable pH, this provides additional confidence that the high pH was due to the crushing process and is not representative of the waste as a whole.

Asbestos

With respect to asbestos, If the waste contains fibres that are free and dispersed then the waste will be hazardous if the waste as a whole contains 0.1% w/w or more asbestos in accordance with WM3. If the waste contains any identifiable pieces of suspected asbestos containing material (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then these pieces must be assessed separately. The waste is hazardous if the concentration of asbestos in the piece of asbestos containing material is 0.1% w/w or more. The waste shall then be regarded as a mixed waste and classified accordingly.

The following codes will then be assigned to the asbestos waste as appropriate:

- 17 06 05* Construction material containing asbestos.
- 17 06 01* Insulation material containing asbestos.

17 06 05* would normally be used in preference to 17 06 01* for the asbestos in asbestos contaminated soil and stones in accordance with WM3.

Tier Environmental Geoenvironmental engineers hold up to date UKATA Asbestos Awareness training certificates in order to demonstrate 'competence' that is required as described in WM3.

Flammable Liquid Waste

Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As such, in those instances where materials are classified as hazardous based on this alone and no free phase product is encountered, it is considered that the materials may be regarded as being non-hazardous. Please note that the table below includes a column to show whether free phase product has been encountered within the sample location.

13.2. Preliminary Waste Materials Classification and Waste Disposal Route Determination

Tier Environmental have assessed the chemical results in terms of basic waste characterisation of materials on site. This provides a preliminary assessment of whether a material is potentially non-hazardous or hazardous waste. In addition, Waste Acceptance Criteria (WAC) testing has been carried out on selected samples with a determination made as to the appropriate waste disposal route in each case.

The results of this preliminary assessment are summarised in the following table.

Made Ground

Basic waste characterisation has shown that the majority of Made Ground samples tested are suitable for disposal as non-hazardous waste, with the exception of the following samples:

- The Made Ground at WS108 at 0.90m bgl is classed as hazardous due to elevated TPH concentration.
- The Made Ground at WS107 at 3.60m bgl, WS109 at 0.40m bgl and WS205 at 0.25m bgl is classed as suitable for disposal as inert waste



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Natural Soils / Bedrock

Representative samples of natural soils have been obtained during the investigation. The results of basic waste characterisation are summarised in the table below. It is likely that any natural soils (that are not impacted by any known contamination from shallow Made Ground, or unexpected contamination) would be suitable for disposal to an inert waste landfill. It is recommended that the landfill is approached to confirm this position prior to off-site disposal. Otherwise, additional testing will be required to confirm the waste disposal route for natural soils beneath the site.

It should be noted that the natural sandstone within WS105 at 4.00m bgl is classed as hazardous waste due to an elevated TPH concentration. A hydrocarbon odour was recorded for this material at this depth, which was not encountered within this material elsewhere across the site, and is therefore considered to be limited to this location only.



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Table 13-1 Preliminary Materials Waste Classification and Waste Disposal Route Determination

Exploratory Hole Location	Sample Depth (m bgl)	Simplified Description of the Sample	Basic Waste Characterisation Result	If 'Potentially Hazardous': Is it Possible to Demonstrate the Material is Non-Hazardous?	If the material is Hazardous – What is the Driver for Hazardous Waste Classification?	Asbestos Presence, Type and Quantification	WAC Sample Available?	Soil Waste Disposal Route Determination
Tier 2022 Investigation								
WS101	0.35	Brownish red gravelly Sand	Non-Hazardous	N/A	N/A	Not analysed for asbestos	No	No WAC sample taken
WS102	0.30	Made Ground: Red sandy Gravel	'Potentially hazardous' but can be downgraded to non-hazardous (see next column for details).	Yes. Driven by 'HP 3(i): Flammable "flammable liquid waste"' (hazard statement: Flam. Liq. 3; H226 "Flammable liquid and vapour."). However, Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As no free phase product was encountered, it is considered that the materials above may be regarded as being non-hazardous .	N/A	No asbestos detected	No	No WAC sample taken
WS103	0.35	Made Ground: Brownish red Gravel	Non-Hazardous	N/A	N/A	Chrysotile and amosite fibre bundles and bitumen products at 0.006% w/w	No	No WAC sample taken
WS104	0.30	Made Ground: Grey slightly sandy Gravel	'Potentially hazardous' but can be downgraded to non-hazardous (see next column for details).	Yes. Driven by 'HP 3(i): Flammable "flammable liquid waste"' (hazard statement: Flam. Liq. 3; H226 "Flammable liquid and vapour."). However, Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As no free phase product was encountered, it is considered that the materials above may be regarded as being non-hazardous .	N/A	No asbestos detected	No	No WAC sample taken
WS105	0.70	Made Ground: Brown sandy gravelly Clay	Non-Hazardous	N/A	N/A	No asbestos detected	No	No WAC sample taken
WS105	4.00	Yellowish brown Sandstone	Hazardous	N/A	TPH (C6 to C40) petroleum group	Not analysed for asbestos	No	No WAC sample taken
WS106	0.50	Made Ground: Grey sandy Gravel	'Potentially hazardous' but can be downgraded to non-hazardous (see next column for details).	Yes. Driven by 'HP 3(i): Flammable "flammable liquid waste"' (hazard statement: Flam. Liq. 3; H226 "Flammable liquid and vapour."). However, Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As no free phase product was encountered, it is considered that the materials above may be regarded as being non-hazardous .	N/A	No asbestos detected	No	No WAC sample taken
WS106A	0.80	Made Ground: Black Gravel of asphalt	Non-Hazardous	N/A	N/A	No asbestos detected	No	No WAC sample taken
WS107	0.30	Made Ground: Red sandy Gravel	'Potentially hazardous' but can be downgraded to non-hazardous (see next column for details).	Yes. Driven by 'HP 3(i): Flammable "flammable liquid waste"' (hazard statement: Flam. Liq. 3; H226 "Flammable liquid and vapour."). However, Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As no free phase product was encountered, it is considered that the materials above may be regarded as being non-hazardous .	N/A	Not analysed for asbestos	No	No WAC sample taken
WS107	3.60	Made Ground: Reddish brown slightly gravelly sandy Clay				No asbestos detected	Yes	Suitable for disposal to an inert waste landfill
WS108	0.90	Made Ground: Dark brownish grey gravelly Sand	Hazardous	N/A	TPH (C6 to C40) petroleum group	No asbestos detected	No	No WAC sample taken
WS109	0.40	Made Ground: Greyish brown sandy Gravel	Hazardous but can be downgraded to non-hazardous	N/A	pH however likely elevated by the presence of concrete in the sample	No asbestos detected	Yes	Suitable for disposal to an inert waste landfill
Tier 2026 Investigation								
CP01	0.30	Made Ground: Red and greyish brown sandy Gravel with ash.	Non-Hazardous	N/A	N/A	No asbestos detected	Yes	Suitable for disposal to a non-hazardous landfill due to Total Organic Carbon, sulphate as SO4 and Total Dissolved Solids in excess of the inert waste threshold.



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Exploratory Hole Location	Sample Depth (m bgl)	Simplified Description of the Sample	Basic Waste Characterisation Result	If 'Potentially Hazardous': Is it Possible to Demonstrate the Material is Non-Hazardous?	If the material is Hazardous – What is the Driver for Hazardous Waste Classification?	Asbestos Presence, Type and Quantification	WAC Sample Available?	Soil Waste Disposal Route Determination
CP02	0.30	Made Ground: Reddish brown slightly gravelly Sand.	Non-Hazardous	N/A	N/A	No asbestos detected	No	No WAC sample taken
CPT05	0.70	Made Ground: Black to dark grey sandy clayey Gravel.	Non-Hazardous	N/A	N/A	No asbestos detected	Yes	Suitable for disposal to a non-hazardous landfill due to fluoride in excess of the inert waste threshold.
WS201	0.40	Made Ground: Reddish brown sandy gravelly Clay.	Non-Hazardous	N/A	N/A	No asbestos detected	No	No WAC sample taken
WS204	0.25	Made Ground: Reddish brown sandy gravelly Clay.	Non-Hazardous	N/A	N/A	No asbestos detected	No	No WAC sample taken
WS205	0.10	Made Ground: Greyish brown slightly gravelly Sand.	'Potentially hazardous' but can be downgraded to non-hazardous (see next column for details).	Yes. Driven by 'HP 3(i): Flammable "flammable liquid waste"' (hazard statement: Flam. Liq. 3; H226 "Flammable liquid and vapour."). However, Tier Environmental consider that such a hazard property would apply if free phase product has been reported in the sample. As no free phase product was encountered, it is considered that the materials above may be regarded as being non-hazardous .	N/A	Not analysed for asbestos	No	Suitable for disposal as inert waste
WS208	0.25	Made Ground: Reddish brown clayey gravelly Sand.				No asbestos detected	No	No WAC sample taken

Table 13-2 Preliminary Asphalt Materials Waste Classification

Exploratory Hole Location	Sample Depth (m bgl)	Is the sample Representative of 'Black Top' (Road Surface) Waste?	Coal Tar Concentration (%)	Concentration of Benzo(a)pyrene	Benzo(a)pyrene Units (µg/kg or mg/kg)	Does the Reported Concentration of Benzo(a)pyrene exceed 50ppm (50 mg/kg)?	If Coal Tar Concentration Greater Than, or Equal To, 0.1%: Is Concentration of Benzo(a)pyrene less than 0.005% of the Concentration of the Coal Tar?	Asphalt Waste Classification
WS101	0.25	Yes	<0.1	42	µg/kg	No	Yes	The coal tar concentration is <0.1% and the benzo(a)pyrene concentration is <50 ppm (mg/kg), therefore the asphalt would be classed as NON-HAZARDOUS WASTE in accordance with WM3. The non-hazardous EWC code 17 03 02 (bituminous mixtures other than those mentioned in 17 03 01), therefore applies.
WS106	0.15	Yes	<0.1	140	µg/kg	No	No	The coal tar concentration is <0.1% and the benzo(a)pyrene concentration is <50 ppm (mg/kg), therefore the asphalt would be classed as NON-HAZARDOUS WASTE in accordance with WM3. The non-hazardous EWC code 17 03 02 (bituminous mixtures other than those mentioned in 17 03 01), therefore applies.



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13.3. Materials Re-Use

Subject to volumetric fill requirements and a future assessment of suitability of re-use (both chemically and geotechnically), some materials may be considered for potential re-use in line with an appropriate end-of-waste protocol such as WRAP Quality Protocol for Aggregates from Inert Waste, U1 Exemption or a Materials Management Plan in accordance with the CL:AIRE Definition of Waste Code of Practice (DoWCoP). Please note that any previously landfilled or mining waste materials may not be appropriately subject to consideration under DoWCoP and may not be re-used under DoWCoP unless sufficient lines of evidence and agreement with the local Environment Agency Waste Team can be sought beforehand.

Re-Use of Excavated and Stockpiled Clean Naturally Occurring Soils on Other Sites

In addition, Tier Environmental are aware that CL:AIRE is classing stockpiled clean, naturally occurring soils as waste, unless their final destination is identified in a Materials Management Plan, before they are excavated. However, Tier Environmental consider that any clean naturally occurring soils arising from enabling works, earthworks or construction activities would be regarded as an asset and the default assumption for this site (prior to excavation and stockpiling) is not the intention to discard these materials where they may be reasonably re-used on this, or another, development site. Stockpiling is a recognised, recommended means of safely storing soils. Whilst there may be advantages to leaving soils in-situ, stripping topsoil and subsoil prior to earthworks is a routine construction activity. Tier Environmental consider that it is not unreasonable to state that in the event that the developer owns another site where the construction phase is ongoing, soils can be transferred between their sites as an owned product and never become waste.

The above paragraph above is therefore considered a clear intention to reuse any clean, naturally occurring soils derived from excavations at this site (which may also include temporary stockpiling these materials). It is considered; however, that in addition to this the following must be adhered to:

- Reuse does need to occur within a 'reasonable' timeframe (12 No. months); and,
- If soils are transferred to a third party (another developer), there needs to be some contractual agreement in place, as in this situation it is important to have something in place confirming that surplus soils are required by the third party.

Re-Use of Excavated and Stockpiled Clean Naturally Occurring Soils Within The Site They Are Excavated From

Further to the above, where soils are naturally occurring, uncontaminated and re-used on the site they are excavated from, they fall outside of the Waste Framework Directive (WFD) i.e. they will not be classified as a waste. Currently the CL:AIRE Definition of Waste Code of Practice states the following which appears to support this position: *"If the material is waste an Environmental Permit will be required to lawfully deposit or re-use it unless the material is "uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated", which is excluded from waste regulation by the Waste Framework Directive (2008)."*



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14.CONCLUSIONS AND RECOMMENDATIONS

14.1. Conclusions

- Ground conditions encountered across the site include Made Ground, generally of limited thickness within the north (0.20m to 0.60m), deepening towards the centre (0.60m to 0.75m), further deepening towards the south (up to 4.65m bgl). Made Ground generally comprised granular deposits in the north, and granular and cohesive deposits in the south. The Made Ground is underlain by the Chester Sandstone Formation, which is weathered in the upper horizons. The weathering of the Chester Sandstone strata decreases with depth, with solid bedrock encountered within the majority of the exploratory holes that achieved refusal from depths of between 0.30m at WS101 in the north west and 5.15m bgl in WS106A in the south. SPT N values of between N=2 and N= >50 have been recorded within the Weathered Chester Sandstone, although it should be noted that the majority of N values are recorded as N = 20 (medium dense) and above.
- Perched groundwater was encountered within the Made Ground at positions WS206, TP02, WS106, WS106A and WS107 predominantly located in the south of the site, from depths of between 0.40m to 1.50m bgl. Groundwater was encountered within the weathered Chester Sandstone from depths of between 1.60m to 3.60m bgl, and in the Chester Sandstone at a depth of 5.35m bgl within WS106A only. The groundwater body within the weathered zone and within the Chester Sandstone Formation is considered to be discontinuous. Groundwater monitoring recorded standing groundwater levels of between 0.25m and 3.98m bgl across the 2022 and 2026 monitoring visits.
- The most suitable foundation and floor slab solutions for the site would be a hybrid pad and vibro stone column solution, founded upon the Chester Sandstone Formation to avoid differential settlement. Where bedrock is shallow in the north, pad foundations could be utilised, founding within the competent Chester Sandstone bedrock, with vibro stone columns utilised beneath the majority of the building footprint. The approximate anticipated extent of pads/vibro stone columns beneath the site is shown in Drawing no TE1704-TE-00-XX-DR-GE-008-V01, included within Appendix A.
- The clay across site (where encountered) is expected to have been in situ since the construction of the current building in the 1970s and is therefore unlikely to cause any consolidation issues with the use of VSCs. It should be noted that pre-auguring at vibro stone column locations may be required due to the high SPT values recorded within the Made Ground and weathered Chester Sandstone Formation. A turnover would also be required to remove the foundations of the existing building and obstructions recorded in Table 6.1.
- It should be noted that the variable ground conditions recorded beneath the centre and south of the proposed building footprint may be representative of naturally occurring competent strata at approximately 1.00m bgl. Vibro Stone Columns have been recommended for this area; however it may be beneficial to undertake further delineation via trial pitting between the Made Ground and natural soils within this area when greater access is available (i.e. following demolition of the existing building and removal of the floor slab). The findings may show pads could be utilised instead of VSCs further southward within a portion of the central area currently shown within Drawing no. TE1704-TE-00-XX-DR-GE-008-V01.
- No measured concentrations of potential contaminants of concern have been reported in excess of the respective GACs protective of human health for a commercial/industrial land use.
- During the previous 2022 Preliminary Ground Investigation by Tier Environmental, asbestos was recorded within WS103 in the northeast of the site, recorded to be present as fibre bundles and bitumen products at a concentration of 0.006% w/w. Hand dug pits were undertaken to delineate the extent of the asbestos surrounding WS103, with asbestos screening undertaken as detailed below.
- Of the 17 No. of Made Ground samples submitted for asbestos screening from the 2026 ground investigation, none were reported to contain asbestos. This includes the hand dug pits undertaken within 1.00m north, east and south of WS103 to delineate the asbestos hotspot recorded within the Made Ground (MG2), for which samples were undertaken within the same material type/ similar depths as detailed in Table 8.2 above.



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- The conclusion of a controlled waters risk assessment completed by Tier as part of the 2022 investigation determined that measured groundwater concentrations of arsenic, copper, nickel, zinc, fluoranthene, benzo(a)pyrene, sum PAHs and ammonia have been reported in excess of the WQS protective of the controlled waters environment by either the same order of magnitude or one order of magnitude. Given the marginal nature of these exceedances, the potential for significant dilution between the Site and the nearest surface water receptor (an unnamed pond located 115m southeast) or the nearest running water feature (an unnamed inland river located 247m south), the absence of a continuous groundwater body beneath the site, the fact that the Site will incorporate buildings / hardstanding and a dedicated drainage system that shall reduce infiltration rates through the soils, the historical commercial/industrial heritage of the surrounding area, the moderate sensitivity of the controlled waters environment, and that the distance to the nearest active groundwater abstraction point is 845m north and none within 1km hydraulically downgradient, these exceedances are not expected to have pose a significant risk to controlled waters beneath the site.
- A Gas Screening Value of 0.1118 l/hr has been calculated for the site, based on a maximum carbon dioxide concentration of 7.7% v/v, a maximum methane concentration of 8.6% v/v and a maximum representative flow rate of 1.3 l/hr. Whilst this places the site within Characteristic Situation 2 –low risk, further consideration has been undertaken to demonstrate that when taking into account the wider ground gas regime, the effect of groundwater pumping, and the conceptual site model, it is not considered necessary to increase the Characteristic Situation beyond that of a CS1-Very Low Risk scenario as has been determined via the borehole hazardous gas flow rates. Therefore, no gas protection measures are required.
- Basic waste characterisation has shown that the majority of Made Ground samples tested are suitable for disposal as non-hazardous waste to a non-hazardous waste landfill, with the exception of the following samples:
 - The Made Ground at WS108 at 0.90m bgl is classed as hazardous due to elevated TPH concentration.
 - The Made Ground at WS107 at 3.60m bgl, WS109 at 0.40m bgl and WS205 at 0.25m bgl is classed as suitable for disposal at an inert waste landfill
- It should be noted that the natural sandstone within WS105 at 4.00m bgl is classed as hazardous waste due to an elevated TPH concentration. A hydrocarbon odour was recorded for this material at this depth, which was not encountered within this material elsewhere across the site, and is therefore considered to be limited to this location only. The remainder of bedrock materials are expected to be suitable for disposal as inert waste

14.2. Recommendations

The following is recommended for the site:

- It may be beneficial to undertake further delineation via trial pitting between the Made Ground and natural soils within the central area of the site, when greater access is available (i.e. following demolition of the existing building and removal of the floor slab). The findings may show pads could be utilised further southward instead of VSCs within a portion of the central area currently shown as requiring vibro stone columns (see Drawing no. TE1704-TE-00-XX-DR-GE-008-V01).
- Alternatively, if detailed records are made regarding the depth and position of existing foundations during the grubbing out/demolition works, it may be possible to determine the extent of competent strata for pads within this area from this information.
- The asbestos containing Made Ground within 1.00m vicinity of WS103 (Chrysotile and amosite fibre bundles and bitumen products asbestos at 0.006%w/w) will require removal and disposal to a suitably licensed landfill. Alternatively, if no excavation is to occur within this area, it could remain in situ if the area is to be covered by hardstanding (subject to approval from the contaminated land officer). All works in this area will need to be undertaken in accordance with CAR:2012 regulations.



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15.REGULATORY APPROVALS

The conclusions and recommendations presented above are considered reasonable based on the findings of the site investigation . However, these cannot be guaranteed to gain regulatory approval and, therefore, the report should be passed to the appropriate regulatory authorities and/or other organisations for their comment and approval prior to undertaking any works on site.

It is recommended that conditions placed on any planning permission are discharged prior to commencement of site works.



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17.GLOSSARY OF TERMS

ACEC	Aggressive Chemical Environment for Concrete (classification)
aOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
Designated location	Site (and the ecosystem on that site) protected under national or international legislation. A potential ecological receptor to be considered as part of the assessment of land contamination. Example designated locations include SSSIs (q.v.), SACs (q.v.), national nature reserves, Ramsar sites and bird special protection areas.
DQA	Data Quality Assessment
DQO	Data Quality Objective
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
K _{ow}	Octanol-water partition coefficient
LEL	Lower Explosive Limit
LL	Liquid Limit
LoD	Limit of Detection (analytical)
LoQ	Limit of Quantification (analytical)
Mean Value Test	Statistical test (described in the CIEH Guidance) to estimate the mean value of a normally distributed population of data at a given level of confidence. Normally for contaminated land assessment, the 95th percentile (referred to as the 95%UCL or US95) is applied as a reasonable but conservative estimate of the mean concentration for comparison with the relevant assessment criteria.
Maximum Value Test	Statistical test (described in the CIEH Guidance) to identify whether an elevated concentration within a normally distributed data set forms part of the underlying population from which it has been sampled or whether it is an outlier (such as a localised area of contamination) that merits further consideration.
MC	Moisture Content
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
PI	Plasticity Index
PID	Photoionisation Detector
PL	Plastic Limit
ppm	Parts per million
ppmv	Parts per million by volume
QA	Quality Assurance
QC	Quality Control
SAC	Special Area of Conservation
SOM	Soil Organic Matter



GROUND INVESTIGATION REPORT FOR DEACON PARK, KNOWSLEY

Report No : TE1704-TE-00-XX-RP-GE-002-V02

Page No : 63 of 63

Engineer: Stuart Milne & Stefani Ellis

Date: 21/08/2026

SPT	Standard Penetration Test
SPZ	Source Protection Zone (see Appendix K)
SSAC	Site-Specific Assessment Criterion
SSSI	Site of Special Scientific Interest
SVOC	Semi-Volatile Organic Compound
TEF	Toxicity Equivalent Factor
TPH	Total Petroleum Hydrocarbons
TWA	Time Weighted Average
US95	95 th percentile estimate of the true mean value of a data population (also known as 95%UCL).
VOC	Volatile Organic Compound

APPENDIX A - DRAWINGS



Deacon Business Park Site Location Plan



The Site

Job Number: TE1704

Job Name: Deacon Business Park

Client: EEIP Arundel Propco 2 Holdings Ltd

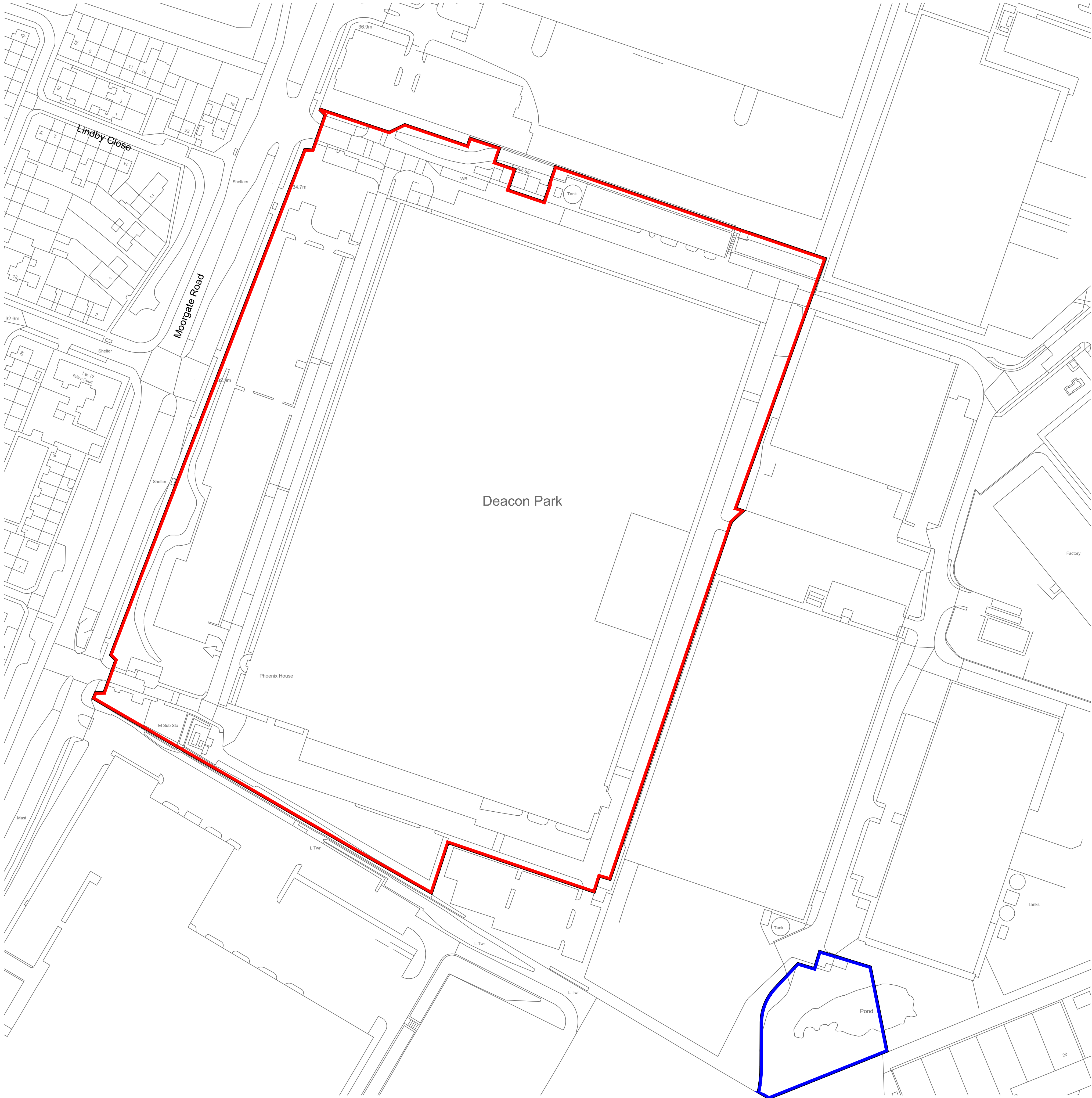
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Drawing Number: TE1704-TE-00-XX-DR-GE-001-V02

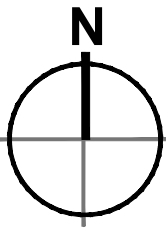
Drawn By: ER

Checked By: AR

Scale: NTS



- Dimensions are in millimeters, unless stated otherwise.
- It is the recipient's responsibility to print this document to the correct scale.
- All relevant drawings and specifications should be read in conjunction with this drawing.



Planning Application Boundary
21.89 Acres / 8.86 Ha

Ownership Boundary

Ordnance Survey, (c) Crown Copyright 2022. All rights reserved. Licence number 100022432

Existing Site Plan
Scale 1:1000



PLANNING
THIS DRAWING IS TO BE USED FOR THE STATED PURPOSE
ONLY AND SHOULD NOT BE USED FOR ANY OTHER

P1	Issued For Planning	MS	AD	15.12.22
rev	amendments	by	ckd	date

Deacon Business Park, Knowsley

Existing Site Plan

Information Container LOD:	LOD 200
----------------------------	---------



RIBA PoW Stage:	3 - Spatial Coordination
Document Suitability:	S3
Drawn / Checked:	MS / AD
Date:	01/12/2022
Scale:	1:1000 @ A1
UMC Project Number:	21241
Document Reference:	Drawing no: Revision:
21241 - UMC - 0001 - SI - DR - A	0501 P1



Proposed Site Plan
Scale 1:1000



- Dimensions are in millimeters, unless stated otherwise.
- It is the recipient's responsibility to print this document to the correct scale.
- All relevant drawings and specifications should be read in conjunction with this drawing.



SCHEDULE OF ACCOMMODATION
(Gross Internal Area)

Unit 1	
Warehouse Area	- 414,572 sq ft (38,515m²)
Office (2 storey)	- 25,295 sq ft (2,350m²)
Transport Office	- 2,390 sq ft (222m²)
Gatehouse	- 291 sq ft (27m²)
Total Area	- 442,548 sq ft (41,114m²)
Loading Docks	- 40
Level Access	- 3
HGV Parking	- 65
Car Parking	- 385
Plot Area	- 21.89 Acres (8.86 Hectares)
Site Density	- 46.41%

Parking Standards Knowsley Council	
Draft Ensuring a Choice of Travel Supplementary Planning Document (February 2010)	
B8- Storage and Distribution (max)	
1 space per 100 m² GFA	

P2	Dims added	CD	DB	15.12.22
P1	Issued For Planning	MS	AD	15.12.22
rev	amendments	by	ckd	date

Deacon Business Park, Knowsley

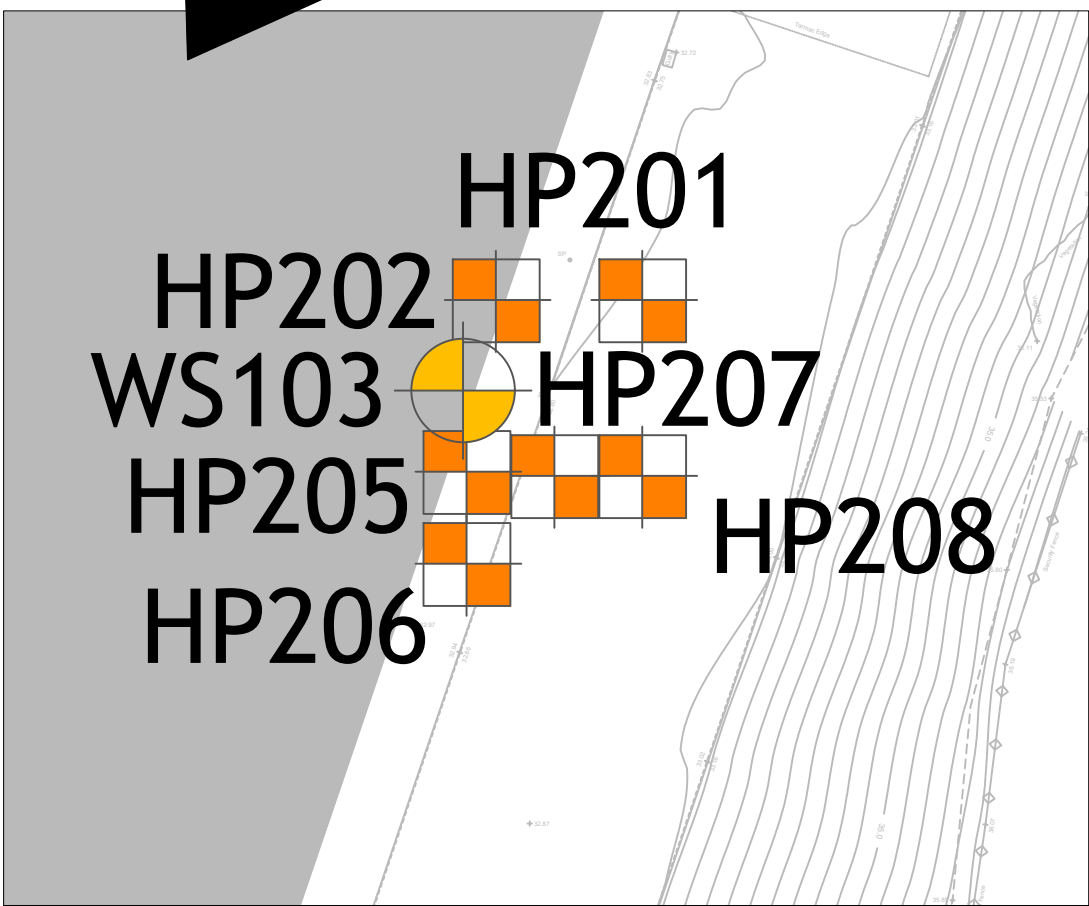
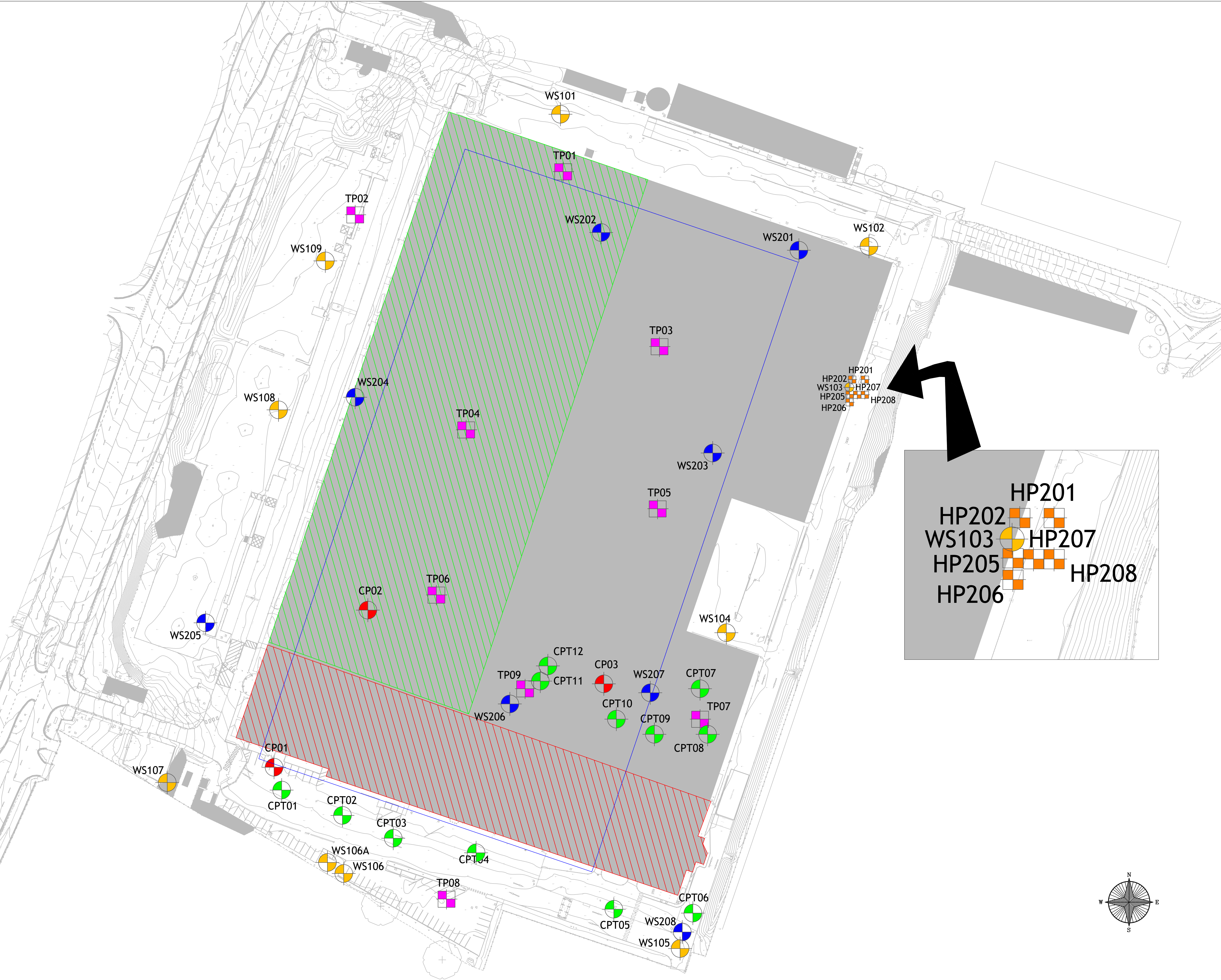
Proposed Site Plan

Information Container LOD:	LOD 200
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RIBA PoW Stage:	3 - Spatial Coordination
Document Suitability:	S3
Drawn / Checked:	MS / AD
Date:	13/10/2022
Scale:	As Drawn @A1
UMC Project Number:	21241
Document Reference:	Drawing no: Revision:
21241 - UMC - 0001 - SI - DR - A	0601 P2

PLANNING
THIS DRAWING IS TO BE USED FOR THE STATED PURPOSE
ONLY AND SHOULD NOT BE USED FOR ANY OTHER



DO NOT SCALE



NOTES

- 2026 CABLE PERCUSSIVE LOCATION
- 2026 CPT LOCATIONS
- 2026 WINDOW SAMPLE LOCATION
- 2026 HAND DUG PIT LOCATIONS
- 2026 TRIAL PIT LOCATIONS
- 2022 WINDOW SAMPLE LOCATION
- NOT ACCESSIBLE DUE TO LOW HEADROOM
- NOT ACCESSIBLE FOR CPT RIG DUE TO DOORWAY WIDTH FOR CLEARANCE
- APPROXIMATE EXTENT OF PROPOSED BUILDING LAYOUT

P5	21.08.2026	CS	ISSUED FOR INFORMATION	SE	SE
P4	01.04.2026	CS	ISSUED FOR INFORMATION	SE	SE
P3	30.03.2026	CS	ISSUED FOR INFORMATION	SE	SE
P2	11.03.2026	CS	ISSUED FOR INFORMATION	SE	SE
P1	23.02.2026	CS	ISSUED FOR INFORMATION	SE	SE
REV	DATE	BY	DESCRIPTION	CHK	APD

DRAWING STATUS: INFORMATION

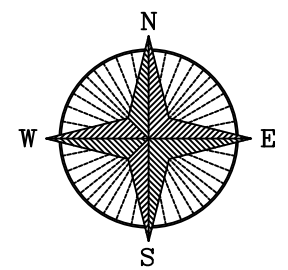
Tier Environmental Ltd.
Unit 5 Office Village
Sandpiper Court
Chester Business Park
Chester | CH4 9QZ
t: 01925 818 388

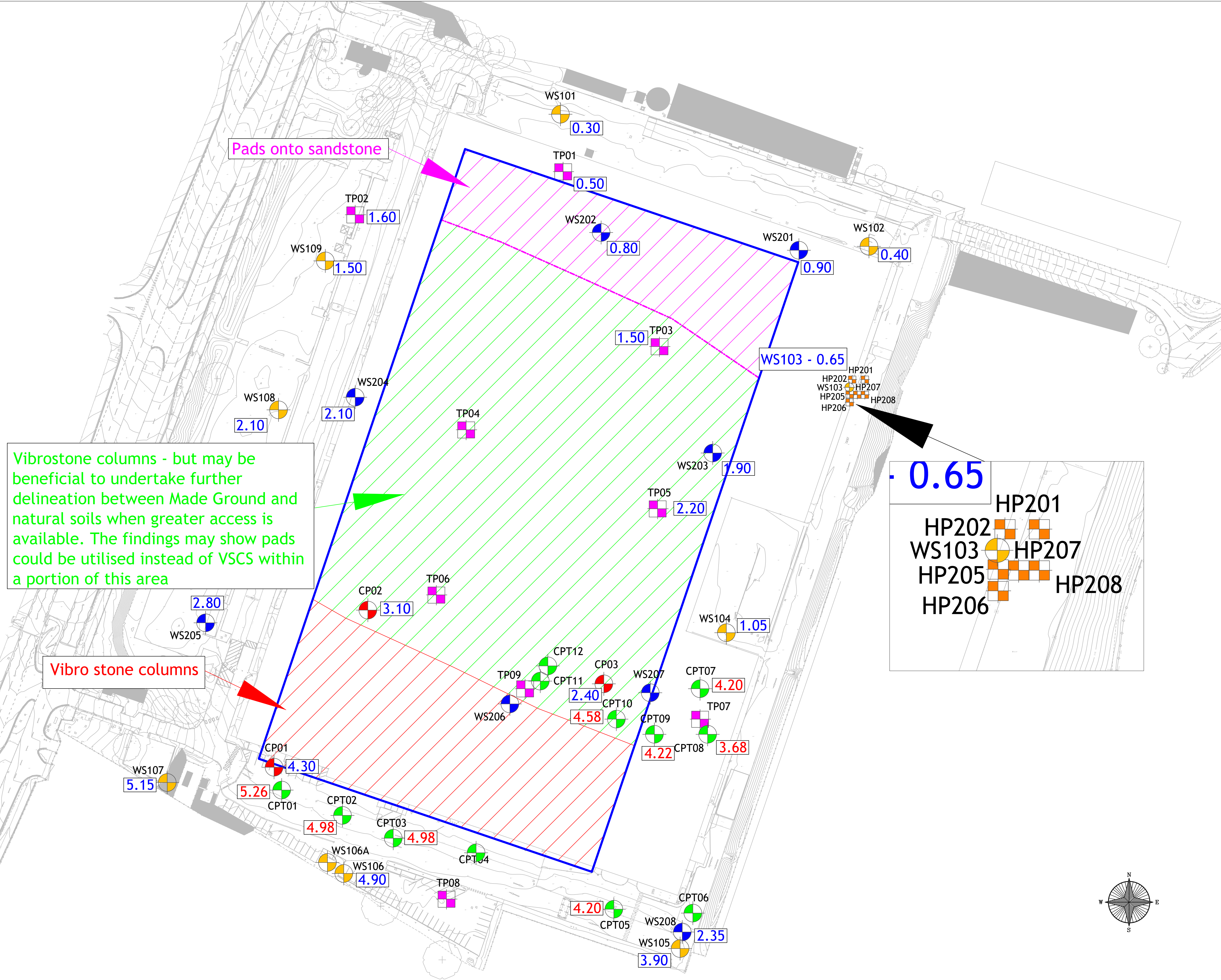
CLIENT:
EPIP ARUNDEL PROPCO 2 HOLDINGS LTD

PROJECT:
DEACON BUSINESS PARK, KNOWSLEY

TITLE:
EXPLORATORY HOLE LOCATION PLAN

SCALE: 1:1000	CHECKED: SE	APPROVED: SE
CAD FILE: -	DESIGN/DRAWN: CS	DATE: 23.02.2026
PROJECT No: TE1704	DRAWING No: TE1704-TE-00-XX-DR-GE-005-V04	REV: p4





DO NOT SCALE

TIER

CONSULT GROUP

NOTES

2026 CABLE PERCUSSIVE LOCATION

2026 CPT LOCATIONS

2026 WINDOW SAMPLE LOCATION

2026 HAND DUG PIT LOCATIONS

2026 TRIAL PIT LOCATIONS

2022 WINDOW SAMPLE LOCATION

APPROXIMATE EXTENT OF PROPOSED BUILDING LAYOUT

1.50 - DEPTH TO ROCKHEAD (MBGL, PROVEN)

4.20 - DEPTH TO ROCKHEAD (MBGL, INFERRED FROM CPT REFUSAL)

REV

DATE

BY

DESCRIPTION

CHK

APD

DRAWING STATUS:

INFORMATION

TIER

CONSULT GROUP

Tier Environmental Ltd.

Unit 5 Office Village

Sandpiper Court

Chester Business Park

Chester | CH4 9QZ

t: 01925 818 388

CLIENT:

EEIP ARUNDEL PROPCO 2 HOLDINGS LTD

PROJECT:

DEACON BUSINESS PARK, KNOWSLEY

TITLE:

FOUNDATION ZONING PLAN

SCALE: 1:1000

NTS

CHECKED:

SE

APPROVED:

SE

CAD FILE:

-

DESIGN/DRAWN:

CS

DATE:

02.04.2026

PROJECT No:

TE1704

DRAWING No:

TE1704-TE-00-XX-DR-GE-008-V02

REV:

p2

APPENDIX B - EXPLORATORY HOLE LOGS



Borehole Log

Borehole No.

CP01

Sheet 1 of 2

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342432.00 - 397452.00

Hole Type
CP

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 03/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.15	ES	N=14 (2,2/3,3,4,4)	0.10			MADE GROUND: Grey ASPHALT MADE GROUND	1		
		0.30	ES		0.20			MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone (TYPE 1 MOT) MADE GROUND			
		0.40	D		0.60			MADE GROUND: Red and greyish brown, sandy, fine to coarse, angular to subangular GRAVEL of possible burnt shale / brick and ash MADE GROUND			
		0.70	D					MADE GROUND: Reddish brown, slightly gravelly SAND. Gravel is fine to medium, subangular to rounded of mudstone, sandstone and brick MADE GROUND			
		0.70	ES					MADE GROUND: Firm to stiff, brownish grey, slightly gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and mixed aggregates MADE GROUND			
		1.10	D		1.00						
		1.20									
		1.70 - 2.00	B								
		2.20 - 2.65	U								
		2.70	D								
		3.30		N=15 (3,3/3,4,4,4)							
		4.30		50 (5,6/50 for 220mm)	4.30			Reddish brown, weathered SANDSTONE			
		4.70 - 5.00	B								

Continued on next sheet

5

Continued on next sheet

5

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) Backfilled with arisings 5) Made ground of possible burnt shale/brick and ash between 0.20m and 0.60m bgl, no further visual or olfactory evidence of contamination





CP01

Sheet 2 of 2

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342432.00 - 397452.00

Hole Type
CP

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 03/02/2026 -

Logged By
JW

[illegible]

Remarks
1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) Backfilled with arisings 5) Made ground of possible burnt shale/brick and ash between 0.20m and 0.60m bgl, no further visual or olfactory evidence of contamination





Borehole Log

Borehole No.

CP02

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342469.00 - 397514.00

Hole Type
CP

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.03			MADE GROUND: Grey CONCRETE (screed layer)	
					0.25			MADE GROUND: Greyish brown CONCRETE with medium aggregate content. Aggregate is fine to coarse, angular to subangular of mixed natural lithologies. Rebar at approx 0.10m bgl approx Ø10mm	
		0.40	D		0.40			MADE GROUND: Reddish brown, slightly clayey, slightly gravelly SAND. Gravel is fine to coarse, angular to subangular of mixed anthropogenic lithologies. Sand is fine grained	
					1.00			MADE GROUND: Reddish brown, slightly clayey, slightly gravelly SAND	
		1.10	B					Reddish brown, slightly gravelly SAND	
		1.10	D					Brownish grey, stiff, slightly sandy CLAY	
		1.20		N=30 (3,4/5,7,8,10)				Pockets of black organic material from 1.00m bgl	1
					1.60			Dense, reddish brown, fine grained SAND	2
		1.70 - 2.00	B						
		2.80		50 (5,10/50 for 170mm)					3
					3.10			Extremely weak, reddish brown weathered SANDSTONE recovered as sand and gravel.	
		3.80		50 (25 for 95mm/50 for 85mm)					4
					3.98			End of borehole at 3.98 m	5

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings





Borehole Log

Borehole No.

CP03

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342562.07 - 397484.92

Hole Type
CP

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.03			0.03			MADE GROUND: Grey CONCRETE (screed layer)	
		0.27			0.27			MADE GROUND	
		0.40			0.40			MADE GROUND: Greyish brown CONCRETE	
		0.60	D					MADE GROUND	
		0.60 - 1.00	B					MADE GROUND: Reddish brown, slightly clayey, slightly gravelly SAND. Gravel is fine to coarse, angular to subangular of concrete, brick and mixed lithologies. Sand is fine to medium grained	
		1.20		N=50 (6,10/50 for 295mm)	1.20			MADE GROUND	
								Reddish brown, slightly gravelly SAND. Gravel is fine to medium, angular to subangular of sandstone	1
								Dense to very dense, reddish brown, fine grained SAND	2
		2.40		N=50 (8,12/50 for 275mm)	2.40				
								Extremely weak, reddish brown weathered SANDSTONE recovered as sand and gravel	3
		3.30		50 (25 for 125mm/50 for 105mm)					
					3.55			End of borehole at 3.55 m	4
									5

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination.





Trial Pit Log

Trialpit No

CPT01

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.09			MADE GROUND: Grey ASPHALT	
				0.20			MADE GROUND	
							MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of MOT	
							MADE GROUND	
							MADE GROUND: Reddish grey and brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of brick and ash.	
							MADE GROUND	
				1.00				
				1.20			MADE GROUND: Brownish red, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of brick and mixed aggregates	1
							MADE GROUND	
							End of pit at 1.20 m	
								2
								3
								4
								5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT02

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.16			MADE GROUND: Grey ASPHALT MADE GROUND
				0.22			MADE GROUND: Greyish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse of limestone (MOT Type 1) MADE GROUND
				0.70			MADE GROUND: Red, grey and brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to medium of brick and ash MADE GROUND
				0.90			MADE GROUND: Reddish brown, slightly gravelly, fine to medium grained SAND. Gravel is fine to medium, subangular to rounded of mudstone, sandstone and brick MADE GROUND
				1.20			MADE GROUND: reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and mixed aggregates MADE GROUND
							End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability:





Trial Pit Log

Trialpit No

CPT03

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.12 0.18			MADE GROUND: Grey ASPHALT MADE GROUND
							MADE GROUND: Greyish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse of limestone (MOT Type 1) MADE GROUND
				0.75 0.87			MADE GROUND: Red, grey and brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to medium of brick and ash MADE GROUND
							MADE GROUND: Reddish brown, slightly gravelly, fine to medium grained SAND. Gravel is fine to medium, subangular to rounded of mudstone, sandstone and brick MADE GROUND
				1.20			MADE GROUND: reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and mixed aggregates MADE GROUND
							End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT04

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			MADE GROUND: Grey ASPHALT MADE GROUND	
				0.35			MADE GROUND: Greyish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse of limestone (MOT Type 1)	
				0.50			MADE GROUND MADE GROUND: Reddish brown, slightly gravelly, fine to medium grained SAND. Gravel is fine to medium, subangular to rounded of mudstone, sandstone and brick	
				1.20			MADE GROUND MADE GROUND: reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and mixed aggregates MADE GROUND	1
							End of pit at 1.20 m	2
								3
								4
								5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No
CPT05
Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -
Level:

Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):

Depth
1.20

Scale
1:25

Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.70	ES		0.06			MADE GROUND: Grey ASPHALT
				0.15			MADE GROUND
							MADE GROUND: Greyish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse of limestone (MOT Type 1)
				0.52			MADE GROUND
				0.72			MADE GROUND: Red, grey and brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to medium of brick and ash
				0.82			MADE GROUND
							MADE GROUND: Black / dark grey, slightly sandy, slightly clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of clinker and ash
							MADE GROUND
				1.20			Black in colour, slight hydrocarbon odour. Occasional cobbles and clinker
							MADE GROUND: Reddish brown, slightly gravelly, fine to medium grained SAND. Gravel is fine to medium, subangular to rounded of mudstone, sandstone and brick
							MADE GROUND
							MADE GROUND: reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and mixed aggregates
							MADE GROUND

End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT Follow on 3) No groundwater ingress encountered 4) Slight hydrocarbon odour and black colouring between 0.52m and 0.72m bgl

Stability: Stable





Trial Pit Log

Trialpit No

CPT06

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.10			MADE GROUND: Grey ASPHALT
				0.17			MADE GROUND
							MADE GROUND: Grey CONCRETE
							MADE GROUND
				0.38			MADE GROUND: Black, dark grey, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of ash
							MADE GROUND
				0.85			MADE GROUND: Red, grey and brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to angular, fine to medium of brick and ash
							MADE GROUND
				1.20			MADE GROUND: Reddish brown, slightly gravelly, slightly clayey SAND. Gravel is fine to medium, subangular to angular of brick and mixed aggregates. Sand is fine to coarse
							MADE GROUND
							End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT07

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.05			MADE GROUND: Grey CONCRETE (screed layer) MADE GROUND
				0.22			MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.10m bgl
				0.40			MADE GROUND
				0.50			MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1). Sand is fine to coarse grained MADE GROUND
				1.20			MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. Sand is fine to medium grained MADE GROUND Reddish brown, slightly gravelly, fine grained SAND. Gravel is fine to medium, angular to subangular of sandstone End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT08

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			MADE GROUND: Grey CONCRETE (screed layer)	
				0.25			MADE GROUND	
				0.35			MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.10m bgl	
				0.50			MADE GROUND	
							MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1). Sand is fine to coarse grained	
							MADE GROUND	
							MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. Sand is fine to medium grained.	1
				1.20			MADE GROUND	
							Reddish brown, slightly gravelly, fine grained SAND. Gravel is fine to medium, angular to subangular of sandstone	
							End of pit at 1.20 m	
								2
								3
								4
								5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT09

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.09			MADE GROUND: Grey CONCRETE (screed layer)
				0.25			MADE GROUND
				0.35			MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.28m bgl
				0.60			MADE GROUND
							MADE GROUND: Pink, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1). Sand is fine to coarse grained.
							MADE GROUND
							MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale.
				1.20			MADE GROUND
							Reddish brown, slightly gravelly, fine grained SAND. Gravel is fine to medium, angular to subangular of sandstone
							End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT10

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.06			MADE GROUND: Grey CONCRETE MADE GROUND
				0.23			MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.10m bgl
				0.40			MADE GROUND
				0.70			MADE GROUND: Pink, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT TYPe 1) Sand is fine to coarse grained MADE GROUND
				1.20			MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. MADE GROUND Reddish brown, slightly gravelly, fine grained SAND. Gravel is fine to medium, angular to subangular of sandstone End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

CPT11

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.01			MADE GROUND: Grey CONCRETE (screed layer)	
				0.22			MADE GROUND MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.09m and 0.20m bgl. Rebar approx Ø15mm at 0.15m bgl	
							MADE GROUND MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. Sand is fine to medium grained	
							MADE GROUND Occasional grey pockets with slight organic odour between 0.90m and 1.00m bgl	1
				1.20			End of pit at 1.20 m	
								2
								3
								4
								5

Remarks: 1) Hand dug pit for service clearance 2) CPT Follow on. 3) No groundwater ingress encountered 4) Occasional grey pockets with slight organic odour in made ground between 0.90m and 1.00m bgl

Stability:





Trial Pit Log

Trialpit No

CPT12

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
03/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
1.20Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.02			MADE GROUND: Grey CONCRETE (screed layer) MADE GROUND
				0.25			MADE GROUND: Strong, brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.09m and 0.20m bgl. Rebar approx Ø15mm at 0.15m bgl
				0.40			MADE GROUND
				0.75			MADE GROUND: Pink, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1) Sand is fine to coarse grained MADE GROUND
				1.20			MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. MADE GROUND
							MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone, occasional coal and possible burnt shale. MADE GROUND

End of pit at 1.20 m

1

2

3

4

5

Remarks: 1) Hand dug pit for service clearance 2) CPT follow on 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination

Stability: Stable





Trial Pit Log

Trialpit No

HDP201

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
05/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
0.45Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.37 - 0.43	ES		0.05 0.20 0.37 0.44 0.45		  	MADE GROUND: Black ASPHALT MADE GROUND MADE GROUND: Dark grey ASPHALT MADE GROUND MADE GROUND: Brownish grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1) MADE GROUND MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of brick, sandstone and occasional possible burnt shale MADE GROUND MADE GROUND: Reddish brown, fine grained SAND MADE GROUND	1
							End of pit at 0.45 m	
								2
								3
								4
								5

Remarks: 1) Hand dug pit for asbestos delineation 2) No groundwater ingress encountered 3) Terminated at required depth 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

HDP202

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords:	-
Level:	

Date
05/02/2026

Location: KNOWSLEY

Dimensions
(m):

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
0.43

Logged
SE

[illegible]

Remarks: 1) Hand dug pit for asbestos delineation 2) No groundwater ingress encountered 3) Terminated at required depth 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

HDP205

Sheet 1 of 1

Project Name:	DEACON BUSINESS PARK
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Project No.
TE1704

Co-ords:	-
----------	---

Level:

Date _____

05/02/2026

Location: KNOWSLEY

Dimensions
(m):

Scale

1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
0.47

Logged
SE

[illegible]

Remarks:	1) Hand dug pit for asbestos delineation 2) No groundwater ingress encountered 3) Terminated at required depth 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings
----------	--

Stability: Stable





Trial Pit Log

Trialpit No

HDP207

Sheet 1 of 1

Project Name:	DEACON BUSINESS PARK
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Project No.
TE1704

Co-ords:	-
----------	---

Level:

Date _____

04/02/2026

Location: KNOWSLEY

Dimensions
(m):

Scale

1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
0.60

Logged
SE

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.40	ES		0.04			MADE GROUND: Black ASPHALT
				0.15		MADE GROUND	
				0.22		MADE GROUND: Dark grey ASPHALT	
						MADE GROUND	
						MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone (MOT Type 1)	
						MADE GROUND	
				0.59		MADE GROUND: Reddish brown, sandy, fine to coarse, angular to subangular GRAVEL of possible burnt shale with occasional brick and concrete	
				0.60		MADE GROUND	
						MADE GROUND: Reddish brown, fine grained SAND	
						MADE GROUND	
End of pit at 0.60 m							

Remarks:	1) Hand dug pit for asbestos delineation 2) No groundwater ingress encountered 3) Terminated at required depth 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings
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Stability: Stable





Trial Pit Log

Trialpit No

HDP208

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
04/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
0.60Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30 - 0.50	ES		0.09 0.29 0.55 0.60		     	MADE GROUND: Black ASPHALT MADE GROUND MADE GROUND: Strong grey CONCRETE with medium aggregate content. Aggregate MADE GROUND MADE GROUND: Reddish brown, slightly sandy, slightly clayey, fine to coarse angular to subangular GRAVEL of possible burnt shale with occasional clinker and sandstone MADE GROUND MADE GROUND: Reddish brown, fine grained SAND MADE GROUND
							End of pit at 0.60 m

1

2

3

4

5

Remarks: 1) Hand dug pit for asbestos delineation 2) No groundwater ingress encountered 3) Terminated at required depth 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings

Stability:





Trial Pit Log

Trialpit No

TP01

Sheet 1 of 1

Project Name:	DEACON BUSINESS PARK
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Project No.
TE1704

Co-ords:	-
----------	---

Level:

Date _____

04/02/2026

Location: KNOWSLEY

Dimensions
(m):

2.65

Depth
0.65

0.95

Scale

1:25

Logged
JW

Client: EEIP Arundel Propco 2 Holdings Ltd

[illegible]

Remarks:	1) No groundwater ingress encountered 2) Terminated on bedrock 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings
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Stability: Stable





Trial Pit Log

Trialpit No

TP02

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
04/02/2026

Location: KNOWSLEY

Dimensions
(m):

2.5

Depth
1.75

0.7

Scale
1:25Logged
SE

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼	1.10	B		0.06			MADE GROUND: Greyish brown BLOCK PAVING MADE GROUND	1
				0.18			MADE GROUND: Yellowish brown, slightly gravelly	
				0.25			SAND. Gravel is fine to medium, subangular to angular	
				0.30			of mixed aggregates. Sand is fine to coarse MADE GROUND	
0.50						MADE GROUND: Light grey, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse,		
0.70						subangular to angular of limestone (MOT type 1) MADE GROUND		
0.80						MADE GROUND: Grey CONCRETE slab in eastern end of pit. Approx Ø5mm rebar MADE GROUND		
						MADE GROUND: Grey, slightly clayey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse,		
						subangular to angular of limestone, brick, quartzite and sandstone MADE GROUND		
						MADE GROUND: Stiff, dark grey, sandy organic CLAY MADE GROUND		
▼				1.60			<i>Slight organic odour and occasional organic fragments (vegetation)</i>	2
							MADE GROUND: Reddish brown, slightly gravelly, clayey SAND. Gravel is fine to medium, subangular to subrounded of sandstone and occasional clinker. Sand is fine to coarse MADE GROUND	
				1.75			Reddish brown, slightly gravelly, clayey SAND. Gravel is fine to medium, subangular to angular of sandstone. Sand is fine to coarse Reddish brown SANDSTONE recovered as sandy cobbles	
							End of pit at 1.75 m	
								3
								4
								5

Remarks: 1) Groundwater ingress as slow drips at 0.50m, 0.75m and 1.60m bgl 2) Terminated on bedrock 3) Organic dark grey, made ground between 0.50m to 0.60m bgl with slight organic odour and occasional organic fragments (vegetation) 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP03

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342584.00 - 397618.00

Level:

Date

04/02/2026

Location: KNOWSLEY

Dimensions
(m):

2.45

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
1.60

0.8

Scale

1:25

Logged
JW

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	B		0.10			MADE GROUND: Grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.08m bgl	
				0.40			MADE GROUND MADE GROUND: Grey, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone (MOT). Sand is fine to coarse	
				0.65			MADE GROUND MADE GROUND: Reddish brown, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of possible burnt shale / brick and sandstone. Sand is fine to coarse	
							MADE GROUND Reddish brown, slightly clayey, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of sandstone	1
				1.50			Extremely weak, reddish brown SANDSTONE recovered as gravel and cobbles	
				1.60			End of pit at 1.60 m	2
								3
								4
								5

Remarks: 1) Groundwater encountered at 1.60m as slow trickle, rising to 1.55m after 2mins 2) Terminated on bedrock 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP04

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
05/02/2026

Location: KNOWSLEY

Dimensions
(m):

3.1

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
1.00

1.3

Scale
1:25Logged
JW

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.10			MADE GROUND: Grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, angular to subangular of mixed natural lithologies.
				0.20			MADE GROUND
							MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone (MOT). Sand is fine to coarse
				0.65			MADE GROUND
							MADE GROUND: Reddish brown, gravelly SAND. Gravel is fine to medium, subangular to angular of brick and aggregates. Sand is fine to coarse
				1.00			MADE GROUND
							Reddish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of sandstone
							End of pit at 1.00 m

1

2

3

4

5

Remarks: 1) No groundwater ingress encountered 2) No visual or olfactory evidence of contamination 3) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP05

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342583.26 - 397554.00

Level:

Date

04/02/2026

Location: KNOWSLEY

Dimensions
(m):

3.8

Depth
2.50

1.3

Scale

1:25

Logged

JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	D		0.18 0.25 0.45 0.65		                      	MADE GROUND: Grey CONCRETE with medium to high aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. rebar approx Ø10mm at 0.07m bgl MADE GROUND MADE GROUND: Grey, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone (MOT). Sand is fine to coarse MADE GROUND MADE GROUND: Reddish brown and grey, gravelly SAND. Gravel is fine to medium, subangular to angular of brick and aggregates. Sand is fine to coarse MADE GROUND MADE GROUND: Friable, reddish brown, slightly sandy, gravelly CLAY. Gravel is fine to coarse, subangular to angular of sandstone, brick, occasional clinker and possible burnt shale/brick. Sand is fine to coarse MADE GROUND Reddish brown, slightly gravelly, clayey SAND. Gravel is fine to coarse, subangular to angular of sandstone. Sand is fine to coarse
				2.20 2.50		            	Extremely weak, reddish brown SANDSTONE recovered as gravel and cobbles End of pit at 2.50 m

Remarks: 1) No groundwater ingress encountered 2) Terminated on bedrock 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP06

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342496.00 - 397520.00

Level:

Date

05/02/2026

Location: KNOWSLEY

Dimensions
(m):Depth
3.60

Scale

1:25

Logged

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼	0.20	B		0.15			MADE GROUND: Grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies	1
				0.30			MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone, brick and concrete with occasional clinker. Sand is fine to coarse	
				0.45			MADE GROUND: Reddish brown, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of brick/possible burnt shale and sandstone. Sand is fine to coarse	
				0.75			MADE GROUND: Reddish grey, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of sandstone, brick and aggregates. Sand is fine to coarse	
				1.10			MADE GROUND: Reddish brown, slightly gravelly, sandy CLAY. Gravel is sandstone. Sand is fine to coarse	
				1.80			Reddish brown, slightly gravelly SAND. Gravel is fine to coarse, subangular to angular of sandstone. Sand is fine to coarse	
				3.60			End of pit at 3.60 m	4
								5

Remarks: 1) Groundwater encountered as slow drip in eastern and western trial pit faces at 3.60m bgl 2) Terminated due to max reach of excavator 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP07

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
05/02/2026

Location: KNOWSLEY

Dimensions
(m):

2.75

1:14

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
3.00Logged
JW

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25 0.30			MADE GROUND: Grey CONCRETE with a medium to high aggregate content. Aggregate is angular to subrounded of mixed natural lithologies. Rebar Ø10mm at 0.07m bgl	
				0.55			MADE GROUND MADE GROUND: Greyish brown, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone (MOT Type 1)	
							MADE GROUND MADE GROUND: Reddish brown, slightly sandy GRAVEL. Gravel is fine to medium, subangular to angular of brick and occasional possible burnt shale.	
							MADE GROUND Reddish brown, slightly gravelly SAND. Gravel is fine to coarse, subangular to angular of sandstone	1
				2.30			Reddish brown, slightly sandy CLAY. Sand is fine to coarse	2
				3.00			End of pit at 3.00 m	3
								4
								5

Remarks: 1) No groundwater ingress encountered 2) Terminated on max reach of excavator 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP08

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704Co-ords: -
Level:Date
04/02/2026

Location: KNOWSLEY

Dimensions
(m):

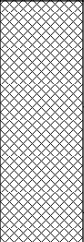
2.6

Client: EEIP Arundel Propco 2 Holdings Ltd

Depth
1.00

0.8

Scale
1:25Logged
SE

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼	0.50	B		0.20			MADE GROUND: Black ASPHALT MADE GROUND	1
							MADE GROUND: Brownish grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone with occasional brick (MOT Type 1) MADE GROUND	
						<i>Geotextile membrane at 0.55m bgl</i>		
				1.00			<i>Plastic pipe approx Ø100mm at 0.90m bgl. Groundwater strike at 0.90m bgl from pocket of brick rubble in south east corner of pit, slow seepage, stopping after ~1min with no rise. Concrete obstruction with rebar approx Ø15mm in centre of north pit at 0.90m bgl covering northern half of pit</i> End of pit at 1.00 m	2 <

Remarks: 1) Groundwater encountered ar slow seepage from pocket of brick rubble in south east corner of pit at 0.90m bgl - no rise after 20mins 2) Terminated on concrete obstruction in northern half of pit 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Trial Pit Log

Trialpit No

TP09

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342531.00 - 397483.00

Level:

Date

05/02/2026

Location: KNOWSLEY

Dimensions
(m):

3.3

Depth
3.40

1.2

Scale

1:25

Logged

JW

Client: EEIP Arundel Propco 2 Holdings Ltd

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			MADE GROUND: Grey CONCRETE with a medium to high aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar at 0.09m bgl approx Ø10mm MADE GROUND MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of limestone and occasional concrete (MOT). Sand is fine to coarse MADE GROUND MADE GROUND: Reddish brown, sandy GRAVEL. Gravel is fine to coarse, subangular to angular of occasional possible burnt shale and brick. MADE GROUND MADE GROUND: Reddish brown, slightly gravelly SAND. Sand is fine to coarse. Gravel is of sandstone and brick MADE GROUND Reddish brown, slightly gravelly, sandy CLAY. Gravel is fine to medium, subangular to angular of sandstone. Sand is fine to coarse	1
				0.25				
				0.45				
				1.10				
				2.10			Reddish brown, slightly gravelly SAND. Gravel is fine to coarse, subangular to angular of weathered sandstone. Sand is fine to coarse	2
				3.40			End of pit at 3.40 m	3
								4
								5

Remarks: 1) No groundwater ingress encountered 2) Terminated due to max reach of excavator 3) No visual or olfactory evidence of contamination 4) Backfilled with arisings

Stability: Stable





Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.25	ES	56 (19 for 75mm/56 for 90mm)	0.28			MADE GROUND: Black ASPHALT with high aggregate content. MADE GROUND	1	
		0.28			0.30			Brownish red, gravelly, fine to medium, grained SAND. Gravel is medium to coarse, angular to subangular of sandstone.		
		0.35	ES		0.50			Extremely weak, yellowish brown, find grained SANDSTONE		
		0.40	SPTLS					End of borehole at 0.50 m		
									2	
									3	
									4	
									5	
									6	

Remarks

1) No groundwater encountered. 2) Backfilled with arisings and asphalt reinstated. 3) Terminated due to refusal 4) All strength terms are derived from field tests only





WS102

Hole Type
WS

Scale
1:25

Logged By
SE

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342666.63 - 397657.53

Location: KNOWSLEY

Level:

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

- 1
- 2
- 3
- 4
- 5

1) No groundwater encountered. 2) Backfilled with arisings and asphalt reinstated. 3) Terminated due to refusal 4) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.17			0.17			MADE GROUND: Black ASPHALT with high aggregate content.	
		0.30			0.30			MADE GROUND <i>One layer of asphalt 0.05m thick, second layer 0.12m thick.</i>	
		0.35	ES		0.50			MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone.	
		0.30 - 0.50	B		0.65			MADE GROUND	
		0.55	ES		0.95			MADE GROUND: Dense, brownish red, sandy GRAVEL of fine to coarse, angular BURNT SHALE with occasional brick and concrete.	
		0.65	SPTL					MADE GROUND	1
		0.70	S	50 (25 for 125mm/50 for 100mm)				Reddish brown, slightly gravelly, fine to medium, grained SAND. Gravel is fine to medium, subangular of sandstone.	
								Extremely weak to weak, reddish brown, medium grained SANDSTONE. End of borehole at 0.95 m	
									2
									3
									4
									5

Remarks

1) No groundwater encountered. 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.25			MADE GROUND: Grey reinforced CONCRETE with high aggregate content. Rebar 0.02m thick MADE GROUND	
		0.25 - 0.58	B		0.40			MADE GROUND: Grey, slightly sandy, fine to coarse, angular to subangular GRAVEL of limestone.	
		0.45	ES		0.58			MADE GROUND	
								MADE GROUND: Greyish brown, sandy, fine to coarse, angular to subangular GRAVEL of limestone, occasional concrete and sandstone MADE GROUND	
								Red, fine to medium, grained SAND	
		1.10	SPTL		1.05			Extremely weak, red, with occasional brownish orange bands, fine to medium grained SANDSTONE.	1
		1.10	S	N=50 (4,7/10,13,13,14)					
					1.55			End of borehole at 1.55 m	2
									3
									4
									5

Remarks

1) No groundwater encountered. 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES					MADE GROUND: Grass over dark brown, sandy CLAY. (TOPSOIL) MADE GROUND	
					0.35				
		0.70	ES					MADE GROUND: Brown, sandy, gravelly CLAY. Gravel is fine to coarse, angular to subangular of brick, concrete, sandstone and occasional plastic. MADE GROUND	
					0.85				
		1.20	ES					MADE GROUND: Grey, sandy, angular to subangular, fine to coarse GRAVEL of limestone. MADE GROUND	1
		1.20		N=4 (1,0/2,0,1,1)				MADE GROUND: Brown, sandy, gravelly CLAY. Gravel is medium to coarse, angular to subangular of brick, occasional coal and rare metal. MADE GROUND	
					1.45				
		2.00	SPTL					Very loose to loose, reddish brown, slightly gravelly, fine to medium, grained SAND. Gravel is medium to coarse, subangular of sandstone.	2
		2.00	S	N=5 (1,0/0,2,2,1)					
		2.50	ES						
		3.00	SPTL					Wet arisings around 3.00m bgl	3
		3.00	S	N=2 (1,0/0,1,0,1)					
		4.00	SPTL					Extremely weak, yellowish brown, fine to medium, grained SANDSTONE. Slight hydrocarbon odour from 4.00m bgl	4
		4.00	S	50 (25 for 75mm/50 for 70mm)					
					3.90				
					4.20			End of borehole at 4.20 m	5

Remarks

1) No groundwater encountered. 2) Damp arisings between 3.00m - 3.60m bgl 3) Terminated due to refusal. 4) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15	ES		0.10			TOPSOIL: Dark brown, slightly clayey SAND with frequent rootlets.	
					0.25			TOPSOIL	
		0.50	ES					MADE GROUND: Black, medium to coarse, angular to subangular GRAVEL of asphalt.	
		0.25 - 0.80	B					MADE GROUND	
		0.80	SPTL		0.80			MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone and frequent brick, occasional asphalt.	
		0.80	S	N=41 (10,10/10,9,9,13)				MADE GROUND	
		0.85	ES		1.00			MADE GROUND: Black, medium to coarse, angular to subangular GRAVEL of asphalt	
								MADE GROUND	
		1.30	SPTL		1.30			MADE GROUND: Reddish brown, slightly clayey, sandy, fine to medium, angular to subangular GRAVEL of brick fragments with occasional sandstone and concrete.	
		1.30	S	50 (25 for 135mm/50 for 110mm)				MADE GROUND	
		1.40	ES					End of borehole at 1.30 m	

1

2

3

4

5

Remarks

1) Groundwater encountered at 0.60m. 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS106a

Sheet 1 of 2

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342453.06 - 397414.43

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.20			MADE GROUND: Dark brown, slightly clayey SAND with frequent rootlets (TOPSOIL) MADE GROUND	1		
					0.75			MADE GROUND: Grey, sandy, fine to coarse, angular to subangular GRAVEL of limestone and frequent brick and occasional asphalt. MADE GROUND			
		0.80	ES					MADE GROUND: Soft, brownish grey, sandy, slightly gravelly CLAY. Gravel is fine to medium, angular to subangular of brick, limestone and sandstone. Gravel content decreasing past 1.00m bgl MADE GROUND			
		1.10	D						2		
		1.70	ES			1.60		MADE GROUND: Soft, black, sandy CLAY with occasional rootlets. Slight organic odour. MADE GROUND			
		2.00 2.00 2.20	SPTL S ES	N=8 (2,1/2,2,2,2)	2.10			MADE GROUND: Soft, grey, sandy CLAY with occasional rootlets and organic fragments (wood fragments) becoming firm from 2.60m bgl MADE GROUND			
		3.00 3.00	SPTL S	N=14 (2,2/3,3,4,4)					3		
		3.40 3.50	ES D		3.30			MADE GROUND: Firm to stiff, brown, mottled grey, slightly sandy, reworked CLAY with rare fine gravel of sandstone and brick. MADE GROUND			
		4.00 4.00	SPTL S	N=20 (3,3/4,4,4,8)							
					4.65			Red, fine to medium grained SAND	4		
		4.90	SPTL S		4.90			Extremely weak to weak, red, fine, grained SANDSTONE.			
		Continued on next sheet									5

Remarks

1) Groundwater encountered at 0.65m and at base of SPT at 5.35m bgl. 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS106a

Sheet 2 of 2

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342453.06 - 397414.43

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		4.90		50 (8,8/50 for 190mm)					
	▼				5.35			End of borehole at 5.35 m	
									6
									7
									8
									9
									10

Remarks

1) Groundwater encountered at 0.65m and at base of SPT at 5.35m bgl. 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS107

Sheet 1 of 2

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342389.88 - 397445.99

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.12			MADE GROUND: Black ASPHALT with high aggregate content. MADE GROUND	
		0.30	ES					MADE GROUND: Red, fine to coarse, angular to subangular GRAVEL of brick fragments with occasional asphalt, limestone and sandstone. MADE GROUND	
		0.50	ES		0.45			MADE GROUND: Firm, brown, sandy, slightly gravelly CLAY. Gravel is medium to coarse, subangular of sandstone, occasional brick and rare coal. MADE GROUND	
		0.60	D					<i>Becoming greyish brown between 1.10m and 1.30m bgl</i>	1
		1.20	SPTL						
		1.20	S	N=6 (1,1/1,1,2,2)				<i>Band of clayey sand between 3.00m and 3.10m bgl and 3.40m and 3.50m bgl.</i>	
		2.00	SPTL						
		2.00	S	N=9 (2,2/2,2,2,3)					2
		3.00	SPTL						
		3.00	S	N=11 (2,2/2,2,3,4)					3
		3.60	ES		3.50			MADE GROUND: Soft, reddish brown, slightly gravelly, sandy CLAY. Gravel is medium to coarse, angular to subangular sandstone. MADE GROUND	
								<i>Occasional fine organic fragments and rootlets.</i>	
		4.00	SPTL						
		4.00	S	N=9 (2,1/2,2,2,3)					4
		4.40	ES		4.35			Loose, reddish brown, clayey, fine to medium, grained SAND. <i>Band of yellow, medium grained sand between 4.80m and 4.90m bgl</i>	
									5

Continued on next sheet

Remarks

1) Groundwater encountered at 0.40m bgl 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





WS107

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342389.88 - 397445.99

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

[illegible]

Remarks

1) Groundwater encountered at 0.40m bgl 2) Terminated due to refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS108

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=30 (1,1/6,6,10,8)	0.15			MADE GROUND: Grey block paving MADE GROUND	1
								MADE GROUND: Greyish brown, slightly clayey, sandy, fine to coarse, angular to subangular GRAVEL of brick, limestone, concrete, occasional sandstone and asphalt. MADE GROUND	
		0.90	ES		0.80			MADE GROUND: Dark brownish grey, slightly gravelly, fine grained, SAND. Gravel is fine to medium, angular to subangular of brick and sandstone with rare coal. MADE GROUND	
		1.00 - 1.40 1.20 1.20	B SPTL S					<u>Becoming slightly clayey from 1.40m bgl.</u>	
		1.80	ES	50 (7,12/50 for 265mm)	1.70			Reddish brown, fine to medium, grained SAND.	2
		2.00 2.00	SPTL S		2.10			Extremely weak, red, fine grained SANDSTONE	
					2.35				
								End of borehole at 2.35 m	3
									4
									5

Remarks

1) No groundwater encountered. 2) Terminated on refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS109

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 15/11/2022 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05			MADE GROUND: Grey block paving MADE GROUND	
		0.20			0.20			MADE GROUND: Greyish brown, slightly clayey, sandy, fine to coarse, angular to subangular	
		0.30			0.30			GRAVEL of brick, limestone, concrete, occasional sandstone and asphalt.	
		0.40	ES		0.40			MADE GROUND	
		0.60	ES		0.60			MADE GROUND: Grey CONCRETE MADE GROUND	
		0.80			0.80			MADE GROUND: Greyish brown, sandy, fine to medium, angular to subangular GRAVEL of mixed lithologies including concrete, occasional limestone, brick and sandstone	
		1.10	SPTL		1.10			MADE GROUND	
		1.10	S	N=29 (4,6/9,10,5,5)	1.10			Extremely weak, reddish brown, fine grained, SANDSTONE recovered as gravel.	
		1.10 - 1.50	B		1.10 - 1.50			Extremely weak, red, fine grained SANDSTONE, recovered as sand	
		1.50			1.50			Medium dense, reddish brown, medium grained SAND.	
		1.70	SPTL		1.70			Extremely weak, reddish brown, fine to medium, grained SANDSTONE	
		1.70	S	50 (25 for 105mm/50 for 110mm)	1.70				
		1.90			1.90			End of borehole at 1.90 m	

Remarks

1) No groundwater encountered. 2) Terminated on refusal. 3) All strength terms are derived from field tests only





Borehole Log

Borehole No.

WS201

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342639.00 - 397656.00

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	ES		0.23			MADE GROUND: Strong greyish brown CONCRETE with medium to high aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar approx Ø10mm at 0.07m bgl MADE GROUND MADE GROUND: Dark grey becoming brownish grey, sandy, fine to coarse, angular to subangular GRAVEL of mixed lithologies including concrete, brick and sandstone MADE GROUND MADE GROUND: Friable, reddish brown, sandy, gravelly CLAY. Gravel is fine to coarse, angular to subrounded of brick, sandstone and occasional clinker MADE GROUND Dense, reddish brown, slightly gravelly SAND. Gravel is medium to coarse, angular to subangular of sandstone, increasing with depth. Sand is fine grained Extremely weak, reddish brown SANDSTONE recovered as sand and gravel Refusal of sampler at base End of borehole at 0.98 m	1
		0.40	ES		0.30				
					0.65				
		0.90		50 (25 for 40mm/50 for 40mm)	0.90				
		0.98	ES		0.98				
									2
									3
									4
									5

Remarks

1) Hand dug pit to 0.90m bgl for service clearance 2) Terminated on bedrock 3) No groundwater ingress encountered 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings





Borehole Log

Borehole No.

WS202

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.03	ES	50 (11,13/50 for 125mm)	0.03			MADE GROUND: Grey CONCRETE (screed layer)	
		0.23			0.23			MADE GROUND	
		0.40			0.40			MADE GROUND: Strong greyish brown CONCRETE with medium aggregate content. Aggregate is fine to coarse, angular to subrounded of mixed lithologies. Rebar at 0.20m approx Ø10mm	
		0.80			0.80			MADE GROUND: Reddish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to medium, subangular to angular of brick and mixed aggregates	
		1.20			1.20			MADE GROUND: Reddish brown, slightly gravelly SAND. Gravel is fine to coarse, angular to subangular of sandstone	
								Extremely weak, reddish brown SANDSTONE	
								End of borehole at 1.20 m	

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination





Borehole Log

Borehole No.

WS203

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342605.00 - 397576.00

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.20			MADE GROUND: Strong, greyish brown CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar approx Ø10mm at 0.10m bgl MADE GROUND	
					0.40				
					0.50				
		0.60	ES		0.75				
							MADE GROUND: Grey COBBLES of concrete and sandstone MADE GROUND MADE GROUND: Grey, fine to coarse, angular to subangular GRAVEL of sandstone, concrete and occasional brick MADE GROUND MADE GROUND: Reddish brown, fine to coarse, angular GRAVEL of crushed brick / possible burnt shale MADE GROUND		
		1.20		N=20 (4,5/5,6,7,2)					
		2.00		50 (7,11/50 for 135mm)	1.90			Extremely weak, reddish brown SANDTONE recovered as sand and gravel	
					2.25				
End of borehole at 2.25 m									

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) No visual or olfactory evidence of contamination 4) Terminated on refusal





Borehole Log

Borehole No.

WS204

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	ES		0.20			MADE GROUND: Strong brownish grey CONCRETE with medium aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar approx Ø5mm at 0.08m and 0.18m bgl	
		0.70	ES		0.62			MADE GROUND: Reddish brown, sandy gravelly CLAY. Gravel is fine to medium, angular to subangular of brick, concrete, sandstone and coal	
		1.20		N=21 (3,4/5,5,5,6)				MADE GROUND Medium dense, reddish brown, slightly clayey SAND. Sand is fine grained	
								Occasional lenses of slightly silty, yellowish brown sand between 1.30m and 1.50m bgl	
		2.00		N=50 (8,10/50 for 265mm)	2.10			Extremely weak, reddish brown SANDSTONE recovered as sand and gravel	
					2.41			End of borehole at 2.41 m	

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) No visual or olfactory evidence of contamination 4) Terminated on refusal





Borehole Log

Borehole No.

WS205

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 04/02/2026 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=11 (2,2/2,3,3,3)	0.05			MADE GROUND: Grey BLOCK PAVING MADE GROUND	1
		0.40	ES		0.35			MADE GROUND: Greyish brown, slightly gravelly SAND. Gravel is fine to medium, subangular to angular of brick, limestone, concrete and sandstone MADE GROUND	
		1.10	ES		1.00			MADE GROUND: Dark brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular to subrounded of mixed aggregates including brick, concrete, limestone and sandstone. Sand is fine to medium MADE GROUND	
		1.20						MADE GROUND: Firm, Greyish brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to angular, fine to medium of brick, limestone and occasional sandstone. Sand is fine to medium MADE GROUND	
		1.60	ES	N=12 (2,2/2,3,3,4)	1.50			MADE GROUND: Firm, dark brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular to angular of brick, sandstone and coal. Sand is fine to medium. MADE GROUND	2
		2.00			1.85			Firm, reddish brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular to angular of sandstone. Sand is fine to medium <i>occasional veins of grey / beige sand</i>	
		3.00		50 (6,7/50 for 190mm)	2.80			Extremely weak, reddish brown weathered SANDSTONE	3
					3.30			End of borehole at 3.30 m	
									4
									5

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination





Borehole Log

Borehole No.

WS206

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
SE

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.04			MADE GROUND: Grey CONCRETE (screed layer)	
								MADE GROUND	
		0.30	ES		0.26 0.28			MADE GROUND: Strong brownish grey CONCRETE with medium to high aggregate content. Aggregate is fine to coarse, subangular to subrounded of mixed natural lithologies. Rebar approx Ø10mm at 0.11m and 0.21m bgl	
								MADE GROUND	
								MADE GROUND: Dark grey, fine to medium, subangular GRAVEL of concrete with occasional clinker and brick	
								MADE GROUND	
		1.20 1.20	ES	N=10 (2,2/2,3,3,2)	1.10			MADE GROUND: Firm, reddish brown, slightly sandy, gravelly CLAY. Gravel is fine to coarse, angular to subangular of brick with occasional sandstone	1
								MADE GROUND	
								Gravel becoming fine to medium from 0.50m bgl	
								MADE GROUND: Firm, brown to reddish brown, sandy, gravelly CLAY. Gravel is fine to coarse, angular to subangular of brick, sandstone and rare coal	
		2.00		50 (25 for 50mm/50 for 60mm)	2.00 2.11			MADE GROUND becoming soft around 1.50m bgl likely due to groundwater strike.	2
								MADE GROUND: CONCRETE	
								MADE GROUND	
								End of borehole at 2.11 m	
									3
									4
									5

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) Groundwater strike at 1.50m bgl - no rise 3) No visual or olfactory evidence of contamination 4) Terminated due to refusal on concrete obstruction





Borehole Log

Borehole No.

WS207

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: 342580.37 - 397481.39

Hole Type
WS

Location: KNOWSLEY

Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 02/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.09	ES		0.09			MADE GROUND: Grey CONCRETE (screed layer) MADE GROUND MADE GROUND: Strong greyish brown CONCRETE with medium to high aggregate content. Aggregate is subangular to subrounded, fine to coarse. Rebar Ø10mm at 0.12m and 0.18m bgl MADE GROUND Cobble of brick at 0.35m bgl Clay drainage pipe approx Ø150mm at 0.40m bgl MADE GROUND: Reddish brown, slightly clayey, slightly gravelly SAND. Gravel is fine to medium, subangular to angular of brick and mixed aggregates. Sand is fine to coarse MADE GROUND Reddish brown, slightly gravelly SAND. Gravel is fine to medium, subangular to angular of sandstone. Sand is fine to coarse Stiff, reddish brown, sandy CLAY. Sand is fine to coarse	1	
		0.60			0.59 0.65					
		1.20			1.00					
		2.00			2.30					
		3.00								
	3.40		End of borehole at 3.40 m	4						
							5			

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination 5) backfilled with arisings





Borehole Log

Borehole No.

WS208

Sheet 1 of 1

Project Name: DEACON BUSINESS PARK

Project No.
TE1704

Co-ords: -

Hole Type
WS

Location: KNOWSLEY

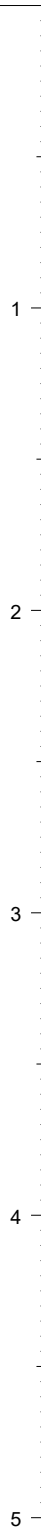
Level:

Scale
1:25

Client: EEIP Arundel Propco 2 Holdings Ltd

Dates: 04/02/2026 -

Logged By
JW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.18			0.18			MADE GROUND: Grey ASPHALT	
		0.20			0.20			MADE GROUND	
		0.25	ES		0.25			MADE GROUND: Greyish brown, slightly sandy GRAVEL. Gravel is fine to coarse, subangular to angular of mixed aggregates. Sand is fine to coarse.	
		0.40	ES		0.40			MADE GROUND	
					0.60			MADE GROUND: Reddish brown, slightly clayey, slightly gravelly SAND. Gravel is fine to medium, subangular to angular of brick and mixed aggregates. Sand is fine to coarse	
					0.80			MADE GROUND	
		1.20		N=12 (2,2/3,3,3,3)	1.20			MADE GROUND: Reddish brown, slightly sandy GRAVEL. Gravel is fine to medium, subangular to angular of mixed aggregates including brick / possible burnt shale, concrete, sandstone and limestone.	
					1.60			MADE GROUND	
								Reddish brown, slightly clayey, slightly gravelly SAND. Gravel is fine to medium of sandstone. Sand is fine to coarse	
		2.00		N=20 (3,3/4,5,5,6)	2.00			Reddish brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular to angular of sandstone. Sand is fine to medium	
					2.35			Reddish brown, slightly clayey SAND. Sand is fine to coarse	2
								Extremely weak reddish brown, SANDSTONE	3
		3.00		50 (1,14/50 for 135mm)	3.00				
					3.30				4
									5
								End of borehole at 3.30 m	

Remarks

1) Hand dug pit to 1.20m bgl for service clearance 2) No groundwater ingress encountered 3) Terminated on refusal 4) No visual or olfactory evidence of contamination 5) Backfilled with arisings



APPENDIX C - GEOENVIRONMENTAL SOIL LABORATORY RESULTS

Tier Environmental
Suite 414, Chadwick House
Warrington Rd
Birchwood
Warrington
United Kingdom
WA3 6AE



4225



Attention : Stefani Ellis

Date : 26th February, 2026

Your reference : TE1704

Our reference : Test Report 26/1647 Batch 1

Location : Deacon Park, Knowsley

Date samples received : 4th February, 2026

Status : Final Report

Issue : 202602261446

Thirty six samples were received for analysis on 4th February, 2026 of which eleven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 40.689 kg of CO2

Scope 1&2&3 emissions - 96.158 kg of CO2

Authorised By:



Phil Sommerton BSc

Senior Technical Account Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	5-8	13-16	25-27	28-31	32-34	50-53	58-61	73-76	88-91		Please see attached notes for all abbreviations and acronyms		
Sample ID	CP01	CP02	CPT05	WS201	WS201	WS204	WS205	WS206	WS208				
Depth	0.30	0.30	0.70	0.25	0.40	0.25	0.10	0.30	0.25				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	03/02/2026	02/02/2026	03/02/2026	02/02/2026	02/02/2026	02/02/2026	03/02/2026	02/02/2026	03/02/2026				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026		LOD/LOR	Units	Method No.
Arsenic #	31.0	13.5	9.4	-	17.0	8.0	17.5	-	39.4		<0.5	mg/kg	TM30/PM15
Cadmium #	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	-	<0.3		<0.3	mg/kg	TM30/PM15
Chromium #	24.5	14.0	18.7	-	37.4	37.5	66.7	-	37.0		<0.5	mg/kg	TM30/PM15
Copper #	78	48	14	-	34	17	60	-	84		<1	mg/kg	TM30/PM15
Lead #	54	34	5	-	33	16	59	-	77		<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	-	0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM30/PM15
Nickel #	33.4	15.9	10.1	-	29.9	14.6	29.0	-	46.9		<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	3	-	1	<1	<1	-	<1		<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	8039	8552	4815		5564	1597	1446	-	1888		<50	mg/kg	TM50/PM29
Zinc #	77	28	16	-	71	35	117	-	120		<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.17	<0.04	0.10	-	0.11	<0.04	0.06	-	0.06		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	-	0.04	<0.03	0.12	-	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	-	<0.05	<0.05	0.15	-	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	0.05	<0.04	<0.04	-	0.06	<0.04	0.10	-	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.25	<0.03	0.03	-	0.16	<0.03	1.21	-	0.16		<0.03	mg/kg	TM4/PM8
Anthracene #	0.06	<0.04	<0.04	-	0.07	<0.04	0.60	-	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.19	<0.03	0.05	-	0.09	<0.03	5.58	-	0.08		<0.03	mg/kg	TM4/PM8
Pyrene #	0.16	<0.03	0.05	-	0.09	<0.03	5.29	-	0.07		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.14	<0.06	<0.06	-	0.09	<0.06	2.64	-	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene #	0.11	<0.02	0.03	-	0.07	<0.02	2.37	-	0.05		<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene #	0.22	<0.07	<0.07	-	0.12	<0.07	4.46	-	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.15	<0.04	<0.04	-	<0.04	<0.04	3.11	-	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.11	<0.04	<0.04	-	0.06	<0.04	2.27	-	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	-	0.06	<0.04	0.44	-	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.11	<0.04	<0.04	-	0.07	<0.04	2.22	-	<0.04		<0.04	mg/kg	TM4/PM8
Coronene	<0.04	-	<0.04	-	-	-	0.49	-	-		<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.7	<0.6	<0.6	-	1.1	<0.6	30.6	-	<0.6		<0.6	mg/kg	TM4/PM8
PAH 17 Total	1.72	-	<0.64	-	-	-	31.11	-	-		<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.16	<0.05	<0.05	-	0.09	<0.05	3.21	-	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.06	<0.02	<0.02	-	0.03	<0.02	1.25	-	<0.02		<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	108	107	94	-	104	101	102	-	95		<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #	<2	<2	<2	-	<2	-	-	-	<2		<2	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	-	<3	-	-	-	<3		<3	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	-	<3	-	-	-	5		<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	-	<3	-	-	-	<3		<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	-	<5	-	-	-	<5		<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	-	<3	-	-	-	<3		<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	57	74	72	-	65	-	-	-	64		<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	64	98	92	-	77	-	-	-	69		<0	%	TM15/PM10
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	-	<30	-	-	-	<30	-	-		<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	5-8	13-16	25-27	28-31	32-34	50-53	58-61	73-76	88-91		Please see attached notes for all abbreviations and acronyms		
Sample ID	CP01	CP02	CPT05	WS201	WS201	WS204	WS205	WS206	WS208				
Depth	0.30	0.30	0.70	0.25	0.40	0.25	0.10	0.30	0.25				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	03/02/2026	02/02/2026	03/02/2026	02/02/2026	02/02/2026	02/02/2026	03/02/2026	02/02/2026	03/02/2026				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026		LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	0.6		<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	-	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	-	<4	<4	5	-	6		<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	11	<7	<7	-	10	<7	16	-	25		<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	11	<7	<7	-	<7	<7	<7	-	33		<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	<7	<7	-	<7	<7	<7	-	<7		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	<26	<26	<26	-	<26	<26	<26	-	65		<26	mg/kg	TM5/PM8/PM16/PM12/PM18
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1 ^{SV}	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	-	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	9	<4	<4	-	<4	<4	<4	-	9		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	15	<7	<7	-	<7	<7	53	-	10		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	<7	<7	-	<7	<7	271	-	<7		<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	<7	<7	-	<7	<7	68	-	<7		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	<26	<26	<26	-	<26	<26	392	-	<26		<26	mg/kg	TM5/PM8/PM16/PM12/PM18
Total aliphatics and aromatics (C5-40) (EH_CU+HS_1D_Total)	<52	<52	<52	-	<52	<52	392	-	65		<52	mg/kg	TM5/PM8/PM16/PM12/PM18
MTBE #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
Benzene #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
Toluene #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
Ethylbenzene #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
m/p-Xylene #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
o-Xylene #	-	-	-	-	-	<5	<5	-	-		<5	ug/kg	TM36/PM12
PCB 28 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 52 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 101 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 118 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 138 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 153 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
PCB 180 #	<5	-	<5	<5	-	-	<5	<5	-		<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	-	<35	<35	-	-	<35	<35	-		<35	ug/kg	TM17/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	-	<0.15	<0.15	<0.15	-	<0.15		<0.15	mg/kg	TM26/PM21B
Monoethylene glycol	-	-	-	<50	-	-	<50	-	<50		<50	ug/kg	TM179/PM8
Propylene glycol	-	-	-	<50	-	-	<50	-	<50		<50	ug/kg	TM179/PM8
Diethylene glycol	-	-	-	<50	-	-	<50	-	<50		<50	ug/kg	TM179/PM8

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

SVOC Report : Solid

EMT Sample No.	5-8	13-16	25-27	32-34	88-91						Please see attached notes for all abbreviations and acronyms		
Sample ID	CP01	CP02	CPT05	WS201	WS208								
Depth	0.30	0.30	0.70	0.40	0.25								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	03/02/2026	02/02/2026	03/02/2026	02/02/2026	03/02/2026								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026								
SVOC MS													
Phenols													
2-Chlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Methylphenol	18	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
Phenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	229	<10	64	129	71						<10	ug/kg	TM16/PM8
Naphthalene	-	<10	-	155	-						<10	ug/kg	TM16/PM8
Acenaphthylene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Acenaphthene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Fluorene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Phenanthrene #	-	<10	-	122	-						<10	ug/kg	TM16/PM8
Anthracene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Fluoranthene #	-	<10	-	19	-						<10	ug/kg	TM16/PM8
Pyrene #	-	12	-	16	-						<10	ug/kg	TM16/PM8
Benzo(a)anthracene	-	38	-	39	-						<10	ug/kg	TM16/PM8
Chrysene	-	15	-	21	-						<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Benzo(a)pyrene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	-	<10	-	<10	-						<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

SVOC Report : Solid

[illegible]

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

VOC Report : Solid

EMT Sample No.	5-8	13-16	25-27	32-34	88-91						Please see attached notes for all abbreviations and acronyms		
Sample ID	CP01	CP02	CPT05	WS201	WS208								
Depth	0.30	0.30	0.70	0.40	0.25								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	03/02/2026	02/02/2026	03/02/2026	02/02/2026	03/02/2026								
Sample Type	Soil	Soil	Soil	Soil	Soil						LOD/LOR	Units	Method No.
Batch Number	1	1	1	1	1								
Date of Receipt	04/02/2026	04/02/2026	04/02/2026	04/02/2026	04/02/2026								
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2						<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1						<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	198	18	<7	10	101						<7	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	7	<3	13	1374						<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	5						<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5	<5	<5						<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3						<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2						<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5						<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6						<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
4-Isopropyltoluene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
n-Butylbenzene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7	<7	<7	<7	<7						<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4						<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	46	<27	<27						<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7	<7	<7	<7	<7						<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	57	74	72	65	64						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	64	98	92	77	69						<0	%	TM15/PM10

Mass of sample taken (kg)	0.1039	Moisture Content Ratio (%) =	15.6
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	86.5
Particle Size <4mm =	>95%		
EMT Job No	26/1647	Landfill Waste Acceptance Criteria Limits Inert Waste Landfill Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill Hazardous Waste Landfill	
Sample No	8		
Client Sample No	CP01		
Depth/Other	0.30		
Sample Date	03/02/2026		
Batch No	1		
Solid Waste Analysis			
Total Organic Carbon (%)	4.84	3	5
Loss on Ignition (%)	8.1	-	10
Sum of BTEX (mg/kg)	<0.017	6	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-
PAH Sum of 17(mg/kg)	1.72	100	-
pH (pH Units)	7.91	-	>6
ANC to pH 7 (mol/kg)	NDP	-	to be evaluated
ANC to pH 4 (mol/kg)	0.12	-	to be evaluated
Eluate Analysis	10:1 concⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg mg/kg
	C₁₀ mg/l	A₁₀ mg/kg	
Arsenic	0.0083	0.083	0.5
Barium	0.021	0.21	20
Cadmium	<0.0005	<0.005	0.04
Chromium	<0.0015	<0.015	0.5
Copper	<0.007	<0.07	2
Mercury	<0.001	<0.01	0.01
Molybdenum	0.013	0.13	0.5
Nickel	<0.002	<0.02	0.4
Lead	<0.005	<0.05	0.5
Antimony	<0.002	<0.02	0.06
Selenium	0.004	0.04	0.1
Zinc	<0.003	<0.03	4
Chloride	1.0	10	800
Fluoride	0.4	4	10
Sulphate as SO ₄	450.0	4500	1000
Total Dissolved Solids	753	7530	4000
Phenol	<0.01	<0.1	1
Dissolved Organic Carbon	<2	<20	500

Unable to perform guideline check. Limits of detection have been raised. This could be due to insufficient sample, dilution or matrix effect.

Mass of sample taken (kg)	0.0998	Moisture Content Ratio (%) =	10.6
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	90.4
Particle Size <4mm =	>95%		
EMT Job No	26/1647	Landfill Waste Acceptance Criteria Limits Inert Waste Landfill Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill Hazardous Waste Landfill	
Sample No	27		
Client Sample No	CPT05		
Depth/Other	0.70		
Sample Date	03/02/2026		
Batch No	1		
Solid Waste Analysis			
Total Organic Carbon (%)	0.68	3	5
Loss on Ignition (%)	5.1	-	10
Sum of BTEX (mg/kg)	<0.017	6	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-
PAH Sum of 17(mg/kg)	<0.64	100	-
pH (pH Units)	9.44	-	>6
ANC to pH 7 (mol/kg)	0.05	-	to be evaluated
ANC to pH 4 (mol/kg)	0.13	-	to be evaluated
Eluate Analysis	10:1 concⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg mg/kg
	C₁₀ mg/l	A₁₀ mg/kg	
Arsenic	0.0050	0.050	0.5
Barium	0.044	0.44	20
Cadmium	<0.0005	<0.005	0.04
Chromium	<0.0015	<0.015	0.5
Copper	<0.007	<0.07	2
Mercury	<0.001	<0.01	0.01
Molybdenum	0.021	0.21	0.5
Nickel	<0.002	<0.02	0.4
Lead	<0.005	<0.05	0.5
Antimony	0.003	0.03	0.06
Selenium	<0.003	<0.03	0.1
Zinc	<0.003	<0.03	4
Chloride	38.1	381	800
Fluoride	1.1	11	10
Sulphate as SO ₄	78.4	784	1000
Total Dissolved Solids	192	1919	4000
Phenol	<0.01	<0.1	1
Dissolved Organic Carbon	4	40	500

Unable to perform guideline check. Limits of detection have been raised. This could be due to insufficient sample, dilution or matrix effect.

Mass of sample taken (kg)	0.1019	Moisture Content Ratio (%) =	13.6
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	88.1
Particle Size <4mm =	>95%		
EMT Job No	26/1647	Landfill Waste Acceptance Criteria Limits	
Sample No	61		
Client Sample No	WS205		
Depth/Other	0.10		
Sample Date	03/02/2026		
Batch No	1		
Solid Waste Analysis		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill
Total Organic Carbon (%)	1.67	3	5
Loss on Ignition (%)	3.5	-	10
Sum of BTEX (mg/kg)	<0.025	6	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-
PAH Sum of 17(mg/kg)	31.11	100	-
pH (pH Units)	10.07	-	>6
ANC to pH 7 (mol/kg)	0.06	-	to be evaluated
ANC to pH 4 (mol/kg)	0.34	-	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg
	C ₁₀ mg/l	A ₁₀ mg/kg	
Arsenic	0.0049	0.049	0.5
Barium	0.013	0.13	20
Cadmium	<0.0005	<0.005	0.04
Chromium	<0.0015	<0.015	0.5
Copper	<0.007	<0.07	2
Mercury	<0.001	<0.01	0.01
Molybdenum	<0.002	<0.02	0.5
Nickel	<0.002	<0.02	0.4
Lead	<0.005	<0.05	0.5
Antimony	0.004	0.04	0.06
Selenium	<0.003	<0.03	0.1
Zinc	<0.003	<0.03	4
Chloride	<0.3	<3	800
Fluoride	0.9	9	10
Sulphate as SO ₄	4.6	46	1000
Total Dissolved Solids	64	640	4000
Phenol	<0.01	<0.1	1
Dissolved Organic Carbon	<2	<20	500

Unable to perform guideline check. Limits of detection have been raised. This could be due to insufficient sample, dilution or matrix effect.

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
26/1647	1	CP01	0.30	7	Kieran Hubbard	12/02/2026	General Description (Bulk Analysis)	brown soil
					Kieran Hubbard	12/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	12/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type (2)	NAD
26/1647	1	CP02	0.30	15	Kieran Hubbard	12/02/2026	General Description (Bulk Analysis)	brown soil
					Kieran Hubbard	12/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	12/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type (2)	NAD
26/1647	1	CPT05	0.70	26	Kieran Hubbard	11/02/2026	General Description (Bulk Analysis)	Brown Soil
					Kieran Hubbard	11/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	11/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	11/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	11/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	11/02/2026	Asbestos Type	NAD
					Kieran Hubbard	11/02/2026	Asbestos Type (2)	NAD
26/1647	1	WS201	0.40	34	Charlotte Taylor	12/02/2026	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	12/02/2026	Asbestos Fibres	NAD
					Charlotte Taylor	12/02/2026	Asbestos Fibres (2)	NAD
					Charlotte Taylor	12/02/2026	Asbestos ACM	NAD
					Charlotte Taylor	12/02/2026	Asbestos ACM (2)	NAD
					Charlotte Taylor	12/02/2026	Asbestos Type	NAD
					Charlotte Taylor	12/02/2026	Asbestos Type (2)	NAD
26/1647	1	WS203	0.30	45	Kieran Hubbard	12/02/2026	General Description (Bulk Analysis)	Brown soil
					Kieran Hubbard	12/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	12/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	12/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type	NAD
					Kieran Hubbard	12/02/2026	Asbestos Type (2)	NAD

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
26/1647	1	WS204	0.25	53	Mathew Day	12/02/2026	General Description (Bulk Analysis)	Red/brown sand, stones
					Mathew Day	12/02/2026	Asbestos Fibres	NAD
					Mathew Day	12/02/2026	Asbestos Fibres (2)	NAD
					Mathew Day	12/02/2026	Asbestos ACM	NAD
					Mathew Day	12/02/2026	Asbestos ACM (2)	NAD
					Mathew Day	12/02/2026	Asbestos Type	NAD
					Mathew Day	12/02/2026	Asbestos Type (2)	NAD
26/1647	1	WS205	0.40	65	Caoimhe Anders	12/02/2026	General Description (Bulk Analysis)	Brown soil, stones
					Caoimhe Anders	12/02/2026	Asbestos Fibres	NAD
					Caoimhe Anders	12/02/2026	Asbestos ACM	NAD
					Caoimhe Anders	12/02/2026	Asbestos Type	NAD
26/1647	1	WS206	0.30	74	Caoimhe Anders	12/02/2026	General Description (Bulk Analysis)	Red brick debris
					Caoimhe Anders	12/02/2026	Asbestos Fibres	NAD
					Caoimhe Anders	12/02/2026	Asbestos ACM	NAD
					Caoimhe Anders	12/02/2026	Asbestos Type	NAD
26/1647	1	WS208	0.25	90	Charlotte Taylor	12/02/2026	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	12/02/2026	Asbestos Fibres	NAD
					Charlotte Taylor	12/02/2026	Asbestos Fibres (2)	NAD
					Charlotte Taylor	12/02/2026	Asbestos ACM	NAD
					Charlotte Taylor	12/02/2026	Asbestos ACM (2)	NAD
					Charlotte Taylor	12/02/2026	Asbestos Type	NAD
					Charlotte Taylor	12/02/2026	Asbestos Type (2)	NAD

Matrix : Solid

14 of 23

Element Materials Technology **Notification of Deviating Samples**

Client Name:	Tier Environmental
Reference:	TE1704
Location:	Deacon Park, Knowsley
Contact:	Stefani Ellis

Notification of Deviating Samples

Matrix : Solid

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 26/1647

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitatively, with a matrix specific limit of detection.

Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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

EMT Job No: 26/1647

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

EMT Job No: 26/1647

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.	Yes		AR	Yes

EMT Job No: 26/1647

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM77	Modified DDCE/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma-Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes		AR	Yes

EMT Job No: 26/1647

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
TM179	Determination of Glycols using LCMS	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Tier Environmental
Suite 414, Chadwick House
Warrington Rd
Birchwood
Warrington
United Kingdom
WA3 6AE



4225



Attention : Stefani Ellis
Date : 16th February, 2026
Your reference : TE1704
Our reference : Test Report 26/1647 Batch 2
Location : Deacon Park, Knowsley
Date samples received : 11th February, 2026
Status : Final Report
Issue : 202602161546

Seven samples were received for analysis on 11th February, 2026 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 3.041 kg of CO2

Scope 1&2&3 emissions - 7.186 kg of CO2

Authorised By:



Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis
EMT Job No: 26/1647

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: Tier Environmental
Reference: TE1704
Location: Deacon Park, Knowsley
Contact: Stefani Ellis

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
26/1647	2	HDP202	0.34-0.42	108	Kieran Hubbard	13/02/2026	General Description (Bulk Analysis)	BROWN SOIL
					Kieran Hubbard	13/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	13/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type (2)	NAD
26/1647	2	HDP205	0.36-0.47	109	Kieran Hubbard	13/02/2026	General Description (Bulk Analysis)	Brown soil
					Kieran Hubbard	13/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	13/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type (2)	NAD
26/1647	2	HDP201	0.37-0.45	110	Kieran Hubbard	13/02/2026	General Description (Bulk Analysis)	Brown soil
					Kieran Hubbard	13/02/2026	Asbestos Fibres	NAD
					Kieran Hubbard	13/02/2026	Asbestos Fibres (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM	NAD
					Kieran Hubbard	13/02/2026	Asbestos ACM (2)	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type	NAD
					Kieran Hubbard	13/02/2026	Asbestos Type (2)	NAD
26/1647	2	HDP206	0.48-0.50	111	Caoimhe Anders	13/02/2026	General Description (Bulk Analysis)	Stones, sand, grit
					Caoimhe Anders	13/02/2026	Asbestos Fibres	NAD
					Caoimhe Anders	13/02/2026	Asbestos ACM	NAD
					Caoimhe Anders	13/02/2026	Asbestos Type	NAD
26/1647	2	HDP208	0.30-0.50	112	Caoimhe Anders	13/02/2026	General Description (Bulk Analysis)	Brown soil, stones
					Caoimhe Anders	13/02/2026	Asbestos Fibres	NAD
					Caoimhe Anders	13/02/2026	Asbestos ACM	NAD
					Caoimhe Anders	13/02/2026	Asbestos Type	NAD
26/1647	2	HDP207	0.40	113	Caoimhe Anders	13/02/2026	General Description (Bulk Analysis)	Brown soil, stones
					Caoimhe Anders	13/02/2026	Asbestos Fibres	NAD
					Caoimhe Anders	13/02/2026	Asbestos ACM	NAD
					Caoimhe Anders	13/02/2026	Asbestos Type	NAD

Client Name:	Tier Environmental
Reference:	TE1704
Location:	Deacon Park, Knowsley
Contact:	Stefani Ellis

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 26/1647

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

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It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitatively, with a matrix specific limit of detection.

Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

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

EMT Job No: 26/1647

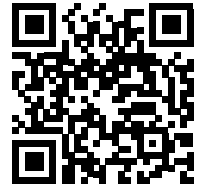
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes



Waste Classification Report

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

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



8MJRN-VF1RP-P3BG7

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

Report is invalid if pages are removed.

Job name

EMT-26-1647-Batch-1-202602261446

Description/Comments

Project

TE1704

Site

Deacon Business Park, Knowsley

Classified by

Name: **Adrian Read**
Date: **18 Mar 2026 13:37 GMT**
Telephone: **01925 818388**
Company: **Tier Environmental**
Unit 5 Office Village, Sandpiper Court,
Chester Business Park, Chester, CH4 9QZ

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

HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification
Most recent 3 year Refresher

Date

03 Dec 2020
05 Dec 2023

Next 3 year Refresher due by Dec 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

Deacon Business Park, Moorgate Road, Southdene, Kirkby, Knowsley

Post Code **L33 7RX**

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Proposed redevelopment of land

Description of the specific process, sub-process and/or activity that created the waste

Waste created during excavation of soils during development

Description of the waste

Made ground and/or natural soils



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	CP01-03/02/2026-0.30m		Non Hazardous		3
2	CP02-02/02/2026-0.30m		Non Hazardous		9
3	CPT05-03/02/2026-0.70m		Non Hazardous		15
4	WS201-02/02/2026-0.25m		Non Hazardous		21
5	WS201-02/02/2026-0.40m		Non Hazardous		22
6	WS204-02/02/2026-0.25m		Non Hazardous		28
7	WS205-03/02/2026-0.10m		Potentially Hazardous	HP 3(i)	30
8	WS206-02/02/2026-0.30m		Non Hazardous		33
9	WS208-03/02/2026-0.25m		Potentially Hazardous	HP 3(i)	34

Related documents

#	Name	Description
1	EMT-26-1647-Batch-1-202602261446.HWOL	Element .hwol file used to populate the Job
2	Example worst case waste stream template: 17 05 04 or 17 05 03 *	waste stream template used to create this Job

Report

Created by: Adrian Read

Created date: 18 Mar 2026 13:37 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	40
Appendix B: Rationale for selection of metal species	44
Appendix C: Version	44

Classification of sample: CP01-03/02/2026-0.30m

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

Sample details

Sample name:	LoW Code:
CP01-03/02/2026-0.30m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
13.3%	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
(dry weight correction)	Entry:

Hazard properties

None identified

Determinands

Moisture content: 13.3% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				31 mg/kg	1.895	51.836 mg/kg	0.00518 %	✓	
	033-005-00-1									
2	cadmium { cadmium sulfate }				<0.3 mg/kg	1.855	<0.556 mg/kg	<0.0000556 %		<LOD
	048-009-00-9	233-331-6	10124-36-4							
3	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				24.5 mg/kg	2.27	49.086 mg/kg	0.00491 %	✓	
	024-017-00-8									
4	copper { copper sulphate pentahydrate }				78 mg/kg	3.929	270.491 mg/kg	0.027 %	✓	
	029-023-00-4	231-847-6	7758-99-8							
5	lead { lead chromate }			1	54 mg/kg	1.56	74.342 mg/kg	0.00477 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
6	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
7	nickel { nickel dibromate }				33.4 mg/kg	5.358	157.959 mg/kg	0.0158 %	✓	
	028-053-00-5	238-596-1	14550-87-9							
8	selenium { nickel selenate }				2 mg/kg	2.554	4.508 mg/kg	0.000451 %	✓	
	028-031-00-5	239-125-2	15060-62-5							
9	zinc { zinc chromate }				77 mg/kg	2.774	188.534 mg/kg	0.0189 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
10	TPH (C6 to C40) petroleum group				<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD
			TPH							
11	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
12	benzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
13	toluene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
14	ethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
15	xylene				<0.011 mg/kg		<0.011 mg/kg	<0.0000011 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
16	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 }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %			<LOD
	006-007-00-5										
17	pH				7.91 pH		7.91 pH	7.91 pH			
			PH								
18	naphthalene				0.17 mg/kg		0.15 mg/kg	0.000015 %		✓	
	601-052-00-2	202-049-5	91-20-3								
19	acenaphthylene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %			<LOD
		205-917-1	208-96-8								
20	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
		201-469-6	83-32-9								
21	fluorene				0.05 mg/kg		0.0441 mg/kg	0.00000441 %		✓	
		201-695-5	86-73-7								
22	phenanthrene				0.25 mg/kg		0.221 mg/kg	0.0000221 %		✓	
		201-581-5	85-01-8								
23	anthracene				0.06 mg/kg		0.053 mg/kg	0.0000053 %		✓	
		204-371-1	120-12-7								
24	fluoranthene				0.19 mg/kg		0.168 mg/kg	0.0000168 %		✓	
		205-912-4	206-44-0								
25	pyrene				0.16 mg/kg		0.141 mg/kg	0.0000141 %		✓	
		204-927-3	129-00-0								
26	benzo[a]anthracene				0.14 mg/kg		0.124 mg/kg	0.0000124 %		✓	
	601-033-00-9	200-280-6	56-55-3								
27	chrysene				0.11 mg/kg		0.0971 mg/kg	0.00000971 %		✓	
	601-048-00-0	205-923-4	218-01-9								
28	benzo[b]fluoranthene				0.16 mg/kg		0.141 mg/kg	0.0000141 %		✓	
	601-034-00-4	205-911-9	205-99-2								
29	benzo[k]fluoranthene				0.06 mg/kg		0.053 mg/kg	0.0000053 %		✓	
	601-036-00-5	205-916-6	207-08-9								
30	benzo[a]pyrene; benzo[def]chrysene				0.15 mg/kg		0.132 mg/kg	0.0000132 %		✓	
	601-032-00-3	200-028-5	50-32-8								
31	indeno[123-cd]pyrene				0.11 mg/kg		0.0971 mg/kg	0.00000971 %		✓	
		205-893-2	193-39-5								
32	dibenz[a,h]anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
33	benzo[ghi]perylene				0.11 mg/kg		0.0971 mg/kg	0.00000971 %		✓	
		205-883-8	191-24-2								
34	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
35	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %			<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3								
36	tetrachloroethylene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %			<LOD
	602-028-00-4	204-825-9	127-18-4								
37	carbon tetrachloride; tetrachloromethane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %			<LOD
	602-008-00-5	200-262-8	56-23-5								
38	trichloroethylene; trichloroethene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %			<LOD
	602-027-00-9	201-167-4	79-01-6								
39	vinyl chloride; chloroethylene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %			<LOD
	602-023-00-7	200-831-0	75-01-4								
40	hexachlorobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	602-065-00-6	204-273-9	118-74-1								
41	polychlorobiphenyls; PCB				<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %			<LOD
	602-039-00-4	215-648-1	1336-36-3								
42	dichlorodifluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %			<LOD
		200-893-9	75-71-8								
43	chloromethane; methyl chloride				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %			<LOD
	602-001-00-7	200-817-4	74-87-3								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
44	bromomethane; methylbromide				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	602-002-00-2	200-813-2	74-83-9							
45	chloroethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-009-00-0	200-830-5	75-00-3							
46	trichlorofluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-892-3	75-69-4							
47	1,1-dichloroethylene; vinylidene chloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-025-00-8	200-864-0	75-35-4							
48	dichloromethane; methylene chloride				0.198 mg/kg		0.175 mg/kg	0.0000175 %	✓	
	602-004-00-3	200-838-9	75-09-2							
49	2,2-dichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		209-832-0	594-20-7							
50	bromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-826-3	74-97-5							
51	chloroform; trichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-006-00-4	200-663-8	67-66-3							
52	1,1,1-trichloroethane; methyl chloroform				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-013-00-2	200-756-3	71-55-6							
53	1,1-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-031-00-0	209-253-3	563-58-6							
54	1,2-dichloropropane; propylene dichloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-020-00-0	201-152-2	78-87-5							
55	dibromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-003-00-8	200-824-2	74-95-3							
56	bromodichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-856-7	75-27-4							
57	1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]							
58	trans-1,3-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		431-460-4	10061-02-6							
59	1,1,2-trichloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-014-00-8	201-166-9	79-00-5							
60	1,3-dichloropropane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		205-531-3	142-28-9							
61	dibromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		204-704-0	124-48-1							
62	1,2-dibromoethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-010-00-6	203-444-5	106-93-4							
63	chlorobenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-033-00-1	203-628-5	108-90-7							
64	1,1,1,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		211-135-1	630-20-6							
65	bromoform; tribromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-007-00-X	200-854-6	75-25-2							
66	cumene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-024-00-X	202-704-5	98-82-8							
67	1,1,2,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-015-00-3	201-197-8	79-34-5							
68	bromobenzene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-060-00-9	203-623-8	108-86-1							
69	1,2,3-trichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-062-00-X	202-486-1	96-18-4							
70	propylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-097-00-8	203-132-9	103-65-1							
71	mesitylene; 1,3,5-trimethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-025-00-5	203-604-4	108-67-8							
72	tert-butylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
		202-632-4	98-06-6							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
73	1,2,4-trimethylbenzene				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	601-043-00-3	202-436-9	95-63-6							
74	sec-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		205-227-0	135-98-8							
75	1-isopropyl-4-methylbenzene; p-cymene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-094-00-1	202-796-7	99-87-6							
76	1,3-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-067-00-7	208-792-1	541-73-1							
77	1,4-dichlorobenzene; p-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-035-00-2	203-400-5	106-46-7							
78	n-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		203-209-7	104-51-8							
79	1,2-dichlorobenzene; o-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-034-00-7	202-425-9	95-50-1							
80	1,2-dibromo-3-chloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-021-00-6	202-479-3	96-12-8							
81	1,2,4-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
	602-087-00-6	204-428-0	120-82-1							
82	hexachlorobutadiene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		201-765-5	87-68-3							
83	1,2,3-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		201-757-1	87-61-6							
84	styrene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-026-00-0	202-851-5	100-42-5							
85	2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-008-00-0	202-433-2 [1] 203-402-6 [2] 203-582-6 [3] 246-691-4 [4]	95-57-8 [1] 106-48-9 [2] 108-43-0 [3] 25167-80-0 [4]							
86	2-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-857-5	88-75-5							
87	2,4-dichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-011-00-7	204-429-6	120-83-2							
88	3,4-xylene; [1] 2,5-xylene; [2] 2,4-xylene; [3] 2,3-xylene; [4] 2,6-xylene; [5] xylene; [6] 2,4(or 2,5)-xylene [7]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]	95-65-8 [1] 95-87-4 [2] 105-67-9 [3] 526-75-0 [4] 576-26-1 [5] 1300-71-6 [6] 71975-58-1 [7]							
89	2,4,5-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-017-00-X	202-467-8	95-95-4							
90	2,4,6-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-018-00-5	201-795-9	88-06-2							
91	chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-014-00-3	200-431-6	59-50-7							
92	4-nitrophenol; p-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-015-00-2	202-811-7	100-02-7							
93	pentachlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-002-00-8	201-778-6	87-86-5							
94	2-chloronaphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		202-079-9	91-58-7							
95	2-methyl naphthalene				0.229 mg/kg		0.202 mg/kg	0.0000202 %	✓	
		202-078-3	91-57-6							
96	bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-317-00-9	204-211-0	117-81-7							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
97	BBP; benzyl butyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-430-00-3	201-622-7	85-68-7							
98	dibutyl phthalate; DBP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-318-00-4	201-557-4	84-74-2							
99	di-n-octyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		204-214-7	117-84-0							
100	diethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-550-6	84-66-2							
101	dimethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		205-011-6	131-11-3							
102	2,4-dinitrotoluene; [1] dinitrotoluene [2]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-007-00-9	204-450-0 [1] 246-836-1 [2]	121-14-2 [1] 25321-14-6 [2]							
103	2,6-dinitrotoluene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-049-00-8	210-106-0	606-20-2							
104	4-bromophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		202-952-4	101-55-3							
105	4-chloroaniline				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	612-137-00-9	203-401-0	106-47-8							
106	4-chlorophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		230-281-7	7005-72-3							
107	azobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	611-001-00-6	203-102-5	103-33-3							
108	bis(2-chloroethoxy)methane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-920-2	111-91-1							
109	bis(2-chloroethyl) ether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	603-029-00-2	203-870-1	111-44-4							
110	carbazole				0.014 mg/kg		0.0124 mg/kg	0.00000124 %	✓	
		201-696-0	86-74-8							
111	dibenzofuran				0.102 mg/kg		0.09 mg/kg	0.000009 %	✓	
		205-071-3	132-64-9							
112	hexachlorocyclopentadiene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-078-00-7	201-029-3	77-47-4							
113	hexachloroethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		200-666-4	67-72-1							
114	3,5,5-trimethylcyclohex-2-enone; isophorone				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	606-012-00-8	201-126-0	78-59-1							
115	nitrosodipropylamine				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	612-098-00-8	210-698-0	621-64-7							
116	nitrobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-003-00-7	202-716-0	98-95-3							
117	coronene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-881-7	191-07-1							
118	1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]	540-59-0 [1] 156-59-2 [2] 156-60-5 [3]							
119	2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]	95-49-8 [1] 108-41-8 [2] 106-43-4 [3] 25168-05-2 [4]							
120	m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]				0.018 mg/kg		0.0159 mg/kg	0.00000159 %	✓	
	604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]	108-39-4 [1] 95-48-7 [2] 106-44-5 [3] 1319-77-3 [4]							



#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
121		o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]				<0.03 mg/kg	<0.03 mg/kg	<0.000003 %		<LOD	
	612-012-00-9	201-855-4 [1]	88-74-4 [1]								
		202-729-1 [2]	99-09-2 [2]								
		202-810-1 [3]	100-01-6 [3]								
Total:									0.0772 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CP02-02/02/2026-0.30m

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

Sample details

Sample name:	LoW Code:
CP02-02/02/2026-0.30m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
21.6%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 21.6% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				13.5	mg/kg	1.895	21.033	mg/kg	0.0021 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				<0.3	mg/kg	1.855	<0.556	mg/kg	<0.0000556 %		<LOD
	048-009-00-9	233-331-6	10124-36-4									
3	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				14	mg/kg	2.27	26.135	mg/kg	0.00261 %	✓	
	024-017-00-8											
4	copper { copper sulphate pentahydrate }				48	mg/kg	3.929	155.094	mg/kg	0.0155 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
5	lead { lead chromate }			1	34	mg/kg	1.56	43.613	mg/kg	0.0028 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
6	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel dibromate }				15.9	mg/kg	5.358	70.064	mg/kg	0.00701 %	✓	
	028-053-00-5	238-596-1	14550-87-9									
8	selenium { nickel selenate }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5									
9	zinc { zinc chromate }				28	mg/kg	2.774	63.878	mg/kg	0.00639 %	✓	
	024-007-00-3	236-878-9	13530-65-9									
10	TPH (C6 to C40) petroleum group				<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
			TPH									
11	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
12	benzene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
13	toluene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
14	ethylbenzene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
15	xylene				<0.011	mg/kg		<0.011	mg/kg	<0.0000011 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	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 }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
	006-007-00-5									
17	pH				10.14 pH		10.14 pH	10.14 pH		
			PH							
18	naphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
19	acenaphthylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		205-917-1	208-96-8							
20	acenaphthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-469-6	83-32-9							
21	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
22	phenanthrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-581-5	85-01-8							
23	anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		204-371-1	120-12-7							
24	fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		205-912-4	206-44-0							
25	pyrene				0.012 mg/kg		0.0098 mg/kg	0.000000987 %	✓	
		204-927-3	129-00-0							
26	benzo[a]anthracene				0.038 mg/kg		0.0313 mg/kg	0.00000313 %	✓	
	601-033-00-9	200-280-6	56-55-3							
27	chrysene				0.015 mg/kg		0.0123 mg/kg	0.00000123 %	✓	
	601-048-00-0	205-923-4	218-01-9							
28	benzo[b]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
29	benzo[k]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
30	benzo[a]pyrene; benzo[def]chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
31	indeno[123-cd]pyrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		205-893-2	193-39-5							
32	dibenz[a,h]anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
33	benzo[ghi]perylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		205-883-8	191-24-2							
34	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
35	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
36	tetrachloroethylene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
37	carbon tetrachloride; tetrachloromethane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
38	trichloroethylene; trichloroethene				0.007 mg/kg		0.0057 mg/kg	0.000000576 %	✓	
	602-027-00-9	201-167-4	79-01-6							
39	vinyl chloride; chloroethylene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
40	hexachlorobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
41	dichlorodifluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-893-9	75-71-8							
42	chloromethane; methyl chloride				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-001-00-7	200-817-4	74-87-3							
43	bromomethane; methylbromide				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	602-002-00-2	200-813-2	74-83-9							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
44	chloroethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-009-00-0	200-830-5	75-00-3							
45	trichlorofluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-892-3	75-69-4							
46	1,1-dichloroethylene; vinylidene chloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-025-00-8	200-864-0	75-35-4							
47	dichloromethane; methylene chloride				0.018 mg/kg		0.0148 mg/kg	0.00000148 %	✓	
	602-004-00-3	200-838-9	75-09-2							
48	2,2-dichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		209-832-0	594-20-7							
49	bromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-826-3	74-97-5							
50	chloroform; trichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-006-00-4	200-663-8	67-66-3							
51	1,1,1-trichloroethane; methyl chloroform				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-013-00-2	200-756-3	71-55-6							
52	1,1-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-031-00-0	209-253-3	563-58-6							
53	1,2-dichloropropane; propylene dichloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-020-00-0	201-152-2	78-87-5							
54	dibromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-003-00-8	200-824-2	74-95-3							
55	bromodichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-856-7	75-27-4							
56	1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]							
57	trans-1,3-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		431-460-4	10061-02-6							
58	1,1,2-trichloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-014-00-8	201-166-9	79-00-5							
59	1,3-dichloropropane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		205-531-3	142-28-9							
60	dibromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		204-704-0	124-48-1							
61	1,2-dibromoethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-010-00-6	203-444-5	106-93-4							
62	chlorobenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-033-00-1	203-628-5	108-90-7							
63	1,1,1,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		211-135-1	630-20-6							
64	bromoform; tribromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-007-00-X	200-854-6	75-25-2							
65	cumene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-024-00-X	202-704-5	98-82-8							
66	1,1,2,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-015-00-3	201-197-8	79-34-5							
67	bromobenzene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-060-00-9	203-623-8	108-86-1							
68	1,2,3-trichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-062-00-X	202-486-1	96-18-4							
69	propylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-097-00-8	203-132-9	103-65-1							
70	mesitylene; 1,3,5-trimethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-025-00-5	203-604-4	108-67-8							
71	tert-butylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
		202-632-4	98-06-6							
72	1,2,4-trimethylbenzene				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	601-043-00-3	202-436-9	95-63-6							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
73	sec-butylbenzene	205-227-0	135-98-8		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
74	1-isopropyl-4-methylbenzene; p-cymene	601-094-00-1	202-796-7		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
75	1,3-dichlorobenzene	602-067-00-7	208-792-1		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
76	1,4-dichlorobenzene; p-dichlorobenzene	602-035-00-2	203-400-5		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
77	n-butylbenzene	203-209-7	104-51-8		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
78	1,2-dichlorobenzene; o-dichlorobenzene	602-034-00-7	202-425-9		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
79	1,2-dibromo-3-chloropropane	602-021-00-6	202-479-3		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
80	1,2,4-trichlorobenzene	602-087-00-6	204-428-0		<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
81	hexachlorobutadiene	201-765-5	87-68-3		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
82	1,2,3-trichlorobenzene	201-757-1	87-61-6		<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
83	styrene	601-026-00-0	202-851-5		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
84	2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]	604-008-00-0	202-433-2 [1] 203-402-6 [2] 203-582-6 [3] 246-691-4 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
85	2-nitrophenol	201-857-5	88-75-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
86	2,4-dichlorophenol	604-011-00-7	204-429-6		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
87	3,4-xyleneol; [1] 2,5-xyleneol; [2] 2,4-xyleneol; [3] 2,3-xyleneol; [4] 2,6-xyleneol; [5] xyleneol; [6] 2,4(or 2,5)-xyleneol [7]	604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
88	2,4,5-trichlorophenol	604-017-00-X	202-467-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
89	2,4,6-trichlorophenol	604-018-00-5	201-795-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
90	chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol	604-014-00-3	200-431-6		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
91	4-nitrophenol; p-nitrophenol	609-015-00-2	202-811-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
92	pentachlorophenol	604-002-00-8	201-778-6		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
93	2-chloronaphthalene	202-079-9	91-58-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
94	2-methyl naphthalene	202-078-3	91-57-6		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
95	bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP	607-317-00-9	204-211-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
96	BBP; benzyl butyl phthalate	607-430-00-3	201-622-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD



#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
97		dibutyl phthalate; DBP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		607-318-00-4	201-557-4	84-74-2							
98	■	di-n-octyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
			204-214-7	117-84-0							
99	■	diethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
			201-550-6	84-66-2							
100	■	dimethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
			205-011-6	131-11-3							
101		2,4-dinitrotoluene; [1] dinitrotoluene [2]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		609-007-00-9	204-450-0 [1] 246-836-1 [2]	121-14-2 [1] 25321-14-6 [2]							
102		2,6-dinitrotoluene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		609-049-00-8	210-106-0	606-20-2							
103	■	4-bromophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			202-952-4	101-55-3							
104		4-chloroaniline				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		612-137-00-9	203-401-0	106-47-8							
105	■	4-chlorophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			230-281-7	7005-72-3							
106		azobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		611-001-00-6	203-102-5	103-33-3							
107	■	bis(2-chloroethoxy)methane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			203-920-2	111-91-1							
108		bis(2-chloroethyl) ether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		603-029-00-2	203-870-1	111-44-4							
109	■	carbazole				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-696-0	86-74-8							
110	■	dibenzofuran				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-071-3	132-64-9							
111		hexachlorocyclopentadiene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		602-078-00-7	201-029-3	77-47-4							
112	■	hexachloroethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			200-666-4	67-72-1							
113		3,5,5-trimethylcyclohex-2-enone; isophorone				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		606-012-00-8	201-126-0	78-59-1							
114		nitrosodipropylamine				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		612-098-00-8	210-698-0	621-64-7							
115		nitrobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		609-003-00-7	202-716-0	98-95-3							
116		1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
		602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]	540-59-0 [1] 156-59-2 [2] 156-60-5 [3]							
117		2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
		602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]	95-49-8 [1] 108-41-8 [2] 106-43-4 [3] 25168-05-2 [4]							
118		m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]				<0.02 mg/kg		<0.02 mg/kg	<0.0000002 %		<LOD
		604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]	108-39-4 [1] 95-48-7 [2] 106-44-5 [3] 1319-77-3 [4]							
119		o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]				<0.03 mg/kg		<0.03 mg/kg	<0.0000003 %		<LOD
		612-012-00-9	201-855-4 [1] 202-729-1 [2] 202-810-1 [3]	88-74-4 [1] 99-09-2 [2] 100-01-6 [3]							
Total:									0.0364 %		



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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CPT05-03/02/2026-0.70m

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

Sample details

Sample name:	LoW Code:
CPT05-03/02/2026-0.70m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
9%	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 9% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				9.4	mg/kg	1.895	16.338	mg/kg	0.00163 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				<0.3	mg/kg	1.855	<0.556	mg/kg	<0.0000556 %		<LOD
	048-009-00-9	233-331-6	10124-36-4									
3	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				18.7	mg/kg	2.27	38.944	mg/kg	0.00389 %	✓	
	024-017-00-8											
4	copper { copper sulphate pentahydrate }				14	mg/kg	3.929	50.465	mg/kg	0.00505 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
5	lead { lead chromate }			1	5	mg/kg	1.56	7.155	mg/kg	0.000459 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
6	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel dibromate }				10.1	mg/kg	5.358	49.65	mg/kg	0.00497 %	✓	
	028-053-00-5	238-596-1	14550-87-9									
8	selenium { nickel selenate }				3	mg/kg	2.554	7.029	mg/kg	0.000703 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
9	zinc { zinc chromate }				16	mg/kg	2.774	40.721	mg/kg	0.00407 %	✓	
	024-007-00-3	236-878-9	13530-65-9									
10	TPH (C6 to C40) petroleum group				<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
			TPH									
11	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
12	benzene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
13	toluene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
14	ethylbenzene				<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
15	xylene				<0.011	mg/kg		<0.011	mg/kg	<0.0000011 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	pH		PH		9.44 pH		9.44 pH	9.44 pH		
17	naphthalene				0.1 mg/kg		0.0917 mg/kg	0.00000917 %	✓	
	601-052-00-2	202-049-5	91-20-3							
18	acenaphthylene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		205-917-1	208-96-8							
19	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
20	fluorene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7							
21	phenanthrene				0.03 mg/kg		0.0275 mg/kg	0.00000275 %	✓	
		201-581-5	85-01-8							
22	anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		204-371-1	120-12-7							
23	fluoranthene				0.05 mg/kg		0.0459 mg/kg	0.00000459 %	✓	
		205-912-4	206-44-0							
24	pyrene				0.05 mg/kg		0.0459 mg/kg	0.00000459 %	✓	
		204-927-3	129-00-0							
25	benzo[a]anthracene				<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
26	chrysene				0.03 mg/kg		0.0275 mg/kg	0.00000275 %	✓	
	601-048-00-0	205-923-4	218-01-9							
27	benzo[b]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
28	benzo[k]fluoranthene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
29	benzo[a]pyrene; benzo[def]chrysene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
30	indeno[123-cd]pyrene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-893-2	193-39-5							
31	dibenz[a,h]anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
32	benzo[ghi]perylene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-883-8	191-24-2							
33	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
34	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
35	tetrachloroethylene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
36	carbon tetrachloride; tetrachloromethane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
37	trichloroethylene; trichloroethene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-027-00-9	201-167-4	79-01-6							
38	vinyl chloride; chloroethylene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
39	hexachlorobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
40	polychlorobiphenyls; PCB				<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
41	dichlorodifluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-893-9	75-71-8							
42	chloromethane; methyl chloride				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-001-00-7	200-817-4	74-87-3							
43	bromomethane; methylbromide				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	602-002-00-2	200-813-2	74-83-9							
44	chloroethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-009-00-0	200-830-5	75-00-3							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
45	trichlorofluoromethane	200-892-3	75-69-4		<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
46	1,1-dichloroethylene; vinylidene chloride	602-025-00-8	200-864-0	75-35-4	<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
47	dichloromethane; methylene chloride	602-004-00-3	200-838-9	75-09-2	<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
48	2,2-dichloropropane	209-832-0	594-20-7		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
49	bromochloromethane	200-826-3	74-97-5		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
50	chloroform; trichloromethane	602-006-00-4	200-663-8	67-66-3	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
51	1,1,1-trichloroethane; methyl chloroform	602-013-00-2	200-756-3	71-55-6	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
52	1,1-dichloropropene	602-031-00-0	209-253-3	563-58-6	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
53	1,2-dichloropropane; propylene dichloride	602-020-00-0	201-152-2	78-87-5	<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
54	dibromomethane	602-003-00-8	200-824-2	74-95-3	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
55	bromodichloromethane	200-856-7	75-27-4		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
56	1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]	<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
57	trans-1,3-dichloropropene	431-460-4	10061-02-6		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
58	1,1,2-trichloroethane	602-014-00-8	201-166-9	79-00-5	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
59	1,3-dichloropropane	205-531-3	142-28-9		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
60	dibromochloromethane	204-704-0	124-48-1		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
61	1,2-dibromoethane	602-010-00-6	203-444-5	106-93-4	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
62	chlorobenzene	602-033-00-1	203-628-5	108-90-7	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
63	1,1,1,2-tetrachloroethane	211-135-1	630-20-6		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
64	bromoform; tribromomethane	602-007-00-X	200-854-6	75-25-2	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
65	cumene	601-024-00-X	202-704-5	98-82-8	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
66	1,1,2,2-tetrachloroethane	602-015-00-3	201-197-8	79-34-5	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
67	bromobenzene	602-060-00-9	203-623-8	108-86-1	<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
68	1,2,3-trichloropropane	602-062-00-X	202-486-1	96-18-4	<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
69	propylbenzene	601-097-00-8	203-132-9	103-65-1	<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
70	mesitylene; 1,3,5-trimethylbenzene	601-025-00-5	203-604-4	108-67-8	<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
71	tert-butylbenzene	202-632-4	98-06-6		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
72	1,2,4-trimethylbenzene	601-043-00-3	202-436-9	95-63-6	<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
73	sec-butylbenzene	205-227-0	135-98-8		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
74	1-isopropyl-4-methylbenzene; p-cymene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-094-00-1	202-796-7	99-87-6							
75	1,3-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-067-00-7	208-792-1	541-73-1							
76	1,4-dichlorobenzene; p-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-035-00-2	203-400-5	106-46-7							
77	n-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		203-209-7	104-51-8							
78	1,2-dichlorobenzene; o-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-034-00-7	202-425-9	95-50-1							
79	1,2-dibromo-3-chloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-021-00-6	202-479-3	96-12-8							
80	1,2,4-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
	602-087-00-6	204-428-0	120-82-1							
81	hexachlorobutadiene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		201-765-5	87-68-3							
82	1,2,3-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		201-757-1	87-61-6							
83	styrene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-026-00-0	202-851-5	100-42-5							
84	2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-008-00-0	202-433-2 [1]	95-57-8 [1]							
		203-402-6 [2]	106-48-9 [2]							
		203-582-6 [3]	108-43-0 [3]							
		246-691-4 [4]	25167-80-0 [4]							
85	2-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-857-5	88-75-5							
86	2,4-dichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-011-00-7	204-429-6	120-83-2							
87	3,4-xyleneol; [1] 2,5-xyleneol; [2] 2,4-xyleneol; [3] 2,3-xyleneol; [4] 2,6-xyleneol; [5] xyleneol; [6] 2,4(or 2,5)-xyleneol [7]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-006-00-X	202-439-5 [1]	95-65-8 [1]							
		202-461-5 [2]	95-87-4 [2]							
		203-321-6 [3]	105-67-9 [3]							
		208-395-3 [4]	526-75-0 [4]							
		209-400-1 [5]	576-26-1 [5]							
		215-089-3 [6]	1300-71-6 [6]							
		276-245-4 [7]	71975-58-1 [7]							
88	2,4,5-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-017-00-X	202-467-8	95-95-4							
89	2,4,6-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-018-00-5	201-795-9	88-06-2							
90	chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-014-00-3	200-431-6	59-50-7							
91	4-nitrophenol; p-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-015-00-2	202-811-7	100-02-7							
92	pentachlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-002-00-8	201-778-6	87-86-5							
93	2-chloronaphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		202-079-9	91-58-7							
94	2-methyl naphthalene				0.064 mg/kg		0.0587 mg/kg	0.00000587 %	✓	
		202-078-3	91-57-6							
95	bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-317-00-9	204-211-0	117-81-7							
96	BBP; benzyl butyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-430-00-3	201-622-7	85-68-7							
97	dibutyl phthalate; DBP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-318-00-4	201-557-4	84-74-2							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
98	di-n-octyl phthalate	204-214-7	117-84-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
99	diethyl phthalate	201-550-6	84-66-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
100	dimethyl phthalate	205-011-6	131-11-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
101	2,4-dinitrotoluene; [1] dinitrotoluene [2]	609-007-00-9	204-450-0 [1] 246-836-1 [2]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
102	2,6-dinitrotoluene	609-049-00-8	210-106-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
103	4-bromophenylphenylether	202-952-4	101-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
104	4-chloroaniline	612-137-00-9	203-401-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
105	4-chlorophenylphenylether	230-281-7	7005-72-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
106	azobenzene	611-001-00-6	203-102-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
107	bis(2-chloroethoxy)methane	203-920-2	111-91-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
108	bis(2-chloroethyl) ether	603-029-00-2	203-870-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
109	carbazole	201-696-0	86-74-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
110	dibenzofuran	205-071-3	132-64-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
111	hexachlorocyclopentadiene	602-078-00-7	201-029-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
112	hexachloroethane	200-666-4	67-72-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
113	3,5,5-trimethylcyclohex-2-enone; isophorone	606-012-00-8	201-126-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
114	nitrosodipropylamine	612-098-00-8	210-698-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
115	nitrobenzene	609-003-00-7	202-716-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
116	coronene	205-881-7	191-07-1		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
117	1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]	602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
118	2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]	602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
119	m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]	604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
120	o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]	612-012-00-9	201-855-4 [1] 202-729-1 [2] 202-810-1 [3]		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
Total:								0.0208 %		



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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS201-02/02/2026-0.25m

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

Sample details

Sample name:	LoW Code:
WS201-02/02/2026-0.25m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
9.5%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

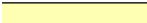
None identified

Determinands

Moisture content: 9.5% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1		polychlorobiphenyls; PCB				<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
		602-039-00-4	215-648-1	1336-36-3							
2		ethanediol; ethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		603-027-00-1	203-473-3	107-21-1							
3		2,2' -oxybisethanol; diethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		603-140-00-6	203-872-2	111-46-6							
4		2,2'-thiodiethanol; thiodiglycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		603-081-00-6	203-874-3	111-48-8							
Total:									0%		

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)
<LOD	Below limit of detection

Classification of sample: WS201-02/02/2026-0.40m

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

Sample details

Sample name:	LoW Code:
WS201-02/02/2026-0.40m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
12.3%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12.3% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number								
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				17 mg/kg	1.895	28.679 mg/kg	0.00287 %	✓		
		033-005-00-1										
2		cadmium { cadmium sulfate }				<0.3 mg/kg	1.855	<0.556 mg/kg	<0.0000556 %		<LOD	
		048-009-00-9	233-331-6	10124-36-4								
3		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				37.4 mg/kg	2.27	75.599 mg/kg	0.00756 %	✓		
		024-017-00-8										
4		copper { copper sulphate pentahydrate }				34 mg/kg	3.929	118.956 mg/kg	0.0119 %	✓		
		029-023-00-4	231-847-6	7758-99-8								
5		lead { lead chromate }			1	33 mg/kg	1.56	45.836 mg/kg	0.00294 %	✓		
		082-004-00-2	231-846-0	7758-97-6								
6		mercury { mercury dichloride }				0.1 mg/kg	1.353	0.121 mg/kg	0.0000121 %	✓		
		080-010-00-X	231-299-8	7487-94-7								
7		nickel { nickel dibromate }				29.9 mg/kg	5.358	142.666 mg/kg	0.0143 %	✓		
		028-053-00-5	238-596-1	14550-87-9								
8		selenium { nickel selenate }				1 mg/kg	2.554	2.274 mg/kg	0.000227 %	✓		
		028-031-00-5	239-125-2	15060-62-5								
9		zinc { zinc chromate }				71 mg/kg	2.774	175.391 mg/kg	0.0175 %	✓		
		024-007-00-3	236-878-9	13530-65-9								
10		TPH (C6 to C40) petroleum group				<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD	
				TPH								
11		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD	
		603-181-00-X	216-653-1	1634-04-4								
12		benzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD	
		601-020-00-8	200-753-7	71-43-2								
13		toluene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD	
		601-021-00-3	203-625-9	108-88-3								
14		ethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD	
		601-023-00-4	202-849-4	100-41-4								
15		xylene				<0.011 mg/kg		<0.011 mg/kg	<0.0000011 %		<LOD	
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	pH		PH		8.26 pH		8.26 pH	8.26 pH		
17	naphthalene				0.155 mg/kg		0.138 mg/kg	0.0000138 %	✓	
	601-052-00-2	202-049-5	91-20-3							
18	acenaphthylene				0.04 mg/kg		0.0356 mg/kg	0.00000356 %	✓	
		205-917-1	208-96-8							
19	acenaphthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-469-6	83-32-9							
20	fluorene				0.06 mg/kg		0.0534 mg/kg	0.00000534 %	✓	
		201-695-5	86-73-7							
21	phenanthrene				0.16 mg/kg		0.142 mg/kg	0.0000142 %	✓	
		201-581-5	85-01-8							
22	anthracene				0.07 mg/kg		0.0623 mg/kg	0.00000623 %	✓	
		204-371-1	120-12-7							
23	fluoranthene				0.09 mg/kg		0.0801 mg/kg	0.00000801 %	✓	
		205-912-4	206-44-0							
24	pyrene				0.09 mg/kg		0.0801 mg/kg	0.00000801 %	✓	
		204-927-3	129-00-0							
25	benzo[a]anthracene				0.09 mg/kg		0.0801 mg/kg	0.00000801 %	✓	
	601-033-00-9	200-280-6	56-55-3							
26	chrysene				0.07 mg/kg		0.0623 mg/kg	0.00000623 %	✓	
	601-048-00-0	205-923-4	218-01-9							
27	benzo[b]fluoranthene				0.09 mg/kg		0.0801 mg/kg	0.00000801 %	✓	
	601-034-00-4	205-911-9	205-99-2							
28	benzo[k]fluoranthene				0.03 mg/kg		0.0267 mg/kg	0.00000267 %	✓	
	601-036-00-5	205-916-6	207-08-9							
29	benzo[a]pyrene; benzo[def]chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
30	indeno[123-cd]pyrene				0.06 mg/kg		0.0534 mg/kg	0.00000534 %	✓	
		205-893-2	193-39-5							
31	dibenz[a,h]anthracene				0.06 mg/kg		0.0534 mg/kg	0.00000534 %	✓	
	601-041-00-2	200-181-8	53-70-3							
32	benzo[ghi]perylene				0.07 mg/kg		0.0623 mg/kg	0.00000623 %	✓	
		205-883-8	191-24-2							
33	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
34	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
35	tetrachloroethylene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
36	carbon tetrachloride; tetrachloromethane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
37	trichloroethylene; trichloroethene				0.013 mg/kg		0.0116 mg/kg	0.00000116 %	✓	
	602-027-00-9	201-167-4	79-01-6							
38	vinyl chloride; chloroethylene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
39	hexachlorobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
40	dichlorodifluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-893-9	75-71-8							
41	chloromethane; methyl chloride				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-001-00-7	200-817-4	74-87-3							
42	bromomethane; methylbromide				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	602-002-00-2	200-813-2	74-83-9							
43	chloroethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-009-00-0	200-830-5	75-00-3							
44	trichlorofluoromethane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
		200-892-3	75-69-4							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
45	1,1-dichloroethylene; vinylidene chloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-025-00-8	200-864-0	75-35-4							
46	dichloromethane; methylene chloride				0.01 mg/kg		0.0089 mg/kg	0.00000089 %	✓	
	602-004-00-3	200-838-9	75-09-2							
47	2,2-dichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		209-832-0	594-20-7							
48	bromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-826-3	74-97-5							
49	chloroform; trichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-006-00-4	200-663-8	67-66-3							
50	1,1,1-trichloroethane; methyl chloroform				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-013-00-2	200-756-3	71-55-6							
51	1,1-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-031-00-0	209-253-3	563-58-6							
52	1,2-dichloropropane; propylene dichloride				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	602-020-00-0	201-152-2	78-87-5							
53	dibromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-003-00-8	200-824-2	74-95-3							
54	bromodichloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		200-856-7	75-27-4							
55	1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]							
56	trans-1,3-dichloropropene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		431-460-4	10061-02-6							
57	1,1,2-trichloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-014-00-8	201-166-9	79-00-5							
58	1,3-dichloropropane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		205-531-3	142-28-9							
59	dibromochloromethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		204-704-0	124-48-1							
60	1,2-dibromoethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-010-00-6	203-444-5	106-93-4							
61	chlorobenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-033-00-1	203-628-5	108-90-7							
62	1,1,1,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
		211-135-1	630-20-6							
63	bromoform; tribromomethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-007-00-X	200-854-6	75-25-2							
64	cumene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-024-00-X	202-704-5	98-82-8							
65	1,1,2,2-tetrachloroethane				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-015-00-3	201-197-8	79-34-5							
66	bromobenzene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	602-060-00-9	203-623-8	108-86-1							
67	1,2,3-trichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-062-00-X	202-486-1	96-18-4							
68	propylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-097-00-8	203-132-9	103-65-1							
69	mesitylene; 1,3,5-trimethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-025-00-5	203-604-4	108-67-8							
70	tert-butylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
		202-632-4	98-06-6							
71	1,2,4-trimethylbenzene				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	601-043-00-3	202-436-9	95-63-6							
72	sec-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		205-227-0	135-98-8							
73	1-isopropyl-4-methylbenzene; p-cymene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-094-00-1	202-796-7	99-87-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
74	1,3-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-067-00-7	208-792-1	541-73-1							
75	1,4-dichlorobenzene; p-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-035-00-2	203-400-5	106-46-7							
76	n-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		203-209-7	104-51-8							
77	1,2-dichlorobenzene; o-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-034-00-7	202-425-9	95-50-1							
78	1,2-dibromo-3-chloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-021-00-6	202-479-3	96-12-8							
79	1,2,4-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
	602-087-00-6	204-428-0	120-82-1							
80	hexachlorobutadiene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		201-765-5	87-68-3							
81	1,2,3-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		201-757-1	87-61-6							
82	styrene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-026-00-0	202-851-5	100-42-5							
83	2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-008-00-0	202-433-2 [1] 203-402-6 [2] 203-582-6 [3] 246-691-4 [4]	95-57-8 [1] 106-48-9 [2] 108-43-0 [3] 25167-80-0 [4]							
84	2-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
		201-857-5	88-75-5							
85	2,4-dichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-011-00-7	204-429-6	120-83-2							
86	3,4-xyleneol; [1] 2,5-xyleneol; [2] 2,4-xyleneol; [3] 2,3-xyleneol; [4] 2,6-xyleneol; [5] xyleneol; [6] 2,4(or 2,5)-xyleneol [7]				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]	95-65-8 [1] 95-87-4 [2] 105-67-9 [3] 526-75-0 [4] 576-26-1 [5] 1300-71-6 [6] 71975-58-1 [7]							
87	2,4,5-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-017-00-X	202-467-8	95-95-4							
88	2,4,6-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-018-00-5	201-795-9	88-06-2							
89	chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-014-00-3	200-431-6	59-50-7							
90	4-nitrophenol; p-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	609-015-00-2	202-811-7	100-02-7							
91	pentachlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	604-002-00-8	201-778-6	87-86-5							
92	2-chloronaphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
		202-079-9	91-58-7							
93	2-methyl naphthalene				0.129 mg/kg		0.115 mg/kg	0.0000115 %	✓	
		202-078-3	91-57-6							
94	bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP				<0.1 mg/kg		<0.1 mg/kg	<0.000001 %		<LOD
	607-317-00-9	204-211-0	117-81-7							
95	BBP; benzyl butyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.000001 %		<LOD
	607-430-00-3	201-622-7	85-68-7							
96	dibutyl phthalate; DBP				<0.1 mg/kg		<0.1 mg/kg	<0.000001 %		<LOD
	607-318-00-4	201-557-4	84-74-2							
97	di-n-octyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.000001 %		<LOD
		204-214-7	117-84-0							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
98	diethyl phthalate	201-550-6	84-66-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
99	dimethyl phthalate	205-011-6	131-11-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
100	2,4-dinitrotoluene; [1] dinitrotoluene [2]	609-007-00-9	204-450-0 [1] 246-836-1 [2]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
101	2,6-dinitrotoluene	609-049-00-8	210-106-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
102	4-bromophenylphenylether	202-952-4	101-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
103	4-chloroaniline	612-137-00-9	203-401-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
104	4-chlorophenylphenylether	230-281-7	7005-72-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
105	azobenzene	611-001-00-6	203-102-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
106	bis(2-chloroethoxy)methane	203-920-2	111-91-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
107	bis(2-chloroethyl) ether	603-029-00-2	203-870-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
108	carbazole	201-696-0	86-74-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
109	dibenzofuran	205-071-3	132-64-9		0.076 mg/kg		0.0677 mg/kg	0.00000677 %	✓	
110	hexachlorocyclopentadiene	602-078-00-7	201-029-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
111	hexachloroethane	200-666-4	67-72-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
112	3,5,5-trimethylcyclohex-2-enone; isophorone	606-012-00-8	201-126-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
113	nitrosodipropylamine	612-098-00-8	210-698-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
114	nitrobenzene	609-003-00-7	202-716-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
115	1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]	602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
116	2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]	602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
117	m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]	604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
118	o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]	612-012-00-9	201-855-4 [1] 202-729-1 [2] 202-810-1 [3]		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
Total:								0.0574 %		



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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS204-02/02/2026-0.25m

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

Sample details

Sample name:	LoW Code:
WS204-02/02/2026-0.25m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
21.8% (dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 21.8% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				8 mg/kg	1.895	12.444 mg/kg	0.00124 %	✓		
	033-005-00-1										
2	cadmium { cadmium sulfate }				<0.3 mg/kg	1.855	<0.556 mg/kg	<0.0000556 %			<LOD
	048-009-00-9	233-331-6	10124-36-4								
3	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				37.5 mg/kg	2.27	69.889 mg/kg	0.00699 %	✓		
	024-017-00-8										
4	copper { copper sulphate pentahydrate }				17 mg/kg	3.929	54.839 mg/kg	0.00548 %	✓		
	029-023-00-4	231-847-6	7758-99-8								
5	lead { lead chromate }			1	16 mg/kg	1.56	20.49 mg/kg	0.00131 %	✓		
	082-004-00-2	231-846-0	7758-97-6								
6	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
7	nickel { nickel dibromate }				14.6 mg/kg	5.358	64.229 mg/kg	0.00642 %	✓		
	028-053-00-5	238-596-1	14550-87-9								
8	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	028-031-00-5	239-125-2	15060-62-5								
9	zinc { zinc chromate }				35 mg/kg	2.774	79.717 mg/kg	0.00797 %	✓		
	024-007-00-3	236-878-9	13530-65-9								
10	TPH (C6 to C40) petroleum group				<52 mg/kg		<52 mg/kg	<0.0052 %			<LOD
			TPH								
11	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %			<LOD
	603-181-00-X	216-653-1	1634-04-4								
12	benzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %			<LOD
	601-020-00-8	200-753-7	71-43-2								
13	toluene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %			<LOD
	601-021-00-3	203-625-9	108-88-3								
14	ethylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %			<LOD
	601-023-00-4	202-849-4	100-41-4								
15	xylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	● pH				10.27 pH		10.27 pH	10.27 pH		
17	naphthalene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
18	● acenaphthylene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		205-917-1	208-96-8							
19	● acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
20	● fluorene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7							
21	● phenanthrene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		201-581-5	85-01-8							
22	● anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		204-371-1	120-12-7							
23	● fluoranthene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		205-912-4	206-44-0							
24	● pyrene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		204-927-3	129-00-0							
25	benzo[a]anthracene				<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
26	chrysene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
27	benzo[b]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
28	benzo[k]fluoranthene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
29	benzo[a]pyrene; benzo[def]chrysene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
30	● indeno[123-cd]pyrene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-893-2	193-39-5							
31	dibenz[a,h]anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
32	● benzo[ghi]perylene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-883-8	191-24-2							
Total:								0.0294 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS205-03/02/2026-0.10m

*** Potentially Hazardous Waste**
Classified as **17 05 04** or **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
WS205-03/02/2026-0.10m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
13.5%	Entry:
(dry weight correction)	17 05 04 or 17 05 03 * (Soil and stones other than those mentioned in 17 05 03 or Soil and stones containing hazardous substances)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0345%)

Determinands

Moisture content: 13.5% Dry Weight Moisture Correction applied (MC)

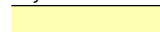
#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				17.5	mg/kg	1.895	29.211	mg/kg	0.00292 %	✓	
	033-005-00-1												
2		cadmium { cadmium sulfate }				<0.3	mg/kg	1.855	<0.556	mg/kg	<0.0000556 %		<LOD
	048-009-00-9	233-331-6	10124-36-4										
3		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				66.7	mg/kg	2.27	133.4	mg/kg	0.0133 %	✓	
	024-017-00-8												
4		copper { copper sulphate pentahydrate }				60	mg/kg	3.929	207.703	mg/kg	0.0208 %	✓	
	029-023-00-4	231-847-6	7758-99-8										
5		lead { lead chromate }			1	59	mg/kg	1.56	81.083	mg/kg	0.0052 %	✓	
	082-004-00-2	231-846-0	7758-97-6										
6		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7										
7		nickel { nickel dibromate }				29	mg/kg	5.358	136.909	mg/kg	0.0137 %	✓	
	028-053-00-5	238-596-1	14550-87-9										
8		selenium { nickel selenate }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5										
9		zinc { zinc chromate }				117	mg/kg	2.774	285.969	mg/kg	0.0286 %	✓	
	024-007-00-3	236-878-9	13530-65-9										
10		TPH (C6 to C40) petroleum group				392	mg/kg		345.374	mg/kg	0.0345 %	✓	
			TPH										
11		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
	603-181-00-X	216-653-1	1634-04-4										
12		benzene				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
	601-020-00-8	200-753-7	71-43-2										



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
13	toluene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
14	ethylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
15	xylene				<0.01 mg/kg		<0.01 mg/kg	<0.0000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
16	pH				10.07 pH		10.07 pH	10.07 pH		
			PH							
17	naphthalene				0.06 mg/kg		0.0529 mg/kg	0.00000529 %	✓	
	601-052-00-2	202-049-5	91-20-3							
18	acenaphthylene				0.12 mg/kg		0.106 mg/kg	0.0000106 %	✓	
		205-917-1	208-96-8							
19	acenaphthene				0.15 mg/kg		0.132 mg/kg	0.0000132 %	✓	
		201-469-6	83-32-9							
20	fluorene				0.1 mg/kg		0.0881 mg/kg	0.00000881 %	✓	
		201-695-5	86-73-7							
21	phenanthrene				1.21 mg/kg		1.066 mg/kg	0.000107 %	✓	
		201-581-5	85-01-8							
22	anthracene				0.6 mg/kg		0.529 mg/kg	0.0000529 %	✓	
		204-371-1	120-12-7							
23	fluoranthene				5.58 mg/kg		4.916 mg/kg	0.000492 %	✓	
		205-912-4	206-44-0							
24	pyrene				5.29 mg/kg		4.661 mg/kg	0.000466 %	✓	
		204-927-3	129-00-0							
25	benzo[a]anthracene				2.64 mg/kg		2.326 mg/kg	0.000233 %	✓	
	601-033-00-9	200-280-6	56-55-3							
26	chrysene				2.37 mg/kg		2.088 mg/kg	0.000209 %	✓	
	601-048-00-0	205-923-4	218-01-9							
27	benzo[b]fluoranthene				3.21 mg/kg		2.828 mg/kg	0.000283 %	✓	
	601-034-00-4	205-911-9	205-99-2							
28	benzo[k]fluoranthene				1.25 mg/kg		1.101 mg/kg	0.00011 %	✓	
	601-036-00-5	205-916-6	207-08-9							
29	benzo[a]pyrene; benzo[def]chrysene				3.11 mg/kg		2.74 mg/kg	0.000274 %	✓	
	601-032-00-3	200-028-5	50-32-8							
30	indeno[123-cd]pyrene				2.27 mg/kg		2 mg/kg	0.0002 %	✓	
		205-893-2	193-39-5							
31	dibenz[a,h]anthracene				0.44 mg/kg		0.388 mg/kg	0.0000388 %	✓	
	601-041-00-2	200-181-8	53-70-3							
32	benzo[ghi]perylene				2.22 mg/kg		1.956 mg/kg	0.000196 %	✓	
		205-883-8	191-24-2							
33	polychlorobiphenyls; PCB				<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
34	coronene				0.49 mg/kg		0.432 mg/kg	0.0000432 %	✓	
		205-881-7	191-07-1							
35	ethanediol; ethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.0000005 %		<LOD
	603-027-00-1	203-473-3	107-21-1							
36	2,2'-oxybisethanol; diethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.0000005 %		<LOD
	603-140-00-6	203-872-2	111-46-6							
37	2,2'-thiodiethanol; thiodiglycol				<0.05 mg/kg		<0.05 mg/kg	<0.0000005 %		<LOD
	603-081-00-6	203-874-3	111-48-8							
Total:								0.122 %		



Key

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

Classification of sample: WS206-02/02/2026-0.30m

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

Sample details

Sample name:	LoW Code:
WS206-02/02/2026-0.30m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
18.8% (dry weight correction)	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 18.8% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	polychlorobiphenyls; PCB				<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
Total:								0%		

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)
<LOD	Below limit of detection

Classification of sample: WS208-03/02/2026-0.25m

*** Potentially Hazardous Waste**
Classified as **17 05 04** or **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
WS208-03/02/2026-0.25m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
15%	Entry:
(dry weight correction)	17 05 04 or 17 05 03 * (Soil and stones other than those mentioned in 17 05 03 or Soil and stones containing hazardous substances)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinand:

toluene (conc.: 4.35e-07%)

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00565%)

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				39.4	mg/kg	1.895	64.908	mg/kg	0.00649 %	✓	
		033-005-00-1											
2		cadmium { cadmium sulfate }				<0.3	mg/kg	1.855	<0.556	mg/kg	<0.0000556 %		<LOD
		048-009-00-9	233-331-6	10124-36-4									
3		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				37	mg/kg	2.27	73.035	mg/kg	0.0073 %	✓	
		024-017-00-8											
4		copper { copper sulphate pentahydrate }				84	mg/kg	3.929	286.992	mg/kg	0.0287 %	✓	
		029-023-00-4	231-847-6	7758-99-8									
5		lead { lead chromate }			1	77	mg/kg	1.56	104.44	mg/kg	0.0067 %	✓	
		082-004-00-2	231-846-0	7758-97-6									
6		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
7		nickel { nickel dibromate }				46.9	mg/kg	5.358	218.526	mg/kg	0.0219 %	✓	
		028-053-00-5	238-596-1	14550-87-9									
8		selenium { nickel selenate }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
		028-031-00-5	239-125-2	15060-62-5									
9		zinc { zinc chromate }				120	mg/kg	2.774	289.476	mg/kg	0.0289 %	✓	
		024-007-00-3	236-878-9	13530-65-9									
10		TPH (C6 to C40) petroleum group				65	mg/kg		56.522	mg/kg	0.00565 %	✓	
				TPH									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
11	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
12	benzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
13	toluene				0.005 mg/kg		0.0043 mg/kg	0.000000435 %	✓	
	601-021-00-3	203-625-9	108-88-3							
14	ethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
15	xylene				<0.011 mg/kg		<0.011 mg/kg	<0.0000011 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
16	pH				8.71 pH		8.71 pH	8.71 pH		
			PH							
17	naphthalene				0.06 mg/kg		0.0522 mg/kg	0.00000522 %	✓	
	601-052-00-2	202-049-5	91-20-3							
18	acenaphthylene				<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		205-917-1	208-96-8							
19	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
20	fluorene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7							
21	phenanthrene				0.16 mg/kg		0.139 mg/kg	0.0000139 %	✓	
		201-581-5	85-01-8							
22	anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		204-371-1	120-12-7							
23	fluoranthene				0.08 mg/kg		0.0696 mg/kg	0.00000696 %	✓	
		205-912-4	206-44-0							
24	pyrene				0.07 mg/kg		0.0609 mg/kg	0.00000609 %	✓	
		204-927-3	129-00-0							
25	benzo[a]anthracene				<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
26	chrysene				0.05 mg/kg		0.0435 mg/kg	0.00000435 %	✓	
	601-048-00-0	205-923-4	218-01-9							
27	benzo[b]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
28	benzo[k]fluoranthene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
29	benzo[a]pyrene; benzo[def]chrysene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
30	indeno[123-cd]pyrene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-893-2	193-39-5							
31	dibenz[a,h]anthracene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
32	benzo[ghi]perylene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
		205-883-8	191-24-2							
33	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
34	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
35	tetrachloroethylene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
36	carbon tetrachloride; tetrachloromethane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
37	trichloroethylene; trichloroethene				1.374 mg/kg		1.195 mg/kg	0.000119 %	✓	
	602-027-00-9	201-167-4	79-01-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
38	vinyl chloride; chloroethylene 602-023-00-7	200-831-0	75-01-4		<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
39	hexachlorobenzene 602-065-00-6	204-273-9	118-74-1		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
40	dichlorodifluoromethane 200-893-9	75-71-8			<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
41	chloromethane; methyl chloride 602-001-00-7	200-817-4	74-87-3		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
42	bromomethane; methylbromide 602-002-00-2	200-813-2	74-83-9		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
43	chloroethane 602-009-00-0	200-830-5	75-00-3		<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
44	trichlorofluoromethane 200-892-3	75-69-4			<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
45	1,1-dichloroethylene; vinylidene chloride 602-025-00-8	200-864-0	75-35-4		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
46	dichloromethane; methylene chloride 602-004-00-3	200-838-9	75-09-2		0.101 mg/kg		0.0878 mg/kg	0.00000878 %	✓	
47	2,2-dichloropropane 209-832-0	594-20-7			<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
48	bromochloromethane 200-826-3	74-97-5			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
49	chloroform; trichloromethane 602-006-00-4	200-663-8	67-66-3		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
50	1,1,1-trichloroethane; methyl chloroform 602-013-00-2	200-756-3	71-55-6		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
51	1,1-dichloropropene 602-031-00-0	209-253-3	563-58-6		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
52	1,2-dichloropropane; propylene dichloride 602-020-00-0	201-152-2	78-87-5		<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
53	dibromomethane 602-003-00-8	200-824-2	74-95-3		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
54	bromodichloromethane 200-856-7	75-27-4			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
55	1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2] 602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]		<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
56	trans-1,3-dichloropropene 431-460-4	10061-02-6			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
57	1,1,2-trichloroethane 602-014-00-8	201-166-9	79-00-5		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
58	1,3-dichloropropane 205-531-3	142-28-9			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
59	dibromochloromethane 204-704-0	124-48-1			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
60	1,2-dibromoethane 602-010-00-6	203-444-5	106-93-4		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
61	chlorobenzene 602-033-00-1	203-628-5	108-90-7		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
62	1,1,1,2-tetrachloroethane 211-135-1	630-20-6			<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
63	bromoform; tribromomethane 602-007-00-X	200-854-6	75-25-2		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
64	cumene 601-024-00-X	202-704-5	98-82-8		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
65	1,1,2,2-tetrachloroethane 602-015-00-3	201-197-8	79-34-5		<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
66	bromobenzene 602-060-00-9	203-623-8	108-86-1		<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<LOD



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
67	1,2,3-trichloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-062-00-X	202-486-1	96-18-4							
68	propylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-097-00-8	203-132-9	103-65-1							
69	mesitylene; 1,3,5-trimethylbenzene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-025-00-5	203-604-4	108-67-8							
70	tert-butylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
		202-632-4	98-06-6							
71	1,2,4-trimethylbenzene				<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD
	601-043-00-3	202-436-9	95-63-6							
72	sec-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		205-227-0	135-98-8							
73	1-isopropyl-4-methylbenzene; p-cymene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	601-094-00-1	202-796-7	99-87-6							
74	1,3-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-067-00-7	208-792-1	541-73-1							
75	1,4-dichlorobenzene; p-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-035-00-2	203-400-5	106-46-7							
76	n-butylbenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		203-209-7	104-51-8							
77	1,2-dichlorobenzene; o-dichlorobenzene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-034-00-7	202-425-9	95-50-1							
78	1,2-dibromo-3-chloropropane				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	602-021-00-6	202-479-3	96-12-8							
79	1,2,4-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
	602-087-00-6	204-428-0	120-82-1							
80	hexachlorobutadiene				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
		201-765-5	87-68-3							
81	1,2,3-trichlorobenzene				<0.007 mg/kg		<0.007 mg/kg	<0.0000007 %		<LOD
		201-757-1	87-61-6							
82	styrene				<0.003 mg/kg		<0.003 mg/kg	<0.0000003 %		<LOD
	601-026-00-0	202-851-5	100-42-5							
83	2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-008-00-0	202-433-2 [1]	95-57-8 [1]							
		203-402-6 [2]	106-48-9 [2]							
		203-582-6 [3]	108-43-0 [3]							
		246-691-4 [4]	25167-80-0 [4]							
84	2-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-857-5	88-75-5							
85	2,4-dichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-011-00-7	204-429-6	120-83-2							
86	3,4-xlenol; [1] 2,5-xlenol; [2] 2,4-xlenol; [3] 2,3-xlenol; [4] 2,6-xlenol; [5] xlenol; [6] 2,4(or 2,5)-xlenol [7]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-006-00-X	202-439-5 [1]	95-65-8 [1]							
		202-461-5 [2]	95-87-4 [2]							
		203-321-6 [3]	105-67-9 [3]							
		208-395-3 [4]	526-75-0 [4]							
		209-400-1 [5]	576-26-1 [5]							
		215-089-3 [6]	1300-71-6 [6]							
		276-245-4 [7]	71975-58-1 [7]							
87	2,4,5-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-017-00-X	202-467-8	95-95-4							
88	2,4,6-trichlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-018-00-5	201-795-9	88-06-2							
89	chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-014-00-3	200-431-6	59-50-7							
90	4-nitrophenol; p-nitrophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-015-00-2	202-811-7	100-02-7							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
91	pentachlorophenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-002-00-8	201-778-6	87-86-5							
92	2-chloronaphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		202-079-9	91-58-7							
93	2-methyl naphthalene				0.071 mg/kg		0.0617 mg/kg	0.00000617 %	✓	
		202-078-3	91-57-6							
94	bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-317-00-9	204-211-0	117-81-7							
95	BBP; benzyl butyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-430-00-3	201-622-7	85-68-7							
96	dibutyl phthalate; DBP				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	607-318-00-4	201-557-4	84-74-2							
97	di-n-octyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		204-214-7	117-84-0							
98	diethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-550-6	84-66-2							
99	dimethyl phthalate				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		205-011-6	131-11-3							
100	2,4-dinitrotoluene; [1] dinitrotoluene [2]				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-007-00-9	204-450-0 [1] 246-836-1 [2]	121-14-2 [1] 25321-14-6 [2]							
101	2,6-dinitrotoluene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-049-00-8	210-106-0	606-20-2							
102	4-bromophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		202-952-4	101-55-3							
103	4-chloroaniline				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	612-137-00-9	203-401-0	106-47-8							
104	4-chlorophenylphenylether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		230-281-7	7005-72-3							
105	azobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	611-001-00-6	203-102-5	103-33-3							
106	bis(2-chloroethoxy)methane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-920-2	111-91-1							
107	bis(2-chloroethyl) ether				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	603-029-00-2	203-870-1	111-44-4							
108	carbazole				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-696-0	86-74-8							
109	dibenzofuran				0.031 mg/kg		0.027 mg/kg	0.0000027 %	✓	
		205-071-3	132-64-9							
110	hexachlorocyclopentadiene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-078-00-7	201-029-3	77-47-4							
111	hexachloroethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		200-666-4	67-72-1							
112	3,5,5-trimethylcyclohex-2-enone; isophorone				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	606-012-00-8	201-126-0	78-59-1							
113	nitrosodipropylamine				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	612-098-00-8	210-698-0	621-64-7							
114	nitrobenzene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	609-003-00-7	202-716-0	98-95-3							
115	ethanediol; ethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	603-027-00-1	203-473-3	107-21-1							
116	2,2' -oxybisethanol; diethylene glycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	603-140-00-6	203-872-2	111-46-6							
117	2,2'-thiodiethanol; thiodiglycol				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	603-081-00-6	203-874-3	111-48-8							



#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
118		1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]			<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD	
	602-026-00-3	208-750-2 [1]	540-59-0 [1]								
		205-859-7 [2]	156-59-2 [2]								
		205-860-2 [3]	156-60-5 [3]								
119		2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]			<0.006 mg/kg		<0.006 mg/kg	<0.0000006 %		<LOD	
	602-040-00-X	202-424-3 [1]	95-49-8 [1]								
		203-580-5 [2]	108-41-8 [2]								
		203-397-0 [3]	106-43-4 [3]								
		246-698-2 [4]	25168-05-2 [4]								
120		m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]			<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD	
	604-004-00-9	203-577-9 [1]	108-39-4 [1]								
		202-423-8 [2]	95-48-7 [2]								
		203-398-6 [3]	106-44-5 [3]								
		215-293-2 [4]	1319-77-3 [4]								
121		o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]			<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD	
	612-012-00-9	201-855-4 [1]	88-74-4 [1]								
		202-729-1 [2]	99-09-2 [2]								
		202-810-1 [3]	100-01-6 [3]								
Total:								0.106 %			

Key

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

Appendix A: Classifier defined and non GB MCL determinands

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Unknown Oil

Hazard statements taken from WM3 1st Edition 2015

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4

Description/Comments:

Additional Hazard Statement(s): Carc. 2; H351

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

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

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

pH (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

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

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

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

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

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

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

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

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

• **1,1-dichloroethane and 1,2-dichloroethane (combined)** (EC Number: 203-458-1, 200-863-5, CAS Number: 107-06-2, 75-34-3)

Description/Comments: Combines the hazard statements and risk phrases for 1,1-dichloroethane and 1,2-dichloroethane
Data source: N/a
Data source date: 14 Oct 2016
Hazard Statements: Flam. Liq. 2; H225 , Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 1B; H350 , Aquatic Chronic 3; H412

• **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

GB MCL index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Additional Hazard Statement(s): Carc. 1A; H350

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from:: IARC Group 1 (23, Sup 7, 100C) 2012

• **dichlorodifluoromethane** (EC Number: 200-893-9, CAS Number: 75-71-8)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 02 Mar 2017
Hazard Statements: Aquatic Chronic 3; H412 , Ozone 1; H420 , Press. Gas; H280

• **trichlorofluoromethane** (EC Number: 200-892-3, CAS Number: 75-69-4)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H312 , Ozone 1; H420

• **2,2-dichloropropane** (EC Number: 209-832-0, CAS Number: 594-20-7)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H332 , Flam. Liq. 2; H225 , Acute Tox. 4; H302 , Acute Tox. 4; H312 , Eye Irrit. 2; H319

• **bromochloromethane** (EC Number: 200-826-3, CAS Number: 74-97-5)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H312 , Skin Corr. 1B; H314 , Eye Dam. 1; H318 , Acute Tox. 4; H332 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Ozone 1; H420

■ **bromodichloromethane** (EC Number: 200-856-7, CAS Number: 75-27-4)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302, Skin Irrit. 2; H315, Eye Dam. 1; H318, Eye Irrit. 2; H319, STOT SE 3; H335, Muta. 1B; H340, Carc. 1B; H350, Repr. 1A; H360

■ **trans-1,3-dichloropropene** (EC Number: 431-460-4, CAS Number: 10061-02-6)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Flam. Liq. 3; H226, Acute Tox. 3; H301, Asp. Tox. 1; H304, Acute Tox. 3; H311, Skin Irrit. 2; H315, Skin Sens. 1; H317, Eye Irrit. 2; H319, Acute Tox. 4; H332, STOT SE 3; H335, Aquatic Chronic 1; H410

■ **1,3-dichloropropane** (EC Number: 205-531-3, CAS Number: 142-28-9)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H332, Flam. Liq. 2; H225, Flam. Liq. 3; H226, Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335

■ **dibromochloromethane** (EC Number: 204-704-0, CAS Number: 124-48-1)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 3;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302, Acute Tox. 4; H312, Skin Irrit. 2; H315, Eye Irrit. 2; H319, Acute Tox. 4; H332, STOT SE 3; H335, STOT SE 3; H336, Muta. 2; H341, Aquatic Chronic 2; H411

■ **1,1,1,2-tetrachloroethane** (EC Number: 211-135-1, CAS Number: 630-20-6)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H310, Eye Irrit. 2; H319, Acute Tox. 3; H331, Eye Dam. 1; H318, Acute Tox. 4; H332, Carc. 2; H351, Acute Tox. 4; H312, Aquatic Chronic 3; H412, Skin Irrit. 2; H315

■ **tert-butylbenzene** (EC Number: 202-632-4, CAS Number: 98-06-6)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Flam. Liq. 3; H226, Skin Irrit. 2; H315, Eye Irrit. 2; H319, Acute Tox. 3; H331, Acute Tox. 4; H332, STOT SE 3; H335, Asp. Tox. 1; H304, Aquatic Chronic 2; H411

■ **sec-butylbenzene** (EC Number: 205-227-0, CAS Number: 135-98-8)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, Skin Irrit. 2; H315, Eye Irrit. 2; H319, Aquatic Chronic 2; H411

■ **n-butylbenzene** (EC Number: 203-209-7, CAS Number: 104-51-8)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Flam. Liq. 3; H226, Skin Irrit. 2; H315, Eye Irrit. 2; H319, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

■ **hexachlorobutadiene** (EC Number: 201-765-5, CAS Number: 87-68-3)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 3;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 3; H301, Acute Tox. 2; H310, Skin Irrit. 2; H315, Skin Sens. 1; H317, Eye Irrit. 2; H319, Acute Tox. 2; H330, Carc. 2; H351, Repr. 2; H361, STOT SE 2; H371, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

■ **1,2,3-trichlorobenzene** (EC Number: 201-757-1, CAS Number: 87-61-6)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302, Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, STOT SE 3; H336, Aquatic Acute 1; H400, Aquatic Chronic 3; H410

■ **2-nitrophenol** (EC Number: 201-857-5, CAS Number: 88-75-5)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 4; H312 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 4; H332 , STOT SE 3; H335 , STOT RE 2; H373 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **2-chloronaphthalene** (EC Number: 202-079-9, CAS Number: 91-58-7)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

■ **2-methyl naphthalene** (EC Number: 202-078-3, CAS Number: 91-57-6)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , STOT SE 3; H336 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **di-n-octyl phthalate** (EC Number: 204-214-7, CAS Number: 117-84-0)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Repr. 2; H361 , Skin Sens. 1; H317 , Resp. Sens. 1; H334 , Eye Irrit. 2; H319 , Aquatic Chronic 4; H413

■ **diethyl phthalate** (EC Number: 201-550-6, CAS Number: 84-66-2)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Skin Irrit. 2; H315 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , STOT SE 3; H335 , STOT RE 2; H373 , Repr. 2; H361 , Acute Tox. 4; H302 , STOT SE 3; H336 , Skin Sens. 1; H317 , Aquatic Chronic 1; H410

■ **dimethyl phthalate** (EC Number: 205-011-6, CAS Number: 131-11-3)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 3; H331 , STOT SE 3; H335 , STOT SE 3; H336 , Repr. 2; H361 , Aquatic Chronic 3; H412

■ **4-bromophenylphenylether** (EC Number: 202-952-4, CAS Number: 101-55-3)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Dam. 1; H318 , Eye Irrit. 2; H319 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **4-chlorophenylphenylether** (EC Number: 230-281-7, CAS Number: 7005-72-3)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Dam. 1; H318 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **bis(2-chloroethoxy)methane** (EC Number: 203-920-2, CAS Number: 111-91-1)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 3; H301 , Acute Tox. 4; H312 , Acute Tox. 1; H330 , Acute Tox. 2; H330 , STOT SE 1; H370 , STOT RE 2; H373

■ **carbazole** (EC Number: 201-696-0, CAS Number: 86-74-8)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Muta. 2; H341 , Carc. 2; H351 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301

■ **dibenzofuran** (EC Number: 205-071-3, CAS Number: 132-64-9)

Description/Comments: VOC; Data from C&L Inventory Database

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 4; H312 , Acute Tox. 4; H332 , Aquatic Chronic 2; H411

■ **hexachloroethane** (EC Number: 200-666-4, CAS Number: 67-72-1)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;

Data source: <https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 02 Mar 2017

Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , STOT RE 2; H373

■ **coronene** (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.

Data source: <http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en>

Data source date: 16 Jun 2014

Hazard Statements: STOT SE 2; H371

Appendix B: Rationale for selection of metal species

arsenic {arsenic acid and its salts with the exception of those specified elsewhere in this Annex}

Worst case CLP species based on hazard statements/molecular weight and conversion factor for arsenic acid H₃AsO₄. (edit as required)

cadmium {cadmium sulfate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

chromium in Cr(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {copper sulphate pentahydrate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Reasonable worst case CLP species based on hazard statements/molecular weight and assuming no evidence for the use of explosives. (edit as required)

nickel {nickel dibromate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021

HazWasteOnline Classification Engine Version: 2026.56.7002.12617 (25 Feb 2026)

HazWasteOnline Database: 2026.56.7002.12617 (25 Feb 2026)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK:

2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021

GB MCL List v2.0 - version 2.0 of 20th October 2023

GB MCL List v3.0 - version 3.0 of 11th January 2024

GB MCL List v4.0 - version 4.0 of 2nd March 2024

GB MCL List v5.0 - version 5.0 of 26th June 2024

GB MCL List v6.0 - version 6.0 of 15th February 2025

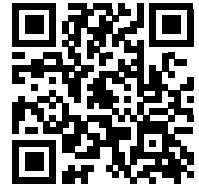
GB MCL List v7.0 - version 7.0 of 23rd September 2025



Waste Classification Report

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

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



AEU06-3NZDE-ZHM3B

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

Report is invalid if pages are removed.

Job name

EMT-26-1647-Batch-2-202602161546

Description/Comments

Project

TE1704

Site

Deacon Business Park, Knowsley

Classified by

Name: **Adrian Read**
Date: **18 Mar 2026 13:38 GMT**
Telephone: **01925 818388**
Company: **Tier Environmental**
Unit 5 Office Village, Sandpiper Court,
Chester Business Park, Chester, CH4 9QZ

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

HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification
Most recent 3 year Refresher

Date

03 Dec 2020
05 Dec 2023

Next 3 year Refresher due by Dec 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

Deacon Business Park, Moorgate Road, Southdene, Kirkby, Knowsley

Post Code **L33 7RX**

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Proposed redevelopment of land

Description of the specific process, sub-process and/or activity that created the waste

Waste created during excavation of soils during development

Description of the waste

Made ground and/or natural soils



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP05-04/02/2026-0.50m		Non Hazardous		3

Related documents

#	Name	Description
1	EMT-26-1647-Batch-2-202602161546.HWOL	Element .hwol file used to populate the Job
2	Example worst case waste stream template: 17 05 04 or 17 05 03 *	waste stream template used to create this Job

Report

Created by: Adrian Read

Created date: 18 Mar 2026 13:38 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	4
Appendix B: Rationale for selection of metal species	4
Appendix C: Version	4

Classification of sample: TP05-04/02/2026-0.50m

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

Sample details

Sample name:	LoW Code:
TP05-04/02/2026-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
10.1% (dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 10.1% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	 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 }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
	006-007-00-5									
2	 polychlorobiphenyls; PCB				<0.35 mg/kg		<0.35 mg/kg	<0.000035 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
Total:								0%		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection

Appendix A: Classifier defined and non GB MCL determinands

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

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

GB MCL index number: 602-039-00-4

Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Additional Hazard Statement(s): Carc. 1A; H350

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

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] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2026.56.7002.12617 (25 Feb 2026)

HazWasteOnline Database: 2026.56.7002.12617 (25 Feb 2026)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

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5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

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15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

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The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020

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GB MCL List v3.0 - version 3.0 of 11th January 2024

GB MCL List v4.0 - version 4.0 of 2nd March 2024

GB MCL List v5.0 - version 5.0 of 26th June 2024

GB MCL List v6.0 - version 6.0 of 15th February 2025

GB MCL List v7.0 - version 7.0 of 23rd September 2025

APPENDIX D - GEOTECHNICAL IN SITU FIELDWORK AND LABORATORY RESULTS

TEST REPORT

Client Tier Environmental

Address Suite 513
Chadwick House
Warrington Road
Birchwood
WA3 6AE

Contract TE1704 - Deacon Park

Job Number MRN 26011/15A

Date of Issue 25 March 2026

Page 1 of 14

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

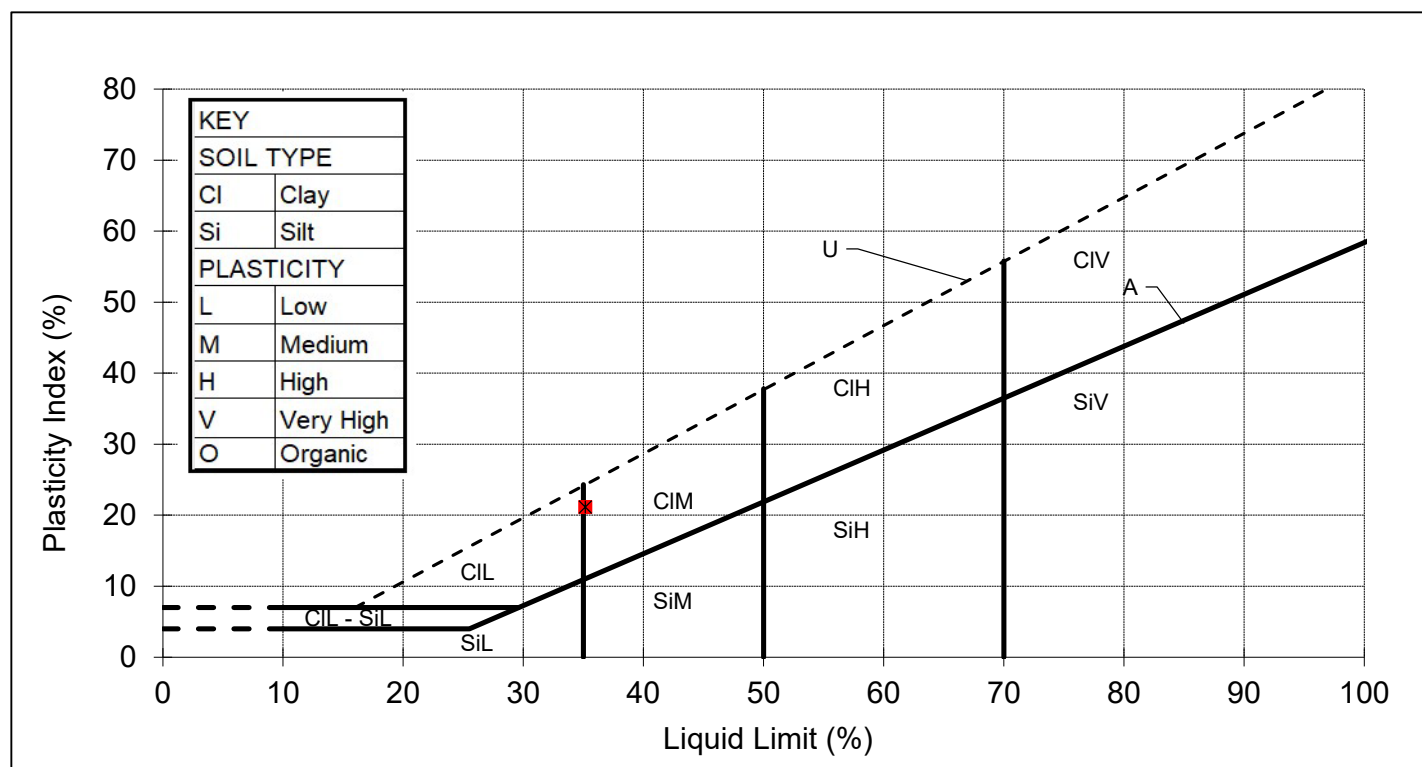
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP01 1.1m	DATE SAMPLED	02-Feb-26
SAMPLE No.	6023301	DATE RECEIVED	05-Feb-26
DATE TESTED	27-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Won	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.5	34.5	1.023	
Determination 2 (avg)	18.4	34.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15.5	35	14	21	76



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022



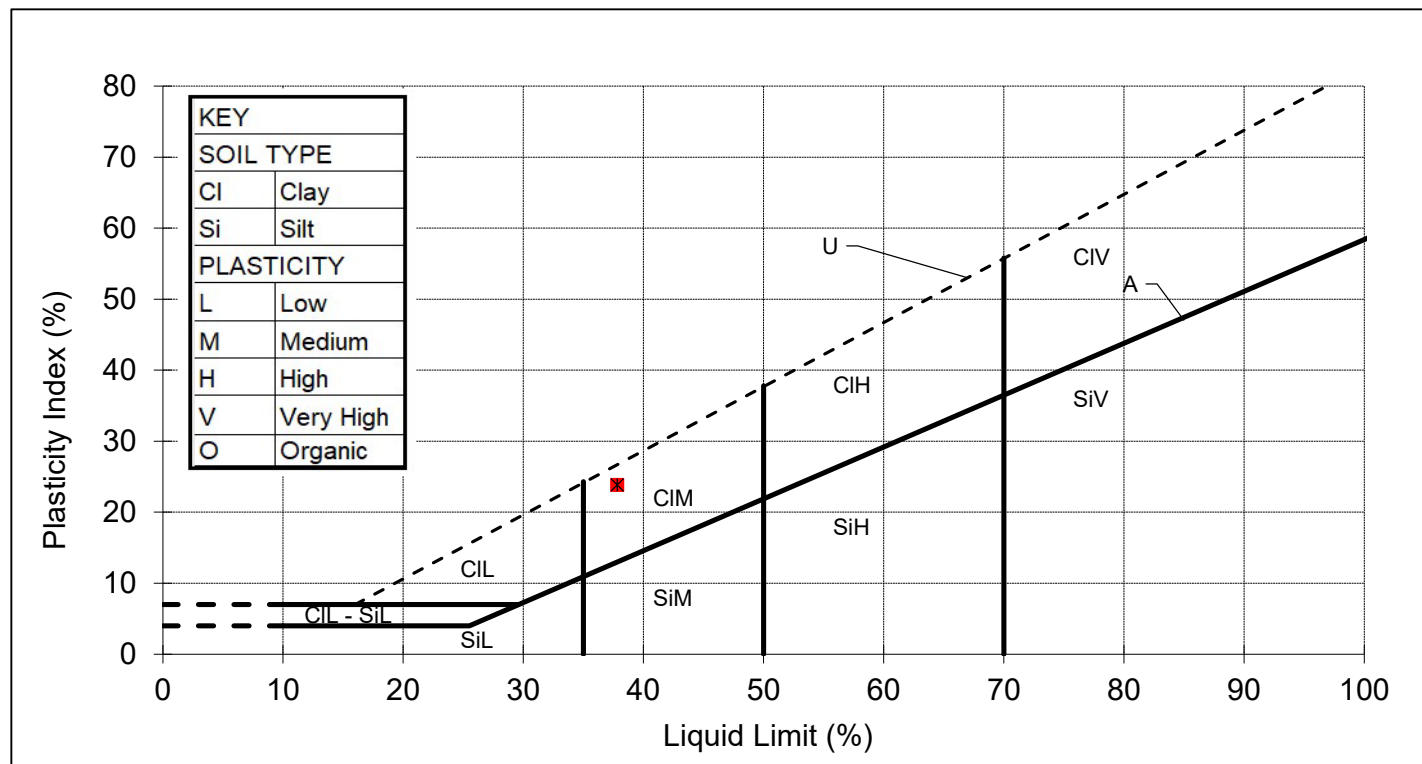
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP01 1.2-1.65m	DATE SAMPLED	02-Feb-26
SAMPLE No.	6023302	DATE RECEIVED	05-Feb-26
DATE TESTED	27-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Won	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Wet Sieved

Test Readings mm (average)	Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.5	1.010	
Determination 2 (avg)	19.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15.7	38	14	24	88



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022



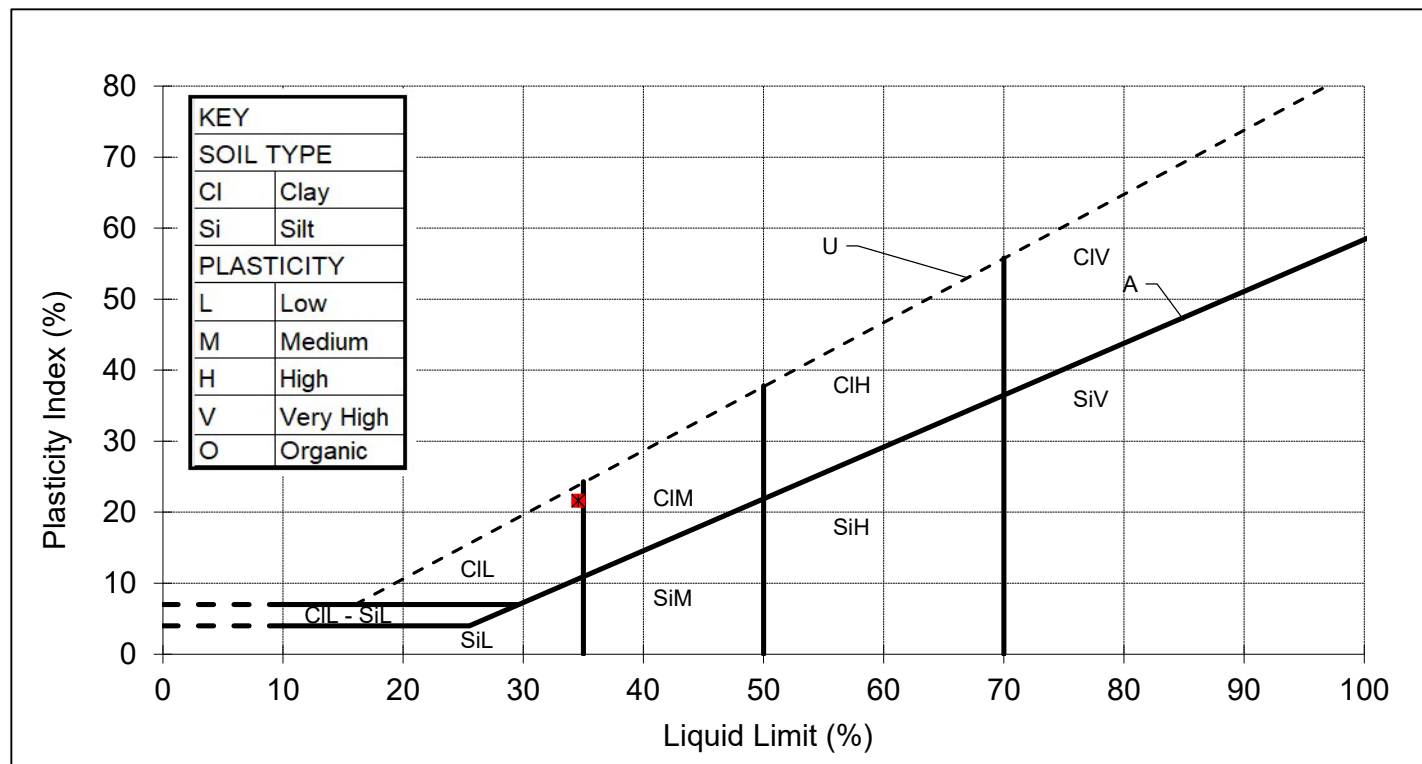
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	TP05 0.5m	DATE SAMPLED	02-Feb-26
SAMPLE No.	6023305	DATE RECEIVED	05-Feb-26
DATE TESTED	27-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Won	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.5	33.8	1.025	
Determination 2 (avg)	18.2	33.7		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
13.4	35	13	22	83



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

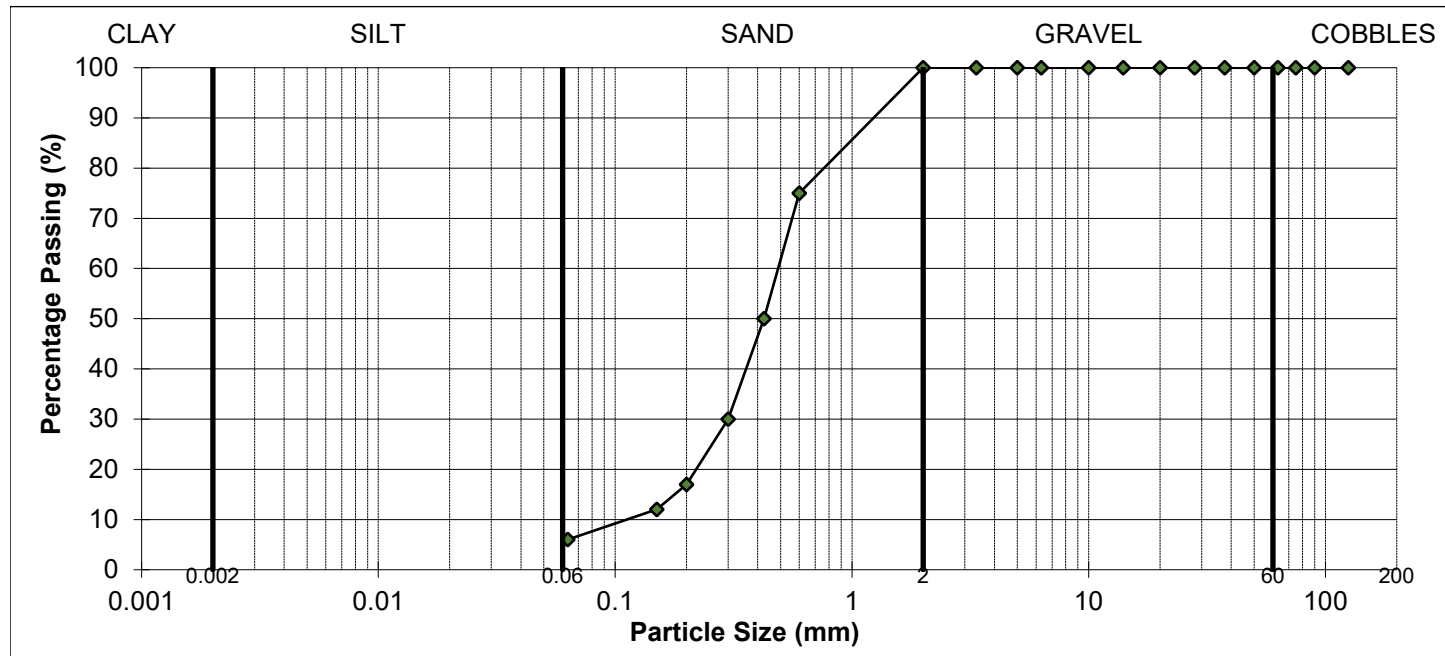


CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	TP02 1.1m	DATE SAMPLED	02-Feb-26
LAB SAMPLE No	6023308	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty SAND		
ADVISED SOURCE	Site Won	AS RECEIVED WATER CONTENT (%)	10.3

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		6.3	100	
90	100		5	100	
75	100		3.35	100	
63	100		2	100	
50	100		0.6	75	
37.5	100		0.425	50	
28	100		0.3	30	
20	100		0.2	17	
14	100		0.15	12	
10	100		0.063	6	



SOIL FRACTIONS			
COBBLES	0	SAND	94%
GRAVEL		SILT / CLAY	6%

REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

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DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870



TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

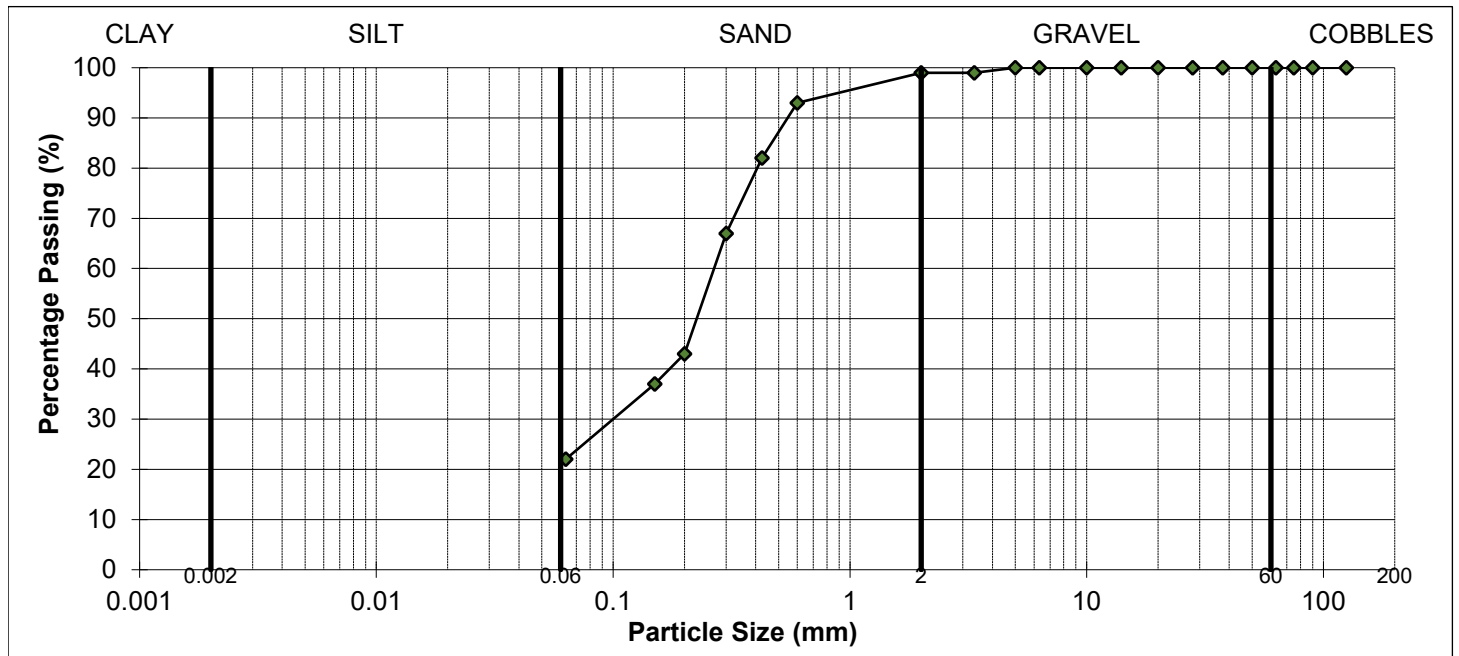
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	TP03 0.5m	DATE SAMPLED	02-Feb-26
LAB SAMPLE No	6023309	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty slightly gravelly SAND		
ADVISED SOURCE	Site Won	AS RECEIVED WATER CONTENT (%)	26.0

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		6.3	100	
90	100		5	100	
75	100		3.35	99	
63	100		2	99	
50	100		0.6	93	
37.5	100		0.425	82	
28	100		0.3	67	
20	100		0.2	43	
14	100		0.15	37	
10	100		0.063	22	



SOIL FRACTIONS			
COBBLES	0	SAND	77%
GRAVEL	1%	SILT / CLAY	22%

REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

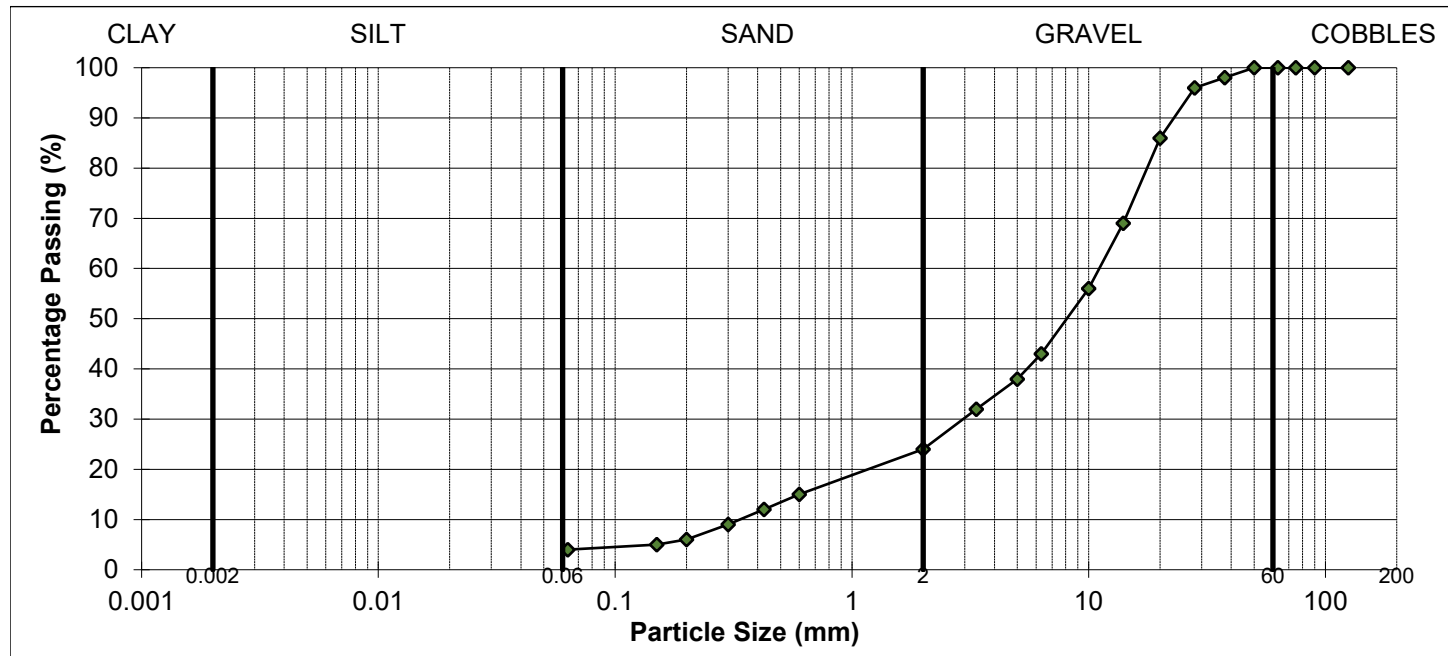


CLIENT	Tier Environmental		
SITE	TE1704 - Deacon Park		
JOB NUMBER	MRN 26011/15A		

SAMPLE LABEL	TP08 0.5m	DATE SAMPLED	02-Feb-26
LAB SAMPLE No	6023310	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Grey brown silty sandy GRAVEL		
ADVISED SOURCE	Site Won	AS RECEIVED WATER CONTENT (%)	6.9

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		6.3	43	
90	100		5	38	
75	100		3.35	32	
63	100		2	24	
50	100		0.6	15	
37.5	98		0.425	12	
28	96		0.3	9	
20	86		0.2	6	
14	69		0.15	5	
10	56		0.063	4	



SOIL FRACTIONS			
COBBLES	0	SAND	20%
GRAVEL	76%	SILT / CLAY	4%

REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

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DUKINFIELD, CHESHIRE SK16 4QX

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TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

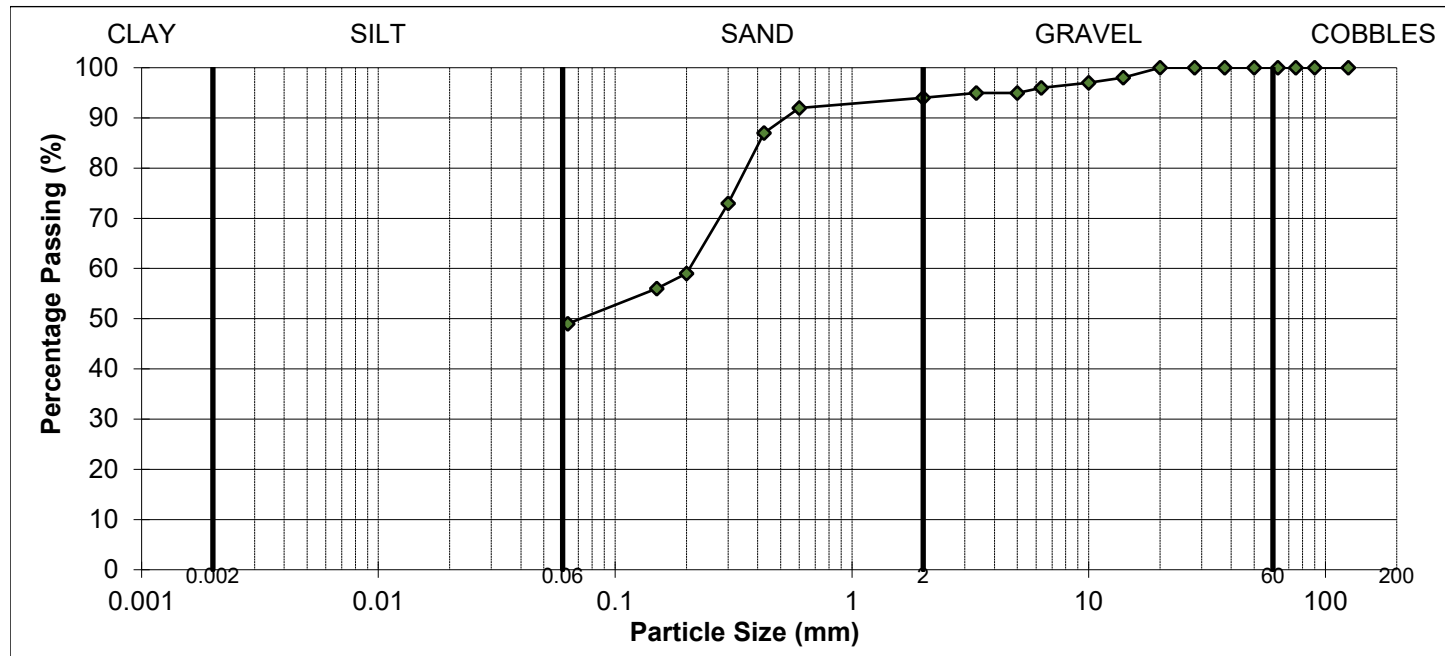


CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP01 1.7-2.0m	DATE SAMPLED	02-Feb-26
LAB SAMPLE No	6023311	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Brown silty sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Won	AS RECEIVED WATER CONTENT (%)	15.4

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		6.3	96	
90	100		5	95	
75	100		3.35	95	
63	100		2	94	
50	100		0.6	92	
37.5	100		0.425	87	
28	100		0.3	73	
20	100		0.2	59	
14	98		0.15	56	
10	97		0.063	49	



SOIL FRACTIONS			
COBBLES	0	SAND	45%
GRAVEL	6%	SILT / CLAY	49%

REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

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DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

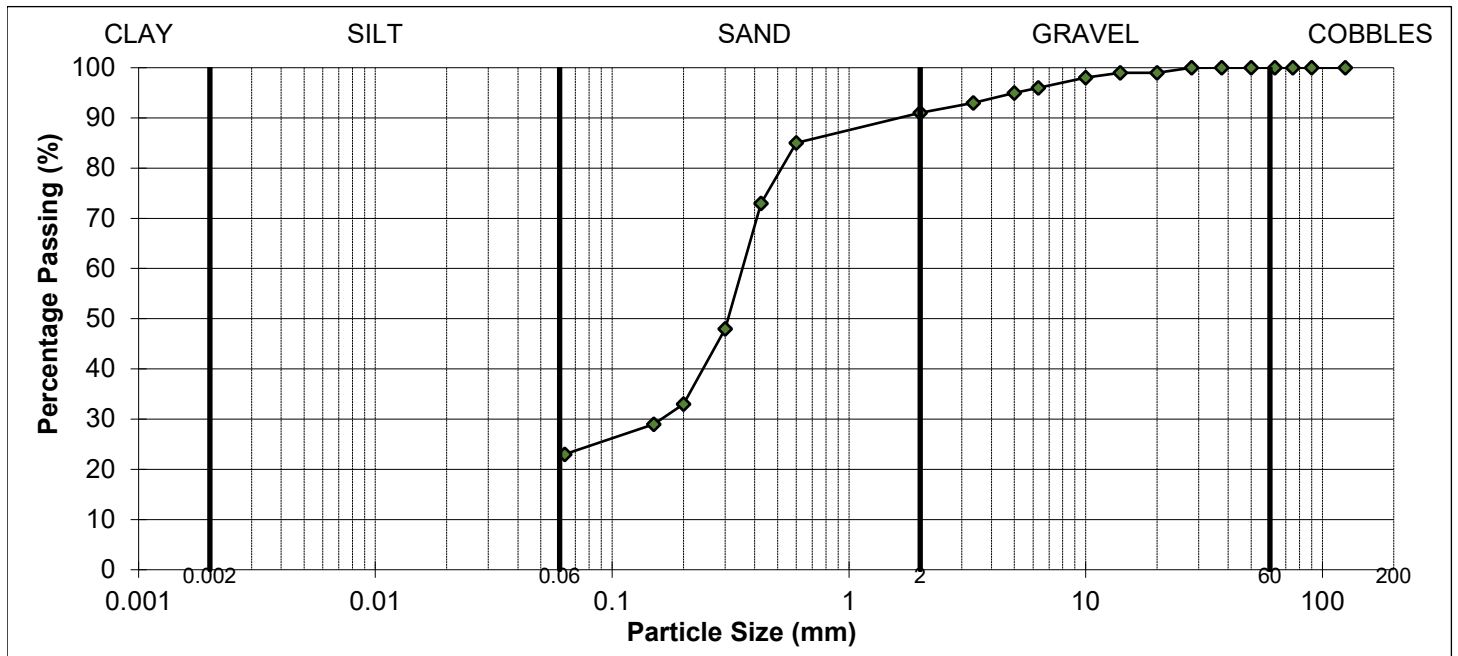


CLIENT	Tier Environmental		
SITE	TE1704 - Deacon Park		
JOB NUMBER	MRN 26011/15A		

SAMPLE LABEL	CP03 0.6-1.0m	DATE SAMPLED	02-Feb-26
LAB SAMPLE No	6023314	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty gravelly SAND		
ADVISED SOURCE	Site Won	AS RECEIVED WATER CONTENT (%)	22.4

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		6.3	96	
90	100		5	95	
75	100		3.35	93	
63	100		2	91	
50	100		0.6	85	
37.5	100		0.425	73	
28	100		0.3	48	
20	99		0.2	33	
14	99		0.15	29	
10	98		0.063	23	



SOIL FRACTIONS			
COBBLES	0	SAND	68%
GRAVEL	9%	SILT / CLAY	23%

REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

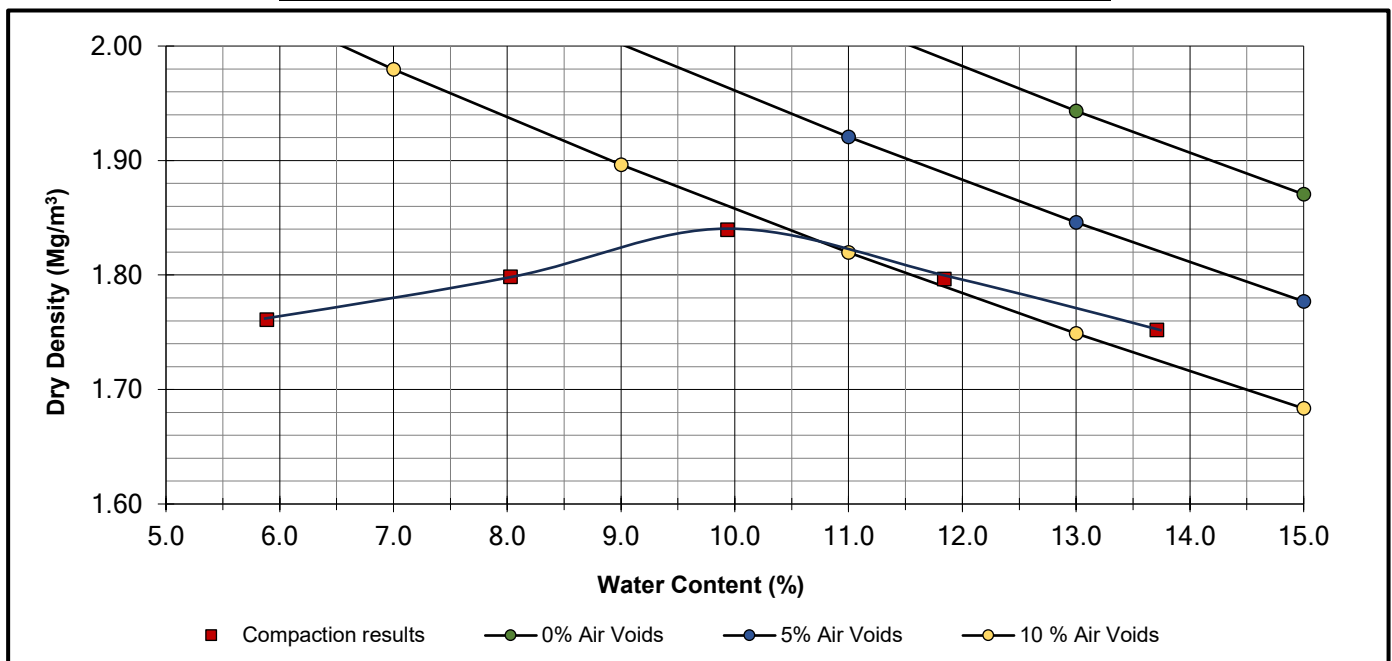
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	TP03 0.5m	DATE SAMPLED	02-Feb-2026
SAMPLE NUMBER	6023309	DATE RECEIVED	05-Feb-2026
DATE TESTED	26-Feb-2026	SAMPLED BY	Client

MATERIAL	Reddish brown silty slightly gravelly SAND
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	ZONE 1	MOULD SIZE	1 Litre
RETAINED 20mm	0 %	PARTICLE DENSITY	2.60 Mg/m ³	(Assumed)	

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	5.9	1.761
2	8.0	1.799
3	9.9	1.840
4	11.8	1.796
5	13.7	1.752



OPTIMUM WATER CONTENT	10	(%)
MAXIMUM DRY DENSITY	1.84	(Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

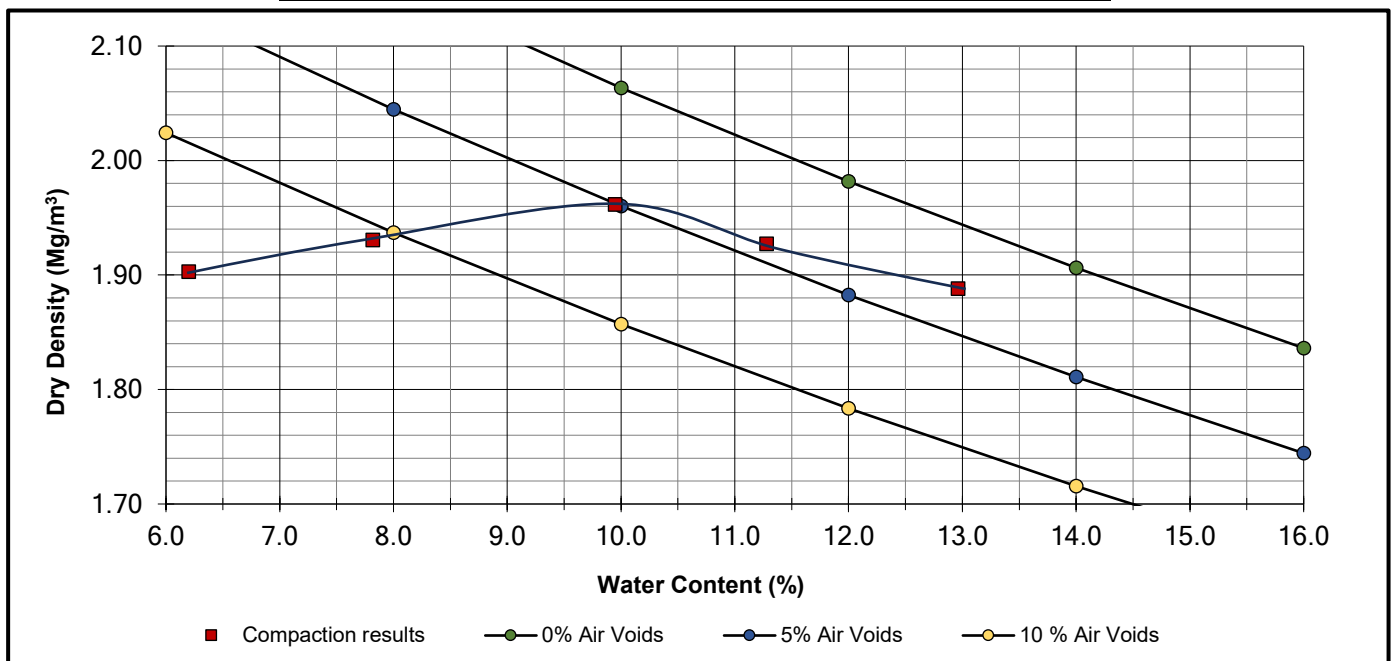
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP01 1.7-2.0m	DATE SAMPLED	02-Feb-2026
SAMPLE NUMBER	6023311	DATE RECEIVED	05-Feb-2026
DATE TESTED	26-Feb-2026	SAMPLED BY	Client

MATERIAL	Brown silty sandy slightly gravelly CLAY
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	ZONE 1	MOULD SIZE	1 Litre
RETAINED 20mm	0 %	PARTICLE DENSITY	2.60 Mg/m ³	(Assumed)	

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	6.2	1.903
2	7.8	1.931
3	9.9	1.962
4	11.3	1.927
5	13.0	1.888



OPTIMUM WATER CONTENT	10 (%)
MAXIMUM DRY DENSITY	1.96 (Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

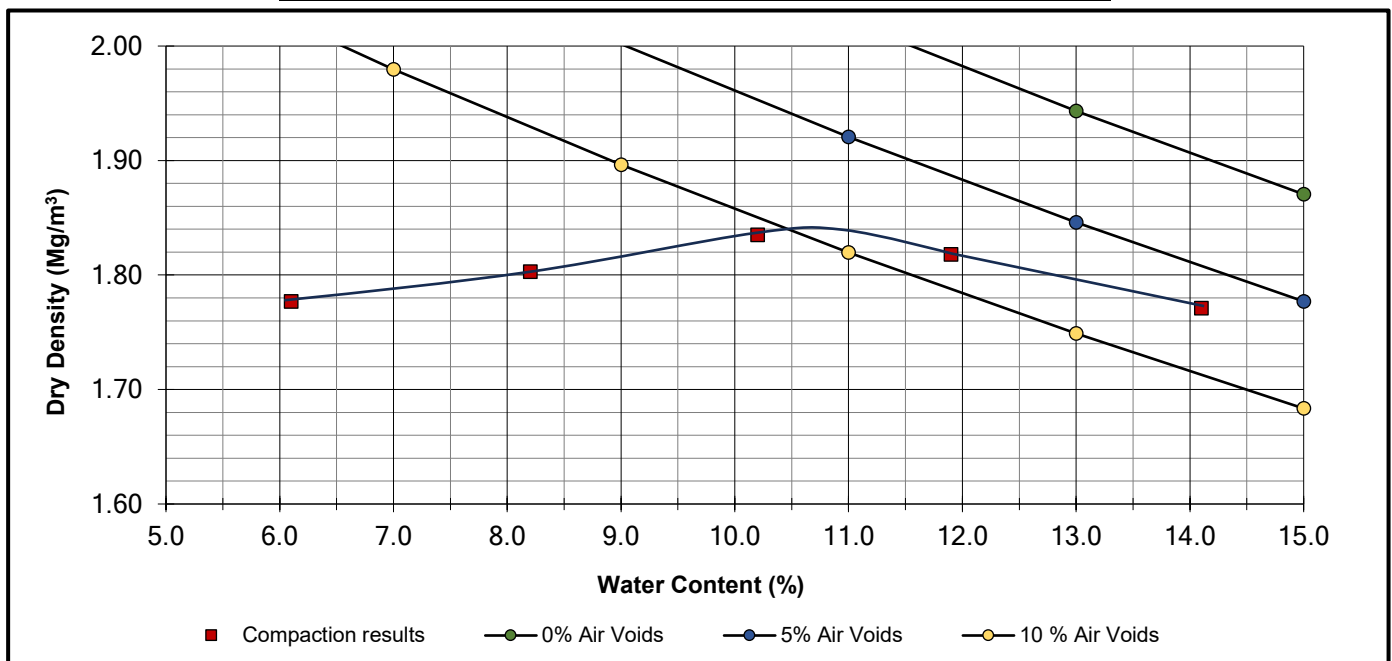
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP01 4.7-5.0m	DATE SAMPLED	02-Feb-2026
SAMPLE NUMBER	6023312	DATE RECEIVED	05-Feb-2026
DATE TESTED	24-Feb-2026	SAMPLED BY	Client

MATERIAL	Reddish brown silty gravelly SAND
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	ZONE 2	MOULD SIZE	1 Litre
RETAINED 20mm	1 %	PARTICLE DENSITY	2.60 Mg/m ³	(Assumed)	

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	6.1	1.777
2	8.2	1.803
3	10.2	1.835
4	11.9	1.818
5	14.1	1.771



OPTIMUM WATER CONTENT	11 (%)
MAXIMUM DRY DENSITY	1.84 (Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

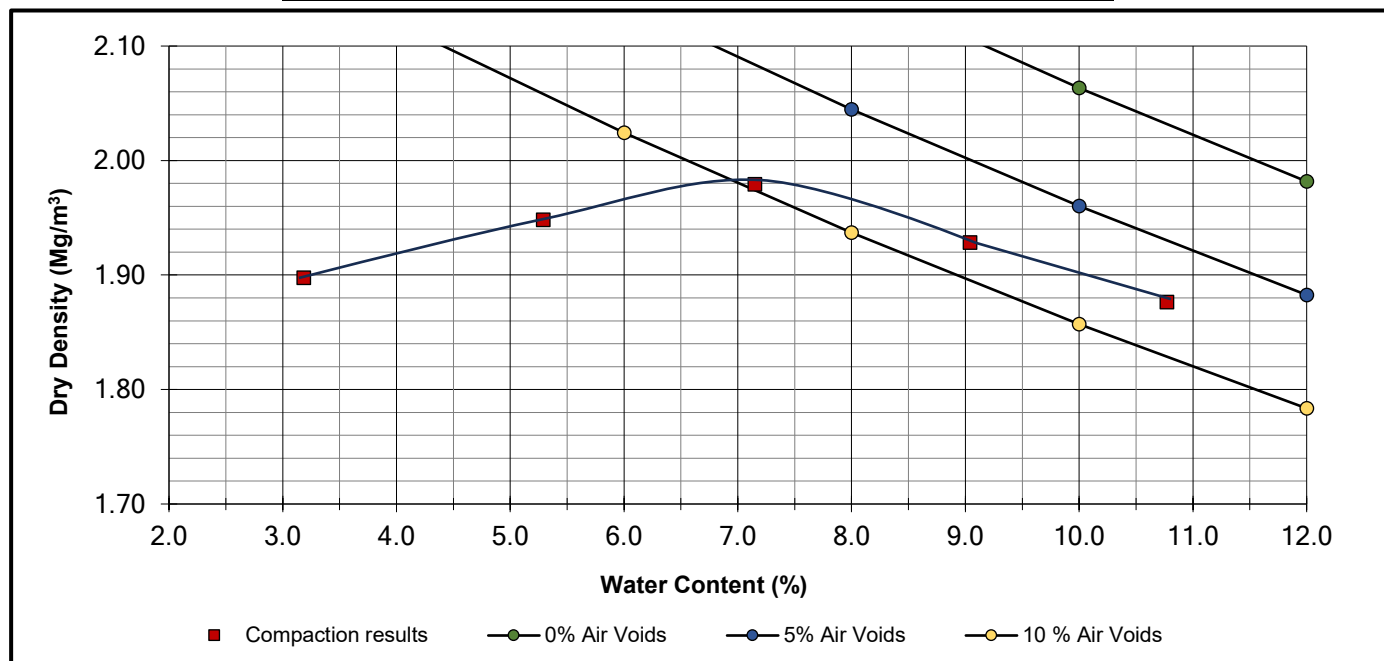
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	TP08 0.5m	DATE SAMPLED	02-Feb-26
SAMPLE NUMBER	6023310	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Grey brown silty sandy GRAVEL
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	2 %	GRADING ZONE	ZONE 4	MOULD SIZE	1 Litre
RETAINED 20mm	14 %	PARTICLE DENSITY	2.60 Mg/m ³	(Assumed)	

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	10.8	1.876
2	9.0	1.928
3	7.2	1.979
4	5.3	1.948
5	3.2	1.898



OPTIMUM WATER CONTENT	7.2 (%)
MAXIMUM DRY DENSITY	1.98 (Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 25-Mar-26

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

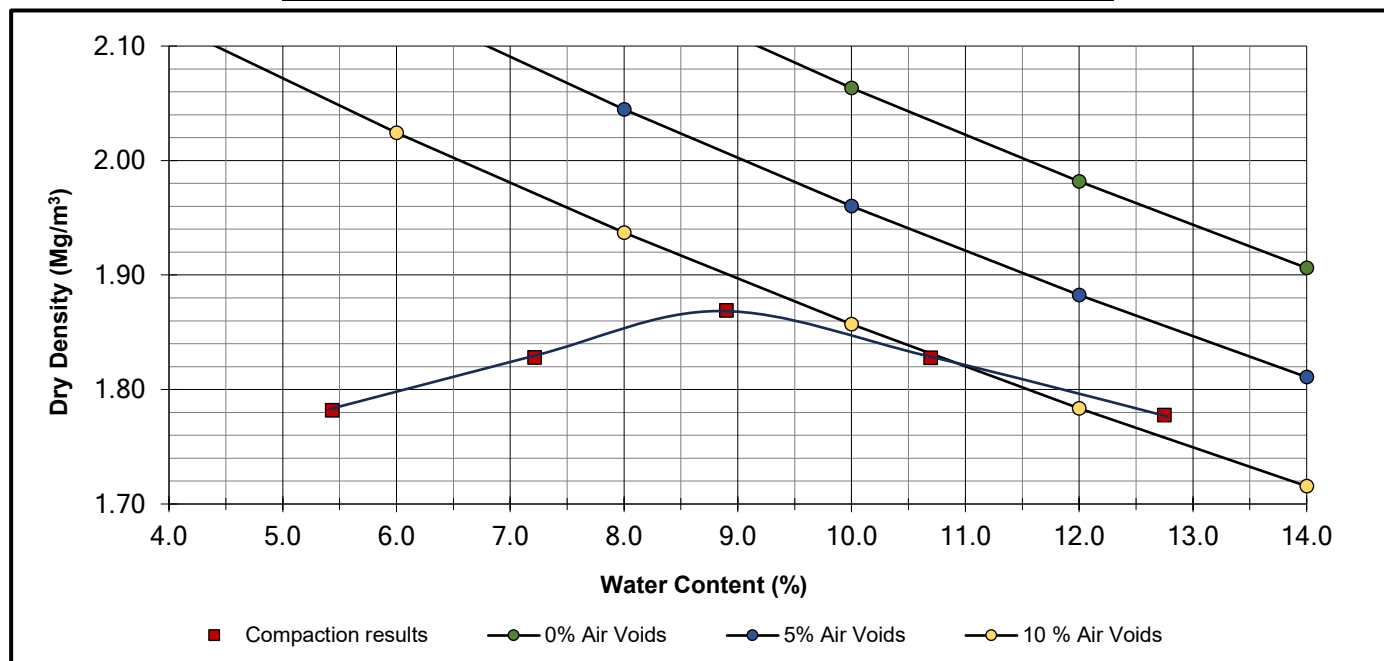
CLIENT	Tier Environmental
SITE	TE1704 - Deacon Park
JOB NUMBER	MRN 26011/15A

SAMPLE LABEL	CP03 0.6-1.0m	DATE SAMPLED	02-Feb-26
SAMPLE NUMBER	6023314	DATE RECEIVED	05-Feb-26
DATE TESTED	26-Feb-26	SAMPLED BY	Client

MATERIAL	Reddish brown silty gravelly SAND
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	ZONE 2	MOULD SIZE	1 Litre
RETAINED 20mm	1 %	PARTICLE DENSITY	2.60 Mg/m ³	(Assumed)	

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	5.4	1.782
2	7.2	1.828
3	8.9	1.869
4	10.7	1.828
5	12.7	1.778



OPTIMUM WATER CONTENT	8.9 (%)
MAXIMUM DRY DENSITY	1.87 (Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 25-Mar-26

KNOWSLEY

SOIL INVESTIGATION

CPT REPORT

Cone penetration testing
Parameter derivation

Project Reference.: 26-32-30842-1

Report Issue No.: 01 30842_01

PROJECT:	Knowsley
----------	----------

CLIENT:	Tier Environmental
---------	--------------------

FIELDWORK

CPT rig(s)	18.0-tonne track-truck mounted CPT unit (UK22)
Date fieldwork started	5 th February 2026
Date fieldwork completed	5 th February 2026
Lankelma's representative	Paul Dimelow
Client's representative	Stefani Ellis

DOCUMENT CHECKING

Action	Date	Name
Completed	13/02/2026	Christopher Player
Checked	13/02/2026	Joseph Hobbs
Approved	13/02/2026	Joseph Hobbs

Issue	Date	Status
01_01	13/02/2026	Final

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1 INTRODUCTION

At the request of Tier Environmental, a soils investigation was carried out on project *Knowsley*.

Site location:

(In the general region of)

Deacon Business Park
Knowsley
L33 7RX

2 DISCLAIMER

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

Lankelma was contracted by the Client to collect and provide the measurement data ("Data") which is included in the Report. Lankelma exercised reasonable skill and care in the acquisition and reporting of the Data. No other warranty, express or implied, with respect to the Data is made by Lankelma. With the exception of derived sensor pressure(s) and measurement corrections (where applicable), any analysis, interpretation, judgment, calculation result and/or derived geotechnical parameter values (collectively "Interpretations") included in the Report and data files referenced within the Report, including those based on the Data, are outside the scope of deliverables agreed under the contract between Lankelma and the Client and are included in the Report as a courtesy only. Other than the Data, the contents of the Report (including any Interpretations) should not be relied upon in any way without independent assessment/verification and Lankelma is in no way responsible for any loss, damage or expense resulting from the use of, and/or reliance on, such material by any party.

3 GLOSSARY OF SYMBOLS, TERMS AND ABBREVIATIONS

SYMBOLS (excluding base units)

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

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

TERMS AND ABBREVIATIONS

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

CPT: Cone penetration test

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

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

HOC: Heavily overconsolidated

LOC: Lightly overconsolidated

mBGL: Meters below ground level

NC: Normally consolidated

OC: Overconsolidated

Penetration length: CPT test length without correction for inclination

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

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

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

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

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

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

4 COMPLETED WORKS

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

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

5 FIELDWORK GENERAL

Fieldwork was performed with an 18.0-tonne track-truck mounted CPT unit (UK22) equipped with a 17.5-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 10 m below ground level. Table 3 details the final test depths and reasons for test termination (*refusal factor*). Where required, each penetration refusal decision was verbally confirmed with the Client's on-site representative.

6 CONE PENETRATION TESTS

Cone penetration testing was carried out in general accordance with BS ISO 22476-1:2023 (ISO-22476-1:2022).

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

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

The penetrometer used was a 150 kN axial capacity model with digital output (down-hole digitisation) and an internal sensor for load cell temperature measurement. Temperature data was used for quality assurance purposes during testing and was used to algorithmically correct for temperature error during processing. During fieldwork, the operator aimed to limit the rate of temperature change to less than 0.5 °C per minute in low-strength soils to minimize residual measurement error. Additionally, temperature readings can provide an estimate of ground temperature at depths where the cone remains stationary for 20–50 minutes (depending on thermal properties), with error bounds of 0,+0.3 °C.

The piezometer filter element was HDPE plastic with a nominal filtration of 60 microns. The filter was vacuum saturated in a > 99.9% vacuum under 1.5 Pa.s vegetable glycerine oil for > 7 days prior to mobilisation. The cone was vacuum saturated in the disassembled state and assembled under oil prior to each test. The filter position used for each test is indicated in Table 3 CPT summary in Appendix A. Prior to testing the filter was trimmed to the diameter of the metal part of the tip using a custom cutting device, ensuring that it made no contribution to tip or sleeve force measurements.

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

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

6.1 CPT DATA REDUCTION AND PRESENTATION

Presentation

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

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

Derivation of pressure

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

Zero load reference values

Zero-load reference readings were recorded before and after each test. Periodically, or following significant zero shift, these readings were taken after temperature stabilisation in a water bath to eliminate static and transient temperature effects. Notwithstanding zero shifts caused by deformation of the load cell, it has been identified from experience that the instrument's thermal stability at the point of zeroing is more important than time proximity to the measurements in the medium term (shift duration). Therefore, when selecting the most representative reference values for subtraction from the raw data, priority was given to those obtained following stabilisation. Depending on the frequency of stabilisation, the applied reference values may have been recorded prior to a previous test, or where the average pre/post zero values are applied, may have been recorded after a subsequent test.

Temperature correction (post-processing algorithmic)

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

The tip and pore pressure measurements were corrected for static and transient temperature effects using parameters generated from calibration temperature response test analysis (independent of the ISO calibration temperature verification dataset).

For each measurement, the apparent output due to temperature effects is estimated as the sum (additive error model) of error associated with current temperature change (relative to the stable temperature of the instrument at the time of zeroing) and current rate of temperature change, in the general form:

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

Where $r_{:a}$ is the apparent measured resistance; a is the apparent resistance per unit rate of temperature change, $\Delta T / \Delta t$; b is the change in apparent resistance per unit static temperature change, ΔT .

The temperature corrected resistance is then found from

$$r_{:c} = r - r_{:a},$$

Where $r_{:c}$ is the corrected resistance and r is the measured resistance/pressure after subtraction of the applied stable zero value.

Notes:

1. For pore pressure, the coefficient a is often set to 0 ($r_{:a}$ modelled by $b(\Delta T)$ only), depending on the type of the pore pressure transducer used.

2. Temperature correction of the sleeve data is possible but is often unwarranted as it does not substantially improve accuracy. This is because for subtraction type cones the errors in the sleeve force largely cancel with errors in the tip force when they have the same sign, which is expected when temperature change is the primary driver of sensor drift. Where sleeve data is corrected for temperature effects, the method of correction is identical to the method applied to the tip resistance described above.
3. To avoid confusion the parameter designation is kept unchanged in the logs and AGS data (q_c , q_t , f_s , and u_2) and unless stated otherwise, temperature correction has been applied.

The effectiveness of the correction parameters is verified by the ISO 22476:2022 temperature verification procedure presented in the calibration certificate, which shows the uncorrected and corrected response of sensors during plunge tests between water baths of different temperatures representative of extreme field conditions.

Correction for pore pressure effects

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

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

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

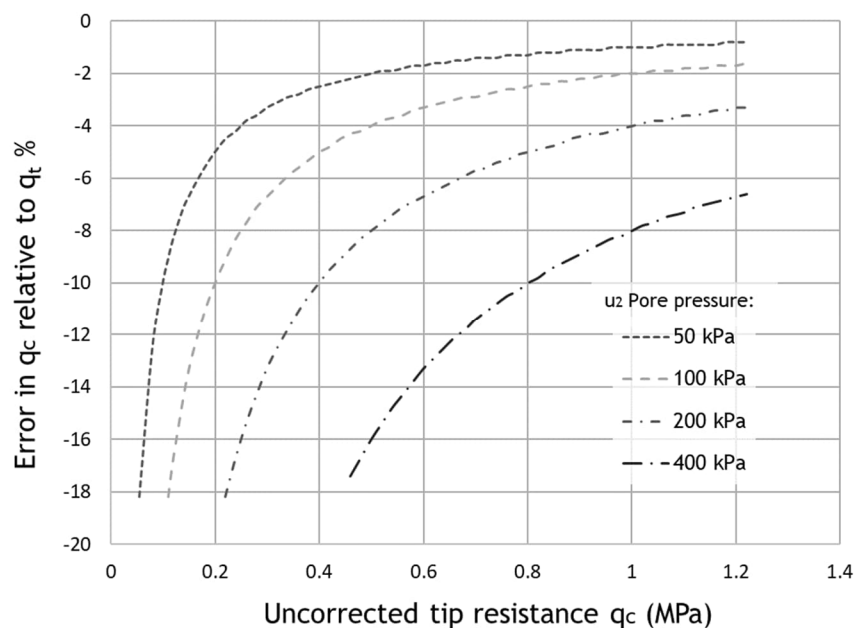


Figure 6-1 Uncorrected tip with % error for various pore pressure values

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

Depth corrections

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

Spike/ artefact removal and resampling

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

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

Parameter derivation and data deliverables

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

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

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

6.2 IN-SITU STRESS CONDITIONS

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

The total vertical stress at a given depth was computed as the cumulative sum of the unit weights for all overlying depth increments:

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

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

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

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

Note: The term phreatic depth is used here to denote the depth at which positive pore water pressure is assumed to start. Under hydrostatic conditions, it is assumed that the piezometric depth recorded by the piezometer coincides with the phreatic depth. This reported value is intended to represent the pore pressure distribution assumed for calculation purposes and may not reflect the actual position of the groundwater table or any perched water bodies. Where measurements indicate complex, non-hydrostatic pressure distributions and these are well-defined, they are applied accordingly.

6.3 SOIL UNIT WEIGHT

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

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

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

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

6.4 SOIL BEHAVIOUR TYPE (SBT)

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

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

- The systems provide a general soil type that tends to show bias towards the soil fraction that dominates the mechanical behaviour in relation to the CPT parameters on which the system is based.
- Significant bonding/microstructure will influence derived soil type (Robertson 2022).
- If cohesive soils are dry and/or heavily overconsolidated, the classification tends to shift towards a coarser soil type (or lower I_c index).
- All SBT methods are applicable to saturated or near saturated soils. Performance of SBT systems in dryer soils exhibiting pore fluid suction should receive due scrutiny where applicable.

- While the repeatability and behavioural bias of the SBT is often of practical benefit, the classification may not be an appropriate substitute for classification based on particle size grading and/or consistency (Atterberg indices).

A dedicated SBT comparison log is provided in Appendix D.

Robertson (1990, 2010)

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

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

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

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

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

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

and

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

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

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

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

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

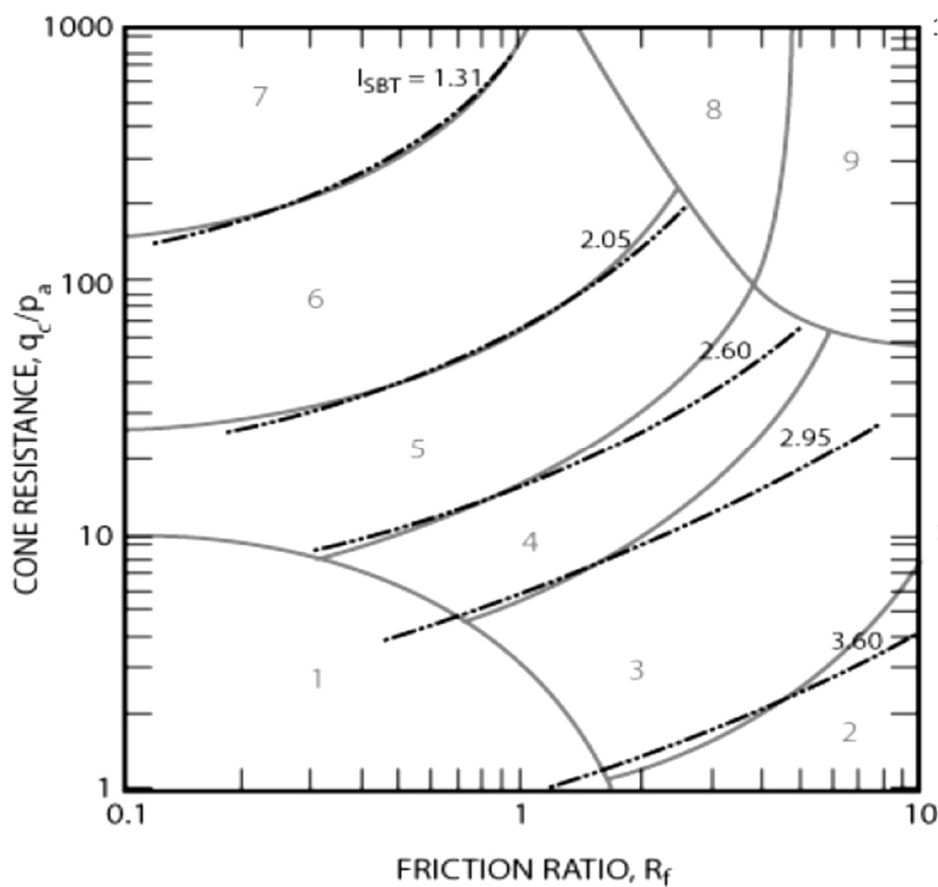


Figure 6-2 Non-normalised SBT chart by Robertson et al. (2010) based on dimensionless cone resistance (q_c/p_a) and friction ratio, R_f , showing contours of SBT index I_{SBT} (denoted I_c on the test plots). The chart is equally applicable to normalised tip resistance (Q_t , Q_{tn}) and normalised friction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

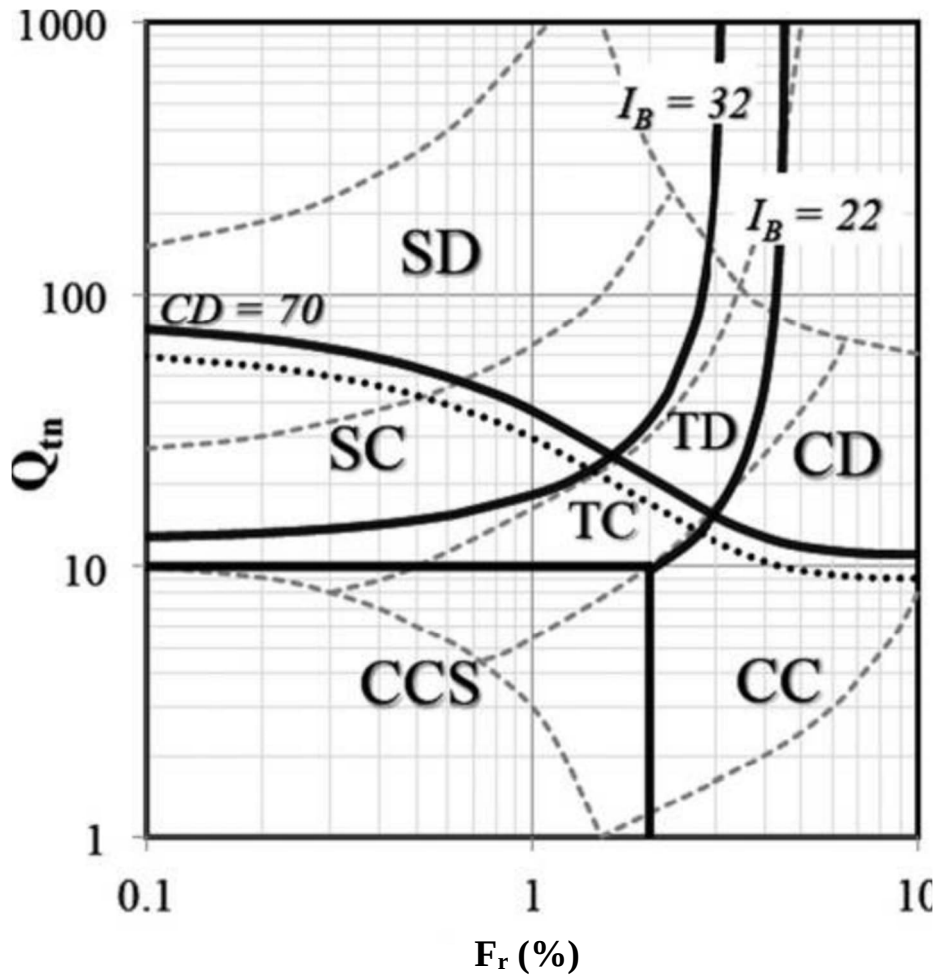
Table 1 Robertson (1990, 2010) soil behaviour type zone descriptions

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

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

Robertson 2016

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



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

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

Schneider *et al.* (2008)

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

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

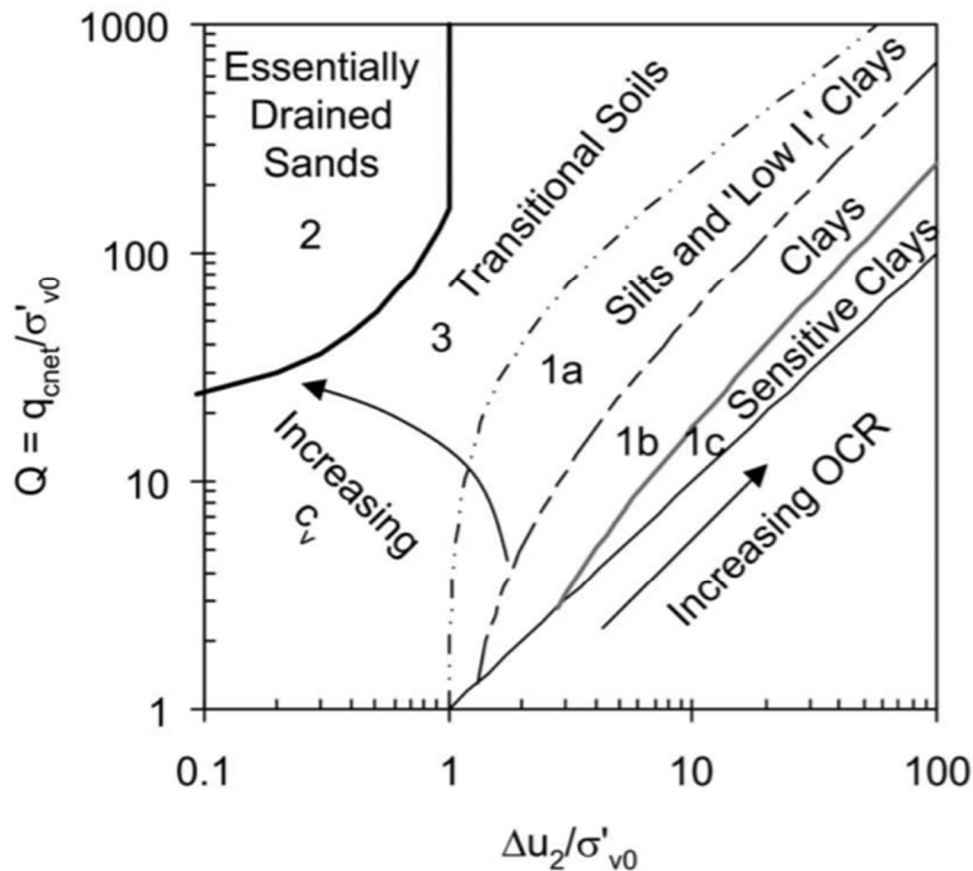


Figure 6-4 Schneider 2008 soil behaviour type classification chart

Layer Analysis

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

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

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

Where

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

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

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

6.5 SOIL BEHAVIOUR TYPE INDEX – I_c

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

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

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

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

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

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

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

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

6.6 RELATIVE DENSITY

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

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

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

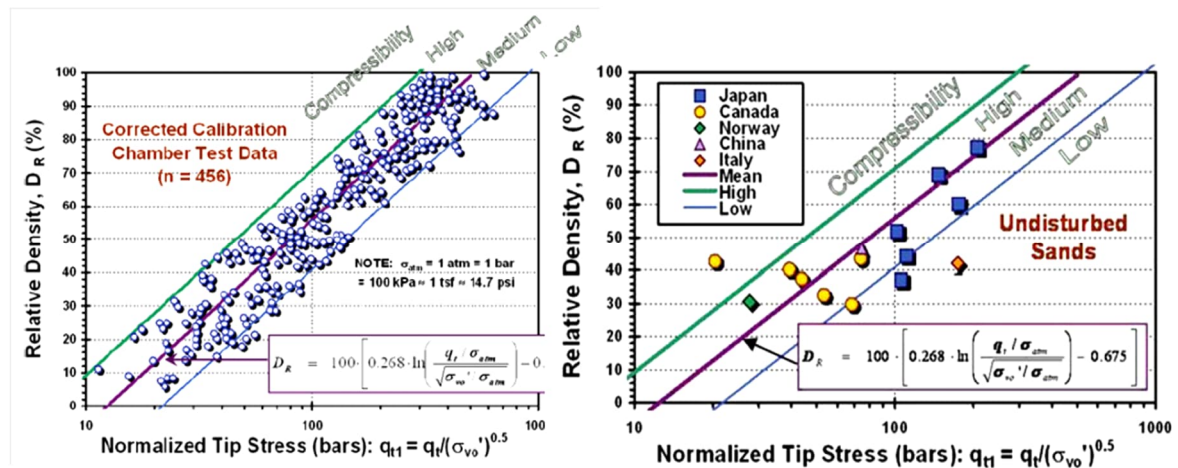


Figure 6-5 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

The results are presented in Appendix F.

6.7 UNDRAINED SHEAR STRENGTH

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

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

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

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

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

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

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

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

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

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

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

When calculated, the s_u estimate based on B_q is presented as ' s_{u5} - Dynamic N_{kt} from B_q (CAUC)' on the plots and is only suitable for tests that have a high-quality pore pressure data, often indicated by a positive, repeatable, and dynamic response. Derived S_u values associated with sudden drops or spikes in pore pressure associated with rod breaks or thin drainage layers are typically ignored.

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

s_u results are presented in Appendix E.

6.8 OVERCONSOLIDATION RATIO

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

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

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

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

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

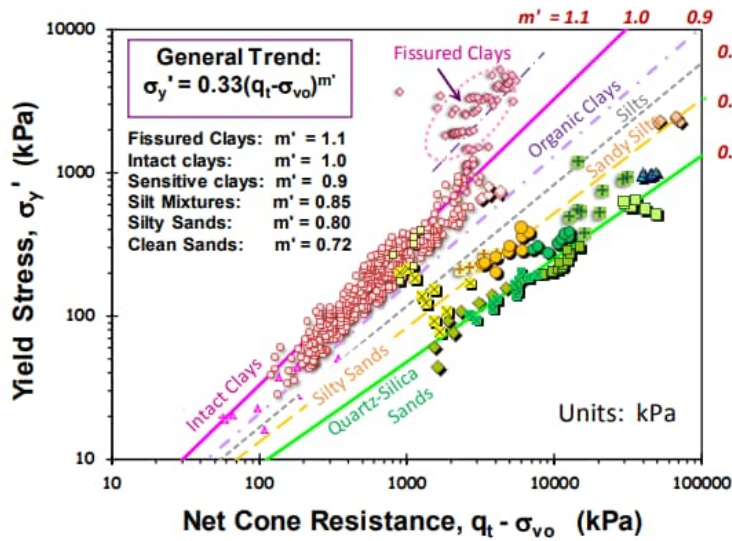


Figure 6-6 Preconsolidation stress with net cone resistance power law, reproduced from Mayne (2014).

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

The results are presented in Appendix E.

6.9 SPT N60 VALUES

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

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

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

Method 2 - Robertson (2012):

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

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

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

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

Where ETR is entered as a percentage.

The results are presented in Appendix F.

6.10 FRICTION ANGLE

Sands

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

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

Where:

ϕ' = Peak friction angle (degrees)

q_{t1} = stress normalised cone resistance:

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

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

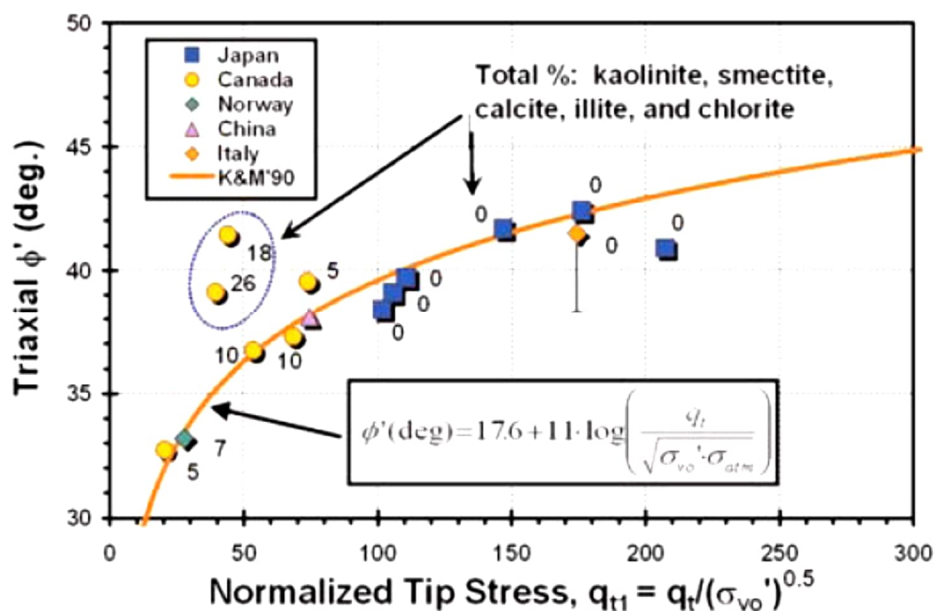


Figure 6-7 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

6.11 COEFFICIENT OF VOLUME CHANGE

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

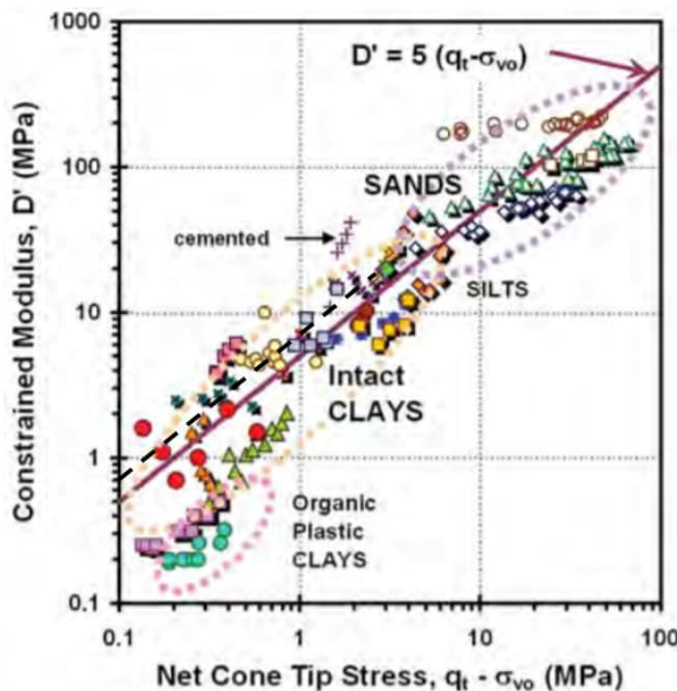
$$m_v = 1/M'$$

Where:

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

$$\alpha = 5$$

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



Kulhawy & Mayne (1990) line
for inorganic clays; $8.25(q_t - \sigma_{v0})$

Figure 6-8 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

The results are presented in Appendix E.

6.12 YOUNG'S MODULUS

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

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

Where:

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

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

The results are presented in Appendix F.

7 GENERAL INTERPRETATION NOTES

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

DRAINED AND UNDRAINED SOIL BEHAVIOUR

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

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

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

DYNAMIC PORE PRESSURE u_2 (CPT u)

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

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

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

CONICAL TIP AND FRICTION SLEEVE OFFSET

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

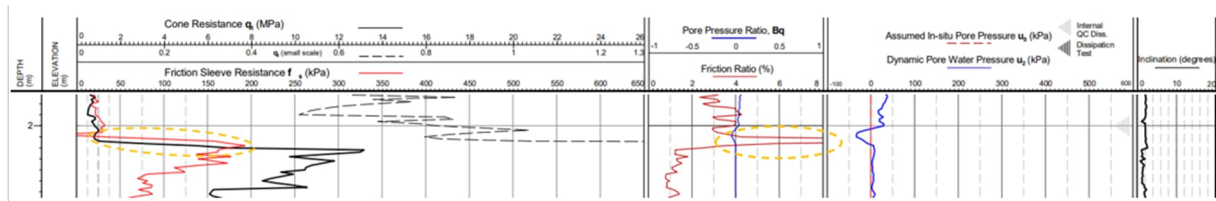


Figure 7-1 example of offset in tip and sleeve response at a strata boundary.

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

FRICTION SLEEVE DATA

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

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

CONE TYPE

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

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. Where a stiff layer is thin (<~1 m) mobilised resistance may be significantly less than that of an equivalent thick layer. The effect for thin low

stiffness layers is less significant. Established procedures for thin-layer effect correction are provided by Robertson and Wride (1998) and Boulanger & DeJong (2018).

GRAVELS

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

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APPENDICES

Appendix A	SUMMARY TABLES
Appendix B	GENERAL INFORMATION
Appendix C	CONE PENETRATION TEST RESULTS
Appendix D	SOIL BEHAVIOUR TYPE RESULTS
Appendix E	PARAMETER RESULTS 1 – s_u , m_v , OCR, SBT, I_c
Appendix F	PARAMETER RESULTS 2 – SPT N60, Φ , D_r , E, I_c
Appendix G	PENETROMETER TEMPERATURE RESULTS

APPENDIX A SUMMARY TABLES

Table 3 CPT summary

Location ID	Stroke number	Final depth (m)	Cone ID	Piezocone test	Pre-drilled (m)	Pre-drilling details ¹	Rig	Primary refusal factor	Applied zero values	Tip zero shift (kPa)	Sleeve zero shift (kPa) ²	Piezo. zero shift (kPa)	Nr dissipation tests	Raw file name	X Coordinate ³	Y Coordinate ³	Z Coordinate ³	Date	Remarks
CPT-01	1	5.26	S15-CFIPTT.1854	YES	0.20	PD-C	UK22	Risk of equipment loss/damage	post	-52.8	2.2	-0.2		30842-V1-050226-UK22-LP100.L01				05/02/2026	
CPT-02	1	4.92	S15-CFIPTT.1854	YES	0.20	PD-C	UK22	Lateral support at surface	pre	21.2	-1.3	-2.6		30842-V1-050226-UK22-LP100.L02				05/02/2026	
CPT-03	1	4.98	S15-CFIPTT.1854	YES	0.20	PD-C	UK22	Risk of equipment loss/damage	pre	-8.8	-0.4	-2.2		30842-V1-050226-UK22-LP100.L03				05/02/2026	
CPT-05	1	4.20	S15-CFIPTT.2213	YES	1.00	IP-O	UK22	Lateral support at surface	post	-26.4	3.3	-1.6		30842-V1-050226-UK22-LP100.L09				05/02/2026	
CPT-07	1	4.20	S15-CFIPTT.1854	YES	1.00	IP-O	UK22	Lateral support at surface	pre	-47.0	2.1	2.9		30842-V1-050226-UK22-LP100.L04				05/02/2026	
CPT-08	1	3.68	S15-CFIPTT.1854	YES	1.00	IP-O	UK22	Lateral support at surface	pre	-17.8	2.0	0.2		30842-V1-050226-UK22-LP100.L05				05/02/2026	
CPT-09	1	4.22	S15-CFIPTT.1854	YES	1.00	IP-O	UK22	Lateral support at surface	pre	10.8	-0.1	-0.5		30842-V1-050226-UK22-LP100.L06				05/02/2026	
CPT-10	1	4.58	S15-CFIPTT.2213	YES	1.00	IP-O	UK22	Lateral support at surface	pre	-29.8	-1.6	-0.6		30842-V1-050226-UK22-LP100.L08				05/02/2026	

¹ Pre-drill abbreviations: PD = pre-drilled, IP = inspection pit, O = open, C = cased, BF = back-filled.

² For subtraction type cones, the shift is calculated identically to the sleeve test data by subtracting shift observed on the tip load cell from the shift observed on the sleeve load cell (which measures both tip and sleeve force). This is calculated in force units before converting to pressure.

CPT test plots are presented in Appendix C.

APPENDIX B GENERAL INFORMATION

LIST OF FIGURES

Cone calibration certificate: S15-CFIIP.1854

Cone calibration certificate: S15-CFIIP.2213

Data sheet: 18.0-tonne track-truck mounted CPT unit (UK22)

Test Setup

Calibrated Instrument

Instrument type:	Subtraction	Number of sensors:	5
Serial number:	DS15-CFIPTT.1854	Manufacturer:	Eijkelpamp Geopoint
Nominal cone area:	15 cm ²	Nominal sleeve area:	227 cm ²
Calibration standard:	BS EN ISO 22476-1:2023	Location:	Lankelma Calibration Laboratory
Calibration date:	20 January 2026	Calibration expiry:	20 July 2026

Sensor measurand	Calibration range	Maximum rating	Momentary overload	Sensor stability (60 sec)	Max drift before re-calibration
Cone resistance (qc)	66.67 MPa	100 MPa	100 MPa	± 0.51 kPa	20,000 0.1N
Sleeve friction (fs)	4.41 MPa	1.30 MPa*	1.30 MPa	± 0.05 kPa	20,000 0.1N
Pore pressure (u)	4 MPa	5 MPa	6.75 MPa	± 0.01 kPa	800,000 0.1Pa
Inclination (i)	20 °	90 °		± 0.00 °	
Temperature (t)	30 °C	90 °C		± 0.002 °C	
Magnetic field (m)					

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

ISO 22476-22 Cone Penetrometer Classification

Sensor measurand	Measurement uncertainty U _{qc: class} , U _{fs: class} , U _{u: class}	Ambient temperature stability			Transient temperature stability			Bending influence Δb _{qc} , Δb _{fs} , Δb _u	Overall classification (highest number represents penetrometer class)
		Uncorrected Δa _{qc} , Δa _{fs} , Δa _u	Corrected Δa _{qc} , Δa _{fs} , Δa _u		Uncorrected Δt _{qc} , Δt _{fs} , Δt _u	Corrected Δt _{qc} , Δt _{fs} , Δt _u			
Cone resistance	0	2	0		2	1		0	1
Sleeve friction	0	0	0		2	0		0	0
Pore pressure	0	2	0		0	0		0	0

Calibration signed by:

Paul Metcalf

Digitally signed by Paul Metcalf
DN: cn=Paul Metcalf, c=GB,
o=Lankelma Ltd,
email=paulmetcalf@lankelma.co.uk
Date: 2026.01.29 10:52:00

P Metcalf

Calibration checked by:

Alastair Harman

Digitally signed by Alastair Harman
DN: cn=Alastair Harman, c=GB,
o=Lankelma Ltd,
email=alastairharman@lankelma.co.uk
Date: 2026.01.29 10:52:09

A Harman

Cone penetrometer, serial number: DS15-CFIPTT.1854 was found to comply with the requirements of BS EN ISO 22476-1:2023 for the following classifications:
Cone Resistance - Class 1 Sleeve Friction - Class 0 Pore Pressure - Class 0

Reference Instruments

Device	Serial number	Uncertainty of recorded value	Calibration expiry date
AM DSCCHA-100 kN	66914	0.02 ±%	01/09/2027
AM DSCCHA-5 kN	61065	0.05 ±%	01/09/2027
Keithley 7.5 Digit DMM	4496826	12.00 PPM	10/06/2026
MMG1.0KV	563542	0.02 ±%	09/04/2026
ETI Ref Thermometer	D24276054	0.04 °C	18/09/2026
Lankelma HV6 Rotary Table	INC-JIG 01	0.10 °	17/07/2027
10 kg Calibration Weight	H1-S1 10kg	0.001 %	12/08/2032
Mitutoyo 200mm Caliper	A23044194	0.02 ±mm	15/09/2026

Calibration Standard

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

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

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

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

After the initial 6 month period, the cone penetrometer will undergo baseline drift and noise checks. If the results are within acceptable limits, the calibration validity will be extended to 12 months from the original date of calibration.

Cone Dimension Verification

Cone Tip

Cone shoulder diameter

Rotational position	d_c
0 °	44.00 mm
120 °	44.00 mm
240 °	44.00 mm

Height of the cylindrical extension of the cone

Rotational position	h_e
0 °	0.00 mm
120 °	0.00 mm
240 °	0.00 mm

Height of the conical section of the cone

Rotational position	h_c
0 °	0.00 mm
120 °	0.00 mm
240 °	0.00 mm

Filter element diameter

Rotational position	d_{fl}
0 °	0.00 mm
120 °	0.00 mm
240 °	0.00 mm

Friction Sleeve

Friction sleeve diameter

Rotational position	Upper section d_{2u}	Middle section d_{2m}	Lower section d_{2l}
0 °	44.00 mm	44.00 mm	44.00 mm
120 °	44.00 mm	44.00 mm	44.00 mm
240 °	44.00 mm	44.00 mm	44.00 mm

Friction sleeve length

Rotational position	l_s
0 °	165.00 mm
120 °	165.00 mm
240 °	165.00 mm

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

Rotational position	l_{gl}
0 °	0.00 mm
120 °	0.00 mm
240 °	0.00 mm

Gap above the upper end of the friction sleeve

Rotational position	l_{gu}
0 °	0.00 mm
120 °	0.00 mm
240 °	0.00 mm

Cone Tip Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_c	44.000 mm
Relative error b_c	0.000 %
Area A_c	1520.531 mm ²
Dimension uncertainty U_{dc}	0.015 mm
Area uncertainty U_{Ac}	1.037 mm ²
Expanded area uncertainty U_{AC}	2.073 mm ²

Friction Sleeve Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_2	44.000 mm
Relative error b_{c2}	0.000 %
Average length l_s	165.000 mm
Relative error b_{ls}	0.000 %
Area A_s	22807.963 mm ²
Dimension uncertainty diameter u_{d2}	0.015 mm
Dimension uncertainty length u_{ls}	0.015 mm
Area uncertainty u_{as}	8.047 mm ²
Expanded area uncertainty U_{as}	16.094 mm ²
Sleeve length to diameter ratio	3.750
Diameter difference, sleeve - tip	0.000 mm

Cone Resistance Calibration

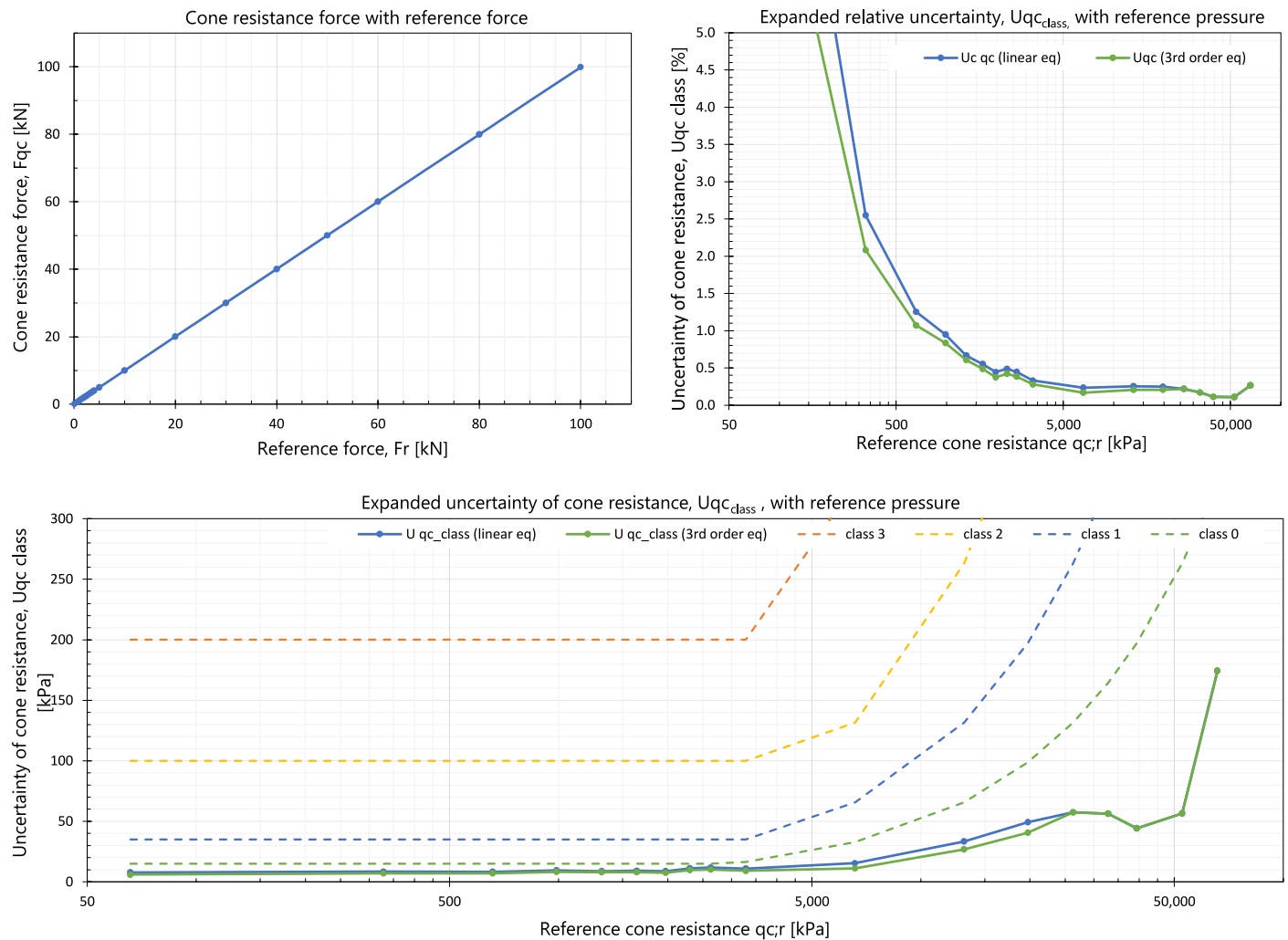
Calibration method

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

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

Cone Penetrometer		Calibration Conditions	
Cone penetrometer type	Subtraction	Ambient temperature	23.2 °C
Cone resistance capacity	150 kN	Ambient temperature variation	0.16 °C
Calibration range	100 kN	Instrument temperature variation	1.49 °C
Cone resistance effective resolution	0.0005 kN	Reference Load Cell Uncertainty	
Cone area	1,521 mm ²	AM DSCCHA-100 kN	0.02 ±%
Measured alpha factor cone area ratio	0.78	AM DSCCHA-5 kN	0.05 ±%
Historic drift between cone calibrations (u_{drift})	0.05774 %	Reference Indicator Uncertainty	
Apparent pore pressure (u_a) at full range	-0.12 kPa	Keithley 7.5 Digit DMM	12 PPM
Cone resistance max zero drift	4.06 kPa		
Reference load cell max zero drift	2.57 kPa		

Cone Resistance Calibration - Graphical Results



Interpolation

Table - 1

Linear Equation	The cone output in force units of D (0.1 N) is derived using a linear factor from the raw cone output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.008969
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (in 0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = -19.68947317$ $a_1 = 0.999819787$ $a_2 = -8.9712E-09$ $a_3 = 1.75603E-14$ Polynomial calc. is only to be used when the cone load is under 30 kN

Cone Resistance Calibration - Tabular Results

Table - 2a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0044	0.0062	0.0016		0.0027	
0.1	0.1060	0.1070	0.1024		0.1007	
0.5	0.5041	0.5068	0.5028		0.4997	
1	1.0033	1.0076	1.0022		0.9984	
1.5	1.5043	1.5082	1.5003		1.4987	
2	2.0025	2.0078	2.0002		1.9985	
2.5	2.5034	2.5098	2.5016		2.4974	
3	3.0039	3.0084	3.0014		2.9978	
3.5	3.5039	3.5100	3.5032		3.4992	
4	4.0058	4.0102	4.0031		3.9976	
5	5.0031	5.0126	5.0033		4.9997	
4				3.9989		3.9931
3.5				3.4996		3.4933
3				3.0000		2.9935
2.5				2.4971		2.4949
2				1.9970		1.9913
1.5				1.4970		1.4917
1				0.9943		0.9913
0.5				0.4966		0.4911
0.1				0.0976		0.0941

Table - 2b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	10.0112	10.0139	10.0059		10.0028	
20	20.0193	20.0258	20.0166		20.0170	
30	30.0284	30.0365	30.0282		30.0243	
40	40.0417	40.0453	40.0396		40.0365	
50	50.0396	50.0454	50.0368		50.0341	
60	60.0256	60.0306	60.0221		60.0206	
80	79.9691	79.9750	79.9662		79.9632	
100	99.8742	99.8789	99.8707		99.8678	
80				79.9860		79.9823
60				60.0512		60.0478
50				50.0621		50.0567
40				40.0639		40.0577
30				30.0445		30.0384
20				20.0284		20.0241
10				10.0062		10.0032

Table - 3 Uncertainty assessment

Reference force	Reference tip resistance	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Tip calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	qc;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Uc qc		Uqc class			Udrift ***
0	0	0.0000	0.0008	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0008	0.0008	1.1		1.1		0	0.0
0.1	66	0.0004	0.0011	0.0006	0.0002	0.0000	0.0029	0.0033	0.0000	0.0046	0.0046	6.0	9.12	6.0	9.11	0	0.0
0.5	329	0.0006	0.0011	0.0016	0.0002	0.0000	0.0022	0.0043	0.0000	0.0052	0.0052	6.9	2.09	6.8	2.08	0	0.2
1	658	0.0007	0.0013	0.0025	0.0002	0.0001	0.0013	0.0043	0.0000	0.0054	0.0054	7.1	1.08	7.0	1.07	0	0.4
1.5	986	0.0048	0.0011	0.0022	0.0002	0.0001	0.0011	0.0030	0.0000	0.0063	0.0063	8.3	0.85	8.2	0.83	0	0.6
2	1,315	0.0041	0.0008	0.0031	0.0002	0.0001	0.0004	0.0030	0.0000	0.0060	0.0062	8.2	0.62	8.0	0.60	0	0.8
2.5	1,644	0.0041	0.0014	0.0037	0.0002	0.0002	0.0008	0.0020	0.0000	0.0061	0.0063	8.3	0.51	8.0	0.49	0	0.9
3	1,973	0.0044	0.0013	0.0026	0.0002	0.0002	0.0010	0.0016	0.0000	0.0056	0.0060	7.9	0.40	7.4	0.37	0	1.1
3.5	2,302	0.0053	0.0013	0.0035	0.0002	0.0002	0.0021	0.0027	0.0000	0.0074	0.0077	10.2	0.44	9.7	0.42	0	1.3
4	2,631	0.0061	0.0019	0.0025	0.0002	0.0002	0.0022	0.0025	0.0000	0.0077	0.0082	10.7	0.41	10.1	0.38	0	1.5
5	3,288	0.0023	0.0013	0.0055	0.0002	0.0003	0.0021	0.0027	0.0000	0.0070	0.0077	10.2	0.31	9.1	0.28	0	1.9
10	6,577	0.0046	0.0016	0.0016	0.0002	0.0006	0.0066	0.0002	0.0000	0.0084	0.0108	14.2	0.22	11.1	0.17	0	3.8
20	13,153	0.0079	0.0017	0.0037	0.0002	0.0012	0.0176	0.0054	0.0000	0.0205	0.0246	32.4	0.25	27.0	0.21	0	7.6
30	19,730	0.0108	0.0027	0.0047	0.0002	0.0019	0.0270	0.0088	0.0000	0.0309	0.0370	48.7	0.25	40.6	0.21	0	11.4
40	26,307	0.0133	0.0015	0.0021	0.0002	0.0025	0.0392	0.0131	0.0000	0.0436	0.0514	67.7	0.26	57.4	0.22	0	15.2
50	32,883	0.0163	0.0016	0.0033	0.0002	0.0031	0.0368	0.0138	0.0000	0.0428	0.0547	72.0	0.22	56.3	0.17	0	19.0
60	39,460	0.0179	0.0015	0.0029	0.0002	0.0037	0.0228	0.0163	0.0000	0.0336	0.0529	69.6	0.18	44.2	0.11	0	22.8
80	52,613	0.0232	0.0017	0.0035	0.0002	0.0049	0.0338	0.0112	0.0000	0.0430	0.0695	91.4	0.17	56.6	0.11	0	30.4
100	65,767	0.0281	0.0019	0.0027	0.0002	0.0062	0.1293	0.0000	0.0000	0.1325	0.1490	196.0	0.30	174.3	0.26	0	38.0

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

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

$$U_{qc_class} = \frac{2}{S} \times \sqrt{\sum_{i=1}^8 u_i^2}$$

where,

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

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

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

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

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

u6 is the standard uncertainty associated with interpolation.

u7 is the standard uncertainty associated with reversibility.

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

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

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

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

Sleeve Friction Calibration

Calibration method

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

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

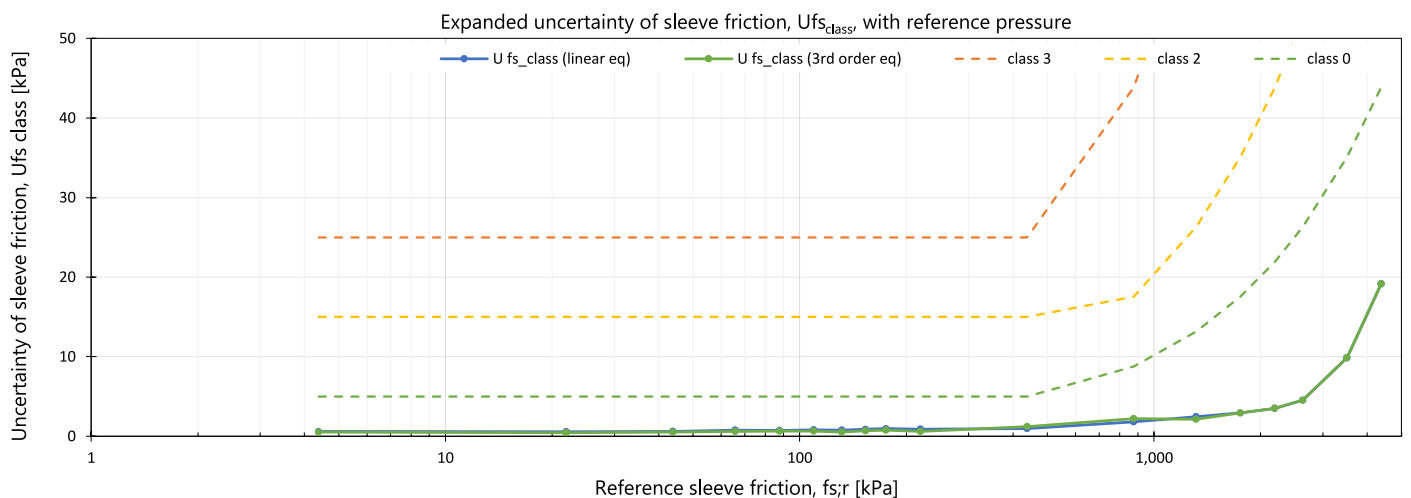
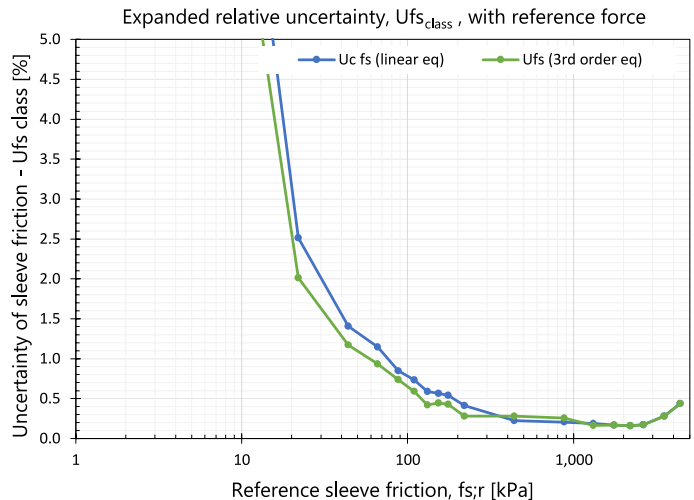
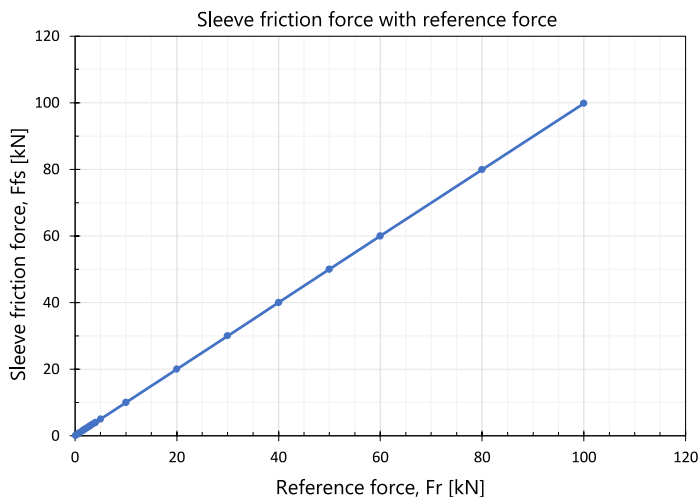
Cone Penetrometer	
Cone penetrometer type	Subtraction
Sleeve friction capacity	150 kN
Calibration range	100 kN
Sleeve friction effective resolution	0.005 kN
Sleeve area	22,808 mm ²
Measured beta factor sleeve area ratio	-0.002
Historic drift between sleeve calibrations (u_{drift})	0.05774 %
Apparent pore pressure (u_a) at full range	-0.12 kPa
Sleeve friction max zero drift	0.31 kPa
Reference load cell max zero drift	0.17 kPa

Calibration Conditions	
Ambient temperature	23.2 °C
Ambient temperature variation	0.16 °C
Instrument temperature variation	1.81 °C

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

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Sleeve Friction Calibration - Graphical Results



Interpolation

Table - 4

Linear Equation	The sleeve output in force units D (0.1 N) is derived using a linear factor from the raw sleeve output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.008707
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = -16.09869479$ $a_1 = 0.998697638$ $a_2 = 1.23632E-09$ $a_3 = 2.14582E-15$ Polynomial calc. is only to be used when the sleeve load is under 30 kN

Sleeve Friction Calibration - Tabular Results

Table - 6a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0059	0.0072	0.0022		0.0022	
0.1	0.1068	0.1099	0.1032		0.1014	
0.5	0.5042	0.5087	0.5021		0.5000	
1	1.0031	1.0096	1.0017		0.9986	
1.5	1.5038	1.5087	1.5025		1.4980	
2	2.0017	2.0101	2.0007		1.9972	
2.5	2.5019	2.5107	2.5019		2.4973	
3	3.0044	3.0097	3.0003		2.9964	
3.5	3.5035	3.5098	3.5010		3.4963	
4	4.0029	4.0085	4.0026		3.9948	
5	5.0015	5.0087	5.0006		4.9970	
4				3.9958		3.9913
3.5				3.4965		3.4919
3				2.9987		2.9946
2.5				2.4973		2.4943
2				1.9951		1.9936
1.5				1.4972		1.4930
1				0.9964		0.9917
0.5				0.4981		0.4939
0.1				0.0993		0.0937

Table - 6b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	9.9995	10.0065	9.9951		9.9916	
20	19.9968	20.0061	19.9942		19.9940	
30	30.0221	30.0257	30.0193		30.0157	
40	40.0170	40.0211	40.0172		40.0112	
50	50.0063	50.0156	50.0044		49.9992	
60	59.9834	59.9912	59.9838		59.9756	
80	79.9111	79.9193	79.9101		79.9021	
100	99.8013	99.8083	99.7987		99.7907	
80				79.9258		79.9185
60				60.0070		60.0014
50				50.0263		50.0201
40				40.0353		40.0288
30				30.0328		30.0257
20				20.0044		19.9986
10				9.9951		9.9933

Table - 6 Uncertainty assessment

Reference force	Reference sleeve friction	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 Class	Sleeve calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	fs;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Uc _{fs}		Ufs _{class}			u _{drift} ***
0	0	0.0000	0.0012	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0024	0.0024	0.21		0.21		0	0.00
0.1	4	0.0004	0.0016	0.0017	0.0020	0.0000	0.0036	0.0033	0.0008	0.0059	0.0059	0.51	11.71	0.51	11.71	0	0.00
0.5	22	0.0006	0.0012	0.0026	0.0020	0.0000	0.0021	0.0029	-0.0001	0.0050	0.0050	0.44	2.01	0.44	2.01	0	0.01
1	44	0.0007	0.0013	0.0037	0.0020	0.0001	0.0012	0.0035	-0.0001	0.0059	0.0059	0.51	1.17	0.51	1.17	0	0.03
1.5	66	0.0048	0.0018	0.0028	0.0020	0.0001	0.0014	0.0030	0.0003	0.0070	0.0070	0.62	0.94	0.61	0.94	0	0.04
2	88	0.0041	0.0014	0.0049	0.0020	0.0001	0.0001	0.0027	-0.0005	0.0074	0.0074	0.65	0.74	0.65	0.74	0	0.05
2.5	110	0.0041	0.0016	0.0051	0.0020	0.0002	0.0004	0.0022	-0.0005	0.0074	0.0074	0.65	0.59	0.65	0.59	0	0.06
3	132	0.0044	0.0023	0.0030	0.0020	0.0002	0.0004	0.0010	-0.0006	0.0063	0.0064	0.56	0.42	0.55	0.42	0	0.08
3.5	153	0.0053	0.0021	0.0036	0.0020	0.0003	0.0002	0.0025	-0.0019	0.0078	0.0079	0.69	0.45	0.68	0.45	0	0.09
4	175	0.0061	0.0027	0.0032	0.0020	0.0003	0.0001	0.0030	-0.0021	0.0085	0.0086	0.76	0.43	0.75	0.43	0	0.10
5	219	0.0023	0.0014	0.0042	0.0020	0.0004	0.0003	0.0039	-0.0023	0.0070	0.0072	0.64	0.29	0.62	0.29	0	0.13
10	438	0.0046	0.0023	0.0040	0.0020	0.0007	0.0046	0.0005	-0.0112	0.0140	0.0144	1.26	0.29	1.23	0.29	0	0.25
20	877	0.0079	0.0009	0.0053	0.0020	0.0014	0.0050	0.0043	-0.0226	0.0256	0.0265	2.33	0.27	2.24	0.27	0	0.51
30	1,315	0.0108	0.0019	0.0021	0.0020	0.0022	0.0190	0.0068	-0.0080	0.0246	0.0268	2.35	0.18	2.15	0.18	0	0.76
40	1,754	0.0133	0.0020	0.0024	0.0020	0.0029	0.0151	0.0103	-0.0242	0.0334	0.0363	3.18	0.18	2.93	0.18	0	1.01
50	2,192	0.0163	0.0021	0.0054	0.0020	0.0036	0.0033	0.0124	-0.0335	0.0401	0.0438	3.84	0.18	3.51	0.18	0	1.27
60	2,631	0.0179	0.0027	0.0045	0.0020	0.0043	0.0191	0.0141	-0.0418	0.0518	0.0560	4.91	0.19	4.54	0.19	0	1.52
80	3,508	0.0232	0.0029	0.0047	0.0020	0.0057	0.0923	0.0093	-0.0584	0.1124	0.1159	10.16	0.29	9.85	0.29	0	2.03
100	4,384	0.0281	0.0032	0.0041	0.0020	0.0072	0.2035	0.0000	-0.0740	0.2185	0.2214	19.41	0.44	19.16	0.44	0	2.53

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

At each given deflection the expanded measurement uncertainty Ufs_{class} is calculated from the readings obtained during calibration.

$$U_{fs_{class}} = \frac{2}{S} \times \sqrt{\sum_{i=1}^8 u_i^2}$$

where,

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

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

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

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

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

u6 is the standard uncertainty associated with interpolation.

u7 is the standard uncertainty associated with reversibility.

u8 is the standard uncertainty associated with apparent load transfer from other sensor. Includes subtraction error where: Fr;qC = Fr;fs.

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

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

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

Sleeve Friction Calibration - Subtraction Error

In use, the forces acting on the sleeve load cell element are a combination of tip resistance and sleeve friction, with the tip resistance force value from the tip load cell element being subtracted to give the sleeve friction value. The resultant error values for differing tip and sleeve values are shown in Table 7.

The highlighted cell results in Table 7, show a direct reading of the subtraction error from the calibration results.

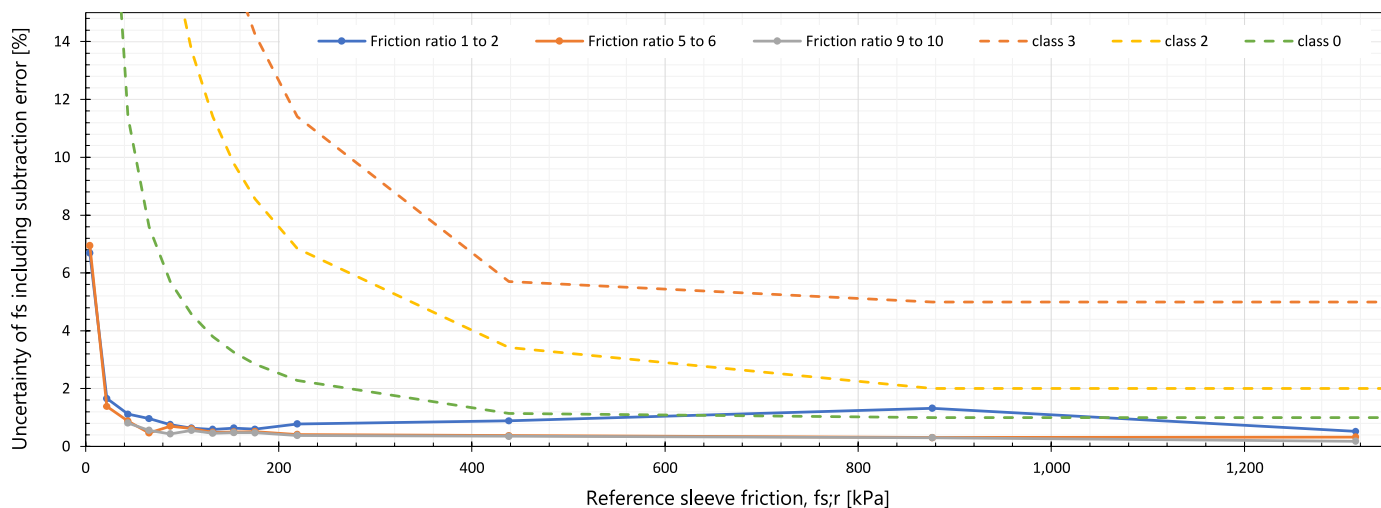
The non-highlighted cells in Table 7, show an interpolated subtraction error from the calibration results.

Sleeve friction - tip subtraction combined standard uncertainty uc_{sub} , where friction ratio is between 0.1% and 10%.

Table - 7

Table - 7														
Sleeve friction combined standard uncertainty including subtraction error (%)														
Sleeve friction kPa →														
4 22 44 66 88 110 132 153 175 219 438 877 1,315														
Tip resistance kPa ↓	66	6.95	-	-	-	-	-	-	-	-	-	-	-	-
	329	6.69	1.38	-	-	-	-	-	-	-	-	-	-	-
	658	7.45	1.43	0.88	0.55	-	-	-	-	-	-	-	-	-
	986	8.72	1.72	0.81	0.47	0.43	-	-	-	-	-	-	-	-
	1,315	8.63	1.48	0.63	0.53	0.44	0.56	0.45	-	-	-	-	-	-
	1,644	9.50	1.34	0.83	0.86	0.70	0.59	0.48	0.48	-	-	-	-	-
	1,973	10.12	1.71	0.94	0.90	0.42	0.62	0.50	0.50	0.47	-	-	-	-
	2,302	9.62	2.11	1.10	0.86	0.71	0.60	0.49	0.48	0.46	0.37	-	-	-
	2,631	10.26	2.01	0.95	0.91	0.74	0.62	0.51	0.50	0.48	0.38	-	-	-
	3,288	11.55	2.27	1.30	0.99	0.80	0.67	0.55	0.54	0.51	0.41	-	-	-
	6,577	-	2.07	1.19	0.93	0.75	0.63	0.52	0.51	0.48	0.39	0.37	-	-
	13,153	-	2.93	1.63	1.21	0.97	0.81	0.66	0.63	0.59	0.48	0.26	0.18	0.18
	19,730	-	9.02	4.67	3.24	2.49	2.02	1.68	1.50	1.35	1.08	0.45	0.18	0.33
	26,307	-	-	4.62	3.21	2.47	2.00	1.66	1.49	1.34	1.07	0.76	0.32	0.37
	32,883	-	-	5.26	3.64	2.79	2.26	1.87	1.67	1.50	1.20	1.08	0.51	0.80
39,460	-	-	6.01	4.14	3.16	2.56	2.12	1.88	1.69	1.35	0.82	1.14	0.41	
52,613	-	-	-	5.13	3.90	3.16	2.62	2.31	2.06	1.65	0.97	1.94	0.46	
65,767	-	-	-	6.19	4.70	3.79	3.15	2.76	2.46	1.97	1.13	0.70	0.52	
Friction ratio (for a given row) →														
Friction ratio (for a given column) ↑														

Uncertainty of sleeve friction including subtraction error [uc_{sub}] for low, medium, and high friction ratios, with ref. pressure



Pore Pressure Calibration

Calibration method

1. The cone penetrometer was placed in a pressure vessel and was pressurised to full range 3 times for no less than 1 minute before calibration.
2. The pore pressure was calibrated with 2 sets of increasing pressures and 2 sets of decreasing pressures.
3. The coefficients of a linear and third order equation relating the estimate of applied pressure as a function of deflection were calculated and are shown in Table 8.
4. The pressures applied, and the resulting deflections are given in Tables 9. No corrections for temperature have been applied to these results.
5. The combined expanded uncertainty* of deflection U_u and U_{u_class} for each force is shown as a percentage of the recorded value and in units of pressure kPa as shown in Table 10.

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

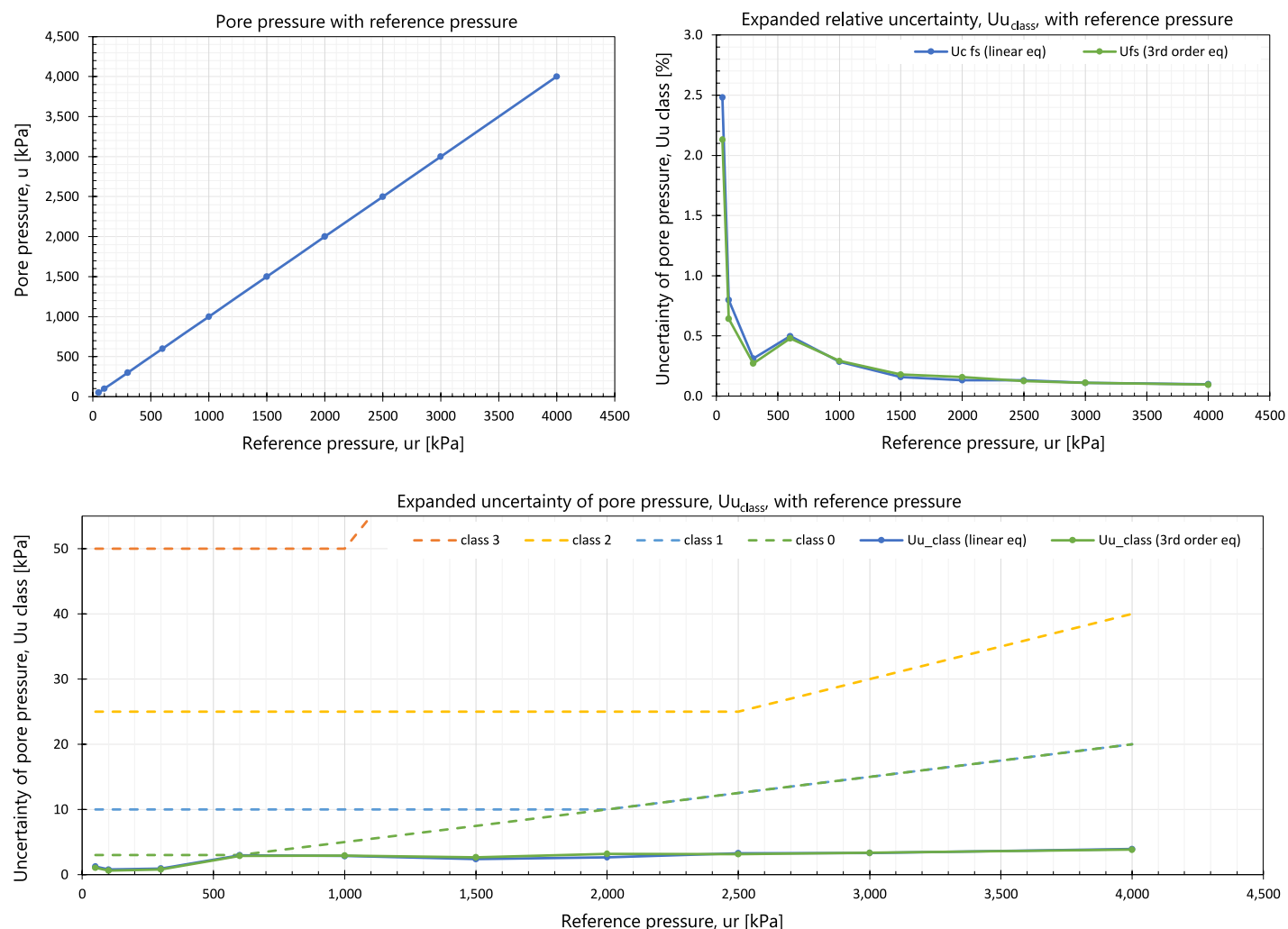
Cone Penetrometer	
Pore pressure sensor capacity	5 MPa
Calibration range	4 MPa
Pore pressure resolution	0.005 kPa
Historic drift between pore calibrations (u_{drift})	0.05774 %
Pore pressure sensor max zero drift	0.11 kPa
Reference pressure sensor max zero drift	1.12 kPa

Calibration Conditions	
Ambient temperature	21.9 °C
Pressure chamber temperature variation	0.24 °C
Instrument temperature variation	0.27 °C

Reference Pressure Sensor Uncertainty	
MMG1.0KV	0.02 ±%

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Pore Pressure Calibration - Graphical Results



Interpolation

Table - 8		
Linear Equation	The pore pressure output in pressure units D (0.1 Pa) is derived using a linear factor from the raw pore pressure output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 Pa Factor = 0.049779
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 Pa units), the corrected applied pressure, P (in 0.1 Pa units) is calculated from : $P = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$	$a0 = -871.4429742$ $a1 = 0.999617247$ $a2 = 6.99324E-11$ $a3 = -1.54866E-18$

Pore Pressure Calibration - Tabular Results
Table - 9 Calibration results

kPa ur	kPa X1	kPa X2'	kPa X3	kPa X4'
0	0.11		0.07	
50	50.45		50.44	
100	100.19		100.17	
300	300.04		300.19	
600	600.15		601.45	
1000	999.92		1001.45	
1500	1500.28		1501.06	
2000	2000.51		2001.25	
2500	2499.71		2500.90	
3000	3000.73		3000.23	
4000	4000.07		4000.05	
3000		2999.82		2998.87
2500		2500.16		2499.05
2000		1999.81		1999.15
1500		1499.54		1499.06
1000		999.47		999.07
600		599.44		599.08
300		299.69		299.32
100		99.63		99.83
50		49.89		49.96

Table - 10 Uncertainty assessment

Reference pressure	Standard uncertainty u1 to u6						Combined standard calibration uncertainty	Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Pore calibration drift	
	kPa	kPa	kPa	kPa	kPa	kPa		kPa	%	kPa	%			
	ur	u1*	u2	u3	u4	u5		u6	ui	Uu	Uuclass			Cone Class **
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0	0.00
50	0.02	0.01	0.00	0.00	0.44	0.30	0.53	1.06	1.06	2.13	1.06	2.13	0	0.03
100	0.05	0.01	0.00	0.00	0.18	0.26	0.32	0.32	0.64	0.64	0.64	0.64	0	0.06
300	0.14	0.09	0.00	0.01	0.12	0.35	0.41	0.14	0.82	0.27	0.82	0.27	0	0.17
600	0.29	0.75	0.00	0.02	0.80	0.89	1.44	0.24	2.88	0.48	2.88	0.48	0	0.35
1000	0.48	0.88	0.00	0.03	0.68	0.82	1.47	0.15	2.93	0.29	2.93	0.29	0	0.58
1500	0.72	0.45	0.00	0.04	0.67	0.79	1.34	0.09	2.69	0.18	2.69	0.18	0	0.87
2000	0.96	0.42	0.00	0.05	0.88	0.81	1.59	0.08	3.18	0.16	3.18	0.16	0	1.15
2500	1.20	0.69	0.00	0.07	0.30	0.66	1.57	0.06	3.13	0.13	3.13	0.13	0	1.44
3000	1.44	0.29	0.00	0.08	0.48	0.65	1.68	0.06	3.36	0.11	3.36	0.11	0	1.73
4000	1.92	0.01	0.00	0.11	0.06	0.00	1.93	0.05	3.85	0.10	3.85	0.10	0	2.31

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

At each given deflection the expanded measurement uncertainty U_{u_class} is calculated from the readings obtained during calibration.

$$U_{u_{class}} = 2 \times \sqrt{\sum_{i=1}^6 u_i^2}$$

where,

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

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

u3 is the standard uncertainty associated with the resolution and noise of the system.

u4 is the standard uncertainty associated with the drift in zero output.

u5 is the standard uncertainty associated with interpolation.

u6 is the standard uncertainty associated with reversibility.

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

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

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

Pore Pressure Calibration - Measured Area Ratios
Calibration method

1. The apparent cone resistance $q_{c;a}$ and apparent sleeve friction $f_{s;a}$ are recorded for all pore pressure calibration intervals, and shown in Table 11a and 11b.
2. The resulting net area ratios of the cone a and net area ratios of the sleeve b are computed and shown in Table 11a and 11b.
3. The final recorded cone net area ratio a and sleeve net area ratio b are shown in Table 12, where reference pressure $u_r = 2000\text{kPa}$

Table - 11a Cone net area ratio assessment

kPa u_r	Apparent cone resistance [$q_{c;a}$]					Alpha factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	31.9		33.5		32.7	0.65
100	68.8		67.8		68.3	0.68
300	225.7		223.5		224.6	0.75
600	461.9		460.5		461.2	0.77
1000	770.9		771.7		771.3	0.77
1500	1160.9		1160.6		1160.7	0.77
2000	1556.2		1557.5		1556.8	0.78
2500	1954.4		1954.0		1954.2	0.78
3000	2349.8		2348.9		2349.4	0.78
4000	3140.5		3141.5		3141.0	0.79
3000		2354.2		2352.4	2353.3	0.78
2500		1961.92		1961.39	1961.7	0.78
2000		1574.64		1572.07	1573.4	0.79
1500		1189.3		1188.65	1189.0	0.79
1000		798.82		799.15	799.0	0.80
600		485.904		485.325	485.6	0.81
300		247.978		246.535	247.3	0.82
100		83.9373		84.8744	84.4	0.84
50		43.6033		42.288	42.9	0.86

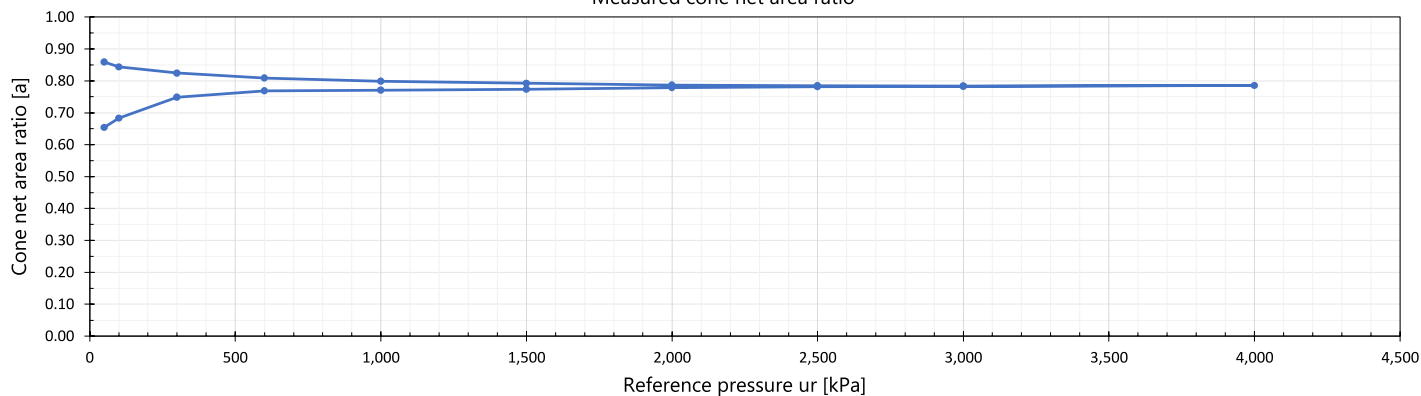
Table - 11b Sleeve friction net area ratio assessment

kPa u_r	Apparent sleeve friction [$f_{s;a}$]					Beta factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	-0.11		-0.30		-0.20	-0.004
100	-0.23		-0.41		-0.32	-0.003
300	-0.87		-0.98		-0.93	-0.003
600	-1.43		-1.60		-1.52	-0.003
1000	-1.84		-1.99		-1.91	-0.002
1500	-2.44		-2.68		-2.56	-0.002
2000	-3.25		-3.33		-3.29	-0.002
2500	-4.19		-4.17		-4.18	-0.002
3000	-5.12		-5.15		-5.14	-0.002
4000	-6.95		-7.05		-7.00	-0.002
3000		-5.22		-5.09	-5.15	-0.002
2500		-4.44		-4.30	-4.37	-0.002
2000		-3.66		-3.51	-3.58	-0.002
1500		-2.88		-2.81	-2.84	-0.002
1000		-2.26		-2.22	-2.24	-0.002
600		-1.76		-1.68	-1.72	-0.003
300		-1.19		-1.16	-1.18	-0.004
100		-0.47		-0.48	-0.48	-0.005
50		-0.29		-0.20	-0.25	-0.005

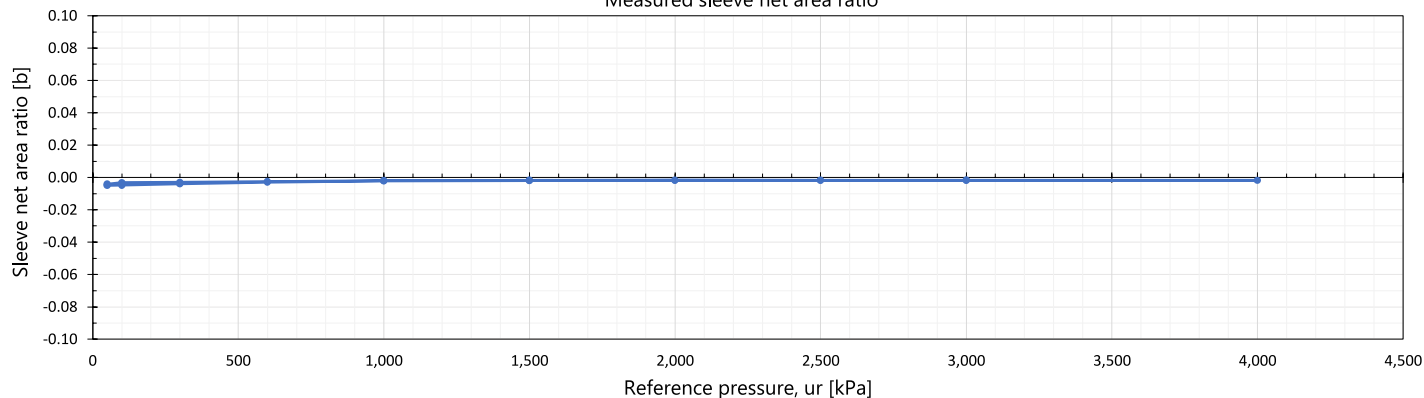
Table - 12

Cone net area ratio [a]	0.78
Sleeve friction net area ratio [b]	-0.002

Measured cone net area ratio



Measured sleeve net area ratio



Inclination Calibration

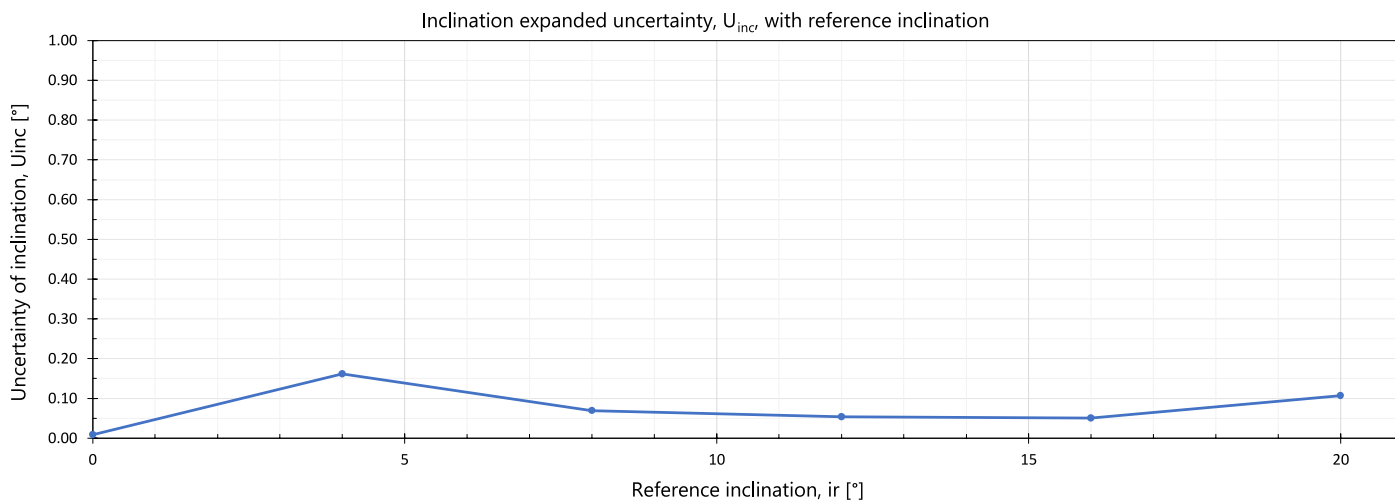
Calibration method

1. The cone penetrometer was placed in the inclination calibration frame and set to a vertical reference inclination of $i_r = 0^\circ$.
2. The inclination was calibrated from $i_r = 0^\circ$ to $i_r = 20^\circ$. This was conducted twice, once with the cone at 0° rotation and once with the cone at 90° rotation.
3. The coefficients of a linear equation relating the estimate of the inclination as a function of raw sensor deflection were calculated and are shown in Table 13.
4. The inclination angle applied, and the resulting measurements are given in Table 14.
5. The combined expanded uncertainty* of measurement U_{inc} for each inclination angle is shown as a percentage of the recorded value and in units of arc degrees $^\circ$, as shown in Table 15.

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

Cone Penetrometer		Reference Inclination Rotary Table Uncertainty	
Inclination sensor range	90 $^\circ$	Lankelma HV6 Rotary Table	0.10 $^\circ$
Calibration range	20 $^\circ$		
Inclination resolution	0.005 $^\circ$		
Inclinometer number of axis	2		

Inclination - Graphical Results



Interpolation

Table - 13

Linear Equation	The Inclination output in angular units ($0.1^\circ \times 10^{-3}$) is derived using a linear factor from the raw inclination output.	X axis Factor =	9.659276
		Y axis Factor =	9.723745

Inclination Calibration - Tabular Results

Table - 14

Inclination calibration		
i_r	θ_0	θ_{90}
0	0.00	0.00
4	4.07	4.09
8	8.03	8.03
12	12.00	11.97
16	16.02	15.98
20	20.03	20.07

Table - 15 Uncertainty assessment

Reference Inclination	Standard calibration uncertainty u_1 to u_4				Combined standard calibration uncertainty u_i		Expanded calibration uncertainty U_{inc} [$k=2$]	
	i_r	u_1	u_2	u_3	u_4	u_i	U_{inc}	
0	0	0.00	0.00	0.00	0.00	0.00	0.01	
4	4	0.01	0.01	0.00	0.08	0.08	0.16	4.04
8	8	0.02	0.00	0.00	0.03	0.03	0.07	0.87
12	12	0.02	0.01	0.00	-0.02	0.03	0.05	0.45
16	16	0.02	0.01	0.00	0.00	0.03	0.05	0.32
20	20	0.02	0.02	0.00	0.05	0.05	0.11	0.54

At each given deflection the expanded measurement uncertainty U_{inc} is calculated from the readings obtained during calibration.

$$U_{inc} = 2 \times \sqrt{\sum_{i=1}^4 u_i^2}$$

where,

u_1 is the standard uncertainty associated with the applied calibration inclination.

u_2 is the standard uncertainty associated with the reproducibility of the calibration results.

u_3 is the standard uncertainty associated with the resolution and noise of the system.

u_4 is the standard uncertainty associated with interpolation.

Temperature Calibration

Calibration method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 0°C.
2. The temperature was calibrated from Tr = 0°C to Tr = 30°C.
3. The coefficients of a linear equation relating the estimate of temperature as a function of raw temperature sensor deflection were calculated and are shown in Table 16.
4. The applied temperature, and the resulting measurements are given in Table 17.
5. The combined expanded uncertainty* of measurement Utemp for each temperature is shown as a percentage of the recorded value and in units of Celsius °C, as shown in Table 18.

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

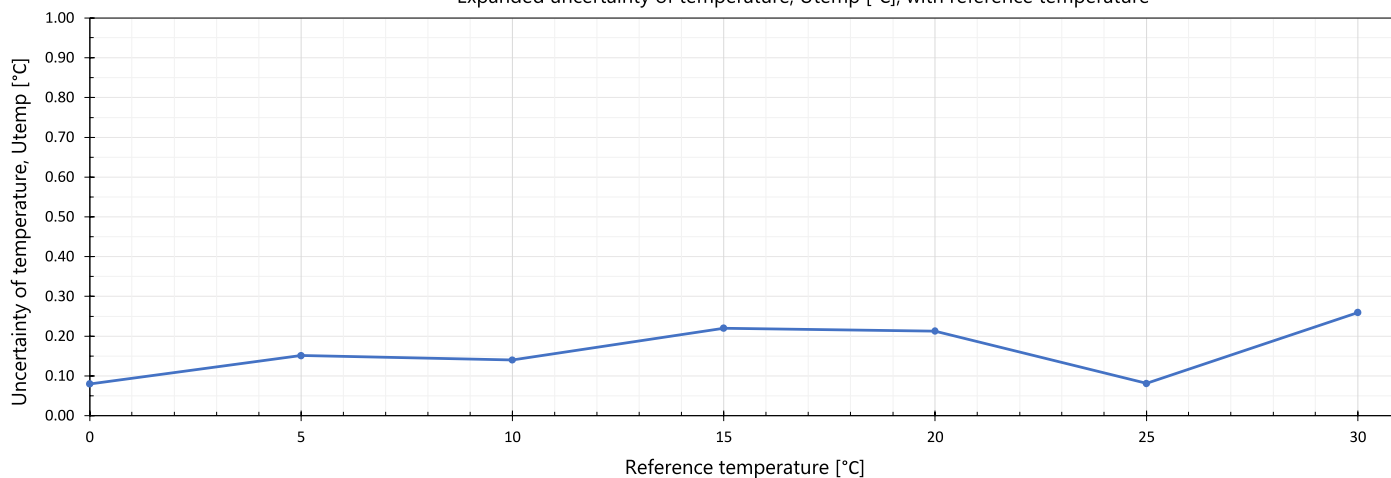
Cone Penetrometer	
Temperature sensor range	90 °
Calibration range	30 °
Temperature resolution	0.005 °
Temperature number of axis	2

Reference Thermometer Uncertainty	
ETI Ref Thermometer	0.04 °

Temperature Datalogger Uncertainty	
ETI ThermoData	0.4 °

Temperature Calibration - Graphical Results

Expanded uncertainty of temperature, Utemp [°C], with reference temperature



Interpolation

Table - 16

Linear Equation	The temperature sensor output in temperature units ($0.1^{\circ}\text{C} \times 10^{-3}$) is derived using a linear factor from the raw temperature output.	Temperature sensor [qc] factor =	0.569553
		Temperature sensor [fs] factor =	0.568702

Temperature Calibration - Tabular Results

Table - 17
Temperature calibration

°C	°C
Tr	Ta
0	0.00
5	5.07
10	9.94
15	14.90
20	19.90
25	24.99
30	30.12

Table - 18 Uncertainty assessment

Reference temp	Standard calibration uncertainty u1 to u3			Combined standard calibration uncertainty ut		Expanded calibration uncertainty Utemp [k=2]	
	°C	°C	°C	°C	%	°C	%
Tr	u1	u2	u3	ut		Utemp	
0	0.04	0.00	0.00	0.04		0.08	
5	0.04	0.00	0.06	0.08	1.51	0.15	3.02
10	0.04	0.00	-0.06	0.07	0.70	0.14	1.40
15	0.04	0.00	-0.10	0.11	0.73	0.22	1.47
20	0.04	0.00	-0.10	0.11	0.53	0.21	1.06
25	0.04	0.00	-0.01	0.04	0.16	0.08	0.33
30	0.04	0.00	0.12	0.13	0.43	0.26	0.86

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

$$U_{temp} = 2 \times \sqrt{\sum_{i=1}^3 u_i^2}$$

where,

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

u2 is the standard uncertainty associated with the resolution and noise of the system.

u3 is the standard uncertainty associated with interpolation.

Temperature Influence Verification
Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 30 °C, the second bath temperature was set to 0 °C.
2. The test method for verification of a cone penetrometer for temperature influence was followed as set out in BS EN ISO 224 76-1:2023, clause B.2.7.2.
3. The bath temperatures, apparent cone resistance, apparent sleeve friction, apparent pore pressure, and apparent cone temperature were recorded for the duration of the test.
4. The correction factors for q_c ; corrected apparent cone resistance, corrected sleeve friction, and corrected pore pressure were applied in post processing.
5. The start and end apparent readings are shown in Table 19. The maximum and minimum apparent readings are shown in Table 20.
6. The ambient stability, transient stability, and resulting penetrometer class were calculated and are shown in Table 21.

Table - 19 Start and end apparent readings

	°C	°C	kPa	kPa	kPa	kPa	kPa	kPa
	Ta _{qc}	Ta _{fs}	q _c ;a	q _c ;ac	fs;a	fs;ac	u;a	u;ac
T30	30.2	30.2	-0.1	0.0	0.0	0.0	0.0	0.0
T0	0.3	0.4	-111.3	9.5	-2.7	1.4	7.9	-0.6

Table - 20 Maximum / minimum apparent readings

	kPa	kPa	kPa	kPa	kPa	kPa
	q _c ;a	q _c ;ac	fs;a	fs;ac	u;a	u;ac
max	374.0	114.4	9.7	7.8	8.3	0.9
min	-474.6	-81.3	-12.7	-6.9	-3.1	-4.0

Maximum rate of change

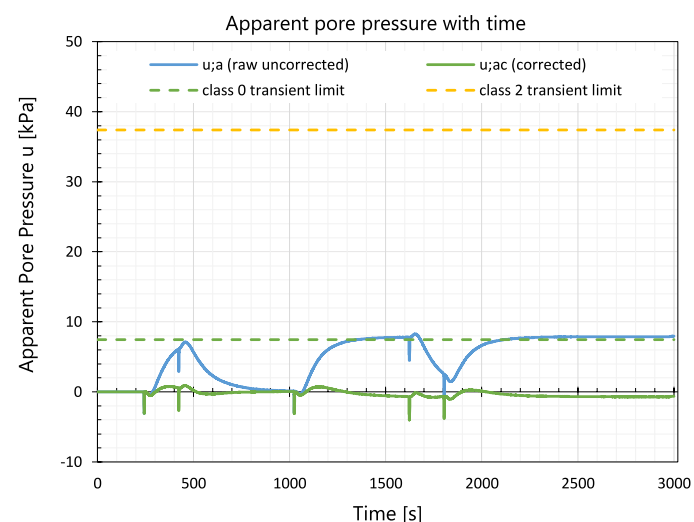
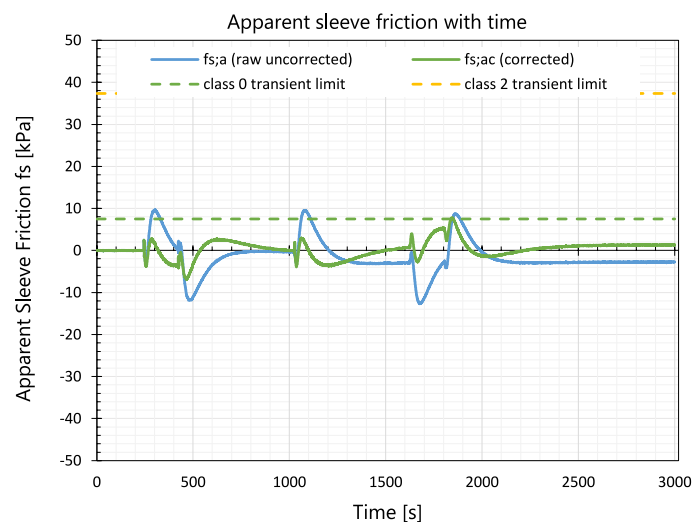
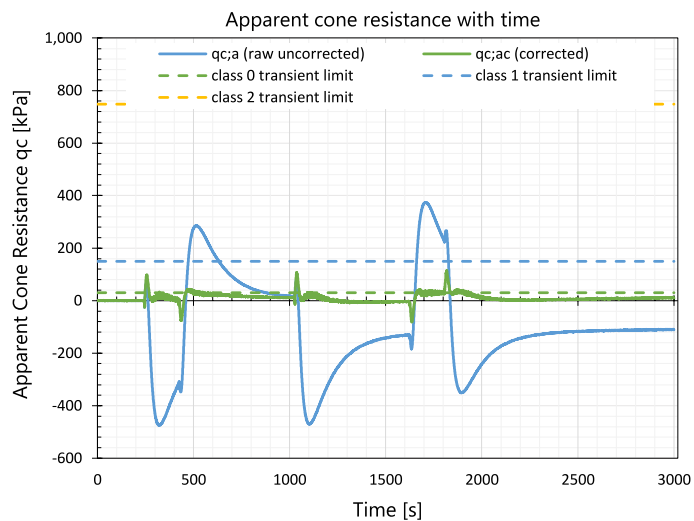
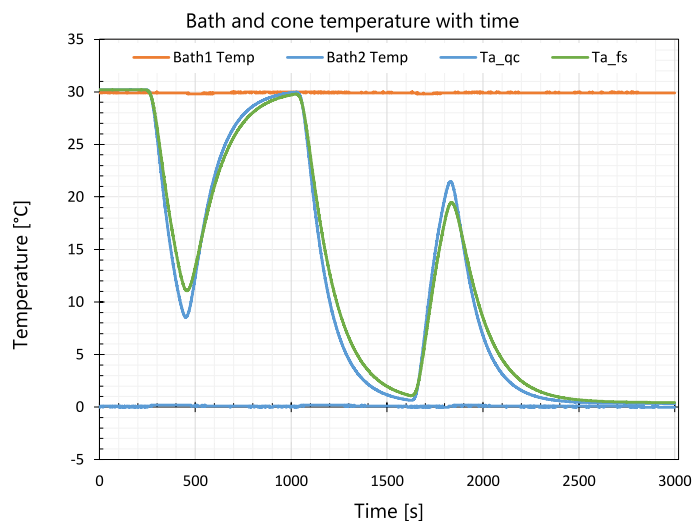
kPa/s	kPa/s	kPa/s	kPa/s	kPa/s	kPa/s
Δfg _{qc}	Δfg _{qcc}	Δfg _{fs}	Δfg _{fsc}	Δfg _u	Δfg _{uc}
15.93	5.22	0.47	0.31	0.20	0.18

Table - 21a Ambient temperature stability and classification

Ambient temperature stability		kPa/°C	Class
Uncorrected	Δa _{qc}	3.72	2
	Δa _{fs}	0.09	0
	Δa _u	-0.27	2
Corrected	Δa _{qcc}	-0.32	0
	Δa _{fsc}	-0.05	0
	Δa _{uc}	0.02	0

Table - 21b Transient temperature stability and classification

Transient temperature stability		kPa/°C	Class
Uncorrected	Δt _{qc}	28.38	2
	Δt _{fs}	0.75	2
	Δt _u	0.38	0
Corrected	Δt _{qcc}	6.55	1
	Δt _{fsc}	0.50	0
	Δt _{uc}	0.16	0



Bending Influence Verification

Verification Method

1. The cone penetrometer was placed in the bending influence frame, clamping the cone horizontally.
2. The test method for verification of a cone penetrometer for bending influence was followed as set out in BS EN ISO 22476-1:2023, clause B.2.8.2.
3. The air temperature, apparent cone resistance, apparent sleeve friction, and apparent pore pressure were recorded for the duration of each test. In total 8 tests were performed from 0° rotation to 315° rotation, evenly spaced with 45° rotation between tests.
4. The bending influence results and resulting cone penetrometer classification was calculated and are shown in Table 22.

Table - 22 Bending Influence results

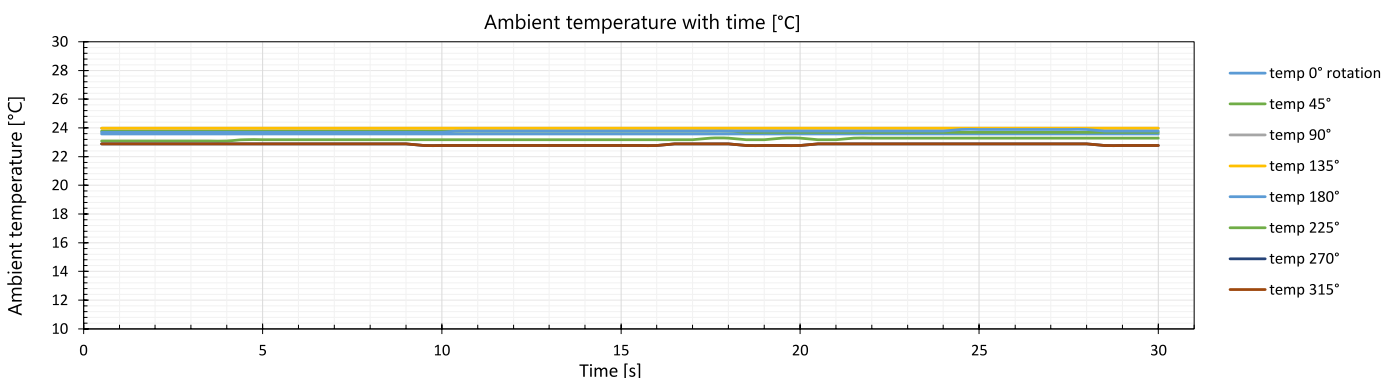
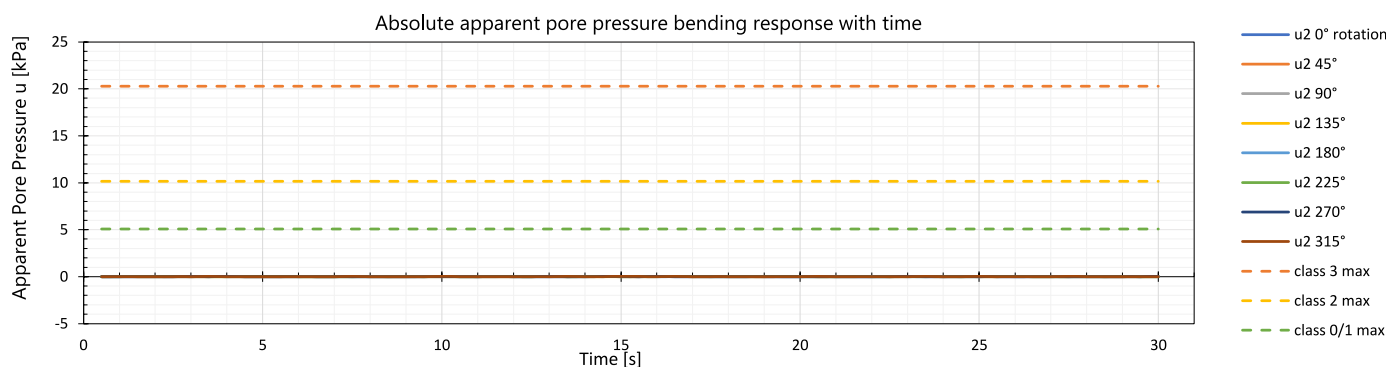
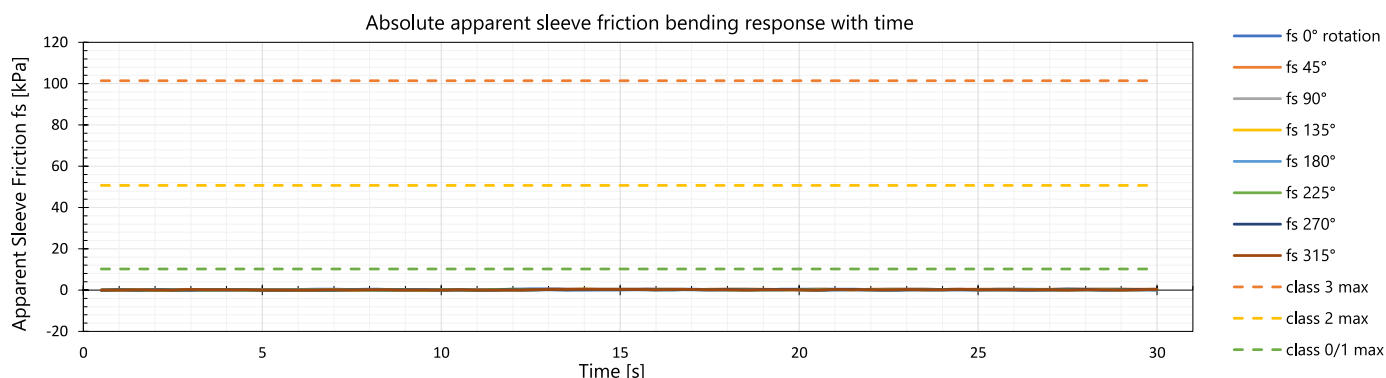
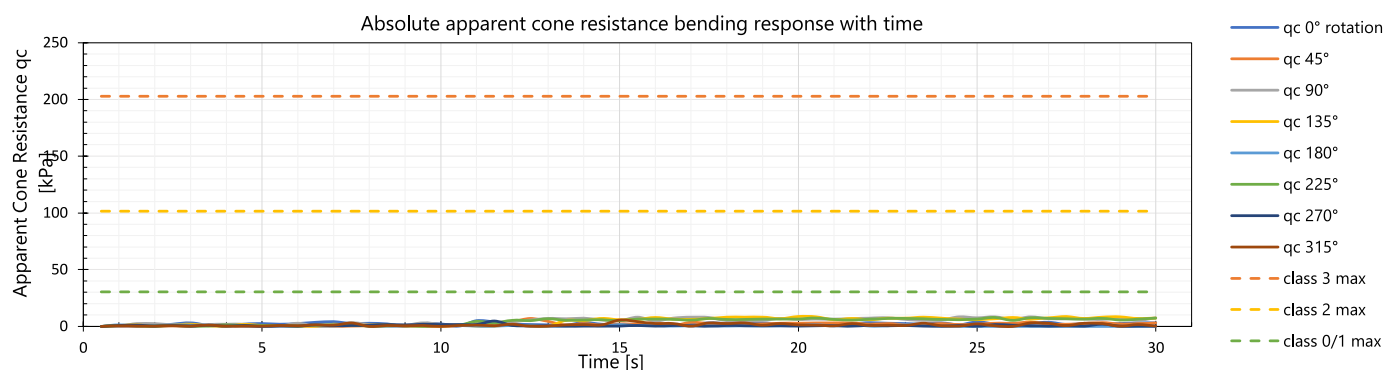
	qc;a [kPa/N]	fs;a [kPa/N]	u2;a [kPa/N]	Ambient Temp [°C]
max	0.042	0.006	0.000	23.9
min	-0.077	-0.001	0.000	23.7
max test Δb, Δt	0.119	0.007	0.001	0.2
class	0	0	0	

10 kg Calibration Weight Uncertainty

10 kg Calibration Weight 0.001 %

10 kg Calibration Weight

Reference weight 10.341 kg
Reference force 101.411 N



Sensor Stability Verification

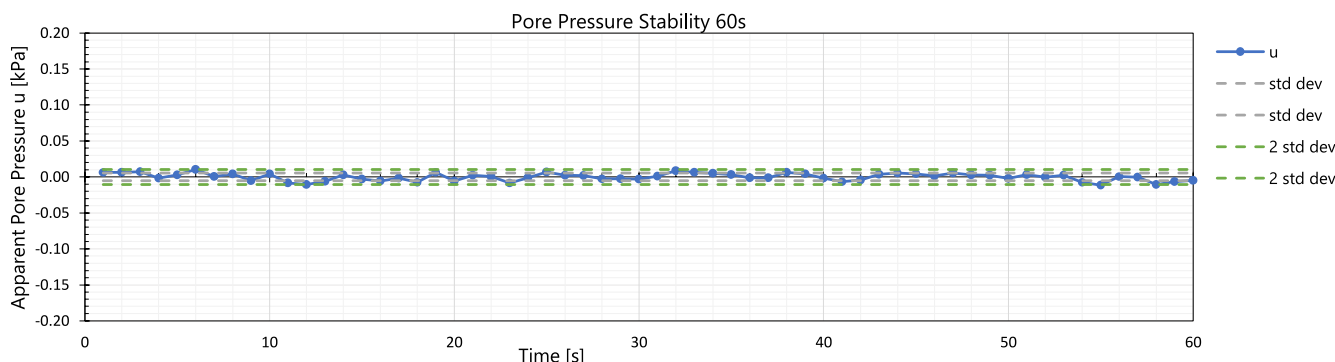
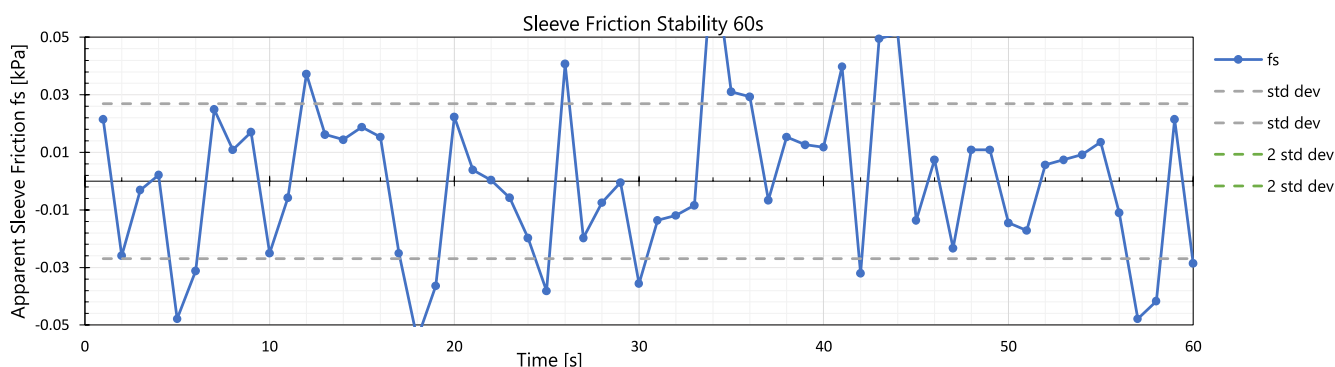
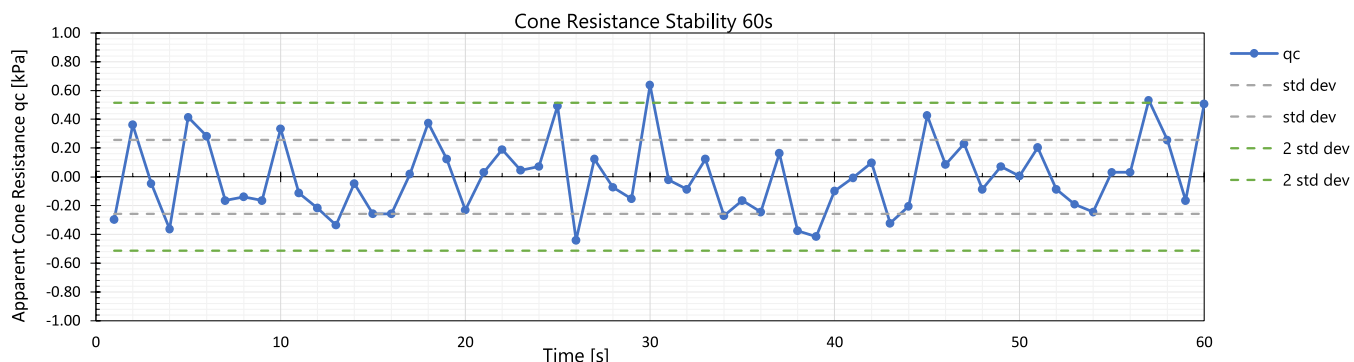
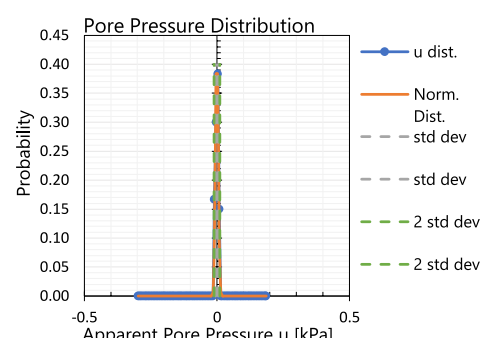
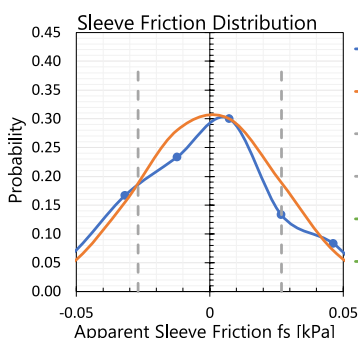
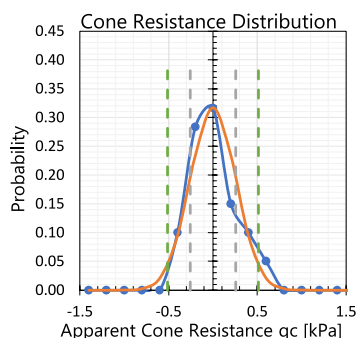
The purpose of this section is to quantify the stability of the geotechnical sensors (q_c , f_s , u) and demonstrate validity of applying a normal distribution, described by standard deviation and mean, when assessing probability of noise magnitude. The sampling duration has been limited to 60 seconds to allow direct comparison to the field verification data required under BS EN ISO 22476-1: 2023.

Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath at ambient temperature.
2. The cone penetrometer was left for no less than 30 minutes or until the output was stable.
3. The output was recorded for 60 seconds at a frequency of 1Hz. The maximum change and standard deviation are shown in Table 23.

Table - 23 Sensor stability results

	q_c (kPa)	f_s (kPa)	u (kPa)	Inc (°)	Temp (°C)
Max	0.637	0.079	0.010	0.005	0.003
Min	-0.441	-0.055	-0.011	-0.006	-0.002
Δ (Max - Min)	1.079	0.134	0.022	0.012	0.006
Standard deviation (68% coverage)	± 0.257	± 0.027	± 0.005	± 0.002	± 0.001
2 standard deviations (95% coverage)	± 0.514	± 0.054	± 0.010	± 0.005	± 0.002



Test Setup**Calibrated Instrument**

Instrument type:	Subtraction	Number of sensors:	5
Serial number:	DS15-CFIPTT.2213	Manufacturer:	Eijkelpamp Geopoint
Nominal cone area:	15 cm ²	Nominal sleeve area:	227 cm ²
Calibration standard:	BS EN ISO 22476-1:2023	Location:	Lankelma Calibration Laboratory
Calibration date:	24 November 2025	Calibration expiry:	24 May 2026

Sensor measurand	Calibration range	Maximum rating	Momentary overload	Sensor stability (60 sec)	Max drift before re-calibration
Cone resistance (qc)	66.67 MPa	100 MPa	100 MPa	± 0.50 kPa	20,000 0.1N
Sleeve friction (fs)	4.41 MPa	1.30 MPa*	1.30 MPa	± 0.04 kPa	20,000 0.1N
Pore pressure (u)	4 MPa	5 MPa	6.75 MPa	± 0.02 kPa	800,000 0.1Pa
Inclination (i)	20 °	90 °		± 0.05 °	
Temperature (t)	30 °C	90 °C		± 0.003 °C	
Magnetic field (m)					

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

ISO 22476-22 Cone Penetrometer Classification

Sensor measurand	Measurement uncertainty $U_{qc: class}$ $U_{fs: class}$ $U_{u: class}$	Ambient temperature stability		Transient temperature stability		Bending influence Δb_{qc} , Δb_{fs} , Δb_u	Overall classification <i>(highest number represents penetrometer class)</i>
		Uncorrected	Corrected	Uncorrected	Corrected		
		Δa_{qc} , Δa_{fs} , Δa_u	Δa_{qcc} , Δa_{fsc} , Δa_{uc}	Δt_{qc} , Δt_{fs} , Δt_u	Δt_{qcc} , Δt_{fsc} , Δt_{uc}		
Cone resistance	0	1	0	2	1	0	1
Sleeve friction	0	0	0	2	0	0	0
Pore pressure	0	2	0	0	0	0	0

Calibration signed by:**Paul Metcalf**

Digitally signed by Paul Metcalf
DN: cn=Paul Metcalf, c=GB,
o=Lankelma Ltd,
email=paulmetcalf@lankelma.co.uk
Date: 2025.11.26 15:35:48

P Metcalf**Calibration checked by:****Alastair Harman**

Digitally signed by Alastair Harman
DN: cn=Alastair Harman, c=GB,
o=Lankelma Ltd,
email=alastairharman@lankelma.co.uk
Date: 2025.11.26 15:36:01

A Harman

Cone penetrometer, serial number: DS15-CFIPTT.2213 was found to comply with the requirements of BS EN ISO 22476-1:2023 for the following classifications:
Cone Resistance - Class 1 Sleeve Friction - Class 0 Pore Pressure - Class 0

Reference Instruments

Device	Serial number	Uncertainty of recorded value	Calibration date
AM DSCCHA-100 kN	66914	0.02 ±%	01/07/2025
AM DSCCHA-5 kN	61065	0.05 ±%	01/07/2025
Keithley 7.5 Digit DMM	4496826	12.00 PPM	10/06/2025
MMG1.0KV	563542	0.02 ±%	09/04/2025
ETI Ref Thermometer	D24276054	0.04 °C	18/09/2025
Lankelma HV6 Rotary Table	INC-JIG 01	0.10 °	17/07/2023
10 kg Calibration Weight	H1-S1 10kg	0.001 %	02/08/2024
Mitutoyo 200mm Caliper	A23044194	0.02 ±mm	14/06/2025

Calibration Standard

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

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

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

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

Cone Dimension Verification

Cone Tip

Cone shoulder diameter

Rotational position	d_c
0 °	43.79 mm
120 °	43.79 mm
240 °	43.80 mm

Height of the cylindrical extension of the cone

Rotational position	h_e
0 °	11.59 mm
120 °	11.59 mm
240 °	11.59 mm

Height of the conical section of the cone

Rotational position	h_c
0 °	35.12 mm
120 °	35.12 mm
240 °	35.12 mm

Filter element diameter

Rotational position	d_{fl}
0 °	43.61 mm
120 °	43.61 mm
240 °	43.60 mm

Friction Sleeve

Friction sleeve diameter

Rotational position	Upper section d_{2u}	Middle section d_{2m}	Lower section d_{2l}
0 °	43.90 mm	43.94 mm	43.97 mm
120 °	43.89 mm	43.96 mm	43.98 mm
240 °	43.89 mm	43.96 mm	43.95 mm

Friction sleeve length

Rotational position	l_s
0 °	165.00 mm
120 °	165.00 mm
240 °	165.00 mm

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

Rotational position	l_{gl}
0 °	2.81 mm
120 °	2.81 mm
240 °	2.81 mm

Gap above the upper end of the friction sleeve

Rotational position	l_{gu}
0 °	2.71 mm
120 °	2.71 mm
240 °	2.71 mm

Cone Tip Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_c	43.793 mm
Relative error b_c	0.015 %
Area A_c	1506.281 mm ²
Dimension uncertainty U_{dc}	0.015 mm
Area uncertainty U_{Ac}	1.065 mm ²
Expanded area uncertainty U_{AC}	2.131 mm ²

Friction Sleeve Dimension Uncertainty

Reference device uncertainty u_r	0.015 mm
Average diameter d_2	43.938 mm
Relative error b_{c2}	0.109 %
Average length l_s	165.000 mm
Relative error b_{ls}	0.000 %
Area A_s	22775.709 mm ²
Dimension uncertainty diameter u_{d2}	0.031 mm
Dimension uncertainty length u_{ls}	0.015 mm
Area uncertainty u_{as}	16.407 mm ²
Expanded area uncertainty U_{as}	32.815 mm ²
Sleeve length to diameter ratio	3.755
Diameter difference, sleeve - tip	0.144 mm

Cone Resistance Calibration

Calibration method

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

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

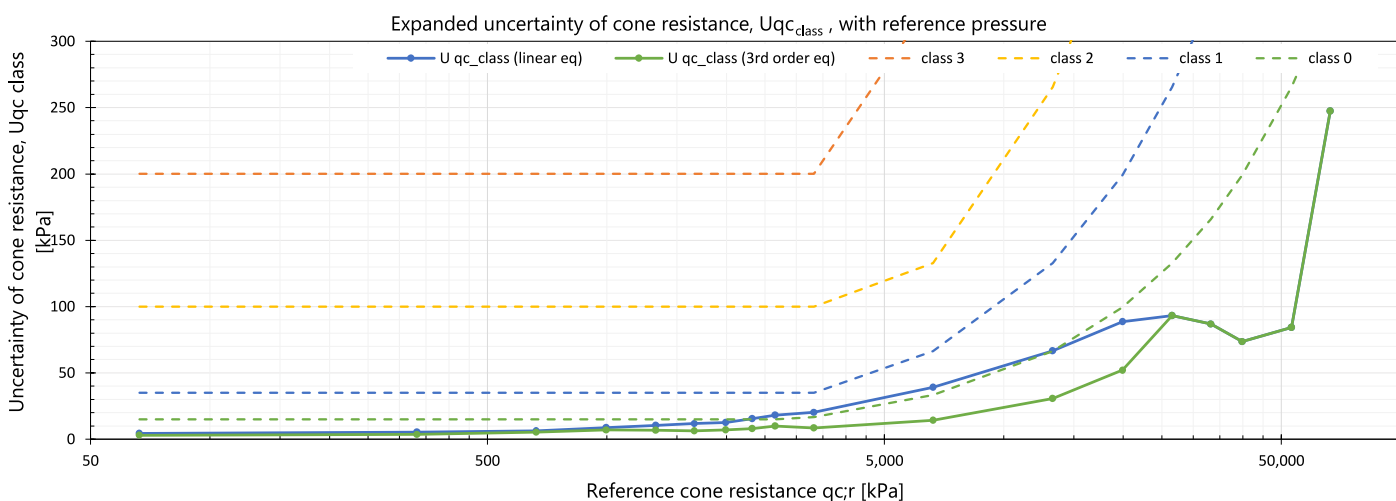
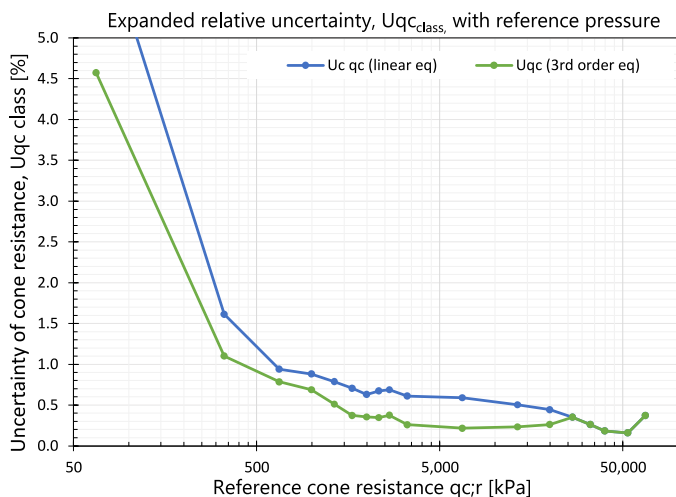
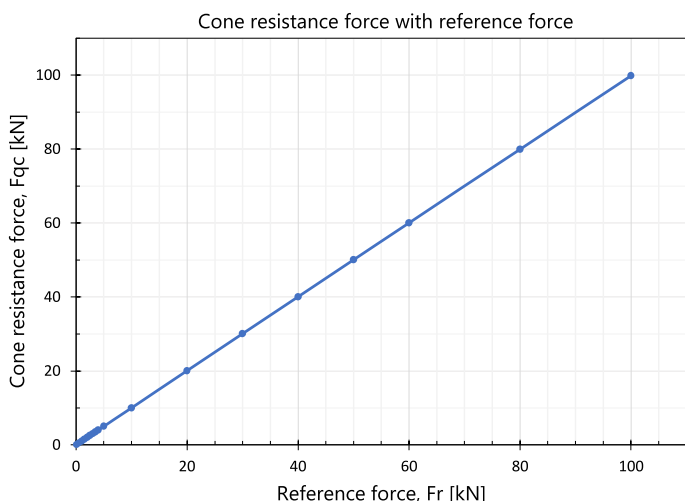
Cone Penetrometer	
Cone penetrometer type	Subtraction
Cone resistance capacity	150 kN
Calibration range	100 kN
Cone resistance effective resolution	0.0005 kN
Cone area	1,506 mm ²
Measured alpha factor cone area ratio	0.78
Historic drift between cone calibrations (u_{drift})	0.05095 %
Apparent pore pressure (u_a) at full range	0.01 kPa
Cone resistance max zero drift	2.32 kPa
Reference load cell max zero drift	2.09 kPa

Calibration Conditions	
Ambient temperature	25.8 °C
Ambient temperature variation	0.42 °C
Instrument temperature variation	0.32 °C

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

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Cone Resistance Calibration - Graphical Results



Interpolation

Linear Equation	The cone output in force units of D (0.1 N) is derived using a linear factor from the raw cone output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.009074
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (in 0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = -8.403013648$ $a_1 = 0.997342252$ $a_2 = -2.47917E-09$ $a_3 = 1.03526E-14$ Polynomial calc. is only to be used when the cone load is under 30 kN

Cone Resistance Calibration - Tabular Results

Table - 2a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0017	0.0032	0.0035		0.0009	
0.1	0.1035	0.1035	0.1010		0.1014	
0.5	0.5018	0.5051	0.5008		0.5003	
1	0.9999	1.0041	1.0021		0.9963	
1.5	1.5020	1.5018	1.4994		1.4966	
2	2.0022	2.0057	1.9997		1.9980	
2.5	2.5034	2.5040	2.4999		2.4969	
3	3.0021	3.0034	2.9998		2.9961	
3.5	3.5041	3.5041	3.4990		3.4974	
4	4.0034	4.0036	4.0006		3.9975	
5	5.0020	5.0055	5.0014		4.9985	
4				3.9962		3.9944
3.5				3.4979		3.4956
3				3.0004		2.9960
2.5				2.4981		2.4966
2				1.9979		1.9954
1.5				1.4990		1.4932
1				0.9968		0.9943
0.5				0.4994		0.4963
0.1				0.1020		0.0989

Table - 2b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	10.0064	10.0051	10.0017		9.9968	
20	20.0003	20.0004	19.9938		19.9910	
30	29.9876	29.9887	29.9852		29.9791	
40	40.0704	40.0730	40.0659		40.0614	
50	50.0620	50.0587	50.0589		50.0469	
60	60.0398	60.0469	60.0559		60.0208	
80	79.9429	79.9703	79.9632		79.9595	
100	99.8295	99.8430	99.8292		99.7918	
80				80.0240		80.0184
60				60.1073		60.0848
50				50.1138		50.0942
40				40.1044		40.0935
30				30.0066		30.0017
20				20.0079		20.0008
10				10.0040		9.9980

Table - 3 Uncertainty assessment

Reference force	Reference tip resistance	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Tip calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	qc;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Uc qc		Uqc class			Udrift ***
0	0	0.0000	0.0008	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0008	0.0008	1.1		1.1		0	0.0
0.1	66	0.0004	0.0005	0.0000	0.0002	0.0000	0.0019	0.0010	0.0000	0.0023	0.0023	3.0	4.57	3.0	4.57	0	0.0
0.5	332	0.0006	0.0006	0.0019	0.0002	0.0000	0.0010	0.0016	0.0000	0.0028	0.0028	3.7	1.11	3.7	1.10	0	0.2
1	664	0.0007	0.0021	0.0024	0.0002	0.0000	0.0006	0.0021	0.0000	0.0039	0.0040	5.3	0.80	5.2	0.79	0	0.3
1.5	996	0.0048	0.0014	0.0001	0.0002	0.0001	0.0007	0.0011	0.0000	0.0052	0.0053	7.0	0.70	6.8	0.69	0	0.5
2	1,328	0.0041	0.0018	0.0020	0.0002	0.0001	0.0000	0.0013	0.0000	0.0051	0.0053	7.0	0.53	6.8	0.51	0	0.7
2.5	1,660	0.0041	0.0022	0.0003	0.0002	0.0001	0.0001	0.0006	0.0000	0.0047	0.0050	6.6	0.40	6.2	0.37	0	0.8
3	1,992	0.0044	0.0028	0.0008	0.0002	0.0001	0.0007	0.0002	0.0000	0.0053	0.0057	7.6	0.38	7.1	0.35	0	1.0
3.5	2,324	0.0053	0.0028	0.0000	0.0002	0.0001	0.0002	0.0008	0.0000	0.0061	0.0065	8.7	0.37	8.1	0.35	0	1.2
4	2,656	0.0061	0.0037	0.0001	0.0002	0.0001	0.0005	0.0022	0.0000	0.0075	0.0080	10.7	0.40	10.0	0.38	0	1.4
5	3,319	0.0023	0.0053	0.0020	0.0002	0.0002	0.0006	0.0022	0.0000	0.0065	0.0074	9.9	0.30	8.7	0.26	0	1.7
10	6,639	0.0046	0.0095	0.0007	0.0002	0.0003	0.0016	0.0010	0.0000	0.0108	0.0129	17.1	0.26	14.3	0.22	0	3.4
20	13,278	0.0079	0.0201	0.0001	0.0002	0.0007	0.0050	0.0069	0.0000	0.0232	0.0271	36.0	0.27	30.8	0.23	0	6.8
30	19,917	0.0108	0.0316	0.0006	0.0002	0.0010	0.0160	0.0127	0.0000	0.0392	0.0446	59.2	0.30	52.0	0.26	0	10.1
40	26,555	0.0133	0.0026	0.0015	0.0002	0.0014	0.0658	0.0204	0.0000	0.0702	0.0757	100.5	0.38	93.2	0.35	0	13.5
50	33,194	0.0163	0.0046	0.0019	0.0002	0.0017	0.0559	0.0295	0.0000	0.0654	0.0744	98.8	0.30	86.9	0.26	0	16.9
60	39,833	0.0179	0.0101	0.0041	0.0002	0.0021	0.0388	0.0333	0.0000	0.0553	0.0697	92.6	0.23	73.5	0.18	0	20.3
80	53,111	0.0232	0.0062	0.0158	0.0002	0.0028	0.0448	0.0346	0.0000	0.0636	0.0851	113.0	0.21	84.4	0.16	0	27.1
100	66,389	0.0281	0.0125	0.0078	0.0002	0.0035	0.1835	0.0000	0.0000	0.1863	0.1993	264.6	0.40	247.3	0.37	0	33.8

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

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

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

where,

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

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

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

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

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

u6 is the standard uncertainty associated with interpolation.

u7 is the standard uncertainty associated with reversibility.

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

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

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

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

Sleeve Friction Calibration

Calibration method

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

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

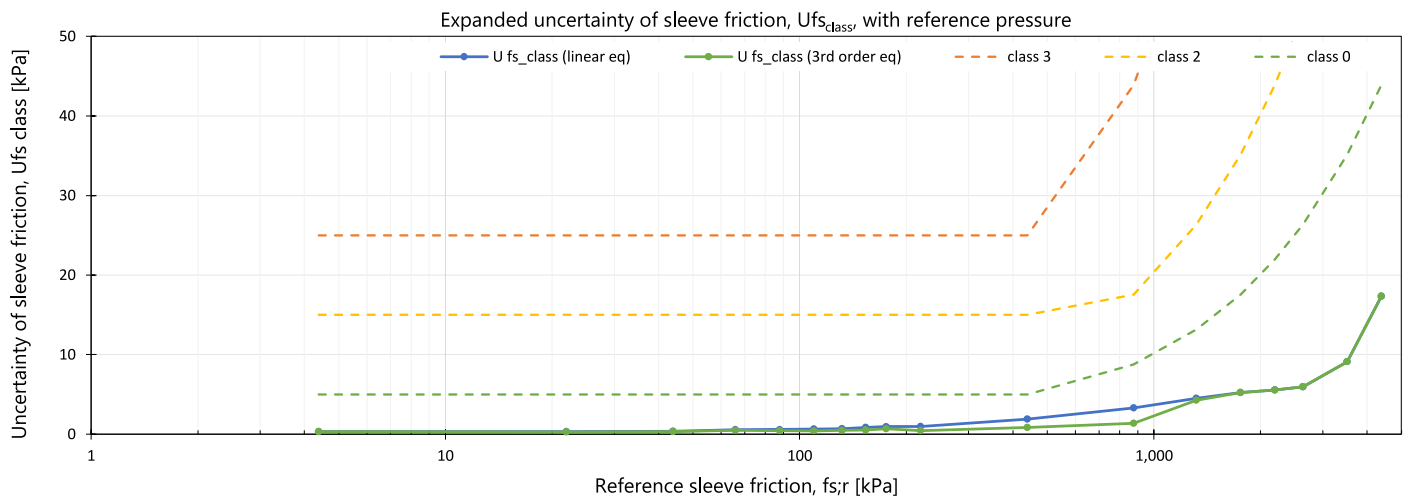
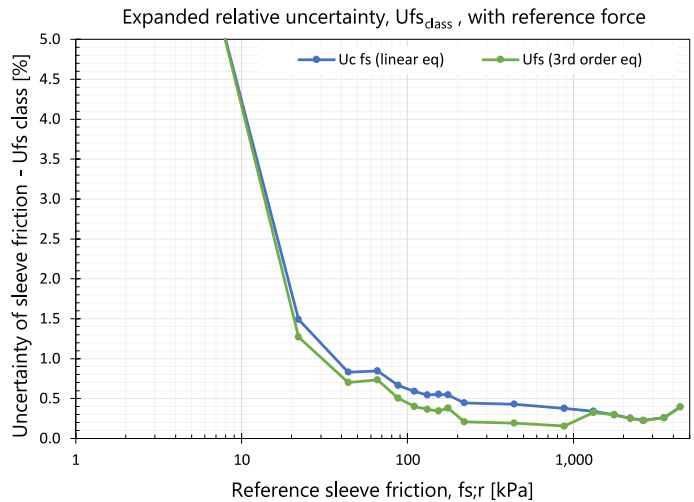
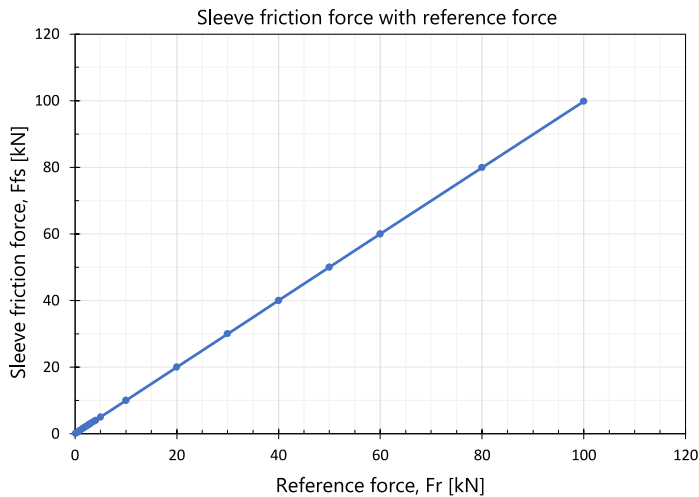
Cone Penetrometer	
Cone penetrometer type	Subtraction
Sleeve friction capacity	150 kN
Calibration range	100 kN
Sleeve friction effective resolution	0.005 kN
Sleeve area	22,776 mm ²
Measured beta factor sleeve area ratio	-0.002
Historic drift between sleeve calibrations (u_{drift})	0.01971 %
Apparent pore pressure (u_a) at full range	0.01 kPa
Sleeve friction max zero drift	0.20 kPa
Reference load cell max zero drift	0.14 kPa

Calibration Conditions	
Ambient temperature	25.8 °C
Ambient temperature variation	0.42 °C
Instrument temperature variation	1.81 °C

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

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Sleeve Friction Calibration - Graphical Results



Interpolation

Table - 4

Linear Equation	The sleeve output in force units D (0.1 N) is derived using a linear factor from the raw sleeve output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 N Factor = 0.008783
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 N units), the corrected applied force, F (in 0.1 N units) is calculated from :	$a_0 = 2.205183935$ $a_1 = 0.997746023$ $a_2 = 4.15408E-09$ $a_3 = 1.96037E-17$ Polynomial calc. is only to be used when the sleeve load is under 30 kN

Sleeve Friction Calibration - Tabular Results
Table - 6a Low range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
0	0.0022	0.0046	0.0046		0.0014	
0.1	0.1041	0.1045	0.1027		0.1013	
0.5	0.5033	0.5044	0.5004		0.5006	
1	1.0020	1.0054	1.0008		0.9987	
1.5	1.5026	1.5030	1.4996		1.4974	
2	2.0023	2.0030	1.9983		1.9977	
2.5	2.5021	2.5025	2.5000		2.4963	
3	3.0028	3.0052	2.9977		2.9973	
3.5	3.5020	3.5026	3.5005		3.4962	
4	4.0011	4.0027	3.9981		3.9949	
5	5.0005	5.0032	4.9974		4.9954	
4				4.0017		3.9939
3.5				3.5003		3.4962
3				3.0001		2.9961
2.5				2.5018		2.4968
2				2.0004		1.9960
1.5				1.5004		1.4951
1				0.9990		0.9964
0.5				0.5034		0.4986
0.1				0.1046		0.1012

Table - 6b High range calibration results

	0°	0°	120°	120°	240°	240°
kN	kN	kN	kN	kN	kN	kN
Fr	X1	X2	X3	X4'	X5	X6'
10	10.0000	9.9994	9.9952		9.9922	
20	19.9994	19.9979	19.9909		19.9900	
30	30.0286	30.0285	30.0216		30.0181	
40	40.0200	40.0175	40.0110		40.0068	
50	50.0045	50.0038	49.9988		49.9918	
60	59.9839	59.9879	59.9939		59.9605	
80	79.9014	79.9264	79.9171		79.9143	
100	99.8255	99.8331	99.8207		99.7721	
80				79.9070		79.8962
60				60.0106		59.9936
50				50.0408		50.0206
40				40.0475		40.0359
30				30.0494		30.0429
20				20.0130		20.0052
10				10.0022		9.9956

Table - 6 Uncertainty assessment

Reference force	Reference sleeve friction	Standard uncertainty u1 - u8								Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 Class	Sleeve calibration drift
kN	kPa	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kPa	%	kPa	%	Cone Class **	kPa
Fr	fs;r	u1*	u2	u3	u4	u5	u6	u7	u8	uc	uc;dim	Ucfs		Ufsclass			Udrift***
0	0	0.0000	0.0010	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0023	0.0023	0.20		0.20		0	0.00
0.1	4	0.0004	0.0008	0.0002	0.0020	0.0000	0.0026	0.0006	0.0007	0.0036	0.0036	0.32	7.18	0.32	7.18	0	0.00
0.5	22	0.0006	0.0009	0.0006	0.0020	0.0000	0.0014	0.0014	0.0005	0.0032	0.0032	0.28	1.28	0.28	1.28	0	0.00
1	44	0.0007	0.0010	0.0019	0.0020	0.0000	0.0005	0.0012	0.0011	0.0035	0.0036	0.31	0.72	0.31	0.72	0	0.01
1.5	66	0.0048	0.0015	0.0002	0.0020	0.0001	0.0001	0.0009	0.0005	0.0055	0.0056	0.49	0.75	0.48	0.75	0	0.01
2	88	0.0041	0.0015	0.0004	0.0020	0.0001	0.0005	0.0011	-0.0005	0.0050	0.0052	0.46	0.52	0.44	0.52	0	0.02
2.5	110	0.0041	0.0017	0.0002	0.0020	0.0001	0.0005	0.0007	-0.0006	0.0050	0.0053	0.47	0.42	0.44	0.42	0	0.02
3	132	0.0044	0.0018	0.0013	0.0020	0.0001	0.0007	0.0010	-0.0001	0.0055	0.0059	0.52	0.39	0.48	0.39	0	0.03
3.5	154	0.0053	0.0017	0.0004	0.0020	0.0002	0.0004	0.0001	-0.0006	0.0060	0.0065	0.57	0.37	0.53	0.37	0	0.03
4	176	0.0061	0.0018	0.0010	0.0020	0.0002	0.0020	0.0013	-0.0025	0.0076	0.0081	0.71	0.41	0.67	0.41	0	0.03
5	220	0.0023	0.0015	0.0016	0.0020	0.0002	0.0022	0.0004	-0.0029	0.0052	0.0063	0.56	0.25	0.46	0.25	0	0.04
10	439	0.0046	0.0023	0.0004	0.0020	0.0005	0.0042	0.0030	-0.0058	0.0096	0.0120	1.05	0.24	0.84	0.24	0	0.09
20	878	0.0079	0.0030	0.0009	0.0020	0.0009	0.0066	0.0108	-0.0016	0.0155	0.0211	1.86	0.21	1.36	0.21	0	0.17
30	1,317	0.0108	0.0031	0.0000	0.0020	0.0014	0.0227	0.0152	0.0388	0.0488	0.0534	4.69	0.36	4.29	0.36	0	0.26
40	1,756	0.0133	0.0039	0.0015	0.0020	0.0018	0.0126	0.0189	-0.0533	0.0596	0.0662	5.82	0.33	5.24	0.33	0	0.35
50	2,195	0.0163	0.0037	0.0004	0.0020	0.0023	0.0016	0.0204	-0.0575	0.0634	0.0729	6.40	0.29	5.57	0.29	0	0.43
60	2,634	0.0179	0.0099	0.0023	0.0020	0.0028	0.0206	0.0144	-0.0594	0.0678	0.0804	7.06	0.27	5.96	0.27	0	0.52
80	3,513	0.0232	0.0049	0.0144	0.0020	0.0037	0.0891	0.0082	-0.0443	0.1037	0.1187	10.42	0.30	9.11	0.30	0	0.69
100	4,391	0.0281	0.0171	0.0044	0.0020	0.0046	0.1943	0.0000	-0.0107	0.1975	0.2102	18.46	0.42	17.34	0.42	0	0.87

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

At each given deflection the expanded measurement uncertainty U_{fs_class} is calculated from the readings obtained during calibration.

$$U_{fs_class} = \frac{2}{S} \times \sqrt{\sum_{i=1}^8 u_i^2}$$

where,

u_1 is the standard uncertainty associated with the applied calibration force.

u_2 is the standard uncertainty associated with the reproducibility of the calibration results.

u_3 is the standard uncertainty associated with the repeatability of the calibration results.

u_4 is the standard uncertainty associated with the resolution and noise of the system.

u_5 is the standard uncertainty associated with the drift in zero output.

u_6 is the standard uncertainty associated with interpolation.

u_7 is the standard uncertainty associated with reversibility.

u_8 is the standard uncertainty associated with apparent load transfer from other sensor. Includes subtraction error where: $F_{r;qC} = F_r;fs$.

* u_1 is not a requirement for BS EN ISO 22476-1:2023 class uncertainty U_{fs_class} . We have included u_1 for clarity and confidence in the result.

** If the classification is altered with the inclusion u_1 , then the lower classification will be given alongside a # symbol as identification.

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

Sleeve Friction Calibration - Subtraction Error

In use, the forces acting on the sleeve load cell element are a combination of tip resistance and sleeve friction, with the tip resistance force value from the tip load cell element being subtracted to give the sleeve friction value. The resultant error values for differing tip and sleeve values are shown in Table 7.

The highlighted cell results in Table 7, show a direct reading of the subtraction error from the calibration results.

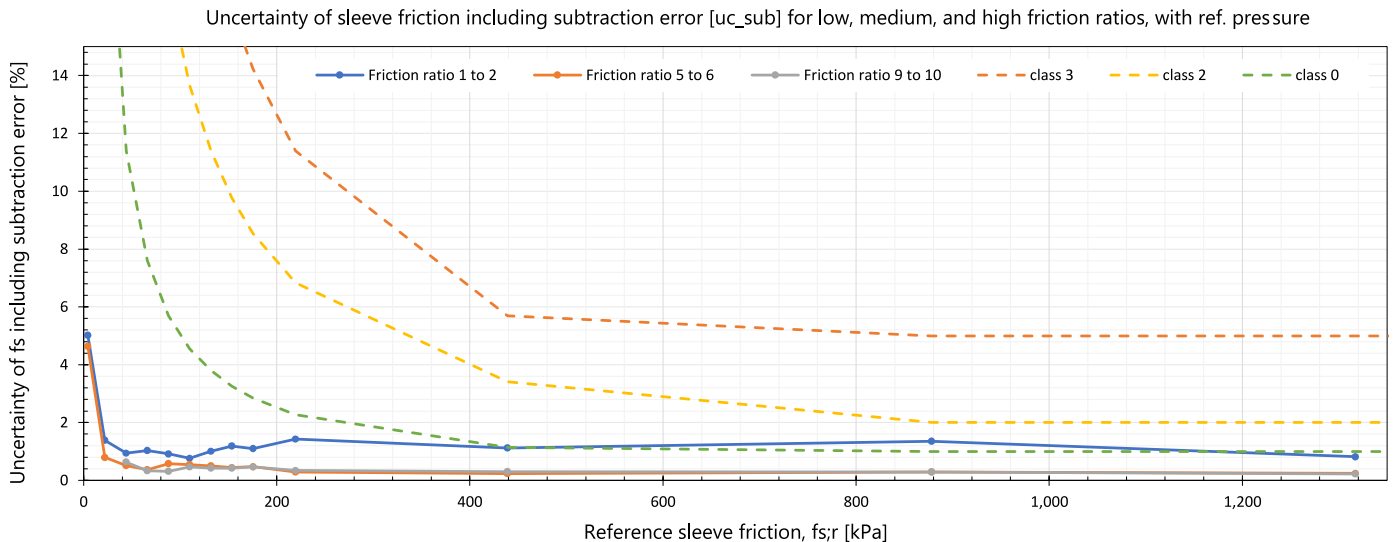
The non-highlighted cells in Table 7, show an interpolated subtraction error from the calibration results.

Sleeve friction - tip subtraction combined standard uncertainty uc_{sub} , where friction ratio is between 0.1% and 10%.

Table - 7

		Sleeve friction combined standard uncertainty including subtraction error (%)												
		Sleeve friction kPa →												
		4	22	44	66	88	110	132	154	176	220	439	878	1,317
Tip resistance kPa ↓	66	4.63	-	-	-	-	-	-	-	-	-	-	-	-
	332	5.02	0.79	-	-	-	-	-	-	-	-	-	-	-
	664	6.43	1.19	0.51	0.34	-	-	-	-	-	-	-	-	-
	996	6.63	1.03	0.51	0.37	0.31	-	-	-	-	-	-	-	-
	1,328	6.39	1.10	0.62	0.43	0.48	0.46	0.43	-	-	-	-	-	-
	1,660	7.10	1.25	0.65	0.75	0.58	0.49	0.45	0.43	-	-	-	-	-
	1,992	8.45	1.24	0.89	0.84	0.34	0.55	0.50	0.46	0.47	-	-	-	-
	2,324	8.70	1.95	1.01	0.86	0.66	0.56	0.51	0.47	0.47	0.36	-	-	-
	2,656	7.62	1.57	0.79	0.78	0.60	0.51	0.47	0.44	0.45	0.34	-	-	-
	3,319	8.83	1.81	1.02	0.86	0.66	0.56	0.51	0.48	0.48	0.29	-	-	-
	6,639	-	2.80	1.51	1.20	0.91	0.76	0.68	0.62	0.60	0.46	0.24	-	-
	13,278	-	6.82	3.52	2.53	1.92	1.56	1.34	1.19	1.10	0.86	0.77	0.35	0.22
	19,917	-	18.07	9.15	6.28	4.73	3.81	3.22	2.80	2.51	1.99	0.88	0.39	0.24
	26,555	-	-	1.53	1.20	0.92	0.77	0.68	0.62	0.60	0.47	1.31	0.39	0.36
	33,194	-	-	2.69	1.98	1.50	1.23	1.07	0.95	0.89	0.70	1.44	0.34	0.83
	39,833	-	-	4.08	2.91	2.20	1.79	1.53	1.35	1.24	0.98	0.61	1.16	0.44
53,111	-	-	-	6.04	4.54	3.66	3.10	2.69	2.42	1.92	1.08	1.73	0.60	
66,389	-	-	-	-	7.81	6.27	5.27	4.56	4.05	3.22	1.73	0.98	0.81	
		Friction ratio (for a given row) →												

↑ Friction ratio (for a given column)



Pore Pressure Calibration

Calibration method

1. The cone penetrometer was placed in a pressure vessel and was pressurised to full range 3 times for no less than 1 minute before calibration.
2. The pore pressure was calibrated with 2 sets of increasing pressures and 2 sets of decreasing pressures.
3. The coefficients of a linear and third order equation relating the estimate of applied pressure as a function of deflection were calculated and are shown in Table 8.
4. The pressures applied, and the resulting deflections are given in Tables 9. No corrections for temperature have been applied to these results.
5. The combined expanded uncertainty* of deflection U_u and U_{u_class} for each force is shown as a percentage of the recorded value and in units of pressure kPa as shown in Table 10.

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

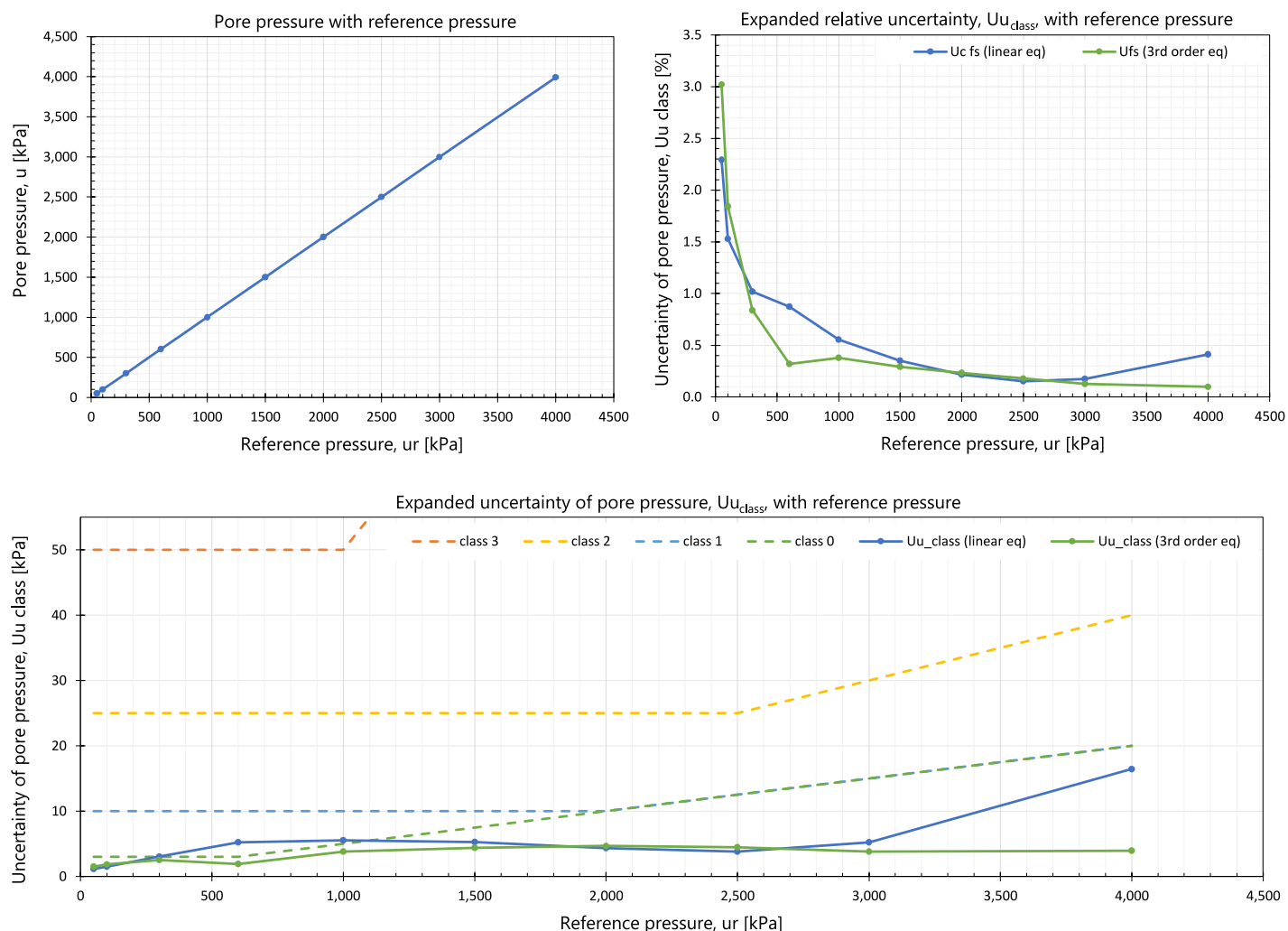
Cone Penetrometer	
Pore pressure sensor capacity	5 MPa
Calibration range	4 MPa
Pore pressure resolution	0.005 kPa
Historic drift between pore calibrations (u_{drift})	0.05774 %
Pore pressure sensor max zero drift	0.12 kPa
Reference pressure sensor max zero drift	0.72 kPa

Calibration Conditions	
Ambient temperature	22.3 °C
Pressure chamber temperature variation	0.31 °C
Instrument temperature variation	0.45 °C

Reference Pressure Sensor Uncertainty	
MMG1.0KV	0.02 ±%

Reference Indicator Uncertainty	
Keithley 7.5 Digit DMM	12 PPM

Pore Pressure Calibration - Graphical Results



Interpolation

Table - 8		
Linear Equation	The pore pressure output in pressure units D (0.1 Pa) is derived using a linear factor from the raw pore pressure output. $D = \text{Factor} \times \text{RAW_Output}$	0.1 Pa Factor = 0.047176
Polynomial Equation	3rd order polynomial equation. For a given cone indicated output of D (0.1 Pa units), the corrected applied pressure, P (in 0.1 Pa units) is calculated from : $P = (a3 \times D^3) + (a2 \times D^2) + (a1 \times D) + a0$	$a0 = -5428.211954$ $a1 = 0.994929627$ $a2 = 2.18101E-10$ $a3 = -9.64148E-19$

Pore Pressure Calibration - Tabular Results
Table - 9 Calibration results

kPa ur	kPa X1	kPa X2'	kPa X3	kPa X4'
0	0.06		0.12	
50	49.63		49.29	
100	99.44		99.29	
300	299.51		299.03	
600	599.65		599.64	
1000	998.92		998.72	
1500	1498.62		1498.42	
2000	1998.72		1998.26	
2500	2498.81		2498.79	
3000	2999.53		2999.15	
4000	4000.23		3999.50	
3000		3000.89		3001.30
2500		2501.50		2501.20
2000		2001.25		2000.87
1500		1501.01		1501.04
1000		1001.29		1001.20
600		601.19		601.03
300		300.89		301.01
100		100.59		100.38
50		50.11		50.45

Table - 10 Uncertainty assessment

Reference pressure ur	Standard uncertainty u1 to u6						Combined standard calibration uncertainty		Expanded calibration uncertainty [k=2]				BS EN ISO 22476:2023 class	Pore calibration drift
	kPa u1*	kPa u2	kPa u3	kPa u4	kPa u5	kPa u6	kPa u _i	%	kPa U _u	%	kPa U _u _{class}	%	Cone Class **	kPa U _u _{drift} ***
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0	0.00
50	0.02	0.20	0.00	0.00	0.55	0.48	0.76	1.51	1.51	3.02	1.51	3.02	0	0.03
100	0.05	0.09	0.00	0.00	0.64	0.65	0.92	0.92	1.84	1.84	1.84	1.84	0	0.06
300	0.14	0.28	0.00	0.01	0.73	0.97	1.26	0.42	2.52	0.84	2.52	0.84	0	0.17
600	0.29	0.00	0.00	0.02	0.35	0.84	0.96	0.16	1.92	0.32	1.92	0.32	0	0.35
1000	0.48	0.12	0.00	0.03	1.18	1.40	1.90	0.19	3.80	0.38	3.80	0.38	0	0.58
1500	0.72	0.11	0.00	0.05	1.48	1.45	2.20	0.15	4.40	0.29	4.40	0.29	0	0.87
2000	0.96	0.27	0.00	0.06	1.51	1.48	2.34	0.12	4.68	0.23	4.68	0.23	0	1.15
2500	1.20	0.01	0.00	0.08	1.20	1.47	2.25	0.09	4.49	0.18	4.49	0.18	0	1.44
3000	1.44	0.22	0.00	0.09	0.66	1.02	1.90	0.06	3.80	0.13	3.80	0.13	0	1.73
4000	1.92	0.42	0.00	0.12	0.14	0.00	1.98	0.05	3.95	0.10	3.95	0.10	0	2.31

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

At each given deflection the expanded measurement uncertainty U_u_{class} is calculated from the readings obtained during calibration.

$$U_{u_{class}} = 2 \times \sqrt{\sum_{i=1}^6 u_i^2}$$

where,

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

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

u3 is the standard uncertainty associated with the resolution and noise of the system.

u4 is the standard uncertainty associated with the drift in zero output.

u5 is the standard uncertainty associated with interpolation.

u6 is the standard uncertainty associated with reversibility.

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

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

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

Pore Pressure Calibration - Measured Area Ratios
Calibration method

1. The apparent cone resistance $q_{c;a}$ and apparent sleeve friction $f_{s;a}$ are recorded for all pore pressure calibration intervals, and shown in Table 11a and 11b.
2. The resulting net area ratios of the cone a and net area ratios of the sleeve b are computed and shown in Table 11a and 11b.
3. The final recorded cone net area ratio a and sleeve net area ratio b are shown in Table 12, where reference pressure $u_r = 2000\text{kPa}$

Table - 11a Cone net area ratio assessment

kPa u_r	Apparent cone resistance [$q_{c;a}$]					Alpha factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	35.2		32.8		34.0	0.68
100	74.2		69.9		72.0	0.72
300	225.0		223.7		224.4	0.75
600	452.4		453.6		453.0	0.75
1000	767.9		768.3		768.1	0.77
1500	1166.4		1163.0		1164.7	0.78
2000	1564.4		1562.7		1563.6	0.78
2500	1969.2		1974.3		1971.8	0.79
3000	2376.1		2388.4		2382.3	0.79
4000	3157.7		3167.0		3162.4	0.79
3000		2427.2		2429.3	2428.2	0.81
2500		2037.77		2033.15	2035.5	0.81
2000		1645.17		1649.17	1647.2	0.82
1500		1251.34		1250.02	1250.7	0.83
1000		849.227		849.272	849.2	0.85
600		514.862		517.475	516.2	0.86
300		259.211		260.08	259.6	0.87
100		84.4597		86.3824	85.4	0.85
50		44.8782		43.7769	44.3	0.89

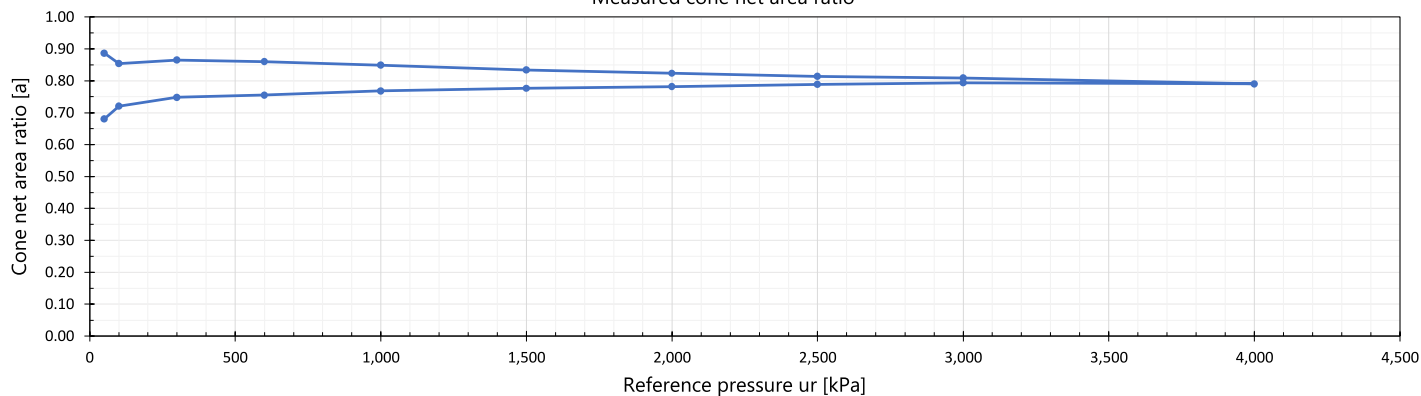
Table - 11b Sleeve friction net area ratio assessment

kPa u_r	Apparent sleeve friction [$f_{s;a}$]					Beta factor
	kPa X1	kPa X2'	kPa X3	kPa X4'	kPa Mean	
50	-0.13		-0.07		-0.10	-0.002
100	-0.14		-0.15		-0.14	-0.001
300	-0.31		-0.38		-0.34	-0.001
600	-0.64		-0.79		-0.72	-0.001
1000	-1.44		-1.63		-1.54	-0.002
1500	-2.83		-2.81		-2.82	-0.002
2000	-4.05		-4.03		-4.04	-0.002
2500	-5.29		-5.34		-5.32	-0.002
3000	-6.48		-6.54		-6.51	-0.002
4000	-8.69		-8.67		-8.68	-0.002
3000		-7.25		-7.19	-7.22	-0.002
2500		-6.40		-6.42	-6.41	-0.003
2000		-5.63		-5.68	-5.65	-0.003
1500		-4.59		-4.68	-4.63	-0.003
1000		-3.27		-3.41	-3.34	-0.003
600		-2.08		-2.23	-2.16	-0.004
300		-0.86		-0.96	-0.91	-0.003
100		-0.18		-0.35	-0.27	-0.003
50		-0.16		-0.12	-0.14	-0.003

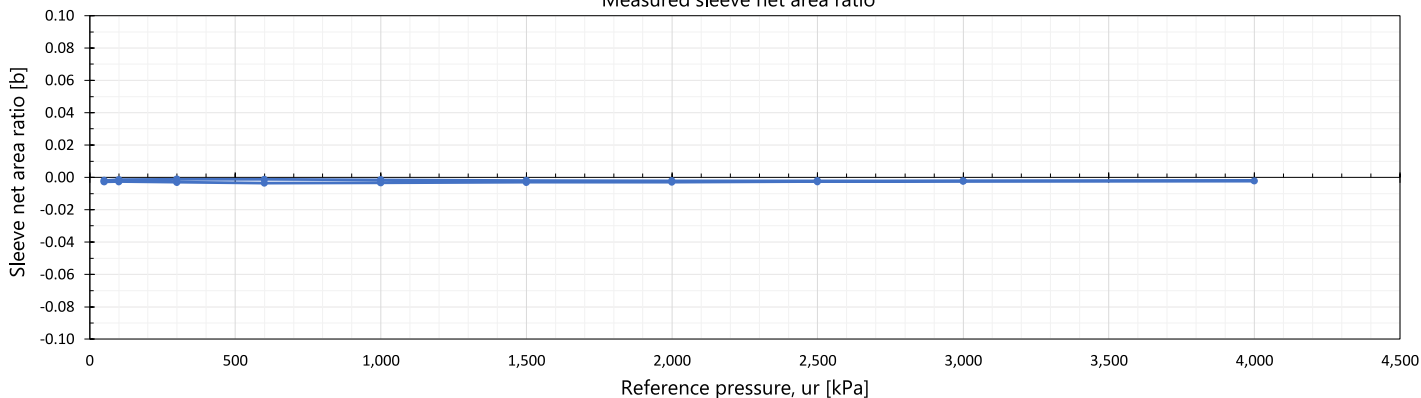
Table - 12

Cone net area ratio [a]	0.78
Sleeve friction net area ratio [b]	-0.002

Measured cone net area ratio



Measured sleeve net area ratio



Inclination Calibration
Calibration method

1. The cone penetrometer was placed in the inclination calibration frame and set to a vertical reference inclination of $i_r = 0^\circ$.
2. The inclination was calibrated from $i_r = 0^\circ$ to $i_r = 20^\circ$. This was conducted twice, once with the cone at 0° rotation and once with the cone at 90° rotation.
3. The coefficients of a linear equation relating the estimate of the inclination as a function of raw sensor deflection were calculated and are shown in Table 13.
4. The inclination angle applied, and the resulting measurements are given in Table 14.
5. The combined expanded uncertainty* of measurement U_{inc} for each inclination angle is shown as a percentage of the recorded value and in units of arc degrees $^\circ$, as shown in Table 15.

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

Cone Penetrometer		Reference Inclination Rotary Table Uncertainty	
Inclination sensor range	90 $^\circ$	Lankelma HV6 Rotary Table	0.10 $^\circ$
Calibration range	20 $^\circ$		
Inclination resolution	0.005 $^\circ$		
Inclinometer number of axis	2		

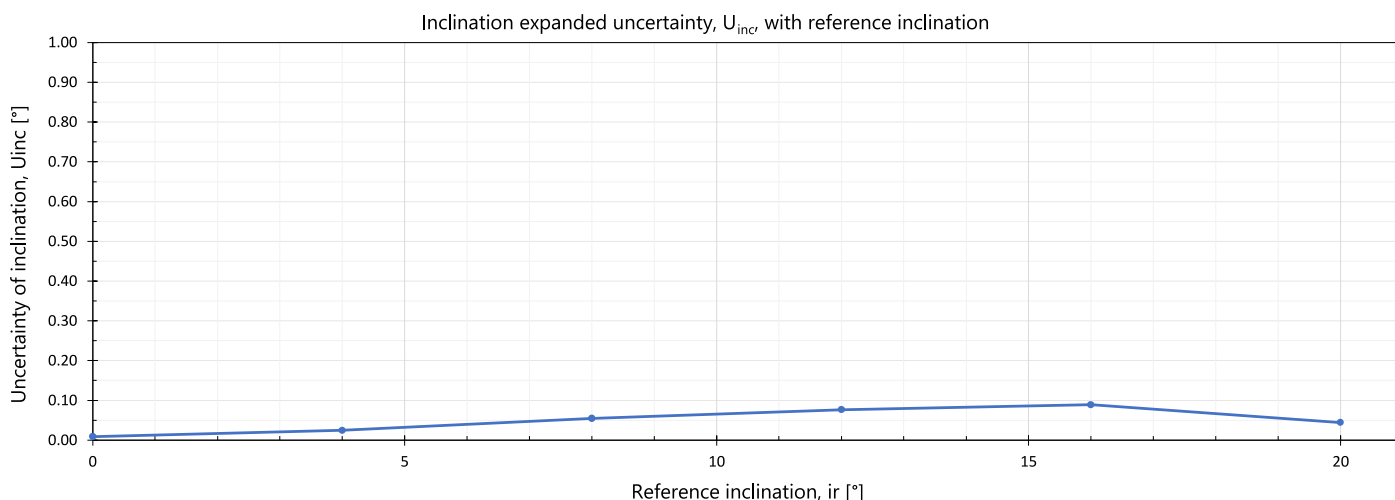
Inclination - Graphical Results

Interpolation

Table - 13

Linear Equation	The Inclination output in angular units ($0.1^\circ \times 10^{-3}$) is derived using a linear factor from the raw inclination output.	X axis Factor =	9.824298
		Y axis Factor =	9.803696

Inclination Calibration - Tabular Results

Table - 14

Inclination calibration		
i_r	θ_0	θ_{90}
0	0.00	0.00
4	4.02	4.00
8	7.99	7.98
12	12.03	12.04
16	16.03	16.05
20	20.00	20.02

Table - 15 Uncertainty assessment

Reference Inclination	Standard calibration uncertainty u_1 to u_4				Combined standard calibration uncertainty u_i		Expanded calibration uncertainty U_{inc} [k=2]	
	i_r	u_1	u_2	u_3	u_4	u_i	%	%
0	0	0.00	0.00	0.00	0.00	0.00		0.01
4	4	0.01	0.01	0.00	0.01	0.01	0.31	0.02 0.61
8	8	0.02	0.01	0.00	-0.02	0.03	0.34	0.05 0.68
12	12	0.02	0.00	0.00	0.03	0.04	0.32	0.08 0.64
16	16	0.02	0.01	0.00	0.04	0.04	0.28	0.09 0.56
20	20	0.02	0.01	0.00	0.01	0.02	0.11	0.04 0.22

At each given deflection the expanded measurement uncertainty U_{inc} is calculated from the readings obtained during calibration.

$$U_{inc} = 2 \times \sqrt{\sum_{i=1}^4 u_i^2}$$

where,

u_1 is the standard uncertainty associated with the applied calibration inclination.

u_2 is the standard uncertainty associated with the reproducibility of the calibration results.

u_3 is the standard uncertainty associated with the resolution and noise of the system.

u_4 is the standard uncertainty associated with interpolation.

Temperature Calibration

Calibration method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 0°C.
2. The temperature was calibrated from Tr = 0°C to Tr = 30°C.
3. The coefficients of a linear equation relating the estimate of temperature as a function of raw temperature sensor deflection were calculated and are shown in Table 16.
4. The applied temperature, and the resulting measurements are given in Table 17.
5. The combined expanded uncertainty* of measurement Utemp for each temperature is shown as a percentage of the recorded value and in units of Celsius °C, as shown in Table 18.

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

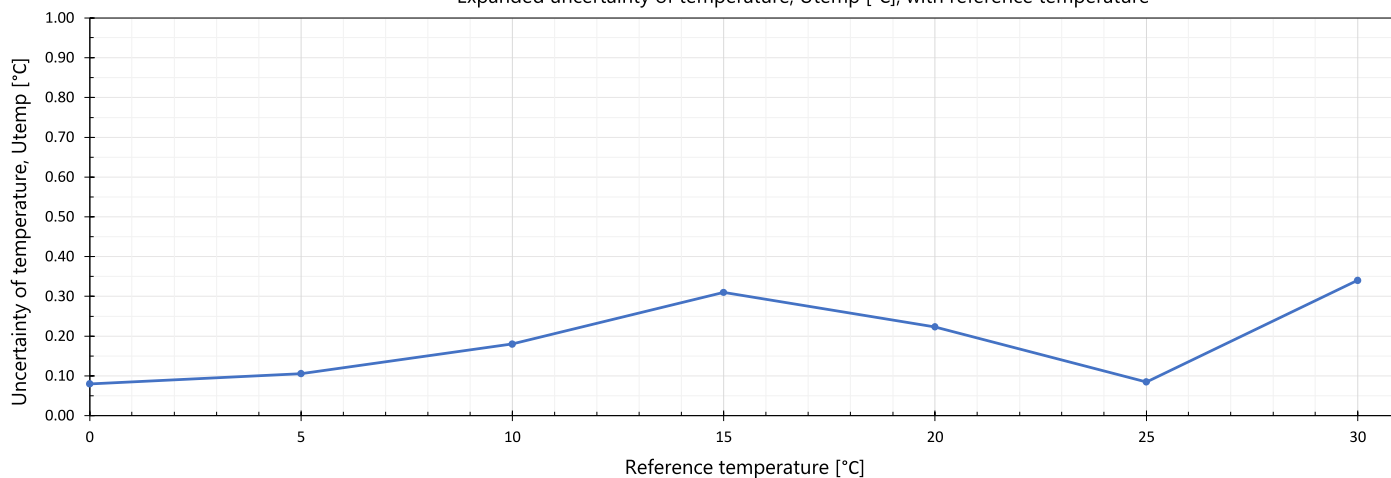
Cone Penetrometer	
Temperature sensor range	90 °
Calibration range	30 °
Temperature resolution	0.005 °
Temperature number of axis	2

Reference Thermometer Uncertainty	
ETI Ref Thermometer	0.04 °

Temperature Datalogger Uncertainty	
ETI ThermoData	0.4 °

Temperature Calibration - Graphical Results

Expanded uncertainty of temperature, Utemp [°C], with reference temperature



Interpolation

Table - 16

Linear Equation	The temperature sensor output in temperature units ($0.1^{\circ}\text{C} \times 10^{-3}$) is derived using a linear factor from the raw temperature output.	Temperature sensor [qc] factor =	0.568917
		Temperature sensor [fs] factor =	0.569077

Temperature Calibration - Tabular Results

Table - 17
Temperature calibration

°C	°C
Tr	Ta
0	0.00
5	5.03
10	9.92
15	14.85
20	19.90
25	24.99
30	30.17

Table - 18 Uncertainty assessment

Reference temp	Standard calibration uncertainty u1 to u3			Combined standard calibration uncertainty ut		Expanded calibration uncertainty Utemp [k=2]	
	°C	°C	°C	°C	%	°C	%
Tr	u1	u2	u3	ut		Utemp	
0	0.04	0.00	0.00	0.04		0.08	
5	0.04	0.00	0.03	0.05	1.05	0.11	2.11
10	0.04	0.00	-0.08	0.09	0.90	0.18	1.80
15	0.04	0.00	-0.15	0.16	1.03	0.31	2.07
20	0.04	0.00	-0.10	0.11	0.56	0.22	1.12
25	0.04	0.00	-0.01	0.04	0.17	0.09	0.34
30	0.04	0.00	0.17	0.17	0.57	0.34	1.13

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

$$U_{temp} = 2 \times \sqrt{\sum_{i=1}^3 u_i^2}$$

where,

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

u2 is the standard uncertainty associated with the resolution and noise of the system.

u3 is the standard uncertainty associated with interpolation.

Temperature Influence Verification

Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath with the temperature set to 30 °C, the second bath temperature was set to 0 °C.
2. The test method for verification of a cone penetrometer for temperature influence was followed as set out in BS EN ISO 224 76-1:2023, clause B.2.7.2.
3. The bath temperatures, apparent cone resistance, apparent sleeve friction, apparent pore pressure, and apparent cone temperature were recorded for the duration of the test.
4. The correction factors for q_c ; corrected apparent cone resistance, corrected sleeve friction, and corrected pore pressure were applied in post processing.
5. The start and end apparent readings are shown in Table 19. The maximum and minimum apparent readings are shown in Table 20.
6. The ambient stability, transient stability, and resulting penetrometer class were calculated and are shown in Table 21.

Table - 19 Start and end apparent readings

	°C	°C	kPa	kPa	kPa	kPa	kPa	kPa
	Ta _{qc}	Ta _{fs}	q _c ;a	q _c ;ac	fs;a	fs;ac	u;a	u;ac
T30	30.2	30.2	-0.6	0.2	0.0	0.0	-0.1	-0.1
T0	0.2	0.2	-17.6	2.3	-1.3	2.7	3.4	-2.4

Table - 20 Maximum / minimum apparent readings

	kPa	kPa	kPa	kPa	kPa	kPa
	q _c ;a	q _c ;ac	fs;a	fs;ac	u;a	u;ac
max	433.3	137.0	10.5	9.0	8.8	5.5
min	-403.4	-106.7	-13.5	-5.9	-5.1	-8.9

Maximum rate of change

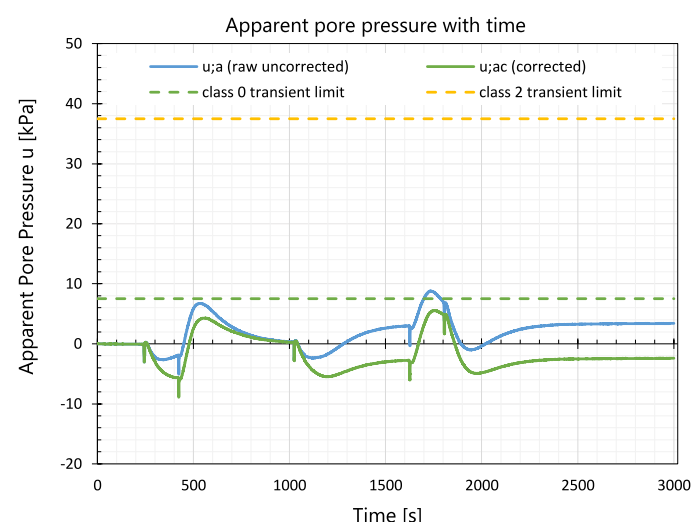
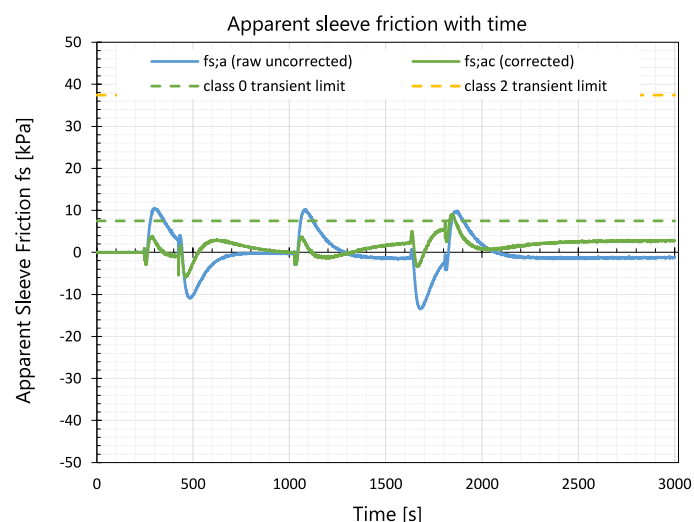
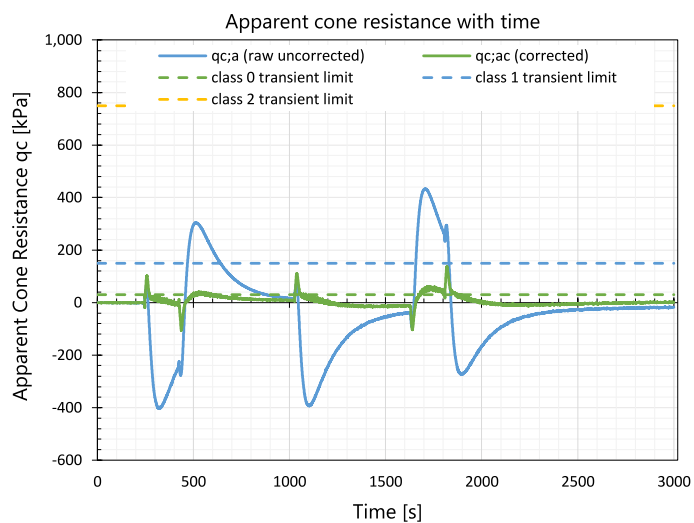
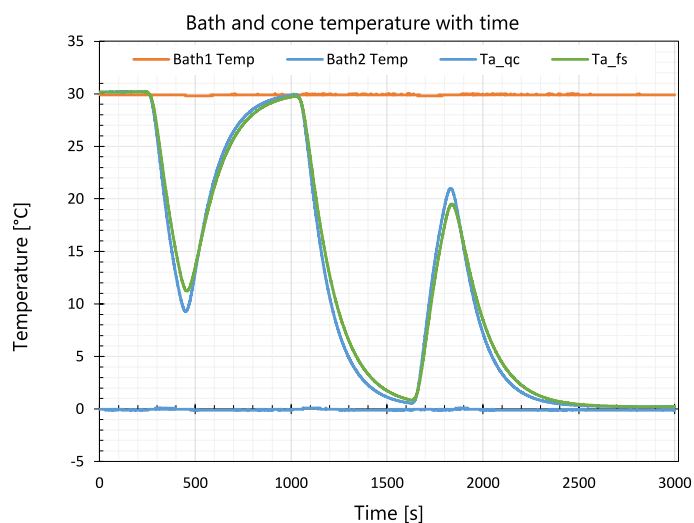
kPa/s	kPa/s	kPa/s	kPa/s	kPa/s	kPa/s
Δfg _{qc}	Δfg _{qcc}	Δfg _{fs}	Δfg _{fsc}	Δfg _u	Δfg _{uc}
15.06	5.78	0.52	0.39	0.21	0.21

Table - 21a Ambient temperature stability and classification

Ambient temperature stability		kPa/°C	Class
Uncorrected	Δa _{qc}	0.57	1
	Δa _{fs}	0.04	0
	Δa _u	-0.12	2
Corrected	Δa _{qcc}	-0.07	0
	Δa _{fsc}	-0.09	0
	Δa _{uc}	0.08	0

Table - 21b Transient temperature stability and classification

Transient temperature stability		kPa/°C	Class
Uncorrected	Δt _{qc}	27.91	2
	Δt _{fs}	0.80	2
	Δt _u	0.46	0
Corrected	Δt _{qcc}	8.13	1
	Δt _{fsc}	0.50	0
	Δt _{uc}	0.48	0



Bending Influence Verification

Verification Method

1. The cone penetrometer was placed in the bending influence frame, clamping the cone horizontally.
2. The test method for verification of a cone penetrometer for bending influence was followed as set out in BS EN ISO 22476-1:2023, clause B.2.8.2.
3. The air temperature, apparent cone resistance, apparent sleeve friction, and apparent pore pressure were recorded for the duration of each test. In total 8 tests were performed from 0° rotation to 315° rotation, evenly spaced with 45° rotation between tests.
4. The bending influence results and resulting cone penetrometer classification was calculated and are shown in Table 22.

Table - 22 Bending Influence results

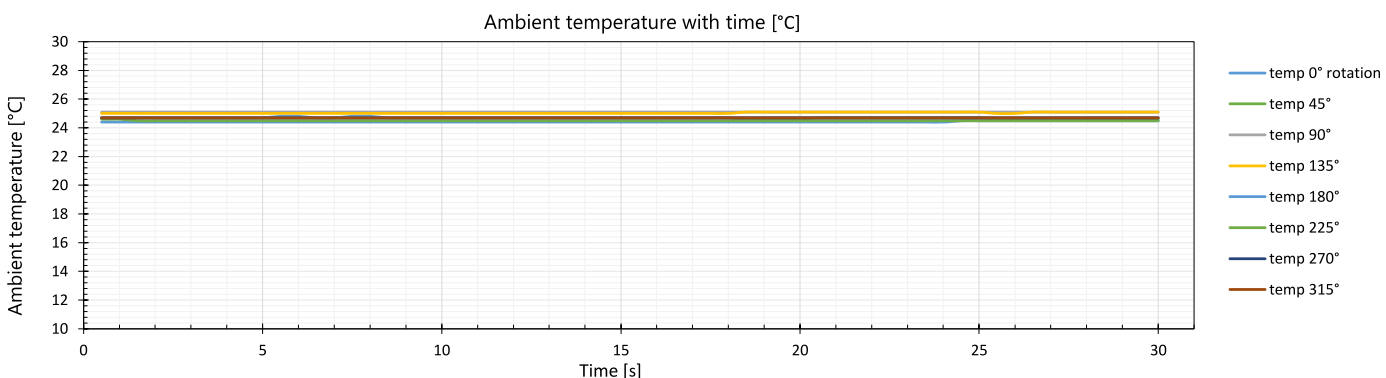
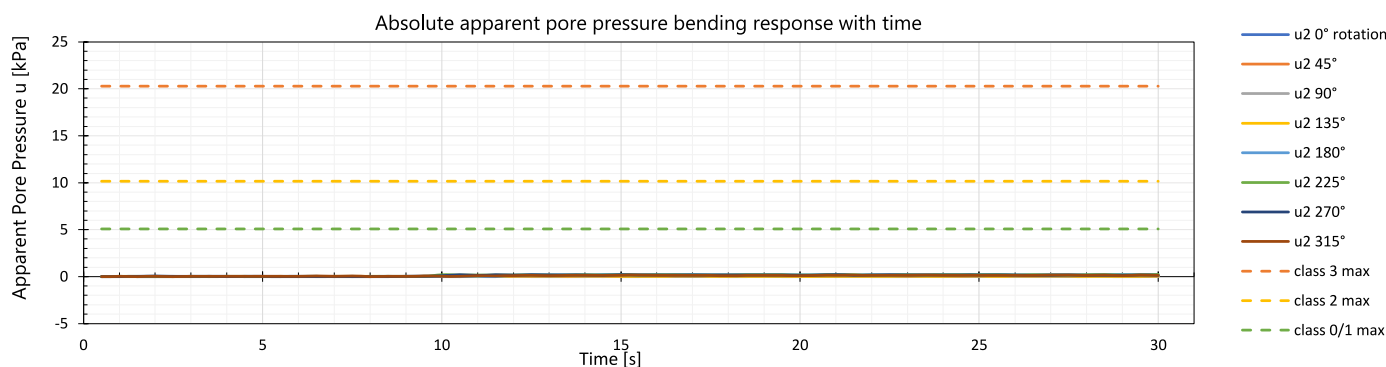
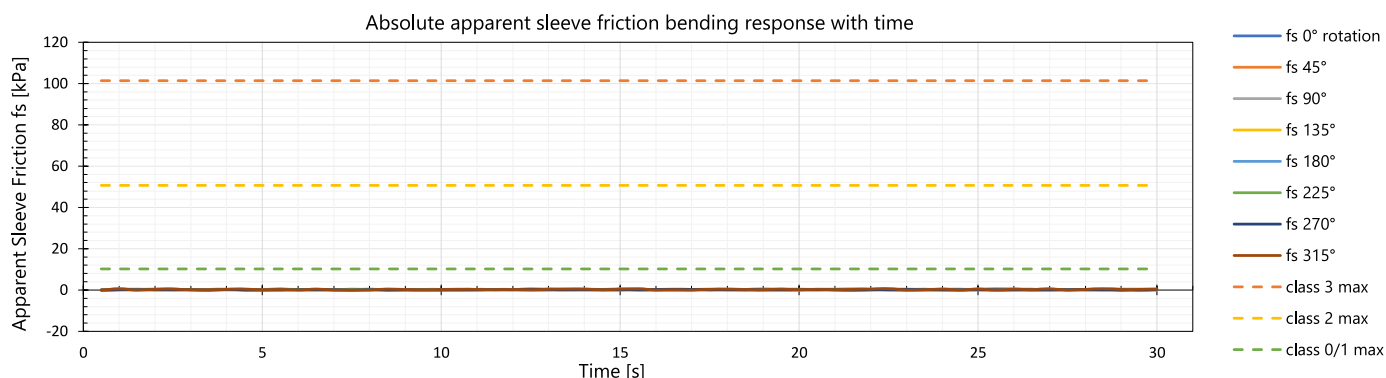
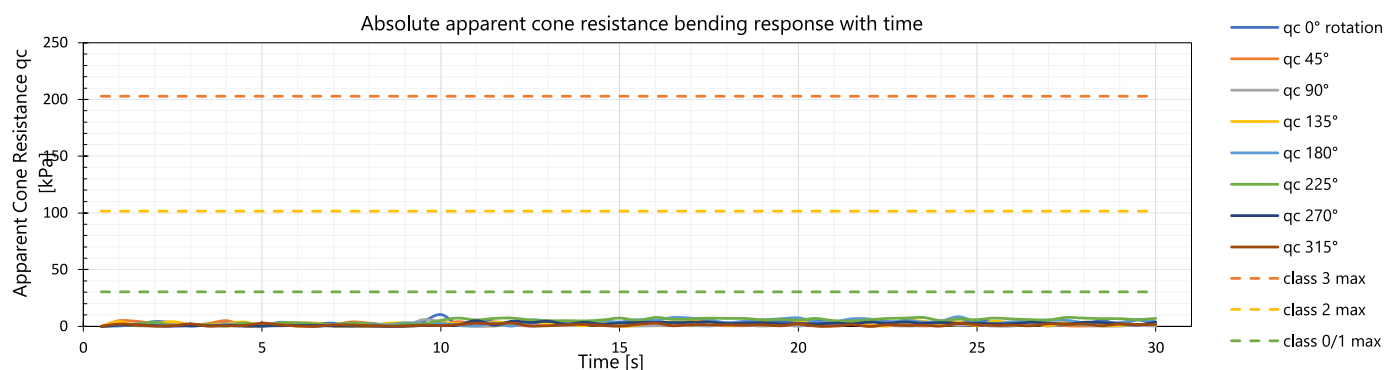
	qc;a [kPa/N]	fs;a [kPa/N]	u2;a [kPa/N]	Ambient Temp [°C]
max	0.030	0.002	0.002	24.5
min	-0.084	-0.006	0.000	24.4
max test Δb, Δt	0.114	0.008	0.003	0.1
class	0	0	0	

10 kg Calibration Weight Uncertainty

10 kg Calibration Weight 0.001 %

10 kg Calibration Weight

Reference weight 10.341 kg
Reference force 101.411 N



Sensor Stability Verification

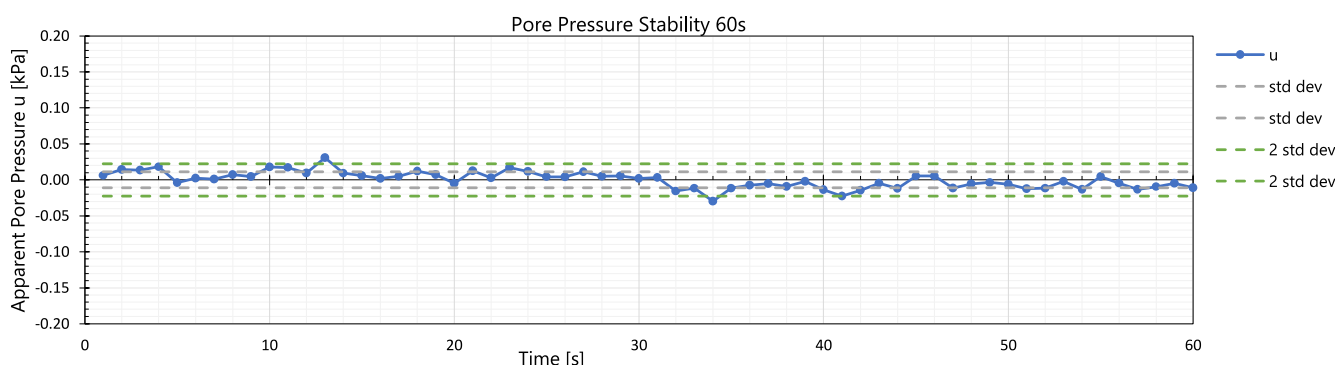
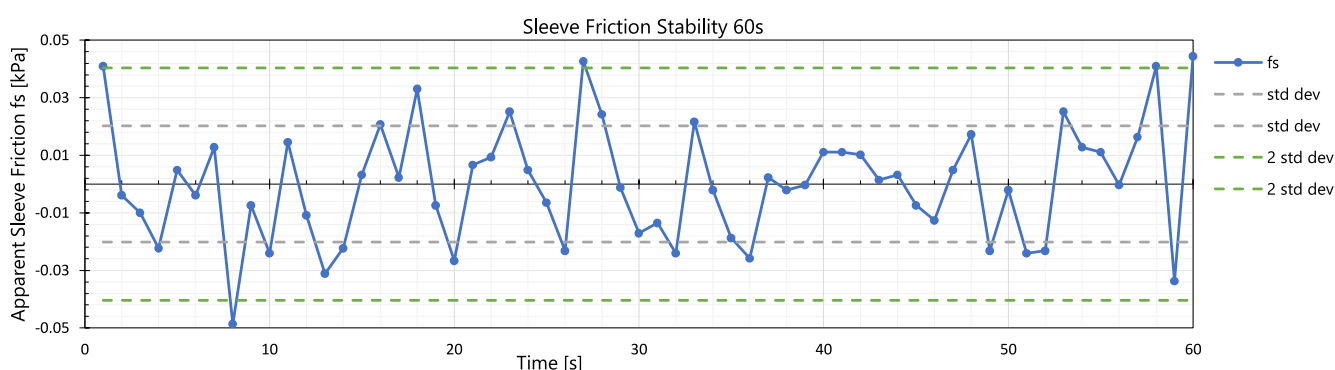
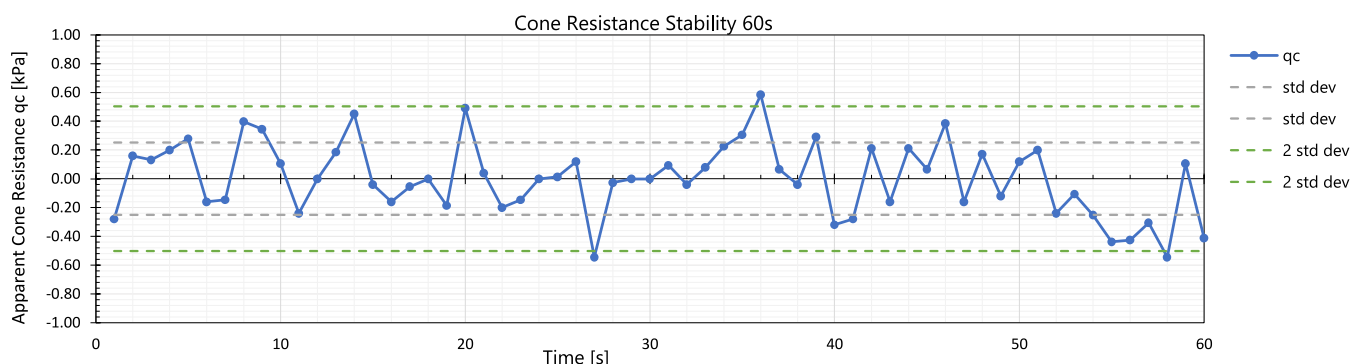
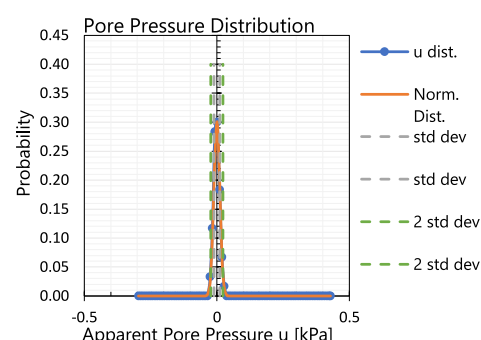
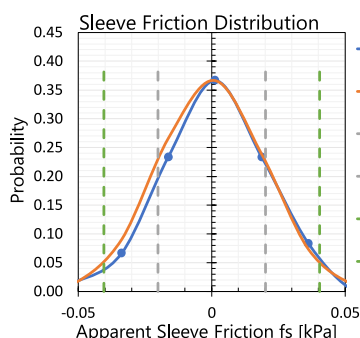
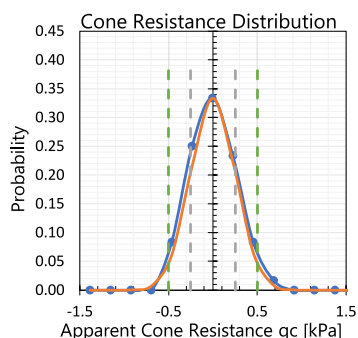
The purpose of this section is to quantify the stability of the geotechnical sensors (q_c , f_s , u) and demonstrate validity of applying a normal distribution, described by standard deviation and mean, when assessing probability of noise magnitude. The sampling duration has been limited to 60 seconds to allow direct comparison to the field verification data required under BS EN ISO 22476-1: 2023.

Verification method

1. The cone penetrometer was placed in the thermostatic temperature calibration bath at ambient temperature.
2. The cone penetrometer was left for no less than 30 minutes or until the output was stable.
3. The output was recorded for 60 seconds at a frequency of 1Hz. The maximum change and standard deviation are shown in Table 23.

Table - 23 Sensor stability results

	q_c (kPa)	f_s (kPa)	u (kPa)	Inc (°)	Temp (°C)
Max	0.584	0.044	0.031	0.049	0.002
Min	-0.545	-0.049	-0.030	-0.058	-0.003
Δ (Max - Min)	1.129	0.093	0.061	0.118	0.008
Standard deviation (68% coverage)	± 0.251	± 0.020	± 0.011	± 0.023	± 0.001
2 standard deviations (95% coverage)	± 0.503	± 0.040	± 0.022	± 0.045	± 0.003





UK22 Track-truck

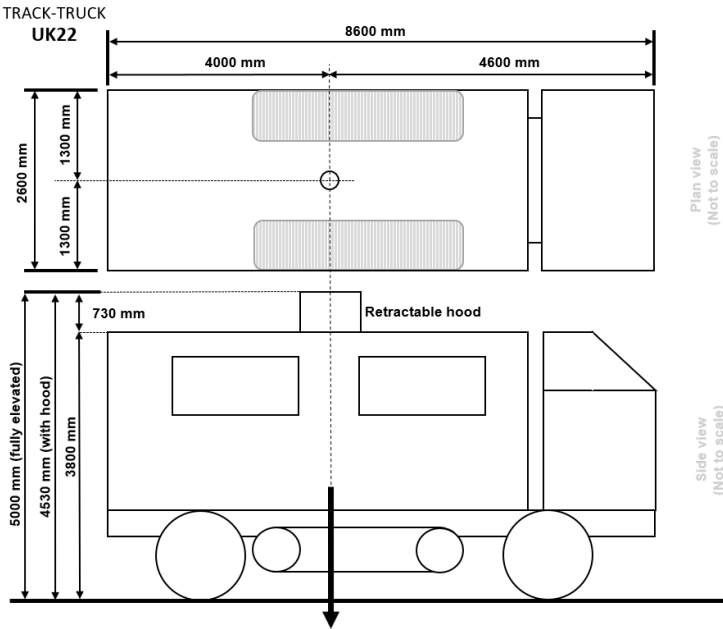


Rig weight	18 T
Max. operating ram capacity	200 kN
Max. travelling speed	4 km/h (tracking)
Track material	Composite
Track length	2800 mm
Track width	650 mm
Jack plate dimensions	Tracks act as jacks
Jack arrangements	1nr. on each side
Max. ground bearing pressure	76 kPa
Max. testing gradient	10 degrees
Max. traversing gradient	20 degrees (operator assessed)
Clamp arrangement	Automatic hydraulic
Ram stroke	1250 mm
Max. casing size	55 mm
Typical production	100 m+ of standard CPTu testing per day (depending on conditions and access)

The versatile track-truck is suitable for most geotechnical sites. The rig is driven to site as a self-contained HGV with composite tracks that can be deployed to cope with soft or uneven terrain.

Remote-controlled tracking to assist with manoeuvring onto location.

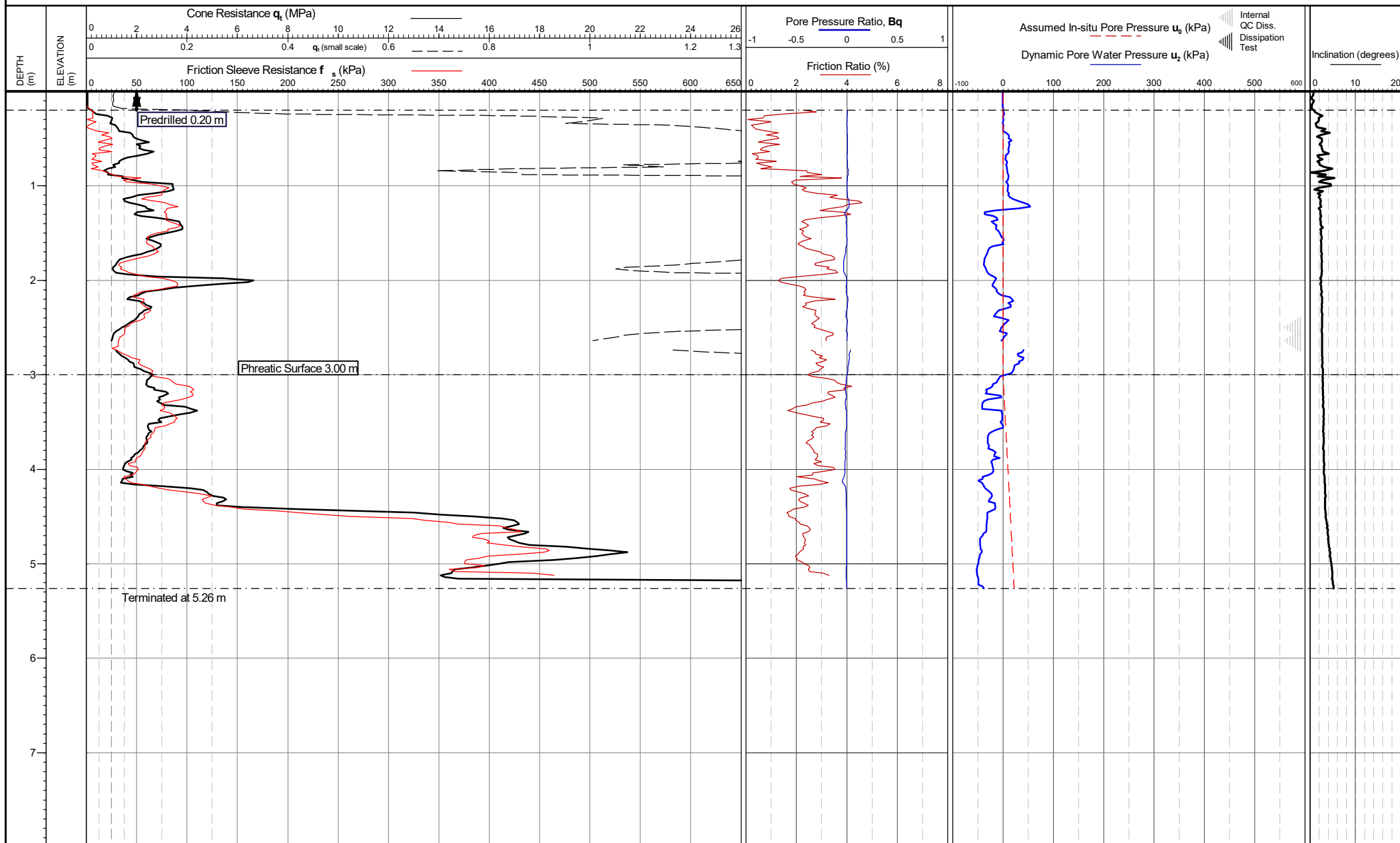
Complies with Euro 6 emission standards for use in London's low emissions zones (LEZ).



APPENDIX C CONE PENETRATION TEST RESULTS

Measured CPT parameters

intermediate parameters R_f and B_q



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 09:45:27

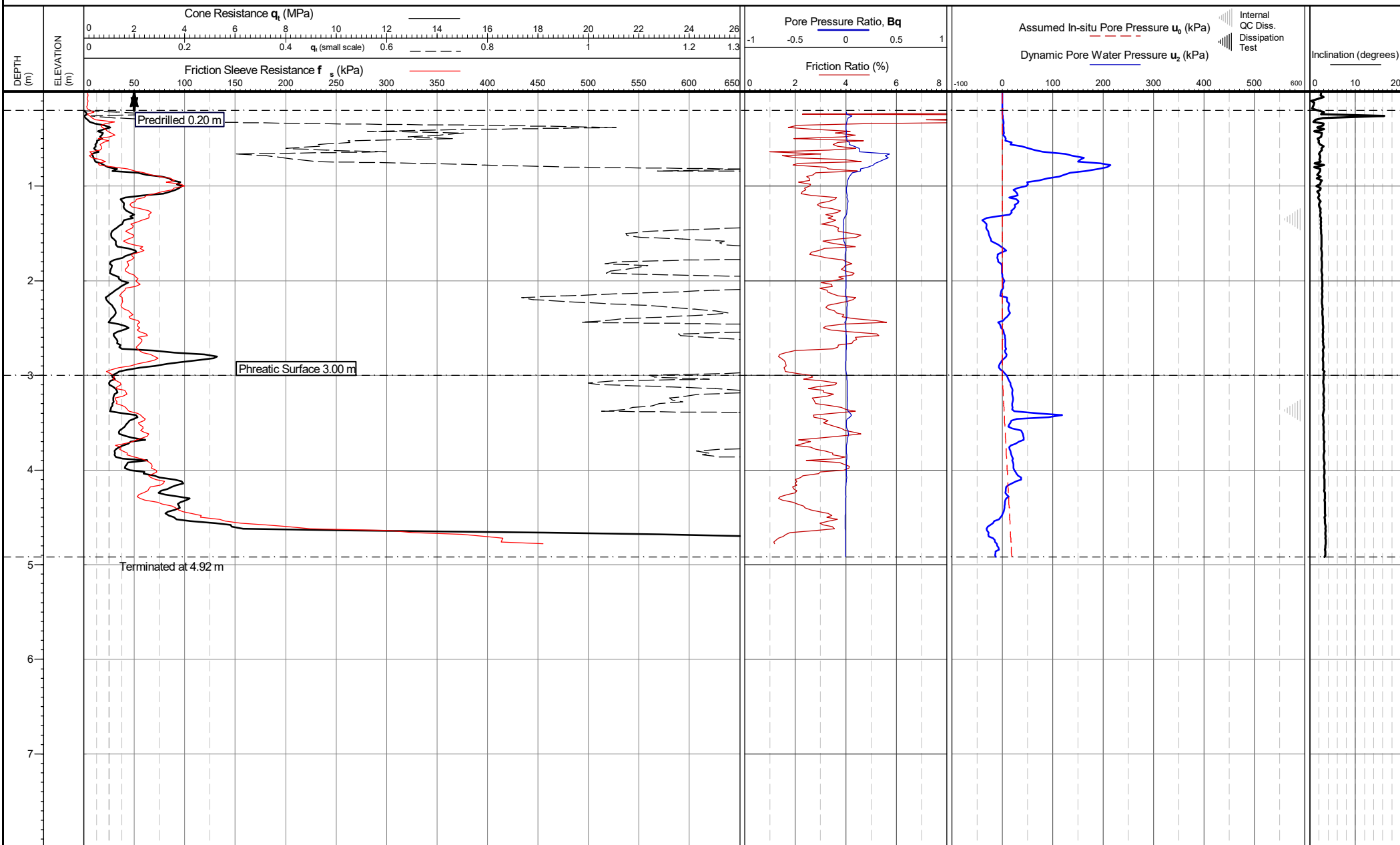
Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Risk of equipment loss/damage

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-01



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:11:41

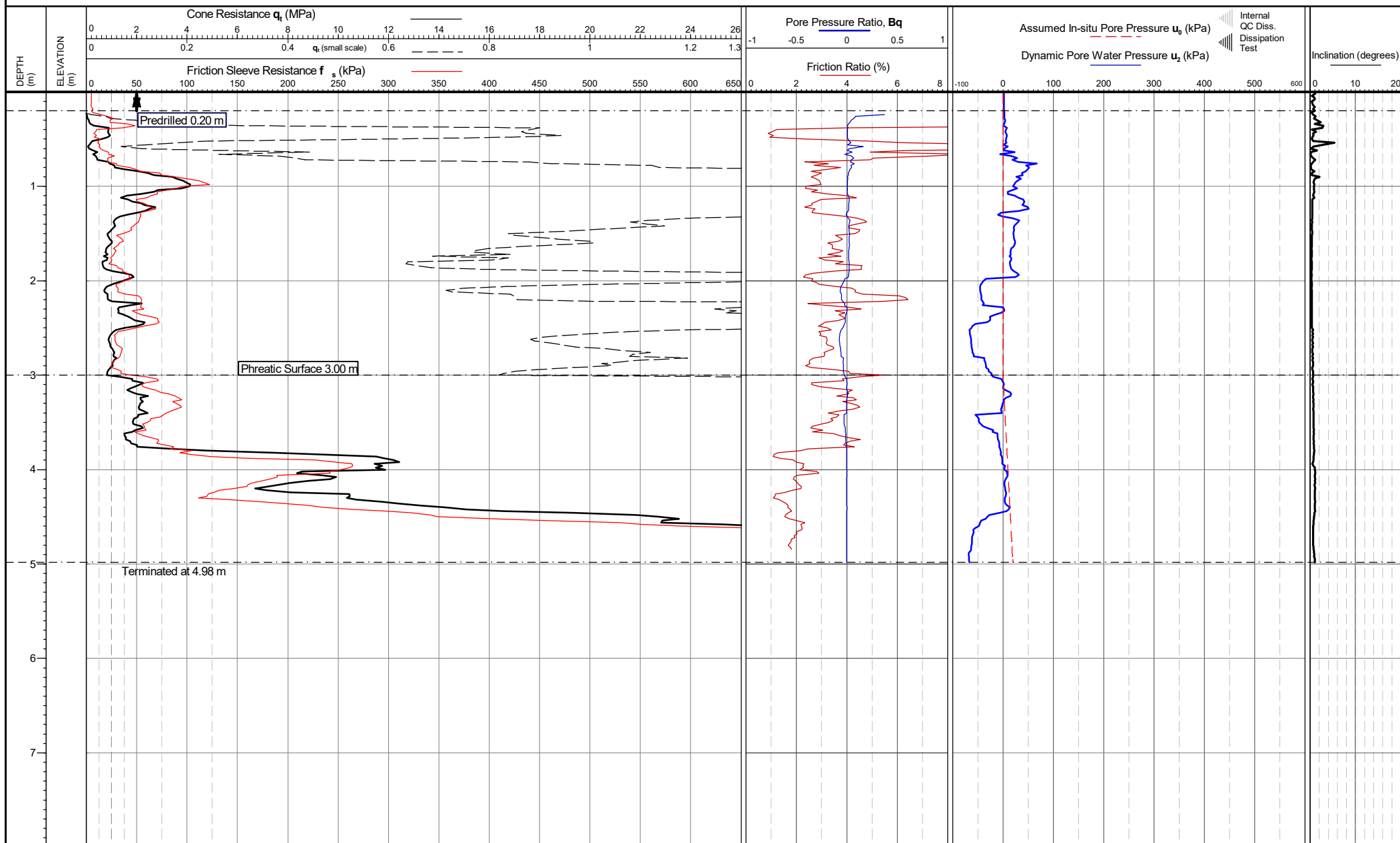
Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-02



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:57:15

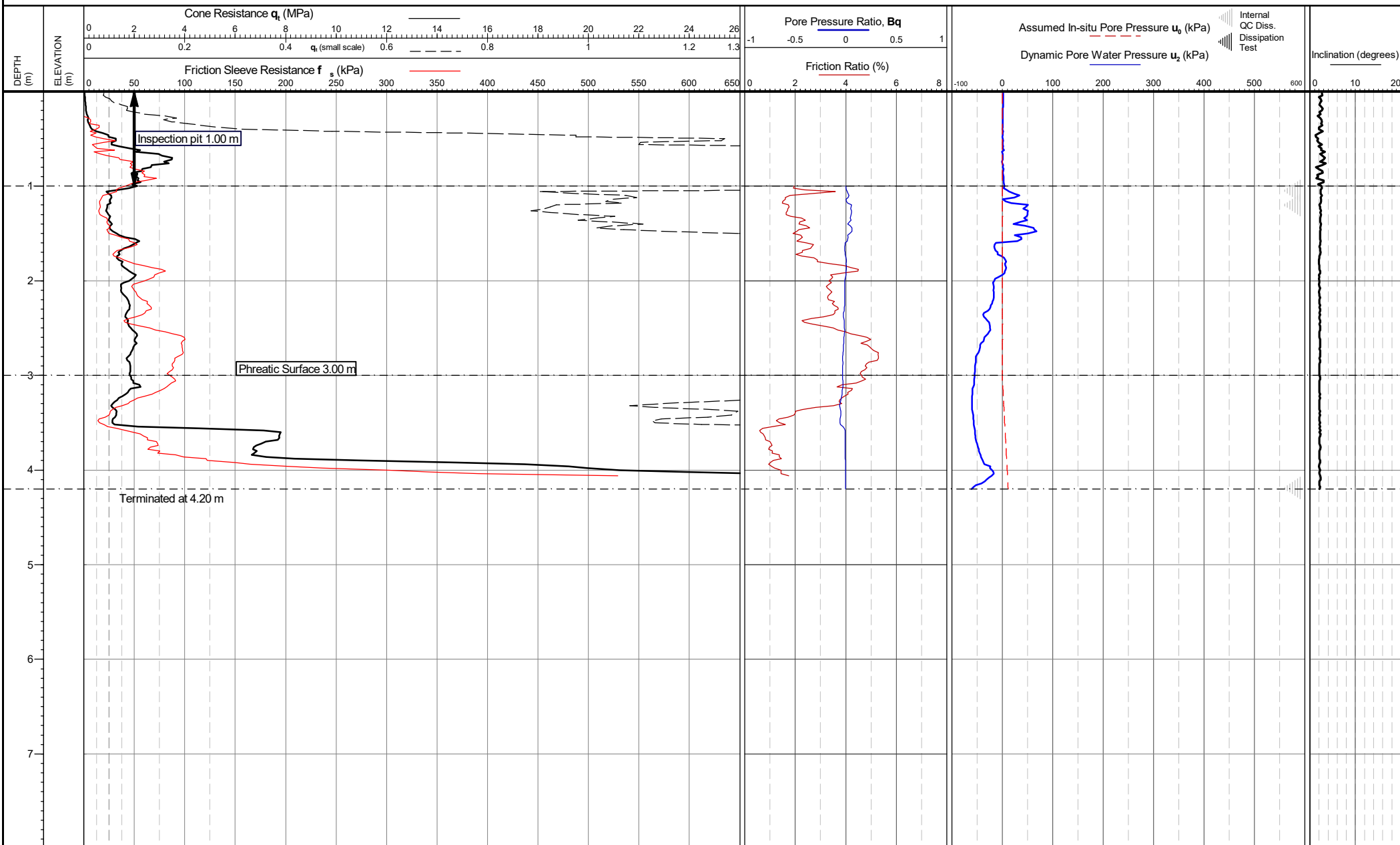
Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Risk of equipment loss/damage

Date of plot:
10-02-26
Lankelma Project Ref:
26-32-30842-1
Checked by:
Chris Player

TEST ID: CPT-03



Cone area (mm²):
Cone ID: S15-CFIPTT.2213
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 16:04:05

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

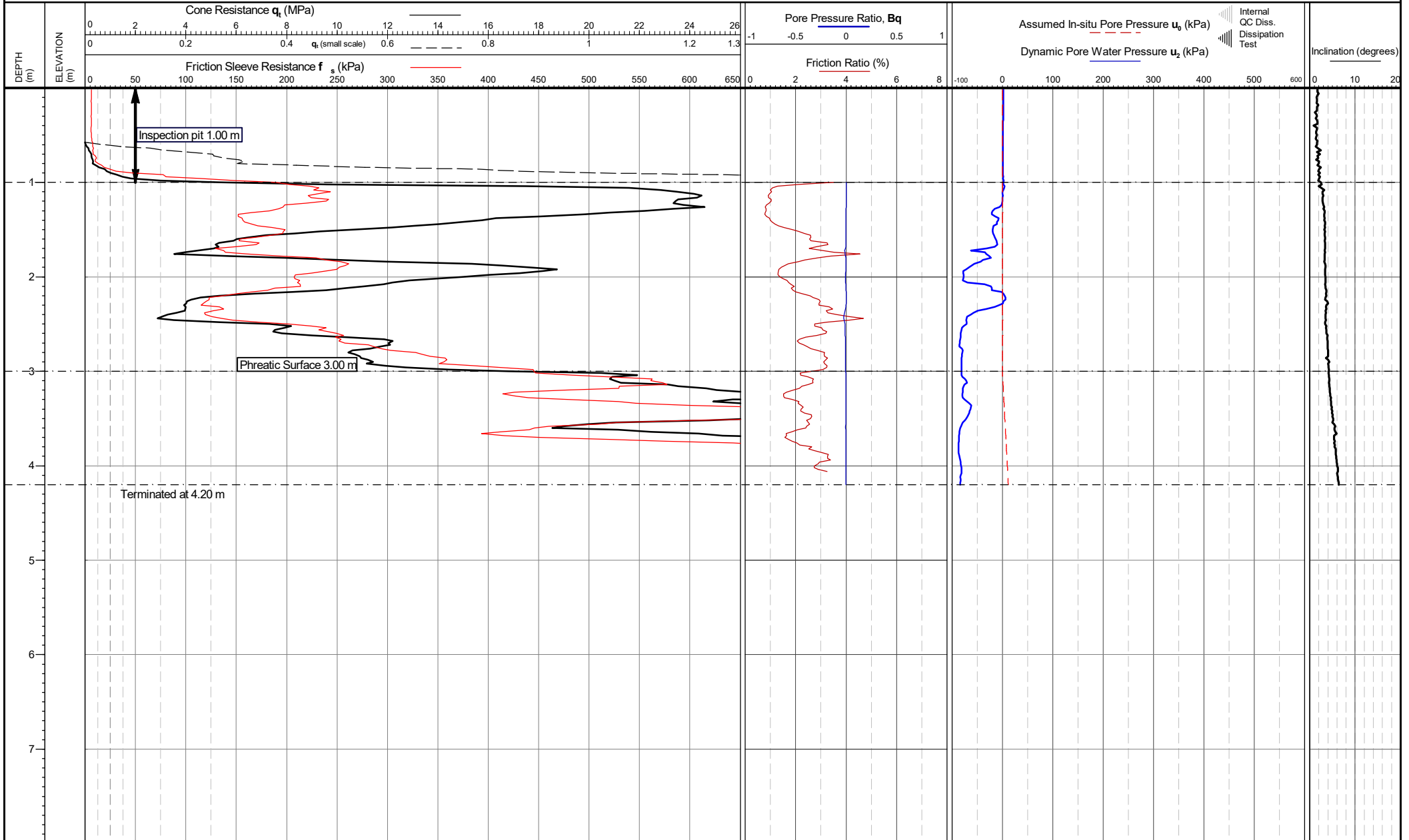
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-05



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 12:54:49

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

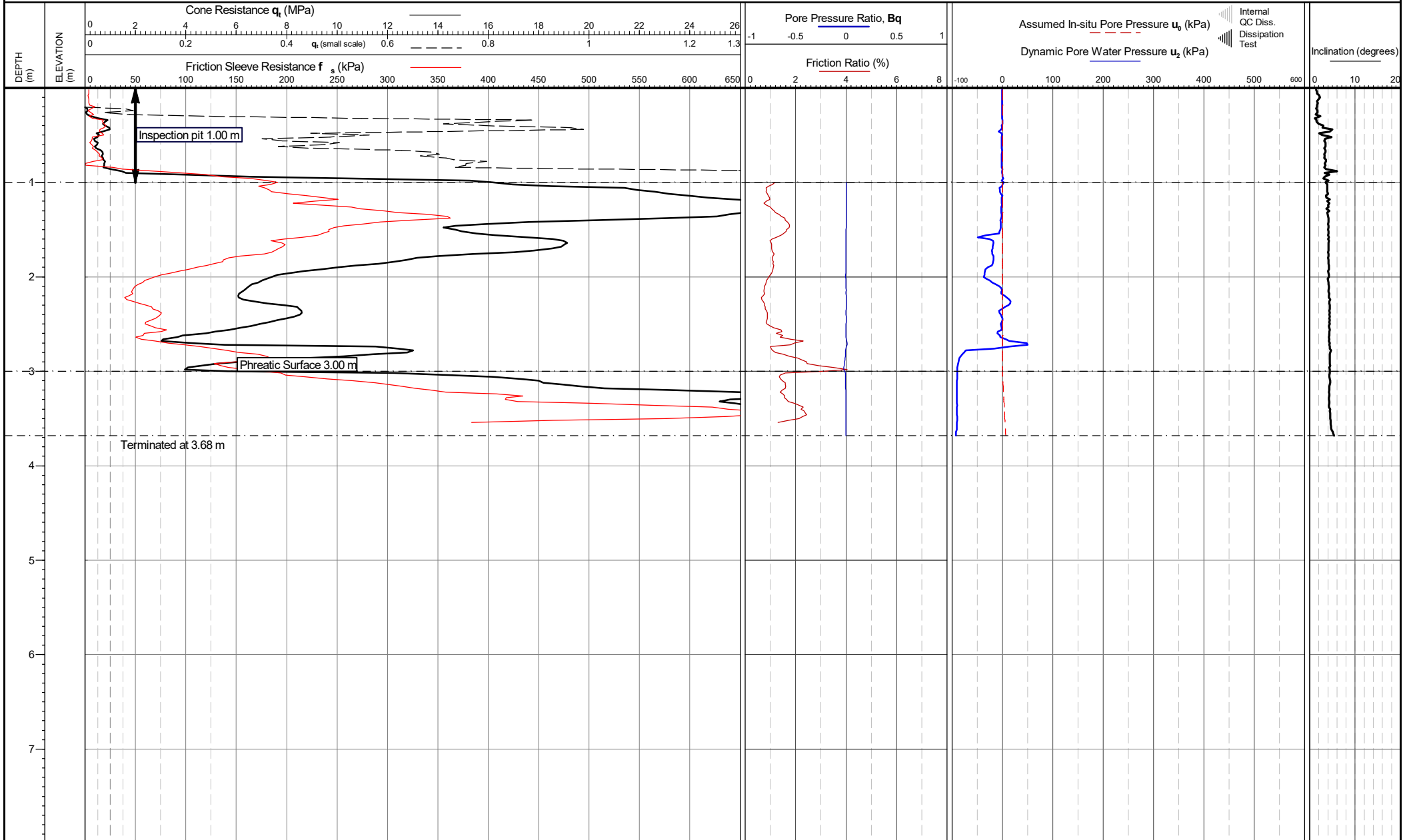
Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-07

Page 1 of 1



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 13:44:51

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

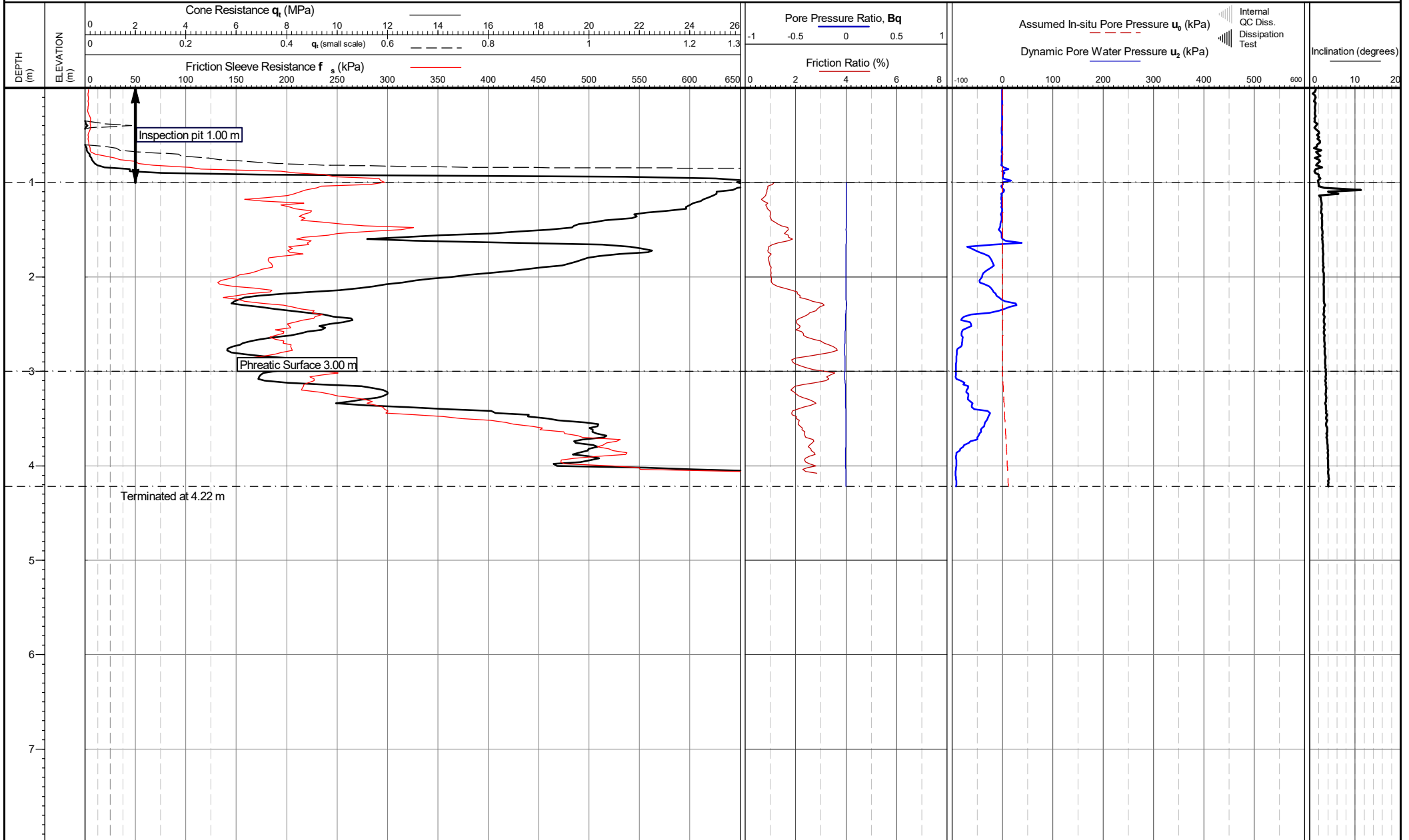
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-08



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 14:19:36

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

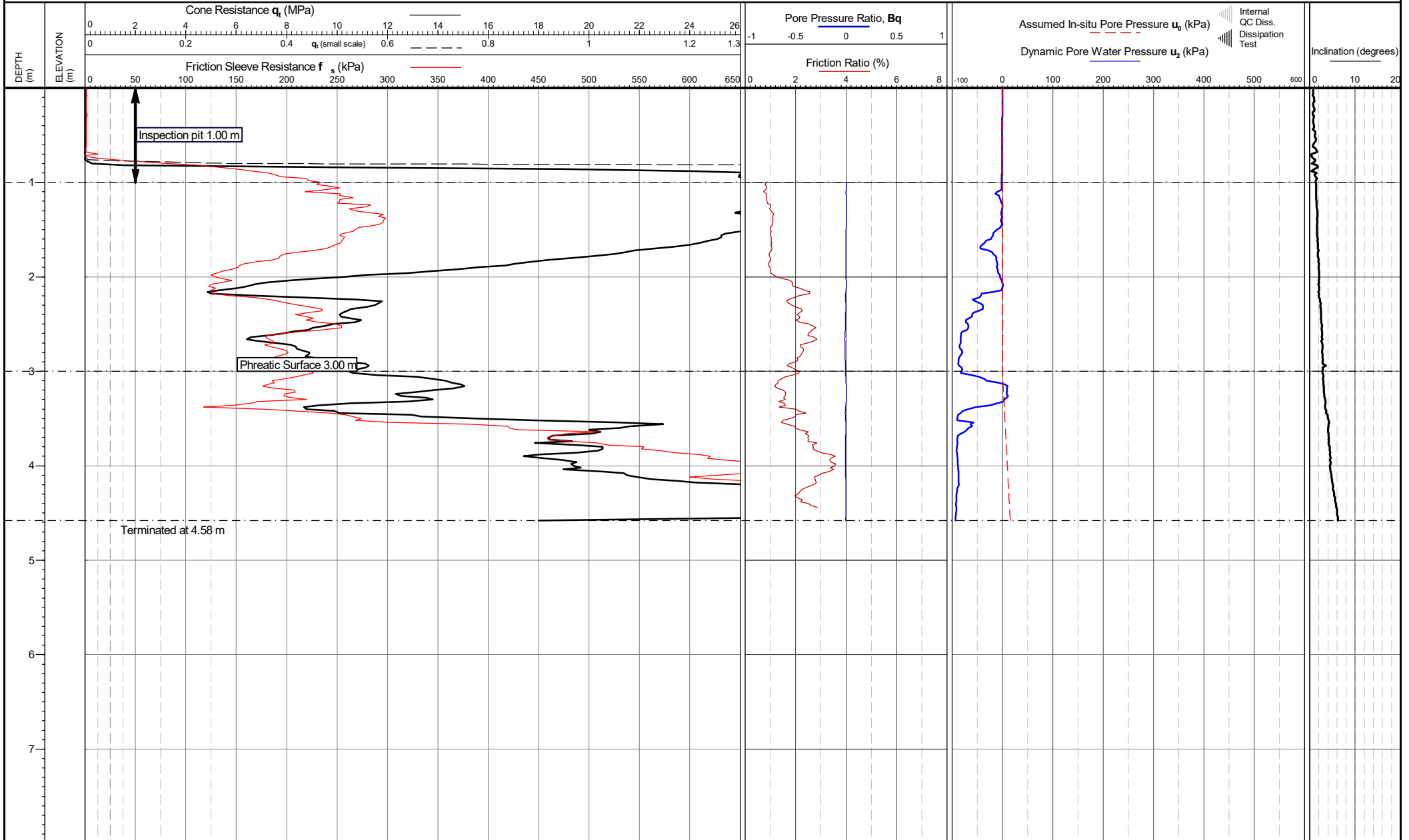
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-09



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.2213
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 15:33:04

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_2 (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot:
10-02-26
Lankelma Project Ref:
26-32-30842-1
Checked by:
Chris Player

TEST ID: CPT-10

APPENDIX D SOIL BEHAVIOUR TYPE RESULTS

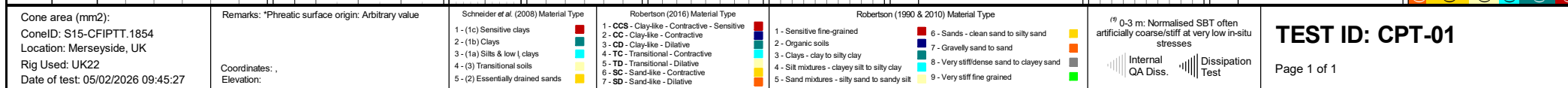
Soil behaviour type (SBT) point data evaluation according to:

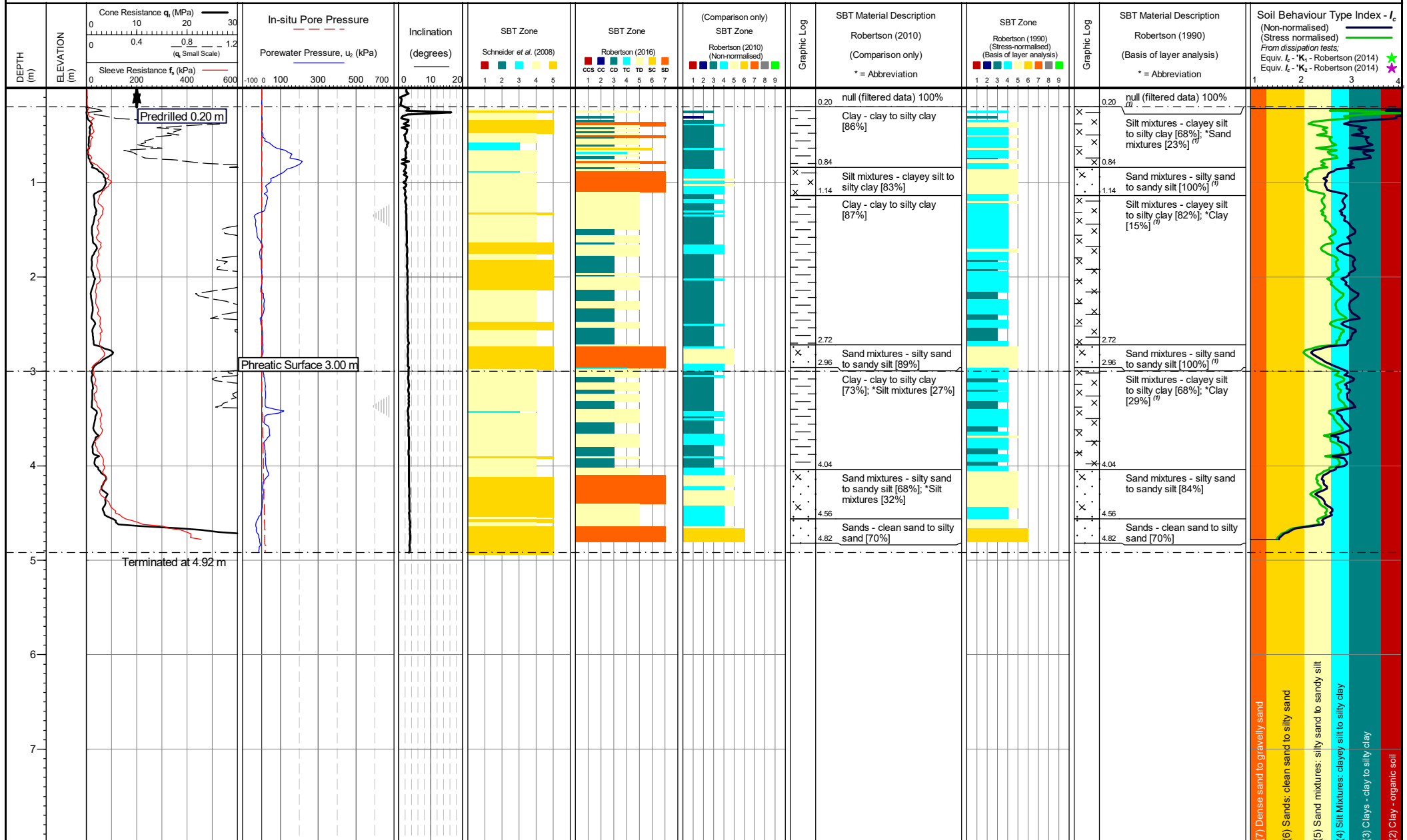
Schneider et al (2008)

Robertson (2016)

Robertson (2010) with aggregate layer descriptions

Robertson (1990) with aggregate layer descriptions





Cone area (mm2):
ConeID: S15-CFIPTT.1854
Location: Merseyside, UK
Rig Used: UK22
Date of test: 05/02/2026 11:11:41

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider et al. (2008) Material Type

- 1 - (1c) Sensitive clays
- 2 - (1b) Clays
- 3 - (1a) Silts & low I_c clays
- 4 - (3) Transitional soils
- 5 - (2) Essentially drained sands

Robertson (2016) Material Type

- ☐ CS - Clay-like - Contractive
- ☐ C - Clay-like - Contractive
- ☐ D - Clay-like - Dilative
- ☐ C - Transitional - Contractive
- ☐ D - Transitional - Dilative
- ☐ C - Sand-like - Contractive
- ☐ D - Sand-like - Dilative

Robertson (1990 & 2010) Material Type

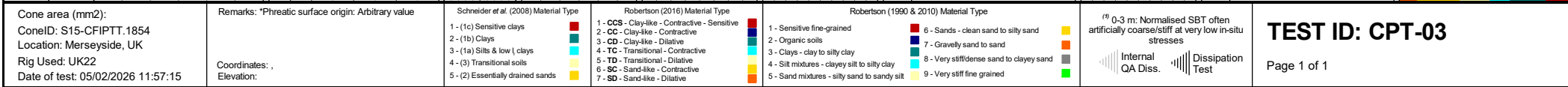
1 - Sensitive fine-grained	6 - Sands - clean sand to
2 - Organic soils	7 - Gravelly sand to sand
3 - Clays - clay to silty clay	8 - Very stiff/dense sand
4 - Silt mixtures - clayey silt to silty clay	9 - Very stiff fine grained
5 - Sand mixtures - silty sand to sandy silt	

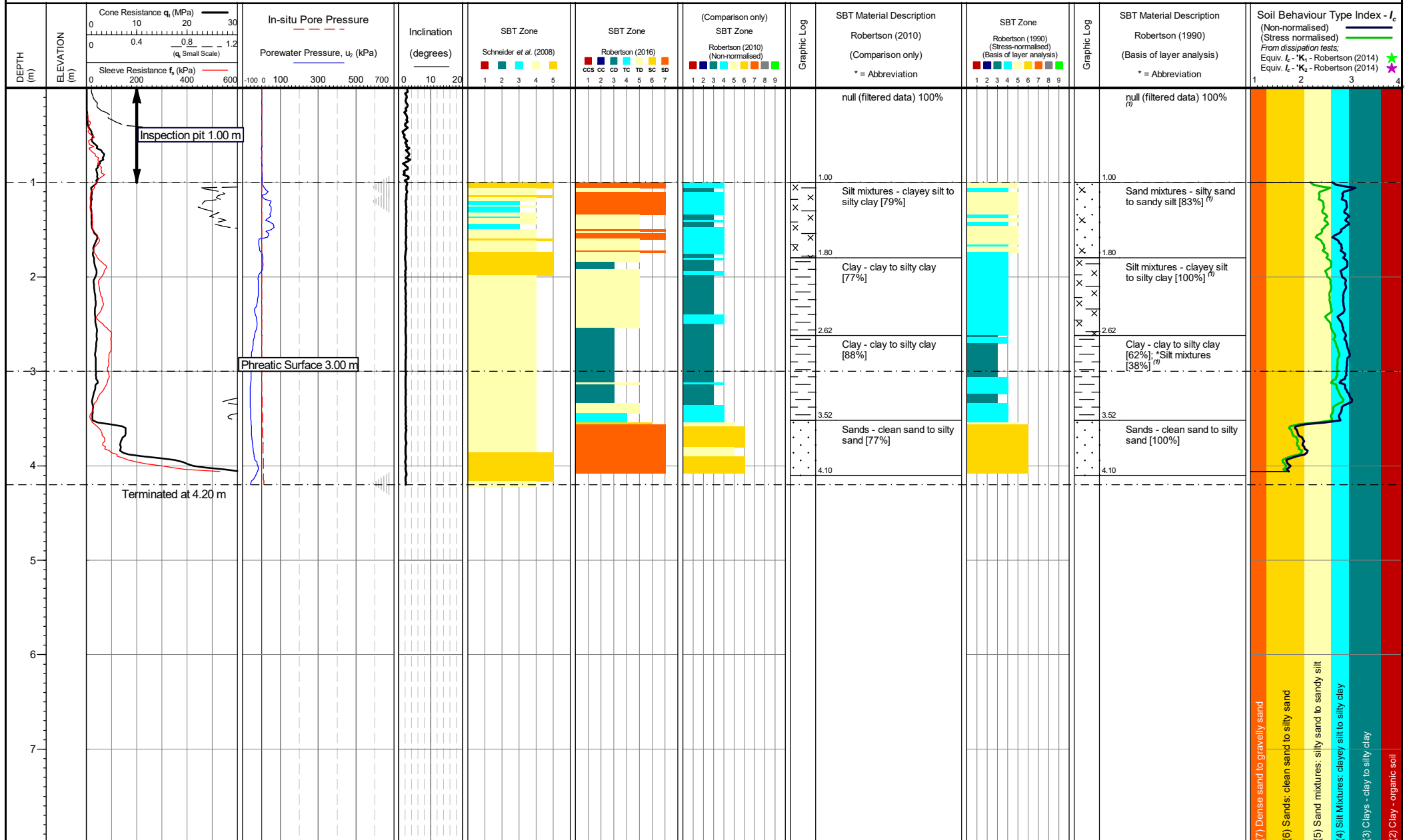
^(f) 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss. Dissipation Test

TEST ID: CPT-02

Page 1 of 1





Cone area (mm²):
ConeID: S15-CFIPTT.2213
Location: Merseyside, UK
Rig Used: UK22
Date of test: 05/02/2026 16:04:05

Remarks: *Phreatic surface origin: Arbitrary value
Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

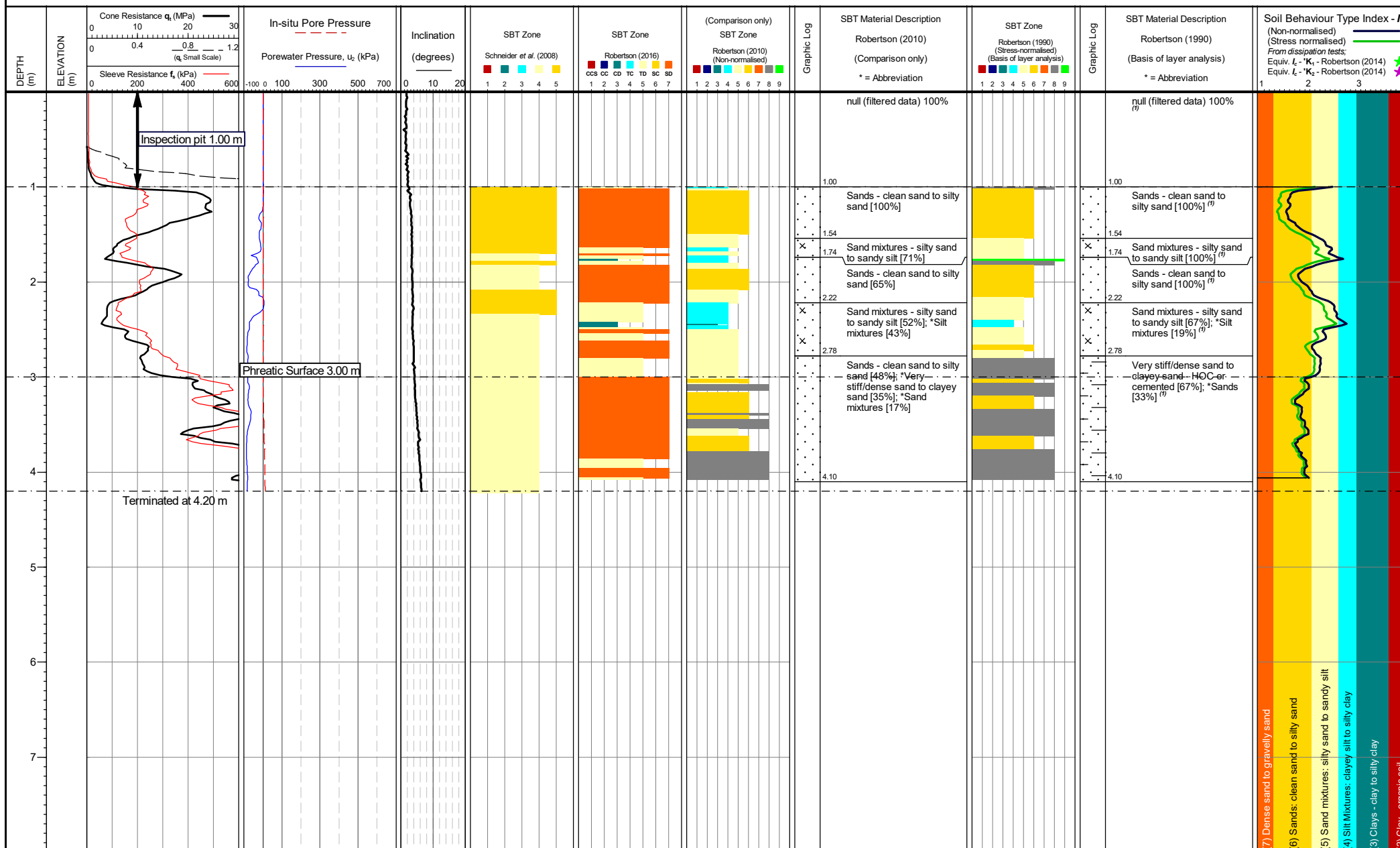
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁷⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT-05



Cone area (mm²):
ConeID: S15-CFIP.TT.1854
Location: Merseyside, UK
Rig Used: UK22
Date of test: 05/02/2026 12:54:49

Remarks: *Phreatic surface origin: Arbitrary value

Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type

- 1 - (1c) Sensitive clays
- 2 - (1b) Clays
- 3 - (1a) Silts & low l. clays
- 4 - (3) Transitional soils
- 5 - (2) Essentially drained sands

Robertson (2016) Material Type

- 1 - CCS - Clay-like - Contractive - Sensitive
- 2 - CC - Clay-like - Contractive
- 3 - CD - Clay-like - Dilative
- 4 - TC - Transitional - Contractive
- 5 - TD - Transitional - Dilative
- 6 - SC - Sand-like - Contractive
- 7 - SD - Sand-like - Dilative

Robertson (1990 & 2010) Material Type

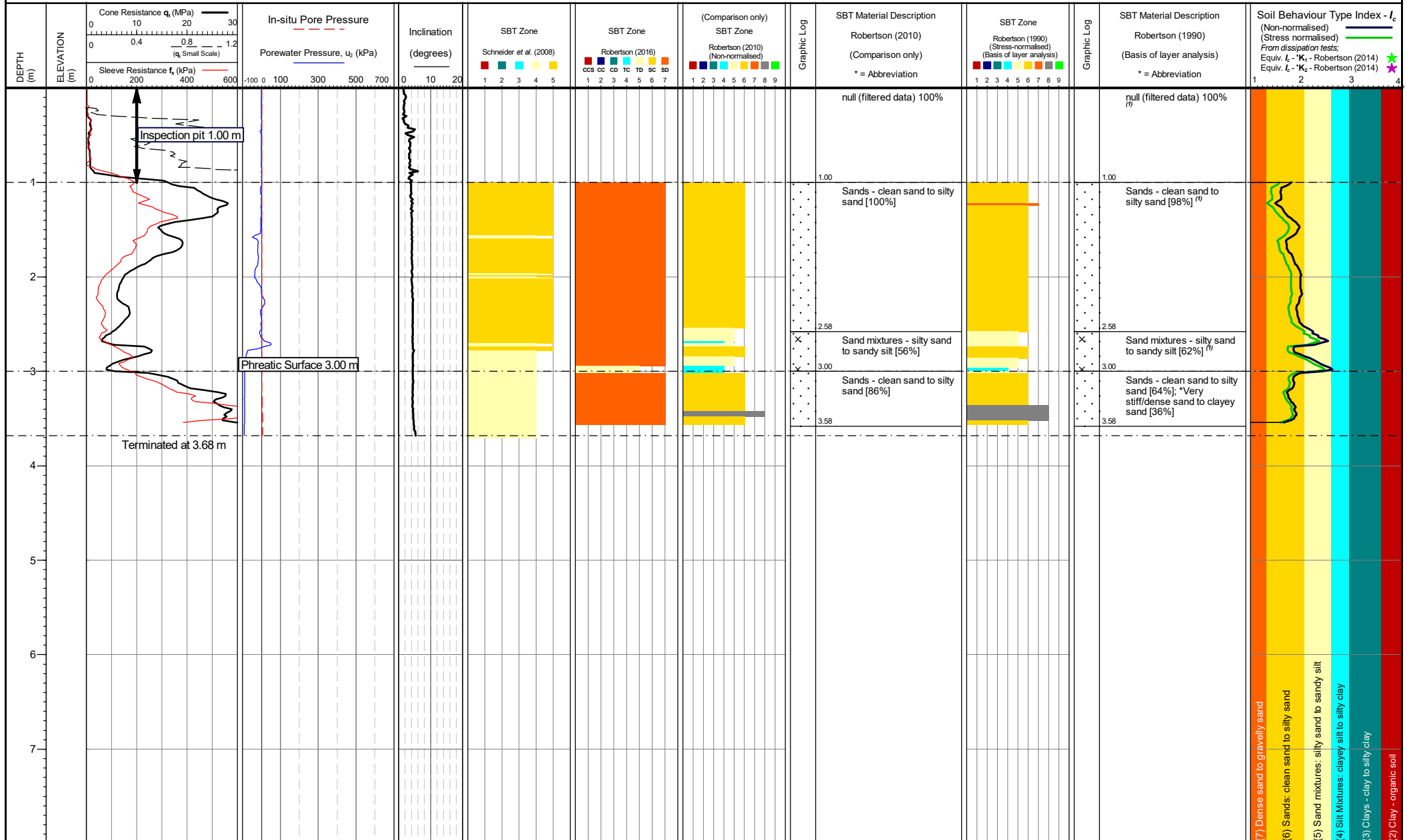
- 1 - Sensitive fine-grained
- 2 - Organic soils
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt

- 6 - Sands - clean sand to silty sand
- 7 - Gravelly sand to sand
- 8 - Very stiff/dense sand to clayey sand
- 9 - Very stiff fine grained

⁽¹⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses

Internal QA Diss. Dissipation Test

TEST ID: CPT-07



Cone area (mm²):
ConeID: S15-CFIPPT.1854
Location: Merseyside, UK
Rig Used: UK22
Date of test: 05/02/2026 13:44:51

Remarks: *Phreatic surface origin: Arbitrary value
Coordinates: ,
Elevation:

Schneider *et al.* (2008) Material Type
1 - (1c) Sensitive clays
2 - (1b) Clays
3 - (1a) Silts & low l. clays
4 - (3) Transitional soils
5 - (2) Essentially drained sands

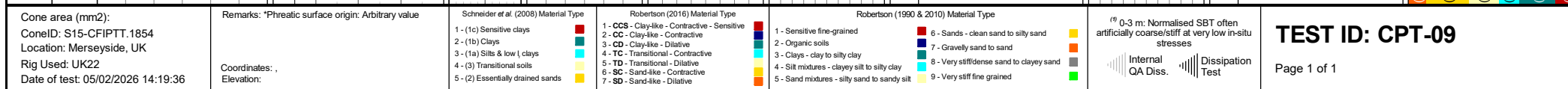
Robertson (2016) Material Type
1 - CCS - Clay-like - Contractive - Sensitive
2 - CC - Clay-like - Contractive
3 - CD - Clay-like - Dilative
4 - TC - Transitional - Contractive
5 - TD - Transitional - Dilative
6 - SC - Sand-like - Contractive
7 - SD - Sand-like - Dilative

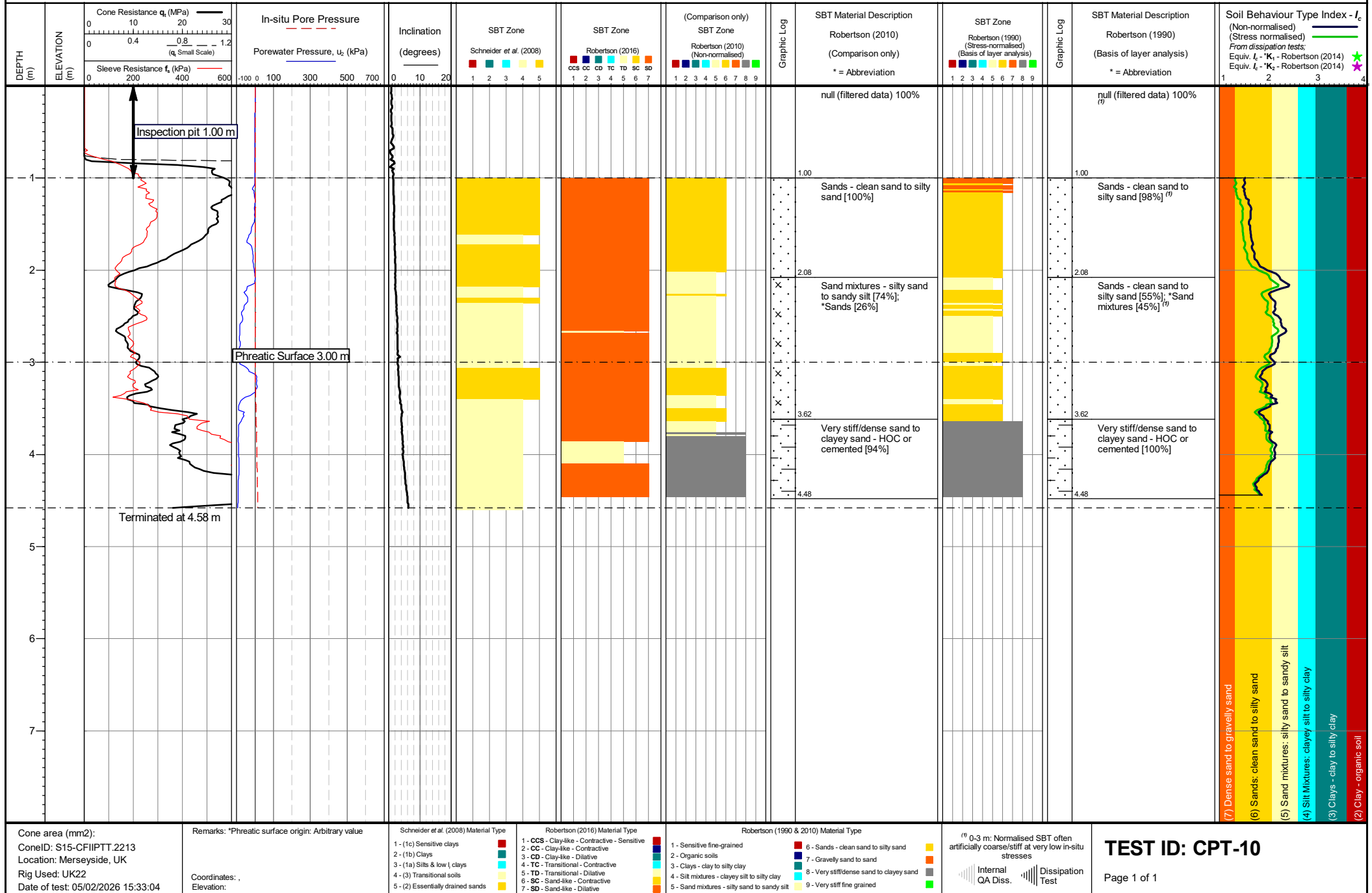
Robertson (1990 & 2010) Material Type
1 - Sensitive fine-grained
2 - Organic soils
3 - Clays - clay to silty clay
4 - Silt mixtures - clayey silt to silty clay
5 - Sand mixtures - silty sand to sandy silt

6 - Sands - clean sand to silty sand
7 - Gravelly sand to sand
8 - Very stiff/dense sand to clayey sand
9 - Very stiff fine grained

⁽⁷⁾ 0-3 m: Normalised SBT often artificially coarse/stiff at very low in-situ stresses
Internal QA Diss. Dissipation Test

TEST ID: CPT-08





TEST ID: CPT-10

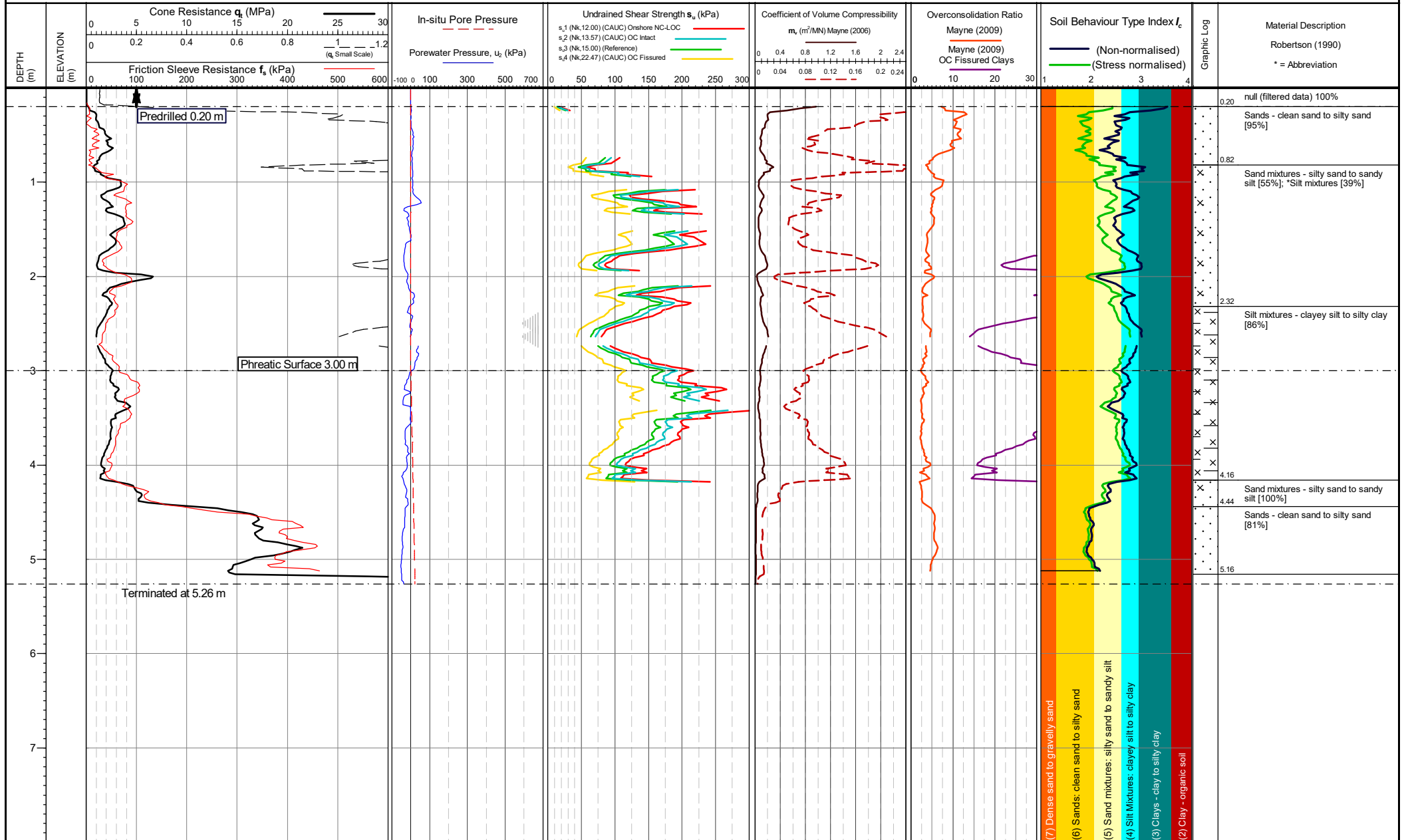
APPENDIX E PARAMETER RESULTS 1 – S_u , M_v , OCR, SBT, I_c

Undrained shear strength

Coefficient of volume change

Overconsolidation ratio

Robertson 1990 SBT descriptions & SBT index I_c



Cone area (mm²):
ConeID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 09:45:27

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

Remarks: *Phreatic surface origin: Arbitrary value

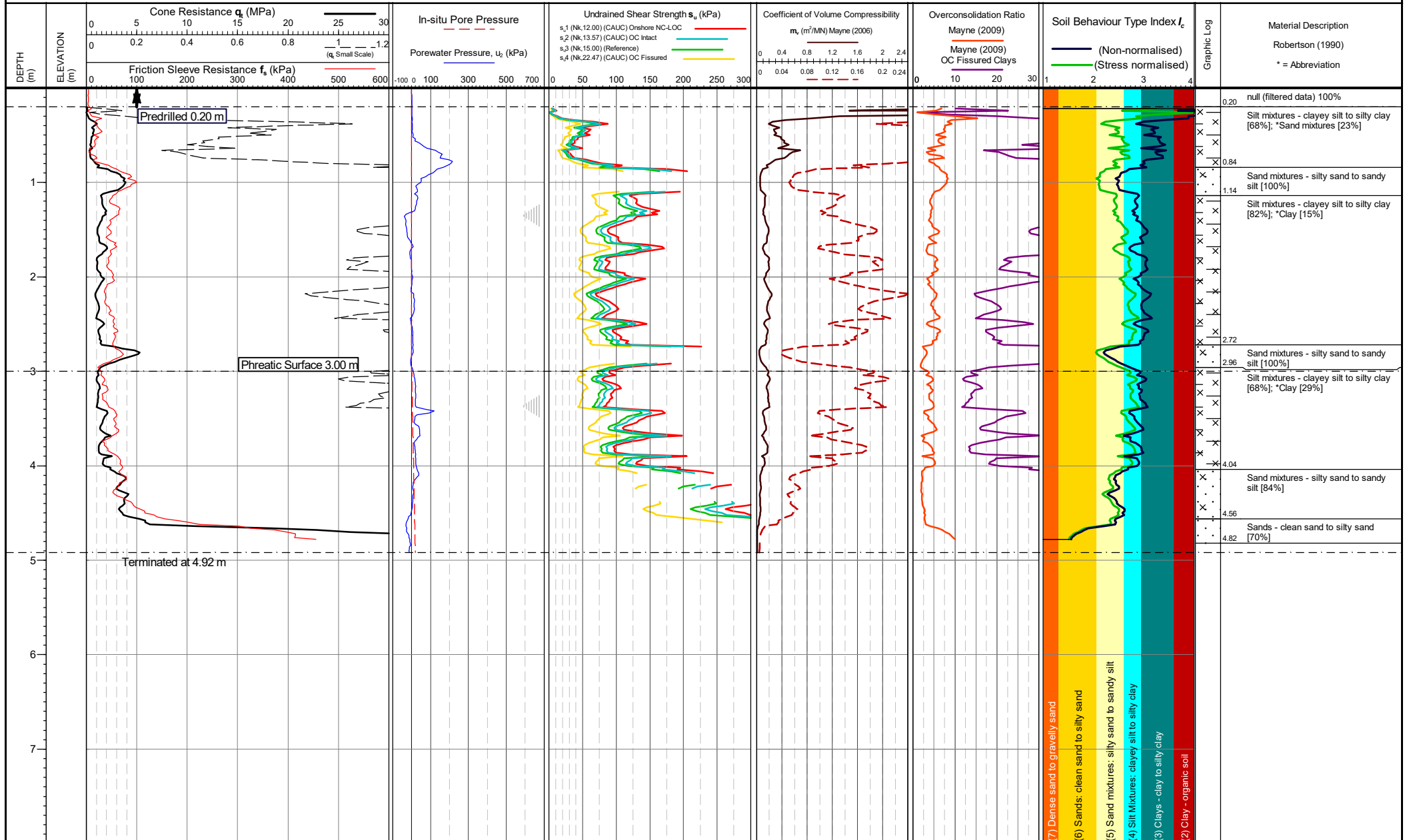
Termination Remark:
Risk of equipment loss/damage

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

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-01



Cone area (mm²):
ConeID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:11:41

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at surface

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

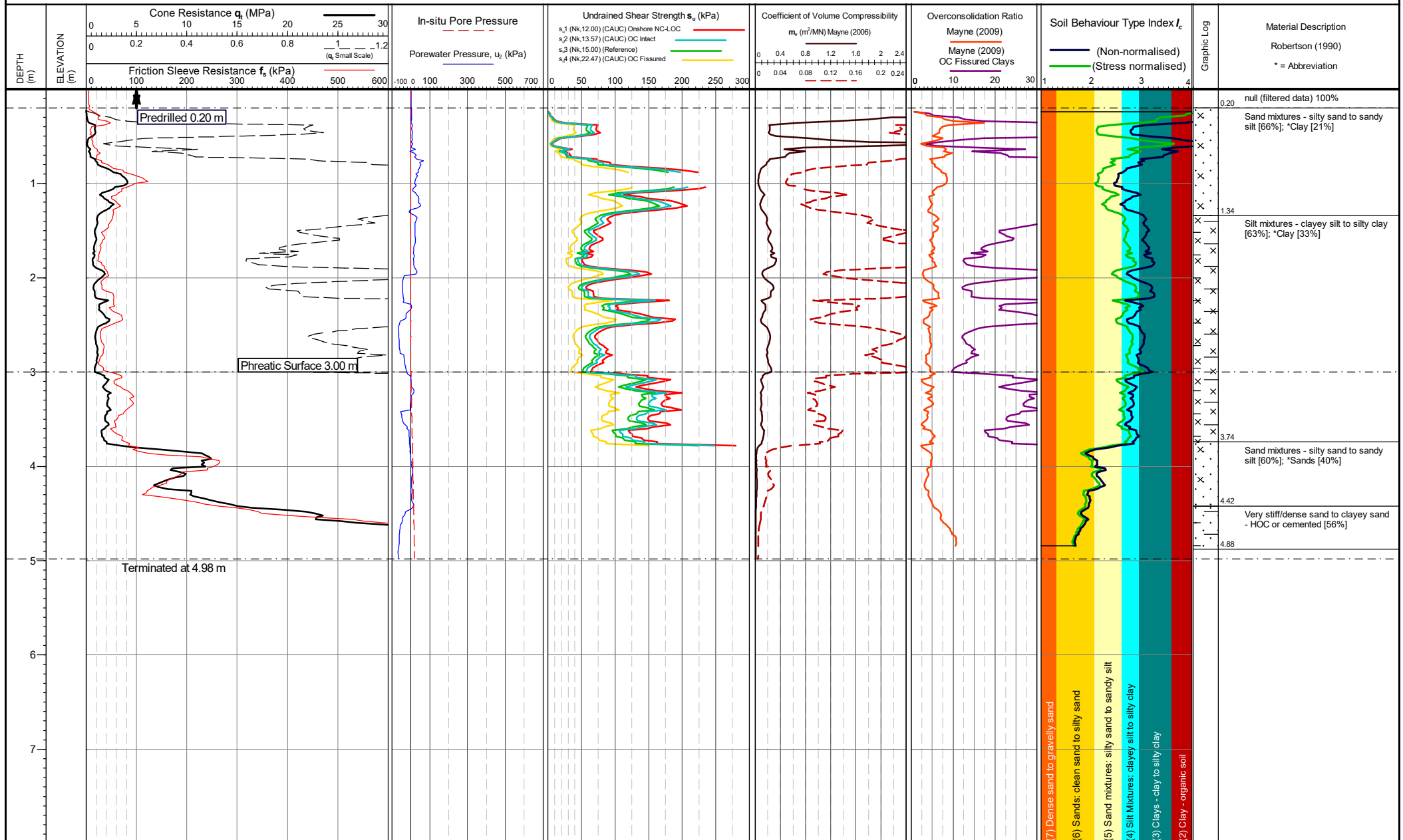
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
10-02-26

Lankelma Project Ref:
26-32-30842-1

Checked by:
Chris Player

TEST ID: CPT-02



Cone area (mm²):
ConeID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:57:15

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Risk of equipment loss/damage

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

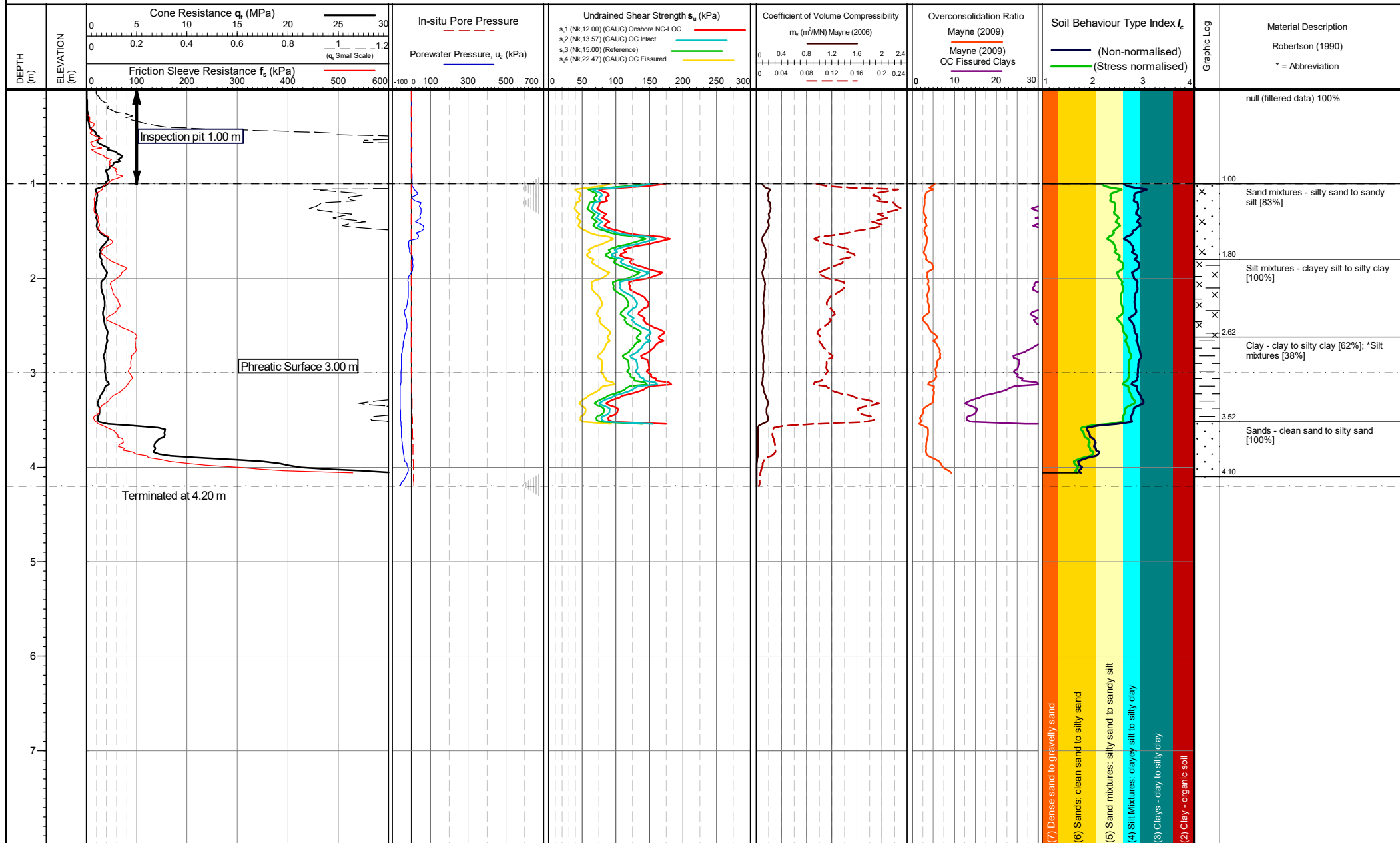
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
10-02-26

Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-03



Cone area (mm²):
ConeID: S15-CFIIPTT.2213
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 16:04:05

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at surface

Internal
QA Diss.
Dissipation
Test

Penetration
Pause (<1cm/s)

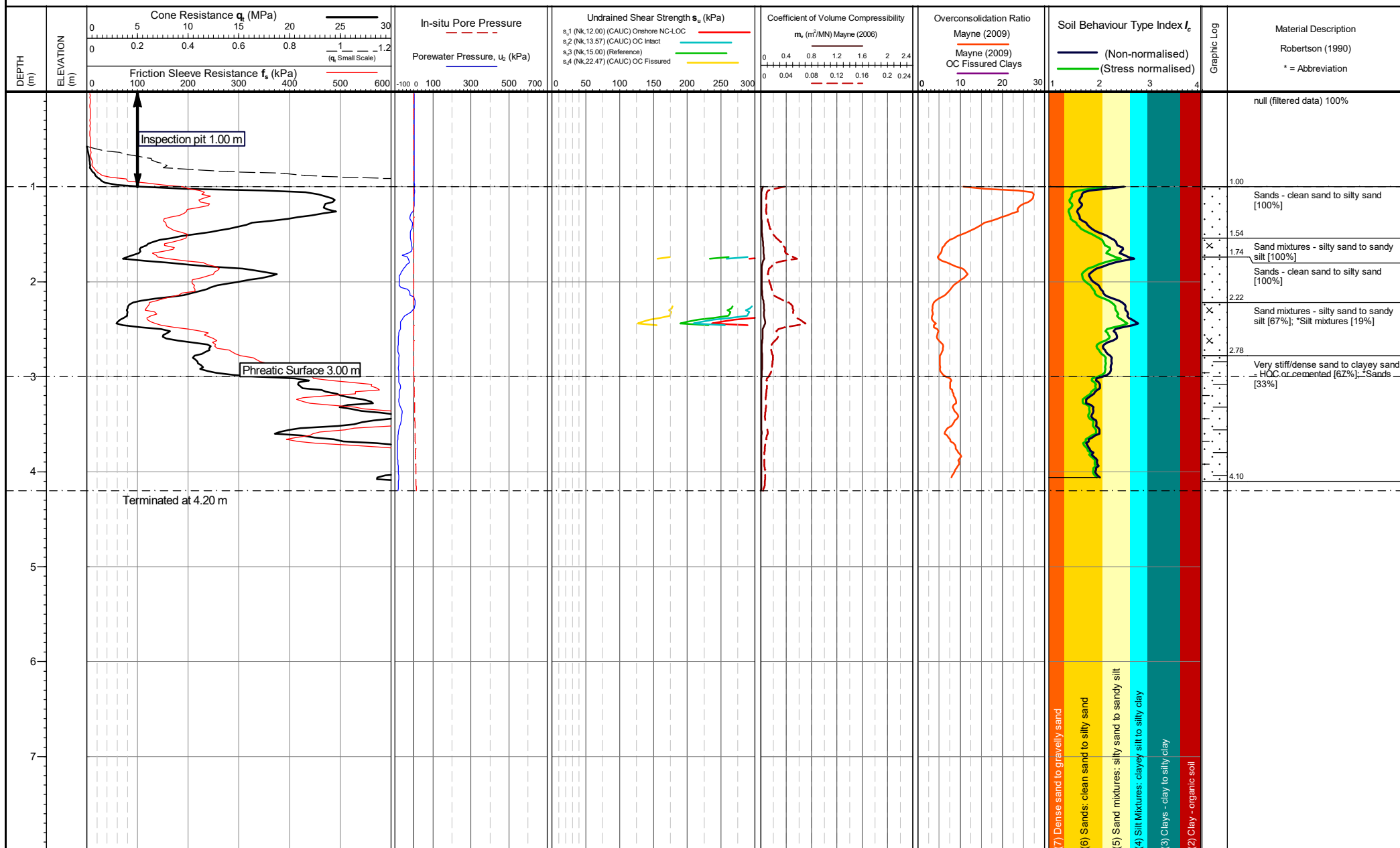
Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
10-02-26

Lankelma Project Ref:
26-32-30842-1

Checked by:
Chris Player

TEST ID: CPT-05



Cone area (mm2):
ConeID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 12:54:49

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Lateral support at surface

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

Both drained and undrained parameters are calculated for mixed SBTs = Ic 2.40-2.70. See report text for methods and discussion of parameter evaluation.

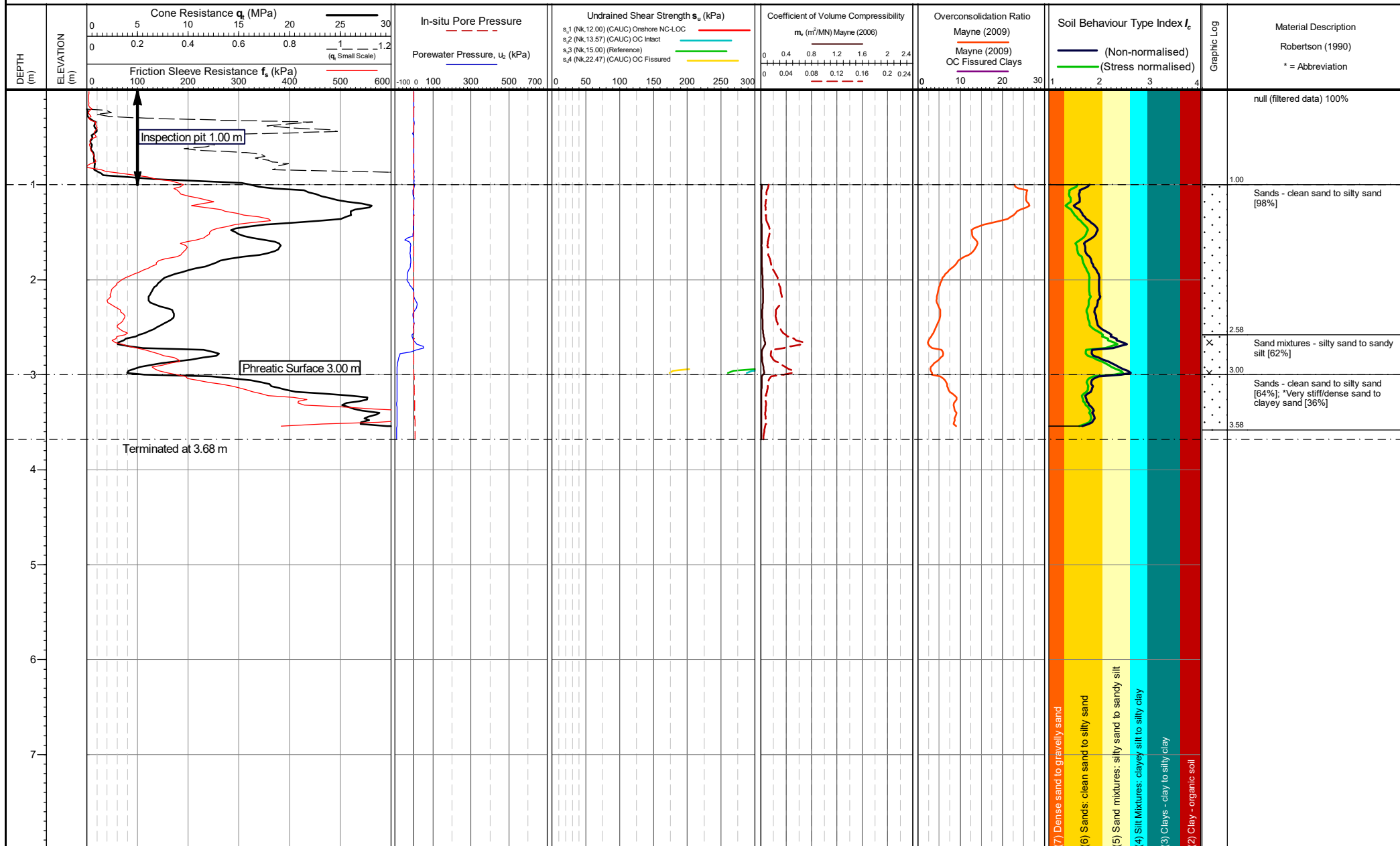
Date of plot
10-02-26

Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-07

Page 1 of 1



Cone area (mm²):
ConeID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 13:44:51

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

Remarks: *Phreatic surface origin: Arbitrary value

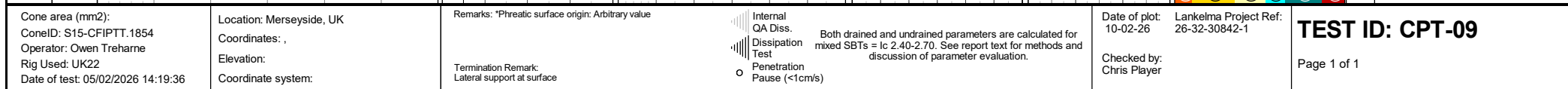
Termination Remark:
Lateral support at surface

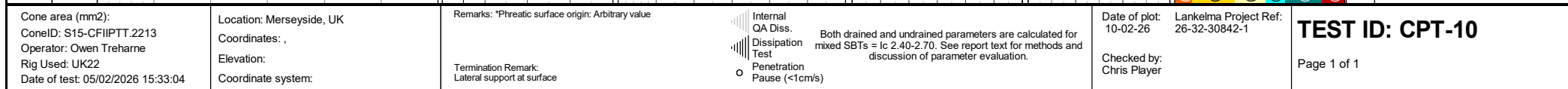
Internal
QA Diss.
Dissipation
Test
Penetration
Pause (<1cm/s)

Both drained and undrained parameters are calculated for mixed SBTs = I_c 2.40-2.70. See report text for methods and discussion of parameter evaluation.

Date of plot:
10-02-26
Lankelma Project Ref:
26-32-30842-1
Checked by:
Chris Player

TEST ID: CPT-08





APPENDIX F PARAMETER RESULTS 2 – SPT N60, ϕ , D_R , E , I_c

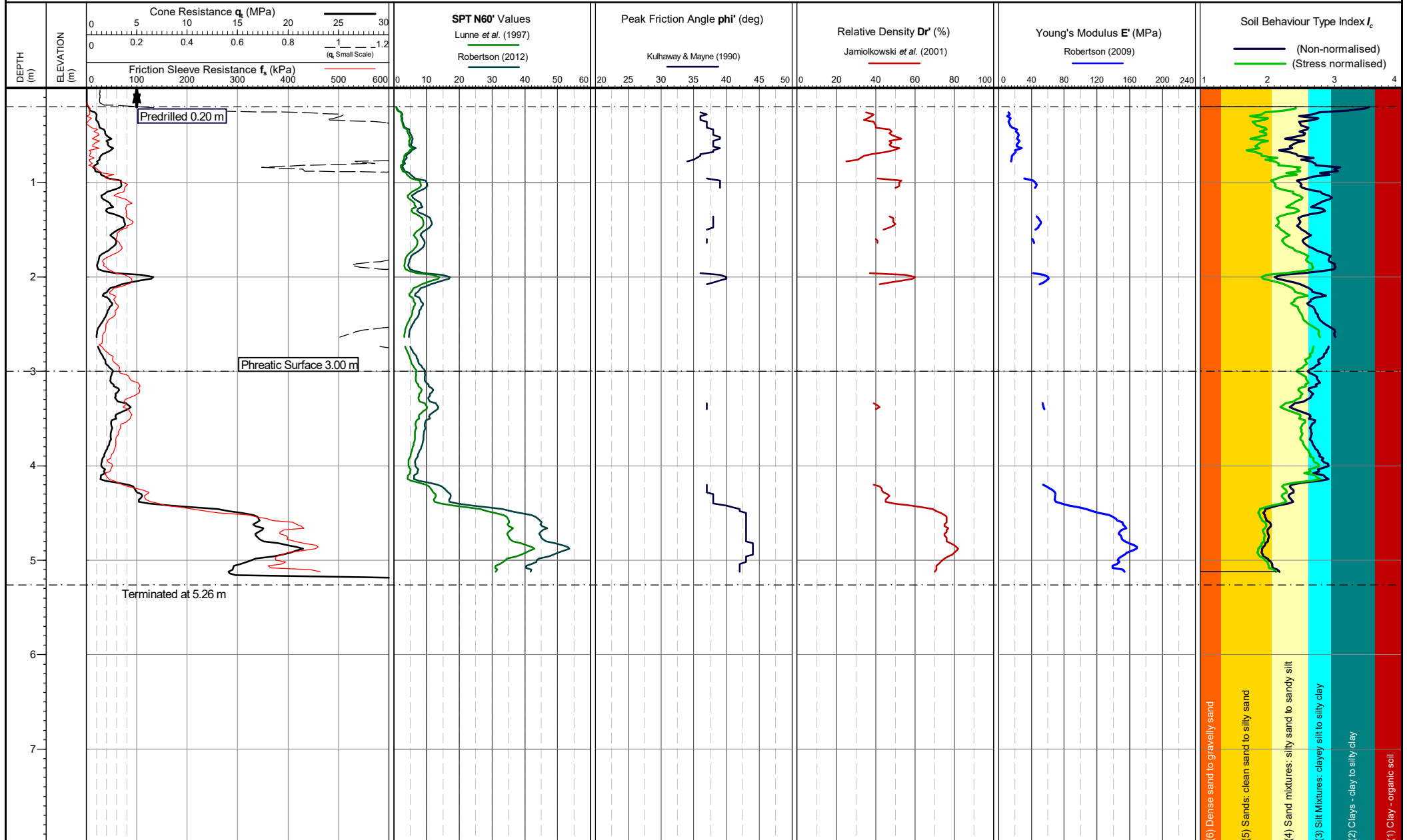
Equivalent SPT N60

Peak friction angle

Relative density

Young's modulus

SBT index I_c



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 09:45:27

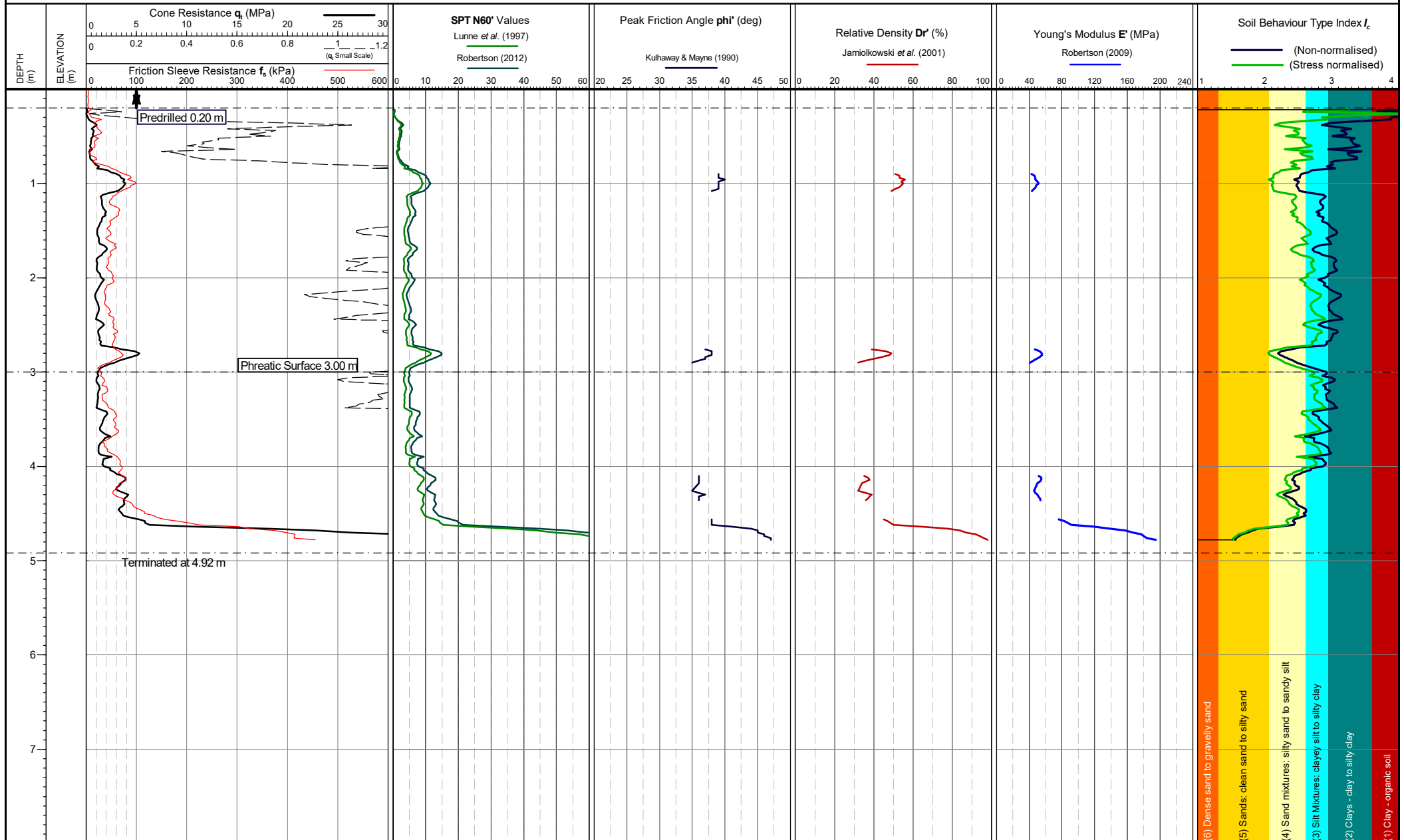
Location: Merseyside, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-01



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 11:11:41

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

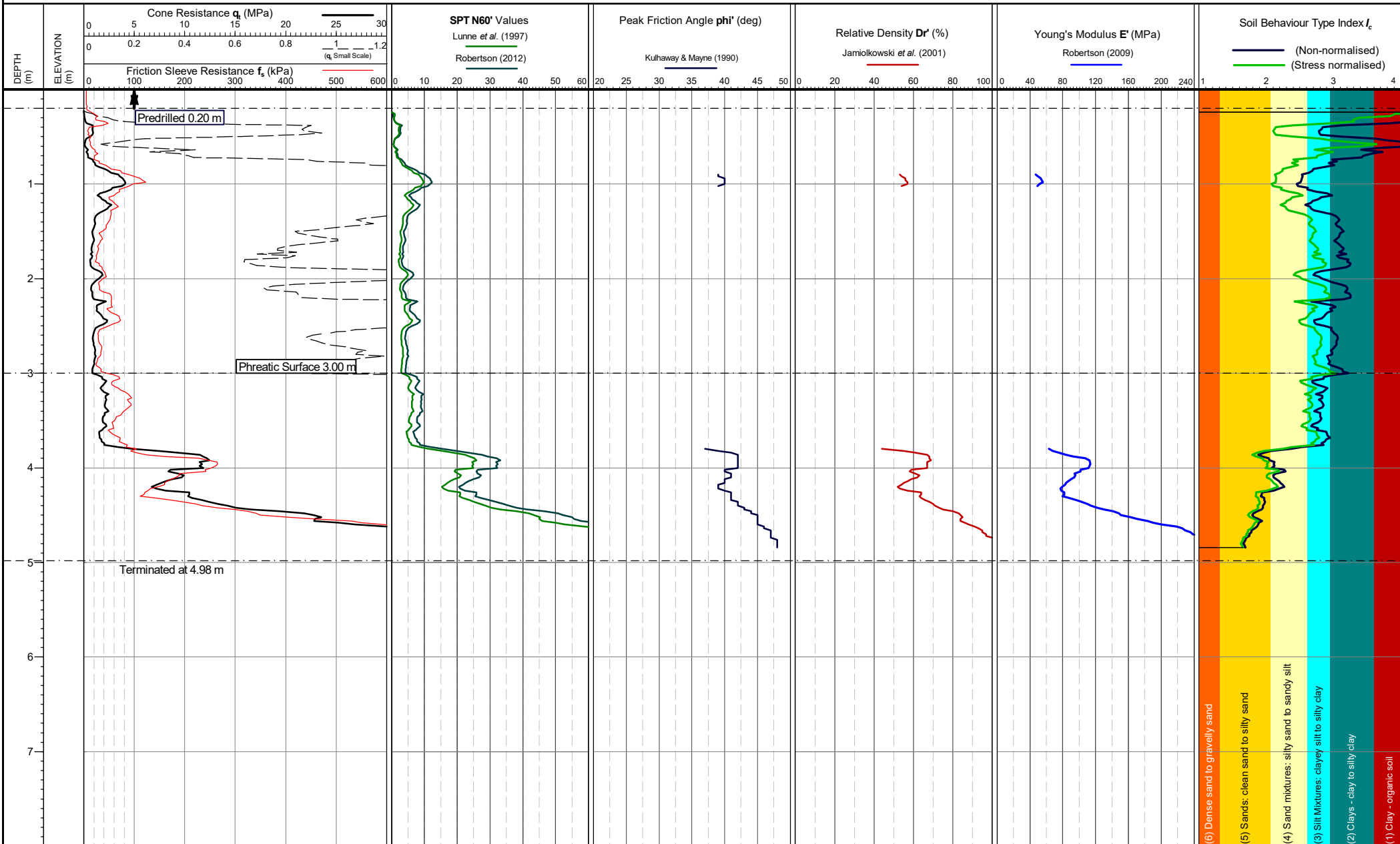
Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-02

Page 1 of 1



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 11:57:15

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

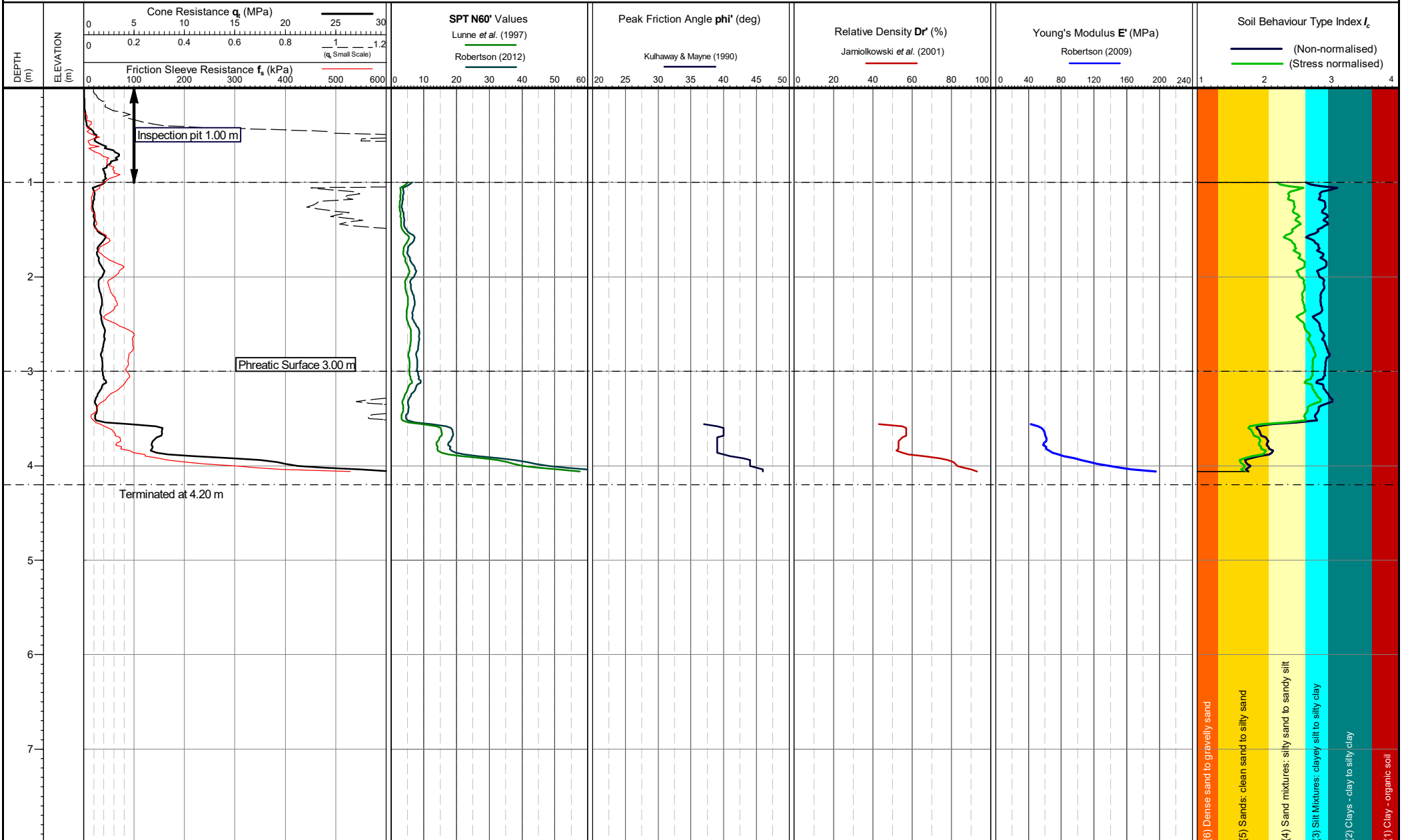
Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-03

Page 1 of 1



Cone area (mm²):
Cone ID: S15-CFIIPTT.2213
Operator: Owen Treharne
Date of test: 05/02/2026 16:04:05

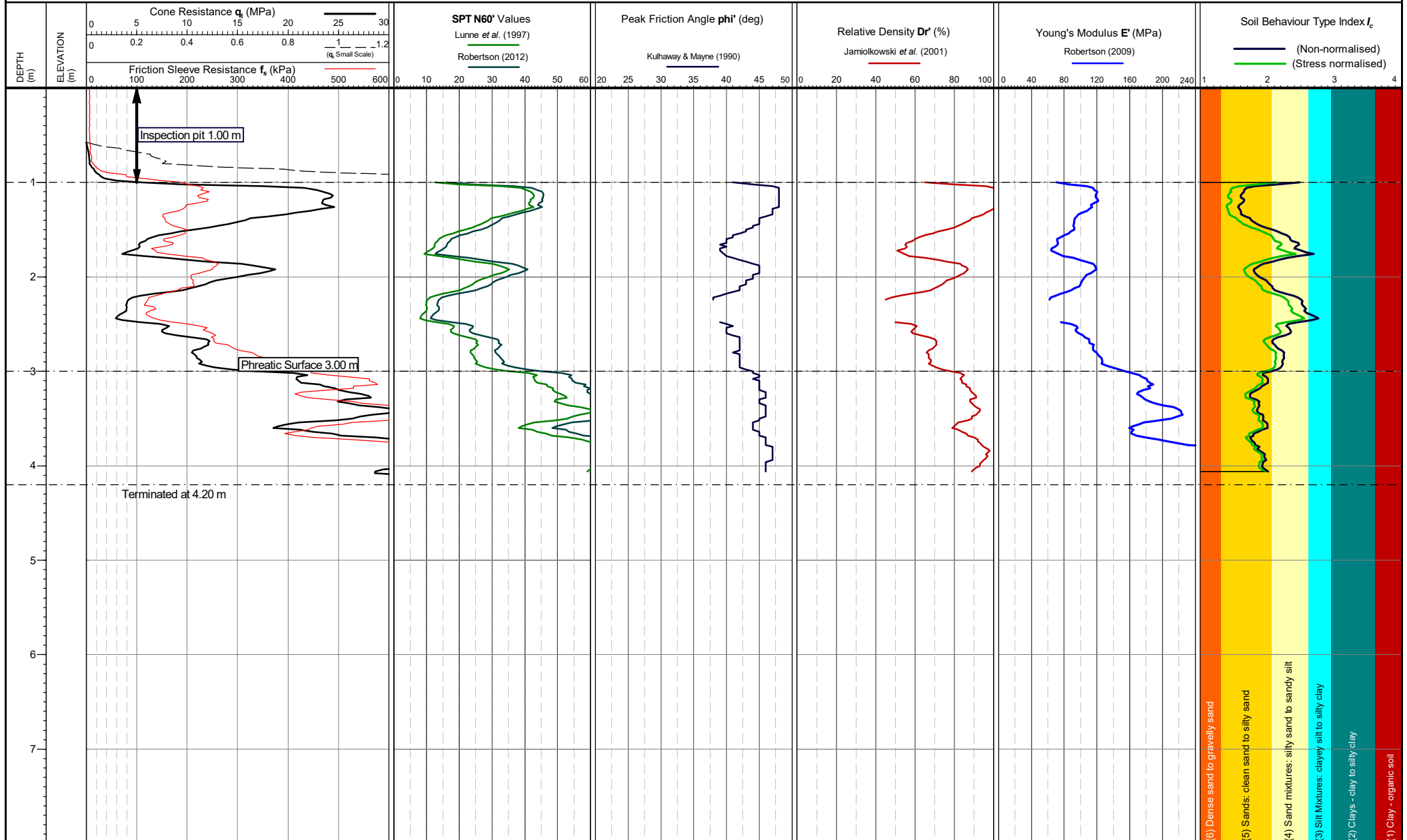
Location: Merseyside, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-05



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 12:54:49

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

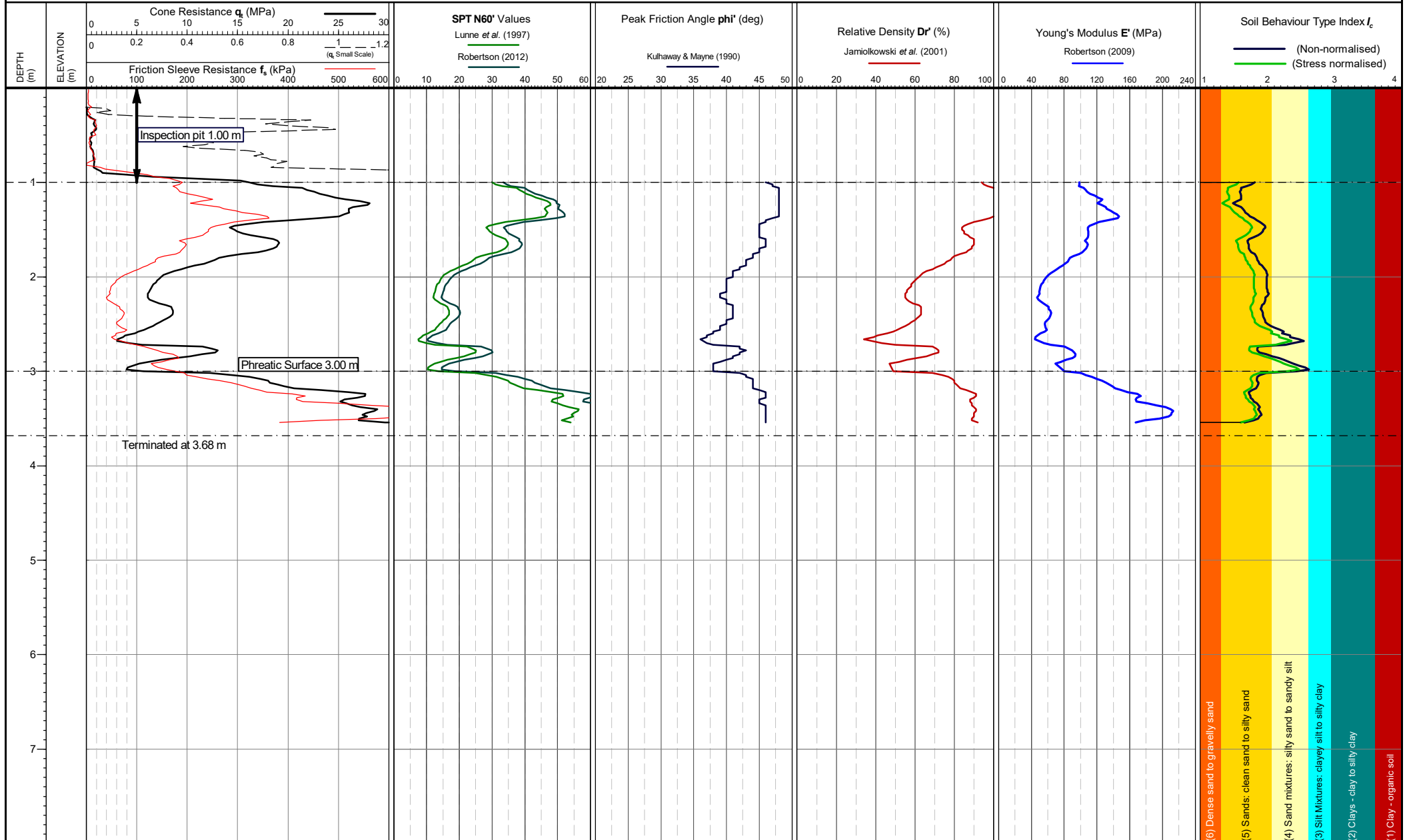
Both drained and undrained
parameters are calculated for mixed
SBTs = Ic 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-07

Page 1 of 1



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 13:44:51

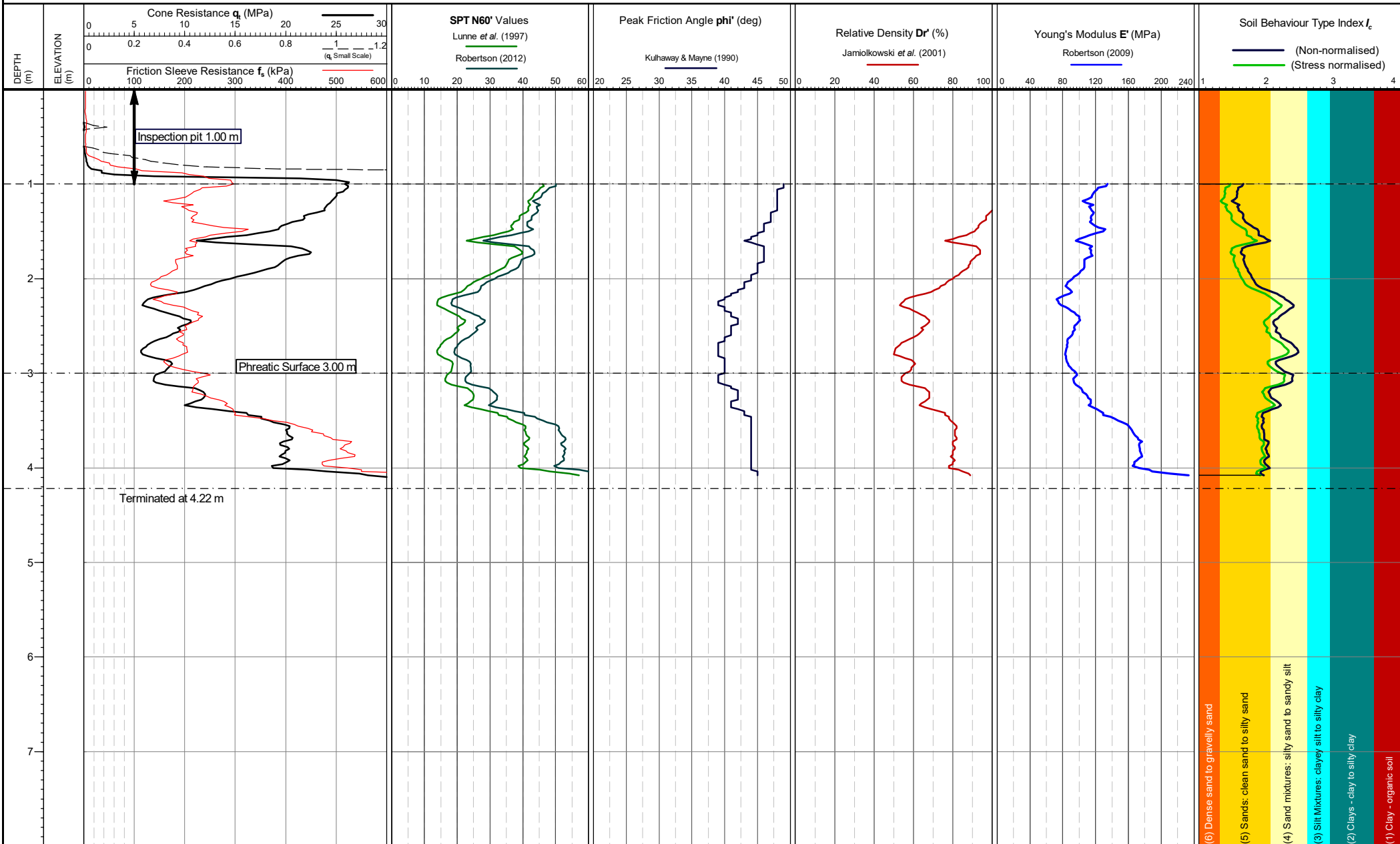
Location: Merseyside, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-08



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Date of test: 05/02/2026 14:19:36

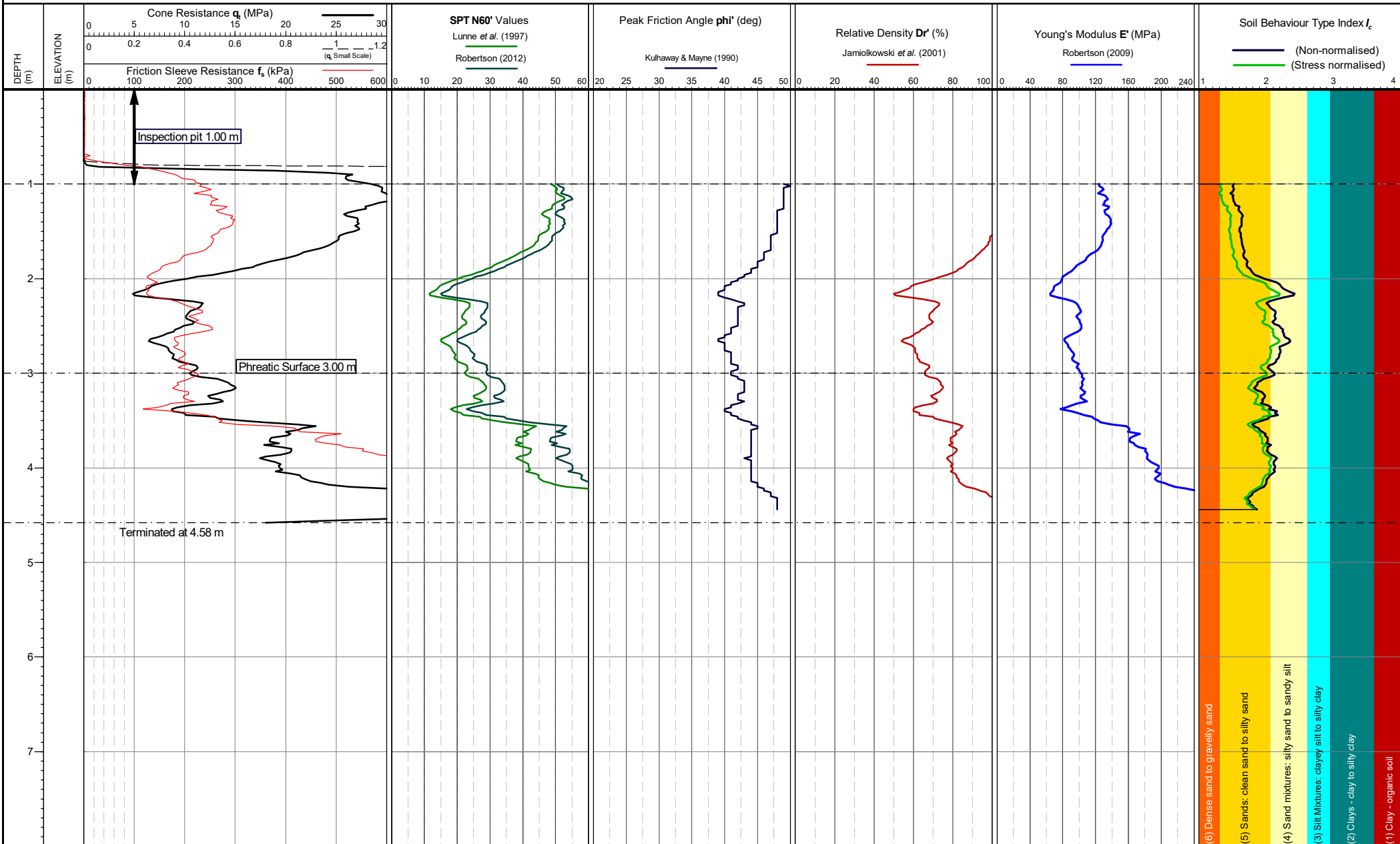
Location: Merseyside, UK
Coordinates: ,
Elevation:
Coordinate system:

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26
Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-09



Cone area (mm²):
Cone ID: S15-CFIIPTT.2213
Operator: Owen Treharne
Date of test: 05/02/2026 15:33:04

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

Both drained and undrained
parameters are calculated for mixed
SBTs = I_c 2.40-2.70. See report text
for methods and discussion of
parameter evaluation.

Date of plot:
10-02-26

Checked by:
Chris Player

Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-10

Page 1 of 1

APPENDIX G PENETROMETER TEMPERATURE RESULTS

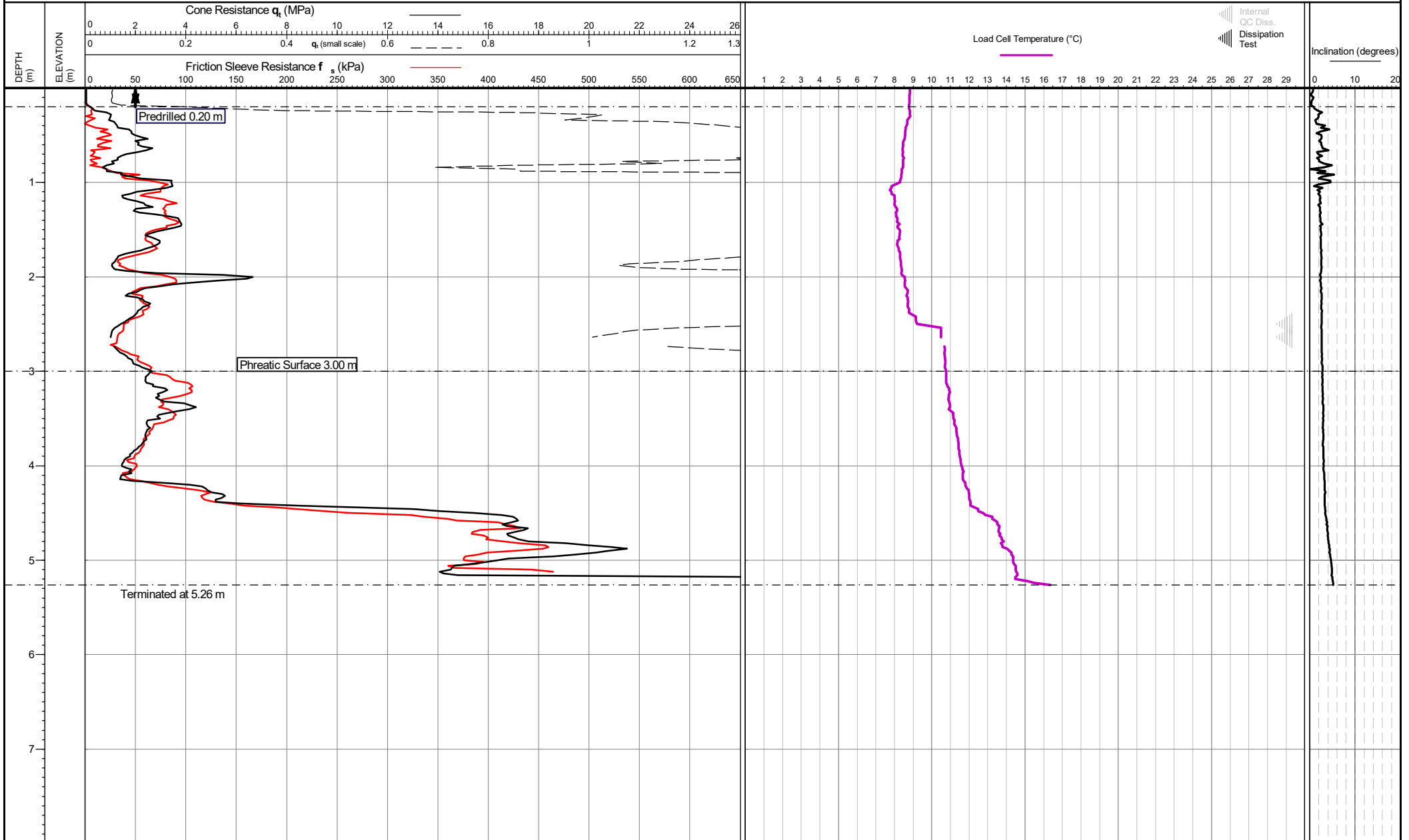
The logs of this Appendix present the recorded temperature of the penetrometer tip load cell. The data is used for QC purposes during fieldwork and post processing, and the reader may compare the data to the temperature verification section of the corresponding calibration certificate. The data has been used during post processing to correct the tip and pore pressure results for transient and static temperature effects.

Note:

Ground temperature is only represented following a penetration pause of 20-50 minutes, depending on the thermal properties of the soil.

Plots will not be provided for tests performed with magnetometer readings.

Near horizontal lines (steps) in the temperature plots indicate change in temperature during a pause in penetration for dissipation tests, rod join pauses, or QA stabilisation pauses.



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 09:45:27

Zero drift (Pre/post test)
 q_c (kPa):
 f_s (kPa):
 u_z (kPa):

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

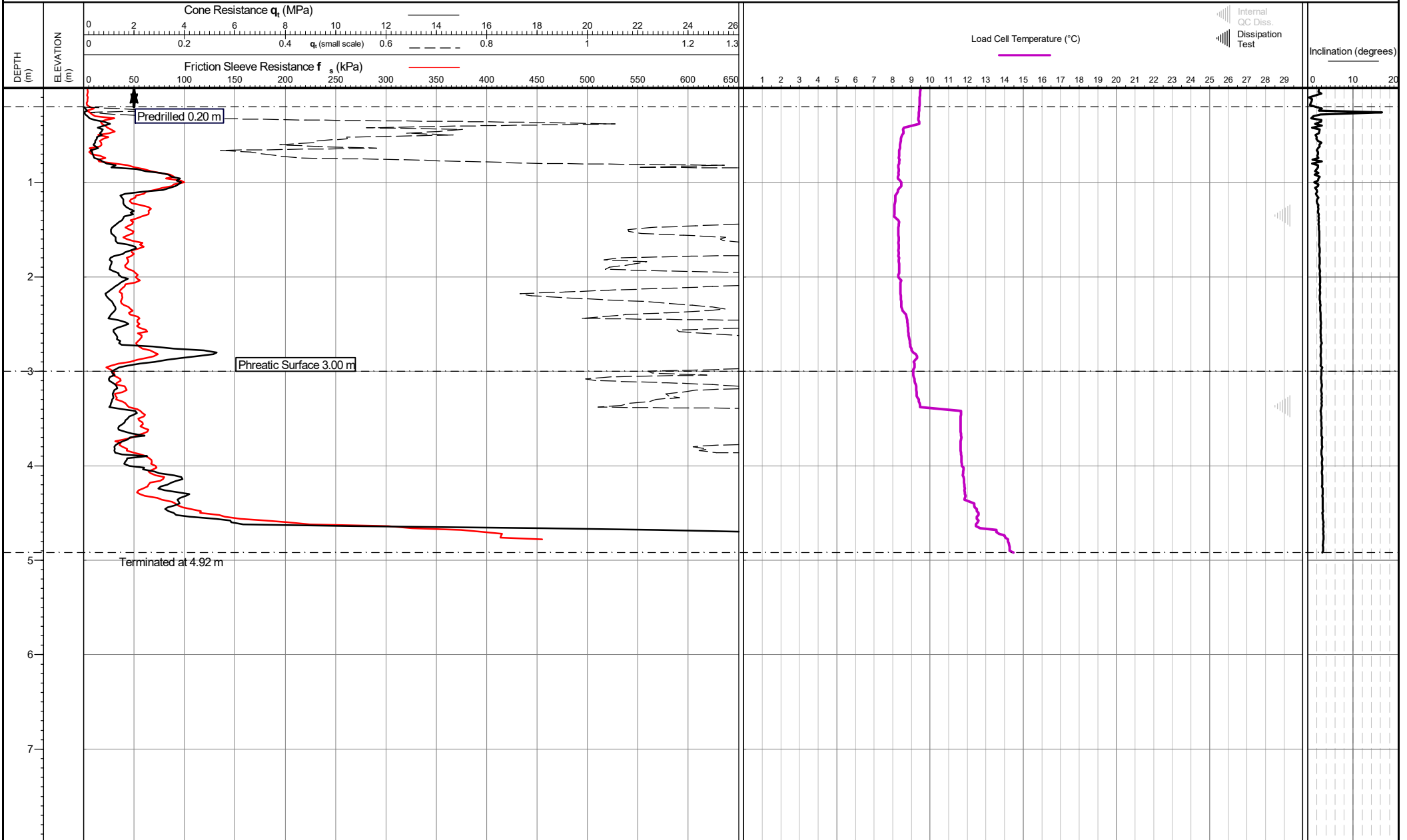
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Risk of equipment loss/damage

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-01



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:11:41

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_z (kPa):

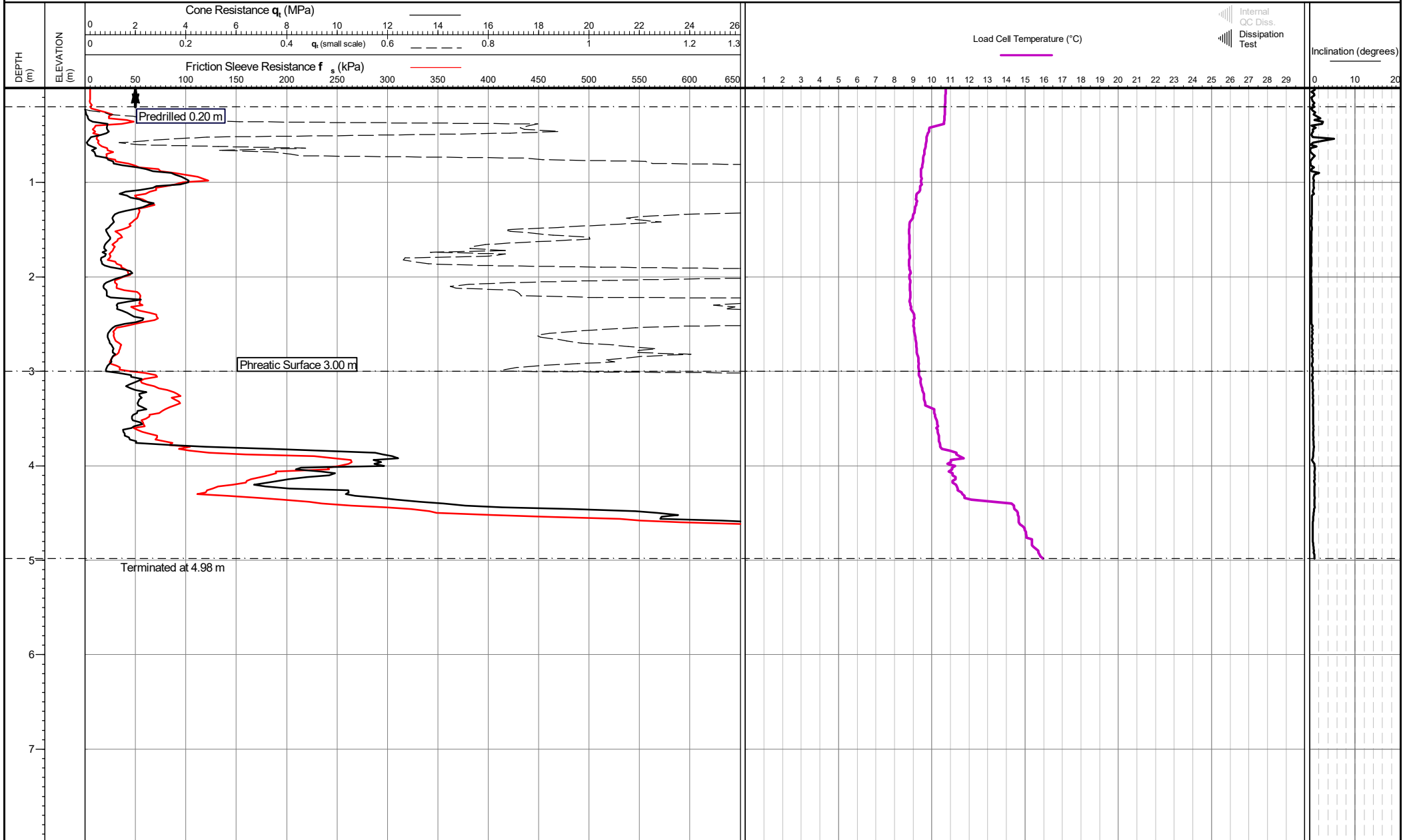
Location: Merseyside, UK
Coordinates: ,
Elevation:
Coordinate system:

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-02

Page 1 of 1



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 11:57:15

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_z (kPa):

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

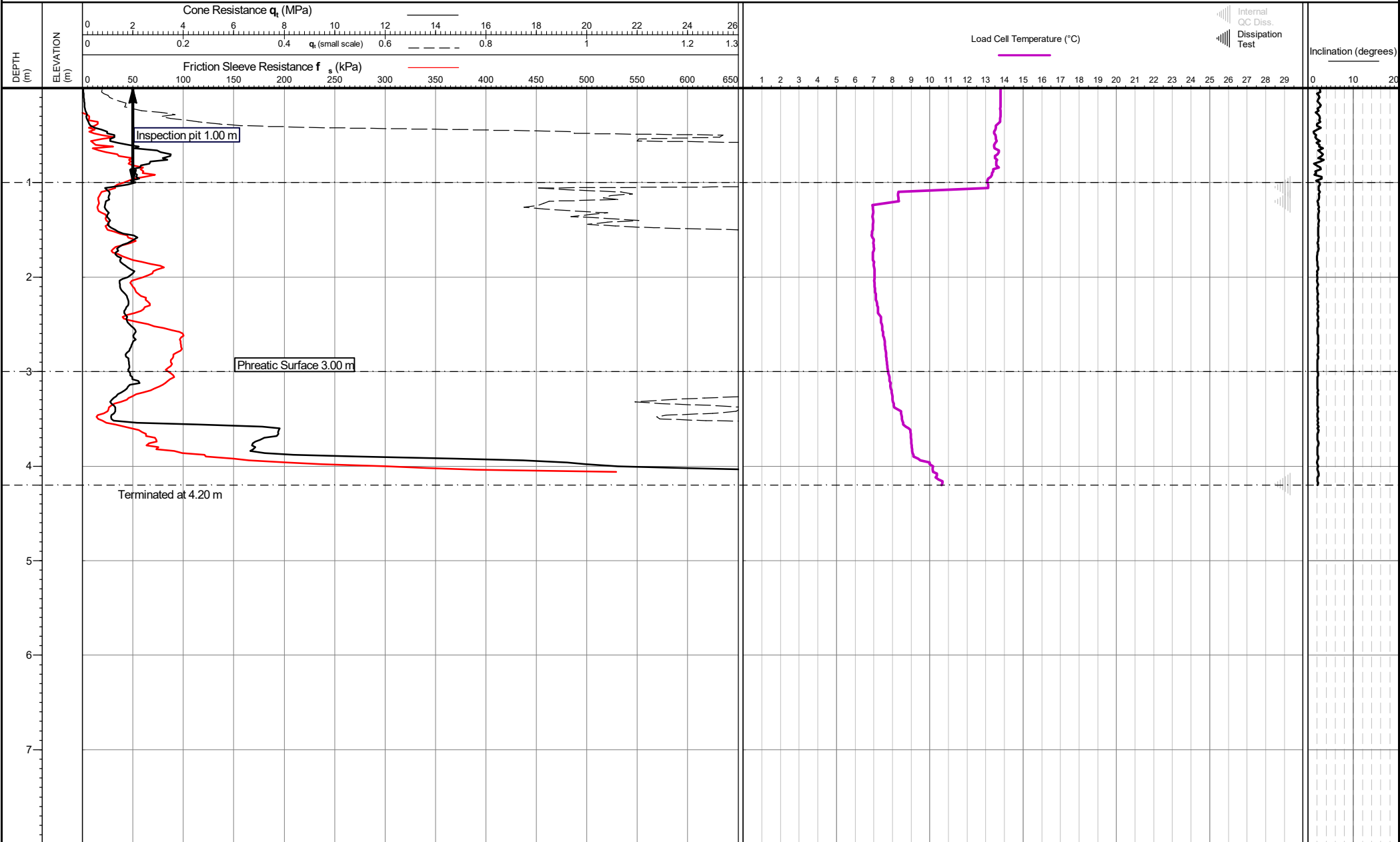
Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Risk of equipment loss/damage

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-03



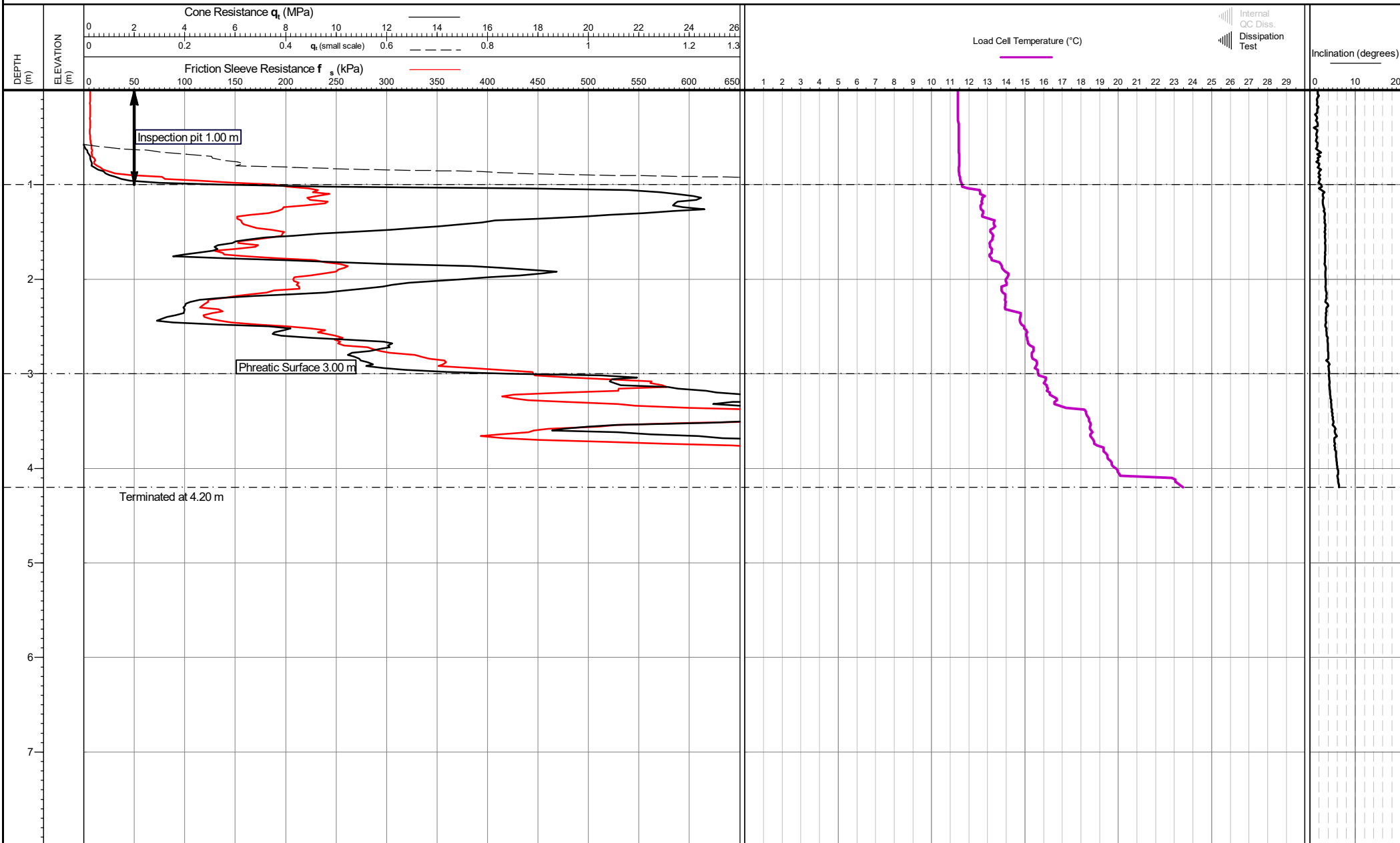
Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm ²): Cone ID: S15-CFIPTT.2213 Operator: Owen Treharne Rig Used: UK22 Date of test: 05/02/2026 16:04:05	Zero drift (Pre/post test) q_0 (kPa): f_0 (kPa): u_z (kPa):	Location: Merseyside, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Termination Remark: Lateral support at surface	Date of plot: 10-02-26 Checked by: Chris Player	Lankelma Project Ref: 26-32-30842-1	TEST ID: CPT-05 Page 1 of 1
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Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 12:54:49

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_z (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

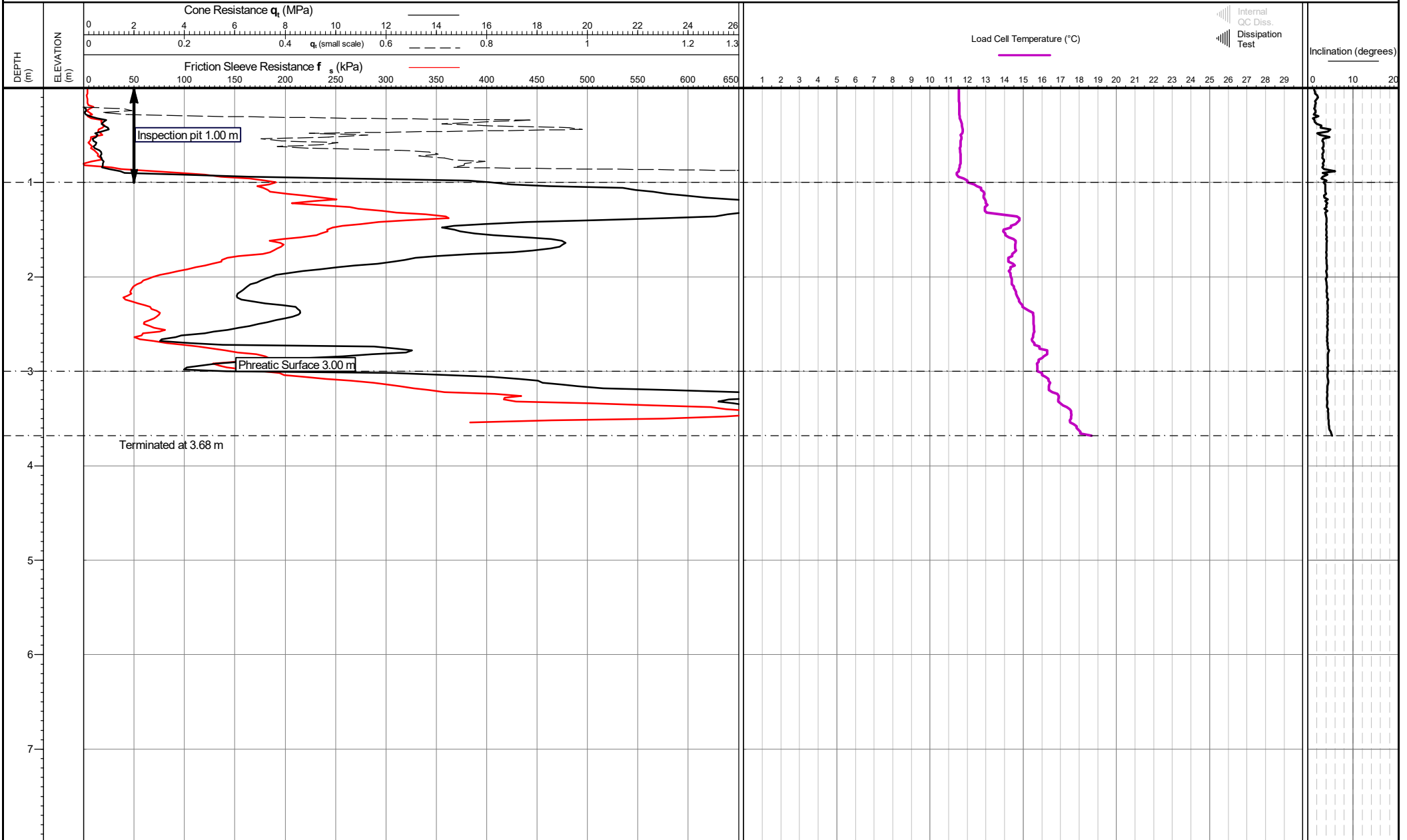
Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-07

Page 1 of 1



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 13:44:51

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_z (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

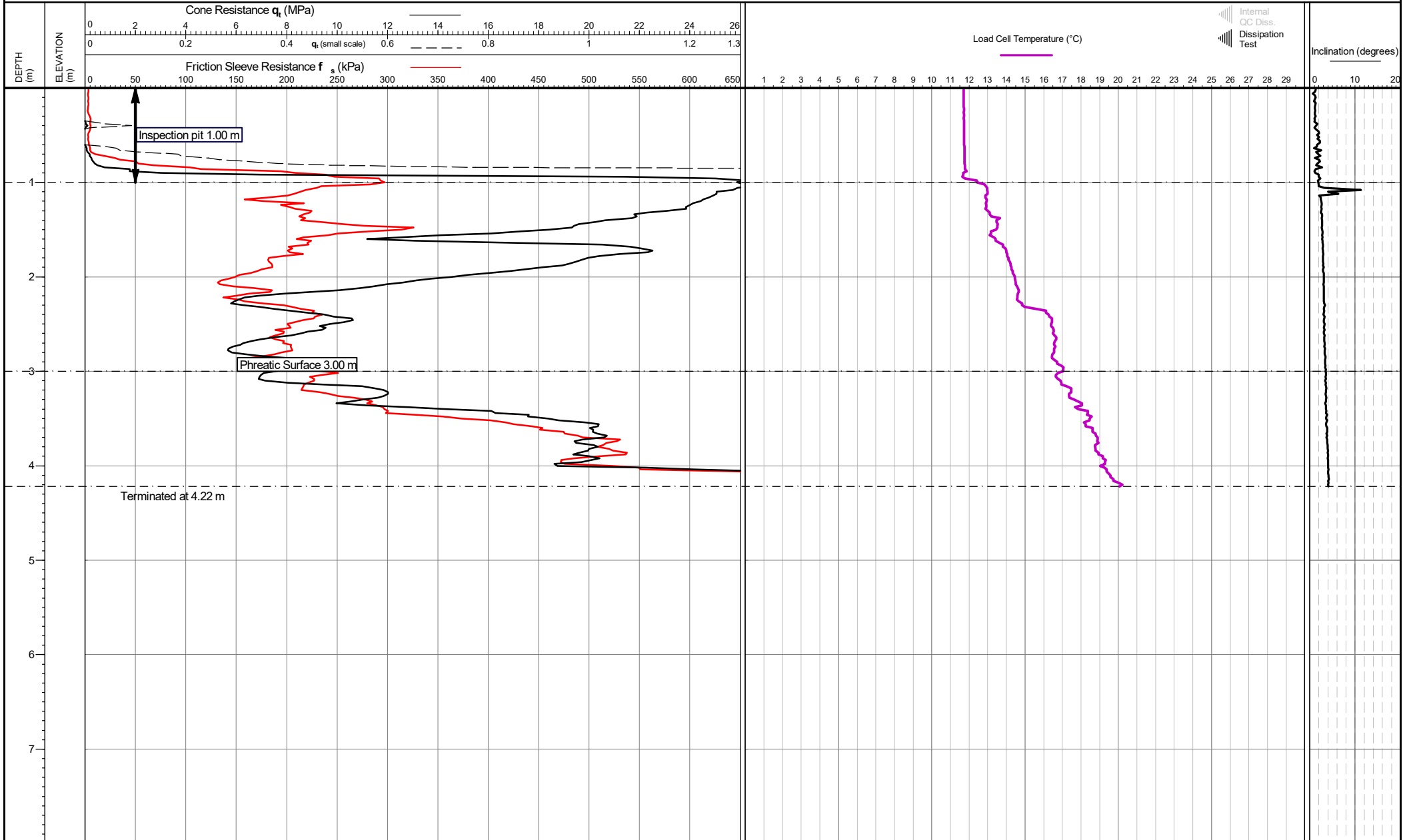
Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-08

Page 1 of 1



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.1854
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 14:19:36

Zero drift (Pre/post test)
 q_c (kPa):
 f_s (kPa):
 u_z (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot:
10-02-26
Checked by:
Chris Player

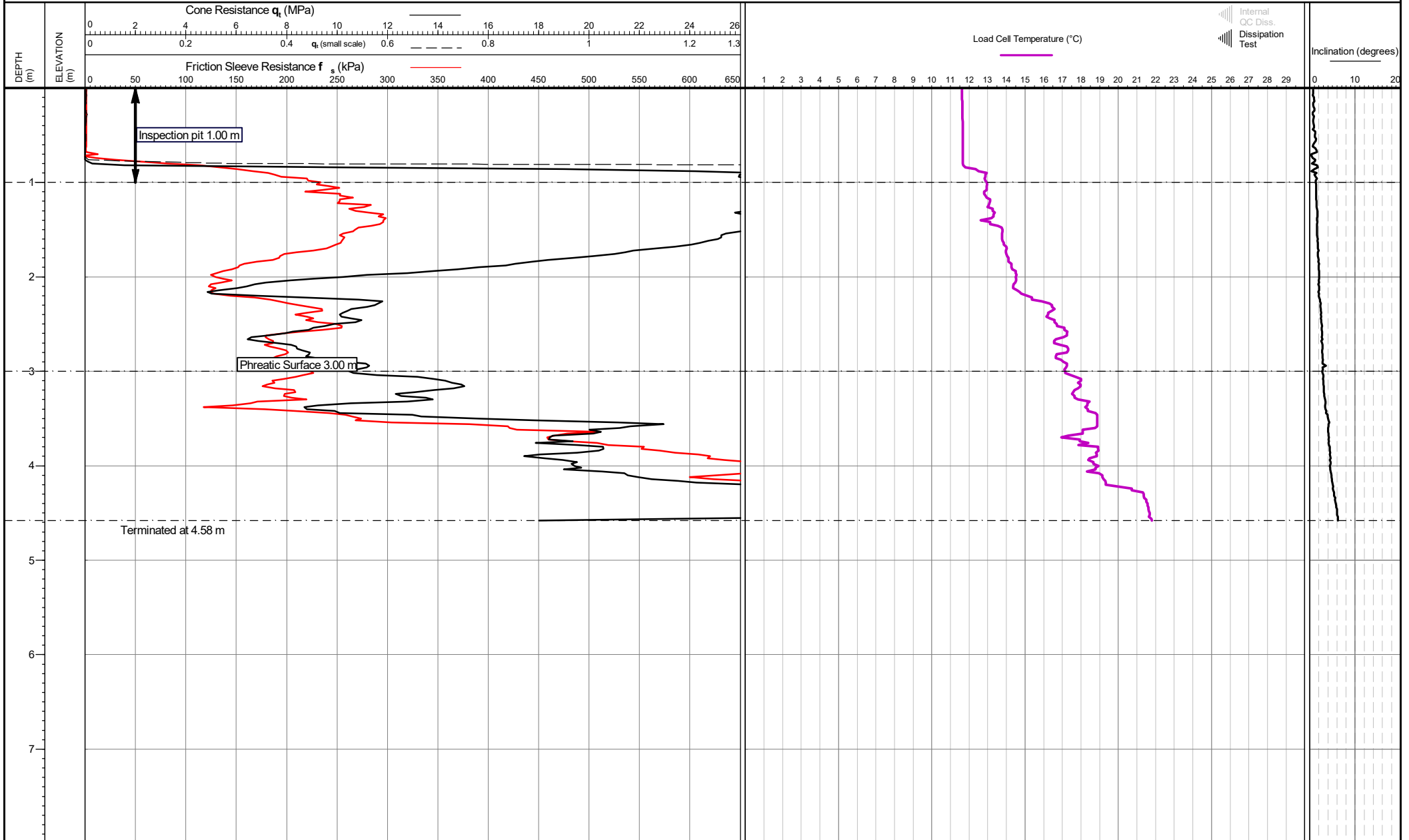
Lankelma Project Ref:
26-32-30842-1

TEST ID: CPT-09

Page 1 of 1



Project: KNOWSLEY
Client: TIER ENVIRONMENTAL



Cone area (mm²):
Cone ID: S15-CFIPTT.2213
Operator: Owen Treharne
Rig Used: UK22
Date of test: 05/02/2026 15:33:04

Zero drift (Pre/post test)
 q_0 (kPa):
 f_0 (kPa):
 u_z (kPa):

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

Remarks:
*Phreatic surface origin: Arbitrary value
Termination Remark: Lateral support at surface

Date of plot: 10-02-26
Lankelma Project Ref: 26-32-30842-1
Checked by: Chris Player

TEST ID: CPT-10

Page 1 of 1

**APPENDIX E - GROUNDWATER AND GAS MONITORING RESULTS & GAS ANALYSER
CALIBRATION CERTIFICATE**

Key

CS	Hazard Potential	GSV (l/hr)	Additional Factors
CS1	Very Low	<0.07	Typically <1% CH4 and <5% CO2
CS2	Low	<0.70	Typical measured flow rate <70 l/h
CS3	Moderate	<3.5	N/A
CS4	Moderate to High	<15	N/A
CS5	High	<70	N/A
CS6	Very High	>70	N/A

[illegible][illegible]

Key

CS	Hazard Potential	GSV (l/hr)	Additional Factors
CS1	Very Low	<0.07	Typically <1% CH4 and <5% CO2
CS2	Low	<0.70	Typical measured flow rate <70 l/h
CS3	Moderate	<3.5	N/A
CS4	Moderate to High	<15	N/A
CS5	High	<70	N/A
CS6	Very High	>70	N/A

[illegible][illegible]

Key

CS	Hazard Potential	GSV (l/hr)	Additional Factors
CS1	Very Low	<0.07	Typically <1% CH4 and <5% CO2
CS2	Low	<0.70	Typical measured flow rate <70 l/h
CS3	Moderate	<3.5	N/A
CS4	Moderate to High	<15	N/A
CS5	High	<70	N/A
CS6	Very High	>70	N/A

[illegible]

Job No:	TE1704		
Visit No:	2	of	4
Operator:	Julian Weaver		
Project Manager:	Adrian Read		

☐ Frozen

CS	Hazard Potential	GSV (l/hr)	Additional Factors
CS1	Very Low	<0.07	Typically <1% CH ₄ and <5% CO ₂
CS2	Low	<0.70	Typical measured flow rate <70 l/h
CS3	Moderate	<3.5	N/A
CS4	Moderate to High	<15	N/A
CS5	High	<70	N/A
CS6	Very High	>70	N/A

[illegible]

CERTIFICATION OF CALIBRATION



Date Of Calibration: 26-Jun-2025

No. 66916

Certificate Number: G508641_9/38893

Issued by: QED Environmental Systems Inc.

Customer: TIER ENVIRONMENTAL LTD
UNIT 5 VILLAGE OFFICE CHESTER BUSINESS PARK CHESTER, CHESHIRE CH4 9QZ

Description:

Model: GA5000

Serial Number: G508641

Accredited Results:

Methane (CH4)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.9	0.42
15.0	14.9	0.66
60.0	59.7	1.03

Carbon Dioxide (CO2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.9	0.43
15.0	14.8	0.71
40.0	40.0	1.19

Oxygen (O2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
21.3	21.4	0.25

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at: 32.8 °C/91.1 °F

O2 readings recorded at: 22.9 °C/73.3 °F

Barometric Pressure: 0981 mbar/28.98 "Hg

Method of Test: The analyzer is calibrated in a temperature controlled chamber using reference gases. All analyzers are calibrated in accordance with our procedure ISP-17 using high purity grade gas.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATION OF CALIBRATION



Date Of Calibration: 26-Jun-2025

No. 66916

Certificate Number: G508641_9/38893

Issued by: QED Environmental Systems Inc.

Non Accredited results:

Pressure Transducers (inches of water column)					
Transducer	Certified (Low)	Reading (Low)	Certified (High)	Reading (High)	Accuracy
Relative	0"	0"	40"	41.17"	2.0"

Barometer (mbar)	
Reference	Instrument Reading
0981 mbar / 28.98 "Hg	0981 mbar / 28.98 "Hg

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	499	499
H ₂ S	250	250

Internal Flow	
Applied	Measured
25.2	25.2
10	10.1
5	5

As received Gas readings recorded at: 32.8 °C/91.1 °F

As received Barometric Pressure recorded at: 22.9 °C/73.3 °F

As received gas check readings are only recorded if the instrument is received in a working condition.
Where the instrument is received damaged no reading can be taken.

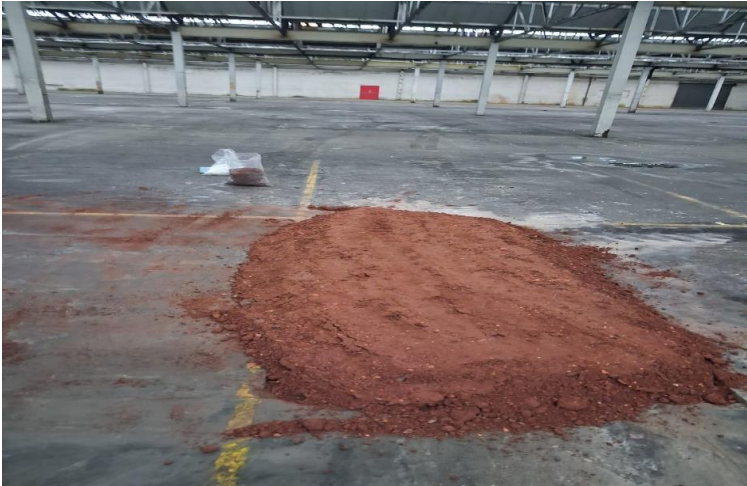
Date of Issue : 27 Jun 2025

Approved By Signatory

Sarah Schafer
Laboratory Inspection

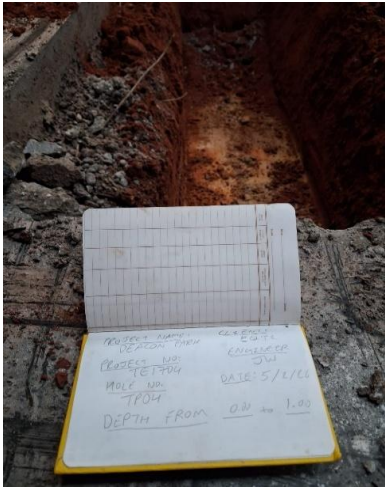
The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

APPENDIX F - PHOTOGRAPHS

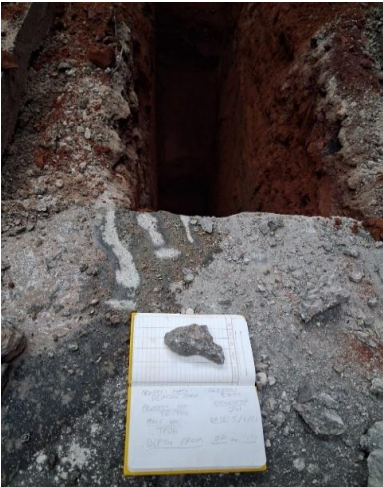
Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No.	TE1704		TP01
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			Pit
			Spoil
Photographed By		Date	
SE / JW		04.02.2026	

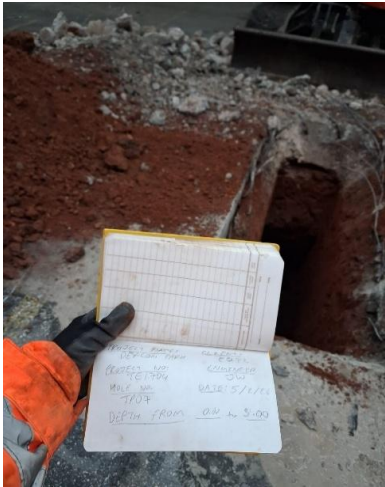
Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No. TE1704			TP02
Engineer SE / JW			
Client EEIP Arundel Propco 2 Holdings Ltd			
			Pit
			Spoil
Photographed By		Date	
SE / JW		04.02.2026	

Project Name Deacon Business Park, Knowsley Project No. TE1704 Engineer SE / JW Client EEIP Arundel Propco 2 Holdings Ltd		Photographic Record	Location ID TP03
			Pit
			Spoil
Photographed By SE / JW		Date 04.02.2026	

Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No. TE1704			TP04
Engineer SE / JW			
Client EEIP Arundel Propco 2 Holdings Ltd			
		Pit	
		Spoil	
Photographed By		Date	
SE / JW		05.02.2026	

Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No. TE1704			TP05
Engineer SE / JW			
Client EEIP Arundel Propco 2 Holdings Ltd			
			Pit
			Spoil
Photographed By		Date	
SE / JW		04.02.2026	

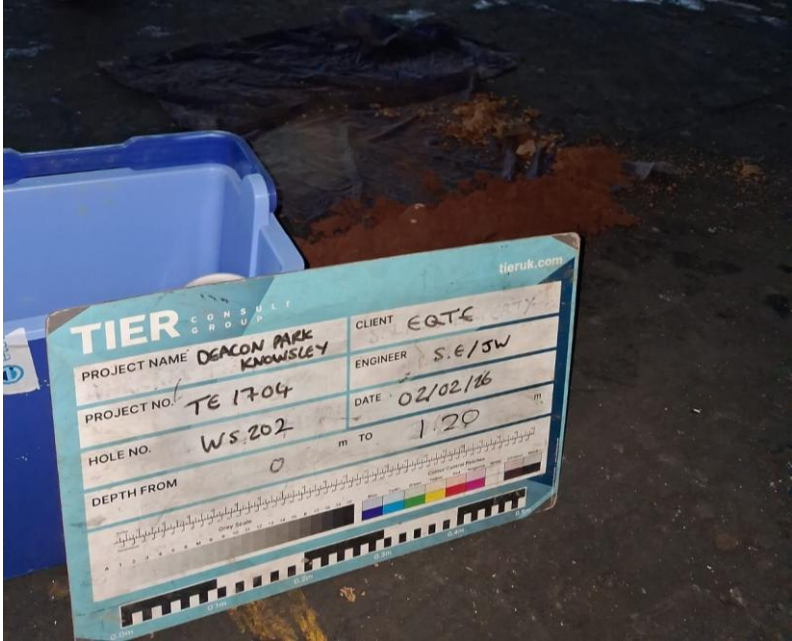
Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No.	TE1704		TP06
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
		Pit	
		Spoil	
Photographed By		Date	
SE / JW		05.02.2026	

Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No.	TE1704		TP07
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
		Pit	
		Spoil	
Photographed By		Date	
SE / JW		05.02.2026	

Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No. TE1704			TP08
Engineer SE / JW			
Client EEIP Arundel Propco 2 Holdings Ltd			
			Pit
			Spoil
Photographed By		Date	
SE / JW		04.02.2026	

Project Name Deacon Business Park, Knowsley		Photographic Record	Location ID
Project No. TE1704			TP09
Engineer SE / JW			
Client EEIP Arundel Propco 2 Holdings Ltd			
		Pit	
		Spoil	
Photographed By		Date	
SE / JW		05.02.2026	

Project Name Project No. Engineer Client	Deacon Business Park, Knowsley TE1704 SE / JW EEIP Arundel Propco 2 Holdings Ltd	Photographic Record	Location ID WS201
			
Photographed By SE / JW		Date 02.02.2026	

Project Name	Deacon Business Park, Knowsley	Photographic Record	Location ID
Project No.	TE1704		WS202
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			
Photographed By		Date	
SE / JW		02.02.2026	

Project Name	Deacon Business Park, Knowsley	Photographic Record	Location ID
Project No.	TE1704		WS203
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			
Photographed By		Date	
SE / JW		02.02.2026	

Project Name	Deacon Business Park, Knowsley	Photographic Record	Location ID
Project No.	TE1704		WS204
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			
Photographed By		Date	
SE / JW		02.02.2026	

Project Name	Deacon Business Park, Knowsley	Photographic Record	Location ID
Project No.	TE1704		WS205
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			
Photographed By		Date	
SE / JW		03.02.2026	

Project Name Project No. Engineer Client	Deacon Business Park, Knowsley TE1704 SE / JW EEIP Arundel Propco 2 Holdings Ltd	Photographic Record	Location ID WS207
	 		
Photographed By SE / JW		Date 02.02.2026	

Project Name	Deacon Business Park, Knowsley	Photographic Record	Location ID
Project No.	TE1704		WS208
Engineer	SE / JW		
Client	EEIP Arundel Propco 2 Holdings Ltd		
			
Photographed By		Date	
SE / JW		03.02.2026	

APPENDIX G - PREVIOUS SITE INVESTIGATION REPORT (AVAILABLE AS A SEPARATE DOCUMENT)

APPENDIX H – REGULATORY RESPONSES

Christina Shannon
Tier Environmental Ltd

**Merseyside Fire & Rescue
Authority Headquarters**

Strategy and Performance
Bridle Road
Bootle
Merseyside
L30 4YD

Telephone: 0151 296 4000
(Calls may be recorded)

Debbie Appleton 0151 296 4402
Sue Coker 0151 296 4425

Web Site:
www.merseyfire.gov.uk

Date: 16 June 2026

Our Ref: FOI/25/2026-27

Dear Ms. Shannon

**Freedom of Information (FOI) Act 2000/Environmental Information
Regulations (EIRs) 2004 - Information Request**

You initially requested the following information:

Site Address: DEACON PARK, MOORGATE ROAD, SOUTHdene, KIRKBY, L33 7RX

Details of any fires reported at the address, including the following:

- Dates of the fire(s) **Please see attached spreadsheet.**
- Reference numbers associated with the incidents **These numbers have been redacted as it is operational information.**
- Nature and scale of the fire(s) **Please see attached spreadsheet.**
- Cause of the fire(s) **Please see attached spreadsheet.**

Details of the fire fighting fluids or materials used, including:

- Whether PFAS containing fire fighting foams were used (**please note that this is an important consideration for our desk study**) **No.**
- Whether just water was used **Please see attached spreadsheet.**
- The volumes used to put out the fires **MFRS does not hold this information.**
- Details of any reported run-off into drains or the ground etc **MFRS does not hold this information.**

On 11.05.2026, you then clarified your request to include:

- whether the request has been considered under the Freedom of Information Act 2000 and/or the Environmental Information Regulations 2004; **Your initial request was processed as an information request for a chargeable item. Following your clarification, the request has been treated as a FOI request.**
- what exemption or exception is being relied upon to withhold information relating to earlier incidents at the site; **None; the attached document provides a redacted, confirmation-only disclosure, as requested.**
- whether redacted reports, or confirmation-only disclosure of historic incidents, could be provided where any personal data has been removed. **See above.**

Our Response

Please see the attached spreadsheet.

If you have any queries or concerns, please do not hesitate to contact the Director of Strategy and Performance on the above numbers.

The Service has an internal review procedure. If you are dissatisfied with the handling of your request please contact the Information Management Officer, Merseyside Fire and Rescue Authority Headquarters, Bridle Road, Bootle, Merseyside, L30 4YD, email foiteam@merseyfire.gov.uk.



You can also contact the Information Commissioner at:

*Information Commissioner's Office
Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF*

Telephone: 0303 123 1113

<http://www.ico.org.uk>

Yours sincerely

Sue Coker

Information Management Officer

Call_Date	Property_Type	Ignition Source	Equipment Used	Damage	Summary
28/05/2009	Road Vehicle - Agricultural--	Overheating, unknown cause	Water Delivery - Hosereel – high pressure, CO2	Limited to Vehicle	JCB INSIDE WAREHOUSE
19/09/2012	Non Residential-Offices and call centres-Call Centre	Combustible articles too close to heat source (or fire)	No Fire Fighting Out on Arrival	Up to 5m	CALL CENTRE, FIRST FLOOR CANTEEN INVOLVED
08/11/2009	Non Residential-Industrial Processing-Animal products	Faulty fuel supplies - Electricity	Water Delivery - Hosereel – high pressure, Water Delivery - Main line/jet	11-20m	ANIMAL FOOD CEREAL PRODUCTION AND STORAGE WAREHOUSE.SINGLE STOREY BUILDING APPROX 250M X 50M, 20 TONNE ARTICULATED DIGGER INVOLVED
18/03/2010	Non Residential-Industrial Processing-Recycling	Accumulation of flammable material	Water Delivery - Hosereel – high pressure	Up to 5m	PURPOSE BUILT SINGLE STORY FACTORY,FIRE INV IN EXTERNAL COMPACTION UNIT

[illegible]

Freedom of Information

Reference number

10171

Subject

EIR 10171- Response

Request details

Good morning,

Please find the attached environmental search request for our reference TE1704.

Kind regards,

Christina

Response details

Dear Christina,

Re: DEACON PARK, MOORGATE ROAD, SOUTHdene, KIRKBY, L33 7RX

Thank you for the request for information relation to the above premises, I have responded to your queries below.

- Records of any landfills on or within the vicinity of the site

None.

- Any information pertaining to historic contaminated land uses or contamination concerns

The historical maps indicate a factory (engineering works), electricity substation plus embankments and drainage ditches.

Site investigation reports were undertaken under 05/00721/FUL for the adjacent site. Information can be found at Search Results (<https://planapp.knowsley.gov.uk/online-applications/simpleSearchResults.do?action=firstPage>).

- Any records of odour complaints or similar evidence of historic contamination

No complaints received.

- Information of any asbestos

No information held within this department.

- Information associated with any historic site investigations

Please see information detailed above.

- Information associated with any previous remediation

Please see information detailed above.

- Any pertinent information regarding the site and the environmental setting surrounding the site

No further information held on this site.

- Any pertinent information pertaining to known geotechnical issues such as sinkholes, subsidence, mining related issues etc

No further information held on this site.

Kind Regards

If you are dissatisfied with the handling of your Freedom of Information request, you may request an internal review. Internal review requests should be made within 40 working days of our initial response to your request. After this deadline the Council are not obliged to accept internal reviews. To request an internal view, please email foi@knowsley.gov.uk (<mailto:foi@knowsley.gov.uk>)

Should you submit a review under this procedure but remain dissatisfied, we are also required to inform you that you can appeal against the decision by contacting the Information Commissioner.

The Commissioner's postal address is Wycliffe House, Water Lane, Wilmslow SK9 5AF. The telephone number for the Information Commissioner's Office is 0303 123 1113 or 01625 545745. The e-mail address is: casework@ico.org.uk (<mailto:casework@ico.org.uk>)

From: [Cumbria and Lancashire Enquiries](#)
To: [Christina Shannon](#)
Subject: RESPONSE - Request for information - Ref: EIR2026/06545GC
Date: 13 February 2026 09:05:36
Attachments: [Historical Site Investigations.xlsx](#)

Our ref: EIR2026/06545

Your ref:

Dear Christina Shannon,

I am writing in response to your request for information, received 9 February 2026, regarding 100226/JTH03 EA_ Environmental Search request Letter_TE1704.

We respond to requests for information under the Freedom of Information Act 2000 (FOI) and Environmental Information Regulations 2004 (EIR).

*Please see the response from the relevant teams in **bold**.*

1. *Records of any landfills on or within the vicinity of the site* **There are no active or historic landfill sites within 500m of the site boundary.**
2. *Any information pertaining to historic contaminated land uses or contamination concerns*

Please see the electronic summary of historical site investigations attached.

3. *Any records of odour complaints or similar evidence of historic contamination*

From 1st January 2001 – present, with a 0.5km buffer of grid reference 342534 397564, there are no closed, substantiated reports to provide.

4. *Information of any asbestos*

Asbestos is not mentioned in the summary information we have retained (see [2] above).

5. *Information associated with any historic site investigations*

As per response to [2] above.

6. *Information associated with any previous remediation*

No remediation works are known to us, but the Local Planning Authority should be consulted.

7. *Any pertinent information regarding the site and the environmental setting surrounding the site*

As we have not retained any relevant records, public domain sources (e.g. historical maps e.g. [OS map SJ49NW published in 1956](#)), local libraries and local newspapers) should be consulted regarding former uses of land and/or historical (pre-1996) pollution incidents.

8. *Any pertinent information pertaining to known geotechnical issues such as sinkholes, subsidence, mining related issues etc* **Although we do not retain such records, the British Geological Survey may maintain a database of geohazards; and/or (unlike the Environment Agency) may be able to provide a relevant consultancy service.**

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Rights of appeal

If you are not satisfied with our decision, you can contact us within two calendar months to ask for the decision to be reviewed. We will then conduct an internal review of our response to your request and give you our decision in writing within 40 working days.

If you are not satisfied with the outcome of the internal review, you can then make an appeal to the Information Commissioner Office, the statutory regulator for the Environmental Information Regulations 2004 and the Freedom of Information Act 2000. Please follow this link to the [ICO online complaints portal](#). The address is: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire. SK9 5AF.

Tel: 0303 123 1113 (local rate) or 01625 545 745 (national rate) | Fax: 01625 524 510
Email: icocasework@ico.org.uk | Website: www.ico.org.uk

Yours sincerely,

Gini Craig

CLA Area Customers and Engagement Team

Environment Agency

Please tell us how we did

To help improve your experience as a customer we are currently gathering feedback. If you would like to take part in a short customer satisfaction survey, please click the link below:

[Environment Agency FOI Customer Satisfaction Survey](#)

APPENDIX I - DEFINITIONS OF TERMS USED IN QUALITATIVE AND QUANTITATIVE RISK ASSESSMENTS

CIRIA C552 Terminology

For the qualitative and quantitative assessment of risks posed by potential pollutant linkages have been undertaken using the risk matrix adapted from CIRIA C552 and outlined in the table below.

	Category	Definition
Potential severity	Severe	Acute (short term) risk to human health, Major pollution of sensitive controlled waters, ecosystems or habitat. Catastrophic damage to buildings or property or crops.
	Medium	Chronic (Medium / long term) risk to human health Pollution of sensitive controlled waters, ecosystems or species, Significant damage to crops, buildings or structures
	Mild	Easily preventable permanent health effects on humans. Pollution of non-sensitive controlled waters. Minor damage to buildings or structures.
	Minor	Easily preventable non-permanent health effects on humans, or no effects. Minor, low level and localised contamination of on-site soil. Easily repairable damage to buildings or structures.
Probability of risk	High Likelihood	Pollutant linkage may be present, and the risk is almost certain to occur , or there is evidence of harm already occurring.
	Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
	Low Likelihood	Pollutant linkages may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
	Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur are improbable.

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of risk	High Likelihood	Very high risk	High risk	Moderate risk	Moderate / low risk
	Likely	High risk	Moderate risk	Moderate / low risk	Low risk
	Low Likelihood	Moderate risk	Moderate / low risk	Low risk	Very low risk
	Unlikely	Moderate / low risk	Low risk	very low risk	Very low risk

APPENDIX J - HUMAN HEALTH ASSESSMENT CRITERIA

HUMAN HEALTH ASSESSMENT CRITERIA

Context

Contaminated Land is defined under law through Part IIA of the Environmental Protection Act 1990, implemented through Section 57 of the Environment Act 1995 and associated guidance ("Part IIA"). These specify that a "suitable for use" approach is to be applied in the assessment of potentially contaminated land, implemented through a phased programme of site investigation and risk assessment appropriate to the site under consideration.

The assessment of potential risks posed by contaminated land is based upon the assessment of plausible contaminant source - pathway - receptor linkages ("pollutant linkages") for the current and/or proposed future use of the site. The process for the assessment of contaminated land adopted in this report is in line with guidance issued by the Environment Agency Land contamination risk management (LCRM) - GOV.UK (www.gov.uk)

Land contamination can harm:

- human health
- drinking water supplies, groundwater and surface water
- soils
- ecosystems including wildlife, animals and wetlands.
- property

It can also affect the current and future land use. Dealing with land contamination helps make the environment clean and safe. Through regeneration it can:

- enhance the health and wellbeing of all.
- add to the economic, ecological and amenity value of the area.

Use land contamination risk management (LCRM) to:

- identify and assess if there is an unacceptable risk.
- assess what remediation options are suitable to manage the risk.
- plan and carry out remediation.
- verify that remediation has worked.

You can use LCRM in a range of regulatory and management contexts. For example, voluntary remediation, planning, assessing liabilities or under the Part 2A contaminated land regime. The Environment Agency expects you to follow LCRM if you are managing the risks from land contamination.

We support the use of the National Quality Mark Scheme (NQMS). You can use it for any type of land contamination report.

Using the NQMS:

- will make sure all legislative requirements and necessary standards related to managing land contamination are met.
- can provide increased confidence by submitting reports of the quality we expect.
- can result in cost and time savings by 'getting it right first time'.

LCRM is made up of 4 guides.

1. LCRM: Before you start.
2. LCRM: Risk assessment.
3. LCRM: Options appraisal.
4. LCRM: Remediation and verification.

We use a staged risk based approach. There are 3 stages, and each stage is broken down into tiers or steps.

Stage 1: Risk assessment

You will use a tiered approach to risk assessment. The 3 tiers are:

1. Preliminary risk assessment.
2. Generic quantitative risk assessment.
3. Detailed quantitative risk assessment.

Stage 1 includes information for intrusive site investigations.

Stage 2: Options appraisal

There are 3 steps to follow.

1. Identify feasible remediation options.
2. Do a detailed evaluation of options.
3. Select the final remediation option.

Stage 3: Remediation and verification

There are 4 steps to follow.

1. Develop a remediation strategy.
2. Remediate.
3. Produce a verification report.
4. Do long term monitoring and maintenance, if required

You must always start with a preliminary risk assessment.

The risk assessment stage is an iterative process. You can do the 3 tiers in order or progress from a preliminary risk assessment to a detailed quantitative risk assessment. As part of a generic or detailed quantitative risk assessment you will need to collect detailed information about the site. This is usually through an intrusive site investigation.

Depending on the level of risk or regulatory requirements, you can proceed from a preliminary risk assessment to the options appraisal stage. If you proceed direct to the options appraisal stage, you still need to collect the detailed site investigation information required by the generic and detailed quantitative risk assessments. This is to confirm that your approach is viable and acceptable.

Following the risk assessment stage, if you conclude that the risks are acceptable, with agreement from the relevant regulator, you can end the process.

If there are unacceptable risks, then remediation or mitigation is required. Follow stages 2 and 3 in order.

In stage 2 options appraisal, you will:

- look at the most feasible options.
- produce a shortlist of options.
- use evaluation criteria to assess them.
- select which ones are the most suitable to take forward to stage 3.

In stage 3 remediation and verification, you will produce a remediation strategy, do the remediation and then produce a verification report.

You will decide at the options appraisal stage if long term monitoring and maintenance is the remediation option. You may need to do post-remediation monitoring for further verification.

The risk assessment and subsequent investigation, remediation and verification must address all potential sources of pollutants that may be present on the site (the “hazards”), all receptors that may be harmed by these (e.g., human health, controlled waters, ecological receptors) and the pathways by which the contamination may be transported from the contaminant source(s) to the receptor(s). This is defined within the conceptual model for the site, which represents the characteristics of the site in a form that shows the possible pollutant linkages. As further information becomes available (for example, through site investigation), so the conceptual model will be refined.

Remedial action can be specified at any phase within this assessment process to break the identified pollutant linkage in determining whether or not to undertake further assessment or to undertake remediation, the potential cost-savings arising from a more thorough assessment of the pollutant linkages and more tightly defined remedial strategy must be considered against the direct costs involved in the work and the time that this will take to execute and gain regulatory approval.

A different approach to the statistical appraisal of data is required depending on whether the assessment is being undertaken to assess land as Contaminated Land in accordance with the regulations or whether the assessment is to assess whether the site is suitable for new development in accordance with the Planning regime. The statistical approach to assessment is discussed further in CL:AIRE:2020 “Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration”.

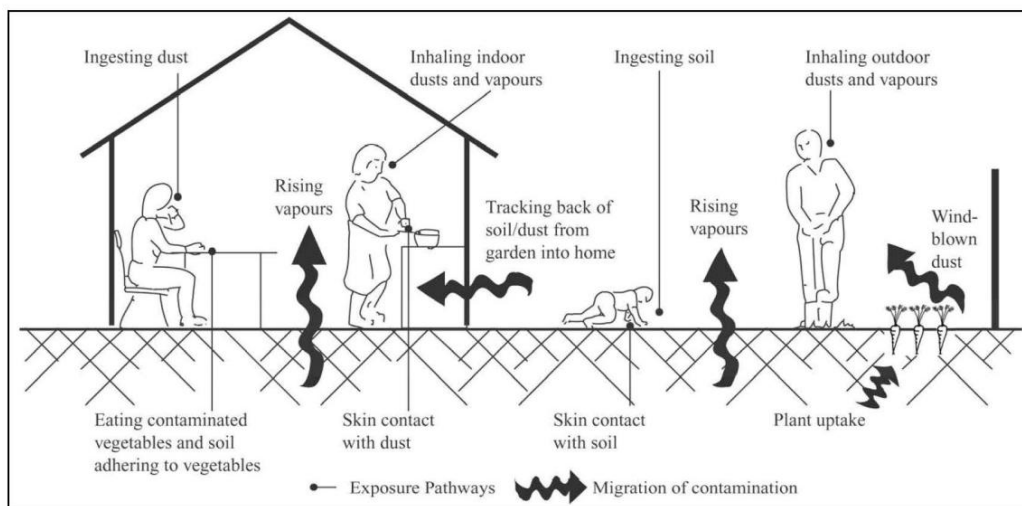
Some form of Detailed Quantitative Risk Assessment (DQRA) will be essential for those cases where appropriate GAC values cannot be established for the contaminant linkages under consideration.

Generic Assessment Criteria for Human Health Risk Assessment

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports and guidance. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. The initial documents (CLR7 – 10) were withdrawn and replaced with revised guidance issued by the Environment Agency including:

- “Using Soil Guideline Values”; EA, 2009; [Land contamination: using soil guideline values \(SGVs\) - GOV.UK \(www.gov.uk\)](http://www.gov.uk)
- “Human Health toxicology assessment of contaminants in soil” EA, 2009; <https://www.gov.uk/government/publications/human-health-toxicological-assessment-of-contaminants-in-soil>
- “Update technical background to the CLEA model” 2009; <https://www.gov.uk/government/publications/updated-technical-background-to-the-clea-model>
- CLEA Software (Version 1.05) Handbook 2015; <https://www.gov.uk/government/publications/contaminated-land-exposure-assessment-clea-tool>
- Compilation of Data for priority Organic Contaminants for Derivation of Soil Guideline Values; Science Report SC050021/SR7, 2008; and,
- “Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration”. CL:AIRE:2020 <https://www.claire.co.uk/component/phocadownload/category/9-other-cl-aire-documents?download=745:2020-stats-guidance>

The CLEA model and associated guidance was developed to calculate an estimated tolerable daily intake (TDI) of contaminants for site users given a set of ‘typical’ human health exposure pathways which are detailed in “SR3: Updated technical background to the CLEA model”



(Science Report SC050021/SR3, EA, 2009) and reproduced below.

Ingestion

- Outdoor soil;
- Indoor dust;
- Home grown produce;
- Soil attached to home grown produce.

Dermal Contact

- Outdoor soil;
- Indoor dust.

Inhalation

- Outdoor dust;
- Indoor dust;
- Outdoor vapour;
- Indoor vapour.

It should be noted that the CLEA model does not include an exhaustive list of potential exposure pathways, e.g. certain compounds can pass through plastic water pipes into drinking water supply.

The potential significance of each of the exposure pathways is dependent upon the type of land use and the nature of the contaminant being considered. The CLEA model considers principal 'default' land use scenarios and makes a series of assumptions with regards to building type (where applicable), identification of the critical human receptor group, exposure frequency and duration. The definitions of the principal land use types given in SR3 (EA, 2009) are:

Residential land use;

- A typical residential property consisting of a two-storey terraced house built on a ground-bearing slab of 0.15m thickness with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden. The critical receptor is a 0 – 6-year-old female.
- Active exposure pathways are ingestion of outdoor soil, ingestion of indoor dust, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and indoor dust and vapour.

Allotments

- A plot of open space commonly made available by the Local Authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than one hectare. The tenants are assumed to be the parents or grandparents and that young children make occasional accompanied visits to the plots. The critical receptor is a 0 – 6-year-old female and there is no building present on site.
- Active exposure pathways are ingestion of outdoor soil, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil; inhalation of outdoor vapour.

Commercial and industrial land use.

- A typical commercial or light industrial property consisting of a three-storey office building (pre-1970) with a ground bearing floor slab at which employees spend most time indoors and are involved in office based or related light physical work. The critical receptor is a working female adult aged 16 – 65 years.
- Active exposure pathway is ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and inhalation of indoor dust and vapour.

Soil Guideline Values

Based on the assumption of each land use type, the EA and DEFRA developed and published Soil Guideline Value (SGV) using the CLEA model for a number of principal contaminants and 'default' end-use scenarios of residential, allotments and commercial/industrial use. The primary purpose of the SGVs is as trigger value for the tolerable daily intake (TDI), below which it can be assumed that the soil does not pose an unacceptable risk to the identified receptor. Where soils contamination is present above this level further assessment may be required. SGVs were developed for the following contaminants:

- Heavy metals and other inorganic compounds: arsenic, cadmium, chromium, cyanide, lead (now withdrawn), mercury, nickel and selenium.
- Benzene, ethylbenzene, toluene and xylenes.
- Phenol.
- Dioxins and dioxin-like polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs) – 11 substances

LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment

In addition, in 2009 CIEH through LQM and EIC published generic assessment criteria (GACs) for 82 substances including metals, petroleum hydrocarbons, PAHs and explosive substances for a variety of soil types and the three 'default' land uses – (residential, allotments and commercial end-uses) as described in SR3 (EA, 2009). These have been superseded as described below.

Category 4 Screening Values

In 2013 "SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination" (CL:AIRE 2013) was issued which detailed findings of a research project undertaken by CL:AIRE to set out the framework by which potential Category 4 Screening Levels (pC4SL) may be derived for 6 contaminants of concern, Arsenic, Benzene, Benzo(a)pyrene, Cadmium, Chromium VI and Lead.

This was supplemented in 2014 by "SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination – Policy Companion Document" (DEFRA, 2014). SP1010 proposed several updated toxicology information relating to contaminant behaviour updated assumptions relating to the modelling of human exposure to soil contaminants, derivation of separate C4SLs for residential with the consumption of home grown produce, residential without the consumption of home grown produce, and two new land uses: public open spaces near residential housing (POS resi) and public parks (POS park).

Public Open Space: Residential

- For public open space in close proximity to residential housing and the central green area around which houses are located, as on many housing estates from the 1930s to 1970s. It is also applicable for smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting. It is considered to be a generally grassed area up to 0.5ha with up to 50% bare soil. The land use is an important resource

for children and the area is near the homes. The critical receptor is a female child age >3 - <9 years old (CLEA age class 4 – 9) as younger children are unlikely to play outdoors unsupervised.

- Active exposure pathways are ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor soil derived dust; inhalation of outdoor and indoor dust and inhalation of outdoor vapour.

Public Open Space: Park

- A public park is defined as an area of open space provided for recreational use and usually owned and maintained by the Local Authority. It is anticipated the park could be used for a wide range of activities, including the following:
 - Family visits and picnics;
 - Children's play area;
 - Sporting activities such as football on an informal basis (i.e. not a dedicated sports pitch); and
 - Dog walking.
- The park is modelled as an area >0.5 ha of predominantly grasses open space with no more than 25% of exposed soil.
- The critical receptor is a female child with CLEA age classes 1 – 6.
- Active exposure pathways are: ingestion of outdoor soil; direct dermal contact with outdoor soil; inhalation of outdoor dust and inhalation of outdoor vapour.

Furthermore, the C4SLs are based on a different toxicological benchmark, the 'low level of toxicological concern' (LLTC). This difference in approach was adopted because the C4SLs were primarily intended for use under Part 2A of the EPA 1990 to quickly screen out Category 4 sites where there is *"no risk or that the level of risk posed is low"*. SGVs and LQM GACs are based on the more conservative 'minimal or tolerable level of risk' as defined in SR2 (EA, 2009) and were derived for assessment of contamination for the Planning process.

LQM/CIEH Suitable 4 Use Levels (S4ULs)

The publication of the C4SLs resulted in considerable and inconclusive debate about the applicability of the lower level of protection of the C4SL, which are underlain by the LLTC, outside of the Part 2A context for which they were derived. In 2014 LQM/CIEH presented a Suitable 4 Use Levels (S4ULs), which incorporate the updated assumption exposure derived for the production of the C4SLs but within the context of deriving screening criteria above which further assessment of the risks or remedial action may be needed. The S4ULs replace the 82 substances, species and fractions and congeners contained in the previous LQM/CIEH GACs issued in 2009. Additionally, following changes and new land uses proposed in the C4SL research project, S4ULs have also been derived for the majority of substances for which the EA derived SGVs in 2009 with the exception of lead (see below).

Lead

The C4SL for lead provides a technically robust and conservative assessment tool using significantly updated toxicological modelling than the withdrawn SGV and derived in line with current science of lead toxicology.

EIC/AGS/CL:AIRE Soil Generic Assessment Criteria (2010)

In some instances, EIC/AGC/CL:AIRE GACs for certain VOC / SVOC potential contaminants of concern have been used *in lieu* of available LQM / CIEH S4UL values.

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Metals/metalloids																			
Arsenic	37			40			43			640			79			170			LQM (2014)
Beryllium	1.7			1.7			35			12			2.2			63			LQM (2014)
Boron	290			11000			45			240000			21000			46000			LQM (2014)
Cadmium	11			85			1.9			190			120			560			LQM (2014 errata)
Chromium III	910			910			18000			8600			1500			33000			LQM (2014)
Chromium VI	6			6			1.8			33			7.7			220			LQM (2014)
Copper	2400			7100			520			68000			12000			44000			LQM (2014)
Lead	200			310			80			2330			630			1300			C4SL
Mercury (elemental)	1.2			1.2			21			58 (25.8)			16			30 (25.8)			LQM (2014)
Mercury (Inorganic)	40			56			19			1100			120			240			LQM (2014)
Methylmercury	11			15			6			320			40			68			LQM (2014)
Nickel	130			180			53			980			230			800			LQM (Revised 2015)
Selenium	250			430			88			12000			1100			1800			LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Vanadium	410			1200			91			9000			2000			5000			LQM (2014)
Zinc	3700			40000			620			730000			81000			170000			LQM (2014)
Other																			
Total Sulphate	2,400			2,400			2,400			2,400			2,400			2,400			BRE (2005)
Water Soluble Sulphate (g/l)	0.5			0.5			0.5			0.5			0.5			0.5			BRE (2005)
PAHs																			
Acenaphthene	210	510	1100	3000 (57)	4700(141)	6000 (336)	34	85	200	84000 (57)	97000 (141)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Acenaphthylene	170	420	920	2900 (86.1)	4600 (212)	6000 (506)	28	69	160	8300 (86.1)	97000 (212)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Anthracene	2400	5400	11000	31000 (1.17)	35000	37000	380	950	2200	520000	540000	540000	74000	74000	74000	150000	150000	150000	LQM (2014)
Benzo(a)anthracene	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	LQM (2014)
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	LQM (2014)
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	0.99	2.1	3.9	44	44	45	7.1	7.1	7.1	13	15	16	LQM (2014)
Benzo(g,h,i)perylene	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	LQM (2014)
Benzo(k)fluoranthene	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	LQM (2014)
Chrysene	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Dibenz(a,h)anthracene	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.61	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	LQM (2014)
Fluoranthene	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	63	6300	6400	LQM (2014)
Fluorene	170	400	860	2800 (30.9)	3800 (76.5)	4500 (183)	27	67	160	63000 (30.9)	68000	71000	9900	9900	9900	20000	20000	20000	LQM (2014)
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	LQM (2014)
Naphthalene	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190 (76.4)	460 (183)	1100 (432)	4900	4900	4900	1200 (76.4)	1900 (183)	3000	LQM (2014)
Phenanthrene	95	220	440	1300 (36)	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	LQM (2014)
Pyrene	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	LQM (2014)
Coal Tar (BaP as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	LQM (2014)
BTEX and TPH																			
Benzene	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	LQM (2014)
Toluene	130	290	660	880 vap (869)	1900	3900	22	51	120	56000 vap (869)	110000 vap (1920)	180000 vap (4360)	56000	56000	56000	87000 vap (869)	95000 vap (1920)	100000 vap (4360)	LQM (2014)
Ethylbenzene	47	110	260	83	190	440	16	39	91	5700 vap (518)	13000 vap (1220)	27000 vap (2840)	24000	24000	25000	17000 vap (518)	22000 vap (1220)	27000 vap (2840)	LQM (2014)
Xylene - o	60	140	330	88	210	480	28	67	160	6600 (478)	15000 (1120)	33000 (2620)	41000	42000	43000	17000 (478)	24000 (1120)	33000 (2620)	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Xylene - m	59	140	320	82	190	450	31	74	170	6200 (625)	14000 (1470)	31000 (3460)	41000	42000	43000	17000 (625)	24000 (1470)	32000 (3460)	LQM (2014)
Xylene - p	56	130	310	79	180	430	29	69	160	5900 (576)	14000 (1350)	30000 (3170)	41000	42000	43000	17000 (576)	23000 (1350)	31000 (3170)	LQM (2014)
Aliphatic EC 5-6	42	78	160	42	78	160	730	1700	3900	3200 (304)	5900 (558)	12000 (1150)	570000 (304)	590000	60000 0	95000 (304)	130000 (558)	180000 (1150)	LQM (2014)
Aliphatic EC >6-8	100	230	530	100	230	530	2300	5600	13000	7800 (144)	17000 (322)	40000 (736)	600000	610000	62000 0	150000 (144)	220000 (322)	320000 (736)	LQM (2014)
Aliphatic EC >8-10	27	65	150	27	65	150	320	770	1700	2000 (78)	4800 (190)	11000 (451)	13000	13000	13000	14000 (78)	18000 (190)	21000 (451)	LQM (2014)
Aliphatic EC >10-12	130 (48)	330 (118)	760 (283)	130 (48)	330 (118)	760 (283)	2200	4400	7300	9700 (48)	23000 (118)	47000 (283)	13000	13000	13000	21000 (48)	23000 (118)	24000(283)	LQM (2014)
Aliphatic EC >12-16	1100 (24)	2400 (59)	4300 (142)	1100 (24)	2400 (59)	4300 (142)	11000	13000	13000	59000 (24)	82000 (59)	90000 (142)	13000	13000	13000	25000 (24)	25000 (59)	26000 (142)	LQM (2014)
Aliphatic EC >16-35	65000 (8.48)	92000 (21)	11000 0	65000 (8.48)	92000 (21)	110000	26000 0	270000	27000 0	160000 0	1700000	180000 0	250000	250000	25000 0	450000	480000	490000	LQM (2014)
Aliphatic EC >35-44	65000 (8.48)	92000 (21)	11000 0	65000 (8.48)	92000 (21)	110000	26000 0	270000	27000 0	160000 0	1700000	180000 0	250000	250000	25000 0	450000	480000	490000	LQM (2014)
Aromatic EC 5-7	70	140	300	370	690	1400	13	27	57	26000 (1220)	46000 (2260)	86000 (4710)	56000	56000	56000	76000 (1220)	84000 (2260)	92000 (4710)	LQM (2014)
Aromatic EC >7-8	130	290	660	860	1800	3900	22	51	120	56000 (869)	110000 (1920)	180000 (4360)	56000	56000	56000	87000 (869)	95000 (1920)	100000 (4360)	LQM (2014)
Aromatic EC >8-10	34	83	190	47	110	270	8.6	21	51	3500 (613)	8100 (1500)	17000 (3580)	5000	5000	5000	7200 (613)	8500 (1500)	9300 (3580)	LQM (2014)
Aromatic EC >10-12	74	180	380	250	590	1200	13	31	74	16000 (364)	28000 (899)	34000 (2150)	5000	5000	5000	9200 (364)	9700 (899)	10000	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Aromatic EC >12-16	140	330	660	1800	2300 (419)	2500	23	27	130	36000 (169)	37000	38000	5100	5100	5000	10000	10000	10000	LQM (2014)
Aromatic EC >16-21	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	LQM (2014)
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >35-44	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >44-75	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
VOCs																			
1,2-dichloroethane (1,2-DCA)	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	LQM (2014)
1,1,1-trichloroethane	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000 (1425)	76000 (2915)	100000 (6392)	LQM (2014)
1,1,2,2,tetrachloroethane	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	LQM (2014)
tetrachloroethene	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	45	95	1400	1400	1400	810 (424)	1100 (951)	1500	LQM (2014)
tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	LQM (2014)
Trichloroethene	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	LQM (2014)
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Chloroethene (Vinyl chloride)	0.0006 4	0.0008 7	0.0014	0.0007 7	0.001	0.0015	0.0005 5	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	LQM (2014)
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	LQM (2014)
RDX	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000 (18.7)	51000	53000	LQM (2014)
HMX	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000 (0.35)	23000 (0.39)	24000 (0.48)	LQM (2014)
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	LQM (2014)
Dieldrin	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	LQM (2014)
Atrazine	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	LQM (2014)
Dichlovos	0.032	0.066	0.014	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	LQM (2014)
Alpha-Endosulfan	7.4	18	41	160 (0.003)	280 (0.007)	410 (0.016)	1.2	2.9	6.8	5600 (0.003)	7400 (0.007)	8400 (0.016)	1200	1200	1200	2400	2400	2500	LQM (2014)
alpha-Hexachlorocycloh exane	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	LQM (2014)
beta-hexachlorocycloh exanes	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	LQM (2014)
gamma-hexachlorocycloh exanes	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300 (675)	2000 (1520)	2900	LQM (2014)
1,2-Dichlorobenzene	23	55	130	24	57	130	94	230	540	2000 (571)	4800 (1370)	11000 (3240)	90000	95000	98000	24000 (571)	36000 (1370)	51000 (3240)	LQM (2014)
1,3-Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	LQM (2014)
1,4-Dichlorobenzene	61	150	350	61	150	350	15	37	88	4400 (224)	10000 (540)	25000 (1280)	17000	17000	17000	36000 (224)	36000 (540)	36000 (1280)	LQM (2014)
VOCs Continued																			
1,2,3-Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770 (134)	1100 (330)	1600 (789)	LQM (2014)
1,2,4-Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700 (318)	2600 (786)	4000 (1880)	LQM (2014)
1,3,5-Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380 (36.7)	580 (90.8)	860 (217)	LQM (2014)
1,2,3,4-Tetrachlorobenzene	15	36	78	24	56	120	4.4	11	26	1700 (122)	3080 (304)	4400 (728)	830	830	830	1500 (122)	1600	1600	LQM (2014)
1,2,3,5-Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49 (39.4)	120 (98.1)	240 (235)	78	79	79	110 (39)	120	130	LQM (2014)
1,2,4,5-Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42 (19.7)	72 (49.1)	96	13	13	13	25	26	26	LQM (2014)
Pentachlorobenzene	5.8	12	22	19	30	38	1.2	3.1	7	640 (43)	770 (107)	830	100	100	100	190	190	190	LQM (2014)

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Hexachlorobenze ne	1.8 (0.2)	3.3 (0.5)	4.9	4.1 (0.2)	5.7 (0.5)	6.7 (1.2)	0.47	1.1	2.5	110 (0.2)	120	120	16	16	16	30	30	30	LQM (2014)
Phenol	120	200	380	440 ^{dir} (460)	690	1200	23	42	83	440 ^{dir} (26000 ^f)	690 ^{dir} (30000)	1300 ^{dir} (34000)	440 ^{dir} (10000)	690 ^{dir} (10000)	1300 ^{dir} (10000)	440 ^{dir} (7600)	690 ^{dir} (8300)	1300 ^{dir} (9300)	LQM (2014 errata)
Chlorophenols (excluding pentachlorophen ol)	0.87 (g)	2	4.5	94	150	210	0.13 (g)	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	LQM (2014)
Pentachlorophen ol	0.22	0.52	1.2	27 (16.4)	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	LQM (2014)
Carbon Disulphide	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	LQM (2014)
Hexachlorobutadi ene	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	LQM (2014)

(g) derived based on 2,3,4,6-tetrachlorophenol; dir - based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only); (vap) calculated for vapour phase only. SOM – Soil Organic Matter; (4.5) solubility. (f) This value also exceeds the vapour saturation limit of 24,200 mg/kg.

APPENDIX K - CONTROLLED WATERS RISK ASSESSMENT

CURRENT GUIDANCE FOR CONTROLLED WATERS RISK ASSESSMENT

Regulatory Context

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

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

(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) Pollution of controlled waters is being, or is likely to be, caused.”

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

“the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter”

Controlled Waters are defined Section 104 of the Water Resources Act 1991. In summary, they comprise relevant territorial waters which extend seaward for three miles from the low-tide limit from which the territorial sea adjacent to England and Wales is measured.

The Environment Agency has powers under Part 7 of The Water Resources Act (1991) to take action to prevent or remedy the pollution of controlled waters, including circumstances where the pollution arises from contamination in the land. This is reinforced in The Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) which came into force in early April 2012.

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

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

Source Protection Zones

Source Protection Zones (SPZs) are defined by the Environment Agency (for England and Wales), SEPA (Scotland) and the Environment and Heritage Service (Northern Ireland) for groundwater sources such as wells, boreholes and springs that are used for public drinking water supply. The zones show the risk of contamination from activities that might cause groundwater pollution in the area. The size and shape of a zone depends upon subsurface conditions, how the groundwater is removed, and other environmental factors.

SPZs are classified into four categories:

- **Zone 1 (Inner protection zone).** Any pollution that can travel to the abstraction point within 50 days from any point within the zone is classified as being inside Zone 1. This applies at and below the groundwater table. This zone also has a minimum 50m protection radius around the abstraction point. These criteria are designed to protect against the transmission of toxic chemicals and water-borne disease.
- **Zone 2 (Outer protection zone).** The outer zone covers pollution that takes up to 400 days to travel to the abstraction point, or 25% of the total catchment area, whichever area is the largest. This travel time is the minimum period over which the Environment Agency considers that pollutants need to be diluted, reduced in strength or delayed by the time they reach the abstraction point.
- **Zone 3 (Total catchment).** This is the total area needed to support removal of water from the abstraction point, and to support any discharge from this.
- **Zone of special interest.** This may occasionally be defined as a special case. This is usually where local conditions mean that industrial sites and other potential sources of contamination could affect the groundwater source, even though they are outside the normal catchment area.

Groundwater Vulnerability Assessments

From 1 April 2010 The Environment Agency Groundwater Protection Policy began to use aquifer designations which are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems.

The aquifer designation data is based on geological mapping provided by the British Geological Survey. It is updated regularly to reflect their ongoing programme of improvements to these maps. The maps are split into two different types of aquifer designation:

- Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels.
- Bedrock - solid permeable formations e.g. sandstone, chalk and limestone.

The maps display the following aquifer designations:

Table 1. Aquifer Classification ("Geological Classification").

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

Environment Agency Guidance

The Environment Agency's stance on groundwater resources is:

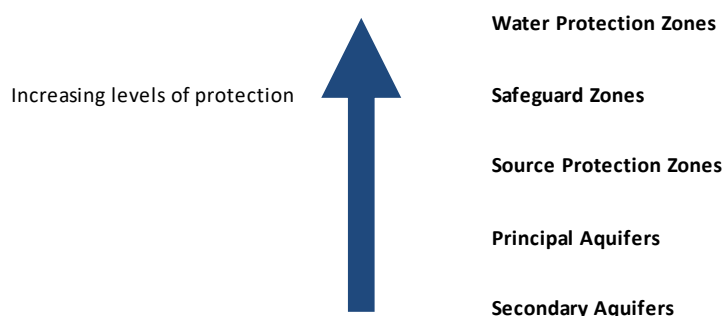
"to protect and manage groundwater resources for present and future generations in ways that are appropriate for the risks we identify"
(Groundwater Protection: Policy and Practice GP3, 2012).

At present, the legislation and guidance pertaining to the protection of controlled waters in the UK is complex; however, the core objectives seek to enforce the position given above.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document introduced areas of focus for developments such as Source Protection Zones (SPZs) and Groundwater Vulnerability Maps. The Policy was revised in 1998, since which there have been substantial changes in legislation, driven by key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991 as amended by the Water Act 2003. Gaps in the 1998 PPPG that emerged as the result of further legislative changes were addressed in the Environment Agency Policy document Groundwater Protection: Policy and Practice (GP3), Version 1 of November 2012. The three main parts of GP3 were:

- Groundwater principals;
- Position statements and legislation; and
- Technical information.

The Environment Agency has a tiered risk based approach to drinking water protection as summarised below:



Controlled Waters Risk Assessment

A number of tools are available (as detailed in GP3) in order for a developer of a potentially contaminated site to fulfil their obligations under the legislation. A site assessment would be required in order to identify any potential risks to controlled waters and to derive suitable clean up criteria, if required, to ensure the protection of controlled waters.

There are three main stages to any risk assessment of controlled waters:

1. Risk Screening (devise Conceptual Site Model, making reference to groundwater vulnerability maps, site setting, controlled waters context etc)
2. Generic Risk Assessment (EA Remedial Targets Methodology Tier 1 / Comparison of groundwater data with relevant standards)
3. Detailed Quantitative Risk Assessment (Consideration of aquifer properties and site specific parameters, EA Remedial Targets Methodology Tiers 2 & 3)

Risk Screening

Here, the Conceptual Site Model (CSM) is a critical tool to assessing any potentially contaminated site. The information from a robust CSM can be used to establish any pathways or receptors that do not require further assessment at an early stage. For example, it may be possible to confirm the absence of a particular sensitive controlled water receptor (such as a surface water feature) within the vicinity of the site thereby breaking the associated source-pathway-receptor pollutant linkage. Information from subsequent tiers of risk assessment, such as following intrusive investigations, are used to update the CSM accordingly.

Generic Risk Assessment - England and Wales

When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with those screening criteria.

In accordance with Part 2A of the Environmental Protection Act 1990, Tier Environmental has made regard to all of the Water Quality Standards (WQS) that are relevant to the specific site and a judgment has been made against the most stringent of those relevant standards:

- EQS Directive 2008/105/EC
- Priority Substances Directive 2013/39/EU
- Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
- UK Drinking Water Standards (UK DWS)
- World Health Organisation (WHO Guidelines) for Drinking Water Quality
- Council Directive 98/83/EC on the quality of water intended for human consumption (Drinking water directive)

In some instances, the laboratory method detection limit is greater than the appropriate EQS/UKDWS value. In these instances, only measured concentrations in excess of the laboratory method detection limit have been considered likely to potentially represent a possible significant risk to controlled waters.

Please note that there is no quantitative criterion for total petroleum hydrocarbons (TPH), or speciated TPH fractions. Historically, standards provided for petroleum hydrocarbons ranges from 10µg/l (Private Water Supply Regulations 1991, removed from the 2009 regulations) to 50µg/l-1000µg/l (Surface Waters (Abstraction for Drinking Water) Regulations 1989) which related to the degree of treatment of water prior to use as drinking water. Over time, the legislative standards have been rescinded and no alternative standard provided, although the Environment Agency planned to release speciated TPH criteria (Fretwell et al., 2009).

In order to assess whether there is a potentially unacceptable risk of pollution of controlled waters, the results of the groundwater chemical analysis for TPH and BTEX were evaluated against Water Quality Standards (WQS) appropriate to the conceptual model for the site:

Table 2. Summary of Selected TPH and BTEX Water Quality Standards Selected for Tier 1 Screening

Determinand	Units	WQS Selected	Source of WQS
Aliphatics >C5-C6	µg/l	15000	Table 5.4 of CL:AIRE 2017#
Aliphatics >C6-C8	µg/l	15000	Table 5.4 of CL:AIRE 2017#
Aliphatics >C8-C10	µg/l	300	Table 5.4 of CL:AIRE 2017#
Aliphatics >C10-C12	µg/l	300	Table 5.4 of CL:AIRE 2017#
Aliphatics >C12-C16	µg/l	300	Table 5.4 of CL:AIRE 2017#
Aliphatics >C16-C21	µg/l	-	Table 5.4 of CL:AIRE 2017#
Aliphatics >C21-C35	µg/l	-	Table 5.4 of CL:AIRE 2017#
Aromatics >EC7-EC7	µg/l	10	Table 5.4 of CL:AIRE 2017#
Aromatics >EC7-EC8	µg/l	700	Table 5.4 of CL:AIRE 2017#
Aromatics >EC8-EC10	µg/l	300	Table 5.4 of CL:AIRE 2017#
Aromatics >EC10-EC12	µg/l	100	Table 5.4 of CL:AIRE 2017#

Aromatics >EC12-EC16	µg/l	100	Table 5.4 of CL:AIRE 2017#
Aromatics >EC16-EC21	µg/l	90	Table 5.4 of CL:AIRE 2017#
Aromatics >EC21-EC35	µg/l	90	Table 5.4 of CL:AIRE 2017#
Benzene	µg/l	10	Priority Substance Water Framework Directive 2015 and Table 5.3 of CL:AIRE 2017#
Toluene	µg/l	74	Table 1 Water Framework Directive 2015 and Table 5.3 of CL:AIRE 2017#
Ethylbenzene	µg/l	20	R&D Technical Report P2-115/TR4, 2002
Total xylenes	µg/l	30	DoE (1997c) Hedgecott S. and Lewis S, An update on proposed environmental quality standards for xylenes in water, final report to the Department of the Environment. Report No. DoE 4273/1. Medmenham: WRC; and; Table 5.3 of CL:AIRE 2017#

Notes - # = CL:AIRE document 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies' (ISBN 978-1-905046-31-7, dated 2017),

Table 5.3 was referenced in the first instance from the CL:AIRE document 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies' (ISBN 978-1-905046-31-7, dated 2017), the to select appropriate Freshwater EQS values for benzene, toluene and total xylenes. The selected value for Ethylbenzene was derived from the proposed EQS value of 20µg/l from the Environment Agency R&D Technical Report P2-115/TR4, 2002. This represents a more conservative value than the 300µg/l value in Table 5.3.

With respect to speciated TPH CWG fractions, Table 5.3 states and refers the reader to 'See Table 5.4'. On this basis, Tier Environmental selected the World Health Organization (WHO) guide values for TPHCWG fractions in drinking water that are presented in Table 5.4 which may be considered appropriately protective of the controlled waters environment based on the conceptual site model.

Generic Risk Assessment is generally undertaken via comparison of reported leachate and/or groundwater concentrations against selected assessment criteria for the potential contaminants of concern identified for the site from a preliminary desk based assessment.

The selected Generic Assessment Criteria (GAC) derived from a Water Quality Standard (WQS) for any specific substance may not necessarily be a simple number and can often be found to be expressed as:

- Annual mean concentration;
- Maximum allowable concentration;
- 95th percentile concentration for *n* samples;
- Total concentration;
- Dissolved concentration (applicable to filtered samples)

The values may sometimes be expressed for individual substances (e.g. arsenic or for groups of substances e.g. total xylenes or sums of certain PAHs).

Environmental Quality Standards (EQS) have been used where available for Priority Substances and Priority Hazardous Substances set at a European level:

- Priority Substances Directive 2013/39/EU;
- Amending 2008/105 and 2000/118/EC

In addition, EQS values derived for Specific Pollutants have been used as presented in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

For assessing risks to potable water abstraction supplies, UK Drinking Water Standards presented in the Water Supply (Water Quality) Regulations 2000 (SI/2000/3184) (as amended) have been applied.

In selecting a GAC for a particular site, Tier Environmental considers the following factors:

- Current use/function of the groundwater (e.g. drinking water, irrigation water, industrial use, base-flow to rivers and streams);
- Plausible, proposed or planned future uses of the water and nearby waters;
- Sensitivity of the critical receptor (e.g. human health, aquatic life); and,
- Requirements to trigger action under the legal context.

In accordance with Part 2A:

"in deciding whether pollution of controlled waters is occurring, the assessor will have regard to all of the water quality standards that are relevant to the specific site and make a judgment against the most stringent of those relevant standards."

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

- To devise suitable remedial solutions;
- To carry out more investigation, sampling and analysis;
- To conduct a site-specific Detailed Quantitative Risk Assessment (DQRA) to whether or not the soil materials are suitable for their site-specific intended use or to devise a site-specific clean-up level.

Detailed Quantitative Risk Assessment (DQRA)

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

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

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

Hazardous and Non Hazardous Substances

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

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

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

APPENDIX L - ASSESSMENT CRITERIA APPLIED FOR GROUND GAS

Ground Gas Monitoring Methodology

Monitoring for the following is generally performed as part of ground gas assessment:

- Methane (CH₄): an odourless, flammable gas. Mixtures of methane with air containing between 5 and 15% v/v methane are explosive.
- Carbon dioxide (CO₂): an asphyxiant at elevated concentrations. Denser than air, it can accumulate in excavations, and within low points inside buildings.
- Oxygen (O₂): important in the assessment of the potential formation of explosive mixtures with methane. Monitoring normally measures both methane and oxygen concentrations in ground gas to derive an indication of the risk of explosive mixture formation, expressed as a percentage of the Lower Explosive Limit (LEL). Low concentrations of oxygen in ground gas can also exacerbate the risk of CO₂ asphyxiation.
- Hydrogen sulphide (H₂S): odorous and toxic, capable of forming flammable mixtures with air.

In addition, depending on the Conceptual Site Model, monitoring may also include for measurements of Volatile Organic Compounds (VOCs); present as chemical contaminants of soil and sometimes also biologically produced in low concentrations.

Assessment of methane (CH₄) and carbon dioxide (CO₂)

Methane and carbon dioxide can arise from natural geological sources, mine workings, rotting organic matter (peat, landfilled materials, etc.) and/or contaminant biodegradation. Assessment of ground gas composition and flows is therefore an essential part of site assessment. The need to adequately address potential risks from ground gas on development sites is therefore required under the planning regime.

In order to appropriately assess the site risks, the Construction Industry Research and Information Association (CIRIA) and others have issued several guidance documents on landfill and ground gas that are intended to provide advice on how to investigate and deal with gas contaminated ground with respect to development. These are:

- Report 149: 'Protecting Development from Methane' (CIRIA, 1995a)
- Report 150: 'Methane Investigation Strategies' (CIRIA, 1995b)
- Report 151: 'Interpreting Measurement of Gas in the Ground' (CIRIA, 1995c)
- Report 152: 'Risk Assessment for Methane and Other Gases from the Ground' (CIRIA, 1995d)

More recent guidance has been published to update the documents detailed above to collaborate and promote industry 'good practice'. These are:

- CIRIA Report 665: 'Assessing risks posed by hazardous ground gases to buildings (CIRIA, 2008)
- BS8485:201+A1:2019: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BSI Group, 2019)
- BS8576:2013: Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs) (BSI Group, 2013)
- SoBRA Report Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater (Feb 2017)
- CL:AIRE Technical Bulletin TB17 Ground Gas Monitoring and 'Worst Case' Conditions (CL:AIRE Aug 2018)

The earlier CIRIA 149 approach is now considered to be too conservative. A more realistic measure of the risk posed by methane and CO₂ in ground gas can be established by determining an appropriate Gas Screening Value (GSV), using the methods described in BS8485.

GSVs are calculated by multiplying the borehole flow rate (l/hr) by the percentage (% v/v) concentration in the gas stream of the specific component, i.e.:

$$\text{GSV} = (\text{Concentration} / 100) \times \text{Flow rate.}$$

For conservatism, Tier Environmental **initially** uses the maximum concentration and gas flow rate of methane detected in any borehole during all of the monitoring visits in deriving recommendations on appropriate protection measures. This represents the worst-case risk of forming an explosive mixtures. For carbon dioxide, steady state concentrations and flow data are applied, as these determine the development of an asphyxiating mixture. All values are selected whether or not they occurred in the same borehole or during the same monitoring event.

Exceedances of the maximum concentrations used in a Tier 1 Gas Risk Assessment can be tolerated, when the conceptual site model indicates that it is safe to do so. However, appropriately derived GSV values must never be exceeded - where site-specific circumstances permit the derivation of alternative GSVs according to the defined conceptual model, then the appropriate GSV values should be applied.

Table 1. GSV Categories Defined for Situation A (Summarised from CIRIA Report 665).

Risk classification	GSV (CH ₄ or CO ₂ ; l/hr)	Additional factors	Characteristic Situation
Very low	<0.07	Typically methane <=1% and/or CO ₂ <=5%, otherwise consider increase to Low Risk.	1
Low	<0.7	Typically borehole ground gas flow rate <=70 l/hr; otherwise consider increase to Moderate Risk.	2
Moderate	<3.5	---	3
Moderate to high	<15	QRA required to evaluate scope of remediation measures.	4
High	<70	---	5
Very high	>70	---	6

Assessment of hydrogen sulphide (H₂S)

H₂S is toxic and highly odorous (“rotten eggs”) gas. It is often a minor component within mine gases, in ground gas within or overlying strata rich in pyrites or other sulphide-rich ores, and in most natural gas fields.

H₂S can be generated biologically in significant concentrations by the decomposition by sulphate-reducing bacteria of natural or anthropogenic organic matter under oxygen-free conditions. Its potential generation will be greater in environments containing elevated sulphate concentrations (including sea water). H₂S is therefore common within the gas arising from estuarine and marine sediments, pond sediment, stagnant water bodies, bogs and marshlands and landfilled waste, for example.

It must be noted that H₂S normally occurs together with other potentially hazardous ground gases. The measures adopted for protection against these will prove equally protective against H₂S.

There are no standards by which H₂S concentrations in ground gas can be assessed directly. Therefore, the significance of measured H₂S concentrations in ground gas must be evaluated on a case-by-case basis, taking into account the measured concentrations of other components and the specific conceptual site and exposure models. To assist in this process, the following standards and guidance may be applied.

General protection of land users

There are no UK air quality standards for general exposure to H₂S. The World Health Organisation has derived ambient air quality standards (WHO, 2000) for this gas, which may be used to inform risk assessment and decision-making:

The 24 hour average exposure guideline value for ambient air: 0.15mg/m³ (0.1 ppmv, approx.; this was derived by the application of a 100x safety factor to the LOAEL for long-term exposure).

This is significantly above the odour threshold, which is typically around 0.01 mg/m³. To avoid substantial nuisance odour complaints, WHO (2000) recommends that the 30 minute average H₂S concentration in ambient air should not exceed: 0.007 mg/m³ (0.005 ppmv, approx.).

Occupational exposures

For occupational exposure, the HSE (2005) limits for H₂S are applicable:

- 8 hour time weighted average occupational exposure limit: 5 ppmv (7 mg/m³).
- Short-term exposure limit (15 minute reference period): 10 ppmv (14 mg/m³).

VOC Data Collection, Sampling and Assessment

BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).

Volatile organic compounds (VOCs) include, for example, halogenated hydrocarbons such as trichloroethene, non-halogenated hydrocarbons such as benzene, and organosulfur compounds such as thiols (mercaptans). They can occur as a component of ground gas originating from historically contaminated ground, spills and leaks from industry, commercial or residential properties (e.g. from pipelines, storage facilities, and at the point of use or dispensing), land-filled wastes and from naturally occurring sources.

The migration of VOCs in ground gas can be via three primary mechanisms:

- diffusive flow (movement of constituent along a concentration gradient);
- advective flow (movement of constituent due to motion of a transporting fluid);
- dispersion (transport resulting from local variations in fluid flow, e.g. due to friction effects in the matrix).

The choice of sampling and monitoring techniques should be based upon the conceptual model and be designed to achieve the objectives of the investigation, bearing in mind the requirements of any subsequent analytical procedures and the need to provide relevant data of sufficient quantity and quality. Consideration should also be given to the nature of ground under investigation, as well as the nature and distribution of contamination, the geology and the hydrogeology. Every effort should be made to avoid cross-contamination and at no point should underlying aquifers be put at risk.

Where the response zone extends below the water table, gas present in the groundwater will tend to produce an equilibrium concentration in the well headspace. This applies to both permanent gases and VOCs but can be particularly misleading in the latter case. Testing for dissolved gases in groundwater is useful to help interpret monitoring results in such a situation. Similarly, any VOCs in a floating non-aqueous hydrocarbon layer will produce an equilibrium concentration in the well headspace.

The monitoring period and frequency of monitoring for VOCs in ground gases should be developed on a site-specific basis from the conceptual site model and investigation data quality objectives.

Ground gas samples can be collected from the unsaturated zone adjacent to, or above, the known or suspected source of VOCs in ground gas through installation of a ground gas monitoring point in the unsaturated zone (see 10.2), and from a near-surface location beneath hardstanding or a floor or foundation slab through installation of a near- or sub-slab monitoring point (see 10.3). For monitoring of VOCs in ground gas the monitoring well should be installed into unsaturated ground to allow sampling for VOCs to take place. The borehole should not be progressed below the groundwater table or the surface of any floating non-aqueous layer. The borehole should be progressed to the target sampling depth within the unsaturated zone. Full details can be found in BS8576 Section 10.2 onwards.

Assessment of VOC concentrations have been made for limited number of VOCs by SoBRA with the Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater in Feb 2017.

The assessment of VOC concentrations is not covered by above-referenced reports. These data can be used to inform the human health risk assessment for site occupants but should not be relied upon to assess human health risk due to uncertainties in the ground gas flow regime, variability in the (generally low) contaminant concentrations measured and inaccuracies in the concentrations measured by PID instruments.

Data on the VOC concentration in ground gas can also help inform potential occupational exposure risks to construction and similar workers. For this purpose, the measured values can be compared to the relevant occupational exposure limit (OEL) for the contaminant(s) of concern, as given in HSE (2005). In cases of doubt as to the identity of the organic contaminants within the ground gas or when these are present as a complex mixture, then the 8 hour time-weighted average (TWA) exposure limit for benzene (1 ppmv) will be applied for screening purposes. This is a reasonably conservative approach since the OEL for benzene is lower than that for the great majority of organic contaminants commonly encountered in soil and groundwater at contaminated sites.

APPENDIX M - CHEMICAL AND GEOTECHNICAL TEST SAMPLING

Samples were selected by a representative of Tier Environmental during the site investigation works in accordance with the sampling approach described elsewhere in this report.

Samples for geotechnical and related testing

Bulk samples were placed within robust heavy duty plastic bags and sealed, together with small-disturbed samples, within airtight 1 litre plastic containers.

100mm diameter 'undisturbed' samples ("U100 samples") were obtained where possible from cable percussive and large diameter window sample boreholes within cohesive materials.

Samples for chemical analysis

All samples for chemical analysis were placed into clean new containers as summarised in Table 1. Unless explicitly stated elsewhere in this report, no preservatives were used to eliminate the risk that preservatives cause contaminant dissolution or analytical interference. Containers for VOC analysis were fully filled to exclude headspace.

Soil samples were dispensed as soon as possible after collection using reusable stainless steel spatulas, trowels or similar implements.

Ground water samples were collected from boreholes using single-use Teflon bailers or dedicated Waterra tubing with foot valves, except as otherwise noted within this report. Caution was taken to avoid excessive agitation during collection.

New disposable gloves were used by the engineer for the collection of each sample.

Reusable equipment was washed down with distilled or deionised water between samples, except where tarry or similarly sticky materials were present. In such cases specific cleaning procedures were adopted as specifically described elsewhere in this report.

All sub-samples taken for chemical analysis were placed into refrigerators or cool boxes containing frozen ice packs immediately after aliquoting. All samples were transferred in cool boxes containing frozen ice packs to the relevant UKAS/MCERTS accredited laboratory as soon as possible. Recommended maximum holding times before analysis are summarised in Table 1.

Table 1. Sample containers and holding times.

Analysis	Container/special requirements	Max. holding time at 4°C before analysis
Soil and sediment samples		
VOCs	30-60 g brown or green glass jar with VOC-resistant cap and inert cap liner. Must be fully filled.	14 days
TPHCWG	30-60 g brown or green glass jar with VOC-resistant cap and inert cap liner PLUS 250-500 g brown or green glass jar with unwaxed cap liner. ¹ The former must be fully filled.	14 days
All other organics	250-500 g brown or green glass jar with unwaxed cap liner.	7 days
Inorganics	Air-tight 0.5-2.0 kg plastic container (250-500 g brown or green glass jar may also be used).	14 days ²
Water samples		
VOCs	40-50ml glass vial with VOC resistant screw cap and inert liner. Must be fully filled.	14 days
TPHCWG	40-50ml glass vial with VOC resistant screw cap and inert liner PLUS 500-1000ml brown or green glass bottle with screw cap and unwaxed liner. ¹ The former must be fully filled, the latter should be filled if possible.	14 days
All other organics	500-1000ml brown or green glass bottle with screw cap. Fill if possible.	7 days
Inorganics	500-1000ml translucent or opaque screw cap plastic or brown or green glass bottles. Fill if possible.	14 days ³

¹ The smaller vessel is used for analysis of the volatile components within the TPH mixture and the larger one is for the non-volatile components.

² 14 days is set as a reasonable limit for all routine analyses of soil for those inorganic components vulnerable to chemical and/or biological breakdown. Samples for sulphate analysis are vulnerable to biological sulphate-reduction but can be held for up to 28 days. For total metals, a holding period of up to 6 months is acceptable.

³ 14 days applies for all routine analyses of most inorganic components that may be vulnerable to chemical and/or biological reactions. In the specific cases of sulphide, nitrite, nitrate and phosphate analyses, storage time must not exceed 48 hours. For total metals, a holding time of up to 6 months is acceptable.

Tier Environmental standard analytical suites

The analyses included with Tier Environmental's standard analytical suites for soil, soil leachate and water samples are presented in Table 2. Other individual analyses were specified as described within this report.

Table 2. Tier Environmental Standard Analytical Suites.

Parameter	Sample type					
	Soil		Leachate ¹		Water	
		LoD ² (mg/kg or as stated)		LoD (µg/l or as stated)		LoD (µg/l or as stated)
Metals and metalloids						
Arsenic	✓	1	✓	10	✓	10
Cadmium	✓	1	✓	5	✓	5
Chromium	✓	1	✓	5	✓	5
Mercury	✓	1	✓	1	✓	1
Lead	✓	1	✓	4	✓	4
Selenium	✓	2	✓	10	✓	10
Copper	✓	1	✓	1	✓	1
Nickel	✓	1	✓	50	✓	50
Zinc	✓	1	✓	8	✓	8
Other inorganics						
Ammonia (as NH ₄ -N)					✓	15
Total sulphate	✓	100			✓	50 mg/l
Water-soluble sulphate	✓	0.1 g/l				
Hardness (as CaCO ₃)					✓	1 mg/l
Organics						
Monohydric phenol	✓	1	✓	0.5	✓	0.5
Speciated PAHs (USEPA 16)	✓	0.1	✓	0.01	✓	0.01
Total Organic Carbon	✓	0.1 wt%				
Others						
Electrical conductivity					✓	NA
pH	✓	NA	✓	NA	✓	NA

NA - Not applicable

¹ Leachate preparation according to NRA (1994), 10:1 liquid to solid ratio.

² The table presents the desired limit of detection for the analysis. Higher LoDs may be reported on analytical data sheets due to interference between analytes within specific samples or if the laboratory needed to dilute samples to achieve results within the calibrated range for that instrument.

Analytical QA procedures

Introduction

Quality Assurance (QA) is a system of review and audit that assesses the effectiveness of that product and assures the producer and user that defined standards of quality have been met. If we consider site investigation and chemical analysis, QA is the management system that ensures these measures are in place and working as intended.

QA within the laboratory form part of relevant certification programmes (such as UKAS and MCERTS) and, indeed, will be undertaken in some form by any reputable analyst, whether for a certified technique or not. Laboratory QA/QC is beyond the control of Tier Environmental and will not be considered further in this document, although the relevant laboratory documentation can be obtained upon request. QA must also form part of the design and execution of a site investigation.

Two parameters often used to assess measurement quality objectives are bias and precision. Bias is a systematic deviation in the data. For example, a positive bias (concentrations higher than in reality) would be introduced if sampling bottles were a source of the analyte and this fact was unknown. Precision is the variation in the measurements around a central 'expected' value. This could be due both to real variability in the environmental medium being measured and random errors in the analytical process. Both precision and bias can be assessed by the use of appropriate blanks and replicates within the site investigation programme.

The objectives of the QA activities undertaken in this present site investigation were to recognise and quantify systematic bias within the analytical dataset and to obtain an indication of precision. In environmental samples, much of the observed variability is likely to result from heterogeneity in the sampled medium, particularly for soil and sediment samples.

Such QA practice within the sampling programme is required by current guidance (e.g., Environment Agency report P5-065/TR (2000); Environment Agency LFTGN02 (2002); BS 10175:2001).

Alternative QA procedures to the generic approach presented in this appendix may be specified for a project, provided case-specific justification is given.

QA checking procedure (data validation)

The responsible Engineer and Project Reviewer are required to undertake data validation and provide comment on data quality within the main body of the report(s) issued, when noteworthy matters arise. This QA checking should involve:

Confirming that data reported by the laboratory have achieved the standards specified by the certification scheme (MCERTS or UKAS). This will be indicated on the analytical certificates issued by the laboratory.

Checking that the limit of detection (LoD) and limit of quantification (LoQ) achieved by the laboratory for an individual analyte is appropriate for the purposes of the report. LoD and LoQ will vary dependent upon analyte concentrations, sample matrix properties and interference from co-contaminants.

A check that the reported range of concentrations are reasonable for the analyte. For example, the dissolved concentration of an analyte in a water sample should not exceed saturation. If it does, then this merits further consideration (e.g., was colloidal organic matter or other solid-phase material present or could there have been unobserved free-phase organic liquid?) and explicit comment. At its simplest, there may be a unit error.

Where analysis involves reporting of Tentatively Identified Compounds (TICs; normally by mass spectrometry), the reviewers should check that these might reasonably be expected at the site under consideration. The uncertainties in identification by MS mean that it is not uncommon that TICs are incorrectly assigned. In cases of doubt, the analytical laboratory can re-check the raw data and confirm.

A review of the analytical precision by comparing data obtained for duplicate samples. There is no absolute threshold - variability is entirely dependent upon the sample matrix and manner in which the contaminant has entered the sample. Variability that cannot reasonably be assigned to such factors (for example a very high apparent variability in data for sediment-free water samples) should be reviewed with the laboratory. Variability that is attributable to the sample matrix can nevertheless provide important pointers to improve understanding of contaminant transport pathways and the risks posed by pollutant linkages (e.g., soil heterogeneity, the association of contamination with particular soil fractions, the presence of residual NAPL within soil pores or the role of suspended sediments in contaminant transport).

Confirmation that no errors have been introduced by data transcription, unit conversion or corrections between preliminary and certificates issued by the laboratory. The reviewer should audit a proportion (typically 5-10%) of all data from the original (final) certificates of analysis through to the equivalent values in the report for those specific samples.

It is important to consult the analytical laboratory if apparent QA issues arise. Many apparent concerns can be adequately resolved on the basis of revisiting the raw analytical data or by obtaining a better understanding of the inherent limitations of the analysis for a particular matrix or sample type.

APPENDIX N - COAL TAR CONTAINING ASPHALT CONSIDERATIONS

Tier Environmental Approach to Coal Tar in Asphalt

This appendix outlines a summary of available guidance and describes the Tier Environmental interpretation of available information to inform, in a robust manner, the approach adopted to consider on, or both of the following objectives:

- If asphalt is present on site, what the waste classification and waste disposal route should be if there is an intention to grub up and dispose of either some, or all, of the asphalt;
- If asphalt is present and there is an intention (subject to suitability for re-use assessment) for re-use, then to determine how that may be achieved.

In order to inform the decision making with respect to the above, the following guidance documents and articles have been referenced:

- Waste Classification - Guidance on the classification and assessment of waste (1st Edition v1.2.GB) Technical Guidance WM3. Environment Agency, Scottish Environmental Protection Agency and Natural Resources Wales;
- Managing Reclaimed Asphalt Highways And Pavements - An ADEPT & Construction Demolition Waste Forum Guidance Note (Version 2019 Revision 1, August 2019);
- Environment Agency Regulatory Position Statement 075: 'The movement and use of treated asphalt waste containing coal tar';
- Environment Agency Regulatory Position Statement 157: 'Storing and treating asphalt waste: RPS 157' (Updated 4th February 2020);
- Environment Agency WRAP Quality Protocol - Aggregates from inert waste. End of waste criteria for the production of aggregates from inert waste;
- CIRIA Sustainable management of surplus soil and aggregates from construction, CIRIA, C809, dated 2023;
- Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) Definition of Waste Code of Practice (version 2);
- SEPA Guidance on the Production of fully Recovered Asphalt Road Planings (Scotland);
- AGS magazine – article entitled 'Coal Tar: Analysis and Detection' (March 2023 edition)

COAL TAR CONTAINING ASPHALT

WM3 includes the following text with regards to ascertaining the correct EWC code for waste asphalt:

Waste containing coal tar

This example provides guidance on the classification of road asphalt waste containing coal tar (AWCCT) and other construction and demolition wastes containing coal tar and related materials. This does not apply to wastes where coal tar is known not to be present.

Coal tar and many coal tar distillates are potentially carcinogenic hazardous substances. If the concentration of such materials is at or above 0.1% the waste would possess the hazardous property HP 7 carcinogenic. Coal tar is complex mix of hydrocarbon compounds which have to be added together to determine the concentration of coal tar. Therefore the 0.1% concentration must be applied to all fractions of the coal tar. Assessments based on PAH's alone are not consistent with the legislation and cannot be used to classify a waste as non-hazardous. However, if the concentration of coal tar is known, the MCL under the GB CLP uses benzo[a]pyrene (BaP) as a marker compound for carcinogenicity for certain coal tar entries. Where the concentration of BaP is less than 0.005% of the concentration of the coal tar (rather than in the waste as a whole), the coal tar is not carcinogenic and does not need to be considered for HP7.

'Black top' (road surface) waste

The following applies only to Asphalt material classified in the List of Wastes as

- 17 03 01* bituminous mixtures containing coal tar
- 17 03 02 bituminous mixtures other than those mentioned in 17 03 01

Where the concentration of benzo[a]pyrene is at or above 50 ppm (mg/kg) in the black top alone (excluding other material) then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material to be hazardous and thus coded 17 03 01. Any sampling of black top would need to ensure that layers with different concentrations of benzo[a]pyrene are identified and sampled.*

Tier Environmental have observed third party assessments that have determined 'black top' (road surface) waste as non-hazardous when benzo(a)pyrene is at or below 50mg/kg; however, it is considered that this represents a misunderstanding of WM3 guidance for the following reasons:

- 1) The first paragraph in the 'Waste containing coal tar' section of WM3 is clear to state that *'This example provides guidance on the classification of road asphalt waste containing coal tar (AWCCT) and other construction and demolition wastes containing coal tar and related materials.'*
- 2) It also states, explicitly that *"Assessments based on PAH's alone are not consistent with the legislation and cannot be used to classify a waste as non-hazardous"*. Tier Environmental consider this statement is tacit to include road asphalt waste containing coal tar (AWCCT) as it is mentioned in the previous paragraph;
- 3) The 'Black top' (road surface) waste sub-section states *"Where the concentration of benzo[a]pyrene is at or above 50 ppm (mg/kg) in the black top alone (excluding other material) then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material"*

to be hazardous and thus coded 17 03 01**". However, this does not mean that benzo(a)pyrene concentrations less than 50mg/kg can be classed as non-hazardous when you take into consideration the text in Item 2), above. This either suggests a contradiction in the guidance, or that benzo(a)pyrene alone can only be used to prove the whether the AWCCT is hazardous but that the opposite does not classify the material as non-hazardous such that to prove non-hazardous you would still require the concentration of the coal tar to be determined.

The AGS article (March 2023) states that for determining whether asphalt waste is hazardous waste that "we also have to consider [B(a)P being greater than or equal to 50mg/kg]" suggesting that is consistent with the Tier Environmental interpretation. However, a bit further down the article states that the ADEPT Guidance reiterates and references WM3 and "the use of the 50mg/kg level for measuring B(a)P should the total coal tar concentration values not be available for measurement". Tier Environmental's interpretation of WM3 is that it does not make reference to the 50mg/kg B(a)P level being used as a threshold in lieu of a coal tar concentration value being available.

So if, in order to determine whether asphalt is non-hazardous waste, there is a requirement for the concentration of coal tar to be analysed then a decision needs to be made as to what type of coal tar test is adequate. The AGS article (March 2023) highlights that "One of the challenges facing laboratories is the lack of standardization in the specification from clients and, also, the analysis itself". The article explains that a review by the AGS Laboratory Working Group revealed a range of techniques and "a potentially confusing landscape for the industry to navigate".

The ADEPT Guidance states there is data corroborating this assertion that 50mg/kg correlates to around 1000mg/kg road tar, this data is presented in Appendix D4.0. of the ADEPT Guidance document; however, Tier Environmental notes that the ADEPT Guidance states "This guidance is not intended as a complete guide to managing waste materials and should be read in conjunction with Regulations and guidance issued by the relevant Regulator, these will take precedence over this guidance in all cases". As such, with respect to waste classification WM3 takes precedence over the ADEPT Guidance and WM3 does not provide details of any corroboration between B(a)P and road tar.

RE-USE OF ASPHALT

The AGS article (March 2023) summarises the ADEPT Guidance as follows:

The ADEPT guidance provides more specific focus on the managing of reclaimed asphalt and provides information in to the classification of waste. It reiterates and references WM3 and the 0.1% threshold for coal tar and also the use of the 50mg/kg level for measuring B(a)P should the total coal tar concentration values not be available for measurement [see Tier Environmental comment above regarding this statement].

What the ADEPT guidance then gives, is a clear and defined protocol for sampling, sample preparation, sample volumes and data review with also indication of analytical requirements and basic principles. The document gives details and references to specific British Standards for the sampling and preparation of road plannings and road cores (BS 932 and BS 12697), and then recommends the following testing:

- PAH analysis in the laboratory by gas chromatography mass spectrometry (GCMS) for the USEPA16 suite of PAHs, though only B(a)P may be necessary. It is worth noting here that labs will test for the full suite in a single process so requesting B(a)P only will usually give no cost or speed benefit. Should further characterisation for landfill disposal be required then the USEPA17 suite inclusive of coronene should be used,
- Screening methods such as PAK marker sprays or Acrylic White sprays can be used but validated by the use of frequent 'full' analysis,
- Specifies the use of Monohydric Phenol (Phenol Index) testing, with a potential requirement to speciate the individual compounds (Phenol, Cresols and Xylenols) should the levels be sufficiently high.

In terms of data review the 3 potential outcomes are:

- 1) Classed as Inert for the purposes of the Quality Protocol for Aggregates from Inert Waste if:
 - a. The guidance of sample numbers has been observed,
 - b. All the B(Aa)P results are below 25mg/ kg,
 - c. There are ≥3 results.
- 2) Classed as Hazardous and treated accordingly is:
 - a. All the B(a)P results are above 50mg/kg Note: If there are limited results and close to the threshold then further investigation is required.
- 3) Full statistical analysis required to make assessment if:
 - a. Some or all results are above 25mg/kg and below 50mg/kg.

Tier Environmental once again notes that the ADEPT Guidance states "This guidance is not intended as a complete guide to managing waste materials and should be read in conjunction with Regulations and guidance issued by the relevant Regulator, these will take precedence over this guidance in all cases". As such, with respect to waste classification WM3 takes precedence over the ADEPT Guidance.

ENVIRONMENT AGENCY REGULATORY POSITION STATEMENTS 075 AND 157

The ADEPT Guidance describes that these documents allow the treatment, movement and use of asphalt waste containing coal tar in construction operations for hard paving structures in England only. They do not enable the producer to demonstrate that end of waste criteria has been met, but they do state that if followed correctly, the EA will not pursue an application for an environmental permit.

CIRIA C809 states the following:

RPS 75 (EA, 2014d) allows the use of treated asphalt waste containing coal tar (AWCCT) (i.e. classified as hazardous) in specific construction operations for hard paving structures such as roads, pavements, footways, car parks and airfields.

While AWCCT is commonly treated by crushing, grinding, and screening, the treatment of AWCCT is not covered by this RPS. The AWCCT needs to meet the requirements of the Specification for Highways Works and can only be used in bound sub-surface layers, e.g. sub-base, base and binder layers.

SEPA GUIDANCE ON THE PRODUCTION OF FULLY RECOVERED ASPHALT ROAD PLANINGS (SCOTLAND)

The ADEPT Guidance describes that this document provides approved methodology that allows producers to demonstrate when aggregate produced from asphalt has been fully recovered and has ceased to be a waste. This guidance is only applicable in Scotland. However, it is not applicable to tar bound aggregates, asphalt contaminated with other substances or asphalt removed/processed by any other method than a road planer.

WRAP QUALITY PROTOCOL - AGGREGATES FROM INERT WASTE. END OF WASTE CRITERIA FOR THE PRODUCTION OF AGGREGATES FROM INERT WASTE

The ADEPT Guidance summarises that this document is applicable to England, Northern Ireland and Wales. It identifies that certain specified inert wastes (including uncontaminated asphalt) may achieve end of waste status through treatment and use in compliance with the Quality Protocol for recycled aggregates from inert waste.

RE-USE UNDER DOWCOP

Tier Environmental consider that *in situ* asphalt may be reasonably considered for re-use under DoWCoP, (subject to following DoWCoP fully including conducting site-specific risk assessments to demonstrate suitability for use) as it would constitute “*Source segregated aggregate material arising from demolition activities....*”.

If the asphalt materials are coal tar containing then it would be necessary to consider the potential risks to human health and controlled waters carefully and agreement with the Local Authority (via Contaminated Land Officer or equivalent), Environment Agency / Natural Resources Wales local waste team / groundwater team would be necessary.

Due consideration may also need to be given to Series 600 if the materials is to be combined with other materials to form an engineering material.

APPENDIX O - COMPLYING WITH CONTROL OF ASBESTOS REGULATIONS 2012

Complying with Control of Asbestos Regulations (CAR): Risk Assessments, Licensing and Training

This appendix outlines CAR risk assessments and where they should be applied in relation to assessing and remediating brownfield sites. The information below details the different classifications of work with asbestos under CAR, summarises the legal requirements for asbestos awareness training for all involved in the investigation and management of asbestos containing soil (ACS), and details the potential requirements for suitable proficiency training relating specifically to ACS.

CAR RISK ASSESSMENTS

A CAR Risk Assessment is required for any work which may expose employees to asbestos. It is recommended that a precautionary approach is adopted if there is any doubt about risks associated with asbestos.

There are three main activities for potential asbestos exposure during work on brownfield sites:

- Site reconnaissance visits;
- Site investigation works; and
- Site remediation.

CAR risk assessments are needed at each stage but may be incorporated during the site investigation stage into the overarching health and safety risk assessments.

The CAR risk assessment must:

- Identify the type of asbestos to which employees are liable to be exposed, where possible, or assume it is present in different forms;
- Determine the type and extent of exposures to asbestos that may occur during the work.
- Identify the steps to be taken to prevent exposure or reduce it to the lowest level reasonably practicable; and,
- Consider the effects of control measures that have been or will be taken.

The CAR risk assessment should include any information used to inform the risk assessment such as asbestos reports or desk study information. In the event that this information is not available, the assessor should be assumed that all forms of asbestos may be present on site.

For all investigation and remediation of ACSs, a detailed written work plan should be produced and followed as detailed on the HSE website and in the CAR.

The CAR risk assessments for specific investigations or remediation projects, will determine whether or not work is 'licensable work' (LW), 'notifiable non-licensable work' (NNLW) or 'non-licensed work' (NLW). In addition, training requirements are also defined by the CAR risk assessment.

Some examples of control measures that apply during site reconnaissance, site investigation works, and site remediation are given below and should be applied depending on the asbestos risks identified for the site at each stage of investigation:

- Avoiding stirring up dust;
- Cleaning footwear after site works;
- Removing and bagging any overalls for disposal/laundry;
- Respirators and hygiene facilities for high risk sites;
- Segregated welfare units;
- Wetting ground
- Minimising soil disturbances;
- Implementation or retention of capping/break layers;
- Implementation of awareness training;
- Air monitoring;
- Managing stockpiles;
- Area segregation;
- Wheel washing
- Road washing/cleaning

It is important to note that during site reconnaissance visits, site investigation works and site remediation that asbestos should not be considered in isolation and control measures are likely to form part of a wider health and safety precautions.

Respiratory protective equipment (RPE)

RPE is the last line of defence and its requirement would be defined by the CAR risk assessment. HSE (2013b) advises that RPE should have an assigned protection factor of 20 or more for all work with asbestos. In certain instances, full face-piece, positive pressure respirators with a protection factor of 40 are necessary (to EN 12942:1998, TM3).

Suitable types of RPE for most **short** duration non-licensed asbestos work:

- Disposable respirator to standards EN149 (type FFP3) or EN1827 (type FMP3)
- Half mask respirator (to standard EN140) with P3 filter
- Semi-disposable respirator (to EN405) with P3 filter

These filters are not suitable for people with beards/stubble or for long or continuous use.

LICENSING

CAR defined certain types of activities involving asbestos as 'licensable work' (LW) or as 'notifiable non-licensable work' (NNLW). All other work would be 'non-licensable work' (NLW).

LW is defined as:

- work where exposure is not 'sporadic and low intensity'.
- work where the risk assessment cannot demonstrate that the control limits (four hour and 10 minute limits) will not be exceeded.
- work on asbestos coating
- work on AIB or insulation where risk assessment is either of first two points above or not of short duration (where short duration is defined for any work liable to disturb asbestos as taking less than two hours per week (including ancillary work) and no one person carries out that work for more than one hour').

NNLW includes work with:

- AIB or asbestos insulation of short duration that is not licensable.
- fire-damaged asbestos cement or asbestos cement damaged so as to create significant dust and debris.
- asbestos ropes, yarns, woven cloths in poor condition or handling cutting or breaking up the materials.
- asbestos papers, felts and cardboard in poor condition, unencapsulated or not bound into another material.

Work with weathered asbestos cement, air monitoring and collecting samples of ACM in buildings would not normally be notifiable.

It is impossible to specify definitively what activities will and will not be licensable. This decision should be made as part of the CAR risk assessment. CAR is not primarily aimed at work with ACSs and there is little published information on airborne asbestos concentrations during work with ACSs. Nevertheless, CAR will require some remediation projects, and occasionally site investigations, to be LW. Investigations on other sites may involve NNLW. The decision as to whether work is LW or NNLW should be made during the CAR risk assessment by those in charge of the brownfield site investigations and remediation projects.

TRAINING REQUIREMENTS

Asbestos health and safety courses are offered by a number of providers in the UK. Training courses that include the problem of identifying ACMs in soil should be undertaken at regular intervals by those involved in the investigation, assessment and management of sites where ACs are known or suspected. It is the role of the employer to identify the level of training required for an employee based on their role, experience and duties. Reference to Regulation 10 of CAR should be referred to for more information on training requirements.

Recognising asbestos within soils is challenging due to the heterogeneity of such soils and the discolouration of asbestos by smeared soil. Specific training for ground workers should include understanding fibre release potential, potential control measures in the field, how to take representative ACSs safely, sample labelling and what analytical tests are available and when they should be implemented.

Health and safety training required under CAR includes asbestos awareness, non-licensable work (including notifiable non-licensable work) and licensable work with asbestos.

In addition to health and safety training, some staff involved in the technical identification on site of ACMs, sampling and analysis may require technical proficiency training (competency training).

Training vs. Competence

HSE (2005) identifies that 'training alone does not make people competent. Training must be consolidated by practical experience so that the person becomes confident, skilful and knowledgeable in practice on the job'. It is critical that ACS surveyors demonstrate competency with details of relevant field experience alongside training and examples of previous works/references.