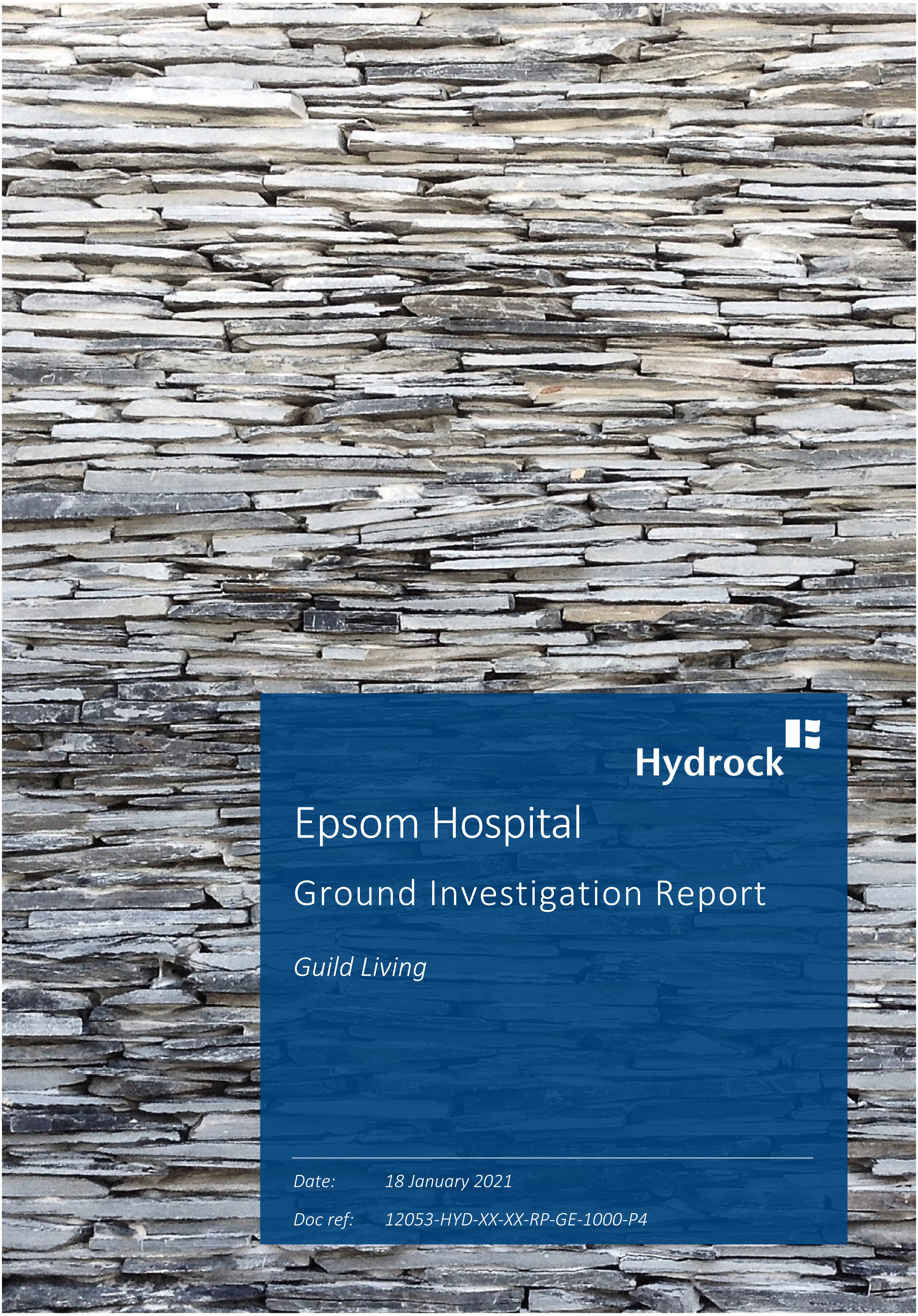

Hydrock

Epsom Hospital

Ground Investigation Report

Guild Living

Date: *18 January 2021*

Doc ref: *12053-HYD-XX-XX-RP-GE-1000-P4*

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Objectives	Phase 2 Ground Investigation
Client	Guild Living
Site name and location	Epsom Hospital, Woodcote Green Road, Epsom, KT18 7EG.
Proposed development	The site development proposals are understood to comprise private accommodation and associated leisure and care facilities for retirees and their visitors. The proposed development include new multi- storey blocks will be a mixture of mostly high-rise (4 to 8 storey) and two low rise (2-3 storey) buildings with leisure facilities, landscaped public open space and car parking.
GROUND MODEL	
Desk study summary	The site currently comprises of former hospital buildings of York House, Rowen House, Beacon Ward and existing hospital buildings including Woodcote Lodge and the energy centre. The majority of the site is currently used as a staff car park with asphalt or concrete finish and with some small areas of verge and planted landscaping. Some mature trees are present on and around the site. The site is approximately 1,4ha in area and the majority of the site is flat with levels ranging between 58.9 to 61.0m AOD. However, the northwest corner slopes to the south west from 62.0m AoD to 60m AOD. Upon review of a previous Contamination Preliminary Risk Assessment/Desk Study undertaken by Arup and also a previous ground investigation undertaken by Arcadis indicates that the site has been part of the Epsom Hospital site since the early 1950s. During this time the site has been part of a series of redevelopments over the wider hospital site. Prior to being a hospital, the southern boundary of the site was occupied by a series of large detached residential properties. A non-specialist UXO assessment indicated the site has a low bomb risk. With the exception of areas of topsoil in landscaped areas, the ground conditions underlying the site comprises a thin layer of Made Ground across the whole area overlying the London Clay to the west and a succession of Terrace Gravels over Lambeth Group silts, sands and clays to the east. The top of the London Clay on the west of the site contains varying proportions of flint and sand which suggest some localised natural reworking of this material with the upper Terrace Gravels - the 'cleaner' more granular deposits of which, now appear to be eroded off from the western half of the site (possibly by natural terracing). It is anticipated that the London Clay is underlain by the Lambeth Group. Below the Lambeth Group the geology comprises Thanet Sand, which itself is underlain by Chalk.
Ground and groundwater conditions encountered by investigation	The ground conditions as proven by the investigation undertaken at the site comprise: • Made Ground – between ground level and 1.9m below ground level (bgl), comprising dark brown to gey sandy gravelly clay with a low to medium cobble content. Including brick, concrete and sandstone; over • River Terrace Deposits – variable thickness from depths between 0.80m and 1.2m to between 2.0m and 4.5mbgl comprising of light brown to orange sandy very clayey gravel to gravelly clay. Gravel is fine to coarse flint.; over • London Clay Formation – variable thickness from between 1.10m and 4.5m to between 4.4m and >15m bgl comprising firm to stiff dark grey occasionally silty occasionally sandy clay; over • Woolwich Formation – variable thickness from between 2.15m and 8m bgl to between 8.8m and 16.3mOD comprising very stiff dark grey to red, yellow, purpleish green silty clay; over • Upnor Formation – variable thickness from between 8.8m and 16.3m to between 12.4m and 18.0m comprising of dense to very dense dark grey and green fine to medium sand to clayey sand; over

	• Thanet Sand – from depths between 12.4m and 18m to 24mbgl comprising very dense green and grey silty sand with beds of hard silt and siltstone. • Lewes Nodular Chalk Formation at depths below 24m (BH05) & >24m. There are considered to be two groundwater bodied below the site: A shallow perched groundwater regime within the River Terrace Deposits with groundwater encountered at depths ranging between 1.2-1.8m bgl and a deeper groundwater body encountered at depths ranging between 9.0 and 13.0m bgl. Pockets of both perched water and confined groundwater are also present as a result of interbedded layers of permeable and impermeable deposits. There is localised visual and olfactory evidence of hydrocarbon contamination in soils associated with fuel oils and diesel within (and deliveries to) an above ground storage tank that serves the sites energy centre. The presence of hydrocarbons within the groundwater are generally concentrated in/on perched water below the area to the east of the above ground storage tank and to the south of the energy centre.
GEOTECHNICAL CONCLUSIONS	
Conclusions of geotechnical assessment	Obstructions associated with former /current development, including foundations, floor slabs and services, should be anticipated. Excavation to proposed founding depth generally should be readily achievable with standard excavation plant. It is considered that excavations within the Made Ground and the River Terrace Deposits shall become unstable particularly below the shallow water table. Foundations are recommended to comprise: • Piled foundations for the higher loaded multi storey blocks. • Either fully piled foundations or a raft incorporating settlement reducing piles/concrete columns for moderately loaded structures. • Pad or strip foundations for lightly loaded structures. Where there is excessive thickness of Made Ground and/or influence from trees, suspended floor slabs are to be put in place. Elsewhere (or if the Made Ground is re-engineered/replaced); ground bearing floor slabs can be utilised. The Made Ground and Terrace Deposits are considered to be non-plastic in terms of shrinkage potential. Other shallow cohesive soils are of medium shrinkage potential. A design CBR of 2.5% is recommended. Soakaway drainage is considered unsuitable for this site due to the shallow groundwater regime.
GEO-ENVIRONMENTAL CONCLUSIONS	
Conclusions of contamination Generic risk assessment	***Human health:*** • Elevated concentrations of benzo(a)pyrene and lead were identified across the site . • Asbestos was found to be pervasive within the Made Ground. • Elevated concentrations of Petroleum Hydrocarbons were encountered within WS01, WS02 and BH102 a hotspot located to the south of the energy centre. ***Plant growth:*** • There are no substances which are considered to be a risk to plant life ***Controlled Waters:*** • Elevated concentrations of heavy metals have been detected in the groundwater beneath the site. This is likely to be associated with natural background concentrations of the wider area. No remedial action is required. • Elevated concentrations of hydrocarbons have been recorded within perched water within WS01, WS02 and BH02S. This is considered to be related to a localised hotspot of contamination which requires further consideration. No elevated pollutants were detected in deeper aquifers.

	Ground gases or vapours: • CS1 ground gas conditions are prevalent. • Vapour protection membrane is likely to be required associated with the hydrocarbon hotpot. The extent of this should be assessed as part of a watching brief for the demolition of the energy centre, generator and above ground fuel tank. Radon: • The site is not in a Radon Affected Area. Water supply pipes: • Brownfield site and the presumption in the guidance is that barrier pipe will be used. However, the investigation and assessment has indicated no significant wide spread Contaminants of Concern across the majority of the site. As such, standard pipework may be suitable for the majority of the site following negotiations with the supply company.
Proposed mitigation measures	The mitigation measures proposed to remove unacceptable risks include: • Delineation and the excavation and removal of heavily tarnished soils from the hydrocarbon hotspot. Also, creation of a sump just below the groundwater level to remove any significant free phase hydrocarbons within the hotspot. • The installation of a 450mm clean cover system in proposed areas of public open space, comprising a bonded geogrid break layer (e.g. Secugrid 30/30), subsoil and a minimum of 150mm of topsoil. • Installation of Protecta-line pipework. The methodology for the remediation should be presented in a Remediation Strategy, which will need to be submitted to the warranty provider and the regulatory authorities for approval. In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow any planned reuse of suitable material at the site. Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works.
Waste management	The majority of excavated soils to be disposed of as waste, are likely to be classed as inert or non-hazardous. However, material excavated from the Hydrocarbon hotspot are likely to be classed as potentially hazardous waste due to the diesel content. In addition, an elevated concentration of Chromium was identified within BH01 which classified the Made Ground in this area as being potentially hazardous waste but this is believed to be an isolated occurrence.
FUTURE CONSIDERATIONS	
Further work	Following the ground investigation works undertaken to date, the following further works will be required: • further testing of shallow groundwater at around the above ground fuel tank to better understand the changes in hydrocarbon concentrations recorded around the tank and understand any vertical migration of the contamination. • discussion and agreement with utility providers regarding the materials suitable for pipework; • discussions with regulatory bodies and the warranty provider regarding the conclusions of this report; • discussions with piling Contractors regarding conclusions of this report and design of the piles; • provision of geotechnical design for the Category 2 (foundations); • production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider). • Preparation of Piling Foundation Works Risk Assessment (if required) • Additional post-demolition investigation within/around the Energy Centre to support delineation of petroleum hydrocarbon hotspot identified. • consideration to the production of a Materials Management Plan relating to any reuse of soils at the site. • verification of the remediation and mitigation works.

This Executive Summary forms part of Hydrock Consultants Limited report number 12053-HYD-XX-XX-RP-GE-1000-P4 and should not be used as a separate document.

1. INTRODUCTION

1.1 Terms of reference

In February 2020, Hydrock Consultants Limited ('Hydrock') was commissioned by Guild Living ('the Client') to undertake a Phase 2 ground investigation at Epsom Hospital, Woodcote Green Road, Epsom ('the site').

The site currently comprises a series of former hospital buildings and a staff car park located within the south west of the wider Epsom Hospital.

Hydrock understands that the proposed redevelopment is to comprise private residential accommodation with associated leisure and care facilities and car parking for retirees and their visitors. It is understood the redevelopment will include the construction of several multi storey blocks including a mixture of high-rise (4 to 8 storey) and low rise (2-3 storey) buildings. A proposed development layout is presented in Appendix A. As part of the redevelopment some of the existing former hospital buildings and infrastructure will be demolished.

A desk study and ground investigation has already been undertaken at the Site by Arcadis (UK) Ltd ('Arcadis') and Ove Arup & Partners Ltd ('Arup') in 2018 and 2019.

The works have been undertaken in accordance with Hydrock's proposal referenced (C-12053-Hydrock fee Proposal-Geotechnical) and the Client's instructions to proceed (Ref: Email instruction from Cast Real Estate and Construction Consultancy, dated 18/02/2020).

The report herein has been revised to reflect updated design information in relation to the geo-environmental assessment. The geotechnical assessment remains unchanged and does not reflect updated design information provided within the new planning application.

1.2 Objectives

The works have been commissioned to assist in clearing planning conditions and to develop the design.

The objective of the Phase 1 Desk Study is to formulate a preliminary Ground Model and an Initial Conceptual Model of the site to identify and make a preliminary assessment of key geo-environmental and geotechnical risks to the proposed development.

The objective of the Phase 2 Ground Investigation is:

- to resolve uncertainties identified during previous ground investigation and assessment by refining and updating the preliminary Ground Model, determining geo-environmental and geotechnical site conditions and identifying any key contamination risks by updating and finalising the Conceptual Model in accordance with the principles of LCRM. Specifically, to:
  - Better delineate a hydrocarbon hot-spot, as identified within previous ground investigation, associated with the boiler rooms;
  - Define with more accuracy the changes in geology and soil strength encountered across (and below) the site to refine preliminary geotechnical design information;
  - Provide better coverage of sampling for the assessment of contaminated ground; and
  - Develop the understanding of the groundwater regime with particular reference to potential hydrocarbon contamination in the vicinity of the existing Energy Centre/Boiler Room.

- to identify geo-environmental mitigation requirements to enable development; and
- to provide preliminary geotechnical recommendations for design.

1.3 Scope

The site investigation includes a Phase 2 Ground Investigation.

The scope of the Phase 2 Ground Investigation comprises:

- A review and summary of the previous ground investigation data;
- a ground investigation including windowless sampling, rotary drilling and hand pits to:
  - obtain data on the ground and groundwater conditions of the site;
  - allow collection of samples for geotechnical and chemical laboratory analysis;
  - allow geotechnical field tests to be undertaken;
  - install gas and groundwater wells;
- gas concentration and groundwater level monitoring (including groundwater sampling);
- geotechnical and chemical laboratory analysis;
- updating of the preliminary Ground Model;
- preparation of a geotechnical risk register;
- presentation of initial geotechnical design recommendations;
- refinement of the Conceptual Site Model (CM), including identification of plausible pollution linkages;
- completion of a generic quantitative risk assessment of potential chemical contaminants to establish ‘suitability for use’ under the current planning regime;
- discussion of potential environmental liabilities associated with land contamination (soil, water and gas); and
- identification of any outline mitigation requirements to ensure the site is ‘suitable for use’.

1.4 Available information

The following documents have been provided to Hydrock by the Client for use in the preparation of this report:

- Arcadis (UK) Ltd, September 2018. Epsom Hospital – Plot 2A. Phase 2 Geo-Environmental and Geotechnical Assessment Report. Report Ref: 10020221-ARC-XX-XX-RP-ZZ-0007-01.
- Arcadis (UK) Ltd, October 2018. Epsom Hospital- Main Hospital Site. Phase 2 Geo-Environmental and Geotechnical Assessment Report. Report Ref: 10020221-ARC-XX-XX-RP-ZZ-0008-01.
- Ove Arup & Partners Ltd, December 2019. Ground Contamination Preliminary Risk Assessment at Epsom Hospital Desk Study. Report Ref: 270352

The Client commissioned the Arup ground contamination preliminary risk assessment and Hydrock assumes full reliance upon its contents.

The previous ground investigation undertaken by Arcadis was commissioned by Epsom and St Helier University Hospital NHS Trust. Therefore, these documents have been used for information purposes only at this stage. No formal reliance has been placed upon their contents.

1.5 Regulatory context and guidance

The investigation work has been carried out in general compliance with recognised best practice, including (but not limited to) BS 5930:2015, BS 10175:2011+A2:2017 and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The geo-environmental section of this report is written in broad accordance with BS 10175:2011+ A2:2017, 'Land Contamination: Risk Management' (LCRM, 2020) and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The methods used follow a risk-based approach, the first stage of which is a Phase 1 desk study and field reconnaissance, with the potential geo-environmental risk assessed qualitatively using the 'source-pathway-receptor contaminant linkage' concept to assess risk as introduced in the Environmental Protection Act 1990 (EPA, 1990). Potential geotechnical risks are also assessed.

Phase 2 comprises intrusive ground investigation work and testing. The factual information from Phase 1 and Phase 2 are used to develop the Conceptual Model (CM). This CM is based on a ground model of the site physical conditions and an exposure model of the possible contaminant linkages. The CM forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines. This GQRA might lead to more Detailed Quantitative Risk Assessment (DQRA).

Professional judgement is then used to evaluate the findings of the risk assessments and to provide recommendations for the development.

The geotechnical section of this report is prepared in general accordance with BS EN 1997-1+A1: 2013, BS EN 1997-2:2007 and BS 8004:2015. This report constitutes a Ground Investigation Report (GIR) as described in Part 2 of Eurocode 7 (BS EN 1997-2) (EC7). However, it is not intended to fulfil the requirements of a Geotechnical Design Report (GDR) as specified in EC7.

Where relevant the current NHBC Standards, have also been applied.

The geo-environmental and geotechnical aspects are discussed in separate sections. Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. Designers should take all aspects of the investigation into account.

Remaining uncertainties and recommendations for further work are listed in Section 10 and Section 11.

3. PHASE 1 STUDY (DESK STUDY REVIEW AND FIELD RECONNAISSANCE)

3.1 Introduction

Hydrock have undertaken an updated field reconnaissance survey on 19/03/2020 to visually assess potential geotechnical hazards, contaminant sources and receptors and compare the site conditions with those previously reported. The weather during the updated field reconnaissance survey was overcast and light rain.

3.2 Site location

The site is located within the grounds of Epsom General Hospital, approximately 1km to the south west of the centre of Epsom at approximate National Grid Reference: 520399E, 159758N. The Site is accessed from Woodcote Green Road to the south.

A site location plan (Drawing Ref. *12053-HYD-XX-XX-GI-DR-GE-1000*) is presented in Appendix A.

3.3 Site description

The site is located within the south-west of the grounds of Epsom General Hospital, comprises numerous former and existing hospital buildings and is approximately 1.4 Hectares (ha) in area. This includes York House, Rowen House and Beacon Ward (all vacant former hospital buildings), Woodcote Lodge and an Energy Centre (which are currently in use). Numerous other small outbuildings or temporary buildings are also present across the Site with some waste storage areas also noted.

Elsewhere, the majority of external areas are surfaced with asphalt or concrete and used for staff car parking and access. Localised small areas of landscaped verge and planting are also present.

The majority of the site is generally flat with elevations ranging between 61m and 58.9m AOD, exhibiting a very gentle fall in an approximately north-easterly direction. Locally within the north-west corner of the site a steeper gradient is present falling from approximately 62m AOD down to 60m AOD in a north/north-easterly direction.

A boiler house and associated infrastructure (referred to as the 'Energy Centre') is present in the northern area comprising numerous tanks, associated plant and a chimney stack. Specifically, this includes two above-ground diesel/fuel oil storage tanks, a chemical store, boiler house and medical gas storage. An external diesel fuel filling point is located on the southern wall. Two generators are also present in this area, housed within separate buildings to the north-west and south-east of the boiler house.

At the time of the Hydrock walkover and investigation the existing buildings on the site were undergoing asbestos removal prior to their planned demolition.

3.4 Additional Site Walkover Information

The following additional features and potential contaminative sources were also noted by Arup during their walkover on 29/08/2019:

- The boiler house contains three diesel-fuelled boilers. The boiler water is treated with bisulphate and sodium hydroxide. These are stored within a bund in the boiler house.

- Arup observed localised evidence of staining around the boiler pipework and pipe pits adjacent to one of the boilers. In addition, black staining was noted around buried pipe runs/ducts external to the boiler house.
- Numerous miscellaneous items were noted within chemical storage areas including paint, oil drums, gas canisters and sand. Locally oily water and purple staining was noted on the floor.
- Two generators are present on the Site. One in a separate outbuilding on the northern boundary of the Site (to the north/north-east of the Energy Centre). A second smaller generator is located within a metal container to the south-west of the Energy Centre. Localised staining was noted to the floor in the larger generator building and some oil canisters were observed.
- the pump room within the basement of Rowan House was noted to be flooded at the time of the site walkover.

3.5 Site history

Epsom Hospital is first recorded on the site in the early 1950s. Prior to the construction of the hospital the site was predominantly residential gardens with localised wooded areas. A number of large detached properties (assumed residential) were situated along the southern boundary and locally in the north of the site.

Since the construction of the hospital on the Site by the early 1950's, there have been several phases of demolition, redevelopment and minor construction as part of the expansion of the wider hospital site. At this time a Chimney is also mapped in the north of the Site within the current Energy Centre complex.

Off-site, a Workhouse was located adjacent to the north from the earliest available historical map of 1840, before becoming part of a Hospital from the 1930s.

The previous reports highlight that a historic tank and two electricity substations are located between 120-150m to the north-east and north west retrospectively of the site.

In addition, an old pond is recorded within 50m of the northern boundary of the site.

3.6 Geology

The published geology of the site is shown on the British Geological Survey (BGS) 1:50,000 geology map of Reigate (Sheet 286).

Superficial deposits of the River Terrace Deposits are present across the majority of the Site, with the exception of in the far west / north-west. Beneath these, the site is underlain by a sequence of deposits of the London Clay (clays and silts) and the Lambeth Group (clays, silt and sand). The London Clay outcrops in the west/north-west of the Site only, whereas the majority of the central and eastern areas are shown to be underlain by the Lambeth Group.

The Lambeth Group includes the Woolwich and Reading Beds.

The deeper underlying geology includes the Thanet Formation (sands) and Upper Chalk of the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation.

Previous ground investigation undertaken by Arcadis indicates that the expected geological sequence is anticipated to comprise of a veneer of Made Ground across the whole site overlying the London

Clay in the west and a succession of River Terrace Gravels over silts, sands and clays of the Lambeth Group to the east.

As the geological mapping suggests, the River Terrace Deposits appear to be absent from the western third of the site but are present elsewhere. Furthermore, it is notable that the top horizon of the underlying London Clay in the west is distinctly weathered and contains varying percentages of flint and sand suggesting an erosional interface with the River Terrace Deposits in the geological past. At a few locations in the central and eastern area of the site the overlying River Terrace Gravels appeared to be naturally well compacted. The top of the underlying clays of the Lambeth Group appeared to be softened, sandy in nature and the presence of shallow groundwater was noted.

3.7 Hydrogeology

The overlying superficial deposits of the River Terrace Deposits are classified by the Environment Agency (EA) as a Secondary A Aquifer.

The London Clay Formation is an Unproductive Aquifer. The underlying Lambeth Group and Thanet Formation are classified as Secondary A Aquifer(s). The Upper Chalk is a Principal Aquifer.

It is probable that multiple groundwater layers may be present, as such groundwater flow direction may changeable based on the individual characteristics of each strata. However, it is inferred that in general groundwater flow direction will be in a the north or north-easterly direction, which is supported by the findings of the Arcadis' ground investigation in 2018.

There are no recorded groundwater abstraction licences within 1km of the Site. The Site is not located within a Source Protection Zone (SPZ). However, a Zone II (Outer Protection) SPZ is present approximately 190m east with a Zone I (Inner Protection Zone) just beyond, approximately 260m north-east.

The existing chemical status of the underlying groundwater body (Hogsmill) classified under the Water Framework Directive as 'fair'.

Hydrock have reviewed the groundwater monitoring undertaken as part of the Arcadis' 2018 ground investigation. Shallow groundwater was encountered within the River Terrace Deposits and Lambeth Group in the central and eastern areas of the Site, at depths typically ranging between approximately 1.1m and 2.2m bgl. In the west, it is evident that localised perched groundwater was noted to lie atop of the relatively impermeable London Clay and within deeper confined strikes recorded within the sandy horizons of the same strata.

3.8 Hydrology

There a no surface water features present on the current Site. The nearest surface water feature is a pond approximately 10m to the south-east (on the opposite side of Woodcote Green Road). An associated network of drains within Woodcote Millennium Green between 25m and 90m to the south-east, appear to drain towards and in to the pond.

3.9 Radon

With reference to the Indicative Atlas of Radon in England and Wales (Miles et al 2007) and Annex A maps in BR 211 (Scivyer 2015), the Site is in an where the maximum radon potential is between 1% and 3%.

The previous desk study and ground investigation information indicates that the site is in an area where <1% of homes are above the action level and no radon protection measures are required for new buildings at this location in line with current guidance.

3.10 Waste Management

There are no recorded waste management or landfill sites within 1km of the Site.

3.11 Unexploded ordnance (UXO)

A non-specialist UXO risk assessment has been undertaken using the Zetica Online Tool. This indicates that the site is in area which is considered to be at a low risk of UXO. No further action is considered necessary in relation to ground investigation. However, further assessment may be considered prudent for construction activities.

3.12 Sensitive Land Uses

The Site is located within a Nitrate Vulnerable Zone.

3.13 Summary of Previous Ground Investigation

Arcadis completed a ground investigation at the current Site in August 2018. This includes three deep cable percussion boreholes (BH101, BH102 & BH104) to 15m bgl and five dynamic (window sample) boreholes (WS101 to WS105) to up to 5m bgl.

The pertinent findings of the previous investigation are summarised as follows:

- Free asbestos fibres (all chrysotile) were encountered with Made Ground soils locally in three samples within WS102 and BH102. Subsequent asbestos quantification detected a concentration of 0.011% in one location.
- Elevated concentrations of PAHs were detected in soils in exceedance of soil screening values for the protection of human health within the Made Ground of BH102. Elevated concentrations of lead were also encountered locally in WS102 and WS105.
- Similarly elevated concentrations of organic contaminants of naphthalene, benzene and TPH were detected within groundwater in BH102 during two separate sampling events. A maximum TPH concentration of 3,980ug/l was recorded. The observed concentrations of organics were attributed to historic spillages / losses associated with the Energy Centre (fuel storage tank, boiler room etc.). No elevated concentrations of petroleum hydrocarbons were noted within the nearest downgradient monitoring well (BH103).
- Zinc was also elevated locally within the groundwater of BH104, however its cause was unknown.
- Three rounds of ground gas monitoring were undertaken over four weeks. Concentrations of methane and carbon dioxide were typically <0.2% and <5% v/v, however localised peaks of up to 7% v/v of carbon dioxide were locally recorded. No gas flow was recorded. Arcadis concluded that CS1 conditions prevailed, however protection requirements to CS2 was recommended on a localised basis (BH102 and WS101).
- Further ground gas monitoring and groundwater sampling was recommended.

4. OUTLINE CONCEPTUAL MODEL

4.1 Introduction

The outline Conceptual Model (oCM) incorporates evidence from the site walkover and findings of the previous reports (completed by others) carried out at the site. The formulation of an outline Conceptual Model is a key component of the LCRM methodology. The oCM incorporates a ground model of the site physical conditions and an exposure model of the possible contaminant linkages; it forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines.

4.2 Ground model

The preliminary ground model presented in Section 3 provides an understanding of the ground conditions and is the basis for preparing the preliminary geotechnical hazard assessment (Section 4.3) and the preliminary geo-environmental exposure model (Section 4.4).

4.3 Geotechnical hazard identification

4.3.1 Context

The preliminary geotechnical hazard identification has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622.

The following section sets out the identified geotechnical hazards and the development elements potentially affected (see Table H.1 in Appendix H for further information).

4.3.2 Plausible geotechnical hazards

Plausible geotechnical hazards identified at the site are:

- Uncontrolled Made Ground (variable strength and compressibility).
- Soft / loose compressible ground (low strength and high settlement potential).
- Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.
- Variable lateral and vertical changes in ground conditions.
- Attack of buried concrete by aggressive ground conditions (particularly in the London Clay).
- Existing below ground structures to remain (Possible foundations, basements).
- Shallow groundwater.

4.3.3 Potential development elements affected

Development elements potentially affected by geotechnical hazards are:

- Buildings – foundations.
- Buildings – floor Slabs
- Roads and pavements.
- Services.
- Concrete below ground.

Health and safety risks to site Contractors and maintenance workers have not been assessed during these works and will need to be considered separately during design.

The above plausible geotechnical hazards and development elements affected have been carried forward for investigation and assessment. The investigation is presented in Section 6 and the assessment is presented in Section 7.

4.4 Geo-environmental exposure model

4.4.1 Context

The preliminary exposure model is used to identify geo-environmental hazards and to establish potential pollution linkages, based on the source-pathway-receptor (SPR) approach.

A viable pollution linkage requires all the components of an SPR to be present. If only one or two are present, there is no linkage and no further assessment is required.

4.4.2 Potential contaminants

For the purpose of this assessment the potential contaminants have been separated according to whether they are likely to have originated from an on-site or off-site source.

Potential on-site sources of contamination

- Made Ground, associated with the historic use, demolition and redevelopment of the Hospital including elevated concentrations of metals, metalloids, asbestos fibres, asbestos containing material, PAH and petroleum hydrocarbons. (S1)
- Localised petroleum hydrocarbons / organics, fuels, lubricants and solvents from leaks/spills and operation of the Energy Centre (above ground diesel storage tank, generators, boiler house etc). (S2)
- Groundwater vapours
- Ground gases (carbon dioxide and methane) derived from Made Ground (S3)
- Asbestos in existing buildings (S4)

Potential off-site sources of contamination

- Ground gases (carbon dioxide and methane) from organic materials in off-site Made Ground and backfilled pond located to the north east of the site (S5).

4.4.3 Potential receptors

The following potential receptors in relation to the proposed land use have been identified.

- People (neighbours, workers, site end users) (R1).
- Development end use (buildings, utilities and landscaping) (R2).
- Groundwater: Secondary A aquifer status of the River Terrace Deposits, deeper bedrock aquifers (including Principal Aquifer of the Upper Chalk) and downgradient SPZ (R3).
- Surface water: pond and drainage network, 25m south-east (R4).

Given the site topography and inferred groundwater flow direction, the surface water pond and drainage network to the south of the Site is considered to be hydraulically upgradient of the Site, with no apparent direct linkage (outfalls, drainage) towards or from the Site. As such the surface water features to the south is unlikely to be a plausible receptor.

4.4.4 Potential pathways

The following potential pathways have been identified.

- Ingestion, skin contact, inhalation of dust (and/or vapours) and outdoor air by humans (P1).
- Root uptake by plants (P2)
- Migration of contaminants via leachate dispersion or mobility through the unsaturated zone to shallow groundwater (P3)
- Vertical and lateral migration within/through groundwater to underlying Secondary and Principal Aquifers (P4)
- Direct contact with substances deleterious to building materials (P5).
- Buildings: ground gas ingress (methane, VOC or hydrocarbon vapours) via permeable soils, preferential pathways (utilities) and/or construction gaps (P6).
- Potential new pathways created by piling (P7).

Health and safety risks to site development contractors and maintenance workers have not been assessed as part of this study and will need to be considered separately.

The above sources, pathways and receptors have been considered as part of the Preliminary Risk Assessment in accordance with LCRM (2020), are considered to be plausible in the context of this site and have been carried forward for investigation and assessment. The investigation is presented in Section 6 and the assessment is presented in Section 8. An assessment of the Source – Pathway – Receptor linkages is undertaken following the assessment (Section 8) and is presented in Appendix I (Table I.1).

5. GROUND INVESTIGATIONS

5.1 Investigation rationale

The ground investigation rationale was based on the findings of the preliminary risk assessment and is summarised in Table 5-1.

For the investigation rationale of the historical investigations, please refer to the individual historical reports. The Arcadis ground investigation report from 2018 is provided in Appendix J.

Table 5-1: Investigation rationale

Location	Purpose
Whole Site	
BH01 - BH06	To assess deeper ground conditions and to allow SPTs to be undertaken. To allow collection of samples for geotechnical characterisation. Installation of gas and leachate/groundwater monitoring and sampling wells.
CPT01 - CPT09	To investigate the strength profile of the underlying ground conditions. To investigate the occurrence of soft spots within the shallow Lambeth Group particularly on the east of the site.
HP01 - HP08	To allow the collection of contamination testing. To assess the depth of existing foundations on the site.
Energy Centre	
WS01 - WS04	To assess shallow ground conditions. To address uncertainties identified within the previous investigations. To allow collection of samples for contamination testing. To allow collection of samples for geotechnical characterisation. Installation of gas and groundwater monitoring and sampling wells.

5.2 Constraints

The footprints of the buildings could not be investigated as most buildings were still in use, preventing intrusive ground investigation.

Live underground services exist beneath the site, particularly in and around the Energy Centre, which restricted the location of exploratory hole locations.

Accessible areas of the site comprised an active car park. As such, the works were positioned to minimise disruption to the users and operation of the site.

5.3 Site works

The fieldwork took place between 1st June 2020 and 10th July 2020 and is summarised in +Table 5-2. The ground investigation locations were surveyed in using a hand-held GPS and are shown on the Exploratory Hole Location Plan (Hydrock Drawing 12053-XX-XX-DR-GE-1001) in Appendix A.

The logs, including details of ground conditions, soil sampling, *in situ* testing and any installations, are also presented in Appendix C.

The weather conditions during the Hydrock fieldwork and for the previous week were generally dry but with heavy showers between the 15th and 17th June 2020.

+Table 5-2: Summary of site works

Activity	Method	No.	Depth Range (m bgl)	*In situ* tests	Notes (e.g. installations)
Drilling, Pitting and Probing					
Boreholes	Rotary (Wireline)	6	20.00-27.00	SPT	50mm HDPE wells with gas taps in BH01-BH05.
	Windowless sampler	4	6.00		50mm HDPE wells with gas taps in all boreholes
Trial pits	Hand-excavated	9	0.20-1.20		Foundation inspection.
Probes	CPT electric cone	9	7.10-12.10	Continuous cone resistance	

Wells for monitoring groundwater levels and ground gas concentrations, and to facilitate the sampling of groundwater, were installed in a number of the windowless sample holes and boreholes. A summary of the monitoring well installations is presented in Table 5-3.

Table 5-3: Summary of monitoring installations

Location	Ground level (m OD)	Standpipe diameter (mm)	Screen top and base depth (m bgl)	Screen top and base elevation (m OD)	Strata targeted
BH01	60.35	50	21.50 to 24.00	38.85 to 36.35	Thanet Sands
BH02	59.23	50	13.5 to 17.80	45.73 to 41.43	Lambeth Group (Woolwich Formation) / Thanet Sands
BH03	59.59	50	12.00 to 15.00	47.59 to 44.59	Lambeth Group (Woolwich Formation and Glauconitic Sands) / Thanet Sands
BH04	59.67	50	20.00 to 22.50	39.67 to 37.17	Thanet Sands
BH05	59.07	50	24.00 to 27.00	35.07 to 32.07	Lewes Nodular Chalk Formation.
WS01	59.45	50	1.00 to 2.50	58.45 to 56.45	River Terrace Deposits
WS02	59.41	50	1.00 to 3.50	58.41 to 55.91	River Terrace Deposits
WS03	59.54	50	1.00 to 6.00	58.54 to 53.54	River Terrace Deposits and London Clay
WS04	59.54	50	1.00 to 2.50	58.54 to 57.04	River Terrace Deposits

5.4 Geo-environmental testing

5.4.1 Sampling strategy and protocols

Exploratory hole positions were determined by reference to the site conditions and uncertainties identified in the Initial Conceptual Model.

No specific sampling statistics or grid were utilised in this instance. However, contamination testing was focused around the boiler room/ energy centre and the above ground fuel tank together with available locations spread around other parts of the site to give a wider general coverage.

Samples were taken, stored and transported in general accordance with BS 10175:2011+A2:2017.

The geo-environmental assessment in Section 8, includes both the Hydrock results and those presented within the Arcadis 2018 ground investigation report.

5.4.2 Site screening tests

A photoionisation detector (PID) (MiniREA Lite) was used during the fieldwork to screen samples on approximate 300 to 500mm intervals initially and decreasing frequency with depth . The PID readings are detailed on the exploratory hole logs in Appendix C.

5.4.3 Geo-environmental monitoring

Gas monitoring boreholes have been monitored on six occasions over a two month period (August to October 2020) following the ground investigation. The results are presented in Appendix E. Monitoring is now complete with the results summarised in Section 6.4 and assessed within Section 8.6.

5.4.4 Geo-environmental laboratory analyses

The chemical test certificates for testing undertaken by Hydrock are provided in Appendix F. Wherever possible, UKAS and MCERTS accredited procedures have been used.

The geo-environmental analyses undertaken on soils are summarised in Table 5-4.

Table 5-4: Geo-environmental analyses of soils (Hydrock).

Determinand Suite	Made Ground	River Terrace Deposits
Hydrock (Ground Investigation – June 2020)		
Hydrock minimum suite of determinands for solids*	22	10
Speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID (Hydrock Tier 2 TPH Suite)	6	4
Asbestos quantification	5	-

Geo-environmental testing undertaken as part of the Arcadis 2018 ground investigation has been included within the Hydrock assessment. A summary of this testing is provided in Table 5-5.

Table 5-5: Geo-environmental analysis of soil from the Arcadis Report.

Determinand Suite	Made Ground	River Terrace Deposits
Arcadis (Ground Investigation – (September 2018)		
Chemical testing including metals and inorganics	11	1
Testing suite including phenols, speciated PAH and TPH CWG (including BTX)	6	0
Asbestos quantification	3	0

The soils chemical test data are interpreted and assessed in Sections 8.3 and 8.4.

The geo-environmental analyses undertaken on waters for testing undertaken by Hydrock are summarised in Table 5-6, below.

Table 5-6: (Hydrock) Geo-environmental analyses of waters

Determinand Suite	Ground-water
Hydrock (Ground Investigation June 2020)	
Hydrock minimum suite of determinands for waters	9
Speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID (Hydrock Tier 2 TPH Suite)	9

Groundwater testing undertaken as part of the Arcadis 2018 ground investigation has been included within the Hydrock assessment. A summary is provided in Table 5.7.

Table 5-7: (Arcadis) Geo-environmental analysis of water

Determinand Suite	Ground-water
Arcadis (Ground Investigation September 2018)	
Metals and inorganics	6
Speciated PAH and TPH	6

It should be noted that the Arcadis suite of testing for metals and inorganic is smaller than the Hydrock standard suite for waterand therefore a number of background metals have not been tested for which are included on the more recent testing.

The groundwater chemical test data are interpreted and assessed in Section 8.5.

5.5 Geotechnical testing

5.5.1 Geotechnical laboratory testing

The geotechnical tests undertaken by Hydrock are summarised in Table 5-8 and the test certificates are provided in Appendix D. Wherever possible, UKAS accredited procedures have been used.

Table 5-8: Summary of sample numbers for geotechnical tests

Test	Made Ground	River Terrace Deposits	London Clay Fm	Woolwich Fm	Upnor Fm	Thanet Sand	Lewes Nodular Chalk Fm
Hydrock (Ground Investigation – June 2020)							
Natural moisture content	-	1	7	8	2	2	-
Atterberg limits	-	1	11	9	2	3	-
Sulfate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	1	5	2	6	3	3	-
Single stage undrained triaxial compressive strength	-	-	4	10	0	1	-
Saturated Moisture Content of Chalk	-	-	-	-	-	-	2
Chalk Porosity	-	-	-	-	-	-	2

The geotechnical test data is summarised in Section 6.6 and interpreted in Section 7.

6. GROUND INVESTIGATION RECORDS AND DATA

6.1 Physical ground conditions

6.1.1 *Summary of strata encountered*

The following presents a summary of the properties of the ground and groundwater conditions encountered, based on field observations, interpretation of the field data and laboratory test results, taking into account drilling, excavation and sampling methods, transport, handling and specimen preparation.

All relevant data from the Hydrock investigation discussed in Section 5 as well as any reliable data from previous investigations noted in Section 1.4 and discussed in Section 3 are used from this point forward.

Details of the Hydrock ground investigation works are provided in the logs in Appendix C and within the geology cross sections provided in Appendix A, a summary of the ground model is presented in Table 6-1 and the individual strata are described in the sections below.

Table 6-1: Strata encountered during the Hydrock Ground Investigation.

Stratum	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) (range)
Surface Cover – Concrete hardstanding/bituminous bound pavement hardstanding.	0.0	0.18-0.50	0.18 – 0.50
‘General’ Made Ground	0.00 - 0.20	0.60 - 1.90	0.75 – 1.90
River Terrace Deposits	0.60 - 1.20	2.00 – 4.50	1.25 – 2.70
London Clay Formation	1.10 – 4.50	4.40 – >15.00	1.30 – >10.55
Lambeth Group (Woolwich Formation)	2.15 – 8.00	8.80 – 16.30	4.40 – 10.20
Lambeth Group (Upnor Formation)	8.80 - 16.30	12.40 - 18.00	1.60 – 5.40
Thanet Sand Formation	12.40 - 18.00	24	10.30 - >10.3
Lewis Nodular Chalk Formation	24.00 - >27.00	un-proven	un-proven

6.1.2 *Surface covering*

The following surface cover was identified during the field reconnaissance and the fieldworks:

- Bituminous bound pavement hardstanding, covering approximately 60% of the site and noted to be in generally good with some areas having been recently replaced.
- Paved parking and walkway covered approximately 15% of the site.
- Structures (former hospital buildings and boiler room) covering approximately 15% of the site.
- Vegetation (grass, trees, brambles), covering approximately 10% of the site.

6.1.3 *Made Ground*

Made Ground was recorded across the entire site and was encountered below vegetated areas to 0.50m bgl and from below hard-standing to depths ranging between 0.50 – 1.90m bgl. The Made

Ground is believed to have been formed following several phases of redevelopment on the site and from the demolition of historic structures.

The Made Ground generally comprised of dark greyish brown sandy gravelly clay with a low cobble content. Gravel is subangular to sub-rounded fine to coarse brick, flint and sandstone. Cobbles are sub-rounded brick of up to 0.15m diameter. Sand was fine to coarse.

Minimal anthropogenic material was encountered within the Made Ground with the exception of occasional metal fragments and corrugated asbestos cement board (ACM) within CPT08.

6.1.4 River Terrace Deposits

The River Terrace Deposits were encountered underlying the Made Ground across the majority of the site (the exception being in the western corner of the site). The composition of the River Terrace Deposits varied between a light brown to orange clayey sandy gravel with subangular to sub-rounded fine to coarse flint to a sandy gravelly clay. Generally, the material had a higher clay proportion in the upper 0.5m. The River Terrace Deposits extended to depths between 2m and 3.8m.

The River Terrace Deposits thin towards the higher ground in the north west of the site. In this area of the site the upper horizon of the London Clay Formation is considered to be weathered and contains varying percentages of flint and sand which is likely to be the result of geological reworking or an erosional face with the River Terrace Deposits.

6.1.5 London Clay Formation

The River Terrace Deposits were underlain by the London Clay which was encountered as a firm becoming stiff dark grey silty to sandy clay.

The thickness of the London Clay is variable across the site. Generally, the London clay thins out in both southerly and easterly directions from approximately 5.25m in the west of the site to between around 1.3m in the south and 2.5m towards the east. In the far eastern fringes of the site, a previous Arcadis borehole (BH104) suggests that London Clay is absent and that the Woolwich Formation lies directly beneath the Terrace Deposits. However, the clay strengths of the upper cohesive body of what is described as Lambeth Group (the Woolwich Formation) by Arcadis appear to be more akin to those of the London Clay.

6.1.6 Lambeth Group (Woolwich Formation)

The Woolwich Formation was encountered underlying the London Clay in the west of the site from approximately 8m bgl and underlying the River Terrace Deposits on the east of the site from depths ranging between 2.7m and 5.1m bgl (becoming thickest in the northeast at 8.3m thick in BH01) and possibly lying directly beneath the Terrace Deposits to the east. The Woolwich Formation comprised a stiff to very stiff dark grey to green mottled purple yellow red and occasional silty clay with sandy beds.

6.1.7 Lambeth Group (Upnor Formation)

The Upnor Formation (or Glauconitic Sands) was encountered below the Woolwich Formation across the whole site and varied in thickness, but with no distinguishable pattern of variance apart from being thicker in the eastern end of the site. At its thinnest it was 1.7m within BH01 in the central western part of the site. At its thickest it was 5.2m within BH06 in the south-eastern corner of the site and seemingly 7.5m thick in Arcadis' borehole BH104 in the eastern end of the site.

The Upnor Formation is described as dense light green and grey slightly clayey sand. This deposit is considered to mark the transition between the Woolwich formation and the underlying Thanet Sands but was often indistinguishable in character from the Thanet Sands, therefore its true variance in vertical extent cannot be reliably defined.

6.1.8 ‘Thanet Sand Formation

The Thanet Sand Formation was encountered underlying the whole site at depths ranging between 12.40 and 18.00m bgl. The Thanet Sand Formation comprised a dense to very dense dark green and grey fine to medium sand (very similar to the glauconitic sands of the Upnor Formation above), but with occasionally hard silty and siltstone beds).

6.1.9 ‘Lewes Nodular Chalk Formation’

The Lewes Nodular Chalk Formation (Upper Chalk) underlies the whole of the site at depth however, this was only encountered within one borehole (BH05) at 24m bgl (35m AOD). Notably the deep borehole sunk to 27m bgl in western part of the site (BH01) did not encounter the Upper Chalk.

The chalk in BH05 is considered to be generally structured CIRIA Grade B4.

6.2 Visual and olfactory evidence of contamination (soil)

In addition to the more common man-made constituents (ash, clinker, plastic, etc), described in Section 6.1.3, visual and olfactory evidence of contamination was noted in a number of locations during the Hydrock investigation and were situated around the Energy Centre and are summarised in Table 6-2.

Table 6-2: Visual and olfactory evidence of contamination - soils

Stratum	Location	Depth (m bgl)	Description
River Terrace Deposits	WS01	1.50 - 2.00	Hydrocarbon odour and black staining.
River Terrace Deposits	WS02	1.75 – 2.00	Hydrocarbon odour and black staining.
River Terrace Deposits	BH02	1.50 – 2.00	Hydrocarbon odour and black staining.

6.3 Groundwater

6.3.1 Groundwater observations and levels

The drilling technique used a water flush and therefore true groundwater levels were masked during the investigation. As such, water strike information is not considered to be fully reliable and have not been included within our assessment of groundwater levels. Groundwater levels recorded during post-fieldwork monitoring are summarised in Table 6-3.

Table 6-3: Groundwater level data summary

Stratum	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
River Terrace Deposits	11/08/2020 & 22/10/2020	WS01	1.17 – 1.67	58.28 - 57.78
		WS02	1.37 -1.82	58.04 - 57.59
		WS04	1.04 - 1.41	58.50 - 58.13

Stratum	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
London Clay Formation		WS03	4.10 - 5.20	55.44 – 54.34
Woolwich Formation/ Upnor Formation / Thanet Sand		BH02	3.68 - 3.81	55.55 - 55.42
		BH03	1.64 - 1.94	57.92 - 57.65
Thanet Sand Formation		BH01	9.01 – 9.13	51.34 – 51.22
		BH04	1.60 - 1.90	58.07 - 57.77
Lewes Nodular Chalk		BH05	13.07 – 13.80	46.00 – 45.27

6.3.2 Groundwater summary

In general, shallow groundwater was encountered within the River Terrace Deposits at depths of between approximately 1.0m and 1.8m bgl (equivalent to between 58.50m to 57.59m AOD). The groundwater appearing to be perched on top of the relatively impermeable underlying strata of stiff clays of the London Clay (in WS01 and WS04) or where absent the cohesive Woolwich Formation (WS02).

Deeper groundwater horizons were measured within the London Clay (at 4.1m to 5.2m bgl), Lambeth Group (1.6m to 3.8m bgl), Thanet Sand (1.6m to 9.0m) and within the Upper Chalk (at 13.0m bgl).

The groundwater encountered within the deposits lying between the gravels and the Chalk may represent localised confined groundwater conditions at these locations but could also possibly be attributed to amounts of drilling fluid being present within the bores during installation given the levels of water monitored elsewhere within the deeper Thanet and Chalk aquifer.

A similar groundwater regime was presented within the historical Arcadis ground investigation. Shallow ground water within the River Terrace Deposits and a second, deep groundwater profile at approximately 12.50m bgl. A possible perched groundwater horizon was encountered this WS102 at approximately 4.30m bgl.

In summary, owing to the variable geology across the Site and presence of significant bands of relatively impermeable clays with interbedded granular horizons throughout, the hydrogeological regime under the Site is likely to be complex leading to multi-layered groundwater conditions with localised aquicludes, aquitards and perched horizons confined within granular bands. Furthermore, the overburden of overlying consolidated clays of the London Clay and Woolwich Beds may also give rise to sub-artesian conditions within the Thanet Formation.

6.4 Ground gases (carbon dioxide and methane)

Records from the gas monitoring boreholes are presented in Appendix E and summarised in Table 6-4.

A total of nine monitoring visits have been undertaken to date across all phases of ground investigation at the site. This includes six monitoring visits undertaken by Hydrock between August and October 2020. Arcadis had previously undertaken three initial monitoring visits between August and September 2018. The monitoring programme is considered to be complete and is discussed in Section 8.6.

Table 6-4: Range of ground gas data

Stratum	Exploration Location	No. of Visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)
Made Ground	WS101, WS102, WS103	9	0.1 – 0.2	0.2 – 6.4	15.7 – 21.3	0.1*
River Terrace Deposits	WS01, BH104s, BH102s	11	0.1 – 0.2	0.4 – 10.9	2.5 – 20.1	0.1*
River Terrace Deposits / London Clay	WS04	6	0.0	0.1 – 4.1	2.5 – 20.1	0.1* - 4.9
London Clay	BH101, WS03	9	0.0 – 0.1	0.2 – 4.8	13.1 – 20.6	0.1
River Terrace Deposits / Woolwich Fm	WS02	6	0.0	0.2 – 3.7	12.7 – 21.1	0.1*
Lambeth Group (Woolwich and Upnor Formations)	BH02, BH102D, BH104D	11	0.0 - 0.2	0.4 – 9.6	12.8 – 20.3	0.1 - 1.7*
Upnor Formation and Thanet Sand Formation	BH03	6	0.0 – 3.2	0.4 – 1.6	12.6 – 19.8	0.1*-0.3
Thanet Sand	BH01, BH04	9	0.1 – 0.2	0.2 – 6.4	17.6-21.7	0.1* - 1.2
Lewes Nodular Chalk Formation	BH05	6	0.0 – 0.3	0.4 - 4.1	6.9 - 19.8	0.1* - 1.6
	Notes: **where the recorded gas flow rate is below the manufacturer's limit of detection for the instrument used, the detection limit has been adopted for the gas flow rate.*					

6.5 Organic vapours

The PID results are provided on the logs in Appendix C. PID results significantly above background concentration are summarised in Table 6-5. Data are assessed in Section 8.6.

*Table 6-5: PID readings significantly above background during ground investigation. **

Stratum	Location	Depth (m bgl)	Reading (ppm)
River Terrace Deposits	WS01	1.90	62
River Terrace Deposits	WS02	2.20	52

*background concentration measured as 0.3-0.6ppm.

Table 6-6: PID reading significantly above background levels during groundwater monitoring.

Location	Reading (ppm)
BH01	311
WS01	11.5

6.6 Geotechnical data

6.6.1 Introduction

Laboratory test results are currently outstanding. However, the following shear strength profiles and characteristic parameters have been determined from insitu testing shown on the relevant exploratory hole logs or datasheets in Appendix C.

6.6.2 Plasticity

The volume change potentials in terms of BRE Digest 298 with respect to building near trees have been determined from the results of plasticity index tests on samples of soil. These are summarised in Table 6-7.

Table 6-7: Volume change potential

Stratum	No. of Tests	Plasticity Index			Modified Plasticity Index			Plasticity Designation	Volume Change Potential
		Mn.	Mx.	Av.	Mn.	Mx.	Av.		
Sporadic Upper Cohesive Mantle of River Terrace Deposits	1	23			*23*			Low	Non-Plastic on consideration of granular content and limited thickness
London Clay Fm	8	45*	64	52	44	64	51	Medium to High	High
Upnor Fm	2	19	27	23	19	27	23	Low	Medium
Woolwich Formation	7	28	53	37	28	52	36	Low to Medium	Medium
Thanet Sand Fm	2	-	-	-	-	-	-	-	Non-Plastic

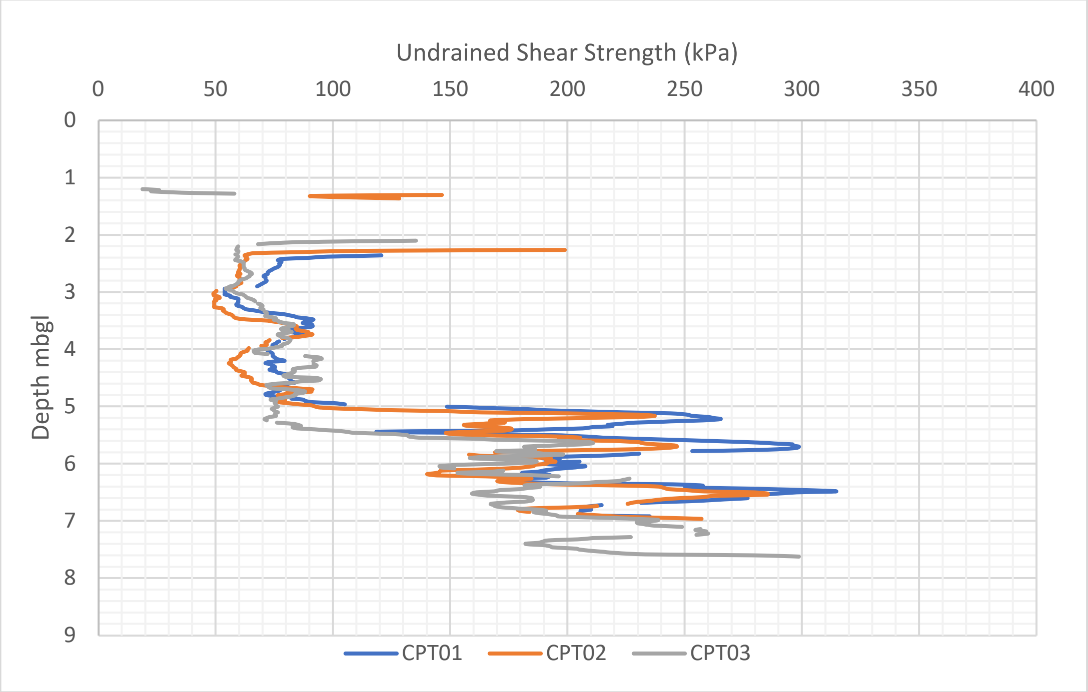
**Out of 8 tests on the London Clay Formation, one Atterberg limits test indicates a modified plasticity of 22% however this was a non-standard test and therefore the results have been discounted.*

6.6.3 Soil strength

Range of insitu Shear strength profiles through London Clay and the Woolwich Formation beneath the eastern end of the site (all terminating on the dense sands of the Upnor Formation), as determined by CPTs are illustrated below and within the lankelma CPT Report within Appendix D:

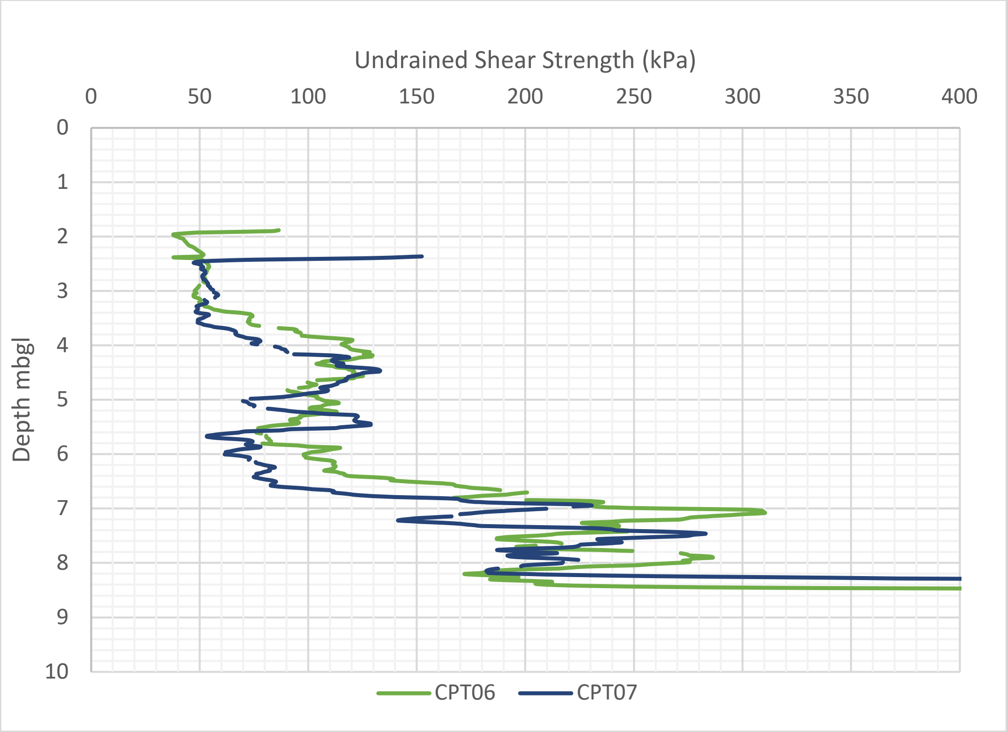
Range of insitu Shear strength profiles through the London Clay and the Woolwich Formation beneath the south eastern end of the site (all terminating on the dense sands of the Upnor Formation) as determined by CPT01, 02 and 03.

Table 6-8: Undrained Shear Strength with depth for CPT Probes CPT 01 - 03. Correlation based on Mayne & Peuchen 2018 (OC Fissured).



Range of insitu Shear strength profiles through the London Clay and the Woolwich Formation beneath the central area of the site (all terminating on the dense sands of the Upnor Formation) as determined by CPT 06 and 07.

Table 6-9: Undrained Shear Strength with depth for CPT Probes CPT 06 - 07. Correlation based on Mayne & Peuchen 2018 (OC Fissured).



Range of insitu Shear strength profiles through the London Clay and the Woolwich Formation beneath the northern central area of the site (all terminating on the dense sands of the Upnor Formation) as determined by CPT 08 and 09.

Table 6-10: Undrained Shear Strength with depth for CPT Probes CPT 08-09. Correlation based on Mayne & Peuchen 2018 (OC Fissured).

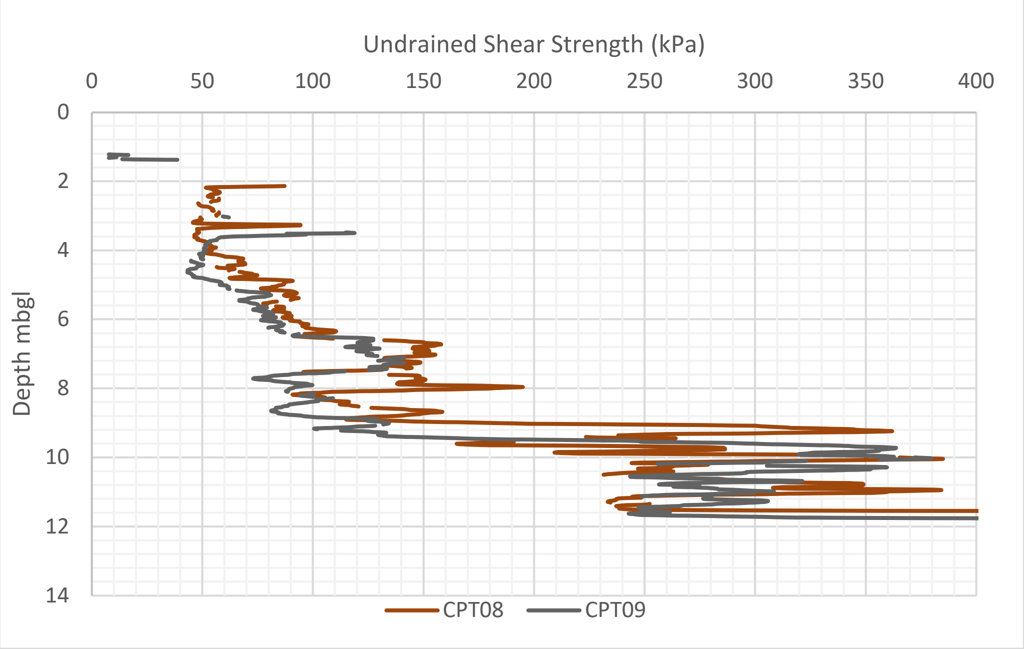


Figure 6-1: Undrained Shear Strength from SPTs - Eastern Part of Site.

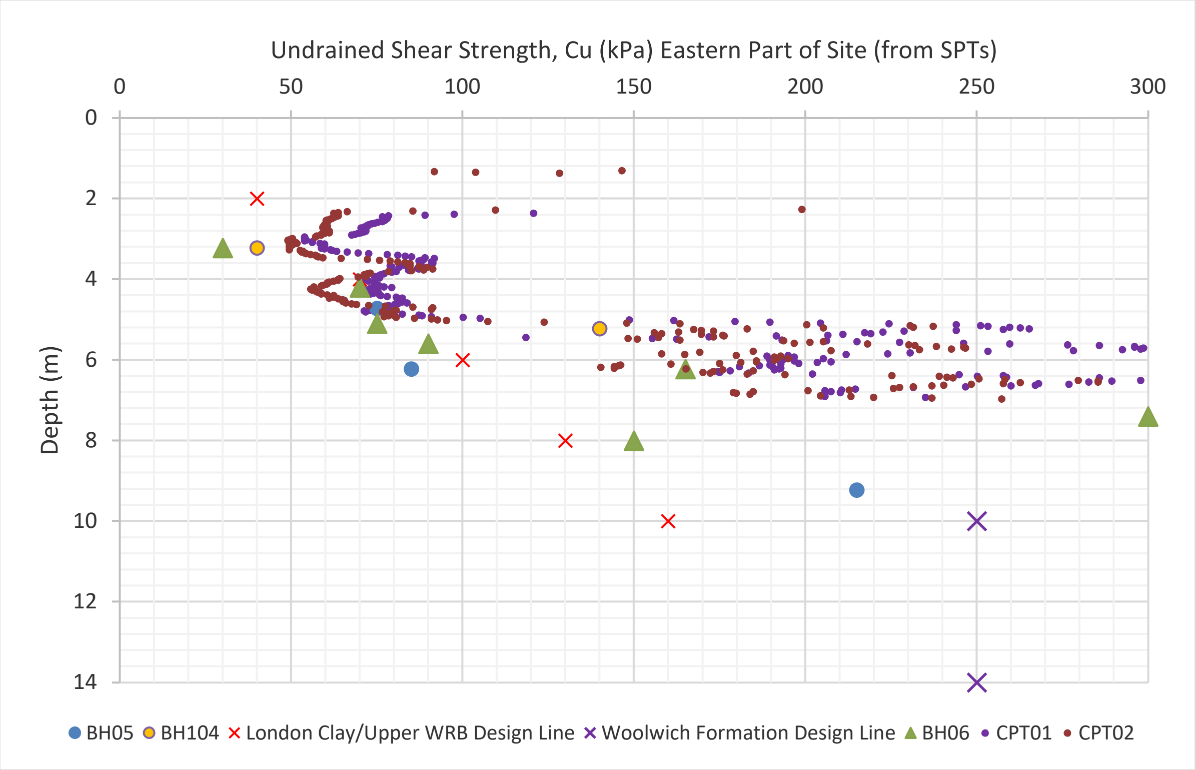


Figure 6-2: Undrained Shear Strength from SPTs - Western Part of Site.

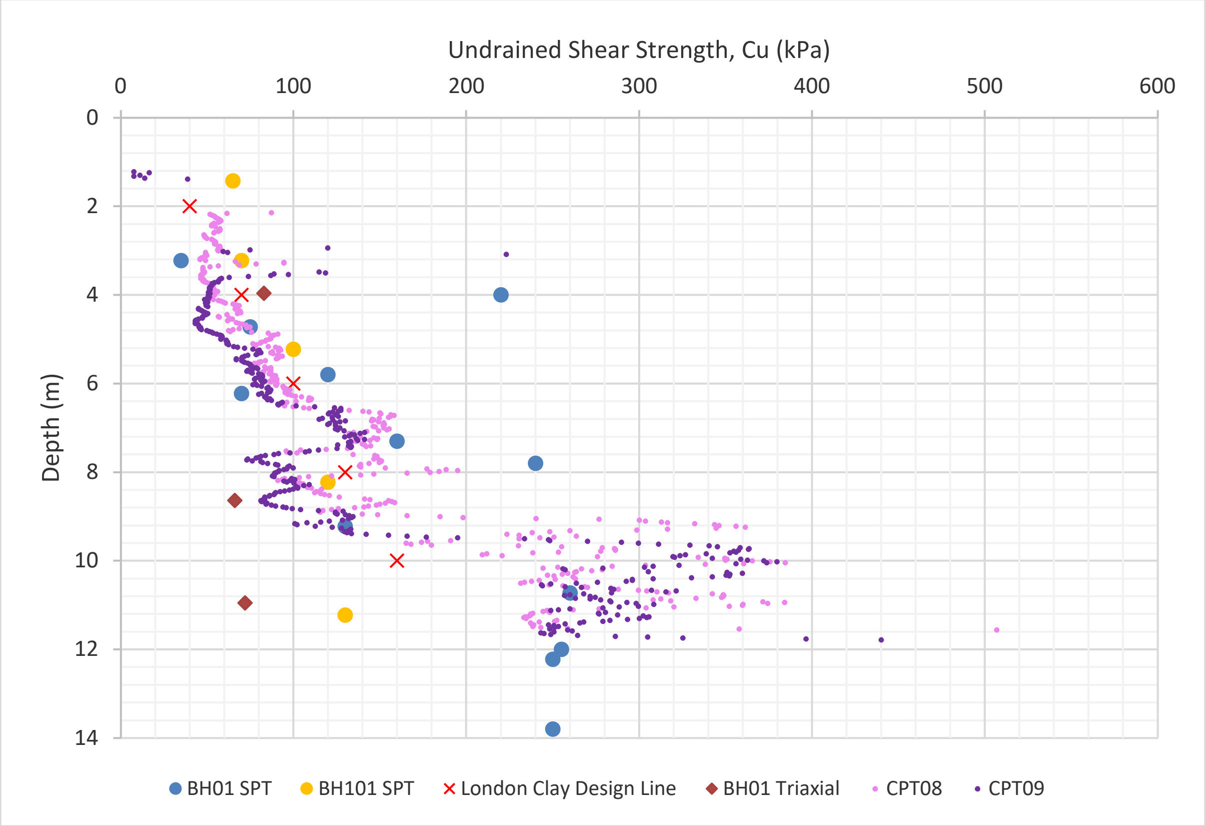
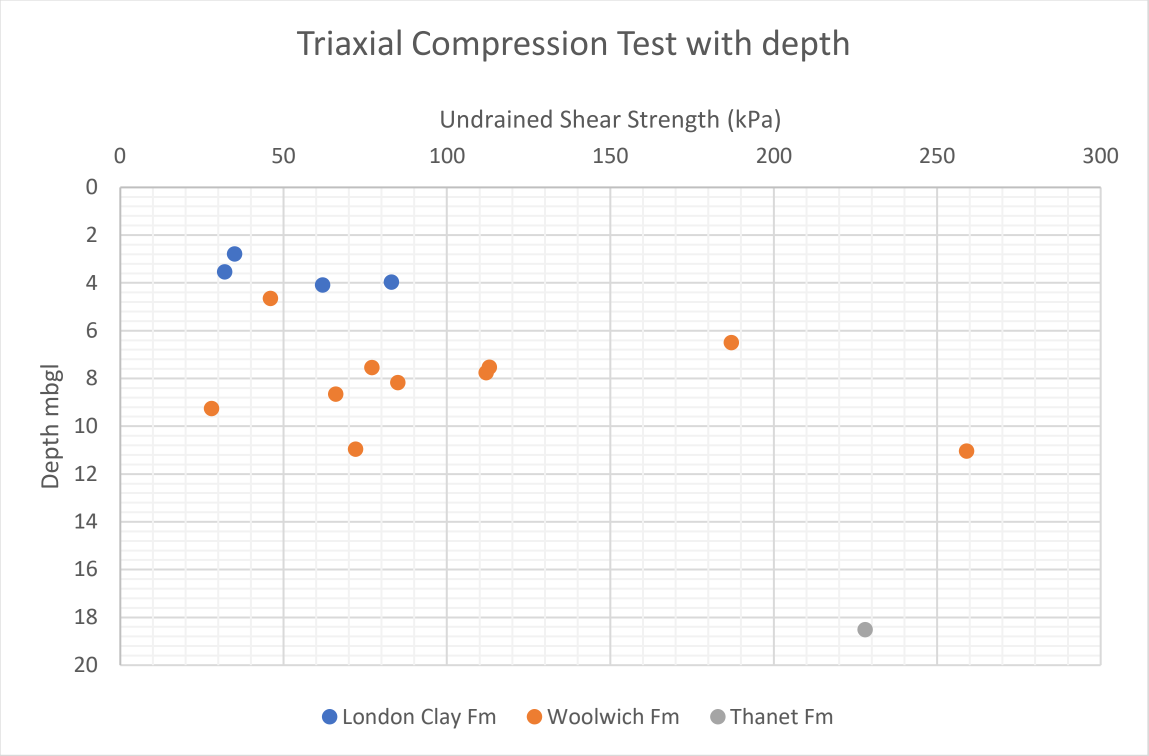
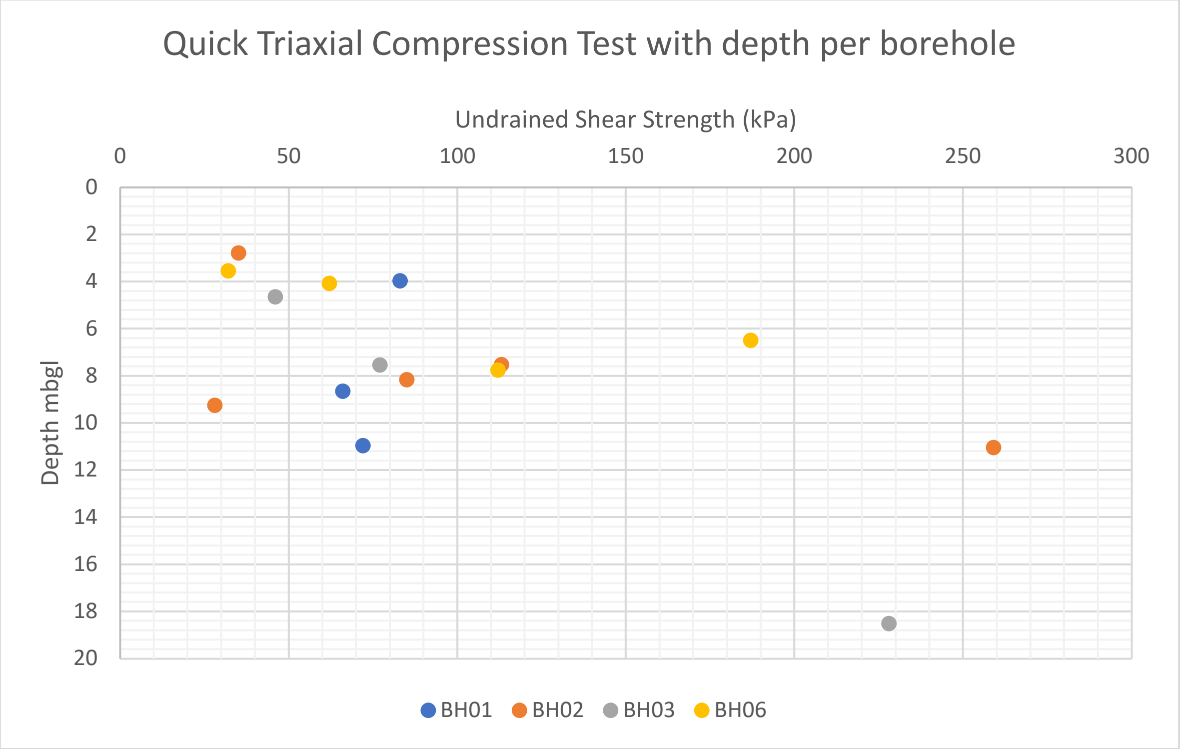


Figure 6-3: Shear Strength from Unconsolidated Quick Undrained Triaxial Compression Test. (Whole Site).



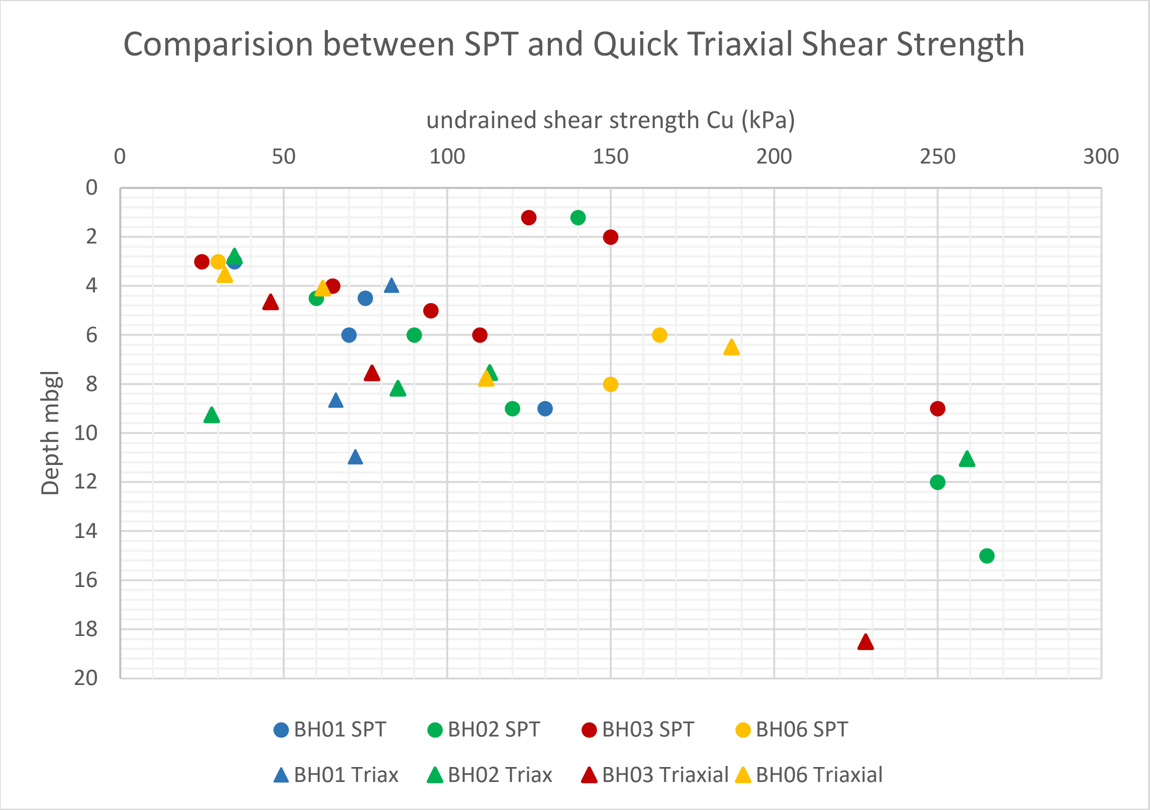
The quick triaxial testing within the London Clay show a range in undrained shear strength between 312-83 kPa. There may be a general increase in undrained shear strength with depth but this is not clear with the limited data. The quick triaxial results within the Woolwich formation show a greater range in undrained shear strength of between 28 and 259 kPa. A general increase in strength has been recorded within the Woolwich Formation.

Table 6-11: undrained Shear Strength from Quick Triaxial Test with depth per Borehole



A general increase in the undrained shear strength can be seen in all boreholes. Within the upper 10m below ground levels the undrained shear strength is generally below 150 kPa.

Table 6-12: Comparison between undrained shear strength recorded by SPT test and Quick Triaxial test.



The undrained shear strength correlated from the SPT tests and the quick undrained triaxial testing has been plotted together to show the variation between the two testing methods. Both testing methods show a general increase in undrained shear strength with depth. However, it is noted that the shear strength recorded by the quick triaxial tests were generally higher than those correlated from the SPT tests. The difference in shear strength between the two tests ranged between 2-22kPa but was on average 10kPa higher for the quick triaxial tests.

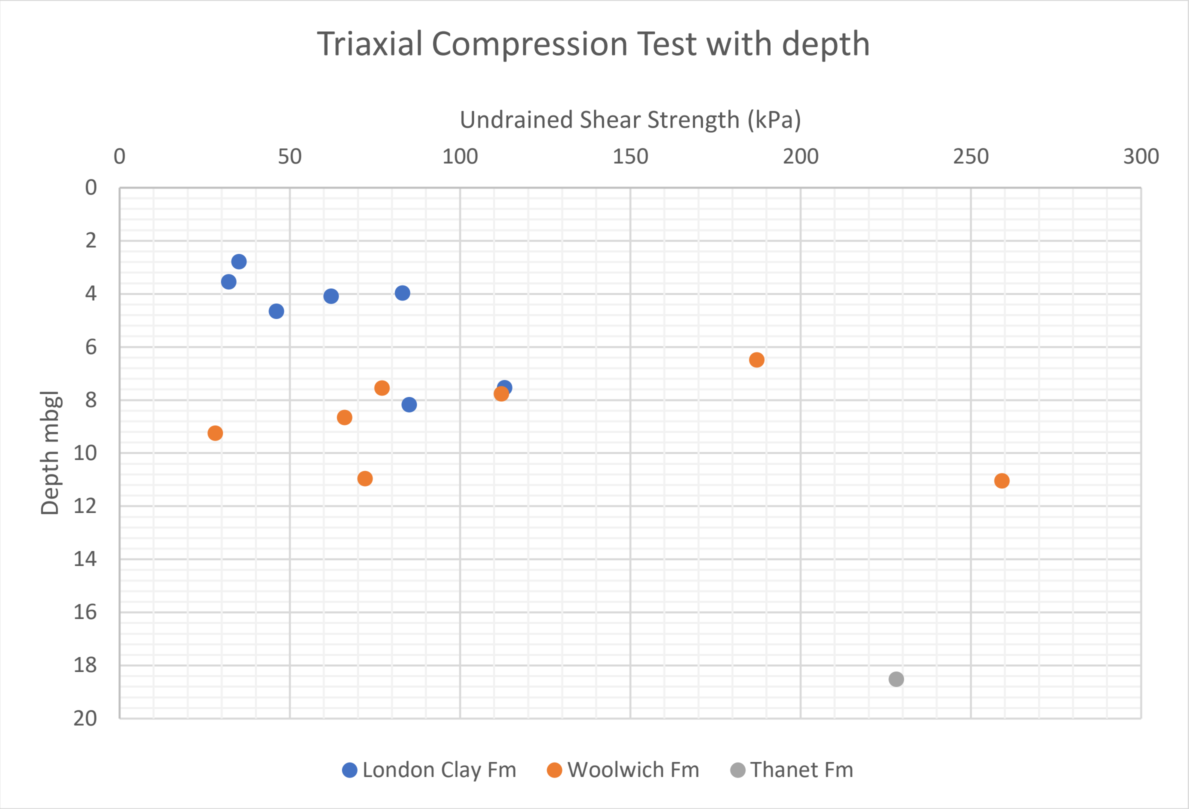
6.6.4 SPTs and Effective Angles of Shearing Resistance

Table 6-13 summarises information pertaining to the SPTs and effective angles of shearing resistance of the granular soils according to geological stratum. Factual results are appended for field tests (SPT & CPT). A SPT 'N' value versus depth profile is summarised in Figure 6.4.

Table 6-13: Relative density results and derived values

Stratum	No. of tests	Method	SPT (N-value) (Range)	phi' (°)
River Terrace Gravels	7	SPT.	5 - 30	33 - 40
Upnor Formation	4	SPT	20 - >50	33 - 36
Thanet Sands	20	SPT	41 - >50	35 - 36

Figure 6-4: SPT Depth Plot for each strata.



The data indicates that there is broadly an increasing strength with depth increasing rapidly within the Woolwich and Upnor Formation below around 6m and 10m depth and more so within the Thanet Sands below.

The River Terrace Deposits are encountered below the Made Ground and have a range in SPT N-value of between 5 and 30, but generally above 25. On account of the minimal thickness of the River Terrace Deposits no discernible trend in strength with depth can be determined from SPTs.

The SPT N-values obtained in the London Clay Formation were recorded as between 5 and 20 (low strength to high strength). The lower values occurred locally at the immediate transition from the Terrace Deposits above and generally increased rapidly to values around 10 immediately below. There is a strong increasing correlation between depth and strength of the London Clay Formation.

The London Clay Formation is underlain by the Woolwich Formation which records SPT N-values of between 20 to 50 from depths ranging between 6m bgl to 9m bgl. At depths below 9m bgl the Woolwich Formation recorded N-values of <50.

The Thanet Sand Formation was encountered from depths of 13.0m bgl. Generally, the recorded SPT N-values were <40 which classified the sands as dense. However, a lower N-value of 15 was recorded at 15m bgl. This maybe the result of an unbalanced water pressure in the borehole, hence it is likely that the in situ density is in reality much higher than indicated from the SPT.

6.6.5 *Sulfate content*

In accordance with BRE (Special Digest 1), the Design Sulfate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 6-14. The assessment summary sheets are presented in Appendix D.

Table 6-14: Aggressive chemical environment concrete classification

Stratum	No. tests	DS	ACEC
Made Ground	1	DS-1	AC-1
River Terrace Deposits	3	DS-2	AC-2
London Clay Formation	2	DS-2	AC-2
Woolwich Formation		DS-1	AC-1
Upnor Formation	1	DS-1	AC-1
Thanet Sand Formation	3	DS-2	AC-2

6.6.6 *Chalk Testing*

Table 6-15 summarises information pertaining to the density characteristics of the Chalk, based on laboratory test data.

Table 6-15: Intact rock strength results and derived values

Parameter Stratum	No. of tests	Dry Density (kg/m^3)	Porosity %	Saturation Moisture Content	Dry Density (range)	Density classification (CIRIA 574)
				%	Mg/m^3	
Lewes Nodular Chalk Formation	2	1640	40	24	1.63 – 1.65	Medium Density

7. GEOTECHNICAL ASSESSMENT

7.1 Geotechnical categorization of the proposed development

Eurocode 7, Section 2 advocates the use of geotechnical categorization of the proposed structures to establish the design requirements.

The geotechnical assessment remains unchanged and does not reflect updated design information provided within the new planning application.

The proposed development comprises of two main blocks (A in the west & B to the east). Block A has 4 and 8 storey sections. To the north-west and south of the block are both 4 storey blocks. There is an area of single storey on the north of the block and 2 basements. Block B comprises of a 8-storey block in the north west and the remainder is 4 storeys. A basement is proposed in the north of the building.

Based on the above, for the purposes of this investigation, the proposed structures have been classed as Geotechnical Category 2.

Following ground investigation and as part of the assessment provided in the following section, the preliminary geotechnical hazard identification undertaken in Section 4.3 has been updated.

Assessment has been undertaken in accordance with the general requirements of ICE/DETR Document ‘Managing Geotechnical Risk’ and the HE documents HD 41/15 and CD 622. The preliminary Geotechnical Risk Register following investigation is provided in Appendix H (Table J.3) and will need to be updated during future design works.

7.2 Groundwork

7.2.1 Site preparation

The redevelopment will involve demolition of the existing buildings. This should be undertaken to an appropriate Specification to ensure any asset materials generated are geotechnically suitable for use.

Buried obstructions were encountered during this investigation associated with foundations of old buildings, services etc., and there is a possibility of further such obstructions being encountered.

7.2.2 Groundworks

Following breaking out of hardstanding and grubbing out obstructions, excavation of shallow soils should be readily undertaken by conventional plant and equipment.

Excavations within the Made Ground and granular River Terrace Deposits are anticipated to be unstable particularly when closer to the water table expected between 1.5m and 2.0m bgl. Temporary trench support, or battering of excavation sides, is recommended for all excavations that are to be left open for any length of time and will definitely be required where man entry is required. Particular attention should be paid to excavation at, or close to, site boundaries/adjoining existing roads/structures/buildings, where collapse of excavation faces could have a disproportionate effect. It should be recognised that groundwater levels may vary from those at the time of the investigation, for example in response to seasonal fluctuations and the timing of construction may dictate the extent of groundwater control required.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015); Construction Information Sheet 47: Inspections and Reports (2005) and HSG47: Avoiding Danger from Underground Services.

To ensure no loads are imposed on the sides of the excavation, spoil should not be placed immediately adjacent to the excavation. Spoil should be placed a suitable distance from the side of the excavation (as assessed by a competent person).

7.3 Foundation recommendations

In accordance with EC7, BS EN 1997-1+A1 (2013), the proposed structures e.g. 4 to 8 storey buildings are considered to be Geotechnical Category 2. As such, foundation recommendations are presented to aid development proposals only and separate geotechnical design will be required.

7.3.1 Foundation Types

There is expected to be a variety of structural loads associated with the development ranging from lightly loaded walls to heavily loaded columns

7.3.2 Pad or Strip Foundations

All foundations must pass through the upper veneer of Made Ground and found in natural soils. For lightly loaded structures founded on extreme western parts of the site where Terrace Gravels are absent it can be expected that a safe net bearing capacity of 100kN/m2 can apply for strip foundations up to 1m width and pad foundations up to 3m width. Note that any pads in such conditions notionally requiring to be wider than 3m would settle beyond 25mm which is likely to be beyond the serviceability limits of a structure.

Where there are Terrace Gravels overlying natural clay deposits; a slightly enhanced safe net bearing capacity of 175kN/m2 can be achieved for pad foundations up to 2.25m width due to the load spread offered by the more granular terrace gravels. As there is often a softened stoney cohesive mantle over the upper horizon of the Terrace Gravels care must however be made to fully penetrate this weaker cohesive layer to achieve such bearing.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity and to below any remaining root hairs.

Where there is insufficient thickness of granular stratum immediately below intended shallow foundation formations, deepening of foundations in accordance with BRE 240 and BRE 298 will be required where pad foundations are within the zone of influence of existing, removed or proposed trees and proposed shrub planting. NHBC Standards (Chapter 4.2) should also be taken into account. A tree survey should be undertaken by an arboriculturist in accordance with BS 5837:2012 to identify the type, and height of existing trees on the site and including any off-site trees, that could have an effect on foundation design.

Where foundations are within the zone of potential desiccation from trees and are deeper than 1.5m bgl, a suitable compressible material or void former will be required on the inside faces of foundations to external walls, and beneath piled ring beams and ground bearing floor slabs.

Foundation formations should be inspected by a geotechnical engineer or other suitably competent person to ensure the founding conditions are suitable and as indicated in this report. Any formation materials deemed as unsuitable should be excavated and replaced with lean mix concrete or deepened to suitable strata.

Foundation excavations should be protected from rain and snow and inflow of surface water, frost and freezing conditions. They should also be protected from drying out in hot dry weather.

Any water that collects at the base of the foundation excavations should be removed by pumping from a sump in the base.

Groundwater monitoring indicates a shallow groundwater table. Alternative methods of groundwater control (such as cut-off trenches or well pointing) may be required if fast groundwater ingress is met upon, which could result in softening of the ground and unstable excavations.

The extreme western part of the site lies over consolidated clay, which can swell and soften in contact with water. Therefore, care will be required to ensure that foundation excavations are kept as free of water as practicable. Foundation concrete should be poured as soon as practicable after excavation.

7.3.3 Piled foundations

Piled foundations are recommended for moderately to highly loaded structures and also where tree influence precludes the use of shallow strip or pad foundations.

Depending on column loads and layouts, piles should extend through the Made Ground and toe into either the London Clay, Woolwich Clay Formation or granular Upnor Formation/Thanet Sands depending on the capacity required.

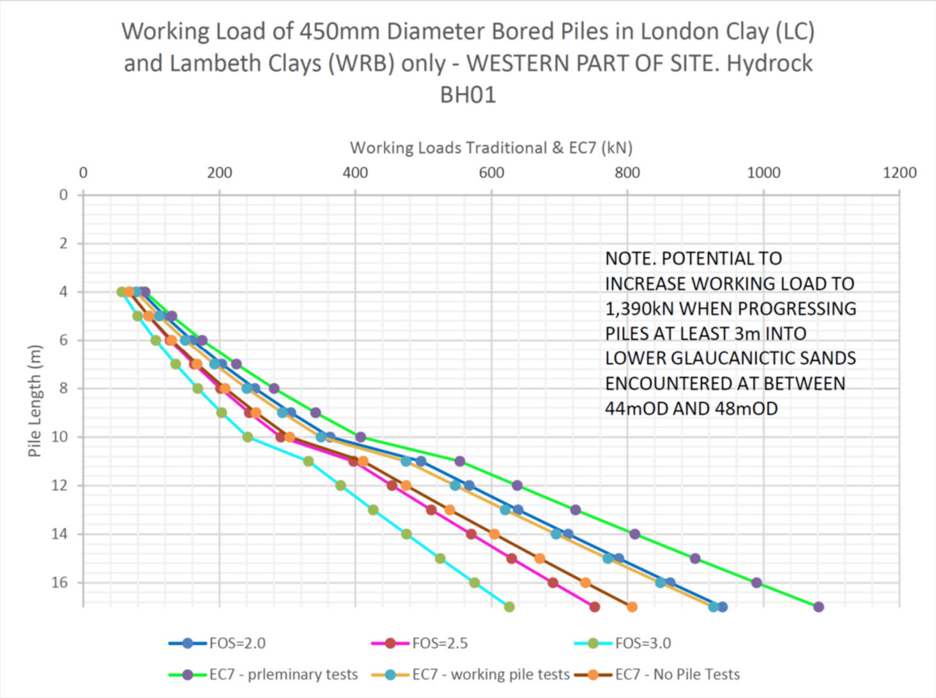
Driven piles or CFA piles should be suitable to support the foundations for the various structures. However, the choice of piling system should be undertaken by a specialist piling Contractor and the design of piles is beyond the scope of this report. The decision on pile type and design should take into account the following factors relevant to the site:

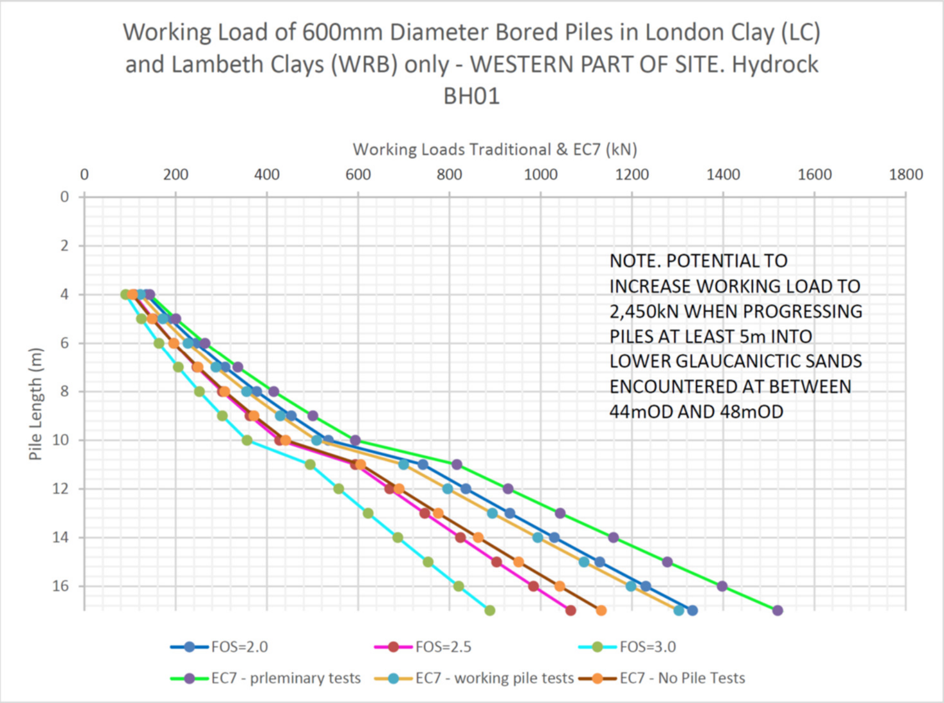
- Obstructions in the ground are expected from the previous structures, which could cause piles to stop shallower than the design depths, or to deviate from the vertical, thereby reducing their capacity. In some circumstances, obstructions can lead to pile breakage.
- Certain pile installations can create preferential pathways for the migration of contaminants to the groundwater.
- Groundwater levels are both shallow and deep. If CFA piles are used, concrete is placed as the auger is withdrawn, which can balance the water pressure if the operation is undertaken carefully.
- The groundwater in the Upnor Formation is potentially under sub-artesian pressure where it is confined by cohesive deposits, which should be taken into account in the pile design.

- Piles should extend a minimum of five pile diameters into the bearing stratum to mobilise sufficient shaft friction and end-bearing resistance to carry the required loads without unacceptable settlement.
- Collapse of the pile shaft can be caused by ‘necking’ of the pile in running sand conditions, leading to pile failure.
- Where foundations are constructed on clay soils within the influencing distance of trees design should include for the upper section of the pile to be sleeved or additional cage & pile length allowed for to resist stresses from clay swelling or shrinkage. In addition, heave protection may be required on the inside faces and underside of the ground beams.
- The production of a Piling Foundation Risk Assessment with regards to protecting the groundwater from contamination during piling is likely to be required by the EA

Based on the ground model and the geotechnical parameters in Section 6, the initial pile capacities for a range of pile diameters and depths are shown in the figures below. These have been calculated using both EC7 methods and traditional Lump-Sum methods by way of a comparison.

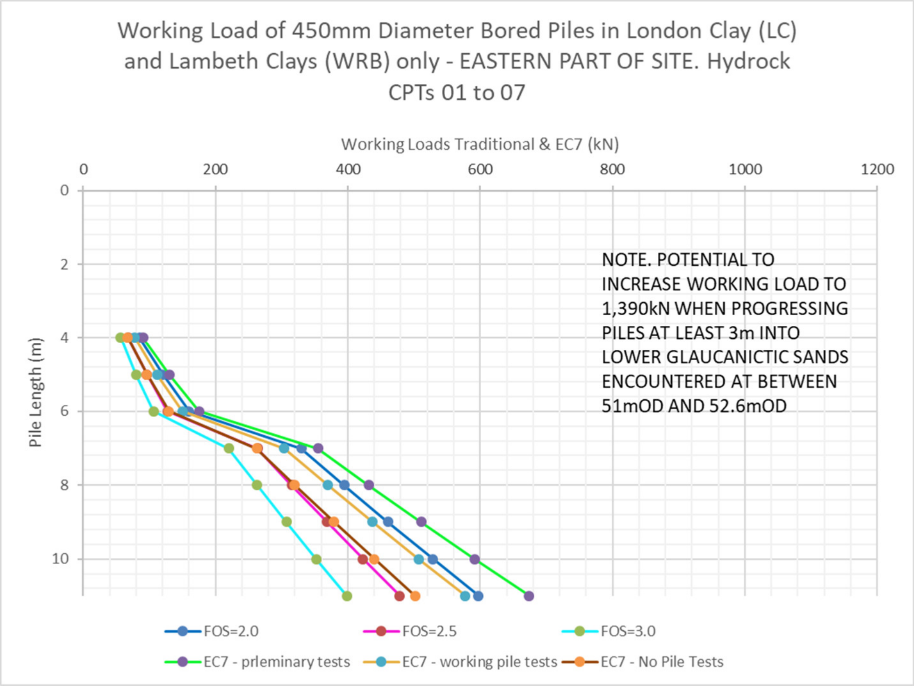
The preliminary Safe Working Loads calculated are a guide only and should not be used for design purposes. The pile design should be undertaken by a specialist based on loading criteria and the serviceability limit states provided by the structural engineer.





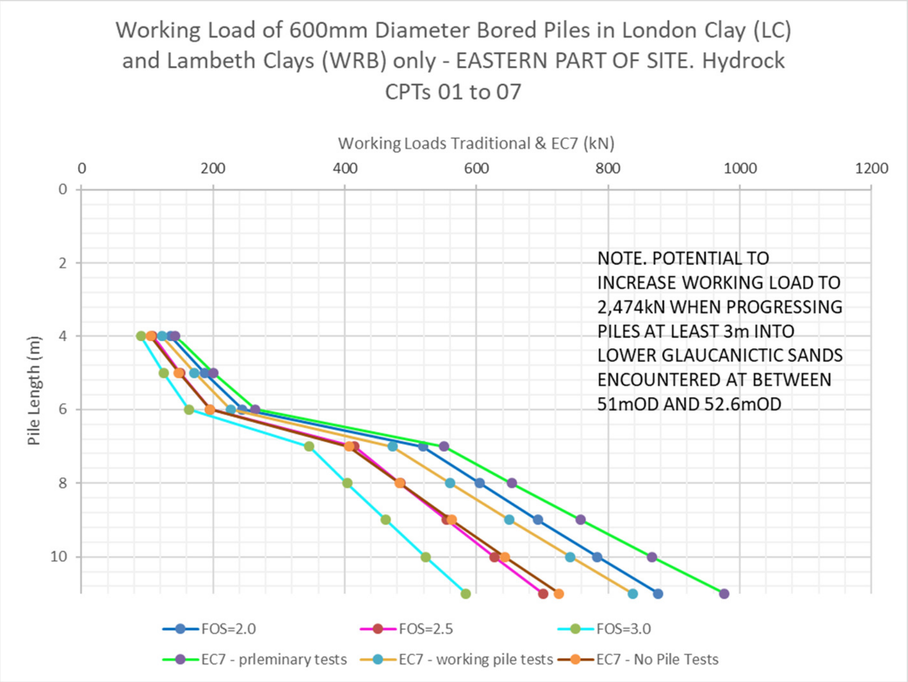
Working Load of 600mm Diameter Bored Piles in London Clay (LC) and Lambeth Clays (WRB) only - WESTERN PART OF SITE. Hydrock BH01

NOTE. POTENTIAL TO INCREASE WORKING LOAD TO 2,450kN WHEN PROGRESSING PILES AT LEAST 5m INTO LOWER GLAUCANICTIC SANDS ENCOUNTERED AT BETWEEN 44mOD AND 48mOD



Working Load of 450mm Diameter Bored Piles in London Clay (LC) and Lambeth Clays (WRB) only - EASTERN PART OF SITE. Hydrock CPTs 01 to 07

NOTE. POTENTIAL TO INCREASE WORKING LOAD TO 1,390kN WHEN PROGRESSING PILES AT LEAST 3m INTO LOWER GLAUCANICTIC SANDS ENCOUNTERED AT BETWEEN 51mOD AND 52.6mOD



7.3.4 Raft foundations incorporating settlement reducing piles

As an alternative to piled foundations for those blocks where moderately high columns are expected, consideration to forming these on raft foundations supported over shorter settlement reducing piles or concrete columns could also be made. The design of such foundations is outside the scope of this report and would need to form part of a separate Geotechnical Design Report if deemed potentially viable.

7.4 Working platform

For piling, a working platform will be required prior to the arrival on site of tracked plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on data on the piling plant in accordance with an FPS certificate for the rig loadings. For initial preliminary budgeting purposes; consideration of the possibility of requiring an unreinforced compacted Class 6F granular piling mat of 900mm thickness with terram 1000 geofabric separator layer can however be made based upon a typical heavy CFA rig (Soilmech CM120). Once the actual rig and track bearing pressures are known Hydrock can facilitate the final design of the working platform (unreinforced or reinforced) for tracking and working areas.

7.5 Roads and pavements

Proposed pavements are likely to be constructed off the Made Ground and/or the upper cohesive and weathered zones of the Terrace Deposits the stiffness of this will determine the required pavement construction thickness. The Made Ground has been found to be variable and shallow natural soils cohesive and often soft to firm. A CBR of 2.5% should therefore be assumed for initial design, subject to undertaking confirmatory testing.

7.6 Ground Floor Slab

As Made Ground is greater than 600mm thick and there is considered to be a volume change potential risk present on the site in areas underlain by cohesive deposits within the influence of trees. It is recommended that suspended floor slabs should be adopted in accordance with NHBC Standards.

The Made Ground underlying the site has a variable composition but from previous testing undertaken by Arcadis would in the main be considered as non-plastic in terms of shrink-swell potential due to the high granular content. Due to the inherent variability of the Made Ground it is perceived to have irregular compressible qualities. It is therefore not suitable to support a ground floor slab on these materials without reworking or stabilising them into a uniform engineered stratum.

Observations and test results indicate that there is an upper clayey mantle associated with the underlying River Terrace Deposits in some areas. The clay fraction of this is shown be of medium volume change potential. However, on consideration of the high granular content and the results of previous plasticity tests undertaken by Arcadis on this stratum, it would be considered as essentially non-plastic in terms of shrink-swell potential. This feature appears to be absent in many areas and also, where encountered is relatively thin (around 500mm thickness). It is considered therefore that should a more plastic horizon be encountered its influence with regards to shrink/swell due to seasonal or tree influenced moisture changes would be negligible and heave protection is not needed in this regard. The strength and depth of this clayey mantle however does not render it suitable for directly supporting ground bearing floor slabs.

7.7 Buried concrete

Based on the guidelines provided in the BRE Special Digest (BRE 2005) and the information presented in section 6.6.5, testing of the shallow soils of the River Terrace Gravel deposits and the underlying London Clay Formation indicate these soils are classified as Design Sulfate Class DS-2 and ACEC Class AC-2. In addition, the deeper soils of the Thanet Sand Formation are also classed as DS -2 and ACEC Class AC-2. Therefore, it is considered that that this should be used as a minimum class for all buried concrete.

The designer should check and confirm the classification of the concrete using information presented in Appendix D and F during the design.

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8. GEO-ENVIRONMENTAL ASSESSMENT

8.1 Updated conceptual model

8.1.1 Updated ground model

The preliminary ground model developed from the desk study and field reconnaissance survey (Section 3) has been updated using the findings of the ground investigation and is presented in Sectio n 6. This ground model is the basis for the geo-environmental assessment presented in this section.

8.1.2 Updated exposure model

Following the ground investigation, the plausible contaminant sources, receptors and pathways identified in the preliminary geo-environmental exposure model (Section 4), have been updated or confirmed as follows.

Sources

No potential sources have been removed from, or added to, the exposure model.

Receptors

No potential receptors have been removed from, or added to, the exposure model.

Pathways

No pathways have been removed from, or added to, the exposure model

Using the updated ground model and updated exposure model, generic risk assessment is undertaken as presented below.

8.2 Risk assessment approach

Generic risk assessments have been undertaken in accordance with the principles of LCRM (Environment Agency, 2020) using the CM that has been updated following the ground investigation.

Firstly, the risks associated with the identified potential contaminant linkages have been estimated using standardised methods (typically involving comparison of site data with published 'screening values'). Secondly, where screening values are exceeded, the result has been evaluated in an authoritative review of the findings with other pertinent information to determine whether or not the exceedance is, or is not acceptable in the site-specific circumstances.

The data sets used in the assessment comprise the analytical results obtained by Hydrock as listed in Section 5 together with any reliable data from previous investigations (Arcadis, 2018) as listed in Section 2.

In cases where unacceptable risks are indicated, actions such as more advanced stages of risk assessment or remediation are proposed in Section 8.11.

8.3 Human health risk assessment

This is a Tier 2 assessment using soil screening values applicable to public open space (residential) CLEA land use scenario.

The soil screening values used are generic assessment criteria (GAC). It should be noted that Category 4 Screening Levels (C4SL) for lead have been used as there is no recognised GAC for lead and the use of the term 'GAC' in this report includes the C4SL for lead.

Statistical testing is used where data sets are suitable. The critical issue is sample numbers. For data sets with low sample numbers or where sampling is targeted at specific areas, individual sample test results are compared directly with the screening values. Larger and non-targeted data sets are subject to statistical testing.

The phrase 'further assessment required' is used to denote soil concentrations that are equal to, or exceed, a GAC. This does not necessarily mean that the soil is 'contaminated' or not otherwise suitable for use. The assessment and any mitigation required are to ensure the site does not pose an 'unacceptable risk'.

The results of the assessment are presented in Appendix F.

8.3.1 Averaging areas

The 'averaging area' used in this report is based on the conceptual model and the proposed development, and is taken to be the entire area of the site, with the data separated into Made Ground and natural soils.

8.3.2 Risk estimation (including statistical testing)

The data set for each chemical determinand has been assessed for potential outliers (based on the conceptual model). No outliers have been removed.

Statistical assessment

In accordance with the guidance provided by the CIEH (May 2008) the 95th upper confidence level on the true mean (US_{95}) has been calculated from the sample data.

Based on a US_{95} exceedance of the GAC, the pervasive chemicals of potential concern which require further assessment are summarised in Table 8-1.

Table 8-1 (Hydrock)Pervasive chemicals of potential concern for which further assessment is required (human health)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
Hydrock (Ground Investigation June 2020)							
Made Ground							
Benzo(a)pyrene	2.6	GAC	22	0.05	24	10.334	6
Natural Ground - No Exceedances							

Table 8-2: (Arcadis)Pervasive chemicals of potential concern for which further assessment is required (Human Health).

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
Arcadis (Ground Investigation September 2018)							

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
Made Ground							
Benzo(a)pyrene	2.6	GAC	11	0.05	10	10.334	2
Natural Ground - No Exceedances							

Benzo(a)pyrene is present in the Made Ground with a US_{95} of 7.77mg/kg, which is a significant exceedance of the GAC (2.6mg/kg). Benzo(a)pyrene (BaP) was encountered within eight locations at levels exceeding the GAC, these include, WS02, CPT01, CPT04a CPT07, CPT 10, BH03 from the Hydrock investigation and BH102 from the Arcadis investigation. The greatest concentrations of BaP were encountered in CPT01 (24mg/kg) and CPT04a (21mg/kg) along the southern site boundary.. Minor exceedances were recorded within BH102, BH03, WS02 and CPT10 around the Energy Centre, as well as CPT10 in the south.. A minor exceedance is recorded within WS02 located close to the boiler room. This exceedance is contributed to ash encountered between the layers of hardstanding. Therefore, it is likely that this hotspot will be removed as part of the removal of hardstanding across the site.

Statistically Lead is not considered to be a contaminant with a US_{95} of 393 mg/kg compared to a GAC of630mg/kg. However, three elevated concentrations of lead were located in exploration locations CPT01, CPT02 and CPT10 at concentrations of between 660mg/kg and 760mg/kg. Due to the localised area where elevated lead has been identified and knowledge that this area shall ultimately be covered by the new building footprints it is considered that further assessment of this is not warranted.

Minor exceedances of BaP and Lead have both been encountered on the south and south west of the site around Woodcote Lodge and Rowen House. Historically these was a row of residential properties with outbuilding and gardens aligned along Woodcote green Road. The majority were demolished in the 1950s for the construction of Rowan house, with further demolition and redevelopment in the 1990-2000s for the current Woodcote Lodge. It is possible that a potential source of contamination may have been disturbed and spread around this area of the site during the redevelopment works.

Asbestos

Visual evidence of Asbestos Containing Materials (ACM) was encountered within one location (CPT08 at 0.35m bgl) in the form of suspected asbestos cement sheeting.

In addition, asbestos fibres were identified during laboratory testing of soil samples as listed in Table 8-3, below.

Table 8-3: Asbestos in soil samples (laboratory testing)

Location	Depth (m bgl)	% Asbestos (w/w)	Comment
WS03	0.7	0.006	Chrysotile
BH03	0.3	0.001	Chrysotile
CPT02	0.6	0.018	Chrysotile & Amosite & Crocidolite
CPT07	0.3	0.012	Chrysotile & Amosite
BH03	0.3	0.001	Chrysotile

Location	Depth (m bgl)	% Asbestos (w/w)	Comment
WS102	0.8	<0.001	Chrysotile
BH102	0.2	0.011	Chrysotile
BH102	0.8	<0.001	Chrysotile

Petroleum hydrocarbons (PHC) and volatile Organic Compounds (VOCs)

Targeted samples of soils (based on visual/olfactory evidence of contamination and PID reading) were collected from around the Energy Centre.

No exceedances of petroleum hydrocarbons were recorded when the results were compared against the GAC for public open space residential land use scenario. However, minor concentrations of Aromatic EC12-EC16 and EC16-35 were recorded within WS01, WS02, WS101 and BH02 (E16-35 within BH102 only at 79mg/kg). The greater concentrations were encountered within the River Terrace Deposits in WS01 and WS02. A maximum concentration of petroleum hydrocarbons was recorded within the River Terrace Deposits of 3,170mg/kg within the TPH Aliphatic >C16-C35 band of WS01 in the vicinity of the Energy Centre. Within BH102 the highest concentrations were within the TPH Aromatic >C21-35 band at 440mg/kg, which is also in the vicinity of the Energy Centre.

8.3.3 Risk evaluation

The screening exercise has identified asbestos, lead and benzo(a)pyrene in Made Ground at concentrations which are considered to be detrimental to human health although not necessarily above the GAC. The majority of these exceedances were encountered on the southern half of the site around Woodcote Lodge and Rowen House. It is considered that the Made Ground in this area of the site is more pervasively contaminated. Further assessment is required.

The phrase ‘further assessment’ does not necessarily mean that the soil is ‘contaminated’ or not fit for use.

Asbestos

There have been eight exploratory hole locations where asbestos fibres (between<0.001% v/v and 0.18% v/v for chrysotile, amosite and crocidolite). In addition, suspected Asbestos containing Material has been identified in one location.

Hydrock consider it plausible for asbestos to be present in any of the Made Ground soils across the whole of the site. Asbestos, (even at low concentrations), represents an unacceptable risk and robust mitigation measures will be required.

Petroleum hydrocarbons

Petroleum hydrocarbon concentrations do not exceed the GAC for the proposed end use scenario of residential public open space. However, there is still considered to be an elevated concentration which may results in a hydrocarbon odour and further assessment is recommended.

Elevated concentrations of petroleum hydrocarbons were largely absent, with the exception of WS01, WS02 and BH102, in close proximity to the Energy Centre. Most notably, elevated concentration of TPH, predominantly within the C12-C35 range where recorded within WS01 and WS02 at 1.90m bgl and 2.20m bgl These locations are located to the east of above ground diesel tanks and south-east of the boiler room. Elevated concentrations of Petroleum Hydrocarbons were also recorded within the Arcadis Ground Investigation report 2018, within BH102 which is located in a similar area to WS01 and WS02.

Given similar findings of the previous investigation and observation of localised staining/spills in the vicinity, the presence of petroleum Hydrocarbons is considered to be the result of the operation of the Energy Centre or associated spills / leaks.

Volatile organic compounds - groundwater (dissolved phase)

The risks to human health arising from vapours in dissolved phase groundwater have been assessed in accordance with the SoBRA GAC. This is a preliminary approach whereby GAC have been developed using the CLEA v7.01 model for indoor air and outdoor inhalation pathways only, assuming a residential or commercial end-use.

A review of the groundwater screening values, indicate that the GAC for TPH Aliphatic >EC10-EC12 of 37ug/l is exceeded within the shallow perched groundwater of WS02 (of 130ug/l). However, given the isolated exceedance and that the proposed redevelopment will remove the contaminant source (Energy Centre), Hydrock considers that it is not a significant risk.

Given that almost all of the human health risk from vapours is attributed to indoor air pathways, the installation of a suitable VOC vapour resistant barrier membrane will also mitigate this risk.

A vapour resistant membrane will be required within the vicinity of the current energy centre where the petroleum Hydrocarbon hotspot has been located. The migration of vapours is generally considered to be vertical, up through the River Terrace Deposits and Made Ground, but it is also plausible that vapours could become ‘trapped’ beneath the existing hardstanding and thus move laterally, find and follow a preferential pathway (eg. gravel around a service run, piles etc), or move laterally through porous geological discontinuities. The risk of vapour intrusion to a building will reduce the further away it is from the source. For buildings immediately over the contamination hot-spot, the protection system installed would need to provide adequate venting beneath, or around the building as part of the protection measures installed.

The requirement for a vapour resistant membrane may be removed via:

- The derivation of site-specific acceptability criteria for vapours in a DQRA considering parameters such as the proposed building type, depth to groundwater, foundation and soil types, and/or
- The collection and assessment of vapour samples, compared against the relevant criteria.
- Removal of the contamination hot-spot / impacted groundwater as part of the demolition and remediation activities.

8.4 Plant life risk assessment

8.4.1 Risk estimation

Priority phytotoxic chemical concentrations have been screened against published values to determine the likely risk to plant growth and the findings presented in Appendix F. As with human health, statistical testing is used where data sets are suitable, otherwise individual sample test results are compared directly with the screening values.

Based on a US_{95} exceedance of the GAC, there are no chemicals of potential concern and therefore, no further assessment is considered necessary.

8.4.2 Risk evaluation

The are no substances at concentrations which would be considered to be a risk to plant life. However, there is no near surface material which is considered to be a suitable growing medium. Therefore, it is necessary for all topsoil for use within the landscaping areas should be imported to site. Guidance should be sought from the landscaping architects regarding the requirements for imported growing medium.

8.5 Pollution of controlled waters risk assessment

8.5.1 Risk estimation

The risks to groundwater and surface water from contaminants on site have been assessed in accordance with the Environment Agency (2006) Remedial Targets Methodology (RTM).

Site contaminant loadings are compared with relevant screening values (Water Quality Targets), which are linked to the Conceptual Model.

Acceptable WQT are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)). The assessment is presented in Table 8-4 below, with the justification for the scenarios selected explained in the following text:

- The hydrogeological conditions beneath the Site are quite complex and multi-layered groundwater horizons are present. It is inferred that shallow perched groundwater is present within the River Terrace Deposits and is separated from the underlying groundwater horizons by substantial bands of relatively impermeable silts/clays of the London Clay and Woolwich Beds. As such vertical connectivity between shallow and deeper groundwater is unlikely or at least water movement is significantly retarded.
- The deeper groundwater encountered within the Glauconitic sands of the Lambeth Group, Thanet Sand Formation and Lewes Nodular Chalk Formation are considered likely to be in hydraulic continuity to a certain degree.
- Currently the nearest surface water is a pond (and associated drainage) located 25m to the south-east, but is considered to be hydraulically upgradient of the Site. This pond has been present on historical maps since 1840.

Table 8-4: Summary of water quality risk assessment protocol

Hydrock scenario	Water body receptors	Secondary receptors	Example contaminant linkages	RTM level and data used	Water quality targets
D	Groundwater. Surface water.	Aquatic ecosystem.	Contaminants from site leach or seep into a groundwater body that is a potential source of water for human consumption. Ground may feed inland surface water by base flow. The surface water may be an aquatic ecosystem.	RTM Level 2 - Groundwater.	DWS EQS (inland)

Hydrock scenario	Water body receptors	Secondary receptors	Example contaminant linkages	RTM level and data used	Water quality targets
Notes: Some EQS are water hardness dependent. This is measured either in the receiving surface water or in groundwater (if it is part of the pathway), or is estimated from national maps. Inland waters EQS applicable to freshwater, 'other' waters EQS applicable to coastal or transitional waters. This table and the results of the assessment are considered as a first screening for potential risks of pollution of Controlled Waters. More specific requirements may be stipulated by the relevant Agency.					

The results of the screening assessment are presented in Appendix F and are summarised in Table 8-5.

There are no WQT for petroleum hydrocarbons in water. Consequently, Hydrock has calculated risk-based guidelines for drinking water based on a methodology proposed by the WHO and using the tolerable daily intakes for the various TPH fractions as used in the derivation of the soil GAC. The results are included in Table 8-5.

In some instances, the reporting limit (or detection limit) quoted by the laboratory may be greater than the WQT that it is being assessed against. As the current exercise is an initial screening assessment, further assessment of these elements has not been undertaken.

Table 8-5: Chemicals of potential concern for which further assessment is required (controlled waters)

Chemical of potential concern	Basis for water quality target	Water Quality Target (ug/l)	Max. (µg/l)	No. samples exceeding WQT
Hydrock (Ground Investigation June 2020)				
Shallow Groundwater (River Terrace Deposits)				
Arsenic	DWS	10	17.5	1
Cadmium	EQS	0.08	1.3	1
Cobalt	EQS	3	6.9	5
Copper	EQS	1	5,4	4
Nickel	EQS	4	14	5
Manganese	EQS & DWS	123 / 50	5500	6
Selenium	DWS	10	26	1
Zinc	EQS	10.9	220	1
Ammonium	DWS	500	2.700	4
Ammoniacal Nitrogen (as N)	EQS	300	2,100	4
Sulphate	EQS & DWS	400,000 / 250,000	2,520,000	2
Phenol	EQS	7.7	9.3	4
TPH CWG Aliphatic >C10-C12	Hydrock DWS**	50	130	1
TPH CWG Aliphatic >C12-C16	Hydrock DWS**	50	1,600	2
TPH CWG Aliphatic >C16-C35	Hydrock DWS**	1,000	8,200	1
TPH CWG Aromatics >C10-C12	Hydrock DWS**	20	230	2
TPH CWG Aromatics >C12-C16	Hydrock DWS**	20	460	2
TPH CWG Aromatics >C16-C21	Hydrock DWS**	15	800	2

Chemical of potential concern	Basis for water quality target	Water Quality Target (ug/l)	Max. (µg/l)	No. samples exceeding WQT
TPH CWG Aromatics >C21-C35	Hydrock DWS**	15	210	1
Deep Groundwater (Lambeth Group, Thanet Sand Fm, Lewes Nodular Chalk)				
Cobalt	EQS	3	160	4
Copper	EQS	1	3.9	9
Manganese	EQS & DWS	123 / 50	800	8
Nickel	EQS & DWS	160	220	6
Ammoniacal Nitrogen (as N)	EQS	300	330	1
Bromate	DWS	10	38	3
Sulphate	EQS & DWS	400,000 / 250,000	1,140,000	4
Phenol	EQS	7.7	9.1	2

Note: The maximum recorded value is compared with the water quality target

** The Water Supply Regulations 1989 and the Private Water Supply Regulation 1991 both contain a prescribed concentration of 10µg/l for "dissolved or emulsified hydrocarbons (after extraction with petroleum ether); mineral oils". This was removed when the Regulations were updated in 2000 (consolidated 2007) and 2009, respectively. However, 10µg/l is used in this report as an initial screening assessment as it is frequently the preferred approach of the Environment Agency.*

*** Hydrock calculated DWS for petroleum hydrocarbon fractions based on WHO methodology.*

Chemical of potential concern	Basis for water quality target	Water Quality Target (ug/l)	Max. (µg/l)	No. samples exceeding WQT
Arcadis (Ground Investigation September 2018)				
Shallow Groundwater (River Terrace Deposits)				
Copper	EQS	1	2.4	1
Nickel	EQS	4	4.8	1
TPH CWG Aliphatic >C12-C16	Hydrock DWS**	50	260	1
TPH CWG Aliphatic >C16-C35	Hydrock DWS**	1,000	480	1
TPH CWG Aromatic >C8-C10	Hydrock DWS**	20	87	1
TPH CWG Aromatics >C10-C12	Hydrock DWS**	20	430	1
TPH CWG Aromatics >C12-C16	Hydrock DWS**	20	1,500	1
TPH CWG Aromatics >C16-C21	Hydrock DWS**	15	1,000	1
Deep Groundwater (Lambeth Group, Thanet Sand Fm)				
Copper	EQS	1	3.6	2
TPH CWG Aliphatic >C12-C16	Hydrock DWS**	50	140	1
TPH CWG Aliphatic >C16-C35	Hydrock DWS**	1.000	200	1
TPH CWG Aromatics >C10-C12	Hydrock DWS**	20	410	1
TPH CWG Aromatics >C12-C16	Hydrock DWS**	20	770	1
TPH CWG Aromatics >C16-C21	Hydrock DWS**	15	640	1

Note: The maximum recorded value is compared with the water quality target

Chemical of potential concern	Basis for water quality target	Water Quality Target (ug/l)	Max. (µg/l)	No. samples exceeding WQT

** The Water Supply Regulations 1989 and the Private Water Supply Regulation 1991 both contain a prescribed concentration of 10µg/l for "dissolved or emulsified hydrocarbons (after extraction with petroleum ether); mineral oils". This was removed when the Regulations were updated in 2000 (consolidated 2007) and 2009, respectively. However, 10µg/l is used in this report as an initial screening assessment as it is frequently the preferred approach of the Environment Agency.*

*** Hydrock calculated DWS for petroleum hydrocarbon fractions based on WHO methodology.*

It should be noted that in some instances the reporting limit (or detection limit) quoted by the laboratory may be greater than the WQT that it is being assessed against. As the current exercise is an initial screening assessment, further assessment if these elements has not been undertaken.

In addition, the chemical suite undertaken as part of the Arcadis ground investigation screened for a smaller suite of chemicals. Therefore, while fewer metal exceedances were encountered during initial groundwater monitoring (September 2018) this is considered to be the results of testing suite and not a less contaminated groundwater.

8.5.2 Risk evaluation

Numerous elevated concentrations of metals have been recorded in exceedance of the WQT within the shallow perched groundwater, however the majority are of minor exceedance only and given the remoteness and upgradient location of the nearest surface water receptor and unlikely to represent a significant risk. Concentrations of ammonium / ammoniacal nitrogen are also locally elevated with the shallow groundwaters across both sampling rounds.

The 2018 Arcadis ground investigation reported similar heavy metal contaminations. The source of this contamination is unknown and may originate from an offsite source or be historic and (which has since been removed). Hydrock consider the likelihood of the contamination being from the Made Ground to be low on account of the hardstanding which covers the majority of the site and minimal evidence of elevated cobalt, copper, nickel, manganese or zinc within the Made Ground sampled. Hydrock do not consider these minor exceedances to pose a risk to controlled waters given the distance from the site.

Of particular note, are concentrations of petroleum hydrocarbons within the shallow groundwater. These are typically within the Aliphatic / Aromatic >C10 – C35 range, with the maximum recorded concentration of 8,200ug/l within the Aliphatic >C16-C35 range in groundwater of WS02. This includes a total TPH of 11,470ug/l within the same borehole (WS02) during the first sampling round on 12/08/2020. However, during a later sampling round, concentrations have significantly reduced to trace levels, whereas WS01 reports a total concentration of TPH of 950ug/l (within the Aromatic >C10 – C21 range). A further round of sampling and testing would be required to assess this further.

Concentrations of petroleum hydrocarbons within the deeper groundwater are all recorded at less than the laboratory limit of detection in all samples. Thus demonstrating that concentrations of TPH are not vertically migrating from the shallow groundwater to deeper groundwater horizons below.

Borehole WS01 is located adjacent to the above ground storage tank next to the energy centre/ boiler house. In addition, the petroleum hydrocarbon range encountered is considered to be consistent with diesel and/or historic weathered heavy end hydrocarbons. This is most likely attributable to a diesel spill / leakage during operation of the Energy Centre.

Groundwater results from BH102D have been excluded from further assessment. The historic ground investigation undertaken by Arcadis in 2018 recorded an elevated concentration of Petroleum Hydrocarbons within a sample collected from the deep response zone (12-15m bgl) within BH102. However, no elevated concentrations of Petroleum Hydrocarbons where recorded within any of the deep groundwater monitoring installations within Hydrock boreholes BH01, BH02 and BH03. Hydrock do not consider the hydrocarbons to have migrated into any deeper groundwater. As such it considered probable that the migration is the result of a poor environmental seal between the two response zones.

As part of the enabling phase of work the Energy Centre will be demolished which will remove the contaminant source.

It is recommended that additional investigation is completed post-demolition within current footprint of the Energy Centre to fully delineate any potential contamination and as necessary subsequently any hot-spot identified. Any grossly contaminated Made Ground and natural soils below should be removed and suitably disposed of off-site. An excavation to just below the shallow water table within the hydrocarbon hotpot should be excavated to provide a sump to remove any significant free phase diesel (by simple absorption using hydrophobic towelling).

Based on the proposed development layout, the hotspot is anticipated to be located below a building and therefore there is minimal risk from surface water leaching through the contaminated ground and therefore the hotspot is unlikely to migrate horizontally or vertically. The removal of the energy centre, above ground fuel storage tank and any grossly contaminated Made Ground and free-phase hydrocarbons is considered to offer a significant betterment to the current situation.

Further assessment is required to assess the potential pathway presented by piling and the risk to the deeper aquifer below the site. As such a Piling Foundation Works Risk Assessment should be considered as part of a Remedial Method Statement (RMS).

8.6 Ground gases risk assessment

Hydrock has undertaken a total of six ground gas monitoring visits between August and October 2020 as part of the current investigation. Previously, Arcadis had completed three rounds between August and September 2018.

The site is underlain by a layer of Made Ground which ranges in thickness between 0.60 and 1.90m. The majority of the Made Ground is believed to have been derived from demolition works on the site. Therefore, the risk of organic material within the Made Ground is considered to be low. In addition, only limited anthropogenic material was noted within the Made Ground during the ground investigation.

Within the desk study assessment a former pond is noted to be present approximately 38m to the north east of the site between 1897 and 1912. Given the age, distance and size of this feature it is a low risk of gas generation.

8.6.1 Data

It is judged from the available evidence that the gas generation potential at the site is low (due to absence of gas generating sources on the site) and that the sensitivity of the development is moderate (due to proposed developments of for apartments). Consequently, and in accordance with CIRIA C665 (Table 5.5a and 5.5b), an appropriate minimum monitoring regime is 6 readings over 2 months, provided other monitoring requirements are also met, such as prevailing atmospheric pressure conditions (for example, BS 8485:2015 +A1:2019 suggests monitoring should include a period of falling atmospheric pressure).

Hydrock has undertaken the required six monitoring visits , as such the conclusions presented below are considered to approximate the worse-case conditions.

8.6.2 Assessment

The risks associated with the ground gases methane (CH_4) and carbon dioxide (CO_2) have been assessed using BS 8485:2015 +A1:2019, which cites the guidelines published by CIRIA (Wilson et al 2007) (known as Situation A).

There is an alternative assessment method described by the NHBC (Boyle and Witherington 2007) (known as Situation B). Whilst 'Situation B' may also be suitable for the assessment, it is Hydrock's opinion that the NHBC Guidelines are not at the current time fully aligned with current ground gas risk assessment principles (as described in BS 8485:2015 +A1:2019). As such, 'Situation A' has been chosen as the means by the gas risk will be assessed.

The assessment guidelines published by CIRIA are based on interpretation of the gas concentrations and the gas flow rates, amongst other variables, and are compliant with the model procedures of LCRM. The modified Wilson and Card assessment has been used by comparing the maximum gas concentrations and gas screening values (GSV[1]) in Appendix D with the published table (CIRIA Table 8.5) and the assessment is summarised in Section 8.6. The assessment is presented in Appendix E.

The measured worst-case Carbon Dioxide concentration is 10.9% v/v and occurs within WS01. Carbon dioxide concentrations were consistently recorded at >5% within WS01, but with the exception of single occasions in each of BH02, BH04, WS02, WS03, BH102D and WS101 was typically <5% elsewhere. A worst-case methane concentration of 1.5% v/v and 3.2% v/v was recorded in BH03 on two occasions. All other methane concentrations were <1%. Recorded gas flow rates were typically below the gas analyser's limit of detection (<0.1 l/hr), however were occasionally raised on single isolated occasions in BH02 (1.7l/hr), BH04 (-1.2l/hr), BH05 (1.6 l/hr) and WS04 (4.9l/hr).

During the Arcadis ground investigation in 2018 the maximum recorded concentrations of Methane and Carbon Dioxide were 0.2%v/v and 7% v/v respectively. However, carbon dioxide concentrations were typically <5% v/v.

The assessment guidelines published by CIRIA are based on interpretation of the gas concentrations and the gas flow rates, amongst other variables, and are compliant with the model procedures of CLR11 and latterly LCRM. The modified Wilson and Card assessment has been used by comparing the maximum gas concentrations and gas screening values (GSV[2]) in Appendix D with the published table (CIRIA Table 8.5, reproduced below as Table 5.4) and the assessment is summarised in Table 8-6.

Table 8-6: Ground gas risk assessment

	Min	Max	Typical	Comment
Steady Flow Rate (l/hr)	0.0	4.9	<0.1 *(at LoD)*	The gas flow rate was typically recorded at less than the limit of detection of the gas analyser (0.1l/hr). However, occasion, but isolated peaks were recorded locally, up to 4.9l/hr.

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[1] Note: GSV is synonymous with 'site characteristic hazardous gas flow rate' (Q_{hgs}) of BS 8485:2015 +A1:2019 Table.

	Min	Max	Typical	Comment
Methane (%)	0.0	3.2	<0.2%	Methane concentrations typically less than limit of detection or trace only (<0.3%). Localised peaks of 1.5% and 3.2% v/v recorded in BH03 on two separate occasions.
Carbon Dioxide (%)	0.0	10.9	<5%	Carbon dioxide concentrations typically <5%, but consistently >5% in WS01 and locally raised on occasion elsewhere.
Oxygen (%)	2.5	21.3	>15%	Oxygen concentrations are locally depleted in BH02, BH03, BH05 & WS01, with minimum recorded concentration of 2.5% in WS01. Typical concentrations are >15% elsewhere
GSV (based on maximum flow and concentration per hole)				
Carbon Dioxide GSV (l/hr)	0	0.1632	<0.07	All readings below GSV of <0.07, with exception of single occasion with. maximum GSV of 0.1632 recorded on BH02. Suggestive of CS1 conditions overall
Methane GSV (l/hr)	0	0.0096	<0.07	Maximum GSV of 0.0096 recorded on one occasion in BH03. All GSV <0.07 suggestive that CS1 conditions are prevalent.
For the purposes of the calculation, where the recorded gas flow rate is below the manufacturer's limit of detection for the instrument used, the detection limit has been adopted for the gas flow rate.				

As indicated in Section 6.4, the computed GSV for carbon dioxide and methane indicates CS1 conditions are prevalent. In addition, methane and carbon dioxide concentrations are 'typically' below 1% and 5% respectively. As such, the site is classified as Characteristic Situation 1 (Situation A).

However; with reference to BS 8485 Code of Practice for the design of protective measures for methane and carbon dioxide for new buildings, where carbon dioxide has concentrations of greater than 5% v/v, consideration should be given to assigning a Characteristic Situation 2 (Low Risk). However, on account that gas flows are typically trace and the recorded gas concentrations summarised in Table 8-6, this approach is considered to be over conservative and a CS1 approach is recommended.

8.7 Volatile organic compounds

Elevated VOCs where encountered during the ground gas and groundwater monitoring visits within BH01 at 311 ppm as a peak reading before falling rapidly to 0ppm. Low levels of VOCs and SVOCs were locally detected within WS01 and WS02 during the ground investigation. Within WS01 and WS02 hydrocarbon staining was noted on the retrieved core sample and corresponded within these elevated VOC readings. However, within BH01 there was no visual or olfactory evidence of hydrocarbon staining and no elevated concentrations within soil or groundwater samples.

Elevated concentration of VOCs where only encountered within the exploratory hole locations located closest to the above ground storage tank and was only a peak reading. Whilst the elevated VOC concentrations within WS01 and WS02 are likely to be derived from the petroleum hydrocarbons within the impacted shallow groundwater within the River Terrace Deposits this is considered to be unlikely the be the case for the elevated VOCs in BH01 as no samples recorded petroleum hydrocarbons. It is considered that the VOCs may have migrated below the existing hardstanding are become concentrated around the top of BH01. This high reading was not recorded in subsequent monitoring visits.

A potential groundwater vapour risk has also been identified during laboratory testing. Initially it is considered that a vapour membrane will be required in the vicinity of the former above ground fuel tank.

Where encountered it is anticipated that any residual, locally hydrocarbon-impacted soils be removed during the demolition of the energy centre and fuel tank. A watching brief of the excavation within the vicinity of the energy centre will enable sufficient testing and delineation of impacted soils and assessment for volatile compounds. Should excessive volatiles be encountered (or suspected to remain after removal of impacted soils and amounts of free-phase product), vapour protection measures may be required beneath the building in this particular area.

8.8 Construction materials risk assessment

8.8.1 Water pipelines

A formal water pipe investigation and risk assessment is beyond the scope of this report. However, the findings of this investigation have been compared to the threshold values in Water UK HBF (2014), Table 1 as far as is practicable, to give an indication of the possible restrictions to the use of plastic pipes for water supply to the site

The site is brownfield. However, the investigation has not detected widespread organic contamination in exceedance of the threshold values and Hydrock believes standard pipework may be suitable for the site. However, upgraded pipework may be needed in the area of Energy Centre owing to the petroleum hydrocarbon concentrations encountered. Confirmation should be sought from the water supply company at the earliest opportunity.

8.8.2 Other construction materials

Plastic pipes for drains and sewers are manufactured from unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) or polyethylene (PE). These materials may be affected by the presence of organic compounds in the soil.

The implications for buried concrete shall be discussed in Section 7.7.

8.9 Contamination risks to ground workers

8.9.1 Introduction

Whilst risks to construction workers are not discussed in detail, the following section discusses potential risks that should be considered.

Information presented in this document is provided to assist in managing the risk associated with contamination in soil and groundwater at the site but is not definitive. The Contractors are responsible for undertaking their own assessments and assessing what risks are present and what control measures are required.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and, if required, RPE should be provided and utilised.

8.9.2 Metals, metalloids, PAH and petroleum hydrocarbons

The soils contain metal and locally petroleum hydrocarbons recorded within the Made Ground and River Terrace Deposits. The effect of these are considered below with regard to ground workers.

8.9.3 Ground Gas

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure or 0.5% for long term exposure. Furthermore, soil concentrations of oxygen are below the HSE recommendations of 18%.

Soil gas concentrations are not necessarily reflected by those in the breathing zone, as such, all Contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

8.9.4 Vapours

During the ground investigation the highest stable PID reading associated with the petroleum hydrocarbon contamination was 64 pp. This was encountered within the vicinity of the energy centre/ boiler rooms. This concentration is considered to be low however, there is still a risk of volatilisation from the soils and groundwater, especially in confined spaces and risk assessments and method statements should be in place if vapours and odours are identified during excavation. Additional guidance can be found in EH40/2005 Workplace Exposure Limits (HSE 2011).

An allowance should be made for the inclusion of Vapour membrane within the new block overlying the Hydrocarbon Hotspot.

8.9.5 Asbestos

Occasional visible fragments of ACM are recorded in the soils in the form of Asbestos Cement, have been identified during the ground investigation and asbestos fibre (up to 0.018%) have been identified during the laboratory testing of soils.

All site staff should be made aware that there is a likelihood of encountering further asbestos containing materials within the Made Ground anywhere on the site, and at any stage of the development. It is advised that the Contractor should supply suitable and sufficient ‘Asbestos Awareness’ training (specific to asbestos in soils) to all site staff who could foreseeably encounter asbestos containing materials during the course of their work.

The Contractor for each stage of works must undertake a suitable and sufficient Risk Assessment in accordance the Regulation 6 of the Control of Asbestos Regulations 2012 (CAR2012). The results of the assessment should be used to compile a methodology in accordance with Regulation 7 of CAR2012, which limits potential exposure and spread of asbestos fibre. Appropriate training should be provided to all site staff identified within the risk assessment as having the potential to be exposed, or encounter asbestos in accordance with Regulation 10 of CAR2012.

It is the responsibility of the Contractor to ensure that mitigation measures are suitable and sufficient to prevent exposure to airborne asbestos so far as is reasonably practicable in accordance with Regulation 11 of CAR2012.

8.10 Findings of the generic contamination risk assessments

The potential sources, pathways and receptors identified in the desk study (Section 3) have been investigated (Sections 5 and 6) and assessed (Sections 8.2 to 8.8). A Source-Pathway-Receptor linkage assessment has been undertaken and is presented in Appendix I (Table K.2).

The final Conceptual Model is illustrated on Hydrock Drawing 12053-HYD-XX-XX-GI-DR-GE-1010 in Appendix A and the main features of the site are summarised on the Site Zonation Plan presented in Appendix A (Hydrock Drawing 12053-HYD-XX-XX-GI-DR-GE-1011).

A summary of the Source-Pathway-Receptor (SPR) contaminant linkages for which the risks may be unacceptable and require mitigation (those that are moderate or higher) are discussed in Table 8-7.

Table 8-7: Residual risks following risk evaluation

Contaminant Linkage			**Comments**	
Sources	**Pathways**	**Receptors**	**General**	**Mitigation**
Localised hotspots of Benzo(a)Pyrene within Made Ground.	Ingestion or direct contact.	Human health.	Significant exceedance of the GAC.	Excavation and disposal of soils as required by construction, provision of capping layer in the form of new building/hardstanding with engineered clean cover system in areas of soft landscaping to break the contaminant pathway.
Petroleum hydrocarbons within shallow groundwater associated with Energy Centre	inhalation of vapours	Human health.	Shallow groundwater within Energy Centre area impacted with hydrocarbons which is also a vapour risk	Mitigation required in the form of removal of the above ground infrastructure (Energy Centre); and remediation verification. Further delineation of the extent of the hotspot required during validation and associated further assessment of groundwater quality.
	Lateral migration off-site.	Groundwater		Installation of vapour protection membrane in new buildings.
Asbestos fibres in soil or asbestos-containing materials in the Made Ground	Inhalation of fugitive dust.	Human health.	Made Ground seen to contain asbestos-containing materials. Asbestos fibres measured in soil samples.	Mitigation required in the form of an engineered cover system. In addition, any ACM encountered during earthworks will need to be handpicked and removed from site.
Hydrocarbons in soils and groundwater in the vicinity of the energy centre.	Direct contact	Water supply pipes.	The Made Ground contain contaminants of concern at levels in excess of the GAC in the area of the energy centre.	Installation of "Protectaline" (or similar) pipework within the vicinity if the energy centre. (extent determined by validation works).

8.11 Mitigation measures

As described in Table 8-7 (and subject to regulatory (and NHBC) agreement), Hydrock consider the following mitigation is required to ensure the site is suitable for use for the proposed end use. These mitigation works will be undertaken in a number of phases and can be separated into:

- Demolition Phase;
- Enablement Phase; and

- Construction Phase.

There will also be a requirement to undertake works to ensure the site is geotechnically suitable.

The methodology for the remediation should be presented in a Remediation Strategy (which will include the ‘Implementation Plan’, the ‘Verification Plan’ and the ‘Long Term Monitoring and Maintenance Plan’), which will need to be submitted to the warranty provider and the regulatory authorities for approval.

The writing and approval of a Materials Management Plan will be required to allow reuse of suitable material at the site. If treatment of Made Ground is required, an appropriate Environmental Permit will also be required.

Verification reports by a suitably qualified independent geo-environmental specialist will be required following completion of any remedial works (including ground gas membrane installation).

8.11.1 Demolition Phase

The existing buildings and associated infrastructure require demolition and the following works are considered necessary during the Demolition Phase of works:

- demolition asbestos survey (Currently being undertaken on site);
- site clearance;
- removal of above ground tanks, boiler house and associated infrastructure (including below ground pipework);
- demolition of site buildings and ancillary structures to slab level; and
- processing the demolition arisings to a suitable specification in accordance with the WRAP ‘Quality Protocol: Aggregates from inert waste’.

8.11.2 Enablement Phase

The following works are considered necessary during the Enablement Phase of works:

- break out of all hardstanding and below ground obstructions and processing for reuse in accordance with a suitable specification and a Materials Management Plan (MMP);
- a temporary sump should be excavated within the vicinity of WS01 and WS02. Any significant free phase fuel can be removed using absorbent hydrophobic towelling.
- excavation of Made Ground and natural soils as required to allow construction with appropriate materials management and processing of excavated soils using a combination of: excavation and stockpiling and screening of soils to leave the site at the level required for the installation of a working platform, pavement construction and to allow the installation of a 450mm engineered cover system;
- off-site disposal of unsuitable or excess material; and
- verification during enablement works.

Due to the potential for low concentrations of dissolved phase hydrocarbons in the groundwater, treatment of any water pumped from excavations within the hotspot (via a granulated activated carbon plant) may be required prior to discharge from the site. This would apply to both the enablement and construction phase of works.

8.11.3 Construction Phase

The Construction Phase of works will comprise:

- appropriate materials handling and stockpiling in accordance with the Materials Management Plan (MMP);
- installation of Protectaline pipework (PL4);
- Installation of vapour membrane within the vicinity of the known Hydrocarbon hotspot.
- import of subsoil and topsoil in accordance with the Materials Management Plan (MMP); and
- the installation of an engineered cover system in public open space areas (PL1 and PL2).

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9. WASTE AND MATERIALS MANAGEMENT

9.1 Introduction

The Waste Framework Directive (WFD) (2009/98/EC) defines waste as ‘*any substance which the holder discards or intends to discard.*’ In a geo-environmental context, the waste is most often ‘soil’ and the two main scenarios are offsite disposal of the material as a waste and/or reuse of the material on site. For cost and sustainability reasons, reuse is preferred to off-site disposal.

Section 9.2 below describes the key issues relating to off-site disposal to landfill and Section 9.3 considers requirements relating to reuse of soils and materials management.

9.2 Waste disposal

9.2.1 Principles

Based on the WFD, any material excavated on site may be classified as waste and it is the responsibility of the producer of a material to determine whether or not it is waste. Where off-site disposal is undertaken, the following guidance applies.

Classification is a staged process:

- A hazardous waste is defined under the WFD as one which possesses one or more of fifteen defined hazardous properties. If a waste is not defined as hazardous, then it is non-hazardous.
- Where the materials are soil, it is then be assigned using the ‘List of Waste Codes’, which classifies the material as either:
  - hazardous (17-05-03), which is defined as “*soil and stones containing hazardous substances*”; or
  - non-hazardous (17-05-04), which is defined as “*soil and stones other than those mentioned in 17-05-03*”.
  - Hydrock utilise the proprietary assessment tool, HazWasteOnline™ to undertake this assessment.
- Waste Acceptance Criteria (WAC) testing is then undertaken if required, and are only applicable following classification of the waste, and only where the waste is destined for disposal to landfill. The WAC are both qualitative and quantitative. The WAC and the associated laboratory analyses (leaching tests) are not suitable for use in the determination of whether a waste is hazardous or non-hazardous.

It should be noted that some non-hazardous wastes may be suitable for disposal at an inert landfill as non-hazardous waste, subject to meeting the appropriate waste acceptance criteria.

It should be noted that classification must be undertaken on the waste produced, by the waste producer. Necessary sampling frequency to adequately characterise a soil population is defined within WM3.

Further discussion with regards to the characterisation process for different scenarios and waste types is provided below.

Topsoil and Peat

Topsoil and peat are biodegradable, therefore if they are surplus to requirements and cannot be re-used in accordance with a Materials Management Plan, they cannot be classified as inert. As such, topsoil and peat need to be classified by a staged assessment and sampling process and would either be classified as hazardous or non-hazardous, depending upon the results of the assessment.

Contaminated or potentially contaminated sites

If the site is brownfield, contaminated or potentially contaminated, the waste must undergo an initial waste classification exercise using background information on the source and origin of the waste and assessment of chemical test data in accordance with Environment Agency Technical Guidance WM3.

If following the initial waste classification exercise, the soils are acceptable for disposal to a non-hazardous landfill, further qualitative Waste Acceptance Criteria (WAC) testing is not required.

However, if soils are potentially able to be disposed to an inert landfill as non-hazardous waste, or require testing to determine if they can be disposed of to a stable non-reactive hazardous or hazardous class of landfill, the next stage of assessment is to undertake qualitative WAC testing. This will determine the Basic Characterisation and the landfill category at which the soils can be accepted.

Hazardous material must be subjected to WAC testing to determine whether it requires treatment before it can be accepted at the hazardous landfill, while non-hazardous material can be tested to determine whether it may be suitable for placement in an inert landfill.

9.2.2 HazWasteOnline™ assessment

As the site is brownfield, in order to inform the preliminary waste characterisation process, Hydrock has undertaken an exercise using the proprietary web-based tool HazWasteOnline™. The output of the HazWasteOnline™ assessment is provided in Appendix G and a summary of the preliminary waste classification is provided below in Section 9.2.4.

9.2.3 WAC Testing

The site is brownfield. However, WAC testing has not been undertaken to date but will be required on the excavated soils that are to be disposed of, to assist with waste disposal options prior to disposal. A summary of the preliminary waste disposal options is provided below in Section 9.2.4.

9.2.4 Preliminary waste disposal options

The site is brownfield and based on the site history and the HazWasteOnline™ assessment, if suitable segregation of different types of waste is put in place, for soils to be disposed of, it is considered that:

- The natural uncontaminated subsoils are likely to be classified as Inert waste.
- The 'General' Made Ground is likely to be classified as Non-Hazardous waste.
- Localised petroleum hydrocarbons around the Energy Centre where impacted the underlying Made Ground and River Terrace Deposits are considered likely to be potentially Hazardous.
- An exceedance of Chromium (VI) of 3.1kg/kg was identified within the Made Ground within BH01 on a localised basis. Given the isolated occurrence and nature and homogeneous nature of the Made Ground across the Site, it is probable that the material can be disposed of as Non-

Hazardous. However, further testing may be required to understand the waste classification of the material in this area.

- Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.

9.2.5 General waste comments

It should be noted that:

- It is the waste producer's responsibility to segregate the waste at source and waste producers must not mix waste materials/streams or dilute hazardous components, for example by mixing with less or non-hazardous waste on site to meet WAC limit values.
- The above preliminary assessment has been made on the basis of the soils tested as part of the ground investigation, using the HazWasteOnline™ assessment. However, the formal classification of waste can only be undertaken on the material to be disposed of, and by the waste producer and the receiving landfill as license conditions vary from landfill to landfill.
- Basic Characterisation should be undertaken in accordance with Environment Agency guidance by the waste producer. Hydrock can assist if required and this report will assist the characterisation. However, Basic Characterisation does not form part of the current commission and would require further assessment and testing on the wastes actually to be disposed.
- Once the waste producer has undertaken an initial Basic Characterisation on each waste stream, they can manage the soils as part of the on-site processing programme (for example, stockpiling, treatment, screening and separation). The waste producer and landfill operator will then need to agree the suite of compliance testing for regularly generated waste to demonstrate compliance with the initial Basic Characterisation prior to disposal.
- At the time of disposal, additional testing on the excavated soils to be disposed of, will likely be necessary.
- Non-hazardous and hazardous soils require pre-treatment (separation, sorting and screening) prior to disposal.
- The costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.
- In addition to disposal costs, landfill tax will be applicable. Non-hazardous and hazardous waste will generally be subject to the Standard Rate Landfill Tax. Inert or inactive waste will generally be subject to the Lower Rate Landfill Tax. The landfill tax value changes each April and can be found at https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013.
- Before a waste producer can move waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit and must have completed the following[3]:
  - Duty of care transfer note / Hazardous Waste consignment note, including comment as to if pre-treatment has been undertaken; and

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[3] ENVIRONMENT AGENCY. November 2010. Guidance on waste acceptance procedures and criteria. Waste acceptance at landfills. The Environment Agency.

- Basic Characterisation of the waste, to include: description of the waste; waste code (using list of wastes); composition of the waste (by testing, if necessary) and; WAC testing (if required).

9.3 Materials management

9.3.1 Introduction

Soils that are to remain on site, should be managed and reused in accordance with a Materials Management Plan (MMP), prepared in accordance with 'The Definition of Waste: Development Industry Code of Practice', Version 2 (CL:AIRE), known as the DoWCoP. Where all aspects of the DoWCoP are followed the soils are considered not to be waste, because they were never discarded in the first place.

Version 2 of the DoWCoP clearly sets out the principles and an outline of the requirements of a MMP. The following compliance criteria must be seen to apply to the MMP for the site:

- Factor 1: Protection of human health and protection of the environment.
- Factor 2: Suitability for use, without further treatment.
- Factor 3: Certainty of Use.
- Factor 4: Fixed Quantity of Material.

The reuse of soils at sites should be considered during the planning and development design process so that compliance with issues such as fixed quantity and certainty of use clearly relate to agreed site levels. Suitability of Use is normally evident from the remediation strategy or the design statement, which form an integral part of a MMP. However, some soils may need to be tested post-excavation to prove they are suitable for use.

Once the MMP is finalised, it must be declared by a Qualified Person (QP). The Declaration is an on-line submission as part of which the QP is required to confirm that the declaration is being made before the relevant works have commenced (i.e. it is not a retrospective application).

Once all material movements have been completed in accordance with the MMP a verification report must be produced, kept for 2 years and provided to the EA on request.

It should be noted that failure to comply with the requirements of the DoWCoP when re-using materials has potentially significant consequences for the waste holder. The risk is that the reused materials are still regarded as a waste that has been illegally deposited. From 1 April 2018, the scope of Landfill Tax has been extended to sites operating without the appropriate environmental disposal permit, and operators of illegal waste sites will now be liable for Landfill Tax. Further information is available at: https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-sites/landfill-tax-disposals-not-made-at-landfill-sites.

If soils are excavated and reused on sites (or moved to another site) without a MMP, exemption, or appropriate Permit in place, anyone who knowingly facilitates the disposal may be *'jointly and severally liable'* to any assessment of tax, fines or prosecution.

9.3.2 Materials management scenarios

The materials management scenarios present on site are discussed below.

It should be noted that more than one scenario may apply, dependent upon where the soils are proposed for reuse.

Clean, naturally occurring materials – transferred to other sites

Where soils are naturally occurring, uncontaminated and are transferred to other sites (i.e. direct transfer), they will not become waste as long as the transfer is undertaken in accordance with the DoWCoP. A MMP must be prepared for the receiving site and the materials movement must be noted in the MMP of the Donor site. This movement must have been declared to CL:AIRE prior to the works commencing.

Made Ground and other contaminated soils

On sites where Made Ground or contaminated soils are present, any soils excavated will be a waste as soon as they are excavated (even if they are clean, naturally occurring materials), unless they are subject to reuse in accordance with the DoWCoP. As such, for any brownfield site or a site where Made Ground is present and soils are being moved and reused, the materials could be deemed a waste, subject to either:

- a Materials Management Plan (MMP), to prevent the material being classified as a waste following reuse; or
- an exemption (for limited volumes); or
- an environmental permit, dependant on its status.

Geotechnical improvement requirements

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties e.g. lime / cement modification, are not generally regarded as waste treatment operations and do not require a permit.

However, should processing be needed (such as screening, treatment or improvement), that would constitute a waste activity and require a mobile treatment permit. This may be as simple as removing oversize material with an excavator bucket, to using a riddle bucket to remove hardcore to full mechanical screening.

10. UNCERTAINTIES AND LIMITATIONS

10.1 Site-specific comments

The footprints of the existing buildings (including the Energy Centre) could not be investigated as most were still in use, preventing intrusive ground investigation. Similarly, buried utilities precluded investigation around the Site, but particularly in and around the Energy Centre, which restricted the location of exploratory hole locations.

Accessible areas of the site comprised an active car park as such the works were positioned to minimise disruption to the users and operation of the site.

The gas monitoring undertaken to date and included in this report is insufficient to fully characterise the site in accordance with CIRIA Report C665. Monitoring is ongoing and the conclusions of this report will be updated following completion of the scheduled monitoring.

10.2 General comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Guild Living (the Client), by e-mail from Bruce Campbell at Cast Real Estate & Construction Consultancy dated 18th February 2020 under the terms of appointment for Hydrock, for the sole and specific use of the Client and parties commissioned by them to undertake work where reliance is placed on this report. Any third parties who use the information contained herein do so at their own risk. Hydrock shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared or for use of the report by any parties not defined in Hydrock's appointment.

This report details the findings of work carried out in June and July 2020. The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, not all potential environmental constraints or liabilities associated with the site may have been revealed.

Hydrock has used reasonable skill, care and diligence in the design of the investigation of the site and in its interpretation of the information obtained. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred.

Groundwater data are only representative of the dates on which they were obtained and both levels and quality may vary.

Plans that provide assessment of foundation types and depths are indicative and subject to further design. This design should incorporate a detailed assessment of the influence of trees, influence of cut to fill proposals and geological conditions.

Unless otherwise stated, the recommendations in this report assume that ground levels will remain as existing. If there is to be any re-profiling (e.g. to create development platforms or for flood alleviation) then the recommendations may not apply.

Information provided by third parties has been used in good faith and is taken at face value; however, Hydrock cannot guarantee its accuracy or completeness.

Where the existing reports prepared by others have been provided by the Client, it is assumed that these have been either commissioned by the Client, or can be assigned to the Client, and can be relied upon by Hydrock. Should this not be the case Hydrock should be informed immediately as additional work may be required. Hydrock is not responsible for any factual errors or omissions in the supplied data, or for the opinions and recommendations of others. It is possible that the conditions described may have since changed through natural processes or later activities.

The work has been carried out in general accordance with recognised best practice. The various methodologies used are available on request. No assessment has been made for the presence of radi oactive substances or unexploded ordnance.
Where the phrase ‘suitable for use’ is used in this report, it is in keeping with the terminology used in planning control and does not imply any specific warranty or guarantee offered by Hydrock.

The chemical analyses reported were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis will be required at the time of disposal to fully classify waste. Discussion and comment with regards to waste classification are preliminary and do not form the requirements of ‘Basic Characterisation’ as required.

Assessment and testing for the presence of coal tar has only been completed at the locations of exploratory holes undertaken for risk assessment purposes. This investigation is not designed to provide a definitive assessment of the risk from coal tar, nor the waste classification for bituminous bound pavement arisings at the site.

Unless otherwise stated, at the time of this investigation the future routes of water supply pipes had not been established. This investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling and chemical testing may be required at a later date once the routes of the supply pipes are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

Whilst the preliminary risk assessment process has identified potential risks to construction workers, consideration of occupational health and safety issues is beyond the scope of this report.

The non-specialist UXO screening has been undertaken for the purposes of ground investigation only (i.e. low risk activity in accordance with CIRIA Report C681). Further assessment should be undertaken with regards to other higher risk activities e.g. construction.

Please note that notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds, this report does not constitute a formal survey of these potential constraints and specialist advice should be sought.

Any site boundary line depicted on plans does not imply legal ownership of land.

11. RECOMMENDATIONS FOR FURTHER WORK

Following the ground investigation works undertaken to date, the following further works will be required:

- further testing of shallow groundwater at around the above ground fuel tank to better understand the changes in hydrocarbon concentrations recorded around the tank and understand any vertical migration of the contamination.
- discussion and agreement with utility providers regarding the materials suitable for pipework;
- discussions with regulatory bodies and the warranty provider regarding the conclusions of this report;
- discussions with piling Contractors regarding conclusions of this report and design of the piles;
- provision of geotechnical design for the Category 2 (foundations);
- production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider).
- Preparation of Piling Foundation Works Risk Assessment (if required)
- Additional post-demolition investigation within/around the Energy Centre to support delineation of petroleum hydrocarbon hotspot identified.
- consideration to the production of a Materials Management Plan relating to any reuse of soils at the site.
- verification of the remediation and mitigation works.

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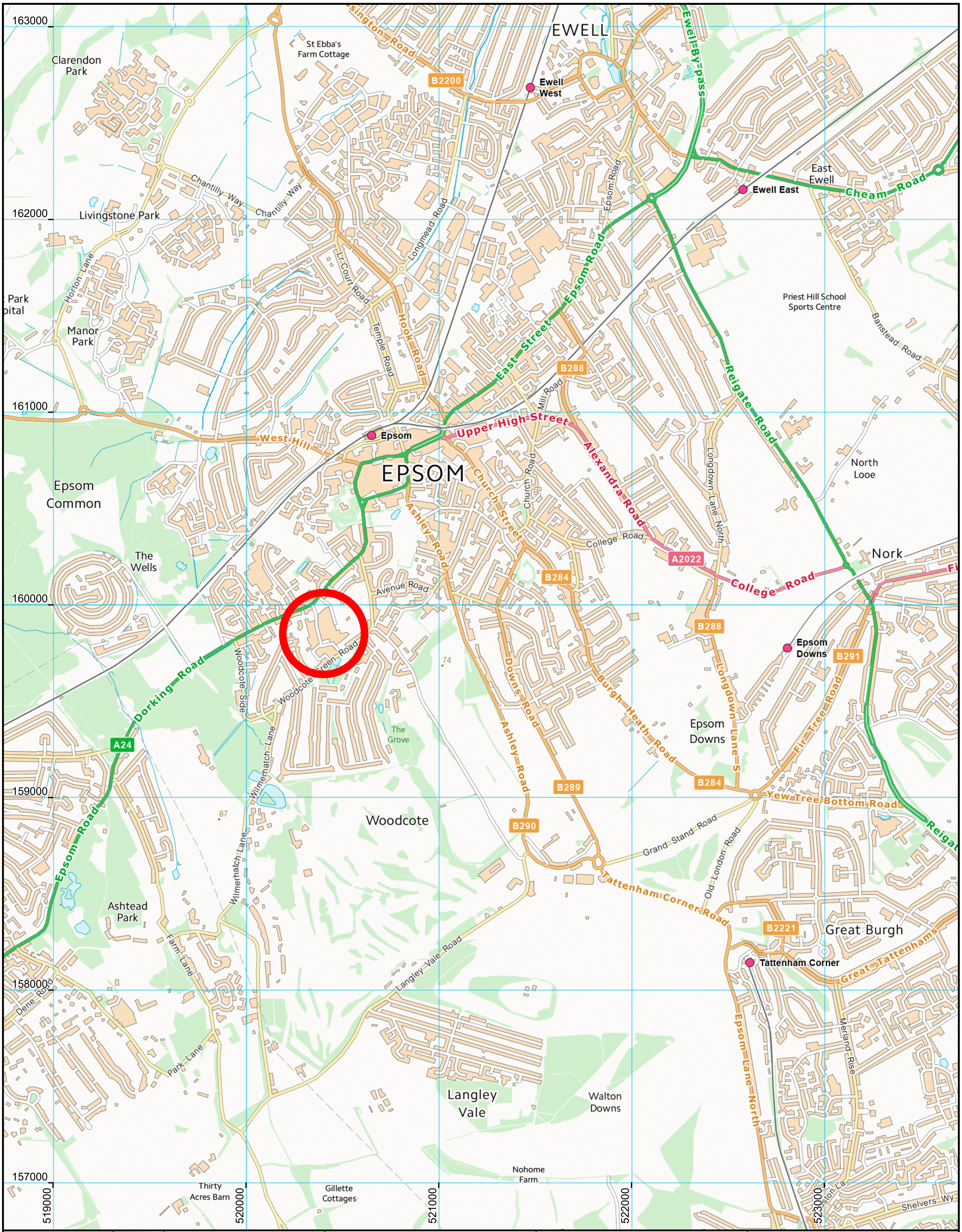
Appendix A

Drawings



OS NORTH

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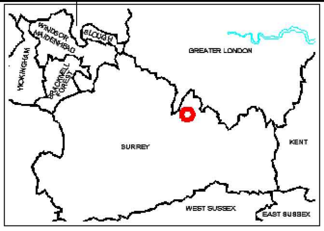
0 500
Metres



P1	FIRST ISSUE					
	EP	04/08/20	TH	04/08/20	SC	04/08/20
REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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CLIENT
SENIOR LIVING URBAN (EPSOM) Ltd

PROJECT
EPSON HOSPITAL

TITLE
SITE LOCATION PLAN

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A4
1:25,000

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1000

REVISION
P1

KEY

TP1 🟥	Proposed Foundation Inspection Trial Pit Locations
WS01 ⊗	Proposed Window Sample Boreholes Locations
BH1 ⊕	Proposed Borehole Locations

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing has been based on the following drawings and information:
3 Sixty Measurements - 18388-04 (Sept 18)

P1	FIRST ISSUE					
	TH	10/07/20	SC	10/07/20	NAME	XX/XX/XX
REV.	REVISION NOTES/COMMENTS					
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PROJECT
EPSON HOSPITAL

TITLE
EXPLORATORY HOLE LOCATION PLAN

HYDROCK PROJECT NO.
C-12053-C

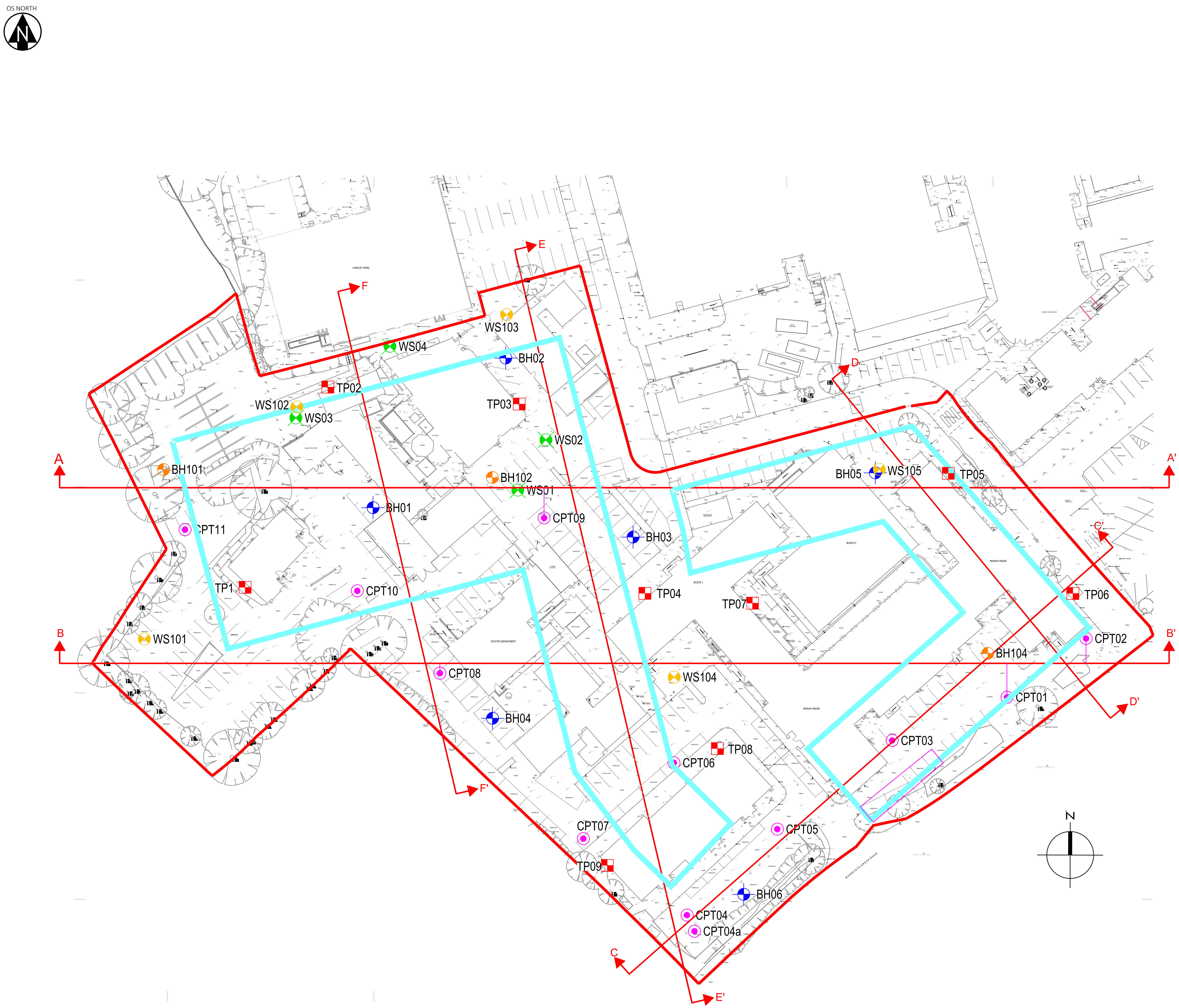
SCALE @ A2
1:500

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1001

REVISION
P1



KEY

TP1 🟥	Hydrock Foundation Trial Pit
WS01 ⊗	Hydrock Window Sample Boreholes
BH1 ⊕	Hydrock Borehole
BH104 ●	Arcadis Window Sample Boreholes
WS104 ●	Arcadis Window Sample Boreholes
◇	Extent of the Proposed Development

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing has been based on the following drawings and information:
3 Sixty Measurements - 18388-04 (Sept 18)

Proposed Building Layout:
Marchese Partners, December 2020. Guild Living Epsom - Building A - L00.
Drawing Ref: EPS001-MPI-AZ-00-DR-A-200500

Marchese Partners, December 2020. Guild Living Epsom - Building B - L00.
Drawing Ref: EPS001-MPI-BZ-00-DR-A-200510

REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P2	SECOND ISSUE					
	TH	11/01/21	SC	11/01/21	SC	11/01/21
P1	FIRST ISSUE					
	TH	10/07/20	SC	10/07/20	SC	10/07/20

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CLIENT
SENIOR LIVING URBAN (EPSOM) Ltd

PROJECT
EPSON HOSPITAL

TITLE
EXPLORATORY HOLE LOCATION PLAN

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A2
1:500

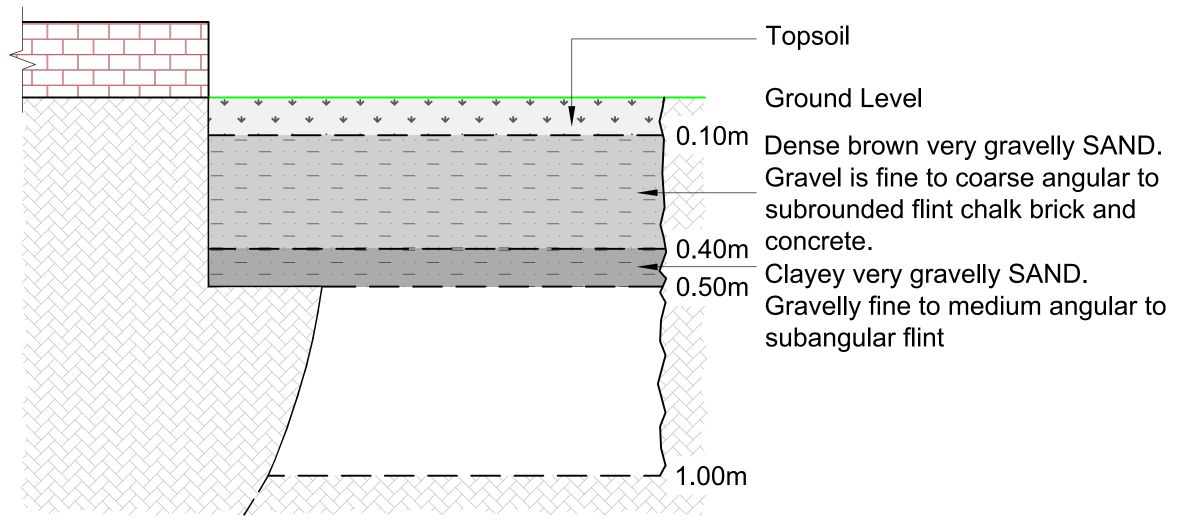
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1002

REVISION
P2

Foundation Inspection - FP01
Scale 1:20



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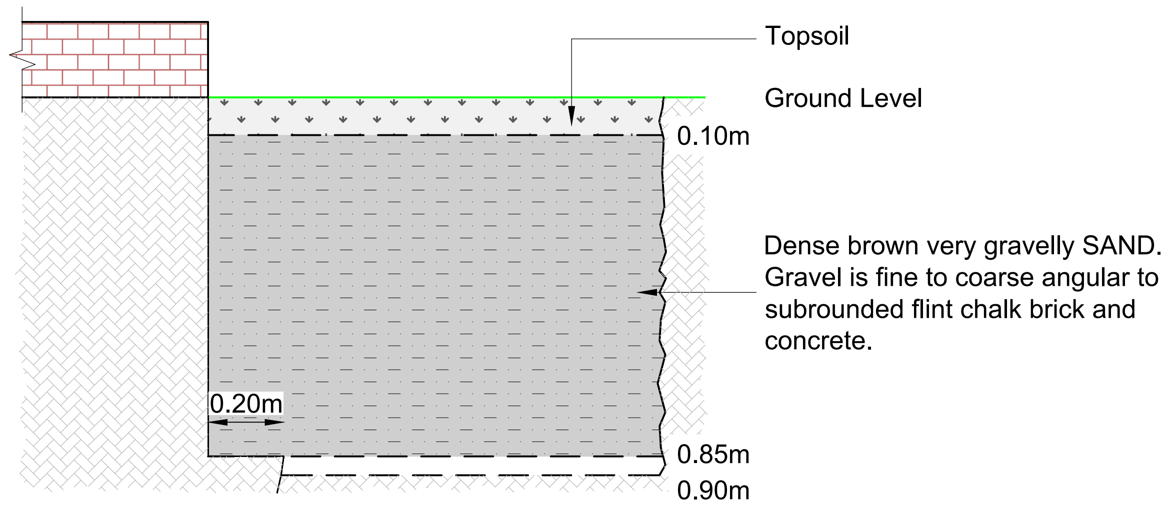

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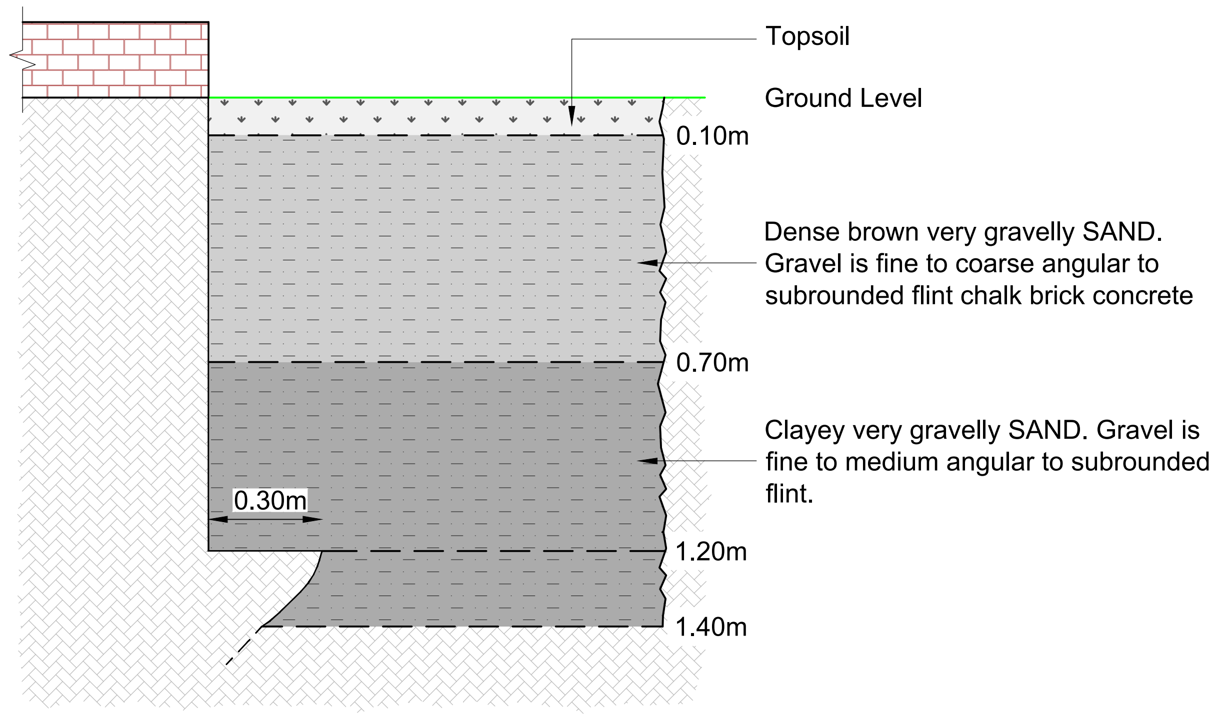

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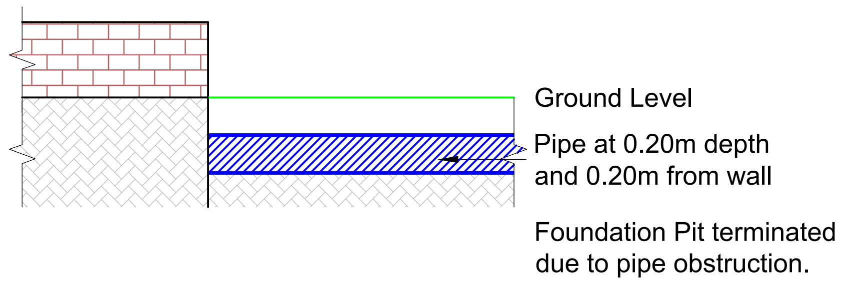

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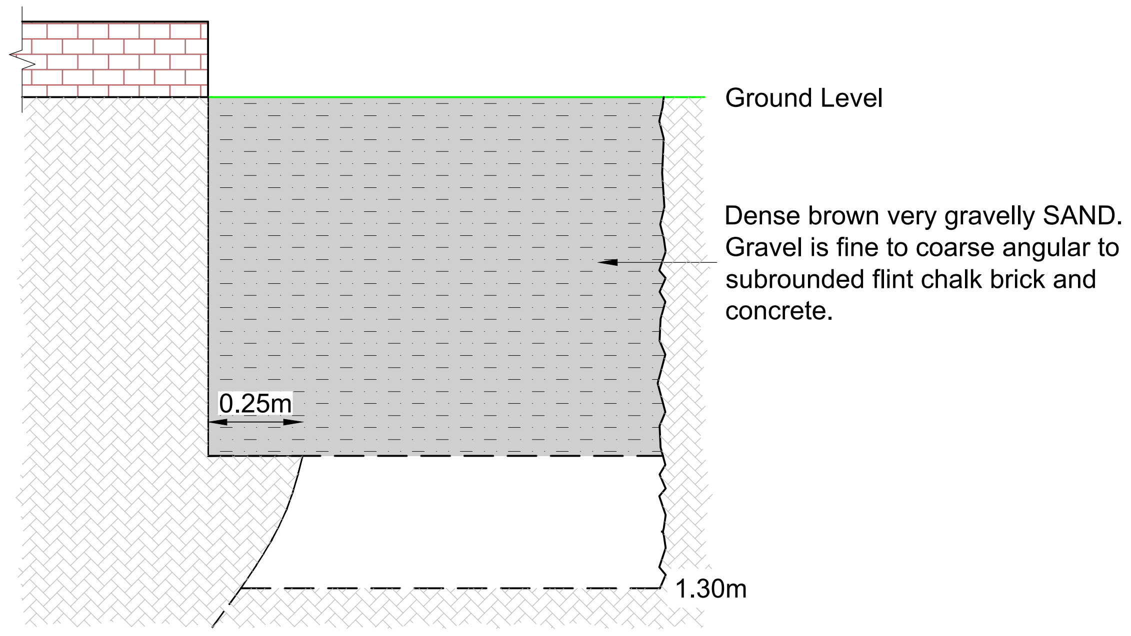

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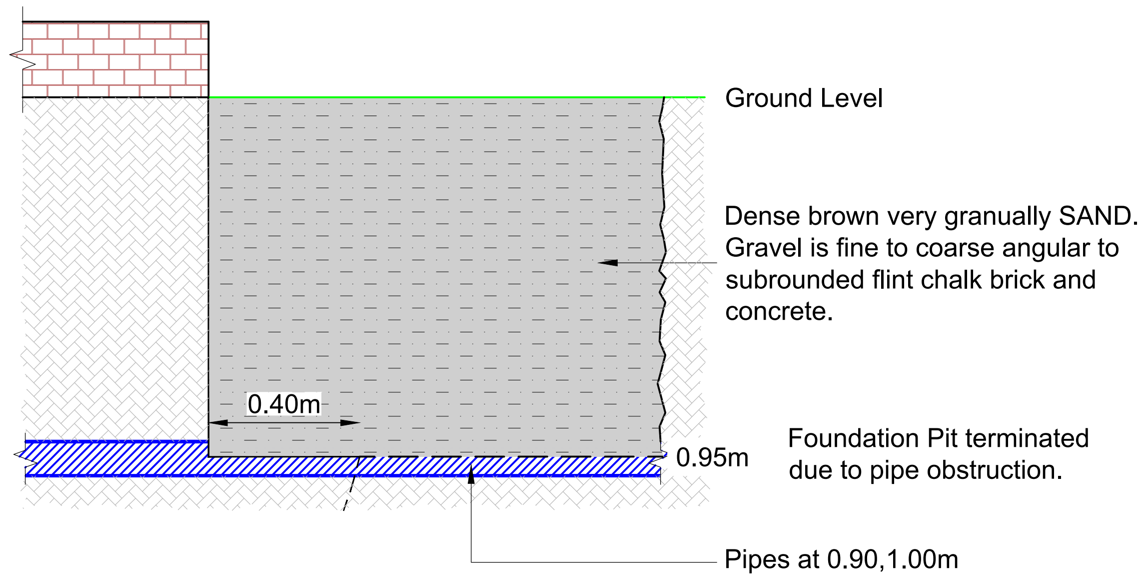

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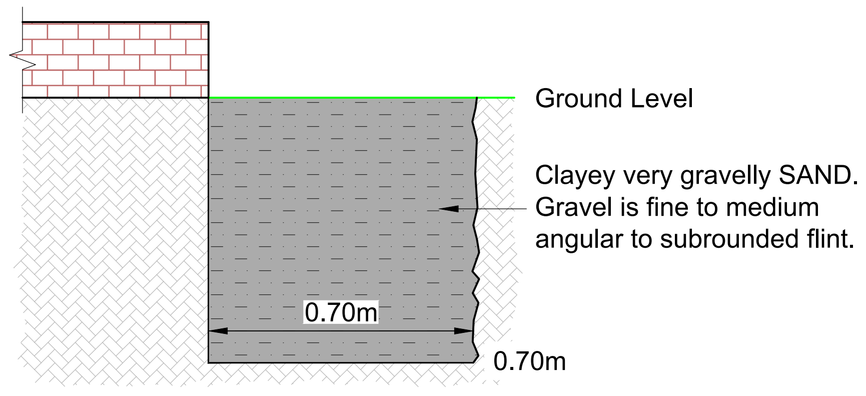

KEY

NOTES

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3. This drawing has been based on the following drawings and information: xxxxxxx

REV.	REVISION NOTES/COMMENTS	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P1	FIRST ISSUE	EP	04/08/20	TH	04/08/20	SC	04/08/20

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PROJECT
EPSON HOSPITAL

TITLE
FOUNDATION HAND PIT CROSS SECTIONS
FP01, FP02, FP04, FP06, FP07, FP08, FP09

HYDROCK PROJECT NO.
C-12053-C

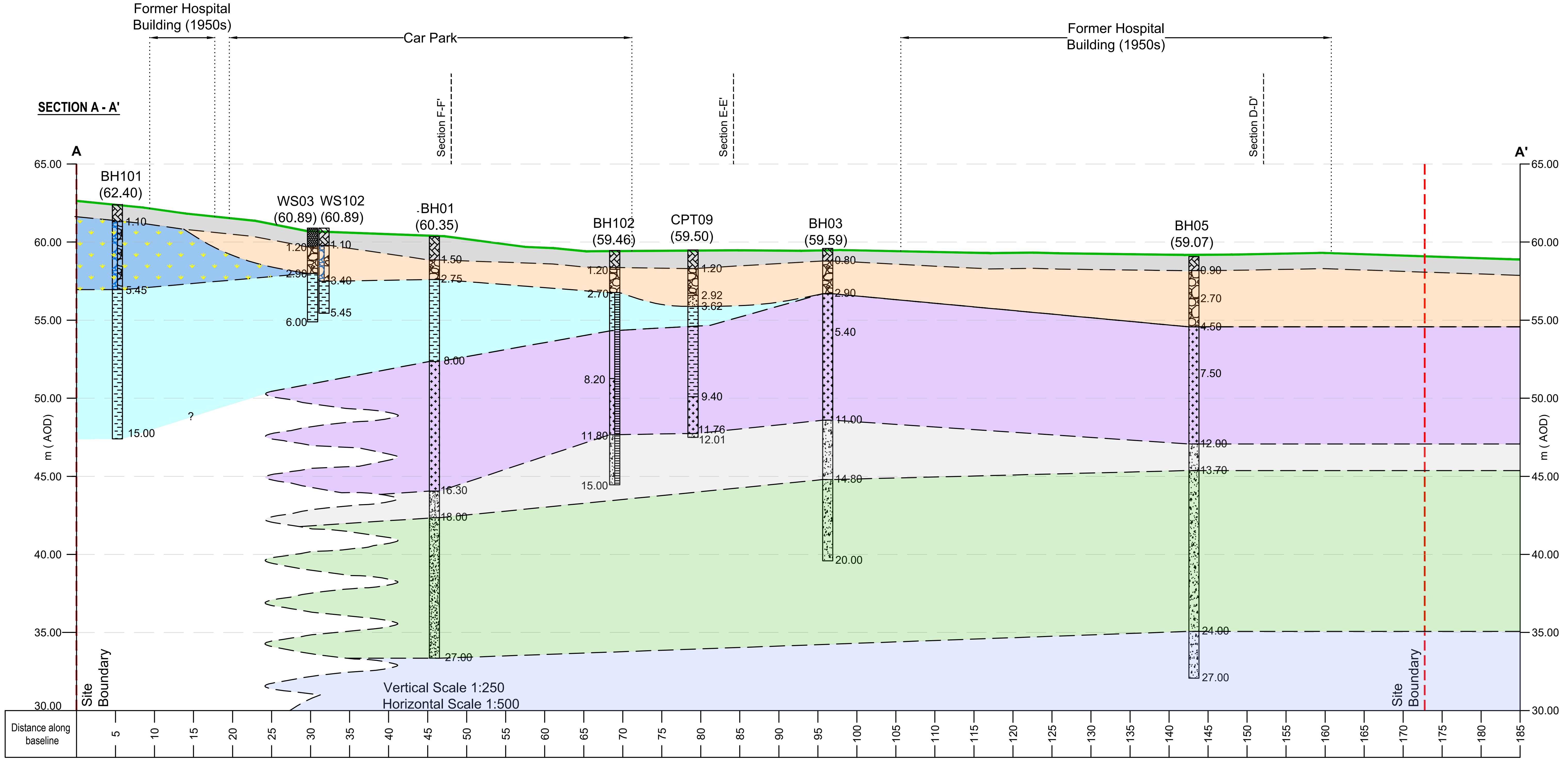
SCALE @ A2
1:250

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1003

REVISION
P1



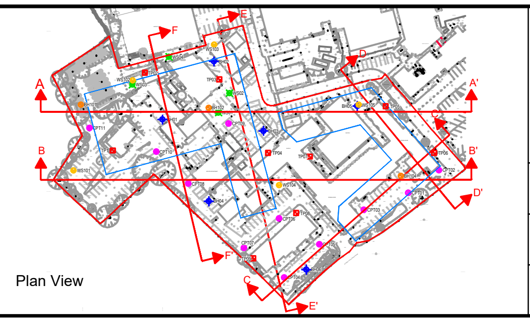
KEY

Site investigation boundary

Existing ground profile

Conjectural geological boundary

▨	Made Ground	▨	London Clay	▨	Thanet Sands	▨	Hydrock - interpretation of Arcadis Grouped Geology
▨	Terrace Gravel	▨	Woolich Formation (Clay)	▨	Chalk		
▨	Naturally Reworked London Clay & Terrace Gravel	▨	Glauconitic Sands	▨	Arcadis - Lambeth Group		



Plan View

NOTES

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PROJECT
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TITLE
CROSS SECTION A-A'

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A3
1:500/1:250

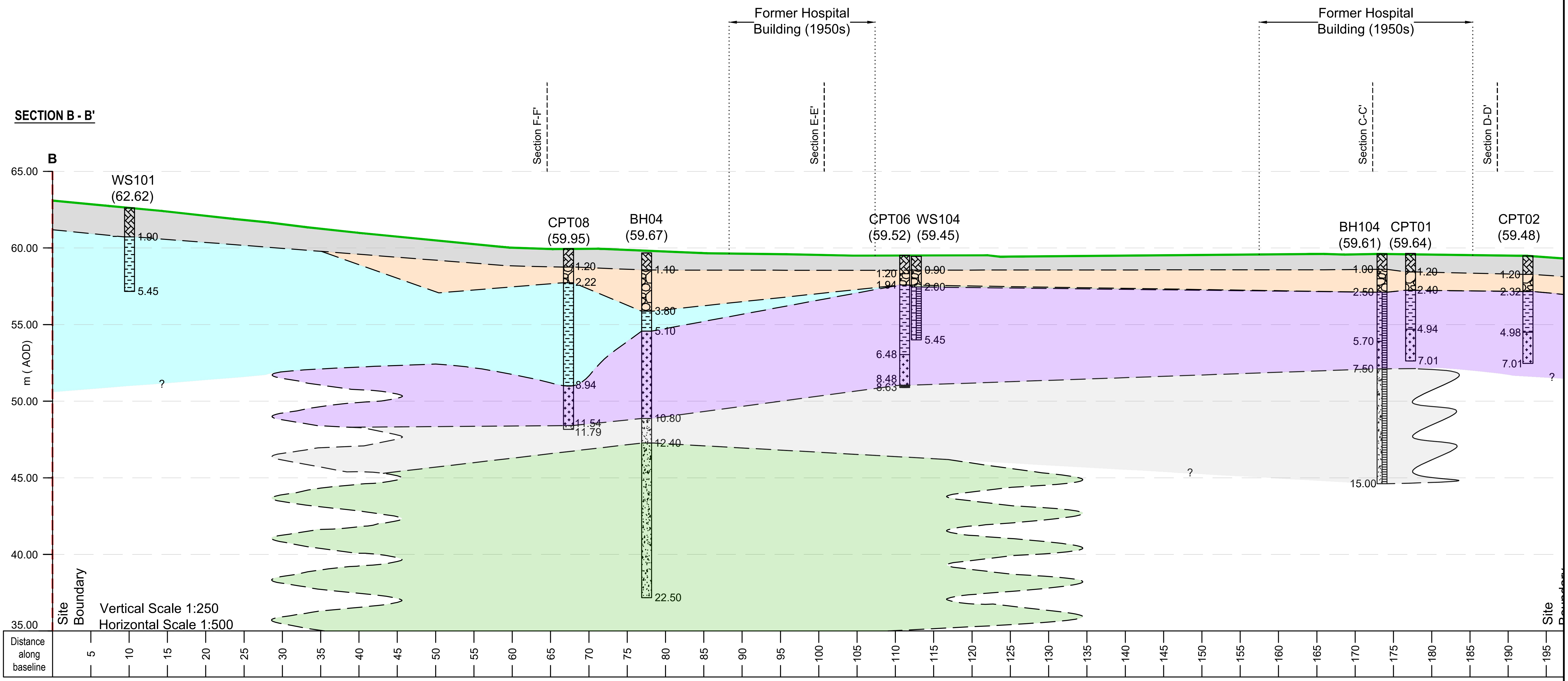
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1004

REVISION
P2

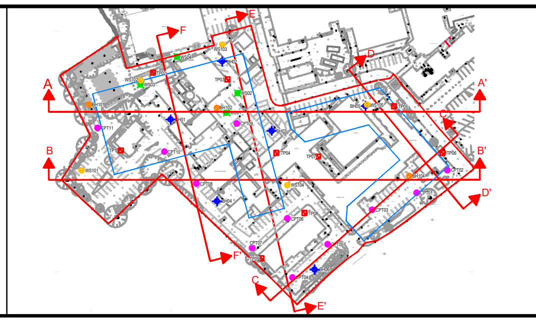
SECTION B - B'



KEY

- Site investigation boundary
- Existing ground profile
- Conjectural geological boundary

▨	Made Ground
▨	Terrace Gravel
▨	Naturally Reworked London Clay & Terrace Gravel
▨	London Clay
▨	Woolich Formation (Clay)
▨	Glauconitic Sands
▨	Thanet Sands
▨	Chalk
▨	Arcadis - Lambeth Group
▨	Hydrock - interpretation of Arcadis Grouped Geology



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TITLE
CROSS SECTION B-B'

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A3
1:500/1:250

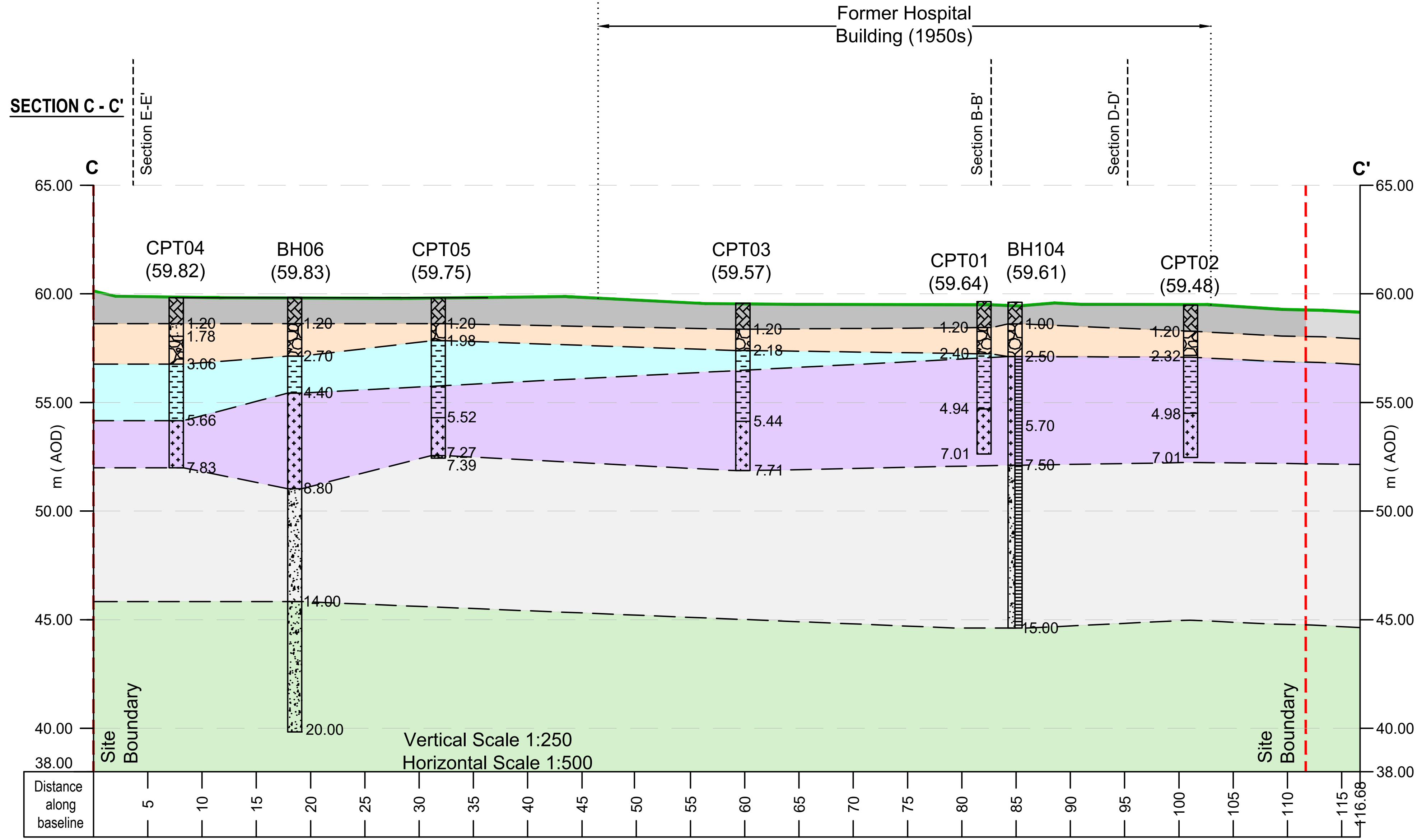
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1005

REVISION
P2

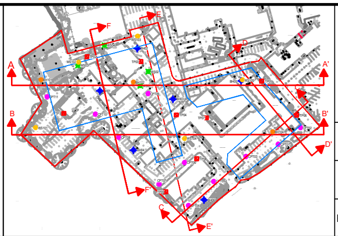
SECTION C - C'



KEY

- 🟥 Site investigation boundary
- 🟩 Existing ground profile
- — — Conjectural geological boundary

▨	Made Ground	▤	London Clay	▩	Thanet Sands	▥	Hydrock - interpretation of Arcadis Grouped Geology
▩	Terrace Gravel	▦	Woolich Formation (Clay)	▩	Chalk		
▧	Naturally Reworked London Clay & Terrace Gravel	▩	Glauconitic Sands	▤	Arcadis - Lambeth Group		



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CROSS SECTION C-C'

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A4
1:500/1:250

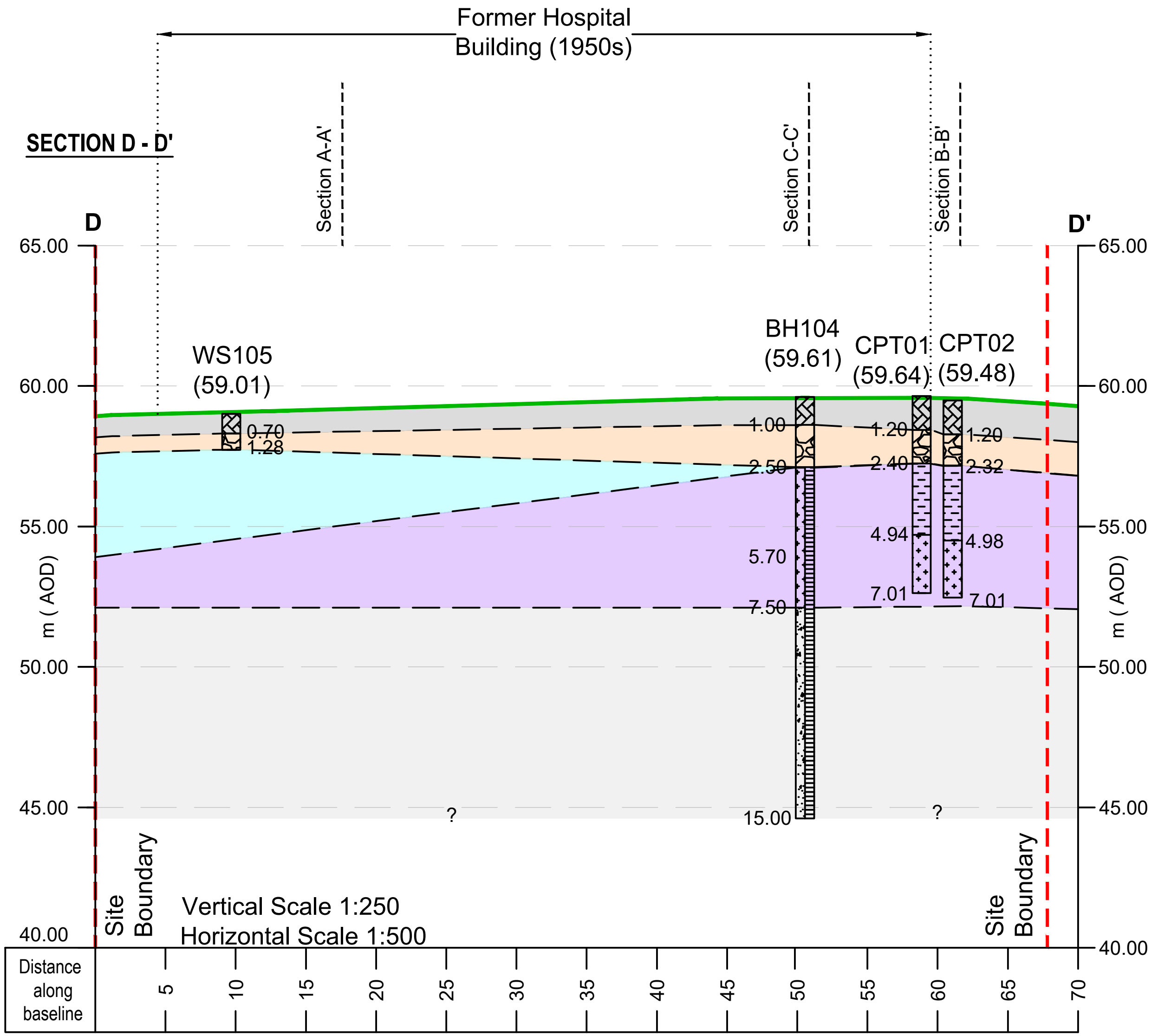
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1006

REVISION
P2

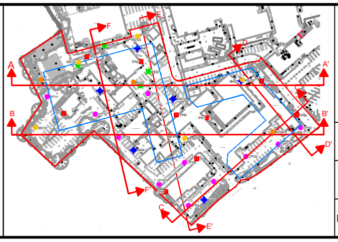
SECTION D - D'



KEY

- Site investigation boundary
- Existing ground profile
- Conjectural geological boundary

▨ Made Ground	▤ London Clay	▩ Thanet Sands	Hydrock - interpretation of Arcadis Grouped Geology
▨ Terrace Gravel	▩ Woolich Formation (Clay)	▩ Chalk	
▨ Naturally Reworked London Clay & Terrace Gravel	▩ Glauconitic Sands	▤ Arcadis - Lambeth Group	



NOTES

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C-12053-C

SCALE @ A4
1:500/1:250

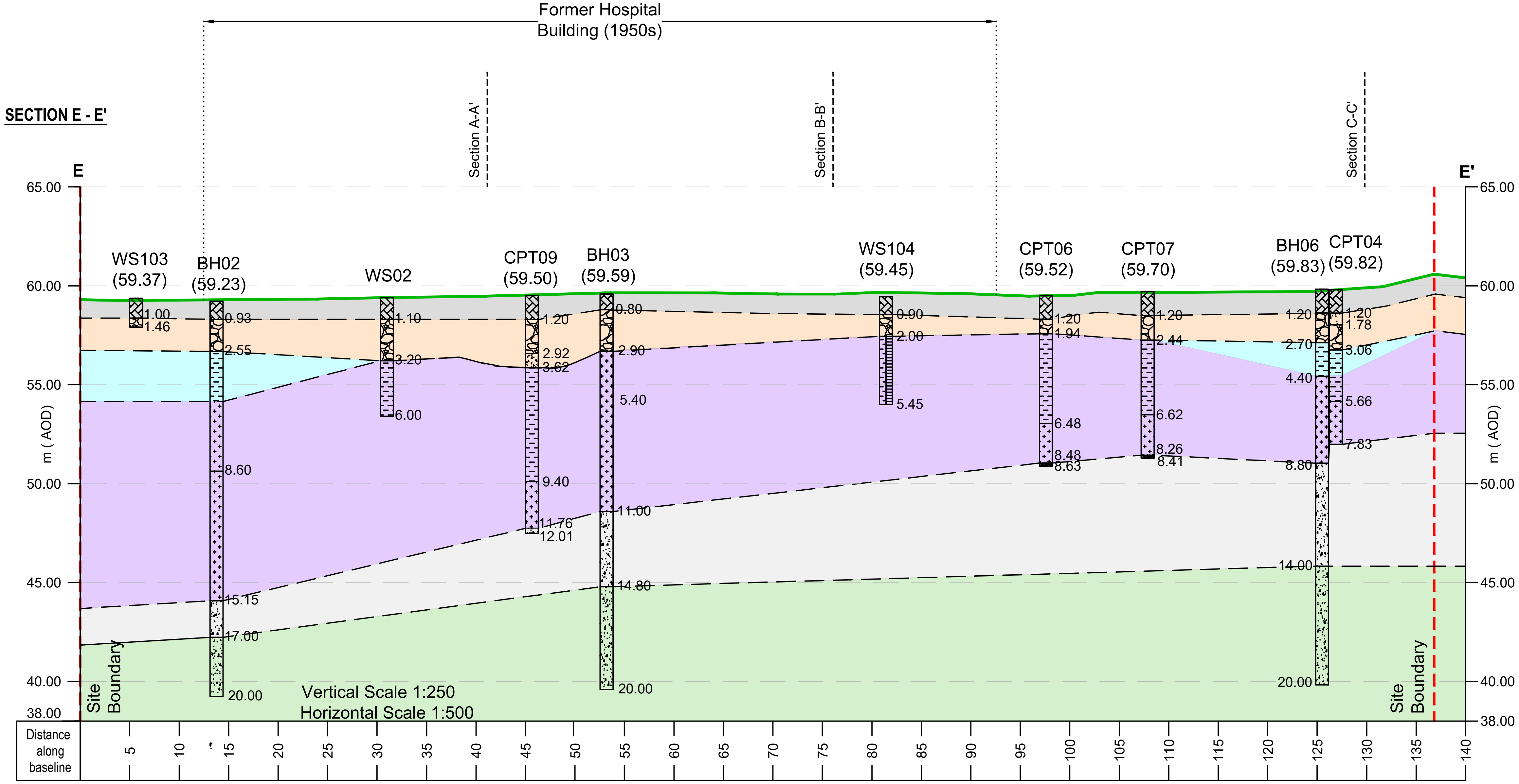
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1007

REVISION
P2

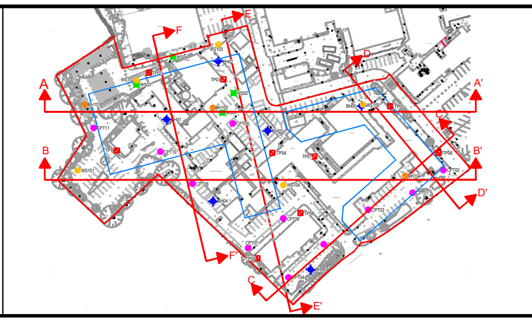
SECTION E - E'



KEY

- - Site investigation boundary
— Existing ground profile
- - Conjectural geological boundary

▨	Made Ground	▤	London Clay	▩	Thanet Sands	▥	Hydrock - interpretation of Arcadis Grouped Geology
▨	Terrace Gravel	▩	Woolich Formation (Clay)	▩	Chalk		
▩	Naturally Reworked London Clay & Terrace Gravel	▩	Glauconitic Sands	▤	Arcadis - Lambeth Group		



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C-12053-C

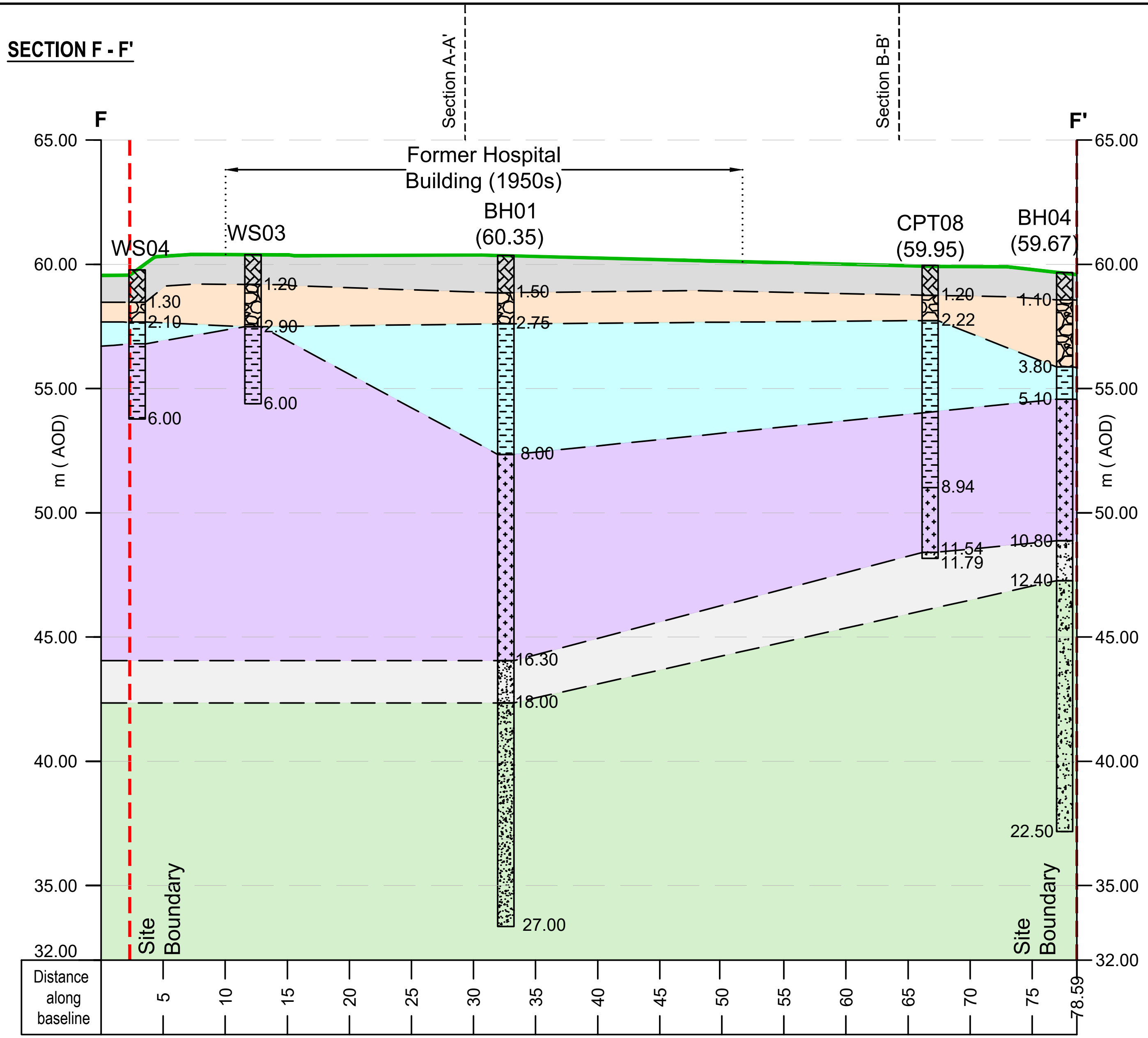
SCALE @ A3
1:500/1:250

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1008

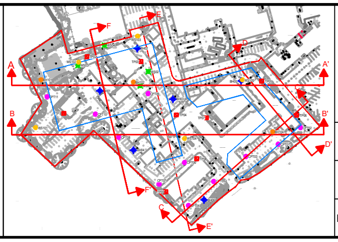
REVISION
P2



KEY

- Site investigation boundary
- Existing ground profile
- Conjectural geological boundary

▨	Made Ground	▨	London Clay	▨	Thanet Sands	▨ Hydrock - interpretation of Arcadis Grouped Geology
▨	Terrace Gravel	▨	Woolich Formation (Clay)	▨	Chalk	
▨	Naturally Reworked London Clay & Terrace Gravel	▨	Glauconitic Sands	▨	Arcadis - Lambeth Group	



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TITLE
CROSS SECTION F-F'

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A4
1:500/1:250

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
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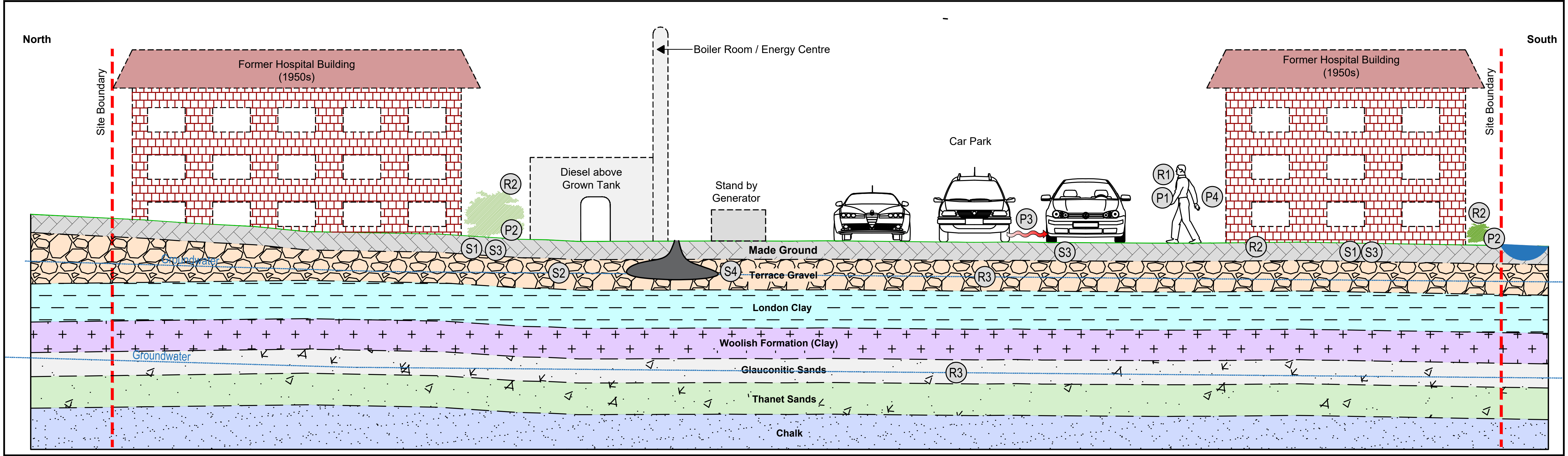
REVISION
P2



Potential on-site sources of contamination

S1. Localised hotspots of Benzo(a)Pyrene within the Made Ground

S2. Petroleum hydrocarbons within the shallow groundwater associated with Energy Centre

S3. Asbestos fibres in the soil or asbestos containing materials in the Made Ground.

S4. Hydrocarbons in soils and groundwater in the vicinity of the energy centre.

Potential pathways

The following potential pathways have been identified.

P1. Humans: ingestion, skin contact, inhalation of dust /particulates and outdoor air..

P2. Plant Life: Root uptake

P3. Lateral migration off site

P4. Inhalation of fugitive dust.

Potential receptors

The following potential receptors in relation to the proposed land use have been identified.

R1. Humans (neighbours, site end users.

R2. Development end use (buildings, utilities and landscaped areas).

R3. Groundwater: Secondary aquifer status of the superficial deposits and deeper bedrock aquifer.

KEY

- Site investigation boundary
- Existing ground profile
- Conjectural geological boundary

▨ Made Ground
▨ Terrace Gravel
▨ London Clay
▨ Woolish Formation (Clay)
▨ Glauconitic Sands
▨ Thanet Sands
▨ Chalk

NOTES

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TITLE
CONCEPTUAL SITE MODEL

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A3
NTS

PURPOSE OF ISSUE
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DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1010

REVISION
P1

KEY

TP1 ▨	Proposed Foundation Inspection Trial Pit Locations
WS01 ⊗	Proposed Window Sample Boreholes Locations
BH1 ⊕	Proposed Borehole Locations
BH101 ⊕	Arcadis Ground Investigation 2018
☐	Approximate extent of proposed building footprint

NOTES

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3. This drawing has been based on the following drawings and information:
3 Sixty Measurements - 18388-04 (Sept 18)

Recorded Contamination

○	Recorded Petroleum Hydrocarbon contamination
○	Recorded Asbestos contamination
○	Recorded Lead contamination
○	Recorded Benzo(a)pyrene contamination
🟧	Approximate Extent of Petroleum Hydrocarbon Contamination from visual and olfactory evidence.

P1	FIRST ISSUE					
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PROJECT

EPSON HOSPITAL

TITLE

SITE CONTAMINATION ZONATION PLAN

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A2
1:500

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
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REVISION
P1

Appendix B

Field Reconnaissance Photographs

Desk Study Photograph 1	
Date: 19/03/20	
Direction Photograph Taken: Looking west along the northern site boundary.	
Description: The energy centre is located to the left. Car park in the distance is the topographical high point of the site.	

Desk Study Photograph 2	
Date: 19/03/20	
Direction Photograph Taken: Looking north.	
Description: Shows the area between the energy centre and a temporary building.	

Desk Study Photograph 3	
Date: 19/03/20	
Direction Photograph Taken: Looking north west..	
Description: Above ground diesel tank.	

Desk Study Photograph 4	
Date: 19/03/20	
Direction Photograph Taken: Looking north .	
Description: Shows car parking are access between the energy centre and York House. .	

Desk Study Photograph 5

Date: 19/03/20

Direction Photograph Taken: Looking West.

Description: Shows access road to the south of York House.

.

Desk Study Photograph 6

Date: 19/03/20

Direction Photograph Taken: Looking North

Description: Shows the car park. .

Desk Study Photograph 7

Date: 19/03/20

Direction Photograph Taken: Looking East

Description: Shows car park access road to the north of Woodcote Lodge. Building in the distance is Rowan House.

1

Desk Study Photograph 8

Date: 19/03/20

Direction Photograph Taken: Looking west..

Description: Shows car park area to the south of woodcote lodge..

Desk Study Photograph 9	
Date: 19/03/20	
Direction Photograph Taken: Looking West..	
Description: Shows car parking area to the south of Rowan House. .	

Desk Study Photograph 10	
Date: 19/03/20	
Direction Photograph Taken: Looking north east	
Description: Access road to the east of Rowan House.	

Desk Study Photograph 11	
Date: 19/03/20	
Direction Photograph Taken: Looing west.	
Description: Shows area between Rowan House and Block H.	

Desk Study Photograph 12	
Date: 19/03/20	
Direction Photograph Taken: Looking south west..	
Description: Shows an area of car parking to the north of Rowan House.	

Desk Study Photograph 13	
Date: 19/03/20	
Direction Photograph Taken: Looking north west.	
Description: View shows the energy centre and power generator. 0	

Appendix C

Exploratory Hole Location Plan, Exploratory Hole Logs and Photographs

Exploratory Hole Location Plan

KEY

TP1 🟥	Proposed Foundation Inspection Trial Pit Locations
WS01 ⊗	Proposed Window Sample Boreholes Locations
BH1 ⊕	Proposed Borehole Locations

NOTES

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3. This drawing has been based on the following drawings and information:
3 Sixty Measurements - 18388-04 (Sept 18)

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PROJECT

EPSON HOSPITAL

TITLE

EXPLORATORY HOLE LOCATION PLAN

HYDROCK PROJECT NO.
C-12053-C

SCALE @ A2
1:500

PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
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DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
12053-HYD-XX-XX-GI-DR-GE-1001

REVISION
P1

Exploratory Hole Logs

Hydrock

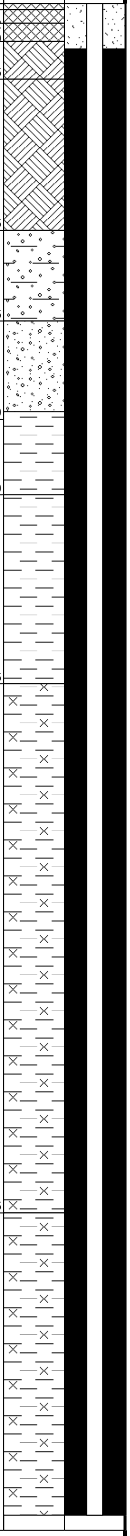
Project: Epsom Hospital

Borehole No
BH01
Page No. 1 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 02/06/2020 - 11/06/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520339.56, 159776.17	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 60.35m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
	0.30	ES						
	0.60	ES						
	1.00	ES						
1.50 - 3.00 87mm 100% rec	1.50	SPT	N=5 (0,2,1,1,1)					
	1.80	D						
	2.50	ES						
3.00 - 4.50 87mm 100% rec	3.00	SPT	N=7 (1,2,1,1,2,3)					
	3.30 - 3.55	C						
	3.50	ES						
	3.80	D						
	3.85 - 4.15	C						
	4.00	HSV	220kPa					
4.50 - 6.00	4.50	SPT	N=15 (2,2,3,4,4,4)	40				
	5.80	HSV	120kPa					
6.00 - 7.50	6.00	SPT	N=14 (2,2,3,3,4,4)	55				
	6.00	D						
	7.30 - 7.45	C						
7.50 - 8.25	7.30	HSV	160kPa	95				
	7.80 - 8.00	C						
	7.80	HSV	240kPa					
8.25 - 9.00				100				
	8.50 - 8.90	C						
9.00 - 10.50	9.00	SPT	N=26 (2,4,6,6,7,7)	75				▼
	9.00	D						

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
MADE GROUND: Asphelt (MADE GROUND)	0.04	(0.04)	60.31
MADE GROUND: Binder Course (MADE GROUND)	0.13	(0.09)	60.22
Made Ground: Base Course (MADE GROUND)	0.25	(0.12)	60.10
MADE GROUND: Cobbles of yellow sandstone. 0.1-0.5m diamater. (MADE GROUND)	0.50	(0.25)	59.85
MADE GROUND: Firm dark greyish brown sandy gravelly CLAY low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse brick flint and sandstone. Cobbles are subrounded brick 0.10 - 0.18m in diamater. (MADE GROUND)	1.50	(1.00)	58.85
Loose light brownish orange sandy very clayey GRAVEL. Sand is fine to medium. Gravel is subrounded to subangular fine to coarse flint. (RIVER TERRACE DEPOSITS)	2.10	(0.60)	58.25
Light brownish orange sandy GRAVEL. Sand is fine to medium. Gravel is subrounded to subangular fine to coarse flint. (RIVER TERRACE DEPOSITS)	2.75	(0.65)	57.60
Soft to firm light greyish brown CLAY. (LONDON CLAY FORMATION)	3.25	(0.55)	57.10
Stiff dark grey organic rich CLAY. (LONDON CLAY FORMATION)	4.50	(1.25)	55.85
Very high strength very stiff grey slightly silty CLAY. (LONDON CLAY FORMATION)	8.00	(3.50)	52.35
High strength to very high strength stiff dark grey to mottled purpleish yellowish green silty CLAY. (WOOLWICH FORMATION)		(2.50)	



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Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
	02/06	1030	0.00					
T41	03/06	1120	1.50		87			
T41	03/06	1530	8.25		110		Water	Grey
T41	04/06	1700	4.50		110			Grey
T41	04/06	1710	15.00		110		Water	Brown
T41	05/06	1430	21.00		110		Water	Grey
T41	08/06	1520	27.00		110	9.58	Water	Grey
T41	10/06	1200	27.00		110	5.10	Water	Grey

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-4.5m bgl. 3) Borehole was cored with wireline drilling between 4.5m bgl and 27.0m bgl. 4) Groundwater levels recorded after borehole installation at 9.01m bgl. 5) Borehole installed with slotted pipe between 21.50 and 24.00m bgl with a gravel surround and plain pipe between ground level and 21.50m bgl with a bentonite seal. A bentonite backfill was used between 24.00-27.00m bgl 6) Borehole terminated at target depth.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No BH01 Page No. 2 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 02/06/2020 - 11/06/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520339.56, 159776.17	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 60.35m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
10.50 - 11.25	10.50	HSV	260kPa	100				
	10.75 - 11.25	C						
11.25 - 12.00	11.70 - 12.00	C		100				
12.00 - 13.50	12.00	SPT	N=50 (4,8,9,14,16,11)	100				
	12.00	HSV	255kPa					
13.50 - 15.00	13.80	HSV	250kPa	100				
15.00 - 16.50	15.00	SPT	50/120mm (11,20,24,26)	100				
	15.50	ES						
16.50 - 18.00				100				
18.00 - 19.50	18.00	SPT	50/117mm (8,12,21,29)	100				
	18.00	ES						
19.50 - 21.00	19.50 - 19.75	C						

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
High strength to very high strength stiff dark grey to mottled purpleish yellowish green silty CLAY. (WOOLWICH FORMATION)	10.50		49.85
Very high strength very stiff grey to mottles reddish brownish green silty CLAY. (WOOLWICH FORMATION) *... fragments of brocken shells at depths between 14.80 - 15.00m bgl.*	16.30	(5.80)	44.05
Light green slightly clayey SAND. Sand is fine to medium. (UPNOR FORMATION) *... subrounded fine to medium flint between 17.50 - 18.00m bgl*	18.00	(1.70)	42.35
Dense to very dense dark greenish grey fine to medium SAND. (THANET SAND FORMATION)			

Continued on Next Sheet

Progress and Observations

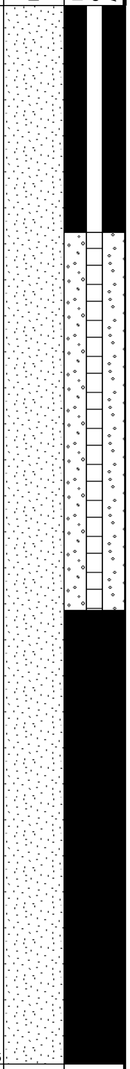
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-4.5m bgl. 3) Borehole was cored with wireline drilling between 4.5m bgl and 27.0m bgl. 4) Groundwater levels recorded after borehole installation at 9.01m bgl. 5) Borehole installed with slotted pipe between 21.50 and 24.00m bgl with a gravel surround and plain pipe between ground level and 21.50m bgl with a bentonite seal. A bentonite backfill was used between 24.00-27.00m bgl 6) Borehole terminated at target depth.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No BH01 Page No. 3 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 02/06/2020 - 11/06/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520339.56, 159776.17	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 60.35m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD
				100					Dense to very dense dark greenish grey fine to medium SAND. (THANET SAND FORMATION)		(9.00)	
21.00 - 22.50	21.00	SPT	N=44 (2,7,9,7,9,19)	35								
	21.00	ES										
	21.20 - 21.50	C										
22.50 - 23.25				100								
23.25 - 24.00				50								
24.00 - 25.50	24.00	SPT	50/185mm (8,11,14,24,12)	100								
	25.00	ES										
25.50 - 27.00				100								
	27.00	SPT	51/160mm (7,10,18,26,7)						End of Borehole at 27.00m	27.00		33.35



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Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-4.5m bgl. 3) Borehole was cored with wireline drilling between 4.5m bgl and 27.0m bgl. 4) Groundwater levels recorded after borehole installation at 9.01m bgl. 5) Borehole installed with slotted pipe between 21.50 and 24.00m bgl with a gravel surround and plain pipe between ground level and 21.50m bgl with a bentonite seal. A bentonite backfill was used between 24.00-27.00m bgl 6) Borehole terminated at target depth.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH02

Method: Dynamic Sampled & Rotary Cored	Date(s): 02/07/2020 - 07/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520365.55, 159804.97	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.23m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
	0.30	PID	0.1ppm					
	0.50	PID	0.2ppm					
1.20 - 2.70 102mm 100% rec	1.10 1.20	PID SPT	0.8ppm N=28 (4,5,5,6,8,9)					
	2.00	PID	24.2ppm					
	2.70 - 3.70	C						
3.50 - 4.50 102mm 100% rec								▼
4.50 - 6.00	4.50	SPT	N=12 (1,2,2,2,3,5)	86				
6.00 - 7.50	6.00	SPT	N=18 (2,2,4,4,4,6)	100				
7.50 - 9.00	7.80	HSV	80kPa	100				
9.00 - 10.50	9.00 9.00	SPT HSV	N=24 (3,4,5,5,6,8) 85kPa	100				

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
MADE GROUND: Concrete (MADE GROUND)	0.03	(0.03)	59.20
MADE GROUND: Concrete (MADE GROUND)	0.18	(0.15)	59.05
MADE GROUND: Brown coarse sandy clayey GRAVEL of fine to coarse subangular to soubrounded flint, brick, and concrete (MADE GROUND)	0.93	(0.75)	58.30
Medium dense light brown clayey sandy GRAVEL. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS) *... Black staining and strong hydrocarbon odour*	2.55	(1.62)	56.68
Stiff dark grey CLAY (LONDON CLAY FORMATION)	2.70	(0.15)	56.53
no recovery (LONDON CLAY FORMATION)	3.50	(0.80)	55.73
Stiff dark grey CLAY (LONDON CLAY FORMATION) *... Band of fine to coarse subangular to subrounded flint*	4.50	(1.00)	54.73
Firm dark grey slightly gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint (LONDON CLAY FORMATION)	5.10	(0.60)	54.13
Firm dark grey to brown CLAY (WOOLWICH FORMATION)	5.80	(0.70)	53.43
no recovery (WOOLWICH FORMATION)	6.00	(0.20)	53.23
Stiff dark grey CLAY (WOOLWICH FORMATION)	7.50	(1.50)	51.73
High strength stiff light brown grey CLAY (WOOLWICH FORMATION)	8.60	(1.10)	50.63
High strength stiff light grey silty CLAY with yellow purple mottle (WOOLWICH FORMATION)	9.00	(0.40)	50.23
Stiff light pink silty CLAY with yellow purple mottle (WOOLWICH FORMATION)		(1.50)	

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
T41	02/07	0000	2.70		102		Water	Grey
	02/07	0800	0.00					
T41	02/07	1100	1.20		102			Grey
T41	03/07	1700	9.00		110		Water	Grey
T41	06/07	1700	20.00		110		Water	Grey

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was rotary cored with Wireline drilling technique between 4.50-20.00m bgl. 4) Groundwater was encountered post installation at 3.79m bgl. 5) Borehole was installed with slotted pipe between 13.50 - 17.80m bgl with a gravel surround and plain pipe between ground level and 13.50m with a bentonite backfill. Bentonite backfill between 17.80-20.00m bgl. 6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital	Borehole No BH02 Page No. 2 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 02/07/2020 - 07/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520365.55, 159804.97	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.23m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log			
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max
10.50 - 12.00	10.70	HSV	240kPa	100			
12.00 - 13.50	12.00	SPT	50/205mm (8,11,15,17,18)	100			
13.50 - 15.00				100			
15.00 - 16.50	15.00	SPT	50/210mm (6,12,15,18,17)	100			
16.50 - 18.00				100			
18.00 - 19.50	18.00	SPT	50/153mm (15,19,22,26,2)	90			
19.50 - 20.00				100			

Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD
	Stiff light pink silty CLAY with yellow purple mottle (WOOLWICH FORMATION)	10.50		48.73
	Very high strength stiff light grey silty CLAY with brown orange mottle (WOOLWICH FORMATION)	11.60	(1.10)	47.63
	Stiff brown silty CLAY with occasional brown mottle (WOOLWICH FORMATION)	13.00	(1.40)	46.23
	Dense light brown fine to medium SAND (WOOLWICH FORMATION)	13.50	(0.50)	45.73
	Very dense green fine to medium SAND with occasional brown mottle (WOOLWICH FORMATION)	14.50	(1.00)	44.73
	Stiff light brown grey sandy CLAY (WOOLWICH FORMATION)	14.60	(0.10)	44.63
	Very dense green yellow purple SAND (WOOLWICH FORMATION)	15.15	(0.55)	44.08
	Very dense dark green fine to medium SAND (UPNOR FORMATION) *... Broken shell fragments between 15.15 and 15.3m bgl* *... Occasional broken shell fragments between 16.5 and 16.9m bgl*	17.00	(1.85)	42.23
	Very weak dark grey green SILTSTONE (THANET SAND FORMATION) *... Occasional broken shell fragments between 18.0 and 18.3m bgl* *... Occasional broken shell fragments between 18.6 and 19.5m bgl*	20.00	(3.00)	39.23

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was rotary cored with Wireline drilling technique between 4.50-20.00m bgl. 4) Groundwater was encountered post installation at 3.79m bgl. 5) Borehole was installed with slotted pipe between 13.50 - 17.80m bgl with a gravel surround and plain pipe between ground level and 13.50m with a bentonite backfill. Bentonite backfill between 17.80-20.00m bgl. 6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH02
Page No. 3 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 02/07/2020 - 07/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520365.55, 159804.97	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.23m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log				Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max							
	20.00	SPT	50/170mm (9,15,20,24,6)						End of Borehole at 20.00m					

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Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

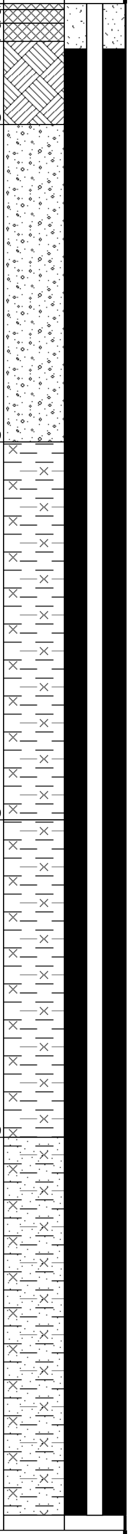
General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was rotary cored with Wireline drilling technique between 4.50-20.00m bgl. 4) Groundwater was encountered post installation at 3.79m bgl. 5) Borehole was installed with slotted pipe between 13.50 - 17.80m bgl with a gravel surround and plain pipe between ground level and 13.50m with a bentonite backfill. Bentonite backfill between 17.80-20.00m bgl. 6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital			Borehole No BH03 Page No. 1 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 12/06/2020 - 16/06/2020	Logged By: TH		Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520390.38, 159770.13	Checked By: SC		Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.59m OD			Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log			
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max
	0.30	ES					
	0.30	PID	0.2ppm				
	0.90	ES					
	0.90	PID	0.1ppm				
1.20 - 2.00 87mm 60% rec	1.20	SPT	N=25 (3,4,5,6,6,8)				
	1.20	ES					
2.00 - 3.00 87mm 100% rec	2.00	SPT	N=30 (2,4,9,7,7,7)				
	2.00	ES					
	2.50	ES					
3.00 - 4.00 87mm 80% rec	3.00	SPT	N=5 (1,2,1,1,2,1)				
	3.00	ES					
	3.50	HSV	100kPa				
	3.80	D					
4.00 - 5.00 87mm 100% rec	4.00	SPT	N=13 (1,2,3,2,4,4)				
	4.20	ES					
	4.60 - 5.00	C					
	5.00	SPT	N=19 (2,3,4,4,5,6)				
	5.00	D					
5.40 - 6.00 87mm 100% rec 5.40 - 6.00	5.00 - 5.40	U		100			
	5.50	D					
	5.50	ES					
6.00 - 7.50	6.00	SPT	N=22 (3,5,4,5,6,7)	65			
	7.00	ES					
7.50 - 8.25	7.50 - 7.80	C		100			
	7.50 - 7.90	C					
	8.00	D					
	8.00	ES					
8.25 - 9.00	8.25	HSV	260kPa	20			
9.00 - 9.75	9.00	SPT	50/240mm (7,10,12,15,17,6)	0			
	9.00	D					
9.75 - 10.50	10.00	D					

Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD
	MADE GROUND: Asphelt (MADE GROUND)	0.04	(0.04)	59.55
	MADE GROUND: Binder Course (MADE GROUND)	0.13	(0.09)	59.46
	MADE GROUND: Base Course (MADE GROUND)	0.25	(0.12)	59.34
	MADE GROUND: Firm dark greyish brown sandy gravelly CLAY low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse brick flint and sandstone. Cobbles are subrounded brick 0.10 - 0.18m in diamater. (MADE GROUND)	0.80	(0.55)	58.79
▼	Medium dense light brown to orange sandy GRAVEL. Gravel is subrounded to subangular fine to coarse flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	2.90	(2.10)	56.69
	Soft rapidly becoming high strength stiff light grey CLAY.(WOOLWICH FORMATION)	5.40	(2.50)	54.19
	Stiff dark grey to mottled purpleish yellowish green silty CLAY. (WOOLWICH FORMATION)	7.50	(2.10)	52.09
	Very high strength very stiff light grey to green mottled yellow brown slity sandy CLAY. (WOOLWICH FORMATION)		(3.50)	



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Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
	11/06	0900	0.00					
T41	11/06	1700	1.20		102			Brown
T41	12/06	1700	5.00		110		Water	Grey
T41	15/06	1700	10.50		110		Water	Grey
T41	16/06	1700	20.00		110		Water	Grey

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-6.00m bgl and rotary cored with wireline drilling technique between 6.00m bgl and 20.00m bgl 3) Groundwater was encountered during post installation monitoring at 1.94m bgl. 5) Borehole installed with slotted pipe between 12.00-15.00m bgl with a gravel surround and plain pipe between ground level and 12.00m bgl with a bentonite backfill. Bentonite was used to backfill the borehole between 15.00-20.00m bgl. 6)Borehole terminated at target depth. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH03
Page No. 2 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 12/06/2020 - 16/06/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520390.38, 159770.13	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.59m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
				40				
10.50 - 11.25	10.50	HSV	256kPa	100				
11.25 - 12.00	11.25	D		100				
12.00 - 13.50	12.00 12.00 12.00 12.00 - 12.40	SPT D ES C	50/167mm (7,11,21,25,4)	100				
13.50 - 15.00	13.50	D		100				
15.00 - 15.75	15.00	SPT	N=15 (3,3,4,4,4,3)	100				
15.75 - 16.50	16.00 16.00	D ES		80				
16.50 - 18.00	16.75	HSV	240kPa	80				
18.00 - 19.00	18.00 18.00	SPT ES	50/130mm (10,14,22,28)	100				
19.00 - 20.00	19.00	D		100				

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
Very high strength very stiff light grey to green mottled yellow brown slity sandy CLAY. (WOOLWICH FORMATION)	11.00		48.59
Dense light green slightly clayey SAND. Sand is fine to medium. (UPNOR FORMATION) *... light green very sandy clay between 11.25 - 12.00m bgl* *... occasional subrounded fine to medium flint pebbles between 11.60 - 12.00m bgl.* *... fragments of brocken shells at depths between 13.20 - 15.50m bgl.*	14.80	(3.80)	44.79
Dense to very dense dark greenish grey fine to medium SAND. (THANET SAND FORMATION)	17.50	(2.70)	42.09
Very weak dark grey SILTSTONE. (THANET SAND FORMATION)	19.00	(1.50)	40.59
Dense to very dense dark greenish grey fine to medium SAND. (THANET SAND FORMATION)	20.00	(1.00)	39.59

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-6.00m bgl and rotary cored with wireline drilling technique between 6.00m bgl and 20.00m bgl 3) Groundwater was encountered during post installation monitoring at 1.94m bgl. 5) Borehole installed with slotted pipe between 12.00-15.00m bgl with a gravel surround and plain pipe between ground level and 12.00m bgl with a bentonite backfill. Bentonite was used to backfill the borehole between 15.00-20.00m bgl. 6)Borehole terminated at target depth. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital			Borehole No BH03 Page No. 3 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 12/06/2020 - 16/06/2020	Logged By: TH		Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520390.38, 159770.13	Checked By: SC		Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.59m OD			Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log				Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max							
	20.00	SPT	50/107mm (19,20,24,26)						End of Borehole at 20.00m					

21
22
23
24
25
26
27
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29
30

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with excavator to 1.2m bgl and backfilled 2) Borehole dynamic sampled between 1.20-6.00m bgl and rotary cored with wireline drilling technique between 6.00m bgl and 20.00m bgl 3) Groundwater was encountered during post installation monitoring at 1.94m bgl. 5) Borehole installed with slotted pipe between 12.00-15.00m bgl with a gravel surround and plain pipe between ground level and 12.00m bgl with a bentonite backfill. Bentonite was used to backfill the borehole between 15.00-20.00m bgl. 6)Borehole terminated at target depth. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH04

Method: Dynamic Sampled & Rotary Cored	Date(s): 18/06/2020 - 24/06/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520367.07, 159738.41	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.67m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max
	0.50	ES					
	0.50	PID	0.2ppm				
	0.90	ES					
	0.90	PID	0.2ppm				
1.20 - 2.70 110mm 80% rec	1.20	SPT	N=14 (2,3,3,2,2,7)				
	2.50	ES					
	2.70	SPT	N=8 (1,1,2,2,2,2)				
3.40 - 4.50 102mm 60% rec							
	4.00	D					
	4.00	ES					
	4.15 - 4.50	C					
4.50 - 6.00	4.50	SPT	N=20 (2,2,4,5,6,5)	100			
	5.00	D					
6.00 - 7.50	6.00	SPT	N=20 (2,4,4,5,6,5)	100			
	7.10 - 7.40	C					
	7.40	D					
	7.40	ES					
7.50 - 9.00				100			
	8.50	D					
9.00 - 10.50	9.00	SPT	50/250mm (4,8,11,15,16,8)	100			
	9.00	D					

Water-Strikes: ▼ (approx. 1.90)

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
MADE GROUND: Firm dark greyish brown sandy gravelly CLAY low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse brick flint and sandstone. Cobbles are subrounded brick 0.10 - 0.18m in diamater. (MADE GROUND)	1.10	(1.10)	58.57
Medium dense light brown orange sandy clayey GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	3.80	(2.70)	55.87
Firm to stiff dark grey CLAY (LONDON CLAY FORMATION)	5.10	(1.30)	54.57
Stiff dark grey CLAY with yellow and purple red mottle (WOOLWICH FORMATION)	7.50	(2.40)	52.17
Stiff light grey CLAY with yellow and purple red mottle (WOOLWICH FORMATION)	9.00	(1.50)	50.67
Stiff light grey silty CLAY with yellow and purple red mottle (WOOLWICH FORMATION)		(1.80)	

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
	18/06	0800	0.00					
T41	18/06	1030	1.20		102			Brown
T41	18/06	1700	2.70		102		Water	Grey
T41	19/06	1700	9.00		110		Water	Grey
T41	22/06	1600	16.50		110		Water	Grey
T41	23/06	1440	22.50		110		Water	Grey

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl. 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was cored with wireline drilling technique between 4.50m-22.5m bgl. 4) Groundwater was recorded in post installation monitoring at 1.90m bgl. 5) Borehole was installed with slotted pipe between 20.00-22.50m bgl with a gravel surround and with plain pipe ground level and 20.00m bgl with a bentonite seal surround. 6) Borehole terminated at target depth, 22.5m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Hydrock	Project: Epsom Hospital	Borehole No BH04 Page No. 2 of 3	
Method: Dynamic Sampled & Rotary Cored	Date(s): 18/06/2020 - 24/06/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520367.07, 159738.41	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.67m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
10.50 - 12.00	10.50	D		100				
	11.80	ES						
12.00 - 13.50	12.00	SPT	50/110mm (12,18,30,20)	100				
	12.00	D						
	13.00	D						
13.50 - 15.00				100				
	14.00	D						
15.00 - 16.50	15.00	SPT	50/87mm (25,25,34,16)	80				
	16.00	D						
16.50 - 18.00				100				
	17.50 - 18.00	B						
18.00 - 19.50	18.00	SPT	N=50 (7,7,8,13,16,13)	90				
	18.50	D						
19.50 - 21.00	19.50	ES						

Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Stiff light grey silty CLAY with yellow and purple red mottle (WOOLWICH FORMATION)	10.80		48.87		
Very dense fine to medium grey green slightly clayey SAND (THANET SAND FORMATION)	11.50	(0.70)	48.17		
Very dense fine to medium green SAND (THANET SAND FORMATION)	12.40	(0.90)	47.27		
Very weak dark brown SILTSTONE (THANET SAND FORMATION)	12.50	(0.10)	47.17		
Very dense fine to medium green SAND (THANET SAND FORMATION)	12.80	(0.30)	46.87		
Very weak dark brown SILTSTONE (THANET SAND FORMATION)	12.95	(0.15)	46.72		
Very dense fine to medium green SAND (THANET SAND FORMATION) *... Broken shell fragments between 14.0 and 14.5m bgl* *... Broken shell fragments between 15.8 and 15.9m bgl*	15.90	(2.95)	43.77		
Very weak dark brown SILTSTONE (THANET SAND FORMATION)	18.00	(2.10)	41.67		
Soft dark grey CLAY (THANET SAND FORMATION)	18.30	(0.30)	41.37		
Very weak dark brown SILTSTONE (THANET SAND FORMATION)	19.50	(1.20)	40.17		
Very dense fine to medium grey green SAND (THANET SAND FORMATION)					

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl. 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was cored with wireline drilling technique between 4.50m-22.5m bgl. 4) Groundwater was recorded in post installation monitoring at 1.90m bgl. 5) Borehole was installed with slotted pipe between 20.00-22.50m bgl with a gravel surround and with plain pipe ground level and 20.00m bgl with a bentonite seal surround. 6) Borehole terminated at target depth, 22.5m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH04
Page No. 3 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 18/06/2020 - 24/06/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520367.07, 159738.41	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.67m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Samples / Tests Type	Samples / Tests Results	Mechanical Log TCR	Mechanical Log SCR	Mechanical Log RQD	Mechanical Log If: Min Mean Max	Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
				100					Very dense fine to medium grey green SAND (THANET SAND FORMATION)					
21.00 - 22.50	20.90 21.00	D SPT	50/186mm (9,14,18,22,10)								(3.00)			
	21.50	D		100										
	22.50	SPT	79/101mm (7,15,24,55)						End of Borehole at 22.50m	22.50		37.17		

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl. 2) Borehole was dynamic samples between 1.20-4.50m bgl. 3) Borehole was cored with wireline drilling technique between 4.50m-22.5m bgl. 4) Groundwater was recorded in post installation monitoring at 1.90m bgl. 5) Borehole was installed with slotted pipe between 20.00-22.50m bgl with a gravel surround and with plain pipe ground level and 20.00m bgl with a bentonite seal surround. 6) Borehole terminated at target depth, 22.5m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No BH05 Page No. 1 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 24/06/2020 - 01/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520437.14, 159781.73	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.07m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
	0.50	ES						
	0.50	PID	0.1ppm					
	0.90	ES						
	0.90	PID	0.1ppm					
	1.10	ES						
1.20 - 2.70 102mm 100% rec	1.10	PID	0.1ppm					
	1.20	D						
	1.50	ES						
3.00 - 4.50 0% rec	3.00	SPT	N=4 (1,1,1,1,1,1)					
4.50 - 6.00 102mm 100% rec	4.50	SPT	N=15 (1,2,4,3,4,4)					
	4.50	D						
	4.50	D						
6.00 - 7.50	6.00	SPT	N=17 (2,3,5,4,4,4)	100				
	6.00	D						
	6.00	D						
	6.00	ES						
7.50 - 9.00	7.50	D		100				
9.00 - 10.50	9.00	SPT	N=43 (6,6,10,10,11,12)	100				
	9.00	D						

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
MADE GROUND: Dark brown SAND with rootlets (MADE GROUND)	0.60	(0.60)	58.47
MADE GROUND: Soft ligth brown sandy gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint, chalk, and bick (MADE GROUND)	0.90	(0.30)	58.17
Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.30)	57.87
Very loose light brown orange sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	2.30	(1.10)	56.77
Medium dense light brown orange fine to medium SAND. (RIVER TERRACE DEPOSITS)	2.70	(0.40)	56.37
No recovery	4.50	(1.80)	54.57
Firm light greysilty CLAY with yellow and purple red mottle (WOOLWICH FORMATION)	6.00	(1.50)	53.07
Firm to stiff light pink CLAY with brown mottle (WOOLWICH FORMATION)	6.90	(0.90)	52.17
Firm light grey purple CLAY with yellow mottle (WOOLWICH FORMATION)	7.50	(0.60)	51.57
Firm to stiff light grey silty CLAY with brown orange mottle (WOOLWICH FORMATION)	8.50	(1.00)	50.57
Firm light pink CLAY with light brown orange mottle (WOOLWICH FORMATION)	9.00	(0.50)	50.07
Stiff light grey silty CLAY with brown mottle (WOOLWICH FORMATION)	9.70	(0.70)	49.37
Very dense fine to medium green SAND (WOOLWICH FORMATION)			

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
	24/06	1430	0.00					
T41	24/06	1700	1.20		102			Brown
T41	25/06	1700	10.50		110		Water	Brown
T41	26/06	1700	21.00		110		Water	Grey
T41	29/06	1630	24.75		110		Water	Grey
T41	30/06	1700	27.00		110		Water	Grey

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic sampled between ground level and 6.00m bgl. 3) Borehole was rotary cored with wireline drilling technique between 6.00 and 27.00m bgl. 4) Groundwater was recorded in post installation at 13.07m bgl. 5) Borehole was installed with slotted pipe between 24.00-27.00m bgl with a gravel surround and plain pipe between ground level and 24.00m bgl with a bentonite surround. 6) Borehole terminated at target depth, 27.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Project: Epsom Hospital			Borehole No BH05 Page No. 2 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 24/06/2020 - 01/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520437.14, 159781.73	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.07m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	TCR	SCR	RQD	If: Min Mean Max
10.50 - 12.00	100			
12.00 - 13.50	73			
13.50 - 14.25	100			
14.25 - 15.00	100			
15.00 - 16.50	100			
16.50 - 18.00	100			
18.00 - 19.50	66			
19.50 - 20.25	100			

Depth (m)	Type	Results
12.00	SPT	25/79mm (10,15,22,3)
13.40	D	
15.00	SPT	50/193mm (5,10,13,18,19)
15.00	ES	
16.00	D	
17.50	D	
18.00	SPT	50/120mm (12,16,24,26)
19.00	D	
19.50	D	

Water-Strikes: ▼ at approx. 13.07

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
Very dense fine to medium green SAND (WOOLWICH FORMATION)	10.85	(1.15)	48.22
Very dense fine to medium yellow purple SAND (WOOLWICH FORMATION)	11.10	(0.25)	47.97
Very weak dark grey brown SILTSTONE (WOOLWICH FORMATION)	11.15	(0.05)	47.92
Very dense fine to medium yellow purple SAND (WOOLWICH FORMATION)	11.70	(0.55)	47.37
Very dense fine to medium green SAND (WOOLWICH FORMATION)	12.00	(0.30)	47.07
no recovery (UPNOR FORMATION)	12.40	(0.40)	46.67
Very dense fine to medium green SAND (UPNOR FORMATION)	13.70	(1.30)	45.37
Very weak dark grey green SILTSTONE (THANET SAND FORMATION)	17.40	(3.70)	41.67
Dense dark green fine to medium SAND (THANET SAND FORMATION)	18.00	(0.60)	41.07
no recovery (THANET SAND FORMATION)	18.50	(0.50)	40.57
Medium dense dark grey green fine to medium SAND (THANET SAND FORMATION)		(2.75)	

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic sampled between ground level and 6.00m bgl. 3) Borehole was rotary cored with wireline drilling technique between 6.00 and 27.00m bgl. 4) Groundwater was recorded in post installation at 13.07m bgl. 5) Borehole was installed with slotted pipe between 24.00-27.00m bgl with a gravel surround and plain pipe between ground level and 24.00m bgl with a bentonite surround. 6) Borehole terminated at target depth, 27.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Hydrock	Project: Epsom Hospital		Borehole No BH05 Page No. 3 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 24/06/2020 - 01/07/2020	Logged By: MC	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520437.14, 159781.73	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.07m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
20.25 - 21.00				100				
21.00 - 22.50	21.00	SPT	50/155mm (8,12,19,24,7)	100				
	21.00	D						
22.50 - 24.00				50				
	23.90	D						
24.00 - 24.75	24.00	SPT	50/40mm (12,25,50)	80				
24.75 - 25.50	24.90	ES		80				
25.50 - 27.00	25.65 - 25.95	C		53				
	25.95 - 26.35	C						
	27.00	SPT	50/10mm (25,25,50)					

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
Medium dense dark grey green fine to medium SAND (THANET SAND FORMATION)	21.25		37.82
Very dense dark grey green fine to medium SAND (THANET SAND FORMATION)	22.50	(1.25)	36.57
no recovery (THANET SAND FORMATION)	23.25	(0.75)	35.82
Very dense dark grey green fine to medium SAND (THANET SAND FORMATION)	24.00	(0.75)	35.07
White structureless CHALK. Dc. (LEWES NODULAR CHALK FORMATION)	24.10	(0.10)	34.97
White structured CHALK. Medium density. Grade B4. (LEWES NODULAR CHALK FORMATION)	24.40	(0.30)	34.67
no recovery (LEWES NODULAR CHALK FORMATION)	24.50	(0.10)	34.57
White structured CHALK. Medium density. Grade B4. Horizontal fracture at 24.6m bgl (LEWES NODULAR CHALK FORMATION)	24.75	(0.25)	34.32
no recovery (LEWES NODULAR CHALK FORMATION)	24.90	(0.15)	34.17
White structureless gravelly CHALK. Gravel of fine to coarse subangular to subrounded flint. Dc. (LEWES NODULAR CHALK FORMATION)	25.15	(0.25)	33.92
White structured CHALK. Medium density. Grade B4. Fractures at 25.25, 25.35, 25.95, 26.35, 26.4, and 26.5 m bgl. (LEWES NODULAR CHALK FORMATION)	26.40	(1.25)	32.67
no recovery (LEWES NODULAR CHALK FORMATION)	27.00	(0.60)	32.07

End of Borehole at 27.00m

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic sampled between ground level and 6.00m bgl. 3) Borehole was rotary cored with wireline drilling technique between 6.00 and 27.00m bgl. 4) Groundwater was recorded in post installation at 13.07m bgl. 5) Borehole was installed with slotted pipe between 24.00-27.00m bgl with a gravel surround and plain pipe between ground level and 24.00m bgl with a bentonite surround. 6) Borehole terminated at target depth, 27.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No BH06 Page No. 1 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 08/07/2020 - 10/07/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520411.39, 159701.26	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.83m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes
	0.30	PID	0.1ppm					
	1.10	PID	0.1ppm					
1.20 - 2.70 110mm 100% rec	1.20	SPT	N=29 (1,2,3,5,10,11)					
	1.20	D						
	1.50	ES						
	2.50	ES						
	2.80	D						
3.00 - 4.50	3.00	SPT	N=6 (1,1,1,1,1,3)	100				
	3.50 - 4.00	C						
	4.00 - 4.30	C						
	4.20	HSV	70kPa					
4.50 - 6.00				100				
	5.00	D						
	5.10	HSV	75kPa					
	5.50	ES						
	5.60	HSV	90kPa					
6.00 - 7.50	6.00	SPT	N=33 (2,4,6,8,9,10)	100				
	6.40 - 6.70	C						
	6.50	D						
	7.40	HSV	300kPa					
7.50 - 9.00				70				
	7.75	D						
	8.00	HSV	150kPa					
9.00 - 9.75	9.00	SPT	50/230mm (8,9,12,14,21,3)	80				
9.75 - 10.50								▼

Stratum Description	Depth mbgl	Thickness (m)	Level m OD
MADE GROUND: Pavers (MADE GROUND)	0.10	(0.10)	59.73
MADE GROUND: Dark reddish brown slightly sandy GRAVEL. Subbase. (MADE GROUND)	0.40	(0.30)	59.43
MADE GROUND: Brown coarse sandy clayey GRAVEL of fine to coarse subangular to soubrounded flint, brick, and concrete (MADE GROUND)	1.20	(0.80)	58.63
Medium dense light brown to orange sandy GRAVEL. Gravel is subrounded to subangular fine to coarse flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	2.70	(1.50)	57.13
Soft rapidly becoming medium strength firm to stiff dark grey clay. (LONDON CLAY FORMATION)	4.40	(1.70)	55.43
High strength stiff red brown mottled to red yellow purple slightly silty CLAY. (WOOLWICH FORMATION)	6.40	(2.00)	53.43
Very high strength stiff light brown to grey green slightly silty CLAY (WOOLWICH FORMATION)	8.80	(2.40)	51.03
Dense light green slightly clayey SAND. Sand is fine to medium. (UPNOR FORMATION)			

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)
	08/07	0830	0.00					
	08/07	0945	1.20		102			Brown
	08/07	1700	7.50		110		Water	Brown
	09/07	1700	18.00		110		Water	Grey
	10/07	1600	20.00		110		Water	Grey

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-2.70m bgl. 3) Borehole was rotary cored with wireline drilling technique between 2.70-20.00m bgl. 4) Groundwater was assessed during drilling operations at approximately 10.00m bgl. 5) Borehole was not installed.6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
BH06
Page No. 2 of 3

Method: Dynamic Sampled & Rotary Cored	Date(s): 08/07/2020 - 10/07/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520411.39, 159701.26	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.83m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests Depth (m)	Type	Results	Mechanical Log TCR	SCR	RQD	If: Min Mean Max	Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
				100					Dense light green slightly clayey SAND. Sand is fine to medium. (UPNOR FORMATION)					
10.50 - 11.25	10.50	D		80										
	11.00	ES									(4.20)			
11.25 - 12.00				100										
12.00 - 13.50	12.00	SPT	50/228mm (3,11,15,14,16,5)	100										
	13.00	D								13.00		46.83		
									Dense dark green to grey slightly clayay fine SAND. (UPNOR FORMATION)					
13.50 - 15.00				100							(1.00)			
										14.00		45.83		
									Very dense dark grey to green medium sand. (THANET SAND FORMATION)					
15.00 - 16.50	15.00	SPT	N=41 (4,7,11,10,10,10)	60										
	15.30	D												
16.50 - 17.25				100										
	17.00	ES									(6.00)			
17.25 - 18.00	17.50	D		100										
18.00 - 19.00	18.00	SPT	50/160mm (10,12,19,22,9)	100										
19.00 - 20.00				100										
										20.00		39.83		

Continued on Next Sheet

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-2.70m bgl. 3) Borehole was rotary cored with wireline drilling technique between 2.70-20.00m bgl. 4) Groundwater was assessed during drilling operations at approximately 10.00m bgl. 5) Borehole was not installed.6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No BH06 Page No. 3 of 3
Method: Dynamic Sampled & Rotary Cored	Date(s): 08/07/2020 - 10/07/2020	Logged By: TH	Drilled By: Tor Drilling
Client: Cast Consult Ltd	Co-ords: 520411.39, 159701.26	Checked By: SC	Flush: Water
Hydrock Project No: C-12053-C	Ground Level: 59.83m OD		Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log				Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max							
	20.00	SPT	50/170mm (9,11,17,21,12)						End of Borehole at 20.00m					

21
22
23
24
25
26
27
28
29
30

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

General Remarks:
1) Service clearance progressed with hand pitting to 1.2m bgl 2) Borehole was dynamic samples between 1.20-2.70m bgl. 3) Borehole was rotary cored with wireline drilling technique between 2.70-20.00m bgl. 4) Groundwater was assessed during drilling operations at approximately 10.00m bgl. 5) Borehole was not installed.6) Borehole terminated at target depth, 20.0m bgl. 7) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Borehole No
WS01
Page No. 1 of 1

Method: Window Sampler	Date(s): 03/06/2020	Logged By: MC	Drilled By: TOR Drilling
Client: Cast Consult Ltd	Co-ords: 520324.60, 159739.57	Checked By: SC	Rig: Dart 477
Hydrock Project No: C-12053-C	Ground Level: 59.45mOD		Scale: 1:30

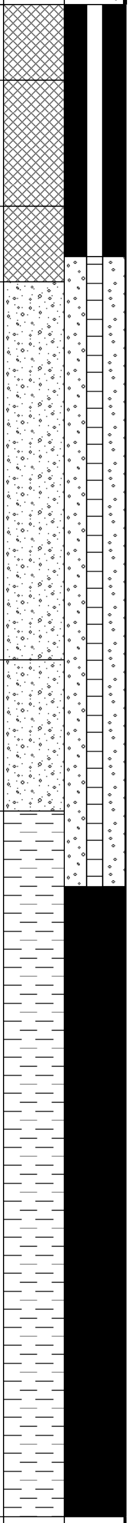
Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							Made Ground: Concrete/Asphalt (MADE GROUND)	0.10	(0.10)	59.45		
							Made Ground: Gravel of concrete and brick (MADE GROUND)	0.30	(0.20)	59.45		
			0.50 0.50	ES PID	 0.7ppm		Made Ground: Light brown very gravelly SAND. Gravel of fine to coarse angular to subrounded brick and concrete. (MADE GROUND)	0.60	(0.30)	59.45		
							Made Ground: Stiff to firm dark grey CLAY. (MADE GROUND)	0.75	(0.15)	59.45		
			0.80 0.80	ES PID	 0.5ppm		Medium dense light brown yellow sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse subrounded to subangular flint. (RIVER TERRACE DEPOSITS)					
1.20 - 2.00	87mm	100%	1.20 1.20 1.30 1.30	ES PID ES PID	 0.8ppm 0.8ppm							
						▼						
							... Black staining and strong hydrocarbon odour					
			1.90 1.90	ES PID	 62.2ppm							
2.00 - 3.00	87mm	100%						2.15	(1.40)	59.45		
							Stiff dark grey silty CLAY (LONDON CLAY FORMATION)	3.00	(0.85)	59.45		
3.00 - 4.00	87mm	100%					Stiff light grey mottled to red brown silty CLAY (WOOLWICH FORMATION)					
4.00 - 5.00	77mm	100%										
5.00 - 6.00	67mm	100%						6.00	(3.00)	59.45		
							End of Borehole at 6.00m					

General Remarks:
1) Handpit to 1.2m bgl. 2) Groundwater encountered post borehole installation at 1.67m bgl. 3) Black staining and petrolium hydrocarbon odure between 1.50-2.0m bgl 4) Borehole insalled will slotted pipe between 1.0-2.5m bgl with gravel surround. Plain pipe between groundlevel and 1.0m with bentonite surround. Bentonite backfll between 2.5-6.0m bgl. 5) Borehole terminated at 6m bgl. 6) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Project: Epsom Hospital			Borehole No WS02 Page No. 1 of 1
Method: Window Sampler	Date(s): 03/06/2020	Logged By: MC	Drilled By: TOR Drilling
Client: Cast Consult Ltd	Co-ords: 520373.06, 159789.32	Checked By: SC	Rig: Dart 477
Hydrock Project No: C-12053-C	Ground Level: 59.41m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							Made Ground:Concrete/Asphalt (MADE GROUND)	0.30	(0.30)			
			0.50 0.50	ES PID	0.1ppm		Made Ground: Dark brown grey v gravelly slightly clayey SAND. Gravel is fine to coarse angular to subrounded flint, brick, ash and concrete. (MADE GROUND)	0.80	(0.50)			
			0.90 0.90	ES PID	0.1ppm		Made Ground: Soft light brown slightly sandy gravelly CLAY. Gravel of fine to coarse anguar to subrounded flint and brick. (MADE GROUND)	1.10	(0.30)			
1.20 - 2.00	87mm	100%	1.20 1.20 1.40	ES PID ES	0.3ppm		Medium dense light brown yellow sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse subrounded to subangular flint. (RIVER TERRACE DEPOSITS)					
						▼	*... Black staining and strong hydrocarbon odour*					
2.00 - 3.00	87mm	100%	2.20 2.20	ES PID	51.4ppm			2.60	(1.50)			
3.00 - 4.00	87mm	100%					Medium dense green grey sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse subrounded to subangular flint. (RIVER TERRACE DEPOSITS)	3.20	(0.60)			
			3.20 3.20	D PID	3.1ppm		Stiff dark grey silty CLAY (WOOLWICH FORMATION)					
4.00 - 5.00	77mm	100%	4.00	D								
5.00 - 6.00	67mm	100%										
							End of Borehole at 6.00m	6.00	(2.80)			



General Remarks:
1) Handpit to 1.2m bgl. 2) Groundwater encountered post borehole installation at 1.82m bgl. 3) Black staining and petrolium hydrocarbon odure between 1.50-2.0m bgl 4) Borehole insalled will slotted pipe between 1.0-3.5m bgl with gravel surround. Plain pipe between groundlevel and 1.0m with bentonite surround. Bentonite backfll between 3.5-6.0m bgl. 5) Borehole terminated at 6m bgl. 6) PID assessment using volume headspace technique with a MiniRAE lite.

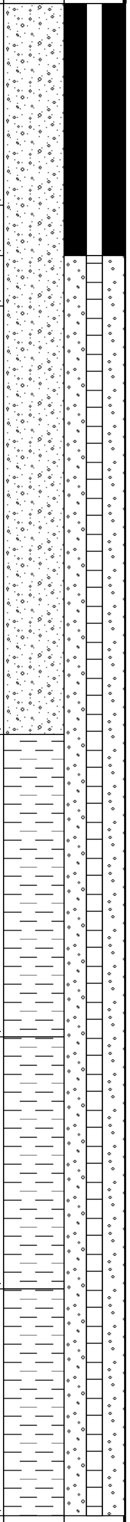
Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No WS03 Page No. 1 of 1
Method: Window Sampler	Date(s): 02/06/2020	Logged By: MC	Drilled By: TOR Drilling
Client: Cast Consult Ltd	Co-ords: 520367.59, 159779.59	Checked By: SC	Rig: Dart 477
Hydrock Project No: C-12053-C	Ground Level: 59.54m OD		Scale: 1:30

Sample Run Info			Testing		
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results
			0.30	ES	
			0.70	ES	
1.20 - 2.00	87mm	100%	1.20	ES	
			1.20	PID	0.3ppm
			1.30	ES	
			1.50	PID	0.0ppm
			1.80	B	
			1.80	ES	
2.00 - 3.00	87mm	100%			
			2.50	PID	0.0ppm
3.00 - 4.00	87mm	90%			
			3.50	PID	0.0ppm
4.00 - 5.00	77mm	100%			
			4.50	PID	0.0ppm
5.00 - 6.00	67mm	40%			
			5.50	B	
			5.50	PID	0.0ppm

Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD
	Made Ground: Dark grey brown very gravelly SAND with rootlets. Gravel is fine to coarse angular to subrounded flint, brick, and concrete. Large brick pieces (0.1 - 0.15m). (MADE GROUND)	0.80	(0.80) (1.00) (1.20)	58.74
	Made Ground: Light brown very gravelly clayey SAND. Gravel is fine to coarse angular to subrounded flint, brick, and concrete. Large brick pieces (0.1 - 0.15m). (MADE GROUND)	1.00		58.54
	Made Ground: Soft to firm brown very gravelly sandy CLAY. Gravel is fine to coarse angular to subrounded flint and brick. Occasional metal pieces. (MADE GROUND)	1.20		58.34
	Medium dense light brown yellow sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse subrounded to subangular flint. (RIVER TERRACE DEPOSITS)	2.90	(2.90)	56.64
	Firm to stiff grey orange CLAY. (LONDON CLAY FORMATION)	4.10	(1.20)	55.44
▼	Stiff dark grey oragnic CLAY. (LONDON CLAY FORMATION) *... Rootlets*	5.10	(1.00)	54.44
	Stiff black dark grey oragnic CLAY. (LONDON CLAY FORMATION)	6.00	(0.90)	53.54

End of Borehole at 6.00m



General Remarks:
1) Handpit to 1.2m bgl. 2) Groundwater encountered post borehole installation at 5.05 bgl. 3) No significant visual or olfactory evidence of contamination. 4) Borehole insalled will slotted pipe between 1.0-6.0m bgl with gravel surround. Plain pipe between groundlevel and 1.0m with bentonite surround. 5) Borehole terminated at 6m bgl. 6) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Borehole No WS04 Page No. 1 of 1
Method: Window Sampler	Date(s): 04/06/2020	Logged By: MC	Drilled By: TOR Drilling
Client: Cast Consult Ltd	Co-ords: 520342.61, 15907.26	Checked By: SC	Rig: Dart 477
Hydrock Project No: C-12053-C	Ground Level: 59.54m OD		Scale: 1:30

Sample Run Info

Sample Run	Run Ø	Recovery
1.20 - 2.00	87mm	100%
2.00 - 3.00	87mm	100%
3.00 - 4.00	87mm	90%
4.00 - 5.00	77mm	100%
5.00 - 6.00	67mm	100%

Testing

Depth (m)	Type	Results
0.30	ES	
0.30	PID	0.3ppm
0.80	ES	
0.80	PID	0.1ppm
1.30	PID	0.0ppm
1.40	ES	
2.50	PID	0.1ppm
3.50	PID	0.6ppm
4.50	PID	0.0ppm
5.50	PID	0.1ppm

Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
	Made Ground: Dark grey brown very gravelly SAND with rootlets. Gravel is fine to coarse angular to subrounded flint, brick, and concrete. Large brick pieces (0.1 - 0.15m). (MADE GROUND)	0.40	(0.40)	59.14		
	Made Ground: Soft to firm brown very gravelly CLAY. Gravel is fine to coarse angular to subrounded flint, chalk, and flint. (MADE GROUND)	0.70	(0.30)	58.84		
	Made Ground: Soft to firm brown very gravelly CLAY. Gravel is fine to coarse angular to subrounded flint and chalk. (MADE GROUND)	1.30	(0.60)	58.24		
▼	Medium dense light brown yellow sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse subrounded to subangular flint. (RIVER TERRACE DEPOSITS)	2.10	(0.80)	57.44		
	Firm to stiff grey CLAY. (LONDON CLAY FORMATION)	2.80	(0.70)	56.74		
	Stiff light grey mottled to red brown silty CLAY (WOOLWICH FORMATION)	4.90	(2.10)	54.64		
	Stiff dark grey CLAY (WOOLWICH FORMATION)	6.00	(1.10)	53.54		

End of Borehole at 6.00m

General Remarks:
1) Handpit to 1.2m bgl. 2) Groundwater encountered post borehole installation at 1.41m bgl. 3) No significant visual or olfactory evidence of contamination. 4) Borehole insalled will slotted pipe between 1.0-5.0m bgl with gravel surround. Plain pipe between groundlevel and 1.0m with bentonite surround. 5) Borehole terminated at 6m bgl. 6) PID assessment using volume headspace technique with a MiniRAE lite.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Trialpit No CPT01 Page No. 1 of 1
Method: Hand-dug Pit	Date(s): 05/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520462.41, 159739.44	Stability:	Dimensions: 0.30m × 0.30m Scale: 1:10
Hydrock Project No: C-12053-C	Ground Level: 59.64m OD	Plant: HP	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Concrete (MADE GROUND)	0.10	(0.10)	59.54	▨
0.50 0.50	ES PID	0.0ppm		Made Ground: Soft dark brown grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete (MADE GROUND)	0.60	(0.50)	59.04	▨
1.20 1.20	ES PID	0.0ppm		Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.60)	58.44	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital			Trialpit No CPT02 Page No. 1 of 1
Method: Hand-dug Pit	Date(s): 04/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520477.73, 159750.44	Stability:	Dimensions: 0.30m × 0.30m Scale: 1:10
Hydrock Project No: C-12053-C	Ground Level: 59.48m OD	Plant: HP	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Concrete (MADE GROUND)	0.17	(0.17)	59.31	▨
0.60 0.60	ES PID	0.2ppm		Made Ground: Brown very gravelly fine to coarse SAND. Garvel of fine to coarse subangular to subrounded flint, chalk, an dbrick. Some bricks pieces up to 10cm in length (MADE GROUND)	1.20	(1.03)	58.28	▨
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Hydrock

Project: Epsom Hospital

Trialpit No
CPT03
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 04/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520440.16, 159731.08	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 59.58m OD	Plant: HP	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Concrete (MADE GROUND)	0.19	(0.19)	59.39	▨
0.50 0.50	ES PID	 0.2ppm		Made Ground: Soft dark grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete (MADE GROUND)	0.70	(0.51)	58.88	▨
1.00 1.00	ES PID	 0.2ppm		Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.50)	58.38	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT04
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 05/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520400.40, 159697.24	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 59.91m OD	Plant: HP	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Asphalt. (MADE GROUND)	0.10	(0.10)	59.81	▨
				Concrete (MADE GROUND)	0.25	(0.15)	59.66	▨
0.40 0.40	ES PID	 0.0ppm		Soft brown grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete (MADE GROUND)	0.50	(0.40)	59.41	▨
				Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.70)	58.71	░
1.20 1.20	ES PID	 0.1ppm		Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No

CPT04a

Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 05/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520400.40, 159697.24	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 59.91m OD	Plant: HP	Scale: 1:10

Samples / Tests			Water-Strikes
Depth (m)	Type	Results	
0.40	ES		

Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Made Ground: Asphalt. (MADE GROUND)	0.10	(0.10)	59.81	▨
Soft brown grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete. (MADE GROUND)	0.30	(0.20)	59.61	▨
Concrete Obstruction (MADE GROUND)	0.35	(0.05)	59.56	▨

Base of Excavation at 0.50m

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at 0.5m due to obstruction. 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT05
Page No. 1 of 1

Method: Hand-dug Pit
Date(s): 05/06/2020
Logged By: MC
Checked By: SC
Client: Cast Consult Ltd
Co-ords: 520417.90, 159713.89
Stability:
Dimensions: 0.30m × 0.30m
Scale: 1:10
Hydrock Project No: C-12053-C
Ground Level: 59.91m OD
Plant: HP

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Concrete (MADE GROUND)	0.20	(0.20)	59.71	
0.40 0.40	ES PID	0.0ppm		Soft brown grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete (MADE GROUND)	0.50	(0.30)	59.41	
				Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.70)	58.71	
1.20 1.20	ES PID	0.2ppm		Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT06
Page No. 1 of 1

Method: Hand-dug Pit
Date(s): 05/06/2020
Logged By: MC
Checked By: SC
Client: Cast Consult Ltd
Co-ords: 520397.87, 159726.74
Stability:
Dimensions: 0.30m × 0.30m
Scale: 1:10
Hydrock Project No: C-12053-C
Ground Level: 59.52m OD
Plant: HP

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Concrete (MADE GROUND)	0.25	(0.25)	59.27	
0.40	ES			Made Ground: Soft brown grey silty very gravelly CLAY. Gravel of fine to coarse angular to subrounded flint, chalk, brick, and concrete (MADE GROUND)	0.50	(0.25)	59.02	
0.50	PID	0.0ppm		Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint and chalk (RIVER TERRACE DEPOSITS)	1.20	(0.70)	58.32	
1.20 1.20	ES PID	 0.0ppm		Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT07
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 04/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520380.31, 159712.05	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 59.71m OD	Plant: HP	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Concrete (MADE GROUND)	0.10	(0.10)	59.61	▨
0.30 0.30	ES PID	 3.6ppm		Light brown very gravelly clayey SAND. Gravel is fine to coarse angular to subrounded flint, brick, and concrete. Large brick pieces (10-15cm). (MADE GROUND)	0.40	(0.30)	59.31	▨
1.00 1.00	ES PID	 2.2ppm		Soft light brown sandy very gravelly CLAY. Gravel of fine to coarse subangular to subrounded flint. (RIVER TERRACE DEPOSITS)	1.20	(0.80)	58.51	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT08
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 02/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520352.51, 159744.10	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 59.87m OD	Plant: HP	Scale: 1:10

Samples / Tests Depth (m)	Type	Results	Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
				Made Ground: Asphalt. (MADE GROUND)	0.08	(0.08)	59.79	▨
				Made Ground: Brick layer with ash. (MADE GROUND)	0.17	(0.09)	59.70	▨
				Made Ground: Concrete (MADE GROUND)	0.34	(0.17)	59.53	▨
0.60	ES			Made Ground: Dark grey to brown sandy gravelly CLAY. Gravel is subrounded medium to coarse brick and flint. (MADE GROUND)	0.70	(0.36)	59.17	▨
0.90 1.20	ES ES			Firm light brown to orange sandy gravelly CLAY. Gravel is subrounded fine to coarse flint. (RIVER TERRACE DEPOSITS)	1.20	(0.50)	58.67	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT09
Page No. 1 of 1

Method: Hand-dug Pit
Date(s): 02/06/2020
Logged By: MC
Checked By: SC
Client: Cast Consult Ltd
Co-ords: 52372.71, 159774.18
Stability:
Dimensions: 0.30m × 0.30m
Scale: 1:10
Hydrock Project No: C-12053-C
Ground Level: 59.90m OD
Plant: HP

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Asphalt. (MADE GROUND)	0.08	(0.08)	59.82	▨
				Made Ground: Concrete (MADE GROUND)	0.25	(0.17)	59.65	▨
0.30	ES			Made Ground: Dark grey to brown sandy gravelly CLAY. Gravel is subrounded medium to coarse brick. (MADE GROUND)	0.68	(0.43)	59.22	▨
0.80	ES			Firm light brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (RIVER TERRACE DEPOSITS)	1.20	(0.52)	58.70	▤
1.20	ES			Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock

Project: Epsom Hospital

Trialpit No
CPT10
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 02/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520336.51, 159760.07	Stability:	Dimensions: 0.30m × 0.30m
Hydrock Project No: C-12053-C	Ground Level: 60.12m OD	Plant: HP	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Asphalt. (MADE GROUND)	0.05	(0.05)	60.07	▨
				Made Ground: Dark brown GRAVEL. Gravel is subangular fine to medium limestone. (Sub-base) (MADE GROUND)	0.15	(0.10)	59.97	▨
				Made Ground: Asphalt. (MADE GROUND)	0.20	(0.05)	59.92	▨
0.40	ES			Made Ground: Dark brown to grey sandy GRAVEL with low cobble content. Gravel is subrounded fine to coarse brick sandstone. Cobbles of subrounded brick 0.15m diamater. (MADE GROUND)	0.60	(0.40)	59.52	▨
0.80	ES			Firm light brown slightly sandy CLAY. (RIVER TERRACE DEPOSITS)	1.20	(0.60)	58.92	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Hydrock	Project: Epsom Hospital		Trialpit No CPT11 Page No. 1 of 1
Method: Hand-dug Pit	Date(s): 02/06/2020	Logged By: MC	Checked By: SC
Client: Cast Consult Ltd	Co-ords: 520303.13, 159771.93	Stability:	Dimensions: 0.30m 0.30m Scale: 1:10
Hydrock Project No: C-12053-C	Ground Level: 62.18m OD	Plant: HP	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Made Ground: Asphalt. (MADE GROUND)	0.10	(0.10)	62.08	▨
0.30	ES			Made Ground: Light brown mottled grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded flint with rare limestone. (MADE GROUND)	0.70	(0.60)	61.48	▨
0.90	ES			Firm becoming stiff light grey to brown slightly gravelly CLAY. Gravel is subrounded fine to coarse flint. (RIVER TERRACE DEPOSITS)	1.20	(0.50)	60.98	▤
				Base of Excavation at 1.20m				

General Remarks:
1) Hand pit undertaken to to clear underground services prior to CPT Probe investigation.2) Hand Pit terminated at target depth of 1.2m bgl.3) No visual or olfactory evidence of contamination.

Logged in general accordance with BS5930:2015

Exploratory Hole Photographs

Site Investigation Photograph 1

Date: 09/06/18

Direction Photograph Taken: n/a.

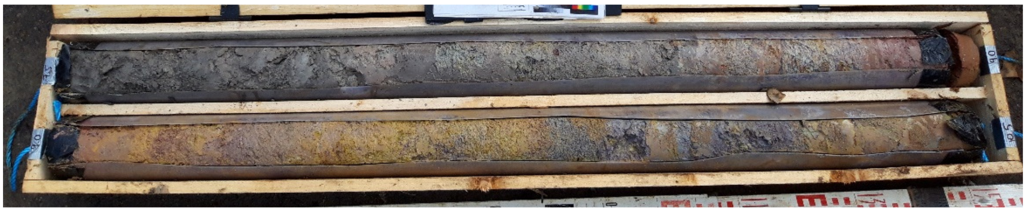
Description: Core from BH01

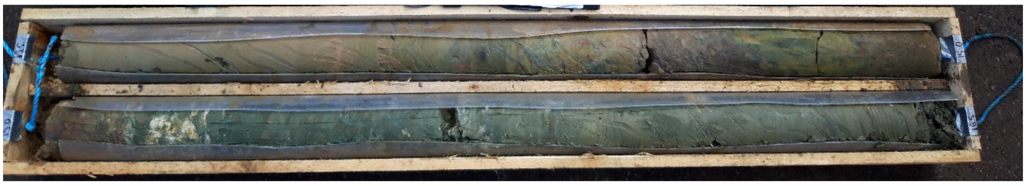
Site Investigation Photograph 2

Date: 10/07/20

Direction Photograph Taken: n/a.

Description: Core from BH02.



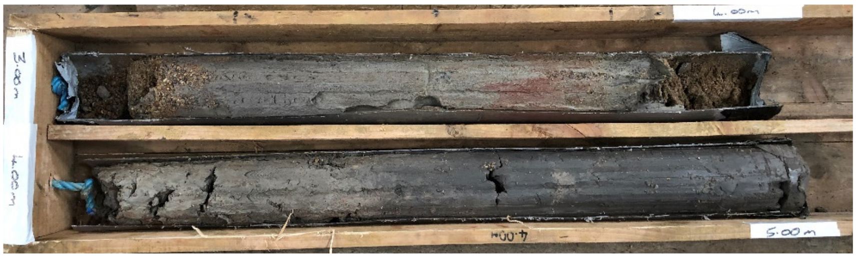


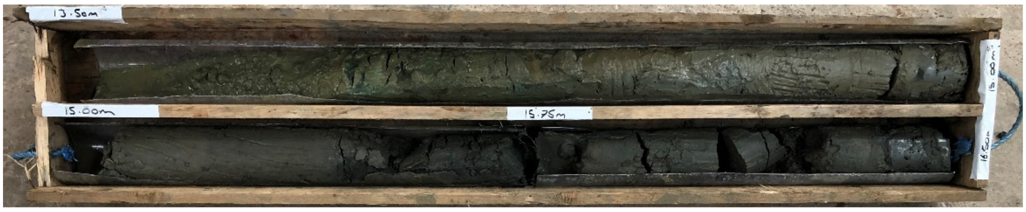
Site Investigation Photograph 3

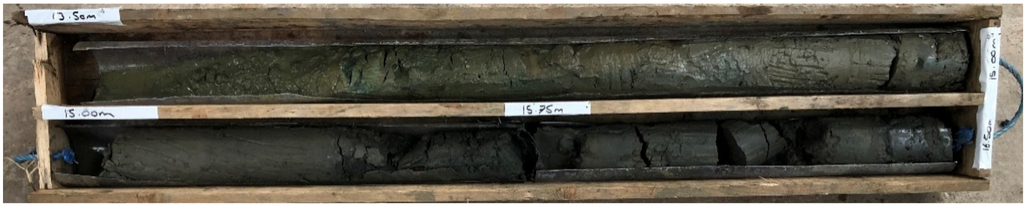
Date: 18/06/20

Direction Photograph Taken: n/a.

Description: Core from BH03





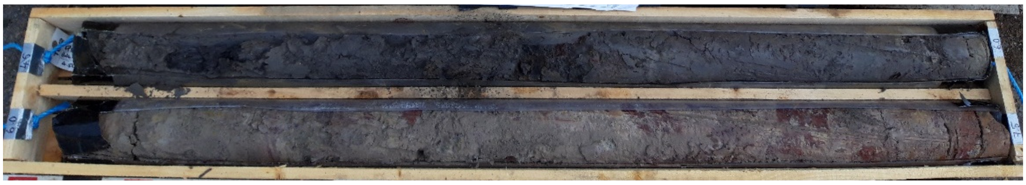


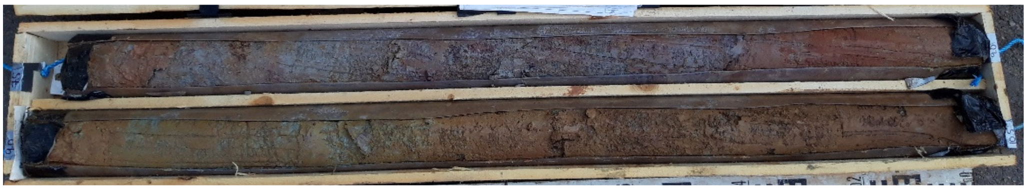
Site Investigation Photograph 4

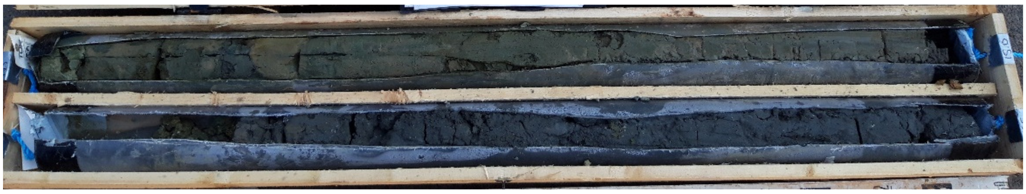
Date: 24/06/20

Direction Photograph Taken: n/a.

Description: Core From BH04





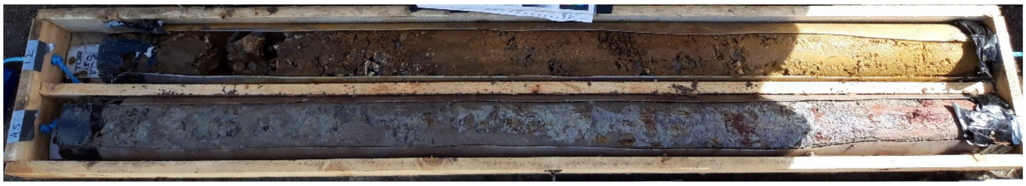


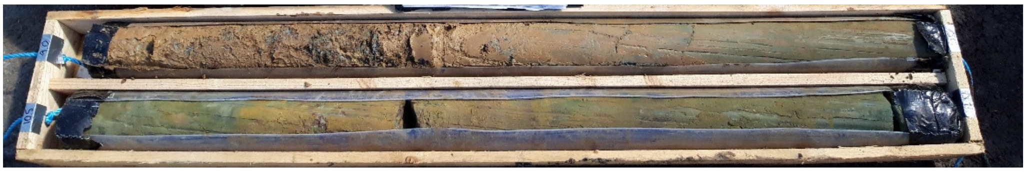
Site Investigation Photograph 5

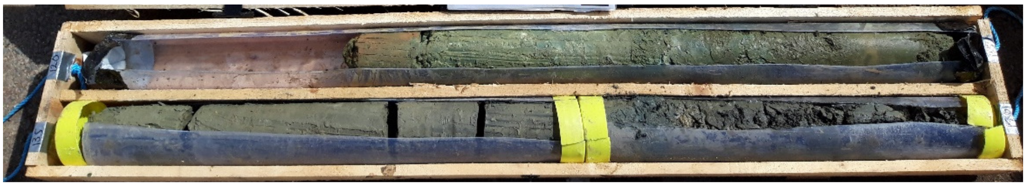
Date: 03/07/20

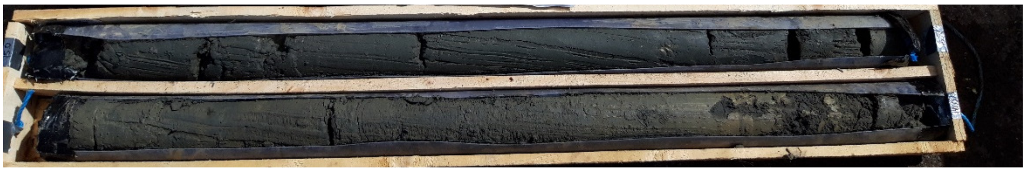
Direction Photograph Taken: n/a

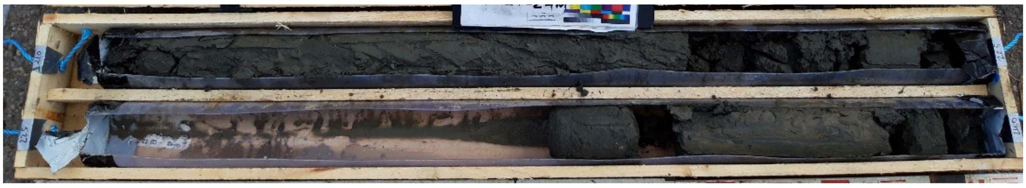
Description: Core from BH05.











Site Investigation Photograph 6	
Date: 09/06/20	
Direction Photograph Taken: N/a	
Description: Foundation hand pit FP01	

Site Investigation Photograph 7	
Date: 11/06/20	
Direction Photograph Taken: N/a	
Description: Foundation Hand Pit FP02.	

<table>
<tr><td>Site Investigation Photograph 8</td><td rowspan="4">
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<tr><td>Date: 09/06/20</td></tr>
<tr><td>Direction Photograph Taken:
N/a.</td></tr>
<tr><td>Description:
Foundation Hand Pit FP04.</td></tr>
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<tr><td>Site Investigation Photograph 9</td><td rowspan="4">
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<tr><td>Date: 09/06/20</td></tr>
<tr><td>Direction Photograph Taken:
N/a</td></tr>
<tr><td>Description:
Foundation Hand Pit FP04.</td></tr>
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<table>
<tr><td>Site Investigation Photograph 10</td><td rowspan="4">
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<tr><td>Date: 09/06/20</td></tr>
<tr><td>Direction Photograph Taken: N/a</td></tr>
<tr><td>Description: Foundation Hand Pit FP08.</td></tr>
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<tr><td>Site Investigation Photograph 11</td><td rowspan="4">
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<tr><td>Date: 03/06/20</td></tr>
<tr><td>Direction Photograph Taken: N/a.</td></tr>
<tr><td>Description: Window Samples Cores WS01.</td></tr>
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Site Investigation Photograph 12

Date: 03/06/20

Direction Photograph Taken: N/a

Description: Window Samples Cores WS02.

Site Investigation Photograph 13

Date: 03/06/20

Direction Photograph Taken: N/a.

Description: Window Samples Cores WS03.

Appendix D

Geotechnical Test Results and Geotechnical Plots

Geotechnical Laboratory Test Results

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 749557R.01(00)

1774

Date	25-August-2020	Contract	Epsom Hospital

Client Hydrock Consultants Limited
Address Over Court Barns
Over Lane
Almondsbury
Bristol
BS32 4DF
For the Attention of Timothy Hatrey

Samples submitted by client	24-July-2020	Client Reference	C12053
Testing Started	24-July-2020	Client Order No.	None
Testing Completed	25-August-2020	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

	Water Content BS EN ISO 17892-1
	Liquid and plastic limits BS EN ISO 17892-12
	UU (single stage) Triaxial BS EN ISO 17892-8
10.02	Saturated moisture content of chalk BS1377:Part 2:1990,clause 3.3
10.04	Porosity and density by saturation and buoyancy in accordance with ISRM 1974-2006

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000. e-mail dimitris.xirouchakis@soils.co.uk

TESTING VERIFICATION CERTIFICATE

UKAS
TESTING
1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **25/08/2020 09:45:43**.

Testing reported after this date is not covered by this Verification Certificate.

A. D. Fr

Approved Signatory
Alan Frost (Data Quality Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

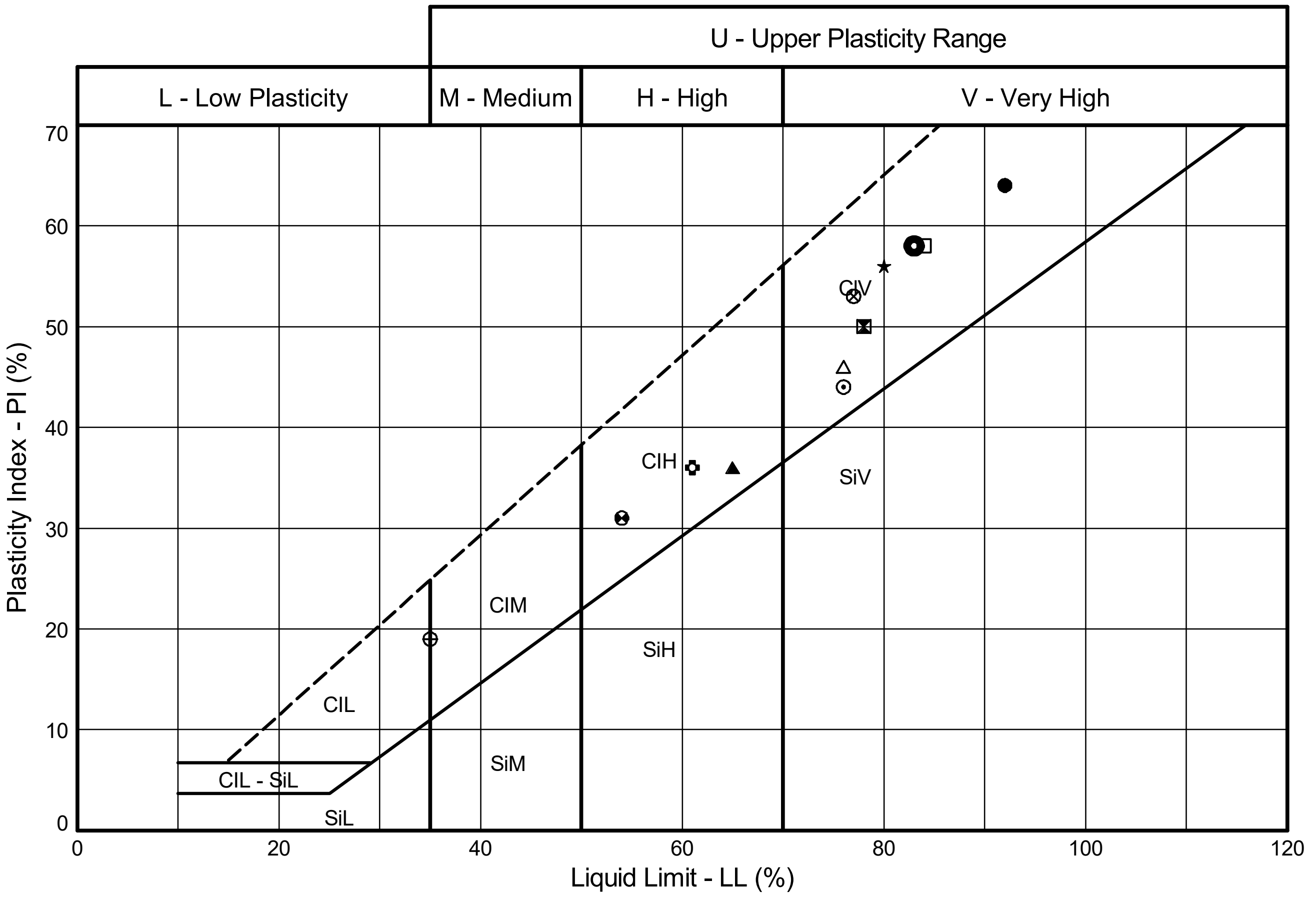
Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU

	Contract:	Job No:
STRUCTURAL SOILS LTD	**Epsom Hospital**	**749557**

AGS

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018



Sample Identification				Test Method #	Preparation Method +	WC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	BH01	D	3.80	5.3/5.5/6.5	5.2.1	35.5	92	28	64	100	B	
⊠	BH01	D	5.00	5.3/5.5/6.5	5.2.1	35.5	78	28	50	100	B	
▲	BH01	D	9.00	5.3/5.5/6.5	5.2.1	32.9	65	29	36	100	B	
★	BH02	D	4.50	5.3/5.5/6.5	5.2.7	30.3	80	24	56	40	B	*
⊙	BH02	D	7.50	5.3/5.5/6.5	5.2.1	46.2	76	32	44	100	B	
✿	BH02	D	11.90	5.3/5.5/6.5	5.2.1	19.4	61	25	36	100	B	
◉	BH03	D	3.80	5.3/5.5/6.5	5.2.1	32.3	83	25	58	100	B	
△	BH03	U	5.00	5.3/5.5/6.5	5.2.1	41.2	76	30	46	99	B	
⊗	BH03	D	8.00	5.3/5.5/6.5	5.2.1	25.2	77	24	53	99	B	
⊕	BH03	D	13.50	5.3/5.5/6.5	5.2.1	18.9	35	16	19	100	B	
☐	BH05	D	6.00	5.3/5.5/6.5	5.2.1	51.6	84	26	58	95	B	
⊗	BH05	D	9.00	5.3/5.5/6.5	5.2.1	28.5	54	23	31	100	B	
	BH05	D	16.00	5.3/5.5/6.5	5.2.1	21.3	NP	NP	NP	99	B	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018

5.3 - Cone Penetrometer Method
5.3.14 - One-Point Cone Penetrometer Method
5.4 - Casagrande Method
5.5 - Plastic Limit Method
6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018.

5.2.1 - Natural State
5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

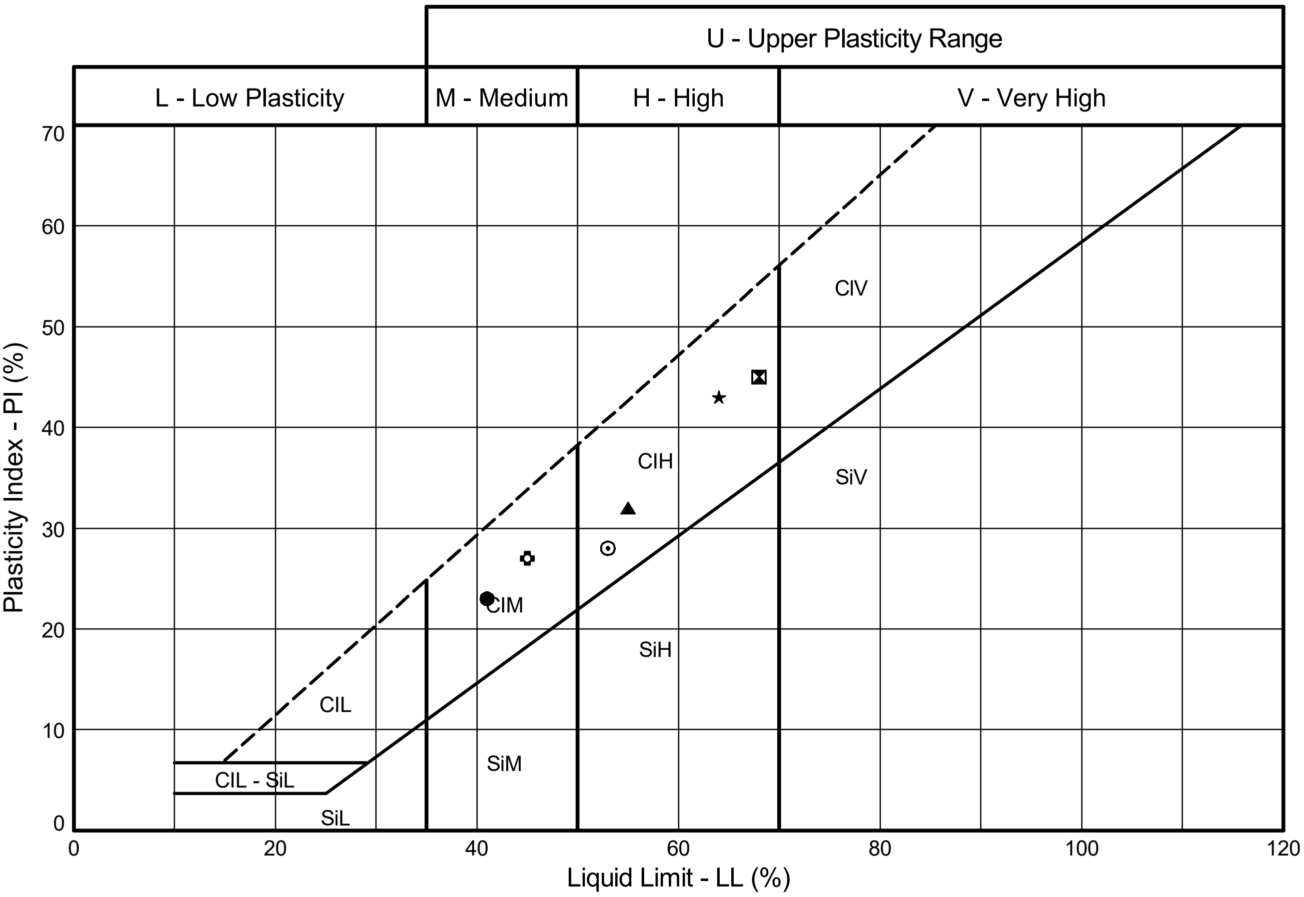
STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By		Date
	THOMAS DAVIES	**20/08/20**

Contract	Contract Ref:
Epsom Hospital	**749557**

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018



	Sample Identification			Test Method #	Preparation Method +	WC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	BH06	D	1.20	5.3/5.5/6.5	5.2.1	20.3	41	18	23	99	B	
⊠	BH06	D	2.80	5.3/5.5/6.5	5.2.1	31.2	68	23	45	99	B	
▲	BH06	D	5.00	5.3/5.5/6.5	5.2.1	30.3	55	23	32	99	B	
★	BH06	D	6.50	5.3/5.5/6.5	5.2.1	27.7	64	21	43	100	B	
⊙	BH06	D	7.75	5.3/5.5/6.5	5.2.1	20.1	53	25	28	100	B	
✿	BH06	D	13.00	5.3/5.5/6.5	5.2.1	20.3	45	18	27	100	B	
	BH06	D	17.50	5.3/5.5/6.5	5.2.1	30.6	NP	NP	NP	100	B	

\# Tested in accordance with the following clauses of BS EN ISO 17892-12:2018

5.3 - Cone Penetrometer Method
5.3.14 - One-Point Cone Penetrometer Method
5.4 - Casagrande Method
5.5 - Plastic Limit Method
6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018.

5.2.1 - Natural State
5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By		Date
	THOMAS DAVIES	**20/08/20**

Contract	Contract Ref:
Epsom Hospital	**749557**

AGS

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892
In accordance with clauses 3.2,4.3,4.4,5.3,5.4 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BH01		D	3.80	35.5	92	28	64	100	Dark grey CLAY
BH01		D	5.00	35.5	78	28	50	100	Grey CLAY
BH01		D	9.00	32.9	65	29	36	100	Grey mottled brown CLAY
BH02		D	4.50	30.3	80	24	56	40	Greyish brown gravelly slightly sandy CLAY
BH02		D	7.50	46.2	76	32	44	100	Grey CLAY
BH02		D	11.90	19.4	61	25	36	100	Brown mottled grey CLAY
BH03		D	3.80	32.3	83	25	58	100	Brownish grey slightly sandy CLAY
BH03		U	5.00	41.2	76	30	46	99	Grey mottled brown slightly gravelly CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD	Contract: **Epsom Hospital**	Contract Ref: **749557**

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892
In accordance with clauses 3.2,4.3,4.4,5.3,5.4 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BH03		D	8.00	25.2	77	24	53	99	Brown mottled grey slightly gravelly CLAY
BH03		D	13.50	18.9	35	16	19	100	Grey mottled dark green sandy CLAY
BH05		D	6.00	51.6	84	26	58	95	Brown slightly gravelly CLAY
BH05		D	9.00	28.5	54	23	31	100	Brown mottled light grey CLAY
BH05		D	16.00	21.3	NP	NP	NP	99	Grey silty SAND
BH06		D	1.20	20.3	41	18	23	99	Brown slightly gravelly sandy CLAY
BH06		D	2.80	31.2	68	23	45	99	Dark grey slightly gravelly CLAY
BH06		D	5.00	30.3	55	23	32	99	Grey mottled brown CLAY

SYMBOLS: * denotes BS 1377

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SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892
In accordance with clauses 3.2,4.3,4.4,5.3,5.4 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BH06		D	6.50	27.7	64	21	43	100	Grey mottled reddish brown CLAY
BH06		D	7.75	20.1	53	25	28	100	Brown mottled grey CLAY
BH06		D	13.00	20.3	45	18	27	100	Grey slightly sandy silty CLAY
BH06		D	17.50	30.6	NP	NP	NP	100	Dark grey sandy SILT

SYMBOLS: * denotes BS 1377

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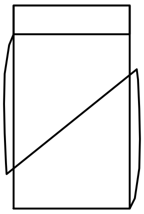
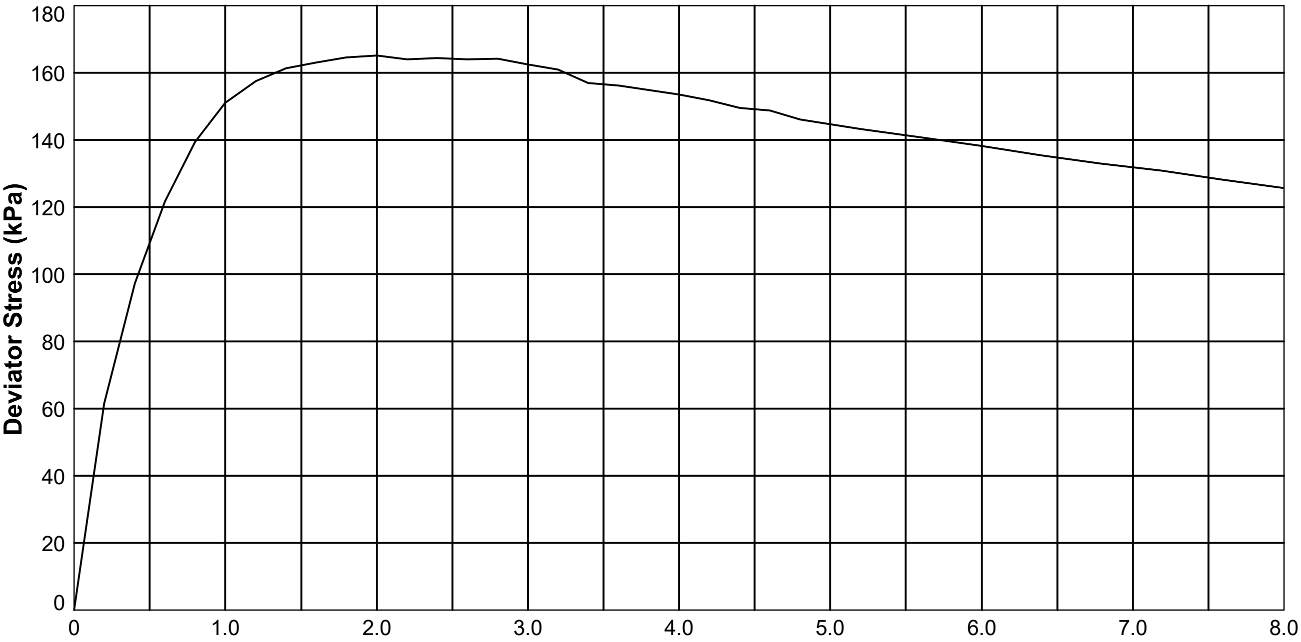
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH01** Sample Ref: Sample Type: **C** Depth (m): **3.96**

Description : **Dark grey CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**75.17**		
	Height (mm)	**152.06**		
	Moisture Content (%)	**48**		
	Bulk Density (Mg/m^3)	**1.73**		
	Dry Density (Mg/m^3)	**1.17**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.37**		
	Rate of Axial Displacement (%/min)	**1.78**		
	Cell Pressure (kPa)	**155**		
	Membrane Correction (kPa)	**0.28**		
	Corrected Deviator Stress (kPa)	**165**		
	Undrained Shear Strength (kPa)	**83**		
FAILURE DETAILS	Strain at Failure (%)	**2.0**		
	Mode of Failure 1 : **Brittle (shear plane)**			



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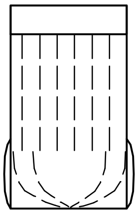
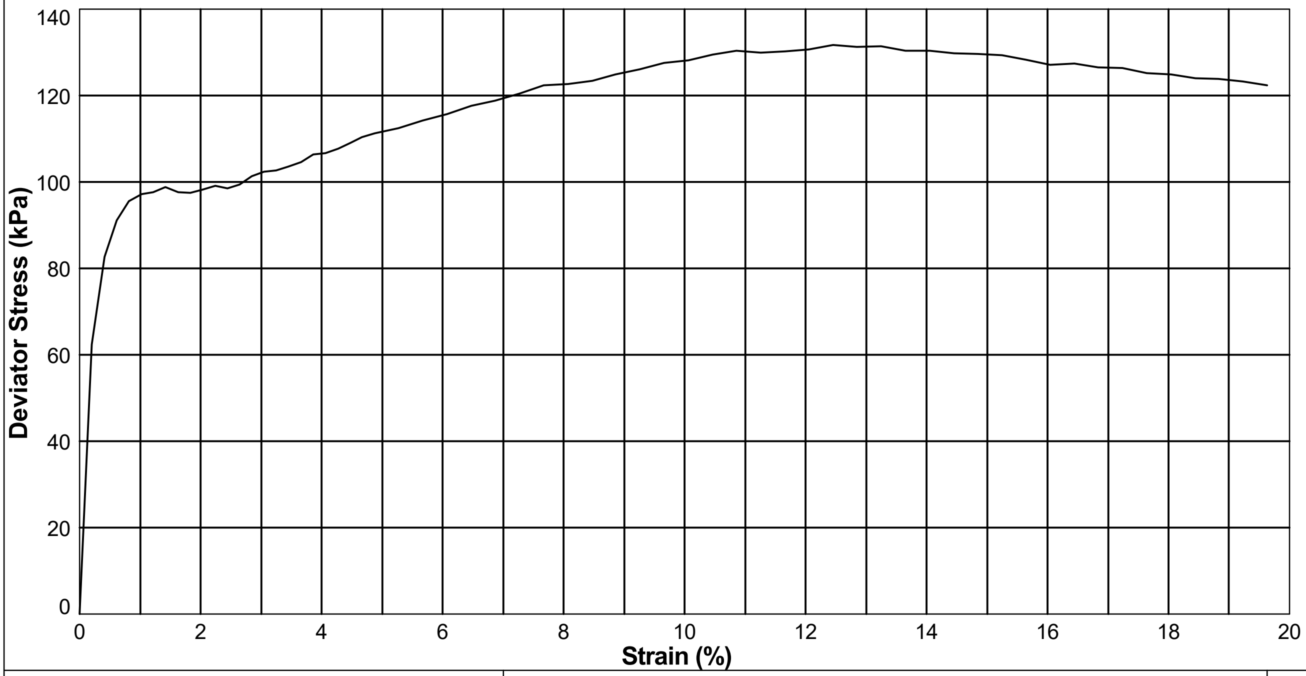
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH01** Sample Ref: Sample Type: **C** Depth (m): **8.64**

Description : **Grey mottled orange and reddish brown CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**100.82**		
	Height (mm)	**201.92**		
	Moisture Content (%)	**30**		
	Bulk Density (Mg/m^3)	**1.97**		
	Dry Density (Mg/m^3)	**1.51**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.26**		
	Rate of Axial Displacement (%/min)	**1.34**		
	Cell Pressure (kPa)	**340**		
	Membrane Correction (kPa)	**0.69**		
	Corrected Deviator Stress (kPa)	**132**		
	Undrained Shear Strength (kPa)	**66**		
FAILURE DETAILS	Strain at Failure (%)	**12.4**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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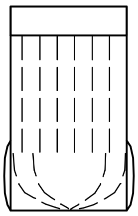
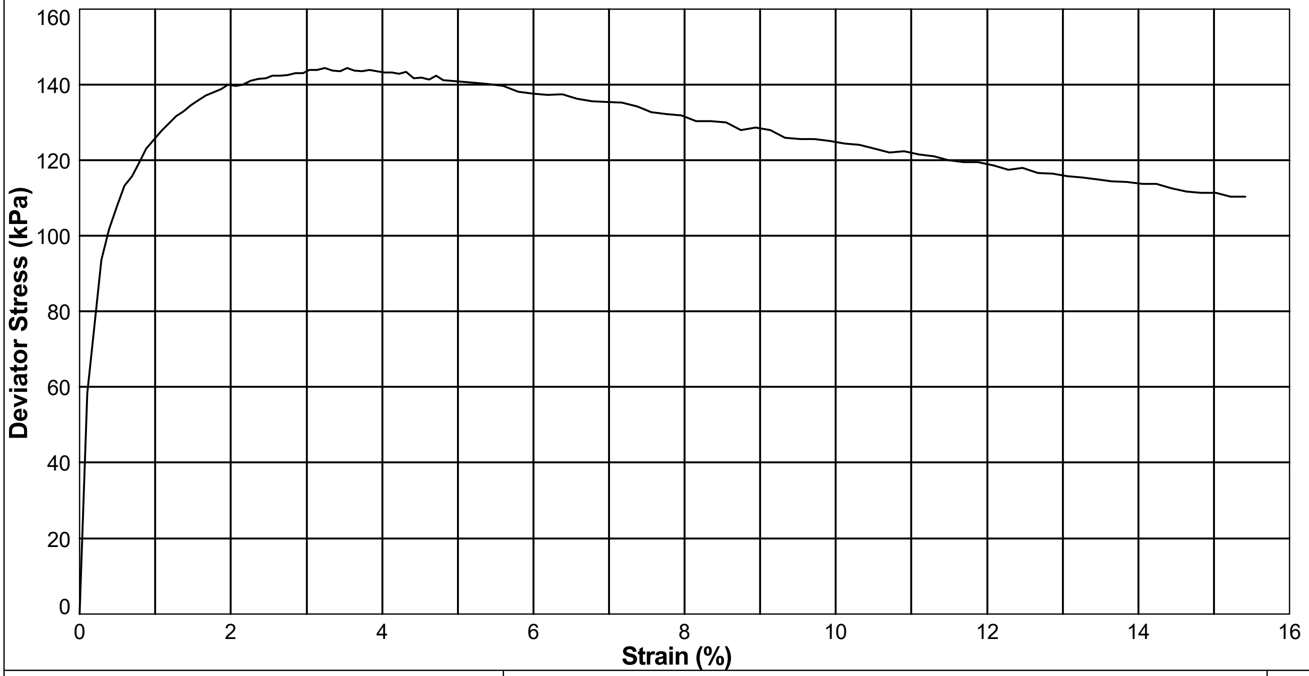
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH01** Sample Ref: Sample Type: **C** Depth (m): **10.95**

Description : **Greyish brown mottled reddish brown, purple and orange CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**101.15**		
	Height (mm)	**201.10**		
	Moisture Content (%)	**24**		
	Bulk Density (Mg/m^3)	**2.07**		
	Dry Density (Mg/m^3)	**1.68**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.26**		
	Rate of Axial Displacement (%/min)	**0.99**		
	Cell Pressure (kPa)	**430**		
	Membrane Correction (kPa)	**0.25**		
	Corrected Deviator Stress (kPa)	**144**		
	Undrained Shear Strength (kPa)	**72**		
FAILURE DETAILS	Strain at Failure (%)	**3.5**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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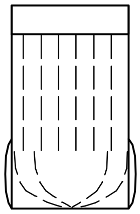
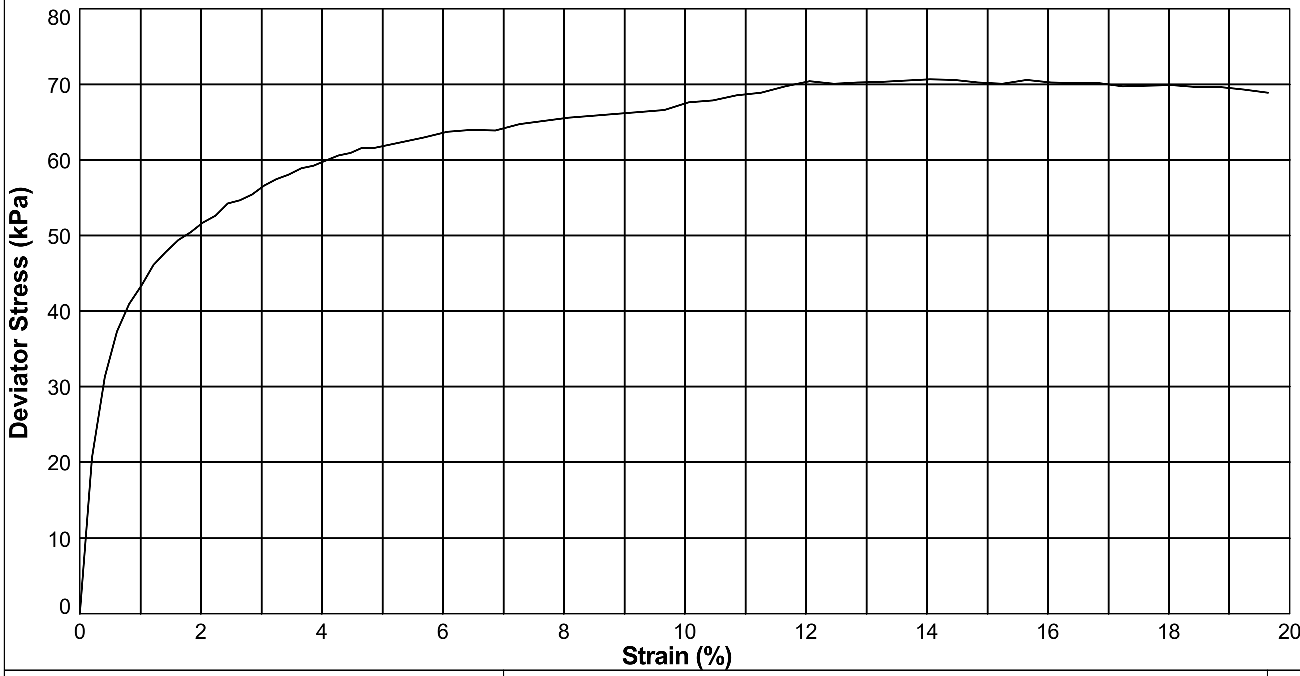
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH02** Sample Ref: Sample Type: **C** Depth (m): **2.77**

Description : **Grey mottled black CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**100.75**		
	Height (mm)	**201.86**		
	Moisture Content (%)	**27**		
	Bulk Density (Mg/m^3)	**1.99**		
	Dry Density (Mg/m^3)	**1.57**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.33**		
	Rate of Axial Displacement (%/min)	**1.34**		
	Cell Pressure (kPa)	**110**		
	Membrane Correction (kPa)	**0.96**		
	Corrected Deviator Stress (kPa)	**71**		
	Undrained Shear Strength (kPa)	**35**		
FAILURE DETAILS	Strain at Failure (%)	**14.0**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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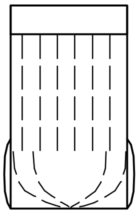
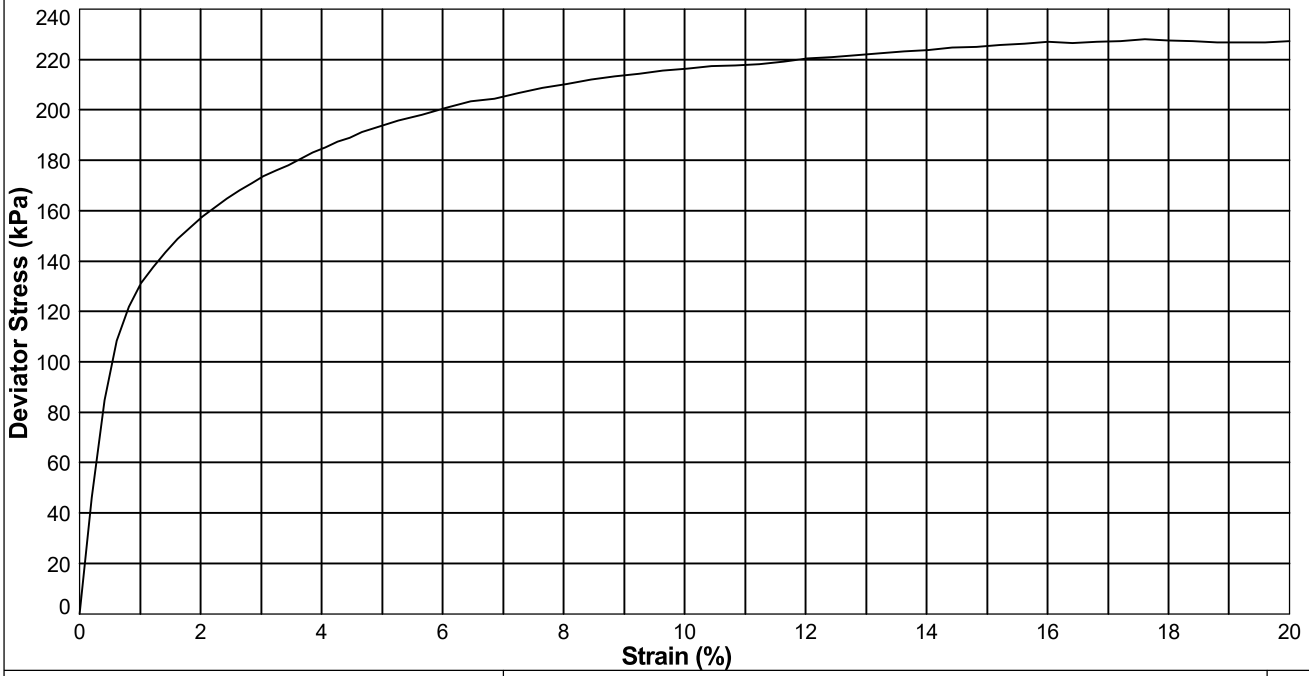
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH02** Sample Ref: Sample Type: **C** Depth (m): **7.52**

Description : **Brown mottled purple, orange and grey CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**98.93**		
	Height (mm)	**202.28**		
	Moisture Content (%)	**23**		
	Bulk Density (Mg/m^3)	**2.03**		
	Dry Density (Mg/m^3)	**1.66**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.30**		
	Rate of Axial Displacement (%/min)	**1.33**		
	Cell Pressure (kPa)	**300**		
	Membrane Correction (kPa)	**0.93**		
	Corrected Deviator Stress (kPa)	**225**		
	Undrained Shear Strength (kPa)	**113**		
FAILURE DETAILS	Strain at Failure (%)	**15.0**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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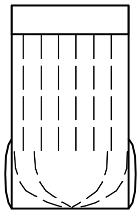
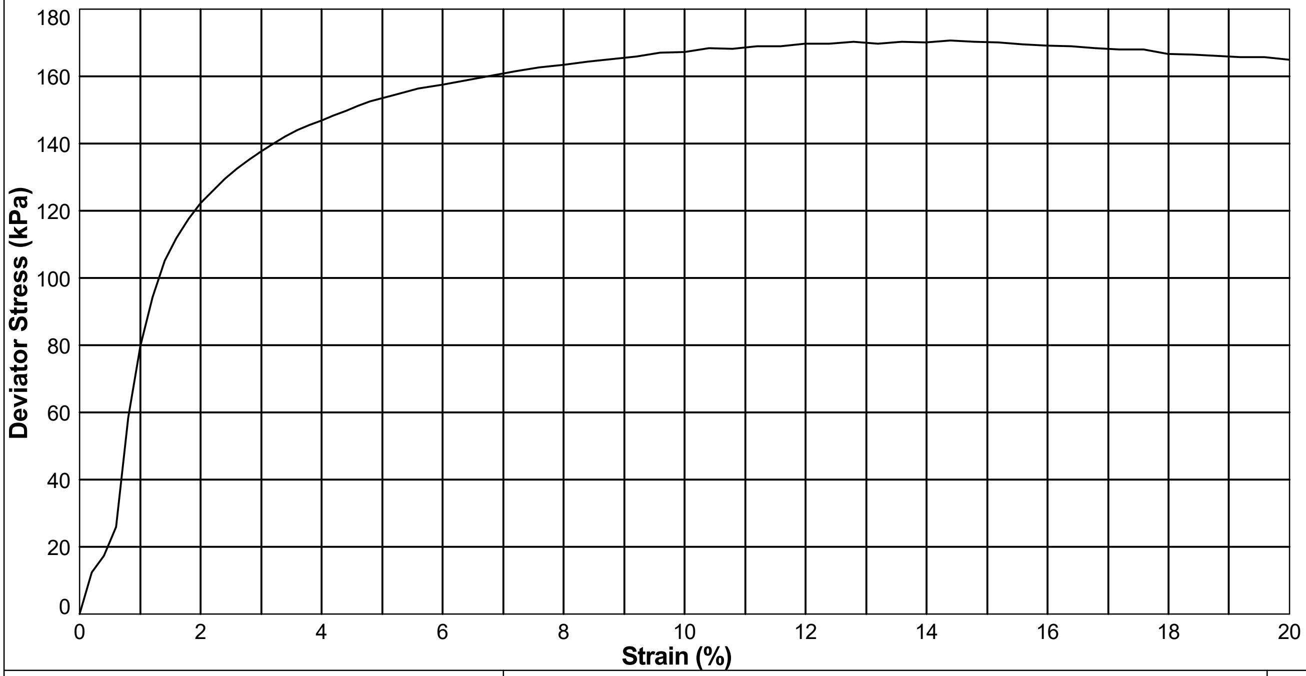
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH02** Sample Ref: Sample Type: **C** Depth (m): **8.16**

Description : **Greenish grey mottled red, purple and yellow silty CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**104.73**		
	Height (mm)	**197.61**		
	Moisture Content (%)	**27**		
	Bulk Density (Mg/m^3)	**1.87**		
	Dry Density (Mg/m^3)	**1.47**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.26**		
	Rate of Axial Displacement (%/min)	**1.37**		
	Cell Pressure (kPa)	**320**		
	Membrane Correction (kPa)	**0.74**		
	Corrected Deviator Stress (kPa)	**171**		
	Undrained Shear Strength (kPa)	**85**		
FAILURE DETAILS	Strain at Failure (%)	**14.4**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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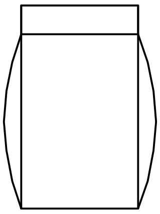
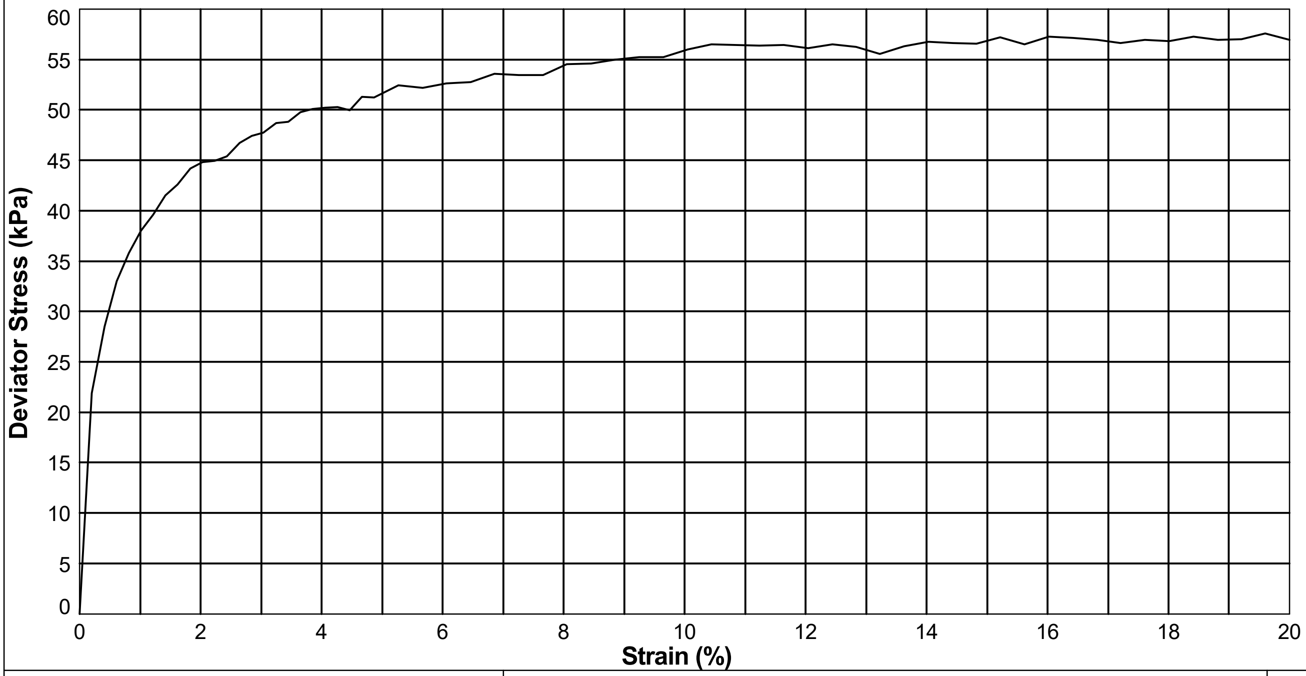
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH02** Sample Ref: Sample Type: **C** Depth (m): **9.24**

Description : **Yellowish brown mottled brown CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**102.37**		
	Height (mm)	**202.21**		
	Moisture Content (%)	**37**		
	Bulk Density (Mg/m^3)	**1.94**		
	Dry Density (Mg/m^3)	**1.42**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.36**		
	Rate of Axial Displacement (%/min)	**1.34**		
	Cell Pressure (kPa)	**360**		
	Membrane Correction (kPa)	**1.08**		
	Corrected Deviator Stress (kPa)	**57**		
	Undrained Shear Strength (kPa)	**28**		
FAILURE DETAILS	Strain at Failure (%)	**15.0**		
	Mode of Failure 1 : **Plastic (Barrelling)**			



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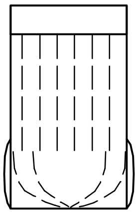
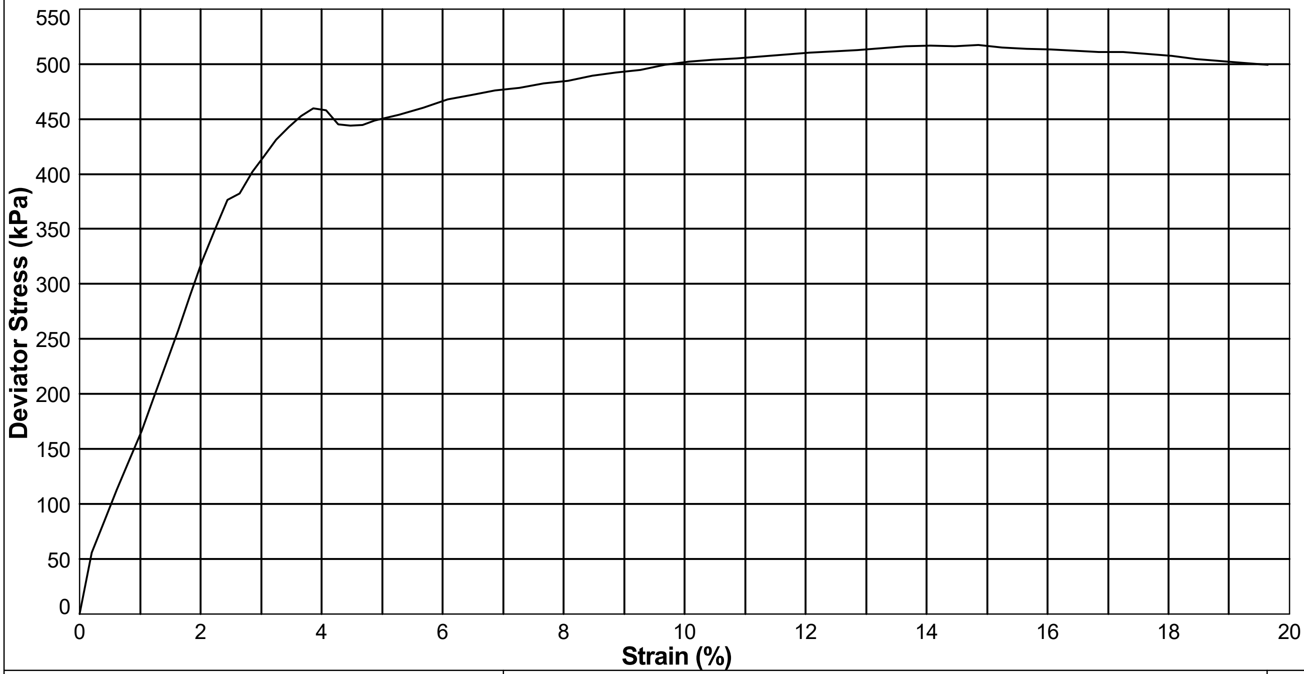
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH02** Sample Ref: Sample Type: **C** Depth (m): **11.03**

Description : **Brown mottled grey CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	99.81		
	Height (mm)	201.80		
	Moisture Content (%)	17		
	Bulk Density (Mg/m^3)	2.17		
	Dry Density (Mg/m^3)	1.86		
TEST DETAILS	Membrane Type	Rubber		
	Membrane Thickness (mm)	0.24		
	Rate of Axial Displacement (%/min)	1.34		
	Cell Pressure (kPa)	440		
	Membrane Correction (kPa)	0.73		
	Corrected Deviator Stress (kPa)	517		
	Undrained Shear Strength (kPa)	259		
FAILURE DETAILS	Strain at Failure (%)	14.9		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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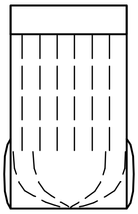
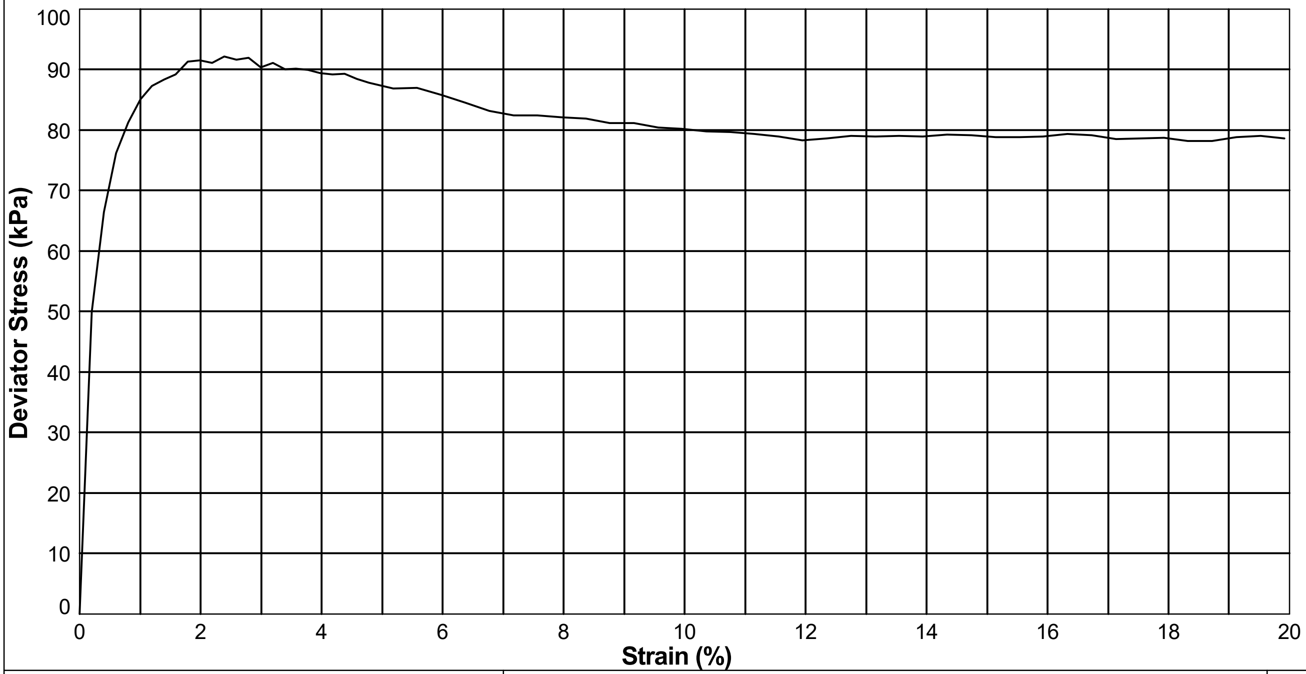
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH03** Sample Ref: Sample Type: **C** Depth (m): **4.64**

Description : **Dark grey slightly gravelly CLAY**

STAGE NUMBER			**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**96.88**		
	Height	(mm)	**205.97**		
	Moisture Content	(%)	**34**		
	Bulk Density	(Mg/m^3)	**1.90**		
	Dry Density	(Mg/m^3)	**1.41**		
TEST DETAILS	Membrane Type		**Rubber**		
	Membrane Thickness	(mm)	**0.24**		
	Rate of Axial Displacement	(%/min)	**1.31**		
	Cell Pressure	(kPa)	**185**		
	Membrane Correction	(kPa)	**0.17**		
	Corrected Deviator Stress	(kPa)	**92**		
	Undrained Shear Strength	(kPa)	**46**		
FAILURE DETAILS	Strain at Failure	(%)	**2.4**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**				



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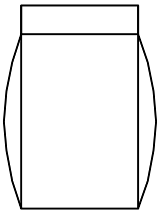
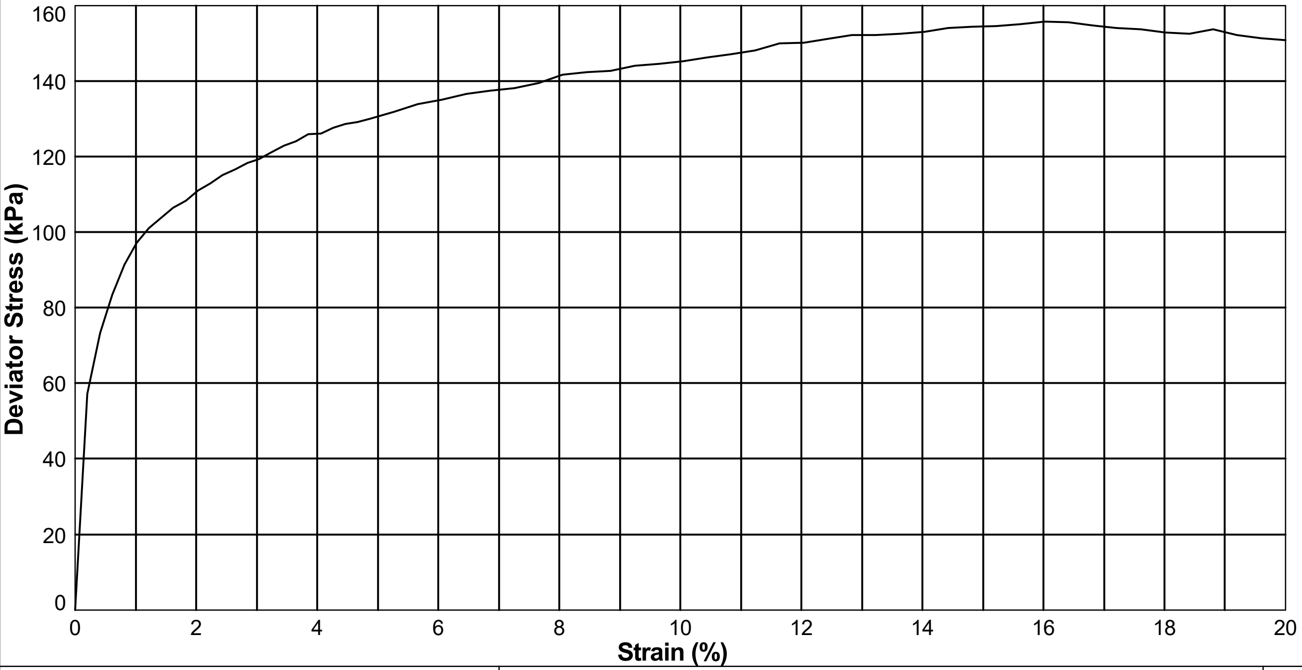
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH03** Sample Ref: Sample Type: **C** Depth (m): **7.53**

Description : **Brown mottled reddish brown and grey CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**100.39**		
	Height (mm)	**202.25**		
	Moisture Content (%)	**28**		
	Bulk Density (Mg/m^3)	**1.96**		
	Dry Density (Mg/m^3)	**1.53**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.26**		
	Rate of Axial Displacement (%/min)	**1.33**		
	Cell Pressure (kPa)	**300**		
	Membrane Correction (kPa)	**0.79**		
	Corrected Deviator Stress (kPa)	**154**		
	Undrained Shear Strength (kPa)	**77**		
FAILURE DETAILS	Strain at Failure (%)	**15.0**		
	Mode of Failure 1 : **Plastic (Barrelling)**			



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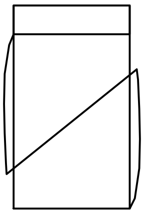
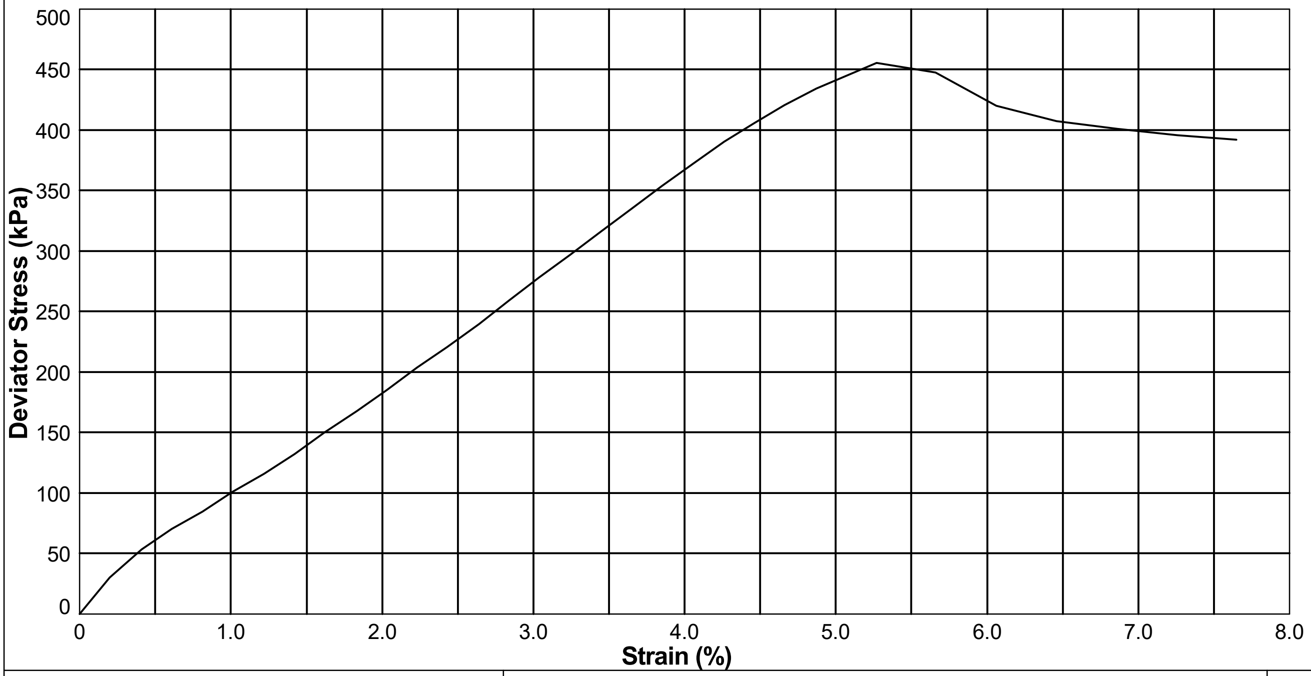
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH03** Sample Ref: Sample Type: **C** Depth (m): **18.50**

Description : **Dark grey sandy CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**101.61**		
	Height (mm)	**202.29**		
	Moisture Content (%)	**25**		
	Bulk Density (Mg/m^3)	**1.97**		
	Dry Density (Mg/m^3)	**1.57**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.31**		
	Rate of Axial Displacement (%/min)	**1.33**		
	Cell Pressure (kPa)	**700**		
	Membrane Correction (kPa)	**0.43**		
	Corrected Deviator Stress (kPa)	**455**		
	Undrained Shear Strength (kPa)	**228**		
FAILURE DETAILS	Strain at Failure (%)	**5.3**		
	Mode of Failure 1 : **Brittle (shear plane)**			



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Contract: **Epsom Hospital**

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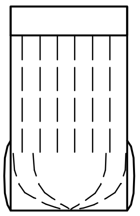
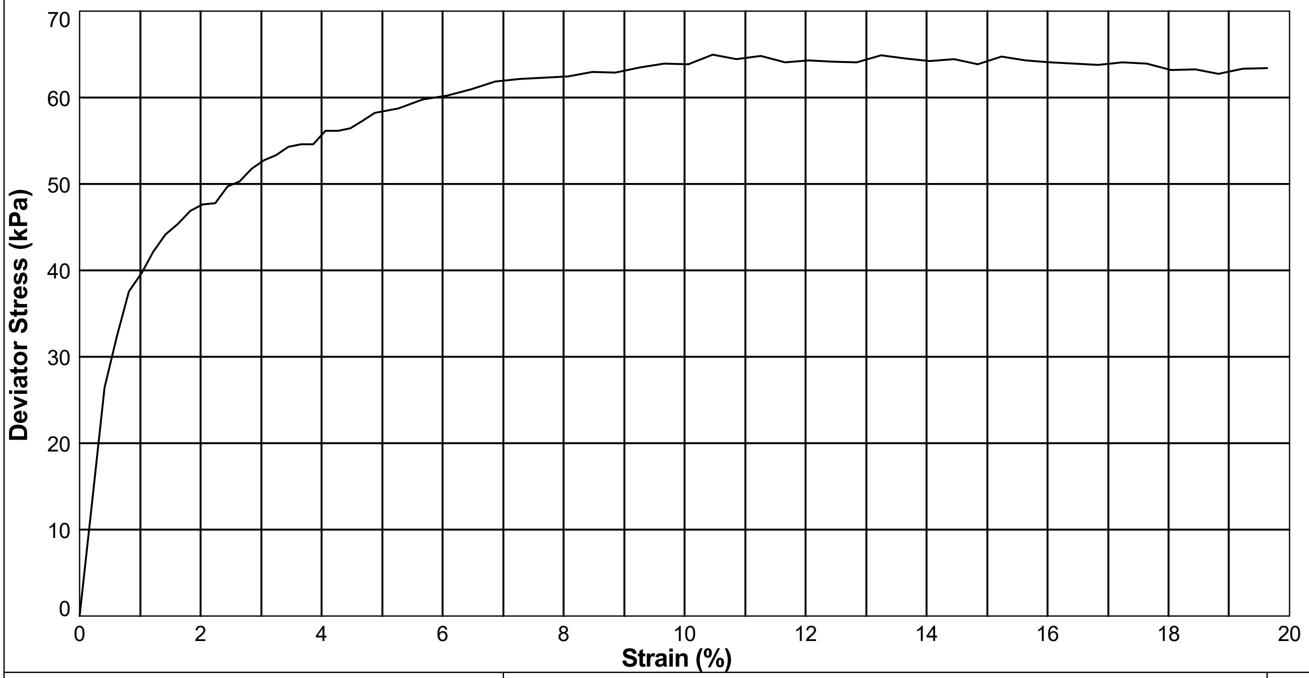
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH06** Sample Ref: Sample Type: **C** Depth (m): **3.53**

Description : **Dark grey CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**101.00**		
	Height (mm)	**201.92**		
	Moisture Content (%)	**28**		
	Bulk Density (Mg/m^3)	**1.97**		
	Dry Density (Mg/m^3)	**1.54**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.36**		
	Rate of Axial Displacement (%/min)	**1.34**		
	Cell Pressure (kPa)	**140**		
	Membrane Correction (kPa)	**0.85**		
	Corrected Deviator Stress (kPa)	**65**		
	Undrained Shear Strength (kPa)	**32**		
FAILURE DETAILS	Strain at Failure (%)	**10.5**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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Contract

Epsom Hospital

Contract Ref:

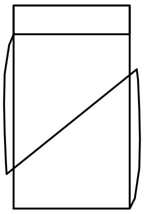
749557

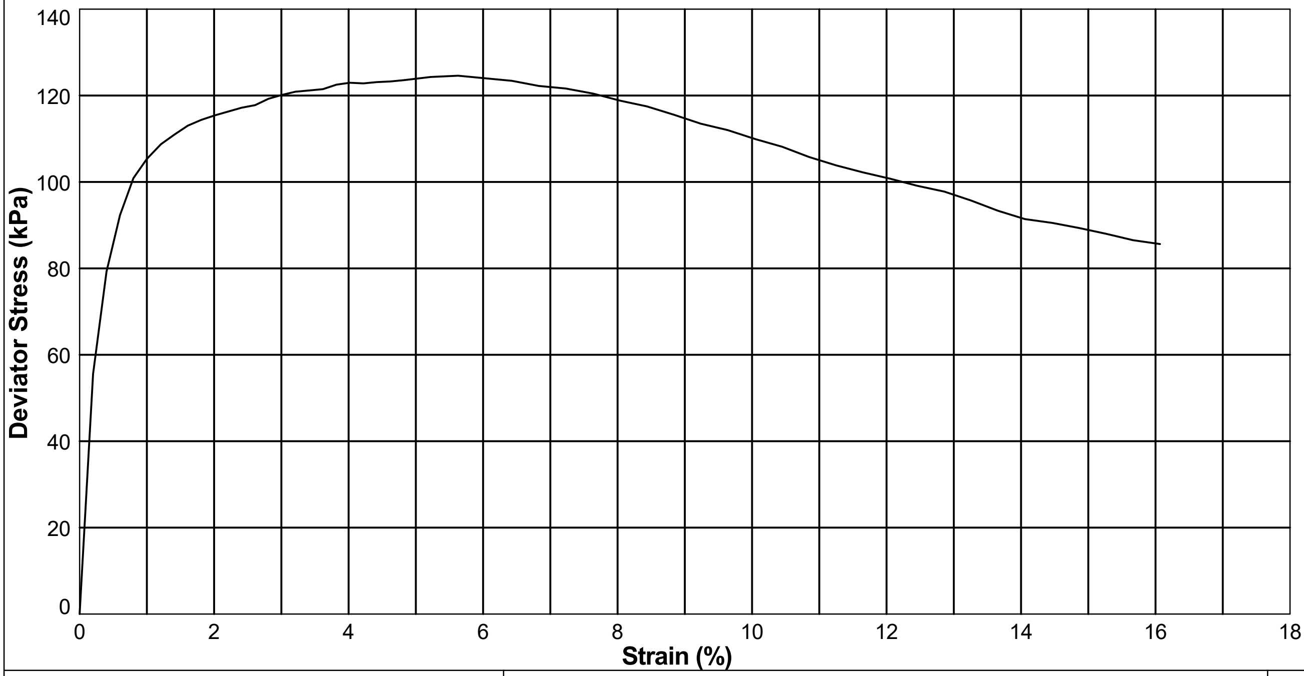
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH06** Sample Ref: Sample Type: **C** Depth (m): **4.07**

Description : **Dark grey mottled black CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**97.01**		
	Height (mm)	**196.62**		
	Moisture Content (%)	**30**		
	Bulk Density (Mg/m^3)	**1.92**		
	Dry Density (Mg/m^3)	**1.48**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.30**		
	Rate of Axial Displacement (%/min)	**1.37**		
	Cell Pressure (kPa)	**160**		
	Membrane Correction (kPa)	**0.46**		
	Corrected Deviator Stress (kPa)	**125**		
	Undrained Shear Strength (kPa)	**62**		
FAILURE DETAILS	Strain at Failure (%)	**5.6**		
	Mode of Failure 1 : **Brittle (shear plane)**			



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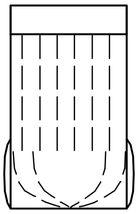
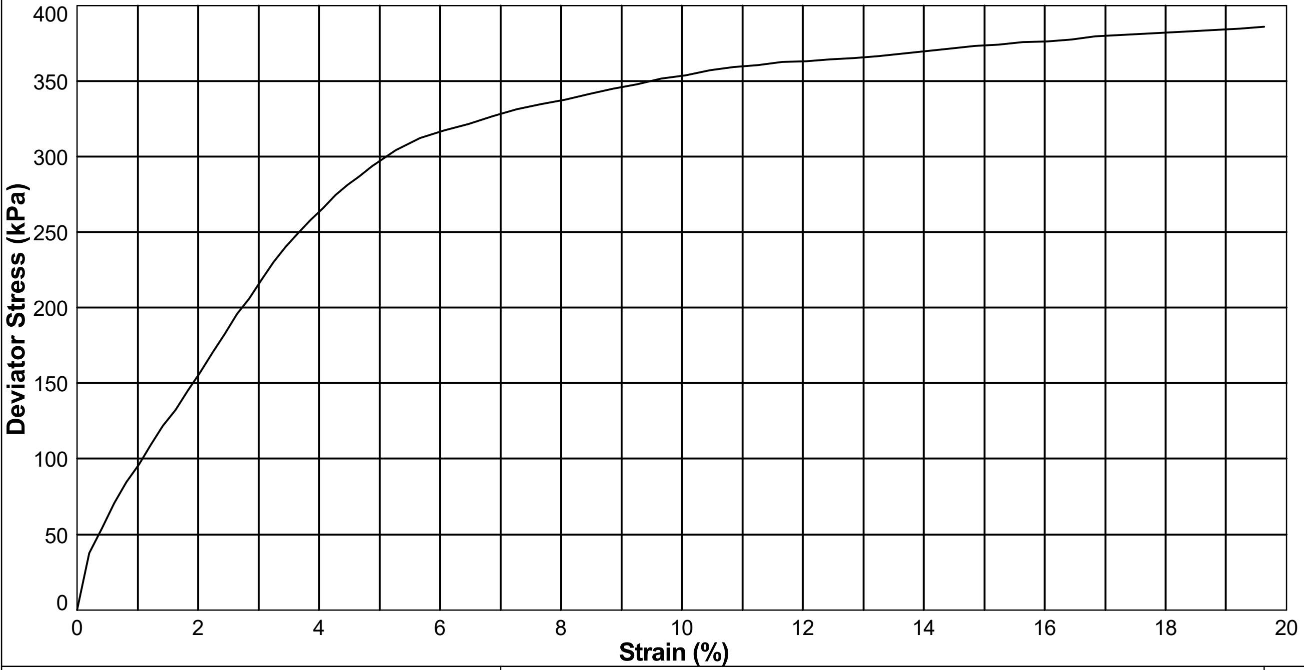
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH06** Sample Ref: Sample Type: **C** Depth (m): **6.48**

Description : **Grey mottled brown CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**100.91**		
	Height (mm)	**201.92**		
	Moisture Content (%)	**17**		
	Bulk Density (Mg/m^3)	**2.18**		
	Dry Density (Mg/m^3)	**1.86**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.45**		
	Rate of Axial Displacement (%/min)	**1.34**		
	Cell Pressure (kPa)	**255**		
	Membrane Correction (kPa)	**1.37**		
	Corrected Deviator Stress (kPa)	**374**		
	Undrained Shear Strength (kPa)	**187**		
FAILURE DETAILS	Strain at Failure (%)	**15.0**		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**			



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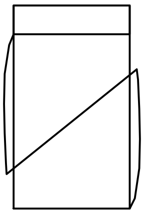
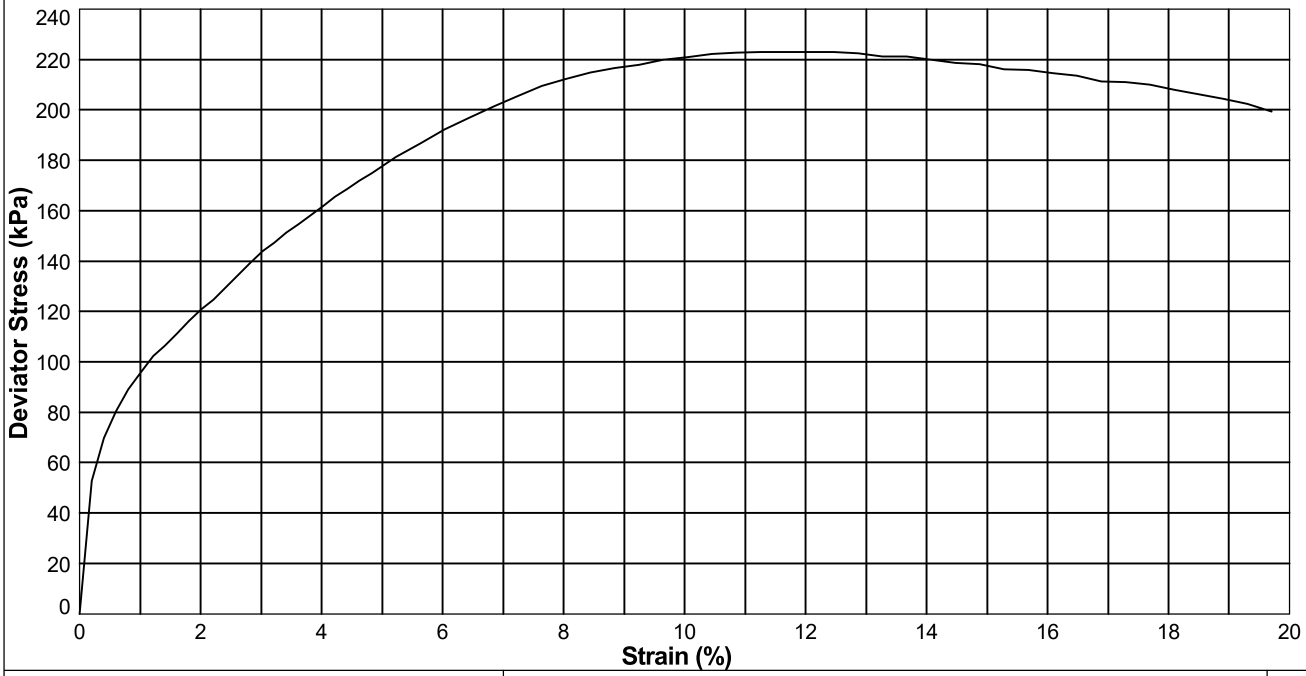
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Borehole: **BH06** Sample Ref: Sample Type: **D** Depth (m): **7.75**

Description : **Brown mottled grey CLAY**

STAGE NUMBER		**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition	**Undisturbed**		
	Orientation of sample	**Vertical**		
	Diameter (mm)	**100.15**		
	Height (mm)	**196.48**		
	Moisture Content (%)	**20**		
	Bulk Density (Mg/m^3)	**2.11**		
	Dry Density (Mg/m^3)	**1.76**		
TEST DETAILS	Membrane Type	**Rubber**		
	Membrane Thickness (mm)	**0.45**		
	Rate of Axial Displacement (%/min)	**1.37**		
	Cell Pressure (kPa)	**310**		
	Membrane Correction (kPa)	**1.15**		
	Corrected Deviator Stress (kPa)	**223**		
	Undrained Shear Strength (kPa)	**112**		
FAILURE DETAILS	Strain at Failure (%)	**11.7**		
	Mode of Failure 1 : **Brittle (shear plane)**			



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SUMMARY OF SATURATED MOISTURE CONTENT OF CHALK TESTS

In accordance with clause 3.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Number of Lumps	Moisture Content %	Bulk Density Mg/m^3	Dry Density Mg/m^3	Saturated Moisture Content %	Description of Sample	Lab location
BH05		C	22.65	1	23	2.01	1.63	24	White CHALK	**B**
BH05		C	25.95	1	23	2.03	1.65	24	White CHALK	**B**

* denotes the average values from multiple lumps

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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SUMMARY OF POROSITY TESTS

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Dry Density kg/m^3	Porosity %	Test Method	Description	Lab location
BH05		C	22.65	1640	40	Clause 3	White CHALK	**B**
BH05		C	25.95	1640	40	Clause 3	White CHALK	**B**

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

Key: Clause 3 = Saturation and buoyancy method

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Contract: **Epsom Hospital**

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EPSOM HOSPITAL

SOIL INVESTIGATION

CPT REPORT

Cone penetration test
Geotechnical data interpretation

Project ref.: P-107437-1

PROJECT:	Epsom Hospital

CLIENT:	Hydrock

FIELDWORK

CPT rig(s)	31.0-tonne wheeled CPT unit (UK17)
Date fieldwork started	8th June 2020
Date fieldwork completed	8th June 2020
Lankelma's representative	Emma Stickland
Client's representative	Simon Calkin

REPORT

Status	Revision	Action	Date	Name
Final	00	**Completed**	20/07/20	Chris Player
		Checked	20/07/20	Emma Stickland
		Approved	20/07/20	Joseph Hobbs

CONTENTS

1 INTRODUCTION

At the request of Hydrock, a soils investigation was carried out on project *Epsom Hospital*.

Site location:

(In the general region of)

Epsom & St. Helier University Hospital
Woodcote Green Road
Epsom
KT18 7EG

2 DISCLAIMER

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

Lankelma has exercised reasonable skill, care and diligence in the fieldwork and preparation of this report. This report has been completed based on information available to Lankelma at the time of preparation. The measurement and interpreted data in this report do not constitute recommendations for design purposes. An appropriately qualified person must review and interpret the data given in this report, together with any assumptions we have made that affect the data, before using the data for design or recommendation.

Lankelma accepts no responsibility for the accuracy or appropriateness of any assumptions, derived soil parameters, soil descriptions or soil unit boundaries contained in this report.

3 COMPLETED WORKS

- 9 nr. cone penetration tests (CPT) without piezo measurement
- Factual report including point data interpretation of selected parameters

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

4 FIELDWORK GENERAL

Fieldwork was performed with a 31.0-tonne wheeled CPT unit (UK17) equipped with a 27-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 6 m below ground level or until cone refusal was reached. Table 1 details the final test depths and reasons for test termination (r*efusal factor).* Where penetration refusal was encountered the termination depth was advised to, and agreed with, the Client's on-site representative.

5 CONE PENETRATION TESTS

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

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

The penetrometer was calibrated in accordance with BS8422:2003 and ASTM E74-13a. The management of calibration records is in accordance with ISO 10012. Copies of all calibration certificates for the cones used are provided in Appendix B.

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

5.1 GLOSSARY OF CPT TERMS AND SYMBOLS

SYMBOLS & ABBREVIATIONS

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

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

<u>TERMS</u>

Cone or 'tip': The conical tip of the cone penetrometer.

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

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

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

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

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

5.2 CPT DATA REDUCTION AND PRESENTATION

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

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

For tests without u_2 pore pressure measurement it is not possible to derive the corrected tip resistance which is found from the formula:

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

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

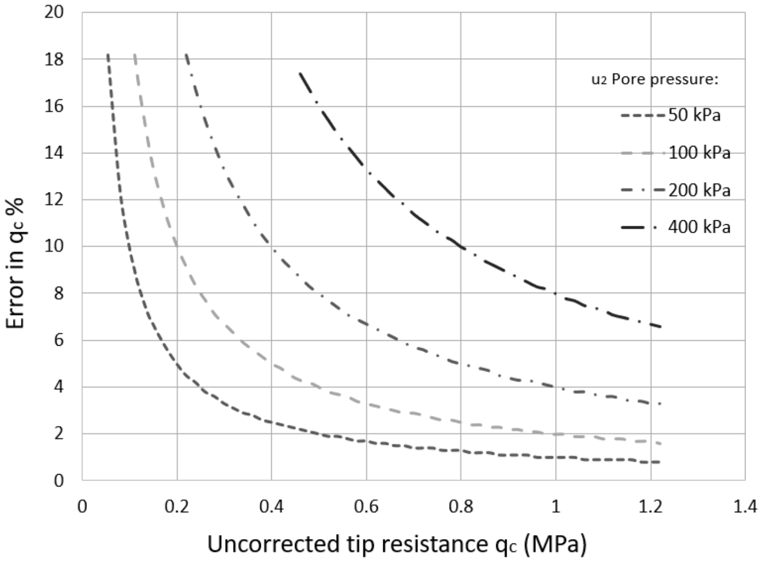

Figure 5-1 Uncorrected tip with measured tip resistance

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

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

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

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

5.3 IN-SITU STRESS CONDITIONS

An estimate of the equilibrium pore pressure and total and effective vertical stress states is necessary as they are applied in many derived parameters obtained from the CPT and dissipation test.

The total vertical stress with depth was calculated as the sum of the calculated soil unit weight above a given depth. See section 5.4 for information on the empirical estimate of soil unit weight.

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

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

5.4 SOIL UNIT WEIGHT

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

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

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

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

5.5 SOIL BEHAVIOUR TYPE

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

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

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

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

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

The layer boundaries are manually interpreted based on broad changes in SBT classification or variance with depth. Once layer boundaries are defined, the SBT zones classified within each layer are listed together with the corresponding percentage of data points within the layer, for example - 'Clay to silty clay [74%]; Silt to clayey silt [20%]'. It is important to consider that the classification zone boundaries do not exist in reality and small shifts in the cone response can lead multiple classifications within layers of relatively uniform behaviour; especially were the layer data plot close to triple junctions and/or has spurious spikes or very thin layers. Therefore, some system to limit the number of classified zones is usually necessary. The logic used by Lankelma for each layer is:

For LPC >= 85, RC = 1
For LPC >= 40, RC = 2
For LPC < 40, RC = 3

Where
LPC = Largest % SBT zone classification within the layer
RC = Number of reported SBT zone classifications for the layer

For layers having a thickness of less than 1 m then 20% of data at the top and bottom of the layer are excluded to limit the effect of transition zone data (mobilised resistance influenced by overlying or underlying strata) being included in the classification.

The continuous SBT index I_c is reported alongside the layer classification to compensate for the remaining unreported classifications, and to describe the distribution of SBT classification within the layer.

An alternative to this system is to classify each data point using coloured bars. However, the zones where the classification is known to be incorrect (very thin layers, transition zones etc) are left included and may be misinterpreted.

The results are presented in Appendix D.

5.6 SOIL BEHAVIOUR TYPE INDEX - I_C

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

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

The basis of I_c and its approximation of the original chart classification zones may be seen from Appendix B figure 'CPT Soil Behaviour Type Chart'. The method does not identify zones 1 (*sensitive fine grained)* and zones 8 & 9 (*overconsolidated or cemented*) which shall be reported in the layer analysis where they form a significant proportion of the layer.

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

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

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

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

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

The results are presented in Appendix D.

5.7 RELATIVE DENSITY

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

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

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

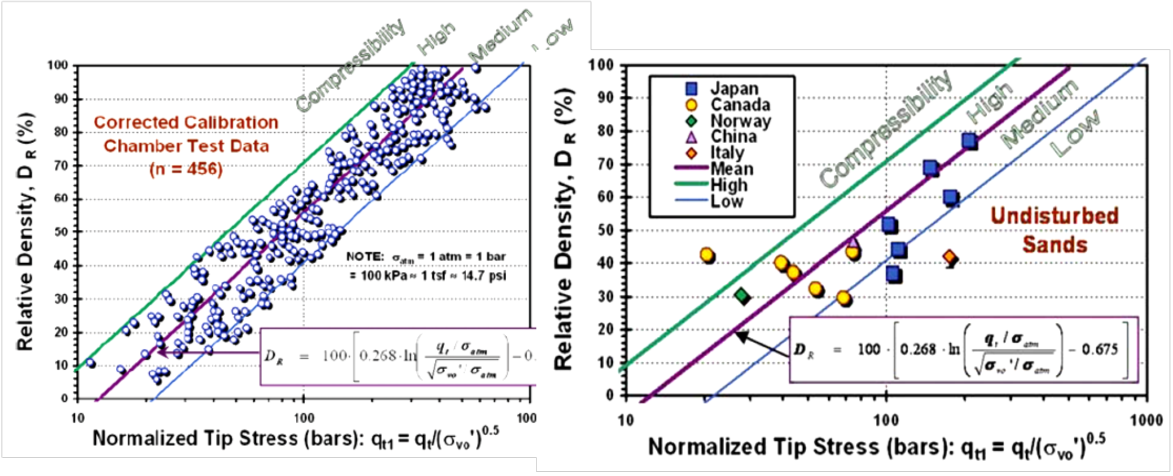

Figure 5-2 Relative density with normalised tip stress and sand compressibility from calibration chamber tests (left) and undisturbed frozen samples (right). Jamiolkowski *et al.* (2001). Reproduced from Mayne (2007).

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

5.8 UNDRAINED SHEAR STRENGTH

The undrained shear strength s_u is usually estimated as a factor of net cone tip resistance (Lunne *et al*, 1981):

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

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

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

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

Clay Group	Number of sites	No. Data	Correlation Coefficient r_2	Factor N_{kt}	Mean Pore Pressure Parameter B_q
Offshore NC-LOC	17	115	0.98	12.32	0.51
Onshore NC-LOC	30	191	0.867	12	0.53
Sensitive NC-LOC	5	43	0.507	10.33	0.84
OC Intact	5	36	0.862	13.57	0.49
OC Fissured	5	22	0.393	22.47	-0.01
All clays	62	407	0.923	13.33	0.55

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

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

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

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

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

The estimate based on B_q is presented as 's_u5' on the parameter plots and is only suitable for tests that have a high-quality pore pressure data, often indicated by a positive, repeatable and dynamic response. For tests that have a reliable pore pressure response throughout, the evaluation on a point by point basis is warranted. For projects with variable response quality and with possible piezo desaturation (for example in the unsaturated zone or by dilation/cavitation) it is preferable to identify zones with reliable pore pressure response for representative soils and select a characteristic value of B_q for evaluation of N_{kt}. Lankelma are not always in view of the effort that has been made in preparation of the test location to maintain saturation of the piezo sensor.

Note: N_{kt} (with subscript 't') indicates a N_k factor that has been established using the corrected tip resistance q_t. N_{kt} can be applied to the uncorrected tip resistance q_c (non-piezocone tests) but results in a slightly lower estimate of s_u depending on the correction magnitude (q_c - q_t) in lower strength soils.

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

5.9 OVERCONSOLIDATION RATIO

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

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

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

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

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

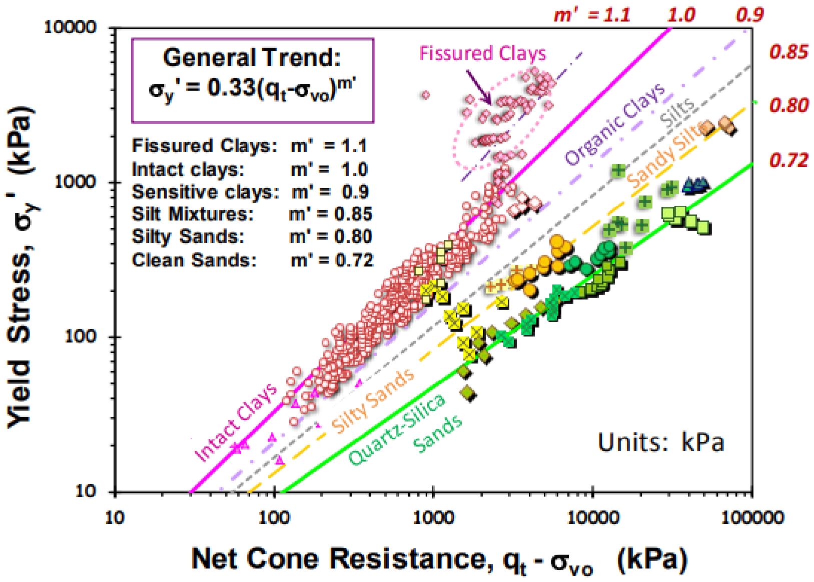

Figure 5-3 Preconsolidation stress with net cone resistance power law, reproduced from Mayne (2014).

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

5.10 SPT N60 VALUES

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

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

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

Method 2 - Robertson (2012)

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

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

The results are presented in Appendix D.

5.11 FRICTION ANGLE

Sands

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

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

Where:

ϕ' = Peak friction angle (degrees)

q_{t1} = stress normalised cone resistance =

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

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

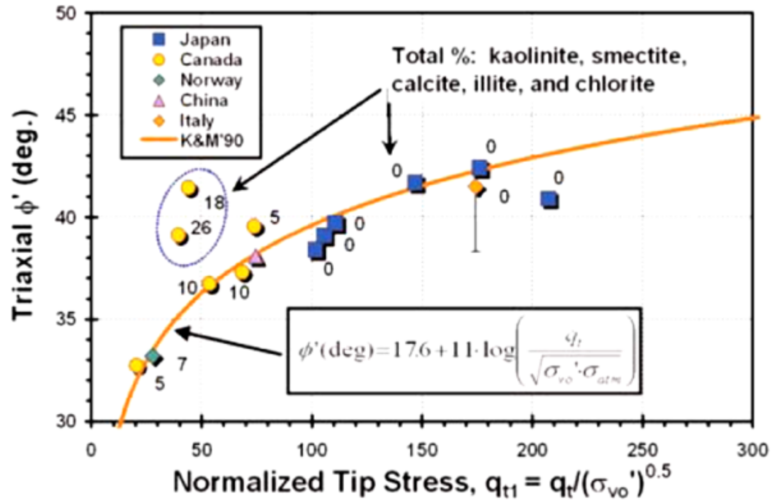

Figure 5-4 Peak triaxial friction angle from undisturbed sands with normalised cone resistance.

Fine grained soils

The effective friction angle for fine grained soils was calculated based on the Senneset *et al.* (1988, 1989) method by applying the approximate closed form solution by Mayne & Campanella (2005) as a direct function of the pore pressure parameter Bq and normalised tip resistance Q. The method is applicable where $0.1 < B_q < 1.0$ and $20° < ϕ' < 45°$and generally appropriate for non-cemented NC-LOC soils.

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

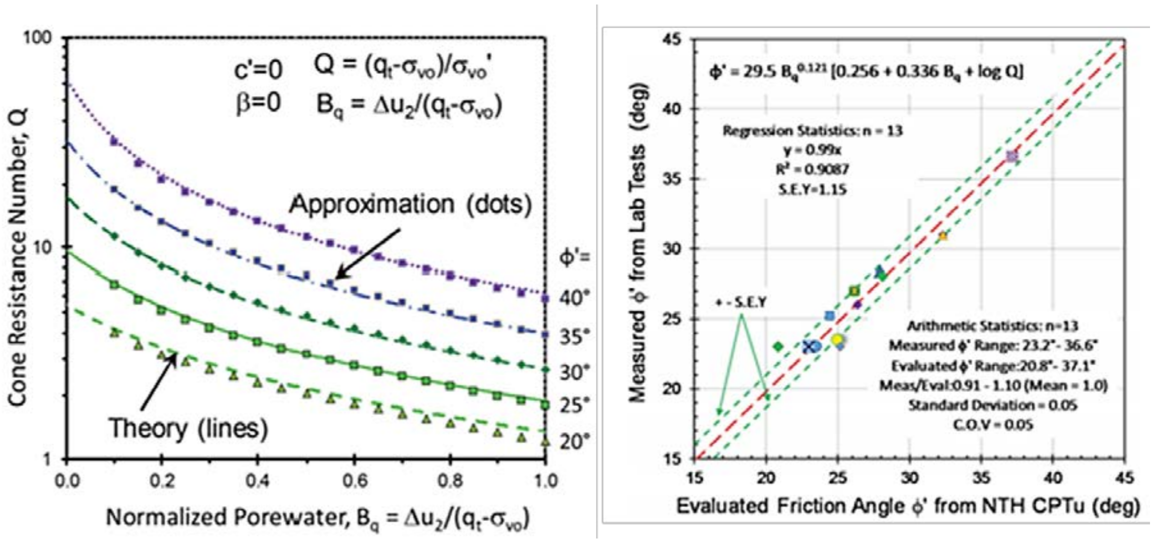

Figure 5-5 [Left] Theoretical curves with function approximation (dots) overlay [Right] calibration data from geotechnical centrifuge tests for a variety of soils. Redrawn from Ouyang & Mayne (2018).

The results are presented in Appendix E.

5.12 COEFFICIENT OF VOLUME CHANGE

Coefficient of volume change (m_v) defined as the inverse of the constrained modulus (M), is evaluated for all soil types using the constrained modulus method proposed by Mayne (2006) cited in Mayne (2007) applicable to the present state of vertical effective stress up to the pre-consolidation stress.

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

Where:

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

$$\alpha = 5$$

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

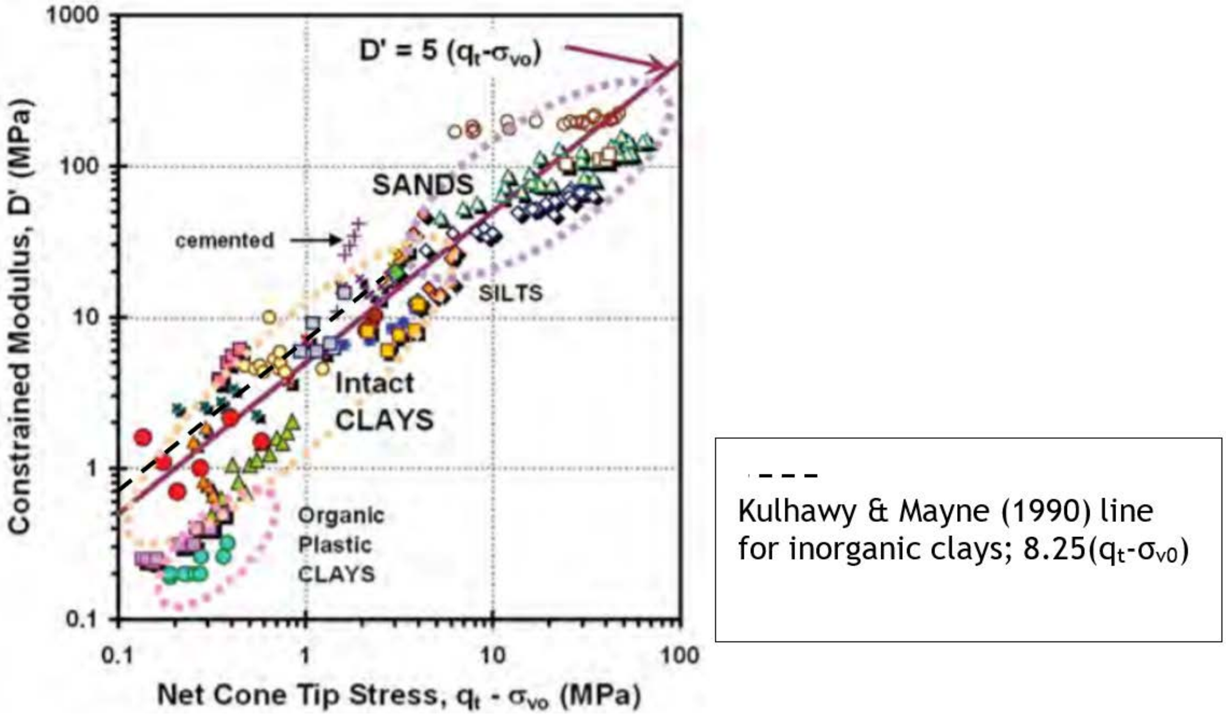

Figure 5-6 Constrained modulus of Mayne (2006). Annotated/redrawn from NCHRP Synthesis 368 (2007).

The results are presented in Appendix D.

5.13 YOUNG'S MODULUS

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

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

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

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

The results are presented in Appendix E.

6 CPT INTERPRETATION NOTES

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

DRAINED AND UNDRAINED SOIL BEHAVIOUR

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

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

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

DYNAMIC PORE PRESSURE (CPTu)

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

If the system becomes desaturated it may or may not re-saturate at higher excess pressures later in the test. The pore pressure response in saturated contractive soils normally have a dynamic ‘peaky’ appearance.

The tip resistance in lower strength contractive soils without pore pressure measurement in the u_2 position is likely to be significantly lower than the equivalent corrected tip resistance depending on the magnitude of excess pore pressure generated during penetration.

CONE TIP AND SLEEVE OFFSET

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

FRICTION SLEEVE DATA

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

CONE TYPE

The reference cone type has a 10 cm^2 projected cone tip area and 150 cm^2 friction sleeve area, however it is common to use the larger 15 cm^2 cone with 225 cm^2 friction sleeve area for improved sensitivity and penetration depth potential. Use of the 15 cm^2 cone will produce more pronounced transitions zones and thin layer effects (larger failure zone).

TRANSITION ZONES AND THIN LAYER EFFECTS

During penetration at the boundary between soils of contrasting stiffness, a transition zone is often evident prior to mobilisation of the true soil stiffness. These should be cautiously ignored in assessment of soil behaviour type and parameter evaluation. Where the stiff layer is thin (<~0.75 m) mobilised resistance may be significantly less than that of an equivalent thick layer. The effect for thin low stiffness layers is less significant. Procedures for thin-layer effect correction are provided by Robertson and Wride (1998).

GRAVELS

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

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APPENDICES

APPENDIX A SUMMARY TABLES

Table 1 CPT summary

Test ID	**Final depth (mBGL)**	**Cone ID {C=**Cone tip**; F=**Friction Sleeve**; I=** Inclination**; P =** Piezo**; S=**Subtraction cone**; 15/10** = cone projected area (cm2))}	**CPT rig**	**Pre-drilled / inspection pit (m)**	**Refusal factor**	**Dissipations**	**Seismic cone**	**Easting**	**Northing**	**Elevation (m)**	**Date of test**	**Remarks**
CPT01	7.10	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT02	7.10	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT03	7.80	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT04	7.92	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT05	7.48	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT06	8.72	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT07	8.50	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT08	11.88	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	
CPT09	12.10	S15-CFIP.1524	UK17	1.20	Target depth						08/06/2020	

CPT test plots are presented in Appendix C.

APPENDIX B GENERAL INFORMATION

LIST OF FIGURES

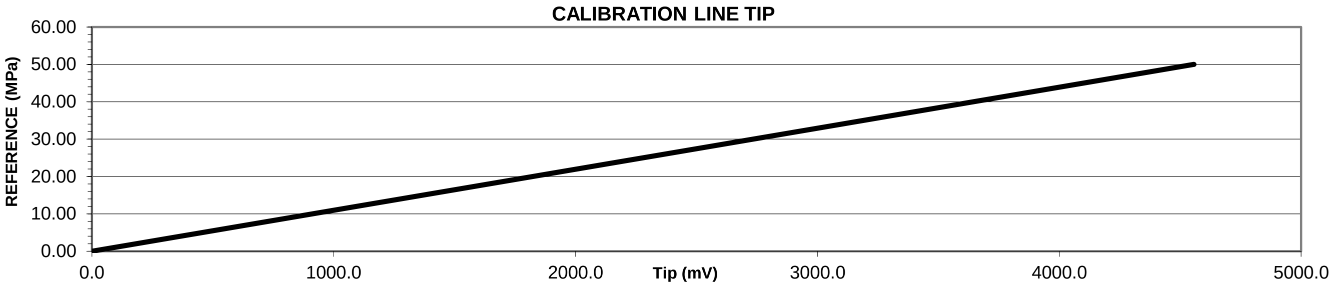
LANKELMA

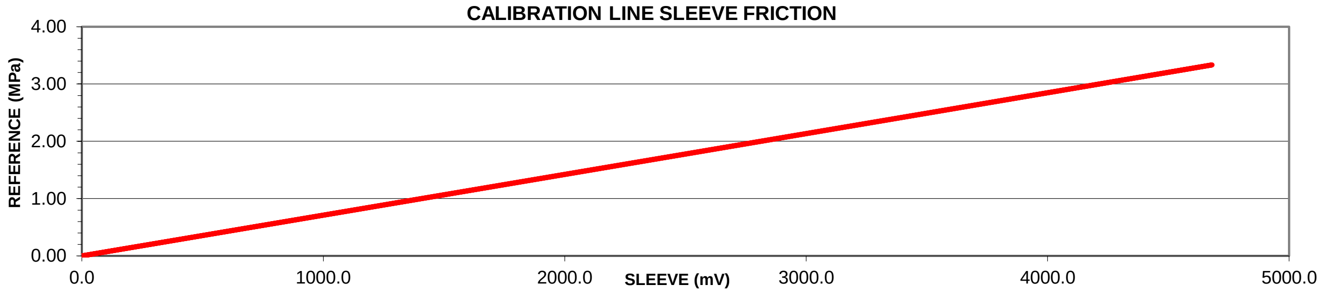
CALIBRATION CERTIFICATE

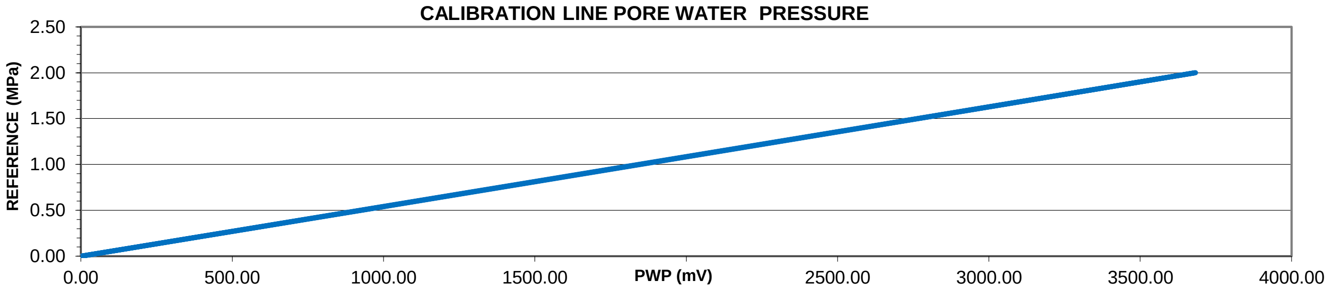
Geopoint-S15-150kN-5MPa

Cone Serial Number:
S15-CFIIP.1524

REFERENCE INSTRUMENTS:	CONE END RESISTANCE	SLEEVE FRICTION	PORE WATER PRESSURE
ID	51998	51998	4009509
TYPE	AM DSCC-100kN	AM DSCC-100kN	Druck DPI 104
UNCERTAINTY (±%)	0.01	0.01	0.05
Nominal pressure (MPa,MPa,MPa)	50.00	3.33	2.00
Maximum pressure (MPa,MPa,MPa)	100.00	6.67	5.00
Area (cm²)	15	225	N/A
Sensitivity (mV/MPa)	91.13	1404.17	1841.00
Calibration file scaling factor:			
Nominal cal force (kN, kN, BAR)	75	75	20
Calibration number (mV)	4557	4681	3682
Zero point (mV)	476	237	218
Sensitivity (mV/kN, mV/kN, mV/BAR)	60.756	62.407	184.100
Inclination factors (mV)	X -20°= 424, 0°= 2494, 20°= 4443 / Y -20°= 576, 0°= 2491, 20°= 4492		
Measured alpha factor:	0.80		
Uncertainty (%):			
Reproducibility	0.01	0.01	0.03
Linearity	0.06	0.04	0.29
Hysteresis	0.13	0.09	0.17
Combined expanded (k=2)	0.27	0.45	0.60
Application class	1	1	1







Instrument:	**S15-150kN**	**Location:**	**Lankelma Calibration Laboratory**
Serial Number:	**S15-CFIIP.1524**	**Temperature(° C)**	**18.2**
Manufacturer:	**Geopoint**	**Calibration Engineer**	**Ed Forder**
Date of calibration:	**05/03/2020**	**Calibration Expiry**	**04/07/2020**

Calibration signed and dated by:	**Calibration checked and dated by:**
Ed Forder	AN Harman

UK17

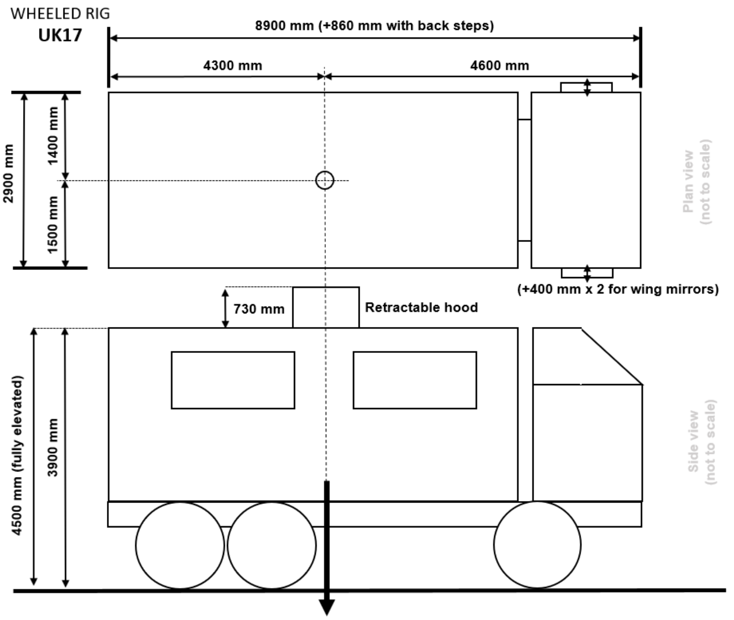
Wheeled truck

Rig weight	31 T
Max. operating ram capacity	27 T
Max. travelling speed	86 km/h
Drive system	6x6 wheel drive (rear axle steer)
Jack plate dimensions	260 mm Φ
Jack arrangements	4nr. jacks total
Maximum ground clearance on jacks	390 mm
Maximum ground bearing pressure	Tracking-pushing – 239 kPa Pulling – 479 kPa
Maximum gradient	15 degrees
Maximum traversing gradient	20 degrees (operator assessed)
Noise output at 2 m	Testing – 79 dBA Driving – 84 dBA
Clamp arrangement	36-60 mm hydraulic clamp
Ram stroke	1.24 m
Typical production	100 m+ of standard CPTu testing per day (depending on conditions and access)

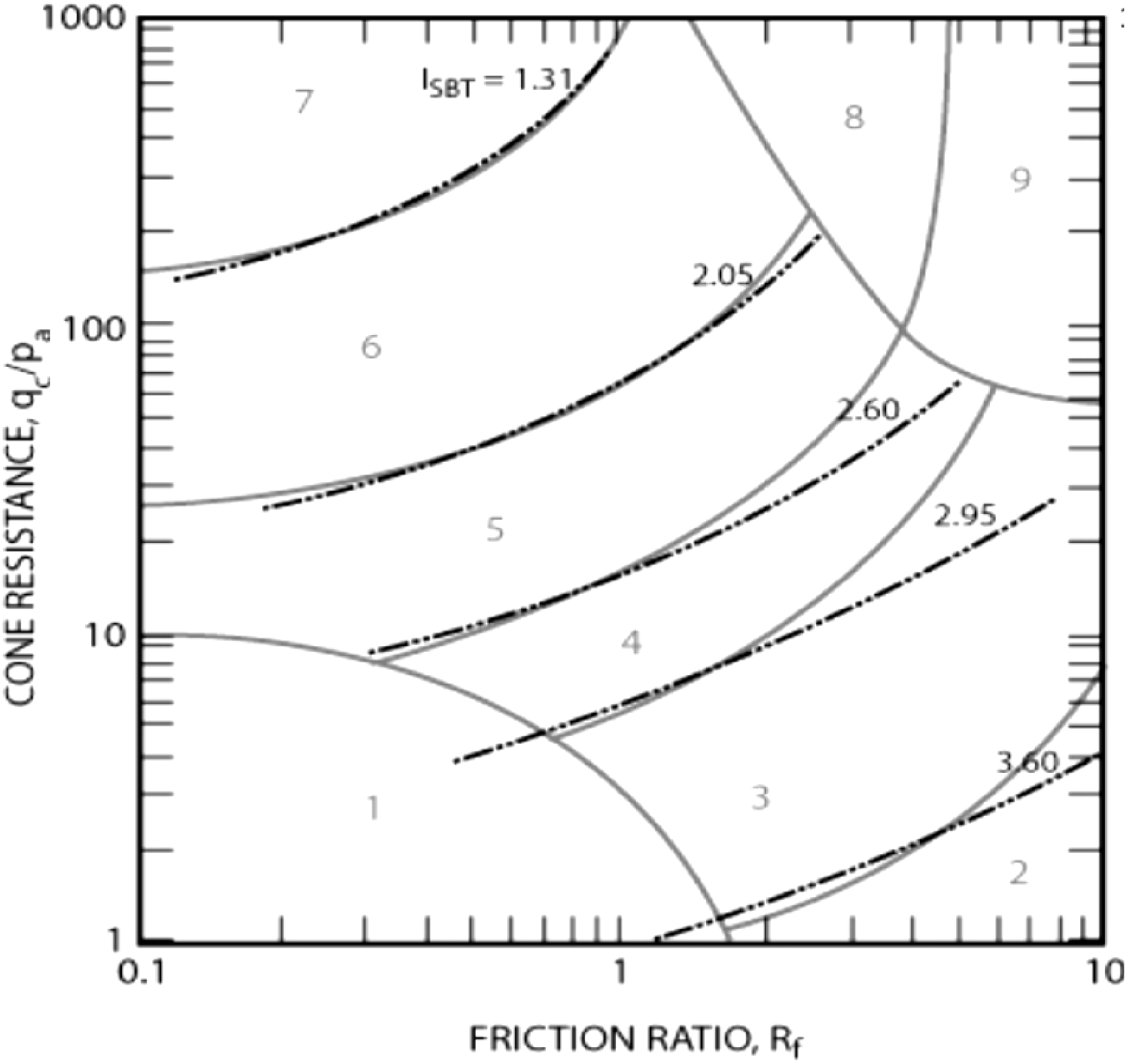
This is Lankelma’s heaviest rig; it can be ballasted to 33 T making it perfect for penetrating hard ground with our dummy cone tip. This technique allows us to continue testing in material beneath.

Our wheeled rig is suitable for hard standing ground conditions.

The spacious interior is ideal for housing our MIP equipment for environmental testing.



CPT SOIL BEHAVIOUR TYPE CHART



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

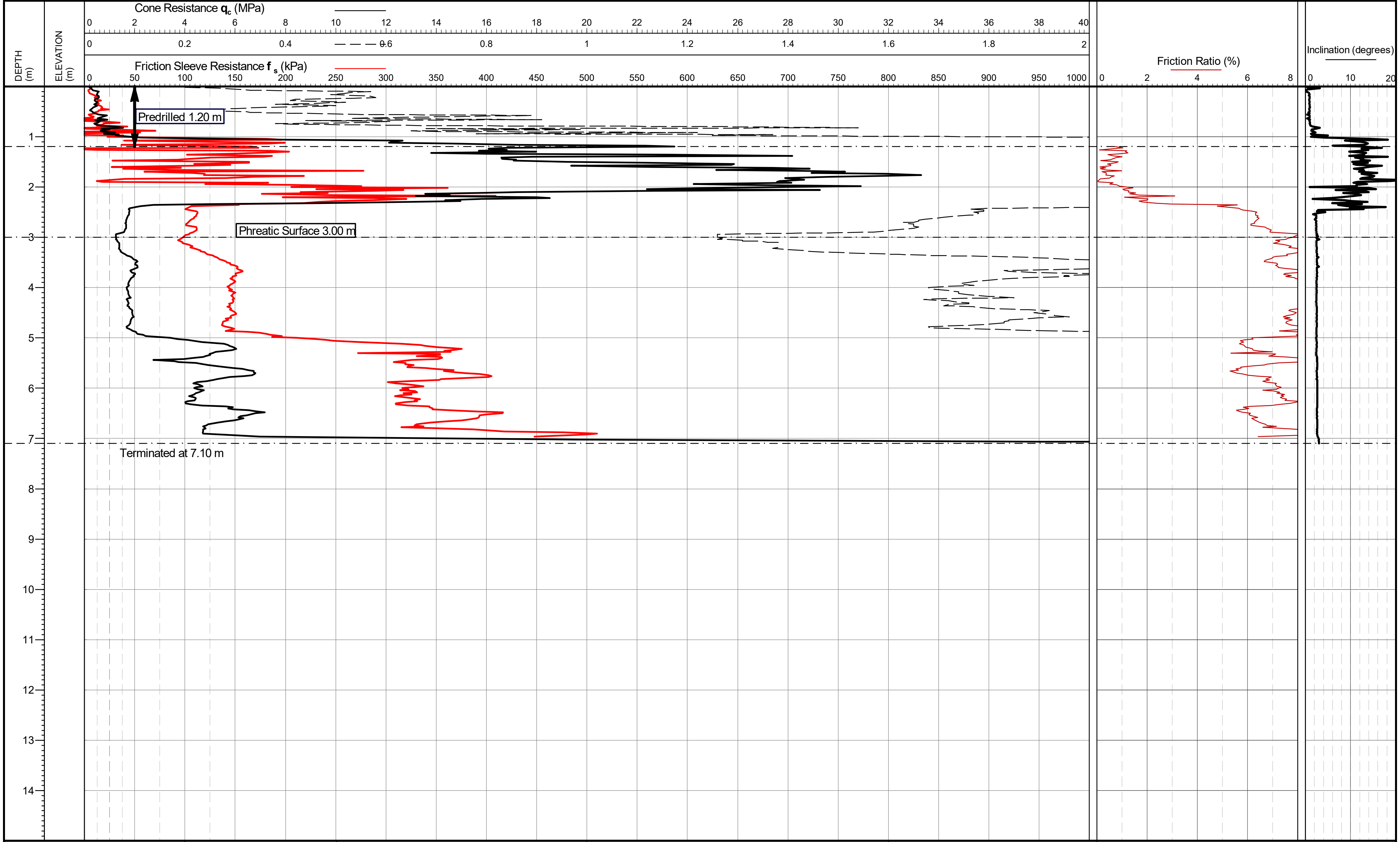
Zone	**Soil Behaviour Type (SBT)**		
1	Sensitive fine-grained	6	Sands: clean sand to sandy silt
2	Clay – organic soil	7	Dense sand to gravelly sand
3	Clays: Clay to silty clay	8	Stiff sand to clayey sand*
4	Silt mixtures: clayey silt to silty clay	9	Stiff fine grained*
5	Sand mixtures: Silty sand to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

APPENDIX C CONE PENETRATION TEST RESULTS

RAW DATA PLOTS

LIST OF FIGURES:

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 09:42:00

Zero drift (Pre/post test)
q_c (kPa): 0.0
f_s (kPa): -2.1 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

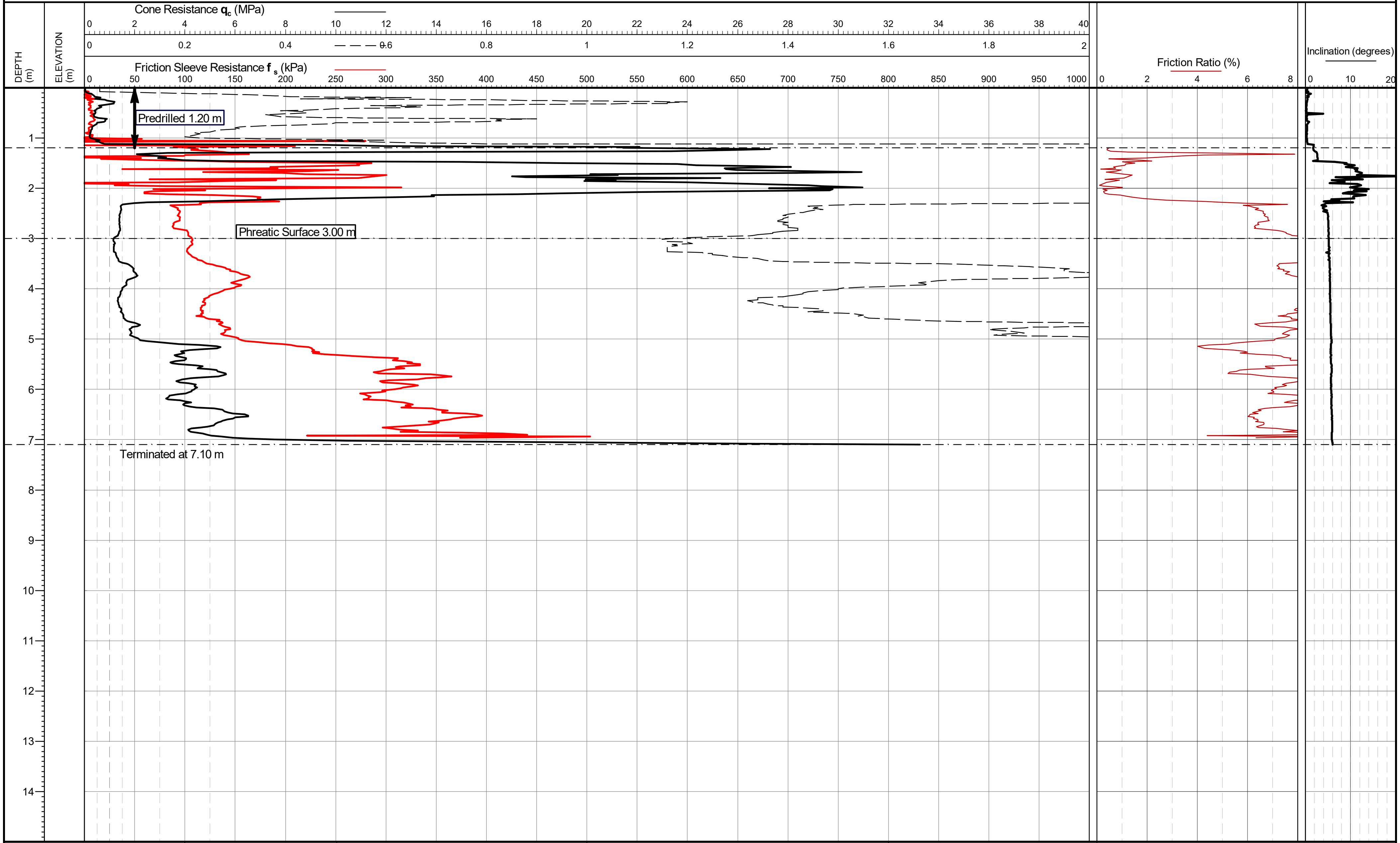
Checked by:
Chris Player

TEST ID: CPT01

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 08:38:00

Zero drift (Pre/post test)
q_c (kPa): 11.0
f_s (kPa): 0.0 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT02

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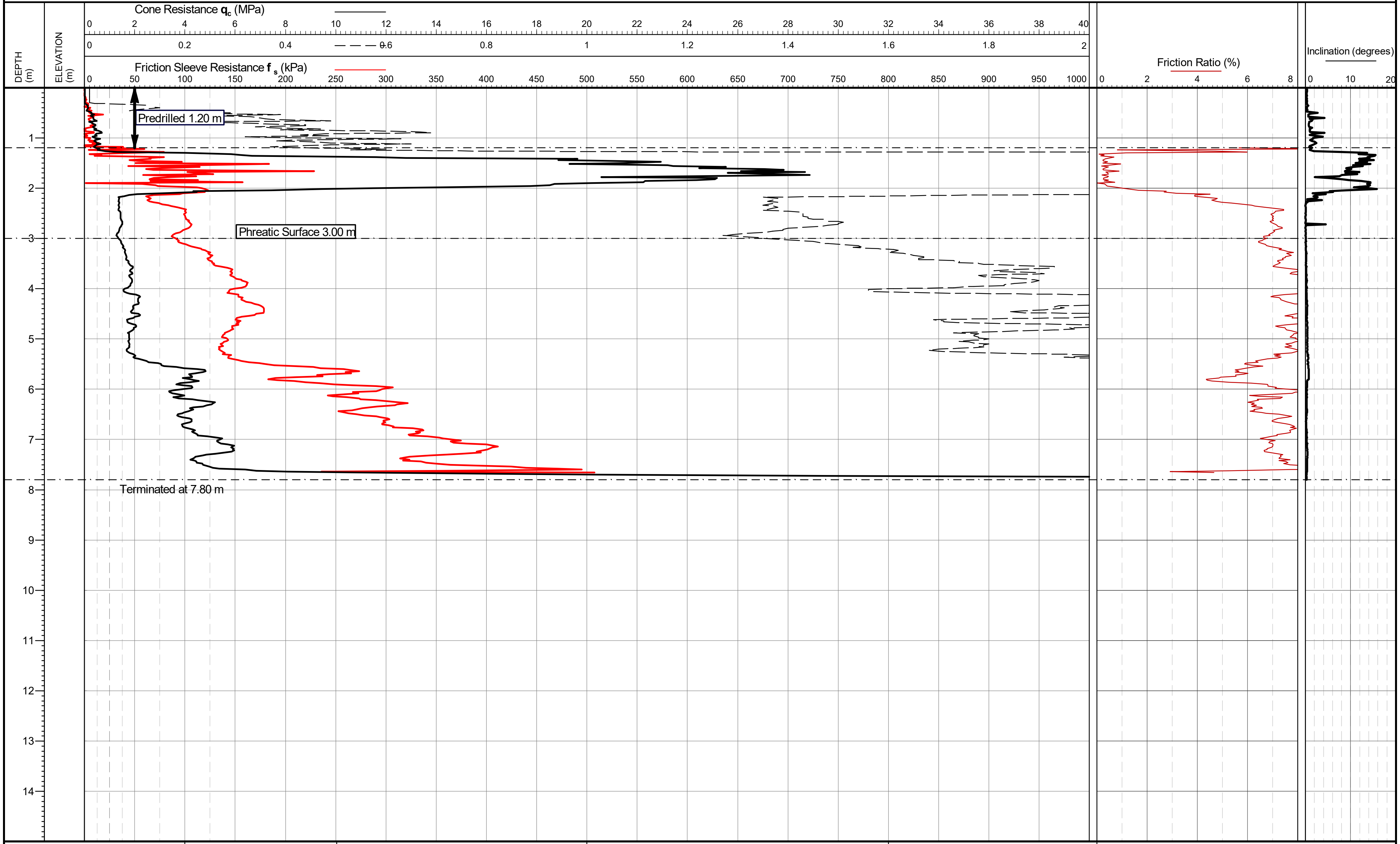
LANKELMA

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 13:05:00

Zero drift (Pre/post test)
q_c (kPa): 21.9
f_s (kPa): -2.2 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT03

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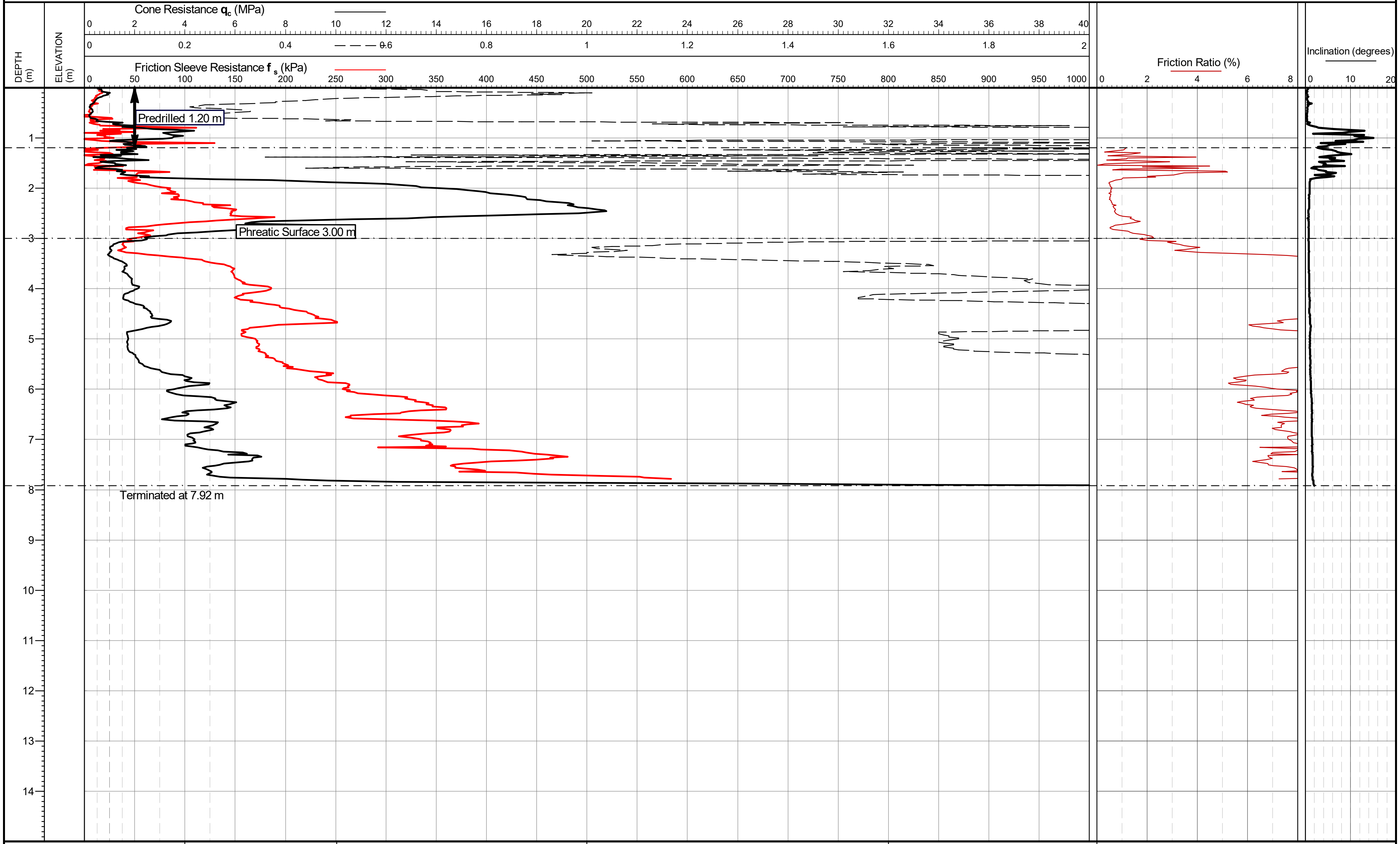
LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500 Cone ID: S15-CFIP.1524 Operator: Gerard Balp Rig Used: UK17 Date of test: 08/06/2020 11:29:00	Zero drift (Pre/post test) q_c (kPa): 0.0 f_s (kPa): 0.0 ($f_{s\ drift}$ - $q_{c\ drift}$)	Location: Surrey, UK Coordinates: , Elevation: Coordinate system:	Remarks: *Phreatic surface origin: Arbitrary value Refusal criteria: Target depth	Date of plot: 20-07-20 Checked by: Chris Player	Lankelma Project Ref: P-107437-1

TEST ID: CPT04

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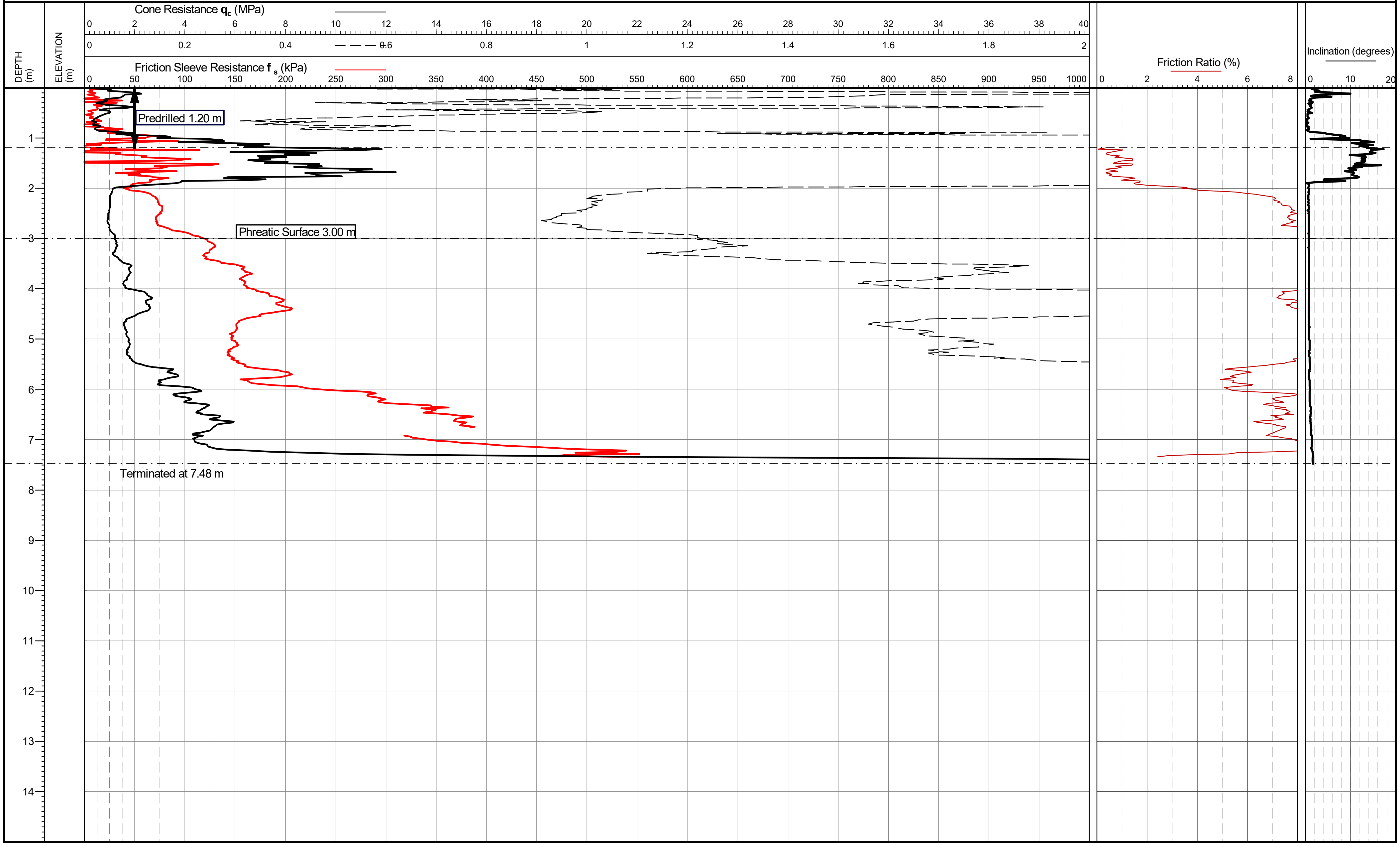
Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 10:52:00

Zero drift (Pre/post test)
q_c (kPa): -21.9
f_s (kPa): 0.8 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT05

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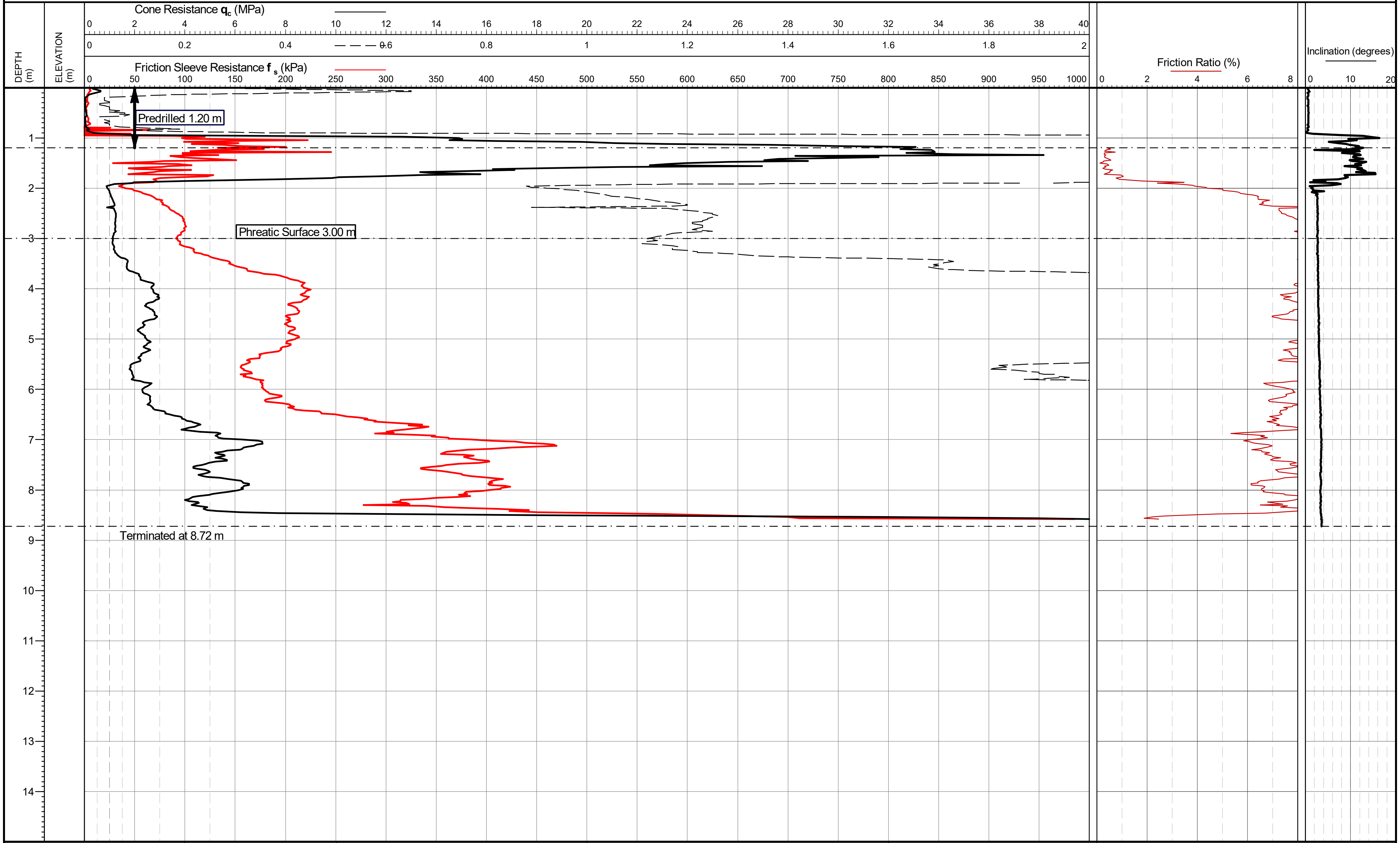
Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 12:06:00

Zero drift (Pre/post test)
q_c (kPa): 0.0
f_s (kPa): -2.8 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

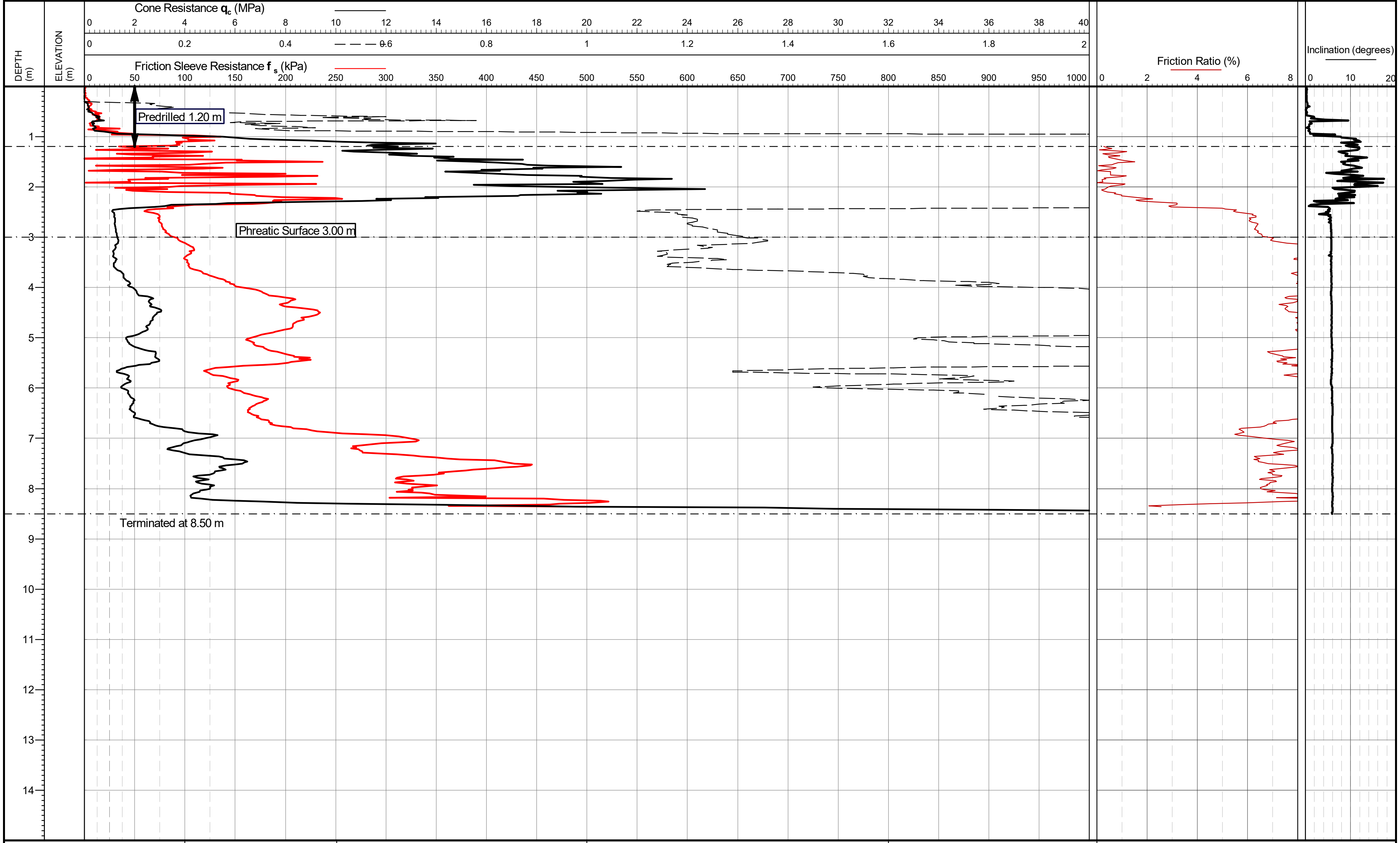
Checked by:
Chris Player

TEST ID: CPT06

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 12:38:00

Zero drift (Pre/post test)
q_c (kPa): -21.9
f_s (kPa): 0.1 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

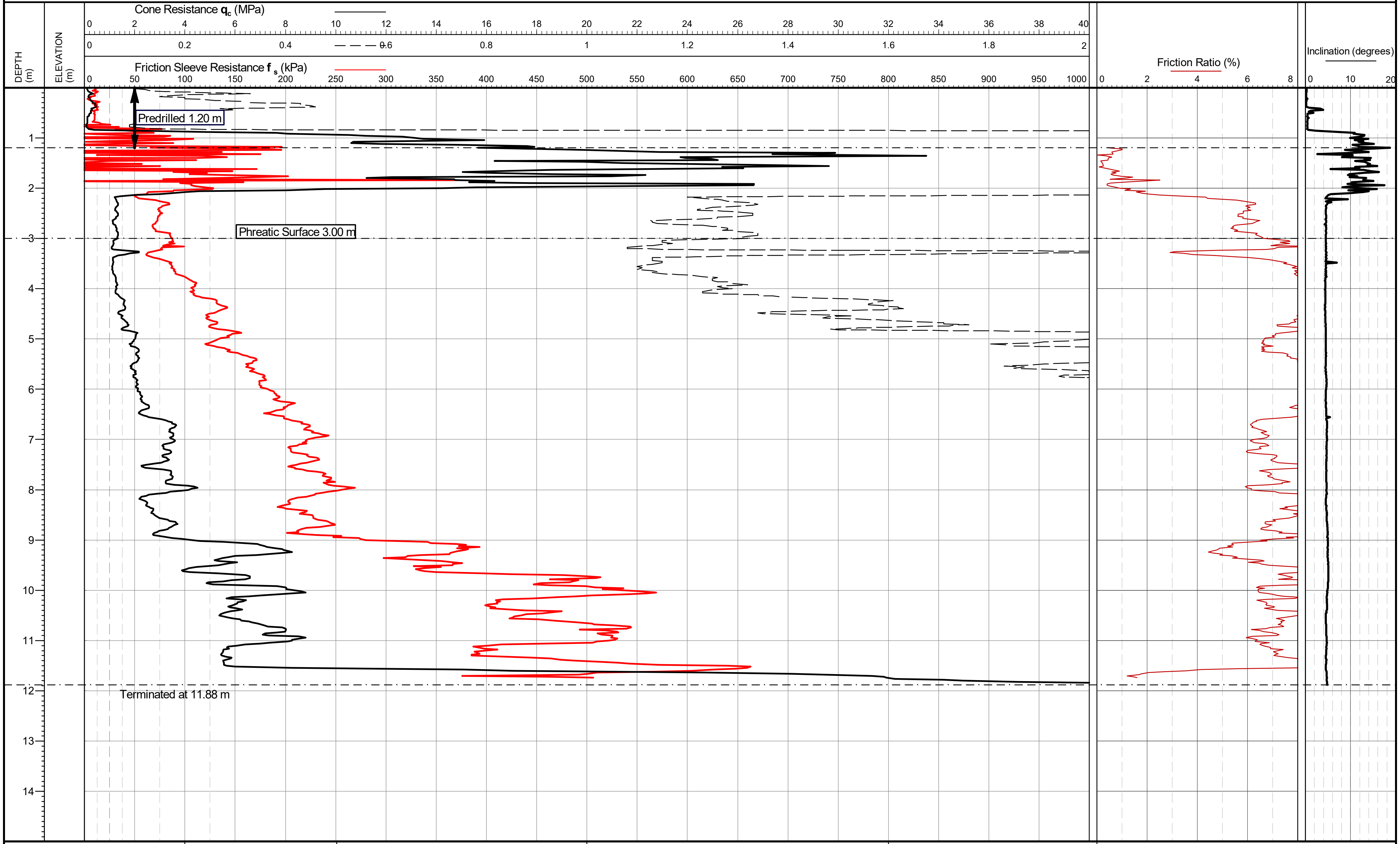
TEST ID: CPT07

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 13:46:00

Zero drift (Pre/post test)
q_c (kPa): -43.9
f_s (kPa): 0.1 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

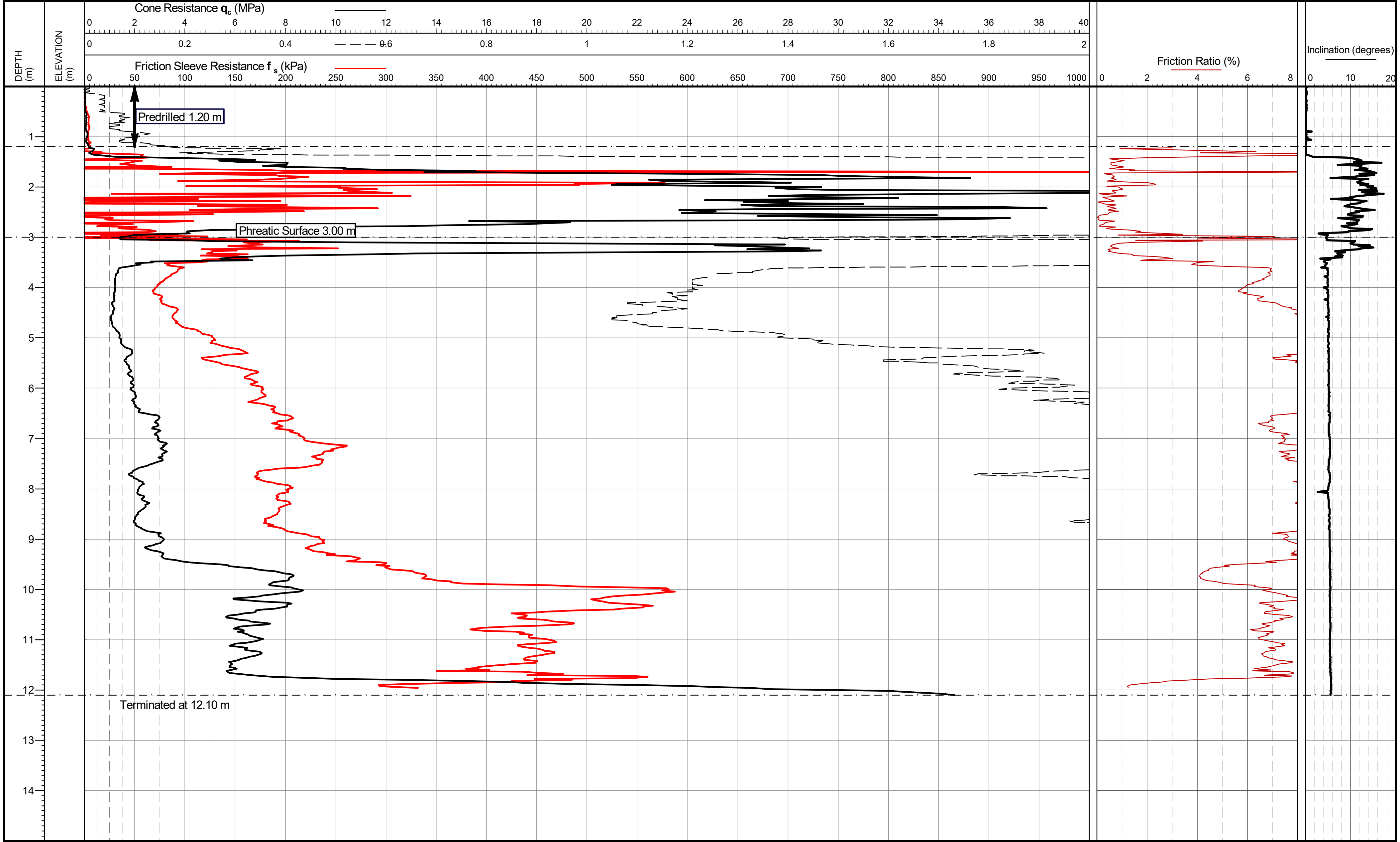
Checked by:
Chris Player

TEST ID: CPT08

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 14:51:00

Zero drift (Pre/post test)
q_c (kPa): 0.0
f_s (kPa): -0.7 ($f_{s\ drift}$ - $q_{c\ drift}$)

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

Remarks:
*Phreatic surface origin: Arbitrary value

Refusal criteria: Target depth

Date of plot:
20-07-20

Checked by:
Chris Player

Lankelma Project Ref:
P-107437-1

TEST ID: CPT09

Page 1 of 1

APPENDIX D STANDARD INTERPRETATION RESULTS - SET 1

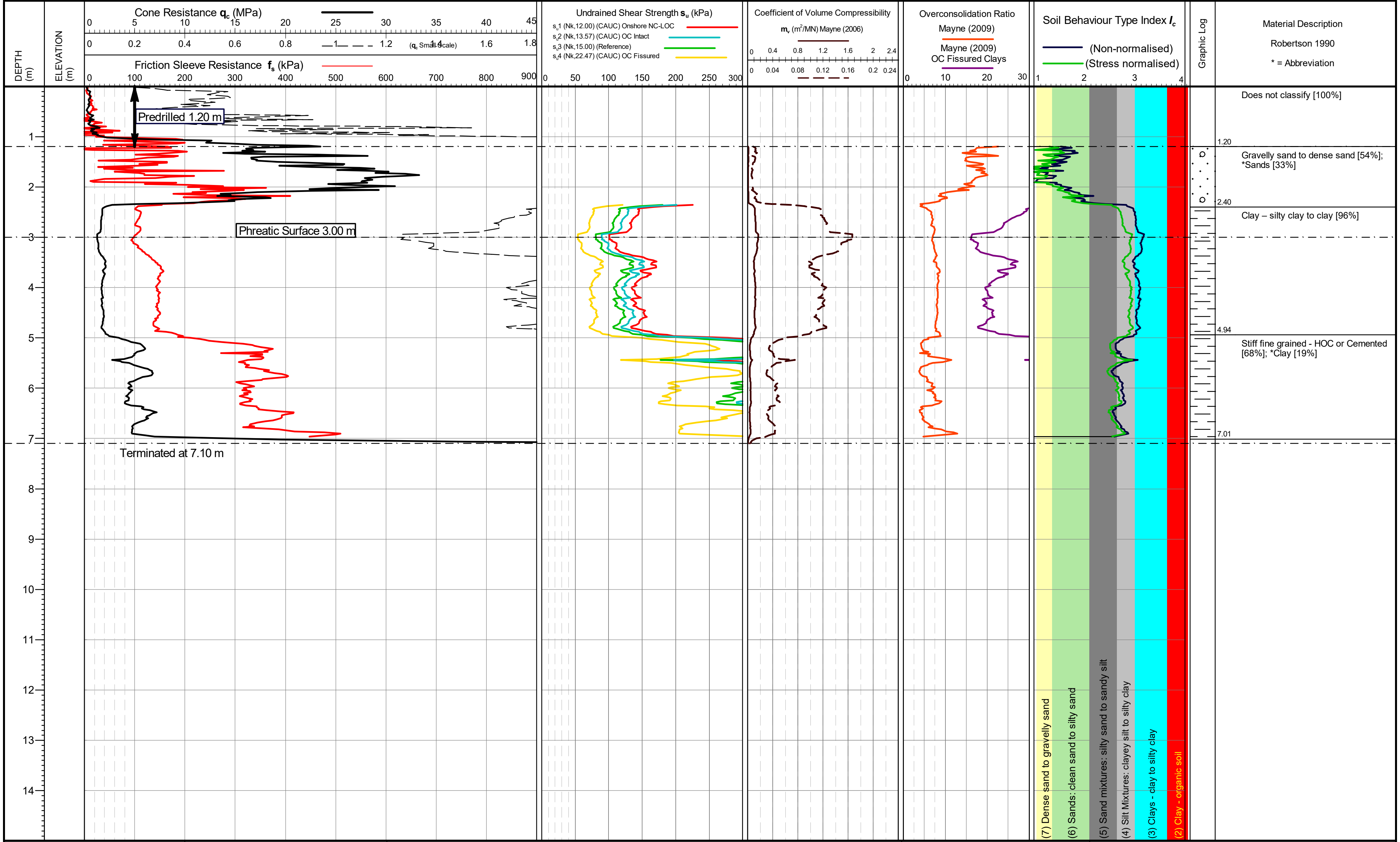
UNDRAINED SHEAR STRENGTH
COEFFICIENT OF VOLUME CHANGE
OVERCONSOLIDATION RATIO
SOIL BEHAVIOUR TYPE (SBT) DESCRIPTIONS

LIST OF FIGURES:

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 09:42:00

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

Remarks: *Phreatic surface origin: Arbitrary value

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.

Termination Remark:
Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

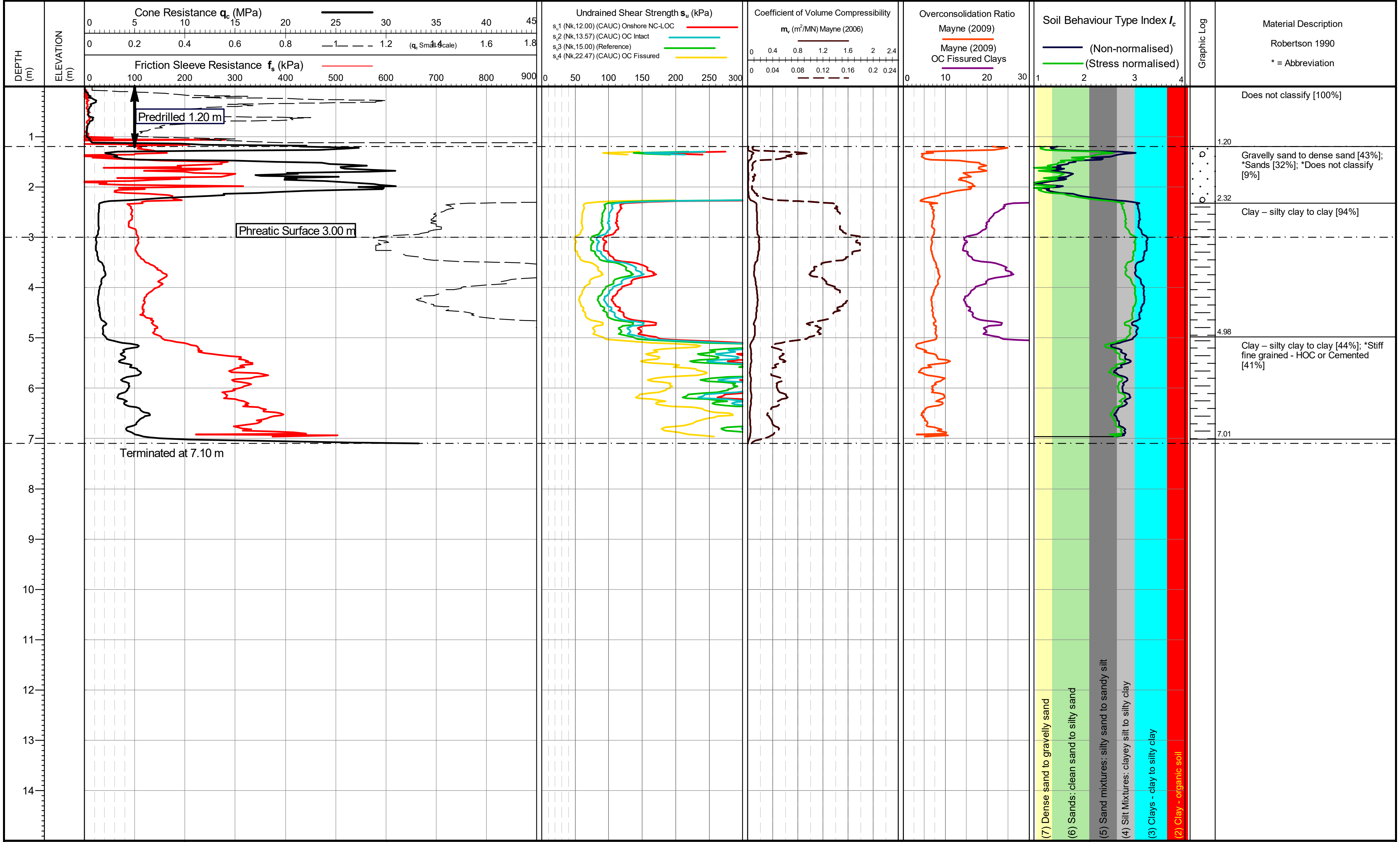
TEST ID: CPT01

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Material Description

Robertson 1990

* = Abbreviation

1.20	Does not classify [100%]
2.32	Gravelly sand to dense sand [43%]; *Sands [32%]; *Does not classify [9%]
4.98	Clay – silty clay to clay [94%]
7.01	Clay – silty clay to clay [44%]; *Stiff fine grained - HOC or Cemented [41%]

Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 08:38:00

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

Remarks: *Phreatic surface origin: Arbitrary value

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.

Termination Remark:
Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

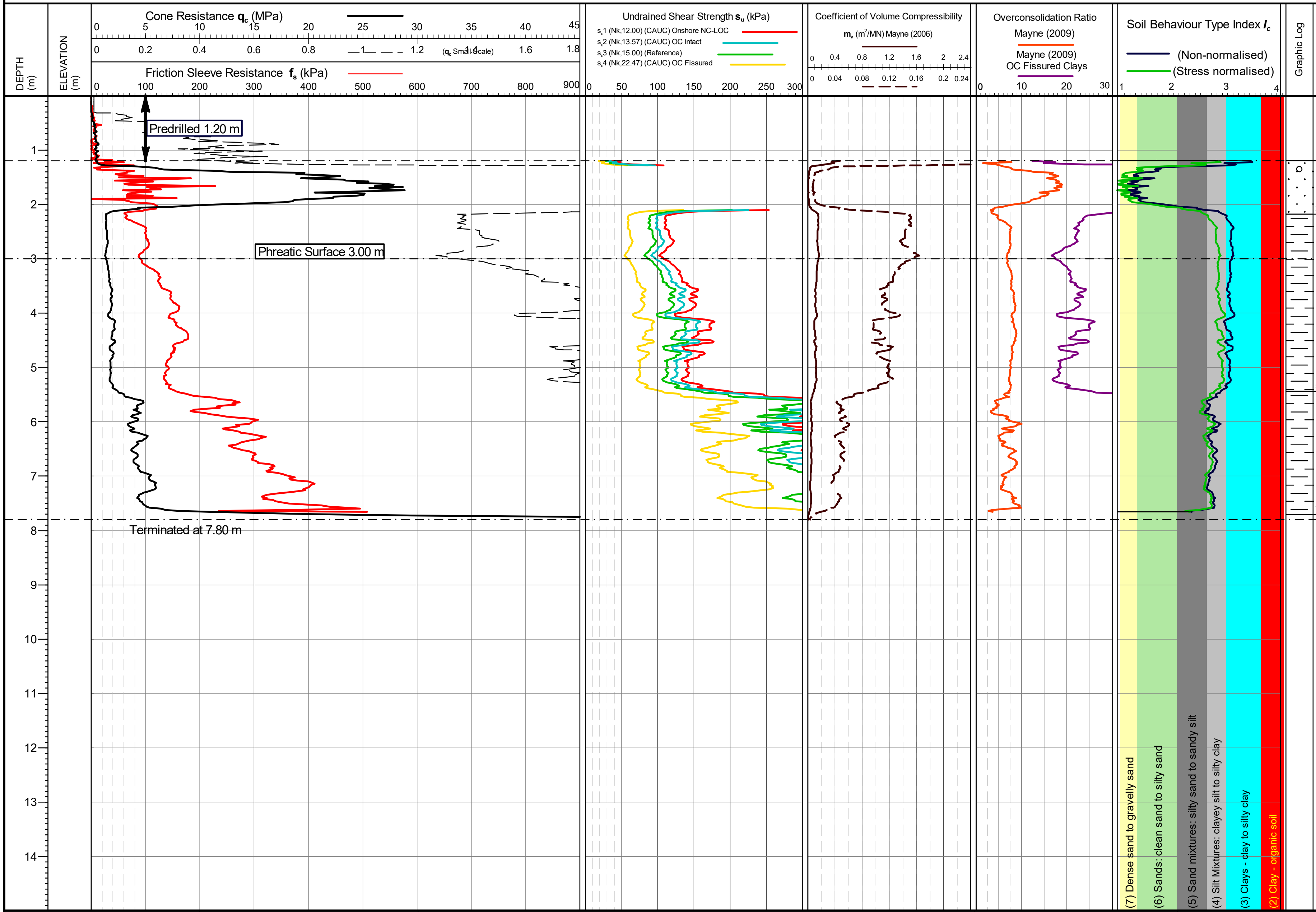
Checked by:
Chris Player

TEST ID: CPT02

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Material Description

Robertson 1990

* = Abbreviation

	Does not classify [100%]
1.20	Gravelly sand to dense sand [70%]; *Sands [13%]
2.18	Clay – silty clay to clay [94%]
5.44	Clay – silty clay to clay [58%]; *Stiff fine grained - HOC or Cemented [25%]
7.71	

Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 13:05:00

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

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:
20-07-20

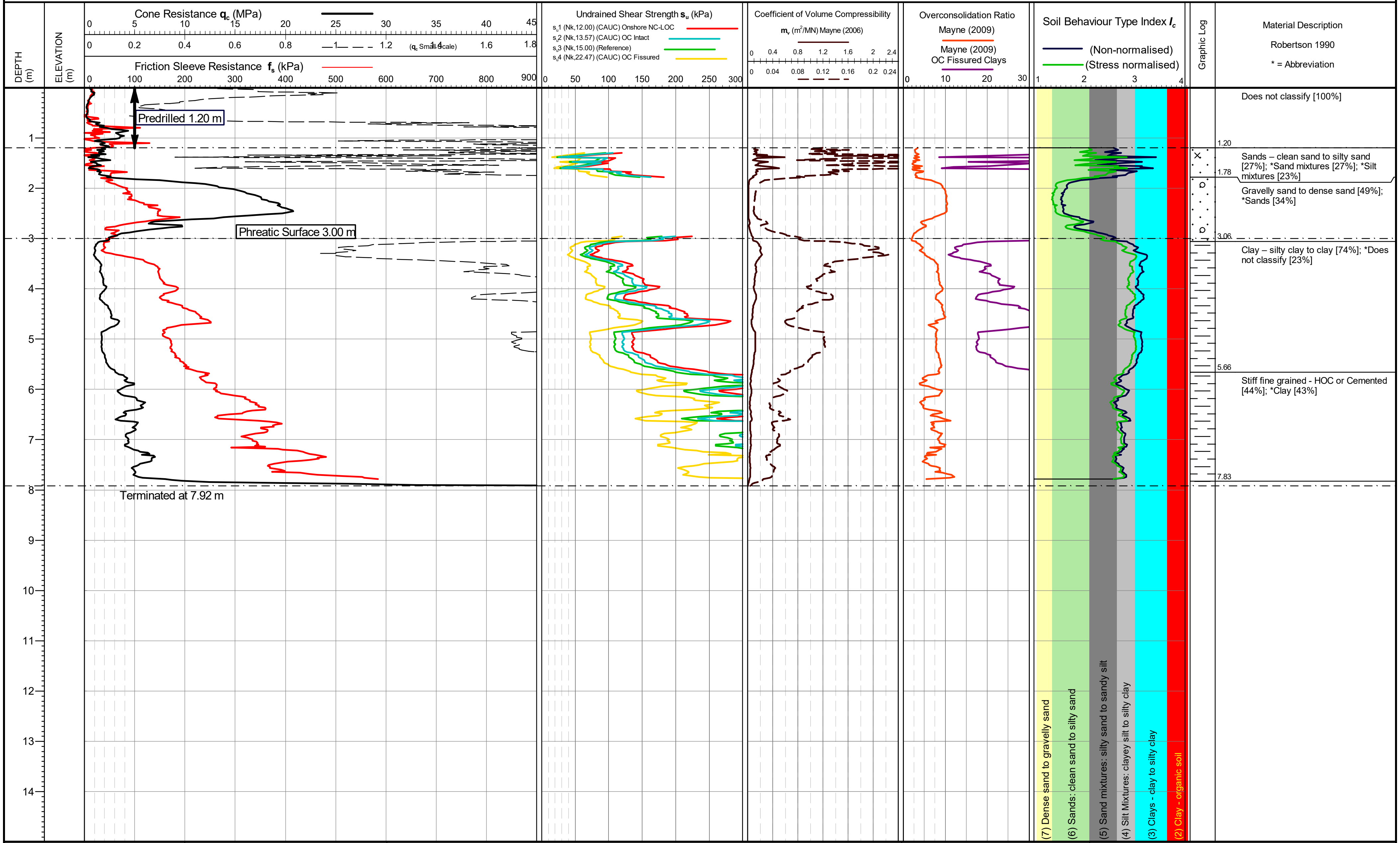
Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT03

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 11:29:00

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

Remarks: *Phreatic surface origin: Arbitrary value

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.

Termination Remark:
Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

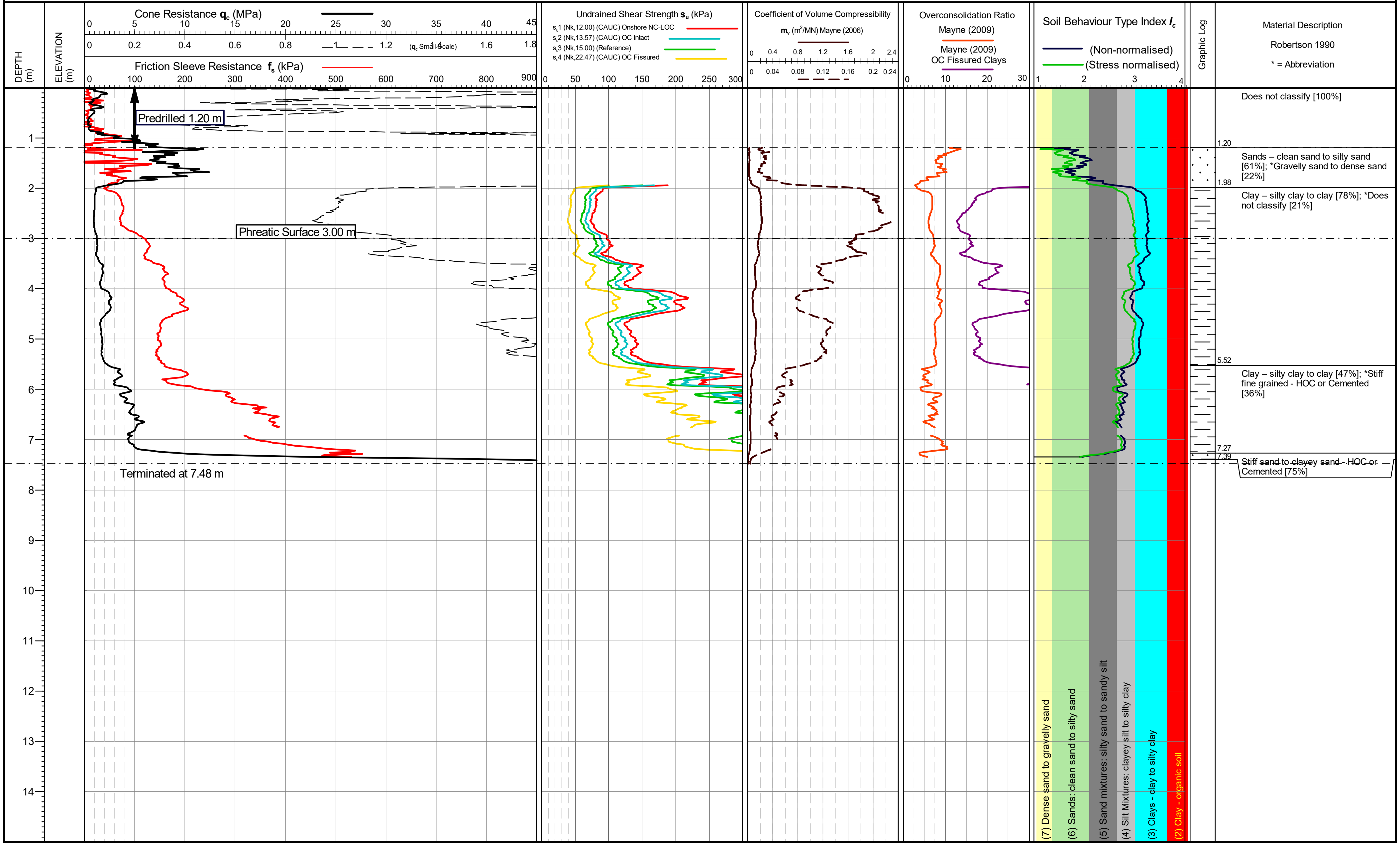
Checked by:
Chris Player

TEST ID: CPT04

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 10:52:00

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

Remarks: *Phreatic surface origin:
Arbitrary value

Termination Remark:
Target depth

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:
20-07-20

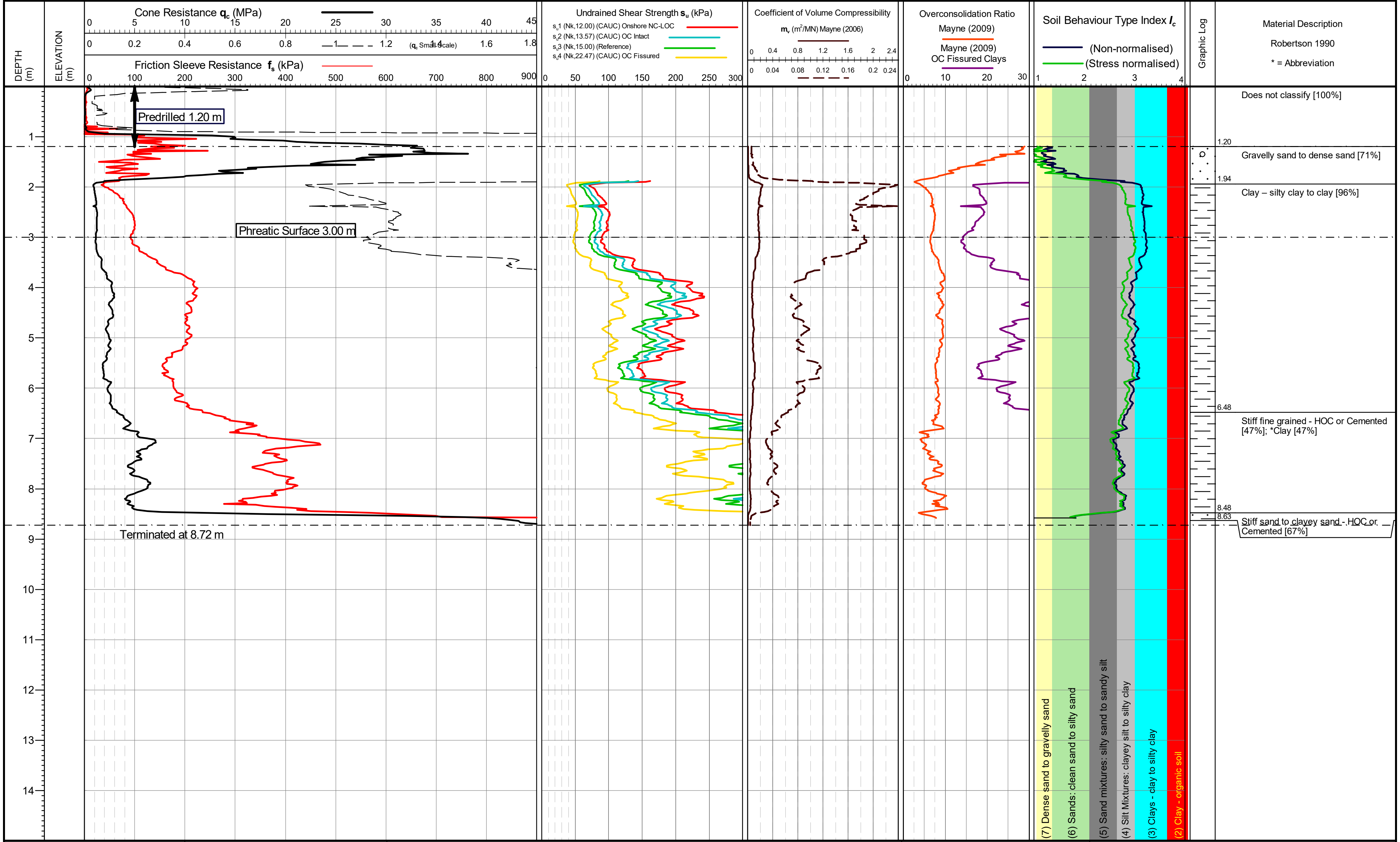
Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT05

Page 1 of 1

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 12:06:00

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

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:
20-07-20

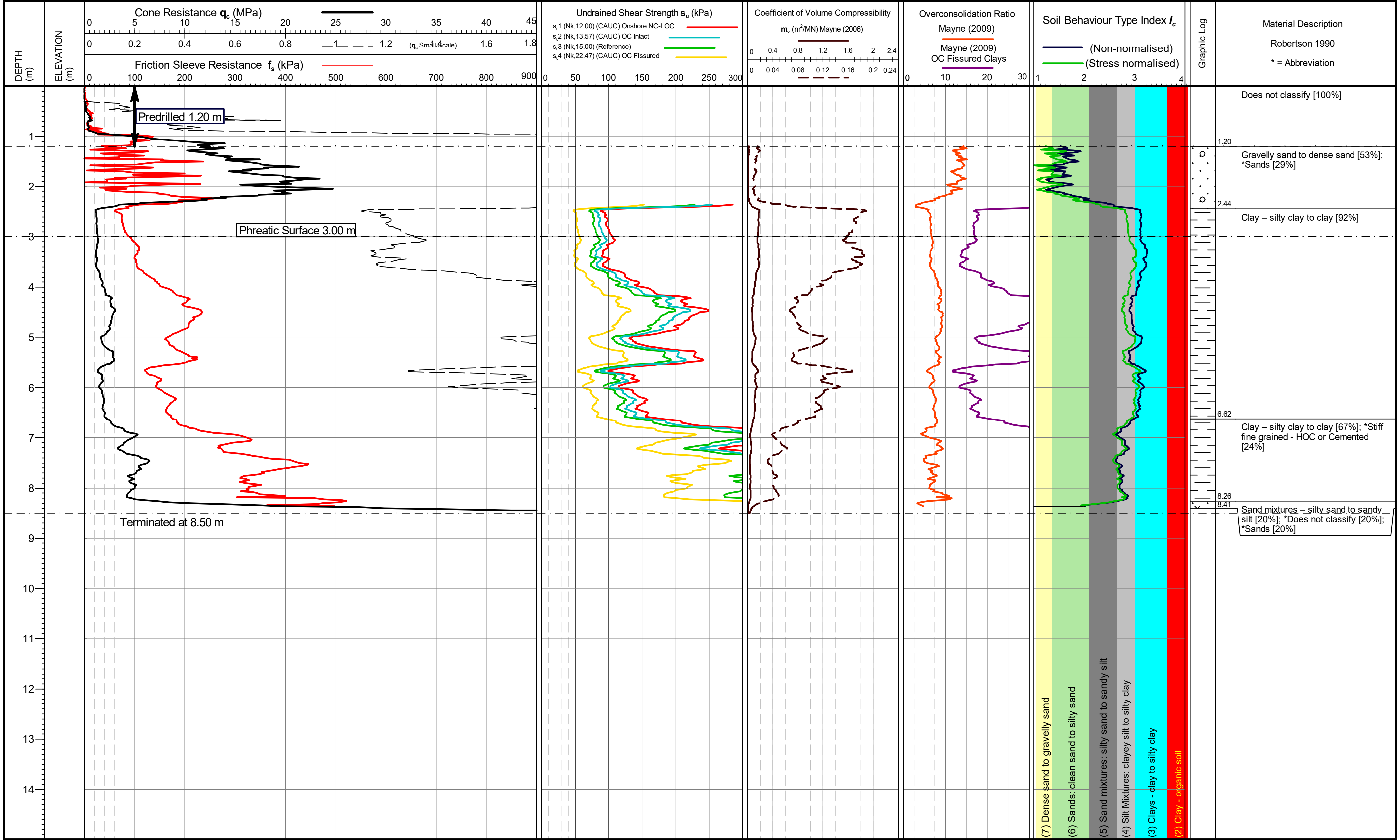
Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT06

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 12:38:00

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

Remarks: *Phreatic surface origin:
Arbitrary value

Termination Remark:
Target depth

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.

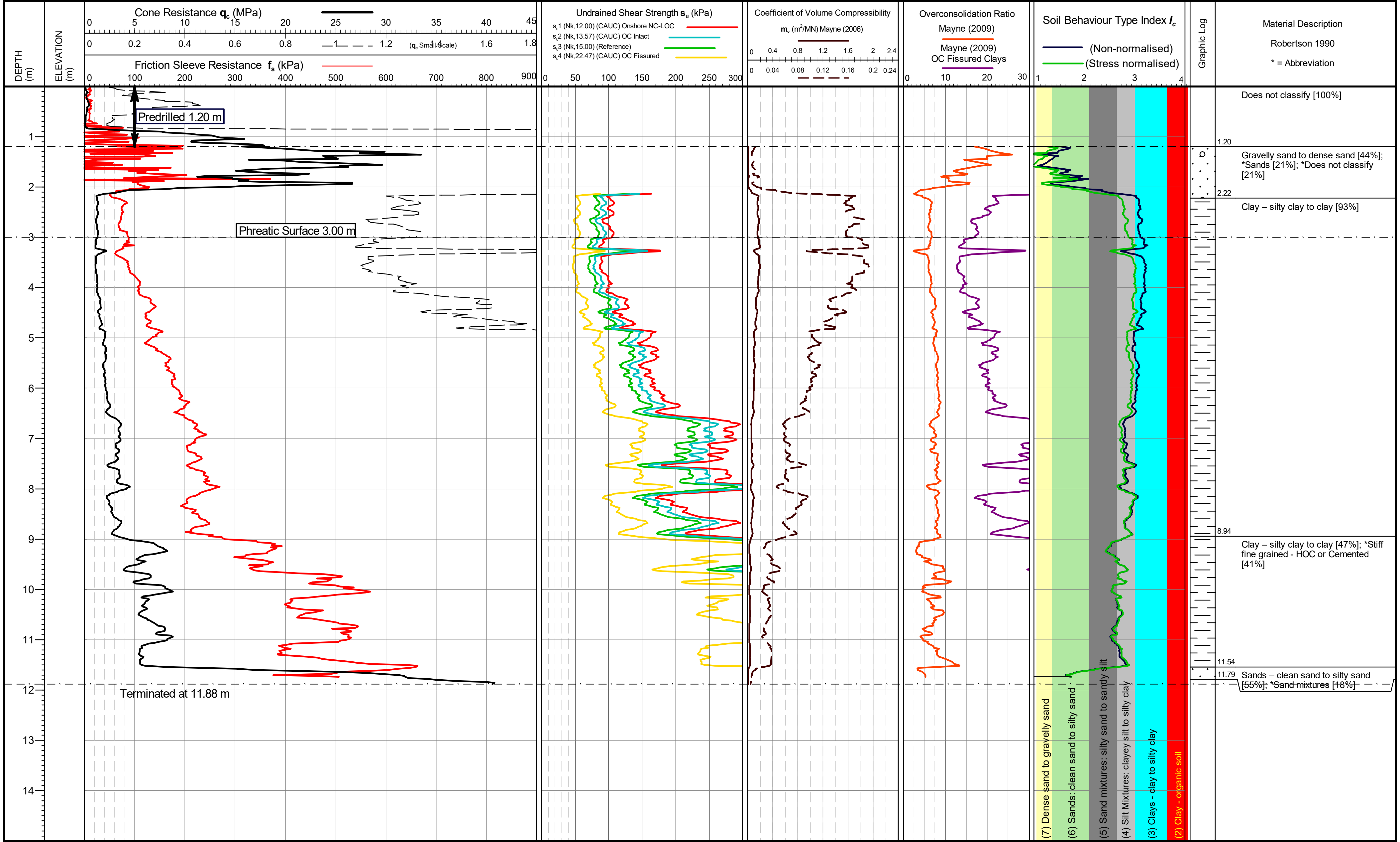
Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT07

Project: EPSOM HOSPITAL
Client: HYDROCK



Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 13:46:00

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

Remarks: *Phreatic surface origin: Arbitrary value

Termination Remark:
Target depth

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:
20-07-20

Lankelma Project Ref:
P-107437-1

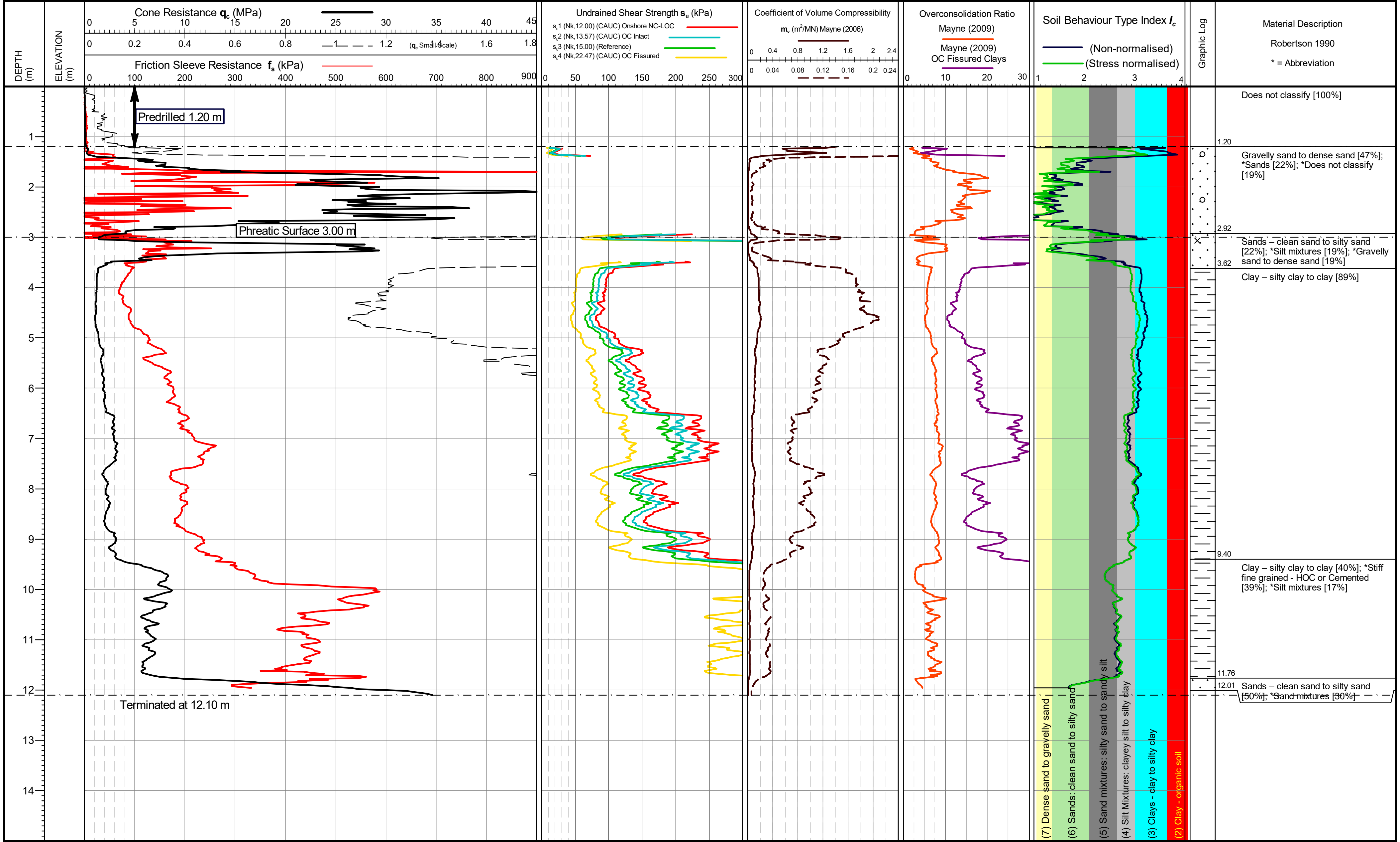
Checked by:
Chris Player

TEST ID: CPT08

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL
Client: HYDROCK



Material Description
Robertson 1990
* = Abbreviation

Does not classify [100%]

Gravelly sand to dense sand [47%]; *Sands [22%]; *Does not classify [19%]

Sands – clean sand to silty sand [22%]; *Silt mixtures [19%]; *Gravelly sand to dense sand [19%]

Clay – silty clay to clay [89%]

Clay – silty clay to clay [40%]; *Stiff fine grained - HOC or Cemented [39%]; *Silt mixtures [17%]

Sands – clean sand to silty sand [50%]; *Sand mixtures [30%]

Cone area (mm2):1500
ConeID: S15-CFIP.1524
Operator: Gerard Balp
Rig Used: UK17
Date of test: 08/06/2020 14:51:00

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

Remarks: *Phreatic surface origin:
Arbitrary value

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.

Termination Remark:
Target depth

Date of plot:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

TEST ID: CPT09

Page 1 of 1

APPENDIX E STANDARD INTERPRETATION RESULTS - SET 2

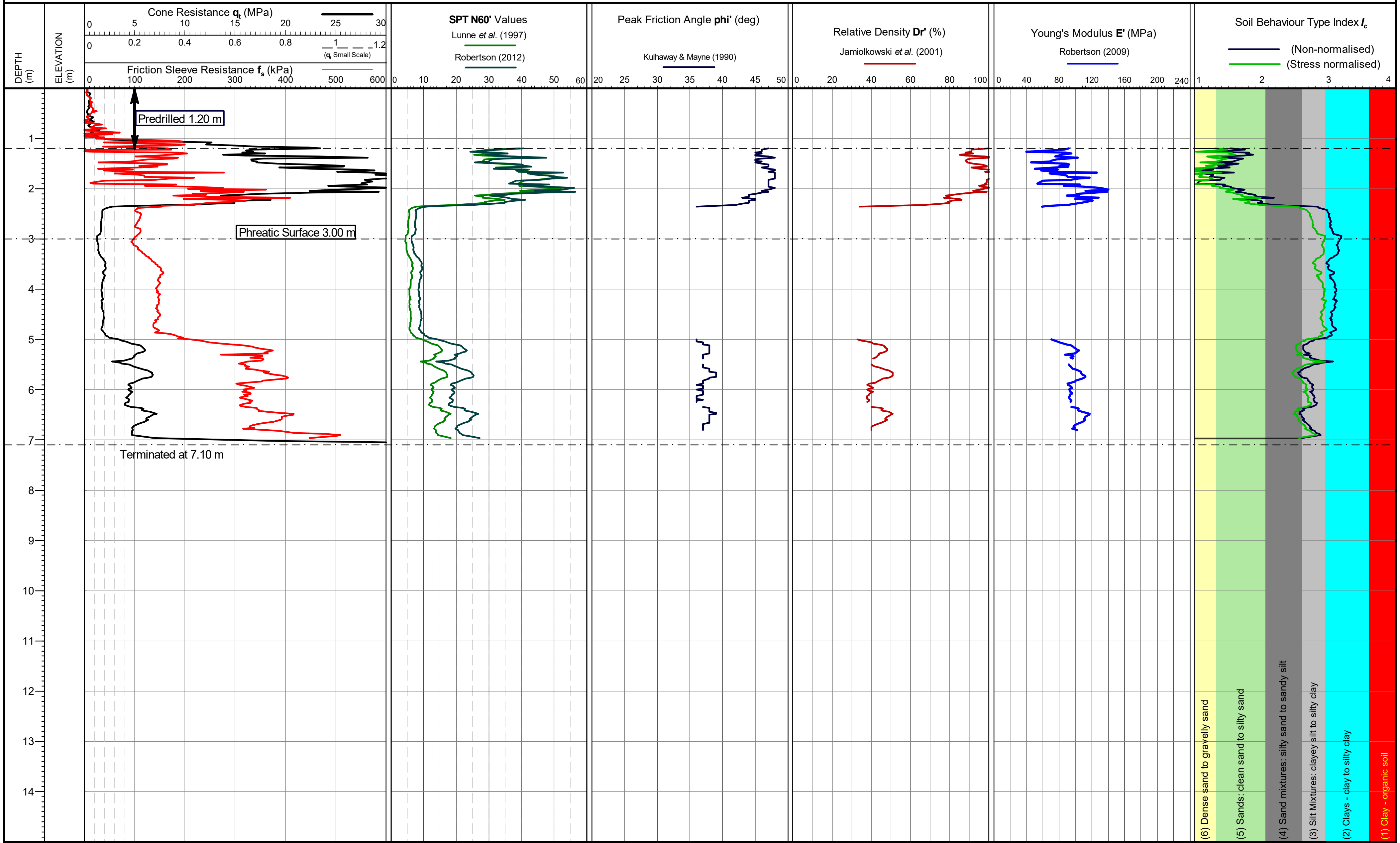
EQUIVALENT SPT N60
PEAK FRICTION ANGLE
RELATIVE DENSITY
YOUNG'S MODULUS

LIST OF FIGURES:

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 09:42:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

Lankelma Project Ref:
P-107437-1

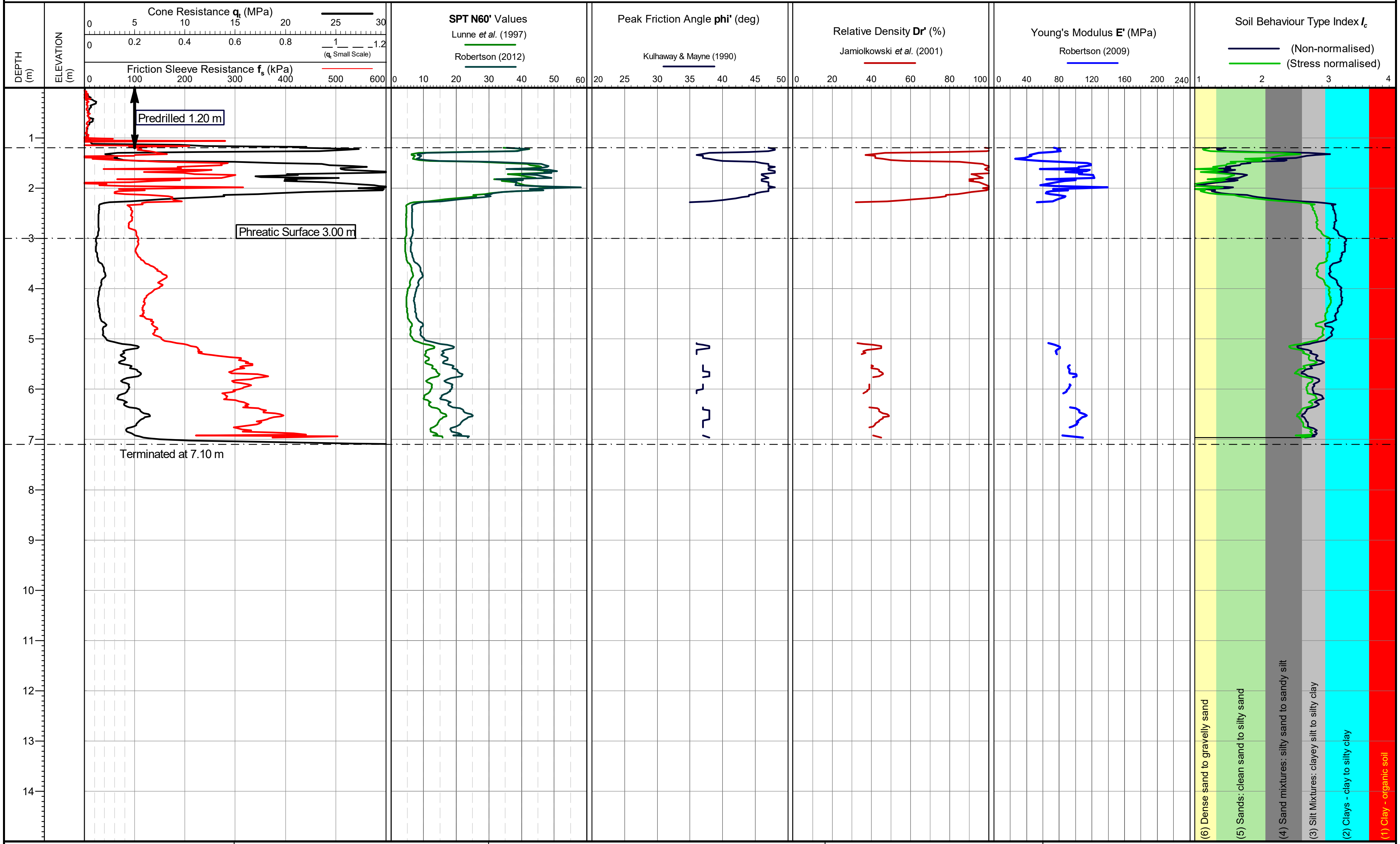
TEST ID: CPT01

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 08:38:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

Lankelma Project Ref:
P-107437-1

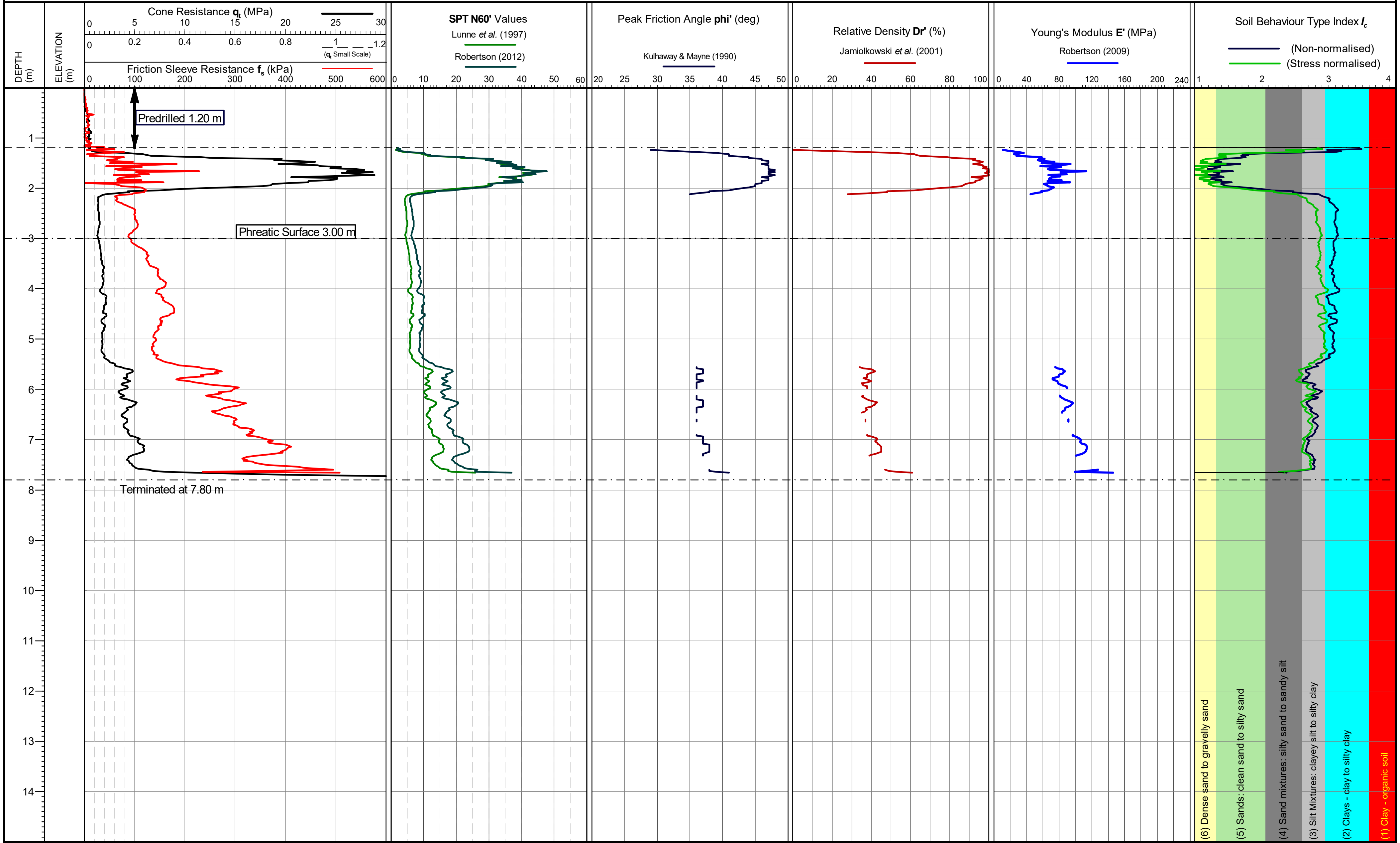
TEST ID: CPT02

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500 Cone ID: S15-CFIP.1524 Operator: Gerard Balp Date of test: 08/06/2020 13:05:00	Location: Surrey, 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: 20-07-20 Checked by: Chris Player	Lankelma Project Ref: P-107437-1

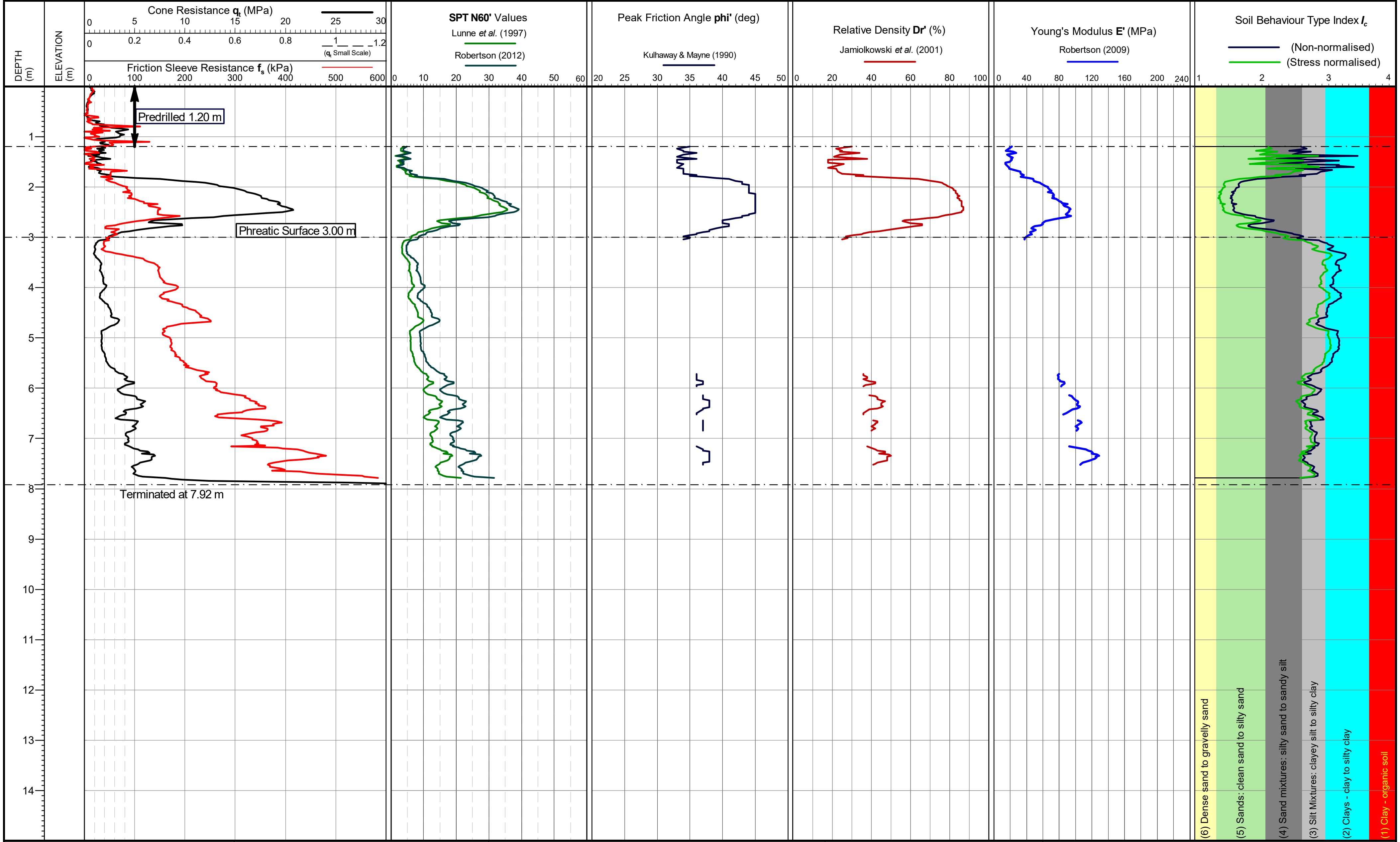
TEST ID: CPT03

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 11:29:00

Location: Surrey, 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:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

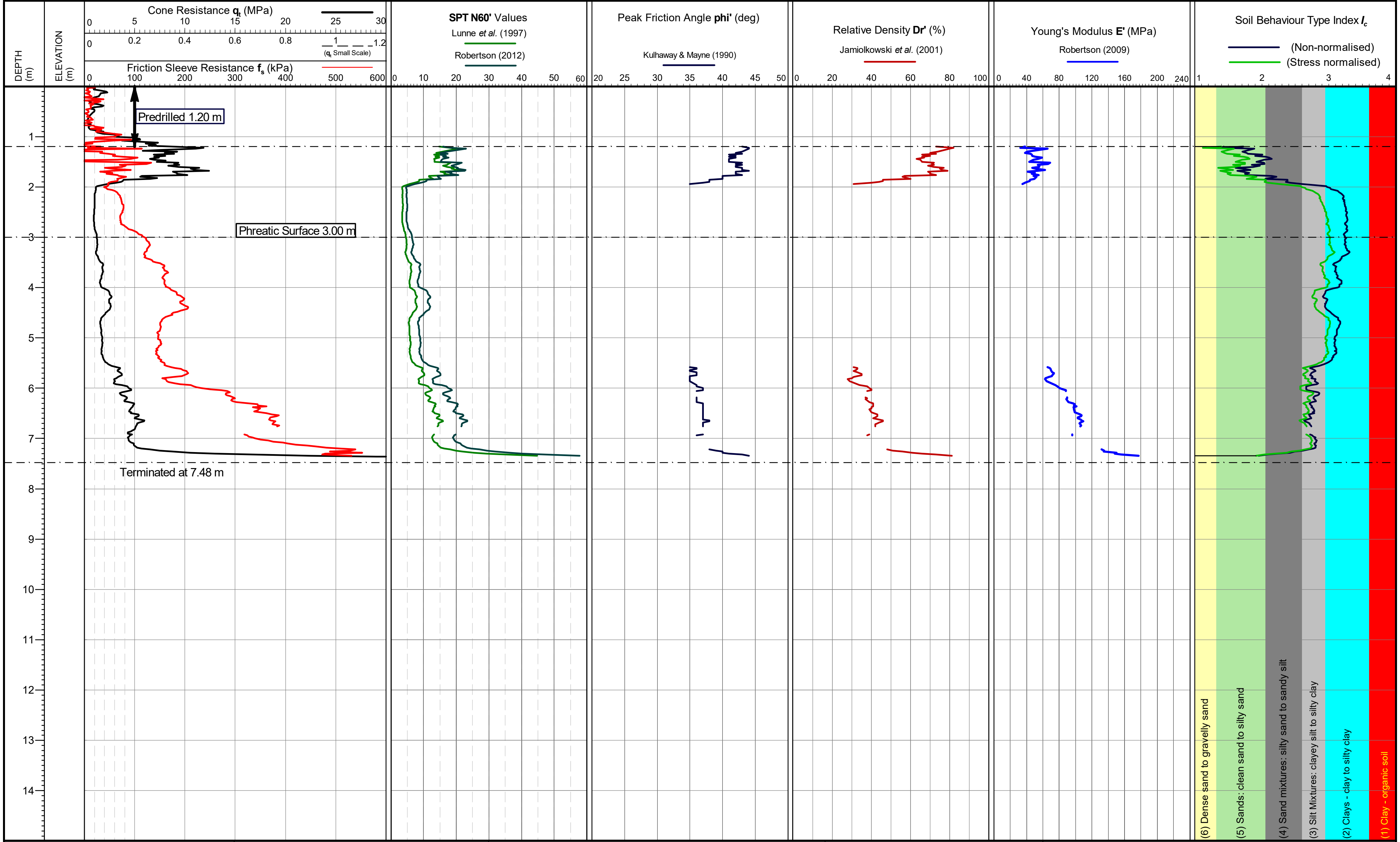
TEST ID: CPT04

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 10:52:00

Location: Surrey, 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:
20-07-20

Lankelma Project Ref:
P-107437-1

Checked by:
Chris Player

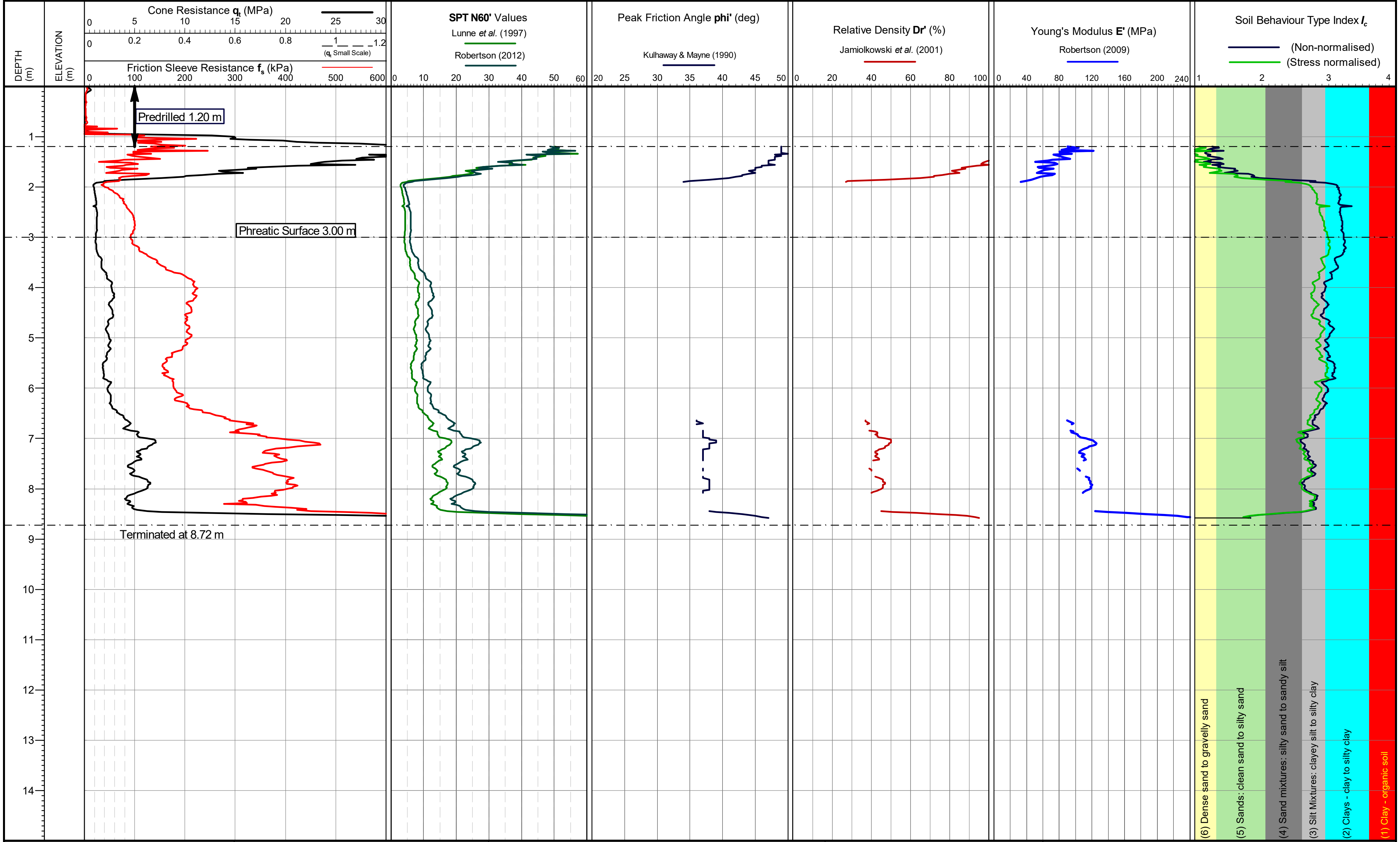
TEST ID: CPT05

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 12:06:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

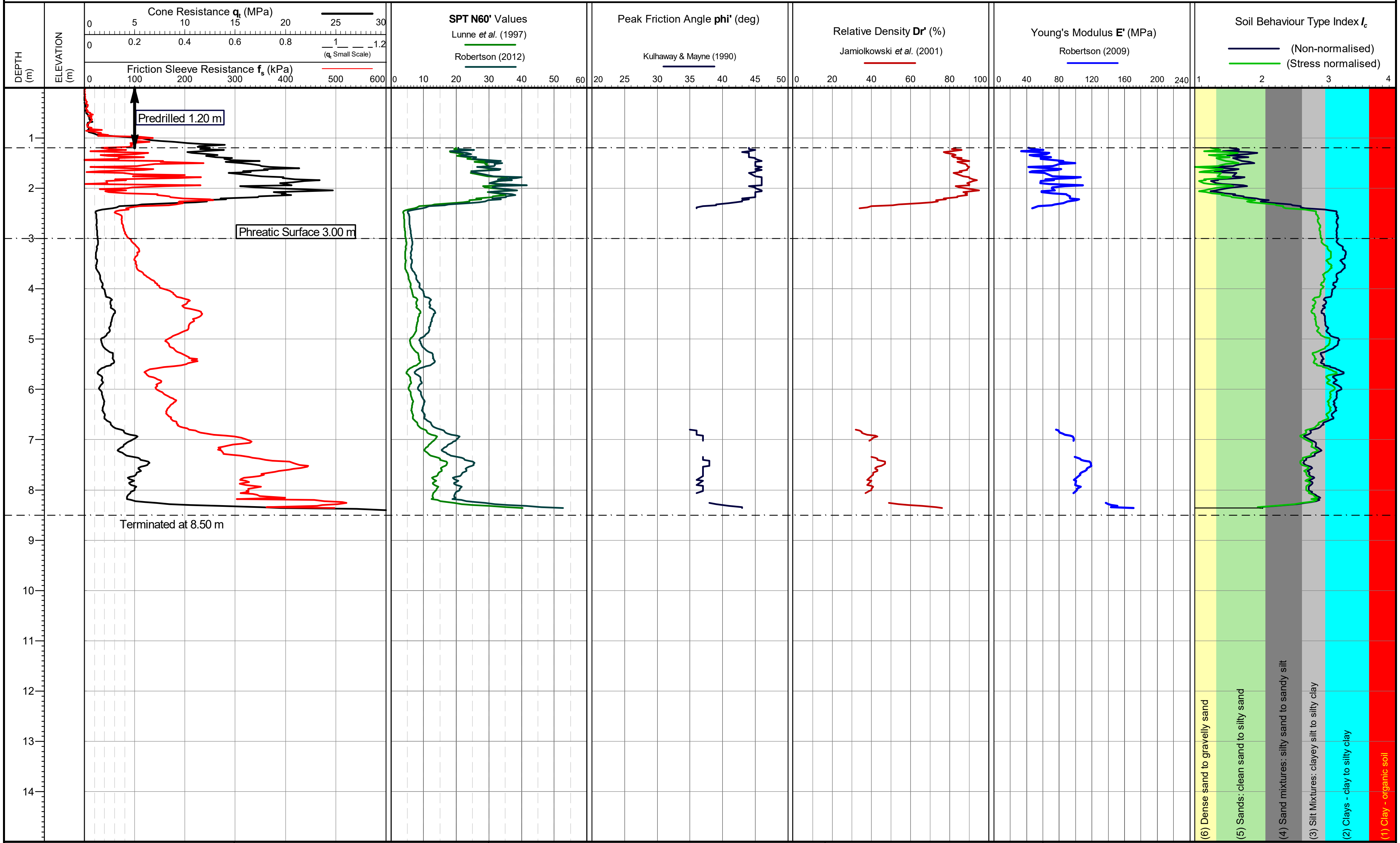
Lankelma Project Ref:
P-107437-1

TEST ID: CPT06

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 12:38:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

Lankelma Project Ref:
P-107437-1

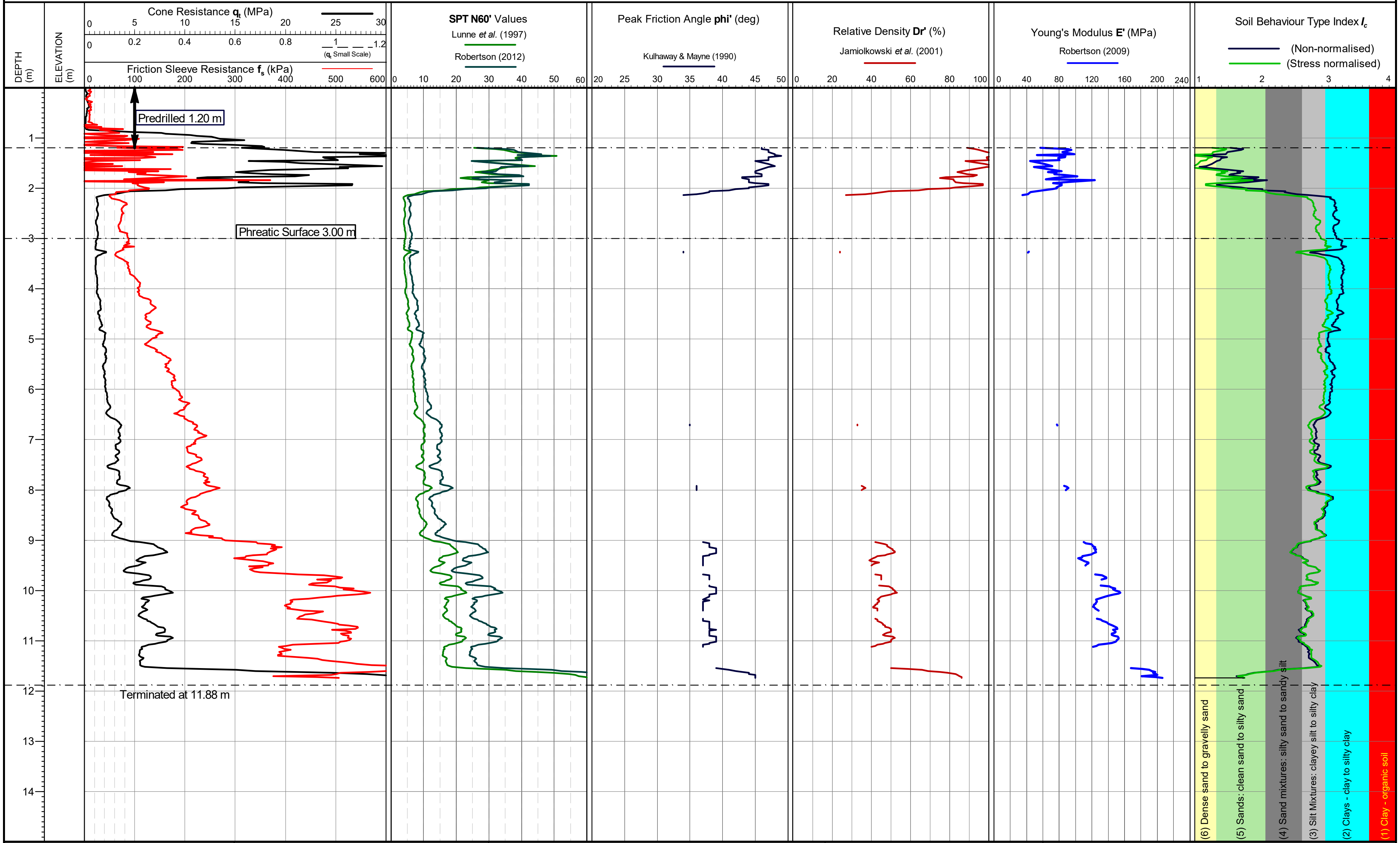
TEST ID: CPT07

Page 1 of 1

LANKELMA

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 13:46:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

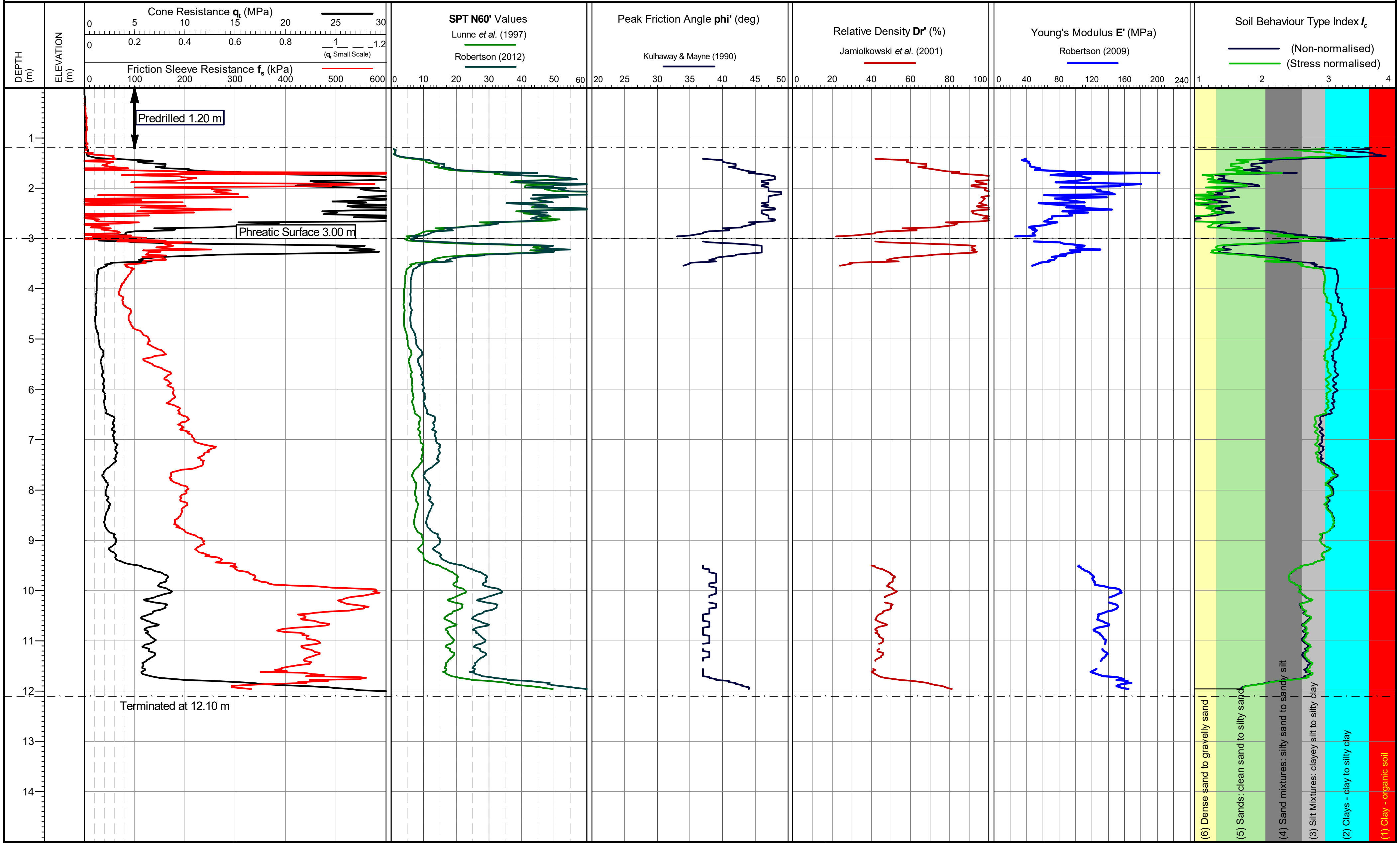
Lankelma Project Ref:
P-107437-1

TEST ID: CPT08

Page 1 of 1

Project: EPSOM HOSPITAL

Client: HYDROCK



Cone area (mm2):1500
Cone ID: S15-CFIP.1524
Operator: Gerard Balp
Date of test: 08/06/2020 14:51:00

Location: Surrey, 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:
20-07-20

Checked by:
Chris Player

Lankelma Project Ref:
P-107437-1

TEST ID: CPT09

Page 1 of 1

Geotechnical Plots

Client
Guild Living
Project
Epsom Hospital
Job number
C12053

Location or material to which this assessment applies
London Clay Formation

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	2	2	2
No. tests in 20% data set	0	0	0
No. tests with suspected pyrite		1	
Maximum value	351.8	0.5	18
Mean of highest two values	180	0	15
Mean of highest 20%			
Characteristic Value	**351.8**	**0.5**	**18**
			Mg not required

	[no pyrite]	**[pyrite suspected]**
DS Class	**DS-1**	**DS-2**

If pyrite suspected, DS Class limited to **DS-2**

Is pyrite assumed to be present? Yes **Adopted DS Class =** **DS-2**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0
		Mg not required

DS Class

pH data

	Soil	Water
Number of tests	2	0
No. tests in 20% data set	0	
Lowest pH	7.3	
Mean of lowest 20%		
Characteristic value	**7.3**	
Design value	**7.3**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-2**

ACEC Class design value

Brownfield
Mobile groundwater **AC-2**

Client
Guild Living
Project
Epsom Hospital
Job number
C12053

Location or material to which this assessment applies
Made Ground

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	1	1	1
No. tests in 20% data set	0	0	0
No. tests with suspected pyrite		0	
Maximum value	41.05	0	2.5
Mean of highest two values	41	0	3
Mean of highest 20%			
Characteristic Value	**41.05**	**0**	**2.5**
			Mg not required

	[no pyrite]	**[pyrite suspected]**
DS Class	**DS-1**	**DS-1**

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? **No** **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0 **Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	1	0
No. tests in 20% data set	0	
Lowest pH	8.0	
Mean of lowest 20%		
Characteristic value	**8.0**	
Design value	**8.0**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield
Mobile groundwater **AC-1**

Client
Guild Living
Project
Epsom Hospital
Job number
C12053

Location or material to which this assessment applies
River Terrace Deposits

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	3	3	3
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		0	
Maximum value	611.1	0.2	12
Mean of highest two values	340	0	10
Mean of highest 20%			
Characteristic Value	**611.1**	**0.2**	**12**
			Mg not required

	[no pyrite]	[pyrite suspected]
DS Class	**DS-2**	**DS-1**

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? No **Adopted DS Class =** **DS-2**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0
		Mg not required
DS Class		

pH data

	Soil	Water
Number of tests	3	0
No. tests in 20% data set	1	
Lowest pH	7.2	
Mean of lowest 20%	7.2	
Characteristic value	**7.2**	
Design value	**7.2**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-2**

ACEC Class design value

Brownfield
Mobile groundwater **AC-2**

Client
Guild Living
Project
Epsom Hospital
Job number
C12053

Location or material to which this assessment applies
Thanet Sand Formation

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	3	3	3
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		1	
Maximum value	751.7	0.6	33
Mean of highest two values	483	0	23
Mean of highest 20%			
Characteristic Value	**751.7**	**0.6**	**33**
			Mg not required

	[no pyrite]	**[pyrite suspected]**
DS Class	**DS-2**	**DS-2**

If pyrite suspected, DS Class limited to **DS-2**

Is pyrite assumed to be present? No **Adopted DS Class = DS-2**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0
		Mg not required

DS Class

pH data

	Soil	Water
Number of tests	3	0
No. tests in 20% data set	1	
Lowest pH	8.0	
Mean of lowest 20%	8.0	
Characteristic value	**8.0**	
Design value	**8.0**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-2**

ACEC Class design value

Brownfield
Mobile groundwater **AC-2**

Client
Guild Living
Project
Epsom Hospital
Job number
C12053

Location or material to which this assessment applies
Upnor Formation

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	1	1	1
No. tests in 20% data set	0	0	0
No. tests with suspected pyrite		0	
Maximum value	56.16	0	4.7
Mean of highest two values	56	0	5
Mean of highest 20%			
Characteristic Value	**56.16**	**0**	**4.7**
			Mg not required

	[no pyrite]	[pyrite suspected]
DS Class	**DS-1**	**DS-1**

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? **No** **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0 **Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	1	0
No. tests in 20% data set	0	
Lowest pH	8.6	
Mean of lowest 20%		
Characteristic value	**8.6**	
Design value	**8.6**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield
Mobile groundwater **AC-1**

Client **Guild Living**	**Location or material to which this assessment applies** Woolwich Formation
Project **Epsom Hospital**	
Job number **C12053**	

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	6	6	6
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		0	
Maximum value	271.195	0.1	25
Mean of highest two values	204	0	17
Mean of highest 20%			
Characteristic Value	**204**	**0**	**17**
			Mg not required

	[no pyrite]	**[pyrite suspected]**
DS Class	**DS-1**	**DS-1**

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? **Yes** **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value **(Maximum Level)**	0	0 **Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	6	0
No. tests in 20% data set	1	
Lowest pH	8.2	
Mean of lowest 20%	8.2	
Characteristic value	**8.2**	
Design value	**8.2**	

Number of soil pH results less than 5.5 0

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield
Mobile groundwater **AC-1**

Appendix E

Site Monitoring Data and Ground Gas Risk Assessment

Site Monitoring Data

Site: Epsom Hospital
Job number: C12053
Client: Guild Living

Gas analyser: GA500961
Equipment check OK: Y
Service in date: Y
Calibration check OK: Y
Name of person monitoring: Rhys Crowther (Initial)

Notes on site conditions:

Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported. GSVs are rounded to 3 places.

Monitoring round		Borehole details						Pressure and flow						Gas concentrations								GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Volume of headspace in BH (well pipe & filter pack) (m^3)	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	VOC (as ppm using PID)	CH_4 (%v/v) Initial	CH_4 (%v/v) Steady	CH_4 (%LEL) Initial	CH_4 (%LEL) Steady	CO_2 (%v/v) Initial	CO_2 (%v/v) Steady	O_2 (%v/v) Initial	O_2 (%v/v) Steady	Gas Screening Value (CH_4) (l/hr)	Gas Screening Value (CO_2) (l/hr)	Notes on condition of borehole and surrounding ground
								Max. individual values:				**4.9**			**3.2**		**64.0**		**10.9**		**21.3**	**0.0096**	**0.1632**	
								Min. individual values:				0.1			0.0		0.0		0.1		2.5	0	-0.0022	**Summary statistics for this monitoring period.**
								Worst-case GSVs based on max. individual flow and max. individual conc. over the duration of this table:														**0.1568**	**0.5341**	
11.08.20	09:15	BH01		24.20	9.01			1009		0.2	0.1	0.1	311.2	0.0	0.0	0	0	0.1	3.3	20.6	19.9	0	0.0033	PID level rose up to 311.2 then fell rapidly to 0 over 2 m
26.08.20	01:12	BH01		24.20	9.09			1007		3.9	0.1	0.1	N/D					0.1	0.6	29.9	20.7	0	0.0006	
09/09/20	12:00	BH01		24.16	9.13			1016		-0.1	0.1	0.1	N/D					0.1	0.3	20.9	20.7	0	0.0003	
25/09/20	NR	BH01																						No Access- Car Parked on BH Location
05/10/20	NR	BH01																						No Access- Car Parked on BH Location
22/10/20	NR	BH01																						No Access- Car Parked on BH Location
11.08.20	09:40	BH02		18.07	3.79			1012		0.3	0.1	0.1	N/D	0.0	0.0	0	0	0.2	0.1	20.3	20.3	0	0.0001	
26.08.20	06:00	BH02		18.07	3.68			1008		0.4	0.1	0.1	N/D					0.2	6.7	21.1	18.2	0	0.0067	
09/09/20	02:24	BH02		18.13	3.72			1020		0.2	0.1	0.1	N/D					0.1	6.0	21.0	18.1	0	0.006	
25/09/20	8.00	BH02		18.18	3.81			994		0.2	0.1	0.1	N/D					0.1	7.0	21.3	17.7	0	0.007	
05/10/20	11.30	BH02		18.04	3.73			992		5.1	1.7	1.7	N/D					9.4	9.6	19.5	15.5	0	0.1632	
22/10/20	0.52	BH02		18.07	3.79			1003		1.6	0.1	0.1	N/D					9.3	9.3	14.4	14.4	0	0.0093	
11.08.20	10:45	BH03		19.80	1.94			1012		0.4	0.1	0.1	N/D	0.0	0.0	0	0	0.1	0.8	20.9	19.4.	0	0.0008	
26.08.20	10:48	BH03		19.80	1.74			1008		-2.5	0.1	0.1	N/D					0.1	0.5	19.7	19.3	0	0.0005	
09/09/20	06:00	BH03		19.77	1.79			1020		-0.1	0.1	0.1	N/D					0.1	0.4	21.1	19.8	0	0.0004	
25/09/20	08:15	BH03		19.72	1.74			996		-0.3	0.1	0.1	N/D					0.3	0.7	21.2	19.7	0	0.0007	
05/10/20	02:52	BH03		19.82	1.64			992		-0.3	0.1	0.1	N/D	1.5	1.5	30	30	0.6	0.6	19.5	18.1	0.0015	0.0006	
22/10/20	12:11	BH03		19.70	1.70			1003		0.4	0.3	0.3	N/D	3.2	3.2	64	64	1.6	1.6	12.6	12.6	0.0096	0.0048	
12.08.20	07:45	BH04		21.97	1.90			1010		0.2	0.1	0.1	N/D	0.0	0.0	0	0	0.1	0.4	20.9	17.6	0	0.0004	
26.08.20	07:55	BH04		21.97	1.63			1007		0.3	0.1	0.1	N/D					0.1	0.5	20.9	18.8	0	0.0005	
09/09/20	07:12	BH04		21.90	1.67			1020		0.1	0.1	0.1	N/D					0.1	0.3	21.1	20.5	0	0.0003	
25/09/20	08:20	BH04		21.87	1.62			996		-0.3	0.1	0.1	N/D					0.2	6.4	21.7	17.9	0	0.0064	
05/10/20	10:00	BH04		22.00	1.62			992		-2.7	0.1	0.1	N/D					0.2	0.2	20.8	20.8	0	0.0002	
22/10/20	11:42	BH04		22.01	1.60			1003		5.0	-1.2	1.2	N/D					1.1	1.1	19.2	19.2	0	0.0132	
11.08.20	10:35	BH05		26.74	13.07			1010		0.4	0.1	0.1	N/D	0.0	0.0	0	0	0.1	0.4	20.9	19.8	0	0.0004	

Monitoring round		Borehole details						Pressure and flow					Gas concentrations									GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Volume of headspace in BH (well pipie & filter pack) (m^3)	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	VOC (as ppm using PID)	CH$_4$ (%v/v)		CH$_4$ (%LEL)		CO$_2$ (%v/v)		O$_2$ (%v/v)		Gas Screening Value (CH$_4$) (l/hr)	Gas Screening Value (CO$_2$) (l/hr)	Notes on condition of borehole and surrounding ground
														Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
26.08.20	09:15	BH05		26.74	13.08			1015		-0.2	0.1	0.1	N/D					0.1	0.9	20.9	19.4	0	0.0009	
09/09/20	09:36	BH05		26.84	13.20			1020		-0.1	0.1	0.1	N/D					0.1	3.3	21.1	11.4	0	0.0033	
25/09/20	08:24	BH05		26.87	13.37			996		-0.4	0.1	0.1	N/D					0.1	2.4	21.4	18.5	0	0.0024	
05/10/20	10:04	BH05		26.55	13.45			992		4.2	1.6	1.6	N/D	0.1	0.1	2	2	3.9	4.0	16.4	9.3	0.0016	0.064	
22/10/20	13:03	BH05		26.90	13.80			1003		-1.0	-0.3	0.3	N/D	0.3	0.3	6	6	4.1	4.1	6.9	6.9	0.0009	0.0123	
11.08.20	09:50	WS01		2.60	1.67			1012		0.4	0.1	0.1	11.5	0.0	0.0	0	0	0.2	9.8	20.4	6.0	0	0.0098	
26.08.20	08:35	WS01		2.60	1.53			1008		0.3	0.1	0.1	N/D					0.4	5.3	20.9	12.8	0	0.0053	
09/09/20	04:48	WS01		2.60	1.59			1020		0.1	0.1	0.1	N/D					0.1	4.8	21.1	13.3	0	0.0048	
25/09/20	08:10	WS01		2.60	1.58			996		-0.9	0.1	0.1	N/D					0.3	6.4	21.7	10.1	0	0.0064	
05/10/20	11:01	WS01		2.60	1.17			992		0.1	0.1	0.1	N/D	0.1	0.0	2	0	10.6	10.9	19.6	2.5	0	0.0109	
22/10/20	12:21	WS01		2.60	1.41			1003		0.4	0.1	0.1	N/D	2.8	0.0	56	0	4.9	4.9	11.1	11.1	0	0.0049	
11.8.20	10:00	WS02		3.55	1.82			1012		0.5	0.1	0.1	N/D	0.0	0.0	0	0	0.4	3.7	19.7	12.7	0	0.0037	
26.08.20	10:30	WS02		3.55	1.67			1008		-0.1	0.1	0.1	N/D					0.2	1.1	20.9	19.3	0	0.0011	
09/09/20	03:36	WS02		3.55	1.70			1020		0.0	0.1	0.1	N/D					0.4	0.1	21.0	21.1	0	0.0001	
25/09/20	08:05	WS02		3.56	1.65			994		-0.2	0.1	0.1	N/D					0.1	0.3	20.9	20.6	0	0.0003	
05/10/20	11:11	WS02		3.40	1.37			991		0.1	0.1	0.1	N/D					0.8	1.6	20.4	17.6	0	0.0016	
22/10/20	12:25	WS02		3.55	1.70			1003		0.6	0.1	0.1	N/D					6.6	6.6	12.7	12.7	0	0.0066	
11.08.20	09:25	WS03		6.22	5.05			1012		0.4	0.1	0.1	N/D	0.0	0.0	0	0	0.7	3.9	19.9	16.7	0	0.0039	
26.08.20	08:15	WS03		6.22	5.00			1007		-0.1	0.1	0.1	N/D					0.1	5.7	21.2	13.2	0	0.0057	
09/09/20	13:12	WS03		6.10	5.20			1020		0.0	0.1	0.1	N/D					0.1	0.2	20.9	20.6	0	0.0002	
25/09/20	07:50	WS03		6.11	4.75			994		-0.3	0.1	0.1	N/D					0.1	0.4	20.9	20.6	0	0.0004	
05/10/20	12:01	WS03		6.10	4.47			992		0.1	0.1	0.1	N/D					0.1	4.6	20.6	14.2	0	0.0046	
22/10/20	12:46	WS03		6.00	4.10			1003		0.4	0.1	0.1	N/D					4.8	4.8	13.1	13.1	0	0.0048	
11.08.20	09:35	WS04		2.76	1.41			1012		0.3	0.1	0.1	N/D	0.0	0.0	0	0	0.4	0.9	20.0	19.6	0	0.0009	
26.08.20	08:20	WS04		2.76	1.23			1007		0	0.1	0.1	N/D					0.3	2	21	17.8	0	0.002	
09/09/20	00:00	WS04		2.75	1.33			1020		0	0.1	0.1	N/D					0.1	1.1	21	19.4	0	0.0011	
20/09/20	07:00	WS04		2.75	1.32			994		0	0.1	0.1	N/D					0.1	1	21	20.4	0	0.001	
05/10/20	11:45	WS04		2.76	1.04			992		15	4.9	4.9	N/D					0.9	0.9	20.3	19.8	0	0.0441	
22/10/20	12:37	WS04		2.87	1.3			1003		0	0.1	0.1	N/D					4.1	4.1	16.4	16.4	0	0.0041	
31/08/20	09:00	BH101		14.92	12.55			1021			0.1	0.1	N/D	0	0.2			1.2	3.7	16.6	14.1	0.0002	0.0037	
13/09/20	09:00	BH101		14.92	12.52			1018			0.1	0.1	N/D	0	0.2			1.2	3.7	16.6	14.1	0.0002	0.0037	
28/09/18	07:30	BH101		15.12	5.66			1023			0.1	0.1	N/D	0.1	0.1			4.8	4.8	14.9	14.9	0.0001	0.0048	
31/08/20	09:00	BH102S		3.05	1.55			1021			0.1	0.1	N/D	0.1	0.2			0.2	0.4	20.4	20.1	0.0002	0.0004	
13/09/18	09:00	BH102S		3.05	1.53			1018			0.1	0.1	N/D	0.2	0.2			0.2	0.4	20.4	20.1	0.0002	0.0004	
28/09/18	08:00	BH102S		2.99	1.41			1023			0.1	0.1	N/D	0.1	0.2			7	7	12.4	12.4	0.0002	0.007	
31/08/20	09:00	BH102D		13.49	1.55			1021			0.1	0.1	N/D	0.1	0.2			0.1	0.4	20.4	20.1	0.0002	0.0004	
13/09/18	09:00	BH102D		13.49	1.55			1018			0.1	0.1	N/D	0.2	0.2			0.1	0.4	20.4	20.1	0.0002	0.0004	
28/09/20	08:05	BH102D		13.5	1.42			1023			0.1	0.1	N/D	0.22	0.2			6.6	6.5	13	12.8	0.0002	0.0065	
31/08/20	09:00	BH104S		2.55	1.55			1021			0.1	0.1	N/D	0	0.2			1.2	2.4	20.1	19.3	0.0002	0.0024	

Monitoring round		Borehole details						Pressure and flow					Gas concentrations									GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Volume of headspace in BH (well pipie & filter pack) (m^3)	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	VOC (as ppm using PID)	CH_4 (%v/v)		CH_4 (%LEL)		CO_2 (%v/v)		O_2 (%v/v)		Gas Screening Value (CH_4) (l/hr)	Gas Screening Value (CO_2) (l/hr)	Notes on condition of borehole and surrounding ground
														Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
13/09/18	09:00	BH104S		2.55	1.54			1018			0.1	0.1	N/D	0	0.2			1.2	2.4	20.1	19.3	0.0002	0.0024	
31/08/20	09:00	BH104D		11.7	1.55			1021			0.1	0.1	N/D	0	0.2			2.1	2.5	20.1	17.9	0.0002	0.0025	
13/09/18	09:00	BH104D		11.7	1.55			1018			0.1	0.1	N/D	0	0.2			2.1	2.5	20.1	17.9	0.0002	0.0025	
31/08/18	09:00	WS101		2.09	Dry	D		1021			0.1	0.1	N/D	0	0.1			0.1	6.4	16.7	15.7	0.0001	0.0064	
13/09/18	10:45	WS101		2.09	Dry	D		1018			0.1	0.1	N/D	0	0.1			0.1	6.4	17	15.7	0.0002	0.0025	
28/09/18	08:10	WS101		2.08		D		1022			0.1	0.1	N/D	0.1	0.1			5.5	5.7	17.4	17.2	0.0001	0.0057	
31/08/18	09:00	WS102		4.35	4.33			1021			0.1	0.1	N/D	0	0.2			0.1	1.9	20.8	19.7	0.0002	0.0025	
13/09/18	09:00	WS102		4.35	4.3			1018			0.1	0.1	N/D	0	0.2			0.1	1.9	15.7	19.7	0.0002	0.0019	
28/09/18	08:20	WS102		4.34		D		1023			0.1	0.1	N/D	0.1	0.1			1.7	0.1	20.6	21.3	0.0001	0.0001	
31/08/18	09:00	WS103		0.99		D		1021			0.1	0.1	N/D	0	0.1			0.1	1.2	20.7	20.1	0	-0.0017	
13/09/18	09:00	WS103		0.99	Dry	D		1018			0.1	0.1	N/D	0	0.2			0.1	2.6	20.1	17.9	0.0002	0.0026	
28/09/18	09:50	WS103		0.99		D		1024			0.1	0.1	N/D	0.1	0.1			0.2	0.2	21.2	21.2	0.0001	0.0002	
21/08/20	09:00	WS104		2.13	1.89			1021			0.1	0.1	N/D	0	0.2			0.1	2.6	20.1	17.7	0	-0.0022	

Appendix F

Contamination Test Results and Statistical Analysis

Contamination Test Results

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Analytical Report Number : 20-13599

Replaces Analytical Report Number : 20-13599, issue no. 1

Additional analysis undertaken.

Project / Site name:	Epsom Hospital	**Samples received on:**	08/06/2020
Your job number:	12053	**Sample instructed/ Analysis started on:**	10/06/2020
Your order number:		**Analysis completed by:**	11/08/2020
Report Issue Number:	2	**Report issued on:**	11/08/2020
Samples Analysed:	26 soil samples		

Signed: RBradley

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-13599

Project / Site name: Epsom Hospital

Lab Sample Number				1530811	1530812	1530813	1530814	1530815
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.90	0.50	2.20	0.70
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	6.5	8.4	12	8.1	12
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	0.006
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	0.006

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	8.0	7.7	7.3	8.3
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.075	0.38	0.16	0.29	0.82
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0057	0.012	0.017	0.0045	0.0089

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.60	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	7.1	0.74	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	11	7.1	1.3	0.95
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.2	< 0.05	0.19
Fluoranthene	mg/kg	0.05	MCERTS	0.39	< 0.05	21	< 0.05	2.3
Pyrene	mg/kg	0.05	MCERTS	0.34	2.7	18	0.74	2.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.27	< 0.05	13	< 0.05	1.5
Chrysene	mg/kg	0.05	MCERTS	0.18	< 0.05	8.9	< 0.05	0.82
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	13	< 0.05	1.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.8	< 0.05	0.52
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	11	< 0.05	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.8	< 0.05	0.63
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.9	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	6.3	< 0.05	0.66

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.18	20.9	116	1.99	12.3

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.6	12	27	16	12
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.61	0.59	1.0	0.74	0.70
Boron (water soluble)	mg/kg	0.2	MCERTS	1.6	0.8	1.6	0.5	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	23	51	19	75	21
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	51	20	75	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.0	3.6	36	6.6	29
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	8.0	490	26	540
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.8	< 0.3	2.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	39	16	46	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	33	38	46	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	45	37	230	61	240

Analytical Report Number: 20-13599

Project / Site name: Epsom Hospital

Lab Sample Number				1530811	1530812	1530813	1530814	1530815
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.90	0.50	2.20	0.70
Date Sampled				03/06/2020	03/06/2020	03/06/2020	03/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	1.2	< 0.001	3.4	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	75	< 1.0	3.7	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	1300	< 2.0	120	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	2600	< 8.0	240	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	570	< 8.0	75	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	12	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	0.014	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	18	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	230	4.6	11	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	420	50	27	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	160	120	< 10	16
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	18	< 8.4	< 8.4

Analytical Report Number: 20-13599

Project / Site name: Epsom Hospital

Lab Sample Number				1530816	1530817	1530818	1530819	1530820
Sample Reference				WS03	WS04	WS04	BH01	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80	0.30	0.80	0.30	1.00
Date Sampled				03/06/2020	04/06/2020	04/06/2020	02/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	7.1	15	16	13
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	0.012	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	0.012	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.5	8.3	7.8	7.9
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.032	0.0080	0.17	0.011
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	< 0.0010	0.014	0.0037	0.022	0.0049

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.63	< 0.05	0.70	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.19	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	2.0	< 0.05	2.0	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.8	< 0.05	1.7	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	1.3	< 0.05	1.3	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.83	< 0.05	0.89	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.5	< 0.05	1.3	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.59	< 0.05	0.75	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.2	< 0.05	1.1	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.74	< 0.05	0.69	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.19	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.88	< 0.05	0.71	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	11.7	< 0.80	11.3	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	13	10	17	7.3
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.0	0.75	0.72	1.1	0.49
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.7	0.8	4.7	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	3.1	< 1.2
Chromium (III)	mg/kg	1	NONE	35	20	24	17	15
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	20	24	20	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26	25	5.7	37	6.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	240	28	350	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.5	< 0.3	0.9	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	12	13	17	9.2
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	48	32	39	39	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	120	45	180	37

Lab Sample Number				1530816	1530817	1530818	1530819	1530820
Sample Reference				WS03	WS04	WS04	BH01	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80	0.30	0.80	0.30	1.00
Date Sampled				03/06/2020	04/06/2020	04/06/2020	02/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	15	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	37	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4

Analytical Report Number: 20-13599

Project / Site name: Epsom Hospital

Lab Sample Number				1530821	1530822	1530823	1530824	1530825
Sample Reference				CPT01	CPT02	CPT03	CPT03	CPT04A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.60	0.50	1.00	0.40
Date Sampled				05/06/2020	04/06/2020	04/06/2020	04/06/2020	05/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	8.4	16	10	8.6
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile & Amosite & Crocidolite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.018	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.018	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.9	8.4	8.6	8.8	9.8
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.059	0.043	0.014	0.024	0.42
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.022	0.011	0.0077	0.0038	0.022
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	0.22
Acenaphthylene	mg/kg	0.05	MCERTS	2.6	< 0.05	< 0.05	< 0.05	1.6
Acenaphthene	mg/kg	0.05	MCERTS	0.33	< 0.05	< 0.05	< 0.05	0.66
Fluorene	mg/kg	0.05	MCERTS	0.85	< 0.05	< 0.05	< 0.05	0.72
Phenanthrene	mg/kg	0.05	MCERTS	13	1.5	< 0.05	< 0.05	9.8
Anthracene	mg/kg	0.05	MCERTS	3.1	0.46	< 0.05	< 0.05	3.4
Fluoranthene	mg/kg	0.05	MCERTS	39	4.6	0.60	0.37	28
Pyrene	mg/kg	0.05	MCERTS	36	4.2	0.58	0.53	28
Benzo(a)anthracene	mg/kg	0.05	MCERTS	26	3.0	0.31	0.28	20
Chrysene	mg/kg	0.05	MCERTS	21	2.2	0.26	0.25	13
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	27	3.0	0.25	0.25	26
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	17	1.6	0.27	0.21	7.1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	24	2.5	0.27	0.23	21
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	13	1.6	< 0.05	< 0.05	11
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	3.7	0.44	< 0.05	< 0.05	3.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	14	1.6	< 0.05	< 0.05	12
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	240	26.7	2.54	2.12	187
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	21	7.5	7.1	12
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.1	0.62	0.55	0.84
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	1.0	0.9	0.9	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	0.4	< 0.2	< 0.2	0.3
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	22	20	18	25	24
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	20	18	26	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	40	14	5.6	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	760	740	73	23	83
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.2	0.6	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	18	12	13	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	38	30	35	40
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	200	120	57	86

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Project / Site name: Epsom Hospital

Lab Sample Number				1530821	1530822	1530823	1530824	1530825
Sample Reference				CPT01	CPT02	CPT03	CPT03	CPT04A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.60	0.50	1.00	0.40
Date Sampled				05/06/2020	04/06/2020	04/06/2020	04/06/2020	05/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

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Project / Site name: Epsom Hospital

Lab Sample Number				1530826	1530827	1530828	1530829	1530830
Sample Reference				CPT05	CPT05	CPT06	CPT06	CPT07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.20	0.40	1.20	0.30
Date Sampled				05/06/2020	05/06/2020	05/06/2020	05/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	9.1	8.3	13	14	8.5
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	Chrysotile & Amosite
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	0.012
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	0.012

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.0	9.2	8.5	10.1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.15	0.11	0.11	0.031	0.56
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0054	0.0044	0.014	0.0060	0.014

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.36
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.30
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.48
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.60	< 0.05	5.8
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.25	< 0.05	1.8
Fluoranthene	mg/kg	0.05	MCERTS	0.49	0.61	1.7	0.35	14
Pyrene	mg/kg	0.05	MCERTS	0.52	0.67	1.6	0.36	16
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.28	0.40	1.1	< 0.05	10
Chrysene	mg/kg	0.05	MCERTS	0.27	0.35	0.83	< 0.05	6.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.33	0.48	1.1	< 0.05	8.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.23	0.29	0.54	< 0.05	5.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.27	0.37	0.76	< 0.05	7.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.33	0.50	< 0.05	4.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.33	0.52	< 0.05	4.7

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.39	3.83	9.41	< 0.80	87.5

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	21	11	9.1	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.73	0.89	0.71	0.88	0.68
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.6	0.6	0.3	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.2	0.4	< 0.2	0.3
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	23	33	24	31	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	34	24	31	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.4	52	35	7.3	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	59	110	130	36	160
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.5	< 0.3	0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	24	14	18	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	39	50	37	48	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40	62	84	53	97

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Project / Site name: Epsom Hospital

Lab Sample Number				1530826	1530827	1530828	1530829	1530830
Sample Reference				CPT05	CPT05	CPT06	CPT06	CPT07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.20	0.40	1.20	0.30
Date Sampled				05/06/2020	05/06/2020	05/06/2020	05/06/2020	04/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

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Project / Site name: Epsom Hospital

Lab Sample Number				1530831	1530832	1530833	1530834	1530835
Sample Reference				CPT07	CPT08	CPT08	CPT09	CPT10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.20	0.80	0.40
Date Sampled				04/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	7.8	17	13	17	17
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.5	8.2	8.3	7.9	8.8
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.033	0.0077	0.0092	0.011	0.059
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0050	0.0092	0.0067	0.012	0.014
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.29
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.48	< 0.05	< 0.05	5.8
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.9
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.0	< 0.05	< 0.05	20
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.80	< 0.05	< 0.05	19
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.51	< 0.05	< 0.05	11
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.49	< 0.05	< 0.05	7.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.45	< 0.05	< 0.05	7.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.25	< 0.05	< 0.05	10
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.39	< 0.05	< 0.05	9.6
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	4.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	5.3
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	4.39	< 0.80	< 0.80	104
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	8.5	7.9	8.3	41
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.72	0.74	0.69	0.66	3.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	0.7	1.1	2.1	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	27	16	23	17	33
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	16	23	18	34
Copper (aqua regia extractable)	mg/kg	1	MCERTS	2.9	18	8.4	14	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	160	41	160	660
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	< 0.3	0.6	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	12	14	12	33
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	41	29	35	36	61
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	57	52	50	330

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Project / Site name: Epsom Hospital

Lab Sample Number				1530831	1530832	1530833	1530834	1530835
Sample Reference				CPT07	CPT08	CPT08	CPT09	CPT10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.20	0.80	0.40
Date Sampled				04/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

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Project / Site name: Epsom Hospital

Lab Sample Number				1530836				
Sample Reference				CPT11				
Sample Number				None Supplied				
Depth (m)				0.30				
Date Sampled				02/06/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	7.9				
Total mass of sample received	kg	0.001	NONE	0.40				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-				
Asbestos Quantification Total	%	0.001	ISO 17025	-				

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.15				
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0087				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	0.30				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.26				
Pyrene	mg/kg	0.05	MCERTS	0.25				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.81				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.47				
Boron (water soluble)	mg/kg	0.2	MCERTS	1.8				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2				
Chromium (III)	mg/kg	1	NONE	16				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.2				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.7				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100				

Analytical Report Number: 20-13599

Project / Site name: Epsom Hospital

Lab Sample Number				1530836				
Sample Reference				CPT11				
Sample Number				None Supplied				
Depth (m)				0.30				
Date Sampled				02/06/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-				
Toluene	µg/kg	1	MCERTS	-				
Ethylbenzene	µg/kg	1	MCERTS	-				
p & m-xylene	µg/kg	1	MCERTS	-				
o-xylene	µg/kg	1	MCERTS	-				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-				
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-				
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-				

Analytical Report Number: **20-13599**
Project / Site name: **Epsom Hospital**
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1530815	WS03	0.70	166	Loose Fibrous Debris	**Chrysotile**	0.006	**0.006**
1530819	BH01	0.30	156	Loose Fibrous Debris	**Chrysotile**	0.012	**0.012**
1530822	CPT02	0.60	165	Loose Fibres & Sheeting/Board Debris	**Chrysotile & Amosite & Crocidolite**	0.018	**0.018**
1530830	CPT07	0.30	160	Sheeting/Board Debris	**Chrysotile & Amosite**	0.012	**0.012**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 20-13599

Project / Site name: Epsom Hospital

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1530811	WS01	None Supplied	1.20	Brown clay and sand with gravel.
1530812	WS01	None Supplied	1.90	Brown sand with gravel.
1530813	WS02	None Supplied	0.50	Brown clay and sand with gravel.
1530814	WS02	None Supplied	2.20	Brown sand with gravel.
1530815	WS03	None Supplied	0.70	Brown clay and sand with gravel and brick.
1530816	WS03	None Supplied	1.80	Brown clay.
1530817	WS04	None Supplied	0.30	Grey clay and sand with gravel and chalk.
1530818	WS04	None Supplied	0.80	Brown clay.
1530819	BH01	None Supplied	0.30	Brown clay and sand.
1530820	BH01	None Supplied	1.00	Brown clay and sand.
1530821	CPT01	None Supplied	0.50	Brown clay.
1530822	CPT02	None Supplied	0.60	Brown clay and sand with gravel.
1530823	CPT03	None Supplied	0.50	Brown clay.
1530824	CPT03	None Supplied	1.00	Brown sandy clay with gravel.
1530825	CPT04A	None Supplied	0.40	Brown clay and sand with gravel.
1530826	CPT05	None Supplied	0.40	Brown clay and sand with gravel.
1530827	CPT05	None Supplied	1.20	Brown clay and sand with gravel.
1530828	CPT06	None Supplied	0.40	Brown clay and sand with gravel.
1530829	CPT06	None Supplied	1.20	Brown clay and sand.
1530830	CPT07	None Supplied	0.30	Brown clay and sand with gravel.
1530831	CPT07	None Supplied	1.00	Brown clay and sand with gravel.
1530832	CPT08	None Supplied	0.50	Brown clay and sand with gravel.
1530833	CPT08	None Supplied	1.20	Brown clay and sand with gravel.
1530834	CPT09	None Supplied	0.80	Brown clay and sand.
1530835	CPT10	None Supplied	0.40	Brown clay and sand with gravel.
1530836	CPT11	None Supplied	0.30	Brown clay and sand.

Analytical Report Number : 20-13599

Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

Analytical Report Number : 20-13599

Project / Site name: Epsom Hospital

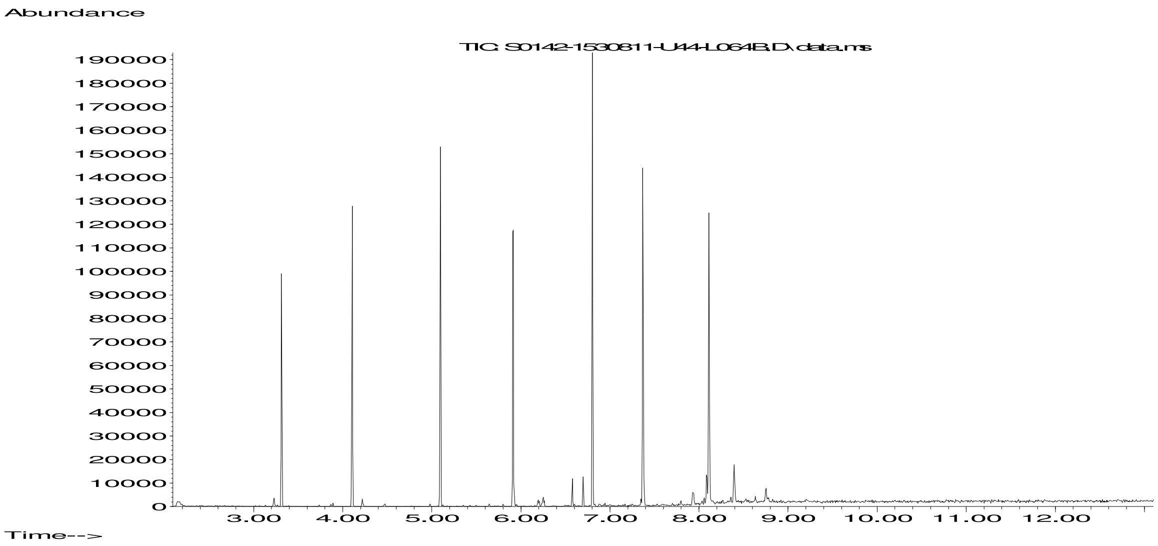
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	**Analytical Method Description**	**Analytical Method Reference**	**Method number**	**Wet / Dry Analysis**	**Accreditation Status**
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH01		S	20-13599	1530819	c	Free cyanide in soil	L080-PL	c
BH01		S	20-13599	1530820	c	Free cyanide in soil	L080-PL	c
CPT02		S	20-13599	1530822	c	Free cyanide in soil	L080-PL	c
CPT03		S	20-13599	1530823	c	Free cyanide in soil	L080-PL	c
CPT03		S	20-13599	1530824	c	Free cyanide in soil	L080-PL	c
CPT07		S	20-13599	1530830	c	Free cyanide in soil	L080-PL	c
CPT07		S	20-13599	1530831	c	Free cyanide in soil	L080-PL	c
CPT08		S	20-13599	1530832	c	Free cyanide in soil	L080-PL	c
CPT08		S	20-13599	1530833	c	Free cyanide in soil	L080-PL	c
CPT09		S	20-13599	1530834	c	Free cyanide in soil	L080-PL	c
CPT10		S	20-13599	1530835	c	Free cyanide in soil	L080-PL	c
CPT11		S	20-13599	1530836	c	Free cyanide in soil	L080-PL	c
WS01		S	20-13599	1530811	c	Free cyanide in soil	L080-PL	c
WS01		S	20-13599	1530812	c	Free cyanide in soil	L080-PL	c
WS02		S	20-13599	1530813	c	Free cyanide in soil	L080-PL	c
WS02		S	20-13599	1530814	c	Free cyanide in soil	L080-PL	c
WS03		S	20-13599	1530815	c	Free cyanide in soil	L080-PL	c
WS03		S	20-13599	1530816	c	Free cyanide in soil	L080-PL	c
WS04		S	20-13599	1530817	c	Free cyanide in soil	L080-PL	c
WS04		S	20-13599	1530818	c	Free cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature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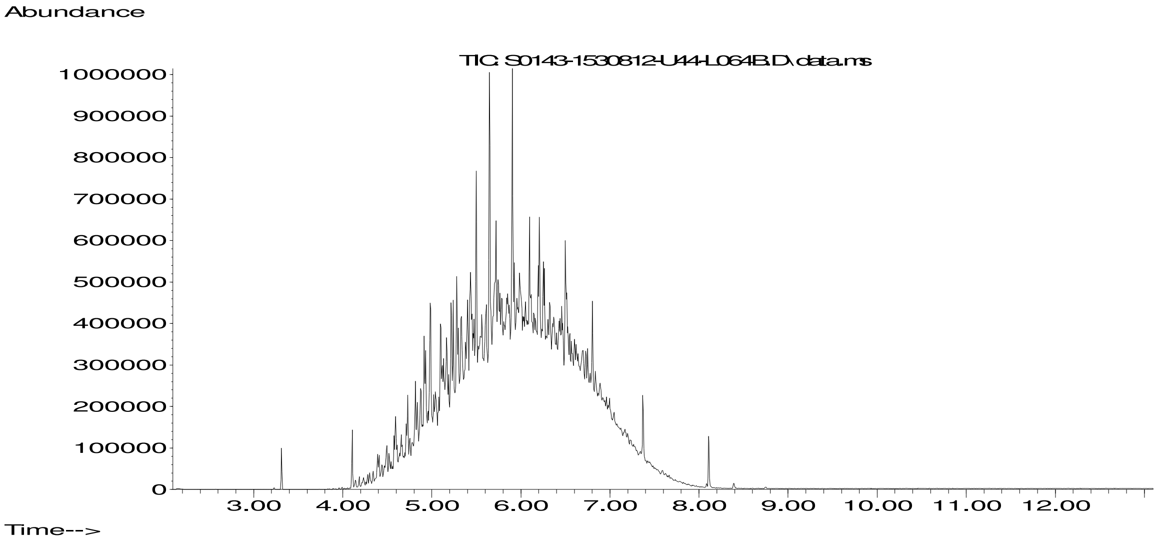
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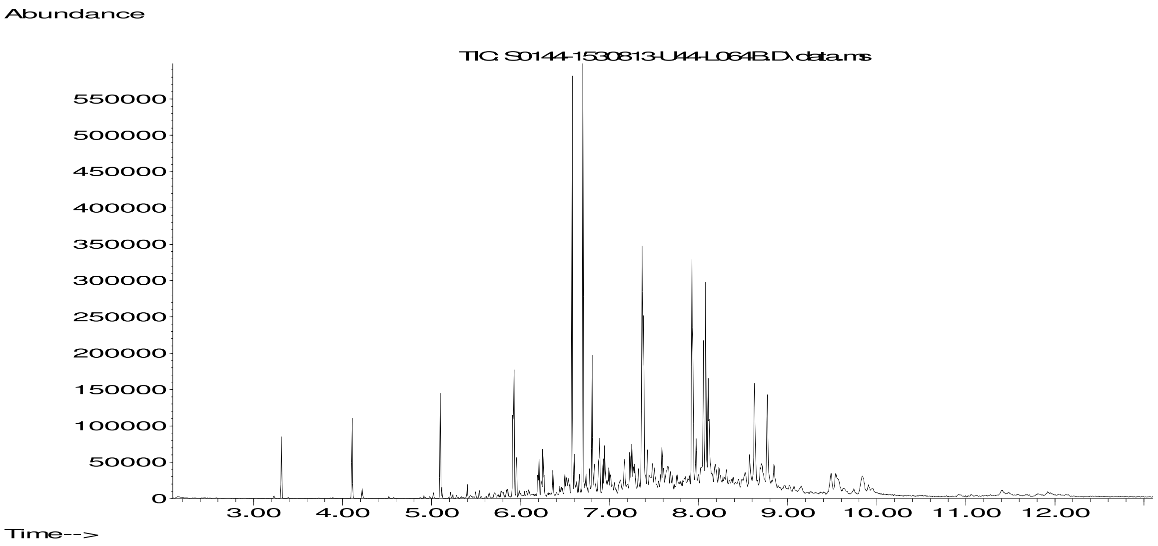
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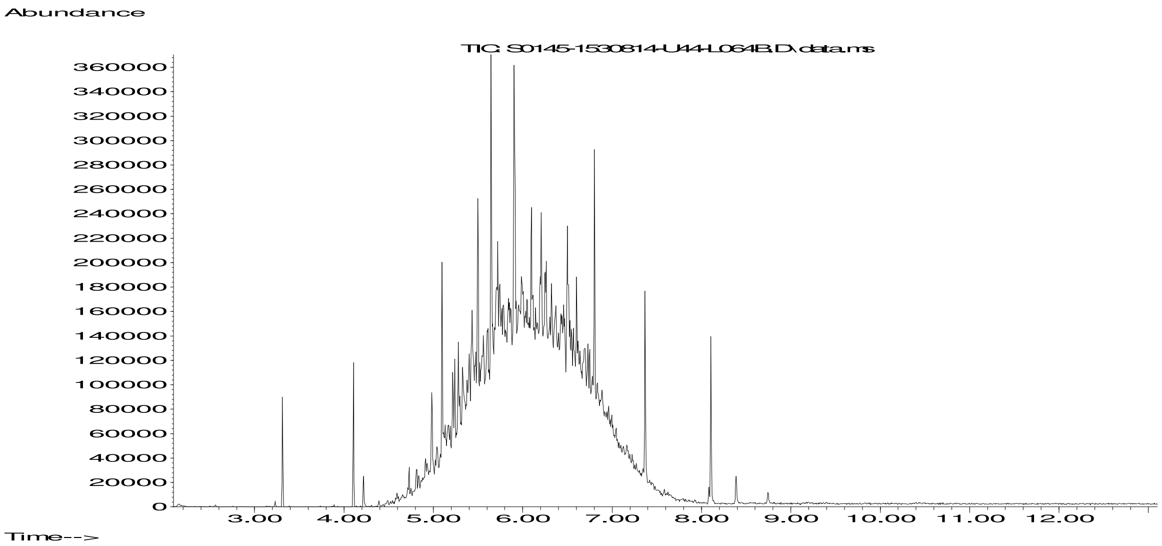
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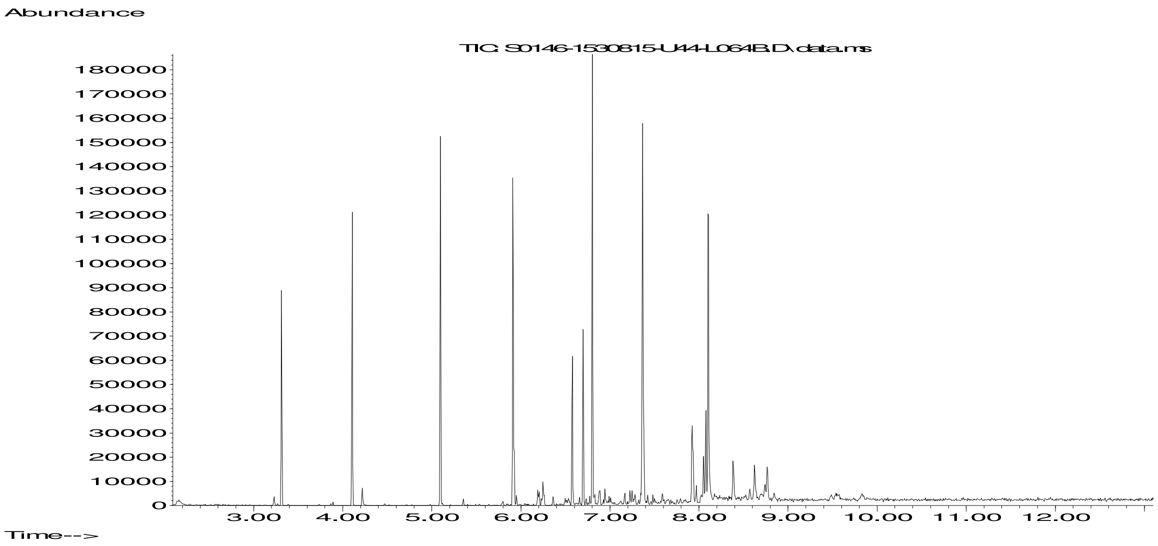
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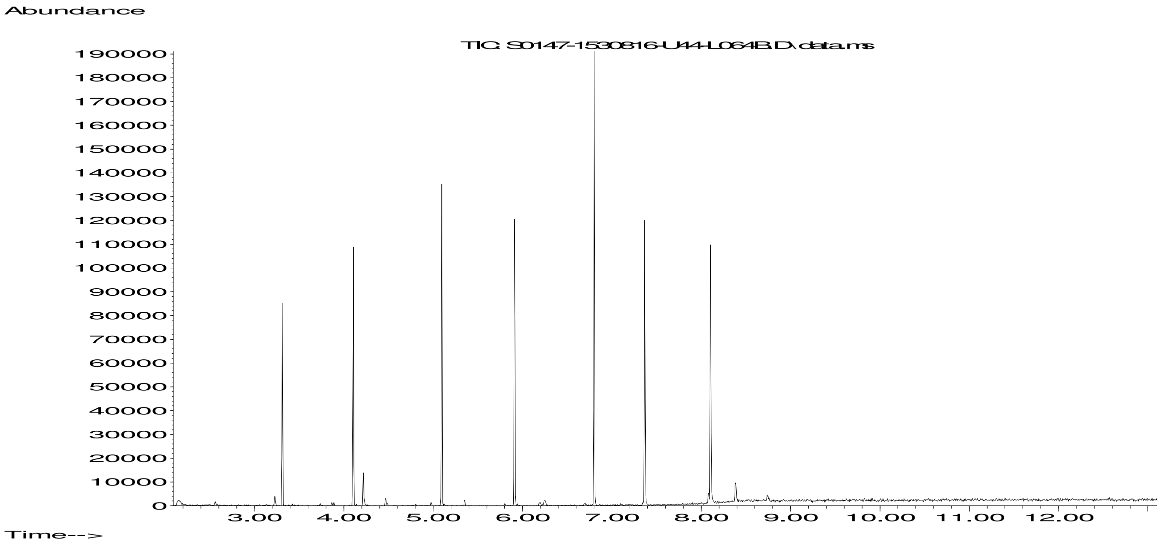
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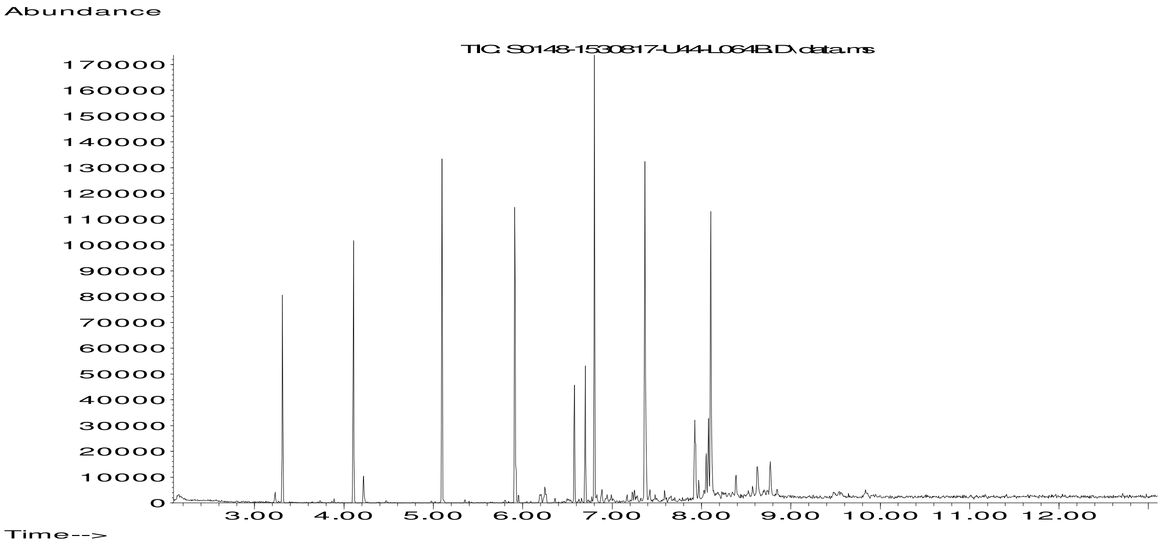
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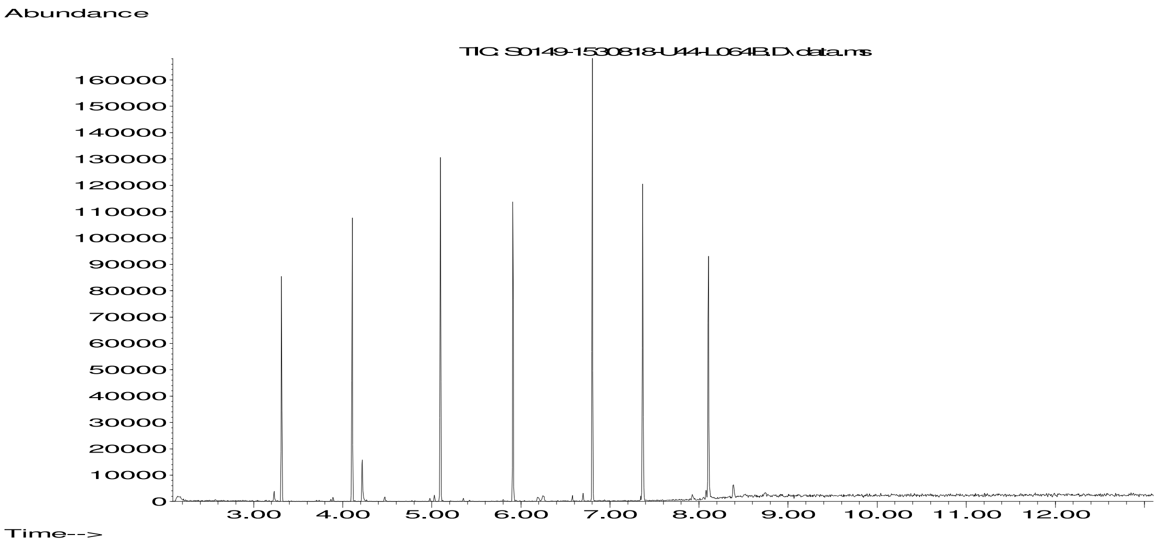
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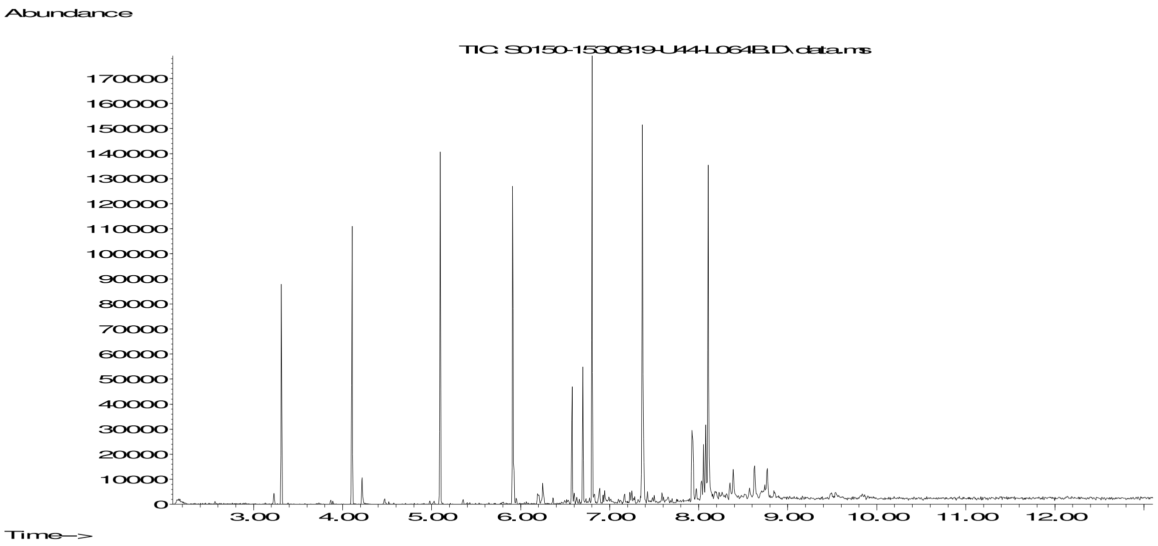
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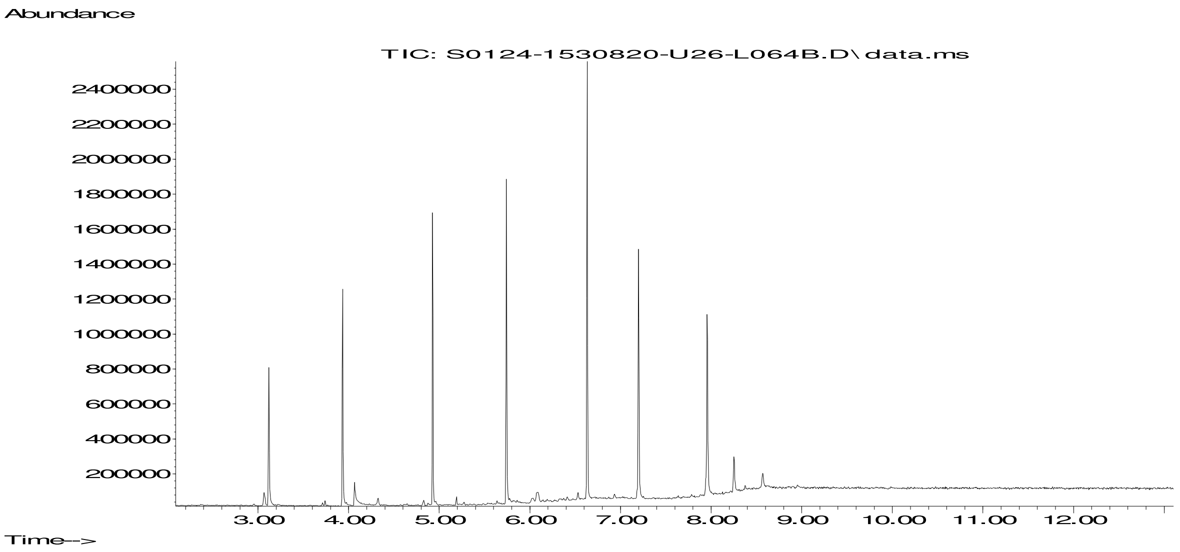
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Analytical Report Number : 20-15129

Replaces Analytical Report Number : 20-15129, issue no. 1

Additional analysis undertaken.

Project / Site name:	Epson Hospital	**Samples received on:**	16/06/2020
Your job number:	C 12053	**Sample instructed/ Analysis started on:**	21/06/2020
Your order number:		**Analysis completed by:**	26/06/2020
Report Issue Number:	2	**Report issued on:**	11/08/2020
Samples Analysed:	2 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-15129

Project / Site name: Epson Hospital

Lab Sample Number				1539225	1539226			
Sample Reference				HP11	BH03			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.30			
Date Sampled				11/06/2020	11/06/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	5.7	8.9			
Total mass of sample received	kg	0.001	NONE	0.50	0.50			

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001			
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001			

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	10.0			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.031	0.33			
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.020	0.019			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.24			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.21			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	21			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.74			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	6.2			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	5.8			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	4.2			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	3.2			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	4.9			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	2.1			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	3.6			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	2.0			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.61			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	2.3			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	56.9			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	12			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.95	0.68			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	2.5			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.9			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (III)	mg/kg	1	NONE	16	22			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	22			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	65			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	110			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	18			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	28			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	60	260			

Analytical Report Number: **20-15129**
Project / Site name: **Epson Hospital**
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1539226	BH03	0.30	188	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 20-15129

Project / Site name: Epson Hospital

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1539225	HP11	None Supplied	0.30	Brown loam and clay with gravel and vegetation.
1539226	BH03	None Supplied	0.30	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 20-15129

Project / Site name: Epson Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH03		S	20-15129	1539226	c	Free cyanide in soil	L080-PL	c
HP11		S	20-15129	1539225	c	Free cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 20-17863

Project / Site name: Epsom Hospital

Samples received on: 25/06/2020

Your job number: C12053

Sample instructed/ Analysis started on: 06/07/2020

Your order number: PO01239

Analysis completed by: 13/07/2020

Report Issue Number: 1

Report issued on: 13/07/2020

Samples Analysed: 3 soil samples

Signed: A. Czerwińska

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Lab Sample Number				1553738	1553739	1553740		
Sample Reference				BH05	BH05	BH04		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	1.00	0.50		
Date Sampled				24/06/2020	24/06/2020	24/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	12	9.1	8.6		
Total mass of sample received	kg	0.001	NONE	0.46	0.44	0.47		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	8.3	11.0		
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.072	0.062	1.9		
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.028	0.0052	0.0059		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	1.0	< 0.05	0.56		
Anthracene	mg/kg	0.05	MCERTS	0.22	< 0.05	0.15		
Fluoranthene	mg/kg	0.05	MCERTS	3.6	< 0.05	1.7		
Pyrene	mg/kg	0.05	MCERTS	3.3	< 0.05	1.8		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.6	< 0.05	1.2		
Chrysene	mg/kg	0.05	MCERTS	1.9	< 0.05	1.2		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.5	< 0.05	0.95		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	< 0.05	0.76		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.4	< 0.05	1.1		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.3	< 0.05	0.47		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.37	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.5	< 0.05	0.63		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	22.4	< 0.80	10.4		

Analytical Report Number: 20-17863

Project / Site name: Epsom Hospital

Lab Sample Number				1553738	1553739	1553740		
Sample Reference				BH05	BH05	BH04		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	1.00	0.50		
Date Sampled				24/06/2020	24/06/2020	24/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	11	8.7		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	0.83	1.9		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.7	1.9		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	0.2	0.2		
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2		
Chromium (III)	mg/kg	1	NONE	23	23	18		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	23	18		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	57	13	48		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	350	54	48		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	17	13		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	39	40	34		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	53	83		

Analytical Report Number : 20-17863

Project / Site name: Epsom Hospital

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1553738	BH05	None Supplied	0.50	Brown loam with gravel and vegetation.
1553739	BH05	None Supplied	1.00	Brown clay and loam with gravel and vegetation.
1553740	BH04	None Supplied	0.50	Brown gravelly loam.

Analytical Report Number : 20-17863

Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	**Analytical Method Description**	**Analytical Method Reference**	**Method number**	**Wet / Dry Analysis**	**Accreditation Status**
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH04		S	20-17863	1553740	c	Free cyanide in soil	L080-PL	c
BH05		S	20-17863	1553738	c	Free cyanide in soil	L080-PL	c
BH05		S	20-17863	1553739	c	Free cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 20-20597

Project / Site name:	Epsom Hospital	**Samples received on:**	25/06/2020
Your job number:	C12053	**Sample instructed/ Analysis started on:**	21/07/2020
Your order number:	PO01314	**Analysis completed by:**	04/08/2020
Report Issue Number:	1	**Report issued on:**	04/08/2020
Samples Analysed:	4 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-20597

Project / Site name: Epsom Hospital

Lab Sample Number				1568778	1568779	1568780	1568781	
Sample Reference				BH04	BH04	BH04	BH04	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				2.50	4.00	7.40	11.80	
Date Sampled				Deviating	Deviating	Deviating	Deviating	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	18	17	12	14	
Total mass of sample received	kg	0.001	NONE	0.90	0.50	0.50	0.70	

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0	7.7	8.5	8.6	
Total Sulphate as SO_4	mg/kg	50	MCERTS	170	220	150	80	
Total Sulphate as SO_4	%	0.005	MCERTS	0.017	0.022	0.015	0.008	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.076	0.13	0.052	0.012	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	75.5	126	51.9	12.3	
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	8.6	5.9	6.6	5.9	
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	4.3	2.9	3.3	2.9	
Total Sulphur	mg/kg	50	MCERTS	87	130	85	58	
Total Sulphur	%	0.005	MCERTS	0.009	0.013	0.008	0.006	
Ammonium as NH_4	mg/kg	0.5	MCERTS	< 0.5	< 0.5	0.6	< 0.5	
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	< 0.05	0.06	< 0.05	
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	15	23	17	6.2	
Magnesium (leachate equivalent)	mg/l	2.5	NONE	7.4	11	8.6	3.1	

Analytical Report Number : 20-20597

Project / Site name: Epsom Hospital

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1568778	BH04	None Supplied	2.50	Brown clay and sand with gravel.
1568779	BH04	None Supplied	4.00	Brown clay with gravel.
1568780	BH04	None Supplied	7.40	Brown clay and loam with gravel.
1568781	BH04	None Supplied	11.80	Brown clay and sand.

Analytical Report Number : 20-20597

Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH04		S	20-20597	1568778	a			
BH04		S	20-20597	1568779	a			
BH04		S	20-20597	1568780	a			
BH04		S	20-20597	1568781	a			

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 20-21010

Project / Site name:	Epsom Hospital	**Samples received on:**	15/07/2020
Your job number:	C-012053-C	**Sample instructed/ Analysis started on:**	24/07/2020
Your order number:	PO01237	**Analysis completed by:**	30/07/2020
Report Issue Number:	1	**Report issued on:**	30/07/2020
Samples Analysed:	5 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-21010

Project / Site name: Epsom Hospital

Lab Sample Number				1571157	1571158	1571159	1571160	1571161
Sample Reference				BH06	BH02	BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.10	3.50	7.60	10.50	16.40
Date Sampled				02/07/2020	10/07/2020	10/07/2020	10/07/2020	10/07/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	23	11	20	20
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.55	0.55	0.55
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	7.3	8.7	8.8	8.6
Free Cyanide	mg/kg	1	MCERTS	< 1	-	-	-	-
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	460*	250*	97	110
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.046*	0.025*	0.010	0.011
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.32*	0.26*	0.048	0.046
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	325*	261*	47.5	46.1
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	34	9.4	8.7	9.2
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	17	4.7	4.4	4.6
Total Sulphur	mg/kg	50	MCERTS	-	1500	360	93	150
Total Sulphur	%	0.005	MCERTS	-	0.150	0.036	0.009	0.015
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	1.2	1.7	0.9	< 0.5
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	0.12	0.17	0.09	< 0.05
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0057	-	-	-	-
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	< 2.0	< 2.0	< 2.0	< 2.0
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	-	< 5.0	< 5.0	< 5.0	< 5.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	1.8	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	2.0	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.4	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	1.0	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.5	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.63	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.2	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.61	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.73	-	-	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	10.8	-	-	-	-

Analytical Report Number: 20-21010

Project / Site name: Epsom Hospital

Lab Sample Number				1571157	1571158	1571159	1571160	1571161
Sample Reference				BH06	BH02	BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.10	3.50	7.60	10.50	16.40
Date Sampled				02/07/2020	10/07/2020	10/07/2020	10/07/2020	10/07/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	-	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.49	-	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	-	-	-
Chromium (III)	mg/kg	1	NONE	16	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.5	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	27	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.8	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	33	-	-	-	-
Magnesium (water soluble)	mg/kg	5	NONE	-	37	49	19	9.5
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	18	25	9.7	4.7

* Despite repeating Total Sulphate and Water Soluble Sulphate analysis, the results remain contradictory.

Analytical Report Number : 20-21010

Project / Site name: Epsom Hospital

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1571157	BH06	None Supplied	1.10	Brown sand.
1571158	BH02	None Supplied	3.50	Grey clay.
1571159	BH02	None Supplied	7.60	Grey clay.
1571160	BH02	None Supplied	10.50	Brown clay.
1571161	BH02	None Supplied	16.40	Brown sandy clay.

Analytical Report Number : 20-21010

Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	**Analytical Method Description**	**Analytical Method Reference**	**Method number**	**Wet / Dry Analysis**	**Accreditation Status**
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 20-21010

Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH06		S	20-21010	1571157	c	Free cyanide in soil	L080-PL	c
BH06		S	20-21010	1571157	c	Monohydric phenols in soil	L080-PL	c
BH06		S	20-21010	1571157	c	Speciated EPA-16 PAHs in soil	L064-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 20-24289

Project / Site name:	Epsom Hospital	**Samples received on:**	12/08/2020
Your job number:	C12053	**Samples instructed on/ Analysis started on:**	13/08/2020
Your order number:	PO00401	**Analysis completed by:**	17/08/2020
Report Issue Number:	1	**Report issued on:**	17/08/2020
Samples Analysed:	3 water samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Lab Sample Number				1590272	1590273	1590274
Sample Reference				BH01	BH02	WS04
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/08/2020	11/08/2020	11/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			

General Inorganics

pH	pH Units	N/A	ISO 17025	8.1	7.9	7.8
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	2000	1100	1200
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1
Sulphate as SO4	µg/l	45	ISO 17025	1140000	432000	290000
Chloride	mg/l	0.15	ISO 17025	78	100	140
Fluoride	µg/l	50	ISO 17025	110	220	350
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	190	210	76
Ammonia as NH3	µg/l	15	ISO 17025	230	250	92
Ammonium as NH4	µg/l	15	ISO 17025	240	270	97
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.28	1.94	7.66
Nitrate as N	mg/l	0.01	ISO 17025	0.07	0.04	0.06
Nitrate as NO3	mg/l	0.05	ISO 17025	0.29	0.2	0.25
Nitrite as N	µg/l	1	ISO 17025	3.3	< 1.0	< 1.0
Nitrite as NO2	µg/l	5	ISO 17025	11	< 5.0	< 5.0

Hardness - Total	mgCaCO3/	1	ISO 17025	1140	647	632
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	8.8	9.1	7.9

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benz	µg/l	0.022	NONE	< 0.022	< 0.022	< 0.022

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	170	100	220

Lab Sample Number				1590272	1590273	1590274
Sample Reference				BH01	BH02	WS04
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/08/2020	11/08/2020	11/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Calcium (dissolved)	mg/l	0.012	ISO 17025	300	190	210
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.13	0.011	0.006
Magnesium (dissolved)	mg/l	0.005	ISO 17025	95	44	23
Sodium (dissolved)	mg/l	0.01	ISO 17025	150	99	98

Aluminium (dissolved)	mg/l	0.001	ISO 17025	< 0.0010	< 0.0010	0.0093
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.5	0.4	< 0.4
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.19	0.54	2.72
Barium (dissolved)	µg/l	0.06	ISO 17025	29	42	57
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	0.05
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	120	4.6	6.9
Copper (dissolved)	µg/l	0.5	ISO 17025	0.6	0.7	2.7
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	560	130	740
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	160	7.2	14
Selenium (dissolved)	µg/l	0.6	ISO 17025	0.8	0.7	0.9
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	0.6
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	32	1.3	5.2

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10

UKAS TESTING 4041

Environmental Science

Analytical Report Number: 20-24289
Project / Site name: Epsom Hospital

Lab Sample Number				1590272	1590273	1590274
Sample Reference				BH01	BH02	WS04
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/08/2020	11/08/2020	11/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-24289
Project / Site name: Epsom Hospital

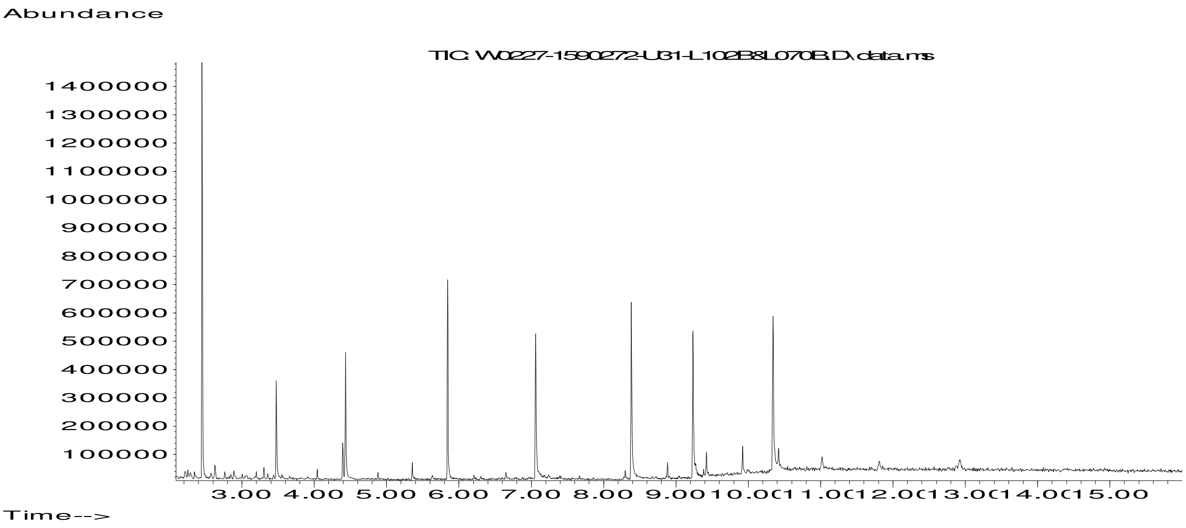
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	NONE
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.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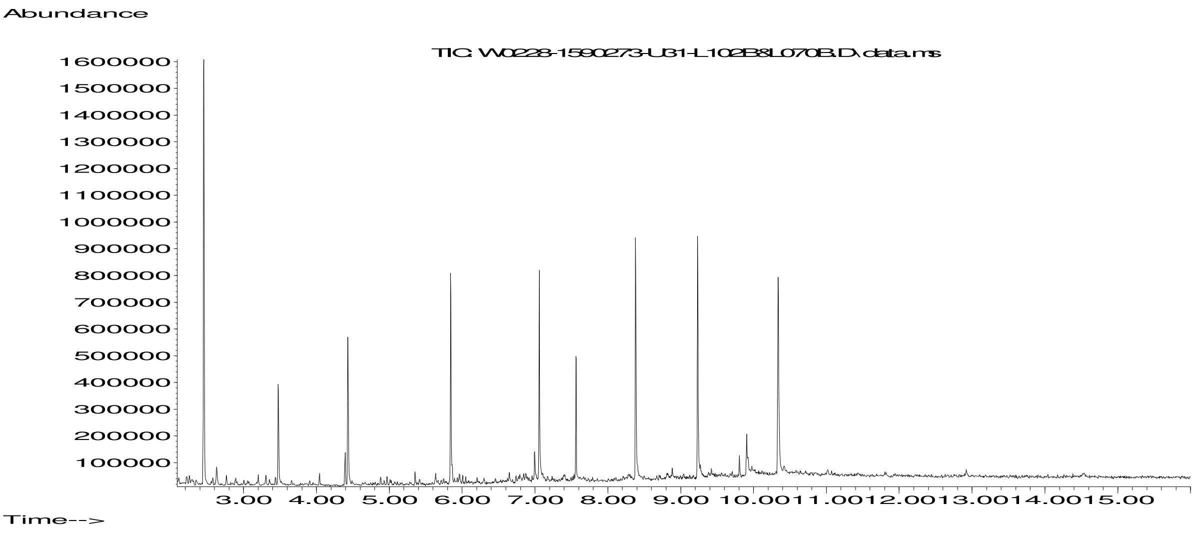
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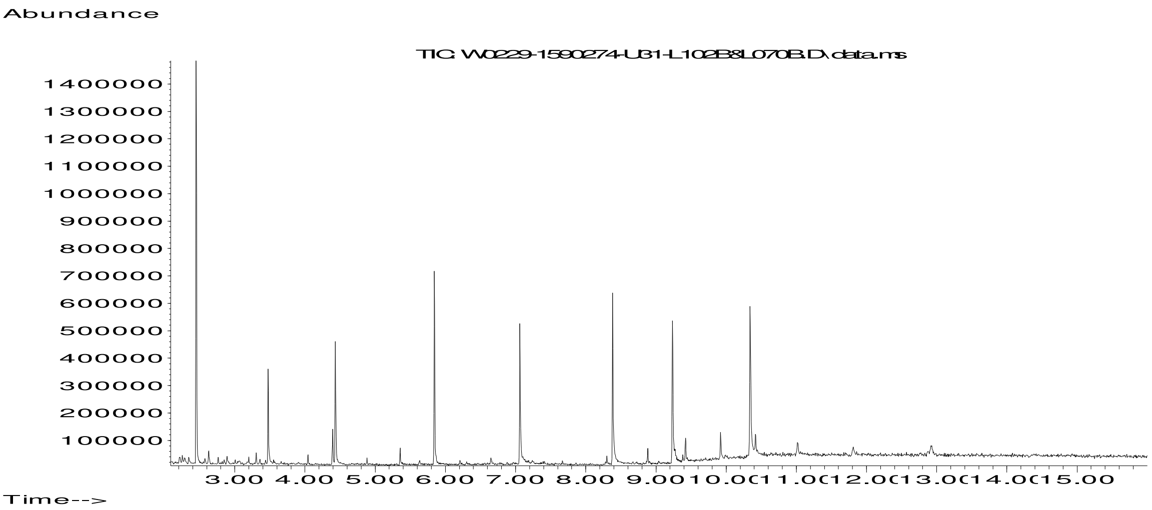
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Analytical Report Number : 20-24514

Project / Site name:	Epsom Hospital	**Samples received on:**	13/08/2020
Your job number:	C12053	**Samples instructed on/ Analysis started on:**	13/08/2020
Your order number:	PO00401	**Analysis completed by:**	18/08/2020
Report Issue Number:	1	**Report issued on:**	18/08/2020
Samples Analysed:	5 water samples		

Signed:

Rachel Bradley
Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-24514
Project / Site name: Epsom Hospital

Your Order No: PO00401

Lab Sample Number				1591571	1591572	1591573	1591574	1591575
Sample Reference				BH03	BH04	BH05	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				12/08/2020	12/08/2020	12/08/2020	12/08/2020	12/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.2	7.3	7.8	7	7.8
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	730	660	1000	1400	1400
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1	< 1	< 1
Sulphate as SO4	µg/l	45	ISO 17025	131000	81700	188000	235000	1550
Chloride	mg/l	0.15	ISO 17025	27	25	70	180	240
Fluoride	µg/l	50	ISO 17025	220	140	200	220	370
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	160	29	100	710	2000
Ammonia as NH3	µg/l	15	ISO 17025	190	35	130	860	2500
Ammonium as NH4	µg/l	15	ISO 17025	200	37	130	920	2600
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	5.01	1.99	4.07	15.6	25.3
Nitrate as N	mg/l	0.01	ISO 17025	0.06	4.38	0.09	0.14	0.19
Nitrate as NO3	mg/l	0.05	ISO 17025	0.25	19.4	0.39	0.64	0.83
Nitrite as N	µg/l	1	ISO 17025	3.2	50	4.4	5.9	22
Nitrite as NO2	µg/l	5	ISO 17025	11	160	15	19	71

Hardness - Total	mgCaCO3/	1	ISO 17025	445	363	671	380	446
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	3.7	< 1.0	3.8	7.5	9.3

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.32
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.61
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.41
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.13
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benz	µg/l	0.022	NONE	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	7.47

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	79	22	130	150	180
Calcium (dissolved)	mg/l	0.012	ISO 17025	130	130	190	140	160

Analytical Report Number: 20-24514
Project / Site name: Epsom Hospital

Your Order No: PO00401

Lab Sample Number				1591571	1591572	1591573	1591574	1591575
Sample Reference				BH03	BH04	BH05	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				12/08/2020	12/08/2020	12/08/2020	12/08/2020	12/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.75	0.13	0.44	10	23
Magnesium (dissolved)	mg/l	0.005	ISO 17025	27	9.3	45	10	12
Sodium (dissolved)	mg/l	0.01	ISO 17025	35	42	69	260	240

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.009	< 0.0010	< 0.0010	0.004	< 0.0010
Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.4	< 0.4	0.5	0.4
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.63	0.5	0.57	1.13	1.98
Barium (dissolved)	µg/l	0.06	ISO 17025	46	35	44	54	28
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	2.4	< 0.2	0.3	4.1	1.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	3.2	2.3	< 0.5	< 0.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	750	14	180	1900	5500
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.2	2.7	4.1	3.8	3.8
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	10	< 0.6	0.7	0.7
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	0.23	< 0.20	0.63	0.41	< 0.20
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.5	< 0.2	0.4	< 0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.3	4.9	5.8	0.8	3.4

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	130
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	1600
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	4500
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	3700
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	8200
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	70
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	460
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	800
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	210
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number : 20-24514
Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

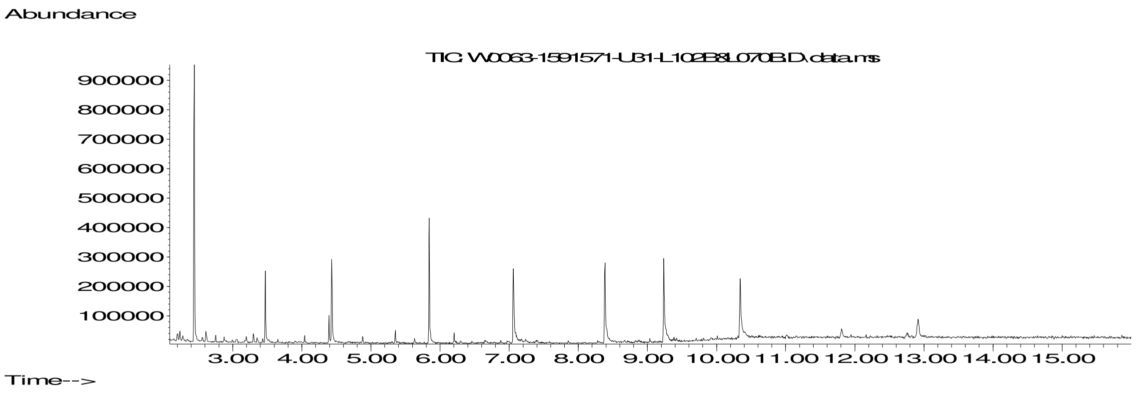
4041

Analytical Report Number : 20-24514
Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	NONE
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.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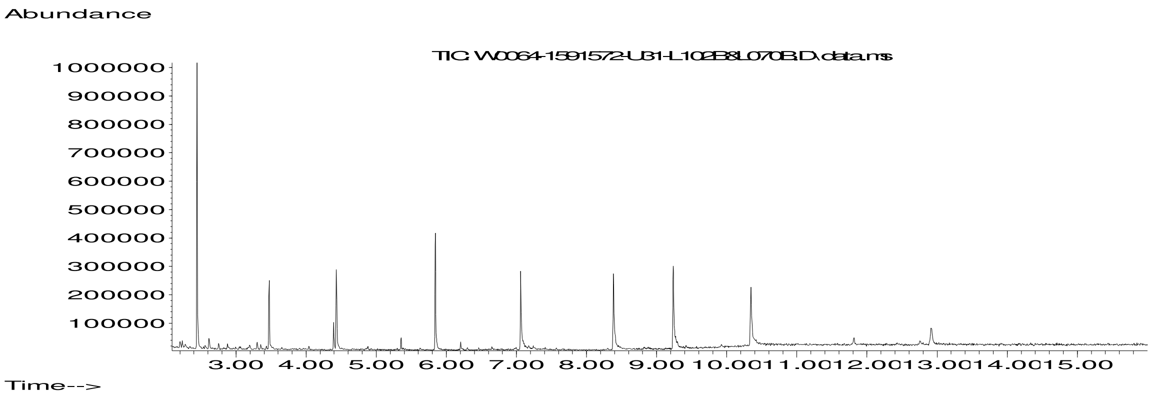
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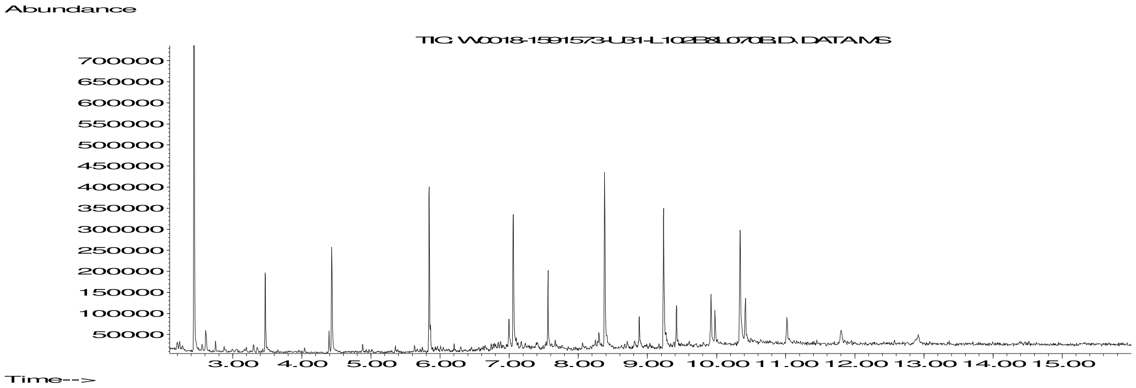
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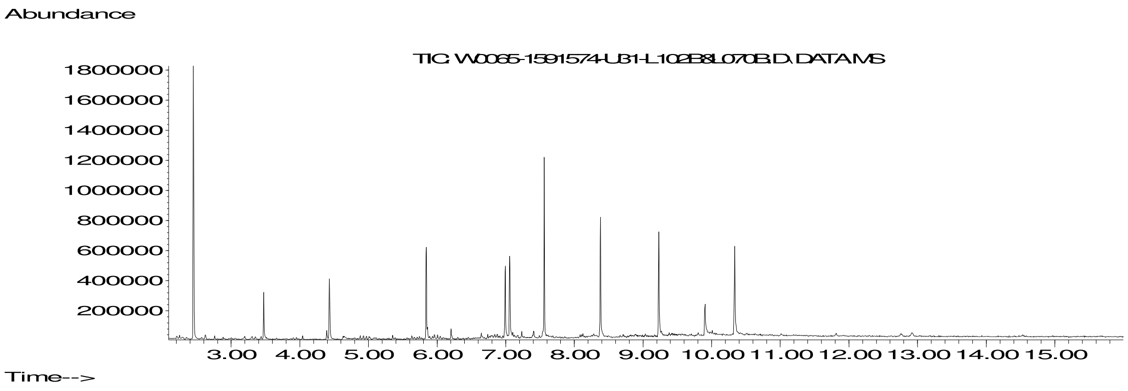
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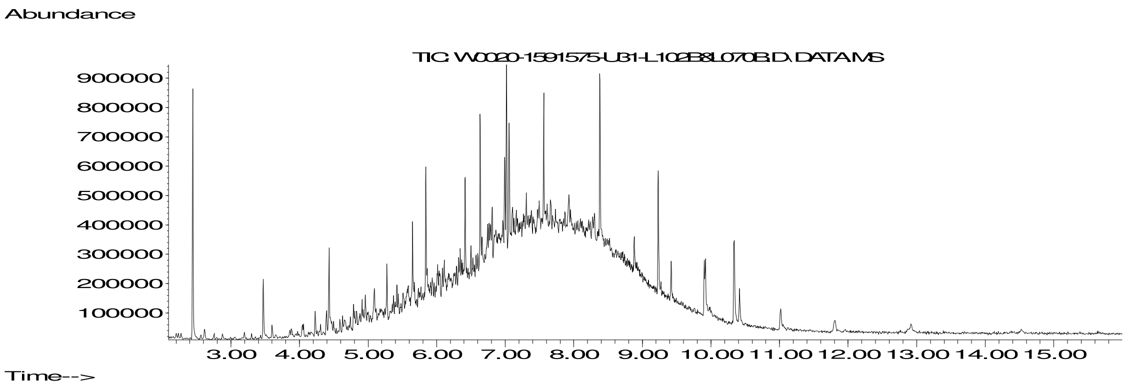
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Analytical Report Number : 20-27186

Project / Site name:	Epsom Hospital	**Samples received on:**	27/08/2020
Your job number:	C12053	**Samples instructed on/ Analysis started on:**	28/08/2020
Your order number:	PO01665	**Analysis completed by:**	04/09/2020
Report Issue Number:	1	**Report issued on:**	04/09/2020
Samples Analysed:	6 water samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-27186
Project / Site name: Epsom Hospital

Your Order No: PO01665

Lab Sample Number				1606390	1606391	1606392	1606393
Sample Reference				BH02	BH03	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020	26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

General Inorganics

pH	pH Units	N/A	ISO 17025	7.7	8	7.2	8.2
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1500	660	1300	1200
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	1.9	1.1
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	1	< 1
Sulphate as SO4	µg/l	45	ISO 17025	336000	97600	1690	219000
Chloride	mg/l	0.15	ISO 17025	260	28	200	87
Fluoride	µg/l	50	ISO 17025	220	230	430	270
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	330	91	2100	240
Ammonia as NH3	µg/l	15	ISO 17025	410	110	2600	290
Ammonium as NH4	µg/l	15	ISO 17025	430	120	2700	310
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	3.58	1.71	27.7	11.2
Nitrate as N	mg/l	0.01	ISO 17025	0.03	0.03	0.17	0.07
Nitrate as NO3	mg/l	0.05	ISO 17025	0.15	0.15	0.74	0.29
Nitrite as N	µg/l	1	ISO 17025	19	2	26	5.5
Nitrite as NO2	µg/l	5	ISO 17025	63	6.6	85	18

Hardness - Total	mgCaCO3/l	1	ISO 17025	763	380	350	153
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	9.1	1.5

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	0.61	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	1.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	1.32	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)pery	µg/l	0.022	NONE	< 0.022	< 0.022	< 0.022	< 0.022

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	2.94	< 0.16

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	190	87	220	190

Your Order No: PO01665

Lab Sample Number				1606390	1606391	1606392	1606393
Sample Reference				BH02	BH03	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020	26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Calcium (dissolved)	mg/l	0.012	ISO 17025	230	110	120	55
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.16	0.58	1.6	0.12
Magnesium (dissolved)	mg/l	0.005	ISO 17025	47	23	10	4.1
Sodium (dissolved)	mg/l	0.01	ISO 17025	100	32	180	210

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0137	0.0032	0.0245	0.0064
Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4	0.5	< 0.4
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.54	0.73	3.77	17.5
Barium (dissolved)	µg/l	0.06	ISO 17025	34	44	29	3.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	4.6	2.9	4.3	1.8
Copper (dissolved)	µg/l	0.5	ISO 17025	1.3	0.6	0.7	3.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	130	630	4300	550
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	7.5	2	5.3	5.8
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	< 0.6	0.8	0.9
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	0.34	0.29	< 0.20	< 0.20
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	0.3	1.3
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.2	2.6	3.3	7.6

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	230	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	420	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	300	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10	< 10

Analytical Report Number: 20-27186
Project / Site name: Epsom Hospital

Your Order No: PO01665

Lab Sample Number				1606390	1606391	1606392	1606393
Sample Reference				BH02	BH03	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020	26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

U/S = Unsuitable Sample I/S = Insufficient Sample

Your Order No: PO01665

Lab Sample Number				1606394	1606395
Sample Reference				WS03	WS04
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		

General Inorganics

pH	pH Units	N/A	ISO 17025	7	8
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	2600	880
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	1
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	1
Sulphate as SO4	µg/l	45	ISO 17025	2520000	153000
Chloride	mg/l	0.15	ISO 17025	400	95
Fluoride	µg/l	50	ISO 17025	< 50	440
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	470	73
Ammonia as NH3	µg/l	15	ISO 17025	570	89
Ammonium as NH4	µg/l	15	ISO 17025	610	94
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	8.62	4.7
Nitrate as N	mg/l	0.01	ISO 17025	0.23	0.16
Nitrate as NO3	mg/l	0.05	ISO 17025	1.03	0.69
Nitrite as N	µg/l	1	ISO 17025	12	6.8
Nitrite as NO2	µg/l	5	ISO 17025	40	22

Hardness - Total	mgCaCO3/l	1	ISO 17025	2080	410
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	< 0.001	< 0.001
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)pery	µg/l	0.022	NONE	< 0.022	< 0.022

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	230	170

Your Order No: PO01665

Lab Sample Number				1606394	1606395
Sample Reference				WS03	WS04
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Calcium (dissolved)	mg/l	0.012	ISO 17025	660	140
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.43	0.016
Magnesium (dissolved)	mg/l	0.005	ISO 17025	100	17
Sodium (dissolved)	mg/l	0.01	ISO 17025	170	68

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0103	0.0304
Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.63	3.76
Barium (dissolved)	µg/l	0.06	ISO 17025	27	49
Cadmium (dissolved)	µg/l	0.02	ISO 17025	1.3	0.05
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	160	3.9
Copper (dissolved)	µg/l	0.5	ISO 17025	5.4	4.6
Lead (dissolved)	µg/l	0.2	ISO 17025	2	0.3
Manganese (dissolved)	µg/l	0.05	ISO 17025	390	490
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	190	8.1
Selenium (dissolved)	µg/l	0.6	ISO 17025	26	0.7
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.53
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.4
Zinc (dissolved)	µg/l	0.5	ISO 17025	220	7.5

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10

Analytical Report Number: 20-27186
Project / Site name: Epsom Hospital

Your Order No: PO01665

Lab Sample Number				1606394	1606395
Sample Reference				WS03	WS04
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number : 20-27186
Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

Analytical Report Number : 20-27186
Project / Site name: Epsom Hospital

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	NONE
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

4041

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Analytical Report Number : 20-27453

Project / Site name:	Epsom Hospital	**Samples received on:**	28/08/2020
Your job number:	C12053	**Samples instructed on/ Analysis started on:**	01/09/2020
Your order number:	PO01665	**Analysis completed by:**	07/09/2020
Report Issue Number:	1	**Report issued on:**	07/09/2020
Samples Analysed:	3 water samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-27453
Project / Site name: Epsom Hospital

Your Order No: PO01665

Lab Sample Number				1607763	1607764	1607765
Sample Reference				BH01	BH04	BH05
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				27/08/2020	27/08/2020	27/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			

General Inorganics

pH	pH Units	N/A	ISO 17025	6.5	7.3	7.7
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1800	630	930
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1
Sulphate as SO4	µg/l	45	ISO 17025	1330000	65200	119000
Chloride	mg/l	0.15	ISO 17025	120	26	74
Fluoride	µg/l	50	ISO 17025	99	160	230
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	270	47	88
Ammonia as NH3	µg/l	15	ISO 17025	320	56	110
Ammonium as NH4	µg/l	15	ISO 17025	340	60	110
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	3.42	2.56	2.44
Nitrate as N	mg/l	0.01	ISO 17025	0.02	0.71	0.07
Nitrate as NO3	mg/l	0.05	ISO 17025	0.1	3.14	0.29
Nitrite as N	µg/l	1	ISO 17025	5.8	12	9.6
Nitrite as NO2	µg/l	5	ISO 17025	19	38	32

Hardness - Total	mgCaCO3/l	1	ISO 17025	1460	354	494
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)pery	µg/l	0.022	NONE	< 0.022	< 0.022	< 0.022

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

Analytical Report Number: 20-27453
Project / Site name: Epsom Hospital

Your Order No: PO01665

Lab Sample Number				1607763	1607764	1607765
Sample Reference				BH01	BH04	BH05
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				27/08/2020	27/08/2020	27/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	260	26	140
Calcium (dissolved)	mg/l	0.012	ISO 17025	390	120	140
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.51	0.021	0.38
Magnesium (dissolved)	mg/l	0.005	ISO 17025	120	13	33
Sodium (dissolved)	mg/l	0.01	ISO 17025	130	27	53

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.007	0.0255	0.0024
Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4	0.5
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.29	0.32	0.64
Barium (dissolved)	µg/l	0.06	ISO 17025	30	48	45
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	160	0.9	1
Copper (dissolved)	µg/l	0.5	ISO 17025	1.5	3.9	1.9
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	800	100	360
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	220	1.7	3.1
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.3	1.4	< 0.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	0.84	0.21	0.71
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.3	< 0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	46	2.4	3.6

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

Your Order No: PO01665

Lab Sample Number				1607763	1607764	1607765
Sample Reference				BH01	BH04	BH05
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				27/08/2020	27/08/2020	27/08/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10

U/S = Unsuitable Sample   I/S = Insufficient Sample

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	NONE
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

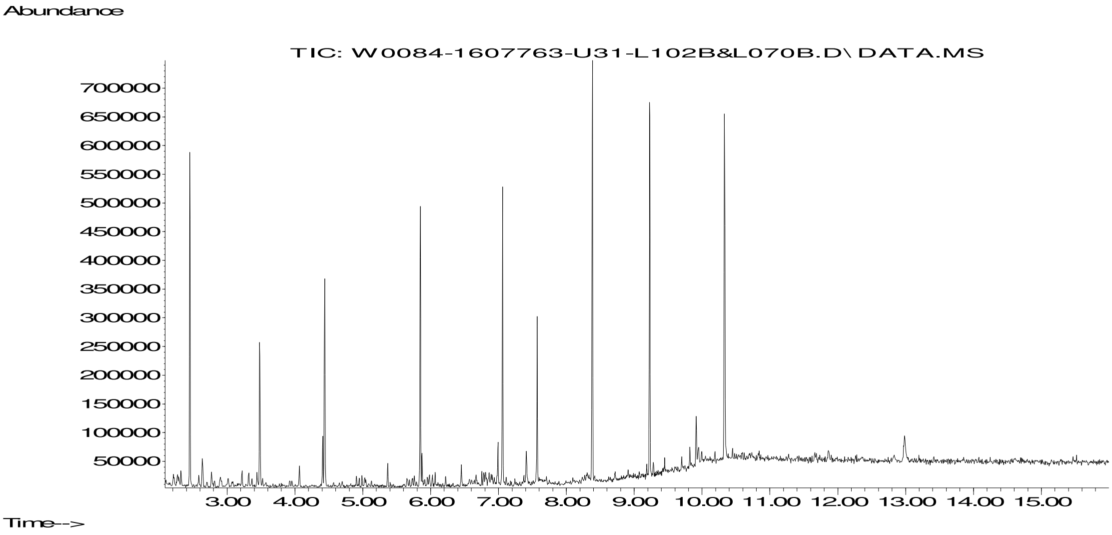
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report

Analytical Report Number : 20-27453
Project / Site name: Epsom Hospital

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	None Supplied	W	1607763	c	Ammonia as NH3 in water	L082-PL	c
BH01	None Supplied	W	1607763	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH01	None Supplied	W	1607763	c	Ammonium as NH4 in water	L082-PL	c
BH01	None Supplied	W	1607763	c	Electrical conductivity at 20oC of water	L031-PL	c
BH01	None Supplied	W	1607763	c	pH at 20oC in water (automated)	L099-PL	c
BH04	None Supplied	W	1607764	c	Ammonia as NH3 in water	L082-PL	c
BH04	None Supplied	W	1607764	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH04	None Supplied	W	1607764	c	Ammonium as NH4 in water	L082-PL	c
BH04	None Supplied	W	1607764	c	Electrical conductivity at 20oC of water	L031-PL	c
BH04	None Supplied	W	1607764	c	pH at 20oC in water (automated)	L099-PL	c
BH05	None Supplied	W	1607765	c	Ammonia as NH3 in water	L082-PL	c
BH05	None Supplied	W	1607765	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH05	None Supplied	W	1607765	c	Ammonium as NH4 in water	L082-PL	c
BH05	None Supplied	W	1607765	c	Electrical conductivity at 20oC of water	L031-PL	c
BH05	None Supplied	W	1607765	c	pH at 20oC in water (automated)	L099-PL	c

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature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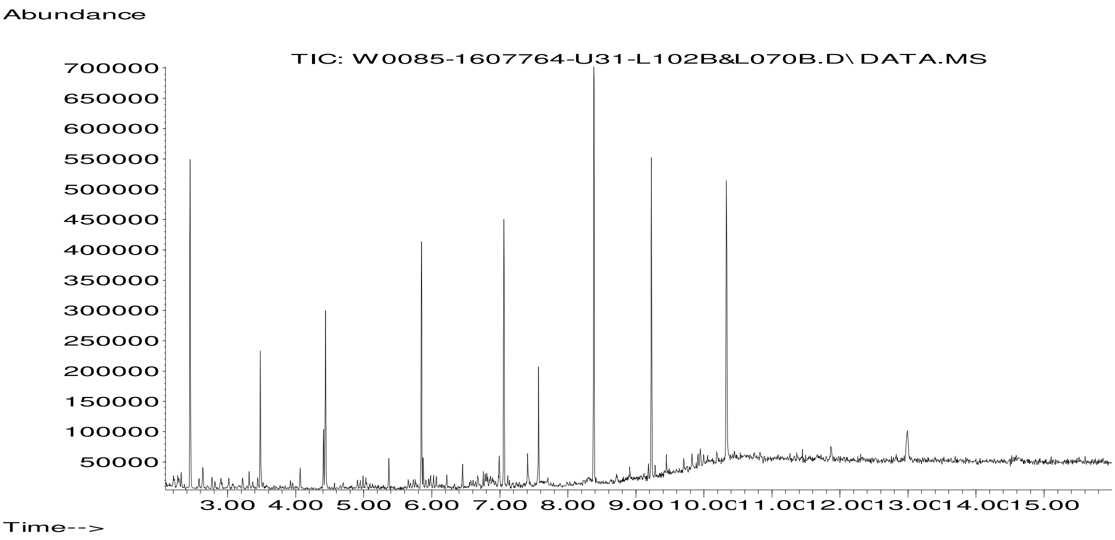
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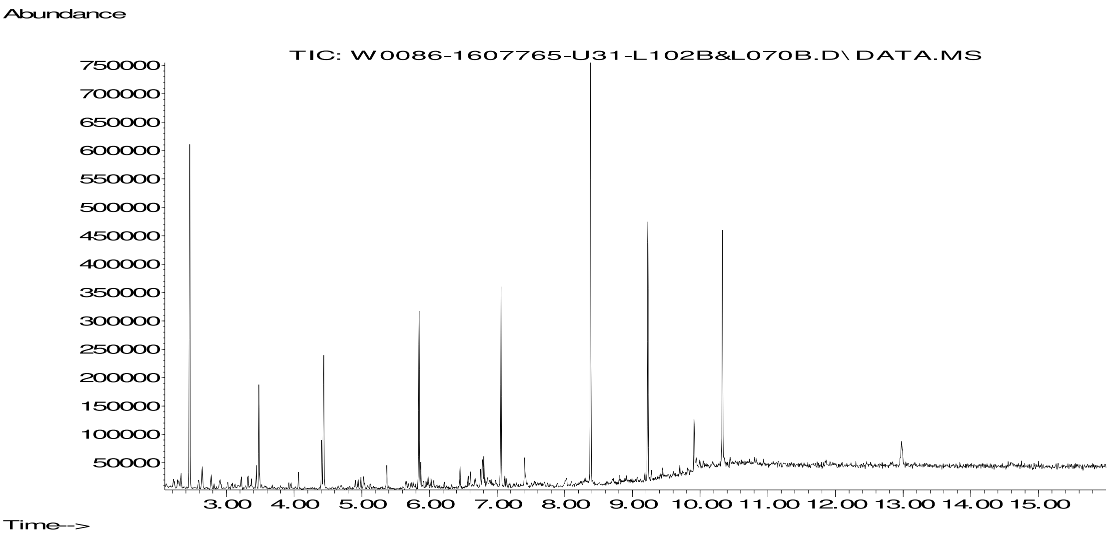
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Statistical Analysis

Assessment of Chemicals of Potential Concern to Human Health

								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
All values in mg/kg unless otherwise stated								Location & Depth	WS02	WS03	WS04	WS04	BH01	BH01	CPT01	CPT02	CPT03	CPT03	CPT04A	CPT05	CPT06	CPT07	CPT08
									0.50	0.70	0.30	0.80	0.30	1.00	0.50	0.60	0.50	1.00	0.40	0.40	0.40	0.30	0.50
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US$_{95}$**	**Result of Significance Test**															
Arsenic	1	33	5.4	41	0	79	18.623156	POTENTIALLY SUITABLE FOR USE	27	12	13	10	17	7.3	16	21	7.5	7.1	12	14	11	13	8.5
Beryllium	0.06	22	0.47	3.1	0	92	1.4823903	POTENTIALLY SUITABLE FOR USE	1	0.7	0.75	0.72	1.1	0.49	1.1	1.1	0.62	0.55	0.84	0.73	0.71	0.68	0.74
Boron	0.2	33	0.4	4.7	0	21000	2.123286	POTENTIALLY SUITABLE FOR USE	1.6	0.4	0.7	0.8	4.7	1.4	1	1	0.9	0.9	0.6	1.2	0.6	1.2	0.7
Cadmium	0.2	33	0.2	0.9	0	120	0.3947992	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.3	0.2	0.4	0.2	0.4	0.4	0.2	0.2	0.3	0.2	0.4	0.3	0.2
Chromium (III)	1	33	15	39	0	1500	25.670228	POTENTIALLY SUITABLE FOR USE	19	21	20	24	17	15	22	20	18	25	24	23	24	23	16
Chromium (VI)	1.2	33	1.2	4	0	7.7	3.2078348	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	3.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	33	5.6	130	0	12000	59.901361	POTENTIALLY SUITABLE FOR USE	36	29	25	5.7	37	6.7	130	40	14	5.6	19	6.4	35	27	18
Lead	2	33	22	760	3	630	393.74087	POTENTIALLY SUITABLE FOR USE	490	540	240	28	350	40	760	740	73	23	83	59	130	160	160
Mercury, inorganic	0.3	33	0.3	2.6	0	470	0.8439048	POTENTIALLY SUITABLE FOR USE	0.8	2.6	0.5	0.3	0.9	0.3	1.2	0.6	0.3	0.3	0.3	0.3	0.5	0.3	0.4
Nickel	2	33	9.2	33	0	290	19.28942	POTENTIALLY SUITABLE FOR USE	16	17	12	13	17	9.2	18	18	12	13	15	16	14	14	12
Selenium	1	33	1	1.7	0	1400	1.113697	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Vanadium	1	22	25	61	0	2000	43.046525	POTENTIALLY SUITABLE FOR USE	38	31	32	39	39	25	42	38	30	35	40	39	37	38	29
Zinc	2	33	33	330	0	81000	169.26434	POTENTIALLY SUITABLE FOR USE	230	240	120	45	180	37	150	200	120	57	86	40	84	97	57
Cyanide (free)	1	33	1	1	0	1600	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phenol (total)	2	33	1	1	0	760	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acenaphthene	0.05	33	0.05	0.66	0	15000	0.2331941	POTENTIALLY SUITABLE FOR USE	0.6	0.05	0.05	0.05	0.05	0.05	0.33	0.05	0.05	0.05	0.66	0.05	0.05	0.3	0.05
Acenaphthylene	0.05	33	0.05	2.6	0	15000	0.5981056	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	2.6	0.05	0.05	0.05	1.6	0.05	0.05	0.36	0.05
Anthracene	0.05	33	0.05	3.4	0	74000	1.2649019	POTENTIALLY SUITABLE FOR USE	2.2	0.19	0.19	0.05	0.05	0.05	3.1	0.46	0.05	0.05	3.4	0.05	0.25	1.8	0.05
Benz(a)anthracene	0.05	33	0.05	26	2	17	8.3560332	POTENTIALLY SUITABLE FOR USE	13	1.5	1.3	0.05	1.3	0.05	26	3	0.31	0.28	20	0.28	1.1	10	0.51
Benzo(a)pyrene	0.05	33	0.05	24	8	2.6	7.7769333	FURTHER ASSESSMENT REQUIRED	11	1.1	1.2	0.05	1.1	0.05	24	2.5	0.27	0.23	21	0.27	0.76	7.5	0.39
Benzo(b)fluoranthene	0.05	33	0.05	27	2	18	9.0000684	POTENTIALLY SUITABLE FOR USE	13	1.5	1.5	0.05	1.3	0.05	27	3	0.25	0.25	26	0.33	1.1	8.5	0.45
Benzo(ghi)perylene	0.05	33	0.05	14	0	120	4.5064583	POTENTIALLY SUITABLE FOR USE	6.3	0.66	0.88	0.05	0.71	0.05	14	1.6	0.05	0.05	12	0.05	0.52	4.7	0.05
Benzo(k)fluoranthene	0.05	33	0.05	17	0	26	4.6967587	POTENTIALLY SUITABLE FOR USE	5.8	0.52	0.59	0.05	0.75	0.05	17	1.6	0.27	0.21	7.1	0.23	0.54	5.6	0.25
Chrysene	0.05	33	0.05	21	0	25	6.1207309	POTENTIALLY SUITABLE FOR USE	8.9	0.82	0.83	0.05	0.89	0.05	21	2.2	0.26	0.25	13	0.27	0.83	6.6	0.49
Dibenz(a,h)anthracene	0.05	33	0.05	3.7	2	2.3	1.2062058	POTENTIALLY SUITABLE FOR USE	1.9	0.05	0.19	0.05	0.05	0.05	3.7	0.44	0.05	0.05	3.3	0.05	0.05	1.3	0.05
Fluoranthene	0.05	33	0.05	39	0	3100	12.694778	POTENTIALLY SUITABLE FOR USE	21	2.3	2	0.05	2	0.05	39	4.6	0.6	0.37	28	0.49	1.7	14	1
Fluorene	0.05	33	0.05	0.85	0	9900	0.318511	POTENTIALLY SUITABLE FOR USE	0.74	0.05	0.05	0.05	0.05	0.05	0.85	0.05	0.05	0.05	0.72	0.05	0.05	0.48	0.05
Indeno(1,2,3,cd)pyrene	0.05	33	0.05	13	2	11	4.0636461	POTENTIALLY SUITABLE FOR USE	5.8	0.63	0.74	0.05	0.69	0.05	13	1.6	0.05	0.05	11	0.05	0.5	4.3	0.05
Naphthalene	0.05	33	0.05	0.5	0	3900	0.2552656	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.26	0.05	0.05	0.05	0.22	0.05	0.05	0.05	0.05
Phenanthrene	0.05	33	0.05	21	0	3100	5.9453303	POTENTIALLY SUITABLE FOR USE	7.1	0.95	0.63	0.05	0.7	0.05	13	1.5	0.05	0.05	9.8	0.05	0.6	5.8	0.48
Pyrene	0.05	33	0.05	36	0	7400	12.053954	POTENTIALLY SUITABLE FOR USE	18	2	1.8	0.05	1.7	0.05	36	4.2	0.58	0.53	28	0.52	1.6	16	0.8
Asbestos identified	Y/N								N	Y	N	N	Y	N	N	Y	N	N	N	N	N	Y	N
FOC (dimensionless)	0.013296	**(mean)**							0.017	0.009	0.014	0.0037	0.022	0.0049	0.022	0.011	0.0077	0.0038	0.022	0.0054	0.014	0.014	0.009
SOM (calculated)	2.29%	**(mean)**							2.93%	1.55%	2.41%	0.64%	3.79%	0.84%	3.79%	1.90%	1.33%	0.66%	3.79%	0.93%	2.41%	2.41%	1.55%
pH (su)	8.7	**(mean)**							7.7	8.3	8.5	8.3	7.8	7.9	8.9	8.4	8.6	8.8	9.8	8.1	9.2	10.1	8.2

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC) or +ve asbestos ID.
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
All values in mg/kg unless otherwise stated								Location & Depth	CPT10	CPT11	HP11	BH03	BH05	BH04	BH06	BH101	WS102	WS102	BH102	BH102	WS101	WS101	WS103
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.40**	**0.30**	**0.30**	**0.30**	**0.50**	**0.50**	**1.10**	**0.5**	**0.3**	**0.8**	**0.2**	**0.8**	**0.4**	**1**	**0.3**
Arsenic	1	33	5.4	41	0	79	18.623156	POTENTIALLY SUITABLE FOR USE	41	6.6	18	12	16	8.7	10	12	10	23	14	9.8	9.9	5.4	9.2
Beryllium	0.06	22	0.47	3.1	0	92	1.4823903	POTENTIALLY SUITABLE FOR USE	3.1	0.47	0.95	0.68	1.3	1.9	0.49								
Boron	0.2	33	0.4	4.7	0	21000	2.123286	POTENTIALLY SUITABLE FOR USE	0.9	1.8	1.7	2.5	0.9	1.9	1.2	1.5	1.6	4.1	2.5	2.2	1	0.8	1
Cadmium	0.2	33	0.2	0.9	0	120	0.3947992	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.2	0.9	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6
Chromium (III)	1	33	15	39	0	1500	25.670228	POTENTIALLY SUITABLE FOR USE	33	16	16	22	23	18	16	16	18	23	30	39	19	18	27
Chromium (VI)	1.2	33	1.2	4	0	7.7	3.2078348	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4	4	4	4	4	4	4	4
Copper	1	33	5.6	130	0	12000	59.901361	POTENTIALLY SUITABLE FOR USE	120	9.2	35	65	57	48	8.5	20	29	50	37	32	30	23	33
Lead	2	33	22	760	3	630	393.74087	POTENTIALLY SUITABLE FOR USE	660	22	110	110	350	48	27	130	140	450	57	88	160	62	240
Mercury, inorganic	0.3	33	0.3	2.6	0	470	0.8439048	POTENTIALLY SUITABLE FOR USE	0.5	0.3	0.3	0.3	0.9	0.3	0.3	0.5	0.3	0.6	0.3	0.3	0.3	0.3	0.3
Nickel	2	33	9.2	33	0	290	19.28942	POTENTIALLY SUITABLE FOR USE	33	10	16	18	20	13	9.8	11	11	22	23	22	11	14	15
Selenium	1	33	1	1.7	0	1400	1.113697	POTENTIALLY SUITABLE FOR USE	1	1.7	1	1	1	1	1	1	1	1	1	1	1	1	1
Vanadium	1	22	25	61	0	2000	43.046525	POTENTIALLY SUITABLE FOR USE	61	29	42	28	39	34	29								
Zinc	2	33	33	330	0	81000	169.26434	POTENTIALLY SUITABLE FOR USE	330	100	60	260	180	83	33	64	110	170	73	44	66	35	110
Cyanide (free)	1	33	1	1	0	1600	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phenol (total)	2	33	1	1	0	760	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acenaphthene	0.05	33	0.05	0.66	0	15000	0.2331941	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.21	0.05	0.05	0.05	0.05	0.05	0.05	0.33	0.05	0.05	0.05	0.05
Acenaphthylene	0.05	33	0.05	2.6	0	15000	0.5981056	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.24	0.05	0.05	0.05	0.05	0.05	0.05	0.44	0.05	0.05	0.05	0.05
Anthracene	0.05	33	0.05	3.4	0	74000	1.2649019	POTENTIALLY SUITABLE FOR USE	1.9	0.05	0.05	0.74	0.22	0.15	0.05	0.05	0.05	0.13	1.2	0.53	0.05	0.05	1.1
Benz(a)anthracene	0.05	33	0.05	26	2	17	8.3560332	POTENTIALLY SUITABLE FOR USE	11	0.05	0.05	4.2	2.6	1.2	1.4	0.23	0.36	0.68	11	4.3	0.19	0.13	2.2
Benzo(a)pyrene	0.05	33	0.05	24	8	2.6	7.7769333	FURTHER ASSESSMENT REQUIRED	9.6	0.05	0.05	3.6	2.4	1.1	1.2	0.36	0.45	0.93	10	4.3	0.47	0.05	2.3
Benzo(b)fluoranthene	0.05	33	0.05	27	2	18	9.0000684	POTENTIALLY SUITABLE FOR USE	7.3	0.05	0.05	4.9	2.5	0.95	1.5	0.45	0.7	1.3	12	5.7	0.41	0.05	2.7
Benzo(ghi)perylene	0.05	33	0.05	14	0	120	4.5064583	POTENTIALLY SUITABLE FOR USE	5.3	0.05	0.05	2.3	1.5	0.63	0.73	0.23	0.34	0.6	5.7	2.3	0.36	0.05	1.3
Benzo(k)fluoranthene	0.05	33	0.05	17	0	26	4.6967587	POTENTIALLY SUITABLE FOR USE	10	0.05	0.05	2.1	1.7	0.76	0.63	0.19	0.19	0.37	4.3	1.4	0.21	0.05	0.97
Chrysene	0.05	33	0.05	21	0	25	6.1207309	POTENTIALLY SUITABLE FOR USE	7.3	0.05	0.05	3.2	1.9	1.2	1	0.31	0.39	0.75	7.6	3.6	0.29	0.18	2.1
Dibenz(a,h)anthracene	0.05	33	0.05	3.7	2	2.3	1.2062058	POTENTIALLY SUITABLE FOR USE	1.3	0.05	0.05	0.61	0.37	0.05	0.05	0.05	0.05	0.05	1.6	0.67	0.05	0.05	0.39
Fluoranthene	0.05	33	0.05	39	0	3100	12.694778	POTENTIALLY SUITABLE FOR USE	20	0.26	0.05	6.2	3.6	1.7	1.8	0.05	0.05	1.4	16	7.3	0.41	0.34	5.2
Fluorene	0.05	33	0.05	0.85	0	9900	0.318511	POTENTIALLY SUITABLE FOR USE	0.29	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.33	0.05	0.05	0.05	0.05
Indeno(1,2,3,cd)pyrene	0.05	33	0.05	13	2	11	4.0636461	POTENTIALLY SUITABLE FOR USE	4.3	0.05	0.05	2	1.3	0.47	0.61	0.19	0.26	0.5	4.5	2	0.26	0.05	1.1
Naphthalene	0.05	33	0.05	0.5	0	3900	0.2552656	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.5	0.5	0.5	0.5
Phenanthrene	0.05	33	0.05	21	0	3100	5.9453303	POTENTIALLY SUITABLE FOR USE	5.8	0.3	0.05	21	1	0.56	0.05	0.14	0.2	0.48	3.2	1.7	0.05	0.19	3.4
Pyrene	0.05	33	0.05	36	0	7400	12.053954	POTENTIALLY SUITABLE FOR USE	19	0.25	0.05	5.8	3.3	1.8	2	0.44	0.6	1.2	15	7.3	0.38	0.28	4.3
Asbestos identified	Y/N								N	N	N	Y	N	N	N	N	N	Y	Y	Y	N	N	N
FOC (dimensionless)	0.013296	**(mean)**							0.014	0.0087	0.02	0.019	0.028	0.0059	0.0057		0.025						
SOM (calculated)	2.29%	**(mean)**							2.41%	1.50%	3.45%	3.28%	4.83%	1.02%	0.98%		4.31%						
pH (su)	8.7	**(mean)**							8.8	8.3	7.2	10	8.1	11	8.8	7.5	6.9	7.2	11.2	11.2	8.6	8.8	8.8

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Assessment of Chemicals of Potential Concern to Human Health

								Soil Typ	**MG**	**MG**	**MG**
	All values in mg/kg unless otherwise stated							**Location & Dept**	**WS104**	**WS105**	**BH104**
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.4**	**0.4**	**0.7-0.8**
Arsenic	1	33	5.4	41	0	79	18.623156	POTENTIALLY SUITABLE FOR USE	9.4	18	11
Beryllium	0.06	22	0.47	3.1	0	92	1.4823903	POTENTIALLY SUITABLE FOR USE			
Boron	0.2	33	0.4	4.7	0	21000	2.123286	POTENTIALLY SUITABLE FOR USE	1.2	0.7	1.4
Cadmium	0.2	33	0.2	0.9	0	120	0.3947992	POTENTIALLY SUITABLE FOR USE	0.4	0.2	0.3
Chromium (III)	1	33	15	39	0	1500	25.670228	POTENTIALLY SUITABLE FOR USE	23	25	23
Chromium (VI)	1.2	33	1.2	4	0	7.7	3.2078348	POTENTIALLY SUITABLE FOR USE	4	4	4
Copper	1	33	5.6	130	0	12000	59.901361	POTENTIALLY SUITABLE FOR USE	28	64	98
Lead	2	33	22	760	3	630	393.74087	POTENTIALLY SUITABLE FOR USE	260	540	190
Mercury, inorganic	0.3	33	0.3	2.6	0	470	0.8439048	POTENTIALLY SUITABLE FOR USE	0.3	0.8	0.3
Nickel	2	33	9.2	33	0	290	19.28942	POTENTIALLY SUITABLE FOR USE	14	20	17
Selenium	1	33	1	1.7	0	1400	1.113697	POTENTIALLY SUITABLE FOR USE	1	1	1
Vanadium	1	22	25	61	0	2000	43.046525	POTENTIALLY SUITABLE FOR USE			
Zinc	2	33	33	330	0	81000	169.26434	POTENTIALLY SUITABLE FOR USE	61	130	82
Cyanide (free)	1	33	1	1	0	1600	1	POTENTIALLY SUITABLE FOR USE	1	1	1
Phenol (total)	2	33	1	1	0	760	1	POTENTIALLY SUITABLE FOR USE	1	1	1
Acenaphthene	0.05	33	0.05	0.66	0	15000	0.2331941	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05
Acenaphthylene	0.05	33	0.05	2.6	0	15000	0.5981056	POTENTIALLY SUITABLE FOR USE	0.05	0.3	0.05
Anthracene	0.05	33	0.05	3.4	0	74000	1.2649019	POTENTIALLY SUITABLE FOR USE	0.05	0.68	0.05
Benz(a)anthracene	0.05	33	0.05	26	2	17	8.3560332	POTENTIALLY SUITABLE FOR USE	0.48	2.4	0.32
Benzo(a)pyrene	0.05	33	0.05	24	8	2.6	7.7769333	FURTHER ASSESSMENT REQUIRED	0.56	2.5	0.24
Benzo(b)fluoranthene	0.05	33	0.05	27	2	18	9.0000684	POTENTIALLY SUITABLE FOR USE	0.76	2.9	0.37
Benzo(ghi)perylene	0.05	33	0.05	14	0	120	4.5064583	POTENTIALLY SUITABLE FOR USE	0.36	1.5	0.05
Benzo(k)fluoranthene	0.05	33	0.05	17	0	26	4.6967587	POTENTIALLY SUITABLE FOR USE	0.3	1.2	0.16
Chrysene	0.05	33	0.05	21	0	25	6.1207309	POTENTIALLY SUITABLE FOR USE	0.52	1.9	0.33
Dibenz(a,h)anthracene	0.05	33	0.05	3.7	2	2.3	1.2062058	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05
Fluoranthene	0.05	33	0.05	39	0	3100	12.694778	POTENTIALLY SUITABLE FOR USE	1	4.4	0.54
Fluorene	0.05	33	0.05	0.85	0	9900	0.318511	POTENTIALLY SUITABLE FOR USE	0.05	0.22	0.05
Indeno(1,2,3,cd)pyrene	0.05	33	0.05	13	2	11	4.0636461	POTENTIALLY SUITABLE FOR USE	0.27	1.2	0.05
Naphthalene	0.05	33	0.05	0.5	0	3900	0.2552656	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05
Phenanthrene	0.05	33	0.05	21	0	3100	5.9453303	POTENTIALLY SUITABLE FOR USE	0.39	3.2	0.05
Pyrene	0.05	33	0.05	36	0	7400	12.053954	POTENTIALLY SUITABLE FOR USE	0.92	3.6	0.5
Asbestos identified	Y/N								N	N	N
FOC (dimensionless)	0.013296	**(mean)**									
SOM (calculated)	2.29%	**(mean)**									
pH (su)	8.7	**(mean)**							8.2	8	8.4

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
All values in mg/kg unless otherwise stated								Location & Depth	WS02	WS03	WS04	WS04	BH01	BH01	CPT01	CPT02	CPT03	CPT03	CPT04A	CPT05	CPT06	CPT07	CPT08
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US$_{95}$**	**Result of Significance Test**	**0.50**	**0.70**	**0.30**	**0.80**	**0.30**	**1.00**	**0.50**	**0.60**	**0.50**	**1.00**	**0.40**	**0.40**	**0.40**	**0.30**	**0.50**
Arsenic	1	33	5.4	41	0	250	18.62316	POTENTIALLY SUITABLE FOR USE	27	12	13	10	17	7.3	16	21	7.5	7.1	12	14	11	13	8.5
Boron	0.2	33	0.4	4.7	2	3	2.123286	POTENTIALLY SUITABLE FOR USE	1.6	0.4	0.7	0.8	4.7	1.4	1	1	0.9	0.9	0.6	1.2	0.6	1.2	0.7
Chromium (III)	1	33	15	39	0	400	25.67023	POTENTIALLY SUITABLE FOR USE	19	21	20	24	17	15	22	20	18	25	24	23	24	23	16
Chromium (VI)	1.2	33	1.2	4	0	25	3.207835	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	3.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	33	5.6	130	0	135	59.90136	POTENTIALLY SUITABLE FOR USE	36	29	25	5.7	37	6.7	130	40	14	5.6	19	6.4	35	27	18
Nickel	2	33	9.2	33	0	75	19.28942	POTENTIALLY SUITABLE FOR USE	16	17	12	13	17	9.2	18	18	12	13	15	16	14	14	12
Zinc	2	33	33	330	1	300	169.2643	POTENTIALLY SUITABLE FOR USE	230	240	120	45	180	37	150	200	120	57	86	40	84	97	57
	Mean																						
pH (su)	8.7								7.7	8.3	8.5	8.3	7.8	7.9	8.9	8.4	8.6	8.8	9.8	8.1	9.2	10.1	8.2

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
All values in mg/kg unless otherwise stated								Location & Depth	CPT10	CPT11	HP11	BH03	BH05	BH04	BH06	BH101	WS102	WS102	BH102	BH102	WS101	WS101	WS103	WS104
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	0.40	0.30	0.30	0.30	0.50	0.50	1.10	0.5	0.3	0.8	0.2	0.8	0.4	1	0.3	0.4
Arsenic	1	33	5.4	41	0	250	18.62316	POTENTIALLY SUITABLE FOR USE	41	6.6	18	12	16	8.7	10	12	10	23	14	9.8	9.9	5.4	9.2	9.4
Boron	0.2	33	0.4	4.7	2	3	2.123286	POTENTIALLY SUITABLE FOR USE	0.9	1.8	1.7	2.5	0.9	1.9	1.2	1.5	1.6	4.1	2.5	2.2	1	0.8	1	1.2
Chromium (III)	1	33	15	39	0	400	25.67023	POTENTIALLY SUITABLE FOR USE	33	16	16	22	23	18	16	16	18	23	30	39	19	18	27	23
Chromium (VI)	1.2	33	1.2	4	0	25	3.207835	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4	4	4	4	4	4	4	4	4
Copper	1	33	5.6	130	0	135	59.90136	POTENTIALLY SUITABLE FOR USE	120	9.2	35	65	57	48	8.5	20	29	50	37	32	30	23	33	28
Nickel	2	33	9.2	33	0	75	19.28942	POTENTIALLY SUITABLE FOR USE	33	10	16	18	20	13	9.8	11	11	22	23	22	11	14	15	14
Zinc	2	33	33	330	1	300	169.2643	POTENTIALLY SUITABLE FOR USE	330	100	60	260	180	83	33	64	110	170	73	44	66	35	110	61
	Mean																							
pH (su)	8.7								8.8	8.3	7.2	10	8.1	11	8.8	7.5	6.9	7.2	11.2	11.2	8.6	8.8	8.8	8.2

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Assessment of Chemicals of Potential Concern to Plant Life

								Soil Typ	MG	MG
	All values in mg/kg unless otherwise stated							Location & Dept	WS105	BH104
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.4**	**0.7-0.8**
Arsenic	1	33	5.4	41	0	250	18.62316	POTENTIALLY SUITABLE FOR USE	18	11
Boron	0.2	33	0.4	4.7	2	3	2.123286	POTENTIALLY SUITABLE FOR USE	0.7	1.4
Chromium (III)	1	33	15	39	0	400	25.67023	POTENTIALLY SUITABLE FOR USE	25	23
Chromium (VI)	1.2	33	1.2	4	0	25	3.207835	POTENTIALLY SUITABLE FOR USE	4	4
Copper	1	33	5.6	130	0	135	59.90136	POTENTIALLY SUITABLE FOR USE	64	98
Nickel	2	33	9.2	33	0	75	19.28942	POTENTIALLY SUITABLE FOR USE	20	17
Zinc	2	33	33	330	1	300	169.2643	POTENTIALLY SUITABLE FOR USE	130	82
	Mean									
pH (su)	8.7								8	8.4

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97270-A, 18-97314-A, 18-97699-A

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

								Soil Type	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD
All values in mg/kg unless otherwise stated								Location & Depth	WS01	WS01	WS02	WS03	CPT05	CPT06	CPT07	CPT08	CPT09	BH05	BH104
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US$_{95}$**	**Result of Significance Test**	**1.20**	**1.90**	**2.20**	**1.80**	**1.20**	**1.20**	**1.00**	**1.20**	**0.80**	**1.00**	**1.2**
Arsenic	1	11	7.6	21	0	79	18.10884	POTENTIALLY SUITABLE FOR USE	7.6	12	16	19	21	9.1	10	7.9	8.3	11	11
Beryllium	0.06	10	0.59	1	0	92	0.9460305	POTENTIALLY SUITABLE FOR USE	0.61	0.59	0.74	1	0.89	0.88	0.72	0.69	0.66	0.83	
Boron	0.2	11	0.3	2.1	0	21000	1.7480297	POTENTIALLY SUITABLE FOR USE	1.6	0.8	0.5	0.3	0.6	0.3	0.9	1.1	2.1	1.7	0.5
Cadmium	0.2	11	0.2	0.3	0	120	0.2713596	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3
Chromium (III)	1	11	17	75	0	1500	54.807926	POTENTIALLY SUITABLE FOR USE	23	51	75	35	33	31	27	23	17	23	25
Chromium (VI)	1.2	11	1.2	1.2	0	7.7	1.2	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	11	2.9	52	0	12000	32.739536	POTENTIALLY SUITABLE FOR USE	6	3.6	6.6	26	52	7.3	2.9	8.4	14	13	15
Lead	2	11	8	160	0	630	108.8017	POTENTIALLY SUITABLE FOR USE	31	8	26	17	110	36	22	41	160	54	30
Mercury, inorganic	0.3	11	0.3	0.6	0	470	0.4461818	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.3	0.3
Nickel	2	11	12	46	0	290	38.034158	POTENTIALLY SUITABLE FOR USE	19	39	46	33	24	18	16	14	12	17	21
Selenium	1	11	1	1	0	1400	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1
Vanadium	1	10	31	50	0	2000	50.32571	POTENTIALLY SUITABLE FOR USE	31	33	46	48	50	48	41	35	36	40	
Zinc	2	11	34	69	0	81000	67.670643	POTENTIALLY SUITABLE FOR USE	45	37	61	66	62	53	69	52	50	53	34
Cyanide (free)	1	11	1	1	0	1600	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1
Phenol (total)	2	11	1	1	0	760	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1
Acenaphthene	0.05	11	0.05	0.05	0	15000	0.05	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Acenaphthylene	0.05	11	0.05	0.05	0	15000	0.05	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Anthracene	0.05	11	0.05	0.05	0	74000	0.05	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Benz(a)anthracene	0.05	11	0.05	0.4	0	17	0.2581182	POTENTIALLY SUITABLE FOR USE	0.27	0.05	0.05	0.05	0.4	0.05	0.05	0.05	0.05	0.05	0.05
Benzo(a)pyrene	0.05	11	0.05	0.37	0	2.6	0.2059273	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.37	0.05	0.05	0.05	0.05	0.05	0.05
Benzo(b)fluoranthene	0.05	11	0.05	0.48	0	18	0.2595273	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.48	0.05	0.05	0.05	0.05	0.05	0.05
Benzo(ghi)perylene	0.05	11	0.05	0.33	0	120	0.1864364	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.33	0.05	0.05	0.05	0.05	0.05	0.05
Benzo(k)fluoranthene	0.05	11	0.05	0.29	0	26	0.1669455	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.29	0.05	0.05	0.05	0.05	0.05	0.05
Chrysene	0.05	11	0.05	0.35	0	25	0.2138668	POTENTIALLY SUITABLE FOR USE	0.18	0.05	0.05	0.05	0.35	0.05	0.05	0.05	0.05	0.05	0.05
Dibenz(a,h)anthracene	0.05	11	0.05	0.05	0	2.3	0.05	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fluoranthene	0.05	11	0.05	0.61	0	3100	0.4181321	POTENTIALLY SUITABLE FOR USE	0.39	0.05	0.05	0.05	0.61	0.35	0.05	0.05	0.05	0.05	0.05
Fluorene	0.05	11	0.05	7.1	0	9900	3.4852727	POTENTIALLY SUITABLE FOR USE	0.05	7.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Indeno(1,2,3,cd)pyrene	0.05	11	0.05	0.33	0	11	0.1864364	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.33	0.05	0.05	0.05	0.05	0.05	0.05
Naphthalene	0.05	11	0.05	0.05	0	3900	0.05	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Phenanthrene	0.05	11	0.05	11	0	3100	5.4779543	POTENTIALLY SUITABLE FOR USE	0.05	11	1.3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Pyrene	0.05	11	0.05	2.7	0	7400	1.4973873	POTENTIALLY SUITABLE FOR USE	0.34	2.7	0.74	0.05	0.67	0.36	0.05	0.05	0.05	0.05	0.05
Asbestos identified	Y/N								N	N	N	N	N	N	N	N	N	N	N
FOC (dimensionless)	0.00629	**(mean)**							0.006	0.012	0.005	0.001	0.004	0.006	0.005	0.0067	0.012	0.0052	
SOM (calculated)	1.08%	**(mean)**							1.03%	2.07%	0.86%	0.17%	0.69%	1.03%	0.86%	1.16%	2.07%	0.90%	
pH (su)	8.0	**(mean)**							7.2	8	7.3	8.1	8	8.5	8.5	8.3	7.9	8.3	8.1

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: River Terace Deposits
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97699-A

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC) or +ve asbestos ID.
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

									RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD
	All values in mg/kg unless otherwise stated								WS01	WS01	WS02	WS03	CPT05	CPT06	CPT07	CPT08	CPT09	BH05	BH104
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	1.20	1.90	2.20	1.80	1.20	1.20	1.00	1.20	0.80	1.00	1.2
Arsenic	1	11	7.6	21	0	250	18.10884	POTENTIALLY SUITABLE FOR USE	7.6	12	16	19	21	9.1	10	7.9	8.3	11	11
Boron	0.2	11	0.3	2.1	0	3	1.74803	POTENTIALLY SUITABLE FOR USE	1.6	0.8	0.5	0.3	0.6	0.3	0.9	1.1	2.1	1.7	0.5
Chromium (III)	1	11	17	75	0	400	54.80793	POTENTIALLY SUITABLE FOR USE	23	51	75	35	33	31	27	23	17	23	25
Chromium (VI)	1.2	11	1.2	1.2	0	25	1.2	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	11	2.9	52	0	135	32.73954	POTENTIALLY SUITABLE FOR USE	6	3.6	6.6	26	52	7.3	2.9	8.4	14	13	15
Nickel	2	11	12	46	0	75	38.03416	POTENTIALLY SUITABLE FOR USE	19	39	46	33	24	18	16	14	12	17	21
Zinc	2	11	34	69	0	300	67.67064	POTENTIALLY SUITABLE FOR USE	45	37	61	66	62	53	69	52	50	53	34
	Mean																		
pH (su)	8.0								7.2	8	7.3	8.1	8	8.5	8.5	8.3	7.9	8.3	8.1

Risk parameter: Plant life pH 7
Data set: River Terace Deposits
Client: Senior Living Epsom
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-13599, 20-15129, 20-17863, 20-21010, 18-97699-A

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

						Soil Type	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**
All values in mg/kg unless otherwise stated						**Location & Depth**	**WS02**	**WS03**	**WS04**	**WS04**	**BH01**	**BH01**	**BH101**	**WS102**	**BH102**	**WS101**	**WS104**	**BH104**
							0.50	**0.70**	**0.30**	**0.80**	**0.30**	**1.00**	**0.5**	**0.8**	**0.2**	**0.4**	**0.4**	**0.7-0.8**
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**												
Aliphatics EC5-EC6	0.01	11	0.001	0.001	0	300	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
Aliphatics >EC6-EC8	0.01	12	0.001	0.001	0	600000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Aliphatics >EC8-EC10	0.01	12	0.001	0.001	0	13000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Aliphatics >EC10-EC12	1	12	1	1	0	13000	1	1	1	1	1	1	1	1	1	1	1	1
Aliphatics >EC12-EC16	2	12	2	8.3	0	13000	2	2	2	2	2	2	2	2	2	8.3	2	2
Aliphatics >EC16-EC35	8	12	8	79	0	250000	8	8	8	8	8	8	8	8	79	25	19	8
Aliphatics >EC35-EC44	8.4	6	8.4	8.4	0	250000	8.4	8.4	8.4	8.4	8.4	8.4						
Aromatics EC5-EC7	0.01	11	0.001	0.001	0	56000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
Aromatics >EC7-EC8	0.01	12	0.001	0.001	0	56000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Aromatics >EC8-EC10	0.01	12	0.001	0.001	0	5000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Aromatics >EC10-EC12	1	12	1	7	0	5000	1	1	1	1	1	1	1	1	7	1	1	1
Aromatics >EC12-EC16	2	12	2	44	0	5000	4.6	2	2	2	2	2	2	2	44	3.4	2	2
Aromatics >EC16-EC21	10	12	10	180	0	3800	50	10	10	10	15	10	10	10	180	15	10	10
Aromatics >EC21-EC35	10	12	10	440	0	3800	120	16	10	10	37	10	10	43	440	350	10	10
Aromatics >EC35-EC44	8.4	6	8.4	18	0	3800	18	8.4	8.4	8.4	8.4	8.4						

	ADDITIVITY CHECK	**HAZARD QUOTIENTS FOR EACH FRACTION**											
	Aliphatics EC5-EC6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Considered additive	Aliphatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aliphatics >EC10-EC12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aliphatics >EC12-EC16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	Aliphatics >EC16-EC35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000	0.000	0.000						
	Aromatics EC5-EC7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Aromatics >EC7-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Considered additive	Aromatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aromatics >EC10-EC12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
	Aromatics >EC12-EC16	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.001	0.000	0.000
Considered additive	Aromatics >EC16-EC21	0.013	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.047	0.004	0.003	0.003
	Aromatics >EC21-EC35	0.032	0.004	0.003	0.003	0.010	0.003	0.003	0.011	0.116	0.092	0.003	0.003
	Aromatics >EC35-EC44	0.005	0.002	0.002	0.002	0.002	0.002						
	Hazard Index for ali>C8-C16	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Hazard Index for aro>C8-C16	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.010**	**0.001**	**0.001**	**0.001**
	Hazard Index for aro>C16-C35	**0.045**	**0.007**	**0.005**	**0.005**	**0.014**	**0.005**	**0.005**	**0.014**	**0.163**	**0.096**	**0.005**	**0.005**

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: Made Ground
Client: Guild Living
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-15129, 18-97270-A, 18-97314-A, 18-97699-A

Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.

Legend: Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.

Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).

MG denotes Made Ground

NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

						Soil Type	**TGD**	**RTD**	**RTD**	**RTD**
All values in mg/kg unless otherwise stated						**Location & Depth**	**WS01**	**WS01**	**WS02**	**WS03**
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**1.20**	**1.90**	**2.20**	**1.80**
Aliphatics EC5-EC6	0.01	4	0.001	0.001	0	300	0.001	0.001	0.001	0.001
Aliphatics >EC6-EC8	0.01	4	0.001	0.001	0	600000	0.001	0.001	0.001	0.001
Aliphatics >EC8-EC10	0.01	4	0.001	3.4	0	13000	0.001	1.2	3.4	0.001
Aliphatics >EC10-EC12	1	4	1	75	0	13000	1	75	3.7	1
Aliphatics >EC12-EC16	2	4	2	1300	0	13000	2	1300	120	2
Aliphatics >EC16-EC35	8	4	8	3170	0	250000	8	3170	279	8
Aliphatics >EC35-EC44	8.4	4	8.4	12	0	250000	8.4	12	8.4	8.4
Aromatics EC5-EC7	0.01	4	0.001	0.001	0	56000	0.001	0.001	0.001	0.001
Aromatics >EC7-EC8	0.01	4	0.001	0.001	0	56000	0.001	0.001	0.001	0.001
Aromatics >EC8-EC10	0.01	4	0.001	0.014	0	5000	0.001	0.014	0.001	0.001
Aromatics >EC10-EC12	1	4	1	18	0	5000	1	18	1	1
Aromatics >EC12-EC16	2	4	2	230	0	5000	2	230	11	2
Aromatics >EC16-EC21	10	4	10	420	0	3800	10	420	27	10
Aromatics >EC21-EC35	10	4	10	160	0	3800	10	160	10	10
Aromatics >EC35-EC44	8.4	4	8.4	8.4	0	3800	8.4	8.4	8.4	8.4

	ADDITIVITY CHECK	**HAZARD QUOTIENTS FOR EACH FRACTION**			
	Aliphatics EC5-EC6	0.000	0.000	0.000	0.000
	Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000
	Aliphatics >EC8-EC10	0.000	0.000	0.000	0.000
Considered additive	Aliphatics >EC10-EC12	0.000	0.006	0.000	0.000
	Aliphatics >EC12-EC16	0.000	0.100	0.009	0.000
	Aliphatics >EC16-EC35	0.000	0.013	0.001	0.000
	Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000
	Aromatics EC5-EC7	0.000	0.000	0.000	0.000
	Aromatics >EC7-EC8	0.000	0.000	0.000	0.000
	Aromatics >EC8-EC10	0.000	0.000	0.000	0.000
Considered additive	Aromatics >EC10-EC12	0.000	0.004	0.000	0.000
	Aromatics >EC12-EC16	0.000	0.046	0.002	0.000
	Aromatics >EC16-EC21	0.003	0.111	0.007	0.003
Considered additive	Aromatics >EC21-EC35	0.003	0.042	0.003	0.003
	Aromatics >EC35-EC44	0.002	0.002	0.002	0.002
	Hazard Index for ali>C8-C16	**0.000**	**0.106**	**0.010**	**0.000**
	Hazard Index for aro>C8-C16	**0.001**	**0.050**	**0.002**	**0.001**
	Hazard Index for aro>C16-C35	**0.005**	**0.153**	**0.010**	**0.005**

Risk parameter: **Human health - POS resi (1%SOM)**
Data set: River Terrace Deposits
Client: Guild Living
Site: Epsom Hospital
Job no.: C-12053-C
Lab. report no(s).: 20-15129

Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.

Legend: Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.

Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).

MG denotes Made Ground

NAT denotes natural ground

Petroleum Hydrocarbons in Water

RTM Level 2 Groundwater Below Source Assessment (from Groundwater Analyses)

Data set: **Groundwater (Shallow)**
Client: **Guild Living**
Site: **Epsom Hospital**
Job no: **C12053**
*Number of TPH carbon bands >DL in data set = 7

Chemical of Potential Concern (concentrations in µg/l)	Water Quality Target (WQT) (µg/l)	Basis of WQT	*Modified WQT (C bands) (µg/l) (Exceeded if red)	Limit of Detection	No. of Samples	Minimum Value (µg/l) (=LoD if blue)	Maximum Value (µg/l) (=LoD if blue)	No. Samples Exceeding Modified WQT	Water Solubility (µg/l) (Exceeded if red)
Ali EC5-EC6	17500	DWS - WHO methodology	2500	1	10	1	1	0	35900
Ali >EC6-EC8	17500	DWS - WHO methodology	2500	1	10	1	1	0	5370
Ali >EC8-EC10	350	DWS - WHO methodology	50	1	10	1	1	0	427
Ali >EC10-EC12	350	DWS - WHO methodology	50	10	10	10	130	1	33.9
Ali >EC12-EC16	350	DWS - WHO methodology	50	10	10	10	1600	2	0.759
Ali >EC16-EC35	7000	DWS - WHO methodology	1000	10	10	10	8200	1	0.00254
Ali >EC35-EC44	7000	DWS - WHO methodology	1000	10	7	10	10	0	0.00254
Aro EC5-EC7	700	DWS - WHO methodology	100	1	10	1	8.7	0	1780000
Aro >EC7-EC8	700	DWS - WHO methodology	100	1	10	1	1	0	590000
Aro >EC8-EC10	140	DWS - WHO methodology	20	1	10	1	87	1	64600
Aro >EC10-EC12	140	DWS - WHO methodology	20	10	10	10	430	3	24500
Aro > EC12-EC16	140	DWS - WHO methodology	20	10	10	10	1500	3	5750
Aro >EC16-EC21	105	DWS - WHO methodology	15	10	10	10	1000	3	653
Aro >EC21-EC35	105	DWS - WHO methodology	15	10	10	10	210	1	6.61
Aro >EC35-EC44	105	DWS - WHO methodology	15	10	7	10	10	0	6.61
Benzene	1	UK/EU DWS	1	1	10	1	8.7	1	1780000
Toluene	700	WHO (2004) DWS	700	1	10	1	1	0	590000
Ethylbenzene	300	WHO (2004) DWS	300	1	10	1	1	0	180000
Xylenes	500	WHO (2004) DWS	500	1	10	1	1	0	191000
MTBE	15	WHO (2004) DWS	15	1	10	1	1	0	48000000

Water quality targets for drinking water quality based on the methodology proposed by the World Health Organisation (WHO, 2005). This is based on an adult consuming 2 litres of water per day (a figure in keeping with the UK Contaminated Land CLEA methodology). A conservative allocation of 10% of the oral Tolerable Daily Intake (TDI) has been attributed to intake from drinking water. The TDIs used are the same as those used in the derivation of soil GACs.

*As a further precautionary approach, the recommendations of the Environment Agency (2009) have been followed and each calculated water quality target has been adjusted by dividing by the number of carbon bands with detected concentrations. This accounts for any potential additivity in toxic endpoints and modes of action.

Petroleum Hydrocarbons in Water

RTM Level 2 Groundwater Below Source Assessment (from Groundwater Analyses)

Data set: Groundwater (Deep)
Client: Guild Living
Site: Epsom Hospital
Job no: C12053
*Number of TPH carbon bands >DL in data set = 1

Chemical of Potential Concern (concentrations in µg/l)	Water Quality Target (WQT) (µg/l)	Basis of WQT	*Modified WQT (C bands) (µg/l) (Exceeded if red)	Limit of Detection	No. of Samples	Minimum Value (µg/l) (=LoD if blue)	Maximum Value (µg/l) (=LoD if blue)	No. Samples Exceeding Modified WQT	Water Solubility (µg/l) (Exceeded if red)
Ali EC5-EC6	17500	DWS - WHO methodology	17500	1	13	1	1	0	35900
Ali >EC6-EC8	17500	DWS - WHO methodology	17500	1	13	1	1	0	5370
Ali >EC8-EC10	350	DWS - WHO methodology	350	1	13	1	1	0	427
Ali >EC10-EC12	350	DWS - WHO methodology	350	10	13	10	21	0	33.9
Ali >EC12-EC16	350	DWS - WHO methodology	350	10	13	10	140	0	0.759
Ali >EC16-EC35	7000	DWS - WHO methodology	7000	10	13	10	200	0	0.00254
Ali >EC35-EC44	7000	DWS - WHO methodology	7000	10	13	10	10	0	0.00254
Aro EC5-EC7	700	DWS - WHO methodology	700	1	13	1	9.3	0	1780000
Aro >EC7-EC8	700	DWS - WHO methodology	700	1	13	1	1	0	590000
Aro >EC8-EC10	140	DWS - WHO methodology	140	1	13	1	39	0	64600
Aro >EC10-EC12	140	DWS - WHO methodology	140	10	13	10	410	1	24500
Aro > EC12-EC16	140	DWS - WHO methodology	140	10	13	10	770	1	5750
Aro >EC16-EC21	105	DWS - WHO methodology	105	10	13	10	640	1	653
Aro >EC21-EC35	105	DWS - WHO methodology	105	10	13	10	10	0	6.61
Aro >EC35-EC44	105	DWS - WHO methodology	105	10	13	10	10	0	6.61
Benzene	1	UK/EU DWS	1	1	13	1	9.3	1	1780000
Toluene	700	WHO (2004) DWS	700	1	13	1	1	0	590000
Ethylbenzene	300	WHO (2004) DWS	300	1	13	1	1	0	180000
Xylenes	500	WHO (2004) DWS	500	1	13	1	1	0	191000
MTBE	15	WHO (2004) DWS	15	1	13	1	1	0	48000000

Water quality targets for drinking water quality based on the methodology proposed by the World Health Organisation (WHO, 2005). This is based on an adult consuming 2 litres of water per day (a figure in keeping with the UK Contaminated Land CLEA methodology). A conservative allocation of 10% of the oral Tolerable Daily Intake (TDI) has been attributed to intake from drinking water. The TDIs used are the same as those used in the derivation of soil GACs.

*As a further precautionary approach, the recommendations of the Environment Agency (2009) have been followed and each calculated water quality target has been adjusted by dividing by the number of carbon bands with detected concentrations. This accounts for any potential additivity in toxic endpoints and modes of action.

Summary of Remedial Targets Methodology Screening

Hydrock

Hydrock Scenario: Scenario D - DWS & EQS (inland)
RTM Level: RTM Level 2 - Groundwater Beneath Source Assessment - groundwater samples
Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction)
Data set: Groundwater (Shallow)
Client: Guild Living
Site: Epsom Hospital
Job no: C12053
Test Certificates(s): 20-24289 & 20-24514 & 20-27186 & 20-27453 & 20-
Dataset ALL ZONES

2013/39/EU Annex I
P = priority substance
PH = priority hazardous substances.
WFD Designation (2015 Directions)
OP = Other substance identical to previous legislation
SP = Specific Pollutant

JAGDAG Hazardous Substances Determination (UK)	
H	Hazardous substance
NP	Non-hazardous pollutant
(blank)	Not included in assessment

1 2 4

CAS / AGS Number	Chemicals of Potential Concern (concentrations in µg/l)	WFD Designation	Hazardous Substance Status	Summary of Sample Data						Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		No. Samples above LoD Exceeding Water Quality Target		Notes
				No. of Samples	No. of Samples > LoD	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
P1133	Hardness as mg/l $CaCO_3$			-	-	-	10	-	-	-	-	-					Representative hardness of receiving surface water environment used in some inland EQS
7440-22-4	Silver (Ag) (dissolved)			7	0	1	0.05	0.05	0.05	0.05	n/a	0.05		0		0	EQS is below the limit of detection.
7429-90-5	Aluminium (Al) (dissolved)			7	5	0.001	0.001	0.04	0.03712	0.04	200	n/a	0		0		
7440-38-2	Arsenic (As) (dissolved)	SP	**H**	10	10	0.15	0.4	17.5	11.3215	17.5	10	50	1	0	1	0	
7440-42-8	Boron (B) (dissolved)		NP	10	10	10	16	230	225.5	230	1000	2000	0	0	0	0	
7440-39-3	Barium (Ba) (dissolved)			7	7	0.06	3.1	57	56.1	57	1300	n/a	0		0		
7440-43-9	Cadmium (Cd) (dissolved)	**PH**	NP	10	0	0	0.02	1.3	0.7375	1.3	5	0.08	0	1	0	1	EQS (inland) dependent on hardness of receiving surface water environment
7440-48-4	Cobalt (Co) (dissolved)		NP	7	7	0.2	1.2	160	114.07	160	n/a	3		5		5	Minor exceedance of EQS
18540-29-9	Chromium (VI) (Cr) (dissolved)	SP	**H**	10	0	5	5	5	5	5	n/a	3.4		10		0	EQS is below the limit of detection.
16065-83-1	Chromium (III) (Cr) (dissolved)	SP		7	0	1	1	1	1	1	n/a	4.7		0		0	
7440-47-3	Chromium (Cr) (total) (dissolved)			10	0	0	0.2	0.4	0.31	0.4	50	n/a	0		0		
7440-50-8	Copper (Cu) (dissolved)	SP	NP	10	6	0.5	0.5	5.4	5.04	5.4	2000	1	0	5	0	5	Bioavailable EQS (inland)
7439-89-6	Iron (Fe) (dissolved)	SP		7	7	0.004	0.006	23	19.1	23	200	1000	0	0	0	0	
7439-97-6	Mercury (Hg) (dissolved)	**PH**	**H**	10	0	0.05	0.05	0.05	0.05	0.05	1	0.07	0	0	0	0	
P1286	Manganese (Mn) (dissolved)	SP		7	7	0.05	23	5500	5140	5500	50	123	6	6	6	6	Bioavailable EQS (inland)
7440-23-5	Sodium (Na) (dissolved)			7	7	0.01	68	260	254	260	200000	n/a	0		0		
7440-02-0	Nickel (Ni) (dissolved)	***P***	NP	10	10	0.5	1.9	190	110.8	190	20	4	1	6	1	6	Bioavailable EQS (inland)
7439-92-1	Lead (Pb) (dissolved)	***P***	**H**	10	2	0.2	0.2	2	1.235	2	10	1.2	0	1	0	1	Bioavailable EQS (inland)
7440-36-0	Antimony (Sb) (dissolved)		NP	7	3	0.4	0.4	0.6	0.57	0.6	5	n/a	0		0		
7782-49-2	Selenium (Se) (dissolved)		NP	10	10	0.6	0.7	26	17	26	10	n/a	1		1		
7440-31-5	Tin (Sn) (dissolved)			7	3	0.2	0.2	0.6	0.579	0.6	n/a	25		0		0	
7440-62-2	Vanadium (V) (dissolved)			7	4	0.2	0.2	1.3	1.03	1.3	n/a	20		0		0	EQS (inland) dependent on hardness of receiving surface water environment
7440-66-6	Zinc (Zn) (dissolved)	SP	NP	10	10	0.5	0.6	220	125.275	220	n/a	10.9		1		1	Bioavailable EQS (inland) + ambient background concentration (ABC)
P1095	Cyanide (free) (hydrogen cyanide)	SP	NP	10	3	1	1	10	10	10	n/a	1		3		3	
57-12-5	Cyanide (total)			10	5	1	1	10	10	10	50	n/a	0		0		
P1140	Ammonium (NH_4^+)		NP	7	7	15	94	2700	2670	2700	500	n/a	4		4		
P1238	Ammnoniacal Nitrogen (as N)		NP	7	7	15	73	2100	2070	2100	n/a	300		4		4	Exceedance of EQS
P1720	Ammonia (unionised) (NH_3 as N) {free ammonia}	SP	NP	7	7	15	89	2600	2570	2600	n/a	n/a					
15541-45-4	Bromate (BrO_3)			7	5	0.002	0.002	0.02	0.02	0.02	10	n/a	0		0		
16887-00-6	Chloride (Cl^-)			7	7	0.15	95	400	352	400	250000	250000	0	0	0	0	
16984-48-8	Fluoride (F^-)			7	6	50	50	440	437	440	1500	1000	0	0	0	0	EQS (inland) dependent on hardness of receiving surface water environment
P1348	Nitrate (NO_3^-)			7	7	0.05	0.25	1.03	0.97	1.03	50000	n/a	0		0		
P1349	Nitrite (NO_2^-)			7	7	5	18	85	80.8	85	500	n/a	0		0		
14808-79-8	Sulfate (SO_4^{2-})			7	7	45	1550	2520000	1851000	2520000	250000	400000	2	1	2	1	Sulphate exceedance from Chemistry of the London Clay
P1134	pH (min.) (su)			0							6.5	6					
P1134	pH (max.) (su)			10	0	0	6.9	8.2	8.11	8.2	9.5	9	0	0	0	0	
P1287	Electrical conductivity (µS/cm)			7	7	10	880	2600	2240	2600	2500	n/a	1		1		
120-12-7	Anthracene	***PH***	**H**	9	0	0.01	0.001	0.01	0.01	0.01	n/a	0.1		0		0	
50-32-8	Benzo(a)pyrene	***PH***	H	9	0	0.01	0.01	0.01	0.01	0.01	0.01	0.00017	0	9	0	0	EQS is below the limit of detection.
206-44-0	Fluoranthene	***P***	**H**	9	1	0.01	0.01	0.19	0.118	0.19	n/a	0.0063		9		1	EQS is below the limit of detection.
91-20-3	Naphthalene	P	NP	9	2	0.01	0.01	24.9	15.184	24.9	n/a	2		1		1	
GRP01	PAHs = sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene	***P***	**H**	7	0	0.01	0.002	0.002	0.002	0.002	0.1	n/a	0		0		
P1877	Phenol	SP	**NP**	7	5	1	1	9.3	9.24	9.3	n/a	7.7		3		3	Minor exceedance of EQS
71-43-2	Benzene	P	**H**	7	0	1	1	1	1	1	1	10	0	0	0	0	
108-88-3	Toluene	SP	**H**	7	0	1	1	1	1	1	700	74	0	0	0	0	
100-41-4	Ethylbenzene		**H**	7	0	1	1	1	1	1	300	20	0	0	0	0	Proposed EQS for Ethylbenzene in Water, R&D Technical Report P2-115/TR4. EA 2001
95-47-6	o-Xylene		H	7	0	1	1	1	1	1	500	30	0	0	0	0	DWS/EQS for total xylene
P1374	m,p-Xylene		H	7	0	1	1	1	1	1	500	30	0	0	0	0	DWS/EQS for total xylene
1634-04-04	Methyl tertiary butyl ether (MTBE)		NP	7	0	1	1	1	1	1	15	n/a	0		0		Non health based value - WHO odour threshold
71-55-6	1,1,1-Trichloroethane		NP	0							n/a	100					
79-00-5	1,1,2-Trichloroethane		**NP**	0							n/a	400					
96-12-8	1,2-Dibromo-3-chloropropane			0							0.1	n/a					
106-93-4	1,2-Dibromoethane		H	0							0.4	n/a					
95-50-1	1,2-Dichlorobenzene		H	0							1000	20					
107-06-2	1,2-Dichloroethane (EDC)	P	NP	0							3	10					
156-59-2	cis 1,2-Dichloroethene (cis 1,2 DCE)		**NP**	0							50	n/a					DWS is for combined isomers
156-60-5	trans 1,2-Dichloroethene (trans 1,2 DCE)		**NP**	0							50	n/a					DWS is for combined isomers
78-87-5	1,2-Dichloropropane		**H**	0							40	n/a					

Summary of Remedial Targets Methodology Screening

Hydrock Scenario: Scenario D - DWS & EQS (inland)
RTM Level: RTM Level 2 - Groundwater Beneath Source Assessment - groundwater samples
Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction)
Data set: Groundwater (Deep)
Client: Guild Living
Site: Epsom Hospital
Job no: C12053
Test Certificates(s): 20-24289 & 2027186 & 20-27453 & 18-97864-A
Dataset ALL ZONES

2013/39/EU Annex I
P= priority substance
PH = priority hazardous substances.
WFD Designation (2015 Directions)
OP = Other substance identical to previous legislation
SP = Specific Pollutant

JAGDAG Hazardous Substances Determination (UK)

H	Hazardous substance
NP	Non-hazardous pollutant
(blank)	Not included in assessment

4

CAS / AGS Number	Chemicals of Potential Concern (concentrations in µg/l)	WFD Designation	Hazardous Substance Status	Summary of Sample Data						Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		No. Samples above LoD Exceeding Water Quality Target		Notes
				No. of Samples	No. of Samples > LoD	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
P1133	Hardness as mg/l $CaCO_3$			-	-	-	10	-	-	-	-	-					Representative hardness of receiving surface water environment used in some inland EQS
7440-22-4	Silver (Ag) (dissolved)			10	0	0.05	0.05	0.05	0.05	0.05	n/a	0.05		0		0	
7429-90-5	Aluminium (Al) (dissolved)			10	6	0.001	0.001	0.0255	0.02019	0.0255	200	n/a	0		0		
7440-38-2	Arsenic (As) (dissolved)	SP	**H**	13	13	0.15	0.19	1.41	1.17	1.41	10	50	0	0	0	0	
7440-42-8	Boron (B) (dissolved)		NP	13	13	10	15	510	360	510	1000	2000	0	0	0	0	
7440-39-3	Barium (Ba) (dissolved)			10	10	0.06	29	48	47.1	48	1300	n/a	0		0		
7440-43-9	Cadmium (Cd) (dissolved)	**PH**	NP	13	0	0.2	0.02	0.02	0.02	0.02	5	0.08	0	0	0	0	EQS (inland) dependent on hardness of receiving surface water environment
7440-48-4	Cobalt (Co) (dissolved)		NP	10	9	0.2	0.2	160	142	160	n/a	3		4		4	
18540-29-9	Chromium (VI) (Cr) (dissolved)	SP	**H**	13	0	5	5	5	5	5	n/a	3.4		13		0	
16065-83-1	Chromium (III) (Cr) (dissolved)	SP		10	0	1	1	1	1	1	n/a	4.7		0		0	
7440-47-3	Chromium (Cr) (total) (dissolved)			13	0	0.2	0.2	0.2	0.2	0.2	50	n/a	0		0		
7440-50-8	Copper (Cu) (dissolved)	SP	NP	13	12	0.5	0.5	3.9	3.72	3.9	2000	1	0	9	0	9	Bioavailable EQS (inland)
7439-89-6	Iron (Fe) (dissolved)	SP		10	10	0.004	0.011	0.75	0.6735	0.75	200	1000	0	0	0	0	
7439-97-6	Mercury (Hg) (dissolved)	**PH**	**H**	10	0	0.05	0.05	0.05	0.05	0.05	1	0.07	0	0	0	0	
P1286	Manganese (Mn) (dissolved)	SP		10	10	0.05	14	800	777.5	800	50	123	8	6	8	6	Bioavailable EQS (inland)
7440-23-5	Sodium (Na) (dissolved)			10	10	0.01	27	150	141	150	200000	n/a	0		0		
7440-02-0	Nickel (Ni) (dissolved)	***P***	NP	13	13	0.5	1	220	184	220	20	4	2	6	2	6	Bioavailable EQS (inland)
7439-92-1	Lead (Pb) (dissolved)	***P***	**H**	13	0	0.2	0.2	0.2	0.2	0.2	10	1.2	0	0	0	0	Bioavailable EQS (inland)
7440-36-0	Antimony (Sb) (dissolved)		NP	10	2	0.4	0.4	0.5	0.5	0.5	5	n/a	0		0		
7782-49-2	Selenium (Se) (dissolved)		NP	13	8	0.6	0.6	11	10.4	11	10	n/a	1		1		
7440-31-5	Tin (Sn) (dissolved)			10	7	0.2	0.2	0.84	0.7815	0.84	n/a	25		0		0	
7440-62-2	Vanadium (V) (dissolved)			10	2	0.2	0.2	0.5	0.41	0.5	n/a	20		0		0	EQS (inland) dependent on hardness of receiving surface water environment
7440-66-6	Zinc (Zn) (dissolved)	SP	NP	13	13	0.5	1.3	46	37.6	46	n/a	10.9		3		3	Bioavailable EQS (inland) + ambient background concentration (ABC)
P1095	Cyanide (free) (hydrogen cyanide)	SP	NP	13	0	1	1	1	1	1	n/a	1		0		0	
57-12-5	Cyanide (total)			13	0	1	1	1	1	1	50	n/a	0		0		
P1140	Ammonium (NH_4^+)		NP	10	10	15	37	430	389.5	430	500	n/a	0		0		
P1238	Ammnoniacal Nitrogen (as N)		NP	10	10	15	29	330	303	330	n/a	300		1		1	
P1720	Ammonia (unionised) (NH_3 as N) {free ammonia}	SP	NP	10	10	15	35	410	369.5	410	n/a	n/a					
15541-45-4	Bromate (BrO_3)			10	3	0.002	0.002	38	35.3	38	10	n/a	3		3		
16887-00-6	Chloride (Cl^-)			10	10	0.15	25	260	197	260	250000	250000	0	0	0	0	
16984-48-8	Fluoride (F^-)			10	10	50	99	230	230	230	1500	1000	0	0	0	0	EQS (inland) dependent on hardness of receiving surface water environment
P1348	Nitrate (NO_3^-)			10	10	0.05	0.1	19.4	12.083	19.4	50000	n/a	0		0		
P1349	Nitrite (NO_2^-)			10	9	5	5	160	116.35	160	500	n/a	0		0		
14808-79-8	Sulfate (SO_4^{2-})			10	10	45	65200	1330000	1244500	1330000	250000	400000	4	3	4	3	
P1134	pH (min.) (su)			0							6.5	6					
P1134	pH (max.) (su)			13	0	0	6.5	8.1	8.04	8.1	9.5	9	0	0	0	0	
P1287	Electrical conductivity (µS/cm)			10	10	10	630	2000	1910	2000	2500	n/a	0		0		
120-12-7	Anthracene	***PH***	**H**	13	5	0.01	0.01	0.1	0.1	0.1	n/a	0.1		0		0	
50-32-8	Benzo(a)pyrene	***PH***	H	13	0	0.01	0.01	0.01	0.01	0.01	0.01	0.00017	0	13	0	0	
206-44-0	Fluoranthene	***P***	**H**	13	0	0.01	0.01	0.01	0.01	0.01	n/a	0.0063		13		0	
91-20-3	Naphthalene	P	NP	13	1	0.01	0.01	21.2	8.486	21.2	n/a	2		1		1	
GRP01	PAHs = sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene	***P***	**H**	10	0	0.01	0.002	0.002	0.002	0.002	0.1	n/a	0		0		
P1877	Phenol	SP	**NP**	10	4	1	1	9.1	8.965	9.1	n/a	7.7		2		2	
71-43-2	Benzene	P	**H**	10	0	1	1	1	1	1	1	10	0	0	0	0	
108-88-3	Toluene	SP	**H**	10	0	1	1	1	1	1	700	74	0	0	0	0	
100-41-4	Ethylbenzene		**H**	10	0	1	1	1	1	1	300	20	0	0	0	0	Proposed EQS for Ethylbenzene in Water, R&D Technical Report P2-115/TR4. EA 2001
95-47-6	o-Xylene		H	10	0	1	1	1	1	1	500	30	0	0	0	0	DWS/EQS for total xylene
P1374	m,p-Xylene		H	10	0	1	1	1	1	1	500	30	0	0	0	0	DWS/EQS for total xylene
1634-04-04	Methyl tertiary butyl ether (MTBE)		NP	10	0	1	1	1	1	1	15	n/a	0		0		Non health based value - WHO odour threshold
71-55-6	1,1,1-Trichloroethane		NP	0							n/a	100					
79-00-5	1,1,2-Trichloroethane		**NP**	0							n/a	400					
96-12-8	1,2-Dibromo-3-chloropropane			0							0.1	n/a					
106-93-4	1,2-Dibromoethane		H	0							0.4	n/a					
95-50-1	1,2-Dichlorobenzene		H	0							1000	20					
107-06-2	1,2-Dichloroethane (EDC)	P	NP	0							3	10					
156-59-2	cis 1,2-Dichloroethene (cis 1,2 DCE)		**NP**	0							50	n/a					DWS is for combined isomers
156-60-5	trans 1,2-Dichloroethene (trans 1,2 DCE)		**NP**	0							50	n/a					DWS is for combined isomers
78-87-5	1,2-Dichloropropane		**H**	0							40	n/a					
10061-01-5	cis 1,3-Dichloropropene		**H**	0							0.1	n/a					DWS is for combined isomers

Summary of Remedial Targets Methodology Screening

Hydrock

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Secondary receptor(s): Human health (abstraction)
Data set: Groundwater (Deep)
Client: Guild Living
Site: Epsom Hospital
Job no: C12053
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Dataset ALL ZONES

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PH = priority hazardous substances.
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NP	Non-hazardous pollutant
(blank)	Not included in assessment

1 2 4

CAS / AGS Number	Chemicals of Potential Concern (concentrations in µg/l)	WFD Designation	Hazardous Substance Status	Summary of Sample Data						Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		No. Samples above LoD Exceeding Water Quality Target		Notes
				No. of Samples	No. of Samples > LoD	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
10061-02-6	trans 1,3-Dichloropropene		H	0							0.1	n/a					DWS is for combined isomers
106-46-7	1,4-Dichlorobenzene		**H**	0							300	20					
75-27-4	Bromodichloromethane			0							60	n/a					
75-01-4	Chloroethene (vinyl chloride)		H	0							0.5	n/a					
124-48-1	Dibromochloromethane			0							100	n/a					
25321-22-6	Dichlorobenzenes (1,2-, 1,3- & 1,4-)			0							n/a	20					
75-09-2	Dichloromethane	P	**NP**	0							20	20					
87-68-3	Hexachlorobutadiene (HCBD)	PH	H	0							0.1	0.6					
100-42-5	Styrene		H	0							20	50					
25322-20-7	Tetrachloroethane (PCA)	SP		0							n/a	140					
127-18-4	Tetrachloroethene (PCE)	OP	**NP**	0							10	10					UK DWS applies to sum of tetrachloroethene and trichloroethene
GRP02	Tetrachloroethene (PCE) and trichloroethene (TCE)			0							10	n/a					UK DWS applies to sum of tetrachloroethene and trichloroethene
56-23-5	Tetrachloromethane (Carbon Tetrachloride)	***OP***	H	0							3	12					
75-25-2	Tribromomethane (bromoform)			0							100	n/a					
12002-48-1	Trichlorobenzenes	***P***	**NP**	0							n/a	0.4					
79-01-6	Trichloroethene	OP	H	0							10	10					UK DWS applies to sum of tetrachloroethene and trichloroethene
67-66-3	Trichloromethane (chloroform)	P	**H**	0							100	2.5					
GRP03	Trihalomethanes, sum of trichloromethane, tribromomethane, dibromchloromethane & bromodichloromethane			0							100	n/a					
88-06-2	2,4,6-Trichlorophenol		**H**	0							200	n/a					
120-83-2	2,4-Dichlorophenol	SP	H	0							n/a	4.2					
95-57-8	2-Chlorophenol		**H**	0							n/a	50					
554-00-7	3,4-Dichloroaniline	SP		0							n/a	0.2					
108-43-0	3-Chlorophenol		**H**	0							n/a	50					
59-50-7	4-Chloro, 3-methylphenol		H	0							n/a	40					
106-48-9	4-Chlorophenol		H	0							n/a	50					
85-68-7	Benzyl butyl phthalate	SP		0							n/a	7.5					
117-81-7	Di(2-ethylhexylphthalate) (DEHP)	PH	NP	0							8	1.3					
84-74-2	Dibutyl phthalate		NP	0							n/a	8					
84-66-2	Diethyl phthalate (DEP)			0							n/a	200					
131-11-3	Dimethyl phthalate (DMP)			0							n/a	800					
117-84-0	Dioctyl phthalates			0							n/a	20					
118-74-1	Hexachlorobenzene	***PH***	H	0							0.1	0.05					
104-40-5	Nonylphenol (4-Nonylphenol)	**PH**		0							n/a	0.3					
140-66-9	Octylphenol ((4-(1,1′, 3,3′-tetramethylbutyl) -phenol))	P		0							n/a	0.1					
608-93-5	Pentachlorobenzene	PH	**H**	0							n/a	0.007					
123-91-1	1,4-dioxane			0							50	n/a					
79-06-1	Acrylamide		**H**	0							0.1	n/a					
92-52-4	Biphenyl (cyclochlorocyclohexane)			0							n/a	25					
32534-81-9	Brominated diphenylethers (Sum congeners 28,47,99,100,153,154)	PH	**H**	0							n/a	0.14					
85535-84-8	Chloroalkanes C10-C13	PH	H	0							n/a	0.4					
25567-68-4	Chloronitrotoluenes		H	0							n/a	10					
3252-43-5	Dibromoacetonitrile			0							70	n/a					
13425-80-4	Dichloroacetate			0							50	n/a					
3018-12-0	Dichloroacetonitrile			0							20	n/a					
GRP04	Dioxins and dioxin-like compounds	PH		0							n/a	n/a					
3194-55-6	Hexabromocyclododecanes (HBCDD)	PH	H	0							n/a	0.0016					
2163-68-0	Hydroxyatrazine			0							200	n/a					
101043-37-2	Microcystin-LR			0							1	n/a					
62-75-9	N-nitrosodimethylamine			0							0.1	n/a					
1763-23-1	Perflurooctane sulfonic acid (PFOS) & derivatives	PH	H	0							0.3	0.00065					DWS represents DWI (2009) Tier 2 action value (commence monitoring).
1336-36-3	Polychlorinated Biphenyls (PCB)		**H**	0							n/a	n/a					
2893-78-9	Sodium dichloroisoxyanurate			0							50000	n/a					
126-73-8	Tributyl phosphate		H	0							n/a	50					
3380-34-5	Triclosan	SP		0							n/a	0.1					
7726-95-6	Bromine (Br)			0							n/a	2					
7782-50-5	Chlorine (total free available)	SP	NP	0							200	2					

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4

CAS / AGS Number	Chemicals of Potential Concern (concentrations in µg/l)	WFD Designation	Hazardous Substance Status	Summary of Sample Data						Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		No. Samples above LoD Exceeding Water Quality Target		Notes
				No. of Samples	No. of Samples > LoD	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
14866-68-3	Chlorate			0							700	n/a					
14998-27-7	Chlorite			0							700	n/a					
60-00-4	EDTA (edetic acid)			0							600	400					
106-89-8	Epichlorohydrin		**H**	0							0.1	n/a					
569-64-2	Malachite green		H	0							n/a	0.5					
10599-90-3	Monochloramine			0							3000	n/a					
79-11-8	Mononchloroacetate (Chloroacetic Acid)			0							20	n/a					
139-13-9	NTA (nitrilotriacetic acid)			0							200	1000					
76-03-9	Trichloroethanoic acid (trichloroacetate)			0							200	n/a					
7440-61-1	U (dissolved)			0							30	n/a					
36643-28-4	Tributyl tin compounds	PH	H	0							n/a	0.0002					
7783-06-4	Hydrogen Sulphide			0							n/a	0.25					
14797-73-0	Perchlorate			0							70	n/a					
GRP06	Total anions			0							n/a	250000					
93-76-5	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)		H	0							0.1	n/a					
94-75-7	2,4-D (2,4-Dichlorophenoxyacetic acid)	SP		0							0.1	0.3					
94-82-6	2,4-DB (4-(2,4-dichlorophenoxy butyric acid)			0							0.1	n/a					
71751-41-2	Abamectin			0							0.1	0.01					
74070-46-5	Aclinofen	***P***		0							0.1	0.12					
15972-60-8	Alachlor	P	H	0							0.1	0.3					
116-06-3	Aldicarb		**NP**	0							0.1	n/a					
309-00-2	Aldrin		**H**	0							0.03	n/a					
GRP07	Aldrin & dieldrin		**H**	0							0.03	n/a					
1912-24-9	Atrazine	P	H	0							0.1	0.6					
35575-96-3	Azamethiphos			0							0.1	n/a					
2642-71-9	Azinphos ethyl		**H**	0							0.1	n/a					
86-50-0	Azinphos-methyl		H	0							0.1	0.01					
25057-89-0	Bentazone		**NP**	0							0.1	500					
42576-02-3	Bifenox	P	**H**	0							0.1	0.012					
1689-84-5	Bromoxynil		**H**	0							0.1	100					
10605-21-7	Carbendazim	SP	H	0							0.1	0.15					
1563-66-2	Carbofuran		**NP**	0							0.1	n/a					
57-74-9	Chlordane		**H**	0							0.1	n/a					
470-90-6	Chlorofenvinphos	P	**H**	0							0.1	0.1					
101-21-3	Chloropropham		**H**	0							0.1	10					
2921-88-2	Chloropyrifos	P	**H**	0							0.1	0.03					
1897-45-6	Chlorothalonil	SP	**H**	0							0.1	0.035					
15545-48-9	Chlorotoluron		**H**	0							0.1	2					
GRP08	Clyclodiene pesticides, sum of Aldrin, Dieldrin, Endrin, Isodrin	OP	**H**	0							0.03	0.01					
56-72-4	Coumaphos		**H**	0							0.1	0.01					
21725-46-2	Cyanazine		H	0							0.1	n/a					
28159-98-0	Cybutryne	P		0							0.1	0.0025					
68359-37-5	Cyfluthrin			0							0.1	0.001					
52315-07-8	Cypermethrin	P	**H**	0							0.1	0.00008					
GRP09	DDT total (dichlorodiphenylthrichloroethane)	OP	**H**	0							0.1	0.025					
8065-48-3	Demeton		**H**	0							0.1	0.5					
333-41-5	Diazinon (sheep dip)	SP	**H**	0							0.1	0.01					
120-36-5	Dichloroprop		**H**	0							0.1	n/a					
62-73-7	Dichlorvos	**P**	**H**	0							0.1	0.0006					
115-32-2	Dicofol	PH	**H**	0							0.1	0.0013					
60-57-1	Dieldrin		**H**	0							0.03	n/a					
35367-38-5	Diflubenzuron		**H**	0							0.1	0.001					
60-51-5	Dimethoate	***SP***	**H**	0							0.1	0.48					
330-54-1	Diuron	P	H	0							0.1	0.2					
117704-25- 3	Doramectin			0							n/a	0.001					
115-29-7	Endosulfan	PH	**H**	0							0.1	0.005					
72-20-8	Endrin		**H**	0							0.1	n/a					
299-84-3	Fenchlorphos		**H**	0							0.1	0.03					
122-14-5	Fenitrothion		**H**	0							0.1	0.01					
93-72-1	Fenoprop ((2,4,5-trichlorophenoxy)propionic acid)		**H**	0							0.1	n/a					
55-38-9	Fenthion		H	0							0.1	n/a					
370-50-3	Flucofuron			0							0.1	1					
50-00-0	Formaldehyde (methanal)		NP	0							0.1	5					

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				No. of Samples	No. of Samples > LoD	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
38641-94-0	Glyphosate	SP		0							0.1	196					
76-44-8	Heptachlor		**H**	0							0.03	2E-07					
GRP10	Heptachlor & Heptachlor epoxide	PH	H	0							0.03	2E-07					
1024-57-3	Heptachlor epoxide			0							0.03	2E-07					
608-73-1	Hexachlorocyclohexane (inlcudes lindane)	PH	**H**	0							0.1	0.02					
1689-83-4	Ioxynil		**H**	0							0.1	10					
465-73-6	Isodrin		H	0							0.1	n/a					
34123-69-6	Isoproturon	P	NP	0							0.1	0.3					
70288-86-7	Ivermectin			0							n/a	0.0001					
330-55-2	Linuron	SP	**H**	0							0.1	0.5					
121-75-5	Malathion		H	0							0.1	0.01					
8018-01-07	Mancozeb		NP	0							0.1	2					
12427-38-2	Maneb		NP	0							0.1	3					
94-74-6	MCPA (4-(2-methyl-4-chlorophenoxy acetic acid))			0							0.1	12					EQS inland dependant on pH. Default 12µg/l as conservative approach
93-65-2	Mecoprop	SP	NP	0							0.1	18					
2032-65-7	Methiocarb	SP	NP	0							0.1	0.01					
72-43-5	Methoxychlor			0							0.1	n/a					
51218-45-2	Metolachlor			0							0.1	n/a					
7786-34-7	Mevinphos		H	0							0.1	0.02					
2212-67-1	Molinate			0							0.1	n/a					
1113-02-6	Omethoate		**H**	0							0.1	0.01					
50-29-3	para-para-DDT	OP	**H**	0							0.1	0.01					
56-38-2	Parathion		**H**	0							0.1	n/a					
298-00-0	Parathion-methyl		H	0							0.1	n/a					
GRP11	PCSDs (cyfluthrin, sulcofuron, flucofuron and permethrin)			0							n/a	0.05					
40487-42-1	Pendimethalin	***SP***	**NP**	0							0.1	0.3					
87-86-5	Pentachlorophenol	P	**H**	0							0.1	0.4					
52645-53-1	Permethrin	SP	H	0							0.1	0.001					
GRP12	Pesticides (individual) (other than aldrin, dieldrin, heptachlor & heptachlor epoxide)			0							0.1	n/a					
GRP13	Pesticides (total)			0							0.5	n/a					
23103-98-2	Pirimicarb		**NP**	0							0.1	1					
29232-93-7	Pirimiphos - methyl		**H**	0							0.1	0.015					
67747-09-5	Prochloraz		**H**	0							0.1	4					
31218-83-4	Propetamphos		**H**	0							0.1	0.03					
23950-58-5	Propyzamide		H	0							0.1	100					
95737-68-1	Pyriproxyfen			0							0.1	n/a					
124495-18-7	Quinoxyfen	***PH***		0							0.1	0.15					
122-34-9	Simazine	P	H	0							0.1	1					
3567-25-7	Sulcofuron			0							0.1	25					
117-18-0	Tecnazene (total)			0							0.1	1					
886-50-0	Tertbutryn	P	**NP**	0							0.1	0.065					
5915-41-3	Tertbutylazine		H	0							0.1	n/a					
148-79-8	Thiabendazole		**NP**	0							0.1	5					
2303-17-5	Triallate		**H**	0							0.1	0.25					
24017-47-8	Triazaphos		**H**	0							0.1	0.005					
1582-09-8	Trifluralin	**PH**	**H**	0							0.1	0.03					
1262-21-1	Triphenyltin and derivatives		**H**	0							0.1	0.02					

Appendix G

Waste Assessment

HazWasteOnline™ Assessment

Waste Classification Report

5E2PP-ANFUJ-SJ4MS

Job name

EPSOM

Description/Comments

Project

C-12053-C

Site

EPSOM

Related Documents

#	Name	Description
None		

Waste Stream Template

Hydrock Standard plus Cresol (ammended Lead)

Classified by

Name:
Alison Holland
Date:
18 Aug 2020 12:22 GMT
Telephone:

Company:
Hydrock Consultants Ltd

HazWasteOnline™ Training Record:

Course	**Date**
Hazardous Waste Classification	-
Advanced Hazardous Waste Classification	-

Report

Created by: Alison Holland
Created date: 18 Aug 2020 12:22 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	1.20	Non Hazardous		3
2	WS01[2]	1.90	Potentially Hazardous	HP 3(i)	5
3	WS02	0.50	Non Hazardous		8
4	WS02[2]	2.20	Non Hazardous		10
5	WS03	0.70	Non Hazardous		12
6	WS03[2]	1.80	Non Hazardous		14
7	WS04	0.30	Non Hazardous		16
8	WS04[2]	0.80	Non Hazardous		18
9	BH01	0.30	Potentially Hazardous	HP 2	20
10	BH01[2]	1.00	Non Hazardous		23
11	CPT01	0.50	Non Hazardous		25
12	CPT02	0.60	Non Hazardous		27
13	CPT03	0.50	Non Hazardous		29

Classification of sample: WS01

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

Sample details

Sample Name:		LoW Code:	
WS01		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.20 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.6	mg/kg	1.32	10.034	mg/kg	0.001 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.27	mg/kg		0.27	mg/kg	0.000027 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.61	mg/kg	2.775	1.693	mg/kg	0.000169 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.6	mg/kg	13.43	21.488	mg/kg	0.00215 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.18	mg/kg		0.18	mg/kg	0.000018 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6	mg/kg	1.126	6.755	mg/kg	0.000676 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		0.39	mg/kg		0.39	mg/kg	0.000039 %		
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	31	mg/kg		31	mg/kg	0.0031 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		19	mg/kg	1.579	30.01	mg/kg	0.003 %		
27	●	pH			PH		7.2	pH		7.2	pH	7.2 pH		
28	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		0.34	mg/kg		0.34	mg/kg	0.000034 %		
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		45	mg/kg	1.245	56.012	mg/kg	0.0056 %		
											Total:	0.0198 %		

Key

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

Classification of sample: WS01[2]

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

Sample details

Sample Name:		LoW Code:	
WS01[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.90 m		Entry:	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:

diesel petroleum group: (conc.: 0.421%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
5		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene	205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide } 004-003-00-8	215-133-1	1304-56-9		0.59	mg/kg	2.775	1.637	mg/kg	0.000164 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.8	mg/kg	13.43	10.744	mg/kg	0.00107 %		

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		51	mg/kg	1.462	74.539	mg/kg	0.00745 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		3.6	mg/kg	1.126	4.053	mg/kg	0.000405 %		
17		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	diesel petroleum group			68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		4209.667	mg/kg		4209.667	mg/kg	0.421 %		
20	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
21	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	fluorene		201-695-5	86-73-7		7.1	mg/kg		7.1	mg/kg	0.00071 %		
23	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
24		lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	8	mg/kg		8	mg/kg	0.0008 %		
25		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
26		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
27		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		39	mg/kg	1.579	61.6	mg/kg	0.00616 %		
28	●	pH			PH		8	pH		8	pH	8pH		
29	●	phenanthrene		201-581-5	85-01-8		11	mg/kg		11	mg/kg	0.0011 %		
30		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
31	●	pyrene		204-927-3	129-00-0		2.7	mg/kg		2.7	mg/kg	0.00027 %		
32		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		37	mg/kg	1.245	46.054	mg/kg	0.00461 %		
											Total:	0.446 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS02

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

Sample details

Sample Name:		LoW Code:	
WS02		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				0.6	mg/kg		0.6	mg/kg	0.00006 %		
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-917-1	208-96-8									
3	●	anthracene				2.2	mg/kg		2.2	mg/kg	0.00022 %		
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				27	mg/kg	1.32	35.649	mg/kg	0.00356 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				13	mg/kg		13	mg/kg	0.0013 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				11	mg/kg		11	mg/kg	0.0011 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				13	mg/kg		13	mg/kg	0.0013 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				6.3	mg/kg		6.3	mg/kg	0.00063 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				5.8	mg/kg		5.8	mg/kg	0.00058 %		
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				1	mg/kg	2.775	2.775	mg/kg	0.000278 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				1.6	mg/kg	13.43	21.488	mg/kg	0.00215 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				19	mg/kg	1.462	27.77	mg/kg	0.00278 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		8.9	mg/kg		8.9	mg/kg	0.00089 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		36	mg/kg	1.126	40.532	mg/kg	0.00405 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		1.9	mg/kg		1.9	mg/kg	0.00019 %		
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		21	mg/kg		21	mg/kg	0.0021 %		
21	●	fluorene		201-695-5	86-73-7		0.74	mg/kg		0.74	mg/kg	0.000074 %		
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		5.8	mg/kg		5.8	mg/kg	0.00058 %		
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	490	mg/kg		490	mg/kg	0.049 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.8	mg/kg	1.353	1.083	mg/kg	0.000108 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		16	mg/kg	1.579	25.272	mg/kg	0.00253 %		
27	●	pH			PH		7.7	pH		7.7	pH	7.7 pH		
28	●	phenanthrene		201-581-5	85-01-8		7.1	mg/kg		7.1	mg/kg	0.00071 %		
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		18	mg/kg		18	mg/kg	0.0018 %		
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		230	mg/kg	1.245	286.284	mg/kg	0.0286 %		
											Total:	0.105 %		

Key

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

Classification of sample: WS02[2]

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

Sample details

Sample Name:		LoW Code:	
WS02[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
2.20 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				16	mg/kg	1.32	21.125	mg/kg	0.00211 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				0.74	mg/kg	2.775	2.054	mg/kg	0.000205 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.5	mg/kg	13.43	6.715	mg/kg	0.000672 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				75	mg/kg	1.462	109.617	mg/kg	0.011 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6.6	mg/kg	1.126	7.431	mg/kg	0.000743 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	26	mg/kg		26	mg/kg	0.0026 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		46	mg/kg	1.579	72.657	mg/kg	0.00727 %		
27	●	pH			PH		7.3	pH		7.3	pH	7.3 pH		
28	●	phenanthrene		201-581-5	85-01-8		1.3	mg/kg		1.3	mg/kg	0.00013 %		
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		0.74	mg/kg		0.74	mg/kg	0.000074 %		
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		61	mg/kg	1.245	75.928	mg/kg	0.00759 %		
											Total:	0.033 %		

Key

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

Classification of sample: WS03

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

Sample details

Sample Name:		LoW Code:	
WS03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.70 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand				CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
3	●	anthracene		204-371-1	120-12-7		0.19	mg/kg		0.19	mg/kg	0.000019 %		
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.5	mg/kg		1.5	mg/kg	0.00015 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.1	mg/kg		1.1	mg/kg	0.00011 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.5	mg/kg		1.5	mg/kg	0.00015 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		0.66	mg/kg		0.66	mg/kg	0.000066 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.52	mg/kg		0.52	mg/kg	0.000052 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7	mg/kg	2.775	1.943	mg/kg	0.000194 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.4	mg/kg	13.43	5.372	mg/kg	0.000537 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<**LOD**
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		21	mg/kg	1.462	30.693	mg/kg	0.00307 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.82	mg/kg		0.82	mg/kg	0.000082 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		29	mg/kg	1.126	32.651	mg/kg	0.00327 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
20	●	fluoranthene		205-912-4	206-44-0		2.3	mg/kg		2.3	mg/kg	0.00023 %		
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.63	mg/kg		0.63	mg/kg	0.000063 %		
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	540	mg/kg		540	mg/kg	0.054 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		2.6	mg/kg	1.353	3.519	mg/kg	0.000352 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		17	mg/kg	1.579	26.851	mg/kg	0.00269 %		
27	●	pH			PH		8.3	pH		8.3	pH	8.3 pH		
28	●	phenanthrene		201-581-5	85-01-8		0.95	mg/kg		0.95	mg/kg	0.000095 %		
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
30	●	pyrene		204-927-3	129-00-0		2	mg/kg		2	mg/kg	0.0002 %		
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		240	mg/kg	1.245	298.731	mg/kg	0.0299 %		
32		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		60	mg/kg		60	mg/kg	0.006 %		
											Total:	0.103 %		

Key

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

Classification of sample: WS03[2]

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

Sample details

Sample Name:		LoW Code:	
WS03[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				19	mg/kg	1.32	25.086	mg/kg	0.00251 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				1	mg/kg	2.775	2.775	mg/kg	0.000278 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.3	mg/kg	13.43	4.029	mg/kg	0.000403 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<**LOD**
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				35	mg/kg	1.462	51.154	mg/kg	0.00512 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				26	mg/kg	1.126	29.273	mg/kg	0.00293 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
19	●	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
20	●	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-912-4	206-44-0									
21	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-695-5	86-73-7									
22	●	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-893-2	193-39-5									
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	17	mg/kg		17	mg/kg	0.0017 %		
		082-001-00-6											
24	⚛	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7									
25		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
26	⚛	nickel { nickel dihydroxide }				33	mg/kg	1.579	52.123	mg/kg	0.00521 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
27	●	pH				8.1	pH		8.1	pH	8.1 pH		
				PH									
28	●	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-581-5	85-01-8									
29		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
30	●	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			204-927-3	129-00-0									
31	⚛	zinc { zinc oxide }				66	mg/kg	1.245	82.151	mg/kg	0.00822 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.027 %		

Key

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

Classification of sample: WS04

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

Sample details

Sample Name:		LoW Code:	
WS04		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
3	●	anthracene				0.19	mg/kg		0.19	mg/kg	0.000019 %		
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				13	mg/kg	1.32	17.164	mg/kg	0.00172 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				0.88	mg/kg		0.88	mg/kg	0.000088 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				0.59	mg/kg		0.59	mg/kg	0.000059 %		
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				0.75	mg/kg	2.775	2.082	mg/kg	0.000208 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.7	mg/kg	13.43	9.401	mg/kg	0.00094 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	0.3	mg/kg	1.285	0.386	mg/kg	0.00003 %		
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.83	mg/kg		0.83	mg/kg	0.000083 %		
16	⚗	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25	mg/kg	1.126	28.147	mg/kg	0.00281 %		
17	⚗	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.19	mg/kg		0.19	mg/kg	0.000019 %		
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		2	mg/kg		2	mg/kg	0.0002 %		
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.74	mg/kg		0.74	mg/kg	0.000074 %		
23	⚗	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	240	mg/kg		240	mg/kg	0.024 %		
24	⚗	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.5	mg/kg	1.353	0.677	mg/kg	0.0000677 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚗	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		12	mg/kg	1.579	18.954	mg/kg	0.0019 %		
27	●	pH			PH		8.5	pH		8.5	pH	8.5 pH		
28	●	phenanthrene		201-581-5	85-01-8		0.63	mg/kg		0.63	mg/kg	0.000063 %		
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		1.8	mg/kg		1.8	mg/kg	0.00018 %		
31	⚗	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		120	mg/kg	1.245	149.366	mg/kg	0.0149 %		
											Total:	0.0513 %		

Key

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

Classification of sample: WS04[2]

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

Sample details

Sample Name:		LoW Code:	
WS04[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	13.203	mg/kg	0.00132 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.72	mg/kg	2.775	1.998	mg/kg	0.0002 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.8	mg/kg	13.43	10.744	mg/kg	0.00107 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<**LOD**
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		5.7	mg/kg	1.126	6.418	mg/kg	0.000642 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	28	mg/kg		28	mg/kg	0.0028 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		13	mg/kg	1.579	20.533	mg/kg	0.00205 %		
27	●	pH			PH		8.3	pH		8.3	pH	8.3 pH		
28	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		45	mg/kg	1.245	56.012	mg/kg	0.0056 %		
											Total:	0.0179 %		

Key

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

Classification of sample: BH01

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

Sample details

Sample Name:		LoW Code:	
BH01		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	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 2: Oxidizing "waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials"

Hazard Statements hit:

Ox. Sol. 1; H271 "May cause fire or explosion; strong oxidiser."

Because of determinand:

chromium(VI) oxide: (compound conc.: 0.00059%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				17	mg/kg	1.32	22.446	mg/kg	0.00224 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				1.1	mg/kg		1.1	mg/kg	0.00011 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				0.71	mg/kg		0.71	mg/kg	0.000071 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				0.75	mg/kg		0.75	mg/kg	0.000075 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }				4.7	mg/kg	13.43	63.121	mg/kg	0.00631 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	0.4	mg/kg	1.285	0.514	mg/kg	0.00004 %		
		048-010-00-4	215-147-8	1306-23-6									

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		3.1	mg/kg	1.923	5.962	mg/kg	0.000596 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.89	mg/kg		0.89	mg/kg	0.000089 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		37	mg/kg	1.126	41.658	mg/kg	0.00417 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20	●	fluoranthene		205-912-4	206-44-0		2	mg/kg		2	mg/kg	0.0002 %		
21	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.69	mg/kg		0.69	mg/kg	0.000069 %		
23	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	350	mg/kg		350	mg/kg	0.035 %		
24	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.9	mg/kg	1.353	1.218	mg/kg	0.000122 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
26	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		17	mg/kg	1.579	26.851	mg/kg	0.00269 %		
27	●	pH			PH		7.8	pH		7.8	pH	7.8 pH		
28	●	phenanthrene		201-581-5	85-01-8		0.7	mg/kg		0.7	mg/kg	0.00007 %		
29		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30	●	pyrene		204-927-3	129-00-0		1.7	mg/kg		1.7	mg/kg	0.00017 %		
31	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		180	mg/kg	1.245	224.049	mg/kg	0.0224 %		
32		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		120	mg/kg		120	mg/kg	0.012 %		
											Total:	0.0898 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH01[2]

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

Sample details

Sample Name:		LoW Code:	
BH01[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.3	mg/kg	1.32	9.638	mg/kg	0.000964 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.49	mg/kg	2.775	1.36	mg/kg	0.000136 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.4	mg/kg	13.43	18.802	mg/kg	0.00188 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
16	⚗	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6.7 mg/kg	1.126	7.543 mg/kg	0.000754 %		
17	⚗	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
19	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20	●	fluoranthene		205-912-4	206-44-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
21	●	fluorene		201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
22	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
23	⚗	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	40 mg/kg		40 mg/kg	0.004 %		
24	⚗	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		**<LOD**
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
26	⚗	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		9.2 mg/kg	1.579	14.531 mg/kg	0.00145 %		
27	●	pH			PH		7.9 pH		7.9 pH	7.9 pH		
28	●	phenanthrene		201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
29		phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		**<LOD**
30	●	pyrene		204-927-3	129-00-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		**<LOD**
31	⚗	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		37 mg/kg	1.245	46.054 mg/kg	0.00461 %		
									Total:	0.0166 %		

Key

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

Classification of sample: CPT01

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

Sample details

Sample Name:		LoW Code:	
CPT01		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				0.33	mg/kg		0.33	mg/kg	0.000033 %		
			201-469-6	83-32-9									
2	●	acenaphthylene				2.6	mg/kg		2.6	mg/kg	0.00026 %		
			205-917-1	208-96-8									
3	●	anthracene				3.1	mg/kg		3.1	mg/kg	0.00031 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				16	mg/kg	1.32	21.125	mg/kg	0.00211 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				26	mg/kg		26	mg/kg	0.0026 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				24	mg/kg		24	mg/kg	0.0024 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				27	mg/kg		27	mg/kg	0.0027 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				14	mg/kg		14	mg/kg	0.0014 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				17	mg/kg		17	mg/kg	0.0017 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }				1	mg/kg	13.43	13.43	mg/kg	0.00134 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	0.4	mg/kg	1.285	0.514	mg/kg	0.00004 %		
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		21 mg/kg		21 mg/kg	0.0021 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		130 mg/kg	1.126	146.365 mg/kg	0.0146 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		3.7 mg/kg		3.7 mg/kg	0.00037 %		
19	●	fluoranthene		205-912-4	206-44-0		39 mg/kg		39 mg/kg	0.0039 %		
20	●	fluorene		201-695-5	86-73-7		0.85 mg/kg		0.85 mg/kg	0.000085 %		
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		13 mg/kg		13 mg/kg	0.0013 %		
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	760 mg/kg		760 mg/kg	0.076 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.2 mg/kg	1.353	1.624 mg/kg	0.000162 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		0.26 mg/kg		0.26 mg/kg	0.000026 %		
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		18 mg/kg	1.579	28.431 mg/kg	0.00284 %		
26	●	pH			PH		8.9 pH		8.9 pH	8.9 pH		
27	●	phenanthrene		201-581-5	85-01-8		13 mg/kg		13 mg/kg	0.0013 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		36 mg/kg		36 mg/kg	0.0036 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		150 mg/kg	1.245	186.707 mg/kg	0.0187 %		
									Total:	0.144 %		

Key

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

Classification of sample: CPT02

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

Sample details

Sample Name:		LoW Code:	
CPT02		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.60 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
3	●	anthracene		204-371-1	120-12-7		0.46	mg/kg		0.46	mg/kg	0.000046 %		
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		21	mg/kg	1.32	27.727	mg/kg	0.00277 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		3	mg/kg		3	mg/kg	0.0003 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		2.5	mg/kg		2.5	mg/kg	0.00025 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		3	mg/kg		3	mg/kg	0.0003 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		1.6	mg/kg		1.6	mg/kg	0.00016 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.6	mg/kg		1.6	mg/kg	0.00016 %		
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1	mg/kg	13.43	13.43	mg/kg	0.00134 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.4	mg/kg	1.285	0.514	mg/kg	0.00004 %		
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				2.2	mg/kg		2.2	mg/kg	0.00022 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				40	mg/kg	1.126	45.036	mg/kg	0.0045 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				0.44	mg/kg		0.44	mg/kg	0.000044 %		
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				4.6	mg/kg		4.6	mg/kg	0.00046 %		
			205-912-4	206-44-0									
20	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	740	mg/kg		740	mg/kg	0.074 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				0.6	mg/kg	1.353	0.812	mg/kg	0.0000812 %		
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				18	mg/kg	1.579	28.431	mg/kg	0.00284 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				8.4	pH		8.4	pH	8.4 pH		
				PH									
27	●	phenanthrene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				4.2	mg/kg		4.2	mg/kg	0.00042 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				200	mg/kg	1.245	248.943	mg/kg	0.0249 %		
		030-013-00-7	215-222-5	1314-13-2									
31		asbestos				180	mg/kg		180	mg/kg	0.018 %		
		650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5									
										Total:	0.135 %		

Key

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

Classification of sample: CPT03

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

Sample details

Sample Name:		LoW Code:	
CPT03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			204-371-1	120-12-7									
4	⚗	arsenic { arsenic trioxide }				7.5	mg/kg	1.32	9.902	mg/kg	0.00099 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				0.31	mg/kg		0.31	mg/kg	0.000031 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				0.27	mg/kg		0.27	mg/kg	0.000027 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				0.27	mg/kg		0.27	mg/kg	0.000027 %		
		601-036-00-5	205-916-6	207-08-9									
10	⚗	beryllium { beryllium oxide }				0.62	mg/kg	2.775	1.721	mg/kg	0.000172 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚗	boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚗	cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
		048-010-00-4	215-147-8	1306-23-6									
13	⚗	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
14	⚗	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number								
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.26	mg/kg		0.26	mg/kg	0.000026 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		14	mg/kg	1.126	15.762	mg/kg	0.00158 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	fluoranthene		205-912-4	206-44-0		0.6	mg/kg		0.6	mg/kg	0.00006 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	73	mg/kg		73	mg/kg	0.0073 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		12	mg/kg	1.579	18.954	mg/kg	0.0019 %		
26	●	pH			PH		8.6	pH		8.6	pH	8.6 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		0.58	mg/kg		0.58	mg/kg	0.000058 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		120	mg/kg	1.245	149.366	mg/kg	0.0149 %		
											Total:	0.0316 %		

Key

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

Classification of sample: CPT03[2]

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

Sample details

Sample Name:		LoW Code:	
CPT03[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.1	mg/kg	1.32	9.374	mg/kg	0.000937 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.28	mg/kg		0.28	mg/kg	0.000028 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.23	mg/kg		0.23	mg/kg	0.000023 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.25	mg/kg		0.25	mg/kg	0.000025 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.21	mg/kg		0.21	mg/kg	0.000021 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.55	mg/kg	2.775	1.526	mg/kg	0.000153 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		25	mg/kg	1.462	36.539	mg/kg	0.00365 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				5.6	mg/kg	1.126	6.305	mg/kg	0.00063 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			205-912-4	206-44-0									
20	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	23	mg/kg		23	mg/kg	0.0023 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				13	mg/kg	1.579	20.533	mg/kg	0.00205 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				8.8	pH		8.8	pH	8.8 pH		
				PH									
27	●	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				0.53	mg/kg		0.53	mg/kg	0.000053 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				57	mg/kg	1.245	70.949	mg/kg	0.00709 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0189 %		

Key

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

Classification of sample: CPT04A

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

Sample details

Sample Name:		LoW Code:	
CPT04A		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.40 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1	●	acenaphthene		201-469-6	83-32-9		0.66	mg/kg		0.66	mg/kg	0.000066 %		
2	●	acenaphthylene		205-917-1	208-96-8		1.6	mg/kg		1.6	mg/kg	0.00016 %		
3	●	anthracene		204-371-1	120-12-7		3.4	mg/kg		3.4	mg/kg	0.00034 %		
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		20	mg/kg		20	mg/kg	0.002 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		21	mg/kg		21	mg/kg	0.0021 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		26	mg/kg		26	mg/kg	0.0026 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		12	mg/kg		12	mg/kg	0.0012 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		7.1	mg/kg		7.1	mg/kg	0.00071 %		
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.84	mg/kg	2.775	2.331	mg/kg	0.000233 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.6	mg/kg	13.43	8.058	mg/kg	0.000806 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.3	mg/kg	1.285	0.386	mg/kg	0.00003 %		
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				13	mg/kg		13	mg/kg	0.0013 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				19	mg/kg	1.126	21.392	mg/kg	0.00214 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
		006-007-00-5											
18		dibenz[a,h]anthracene				3.3	mg/kg		3.3	mg/kg	0.00033 %		
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				28	mg/kg		28	mg/kg	0.0028 %		
			205-912-4	206-44-0									
20	●	fluorene				0.72	mg/kg		0.72	mg/kg	0.000072 %		
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				11	mg/kg		11	mg/kg	0.0011 %		
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	83	mg/kg		83	mg/kg	0.0083 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				0.22	mg/kg		0.22	mg/kg	0.000022 %		
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				15	mg/kg	1.579	23.692	mg/kg	0.00237 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				9.8	pH		9.8	pH	9.8 pH		
				PH									
27	●	phenanthrene				9.8	mg/kg		9.8	mg/kg	0.00098 %		
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				28	mg/kg		28	mg/kg	0.0028 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				86	mg/kg	1.245	107.045	mg/kg	0.0107 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0488 %		

Key

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

Classification of sample: CPT05

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

Sample details

Sample Name:		LoW Code:	
CPT05		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.40 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		14	mg/kg	1.32	18.485	mg/kg	0.00185 %		
5		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.28	mg/kg		0.28	mg/kg	0.000028 %		
6		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.27	mg/kg		0.27	mg/kg	0.000027 %		
7		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.33	mg/kg		0.33	mg/kg	0.000033 %		
8	●	benzo[ghi]perylene	205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.23	mg/kg		0.23	mg/kg	0.000023 %		
10		beryllium { beryllium oxide } 004-003-00-8	215-133-1	1304-56-9		0.73	mg/kg	2.775	2.026	mg/kg	0.000203 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		1.2	mg/kg	13.43	16.116	mg/kg	0.00161 %		
12		cadmium { cadmium sulfide } 048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }	215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.27	mg/kg		0.27	mg/kg	0.000027 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6.4	mg/kg	1.126	7.206	mg/kg	0.000721 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	fluoranthene		205-912-4	206-44-0		0.49	mg/kg		0.49	mg/kg	0.000049 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	59	mg/kg		59	mg/kg	0.0059 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		16	mg/kg	1.579	25.272	mg/kg	0.00253 %		
26	●	pH			PH		8.1	pH		8.1	pH	8.1 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		0.52	mg/kg		0.52	mg/kg	0.000052 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		40	mg/kg	1.245	49.789	mg/kg	0.00498 %		
											Total:	0.022 %		

Key

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

Classification of sample: CPT05[2]

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

Sample details

Sample Name:		LoW Code:	
CPT05[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.20 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene											
			201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2	●	acenaphthylene											
			205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
3	●	anthracene											
			204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
4	⚛	arsenic { arsenic trioxide }											
		033-003-00-0	215-481-4	1327-53-3		21	mg/kg	1.32	27.727	mg/kg	0.00277 %		
5		benzo[a]anthracene											
		601-033-00-9	200-280-6	56-55-3		0.4	mg/kg		0.4	mg/kg	0.00004 %		
6		benzo[a]pyrene; benzo[def]chrysene											
		601-032-00-3	200-028-5	50-32-8		0.37	mg/kg		0.37	mg/kg	0.000037 %		
7		benzo[b]fluoranthene											
		601-034-00-4	205-911-9	205-99-2		0.48	mg/kg		0.48	mg/kg	0.000048 %		
8	●	benzo[ghi]perylene											
			205-883-8	191-24-2		0.33	mg/kg		0.33	mg/kg	0.000033 %		
9		benzo[k]fluoranthene											
		601-036-00-5	205-916-6	207-08-9		0.29	mg/kg		0.29	mg/kg	0.000029 %		
10	⚛	beryllium { beryllium oxide }											
		004-003-00-8	215-133-1	1304-56-9		0.89	mg/kg	2.775	2.47	mg/kg	0.000247 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }											
				10294-33-4, 10294-34-5, 7637-07-2		0.6	mg/kg	13.43	8.058	mg/kg	0.000806 %		
12	⚛	cadmium { cadmium sulfide }											
		048-010-00-4	215-147-8	1306-23-6	1	0.2	mg/kg	1.285	0.257	mg/kg	0.00002 %		
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }											
			215-160-9	1308-38-9		33	mg/kg	1.462	48.231	mg/kg	0.00482 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }											
		024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				52	mg/kg	1.126	58.546	mg/kg	0.00585 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				0.61	mg/kg		0.61	mg/kg	0.000061 %		
			205-912-4	206-44-0									
20	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				0.33	mg/kg		0.33	mg/kg	0.000033 %		
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	110	mg/kg		110	mg/kg	0.011 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				24	mg/kg	1.579	37.908	mg/kg	0.00379 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				8	pH		8	pH	8pH		
				PH									
27	●	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				0.67	mg/kg		0.67	mg/kg	0.000067 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				62	mg/kg	1.245	77.172	mg/kg	0.00772 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.038 %		

Key

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

Classification of sample: CPT06

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

Sample details

Sample Name:	LoW Code:	
CPT06	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.40 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene 	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene 	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene 	204-371-1	120-12-7		0.25	mg/kg		0.25	mg/kg	0.000025 %		
4		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		11	mg/kg	1.32	14.524	mg/kg	0.00145 %		
5		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		1.1	mg/kg		1.1	mg/kg	0.00011 %		
6		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.76	mg/kg		0.76	mg/kg	0.000076 %		
7		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		1.1	mg/kg		1.1	mg/kg	0.00011 %		
8	●	benzo[ghi]perylene 	205-883-8	191-24-2		0.52	mg/kg		0.52	mg/kg	0.000052 %		
9		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.54	mg/kg		0.54	mg/kg	0.000054 %		
10		beryllium { beryllium oxide } 004-003-00-8	215-133-1	1304-56-9		0.71	mg/kg	2.775	1.97	mg/kg	0.000197 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) } 		10294-33-4, 10294-34-5, 7637-07-2		0.6	mg/kg	13.43	8.058	mg/kg	0.000806 %		
12		cadmium { cadmium sulfide } 048-010-00-4	215-147-8	1306-23-6	1	0.4	mg/kg	1.285	0.514	mg/kg	0.00004 %		
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) } 	215-160-9	1308-38-9		24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				0.83	mg/kg		0.83	mg/kg	0.000083 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				35	mg/kg	1.126	39.406	mg/kg	0.00394 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
			205-912-4	206-44-0									
20	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				0.5	mg/kg		0.5	mg/kg	0.00005 %		
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	130	mg/kg		130	mg/kg	0.013 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				0.5	mg/kg	1.353	0.677	mg/kg	0.0000677 %		
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				14	mg/kg	1.579	22.113	mg/kg	0.00221 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				9.2	pH		9.2	pH	9.2 pH		
				PH									
27	●	phenanthrene				0.6	mg/kg		0.6	mg/kg	0.00006 %		
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				84	mg/kg	1.245	104.556	mg/kg	0.0105 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0372 %		

Key

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

Classification of sample: CPT06[2]

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

Sample details

Sample Name:		LoW Code:	
CPT06[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.20 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.1	mg/kg	1.32	12.015	mg/kg	0.0012 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.88	mg/kg	2.775	2.442	mg/kg	0.000244 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.3	mg/kg	13.43	4.029	mg/kg	0.000403 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		31	mg/kg	1.462	45.308	mg/kg	0.00453 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		7.3	mg/kg	1.126	8.219	mg/kg	0.000822 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		0.35	mg/kg		0.35	mg/kg	0.000035 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	36	mg/kg		36	mg/kg	0.0036 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		18	mg/kg	1.579	28.431	mg/kg	0.00284 %		
26	●	pH			PH		8.5	pH		8.5	pH	8.5 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		0.36	mg/kg		0.36	mg/kg	0.000036 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		53	mg/kg	1.245	65.97	mg/kg	0.0066 %		
											Total:	0.021 %		

Key

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

Classification of sample: CPT07

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

Sample details

Sample Name:		LoW Code:	
CPT07		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
1	●	acenaphthene				0.3 mg/kg		0.3 mg/kg	0.00003 %		
			201-469-6	83-32-9							
2	●	acenaphthylene				0.36 mg/kg		0.36 mg/kg	0.000036 %		
			205-917-1	208-96-8							
3	●	anthracene				1.8 mg/kg		1.8 mg/kg	0.00018 %		
			204-371-1	120-12-7							
4	⚛	arsenic { arsenic trioxide }				13 mg/kg	1.32	17.164 mg/kg	0.00172 %		
		033-003-00-0	215-481-4	1327-53-3							
5		benzo[a]anthracene				10 mg/kg		10 mg/kg	0.001 %		
		601-033-00-9	200-280-6	56-55-3							
6		benzo[a]pyrene; benzo[def]chrysene				7.5 mg/kg		7.5 mg/kg	0.00075 %		
		601-032-00-3	200-028-5	50-32-8							
7		benzo[b]fluoranthene				8.5 mg/kg		8.5 mg/kg	0.00085 %		
		601-034-00-4	205-911-9	205-99-2							
8	●	benzo[ghi]perylene				4.7 mg/kg		4.7 mg/kg	0.00047 %		
			205-883-8	191-24-2							
9		benzo[k]fluoranthene				5.6 mg/kg		5.6 mg/kg	0.00056 %		
		601-036-00-5	205-916-6	207-08-9							
10	⚛	beryllium { beryllium oxide }				0.68 mg/kg	2.775	1.887 mg/kg	0.000189 %		
		004-003-00-8	215-133-1	1304-56-9							
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				1.2 mg/kg	13.43	16.116 mg/kg	0.00161 %		
				10294-33-4, 10294-34-5, 7637-07-2							
12	⚛	cadmium { cadmium sulfide }			1	0.3 mg/kg	1.285	0.386 mg/kg	0.00003 %		
		048-010-00-4	215-147-8	1306-23-6							
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				23 mg/kg	1.462	33.616 mg/kg	0.00336 %		
			215-160-9	1308-38-9							
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0							

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		6.6	mg/kg		6.6	mg/kg	0.00066 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		27	mg/kg	1.126	30.399	mg/kg	0.00304 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		1.3	mg/kg		1.3	mg/kg	0.00013 %		
19	●	fluoranthene		205-912-4	206-44-0		14	mg/kg		14	mg/kg	0.0014 %		
20	●	fluorene		201-695-5	86-73-7		0.48	mg/kg		0.48	mg/kg	0.000048 %		
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		4.3	mg/kg		4.3	mg/kg	0.00043 %		
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	160	mg/kg		160	mg/kg	0.016 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.3	mg/kg	1.353	0.406	mg/kg	0.0000406 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		14	mg/kg	1.579	22.113	mg/kg	0.00221 %		
26	●	pH			PH		10.1	pH		10.1	pH	10.1 pH		
27	●	phenanthrene		201-581-5	85-01-8		5.8	mg/kg		5.8	mg/kg	0.00058 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		16	mg/kg		16	mg/kg	0.0016 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		97	mg/kg	1.245	120.737	mg/kg	0.0121 %		
31		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		120	mg/kg		120	mg/kg	0.012 %		
											Total:	0.0615 %		

Key

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

Classification of sample: CPT07[2]

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

Sample details

Sample Name:		LoW Code:	
CPT07[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	13.203	mg/kg	0.00132 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.72	mg/kg	2.775	1.998	mg/kg	0.0002 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.3	mg/kg	1.285	0.386	mg/kg	0.00003 %		
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		27	mg/kg	1.462	39.462	mg/kg	0.00395 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		2.9	mg/kg	1.126	3.265	mg/kg	0.000327 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	22	mg/kg		22	mg/kg	0.0022 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		16	mg/kg	1.579	25.272	mg/kg	0.00253 %		
26	●	pH			PH		8.5	pH		8.5	pH	8.5 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		69	mg/kg	1.245	85.885	mg/kg	0.00859 %		
											Total:	0.021 %		

Key

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

Classification of sample: CPT08

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

Sample details

Sample Name:		LoW Code:	
CPT08		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand				CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		8.5	mg/kg	1.32	11.223	mg/kg	0.00112 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.51	mg/kg		0.51	mg/kg	0.000051 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.39	mg/kg		0.39	mg/kg	0.000039 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.45	mg/kg		0.45	mg/kg	0.000045 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.25	mg/kg		0.25	mg/kg	0.000025 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.74	mg/kg	2.775	2.054	mg/kg	0.000205 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.7	mg/kg	13.43	9.401	mg/kg	0.00094 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.49	mg/kg		0.49	mg/kg	0.000049 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18	mg/kg	1.126	20.266	mg/kg	0.00203 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	fluoranthene		205-912-4	206-44-0		1	mg/kg		1	mg/kg	0.0001 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	160	mg/kg		160	mg/kg	0.016 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.4	mg/kg	1.353	0.541	mg/kg	0.0000541 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		12	mg/kg	1.579	18.954	mg/kg	0.0019 %		
26	●	pH			PH		8.2	pH		8.2	pH	8.2 pH		
27	●	phenanthrene		201-581-5	85-01-8		0.48	mg/kg		0.48	mg/kg	0.000048 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		0.8	mg/kg		0.8	mg/kg	0.00008 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		57	mg/kg	1.245	70.949	mg/kg	0.00709 %		
											Total:	0.0327 %		

Key

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

Classification of sample: CPT08[2]

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

Sample details

Sample Name:		LoW Code:	
CPT08[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.20 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				7.9	mg/kg	1.32	10.431	mg/kg	0.00104 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				0.69	mg/kg	2.775	1.915	mg/kg	0.000191 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				1.1	mg/kg	13.43	14.773	mg/kg	0.00148 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		8.4	mg/kg	1.126	9.457	mg/kg	0.000946 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	41	mg/kg		41	mg/kg	0.0041 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		14	mg/kg	1.579	22.113	mg/kg	0.00221 %		
26	●	pH			PH		8.3	pH		8.3	pH	8.3 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		52	mg/kg	1.245	64.725	mg/kg	0.00647 %		
											Total:	0.0205 %		

Key

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

Classification of sample: CPT09

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

Sample details

Sample Name:		LoW Code:	
CPT09		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-917-1	208-96-8									
3	●	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				8.3	mg/kg	1.32	10.959	mg/kg	0.0011 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				0.66	mg/kg	2.775	1.832	mg/kg	0.000183 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				2.1	mg/kg	13.43	28.203	mg/kg	0.00282 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	0.2	mg/kg	1.285	0.257	mg/kg	0.00002 %		
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		14	mg/kg	1.126	15.762	mg/kg	0.00158 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	160	mg/kg		160	mg/kg	0.016 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.6	mg/kg	1.353	0.812	mg/kg	0.0000812 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		12	mg/kg	1.579	18.954	mg/kg	0.0019 %		
26	●	pH			PH		7.9	pH		7.9	pH	7.9 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		50	mg/kg	1.245	62.236	mg/kg	0.00622 %		
											Total:	0.033 %		

Key

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

Classification of sample: CPT10

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

Sample details

Sample Name:		LoW Code:	
CPT10		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.40 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
1	●	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9							
2	●	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
			205-917-1	208-96-8							
3	●	anthracene				1.9 mg/kg		1.9 mg/kg	0.00019 %		
			204-371-1	120-12-7							
4		arsenic { arsenic trioxide }				41 mg/kg	1.32	54.133 mg/kg	0.00541 %		
		033-003-00-0	215-481-4	1327-53-3							
5		benzo[a]anthracene				11 mg/kg		11 mg/kg	0.0011 %		
		601-033-00-9	200-280-6	56-55-3							
6		benzo[a]pyrene; benzo[def]chrysene				9.6 mg/kg		9.6 mg/kg	0.00096 %		
		601-032-00-3	200-028-5	50-32-8							
7		benzo[b]fluoranthene				7.3 mg/kg		7.3 mg/kg	0.00073 %		
		601-034-00-4	205-911-9	205-99-2							
8	●	benzo[ghi]perylene				5.3 mg/kg		5.3 mg/kg	0.00053 %		
			205-883-8	191-24-2							
9		benzo[k]fluoranthene				10 mg/kg		10 mg/kg	0.001 %		
		601-036-00-5	205-916-6	207-08-9							
10		beryllium { beryllium oxide }				3.1 mg/kg	2.775	8.604 mg/kg	0.00086 %		
		004-003-00-8	215-133-1	1304-56-9							
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.9 mg/kg	13.43	12.087 mg/kg	0.00121 %		
				10294-33-4, 10294-34-5, 7637-07-2							
12		cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<LOD
		048-010-00-4	215-147-8	1306-23-6							
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				33 mg/kg	1.462	48.231 mg/kg	0.00482 %		
			215-160-9	1308-38-9							
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0							

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				7.3	mg/kg		7.3	mg/kg	0.00073 %		
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				120	mg/kg	1.126	135.107	mg/kg	0.0135 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				20	mg/kg		20	mg/kg	0.002 %		
			205-912-4	206-44-0									
20	●	fluorene				0.29	mg/kg		0.29	mg/kg	0.000029 %		
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				4.3	mg/kg		4.3	mg/kg	0.00043 %		
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	660	mg/kg		660	mg/kg	0.066 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				0.5	mg/kg	1.353	0.677	mg/kg	0.0000677 %		
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				33	mg/kg	1.579	52.123	mg/kg	0.00521 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				8.8	pH		8.8	pH	8.8 pH		
				PH									
27	●	phenanthrene				5.8	mg/kg		5.8	mg/kg	0.00058 %		
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				19	mg/kg		19	mg/kg	0.0019 %		
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				330	mg/kg	1.245	410.756	mg/kg	0.0411 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.149 %		

Key

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

Classification of sample: CPT11

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

Sample details

Sample Name:		LoW Code:	
CPT11		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		6.6	mg/kg	1.32	8.714	mg/kg	0.000871 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.47	mg/kg	2.775	1.304	mg/kg	0.00013 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.8	mg/kg	13.43	24.174	mg/kg	0.00242 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		9.2	mg/kg	1.126	10.358	mg/kg	0.00104 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		0.26	mg/kg		0.26	mg/kg	0.000026 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	22	mg/kg		22	mg/kg	0.0022 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		10	mg/kg	1.579	15.795	mg/kg	0.00158 %		
26	●	pH			PH		8.3	pH		8.3	pH	8.3 pH		
27	●	phenanthrene		201-581-5	85-01-8		0.3	mg/kg		0.3	mg/kg	0.00003 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		0.25	mg/kg		0.25	mg/kg	0.000025 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		100	mg/kg	1.245	124.471	mg/kg	0.0124 %		
											Total:	0.0237 %		

Key

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

Classification of sample: HP11

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

Sample details

Sample Name:		LoW Code:	
HP11		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		18	mg/kg	1.32	23.766	mg/kg	0.00238 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.95	mg/kg	2.775	2.637	mg/kg	0.000264 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.7	mg/kg	13.43	22.831	mg/kg	0.00228 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand				CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		35	mg/kg	1.126	39.406	mg/kg	0.00394 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
20	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	110	mg/kg		110	mg/kg	0.011 %		
21	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
22		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
23	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		16	mg/kg	1.579	25.272	mg/kg	0.00253 %		
24	●	pH			PH		7.2	pH		7.2	pH	7.2 pH		
25	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
26		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
27	●	pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		60	mg/kg	1.245	74.683	mg/kg	0.00747 %		
											Total:	0.0328 %		

Key

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

Classification of sample: BH03

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

Sample details

Sample Name:		LoW Code:	
BH03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1	●	acenaphthene		201-469-6	83-32-9		0.21	mg/kg		0.21	mg/kg	0.000021 %		
2	●	acenaphthylene		205-917-1	208-96-8		0.24	mg/kg		0.24	mg/kg	0.000024 %		
3	●	anthracene		204-371-1	120-12-7		0.74	mg/kg		0.74	mg/kg	0.000074 %		
4	⚛	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.2	mg/kg		4.2	mg/kg	0.00042 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.6	mg/kg		3.6	mg/kg	0.00036 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		4.9	mg/kg		4.9	mg/kg	0.00049 %		
8	●	benzo[ghi]perylene		205-883-8	191-24-2		2.3	mg/kg		2.3	mg/kg	0.00023 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.1	mg/kg		2.1	mg/kg	0.00021 %		
10	⚛	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.68	mg/kg	2.775	1.887	mg/kg	0.000189 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		2.5	mg/kg	13.43	33.575	mg/kg	0.00336 %		
12	⚛	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.9	mg/kg	1.285	1.157	mg/kg	0.00009 %		
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		3.2	mg/kg		3.2	mg/kg	0.00032 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		65	mg/kg	1.126	73.183	mg/kg	0.00732 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	indeno[123-cd]pyrene		205-893-2	193-39-5		2	mg/kg		2	mg/kg	0.0002 %		
20	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	110	mg/kg		110	mg/kg	0.011 %		
21	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
22		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		18	mg/kg	1.579	28.431	mg/kg	0.00284 %		
24	●	pH			PH		10	pH		10	pH	10pH		
25	●	phenanthrene		201-581-5	85-01-8		21	mg/kg		21	mg/kg	0.0021 %		
26		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
27	●	pyrene		204-927-3	129-00-0		5.8	mg/kg		5.8	mg/kg	0.00058 %		
28	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		260	mg/kg	1.245	323.626	mg/kg	0.0324 %		
29		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		10	mg/kg		10	mg/kg	0.001 %		
											Total:	0.0686 %		

Key

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

Classification of sample: BH05

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

Sample details

Sample Name:		LoW Code:	
BH05		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
3	●	anthracene				0.22	mg/kg		0.22	mg/kg	0.000022 %		
			204-371-1	120-12-7									
4	⚛	arsenic { arsenic trioxide }				16	mg/kg	1.32	21.125	mg/kg	0.00211 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				2.6	mg/kg		2.6	mg/kg	0.00026 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				2.4	mg/kg		2.4	mg/kg	0.00024 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				2.5	mg/kg		2.5	mg/kg	0.00025 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
		601-036-00-5	205-916-6	207-08-9									
10	⚛	beryllium { beryllium oxide }				1.3	mg/kg	2.775	3.608	mg/kg	0.000361 %		
		004-003-00-8	215-133-1	1304-56-9									
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }				0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12	⚛	cadmium { cadmium sulfide }			1	0.4	mg/kg	1.285	0.514	mg/kg	0.00004 %		
		048-010-00-4	215-147-8	1306-23-6									
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
			215-160-9	1308-38-9									
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
15		chrysene	601-048-00-0	205-923-4	218-01-9		1.9	mg/kg		1.9	mg/kg	0.00019 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		57	mg/kg	1.126	64.176	mg/kg	0.00642 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.37	mg/kg		0.37	mg/kg	0.000037 %		
19	●	fluoranthene		205-912-4	206-44-0		3.6	mg/kg		3.6	mg/kg	0.00036 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		1.3	mg/kg		1.3	mg/kg	0.00013 %		
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	350	mg/kg		350	mg/kg	0.035 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.9	mg/kg	1.353	1.218	mg/kg	0.000122 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		20	mg/kg	1.579	31.59	mg/kg	0.00316 %		
26	●	pH			PH		8.1	pH		8.1	pH	8.1 pH		
27	●	phenanthrene		201-581-5	85-01-8		1	mg/kg		1	mg/kg	0.0001 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		3.3	mg/kg		3.3	mg/kg	0.00033 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		180	mg/kg	1.245	224.049	mg/kg	0.0224 %		
											Total:	0.077 %		

Key

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

Classification of sample: BH05[2]

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

Sample details

Sample Name:		LoW Code:	
BH05[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene 	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene 	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene 	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		11	mg/kg	1.32	14.524	mg/kg	0.00145 %		
5		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[ghi]perylene 	205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide } 004-003-00-8	215-133-1	1304-56-9		0.83	mg/kg	2.775	2.304	mg/kg	0.00023 %		
11		boron { ● boron tribromide/trichloride/trifluoride (combined) } 		10294-33-4, 10294-34-5, 7637-07-2		1.7	mg/kg	13.43	22.831	mg/kg	0.00228 %		
12		cadmium { cadmium sulfide } 048-010-00-4	215-147-8	1306-23-6	1	0.2	mg/kg	1.285	0.257	mg/kg	0.00002 %		
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) } 	215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
16	⚛	copper { dicopper oxide; copper (I) oxide }				13	mg/kg	1.126	14.637	mg/kg	0.00146 %		
		029-002-00-X	215-270-7	1317-39-1									
17	⚛	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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
19	●	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-912-4	206-44-0									
20	●	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-695-5	86-73-7									
21	●	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			205-893-2	193-39-5									
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }			1	54	mg/kg		54	mg/kg	0.0054 %		
		082-001-00-6											
23	⚛	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
25	⚛	nickel { nickel dihydroxide }				17	mg/kg	1.579	26.851	mg/kg	0.00269 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26	●	pH				8.3	pH		8.3	pH	8.3 pH		
				PH									
27	●	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			201-581-5	85-01-8									
28		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
29	●	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
			204-927-3	129-00-0									
30	⚛	zinc { zinc oxide }				53	mg/kg	1.245	65.97	mg/kg	0.0066 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0241 %		

Key

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

Classification of sample: BH04

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

Sample details

Sample Name:		LoW Code:	
BH04		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
2	●	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
3	●	anthracene				0.15	mg/kg		0.15	mg/kg	0.000015 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				8.7	mg/kg	1.32	11.487	mg/kg	0.00115 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				1.1	mg/kg		1.1	mg/kg	0.00011 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				0.95	mg/kg		0.95	mg/kg	0.000095 %		
		601-034-00-4	205-911-9	205-99-2									
8	●	benzo[ghi]perylene				0.63	mg/kg		0.63	mg/kg	0.000063 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				0.76	mg/kg		0.76	mg/kg	0.000076 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				1.9	mg/kg	2.775	5.273	mg/kg	0.000527 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { ● boron tribromide/trichloride/trifluoride (combined) }				1.9	mg/kg	13.43	25.517	mg/kg	0.00255 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	0.2	mg/kg	1.285	0.257	mg/kg	0.00002 %		
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		1.2	mg/kg		1.2	mg/kg	0.00012 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		48	mg/kg	1.126	54.043	mg/kg	0.0054 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
19	●	fluoranthene		205-912-4	206-44-0		1.7	mg/kg		1.7	mg/kg	0.00017 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.47	mg/kg		0.47	mg/kg	0.000047 %		
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	48	mg/kg		48	mg/kg	0.0048 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		13	mg/kg	1.579	20.533	mg/kg	0.00205 %		
26	●	pH			PH		11	pH		11	pH	11pH		
27	●	phenanthrene		201-581-5	85-01-8		0.56	mg/kg		0.56	mg/kg	0.000056 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29	●	pyrene		204-927-3	129-00-0		1.8	mg/kg		1.8	mg/kg	0.00018 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		83	mg/kg	1.245	103.311	mg/kg	0.0103 %		
											Total:	0.0311 %		

Key

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

Classification of sample: BH06

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

Sample details

Sample Name:		LoW Code:	
BH06		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.10 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1	●	acenaphthene	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3	●	anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4	⚛	arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	13.203	mg/kg	0.00132 %		
5		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		1.4	mg/kg		1.4	mg/kg	0.00014 %		
6		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		1.2	mg/kg		1.2	mg/kg	0.00012 %		
7		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		1.5	mg/kg		1.5	mg/kg	0.00015 %		
8	●	benzo[ghi]perylene	205-883-8	191-24-2		0.73	mg/kg		0.73	mg/kg	0.000073 %		
9		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.63	mg/kg		0.63	mg/kg	0.000063 %		
10	⚛	beryllium { beryllium oxide } 004-003-00-8	215-133-1	1304-56-9		0.49	mg/kg	2.775	1.36	mg/kg	0.000136 %		
11	⚛	boron { ● boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		1.2	mg/kg	13.43	16.116	mg/kg	0.00161 %		
12	⚛	cadmium { cadmium sulfide } 048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		<LOD
13	⚛	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }	215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
14	⚛	chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		1	mg/kg		1	mg/kg	0.0001 %		
16	⚛	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		8.5	mg/kg	1.126	9.57	mg/kg	0.000957 %		
17	⚛	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19	●	fluoranthene		205-912-4	206-44-0		1.8	mg/kg		1.8	mg/kg	0.00018 %		
20	●	fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
21	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.61	mg/kg		0.61	mg/kg	0.000061 %		
22	⚛	lead { ● lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	27	mg/kg		27	mg/kg	0.0027 %		
23	⚛	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25	⚛	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		9.8	mg/kg	1.579	15.479	mg/kg	0.00155 %		
26	●	pH			PH		8.8	pH		8.8	pH	8.8 pH		
27	●	phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29	●	pyrene		204-927-3	129-00-0		2	mg/kg		2	mg/kg	0.0002 %		
30	⚛	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		33	mg/kg	1.245	41.076	mg/kg	0.00411 %		
											Total:	0.0164 %		

Key

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

Appendix A: Classifier defined and non CLP determinands

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

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

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

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

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

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

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

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

boron tribromide/trichloride/trifluoride (combined) (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Conversion factor: 13.43
Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride
Data source: N/A
Data source date: 06 Aug 2015
Hazard Statements: Skin Corr. 1B H314 , Skin Corr. 1A H314 , Acute Tox. 2 H300 , Acute Tox. 2 H330 , EUH014

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

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

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

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

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

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

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

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

● **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

● **lead compounds with the exception of those specified elsewhere in this Annex**

CLP index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers many simple lead compounds to be Carcinogenic category 2
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

● **pH** (CAS Number: PH)

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

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

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

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

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

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

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

● **diesel petroleum group** (CAS Number: 68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Aquatic Chronic 2 H411 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Carc. 2 H351 , Acute Tox. 4 H332 , Skin Irrit. 2 H315 , Flam. Liq. 3 H226

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

beryllium {beryllium oxide}

Worst case species based on hazard statements

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

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

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common 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}

Worst case species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Worst case species based on hazard statements

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

zinc {zinc oxide}

Worst case species based on hazard statements

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2020.224.4427.8663 (11 Aug 2020)
HazWasteOnline Database: 2020.224.4427.8663 (11 Aug 2020)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

Appendix H

Preliminary Geotechnical Risk Register

Geotechnical Hazard Identification – Desk Study Stage

Potential geotechnical hazards have been assessed in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The following pages set out the identified geotechnical risks and hazards which are associated with the proposed development and establish the approach which is to be taken to manage the risks including the geotechnical input and analysis.

Table J.1 is a preliminary assessment of possible geotechnical hazards at the site at Desk Study stage. This information is used to assist with ground investigation design.

Table J.1: Possible geotechnical hazards

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Uncontrolled Made Ground (variable strength and compressibility).	Made Ground due to historic demolition and historic ground investigation	✓	-
Soft / loose compressible ground (low strength and high settlement potential).	Made Ground due to historic demolition.	✓	-
Shrink swell of the clay fraction of soils under the influence of vegetation.	Veriable composition of the Made Ground and cohesive soils	✓	-
Variable lateral and vertical changes in ground conditions.	Historic Ground Investigation indicated near surface ground variability.	✓	-
High sulfates present in the soils.	Site underlain by London Clay Fm which is known to have potently elevated sulphates	✓	-
Adverse chemical ground conditions, (e.g. expansive slag).		-	✓
Obstructions.	Pervious building on the site.	✓	-
Existing below ground structures to remain (basements).	Existing basements below Rowen House.	✓	-
Shallow groundwater.	Shallow River Terrace Deposits and historic ground investigation.	✓	-
Changing groundwater conditions.	Historic Ground Investigation indicated deep and shallow groundwater and potential perched water tables.	-	✓
Risk from erosion.		-	✓
Risk from flooding.		-	✓
Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.		✓	-

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Slope stability issues – general slopes.	No significant elevation changes across the site.	-	✓
Slope stability issues – retaining walls.	No significant elevation changes across the site.	✓	-
Earthworks – settlement (due to placement of fill on soft / loose ground).	No earthworks proposed	-	✓
Earthworks – poor bearing capacity of new fill.	No earthworks proposed	-	✓
Earthworks – unsuitability of site won material to be reused as fill.	No earthworks proposed	-	✓
Solution features in Chalk.	Chalk expected at great depth below the site and not considered to be in an area prone to chalk dissolution.	-	✓
Cavities in the Superficial Deposits due to solution features.		-	✓
Mining.	No mining records in the vicinity of the site.	-	✓
Cambered ground with gulls possibly present.	Local geology and topography unlikely to produce these features.	-	✓
Relict Slip Surfaces.		-	✓
Solifluction.	No significant slopes on site	-	✓

Geotechnical Hazard Identification – Following Ground Investigation

The preliminary Geotechnical Risk Register following Ground Investigation is set out in Table J.3.

The probability and impact of a hazard have been judged on a qualitative scale as set out in Table J.2. The degree of risk (R) is determined by combining tan assessment of the probability (P) of the hazard occurring with an assessment of the impact (I) of the hazard and associated mitigation it will require if it occurs (R = P x I).

Table J.2: Qualitative assessment of hazards and risks

P = Probability			I = Impact			R = Risk Rating (P x I)	
1	Very unlikely (VU)		1	Very Low		1 – 4	None / negligible
2	Unlikely (U)		2	Low		5 – 9	Minor
3	Plausible(P)		3	Medium		10 – 14	Moderate
4	Likely (Lk)		4	High		15 – 19	Substantial
5	Very Likely (VLk)		5	Very High		20 - 25	Severe

Table J.3: Preliminary geotechnical risk register

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
General Made Ground from historic redevelopment of the site.	There is Made Ground due to historical construction activity at the site. The Made Ground is up to 1.5m thick due to the cut to fill that has occurred at the site.	Residential Dwellings.	Bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below Made Ground or on Made Ground which has been improved.
			Floor slab failure.	3	4	12	Design floor slabs as suspended.
		Roads and Pavements.	Settlement (total and differential) of roads and pavements.	3	2	6	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate.
		Services.	Settlement (differential), causing damage to services.	3	2	6	Anticipated settlements are significant with regard to services. There is a requirement to improve the Made Ground prior to installation of services. It is also advisable to steepen falls in drainage to prevent back fall and use rocker boxes and flexible couplings.
		Soft landscaped areas	Settlement (differential), in gardens.	3	2	6	It is unlikely that settlements will be significant with regard to gardens.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	2	3	6	Where soft spots encountered, over-excavation and replacement with suitable fill. Outline design of working platform to include geo-grid. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Soft / loose ground (low strength and high settlement potential).	The shallow natural soils comprise River Terrace Deposits, which consist of soft clay and sand and	Residential Dwellings.	Foundation bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below any loose relative density sand and gravel or soft clay, or improve the River Terrace Deposits prior to founding.
			Floor slab failure.	3	4	12	Design floor slab as suspended.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
	gravel with a loose relative density.	Roads and Pavements.	Settlement (total and differential), of roads and pavements.	2	3	6	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace soft soils.
		Services.	Settlement (differential), causing damage to services.	2	3	6	Ground levels are remaining at approximately current levels. Settlements are not anticipated to be significant.
		Soft landscaped areas	Settlement (differential), in gardens.	2	3	6	
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	2	3	6	Where soft spots encountered, over-excavate and replace with suitable fill.
Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.	The clays of the medium heave potential.	Foundations.	Shrinkage or heave of soils and associated damage to foundations.	3	3	9	Design foundations in accordance with NHBC standards. Deepen foundations due to trees as appropriate.
		Floor slabs.	Floor slab failure.	3	4	12	Design floor slabs in accordance with NHBC standards. Design floor slab as suspended with a void, unless the warranty provider is satisfied the soil is not desiccated, or slabs are constructed when soils are not seasonally desiccated (i.e. during winter and spring).
Sulfates present in the soils.	The ground investigation has proven that there is the potential for expansive sulfate bearing soils to be present.	Attack of buried concrete.	Damage to concrete and reduction in strength.	4	4	16	Classify concrete in accordance with BRE SD1 and design concrete accordingly.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Obstructions.	There is a potential for additional obstructions to be present due to historical construction activity and demolition of building	Construction staff, vehicles and plant operators.	Risk of collapse of excavation as obstructions are pulled out.	2	3	6	Undertake Enablement Works and remove all obstructions.
		Roads and Pavements.	Hard spots in externals and roads / pavements.	2	2	4	
		Residential Dwellings.	Impact on piling esulting in additional piles / columns and re-design of foundations.	2	3	6	
Shallow groundwater.	Monitoring during the ground investigations has proven a shallow groundwater table (at approximately 1.4m bgl).	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Designer to consider in their analysis the impact of, and requirements for, de-watering of excavations. Any water that collects at the base of excavations to be removed as soon as practicable.
		Retaining.	Serviceability issues.	3	2	6	Contractor to appoint competent Temporary Works Designer to design temporary works, as required in accordance with BS 5975:2008+A1:2011. The shallow groundwater is to be taken into account during geotechnical design of the permanent works.
Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.	Loose granular material is possible within the Made Ground and River Terrace Deposits which may be	Construction staff, vehicles and plant operators.	Ground failure, instability of plant and machinery.	2	4	8	As instability has been noted in all pits from surface, foundation options should be reviewed to ensure minimal excavation (e.g. piles). Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Design to include recommendations for inspection of excavations. No person entry to unsupported excavations.
			Risk of collapse of excavation.	3	3	9	

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
	exacerbated by shallow groundwater. .						

Whilst the probability and impact of the hazard occurring can be reduced to a minimum by geotechnical design, the impact cannot be reduced below very low. The risk register will need to be up-dated, as necessary, to reflect design, additional information, data and experience as it is gained through the construction process.

Impacts of the design with regard to health and Safety considerations will need to be included by the designer at design stage.

Appendix I

Plausible Source-Pathway-Receptor Contaminant Linkages

Summary of Potential Contaminant Linkages

Table I.2 lists the plausible contaminant linkages which have been identified. These are considered as potentially unacceptable risks in line with guidelines published in LCRM (2019) and additional risk assessment is required.

Source – Pathway – Receptor Linkages have been assessed in general accordance with guidance in CIRIA Report C552 (Rudland et al 2001) but modified to add a 'no linkage' category and to remove low/moderate risk (See Table I.1). Further information is given in the relevant Hydrock methodology, referenced in **Error! Reference source not found.**, including descriptions of typical examples of probability and consequences.

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to site demolition and redevelopment workers, consideration of occupational health and safety issues is beyond the scope of this report and need to be considered separately in the Construction Phase Health and Safety Plan.

Table I.1: Consequence versus probability assessment.

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

Table I.2: Exposure model – final source-pathway-receptor contaminant linkages

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
General Made Ground below the site from historic redevelopment and demolition.	Ingestion, inhalation or direct contact.	Site users.	Likely	Medium	Moderate	Made Ground is present below the entire site, with localised exceedances of metals (lead) and PAHs (BaP).	Contact with these materials is likely in areas of Public Open Space. Mitigation measures will be required to break the SPR linkage including provision of capping layer in the form of new building/hardstanding with engineered clean cover system in areas of soft landscaping.
	Inhalation of fugitive dust.	Neighbours.	Low likelihood	Medium	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone.	Groundwater and possible abstractors.	Low likelihood	Medium	Low	No elevated concentrations of metals, metalloids and PAH in groundwater samples, which can be directly attributed to the Made Ground.	There is Made Ground below the entire site, and there are minor concentrations which exceed the GAC. The site currently comprises hardstanding. The proposed development maintain a high level of hardstanding. Some area of soft landscaping and therefore infiltration and the risk of leaching into the sensitive aquifers below the site.
		Aquatic ecosystems.	Low likelihood	Medium	Low		
	Base flow from contaminated groundwater.	Surface water and possible abstractors.	Low likelihood	Medium	Low		
Hotspot of Petroleum Hydrocarbon in the immediate vicinity of the above ground fuel tank.	Ingestion, inhalation or direct contact.	Site users	Low likelihood	Medium	Low	Investigation has proven petroleum hydrocarbons in soils in WS01, WS02 and BH02s, however not present in quantities that are in exceedance of human health GAC. Mitigation measures will include provision of capping layer in the form of new hardstandings or engineered clean cover system in areas of soft landscaping. Following the tank removal, the hotspot could be delineated and excavated with the material suitably disposed of offsite.	
	Vertical migration through the unsaturated zone	Shallow Groundwater	Likely	Medium	Moderate	Evidence of staining at the surface in/around Energy Centre. Petroleum Hydrocarbons were identified within WS02 within the shallow groundwater.Further investigation following the fuel tank removal to fuel tank and extent of the hotspot has been delineated.	

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
	Direct contact	Water supply pipes.	Likely	Medium	Moderate	Direct contact with buried water supply pipes is likely and mitigation will be required particular in lieu of hydrocarbons contamination around Energy Centre.. However, the contamination is localised and the possible use of specialist supply pipe are unlikely to be required across the whole site.
Petroleum hydrocarbons within shallow groundwater associated with Energy Centre	Inhalation of vapours.	Human health (site end users, neighbours, workers)	Likely	Medium	Moderate	Petroleum Hydrocarbon vapours may be present. Groundwater within WS01&WS02 impacted within hydrocarbons which is also a vapour risk. Low levels of vapours were recorded with a PID during the ground investigation. Installation of vapour membrane within new buildings may be required in the vicinity of the Energy Centre.
	Lateral migration in groundwater off-site.	Off site groundwater	Unlikely	Medium	Very Low	Plausible that hydrocarbons in shallow perched groundwater could migrate beyond the site boundaries, however evidence of hydrocarbon impact to groundwater only identified in WS01/WS02 and not in WS03 and WS04 downgradient to the north.
		Surface water	No Linkage			Nearest surface water feature is pond and drainage network 25m south-east which is hydraulically upgradient and no direct connection to the site.
	Vertical migration to underlying groundwater aquifers	Secondary A & Principal Aquifers	Low likelihood	Medium	Low	Petroleum hydrocarbons all less than the limit of detection within deep groundwater. Significant bands of relatively impermeable clays acting as an aquitard separate shallow perched groundwater and deeper groundwater horizons.
Ground gases (methane) from organic materials in the Made Ground.	Migration, build up and explosion.	Site users. Neighbours. Buildings on site. Buildings on adjacent sites.	Unlikely	Medium to Severe	Low	Ground gas monitoring has indicated that CS1 conditions are prevalent.
	Fugitive dust.	On Site	Likely	Severe	High	Asbestos may be present in existing buildings and in Made Ground.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Asbestos fibres materials in the buildings.		Neighbours.	Unlikely	Severe	Low	Careful removal will be required from buildings during demolition. However, removal under controlled conditions should limit release of fibres to the air and the ground.
Radon	Inhalation.	Site users.	No Linkage			BR211 indicates the site is in a low radon area and no radon protection is required.

Appendix J Historic Ground Investigation Report

EPSOM HOSPITAL - PLOT 2A

Phase 2 Geo-Environmental and Geotechnical Assessment Report

SEPTEMBER 2018

Incorporating

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Epsom Hospital – Plot 2A

Phase 2 - Phase 2 Geo-Environmental and Geotechnical Assessment Report

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Report No	10020221-ARC-XX-XX-RP-ZZ-0007-01
Date	SEPTEMBER 2018

VERSION CONTROL

Version	Date	Author	Changes
001	28th September 2018	AW	Rev 01 for issue

This report dated 28 September 2018 has been prepared for Epsom and St Helier University Hospitals NHS Trust (the "Client") in accordance with the terms and conditions of appointment dated 04 July 2018 (the "Appointment") between the Client and **Arcadis (UK) Limited** ("Arcadis") for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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APPENDICES

1 Introduction

1.1 Terms of Reference

Arcadis Consulting (UK) Limited (Arcadis) was instructed by Epsom and St Helier University Hospitals NHS Trust ‘the Client’ on 4th July 2018 to undertake to undertake an intrusive site investigation to support the sale of ‘Plot 2A’ (the Site) at Epsom General Hospital, Epsom.

An intrusive ground investigation was recommended to better characterise the potential risk levels, associated with both contamination and geotechnical constraints, and establish a land quality baseline for the site.

1.2 Proposed Development

It is understood a portion of the hospital site, known as Plot 2A, is to be sold for redevelopment for residential premises. The Phase 2 Geo-environmental and Geotechnical Assessment Report herein is likely to form part of the sales package for the site, and to assist with supporting the discharge of future environmental planning conditions. This report provides an assessment of the ground conditions and contaminated land constraints, and to provide a quantitative understanding of the land quality in order to better inform potential remediation and/or mitigation associated with redevelopment of the site.

It is understood that there is currently a pre-application in place for 195 units, but the Council would like this increased to 300 units. Therefore, high-rise flats are likely to be considered, potentially up to 6 storeys high.

No development plans were available at the time of writing.

1.3 Previous Reports

A Phase 1 desk study was completed by Arcadis in July 2018 which is referenced as follows:

- Arcadis Consulting, Epsom Hospital - Plot 2A Phase 1 Geo-Environmental Desk Study, July 2018, Report Reference: 10020221-ARC-01-XX-RP-ZZ-0001-01(Ref. 1).

The Phase 1 Desk Study identified several potential sources of contamination which informed the scope of the intrusive investigation.

1.4 Report Objectives

The objectives of this report are to:

- Present the factual information obtained from the intrusive investigation.
- Provide an assessment of whether the potential pollutant linkages identified in the Arcadis desk study (Ref. 1) are likely to be a concern to the development and/or require further assessment/remediation.
- Provide a preliminary assessment of ground conditions to support a geotechnical assessment of potential foundation requirements for the proposed development.

1.5 Limitations

This report has been prepared for Epsom and St Helier University Hospitals NHS Trust in accordance with the terms and conditions of appointment, dated 4th July 2018. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document shall remain the property of Arcadis.

This report has been compiled from a number of sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time of writing. Additional information may become available in the future which may have a bearing on the conclusions of this report and for which Arcadis cannot be held responsible.

Ground investigations by nature only reveal a small percentage of the ground conditions present beneath the site. The possibility of significant variation in ground conditions existing between sampling locations cannot be discounted. Soil borne gas and groundwater conditions are based on observations made at the time of the investigation and during subsequent monitoring visits and may be subject to significant variation due to atmospheric, seasonal or other effects.

Arcadis do not accept liability for any use of the information presented in this report unless it is signed by the author, checker and approver and marked as final.

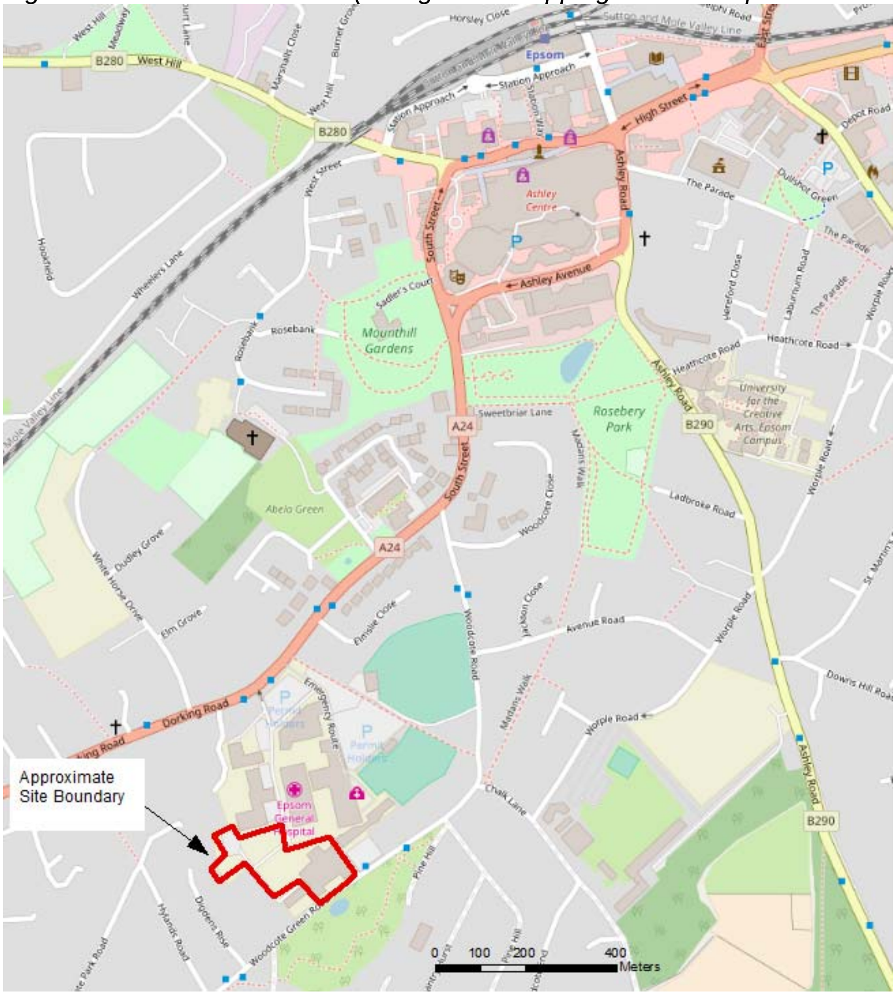
2 Site Setting and Preliminary Conceptual Site Model

The following presents a summary of the site setting and preliminary conceptual model identified in the Arcadis Phase 1 Desk Study (Ref. 1).

2.1 Site Location and Description

The site is located approximately 1km south west of the town centre of Epsom, Essex. The Ordnance Survey National Grid Reference for the approximate centre of the site is TQ203597. The nearest postcode to the site is KT18 7EG. A site location plan is presented in Figure 1 below.

Figure 1 – Site Location Plan (background mapping from OS Opensource Data)



The site comprises an area of land within the southern part of the hospital site (an area of approximately 1.09 Ha in size), as shown on Figure 2 below (Site Layout Plan). A site walkover survey was undertaken as part of the Phase 1 Desk study (Ref. 1) on 12th July 2018. The notable site uses, that present a higher probability of causing impairment of land quality, are presented on Figure 2 and summarised below:

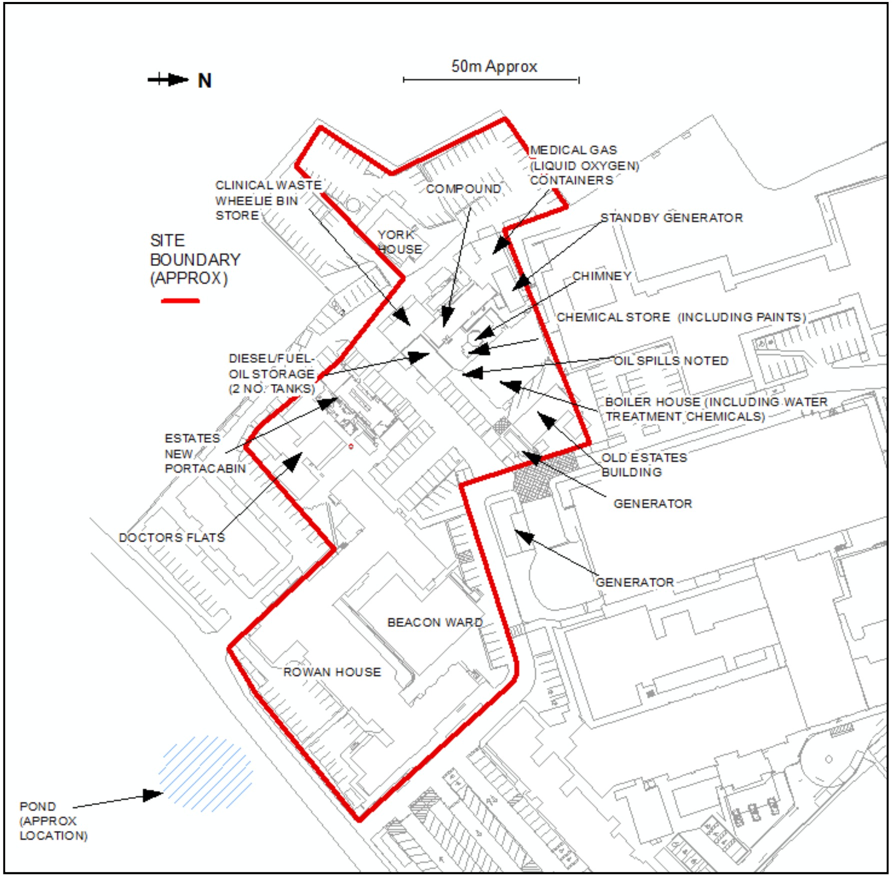
- The majority of the site is covered with buildings, concrete hard standing areas and tarmac parking areas with some areas of soft landscaping.
- York House (Research & Development Department) and car parking facilities are situated at the western end of Plot 2A.
- A chimney with standby generator and medical gas [liquid oxygen] containers, cycle store/changing room portacabin, chemical store, diesel/fuel-oil store and boiler house occupy the north western part of Plot 2A.
- Potential oil spillages were observed at ground level adjacent to the boiler house.
- The standby generator was noted to be old and in a state of disrepair.

- The diesel/ fuel-oil store was contained within a large brick bund, which appeared to be of moderate condition. Access to the tank itself was not possible during the walkover survey.
- Wheelie bins containing clinical waste were stored in a lockable compound to the west of the oil store.
- A second generator was noted adjacent to the 'old estates' building in the northern part of Plot 2A.
- Large manhole covers noted adjacent to the north of the boiler house, just outside the boundary of the Plot 2A land, denoting possible underground tank/chamber.
- Doctor's flats and new estates portacabin in the central part of the site.
- Rowan House (large red-brick 6-7 storey building) and Beacon Ward (single storey pre-fab building) occupies the majority of the eastern part of the Plot 2A land, with associated car parking.
- A pond is situated on the other side of Woodcote Green Road, opposite Rowan House (offsite).
- Given the age of the majority of the hospital buildings/structures, the potential presence of asbestos containing materials (ACMs) cannot be discounted.
- Numerous underground services were noted across the site associated with water supply, drainage, gas, electricity and telecommunications.

The following information has been provided by the Head of Estates (operations) for Epsom & St Helier University Hospitals NHS Trust:

- The boiler water is treated with sodium bisulphite and sodium hydroxide. These chemicals are stored within the Boiler House.
- Other substances stored on site are diesel, paint and liquid oxygen. Paint is stored in the chemical store by the Boiler House.
- The hospital has two 115,547 litre fuel oil storage tanks. Tank No 2 is currently empty. The fuel oil storage is used as the backup fuel for the steam boilers. It is understood that both tanks are situated within the same bunded compound adjacent to the boiler house.

Figure 2 – Site Layout Plan (background mapping provided by Epsom & St Helier University Hospitals NHS Trust)



2.2 Environmental Setting

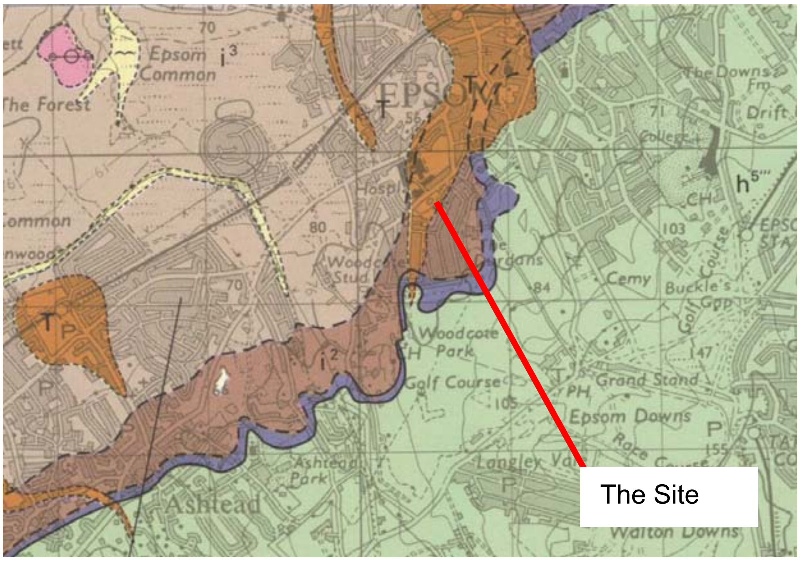
The following section summarises the pertinent information from the Phase 1 Desk Study Report (Ref. 1).

2.2.1 Geology, Hydrogeology and Hydrology

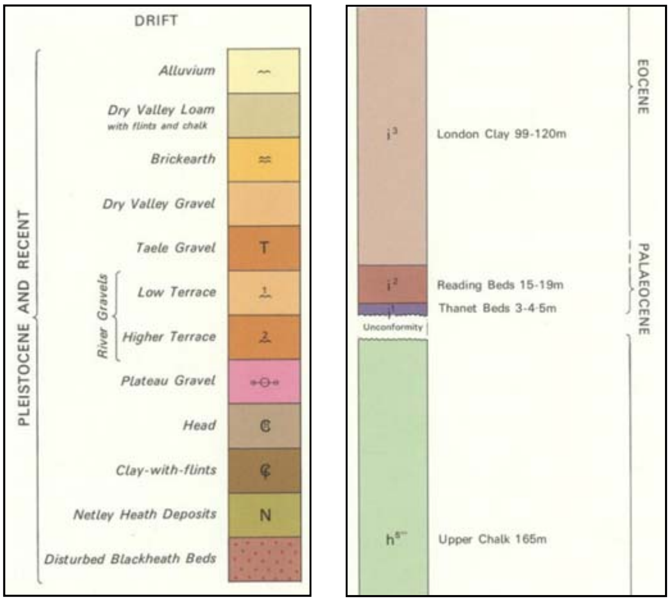
According to the British Geological Survey Geoindex (Ref. 2) and the Envirocheck Geology Datasheet obtained for the Phase 1 Desk Study (Ref. 1) the north western side of the site is underlain by the London Clay Formation, comprising Clay and Silt. The eastern part of the site is underlain by the Lambeth Group formerly known as the Reading Beds, comprising clay, silt and sand. According to the geological cross section lines provided on the published BGS Map sheet of Reigate (Ref. 3) the bedrock (London Clay and Lambeth Group) appears to be dipping gently towards the north west. These strata (London Clay and Lambeth Group) that outcrop on the site are in turn underlain by Thanet Sands and then Chalk, at greater depth.

Superficial deposits directly underlie the majority of the site and cut across the solid geology. These are River Terrace Deposits, comprising sand and gravel which extend northwards from the site. In the north western corner of the site no superficial deposits are indicated to be present. The local geology is displayed on Figure 2.1 below.

Figure 2.1 Superficial and Solid Geology



Contains British Geological Survey materials © NERC [1978]



No geological fault lines were indicated to be present within 1km of the site.

As the site has previously been developed Made Ground is anticipated.

The Envirocheck Report indicates that the bedrock is a Secondary A aquifer. The River Terrace Deposits are defined as having 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.

The site is not located within a groundwater Source Protection Zone (SPZ). There are no recorded groundwater abstraction licences within 1km of the site.

The nearest surface water feature is a pond approximately 10m south east in Woodcote Green Park. Historical maps indicate the pond has been present sine pre 1871 and several surface ‘drains’ which appear to drain into the pond from the south east and south and appear to be man made. It is not known whether the pond is man made but it does not appear to be connected to a wider stream or river network. The nearest (natural) stream is the Bonesgate Stream, approximately 2.5km north west which flows in a north easterly direction towards the Hogsmill River.

Based on the topography and the published geological maps, the direction of groundwater flow within the River Terrace Deposits is expected to be towards the north. Groundwater flow within the Lambeth Group is conceived to be more likely to be towards the north west based on the inferred dip direction of the bedrock.

2.2.2 Site History

The historical map review indicates that prior to being developed into a hospital, the site comprised residential housing and undeveloped land. The housing was demolished, and the site was redeveloped into Epsom Hospital by 1953 and has undergone several minor phases of demolition and redevelopment since then. Adjacent to the north and east is the main site of Epsom Hospital which was developed around the same time as the Plot 2A site and has also undergone phases of minor redevelopment. The land to the west has been residential since the 1950’s and the land adjacent to the south has been undeveloped parkland with a pond since pre 1871.

Potential sources of contamination on site are asbestos fibres from various phases of demolition and redevelopment on the site. There is a chimney, oil storage tank, standby generator and boiler house on the northern side of the site which are potential sources of hydrocarbon contamination.

There was a historical tank approximately 150m north east and two electricity substations approximately 120m north west and 150m north east. These are not considered likely to have significantly impacted the site as they are at moderate distance and not directly up hydraulic gradient from the site.

2.2.3 Potentially Contaminative Land Uses

Based on the Envirocheck Report obained for the Phase 1 Desk Study (Ref. 1) there are 5no contemporary trade directory entries within 200m of the site (between 42m & 198m), which relate to site relating to hospitals (the Epsom General Hospital), cleaning materials and equipment and lighting manufacturers.

A potentially infilled former pond is located 38m northeast of the site.

There are no current or historic landfill sites within 250m of the subject site.

2.2.4 Radon

According to the Radon Atlas of the UK (Ref. 4) the site is located within a lower probability radon area (less than 1% of homes are estimated to be at or above the Radon Action Level).

No radon protective measures are necessary in the construction of new buildings.

2.2.5 Unexploded Ordnance (UXO)

A map of Unexploded Bomb Risk for the local area was obtained from Zetica which is detailed within the Phase 1 Desk Study (Ref. 1) which shows that the site is within an area of Low London Bombing Density. Low risk areas are those which have seen a bombing density of up to 10 bombs per 1000 acres. No abandoned bombs, UXO finds or strategic targets were identified within 1km of the site.

2.3 Preliminary Conceptual Site Model

Based on the information obtained from Desk Study report, potential pollutant linkages were identified, as detailed in Table 2.1.

Table 2.1 Potential Pollutant Linkages

Potential Contaminant Source	Potential Pathway	Receptor	Likelihood of Pollutant Linkage
General Made Ground from various phases of demolition and redevelopment of the site.	Accidental ingestion of contaminants within soil, water and dust. Home grown produce, if gardens are proposed. Inhalation of dusts, vapours or hazardous ground gas Dermal contact with contaminants in soil, water and dust	Current and future site users	Unlikely – current site users would not likely come into contact with potential contamination as the majority of the site is covered with hardstanding. Likely – future site users could come into contact with potential contaminants in soft landscaped areas and / or gardens.
			Potential for ground gas is unlikely – Made Ground containing putrescible material that would be capable of generating significant ground gas (methane and carbon dioxide) is not expected to be present.
		Maintenance workers	Likely - future maintenance workers and contractors could be exposed during below ground works such as digging, maintaining services etc.
	Leaching of contaminants from Made Ground and vertical migration into groundwater Horizontal migration of contaminants in groundwater	Secondary A Aquifer (bedrock and superficial deposits) underlying the site Groundwater SPZ down gradient Pond adjacent to the south	Likely – disturbance of soils and general Made Ground during the development could cause increased leaching of potential contaminants, however the provision of hardstanding in the finished development would minimise rainfall derived leaching.
	Direct contact	Buildings	Unlikely – within general Made Ground and soils impact of a degree capable of causing significant impact to the built environment is unlikely to be present. The exception may be drinking water – piped supplies.

Potential localised hydrocarbon and solvent contamination from standby generator, diesel/fuel-oil store, boiler house, chemical store and generator in north western part of the site. Chemicals used for boiler water treatment and paints.	Accidental ingestion of contaminants within soil, water and dust. Home grown produce, if gardens are proposed Inhalation of dusts, vapours or hazardous ground gas Dermal contact with contaminants in soil, water and dust	Current and future site users	Unlikely – current site users would not likely come into contact with potential contamination as the majority of the site is covered with hardstanding. Likely – future site users could come into contact with potential contaminants in soft landscaped areas. Hydrocarbon vapours may be present.
		Maintenance workers	Likely - future maintenance workers and contractors could be exposed during below ground works such as digging, maintaining services etc. Hydrocarbon vapours may be present.
	Leaching of contaminants from Made Ground/near surface soils and vertical migration into groundwater Horizontal migration of contaminants in groundwater	Secondary A Aquifer (bedrock and superficial deposits) underlying the site Groundwater SPZ down gradient Pond adjacent to the south	Likely – if hydrocarbon or solvent contamination is present it may be disturbed during the works and could migrate into groundwater. Localised impact to groundwater may already be present. Provision of hardstanding in the finished development will minimise rainfall derived leaching.
	Direct contact	Buildings	Likely – if gross hydrocarbon contamination is present it could impact services such as PVC water supply pipes.
Contaminative infill of former pond located 38m north-east of the site	Inhalation of hazardous ground gas Horizontal migration of contaminants in groundwater	Current and future site users	Likely – The River Terrace deposits are likely to be granular and as such could pose a potential migration pathway.
Sulphates in the London Clay.	Direct contact	Buildings	Likely - The London Clay underlying the north western side of the site is a potential source of sulphates which can cause aggressive ground conditions for below ground concrete.

3 Site Investigation

3.1 Scope of Works

The ground investigation was designed and undertaken to examine the geo-environmental and geotechnical conditions at the site and provide evidence of its suitability for the proposed land use, and to review the findings of the Phase 1 Desk Study (Ref. 1).

Ground investigation works were carried out between 15th and 23rd August 2018. The scope of the ground investigation, including the location, scheduled depth and type of exploratory hole undertaken was determined by Arcadis Consulting Ltd**Error! Unknown document property name.** and is summarised within Table 3.1.

Table 3.1 Initial Ground Investigation Scope

Location ID	Hole Type	Scheduled Depth (m)	Requirements
BH101	HTP + CP	15.0	Determine thickness of engineering soils; penetrate 3 m into bedrock; collect representative samples of strata and undertake *in situ* tests.
BH102	HTP + CP	15.0	Determine thickness of engineering soils; penetrate 3 m into bedrock; collect representative samples of strata and undertake *in situ* tests. BH102 is positioned to target potential contaminant source areas.
BH104	HTP + CP	15.0	Determine thickness of engineering soils; penetrate 3 m into bedrock; collect representative samples of strata and undertake *in situ* tests.
WS101	HTP + DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests.
WS102	HTP + DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests. WS102 is positioned to target potential contaminant source areas.
WS103	HTP + DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests. WS103 is positioned to target potential contaminant source areas.
WS104	HTP + DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests.
WS105	HTP + DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests.

Notes: HTP = hand excavated trial pit, CP = cable percussive boring, DS = dynamic sampling.

The investigation works were carried out under the supervision of a suitably experienced ground investigation engineer who undertook the logging and sampling of the exploratory holes and *in situ* testing.

3.2 Exploratory Holes

3.2.1 Exploratory Hole Locations

The co-ordinates and elevations of the exploratory hole locations were obtained by the Arcadis supervising engineer using a Trimble VRS NOW GPRS system; allowing an accuracy of +/-50 mm.

Drawing 10020221-ARC-03-XX-DR-ZZ-0001 presented in Appendix A displays the as-constructed exploratory hole locations while the co-ordinates and elevation of the ground surface at each exploratory hole location are given on the individual logs.

The Exploratory hole logs are presented in Appendix C.

3.2.2 Investigation Methodology

Details of the methods of investigation and associated standards adopted are presented in Appendix B. The completed scope of investigation is summarised in Table 3.2. Comments relate to the time of exploratory hole formation, and do not record extended time related behaviour, e.g. of groundwater.

Table 3.2 Summary of Completed Exploratory Holes

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Comment	Termination Reason
BH101	HTP+CP	15/08/2018	15/08/2018	15.00	No groundwater encountered	Target depth
BH102	HTP+CP	17/08/2018	17/08/2018	15.00	No groundwater encountered, becoming very moist from 11.80 m bgl	Target depth
BH104	HTP+CP	21/08/2018	22/08/2018	15.00	Groundwater encountered at 8.00 m bgl, no rise after 20 minutes	Target depth
WS101	HTP+DS	16/08/2018	16/08/2018	5.45	No groundwater encountered	Target depth (SPT run to 5.45 m bgl)
WS102	HTP+DS	15/08/2018	15/08/2018	5.45	No groundwater encountered	Target depth (SPT run to 5.45 m bgl)
WS103	HTP+DS	16/08/2018	16/08/2018	1.46	No groundwater encountered	SPT refusal
WS104	HTP+DS	16/08/2018	16/08/2018	5.45	No groundwater encountered	Target depth (SPT run to 5.45 m bgl)
WS105	HTP+DS	16/08/2018	16/08/2018	1.28	No groundwater encountered	SPT refusal

Notes: HTP = hand excavated trial pit, CP = cable percussive boring, DS = dynamic sampling.

3.2.3 Cable Percussion Boring

Cable percussive boring was completed using Dando D4000 drilling rig equipped with 152 mm casing and tools to undertake boreholes up to 15 m bgl.

Samples of the material recovered in borehole were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at 0.5 m intervals thereafter in clay soils; and bulk samples were taken at 1 m intervals where the sand and gravel content of the soil was significant.

Where ground conditions were suitable, open drive tube samples were taken using thin-walled sampling apparatus from the relatively undisturbed material at the base of the borehole.

3.2.4 Dynamic Sampling

Dynamic sampling was completed using a track-mounted sampling rig capable of driving windowless sampling tubes using a mechanical hammer dropped repeatedly from a self-governed height to advance window sample tubes into the ground.

The time to drive the sampling tubes (or number of blows for the mechanical hammer) was recorded together with a description of the recovered materials by the supervising engineer or the lead driller.

Photographs of the materials recovered are presented with the appropriate hole log. To enable a representative photographic record, the samples were split prior to the photograph and subsequently destructively logged.

Due to the method of investigation, the materials recovered within the sampler apparatus were generally disturbed and were assessed as complying with Class 3 to Class 5 of BS EN 22475-2. Sub-samples of the material recovered in the liners were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at 0.5 m intervals thereafter in clay soils; and small bulk samples were taken at 1 m intervals where the sand and gravel content of the soil was significant.

3.3 *In Situ* Testing

3.3.1 Penetration Testing

3.3.1.1 Standard Penetration Tests

Standard penetration tests (SPT) were carried out as required in the investigation scope and in accordance with the methods given in the standard procedures presented within Appendix B. Generally, tests were undertaken at regular intervals throughout the borehole to provide a profile of the soil's resistance with depth and a disturbed soil sample was recovered from the SPT split-spoon tool or a disturbed sample was taken over the range of the test interval.

The N-values as determined in the field are presented on the borehole logs as uncorrected values that do not take into account the energy losses or efficiency of the automatic trip hammer used to drive the test tool into the ground. The calibration certification for the test devices used in the investigation is presented in Appendix E and a summary of the SPT equipment used at each location is presented in Table 3.3.

Table 3.3 Test Hammer Calibrations

Location ID	SPT Hammer Reference No.	Energy Efficiency Ratio, E_r %	Comment
BH101, BH102 and BH104	SEDS8	69	Test date 10/05/2018
WS101 to WS105	219	78.68	Test date 09/04/2018

3.3.2 VOC Head Space Screening

The presence of Volatile Organic Compounds (VOC) within the ground was determined using a photo-ionization detector (PID) to detect the 'headspace' vapours emitted by the compounds. The method is applicable to a wide range of compounds that have sufficiently high volatility to be liberated from the soil or water matrix in normal temperature and pressure ranges.

The headspace test was undertaken on the freshly extracted soil core sample at regular intervals,typically of 0.5 m, by placing a small amount of material into a screw-top glass jar so that the jar was not more than half-full. The jar opening was covered with an aluminium foil sheet and the lid screwed on to form an air-tight seal. The sample and jar were then shaken for about 15 seconds to break-up and disperse the soil before resting the sample for about 5 minutes.

To assess the headspace vapour, the jar lid was removed and the PID probe was inserted through the foil into the headspace area. The PID reading recorded was the highest response observed in the first 10 seconds. The screening results are presented on the relevant exploratory holes logs within Appendix D.

The testing was undertaken using a Mini RAE 3000 PID with a 10.6 eV lamp.

The PID instrument was calibrated regularly throughout the day using Balance Air and Isobutylene Mixture reference gas concentrations.

3.4 Installations and Post-fieldwork Monitoring

3.4.1 Installations

Installations to enable long term monitoring of the site were made in those boreholes selected by Arcadis Design Engineer and the details are summarised in Table 3.4 below and are also provided on the relevant borehole logs.

Table 3.4 Summary of Exploratory Hole Installations

Location ID	Installation Type	Response Zone Top m bgl	Response Zone Base m bgl	Comment/limitations
BH101	SP50	5.0	15.0	Flush cover set in 0.50 m concrete 4.50 m bentonite pellet seal to top of response zone 10.00 m pluviated sand filter around response zone to base of hole
BH102	SP50	2.0	3.0	Flush cover set in 0.50 m concrete 1.50 m bentonite pellet seal to top of first response zone 1.00 m pluviated sand filter around first response zone 9.00 m bentonite pellet seal to top of second response zone 3.00 m pluviated sand filter around second response zone to base of hole
	SP50	12.0	15.0	
BH104	SP50	1.0	2.5	Flush cover set in 0.50 m concrete 0.50 m bentonite pellet seal to top of first response zone 1.50 m pluviated sand filter around first response zone 5.00 m bentonite pellet seal to top of second response zone 7.50 m pluviated sand filter around second response zone to base of hole
	SP50	7.5	15.0	
WS101	SP50	0.5	1.9	Flush cover set in 0.25 m concrete

				0.25 m bentonite pellet seal to top of response zone 1.40 m pluviated sand filter around response zone 3.10 m bgl bentonite pellet seal to base of hole
WS102	SP50	0.5	5.0	Flush cover set in 0.25 m concrete 0.25 m bentonite pellet seal to top of response zone 4.50 m pluviated sand filter around response zone 0.45 m bgl bentonite pellet seal to base of hole
WS103	SP50	0.5	1.2	Flush cover set in 0.25 m concrete 0.25 m bentonite pellet seal to top of response zone 0.70 m pluviated sand filter around response zone 0.26 m bgl bentonite pellet seal to base of hole
WS104	SP50	1.0	2.0	Flush cover set in 0.25 m concrete 0.75 m bentonite pellet seal to top of response zone 1.00 m pluviated sand filter around response zone 3.45 m bgl bentonite pellet seal to base of hole
WS105	-	-	-	No installation Backfilled with 1.28 m arisings to base of hole

Notes: SP50 = 50 mm ID standpipe.

3.4.2 Post-fieldwork Monitoring

Post-field work monitoring was undertaken on separate visits on the 23rd August, 31st August, 13th September and 28th September 2018. In all, three visits to the site were made to record land gas emissions and while four visits were made to monitor groundwater levels. During the first monitoring visit, the wells were purged by removing three well volumes of groundwater and *in situ* groundwater monitoring and sampling was undertaken. Where installations were purged dry, monitoring and sampling was conducted on groundwater recovered following recharging of groundwater in installations. Parameters measured during *in situ* monitoring were pH, dissolved oxygen, conductivity and redox potential.

The results of the groundwater monitoring are presented within Appendix E.

4 Ground Conditions

4.1 Encountered Geology

The ground conditions generally confirm the published geology identified in the Desk Study (Ref. 1), comprising Made Ground overlying River Terrace Deposits, comprising granular material.

Made Ground was encountered within every exploratory hole. River Terrace Deposits were encountered to within the centre and to the east of the site area.

The River Terrace Deposits were not encountered to the very west of the site (BH101, WS101 & WS102), where Made Ground directly overlies the bedrock formations. SPT N-Value refusal were encountered within WS103 and WS105 at depths of between 1.28m and 1.46mbgl respectively.

The London Clay Formation and the Lambeth Formation (bedrock geology) was encountered during the investigation within most exploratory holes. All positions terminated either within the River Terrace Deposits or the Bedrock. The extent of the London Clay or the Lambeth Formation was not proven.

The full engineering logs are presented in within the Appendix C.

A summary of the encountered geological strata is provided in Table 4.1 below.

Table 4.1 – Summary of ground conditions

Stratum	General Description	Depth range encountered (m bgl)	Thickness range of stratum (m)
Bitumen	Bound black bituminous material was identified on the ground surface at BH101, BH102, BH104 and WS101.	Ground level – 0.20	0.05 - 0.20
Topsoil	Grass over brown silty gravelly fine to medium SAND. Gravel is angular to rounded fine to medium of concrete, brick, flint & chalk in WS102 Grass over brown slightly sandy CLAY with abundant rootlets in WS103 & WS105.	Ground level – 0.75	0.15 - 0.75
Aggregate	Brown clayey Gravel aggregate was identified at the ground surface in WS104.	Ground level – 0.10	0.10
Made Ground	Brown/grey clayey/silty sandy GRAVEL. Gravel is angular to subrounded of brick, flint, concrete, chalk and mudstone. Occasional cobbles of brick and flint. Brown clayey gravelly SAND. Gravel is angular to rounded of brick, flint and concrete. Soft to firm brown sandy gravelly CLAY with a low cobble content. Gravel is	Ground level – 1.90	1.10 - 1.90

Stratum	General Description	Depth range encountered (m bgl)	Thickness range of stratum (m)
	angular to subrounded of brick. Identified in all exploratory holes.		
River Terrace Deposits (Granular)	Loose to very dense light brown to grey slightly silty sandy to very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded of flint, chalk and quartz. Identified in all exploratory holes except BH101, WS101 & WS102. Low cobble content of flint noted within BH104.	1.20 – 15.00	1.10 – 1.50
London Clay Formation	Stiff to very stiff slightly sandy to sandy slightly gravelly clay CLAY. Gravel is fine to medium subangular to sub rounded of flint. Stiff to very stiff grey slightly sandy SILT. Encountered in WS101, WS103 and BH101 only	1.10 – 2.70	Not Proven
Lambeth Formation (Cohesive)	Firm to very stiff brownish/greenish grey slightly sandy silty CLAY. Very stiff greenish brown slightly clayey very sandy SILT.	2.00 – 15.00	Not Proven

4.2 Groundwater

Groundwater strikes observed during drilling were recorded as follows:

- BH102: Strike at 11.80m bgl within Clay of the Lambeth Group. No rise in groundwater level was observed.
- BH104: Strike at 8.00m bgl within Sand of the Lambeth Group. No rise in groundwater level was observed.

Standing groundwater levels were recorded during the three post fieldwork monitoring rounds which are summarised in Table 4.2.

Table 4.2 Summary of groundwater levels from post fieldwork monitoring

Exploratory Position	Response Zone (m bgl)	Geology of Response Zone	Monitored Groundwater Level 23/08/2018 (m bgl)	Monitored Groundwater Level 31/08/2018 (m bgl)	Monitored Groundwater Level 13/09/2018 (m bgl)	Monitored Groundwater Level 28/09/2018 (m bgl)
BH101	5.0 – 15.0	London Clay	12.55	12.55	12.52	5.66
BH102 (S)	2.0 – 3.0	River Terrace Deposits	1.56	1.55	1.53	1.41
BH102 (D)	12.0 – 15.0	Lambeth Formation	1.56	1.55	1.55	1.42
BH104 (S)	1.0 – 2.5	River Terrace Deposits	1.60	1.55	1.54	N/A
BH104 (D)	7.5 – 15.0	Lambeth Formation	1.09	1.55	1.55	N/A
WS101	0.5 – 1.9	Made Ground	DRY	DRY	DRY	DRY
WS102	0.50 – 5.0	Made Ground/London Clay	4.33	4.33	4.30	0.48
WS103	0.50 – 1.20	Made Ground/River Terrace Deposits	DRY	DRY	DRY	DRY
WS104	1.0 – 2.0	River Terrace Deposits	1.70	1.89	1.84	N/A
WS105	No Install	N/A	N/A	N/A	N/A	N/A

4.3 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was identified during the site investigation.

4.4 Geotechnical Parameters

Geotechnical parameters (preliminary indicative) for each principal stratum type encountered within the exploratory holes are summarised below. These are based on test results or correlation of site observations with published data. It is important that the accompanying notes and previous report are read in detail together with the application of an experienced precautionary approach when using this data to help inform future outline and detailed design and help inform the construction process.

The geotechnical laboratory results are included within the Appendix F.

4.4.1 Made Ground

Due to the shallow depth of Made Ground deposits at the subject site, widespread representative SPT tests were not undertaken within the stratum.

BRE279 testing was undertaken on two samples of Made Ground at a depth of between 0.70m and 1.00mbgl which recorded a pH value of between 7.41 – 7.52, total sulphur content of between 0.16 – 0.17%, and an acid soluble sulphate value of between 0.39 – 0.41% SO4.

4.4.2 River Terrace Deposits

These deposits are, by the nature of deposition, likely to be highly heterogeneous, and variation in lithology should be anticipated both laterally and with depth beyond the locations of each exploratory hole. This natural variation will strongly influence permeability and entry of water into excavations, and stability of excavations, in the presence of groundwater.

SPT testing undertaken within the RTDs ranged between N-values of 13 to 50 indicating medium to very dense relative densities. SPT N-Value refusal were encountered within WS103 (1.46mbgl) and WS105 (1.28mbgl). . The higher values are likely to be skewed (e.g. by presence of gravel).

BRE279 testing was undertaken on one sample of the River Terrace Deposits at a depth of between 0.90m and 1.20mbgl which recorded a pH value of 7.39, total sulphur content of 0.14%, and an acid soluble sulphate value of between 0.33% SO4.

4.4.3 London Clay

SPT testing undertaken within the London Clay recorded SPT N-values of between 13 to 31 indicating stiff to very stiff consistencies. In general, an overall increase in strength with depth was noted within the data set (a depth plot of the data within the bedrock (London Clay and Lambeth Group) is detailed within section 4.4.4).

Geotechnical classification tests undertaken on 6 samples of the cohesive London Clay Formation at a depth of between 1.20m and 3.45mbgl indicated the following;

Table 4.3 Summary of Cohesive London Clay Classification

Test	Range of Values
Natural Moisture Content	22 – 27
Liquid Limit	44 – 64
Plastic Limit (%)	22 – 27
Plasticity Index (%)	22 – 40
Fraction Passing <0.425mm (%)	64 – 100
Modified Plasticity Index (%)	22 – 40

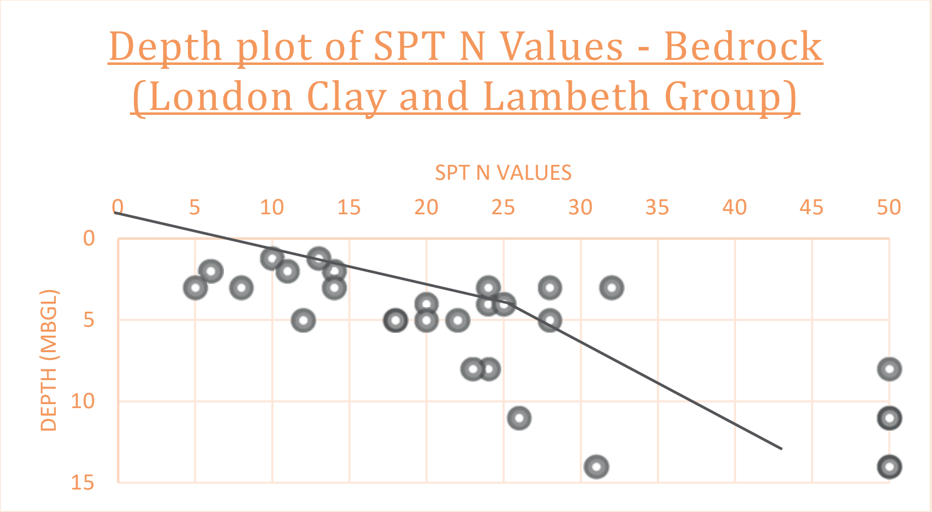
The classification test results indicate that these cohesive samples of the London Clay Formation have a modified plasticity index of 22 to 40%, which therefore has a medium to high shrink-swell potential.

BRE279 testing was undertaken on two samples of the London Clay at depths of between 1.20m and 6.10mbgl which recorded a pH value range of between 7.17 – 7.63, total sulphur content range of between 0.16 – 0.20%, and an acid soluble sulphate value range of between 0.41 – 0.51% SO4.

4.4.4 Lambeth Group

SPT testing undertaken within the Lambeth Group recorded SPT N-values of between 5 to 50 indicating soft to firm to very stiff consistencies. In general, an overall increase in strength with depth was noted within the data set.

Figure 4.1 below displays the relationship between depth and the increase in SPT N-value within the London Clay and Lambeth Group.



Geotechnical classification tests undertaken on 7 samples of the cohesive Lambeth Group at a depth of between 2.00m and 5.10mbgl indicated the following;

Table 4.4 Summary of Cohesive Lambeth Group Classification

Test	Range of Values
Natural Moisture Content	24 – 36
Liquid Limit	47 – 84
Plastic Limit (%)	3 – 28
Plasticity Index (%)	19 – 60
Fraction Passing <0.425mm (%)	53 – 100
Modified Plasticity Index (%)	14 – 51

The classification test results indicate that these cohesive samples of the Lambeth Group have a modified plasticity index of 14 to 51%, which therefore has a low to high shrink-swell potential.

BRE279 testing was undertaken on one sample of the Lambeth Group at depths of between 3.00m and 3.10mbgl which recorded a pH value of 6.51, total sulphur content of 0.17%, and an acid soluble sulphate value of 0.45% SO4.

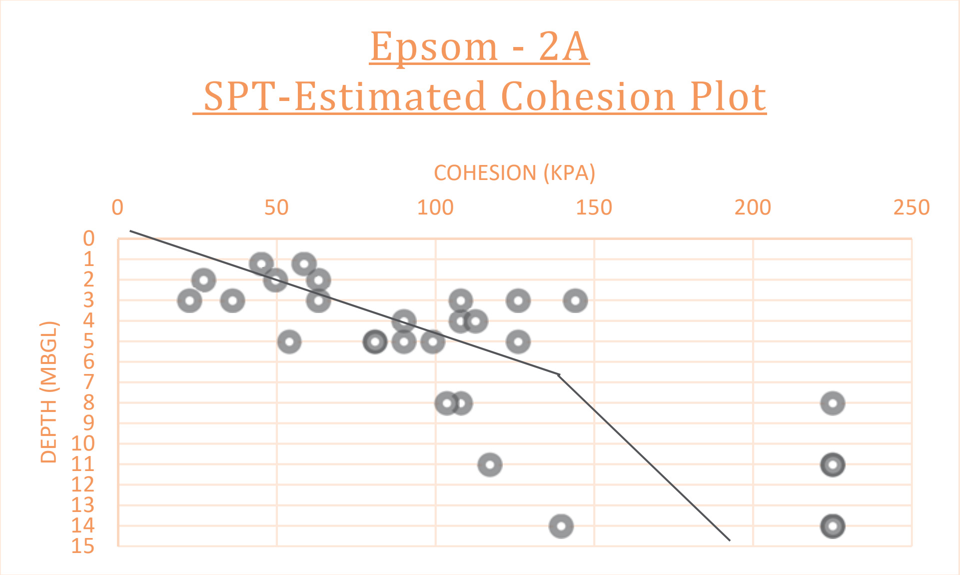
1no “undisturbed” sample was submitted for multi-stage unconsolidated-undrained triaxial tests to determine the undrained shear strength (cohesion) of the material. A summary of the results is presented in Table 4.5.

Table 4.5 Summary of Undrained Triaxial Classification – multistage

Exploratory Hole	Depth	Cell Pressure (kPa)	Undrained Shear Strength (kPa)	Mode of Failure
BH102	4.00 – 4.45	100	78	Compound
		125	86	
		150	93	

The results generally correspond to descriptions of stiff to very stiff clay soils.

The cohesion/shear strength of the strata has also been estimated based on the relationship between undrained shear strength (Cu), plasticity index and SPT N value (after Stroud, 1975) whereby Cu = f1 N . A mean plasticity index of 35% (obtained from onsite testing) has been used to determine coefficient f1 = 4.5. The depth plot is presented in Figure 4.2.



5 Geo-Environmental Assessment

As part of the intrusive investigation, thirteen samples, comprising twelve Made Ground and one natural soil (River Terrace Deposits) sample were selected for chemical testing, in order to determine both the 'baseline' condition of the site and whether the potential source areas identified in the Desk Study represented areas of potential concern in the context of the potential future redevelopment of the site to residential end use.

The exploratory hole location plan is presented within Appendix A and the chemical testing results are presented in Appendix G.

5.1 Soil Screening Values (SSVs)

The chemical data have been compared against the Land Quality Management (LQM) Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels (S4ULs) for Human Health Risk Assessment (Ref. 5). In the absence of a S4UL for lead, the CL:AIRE Category 4 Screening Level (C4SL) (Ref. 6) has been adopted.

Considering the form of the proposed development (residential housing likely to be high rise flats with communal gardens) the screening values for a 'Residential without Plant Uptake' Scenario have been adopted in the assessment.

Contamination risks to construction / maintenance workers are not appraised by chronic (long-term) exposure human health risk assessments and would be addressed under UK employment law, in accordance with the Health and Safety Executive publication entitled "Protection of Workers and the General Public during the Development of Contaminated Land", 1991 (HSG 66) (Ref. 7), the Construction Design and Management (CDM) Regulations (2015) (Ref. 8) and/or any other relevant guidance.

A Soil Organic Matter (SOM) content of 1% has been used in the assessment as a precautionary approach, i.e. soils with a low organic matter content are less able to attenuate organic contaminants and hence this represents a worst-case scenario.

5.2 Tier 1 Screening Assessment

5.2.1 Asbestos

Thirteen samples, comprising twelve Made Ground and one natural sample were screened for the presence of asbestos fibres. Three positive detections were observed within the Made Ground and are detailed within Table 5.1.

Table 5.1 – Asbestos Detections in Made Ground samples

Location	Sample Depth (m)	ACM Detected	Polarised Light Microscope Result	Asbestos Quantification
WS102	0.80	Loose Fibres	Chrysotile	< 0.001%
BH102	0.20	Loose Fibres & Loose Fibrous Debris	Chrysotile	0.011 %
	0.80	Loose Fibres	Chrysotile	< 0.001%

Of the quantified samples a single location (BH102 0.20m) recorded an asbestos concentration above the detection limit of 0.001%, however it should be noted that this is below the hazardous waste threshold of 0.1% (Ref. 9).

5.2.2 Exceedances of SSVs in Made Ground Samples

Chemical testing including metals and inorganics, phenols, speciated PAH and TPH CWG (including BTEX) were undertaken on twelve Made Ground samples. The exceedances of the SSVs are presented in Table 5.2.

All other determinands tested were either below the relevant SSV or below the laboratory limit of detection.

Table 5.2 – Exceedances of SSVs in Made Ground samples

Determinand	SSV (residential without plant uptake) (mg/kg)	Range of concentrations (mg/kg)	Number of exceedances	Samples exceeding SSV, including Concentration
Benzo(b)fluoranthene	3.9	< 0.05 – 12.0	2	BH102 0.20 m bgl (12 mg/kg) BH102 0.80 m bgl (5.7 mg/kg)
Benzo(a)pyrene	3.2	< 0.05 – 10	2	BH102 0.20 m bgl (10 mg/kg) BH102 0.80 m bgl (4.3 mg/kg)
Dibenz(a,h)anthracene	0.31	< 0.05 – 1.6	3	BH102 0.20 m bgl (1.6 mg/kg) BH102 0.80 m bgl (0.67 mg/kg) WS103 0.30m bgl (0.39mg/kg)
Lead	310*	30 - 540	2	WS102 0.80m bgl (450mg/kg) WS105 0.40m bgl (540mg/kg)

**C4SL*

In addition the above findings, the pH value measured in BH102 (11.2 pH units) is higher than the pH range of a normal soil (6-9 pH units). Whilst this alone does not necessarily indicate contamination it does indicate that soils of an unusually alkaline pH are present. The high pH is consistent with, and may be due to, the presence of concrete noted in the Made Ground in BH102 between ground level and 1.20m bgl.

5.2.3 Exceedances of SSVs in Natural Soil Samples

Chemical testing comprising metals and speciated PAH, TPH and phenols was undertaken on one samples of the River Terrace Deposits.

No exceedances were identified against the relevant screening criteria.

5.3 Controlled Waters Risk Assessment

5.3.1 Water Quality Standards

One round of groundwater sampling was undertaken on 23rd August 2018 from the standpipes installed in BH101, BH102 (dual installs), BH104 (dual installs) and WS104.

To assess the risk to controlled waters, the chemical testing results have been compared against appropriate Water Quality Standards (WQS). The WQS comprise Environmental Quality Standards (EQS) from the Water Framework Directive (Ref. 10) which are considered to be protective of the surface water feature (pond) located 10m south-east of the site, and UK Drinking Water Standards (DWS) from the Water Supply Water Quality Regulations (Ref. 11) which are considered to be protective of the underlying Secondary A Aquifer.

The EQS for copper, zinc and nickel are based on bioavailability. Site specific Predicted No Effect Concentrations (PNEC) have been calculated for copper, zinc and nickel based on the average measured concentration of calcium (142.5 mg/l), average measured pH of 7.25 pH units and an average measured dissolved organic carbon of 1.3 mg/l. The approach used is set out in the Water Framework Directive UK Technical Advisory Group guidance, Metal Bioavailability Assessment Tool (Ref. 12).

The groundwater chemical data is presented in within the Appendix G.

5.3.2 Screening Assessment - Inorganics

A single exceedance of the WQS was identified in BH104 (deep install) for metals, as presented in Table 5.3. No exceedances were identified within any of the other five samples.

Table 5.3 – Inorganic Exceedances of WQS in Groundwater samples

Determinand	EQS (µg/l)	DWS (µg/l)	Samples exceeding EQS/ DWS
Zinc	19.25*	3000	BH104 (D) (31 µg/l) (EQS)

**PNEC Value*

BH104 is screened in the Lambeth Formation (7.50 – 15.00m bgl) in the location of car parking adjacent to the Rowan House building. It is unknown whether the overlying Made Ground or an offsite source of contamination is the cause of the elevated concentration of zinc in the groundwater sample. The contamination does not appear to be widespread in the groundwater, therefore it may be an isolated hotspot, or perhaps naturally present. The concentration of metals in the overlying Made Ground in BH104 does not indicate a significant source of metals to be present.

This concentration of Zinc does not exceed DWS, and as water at this depth has no credible pathway to surface waters (where EQS criteria would apply), Zinc in groundwater is not considered to be a contaminant or concern and does not warrant further consideration.

5.3.3 Screening Assessment - Organics

Exceedances of the WQS was identified within both shallow and deep installs within BH102 for organics, as presented in Table 5.4.

No exceedances were identified within any of the other five samples.

Table 5.4 – Organic Exceedances of WQS in Groundwater samples

Determinand	EQS (µg/l)	DWS (µg/l)	Samples exceeding EQS/ DWS
Naphthalene	2	2	BH102 (S) (24.9 µg/l) (EQS & DWS) BH102 (D) (21.2 µg/l) (EQS & DWS)
Benzene	10	1	BH102 (S) (8.7 µg/l) (DWS) BH102 (D) (9.3 µg/l) (DWS)
Total concentration of TPH (Ali+Aro C5-C35)	10	10	BH102 (S) (3980 µg/l) (EQS & DWS) BH102 (D) (2300 µg/l) (EQS & DWS)

Additionally, acenaphthene, fluorene, phenanthrene, fluoranthene and pyrene, for which no WQS have been derived (or the target acceptable risk was not exceeded at theoretical solubility concentration), were also detected within BH104 at measured concentrations marginally above the laboratory Method Detection Limit (MDL).

Naphthalene was recorded above the WQS (DWS) limits for both EQS and DWS within two samples from a single location (dual installation), BH102.

The concentration of sum TPH (aliphatic and aromatic C5 – C35) and Benzene were measured in excess of the WQS within two samples obtained from a single borehole (BH102).

The shallow install is emplaced within the River Terrace Deposits (2.00-3.00mbgl), while the deep install is emplaced within in the Lambeth Formation (12.00 – 15.00mbgl). BH102 is located near to the diesel/fuel storage area where hydrocarbon staining was noted on the ground. Whilst no “elevated” concentrations of TPH were recorded within shallow Made Ground soils within BH102, some impact was recorded – total TPH concentrations of 820 mg/kg at 0.2m and 428 mg/kg at 0.8m. In addition, concentrations of some PAH compounds in these soil samples were also noted to be elevated., It is considered likely that the exceedances noted within the groundwater are from a historical fuel spillage, which has migrated into the granular River Terrace Deposits. Impacted groundwater, but to a lesser extent, in the deeper Lambeth Formation has also been recorded.

Given the limited dataset (one round of groundwater sampling), it would be prudent to undertake further groundwater sampling to provide greater certainty in the data and determine what potential further work/mitigation may be required prior to redevelopment of the site.

It should be noted that the main Epsom Hospital site has undergone other development specific intrusive investigation at the time of this investigation. BH103 from that investigation was emplaced hydraulically down gradient from the likely contamination sources located on the Plot 2A land. No elevated concentrations of hydrocarbons were observed within the groundwater sample obtained from this location.

5.3.4 Screening Assessment - Vapour

The data for TPH, PAH and BTEX has been compared to the Arcadis Generic Assessment Criteria for vapour inhalation from groundwater, and the risk of vapour inhalation from groundwater is considered to be unlikely.

5.4 Ground Gas Risk Assessment

5.4.1 Gas Monitoring Methodology

Three rounds of ground gas monitoring were undertaken on 31st August 2018, 13th September and 28th September 2018 by Arcadis from the monitoring standpipes installed in BH101, BH102 (dual install), BH104 (dual install), WS101, WS102, WS103 and WS104.

Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) in %v/v, gas flow in litres per hour (l/h) and hydrogen sulphide (H_2S) and Carbon Monoxide (CO) in parts per million (ppm) were recorded during the monitoring visits using a GFM436 Landfill Gas Analyser.

5.4.2 Atmospheric Pressure

Atmospheric pressure can impact ground gas flow. According to CIRIA C665 *Assessing the risks posed by hazardous ground gases to buildings* (Ref. 13) “*at falling pressure increased emission rates occur as the gas increases in volume. Rising pressure causes air to flow into the ground, diluting soil gas concentrations. The rate of change in barometric pressure is also important. A swift drop over a small range has the potential to release a greater concentration of gas than a gradual drop over a greater pressure range*”.

Atmospheric pressure data for the monitoring period was obtained from the Wunderground Data website (Ref. 14). The data was obtained from a monitoring station at Chessington, located approximately 4km north of the site.

A summary of the atmospheric pressure conditions for each monitoring round is as follows.

- 31st August 2018: Medium and steady atmospheric pressure (1001 – 1000 millibars (mb))
- 13th September 2018: Medium and steady atmospheric pressure (1001 mb)

- 28th September 2018: High and rising pressure (1023 – 1028 mb)

5.4.3 Gas Monitoring Results

The full results of the three rounds of gas monitoring are presented in within Appendix E. Table 6.3 below presents a summary of the range of gas concentrations from the three monitoring rounds. The maximum concentration of CO_2 and CH_4 are shown and the minimum concentration of O_2, along with the peak and steady gas flow rate. The concentration of H_2S and CO was below the detection limit of the instrument in all locations monitored, so has not been included in the table.

Table 5.5 Summary of gas monitoring results

Borehole Location	Flow Rate range(l/h)	CH_4 range (% v/v)	CO_2 range (% v/v)	O_2 range (% v/v)	Groundwater level range (m bgl)
BH101	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	1.20 – 4.80	14.1 – 17.2	5.66 – 12.55
BH102 (S)	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	0.20 – **7.00**	12.4 – 20.4	1.41 – 1.56
BH102 (D)	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	0.10 – **6.60**	12.8 – 20.4	1.42 – 1.56
BH104 (S)	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	1.20 – 2.40	19.3 – 20.1	1.54 – 1.60
BH104 (D)	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	2.1 – 2.50	17.9 – 20.1	1.09 – 1.55
WS101	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.1	0.10 – **6.40**	15.7 – 17.4	Dry
WS102	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	0.10 – 1.90	19.7 – 21.3	0.48 – 4.33
WS103	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.1	0.50 – 1.20	20.1 – 21.2	Dry
WS104	Peak: 0.0 – 0.1 Steady: 0.0 – 0.1	0.0 – 0.2	0.10 – 2.60	17.9 – 20.1	1.70 – 1.89

During the monitoring visits zero or very low positive rates of flow were measured in the monitoring wells. For the purposes of the assessment a flow rate of 0.1 l/h has been used where flow rates were recorded as zero.

For the purposes of the assessment a worst case of <0.1% was used where no results were recorded.

No elevated concentrations of CH4 were recorded within the monitoring wells installed across the subject site.

Elevated concentrations of CO2 were recorded of up to 6.4%v/v within WS101, up to 7.00%v/v within in BH102 (S) and up to 6.60%v/v within BH102 (D).

5.4.4 Preliminary Gas Hazard Assessment

The CO_2 and CH_4 results from the 3 rounds of gas monitoring have been assessed using current guidance from CIRIA C665 (Ref. 13). Following this approach, the gas concentration and borehole flow rate are used to calculate a Gas Screening Value (GSV) and define a Characteristic Situation (CS). The maximum CH_4 and CO_2 concentrations and maximum steady gas flow rate have been used in the assessment.

The GSV is calculated using the following equation:

GSV (l/h) = borehole flow rate (l/h) x gas concentration (%v)/100

The following parameters have been used in the equation:

CH_4 (max recorded concentration) = 0.2 % v/v

CO_2 (max recorded concentration) = 7.0 % v/v

Flow Rate (max steady flow rate) 0.1 l/hr

GSV CH_4: 0.2/100 x 0.1 = 0.0002 – **CS1 Very low risk**

GSV CO_2: 6.4/100 x 0.1 = 0.0070 – **CS1 Very Low Risk**

Based upon these results, the GSV of 0.0002 l/h (methane) and 0.0070 l/h (carbon dioxide) the site would be assessed as a Characteristic Situation 1 (very low risk) for methane and carbon dioxide.

With reference to BS 8485 *Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* (Ref. 15), if a carbon dioxide concentration greater than 5% v/v is encountered, consideration should be given to assigning a CS2 classification (low risk).

Within the areas of WS101 and BH102 basic gas protection measures may be required for new structures. Outside of the affected area, no protective measures are therefore considered to be required for carbon dioxide and methane. It is recommended that the site is partitioned into ground gas zoning areas, which would highlight new structures within the proposed development which would require basic gas protection measures.

6 Other Development Considerations

6.1 Material Management

In the case of managing soil movements or earthworks it is important to also manage the intention to re-use materials, if a genuine need for the materials exists.

This will help avoid unnecessary additional regulation that can sometimes arise from a “waste management” perspective.

Providing materials are suitable for use, both chemically and geotechnically, and that re-use is certain, arisings do not need to enter the waste regulation system. This process is managed via development of a Materials Management Plan (MMP) in line with the CL:AIRE Code of Practice.

If certain materials do require regulation as waste exemptions have changed significantly in recent years and there are strict limitations on the quantity of soil that can be used and the thickness to which it can be deposited. The use of a permit could stigmatise the site for future conveyance. It is on this basis that we would recommend the development of the MMP.

The MMP once drafted has to be reviewed together with the approved site investigation and remediation documents by a Qualified Person, with their Declaration being issued to the Environment Agency; ultimately allowing the development to go ahead under a self regulation approach.

The development of an MMP will require a “Cut and Fill” model or a detailed materials management strategy to identify the sources of and destinations for site-won materials.

6.2 Excess Arisings

On the basis of the current information it is likely that if materials became excess to requirements, the majority of the natural soils would likely classify as “Inert” for landfill disposal. Owning to the likely presence of organic matter within the topsoil, it should be separated from other natural arisings and appropriately classified. Made Ground would likely be classifiable as Stable Non-Reactive or Hazardous waste (should any further asbestos findings above 0.1% be encountered).

An appropriate waste classification can only be undertaken on the material due to be disposed of via further chemical testing; which should be completed prior to making disposal arrangements. In all cases where excess soils require off-site disposal, the materials need to be managed under the appropriate waste legislation and consideration given to any remedial techniques that could be used to improve the soil.

For Inert Waste and Hazardous Waste disposal, an allowance will need to be made for adequate Waste Acceptance Criteria (WAC) testing with appropriate consideration of the additional time and cost associated with this.

6.3 Health, Safety & Environment

Whilst few samples tested were found to have contamination at concentrations of regulatory concern, there remains a low potential for more-significantly impacted soils to be encountered; consideration should therefore be given to the level of PPE that should be provided to future site operatives. A watching brief should be established to check for such as yet undiscovered impact.

All work on site should be conducted in accordance with appropriate Health and Safety guidance, with particular reference to HSG66 (HSE, 1991, Ref. 7).

Care should be taken to minimise the risk of potentially contaminative incidents occurring during redevelopment. Good working practices should be adopted during construction works in order to minimise the risk of contamination occurring as a result of spillage or leakage of fuels, oils or chemicals stored or used at the site during re-development. All such materials should be sited on an impervious base within a bund and should be adequately secured. In particular, care should be taken to prevent fuel, oils or other mobile contamination sources from entering any surface water drains at the site.

Throughout all redevelopment works, due regard should be given to potential detrimental effects on the surroundings including noise, vibration, odour and dust.

6.4 Built Environment Risk Assessment

There are currently no (fully adopted) national Standards for the protection of potable water supply pipes in potentially contaminated ground. However, the UKWIR has published guidance in this respect and site testing should be undertaken with due recognition of this guidance.

On the basis of the ground conditions encountered, and due to the fact that no gross hydrocarbon contamination was encountered within Made Ground soils during the intrusive investigation it is unlikely that specific protection measures may be required for potable water supply for the development. It is recommended that consultation is undertaken with the local supplier to confirm this and a Water Pipeline Risk Assessment undertaken.

A CS2 (low risk) with respect to ground gas has been identified within one borehole at the site. Therefore, it is considered unlikely that ground gas ingress into confined spaces could cause an explosive risk.

7 Conceptual Model – Pollutant Linkages

Based on the assessment of soil, groundwater and gas monitoring data, the potential contaminant linkages identified in the Phase 1 Desk Study have been updated in accordance with CIRIA Guidance C552 (Ref. 16), taking into consideration the proposed use of the site as a residential housing estate with private gardens.

7.1 Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards (to determine the potential severity of any impact) along with details on the likelihood of impact on detailed receptors. Risks are generally managed by isolating the sensitive receptor or by intercepting or interrupting the exposure pathway, thus no pollutant linkages are formed and there is no risk. The following risk assessment focuses on the potential contaminants identified on the site in the context of the proposed development of the site.

CIRIA guidance C552 (Ref. 16) states that the designation of risk is based upon a consideration of both:

- The likelihood of an event (probability) (takes into account both the presence of the hazard and the receptor and the integrity of the pathway).
- The severity of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as follows: Further risk assessment information is presented in Appendix H.

Table 7.1 Summary of Risk likelihood categories

Term	Description
Very High Risk	There is a high probability that significant harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
High Risk	Significant Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
Moderate Risk	It is possible that without appropriate remedial action, harm could arise to a designated receptor but it is relatively unlikely that any such harm would be severe and if any harm were to occur, it is likely that such harm would be relatively mild.
Low Risk	It is possible that significant harm could arise to a designated receptor from an identified hazard but it is likely that at worst this harm if realised would normally be mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

7.2 Contaminant Sources

The following determinants have been identified as contaminants of concern:

Soils / Made Ground

Asbestos fibres (loose chrysotile) were identified in within 3 samples. Of the quantified samples a single location (BH102 0.20m) recorded an asbestos concentration above the human health (level of detection) limit of 0.011%, however it should be noted that this is below the hazardous waste threshold of 0.1%.Due to the inherent variability of Made Ground it is likely that there may be further asbestos fibres present on site, especially in areas where demolition has occurred – i.e. former buildings associated with the Epsom General Hospital and the former residential dwellings which once resided onsite.

- Two exceedances within Made Ground of the SSV for Lead was identified in WS102 0.8m and WS105 0.40m out of 13 samples analysed.
- Exceedances of the SSV for PAH compounds in three samples of Made Ground (BH102 0.20m & 0.80m, and WS103 0.30m). WS103 is located adjacent to the estates building and near to the boiler house, while BH102 is located near to the diesel/fuel storage area where hydrocarbon staining was noted on the ground.
- Made Ground of unusually alkaline pH was identified in BH102 which is a potential irritant risk, however this is likely to be associated with the presence of concrete in the sample and is not considered to pose a risk to future site users.
- An aggressive chemical environment for concrete is likely to be present, based on 5 BRE279 testing results.

Ground Gas

- Characteristic situation 2 – low risk for carbon dioxide across the site, basic protection measures deemed necessary within affected areas (BH102 & WS101).
- The risk of ground gas ingress causing an explosive risk is considered to be unlikely based on a CS2 (based on CO2) and has not been considered further in the assessment.

Groundwater

- Exceedances of the WQS for metals (Zinc, Naphthalene, Benzene and Total TPH) identified in groundwater samples from BH102 & BH104. It is unknown whether the overlying Made Ground or an offsite source of contamination is the cause of the elevated concentrations of metals in the groundwater sample. The contamination does not appear to be widespread in the groundwater, therefore it may be an isolated hotspot of metal contamination. BH102 is located near to the diesel/fuel storage area where hydrocarbon staining was noted on the ground. As no elevated concentrations of TPH were recorded within shallow Made Ground soils within BH102 (however a number of PAH species were observed to be elevated), it is likely that the exceedances noted within the groundwater are from a historical fuel spillage, which has migrated into the granular River Terrace Deposits.
- This concentration of Zinc does not exceed DWS, and as water at this depth within BH104, has no credible pathway to surface waters (where EQS criteria would apply), Zinc in groundwater is not considered to be a contaminant or concern and does not warrant further consideration.
- The risk of vapour inhalation from groundwater is considered to be unlikely and has not been considered further in the assessment.

7.3 Pathways and Receptors

Potential pathways are the routes that link the receptor to the contamination. The potential pathways and receptors are provided in Table 7.2.

Table 7.2 – Potential contaminant pathways and receptors

Receptors	Pathways
Human Health Future site users Maintenance workers and contractors	Inhalation of asbestos fibres or dust Direct contact (dermal), accidental ingestion Accumulation of gas in a confined space leading to asphyxiation

Controlled Waters	Vertical migration of contaminants from Made Ground Horizontal migration of contaminants into surface water
The Built Environment	Direct contact with buildings and services

7.4 Contaminant Linkages – Conceptual Model

The conceptual site model has been derived from the contaminants identified from the site investigation and assessment and the identified receptors and pathways.

Table 7.3 provides an assessment of each identified contaminant linkage (CL) to establish the potential risk to the sensitive receptors. The proposed development of a single and two storey houses with private gardens has been taken into consideration and the risk assessment has been developed based on this specific redevelopment and land use scenario.

Table 7.3 – Contaminant Linkages

CL No.	Source	Pathway	Receptor	Hazard Severity	Likelihood	Potential Risk and Mitigated Risk	Mitigation/ remedial action or further assessment
CL1	Asbestos fibres in soil	Inhalation (of fibres or dusts)	Future site users, visitors, maintenance workers and contractors	Severe	Likely – exposure could occur during activities such as gardening Reduced to low likelihood with mitigation	High risk Reduced to Moderate/ low with mitigation	The driving exposure pathways for PAH comprise direct exposure pathways including soil ingestion/inhalation and dermal contact. Therefore, in areas with buildings/external hard-standing or similar, no such potential pollution linkage would exist, and hence no specific remedial measures would be required. However, in the areas of soft landscaping/communal garden areas, the potential contamination linkage will need to be broken by capping with a suitable thickness of uncontaminated cover soils. Delineation of asbestos impact and either design site layout to cap asbestos impacted areas with hardstanding (beneath structures, roads and parking areas) or remove offsite to an appropriate waste facility. Good material management during demolition/ construction works
CL2	Exceedances of SSVs for Lead and PAH	Direct contact, accidental ingestion	Future site users, visitors, maintenance workers and contractors	Medium	Likely – exposure could occur during activities such within communal garden areas. Reduced to low likelihood with mitigation	Moderate Reduced to low with mitigation	
CL3	Carbon dioxide and methane gas	Accumulation of ground gas in confined spaces	Future site users, visitors, maintenance	Severe	Likely – gas monitoring has	Moderate/ Low risk	Gas concentrations and flow rates recorded at the subject site indicate that the site is

		leading to asphyxiation	workers and contractors		indicated a CS2 (low risk)		classified as Characteristic Situation 2, as such basic protection measures are likely to be required within the proposed structures.
CL4	Exceedances of WQS for Naphthalene, Benzene and TPH in groundwater samples from BH102	Vertical migration of contaminants from Made Ground Horizontal migration of contaminants into surface water	Underlying Secondary A Aquifer Pond to the south of the site	Medium	Low likelihood of the works causing an increase in metals concentrations in groundwater Watching brief for unexpected contamination (hydrocarbons) during works to prevent mobilisation Reduced to unlikely with mitigation	Moderate/ low Reduced to low with mitigation	Undertake good material management practices during construction such as covering stockpiles to minimise leaching Provision of hardstanding for roads and parking areas will minimise leaching Given the context and the absence of drinking water abstractions in the vicinity of the Site, the measured concentration is not considered to present a significant risk to the identified receptors.
Sulphates and pH	Direct Contact	Buildings, foundations and services	Medium	Likely – building foundations may encounter ground with elevated sulphates Reduced to unlikely with mitigation	Moderate/ low Reduced to low with mitigation	Select an appropriate design classification of concrete classification. Design Sulphate Class (DS) of DS-2 and an Aggressive Chemical Environment for Concrete Class (AC) of AC- 2.	Sulphates and pH

7.5 Pollutant Linkages Discussion

Concentrations above the appropriate SSVs for Lead and PAHs were identified within samples of Made Ground obtained during the intrusive investigation. Additionally, loose chrysotile asbestos fibres were identified in one sample (BH102).

The results are not indicative of gross site wide contamination. The driving exposure pathways for the metals and PAH comprise direct exposure pathways including soil ingestion/inhalation and dermal contact. Therefore, in areas with buildings/external hard-standing or similar, no such potential pollution linkage would exist, and hence no specific remedial measures would be required.

However, in the areas of soft landscaping and garden areas the potential contamination linkage will need to be broken, either by physical excavation of these materials, or by capping with a suitable thickness of uncontaminated cover soils.

Once development plans are known, if impact coincides with a sensitive use, such as gardens, the impacted soils could be removed and disposed of to an appropriate waste treatment facility. Once removed offsite, the soils left in-situ would be validated to confirm their suitability to remain onsite. If suitable, no further remedial measures would be required for the proposed development, as the source-pathway-receptor linkage would be broken.

The primary exposure pathway for asbestos fibres is inhalation/ingestion. The asbestos detection within BH102 was quantified and recorded a fibre concentration of 0.011% which is marginally above the level of detection of 0.001%, however there is a credible risk both during the construction phase and to potential end users of the site. The asbestos hotspot should be delineated. If it coincides with permanent hardcover, then if regulators agree, it could probably be left in-situ and managed through an asbestos management plan detailed within the remediation statement, or if it coincides with gardens/landscaping, for example, excavated and removed offsite to an appropriate waste disposal facility.

Gas concentrations and flow rates recorded at the subject site indicate that the site is classified as Characteristic Situation 2, as such basic special protection measures are likely to be required within the proposed structures within the affected area, it is recommended that the site is zoned.

The concentration of sum TPH (aliphatic and aromatic C5 – C35), Naphthalene and Benzene were measured in excess of the WQS within two samples obtained from a single borehole (BH102). BH102 is located near to the diesel/fuel storage area where hydrocarbon staining was noted on the ground. As no elevated concentrations of TPH were recorded within shallow Made Ground soils within BH102 (however a number of PAH species were observed to be elevated), it is likely that the exceedances noted within the groundwater are from a historical fuel spillage, which has migrated into the granular River Terrace Deposits. It is further noted that for TPH, the compliance criteria selected relates to taste and odour thresholds. Given this context and the absence of drinking water abstractions in the vicinity of the Site, the measured concentration is not considered to present a significant risk to the identified receptors. Based on the limited distribution across the site, the risk to the water resources posed by these compounds is not considered to warrant further works, however it may be prudent to obtain a further sample from BH102.

Design Sulphate Class (DS) of DS-2 and an Aggressive Chemical Environment for Concrete Class (AC) of AC- 2 is recommended for the site.

In order to satisfy and enable the discharge of the likely future relevant Planning Conditions (including pre-commencement conditions), it is recommended that the findings of this report (with respect to contamination) be formalised in a development-specific Remediation Statement (detailing the development scheme and most appropriate remedial option) and be submitted to the Local Planning Authority for their approval.

8 Geotechnical Assessment

8.1 General

It is understood that there is currently a pre-application in place for 195 units, but the Council would like this increased to 300 units. Therefore, high-rise flats are likely to be considered, potentially up to 6 storeys high.

The proposed site/formation level, settlement tolerance criteria and structural loadings have not been provided and will need to be considered during detailed design. It is assumed that the site levels will remain unchanged for the assessment. The following assessment and recommendations will need to be reviewed when design details are available.

8.2 Ground Conditions

Made Ground was encountered within every exploratory hole. River Terrace Deposits were encountered to within the centre and to the east of the site area.

The River Terrace Deposits were not encountered to the very west of the site (BH101, WS101 & WS102), where Made Ground directly overlies the bedrock formations. SPT N-Value refusal were encountered within WS103 and WS105 at depths of between 1.28m and 1.46mbgl respectively.

The London Clay Formation and the Lambeth Formation (bedrock) was encountered during the investigation within the majority of exploratory holes. All positions terminated either within the River Terrace Deposits or the Bedrock. The extent of the London Clay or the Lambeth Formation was not proven.

Groundwater monitoring indicates that perched pockets of groundwater may be present, and the resting groundwater level is likely to be between 0.48 – 12.55mbgl.

8.3 Obstructions

Historical mapping indicates that the housing, and former structures associated with the Epsom General Hospital once resided onsite, which have been demolished. No evidence of buried structures or services was encountered during the site investigation, however there is potential for buried structures or foundations and deeper Made Ground to be present locally. Obstructions may require removal where they may influence future development including foundations, pavements and services as they may act as a hardspot creating differential settlement issues.

8.4 Foundations

The following recommendations are for guidance only and will be subject to detailed design when the loading and settlement criteria become available. For 6 storey buildings, a piled foundation solution is recommended.

Made Ground soils are not considered to be a suitable founding stratum.

The target founding stratum will ideally be the London Clay Formation or the Lambeth Group due to their fairly uniform properties and the increase in strength with depth which has been recorded typically across the site. It is envisaged that a pile design will be able to utilise both end bearing and shaft friction properties of the clay.

Detailed pile designs (in terms of pile type, depths, and method of installation) would be dependent upon the required working loads and should be undertaken in conjunction with a reputable, specialist, piling contractor; ideally with local experience.

Low level contamination has been encountered on site, as such piling works should adhere to the EA guidance on piling through contaminated soils, so as to prevent any mobilisation of contamination into underlying natural soils.

Foundations should be emplaced within consistent strata to reduce the risk of differential settlement and a suitably qualified geotechnical engineer should confirm the ground conditions on site during the works, and pile testing may be required.

8.5 Ground Floor Slabs

The shallow deposits are variable and comprise Made Ground, River Terrace Deposits and the London Clay/Lambeth Group.

In accordance with NHBC guidance 5.1 “substructure and ground bearing floors”, shrinkable soil, expansive materials or other unstable soils may require suspended floor construction. Shrinkable soils are classified as those containing more than 35% fine particles (silt and clay) and have a modified Plasticity Index of 40% or greater (see NHBC Chapters 4.2 ‘Building near trees’ (each section) and 5.2 ‘Suspended ground floors’ (each section)).

The site soils therefore do meet this criteria of “shrinkable soil”, and the shallow soils are found to be variable, hence suspended ground floors are likely to be required to avoid problems of heave and shrinkage settlements.

Furthermore, Due to the variability in geology suspended floor slabs also recommended.

8.6 Excavations

It is likely that the majority of the overlying Made Ground, cohesive River Terrace Deposits and the London Clay/Lambeth Group could be easily excavated using a conventional backhoe excavator. However due to the dense nature and depth of the granular River Terrace Deposits some hard digging or ripping may be required at depth. Due to the presence of fine granular material in places, some temporary support or battering back may be required for deep excavations.

Groundwater has been indicated to be present from 0.48mbgl, so excavations may be prone to groundwater ingress and subsequent collapse, unless dewatering methods such as sumps are used. Trench support and battering may also be required.

8.7 Pavement and Road Design

Areas of hardstanding and car parking are proposed at the site.

No in-situ California Bearing Ratio (CBR) tests were undertaken as part of the investigation.

It is recommended that testing be undertaken during earthworks at the proposed formation level. It is anticipated that a CBR in the order of 2% will be achievable in this material pending further testing. Any topsoil should be removed prior to construction. The subgrade material will be frost susceptible and full pavement thickness will be required.

8.8 Aggressive Chemical Environment for Below Ground Concrete

With reference to guidance outlined within BRE document SD1 “Concrete in aggressive ground” (2005) (Ref 10), the test results returned for sulphate and pH values across the site correspond to a Design Sulphate Class (DS) of DS-2 and an Aggressive Chemical Environment for Concrete Class (AC) of AC- 2.

The London Clay is in places known to be pyritic. From SD1 utilising the methodology stated within section C5.1.2, 6 samples were analysed for BRE 279. None of the samples were deemed to contain pyrite. As a precautionary approach the Design Sulphate value has been selected due to the total potential sulphate content.

8.9 Disposal and Re-use of Material

Foundation, pavement and services construction is likely to generate a significant volume of excess arisings. Early consideration should be given to how this material will be managed, re-used or disposed of. Any material proposed for re-use must be proven to be suitable for its intended use both geotechnically and geo-environmentally.

Excavated soils which are not reused on site will need to be disposed of offsite to an appropriately licenced waste disposal or treatment facility. Material identified as waste will need to be assessed to determine its waste classification and Waste Acceptance Criteria (WAC) testing undertaken to determine the potential waste disposal options.

Made Ground has been identified and is unlikely to be accepted at a landfill as inert. Therefore, Made Ground should be handled, managed and stored separately form natural inert arisings to reduce disposal costs. Material which appears to be ‘clean’ should be segregated from material which appears to be contaminated. Arisings should not be used elsewhere on site as engineering fill unless they can be proven to be suitable for its intended use and not present a risk to controlled waters and human health.

9 Conclusions and Recommendations

9.1 Geo-Environmental

An intrusive ground investigation was undertaken to investigate and assess areas of potential concern identified in the Arcadis Desk Study Report (Ref. 1).

9.1.1 Human Health

- Asbestos fibres were identified in three samples (however following quantification, only the asbestos within BH102 was found to be above the level of detection) and exceedances of the SSV were identified in three samples for Lead and PAH. Future site users are likely to be exposed during activities such as gardening. Therefore in the areas of soft landscaping and garden areas the potential contamination linkage will need to be broken, either by physical excavation of these materials, or by capping with a suitable thickness of uncontaminated cover soils.
- The asbestos hotspot should be delineated. If it coincides with permanent hardcover, then if regulators agree, it could probably be left *in situ* and managed through an asbestos management plan detailed within the remediation statement, or if it coincides with gardens/landscaping, for example, excavated and removed off site to an appropriate waste disposal facility. Early consultation with regulatory bodies will be key in taking the site forward for development.
- Gas concentrations and flow rates recorded at the subject site indicate that the site is classified as Characteristic Situation 2, as such basic special protection measures are likely to be required within the proposed structures within the affected area, it is recommended that the site is zoned. It would be prudent to undertaken further gas monitoring once development specific plans are available for the site.
- The site investigation was designed to target potential sources of contamination identified in the desk study, however further contamination may be present that has not been identified by the extent of exploratory holes. A watching brief should be kept during the works to identify the presence of any previously unidentified contamination. If visual or olfactory evidence of contamination is encountered, all works should cease until the advice of a suitably qualified and experienced person can be sought.
- In order to satisfy and enable the discharge of the likely future relevant Planning Conditions (including pre-commencement conditions), it is recommended that the findings of this report (with respect to contamination) be formalised in a development-specific Remediation Statement (detailing the development scheme and most appropriate remedial option) and be submitted to the Local Planning Authority for their approval.

9.1.2 Controlled Waters

- The concentration of some TPH (aliphatic and aromatic C5 - C35), Naphthalene and Benzene were measured in excess of the WQS within two samples obtained from a single borehole (BH102).The risk to the water resources posed by these compounds is not considered to warrant further works. However, it is possible that some impacted soil may be present in the vicinity of the fuel oil storage tanks that has not been uncovered fully from the current works undertaken. It may be prudent to undertake further groundwater sampling to provide greater certainty in the initial findings and determine what potential further work/mitigation may be required prior to redevelopment of the site.

9.2 Geotechnical

Based on the results of the intrusive investigation, geotechnical laboratory testing and in-situ testing the following indicative geotechnical conclusions and recommendations have been made

- A piled foundation solution is recommended, the target founding stratum will ideally be the London Clay Formation or the Lambeth Group due to their fairly uniform properties and the increase in strength with depth which has been recorded typically across the site. It is envisaged that a pile design will be able to utilise both end bearing and shaft friction properties of the clay.
- Detailed geotechnical design should be undertaken when the loading and settlement criteria are available.

- Due to the variable geology encountered and soils are potentially shrinkable, suspended floor slabs are recommended.
- In deep excavations, excavations may be prone to collapse. Trench support may be required. Sump pumping may be required if groundwater ingress is encountered.
- A CBR in the order of 2% is likely to be achievable for pavement and road design. Further testing should be undertaken to confirm this during the earthworks.
- An aggressive chemical environment for concrete is thought to be present within the London Clay and Lambeth Group. Below ground concrete should be designed to meet the specifications of DS2, AC2.
- Excavated arisings should be disposed of appropriately and should be handled appropriately to minimise the volume of material that may require disposal as non-hazardous or hazardous waste.

10 References

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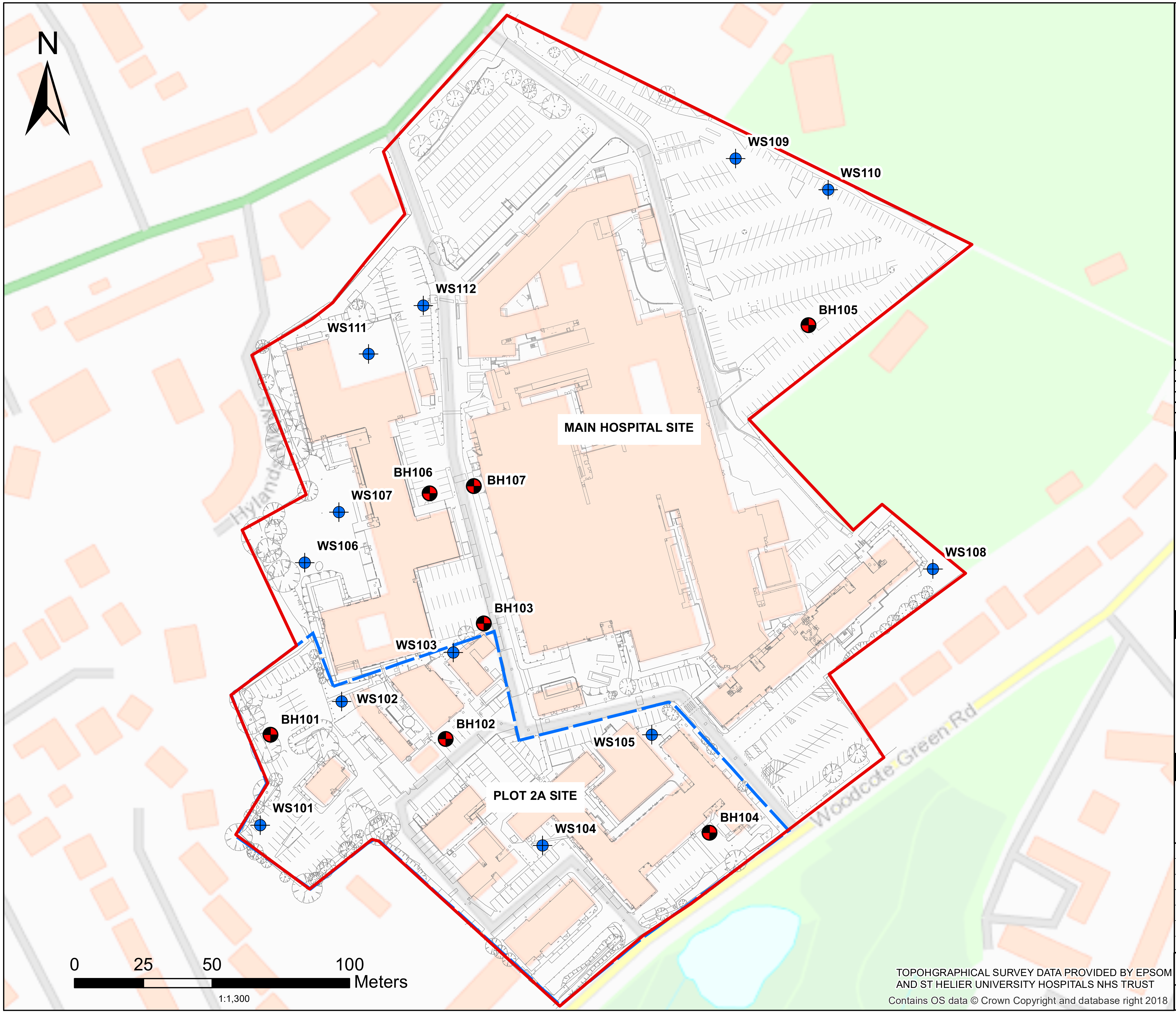
APPENDIX A - Exploratory Hole Location Plan



TOPOHGRAPHICAL SURVEY DATA PROVIDED BY EPSOM
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LEGEND

EXPLORATORY HOLE LOCATIONS

● BH

⊕ WS

Type

▭ MAIN SITE BOUNDARY (APPROX.)

▭ PLOT 2A BOUNDARY (APPROX.)

Rev	Date	Description	Drawn	Check	Approv
01	10/9/18	1ST ISSUE	FW	GF	GF

Client

EPSOM AND ST HELIER
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TITLE:

EPSOM HOSPITAL
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HOLE LOCATION PLAN

Designed	F.W	Date 10SEP18	Signed
Drawn	F.W	Date 10SEP18	Signed
Checked	G.F	Date 10SEP18	Signed
Approved	G.F	Date 10SEP18	Signed
Scale:	1:1,300	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	Sx	Project Number:	10020221

Suitability Description:

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Suitability description comment

Drawing Number: 10020221-ARC-03-XX-DR-ZZ-0001

Revision: 01

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APPENDIX B - Standard Procedures

B0 General Principles

This ground investigation was undertaken in general accordance with the principles of BS EN 1997-1 [1] and BS EN 1997-2 [2] and the advice given in BS5930:2015 [8], which, provides complimentary guidance on the application of the primary standards. Where the requirements of the ground investigation specification differ from these primary standards, the investigation methodology was adapted as required and specific notes regarding methods and techniques employed were made in the appropriate report sections.

B1 Buried Services

Service clearance was undertaken in accordance with Arcadis' common operating practice COP SA1. This document details the methods and safe working practices used to undertake excavations safely. Prior to breaking ground, services plans were consulted and the area scanned using a Cable Avoidance Tool (CAT) with detected signals marked on the ground. For all investigation positions, other than for machine excavated trial pits, hand excavated inspection pits are completed to 1.20 m bgl prior to the use of drilling and boring plant.

B2 Sampling Requirements

The selection of sample types and sampling techniques has been chosen to take account of the soil fabric, size and quality of sample required based on whether the soils mass properties or the intact material properties of the ground are to be determined in subsequent laboratory tests. BS EN ISO 22475-1 [4] describes three generic sample groups that are:

a. Sampling by drilling. Generally a disturbed sample recovered from the drilling tool or digging equipment, typically meeting Class 3 to Class 5 requirements, with the recovered material being stored in bulk bags or sealed jar or tub containers.
b. Sampling by sampler. Typically referred to as open tube or drive sampling in which a tube with a sharp cutting edge is driven into the ground either by static thrust or dynamically driven to give a relatively undisturbed sample of Class 1 or Class 2 but may result in a Class 3 sample.
c. Block sampling. Cylindrical large diameter samples or cuboid hand-cut samples usually relatively undisturbed Class 1 and Class 2.

The open-tube sampling equipment used on the site was of a type and design that conformed to BS EN ISO 22475-1. For the purpose of this ground investigation block sampling was not required.

Generally samples were assessed on site and any unexpected deterioration in sample quality was reported to the ground engineer by the lead drilling technician.

Sufficient and representative samples were taken to allow the geo-mechanical properties of the ground to be adequately characterised and to enable the sequence of soil strata to be described by an engineering geologist or geotechnical engineer.

Where samples have been taken for chemical tests the drilling method attempted to adopt dry drilling over the sampling range that generally was achieved by the use of drill casing to separate and isolate the upper soil layers and exclude groundwater. Cross-contamination was further reduced by regular cleaning of sampling tools. Sample integrity was maintained by sealing samples immediately on collection and storing the samples in a temperature controlled cool box. Samples were despatched from the site at the end of the shift on which they were collected or as required in the project specification. Details of best practice storage, preservation and decontamination measures undertaken are given below:

Task	Soil	Groundwater	Ground Gas
Storage	Glass jars and vials supplied by the laboratory were used for the collection of soil samples to be	Glass vials supplied by the laboratory were used for the collection of samples to be analysed for volatile	1.4L Canisters supplied by the laboratory.

	analysed for volatile compounds. Plastic one-litre tubs were used to collect soil samples for metals analysis.	compounds. Samples to be analysed for lower volatility compounds were stored in laboratory prepared glass bottles.	
Preservation	Filling of sample containers as far as practicable to minimise headspace and low storage temperature to minimise the potential for volatilisation and biodegradation of petroleum hydrocarbon compounds prior to analysis.		Not required.
Decontamination	Disposable gloves were worn and changed between sample collection to prevent cross-contamination.	Groundwater samples were collected using dedicated disposable tubing / bailers, that were changed between monitoring well locations in order to prevent cross-contamination.	Disposable gloves were worn and changed between sample collection to prevent cross contamination.
Transport	Samples stored in dedicated sample boxes provided by the laboratory. Sample details and analytical requests were recorded on the laboratory chain of custody form included with samples, prior to dispatching to laboratory for analysis. Samples were dispatched to the laboratory on the day of sampling.		

B3 Sample Description

Sample description was undertaken by the Arcadis site geologist in accordance with BS 5930: 2015. The descriptions of the individual samples were used to identify the sequence of strata at the exploratory hole location and from which representative exploratory hole logs were drawn.

B4 *In Situ* Testing

In situ geotechnical tests were undertaken taking account of the investigation scope and requirement to attain the appropriate parameters required in the geotechnical design. The tests were undertaken in accordance with the requirements of the relevant parts of BS EN ISO 22476 [5, 6, 7] and other methods as follows:

Dynamic probing

Dynamic probes were undertaken in general accordance with BS EN ISO 22476-2, BS EN 1997-2 and the national annex to BS EN 1997. The tests were generally made using the super-heavy DPSH-B configuration of the apparatus, however, it should be noted that the basis for selection of the type of dynamic probe should be a consideration of the driving energy in relation to the type of ground conditions anticipated at the site.

Where adequate correlation with borehole data is available an interpretation of the estimated soil type may be made, however, it should be noted that probing can give unreliable results in mixed soils.

Standard penetration testing

Standard penetration tests were carried out in accordance with BS EN ISO 22476-3, BS EN 1997-2 and the national Annex to BS EN 1997-2. The test records are presented on the borehole logs as blow counts for each increment with the N-value as the total number of blows of the four main test increments.

Where the N-value exceeds a total of 50 blows, the test reports the penetration in millimetres for the last test increment recorded, and the N value is indicated as greater than 50,

e.g. 4,5/12,14,18, 6 for 10 mm

indicates that the seating blows (4 and 5) were completed and that the test terminated in the 4th increment after penetrating 10 mm.

Where the seating blows exceeded 25 blows for less than 150 mm; the test was stopped and the rods remarked after which, the main drive was continued. The test is then reported as the number of blows in each seating drive for the recorded penetration with the results of the main drive given as above,

e.g. 14/11 for 45 mm/12,14,16, 8 for 10 mm.

In certain circumstances where groundwater in-flow may affect the test, particularly in fine sand or silt, low SPT blow counts may be recorded. Where the SPT blow count was very low, N values of 5 or less, the test was, at the discretion of the site engineer, continued for a further 300 mm, recording blows for each 75 mm increment. **This is not** a standard penetration test value, it does however give an indication of potential disturbance to the ground.

California Bearing Ratio

In situ California Bearing Ratio (CBR) tests were carried out in general accordance with the requirements of BS 1977-9:1990, 4.3 [10]. The CBR is a strength test that is generally concerned with pavement design and the control of pavement sub grade construction, as such it is a test that is most suited to soils with a maximum particle size not exceeding 20 mm.

TRL Dynamic cone penetrometer

The TRL DCP is a device developed by the TRL to assess the California Bearing Ratio of road sub-base by correlation. As such the device was developed for use in a limited range of soil types. The test has no formal standard the test methodology and its use is discussed in TRL report PR IN 277-04 [11].

B5 Data Transfer Format

The data collated during the ground investigation has been organised and managed using the “AGS data format” that allows data transfer between different disciplines and organisations in accordance with BS 8574 [9].

B6 References

1. BS EN 1997-1. 2004. Eurocode 7: Geotechnical Design. Part 1 General Rules. British Standards Institution, 2013 (revised text).
2. BS EN 1997-2. 2007. Eurocode 7: Geotechnical Design. Part 2 Ground Investigation and testing. British Standards Institution, 2010 (revised text).
3. BS EN ISO 22282-1:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 1: General Rules. British Standards Institution.
4. BS EN ISO 22475-1. Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1 Technical principles for execution.
5. BS EN ISO 22476-1:2015. Geotechnical investigation and testing – Field testing – Part 1: Electrical cone and piezocone test. British Standards Institution
6. BS EN ISO 22476-2. Geotechnical investigation and testing – Field testing – Part 2: Dynamic Probing. British Standards Institution
7. BS EN ISO 22476-3 2005. Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test. British Standards Institution
8. BS 5930: 2015. Code of practice for ground investigation. British Standards Institution.
9. BS 8574. Code of practice for the management of geotechnical data for ground engineering projects.
10. BS 1377-9. 1990. Methods of test for soils for civil engineering purposes. Part 9: In-situ tests. British Standards Institution.
11. TRL. 2004. Dynamic cone penetrometer tests and analysis. TRL Technical Report PR IN 277-04. Transport Research Laboratory, Crowthorne, England.

APPENDIX C - Exploratory Hole Logs

Key to Exploratory Hole Symbols and Abbreviations

SAMPLE TYPES

B	Bulk disturbed sample
C	Core sample
CBR-D	Disturbed sample from CBR test area
CBR-U	Undisturbed sample from CBR test area
D	Small disturbed sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
SPT	SPT split spoon sample
U	Undisturbed sample
UT	Undisturbed thin wall sample
W	Water sample

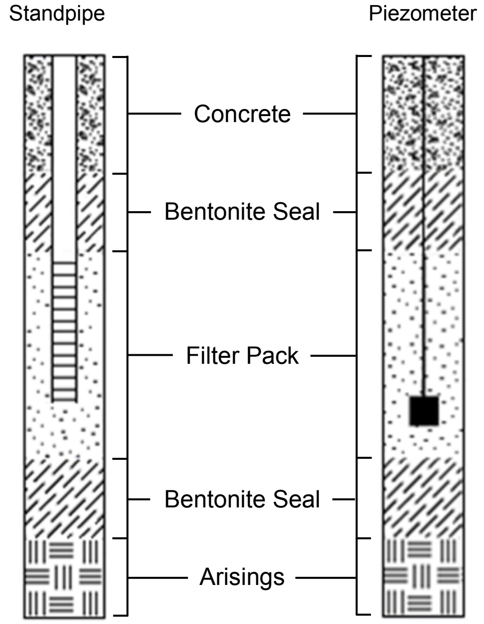
IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT 'N' Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
PP	Pocket Penetrometer Test (kg/m^3)
( )	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms^{-1})
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) * *
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

INSTALLATION & BACKFILL DETAILS



▤ Perforated Standpipe

▯ Plain Standpipe

▮ Piezometer Porous Element

GROUNDWATER

▽ Groundwater strike

▼ Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

STRATUM BOUNDARIES

— Unit boundary

STRATA LEGENDS - Note: Composite strata types are shown by combining symbols

▨ Made Ground

▨ Concrete

▨ Bituminous Bound Materials

▨ Topsoil

▨ Clay

▨ Silt

▨ Sand

▨ Gravel

▨ Cobbles

▨ Boulders

▨ Peat

□ Void

▤ Mudstone

▨ Siltstone

▨ Sandstone

▨ Limestone

▨ Chalk

■ Coal

▨ Metamorphic Rock

▨ Fine Grained Igneous Rock

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* Where a single value is quoted this is the uncorrected 'N' value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

* * The minimum, average and maximum are shown e.g. 5/45/125.

Percussive Borehole Log

BH101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**62.40**	**15/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520298.95**	**159783.57**	**15/08/2018**	**Sheet 1 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend			
						15/08/2018 08:00		MADE GROUND: Bitumen bound material.		0.10	62.30	
								MADE GROUND: Brown sandy GRAVEL. Gravel is angular to subrounded fine to coarse red brick and mudstone.		0.20	62.20	
0.50 - 0.80	B1	0.50	PID	<1ppm				MADE GROUND: Brown clayey gravelly medium to coarse SAND. Gravel is angular to rounded fine to coarse red brick, flint and concrete.		(0.90)		
0.50 - 0.80	ES2											
1.00 - 1.20	B3	1.00	PID	<1ppm								
1.00 - 1.20	ES4											
								Firm dark orangish brown sandy slightly gravelly CLAY with frequent rootlets. Gravel is subrounded fine to medium flint. [WEATHERED LONDON CLAY]		1.10	61.30	
1.20 - 1.65	D5	1.20	SPT(S)	N=13 (2,3/4,2,3,4)						(0.90)		
2.00 - 2.10	D8	2.00	PID	<1ppm Ublow=45				Stiff dark orangish brown mottled grey sandy CLAY. [WEATHERED LONDON CLAY]		2.00	60.40	
2.00 - 2.10	ES7											
2.00 - 2.45	U6											
2.50 - 2.60	D9											
3.00 - 3.10	D10	3.00	SPT(S)	N=14 (1,2/2,3,4,5)				Becoming silty from 3.00 m bgl to 4.50 m bgl.		(2.50)		
4.00 - 4.10	D11			Ublow=50								
4.00 - 4.45	U12											
4.50 - 4.60	D13							Stiff grey mottled red slightly sandy SILT. [WEATHERED LONDON CLAY]		4.50	57.90	
5.00 - 5.10	D14	5.00	SPT(S)	N=20 (2,2/4,4,6,6)						(0.95)		
								Stiff grey silty CLAY with frequent decomposed rootlets. [LONDON CLAY FORMATION]		5.45	56.95	
6.00 - 6.10	D15			Ublow=70								
6.00 - 6.45	U16							Rootlets absent at 6.50 m bgl.		(2.55)		
7.00 - 7.10	D17											
8.00 - 8.10	D18	8.00	SPT(S)	N=24 (2,3/5,6,6,7)				Stiff dark grey SILT. [LONDON CLAY FORMATION]		8.00	54.40	
										(1.00)		
9.00 - 9.10	D19			Ublow=65				Very stiff dark grey sandy CLAY. [LONDON CLAY FORMATION]		9.00	53.40	
9.00 - 9.45	U20											
10.00 - 10.10	D21											

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS						HOLE/CASING DIAMETER				WATER ADDED		
From	To	Type	Hard Strata From	To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00 1.20	1.20 15.00	Inspection Pit Cable Percussion										300 152 140	1.20 2.50 15.00	152	2.50			

Remarks

Borehole terminated at target depth of 15.00 m bgl.
No groundwater encountered.
Installations: 0.00 m - 5.00 m plain 50 mm ID standpipe piezometer, 5.00 m - 15.00 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.50 m concrete, 4.50 m bentonite pellet seal to top of response zone, 10.00 m pluviated sand filter around response zone to base of hole.
No evidence of contamination noted.

Termination Depth: 15.00m

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**IP**	**IP**

Percussive Borehole Log

BH101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**62.40**	**15/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520298.95**	**159783.57**	**15/08/2018**	**Sheet 2 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend			
								Very stiff dark grey sandy CLAY. [LONDON CLAY FORMATION]				
11.00 - 11.10	D22	11.00	SPT(S)	N=26 (2,4/6,6,6,8)						(3.00)		
12.00 - 12.10	D23							Very stiff brown mottled grey slightly silty CLAY. [LONDON CLAY FORMATION]		12.00	50.40	
12.50 - 12.95	U24			Ublow=100								
13.00 - 13.10	D25											
										(3.00)		
14.00 - 14.10	D26	14.00	SPT(S)	N=31 (3,5/5,7,9,10)								
15.00	D27					15/08/2018 17:00	2.50			15.00	47.40	

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS						HOLE/CASING DIAMETER				WATER ADDED		
From	To	Type	Hard Strata From	Hard Strata To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00 1.20	1.20 15.00	Inspection Pit Cable Percussion										300 152 140	1.20 2.50 15.00	152	2.50			

Remarks

Borehole terminated at target depth of 15.00 m bgl.
No groundwater encountered.
Installations: 0.00 m - 5.00 m plain 50 mm ID standpipe piezometer, 5.00 m - 15.00 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.50 m concrete, 4.50 m bentonite pellet seal to top of response zone, 10.00 m pluviated sand filter around response zone to base of hole.
No evidence of contamination noted.

Termination Depth:
15.00m

Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**IP**	**IP**

ARCADIS Percussive Borehole Log

BH102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.46**	**17/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520362.67**	**159782.02**	**17/08/2018**	**Sheet 1 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend			
						17/08/2018 08:00		MADE GROUND: Bitumen bound material.		0.10	59.36	
0.20 - 0.30	ES1	0.20	PID	<1ppm				MADE GROUND: Brown slightly silty sandy GRAVEL. Gravel is angular fine to coarse flint, brick and concrete.		(0.20) 0.30	59.16	
								MADE GROUND: Grey slightly sandy GRAVEL. Gravel is angular to subangular fine to coarse concrete.		(0.30) 0.60	58.86	
0.60 - 1.00	B2							MADE GROUND: Medium dense brown very sandy GRAVEL. Gravel is angular fine to coarse brick and concrete.		(0.60) 1.20	58.26	
0.80 - 0.90	ES3	0.80	PID	<1ppm								
1.20 - 1.70 1.30 - 1.40	B4 ES5	1.20 1.30	SPT(C) PID	N=32 (4,5/7,7,8,10) <1ppm				Medium dense to dense greenish brown slightly silty sandy GRAVEL. Gravel is angular fine to coarse flint and chalk. [RIVER TERRACE DEPOSITS]		(1.50) 2.70	56.76	
2.00 - 2.10 2.00 - 2.50	D6 B7	2.00	SPT(C)	N=19 (4,4/5,5,4,5)	1.50							
								Soft to firm greyish brown gravely clayey SILT. Gravel is subangular siltstone. [LAMBETH GROUP]		(0.80) 3.50	55.96	
3.00 - 3.10	D8	3.00	SPT(S)	N=5 (1,1/1,1,1,2)	2.50							
								Firm grey mottled reddish brown slightly sandy silty CLAY. [LAMBETH GROUP]		(4.70) 8.20	51.26	
4.00 - 4.10 4.00 - 4.45	D10 U9			Ublow=22								
4.50 - 4.60	D11											
5.00 - 5.10 5.00 - 5.50	D12 B13	5.00	SPT(S)	N=12 (1,2/2,3,3,4)								
6.00 - 6.10	D14											
6.50 - 6.95	U15			Ublow=60								
7.00 - 7.10	D16											
8.00 - 8.10	D17	8.00	SPT(S)	N=23 (3,3/5,6,6,6)								
								Firm to stiff light brown mottled grey slightly sandy CLAY. [LAMBETH GROUP]		(1.60) 9.80	49.66	
9.00 - 9.10	D18											
9.50 - 9.95	U19			Ublow=100								
								Stiff greyish brown slightly sandy very silty CLAY. [LAMBETH GROUP]				
10.00 - 10.10	D20											

DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS						HOLE/CASING DIAMETER				WATER ADDED		
From	To	Type	Hard Strata From	To	Duration	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00 1.20	1.20 15.00	Inspection Pit Cable Percussion										300 152 140	1.20 3.00 15.00	152	3.00			

Remarks

Borehole terminated at target depth of 15.00 m bgl.
No groundwater encountered, becoming very moist from 11.80 m bgl. 15 litres of water added between 1.20 m and 2.50 m bgl.
Installations: Shallow = 0.00 m - 2.00 m plain 50 mm ID standpipe piezometer, 2.00 m - 3.00 m slotted 50 mm ID standpipe piezometer. Deep = 0.00 m - 12.00 m 50 mm ID standpipe piezometer, 12.00 m - 15.00 m slotted 50 mm ID standpipe piezometer. Backfill: Flush cover set in 0.50 m concrete, 1.50 m bentonite pellet seal to top of first response zone, 1.00 m pluviated sand filter around first response zone, 9.00 m bentonite pellet seal to top of second response zone, 3.00 m pluviated sand filter around second response zone to base of hole. No evidence of contamination noted.

Termination Depth:
15.00m

AGS
Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS

Percussive Borehole Log

BH102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.46**	**17/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520362.67**	**159782.02**	**17/08/2018**	**Sheet 2 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend	Depth (Thickness)	Level	Install/ Backfill
								Stiff greyish brown slightly sandy very silty CLAY. [LAMBETH GROUP]				
11.00 - 11.10	D21	11.00	SPT(S)	N>50 (6,9/11,14,14,11 for 50mm)						(2.00)		
								Firm to stiff greenish brown slightly clayey very sandy SILT. [LAMBETH GROUP] Becoming very moist from 11.80 m bgl.		11.80	47.66	
12.00 - 12.10	D22											
12.50 - 12.95	U23			Ublow=100								
12.50 - 13.00	B24											
13.00 - 13.10	D25											
										(3.20)		
14.00 - 14.10	D26	14.00	SPT(S)	N>50 (7,10/15,24,11 for 35mm)								
15.00	D27					17/08/2018 16:00	3.00			15.00	44.46	

DRILLING TECHNIQUE

From	To	Type
0.00	1.20	Inspection Pit
1.20	15.00	Cable Percussion

CHISELLING

Hard Strata From	Hard Strata To	Duration

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
300	1.20	152	3.00
152	3.00		
140	15.00		

WATER ADDED

From	To	Volume (ltr)

Remarks

Borehole terminated at target depth of 15.00 m bgl.
No groundwater encountered, becoming very moist from 11.80 m bgl. 15 litres of water added between 1.20 m and 2.50 m bgl.
Installations: Shallow = 0.00 m - 2.00 m plain 50 mm ID standpipe piezometer, 2.00 m - 3.00 m slotted 50 mm ID standpipe piezometer. Deep = 0.00 m - 12.00 m 50 mm ID standpipe piezometer, 12.00 m - 15.00 m slotted 50 mm ID standpipe piezometer. Backfill: Flush cover set in 0.50 m concrete, 1.50 m bentonite pellet seal to top of first response zone, 1.00 m pluviated sand filter around first response zone, 9.00 m bentonite pellet seal to top of second response zone, 3.00 m pluviated sand filter around second response zone to base of hole. No evidence of contamination noted.

Termination Depth: 15.00m

AGS Arcadis Cymru House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS Percussive Borehole Log

BH104

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.61**	**21/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520458.68**	**159747.97**	**22/08/2018**	**Sheet 1 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend			
0.00 - 0.05	ES1	0.00	PID	<1ppm		21/08/2018 14:00	0.00	MADE GROUND: Bitumen bound material.		0.05	59.56	
0.20 - 0.30	ES2	0.20	PID	<1ppm				MADE GROUND: Light grey sandy GRAVEL. Gravel is subangular and subrounded fine to coarse concrete.		(0.25) 0.30	59.31	
0.50 - 1.00	B3							MADE GROUND: Firm dark brown sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse red brick and flint. Cobbles are subangular red brick.				
0.70 - 0.80	ES4	0.70	PID	<1ppm						(0.70)		
								Loose light orangish brown sandy GRAVEL with low cobble content. Gravel is angular to subrounded fine to coarse flint. Cobbles are angular and subangular flint. [RIVER TERRACE DEPOSITS]		1.00	58.61	
1.20 - 1.30 1.20 - 1.65 1.20 - 1.70	ES6 D5 B7	1.20 1.20	SPT(C) PID	N=8 (1,2/1,2,2,3) <1ppm						(1.50)		
2.00 - 2.10 2.00 - 2.45 2.00 - 2.50	D8 D9 B10	2.00	SPT(C)	N=8 (2,2/3,2,2,1)								
								Firm to stiff light grey to reddish purplish brown silty CLAY. [LAMBETH GROUP]		2.50	57.11	
3.00 - 3.10 3.00 - 3.45 3.00 - 3.50	D11 D12 B13	3.00	SPT(S)	N=8 (1,2/1,2,2,3)		21/08/2018 16:00 22/08/2018 07:00	2.90 2.90	Becoming slightly gravely and sandy from 3.00 m bgl to 5.70 m bgl..				
4.00 - 4.10 4.00 - 4.45	D14 U15			Ublow=50						(3.20)		
4.50 - 4.60	D16											
5.00 - 5.10 5.00 - 5.45	D17 D18	5.00	SPT(S)	N=28 (2,3/5,6,7,10)								
								Stiff greenish grey to brown CLAY. [LAMBETH GROUP]		5.70	53.91	
6.00 - 6.10	D19											
6.50 - 6.95	U20			Ublow=100						(1.80)		
7.00 - 7.10	D21											
								Very dense greenish grey occasionally mottled orangish brown slightly clayey fine to medium SAND. [LAMBETH GROUP]		7.50	52.11	
8.00 - 8.10 8.00 - 8.45	D22 D23	8.00	SPT(S)	N>50 (6,10/14,18,18 for 65mm)	▼							
										(2.10)		
9.00 - 9.10	D24											
9.50 - 9.95	D25	9.50	SPT(S)	N>50 (4,6/20,30 for 65mm)								
								Very dense greenish grey occasionally white slightly clayey fine to medium SAND. [LAMBETH GROUP]		9.60	50.01	
10.00 - 10.10	D26											

DRILLING TECHNIQUE		
From	To	Type
0.00	1.20	Inspection Pit
1.20	15.00	Cable Percussion

CHISELLING		
Hard Strata From	Hard Strata To	Duration

WATER OBSERVATIONS					
Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
22/08/2018 11:00	8.00	20	8.00	3.00	

HOLE/CASING DIAMETER			
Hole Dia.	Depth	Casing Dia.	Depth
300 152 140	1.20 4.00 15.00	152	4.00

WATER ADDED		
From	To	Volume (ltr)

Remarks

Borehole terminated at target depth of 15.00 m bgl.
Groundwater encountered at 8.00 m bgl, no rise after 20 minutes.
Installations: Shallow = 0.00 m - 1.00 m plain 50 mm ID standpipe piezometer, 1.00 m - 2.50 m slotted 50 mm ID standpipe piezometer. Deep = 0.00 m - 7.50 m 50 mm ID standpipe piezometer, 7.50 m - 15.00 m slotted 50 mm ID standpipe piezometer. Backfill: Flush cover set in 0.50 m concrete, 0.50 m bentonite pellet seal to top of first response zone, 1.50 m pluviated sand filter around first response zone, 5.00 m bentonite pellet seal to top of second response zone, 7.50 m pluviated sand filter around second response zone to base of hole. No evidence of contamination noted.

Termination Depth: 15.00m

AGS

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St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**MW**	**IP**

ARCADIS Percussive Borehole Log

BH104

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.61**	**21/08/2018**	**1:50**
Client	**Easting (OS mE)**	**Northing (OS mN)**	**End Date**	
Epsom and St. Helier University Hospitals NHS Trust	**520458.68**	**159747.97**	**22/08/2018**	**Sheet 2 of 2**

SAMPLES		TESTS			Water Strikes	PROGRESS		STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Date Time	Casing Water	Description	Legend			
								Very dense greenish grey occasionally white slightly clayey fine to medium SAND. [LAMBETH GROUP] Pockets of white calcrete crystals from 9.60 m to 11.80 m bgl.				
11.00 - 11.10	D27	11.00	SPT(S)	N>50 (16,9 for 50mm/16,22,12 for 30mm)						(2.20)		
11.00 - 11.45	D28											
								Dense to very dense greenish grey slightly clayey fine to medium SAND. [LAMBETH GROUP]		11.80	47.81	
12.00 - 12.10	D29											
12.50 - 12.95	D30	12.50	SPT(S)	N>50 (7,10/12,14,18,6 for 10mm)								
13.00 - 13.10	D31											
										(3.20)		
14.00 - 14.10	D32	14.00	SPT(S)	N=43 (5,9/10,10,11,12)								
14.00 - 14.45	D33											
15.00	D34					22/08/2018 16:00	3.00 5.00			15.00	44.61	

DRILLING TECHNIQUE

From	To	Type
0.00	1.20	Inspection Pit
1.20	15.00	Cable Percussion

CHISELLING

Hard Strata From	Hard Strata To	Duration

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
22/08/2018 11:00	8.00	20	8.00	3.00	

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
300	1.20	152	4.00
152	4.00		
140	15.00		

WATER ADDED

From	To	Volume (ltr)

Remarks

Borehole terminated at target depth of 15.00 m bgl.
Groundwater encountered at 8.00 m bgl, no rise after 20 minutes.
Installations: Shallow = 0.00 m - 1.00 m plain 50 mm ID standpipe piezometer, 1.00 m - 2.50 m slotted 50 mm ID standpipe piezometer. Deep = 0.00 m - 7.50 m 50 mm ID standpipe piezometer, 7.50 m - 15.00 m slotted 50 mm ID standpipe piezometer. Backfill: Flush cover set in 0.50 m concrete, 0.50 m bentonite pellet seal to top of first response zone, 1.50 m pluviated sand filter around first response zone, 5.00 m bentonite pellet seal to top of second response zone, 7.50 m pluviated sand filter around second response zone to base of hole. No evidence of contamination noted.

Termination Depth: 15.00m

AGS
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Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando 4000	**Arcadis Consulting (UK) Ltd**	**MW**	**IP**

ARCADIS Dynamic Sample Log

WS101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**62.62**	**16/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520295.23**	**159750.74**	**16/08/2018**	**Sheet 1 of 1**

SAMPLES		TESTS			
Depth	Type/ No.	Depth	Type/ No.	Results	Water Strikes
0.40 - 0.60	B2	0.40	PID	<1ppm	
0.40 - 0.60	ES1				
0.80 - 1.00	B4	0.80	PID	<1ppm	
0.80 - 1.00	ES3				
1.00 - 1.20	ES5	1.00	PID	<1ppm	
1.20 - 2.00	I7	1.20	SPT(S)	N=16 (6,6/5,5,3,3)	Dry
2.00 - 2.20	ES6	2.00	SPT(S)	N=14 (2,1/2,3,4,5)	Dry
2.00 - 3.00	I8	2.00	PID	<1ppm	
3.00 - 4.00	I9	3.00	SPT(S)	N=28 (3,3/5,5,8,10)	Dry
4.00 - 5.00	I10	4.00	SPT(S)	N=20 (3,4/4,5,5,6)	Dry
		5.00	SPT(S)	N=18 (3,3/3,4,5,6)	Dry

STRATA		
Description	Depth (Thickness)	Level
MADE GROUND: Grey bitumen bound material.	0.10	62.52
MADE GROUND: Black bitumen bound material.	0.20	62.42
MADE GROUND: Medium dense brown slightly silty sandy GRAVEL with local bands of brown clay, up to 30mm diameter. Gravel is angular and subangular fine to coarse concrete, brick, flint and chalk.	(1.70) 1.90	60.72
Firm to stiff greyish brown slightly sandy silty CLAY. [WEATHERED LONDON CLAY FORMATION]	(2.10) 4.00	58.62
Stiff grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium flint. [WEATHERED LONDON CLAY FORMATION]	(1.45) 5.45	57.17

DRILLING TECHNIQUE		
From	To	Technique
0.00	1.20	Inspection Pit
1.20	5.45	Window Sample

WATER OBSERVATIONS					
Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER			
Hole Dia.	Depth	Casing Dia.	Depth
300	1.20		
87	2.00		
77	3.00		
67	5.00		

BACKFILL		
Top	Base	Backfill
0.00	0.25	Concrete
0.25	0.50	Bentonite
0.50	1.90	Gravel
1.90	5.45	Bentonite

Remarks

Borehole terminated at target depth of 5.00 m bgl, with SPT run to 5.45 m bgl.
No groundwater encountered.
Installation: 0.00 m - 0.50 m plain 50 mm ID standpipe piezometer, 0.50 m - 1.90 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.25 m concrete, 0.25 m bentonite pellet seal to top of response zone, 1.40 m pluviated sand filter around response zone, 3.10 m bgl bentonite pellet seal to base of hole.
No evidence of contamination noted.

Termination Depth: 5.45m

AGS Arcadis Cymru House St. Mellon's Business Park Cardiff CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Yellow Dart	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS Dynamic Sample Log

WS102

Project **Epsom Hospital - Plot 2A**	Project No. **10020221**	Ground Level (mAOD) **60.89**	Start Date **15/08/2018**	Scale **1:50**
Client **Epsom and St. Helier University Hospitals NHS Trust**	Easting (OS mE) **520324.78**	Northing (OS mN) **159795.69**	End Date **15/08/2018**	**Sheet 1 of 1**

SAMPLES		TESTS			
Depth	Type/ No.	Depth	Type/ No.	Results	Water Strikes
0.30 - 0.40	ES2	0.30	PID	<1ppm	
0.50 - 0.75	B1				
0.80 - 0.90	ES3	0.80	PID	<1ppm	
1.20 - 1.65	D9	1.20	SPT(S)	N=10 (1,2/2,2,3,3)	Dry
1.20 - 2.00	I5	1.30	PID	<1ppm	
1.30 - 1.40	ES4				
2.00 - 2.45	D10	2.00	SPT(S)	N=11 (1,2/2,3,3,3)	Dry
2.00 - 3.00	I6				
3.00 - 3.45	D11	3.00	SPT(S)	N=32 (6,8/9,9,7,7)	Dry
3.00 - 4.00	I7				
4.00 - 4.45	D12	4.00	SPT(S)	N=24 (6,7/5,5,7,7)	Dry
4.00 - 5.00	I8				
5.00 - 5.45	D13	5.00	SPT(S)	N=22 (4,5/5,5,5,7)	Dry

STRATA				
Description	Legend	Depth (Thickness)	Level	Install/ Backfill
MADE GROUND: Grass over brown silty gravelly fine to medium SAND. Gravel is angular to rounded fine to medium concrete, brick, flint and chalk.		(0.75) 0.75	60.14	
MADE GROUND: Black very gravelly medium to coarse SAND. Gravel is angular to subrounded fine to medium flint and red brick.		(0.35) 1.10	59.79	
Firm dark grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine flint. [WEATHERED LONDON CLAY]		(0.65) 1.75	59.14	
Firm to stiff dark orangish brown mottled grey sandy CLAY. [WEATHERED LONDON CLAY] Becoming very stiff from 3.00 m to 3.40 m bgl.		(1.65) 3.40	57.49	
Stiff light grey mottled red SILT. [WEATHERED LONDON CLAY]		(0.50) 3.90	56.99	
Stiff light grey SILT with frequent decomposed roots. [WEATHERED LONDON CLAY]		(1.55) 5.45	55.44	

DRILLING TECHNIQUE		
From	To	Technique
0.00	1.20	Inspection Pit
1.20	5.45	Window Sample

WATER OBSERVATIONS					
Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER			
Hole Dla.	Depth	Casing Dia.	Depth
300	1.20		
87	2.00		
77	3.00		
67	5.00		

BACKFILL		
Top	Base	Backfill
0.00	0.25	Concrete
0.25	0.50	Bentonite
0.50	5.00	Gravel
5.00	5.45	Bentonite

Remarks

Borehole terminated at target depth of 5.00 m bgl, with SPT run to 5.45 m bgl.
No groundwater encountered.
Installation: 0.00 m - 0.50 m plain 50 mm ID standpipe piezometer, 0.50 m - 5.00 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.25 m concrete, 0.25 m bentonite pellet seal to top of response zone, 4.50 m pluviated sand filter around response zone, 0.45 m bgl bentonite pellet seal to base of hole.
No evidence of contamination noted.

Termination Depth:
5.45m

AGS
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Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Yellow Dart	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS Dynamic Sample Log

WS103

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.37**	**16/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520365.45**	**159813.57**	**16/08/2018**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						MADE GROUND: Grass over brown slightly sandy CLAY with abundant rootlets (TOP SOIL).		(0.15) 0.15	59.22	
0.30 - 0.50	B2	0.30	PID	<1ppm		MADE GROUND: Brown slightly silty sandy GRAVEL with low cobble content. Gravel is angular fine to coarse flint, concrete, brick and chalk. Cobbles are subangular and subrounded flint.		(0.85) 1.00	58.37	
0.30 - 0.50	ES1									
0.60 - 0.70	ES3	0.60	PID	<1ppm						
0.70 - 0.90	B4									
1.20 - 1.46	ES5	1.20	SPT(S)	N>50 (3,3/27,23 for 35mm)	Dry	Very dense greyish brown slightly silty sandy GRAVEL. Gravel is subangular and subrounded fine to coarse flint, sandstone and chalk. [RIVER TERRACE DEPOSITS]		(0.46) 1.46	57.91	
		1.20	PID	<1ppm						

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	1.46	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
300	1.20		
45	1.46		

BACKFILL

Top	Base	Backfill
0.00	0.25	Concrete
0.25	0.50	Bentonite
0.50	1.20	Gravel
1.20	1.46	Bentonite

Remarks

Borehole terminated at 1.46 m bgl due to SPT refusal.
No groundwater encountered.
Installation: 0.00 m - 0.50 m plain 50 mm ID standpipe piezometer, 0.50 m - 1.20 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.25 m concrete, 0.25 m bentonite pellet seal to top of response zone, 0.70 m pluviated sand filter around response zone, 0.26 m bgl bentonite pellet seal to base of hole.
No evidence of contamination noted.

Termination Depth: 1.46m

AGS Arcadis Cymru House St. Mellon's Business Park Cardiff CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Yellow Dart	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS Dynamic Sample Log

WS104

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Epsom Hospital - Plot 2A	**10020221**	**59.45**	**16/08/2018**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Epsom and St. Helier University Hospitals NHS Trust	**520397.90**	**159743.36**	**16/08/2018**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						MADE GROUND: Brown clayey GRAVEL. Gravel is subrounded fine to coarse flint and sandstone.		0.10	59.35	
0.30 - 0.50	B2					MADE GROUND: Soft dark brown grey very sandy CLAY with frequent pockets of orange fine to medium sand.		(0.60)		
0.40 - 0.50	ES1	0.40	PID	<1ppm				0.70	58.75	
0.80 - 0.90	ES3	0.80	PID	<1ppm		MADE GROUND: Brown slightly silty sandy GRAVEL. Gravel is angular and subangular fine to coarse flint, concrete and red brick.		(0.20) 0.90	58.55	
0.90 - 1.20	B5					Medium dense light brown very sandy GRAVEL. Gravel is angular fine to coarse flint, chalk and quartz. [RIVER TERRACE DEPOSITS]				
1.00 - 1.20	ES4	1.00	PID	<1ppm						
1.20 - 2.00	I6	1.20	SPT(S)	N=19 (2,3/5,4,5,5)	Dry			(1.10)		
2.00 - 3.00	I7	2.00	SPT(S)	N=6 (4,2/1,1,2,2)	Dry	Soft to firm brownish grey slightly sandy silty CLAY. [LAMBETH GROUP]		2.00	57.45	
								(1.00)		
3.00 - 4.00	I8	3.00	SPT(S)	N=24 (3,4/5,7,6,6)	Dry	Stiff brownish grey slightly sandy silty CLAY. [LAMBETH GROUP]		3.00	56.45	
4.00 - 5.00	I9	4.00	SPT(S)	N=25 (4,6/5,5,7,8)	Dry	No recovery from 4.00 m to 5.00 m bgl.				
								(2.45)		
		5.00	SPT(S)	N=18 (4,5/5,4,5,4)	Dry					
								5.45	54.00	

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	5.45	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
300	1.20		
87	2.00		
77	3.00		
67	5.00		

BACKFILL

Top	Base	Backfill
0.00	0.25	Concrete
0.25	1.00	Bentonite
1.00	2.00	Gravel
2.00	5.45	Bentonite

Remarks

Borehole terminated at target depth of 5.00 m bgl, with SPT run to 5.45 m bgl.
No groundwater encountered.
Installation: 0.00 m - 1.00 m plain 50 mm ID standpipe piezometer, 1.00 m - 2.00 m slotted 50 mm ID standpipe piezometer.
Backfill: Flush cover set in 0.25 m concrete, 0.75 m bentonite pellet seal to top of response zone, 1.00 m pluviated sand filter around response zone, 3.45 m bgl bentonite pellet seal to base of hole.
No evidence of contamination noted.

Termination Depth: 5.45m

AGS
Arcadis Cymru House
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Cardiff
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Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Yellow Dart	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

ARCADIS Dynamic Sample Log

WS105

Project **Epsom Hospital - Plot 2A**	Project No. **10020221**	Ground Level (mAOD) **59.01**	Start Date **16/08/2018**	Scale **1:50**
Client **Epsom and St. Helier University Hospitals NHS Trust**	Easting (OS mE) **520437.66**	Northing (OS mN) **159783.58**	End Date **16/08/2018**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						MADE GROUND: Grass over brown slightly sandy CLAY with abundant rootlets (TOP SOIL).	▨	(0.30) 0.30	58.71	▨
0.30 - 0.50 0.40 - 0.50	B2 ES1	0.40	PID	<1ppm		MADE GROUND: Brown slightly silty sandy GRAVEL with low cobble content. Gravel is angular fine to coarse flint, concrete, brick and chalk. Cobbles are subangular and subrounded flint.	▨	(0.40) 0.70	58.31	▨
0.70 - 0.90 0.90 - 1.28	B4 ES3	0.90 0.90	SPT(S) PID	N>50 (14,17/16,17,17,0 for 0mm) <1ppm	Dry	Very dense greyish brown slightly silty sandy GRAVEL. Gravel is subangular and subrounded fine to coarse flint, sandstone and chalk. [RIVER TERRACE DEPOSITS]	▨	(0.58) 1.28	57.73	▨

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dla.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00 0.90	0.90 1.28	Inspection Pit Window Sample							300 45	0.90 1.28			0.00	1.28	Arisings

Remarks

Borehole terminated at 1.28 m bgl due to SPT refusal.
No groundwater encountered.
No installation.
Backfill: 1.28 m arisings to base of hole.
No evidence of contamination noted.

Termination Depth:
1.28m

Arcadis Cymru House
St. Mellon's Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Yellow Dart	**Arcadis Consulting (UK) Ltd**	**SS**	**IP**

Window Sample Photography Sheet

WS101

Project **Epsom Hospital – Plot 2A**	Job No **10020221**	Ground Level (mAOD) **62.62**	Start Date **16/08/2018**
Client **Epsom and St. Helier University Hospitals NHS Trust**	Easting (OS mE) **520295.23**	Northing (OS mN) **159750.74**	End Date **16/08/2018**

WS101 – 1.20 m – 5.00 m bgl

Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used **Yellow Dart**	Logged By **SAS**	Checked By **IP**

Window Sample Photography Sheet WS102

Project	Job No	Ground Level (mAOD)	Start Date
Epsom Hospital – Plot 2A	**10020221**	**60.89**	**15/08/2018**
Client	**Easting (OS mE)**	**Northing (OS mN)**	**End Date**
Epsom and St. Helier University Hospitals NHS Trust	**520324.78**	**159795.69**	**15/08/2018**

WS102 – 1.20 m – 2.00 m bgl

WS102 – 2.00 m – 3.00 m bgl

Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Logged By	Checked By
Yellow Dart	**SAS**	**IP**

Window Sample Photography Sheet WS102

Project
Epsom Hospital – Plot 2A
Client
Epsom and St. Helier University Hospitals NHS Trust

Job No	Ground Level (mAOD)	Start Date
10020221	60.89	15/08/2018
Easting (OS mE)	Northing (OS mN)	End Date
520324.78	159795.69	15/08/2018

WS102 – 3.00 m – 4.00 m bgl

WS102 – 4.00 m – 5.00 m bgl

Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Logged By	Checked By
Yellow Dart	SAS	IP

Window Sample Photography Sheet

WS104

Project	Job No	Ground Level (mAOD)	Start Date
Epsom Hospital – Plot 2A	**10020221**	**59.45**	**16/08/2018**
Client	Easting (OS mE)	Northing (OS mN)	End Date
Epsom and St. Helier University Hospitals NHS Trust	**520397.90**	**159743.36**	**16/08/2018**

WS104 – 1.20 m – 5.00 m bgl

AGS
Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Logged By	Checked By
Yellow Dart	**SAS**	**IP**

APPENDIX D - Certification of Field Apparatus

Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Neil Burrows
Southern Testing Laboratories
Unit 11
Charlwoods Road
East Grinstead
RH19 2HU

SPT Hammer Ref:	SEDS8
Test Date:	10/05/2018
Report Date:	15/05/2018
File Name:	SEDS8.spt
Test Operator:	N P BURROWS

Instrumented Rod Data

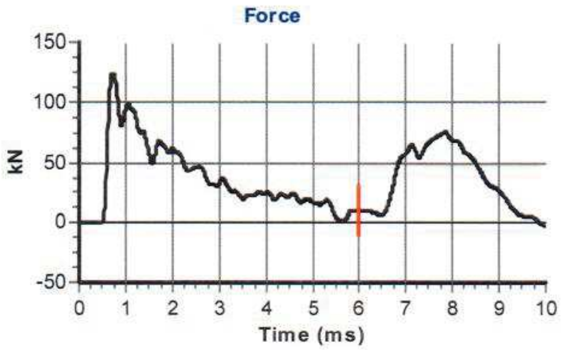
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	6458
Accelerometer No.2:	9607

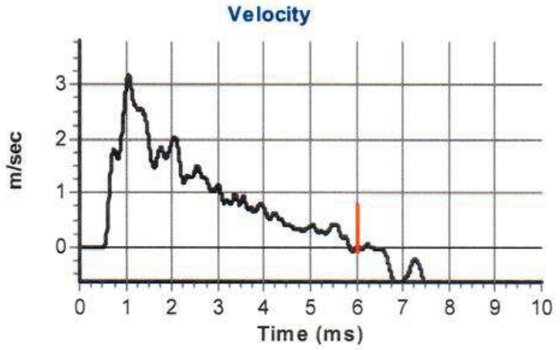
SPT Hammer Information

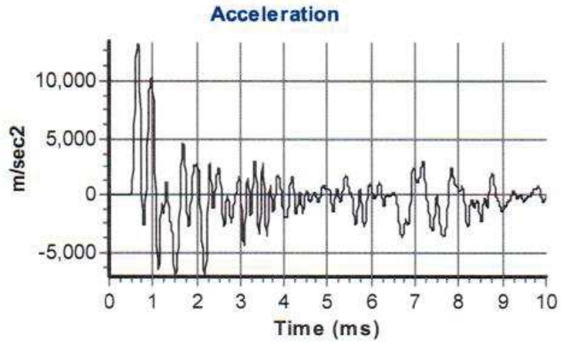
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	14.5

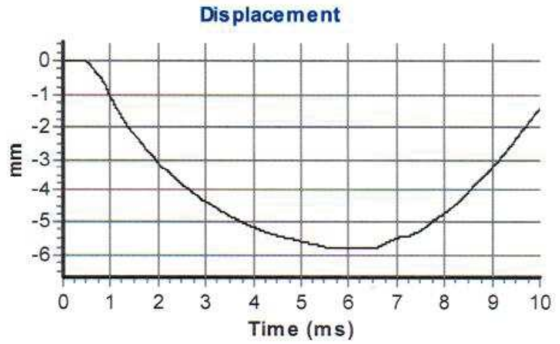
Comments / Location

CHARLWOODS









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	329
Energy Ratio E_r (%):	**69**

Signed: N P Burrows
Title: Field Operations Manager

The recommended calibration interval is 12 months

Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Neil Burrows
Southern Testing Laboratories
Unit 11
Charlwoods Road
East Grinstead
RH19 2HU

SPT Hammer Ref: SEDS11
Test Date: 27/07/2018
Report Date: 27/07/2018
File Name: SEDS11.spt
Test Operator: N P BURROWS

Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 6458
Accelerometer No.2: 9607

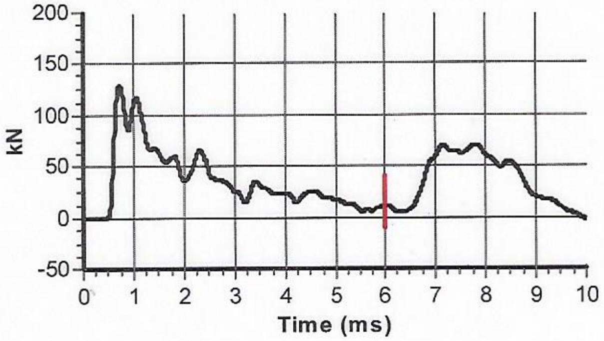
SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

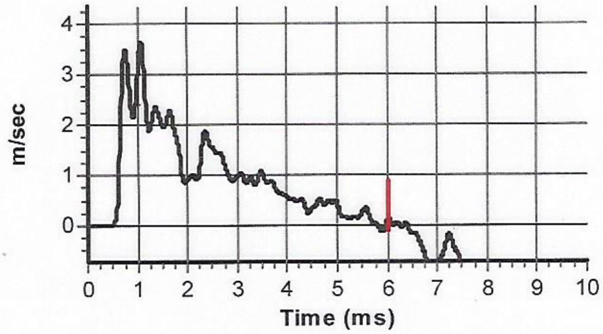
Comments / Location

CHARLWOODS

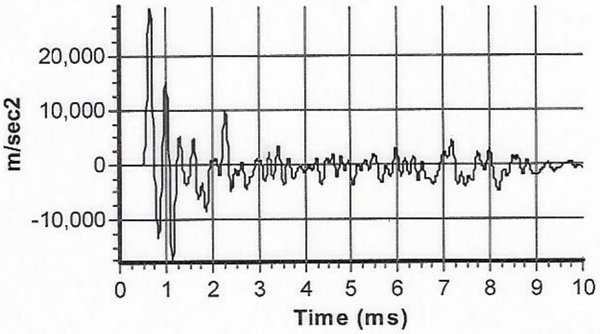
Force



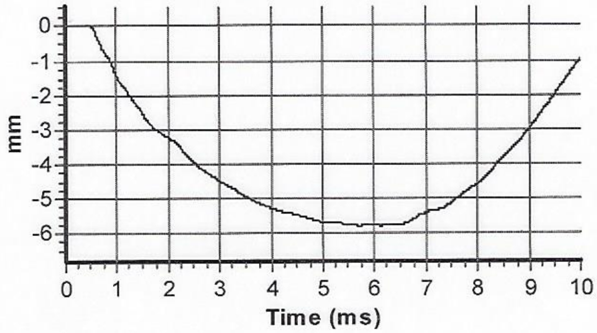
Velocity



Acceleration



Displacement



Calculations

Area of Rod A (mm2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 336

Energy Ratio E_r (%): **71**

N P Burrows

Signed: N P Burrows
Title: Field Operations Manager

The recommended calibration interval is 12 months

SPT Calibration Report

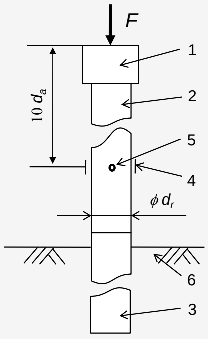
www.equipegroup.com

Hammer Energy Measurement Report

Type of Hammer		DART
Client		GSTL
Test No		EQU2067
Test Depth (m)		8.70
Mass of hammer	m =	63.5kg
Falling height	h =	0.76m
E_{theor} =	$m \times g \times h$ =	473J

Characteristics of the instrumented rod

Diameter	d_r =	0.052 m
Length of instrumented rod		0.558 m
Area	A =	11.61 cm²
Modulus	E_a =	206843 MPa



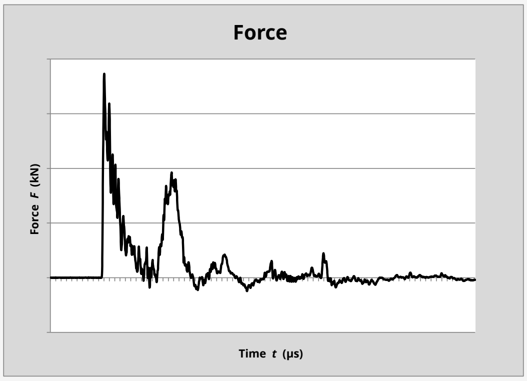
Key

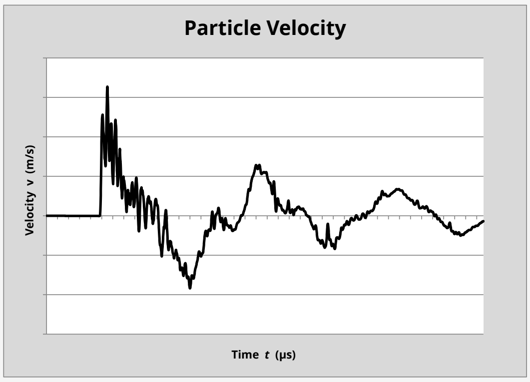
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

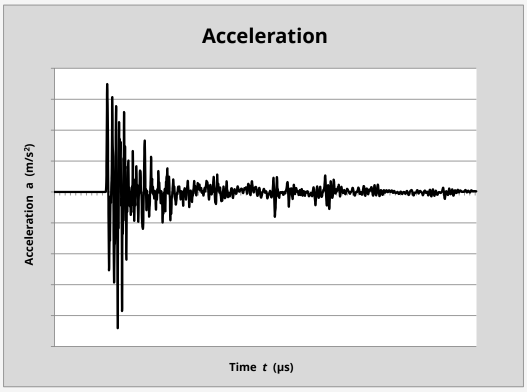
F Force
d_r Diameter of rod

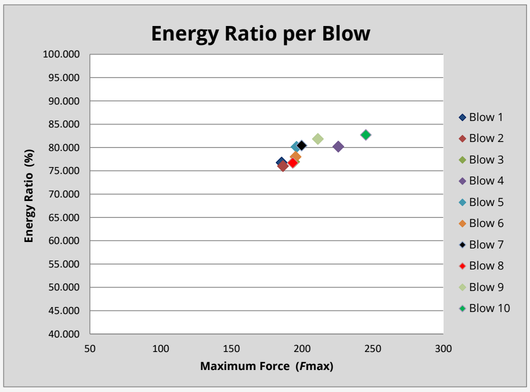
Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

DATE OF TEST	VALID UNTIL	HAMMER ID
09/04/2018	09/04/2019	219









Observations:
1.

E_{meas} = **0.372** kN-m

E_{theor} = **0.473** kN-m

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$
(E_r)

78.68%

Equipe SPT Analyzer Operators: **AF**

Prepared by:		**Checked by:**		**Date:**	**11/04/2018**

APPENDIX E - Monitoring Data

10020221 - Epsom Hospital - Plot 2A - Groundwater Monitoring Data

Ground and Groundwater Elevations

Monitoring Well	Surface Elevation (m AOD)	pH	Temp.	Conductivity	ORP	Dissolved Oxygen	Depth to LNAPL	Thickness of LNAPL	Comments	Depth to Groundwater	Depth to Base	Groundwater Elevation
			(°C)	(mS/cm)	mV	(mg/l)	(m bgl)	(mm)		(m bgl)	(m bgl)	(mAOD)
23-Aug-18												
BH101	62.4	GRAB SAMPLE					-	-	Cloudy, dark brown	12.55	15.14	49.86
BH102 (S)	59.46	6.92	22.06	1791	-139.0	0.34	-	-	Clear, colourless	1.56	3.05	57.91
BH102 (D)	59.46	6.87	18.82	1657	-109.8	0.32	-	-	Clear, colourless	1.56	13.46	57.91
BH104 (S)	59.61	7.35	21.03	771	-15.9	0.15	-	-	Cloudy, dark greenish grey	1.60	12.56	58.02
BH104 (D)	59.61	7.20	17.92	871	-145.1	0.10	-	-	Cloudy, dark greenish grey	1.09	11.67	58.52
WS101	62.62	NO GROUNDWATER ENCOUNTERED					-	-	-	DRY	2.09	N/A
WS102	60.89	GRAB SAMPLE					-	-	Cloudy, dark brown	4.33	4.35	56.56
WS103	59.37	NO GROUNDWATER ENCOUNTERED					-	-		DRY	0.99	N/A
WS104	59.45	GRAB SAMPLE					-	-	Cloudy, dark brown	1.70	2.13	57.76
WS105	59.01	NO WELL INSTALLATION					-	-	-	-	-	N/A

Notes:

m bgl	Metres below ground level
m AOD	Metres Above Ordnance Datum
-	No LNAPL encountered
LNAPL	Light Non-Aqueous Phase Liquid

Project:	Epsom Hospital		
Job Number:	10020221	**Date:**	31/08/2018

Weather:	Overcast with bright spells
Engineer:	SAS

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
AMB	31/08/2018 0900	1010	16	Peak:	Peak:	Initial	0		0.1	20.4	0	0						
						30												
						60												
						90												
				Steady:	Steady:	120												
						150												
						180												
WS101	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		0.1	16.7						Dry	2.09	
						30	0		5.9	15.9								
						60	0.1		6.1	15.9								
						90	0.1		6.3	15.9								
				Steady:	Steady: 0	120	0.1		6.4	15.7								
						150	0.1		6.4	15.7								
						180	0.1		6.4	15.7								
WS102	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		0.1	20.8						4.33	4.35	
						30	0		0.9	20.1								
						60	0.1		1.2	19.7								
						90	0.1		1.9	19.7								
				Steady:	Steady: 0	120	0.1		1.9	19.7								
						150	0.2		1.9	19.7								
						180	0.2		1.9	19.7								
WS103	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		0.1	20.7						Dry	0.99	
						30	0		0.5	20.1								
						60	0.1		1.1	20.1								
						90	0.1		1.2	20.1								
				Steady:	Steady: 0	120	0.1		1.2	20.1								
						150	0.1		1.2	20.1								
						180	0.1		1.2	20.1								
WS04	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		0.1	20.1						1.89	2.13	
						30	0.1		1.3	18.4								
						60	0.2		2.2	17.9								
						90	0.2		2.5	17.9								
				Steady:	Steady: 0	120	0.2		2.5	17.9								
						150	0.2		2.6	17.9								
						180	0.2		2.6	17.9								

Notes:

Previous weather conditions, Atmosphic pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open tap, datum level, vegetation stress, odours, bubbles, etc.

Ambient Concentration	
CH4	
CO2	

Project:	Epsom Hospital		
Job Number:	**10020221**	**Date:**	31/08/2018

Weather:	**Overcast with bright spells**
Engineer:	**SAS**

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH101	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		1.2	16.6						12.55	14.92	
						30	0		3.1	15.2								
						60	0.1		3.5	14.8								
						90	0.1		3.7	14.3								
				Steady:	Steady: 0	120	0.2		3.7	14.1								
						150	0.2		3.7	14.1								
						180	0.2		3.7	14.1								
BH102A	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0.1		0.2	20.4						1.55	3.05	
						30	0.1		0.2	20.2								
						60	0.1		0.3	20.1								
						90	0.2		0.4	20.1								
				Steady:	Steady: 0	120	0.2		0.4	20.1								
						150	0.2		0.4	20.1								
						180	0.2		0.4	20.1								
BH102B	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0.1		0.1	20.4						1.55	13.49	
						30	0.1		0.2	20.1								
						60	0.2		0.4	20.1								
						90	0.2		0.4	20.1								
				Steady:	Steady: 0	120	0.2		0.4	20.1								
						150	0.2		0.4	20.1								
						180	0.2		0.4	20.1								
BH104A	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		1.2	20.1						1.55	2.55	
						30	0		1.7	19.9								
						60	0.1		2.1	19.3								
						90	0.1		2.1	19.3								
				Steady:	Steady: 0	120	0.1		2.4	19.3								
						150	0.2		2.4	19.3								
						180	0.2		2.4	19.3								
BH104B	31/08/2018 0900	1021	16	Peak:	Peak: 0	Initial	0		2.1	20.1						1.55	11.7	
						30	0		2.5	18.6								
						60	0.1		2.5	17.9								
						90	0.1		2.5	17.9								
				Steady:	Steady: 0	120	0.1		2.5	17.9								
						150	0.2		2.5	17.9								
						180	0.2		2.5	17.9								

Notes:

Previous weather conditions, Atmosphic pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open tap, datum level, vegetation stress, odours, bubbles, etc.

Ambient Concentration	
CH4	
CO2	
H2S	

ARCADIS

Project:	Epsom Hospital - Plot 2A			**Weather:**		Overcast with bright spells
Job Number:	10020221	**Date:**	13/09/2018	**Engineer:**		SC

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Surface Elevation (m AOD)	Depth to Water (m)	Depth to base (m)	Groundwater Elevation	Comments (all readings from GL, note datum height if different)
AMB	13/9/18 1000	1018	17	N/A	N/A	N/A	0.0	0.0	0.1	20.4	0.0	0.0	0.0	0.0	N/A	N/A	N/A	N/A	N/A	
BH101	13/9/18 1005	1018	18	Peak:	Peak: 0	Initial	0.0		1.2	16.6						62.40	12.52	14.92	49.88	
						30	0.0		3.1	15.5										
						60	0.1		3.5	15.1										
						90	0.1		3.7	14.5										
				Steady:	Steady: 0	120	0.2		3.7	14.1										
						150	0.2		3.7	14.1										
						180	0.2		3.7	14.1										
BH102 (S)	13/9/18 1015	1018	18	Peak:	Peak: 0	Initial	0.1		0.2	20.4						59.46	1.53	3.05	57.93	
						30	0.1		0.2	20.2										
						60	0.1		0.3	20.1										
						90	0.2		0.4	20.1										
				Steady:	Steady: 0	120	0.2		0.4	20.1										
						150	0.2		0.4	20.1										
						180	0.2		0.4	20.1										
BH102 (D)	13/9/18 1020	1018	18	Peak:	Peak: 0	Initial	0.1		0.1	20.4						59.46	1.55	13.49	57.91	
						30	0.1		0.2	20.1										
						60	0.2		0.4	20.1										
						90	0.2		0.4	20.1										
				Steady:	Steady: 0	120	0.2		0.4	20.1										
						150	0.2		0.4	20.1										
						180	0.2		0.4	20.1										
BH104 (S)	13/9/18 1030	1018	18	Peak:	Peak: 0	Initial	0.0		1.2	20.1						59.61	1.54	2.55	58.07	
						30	0.0		1.7	19.9										
						60	0.1		2.1	19.3										
						90	0.1		2.1	19.3										
				Steady:	Steady: 0	120	0.1		2.4	19.3										
						150	0.2		2.4	19.3										
						180	0.2		2.4	19.3										
BH104 (D)	13/9/18 1040	1021	16	Peak:	Peak: 0	Initial	0.0		2.1	20.1						59.61	1.55	11.7	58.06	
						30	0.0		2.5	18.6										
						60	0.1		2.5	17.9										
						90	0.1		2.5	17.9										
				Steady:	Steady: 0	120	0.1		2.5	17.9										
						150	0.2		2.5	17.9										
						180	0.2		2.5	17.9										

Project:	**Epsom Hospital - Plot 2A**			**Weather:**		**Overcast with bright spells**	
Job Number:	**10020221**	**Date:**	13/09/2018	**Engineer:**		**SC**	

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Surface Elevation (m AOD)	Depth to Water (m)	Depth to base (m)	Groundwater Elevation	Comments (all readings from GL, note datum height if different)
WS101	13/9/18 1045	1018	18	Peak:	Peak: 0	N/A	0.0		0.1	17.0						62.62	Dry	2.09	N/A	
						30	0.0		5.9	16.2										
						60	0.1		6.1	15.9										
						90	0.1		6.3	15.9										
				Steady:	Steady: 0	120	0.1		6.4	15.8										
						150	0.1		6.4	15.8										
						180	0.1		6.4	15.7										
WS102	13/9/18 1055	1018	18	Peak:	Peak: 0	Initial	0.0		0.1	20.8						60.89	4.3	4.35	56.59	
						30	0.0		0.9	20.1										
						60	0.1		1.2	19.7										
						90	0.1		1.9	19.7										
				Steady:	Steady: 0	120	0.1		1.9	19.7										
						150	0.2		1.9	19.7										
						180	0.2		1.9	19.7										
WS103	13/9/18 1105	1018	18	Peak:	Peak: 0	Initial	0.0		0.1	20.7						59.37	Dry	0.99	N/A	
						30	0.0		0.5	20.1										
						60	0.1		1.1	20.1										
						90	0.1		1.2	20.1										
				Steady:	Steady: 0	120	0.1		1.2	20.1										
						150	0.1		1.2	20.1										
						180	0.1		1.2	20.1										
WS104	13/9/18 1115	1018	18	Peak:	Peak: 0	Initial	0.0		0.1	20.1						59.45	1.84	2.13	57.61	
						30	0.1		1.3	18.9										
						60	0.2		2.2	18.4										
						90	0.2		2.5	18.2										
				Steady:	Steady: 0	120	0.2		2.5	18.0										
						150	0.2		2.6	17.9										
						180	0.2		2.6	17.9										

ARCADIS

Project:	**Epsom Hospital - Plot 2A**		
Job Number:	**10020221**	**Date:**	28/09/2018

Weather:	**Overcast**
Engineer:	**M.T**

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH101	28/09/2018 07:50	1023	10	Peak: 0 Steady: 0	Peak: 0.1 Steady: 0	30	0.1	1.0	4.8	14.9	0	6	-	-	0.1	5.66	15.12	
						60	0.1	1.0	4.8	14.9	0	6	-	-				
						90	0.1	1.0	4.8	14.9	0	6	-	-				
						120	0.1	1.0	4.8	14.9	0	6	-	-				
						150	0.1	1.0	4.8	14.9	0	6	-	-				
						180	0.1	1.0	4.8	14.9	0	6	-	-				
BH102 (Shallow)	28/09/2018 08:00	1023	10	Peak: 0 Steady: 0	Peak: 0 Steady: 0	30	0.2	4.0	7.0	12.4	0	7	-	-	0	1.41	2.99	
						60	0.2	4.0	7.0	12.4	0	7	-	-				
						90	0.2	4.0	7.0	12.4	0	7	-	-				
						120	0.2	4.0	7.0	12.4	0	7	-	-				
						150	0.2	4.0	7.0	12.4	0	6	-	-				
						180	0.2	4.0	7.0	12.4	0	6	-	-				
BH102 (Deep)	28/09/2018 08:05	1023	11	Peak: 0 Steady: 0	Peak: 0 Steady: 0	30	0.2	4.0	6.6	13.0	0	9	-	-	0	1.42	13.50	
						60	0.2	4.0	6.6	13.0	0	9	-	-				
						90	0.2	4.0	6.4	12.9	0	8	-	-				
						120	0.2	4.0	6.4	12.9	0	8	-	-				
						150	0.2	4.0	6.4	12.9	0	8	-	-				
						180	0.2	4.0	6.5	12.8	0	7	-	-				
BH104	28/09/2018 10:05	1024	10	Peak: N/A Steady: N/A	Peak: N/A Steady: N/A	-	-	-	-	-	-	-	-	-	-	-	-	Covered by car - unable to monitor
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				

ARCADIS

Project:	**Epsom Hospital - Plot 2A**		
Job Number:	**10020221**	**Date:**	28/09/2018

Weather:	**Overcast**
Engineer:	**M.T**

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH_4 (% v/v)	LEL (%)	CO_2 (% v/v)	O_2 (% v/v)	H_2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS 101	28/09/2018 08:10	1022	11	Peak: 0 Steady: 0	Peak: 0 Steady: 0	30	0.1	1.0	5.5	17.4	0	5	-	-	0	Dry	2.08	
						60	0.1	1.0	5.5	17.4	0	5	-	-				
						90	0.1	1.0	5.5	17.4	0	5	-	-				
						120	0.1	1.0	5.6	17.3	0	5	-	-				
						150	0.1	1.0	5.6	17.3	0	5	-	-				
						180	0.1	1.0	5.7	17.2	0	5	-	-				
WS 102	28/09/2018 08:20	1023	11	Peak: 0 Steady: 0	Peak: 0 Steady: 0	30	0.1	1.0	1.7	20.6	0	5	-	-	0	0.48	4.34	
						60	0.1	1.0	1.8	20.6	0	5	-	-				
						90	0.1	1.0	1.6	20.7	0	5	-	-				
						120	0.1	1.0	0.9	20.9	0	5	-	-				
						150	0.1	1.0	0.7	21.1	0	5	-	-				
						180	0.1	1.0	0.3	21.2	0	5	-	-				
						210	0.1	1.0	0.1	21.3	0	5	-	-				
WS 103	28/09/2018 09:50	1024	10	Peak: 0 Steady: 0	Peak: 0 Steady: 0	30	0.1	1.0	0.2	21.2	0	4	-	-	0	Dry	0.99	
						60	0.1	1.0	0.2	21.2	0	4	-	-				
						90	0.1	1.0	0.2	21.2	0	4	-	-				
						120	0.1	1.0	0.2	21.2	0	4	-	-				
						150	0.1	1.0	0.2	21.2	0	4	-	-				
						180	0.1	1.0	0.2	21.2	0	4	-	-				
WS 104	28/09/2018 10:05	1024	10	Peak: N/A Steady: N/A	Peak: N/A Steady: N/A	-	-	-	-	-	-	-	-	-	-	-	-	Covered by wood inside of workers compound - unable to monitor
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				
						-	-	-	-	-	-	-	-	-				

APPENDIX F - Geotechnical Laboratory Data

UKAS TESTING
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Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 40565

Client Ref: **10020221**
Client PO:

Report Date: **14-09-2018**

Client **Arcadis**
Fortran Rd
St Mellons
Cardiff
CF3 0EY

Contract Title: **Epsom Hospital-Plot 2A**
For the attention of: **Mark Wilson**

Date Received: **03-09-2018**
Date Commenced: **03-09-2018**
Date Completed: **14-09-2018**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	22
4 Point Liquid & Plastic Limit (LL/PL) BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	15
One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days) BS 1377:1990 - Part 5 : 3 - * UKAS	1
Quick Undrained Triaxial Compression Test - Multi-stage Loading of a single specimen (100mm diameter) BS1377 : 1990 Part 7 : 9 - * UKAS	3
(GI) BRE SD1 Reduced Suite pH, Acid Soluble Sulphate, Water Soluble Sulphate and Total Sulphur BS 1377:1990 - Part 3 & BRE CP2/79 - @ Non Accredited Test	7
Disposal of samples for job	1

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

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant)
Wayne Honey (Administrative/Quality Assistant)

GSTL

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)
DESCRIPTIONS

Contract Number	**40565**	
Site Name	**Epsom Hospital-Plot 2A**	

Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH101	5	D	1.20	-	1.65	Brown sandy fine to coarse gravelly silty CLAY.
BH101	10	D	3.00	-	3.10	Brown silty CLAY.
BH101	15	D	6.00	-	6.10	Brown silty CLAY.
BH102	8	D	3.00	-	3.10	Dark grey fine to medium gravelly clayey SILT.
BH102	9	D	4.00	-	4.45	Grey silty CLAY.
BH102	12	D	5.00	-	5.10	Grey silty CLAY.
BH104	12	D	3.00	-	3.45	Greyish brown fine to coarse gravelly sandy silty CLAY.
BH104	15	U	4.00	-	4.45	Brown silty CLAY.
WS101	4	B	0.80	-	1.00	Dark grey fine to medium gravelly clayey SILT.
WS101	8	I	2.00	-	3.00	Brown silty CLAY.
WS102	9	D	1.20	-	1.65	Brown sandy fine to coarse gravelly silty CLAY.
WS102	10	D	2.00	-	2.45	Brown silty CLAY.
WS102	6	I	2.00	-	3.00	Brown sandy fine to coarse gravelly silty CLAY.
WS102	11	D	3.00	-	3.45	Greyish brown fine to coarse gravelly sandy silty CLAY.
WS103	4	B	0.70	-	0.90	Dark grey fine to medium gravelly clayey SILT.
WS104	5	B	0.90	-	1.20	Brown sandy fine to coarse gravelly silty CLAY.
WS104	7	I	2.00	-	3.00	Greyish brown fine to coarse gravelly sandy silty CLAY.
WS104	8	I	3.00	-	4.00	Greyish brown fine to coarse gravelly sandy silty CLAY.
				-		
				-		

Operators	Checked	25/09/2018	Emma Sharp	
RO/MH	Approved	26/09/2018	Paul Evans	D P Evans

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GSTL

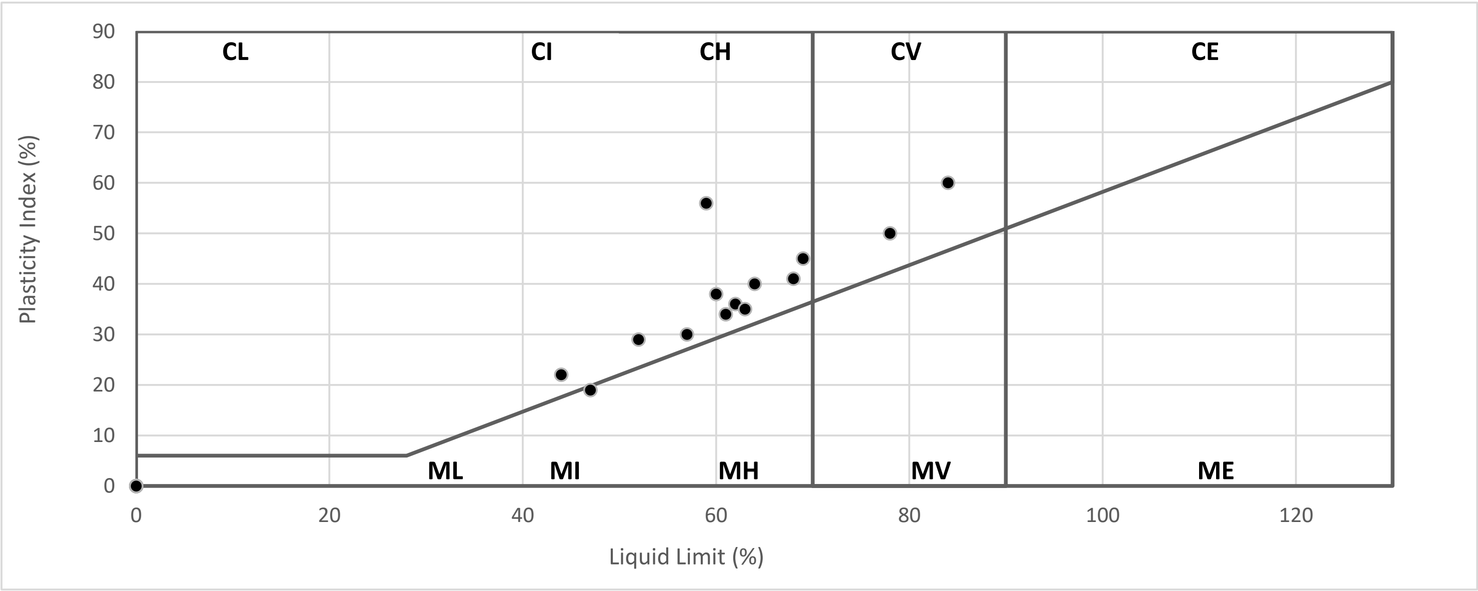
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)

Contract Number	**40565**	
Site Name	**Epsom Hospital-Plot 2A**	

Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
BH101	5	D	1.20	-	1.65	22	58	24	34	64	CH High Plasticity
BH101	10	D	3.00	-	3.10	27	44	22	22	100	CI Intermediate Plasticity
BH101	15	D	6.00	-	6.10	28					
BH102	8	D	3.00	-	3.10	36	47	28	19	76	MI Intermediate Plasticity
BH102	9	D	4.00	-	4.45	31					
BH102	12	D	5.00	-	5.10	28	78	28	50	100	CV Very High Plasticity
BH104	12	D	3.00	-	3.45	27	59	3	56	53	CH High Plasticity
BH104	15	U	4.00	-	4.45	27	57	27	30	100	CH High Plasticity
WS101	4	B	0.80	-	1.00	9.2					
WS101	8	I	2.00	-	3.00	24	63	28	35	100	CH High Plasticity
WS102	9	D	1.20	-	1.65	25	60	22	38	100	CH High Plasticity
WS102	10	D	2.00	-	2.45	25	52	23	29	100	CH High Plasticity
WS102	6	I	2.00	-	3.00	22	61	27	34	82	CH High Plasticity
WS102	11	D	3.00	-	3.45	26	64	24	40	100	CH High Plasticity
WS103	4	B	0.70	-	0.90	9.1					
WS104	5	B	0.90	-	1.20	12					
WS104	7	I	2.00	-	3.00	31	84	24	60	85	CV Very High Plasticity
WS104	8	I	3.00	-	4.00	34	68	27	41	88	CH High Plasticity
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	25/09/2018	Emma Sharp	
DB	Approved	26/09/2018	Paul Evans	D P Evans

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GSTL	**Certificate of Chemical Analysis (BRE BR 279)**	**Contract Number**	40565
		Client Reference	10020221
Client	Arcadis	**Date Received**	
Site Name	Epsom Hospital - Plot 2A	**Date Started**	06/09/2018
		Date Completed	26/09/2018
		No. of Samples	7

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
BH101	5	D	1.20	-	1.65	0.51	0.12		7.17	0.20		
BH101	15	D	6.00	-	6.10	0.41	0.09		7.63	0.16		
BH102	8	D	3.00	-	3.10	0.45	0.10		6.51	0.17		
WS101	4	B	0.80	-	1.00	0.39	0.09		7.52	0.16		
WS103	4	B	0.70	-	0.90	0.41	0.08		7.41	0.17		
WS104	5	B	0.90	-	1.20	0.33	0.09		7.39	0.14		
				-								
				-								
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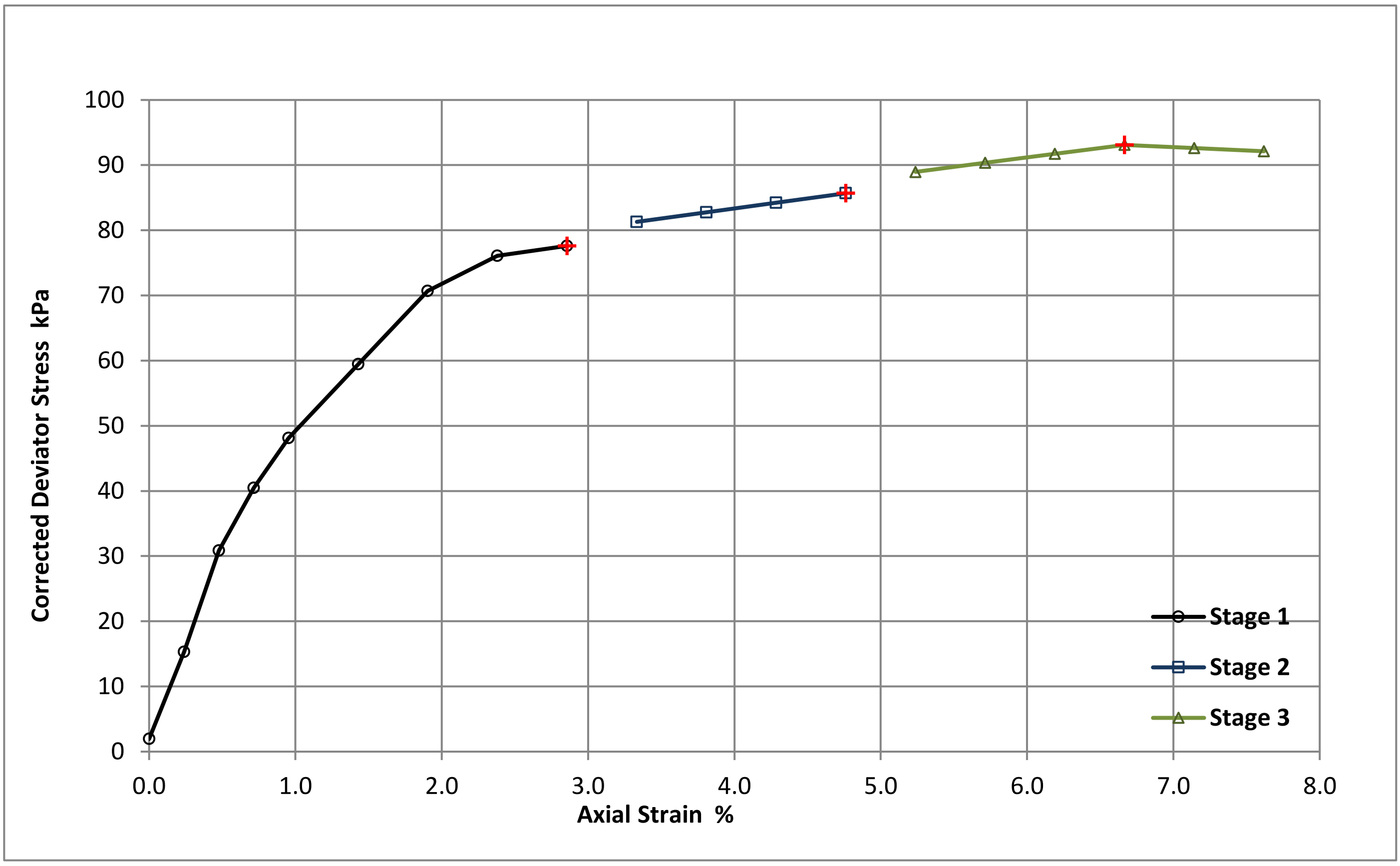
Key	**Reported As**
Acid Soluble Sulphate	% SO_4
Aqueous Extract Sulphate	g/l SO_4
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO_4
Nitrate	NO_3 mg/l

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	
Darren Bourne	Date	26/09/2018		

GSTL	Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9	Contract Number	40565
		Borehole/Pit No.	BH102
Site Name	Epsom Hospital-Plot 2A	Sample No.	9
Soil Description	Grey silty CLAY	Depth Top	4.00
		Depth Base	4.45
		Sample Type	U



Moisture Content (%)	31		
Bulk Density (Mg/m^3)	1.84		
Dry Density (Mg/m^3)	1.41		
Specimen Length (mm)	210		
Specimen Diamteter (mm)	104		
Cell Pressures (kPa)	100	125	150
Deviator Stress (kPa)	78	86	93
Undrained Shear Strength (kPa)	39	43	47
Failure Strain (%)	2.9	4.8	6.7
Mode Of Failure	Compound		
Mrmbrane Used/Thickness	Rubber/0.3mm		
Rate of Strain (%/min)	3.00		

Specimen Post Test

Sample Split

Checked	13/09/2018	Ben Sharp	
Approved	14/09/2018	Paul Evans	D P Evans

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APPENDIX G - Geo-Environmental Laboratory Data

UKAS TESTING 4041

Ian Parsons
Arcadis Consulting (UK) Ltd
5th Floor
The Pithay
Bristol
BS1 2NL

t: 01173721360

e: ian.parsons@arcadis.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 18-97270-A

Replaces Analytical Report Number : 18-97270, issue no. 2

Project / Site name: Epsom Hospital Plot 2A

Samples received on: 21/08/2018

Your job number: 10020221

Samples instructed on: 21/08/2018

Your order number:

Analysis completed by: 10/09/2018

Report Issue Number: 3

Report issued on: 13/09/2018

Samples Analysed: 3 soil samples

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 18-97270-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1028125	1028126	1028127		
Sample Reference				BH101	WS102	WS102		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	0.30	0.80		
Date Sampled				15/08/2018	15/08/2018	15/08/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	5.9	6.7	9.5		
Total mass of sample received	kg	0.001	NONE	1.7	1.4	1.6		

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001		
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	6.9	7.2		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.015	0.31		
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	0.025	-		

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	0.14	0.20	0.48		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13		
Fluoranthene	mg/kg	0.05	MCERTS	0.46	0.71	1.4		
Pyrene	mg/kg	0.05	MCERTS	0.44	0.60	1.2		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.23	0.36	0.68		
Chrysene	mg/kg	0.05	MCERTS	0.31	0.39	0.75		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.45	0.70	1.3		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.19	0.19	0.37		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.36	0.45	0.93		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.19	0.26	0.50		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.23	0.34	0.60		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.00	4.20	8.30		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	10	23		
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	1.6	4.1		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	18	23		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	29	50		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130	140	450		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.3	0.6		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	11	22		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64	110	170		

Analytical Report Number: 18-97270-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1028125	1028126	1028127		
Sample Reference				BH101	WS102	WS102		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	0.30	0.80		
Date Sampled				15/08/2018	15/08/2018	15/08/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	-	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0		

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-		
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-		
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	< 8.0	-		
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	< 8.0	-		
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-		

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001	-		
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-		
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-		
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	< 10	-		
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	17	-		
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	17	-		

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	43		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	53		

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1028127	WS102	0.80	135	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 18-97270-A

Project / Site name: Epsom Hospital Plot 2A

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1028125	BH101	None Supplied	0.50	Brown loam and sand with gravel and vegetation.
1028126	WS102	None Supplied	0.30	Brown loam and sand with gravel.
1028127	WS102	None Supplied	0.80	Brown clay and sand with gravel.

Analytical Report Number : 18-97270-A

Project / Site name: Epsom Hospital Plot 2A

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

Analytical Report Number : 18-97270-A

Project / Site name: Epsom Hospital Plot 2A

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 18-97314-A

Replaces Analytical Report Number : 18-97314, issue no. 3

Project / Site name:	Epsom Hospital Plot 2A	**Samples received on:**	21/08/2018
Your job number:	10020221	**Samples instructed on:**	22/08/2018
Your order number:		**Analysis completed by:**	10/09/2018
Report Issue Number:	4	**Report issued on:**	13/09/2018
Samples Analysed:	7 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Analytical Report Number: 18-97314-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1028357	1028358	1028360	1028361	1028362
Sample Reference				BH102	BH102	WS101	WS101	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.80	0.40	1.00	0.30
Date Sampled				17/08/2018	17/08/2018	16/08/2018	16/08/2018	16/08/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	5.8	2.5	8.6	1.8	5.8
Total mass of sample received	kg	0.001	NONE	0.44	0.39	0.41	0.35	0.36

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.011	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	0.011	< 0.001	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.2	11.2	8.6	8.8	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.082	0.12	0.55	0.15	0.097

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.44	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.33	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.33	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	3.2	1.7	< 0.05	0.19	3.4
Anthracene	mg/kg	0.05	MCERTS	1.2	0.53	< 0.05	< 0.05	1.1
Fluoranthene	mg/kg	0.05	MCERTS	16	7.3	0.41	0.34	5.2
Pyrene	mg/kg	0.05	MCERTS	15	7.3	0.38	0.28	4.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	11	4.3	0.19	0.13	2.2
Chrysene	mg/kg	0.05	MCERTS	7.6	3.6	0.29	0.18	2.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	12	5.7	0.41	< 0.05	2.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.3	1.4	0.21	< 0.05	0.97
Benzo(a)pyrene	mg/kg	0.05	MCERTS	10	4.3	0.47	< 0.05	2.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.5	2.0	0.26	< 0.05	1.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.6	0.67	< 0.05	< 0.05	0.39
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.7	2.3	0.36	< 0.05	1.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	93.8	41.0	2.98	1.12	27.0

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	9.8	9.9	5.4	9.2
Boron (water soluble)	mg/kg	0.2	MCERTS	2.5	2.2	1.0	0.8	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	39	19	18	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	32	30	23	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	57	88	160	62	240
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	22	11	14	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	73	44	66	35	110

Lab Sample Number				1028357	1028358	1028360	1028361	1028362
Sample Reference				BH102	BH102	WS101	WS101	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.80	0.40	1.00	0.30
Date Sampled				17/08/2018	17/08/2018	16/08/2018	16/08/2018	16/08/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Petroleum Hydrocarbons								
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	2.1	-	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	10	-	< 2.0	3.6
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	52	-	< 8.0	12
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	24	-	< 8.0	15
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	88	-	< 10	30
TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001	-	< 0.001	< 0.001
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	< 0.001
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	2.4	-	< 1.0	1.5
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	11	-	< 2.0	7.2
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	97	-	< 10	33
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	230	-	70	77
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	340	-	70	120
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	8.3	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	79	-	25	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	68	-	150	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	150	-	180	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	7.0	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	44	-	3.4	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	180	-	15	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	440	-	350	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	670	-	370	-	-

Analytical Report Number: 18-97314-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1028363	1028364			
Sample Reference				WS104	WS105			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.40	0.40			
Date Sampled				16/08/2018	16/08/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	29	< 0.1			
Moisture Content	%	N/A	NONE	10	5.3			
Total mass of sample received	kg	0.001	NONE	0.50	0.38			

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-			
Asbestos Quantification Total	%	0.001	ISO 17025	-	-			

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.0			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	0.017			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.30			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.22			
Phenanthrene	mg/kg	0.05	MCERTS	0.39	3.2			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.68			
Fluoranthene	mg/kg	0.05	MCERTS	1.0	4.4			
Pyrene	mg/kg	0.05	MCERTS	0.92	3.6			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.48	2.4			
Chrysene	mg/kg	0.05	MCERTS	0.52	1.9			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.76	2.9			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.30	1.2			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.56	2.5			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.27	1.2			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.36	1.5			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.58	26.0			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.4	18			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.7			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	25			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	64			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	260	540			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.8			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	20			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	61	130			

Analytical Report Number: 18-97314-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1028363	1028364			
Sample Reference				WS104	WS105			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.40	0.40			
Date Sampled				16/08/2018	16/08/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-			
Toluene	µg/kg	1	MCERTS	< 1.0	-			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-			
o-xylene	µg/kg	1	MCERTS	< 1.0	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-			
Petroleum Hydrocarbons								
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001			
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001			
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0			
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0			
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	< 8.0			
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	< 8.0			
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10			
TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001			
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001			
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0			
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0			
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	19			
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	57			
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	76			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	10	-			

Analytical Report Number: **18-97314**
Project / Site name: **Epsom Hospital**
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1028357	BH102	0.20	132	Loose Fibres & Loose Fibrous Debris	**Chrysotile**	0.011	**0.011**
1028358	BH102	0.80	123	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 18-97314-A

Project / Site name: Epsom Hospital Plot 2A

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1028357	BH102	None Supplied	0.20	Brown loam and sand with rubble and brick.
1028358	BH102	None Supplied	0.80	Brown loam and sand with rubble and brick.
1028360	WS101	None Supplied	0.40	Brown loam and sand with rubble and vegetation.
1028361	WS101	None Supplied	1.00	Brown loam and sand with rubble and brick.
1028362	WS103	None Supplied	0.30	Light brown loam and sand with brick and vegetation.
1028363	WS104	None Supplied	0.40	Brown loam and clay with stones and gravel
1028364	WS105	None Supplied	0.40	Brown loam and sand with vegetation and gravel.

Analytical Report Number : 18-97314-A

Project / Site name: Epsom Hospital Plot 2A

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 18-97669-A

Replaces Analytical Report Number : 18-97669, issue no. 3

Project / Site name:	Epsom Hospital Plot 2A	**Samples received on:**	23/08/2018
Your job number:	10020221	**Samples instructed on:**	23/08/2018
Your order number:		**Analysis completed by:**	10/09/2018
Report Issue Number:	4	**Report issued on:**	13/09/2018
Samples Analysed:	3 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Lab Sample Number				1030518	1030519	1030520		
Sample Reference				BH104	BH104	BH104		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.00-0.50	0.70-0.80	1.20-1.30		
Date Sampled				22/08/2018	22/08/2018	22/08/2018		
Time Taken				1100	1100	1100		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	26		
Moisture Content	%	N/A	NONE	0.00	11	4.2		
Total mass of sample received	kg	0.001	NONE	0.95	1.2	1.2		
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	8.4	8.1		
Total Cyanide	mg/kg	1	MCERTS	-	< 1	< 1		
Free Cyanide	mg/kg	1	MCERTS	-	< 1	< 1		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.045	0.020		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	-	0.54	< 0.05		
Pyrene	mg/kg	0.05	MCERTS	-	0.50	< 0.05		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.32	< 0.05		
Chrysene	mg/kg	0.05	MCERTS	-	0.33	< 0.05		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.37	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.16	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.24	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	2.46	< 0.80		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	11	11		
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.4	0.5		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.3	0.3		
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	23	25		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	98	15		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	190	30		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	17	21		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	82	34		

Analytical Report Number: 18-97669-A

Project / Site name: Epsom Hospital Plot 2A

Lab Sample Number				1030518	1030519	1030520		
Sample Reference				BH104	BH104	BH104		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.00-0.50	0.70-0.80	1.20-1.30		
Date Sampled				22/08/2018	22/08/2018	22/08/2018		
Time Taken				1100	1100	1100		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-		
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-		
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	< 8.0	-		
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	< 8.0	-		
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-		

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001	-		
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-		
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-		
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-		
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	< 10	-		
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	< 10	-		
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-		

Miscellaneous Organics

Coal Tar	mg/kg	10	NONE	< 10.0	-	-		

Analytical Report Number : 18-97669-A

Project / Site name: Epsom Hospital Plot 2A

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1030518	BH104	None Supplied	0.00-0.50	Black tar with gravel. **
1030519	BH104	None Supplied	0.70-0.80	Brown loam and clay with gravel.
1030520	BH104	None Supplied	1.20-1.30	Brown clay and sand with gravel and stones.

** Non MCERTS matrix.

Analytical Report Number : 18-97669-A

Project / Site name: Epsom Hospital Plot 2A

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Coal Tar in Soil	In-house method by GC-MS, by calculation of discrete polyaromatic content.	In-house method by calculation	L064-UK	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 18-97864-A

Project / Site name:	Epsom Hospital - Plot 2A	**Samples received on:**	24/08/2018
Your job number:	10020221	**Samples instructed on:**	24/08/2018
Your order number:		**Analysis completed by:**	04/09/2018
Report Issue Number:	1	**Report issued on:**	05/09/2018
Samples Analysed:	6 water samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-97864-A

Project / Site name: Epsom Hospital - Plot 2A

Lab Sample Number				1031733	1031734	1031736	1031737	1031738
Sample Reference				BH102 (s)	BH102 (d)	BH104 (s)	BH104 (d)	BH101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				23/08/2018	23/08/2018	23/08/2018	23/08/2018	23/08/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.9	6.8	7.5	7.3	7.7
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	45	ISO 17025	5010	21100	106000	84600	438000
Sulphate as SO_4	mg/l	0.045	ISO 17025	5.0	21.1	106	84.6	438
Alkalinity	mgCaCO3/l	3	ISO 17025	180	140	530	600	460
Dissolved Oxygen	mg/l	1	NONE	1.9	1.3	< 1.0	< 1.0	-
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	24.9	21.2	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	1.52	0.84	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	4.13	1.95	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	3.25	1.08	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	0.19	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	0.30	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	34.3	25.1	< 0.16	< 0.16	< 0.16
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.49	1.41	2.44	0.86	1.01
Boron (dissolved)	µg/l	10	ISO 17025	220	210	16	15	510
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Calcium (dissolved)	mg/l	0.012	ISO 17025	140	140	140	150	-
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	0.4
Copper (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	3.6	3.3
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.8	7.2	2.6	1.0	2.8
Selenium (dissolved)	µg/l	0.6	ISO 17025	2.4	2.7	6.0	4.0	11
Zinc (dissolved)	µg/l	0.5	ISO 17025	9.5	5.6	4.5	31	5.6

Analytical Report Number: 18-97864-A

Project / Site name: Epsom Hospital - Plot 2A

Lab Sample Number				1031733	1031734	1031736	1031737	1031738
Sample Reference				BH102 (s)	BH102 (d)	BH104 (s)	BH104 (d)	BH101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				23/08/2018	23/08/2018	23/08/2018	23/08/2018	23/08/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	8.7	9.3	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	26	21	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	260	140	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	480	200	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	120	37	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	880	400	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	8.7	9.3	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	87	39	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	430	410	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	1500	770	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	1000	640	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	3100	1900	< 10	< 10	< 10

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number: 18-97864-A

Project / Site name: Epsom Hospital - Plot 2A

Lab Sample Number				1031739				
Sample Reference				WS104				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				23/08/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.3				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO_4	µg/l	45	ISO 17025	67400				
Sulphate as SO_4	mg/l	0.045	ISO 17025	67.4				
Alkalinity	mgCaCO3/l	3	ISO 17025	230				
Dissolved Oxygen	mg/l	1	NONE	-				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.40				
Boron (dissolved)	µg/l	10	ISO 17025	120				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.05				
Calcium (dissolved)	mg/l	0.012	ISO 17025	-				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0				
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4				
Copper (dissolved)	µg/l	0.5	ISO 17025	2.4				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.9				
Selenium (dissolved)	µg/l	0.6	ISO 17025	4.1				
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.2				

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Lab Sample Number				1031739				
Sample Reference				WS104				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				23/08/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number : 18-97864-A

Project / Site name: Epsom Hospital - Plot 2A

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Oxygen in water	Determination of dissolved oxygen.	In-house method	L086-PL	W	NONE
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH101		W	18-97864	1031738	cd	BTEX and MTBE in water (Monoaromatics)	L073B-PL	d
BH101		W	18-97864	1031738	cd	TPHCWG (Waters)	L070-PL	d
BH101		W	18-97864	1031738	cd	pH at 20oC in water (automated)	L099-PL	c
BH102 (d)		W	18-97864	1031734	c	Dissolved Oxygen in water	L086-PL	c
BH102 (d)		W	18-97864	1031734	c	pH at 20oC in water (automated)	L099-PL	c
BH102 (s)		W	18-97864	1031733	c	Dissolved Oxygen in water	L086-PL	c
BH102 (s)		W	18-97864	1031733	c	pH at 20oC in water (automated)	L099-PL	c
BH104 (d)		W	18-97864	1031737	c	Dissolved Oxygen in water	L086-PL	c
BH104 (d)		W	18-97864	1031737	c	pH at 20oC in water (automated)	L099-PL	c
BH104 (s)		W	18-97864	1031736	c	Dissolved Oxygen in water	L086-PL	c
BH104 (s)		W	18-97864	1031736	c	pH at 20oC in water (automated)	L099-PL	c
WS104		W	18-97864	1031739	c	pH at 20oC in water (automated)	L099-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

APPENDIX H - Geo-Environmental Risk Assessment Information

CONCEPTUAL SITE MODEL

General

The aim of the initial conceptual model and risk assessment is to provide a preliminary identification of the risks to controlled waters, proposed future site users and the surrounding area posed by any contamination present on site. The assessment is based on identification of ‘contaminant linkages’, i.e. contaminant-pathway-receptor relationships. This approach accords with the guidance that accompanies Part 2A of the Environmental Protection Act of 1990 where land is considered to be contaminated when ‘significant harm’ is occurring, or where there is the ‘significant possibility of significant harm’ or where significant pollution of controlled waters is being, or is likely to be caused. In such cases the contaminant linkage itself is defined as being ‘significant’.

A source of contamination and a pathway to receptors must be present for there to be a risk. The preliminary risk assessment assesses the strength of the link between the source, the pathway and the receptor.

Source - Contaminant that has potential to cause harm to environmental receptors. In a wider sense, sources can include particular ground conditions, for example the existence of redundant footings, which have the potential to impact on development proposals.

Pathway - The route by which the source is brought into contact with the receptor. This can include the transport of contamination via groundwater, wind-blown dust, vapours, excavation and deposition etc.

Receptor - Human beings, other living organisms, physical systems and built structures that could be affected by the source. A receptor will only be affected if a pathway from the source to the receptor is present. Groundwater and surface water systems can be considered as receptors in their own right as their quality is regulated by the statutory bodies, as well as being pathways for contaminant migration to other receptors.

ENVIRONMENTAL RISK ASSESSMENT

Qualitative Methodology

The risk assessment considers the potential sources, receptors and pathways identified in the Conceptual Site Model.

The environmental assessment has been undertaken with due regard to Contaminated Land Guidance Documents issued by the Department of the Environment Food and Rural Affairs (DEFRA). The Guidance requires a risk-based approach; with the potential environmental risk assessed qualitatively using the ‘source-pathway-target’ contaminant linkage concept contained in Part 2A of the Environment Protection Act. Unless specifically stated as relating to ‘Contaminated Land’ as defined in the Environmental Protection Act 1990 (as amended), references to ‘contamination’ and ‘contaminants’ relate in general terms to the presence of potentially hazardous substances, in, on or under the subject site.

Based on information presented in

- CIRIA C552 (2001) Contaminated Land Risk Assessment: A guide to good practice; and
- NHBC / EA/ CIEH (2008) R&D Publication 66: (Volume 1) Guidance for the Safe Development of Housing on Land Affected by Contamination
- DEFRA (2012) Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance

Risk assessment considers the identified sources, the potential receptors and the pathways linking them together.

The designation of risk is based upon the consideration of both:

a. **the severity of the potential consequence -** this takes into account both the potential severity of the hazard and the sensitivity of the receptor
b. **the magnitude of probability** (i.e. likelihood) - this takes into account both the presence of the hazard and receptor and the integrity of the pathway

Severity (consequence) can be defined as the adverse effects (or harm) arising from a defined hazard, which impairs the quality of human health or the environment in the short or longer term. Definitions of different categories of severity are detailed in Table 1 below.

Probability can be defined as the chance of a particular event occurring in a given period of time. Definitions of different categories of probability are detailed in Table 2 below.

A contaminant linkage must first be established before tests for probability and consequence are applied. If there is no contaminant linkage then there is no potential risk.

Table 1 - Classification of Potential Consequence (Severity)

	Human Health	**Controlled Water**	**Built Environment**[1]	**Ecosystems**[2]
Severe	Short term (acute) risk to human health. Concentrations present likely to result in "significant harm" as defined by Part 2A.	Substantial pollution of sensitive water resources.	Catastrophic damage to buildings, structures or the environment, including building collapse.	Major damage to aquatic or other ecosystem, which is likely to result in a substantial adverse change or irreversible change in its functioning or harm to a species of special interest.
Medium	Chronic damage to human health. Concentrations present that could result in significant harm.	Pollution of sensitive water resources or small scale pollution of sensitive water resources	Significant damage to buildings, structures or the environment making it unsafe to occupy, or damage that may impair a scheduled ancient monument.	Significant damage to aquatic or other ecosystems or organism forming part of an ecosystem that could endanger the long term maintenance of a population at that location.
Mild	Slight short term health effects to humans. Exposure to human health unlikely to lead to significant harm.	Pollution to non-sensitive water resources	Minor damage to sensitive buildings, structures, services or the environment.	Minor or short lived damage to aquatic or other ecosystems.
Minor	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.)	Insubstantial pollution to non-sensitive water resources	Easily repairable effects of damage to buildings or structures	Harm (although not necessarily significant harm which may result in financial loss or expenditure to resolve e.g. loss of plants in a landscape scheme).

1. Property includes crops including timber, produce grown domestically (gardens or allotments for consumption), livestock, other owned or domesticated animals or wild animals which are subject to shooting or fishing rights. It also includes buildings, meaning any structure or erection, but does not include plant or machinery within a building or buried services.
2. Where ecological system effects relate to a Site of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Nature Reserve (MNR), and areas of Special Protection for Birds, a "European site", or any habitat or site afforded protection under the Wildlife & Countryside Act 1981 and The Conservation of Habitats and Species Regulations 2010, i.e. candidate Special Areas of Conservation, potential Special Protection Areas and listed Ramsar sites.

Table 2 Classification of Probability

(Only applies if there is a possibility of a contaminant linkage being present)

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

Table 3 Classification of Risk

Once the severity and probability have been classified for a contaminant linkage they can be compared to produce a risk category from very high risk to very low risk as shown in the matrix below.

Consequence				
Severe	Moderate/Low	Moderate	High	Very High
Medium	Low	Moderate/Low	Moderate	High
Mild	Very Low	Low	Moderate/Low	Moderate
Minor	Very Low	Very Low	Low	Moderate/Low
Probability	Unlikely	Low	Likely	High

Table 4 Risk Classification Descriptions

Table 4 below describes the risk classifications.

Risk Term	Description
Very High Risk	There is a high probability that significant harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action or there is evidence that significant harm to a designated receptor is already occurring.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However it is either relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that such harm would be relatively mild. Some remediation work may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely, at worst, that this harm if realised would normally be mild. Any subsequent remediation works are likely to be relatively limited.
Very Low Risk	It is a low possibility that harm could arise to a receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

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