



**Cortis Road
Ashburton Estate
Wandsworth
London SW15 3AZ**

Ground Investigation



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J22403
Rev 0





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Executive summary

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

Brief

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of by Price and Myers, on behalf of Wandsworth London Borough Council. It is understood that it is proposed to demolish the existing structures on site and subsequently construct a six storey apartment block. The purpose of the investigation has been to determine the ground conditions, to provide a preliminary assessment of the presence of contamination and to provide information to assist with the design of suitable foundations. A desk study of the site has previously been completed by GEA (report ref J22403, dated April 2023) and is referred to in this report where appropriate.

Previous desk study findings

The earliest map studied, dated 1868, shows the site to have been occupied by open fields with dividing hedgerows or fences. Ponds were located approximately 25 m north, 105 m east and 115 m to the southwest of the site. The 1916 map shows a large building arranged around a quadrangle immediately adjacent to the western site boundary. By 1948 this building had been demolished and the west of the site was occupied by woodland, along with the surrounding area to the north and south; the large ponds to the east and southwest were still present. By 1953, several of the existing residential apartment blocks had been constructed on the southern and eastern boundaries and Cortis Road had been constructed on the northern boundary. The site was developed in the existing layout by 1963, with storage units in the west, mature coniferous trees, an area of hardstanding in the centre and a substation in the east. The pond area to the southwest had been redeveloped as a children's playground, at a lower level than the adjacent road between 1991 and 1999; the pond to the east was drained and re-landscaped over a similar period.

Reference to the British Geological Survey map indicates the site to be underlain by the London Clay Formation.

The Envirocheck report has indicated that no landfill sites, waste management or waste transfer sites are located within 1 km of the site. There are no areas of potentially infilled land noted within 500 m. The site is not at risk from migrating landfill gas and no gas protection measures are necessary.

Ground conditions

The ground investigation encountered a moderate thickness of made ground, over superficial soils which were in turn underlain by London Clay to the full depth of the investigation, of 20.00 m. The made ground comprised dark brown slightly clayey gravelly sand with fragments of brick, concrete, ceramic, flint and roots and or dark grey and black gravelly sand with fragments of brick, concrete, reinforcement bar, flint and tarmac and extended to a maximum depth of 1.0 m.

Beneath the made ground, superficial soil comprising brown gravelly sand or orange-brown slightly clayey sandy gravel with rare cobbles was encountered to a depth of up to 1.0 m and is assumed to be the Boyn Hill Gravel Member. The underlying London Clay comprised initially firm becoming stiff light brown mottled grey silty clay with roots and rootlets; desiccation was noted to a depth of up to 4.0 m at a distance of 5 m from a row of four mature coniferous trees.

Groundwater was not encountered in any of the boreholes.

Contamination testing has identified concentrations of total PAH including benzo (a) pyrene elevated above the relevant screening values for a residential end use. No asbestos was detected.

Recommendations

Column loads for the proposed development are unknown but are expected to be relatively high. In view of the anticipated high loads and the significant thickness of desiccation, shallow foundations are not likely to be feasible and piled foundations will be required.

The investigation has identified the presence of contamination in the shallow soils, most likely attributable to tarmac fragments. Additional testing is recommended following site clearance to confirm that no additional remediation measures are required in new landscaped areas. The provision of clean topsoil is however likely to be necessary to provide a suitable growing medium.



Part 1: Investigation Report

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 Introduction

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Price and Myers, on behalf of Wandsworth London Borough Council to carry out a ground investigation at Cortis Road, Ashburton Estate, Wandsworth, London.

A desk study of the site has previously been completed by GEA (report ref J22403, dated April 2023) and is referred to in this report where appropriate.

1.1 Proposed Development

It is understood that it is proposed to demolish the existing structures on site and subsequently construct a new six storey apartment block, with limited areas of soft landscaping at the site boundaries.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- to determine the ground conditions and their engineering properties;
- to use the above information to provide recommendations with respect to the design of suitable foundations;
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- a single cable percussion borehole to 20.0 m;
- three boreholes to 5.0 m using window sampling equipment;
- testing of selected soil samples for contamination and geotechnical purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

This report includes a contaminated land assessment which has been undertaken by a suitably qualified and competent professional in accordance with the methodology presented by the Environment Agency in their Land contamination risk assessment (LCRM)¹ published 19 April 2021. This involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. Risk management is divided into three stages; Risk Assessment, Options Appraisal and Remediation, and each stage comprises three tiers. The Risk Assessment stage includes preliminary risk assessment (PRA), generic quantitative risk assessment (GQRA) and detailed quantitative risk assessment (DQRA) and this report includes the PRA and GQRA.

The exploratory methods adopted in this investigation have been selected on the basis of the constraints of the site including but not limited to access and space limitations, together with any budgetary or timing constraints. Where it has not been possible to reasonably use an EC7 compliant investigation technique a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

1 <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

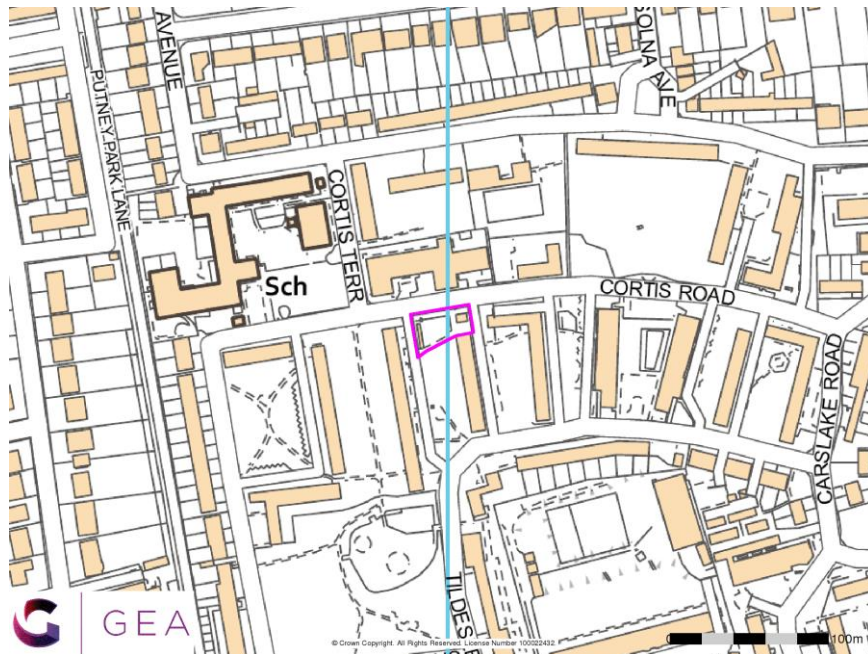


2.0 The Site

2.1 Site Description

The site is located in the London Borough of Wandsworth, approximately 1.1 km southwest of Putney railway station. It is bounded by Cortis Road to the north, an access road to the east and apartment blocks with soft landscaping to the south and west.

The site may be additionally located by National Grid Reference 523000, 174410 and is shown on the map extract below outlined in pink.



The site at the time of the investigation was irregular in shape measuring approximately 35 m west to east and 20 m north to south. It is occupied primarily with hardstanding with an electrical substation in the eastern half. The northern boundary is vegetated with grass and the western boundary mature coniferous trees.

2.2 Previous Desk Study Findings

2.2.1 Site History

The earliest map studied, dated 1868, shows the site to be occupied by open fields with dividing hedgerows or fences. Offsite, there were a number of small ponds located approximately 25 m north, 105 m east and 115 m to the southwest. The 1874 map notes a waterworks approximately 650 m to the southeast which is labelled as a reservoir by 1896.

There are no further significant changes to the site until the 1916 map, which shows a large building arranged around a quadrangle, probably a farm building or stable, had been constructed on the western boundary. By 1948 the building had been demolished and the west of the site was occupied with woodland, along with the surrounding area to the north and south, the large ponds to the east and southwest were still present.

By 1953, several residential apartment blocks had been constructed on the southern and eastern boundaries and Cortis Road had been constructed on the northern boundary. The 1961 map shows a telephone call box had been constructed in the east of the site as well as garages on the western boundary. Further residential blocks had been constructed on the western and northern boundaries.

The pond area to the southwest was redeveloped as a children's playground, at a lower level than the adjacent road between 1991 and 1999; it is therefore assumed that limited infilling of the pond was carried out. In addition, the pond to the east was drained and re-landscaped over a similar period, with limited infilling.

2.2.2 Other Information

There are no recorded landfill sites, waste management or waste transfer sites located within 1 km of site. There are no areas of potentially infilled land noted within 500 m, this does not appear to include the ponds noted in the historic maps.

No pollution incidents to controlled waters have been recorded within 1 km of the site. There are two local authority pollution prevention and controls noted within 500 m. They are both located 265 m southeast, described as PG3/16 mobile screening and crushing processes. Their status is permitted.

The site is not within an area shown by the Environment Agency to be at risk from flooding from rivers or the sea or from groundwater flooding. The northern boundary has a low risk of surface water flooding. The site does not lie within any known areas of sensitive land use.



The Preliminary UXO Risk Assessment undertaken by 1st Line Defence, (report ref PA17312-00, dated 2nd February 2023). indicated that the risk from UXO on site is not considered to be significantly elevated above the 'background level' for this area of the country. It was therefore recommended that no further research be taken at this

The British Geological Survey (BGS) map of the area (as reproduced by Envirocheck) indicates that the site is underlain by the London Clay Formation from the surface, with superficial head deposits being noted within close proximity to the southeast and Boyn Hill Gravel to the southwest.

The London Clay Formation is classified as an Unproductive Stratum, referring to rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The nearest surface water feature is located 260 m south, from the maps it appears to be a small pond. The site is primarily covered in hardstanding, but with significant area of soft landscaping along the northern and western boundaries. These areas will allow for infiltration of rain water directly into the ground.

2.2.3 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

Source

The desk study findings indicate that the site does not have a potentially contaminative history as it was primarily developed with an unidentified building in the early 20th Century and was then subsequently used as a parking area, with substation in the east. The substation on site may be a source of polychlorinated biphenyls (PCBs).

No sources of landfill gas have been identified in the vicinity.

Receptor

The proposed development of the site for residential purposes will result in the end users representing relatively high sensitivity receptors. As the site is underlain by unproductive stratum groundwater is not a sensitive receptor. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are potential receptors during construction or maintenance works.

Pathway

The presence of negligibly permeable London Clay will limit the potential for groundwater percolation into the underlying chalk, and thus a pathway is not considered likely to exist to the major aquifer. Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the presence of the buildings and the extent of the hardstanding, although areas of soft landscaping will provide a direct pathway to end users. Buried services may be exposed to any contaminants present within the soil through direct contact and site workers will come into contact with the soils during construction works. There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

Preliminary Risk Appraisal

On the basis of the above it is considered that there is a LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work.

The site is not at risk from migrating landfill gas and no gas protection measures are necessary.



3.0 Exploratory Work

Access to the site was limited by the presence of parked cars and fencing. Therefore, in order to meet the objectives described in Section 1.2, as far as was possible within the access constraints of the site, a single cable percussion borehole was advanced to 20.0 m and three further boreholes were advanced to 5.0 m, using window sampling equipment.

During boring, undisturbed samples were obtained from the cable percussion borehole for subsequent laboratory examination and testing.

A selection of the samples recovered from the boreholes was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA. The borehole records are appended, together with a site plan indicating the exploratory positions.

3.1 Sampling Strategy

The boreholes were positioned on site by a geotechnical engineer from GEA in accessible areas, with due regard to the proposed development and the locations of known buried services.

Two samples of the made ground have been tested for the presence of contamination. The analytical suite of testing was selected to identify a range of typical industrial contaminants for the purposes of general coverage. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The samples were also screened for the presence of asbestos. The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. A summary of the MCERTs accreditation and test methods are included with the attached results and further details are available upon request. Additionally, due to the presence of the substation on site, PCB testing was also conducted.

4.0 Ground Conditions

The investigation has not encountered the expected ground conditions in that, beneath a nominal thickness of made ground, superficial soils were encountered over London Clay which extended to the maximum explored depth of 20.0 m.

4.1 Made Ground

The made ground comprised dark brown or grey slightly clayey gravelly sand with fragments of brick, concrete, ceramic, flint, roots metal and tarmac and extended to depths of between 0.6 m and 1.0 m.

Apart from fragments of extraneous material noted above, no visual or olfactory evidence of contamination was observed during the fieldwork. Two samples of the made ground have however been analysed for a range of contaminants, including PCB's, and the results are detailed within Section 4.4.

4.2 Boyn Hill Gravel Member

In the west of the site the made ground was underlain by dark brown gravelly sand, the sand being fine and medium, the gravel being medium and coarse subrounded flint which extended to a depth of up to 1.6 m. In the east of the site orange-brown clayey sandy gravel was encountered and extended to a depth of 1.0 m. SPTs indicate this soil to be medium dense.

4.3 London Clay

The London Clay initially comprised firm becoming stiff fissured light brown mottled grey silty clay with rare decaying roots near to the surface. This layer extended to a depth of 5.6 m, below which stiff becoming very stiff fissured grey clay was encountered to the maximum explored depth of 20.0 m. Selenite crystals were noted from a depth of 3.5 m to 4.0 m in the brown clay.

Desiccation was noted to a depth of up to 4.0 m at a distance of 5 m from a row of four mature black pine trees up to 20 m high.



The results of plasticity index tests indicate the clay to be of high volume change potential, and the results of quick undrained triaxial tests indicate the clay to be of high, becoming very high strength.

4.4 Groundwater

Groundwater was not encountered during the investigation.

4.5 Soil Contamination

The table below sets out the values measured within the two samples analysed; all concentrations are in mg/kg unless otherwise stated.

Determinant	BH2 0.30 m	BH4 0.50 m
pH	10.1	7.7
Arsenic	7.3	7.1
Cadmium	0.4	0.2
Chromium	13	21
Lead	31	49
Mercury	< 0.05	0.06
Selenium	< 0.5	< 0.5
Copper	66	17
Nickel	32	9.3
Zinc	56	70
Total Cyanide	0.2	0.2
Total Phenols	0.7	< 0.3
Total PAH	320	1.0
Sulphide	40	< 10

Determinant	BH2 0.30 m	BH4 0.50 m
Benzo(a)pyrene	24	0.11
Naphthalene	0.56	< 0.03
TPH	3000	< 10
Total Organic Carbon %	2.9	0.5

Figure in bold indicates concentration in excess of risk-based soil guideline values, as discussed in Part 2 of this report

In addition, these samples were screened for the presence of asbestos and none was detected.

The PCB testing of a single sample did not note any concentrations of PCBs above detection levels.

4.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. Contaminants of concern are those that have values in excess of generic human health risk-based guideline values, which are either the CLEA² Soil Guideline Values where available, the Suitable 4 Use Values³ (S4UL) produced by LQM/CIEH calculated using the CLEA UK Version 1.07⁴ software, or the DEFRA Category 4 Screening values⁵, assuming a residential end use without plant uptake. The key generic assumptions for this end use are as follows:

- ☒ that groundwater will not be a critical risk receptor;
- ☒ that the critical receptor for human health will be a young female aged 0 to 6 years old;
- ☒ that the exposure duration will be six years;
- ☒ that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours; and
- ☒ that the building type equates to a terrace house.

2 Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009 and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

3 The LQM/CIEH S4ULs for Human Health Risk Assessment S4UL3065 November 2014

4 Contaminated Land Exposure Assessment (CL|EA) Software Version 1.071 Environment Agency 2015

5 CL:AIRE (2013) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination Final Project Report SP1010 and DEFRA (2014) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination Policy Companion Document SP1010



It is considered that these assumptions are acceptable for this generic assessment of this site. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

When comparing the results from the contamination testing to those in the Soil Guideline Values and Generic Guideline Values for a residential end use without plant uptake, concentrations of total PAH, benzo(a)pyrene and TPH were measured above the relevant screening values. However, no individual hydrocarbon compounds were elevated above the respective screening value.

The significance of these results is considered further in Part 2 of the report.



Part 2: Design Basis Report

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to the proposed development.

5.0 Introduction

It is understood that it is proposed to demolish the existing structures onsite and construct a six storey apartment block. Loads of the new buildings are not known but are expected to be moderately high. Limited soft landscaping is to be introduced at the perimeter.

6.0 Ground Model

The previous desk study has revealed that the site has primarily been developed with residential buildings, and on the basis of the fieldwork, the ground conditions can be characterised as follows:

- G beneath a moderate thickness of made ground, superficial soils were encountered over the London Clay which extended to the full depth investigated, of 20.0 m;
- G the made ground comprises dark brown or grey clayey gravelly sand with brick, flint, concrete, ceramic, metal, tarmac and roots, and extends to a maximum depth of 1 m;
- G medium dense dark brown gravelly sand extends to a depth of up to 1.6 m, but was absent in the northeast of the site;
- G firm becoming stiff then very stiff, initially light brown mottled grey silty clay becoming dark grey extends to at least 20.0 m;
- G desiccation was noted to a depth of up to 4.0 m in close proximity to mature coniferous trees;
- G groundwater was not encountered; and
- G contamination testing has revealed the presence of elevated concentrations of total PAH, including benzo (a) pyrene in the made ground.

7.0 Advice & Recommendations

With the limited thickness of sands and gravels encountered and the desiccation noted in the vicinity of the trees, it is likely that shallow foundations would have to be placed at an uneconomical depth and piled foundations will be a more suitable option.

7.1 Piled Foundations

For the ground conditions at this site, either driven or bored piles could be adopted. However, the noise and vibrations associated with driven piles are likely to make their use unacceptable and therefore bored piles are likely to be more suitable.

The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the SPT and cohesion / depth graph for the boreholes drilled on site, a copy of which is included in the appendix.

Stratum	Depth (m)	kN / m ²
Ultimate Skin Friction		
Made Ground and Boyn Hill Gravel	GL to 2.00	Ignore
London Clay	2.00 to 20.00	Increasing linearly from 30 to 90
Ultimate End Bearing		
London Clay	15.00 to 20.00	Increasing linearly from 1350 to 1620

Average ultimate skin friction has been limited to 110 kN/m² and an adhesion factor of 0.5 has been adopted, in accordance with guidance from the London District Surveyors Association (LDSA)⁶.

BS EN 1997-1:2004; Eurocode 7: Geotechnical Design Part 1 (Eurocode 7) provides factors to be applied to the ultimate skin friction and ultimate end bearing capacity in calculating pile resistance ($R_{d,GEO}$). For bored piles, in the absence of either working load tests or combined working load tests and preliminary pile tests, a model factor of 1.4 should be

6 LDSA (2017) *Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA



combined with a factor of 1.6 to be applied to the skin friction, and combined with a factor of 2.0 to be applied to the end bearing.

On the basis of the above, the table below shows the estimated pile resistance for 450 mm and 600 mm diameter piles at various depths. Average ultimate skin friction has been limited to 110 kN/m² and an adhesion factor of 0.5 has been adopted, in accordance with guidance from the London District Surveyors Association (LDSA)⁷.

Pile diameter mm	Toe Depth (m)	Pile length (m)	R _{d,GEO} (kN)
450	15	13	540
	20	18	1050
600	15	13	745
	20	18	1120

In order to determine the required pile lengths, the above outline pile resistances need to be compared with structural loads (actions) that have been factored to determine the design effect, in accordance with Eurocode 7.

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of an appropriate piling scheme.

In the design of piled foundations, the effect of potential future shrinkage and swelling of the clay should be taken into account.

7.2 Shallow Excavations

On the basis of the borehole findings, it is considered that it will be generally feasible to form relatively shallow excavations terminating within the London Clay without the requirement for lateral support, although localised instabilities may occur where more granular material or groundwater is encountered.

Significant inflows of groundwater into shallow excavations are not generally anticipated, although seepages may be encountered from perched water tables within the made ground, although such inflows should be suitably controlled by sump pumping.

If deeper excavations are considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

7.3 Ground Floor Slab

In view of the presence of desiccated clay and the close proximity of mature trees, it is recommended that the floor slab is suspended over a void in accordance with NHBC guidelines.

7.4 Effect of Sulphates

Chemical analyses have revealed relatively high concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-3 conditions of Table C2 of BRE Special Digest 1:SD Third Edition (2005). The measured pH values of the samples show that an ACEC class of AC-2s would be appropriate for the site. This assumes a static water condition at the site. The guidelines contained in the digest should be followed in the design of foundation concrete.

7 LDSA (2017) *Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA



7.5 Contamination Risk Assessment

The desk study findings indicate that the site does not have a potentially contaminative history as it has only been developed with the existing buildings since the early 20th Century. However, elevated concentrations of contamination that are considered to pose a risk to sensitive receptors have been recorded in the soil samples tested.

Comparison of the ratio of PAH compounds has indicated that the contamination is most likely to be attributable to tarmac fragments. It is likely that the contamination will be removed as a result of the site strip, along with the hardstanding, and as such no additional precautions should be required to protect end users, buried services or adjacent site users. However, following the site clearance it is recommended that additional tests are carried out in any new soft landscaped areas to confirm the absence of contaminants. Irrespective of the additional testing, clean topsoil may be necessary to provide a suitable growing medium.

As the site is underlain by the London Clay Formation, classified as Unproductive Strata, groundwater is not a sensitive receptor.

7.5.1 Protection of Site Workers

Site workers should be made aware of the contamination identified on site and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE⁸ and CIRIA⁹ and the requirements of the Local Authority Environmental Health Officer.

A watching brief should be maintained during the site works and if any suspicious soil is encountered, it should be inspected by a suitably qualified engineer and further testing carried out if required.

7.5.2 Services

Consideration may need to be given to the protection of buried plastic potable water supply services laid within the made ground. Details of the proposed protection measures for buried plastic services will in any case need to be approved by the EHO and the relevant service authority prior to the adoption of any scheme. It is possible that barrier pipe will be required, or additional testing will need to be carried out.

7.6 Waste Disposal

Under the Waste Framework Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3¹⁰ states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE¹¹ guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £102.10 per tonne (about £190 per m³) or at the lower rate of £3.25 per tonne (roughly £6.00 per m³). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

Based on the technical guidance provided by the EA it is considered likely that the soils encountered during this ground investigation, as represented by the chemical analyses carried out, would be generally classified as follows.

8 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO
9 CIRIA (1996) *A guide for safe working on contaminated sites*. Report 132, Construction Industry. Research and Information Association

10 Environment Agency 2015. *Guidance on the classification and assessment of waste*. Technical Guidance WM3 First Edition
11 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2



Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Current applicable rate of Landfill Tax
Made ground	Non-hazardous (17 05 04)	Check with receiving landfill	£102.10 / tonne plus gate fee and hazardous waste landfill tax
Natural Soils	Inert non-hazardous (17 05 04)	Should not be required but confirm with receiving landfill	£3.25 / tonne (Reduced rate for uncontaminated naturally occurring rocks and soils)

Under the requirements of the Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper¹² which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

The above opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

8.0 Outstanding Risks & Issues

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work may be required.

8.1 Site-Specific Risks

This investigation has identified the presence of contamination and there may be a requirement for a separate remediation proposals report to be prepared to comply with planning requirements. The remediation will need to be supervised and verified by a geoenvironmental engineer and a completion or validation report will also probably be required to support the planning application..

If during ground works any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out and that the risk assessment is reviewed.

These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk

8.2 General Risks

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the general ground conditions based on the discrete points at which the ground was sampled, but there may be ground conditions (including soil, rock, gas and groundwater) elsewhere on site that have not been revealed by this investigation and therefore could not have been taken into account in this report. The ground conditions should be subject to review as the development proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

12 Environment Agency 23 Oct 2007 *Regulatory Position Statement Treating non-hazardous waste for landfill - Enforcing the new requirement*



The comments made regarding gas and groundwater are based on observations made during the period the work has been carried out. Conditions may vary as a result of seasonal or other effects.

Where any conclusions and recommendations contained in this report have been based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information has not been independently verified by GEA, unless otherwise stated in the report. GEA accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to GEA from others.



Appendix

a. Field Work

Site Plan
Borehole Records

b. Lab Testing

Geotechnical Test Results
SPT & Cohesion/Depth Graph
Chemical Test Results
Generic Risk Based Screening Values



appendix a

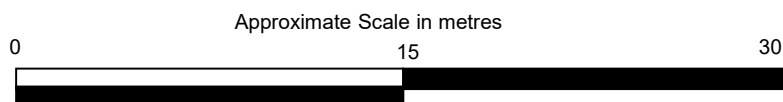
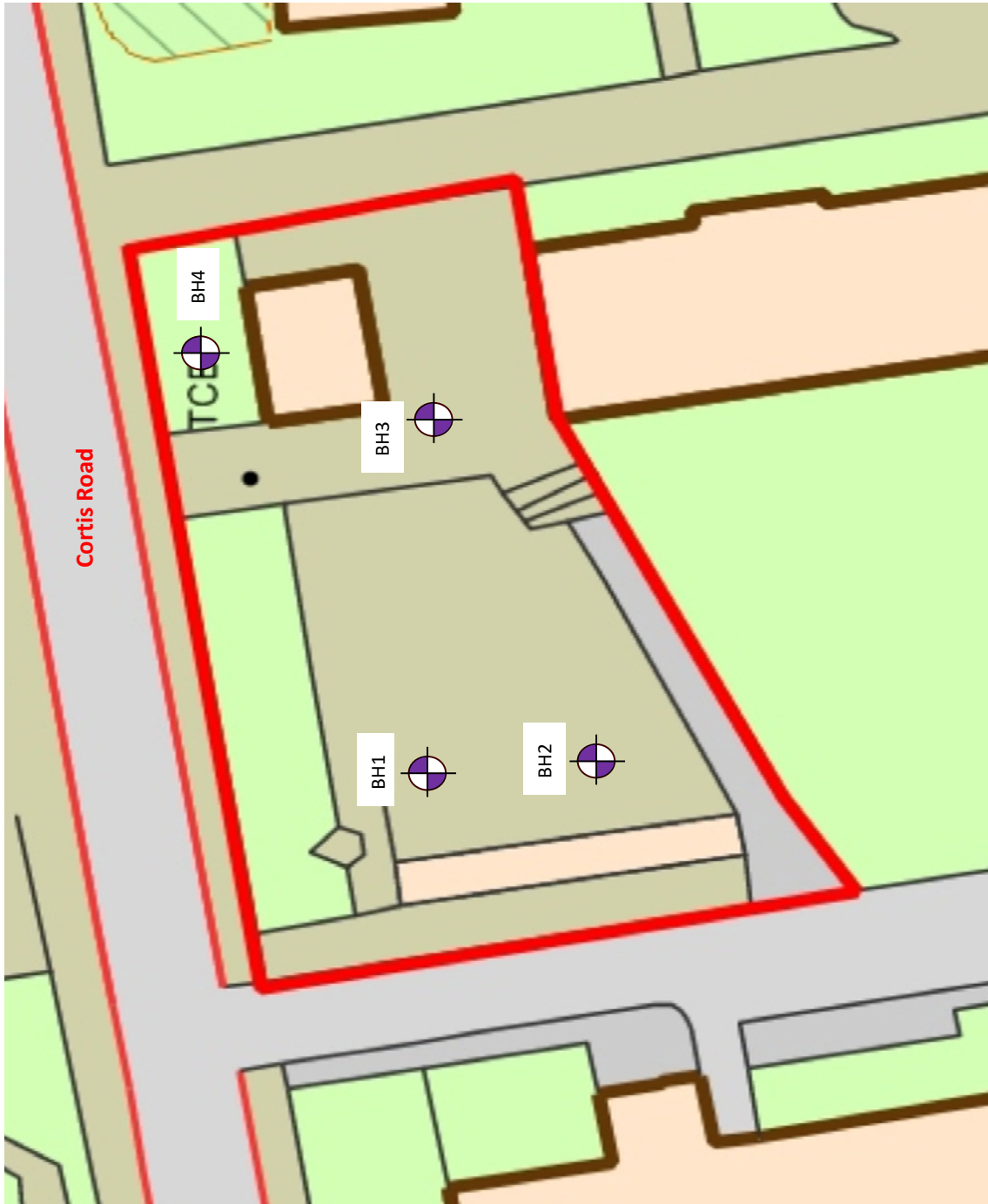
Field Work

Site Plan
Borehole Records



Site Ashburton Estate, Cortis Road, Putney, London
Client Wandsworth Borough Council
Engineer Price and Myers

Job Number
J22403
Sheet
1 / 1





Project Cortis Road, Ashburton Estate, Wandsworth, London				BOREHOLE No BH1
Job No J22403	Date 08-03-23	Ground Level (m OD)	Co-Ordinates () E 522,993.0 N 174,413.0	
Client Wandsworth London Borough Council		Engineer Price and Myers		Sheet 1 of 2

SAMPLES & TESTS			STRATA				Instrument / Backfill	
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
0.30 0.50	D B					(0.80) 0.80	MADE GROUND (dark grey and black gravelly sand with fragments of brick, concrete and tarmac)	
1.20	D	4,5/5,4,3,2 N60 = 14				(0.80) 1.60	Medium dense dark brown gravelly SAND. Sand is fine and medium. Gravel is medium and coarse, subrounded flint	
1.75 2.00	D D	2,2/3,3,2,4 N60 = 12				(4.00)	Firm dark brown silty CLAY	
2.75 3.00	D U100							
3.75 4.00	D D	2,3/4,8,5,6 N60 = 24					4.00 ...becoming stiff	
4.75 5.00	D U100					5.60		
6.00 6.50	D D	3,4/4,5,6,6 N60 = 22					Stiff dark grey fissured silty CLAY	
7.50 8.00	D U100							
9.00 9.50	U U	4,5/5,5,6,7 N60 = 24						

Report ID: CABLE PERCUSSION || Project: J22403 - CORTIS ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 10 May 2023

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand pit to 1.2 m Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable Percussion	Logged By JS
--	--	-----------------



Project Cortis Road, Ashburton Estate, Wandsworth, London				BOREHOLE No BH2	
Job No J22403	Date 07-03-23	Ground Level (m OD)	Co-Ordinates () E 522,993.0 N 174,402.0		
Client Wandsworth London Borough Council			Engineer Price and Myers		Sheet 1 of 1

SAMPLES & TESTS			STRATA				Instrument / Backfill	
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
0.30	ES					(0.60)	MADE GROUND (dark grey and black gravelly sand with fragments of brick, concrete, reinforcement bar, flint and tarmac)	
0.70	D	2,4/6,7,9,9 N60 = 38				0.80	Dark brown gravelly SAND. Sand is fine and medium. Gravel is medium and coarse, subrounded flint	
2.50	D	4,5/7,9,9,11 N60 = 44				(4.20)	Very stiff light brown mottled grey silty CLAY with rare root fragments 0.80 - 4.00 ...desiccation	
3.50	D	4,6/8,9,11,12 N60 = 49					3.50 - 5.00 ...selenite crystals	
4.50	D	3,5/6,6,6,9 N60 = 33				5.00		

Report ID: CABLE PERCUSSION || Project: J22403 - CORTIS ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 10 May 2023

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand pit to 1.2 m Groundwater not encountered Drill rods cracked, could not conduct SPT at 5.0 m

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive Rig	Logged By JS
--	-------------------------------------	-----------------



Project Cortis Road, Ashburton Estate, Wandsworth, London				BOREHOLE No BH3	
Job No J22403	Date 07-03-23	Ground Level (m OD)	Co-Ordinates () E 523,005.0 N 174,408.0		
Client Wandsworth London Borough Council		Engineer Price and Myers		Sheet 1 of 1	

SAMPLES & TESTS			STRATA				Instrument / Backfill	
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
0.20	ES					0.40	MADE GROUND (dark grey and black sandy gravel with fragments of tarmac and concrete)	
0.60	D	2,3/3,3,3,4 N60 = 16				(0.60) 1.00	Medium dense dark orange-brown slightly clayey sandy GRAVEL with rare cobbles. Sand is medium and coarse. Gravel is medium and coarse, subrounded and subangular flint. Cobble is rounded flint	
1.50	D	2,2/3,3,3,4 N60 = 16				(4.00)	Stiff light brown mottled grey silty CLAY with rare root fragments	
3.80	D	3,4/4,6,6,7 N60 = 28				5.00	4.00 - 5.00 ...selenite crystals	

Report ID: CABLE PERCUSSION || Project: J22403 - CORTIS ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 10 May 2023

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand pit to 1.2 m Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive Rig	Logged By JS
--	-------------------------------------	-----------------



Project Cortis Road, Ashburton Estate, Wandsworth, London				BOREHOLE No BH4	
Job No J22403	Date 07-03-23	Ground Level (m OD)	Co-Ordinates () E 523,008.0 N 174,420.0		
Client Wandsworth London Borough Council		Engineer Price and Myers		Sheet 1 of 1	

SAMPLES & TESTS			STRATA				Instrument / Backfill	
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
0.50	ES	3,2/1,2,1,2 N60 = 7				1.00	MADE GROUND (dark brown slightly clayey gravelly sand with fragments of brick, concrete, ceramic, flint and roots)	
1.50	D	2,1/2,2,3,3 N60 = 12				3.00	Firm becoming stiff light brown mottled grey silty CLAY with rare root fragments	
3.50	D	2,2/3,3,3,4 N60 = 16				4.00		

Report ID: CABLE PERCUSSION || Project: J22403 - CORTIS ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 10 May 2023

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand pit to 1.2 m Groundwater not encountered Drill rods cracked, could not drill to 5.0 m

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive Rig	Logged By JS
--	-------------------------------------	-----------------



appendix b

Lab Testing

Geotechnical Test Results
SPT & Cohesion/Depth Graph
Chemical Test Results
Generic Risk Based Screening Values



Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No. 33151	Project Name Cortis Road	Programme	
		Samples received	13/03/2023
Project No. J22403	Client GEA	Schedule received	15/03/2023
		Project started	16/03/2023
		Testing Started	27/03/2023

Hole No.	Sample				Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
	Ref	Top m	Base m	Type							
BH1	-	2.00	-	D	Orangish brown slightly mottled bluish grey silty CLAY	39	100	73	31	42	
BH1	-	2.75	-	D	Orangish brown slightly mottled grey silty CLAY with scattered selenite crystals	47	100	70	29	41	
BH1	-	3.00	-	U	High strength brown slightly mottled grey silty CLAY with occasional selenite deposits	32					
BH1	-	3.75	-	D	Brown and occasional grey silty CLAY with scattered selenite crystals	34	100	69	31	38	
BH1	-	4.00	-	D	Orangish brown slightly mottled dark grey silty CLAY with scattered selenite crystals	40					
BH1	-	4.75	-	D	Orangish brown mottled dark grey silty CLAY with scattered selenite crystals	34					
BH1	-	5.00	-	U	High strength brown slightly mottled grey and orangish brown slightly fine sandy silty CLAY	31					
BH1	-	8.00	-	U	High strength dark grey slightly fine sandy silty CLAY	30					
BH1	-	11.00	-	U	High strength dark grey slightly fine sandy silty CLAY	30					
BH1	-	14.00	-	U	Very high strength dark grey fine sandy silty CLAY	24					
BH1	-	16.50	-	D	Dark grey silty CLAY	31	100	76	29	47	
BH1	-	17.00	-	U	High strength dark grey slightly fine sandy silty CLAY	33					

	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3 and 5.0 <i>These results only apply to the items tested</i>	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.p Date: 29/03/2023
	NOTE: The report shall not be reproduced except in full without authority of the laboratory		Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No. 33151	Project Name Cortis Road	Programme	
		Samples received	13/03/2023
Project No. J22403	Client GEA	Schedule received	15/03/2023
		Project started	16/03/2023
		Testing Started	27/03/2023

Hole No.	Sample				Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
	Ref	Top m	Base m	Type							
BH1	-	19.55	-	U	High strength dark grey slightly fine sandy silty CLAY	34					
BH2	-	2.50	-	D	Orangish brown slightly mottled bluish grey silty CLAY with scattered selenite crystals	24	100	75	30	45	
BH2	-	3.50	-	D	Brown slightly mottled bluish grey slightly sandy silty CLAY with selenite deposits and traces of rootlets	25	100	73	30	43	
BH2	-	4.50	-	D	Dark grey slightly mottled orangish brown silty CLAY with scattered selenite crystals	29	100	74	30	44	
BH3	-	1.50	-	D	Orangish brown slightly mottled grey silty CLAY	31	100	75	29	46	
BH3	-	3.80	-	D	Orangish brown mottled dark grey silty CLAY with scattered selenite crystals	30					

	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3 and 5.0 <i>These results only apply to the items tested</i>	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.p Date: 29/03/2023
	NOTE: The report shall not be reproduced except in full without authority of the laboratory	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R1(b)



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH1

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 2.00

Soil Description Orangish brown slightly mottled bluish grey silty CLAY

Depth Base m -

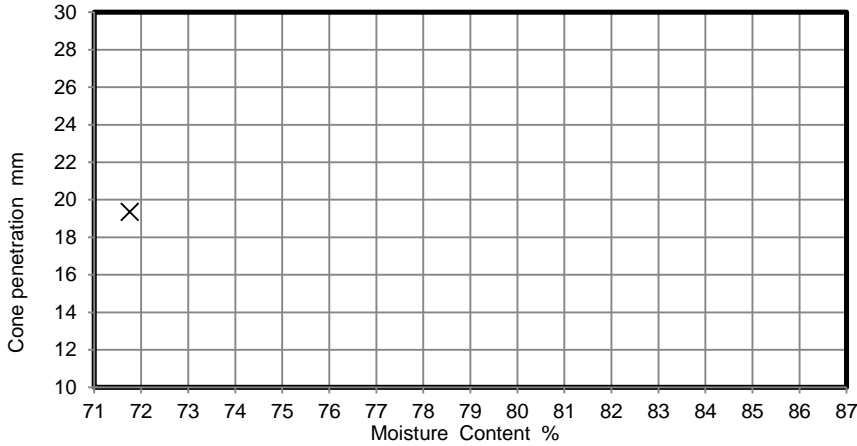
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

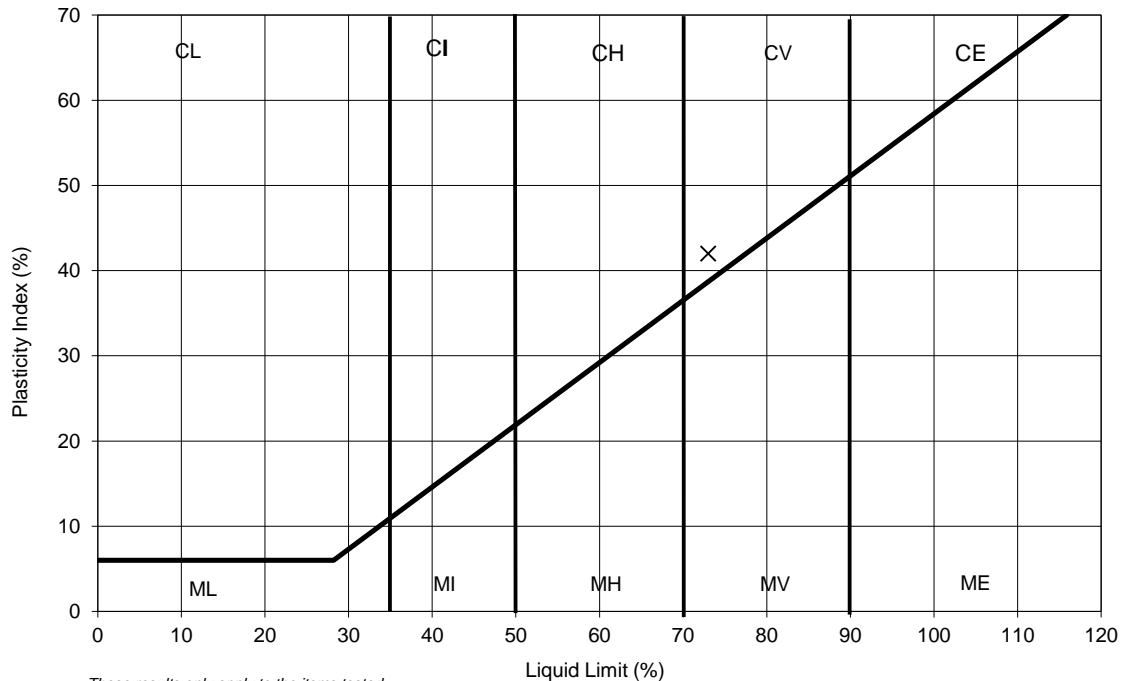


NATURAL MOISTURE CONTENT	39	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	73	%
PLASTIC LIMIT	31	%
PLASTICITY INDEX	42	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

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TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 29/03/2023



2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH1

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 2.75

Soil Description Orangish brown slightly mottled grey silty CLAY with scattered selenite crystals

Depth Base m -

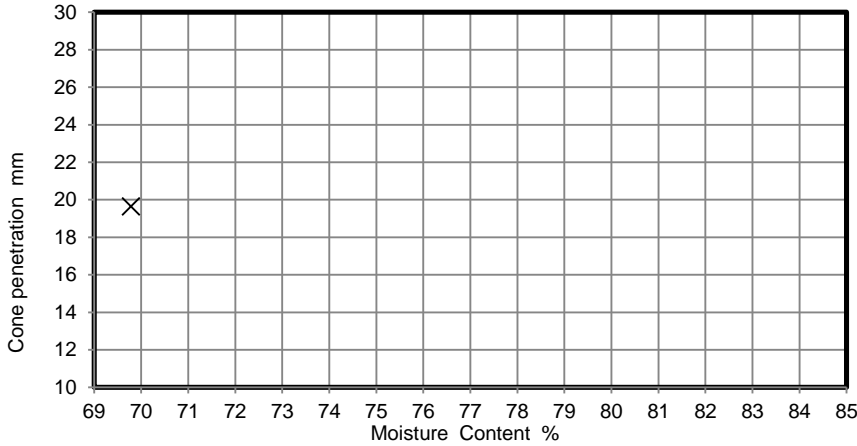
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

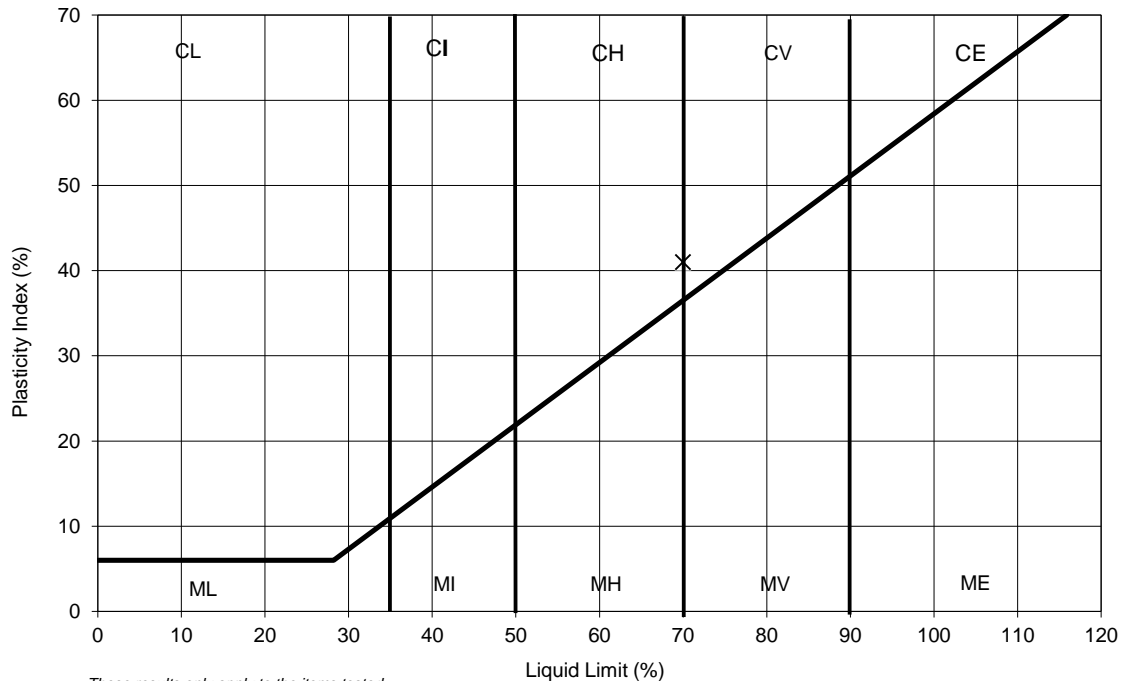


NATURAL MOISTURE CONTENT	47	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	70	%
PLASTIC LIMIT	29	%
PLASTICITY INDEX	41	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH1

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 3.75

Soil Description Brown and occasional grey silty CLAY with scattered selenite crystals

Depth Base m -

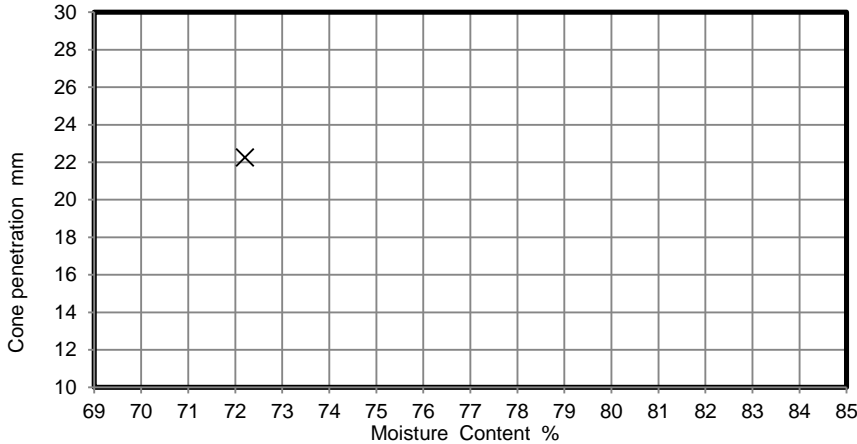
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

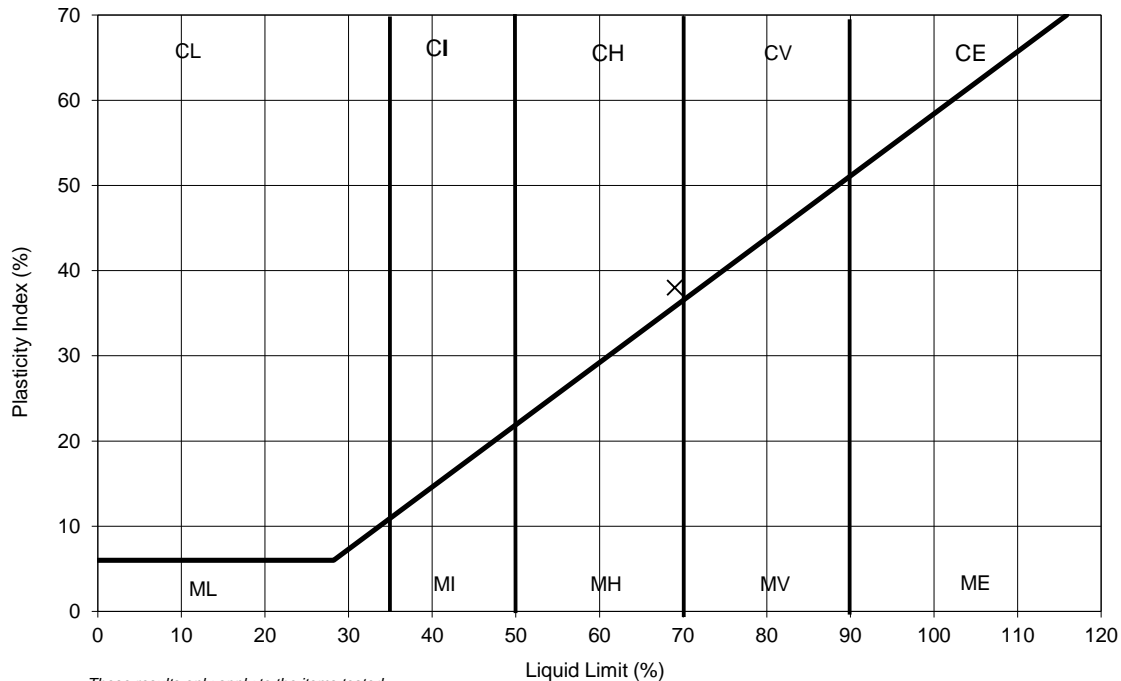


NATURAL MOISTURE CONTENT	34	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	69	%
PLASTIC LIMIT	31	%
PLASTICITY INDEX	38	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2: Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 : Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2: Clause 3.2 : 1990: Determination of the moisture content by the oven drying

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH1

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 16.50

Soil Description Dark grey silty CLAY

Depth Base m -

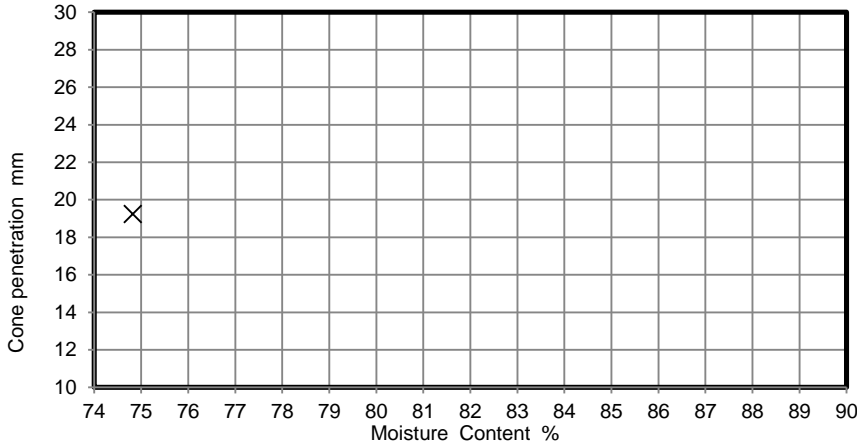
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

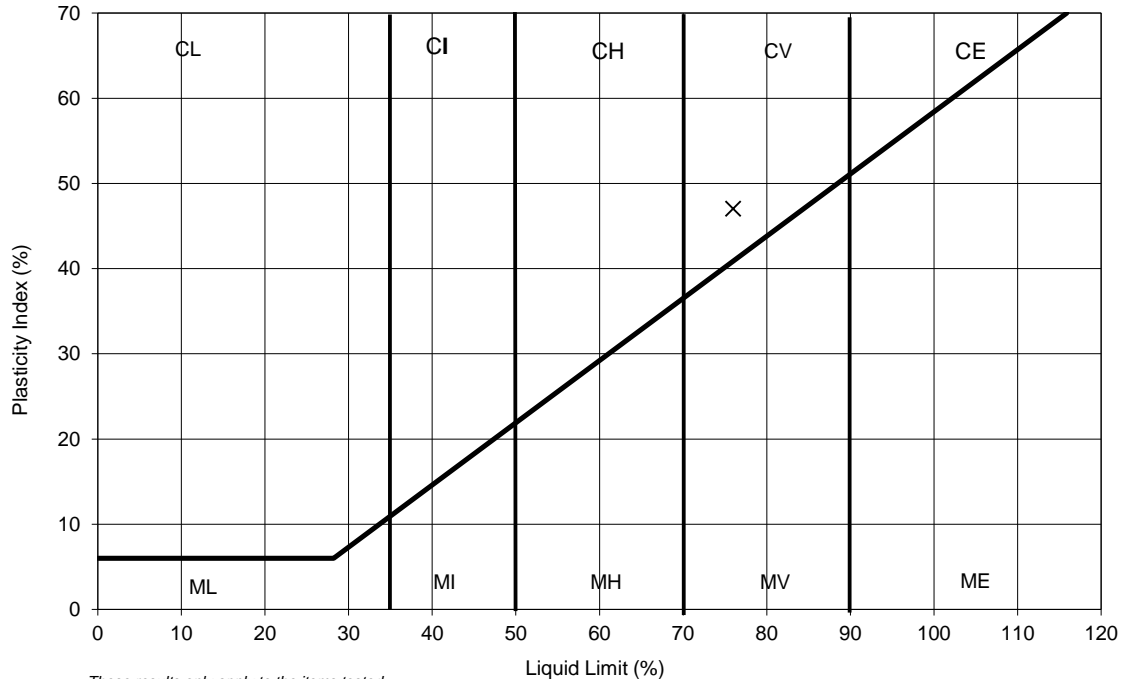


NATURAL MOISTURE CONTENT	31	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	76	%
PLASTIC LIMIT	29	%
PLASTICITY INDEX	47	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 29/03/2023



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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH2

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 2.50

Soil Description Orangish brown slightly mottled bluish grey silty CLAY with scattered selenite crystals

Depth Base m -

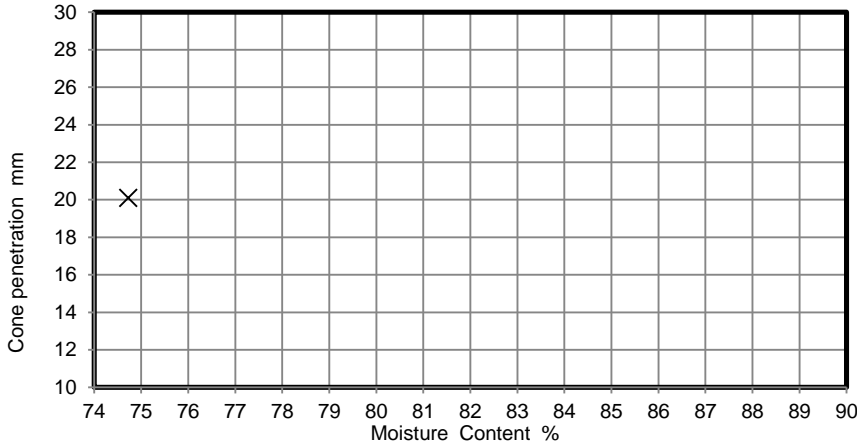
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 23/03/2023

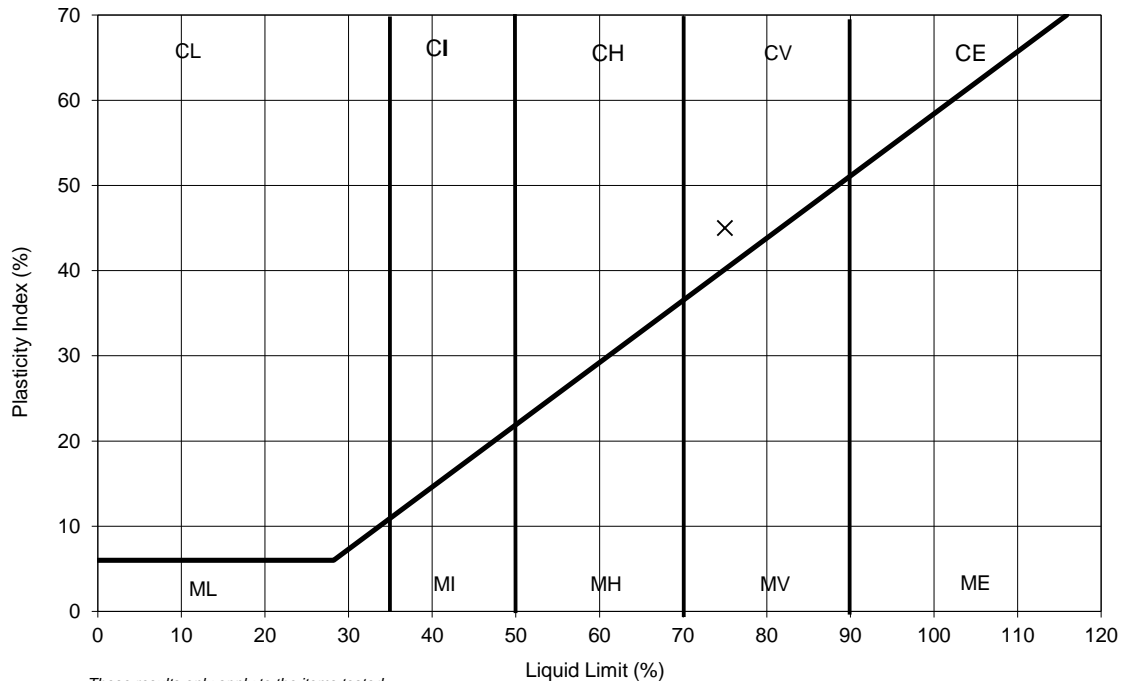


NATURAL MOISTURE CONTENT	24	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	75	%
PLASTIC LIMIT	30	%
PLASTICITY INDEX	45	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 29/03/2023



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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH2

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 3.50

Soil Description Brown slightly mottled bluish grey slightly sandy silty CLAY with selenite deposits and traces of rootlets

Depth Base m -

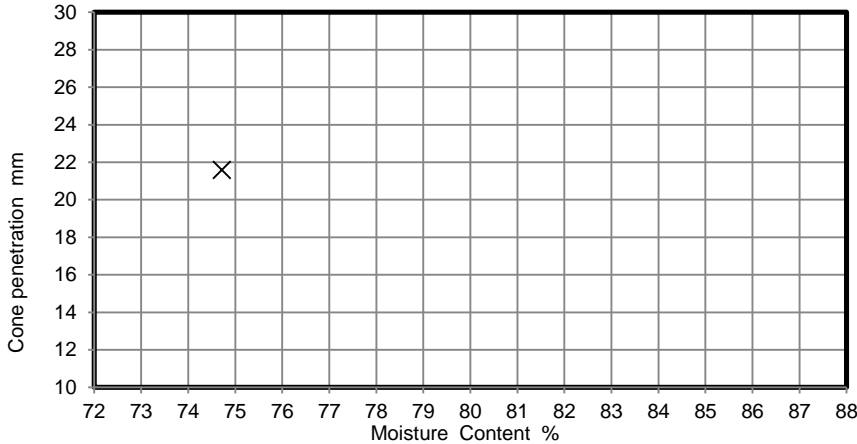
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

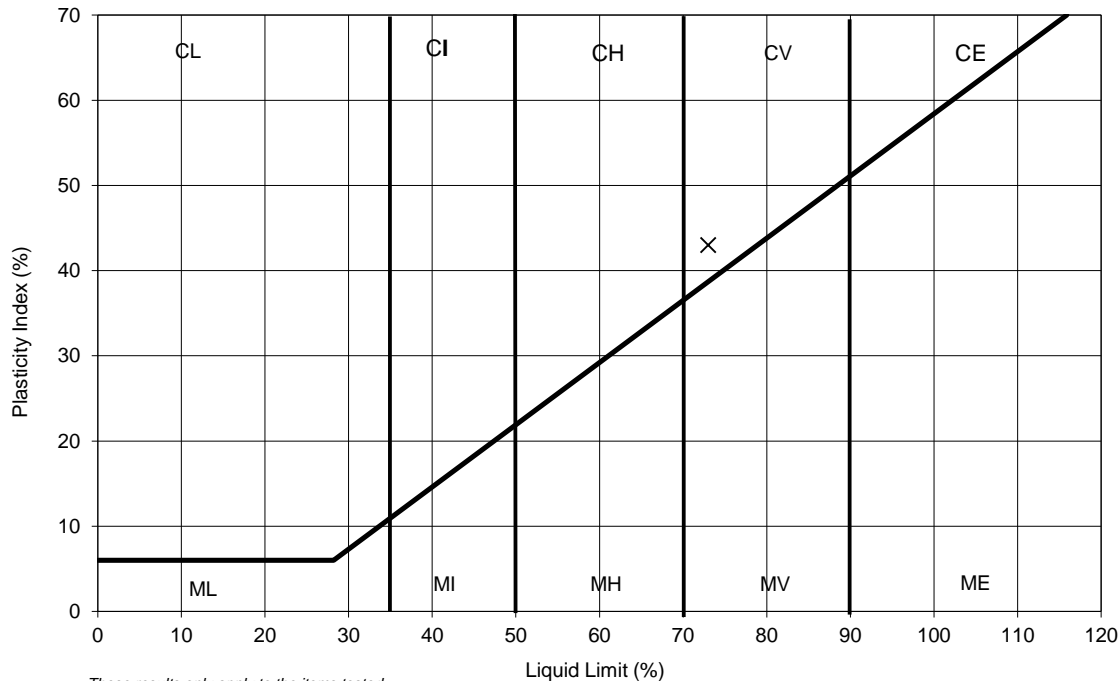


NATURAL MOISTURE CONTENT	25	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	73	%
PLASTIC LIMIT	30	%
PLASTICITY INDEX	43	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 29/03/2023



2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH2

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 4.50

Soil Description Dark grey slightly mottled orangish brown silty CLAY with scattered selenite crystals

Depth Base m -

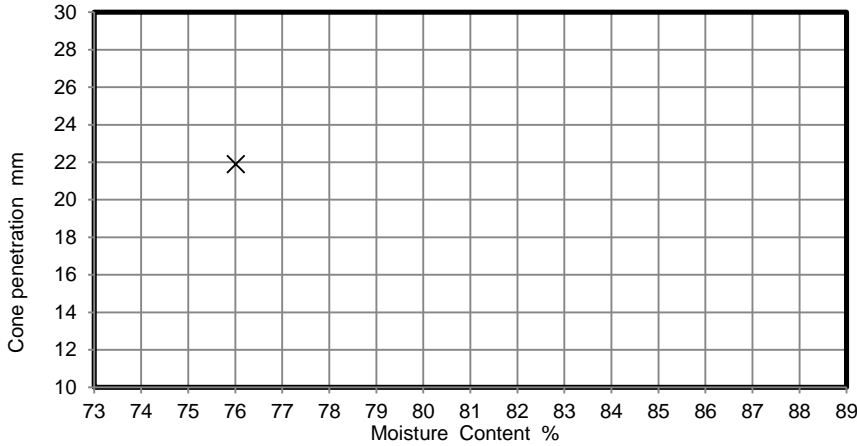
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023

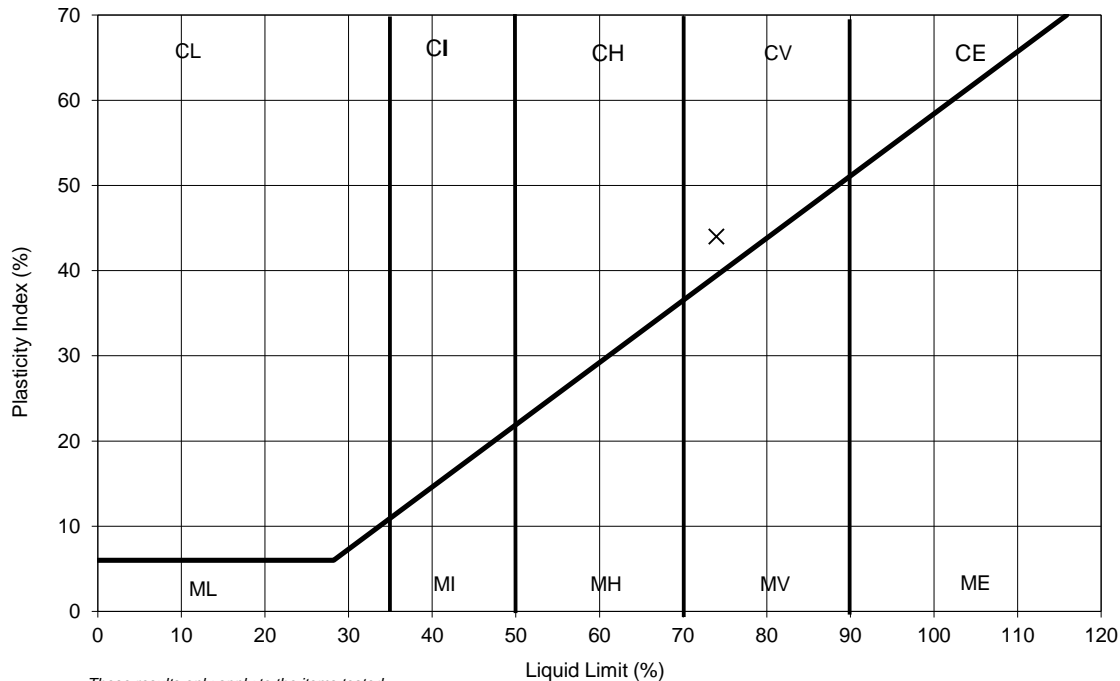


NATURAL MOISTURE CONTENT	29	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	74	%
PLASTIC LIMIT	30	%
PLASTICITY INDEX	44	%

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

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TEST METHOD

BS1377: Part 2: Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 : Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2: Clause 3.2 : 1990: Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33151

Borehole/Pit No. BH3

Site Name Cortis Road

Sample No. -

Project No. J22403 Client GEA

Depth Top m 1.50

Soil Description Orangish brown slightly mottled grey silty CLAY

Depth Base m -

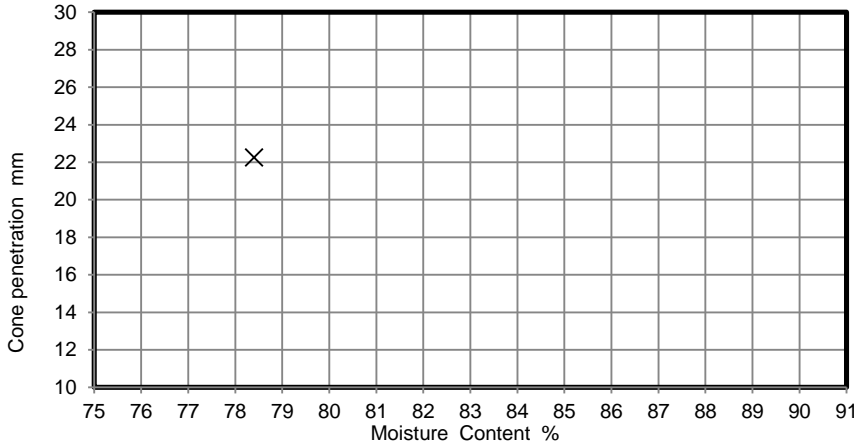
Sample Type D

Samples received 13/03/2023

Schedules received 15/03/2023

Project Started 16/03/2023

Date Tested 27/03/2023



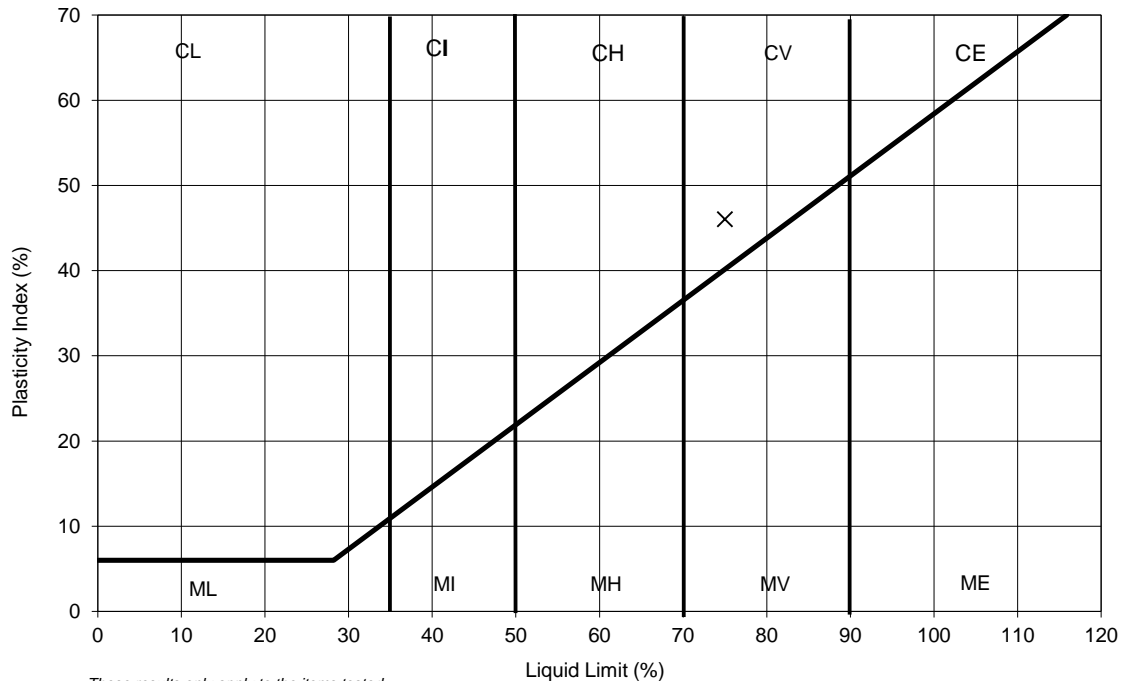
NATURAL MOISTURE CONTENT	31	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	75	%
PLASTIC LIMIT	29	%
PLASTICITY INDEX	46	%

Remarks

Empty box for remarks.

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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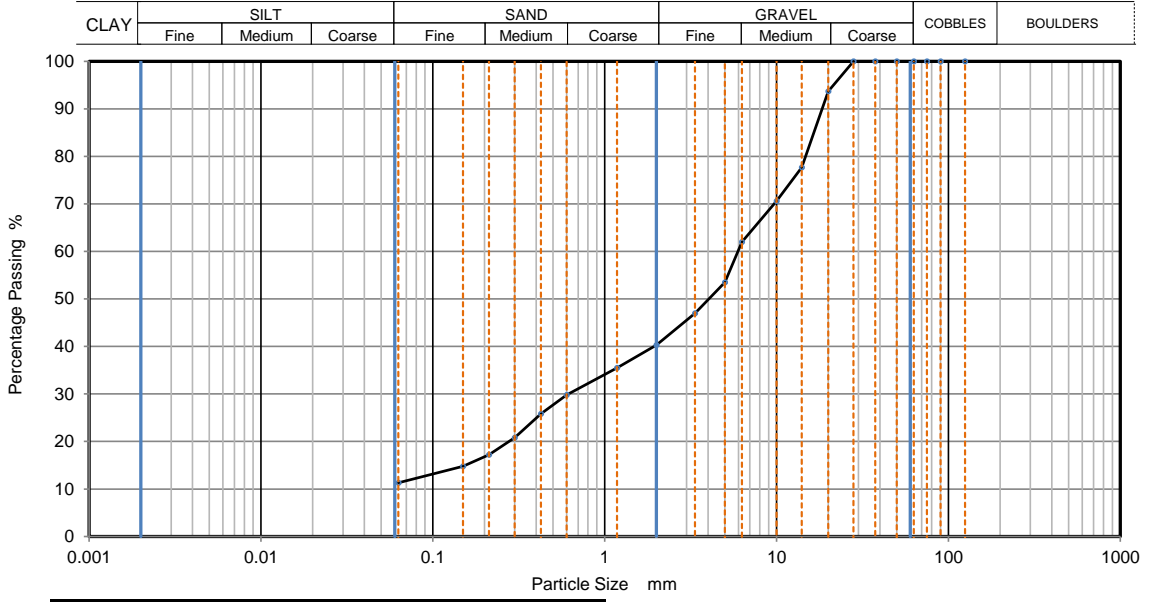
MSF-5 R2



PARTICLE SIZE DISTRIBUTION

		Job Ref	33151
		Borehole/Pit No.	BH2
Site Name	Cortis Road	Sample No.	-
Project No.	J22403	Client	GEA
		Depth Top	0.80 m
Soil Description	Dark greyish brown silty clayey very sandy GRAVEL (gravel is fmc and sub-rounded)	Depth Base	- m
		Sample Type	D
		Samples received	13/03/2023
		Schedules received	15/03/2023
Test Method	BS1377:Part 2: 1990, clause 9.0	Project started	16/03/2023
		Date tested	22/03/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	78		
10	71		
6.3	62		
5	54		
3.35	47		
2	40		
1.18	36		
0.6	30		
0.425	26		
0.3	21		
0.212	17		
0.15	15		
0.063	11		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	59.7
Sand	29.0
Fines <0.063mm	11.3

Grading Analysis	
D100	mm
D60	mm 5.97
D30	mm 0.613
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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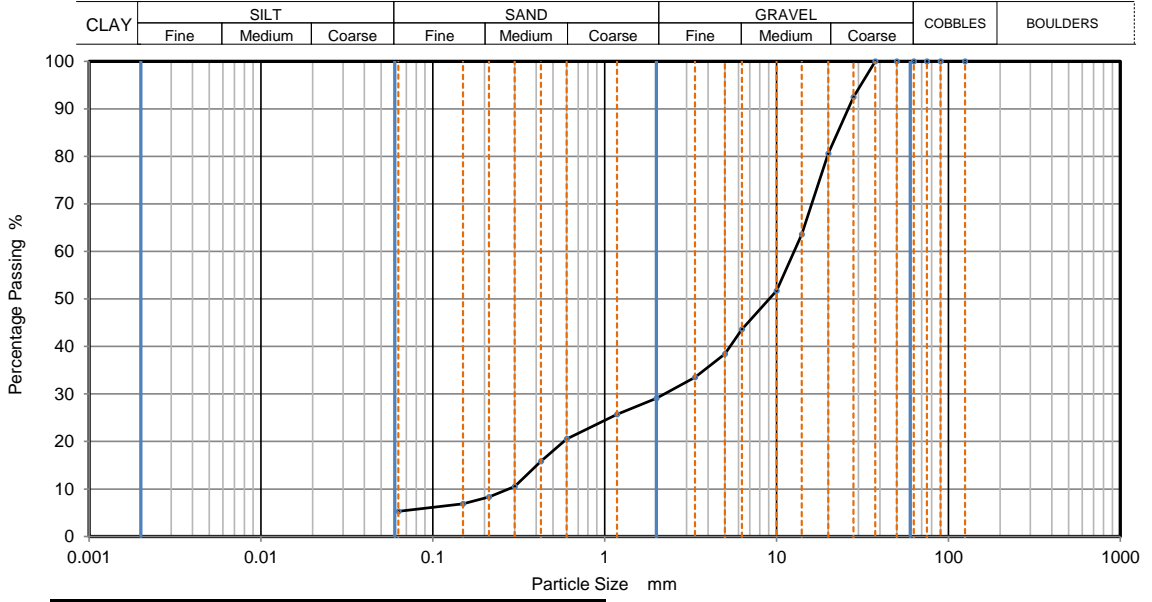
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PARTICLE SIZE DISTRIBUTION

		Job Ref	33151
		Borehole/Pit No.	BH3
Site Name	Cortis Road	Sample No.	-
Project No.	J22403	Client	GEA
		Depth Top	0.60 m
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)	Depth Base	- m
		Sample Type	D
		Samples received	13/03/2023
		Schedules received	15/03/2023
Test Method	BS1377:Part 2: 1990, clause 9.0	Project started	16/03/2023
		Date tested	22/03/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	81		
14	64		
10	52		
6.3	44		
5	38		
3.35	34		
2	29		
1.18	26		
0.6	21		
0.425	16		
0.3	11		
0.212	8		
0.15	7		
0.063	5		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	70.9
Sand	23.7
Fines <0.063mm	5.4

Grading Analysis		
D100	mm	
D60	mm	12.6
D30	mm	2.23
D10	mm	0.279
Uniformity Coefficient		45
Curvature Coefficient		1.4

Remarks
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	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R3



Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No. 33151	Project Name Cortis Road	Programme	
		Samples received	13/03/2023
		Schedule received	15/03/2023
Project No. J22403	Client GEA	Project started	16/03/2023
		Testing Started	24/03/2023

Hole No.	Sample				Soil Description	Test Type	Density		w %	Length mm	Diameter mm	σ_3 kPa	At failure				Remarks
	Ref	Top m	Base m	Type			bulk Mg/m ³	dry					Axial strain %	$\sigma_1 - \sigma_3$ kPa	cu kPa	Mode	
BH1	-	3.00	-	U	High strength brown slightly mottled grey silty CLAY with occasional selenite deposits	UU	1.96	1.49	32	198	102	60	16	168	84	C	
BH1	-	5.00	-	U	High strength brown slightly mottled grey and orangish brown slightly fine sandy silty CLAY	UU	1.98	1.51	31	198	102	100	20	206	103	C	
BH1	-	8.00	-	U	High strength dark grey slightly fine sandy silty CLAY	UU	1.98	1.52	30	198	102	160	11	198	99	C	
BH1	-	11.00	-	U	High strength dark grey slightly fine sandy silty CLAY	UU	2.00	1.54	30	198	102	220	14	188	94	C	
BH1	-	14.00	-	U	Very high strength dark grey fine sandy silty CLAY	UU	2.03	1.63	24	198	102	280	20	308	154	C	
BH1	-	17.00	-	U	High strength dark grey slightly fine sandy silty CLAY	UU	2.00	1.50	33	198	102	340	11	200	100	C	Sample slightly softened on top
BH1	-	19.55	-	U	High strength dark grey slightly fine sandy silty CLAY	UU	2.01	1.50	34	198	102	390	11	171	86	C	Sample slightly water softened at top

Legend	UU - single stage test (single and multiple specimens)	σ_3 Cell pressure	Mode of failure ;	B - Brittle
	UUM - Multistage test on a single specimen	$\sigma_1 - \sigma_3$ Maximum corrected deviator stress		P - Plastic
	suffix R - remoulded or recompacted	cu Undrained shear strength, $\frac{1}{2}(\sigma_1 - \sigma_3)$		C - Compound

 2519	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com Email: james@k4soils.com	Checked and Approved Initials: J.P Date: 29/03/2023
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MSF-5-R7b		

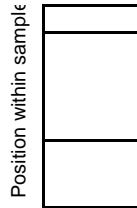


**Unconsolidated Undrained Triaxial
Compression Test without measurement of
pore pressure - single specimen**

Job Ref	33151
Borehole/Pit No.	BH1
Sample No.	-
Depth Top	3.00 m
Depth Base	- m
Sample Type	U
Samples received	13/03/2023
Schedules received	15/03/2023
Date of test	24/03/2023

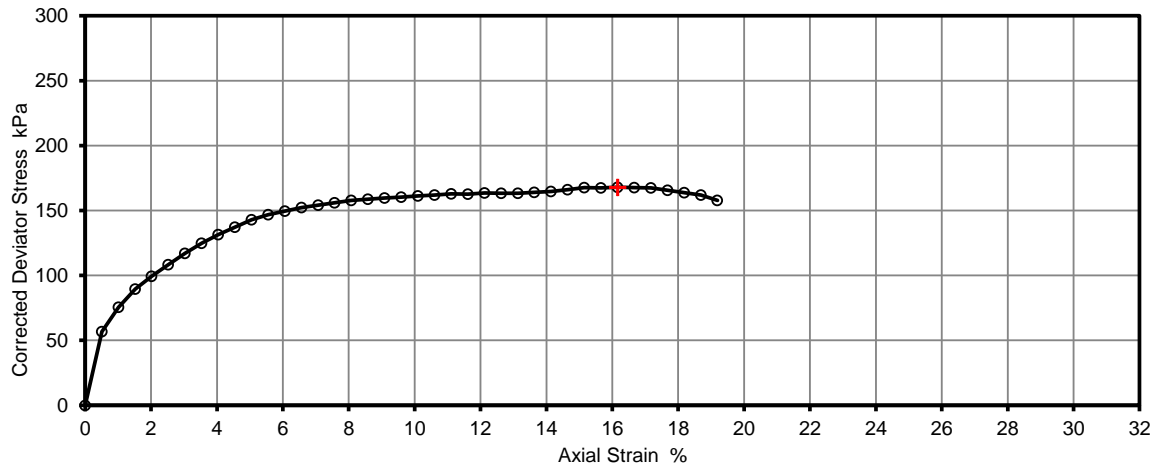
Site Name	Cortis Road		
Project No.	J22403	Client	GEA
Soil Description	High strength brown slightly mottled grey silty CLAY with occasional selenite deposits		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

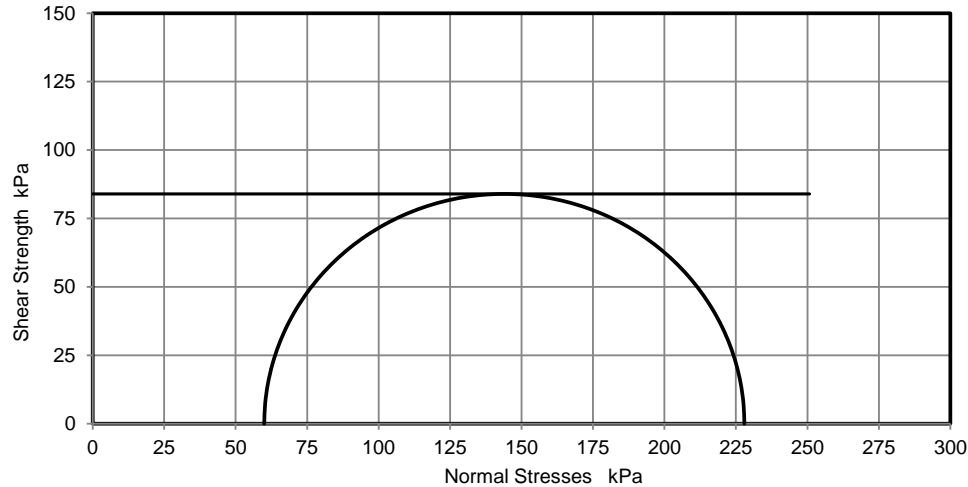


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.96	Mg/m ³
Moisture Content	32	%
Dry Density	1.49	Mg/m ³
Rate of Strain	2.0	%/min
Cell Pressure	60	kPa
Axial Strain	16	%
Deviator Stress, (σ ₁ - σ ₃) _f	168	kPa
Undrained Shear Strength, c _u	84	kPa ½(σ ₁ - σ ₃) _f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



Test Report by **K4 SOILS LABORATORY**
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 Initials: J.P
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**Unconsolidated Undrained Triaxial
Compression Test without measurement of
pore pressure - single specimen**

Job Ref	33151
Borehole/Pit No.	BH1
Sample No.	-
Depth Top	5.00 m
Depth Base	- m
Sample Type	U
Samples received	13/03/2023
Schedules received	15/03/2023
Date of test	24/03/2023

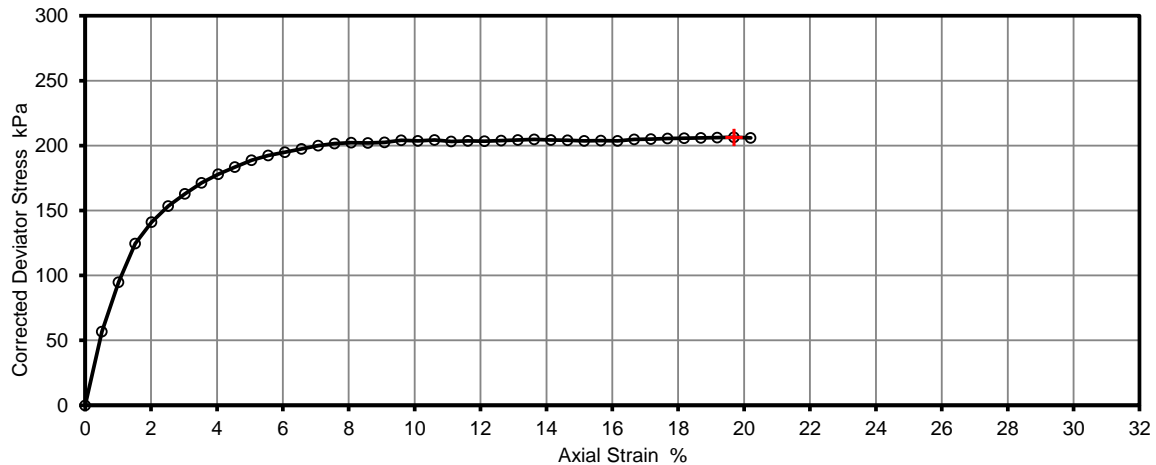
Site Name	Cortis Road		
Project No.	J22403	Client	GEA
Soil Description	High strength brown slightly mottled grey and orangish brown slightly fine sandy silty CLAY		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

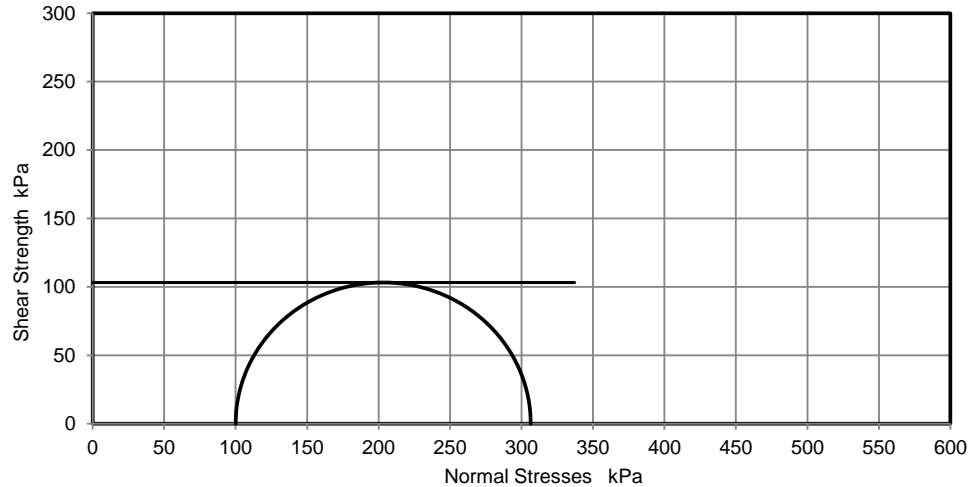


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.98	Mg/m ³
Moisture Content	31	%
Dry Density	1.51	Mg/m ³
Rate of Strain	2.0	%/min
Cell Pressure	100	kPa
Axial Strain	20	%
Deviator Stress, (σ ₁ - σ ₃) _f	206	kPa
Undrained Shear Strength, c _u	103	kPa ½(σ ₁ - σ ₃) _f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



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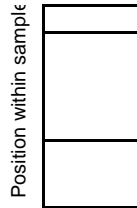


**Unconsolidated Undrained Triaxial
Compression Test without measurement of
pore pressure - single specimen**

Job Ref	33151
Borehole/Pit No.	BH1
Sample No.	-
Depth Top	8.00 m
Depth Base	- m
Sample Type	U
Samples received	13/03/2023
Schedules received	15/03/2023
Date of test	24/03/2023

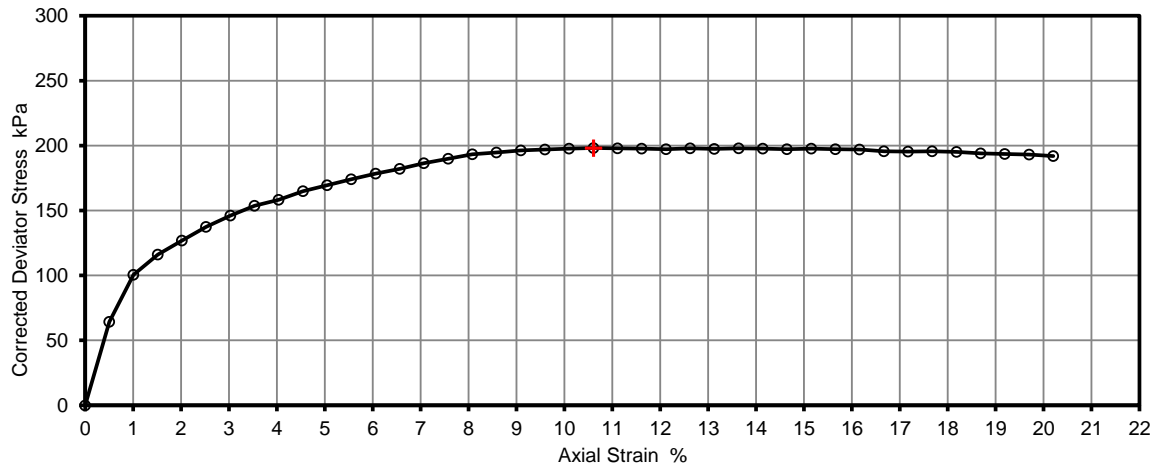
Site Name	Cortis Road		
Project No.	J22403	Client	GEA
Soil Description	High strength dark grey slightly fine sandy silty CLAY		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

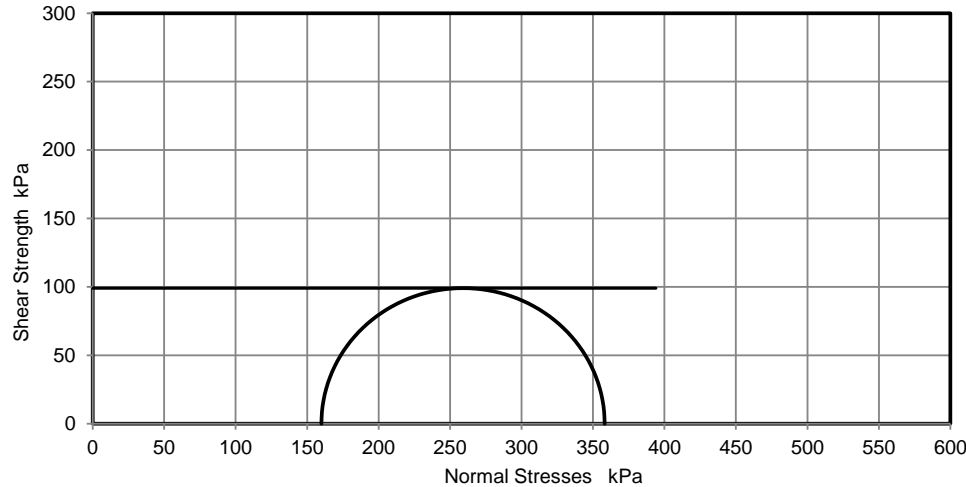


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.98	Mg/m3
Moisture Content	30	%
Dry Density	1.52	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	160	kPa
Axial Strain	11	%
Deviator Stress, ($\sigma_1 - \sigma_3$)f	198	kPa
Undrained Shear Strength, cu	99	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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**Unconsolidated Undrained Triaxial
Compression Test without measurement of
pore pressure - single specimen**

Job Ref	33151
Borehole/Pit No.	BH1
Sample No.	-
Depth Top	11.00 m
Depth Base	- m
Sample Type	U
Samples received	13/03/2023
Schedules received	15/03/2023
Date of test	24/03/2023

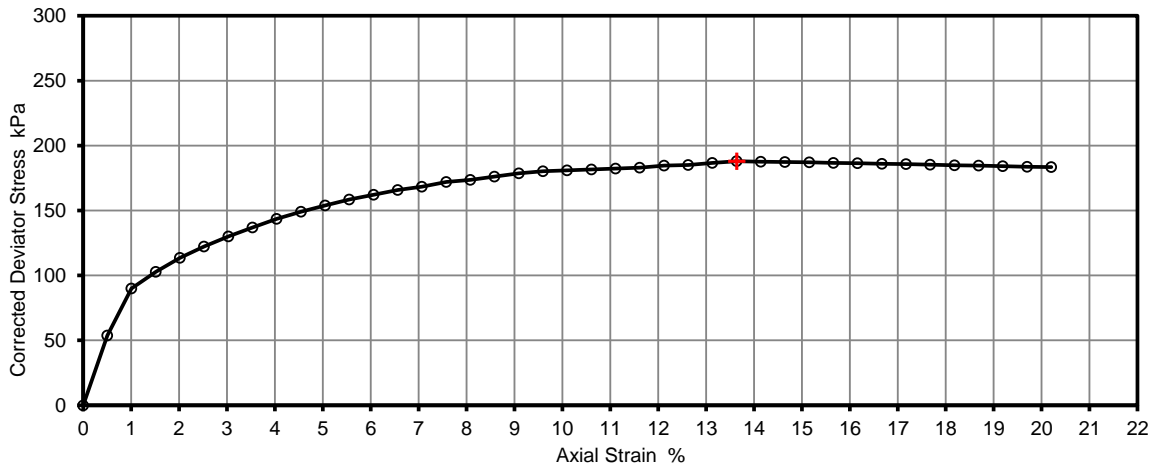
Site Name	Cortis Road		
Project No.	J22403	Client	GEA
Soil Description	High strength dark grey slightly fine sandy silty CLAY		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

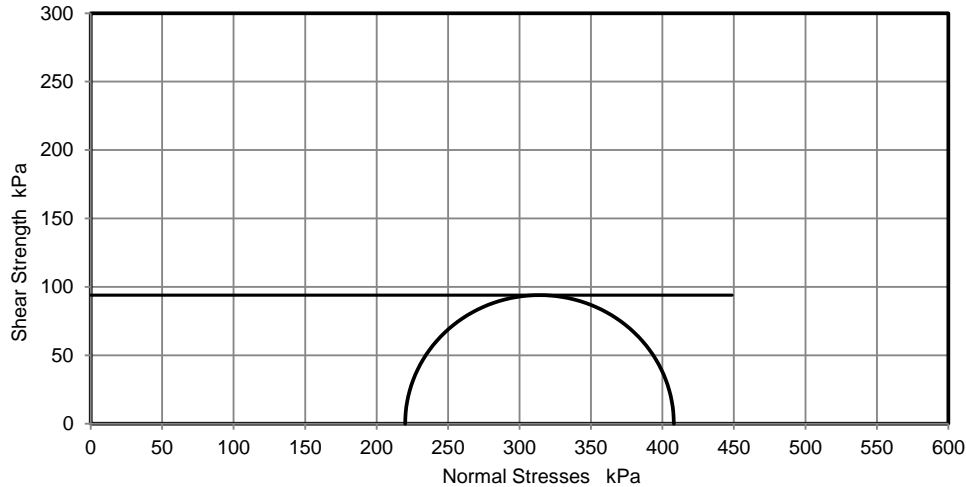


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	30	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	220	kPa
Axial Strain	14	%
Deviator Stress, $(\sigma_1 - \sigma_3)_f$	188	kPa
Undrained Shear Strength, c_u	94	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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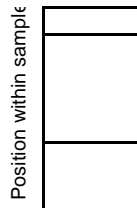
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

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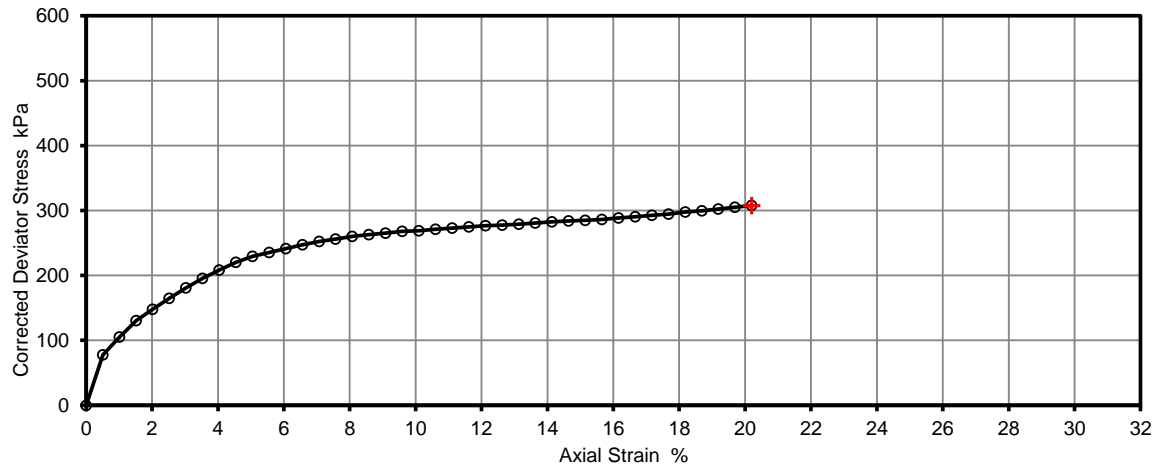
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	33151
				Borehole/Pit No.	BH1
Site Name	Cortis Road			Sample No.	-
Project No.	J22403	Client	GEA	Depth Top	14.00 m
Soil Description	Very high strength dark grey fine sandy silty CLAY			Depth Base	- m
				Sample Type	U
				Samples received	13/03/2023
				Schedules received	15/03/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/03/2023

Remarks

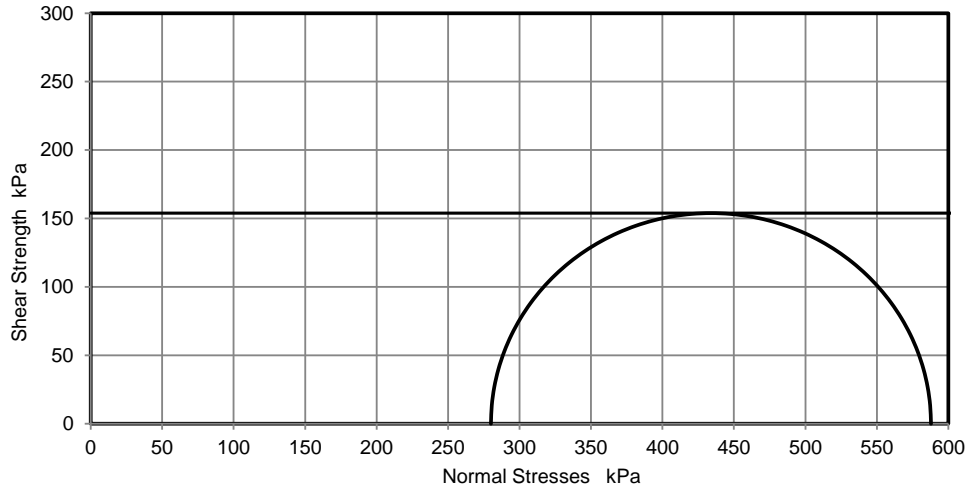


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.03	Mg/m ³
Moisture Content	24	%
Dry Density	1.63	Mg/m ³
Rate of Strain	1.5	%/min
Cell Pressure	280	kPa
Axial Strain	20	%
Deviator Stress, ($\sigma_1 - \sigma_3$)f	308	kPa
Undrained Shear Strength, cu	154	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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 Initials: J.P
 Date 29/03/2023
 MSF-5 R7



**Unconsolidated Undrained Triaxial
Compression Test without measurement of
pore pressure - single specimen**

Job Ref	33151
Borehole/Pit No.	BH1
Sample No.	-
Depth Top	17.00 m
Depth Base	- m
Sample Type	U
Samples received	13/03/2023
Schedules received	15/03/2023
Date of test	24/03/2023

Site Name	Cortis Road		
Project No.	J22403	Client	GEA
Soil Description	High strength dark grey slightly fine sandy silty CLAY		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

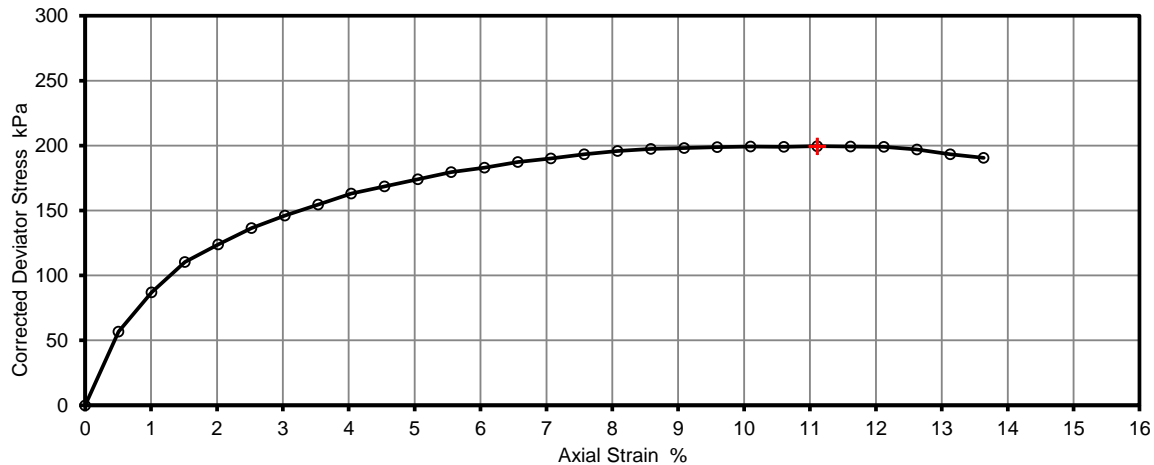
Remarks

Sample slightly softened on top

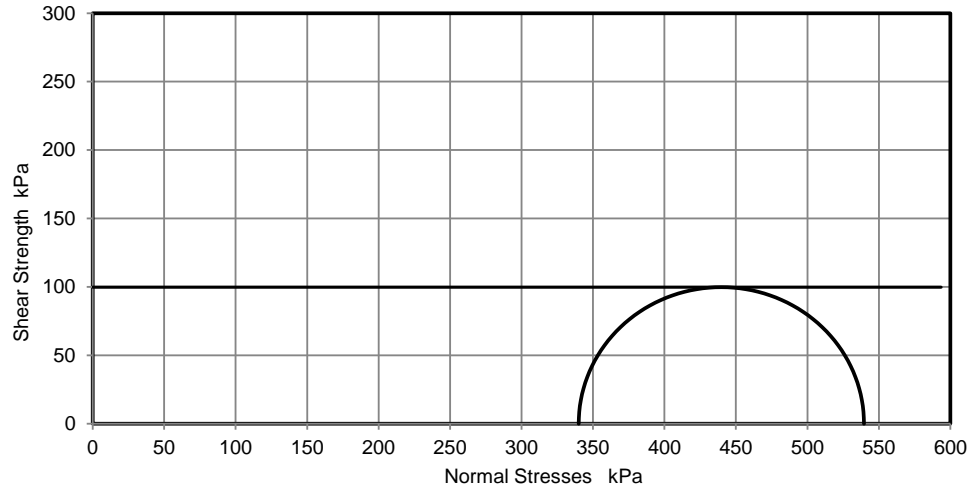


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m ³
Moisture Content	33	%
Dry Density	1.50	Mg/m ³
Rate of Strain	1.5	%/min
Cell Pressure	340	kPa
Axial Strain	11	%
Deviator Stress, ($\sigma_1 - \sigma_3$)f	200	kPa
Undrained Shear Strength, cu	100	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.




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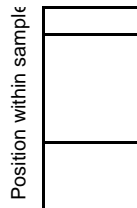
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
 Initials: J.P
 Date 29/03/2023

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	33151
				Borehole/Pit No.	BH1
Site Name	Cortis Road			Sample No.	-
Project No.	J22403	Client	GEA	Depth Top	19.55 m
Soil Description	High strength dark grey slightly fine sandy silty CLAY			Depth Base	- m
				Sample Type	U
				Samples received	13/03/2023
				Schedules received	15/03/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/03/2023

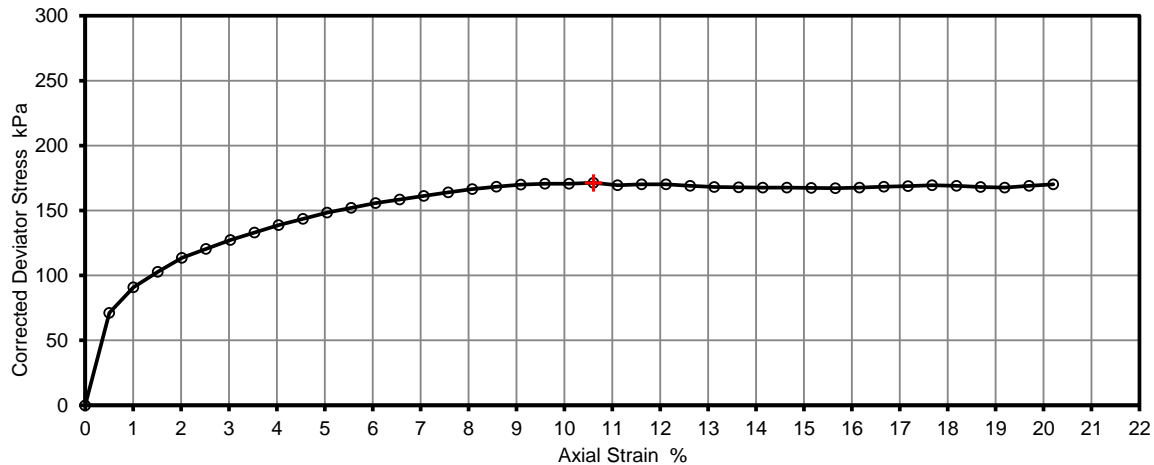
Remarks

Sample slightly water softened at top

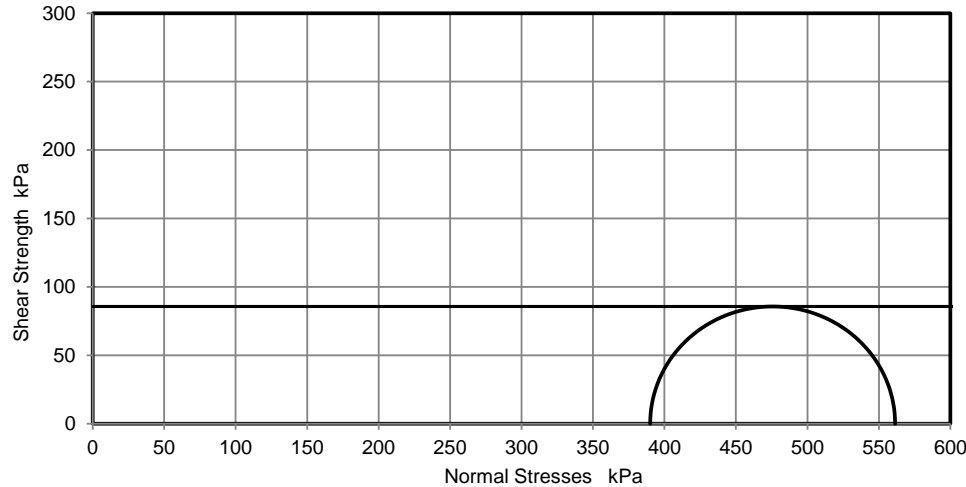


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.01	Mg/m ³
Moisture Content	34	%
Dry Density	1.50	Mg/m ³
Rate of Strain	2.0	%/min
Cell Pressure	390	kPa
Axial Strain	11	%
Deviator Stress, (σ ₁ - σ ₃) _f	171	kPa
Undrained Shear Strength, c _u	86	kPa ½(σ ₁ - σ ₃) _f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



Test Report by K4 SOILS LABORATORY
 Unit 8 Olds Close Olds Approach
 Watford Herts WD18 9RU
 Tel: 01923 711 288 Email: James@k4soils.com

These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
 Initials: J.P
 Date 29/03/2023
 MSF-5 R7



Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results
Tested in accordance with BS1377 : Part 3 : 2018, Clause 7.6 & Clause 12

Job No. 33151	Project Name Cortis Road	Programme	
		Samples received	13/03/2023
Project No. J22403	Client GEA	Schedule received	15/03/2023
		Project started	16/03/2023
		Testing Started	22/03/2023

Hole No.	Sample				Soil description	Dry Mass passing 2mm %	SO4 Content mg/l	pH	Remarks
	Ref	Top m	Base m	Type					
BH1	-	7.50	-	D	Dark grey silty CLAY	100	900	7.1	
BH1	-	15.00	-	D	Grey silty CLAY	100	1060	7.2	
BH2	-	3.50	-	D	Brown slightly mottled bluish grey slightly sandy silty CLAY with selenite deposits and traces of rootlets	100	2680	7.3	
BH4	-	1.50	-	D	Brown slightly mottled bluish grey slightly gravelly slightly sandy silty CLAY (gravel is fm and sub-rounded)	94	460	7.7	

	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com <small>These results only apply to the items tested</small> <small>NOTE: The report shall not be reproduced except in full without authority of the laboratory</small>	Checked and Approved Initials J.P. Date: 29/03/2023
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R29



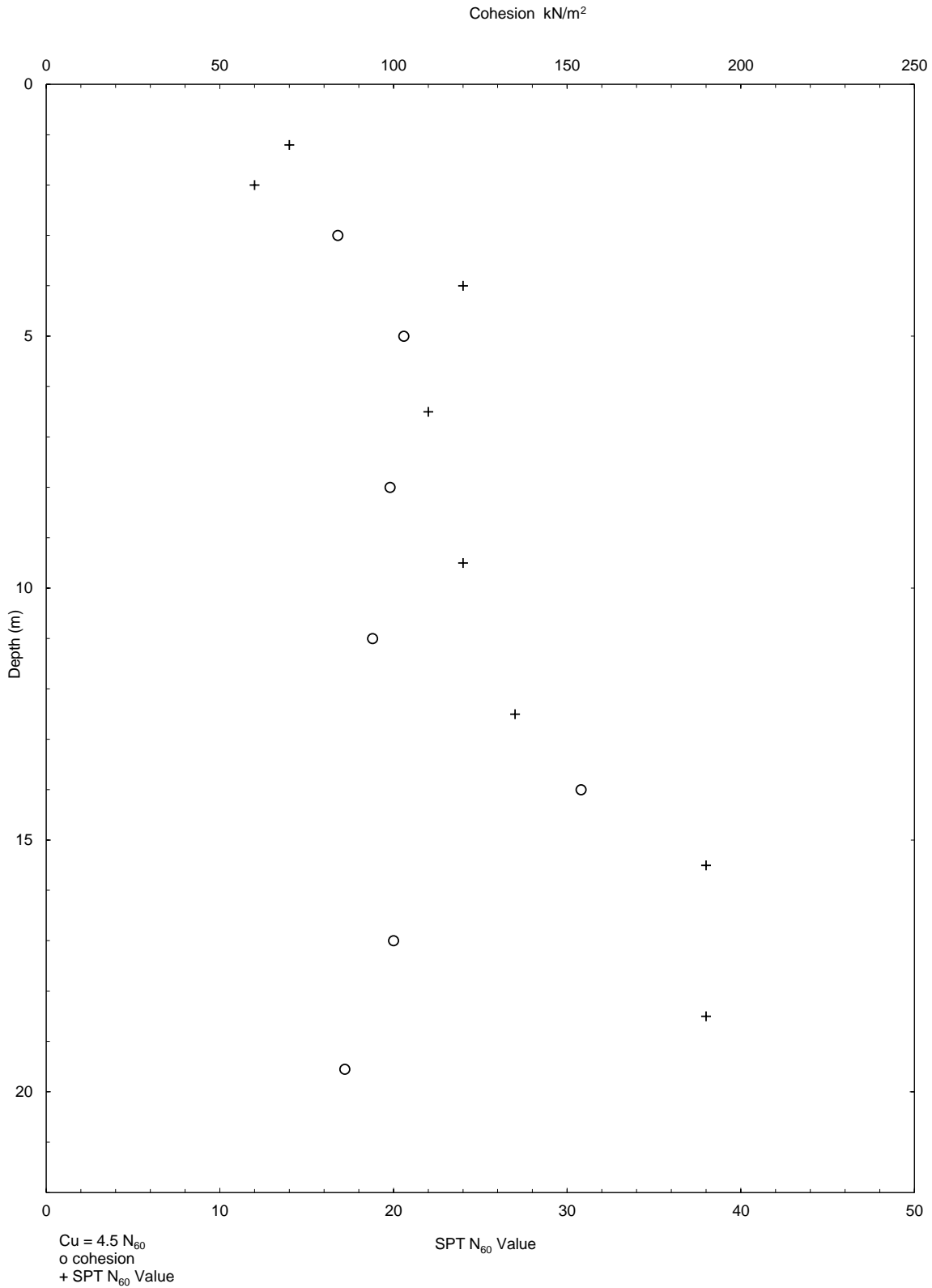
Site Cortis Road, Ashburton Estate, Wandsworth, London

Client Wandsworth London Borough Council

Engineer Price and Myers

Job Number
J22403

Sheet
1 / 1





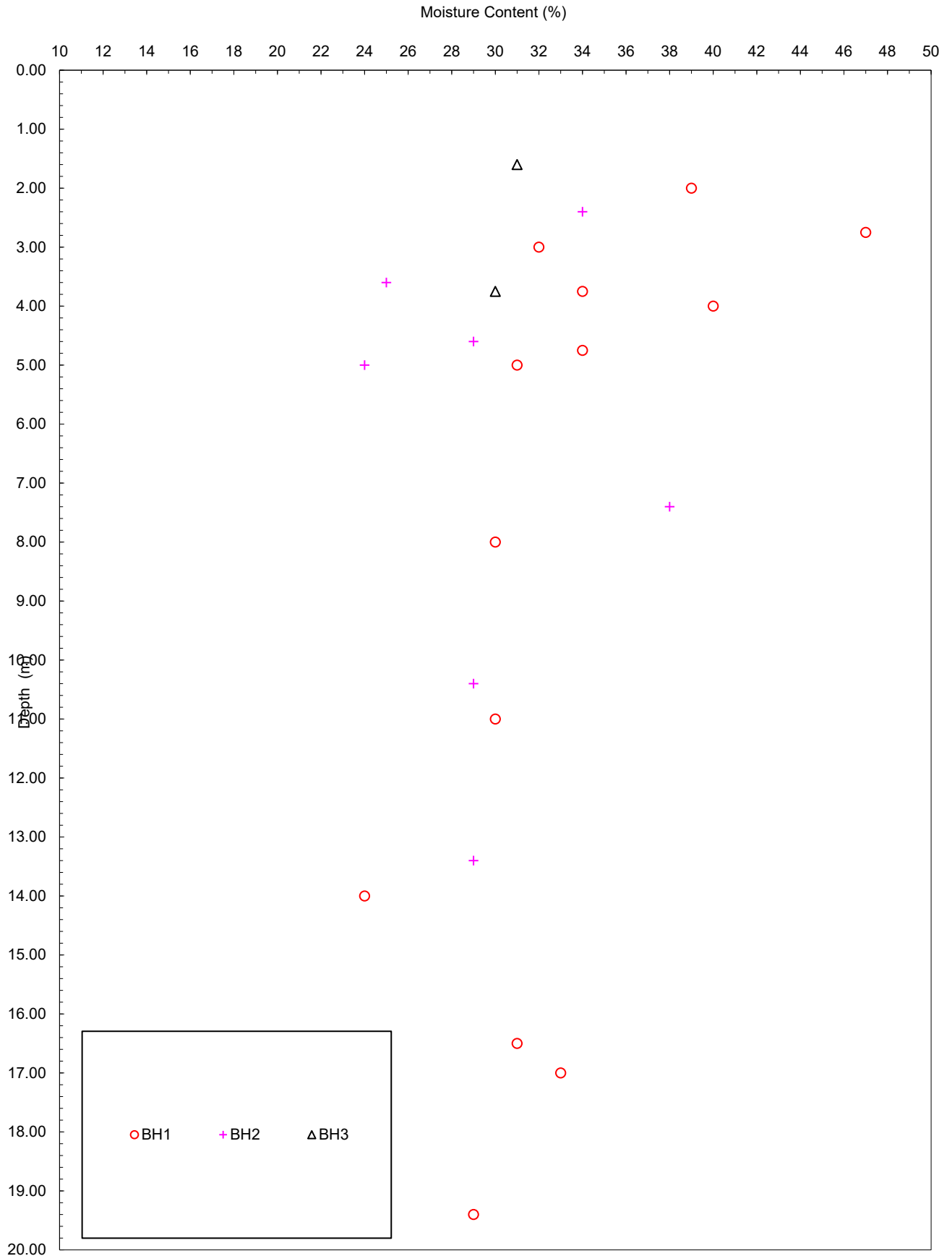
Site: Cortis Road, Ashburton Estate, Wandsworth, London

Job Number
J22403

Client: Wandsworth London Borough Council

Sheet
1 / 1

Engineer: Price and Myers





DETS

Certificate of Analysis

Certificate Number 23-05887

Issued: 11-Apr-23

Client Geotechnical & Environmental Associates
Unit 1
Church Farm
Gotham Road
Nottingham
NG11 0DE

Our Reference 23-05887

Client Reference J22403

Order No J22403

Contract Title Cortis Road, Ashburton Estate, Wandsworth, London

Description 2 Soil samples.

Date Received 10-Mar-23

Date Started 10-Mar-23

Date Completed 11-Apr-23

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

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

Approved By



Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 23-05887

Client Ref J22403

Contract Title Cortis Road, Ashburton Estate, Wandsworth, London

Sample ID	Depth	Lab No	Completed	Matrix Description
BH2	0.3	2138633	11/04/2023	Brown gravelly, clayey SAND
BH4	0.5	2138634	11/04/2023	Brown gravelly, sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 23-05887

Client Ref J22403

Contract Title Cortis Road, Ashburton Estate, Wandsworth, London

Lab No	2138633	2138634
Sample ID	BH2	BH4
Depth	0.30	0.50
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	07/03/2023	07/03/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Preparation					
Stones Removed	DETSC 1003*	0	%	0.0	0.0
Moisture Content 30°C	DETSC 1004*	0.1	%	5.0	9.7
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	7.3	7.1
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	13	21
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	66	17
Lead	DETSC 2301#	0.3	mg/kg	31	49
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	32	9.3
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	56	70
Inorganics					
pH	DETSC 2008#		pH	10.1	7.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	0.2
Total Organic Carbon	DETSC 2002	0.1	%	2.9	0.5
Chloride Aqueous Extract	DETSC 2055	1	mg/l	3.3	5.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	50	55
Sulphide	DETSC 2024*	10	mg/kg	40	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.12	0.03
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	19	
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	19	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	6.1	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	27	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	110	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	140	
Aromatic C5-C35	DETSC 3072*	10	mg/kg	280	
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	300	
EPH (C8-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10

Summary of Chemical Analysis

Soil Samples

Our Ref 23-05887

Client Ref J22403

Contract Title Cortis Road, Ashburton Estate, Wandsworth, London

Lab No	2138633	2138634
Sample ID	BH2	BH4
Depth	0.30	0.50
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	07/03/2023	07/03/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
EPH (C12-C16)	DETSC 3311	10	mg/kg	260	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	1200	< 10
EPH (C21-C35)	DETSC 3311	10	mg/kg	1300	< 10
EPH (C8-C40)	DETSC 3311*	10	mg/kg	3000	< 10
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	0.56	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	1.6	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	5.9	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	7.0	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	61	0.13
Anthracene	DETSC 3303	0.03	mg/kg	16	0.04
Fluoranthene	DETSC 3303#	0.03	mg/kg	59	0.19
Pyrene	DETSC 3303#	0.03	mg/kg	49	0.15
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	27	0.12
Chrysene	DETSC 3303	0.03	mg/kg	22	0.07
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	26	0.11
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	11	0.05
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	24	0.11
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	6.2	0.04
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	1.5	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	7.2	0.04
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	320	1.0
PCBs					
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01	I/S
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.7	< 0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 23-05887

Client Ref J22403

Contract Title Cortis Road, Ashburton Estate, Wandsworth, London

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2138633	BH2 0.30	SOIL	NAD	none	Josh Best
2138634	BH4 0.50	SOIL	NAD	none	Josh Best

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

Information in Support of the Analytical Results

Our Ref 23-05887
 Client Ref J22403
 Contract Cortis Road, Ashburton Estate, Wandsworth, London

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2138633	BH2 0.30 SOIL	07/03/23	GJ 250ml		
2138634	BH4 0.50 SOIL	07/03/23	GJ 250ml		

Key: G-Glass J-Jar

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

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

End of Report



Site	Cortis Road, Ashburton Estate, Wandsworth, London	Job Number	J22403
Client	Wandsworth London Borough Council	Sheet	1 / 2
Engineer	Price and Myers		

Proposed End Use Commercial

Soil Organic Matter content % 1.0

Contaminant	Screening Value mg/kg	Data Source	Contaminant	Screening Value mg/kg	Data Source
Metals			Hydrocarbons		
Arsenic	640	C4SL	Banded TPH (8-10)	5385	Calc1
Cadmium	410	C4SL	Banded TPH (10-12)	24615	Calc1
Chromium (III)	8600	S4UL	Banded TPH (12-16)	55385	Calc1
Chromium (VI)	49	C4SL	Banded TPH (16-21)	43077	Calc1
Copper	68,000	S4UL	Banded TPH (21-35)	43077	Calc1
Lead	2330	C4SL	Benzene	27	C4SL
Elemental Mercury	26	S4UL	Toluene	870	SGV
Inorganic Mercury	1100	S4UL	Ethyl Benzene	48000	SGV
Nickel	980	S4UL	Xylene	475	SGV
Selenium	13000	SGV	Aliphatic C5-C6	3200	S4UL
Zinc	730,000	S4UL	Aliphatic C6-C8	7800	S4UL
Anions			Aliphatic C8-C10	2000	S4UL
Soluble Sulphate	500 mg/l	Structures	Aliphatic C10-C12	9700	S4UL
Sulphide	50	Structures	Aliphatic C12-C16	59000	S4UL
Chloride	400	Structures	Aliphatic C16-C35	1,600,000	S4UL
Others			Aromatic C6-C7	See Benzene	S4UL
Organic Carbon (%)	10	Methanogenic potential	Aromatic C7-C8	See Toluene	S4UL
Total Cyanide	12000	WRAS	Aromatic C8-C10	3500	S4UL
Total Mono Phenols	3200	SGV	Aromatic C10-C12	16000	S4UL
PAH			Aromatic C12-C16	36000	S4UL
Naphthalene	190.00	S4UL	Aromatic C16-C21	28000	S4UL
Acenaphthylene	83,000	S4UL	Aromatic C21-C35	28000	S4UL
Acenaphthene	84,000	S4UL	PRO (C ₅ - C ₁₀)	17397	Calc2
Fluorene	63,000	S4UL	DRO (C ₁₂ - C ₂₈)	1,723,000	Calc2
Phenanthrene	22,000	S4UL	Lube Oil (C ₂₈ - C ₄₄)	1,628,000	Calc2
Anthracene	520,000	S4UL	TPH	750	Trigger to consider speciated testing
Fluoranthene	23,000	S4UL	Chlorinated Solvents		
Pyrene	54,000	S4UL	1,1,1 trichloroethane (TCA)	660	S4UL
Benzo(a)anthracene	170.0	S4UL	tetrachloroethane (PCA)	110	S4UL
Chrysene	350	S4UL	tetrachloroethene (PCE)	24	C4SL
Benzo(b)fluoranthene	44.0	S4UL	trichloroethene (TCE)	0.73	C4SL
Benzo(k)fluoranthene	1,200.0	S4UL	1,2-dichloroethane (DCA)	12	C4SL
Benzo(a)pyrene	42.00	C4SL	vinyl chloride (Chloroethene)	1.1	C4SL
Indeno(1 2 3 cd)pyrene	500.0	S4UL	tetrachloromethane (Carbon tetra	2.9	S4UL
Dibenz(a h)anthracene	3.50	S4UL	trichloromethane (Chloroform)	99	S4UL
Benzo (g h i)perylene	3,900	S4UL			
Total PAH Screen	600.0	B(a)P / 0.15			

Notes

Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL

S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk

Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil

Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction

Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration



Site Cortis Road, Ashburton Estate, Wandsworth, London

Client Wandsworth London Borough Council

Engineer Price and Myers

Job Number
J22403

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Proposed End Use **Commercial**

The key generic assumptions for this end use are as follows;

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be a working female aged 16 to 65 years old;
- that the exposure duration will be 49 years;
- that the building type equates to a three-storey office.
- that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours;

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of the generic screening value there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include:

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.



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