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CHANDOS ROAD, PARK ROYAL
GEO-ENVIRONMENTAL GROUND INVESTIGATION

RAMBOLL

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EXECUTIVE SUMMARY

This report presents the findings and conclusions of a geotechnical and environmental (herein 'geo-environmental') ground investigation at a property known as Units 4-14 Chandos Park Industrial Estate located at Chandos Road, Park Royal, NW10 6NF (the "site"). Ramboll UK Limited ("Ramboll") was instructed by Vantage Data Centers (herein the 'Client'), in accordance with Ramboll's Proposal ref. Q1620009986_Park Royal_03, Issue 03, dated 16th July 2020. It is understood that the Client intends to redevelop the site for commercial use to comprise two data centre units.

The site covers an area of approximately 4.86 acres (1.97 hectares) and is currently occupied by two terraces of industrial warehouse units.

The ground investigation works were undertaken by Geotechnical Engineering Limited (GEL) under Ramboll's supervision. GEL has produced a factual report on the investigation which is provided as an appendix to this report.

The ground investigation comprised drilling of seven cable percussion boreholes to depths between 20.0m and 25.0m below ground level (m bgl) and seven shallow windowless sample boreholes to depths of up to 6.0m bgl. Electrical and thermal resistivity tests were also undertaken.

Thirty soil and four groundwater samples were collected and analysed by a laboratory for a suite of environmental analysis and a further 432 samples were obtained for geotechnical testing.

Investigation Findings

Made Ground was encountered at thicknesses of between 0.3 and 1.6m and generally comprised granular materials and re-worked clay. The London Clay Formation was encountered underlying the Made Ground and proven to maximum depth of 25.0m bgl. The base of the stratum was not proven, although a publicly available borehole record located approximately 500m to the west of the site, accessed via the BGS Online 'Geology of Britain viewer', indicates the base of the stratum is at 75m bgl.

In-situ and laboratory test data has been used to derive characteristic geotechnical parameters for the identified strata.

Perched water was encountered within two boreholes during drilling at depths between 0.25m bgl and 0.3m bgl. Standpipes were installed in ten boreholes, with response zones at a variety of depths across the Made Ground and London Clay Formation. Four rounds of groundwater monitoring of the borehole installations have been completed. Groundwater levels varied from 0mbgl to 8.1mbgl. The shallow groundwater levels are considered to arise from perched groundwater within Made Ground, and potential flooding of installations. Deeper groundwater was monitored in other boreholes, to a maximum depth of 8.1mbgl, which is likely to represent seepage from the low permeability London Clay Formation or the overlying Made Ground, as opposed to a phreatic surface.

Visual and odour evidence of contamination was limited to a hydrocarbon odour and sheen from perched water at one location (CP01, 0.25m bgl) and a solvent type odour at another (WS05, 1.0-1.2m bgl in clay).

Soil chemical analysis identified slightly elevated concentrations of some typical brownfield contaminants; however, only a single marginal exceedance of the relevant screening criteria for commercial use (for vinyl chloride in one soil sample) was recorded. The proposed development will be capped with buildings and hardstanding mitigating the risk of exposure. The concentrations detected are not considered to pose a risk to the proposed development.

Asbestos was identified at three locations at levels quantified to between <0.001% and 0.109% (the latter marginally exceeded the hazardous waste threshold of <0.1%). Whilst this is not considered to represent a significant risk to future site users (since the site will be capped), does require consideration

during the construction phase and will necessitate information being held on the site safety file or future maintenance events.

A continuous groundwater body was not encountered at the site. Whilst some elevated contaminants were identified in discontinuous perched water encountered in Made Ground, the concentrations are not considered significant due to the absence of soil impact and the low hydrogeological and hydrological sensitivity of the site. The concentrations are considered to be reflective of background water quality in an area with an industrial legacy.

Ground gas monitoring was undertaken on three occasions and classified the site as Characteristic Situation 1, indicating that no special protection measures are required. Further confirmatory monitoring may be required to increase the number of visits.

Overall, the investigation did not identify significant soil or groundwater contamination that would be expected to require remedial measures to develop the site; albeit, Ramboll considers that further investigatory work would need to be completed in areas not accessible during this phase of investigation (i.e. within the area of existing building footprints).

Ramboll considers that the Made Ground does not form a suitable founding stratum for structural foundations (i.e. piles), due to its inherent variability in composition and distribution. It is recommended that any structural foundations for the proposed development are founded within the London Clay. Considering the high anticipated loadings, piled foundations are considered to be the most appropriate solution.

A preliminary assessment of geotechnical pile capacities has been undertaken, which is summarised in a separate Geotechnical Advice Note. The Contiguous Flight Auger (CFA) technique is likely to be the most cost-effective and suitable method for the ground conditions and likely depth range. A preliminary settlement analysis has also been undertaken to derive a modulus of subgrade reaction value, which may be used to inform the selection of the most appropriate structural slab solution.

Key geotechnical risks include the potential for encountering buried obstructions, geochemical aggressivity of the ground and the potential for perched groundwater.

Recommendations - Contamination: Ramboll considers the following actions are likely to be required in future as part of discharging typical planning conditions and in accordance with good practice in terms of redevelopment of the site:

1. **The Local Authority** may require an intrusive environmental investigation as a condition of planning. This report should be submitted to the Local Authority in that regard and agreement reached on the scope of further actions (as outlined below).
2. **Further Investigation:** It is possible that as-yet unidentified sources of contamination may be present at the site. Further ground investigation is expected to be required for environmental purposes to characterise ground conditions in areas of the site that were not accessible during the current phase of investigation, for example underlying the footprint of existing buildings.
3. **Gas Monitoring**: To date three monitoring visits have been undertaken. Three further confirmatory visits are recommended to increase the data set.
4. **Unexpected Contamination:** 'Unexpected finds' or 'hotspots' of contamination requiring management may be encountered during redevelopment. An 'unexpected contamination procedure' will need to be implemented to allow groundworkers to act appropriately upon encountering or suspecting the presence of previously unidentified ground contamination.
5. **Health & Safety:** Appropriate H&S management precautions will need to be followed prior to and during the construction phase. This report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in CLR11. In some cases, contaminants may also pose acute hazards to workers at a site and a worker's short

exposure is not considered when deriving the GAC. Asbestos in soil is not considered by CLR11 and will need to be considered for the redevelopment works. The data generated by the investigation should therefore be considered in the appropriate pre-works health and safety assessment, together with the appropriate shorter exposure times for construction workers and more direct contact with the ground. It is anticipated that these short-term risks can be appropriately addressed through the use of appropriate, health and safety plans, safe working procedures and the use of personal protective equipment (PPE), in line with relevant legislation and guidance. Groundworks undertaken by the contractor should be given to CAR 2012 (or CAR-SOIL guidance) when undertaking works at the site.

6. **Materials Management:** Material management plans will need to be prepared if, for example, excess material is to be retained or re-used on-site. Further testing may also be required to confirm the suitability of any material imported or re-used.
7. **Landscaping:** If landscaping is planned a separate assessment will be needed to confirm that soil in landscaped areas is suitable for use. Soils for landscaped areas should be demonstrated to be suitable for use and not to provide a risk to future site users; soils should also comply with British Standard for Topsoil (BS3882:2015).
8. **Water Supply Pipes:** Future water supply pipes will require appropriate material selection given the brownfield nature of the site.

Recommendations - Geotechnical: The following recommendations are made for geotechnical design and aim to mitigate the identified risks associated with the ground and groundwater conditions:

1. **Foundation Design:** The London Clay Formation is recommended as the founding layer for foundations supporting structural column loads for the proposed development. The preliminary pile capacity charts, presented in the separate geotechnical advice note, should be used to inform preliminary pile design. Similarly, the initial modulus of subgrade reaction should be used to inform the selection of the most appropriate structural floor slab solution.
2. **Geotechnical Design Report:** A Geotechnical Design Report (GDR) should be produced for the project, compliant with requirements set out in Eurocode 7. This shall include full details on the interpretation of design data and justification for foundation and earthworks design. Further information on re-use of site-won material and construction supervision or monitoring shall also be included.
3. **Material Re-Use:** Any re-use of site won material shall be in accordance with the Specification for Highway Works. Additional classification and/or compaction testing is also recommended to inform the re-use of any material.
4. **Pavement Design:** Confirmatory CBR or plate load tests should be undertaken across the pavement formation to ensure a minimum CBR value of 2.5% and compliance with any pavement design.
5. **Concrete Aggressivity:** Cast in-situ piling is recommended to reduce concrete exposure to sulphate attack. This may reduce the aggressivity classification from DS-4 AC-4 classification for the London Clay Formation (likely to DS-2 AC-2) for piled foundations, although this should be confirmed with the eventual piling contractor.
6. **Resistivity Testing:** Ramboll has not undertaken any interpretation of the results of the thermal and electrical resistivity testing undertaken as part of this report. Design development of the utilities and services associated with the development should consider the test data.

1. INTRODUCTION

1.1 Instruction

This report presents the findings and conclusions of a geotechnical and environmental (herein 'geo-environmental') ground investigation undertaken by Ramboll at a property known as 'Units 4-14 Chandos Park Industrial Estate' located at Chandos Road, Park Royal, NW10 6NF (the "site"). Ramboll UK Limited ("Ramboll") was instructed by Vantage Data Centers (herein the 'Client'), in accordance with Ramboll's Proposal ref. Q1620009986_Park Royal_03, Issue 03, dated 16th July 2020.

Plans showing the site location and layout are presented as Figure 1 and Figure 2 (see Appendix 1).

1.2 Background Information

The site is located on Chandos Road within the mixed commercial and industrial setting of Park Royal and occupies an area of approximately 1.97 hectares. The site is located approximately 0.36 miles (580m) north from the centre of North Acton (see Appendix 1, Figure 1) and is currently developed to comprise two terraces of industrial warehouse-type units (three units in each terrace). Buildings currently occupy approximately 70% of the total site area (see Appendix 1, Figure 2). The majority of the remaining site area comprises hard landscaped roadways, loading bays and parking areas. Two strips of soft landscaping are present along the site's south-western boundary. A railway line borders the site to the east with Chandos Road to the west. The north of the site is bound by an area of green space, a travellers' site and a site occupied by a precious metals refinery (Vale Acton Refinery). The south of the site is bound by an office building with Victoria Road beyond.

1.3 Proposed Development

Ramboll understands that the Client intends to redevelop the site in phases: Phase 1 will include a 24MW (megawatt) six storey commercial data facility, occupying the north of the property. Phase 2 includes an additional 16 MW five story (double height) commercial data facility on the southern half of the property.

1.4 Phase I ESA

An initial Phase I Environmental Site Assessment (ESA) was commissioned by the Client and issued by Ramboll in June 2020[1] . The assessment included a desk-based review and site walkover. A Phase I Geo-Environmental Assessment was subsequently commissioned by the Client and issued by Ramboll in September 2020[2], including information obtained during a number of site visits completed by Ramboll in May, July and August 2020, providing an update to a Phase I Environmental Site Assessment issued by Ramboll in June 2020. On the basis of Ramboll's previous assessments, the overall risk from soil and groundwater contamination at the site in the context of redevelopment for commercial use was considered to be moderate. It was recommended that an intrusive environmental site investigation be undertaken to assess whether contamination is present in the shallow soils and (if present) shallow groundwater which could pose a risk to the proposed use of the site. The findings of the Phase I assessment are summarised in Section 2 of this report.

[1] Ramboll, Phase I Environmental Site Assessment, Chandos Industrial Estate, Park Royal, London, dated June 2020, project number: 1690015850
[2] Ramboll, Phase I Ge-Environmental Assessment, Chandos Park Industrial Estate, Park Royal, London, dated September 2020, project number: 1620009986

1.5 Phase II Geo-Environmental Investigation

The scope of the investigation has been based on the scope of work outlined by the client, preliminary information on the proposed development and the preliminary conceptual site model developed as part of Ramboll's previous Phase I assessment[2]. The investigation comprised a combined geotechnical and environmental investigation. This interpretive report forms part of the works package for the Phase II investigation.

The scope of the investigation is summarised in Table 1.1 below:

Table 4.1 Scope of Works

Item	Description
Windowless sample boreholes	7 No. windowless sample boreholes to depths of up to 6m for environmental and geotechnical testing.
Cable percussion boreholes	7 No. boreholes to depths up to 25 m for environmental and geotechnical testing.
In-situ geotechnical testing	Standard Penetration Tests (SPT) in each of the 7 No. windowless sample and 7 No. cable percussion boreholes.
Installation of monitoring wells	5 No. windowless sample boreholes installed with monitoring wells to depths of up to 5.0m. 5 No. cable percussion boreholes installed with wells to depths up to 20.5m.
Thermal resistivity tests	Thermal resistivity tests at 6 windowless sample locations. Laboratory soil resistivity tests were carried out to correlate to in-situ values.
Electrical resistivity tests	In-situ soil resistivity tests across 3 arrays.
Environmental sampling: soils	87 No. soil samples were screened for presence of volatile organic compounds using a hand-held photoionization detector (PID). 2-3 soil samples per sampling location were obtained for chemical analyses.
Environmental sampling: groundwater	4 No. groundwater samples obtained from monitoring wells for chemical analysis.
Laboratory analysis: environmental	30 No. Soil and 4 No. groundwater samples analysed for a range of contaminants including metals, cyanide, speciated petroleum hydrocarbons, phenol, polycyclic aromatic hydrocarbons and asbestos. Selected samples were analysed for polychlorinated biphenyls, volatile and semi-volatile organic compounds.
Laboratory analysis: geotechnical	Geotechnical laboratory analysis was undertaken including classification, strength and geochemical testing.
Ground gas monitoring	Three rounds of ground gas monitoring of 10 installed monitoring wells.

The Ground Investigation was undertaken in accordance with the following standards:

- BS EN 1997-2:2007, Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing (BSI, 2007);
- BS 5930:2015, Code of practice for ground investigations (BSI, 2015a);
- BS 1377 series, Methods of test for soils for civil engineering purposes;
- BS 10175:2011, Investigation of potentially contaminated sites.

1.6 Limitations

This report has been prepared by Ramboll UK Limited ("Ramboll") exclusively for the intended use by Vantage Data Centers (the "Client") in accordance with the agreement (proposal reference number ref. Q1620009986_Park Royal_03, Issue 03, dated 16th July 2020) between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended, or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and / or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will be developed for commercial use as per the proposed development figure provided within Appendix 1, without significant changes either on-site or off-site.

The findings and opinions in the report are based upon information derived from a variety of information sources. Ramboll believe these information sources to be reliable.

It should be noted that some of the aspects considered in this study are subject to change with time. Therefore, changes to relevant legislation or site conditions should be considered at the time of future development.

The site investigation works were undertaken during a discrete period of time. The findings and conclusions presented in this report are accordingly factually limited by these circumstances and, unless stated otherwise in the report, are preliminary. The field investigations were restricted to a level of detail necessary to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant period of time has elapsed since the sampling took place. The interpretation of the geological and environmental quality conditions is based on extrapolation from point-source data in a heterogeneous environment. Accordingly, more detailed investigation may be appropriate dependent upon the client objectives.

This report provides information on the distribution and concentration of contaminants identified as part of Ramboll's investigation and is not a method statement or risk assessment on how to deal with asbestos.

2. SITE DESCRIPTION

2.1 Background Information

The following information has been prepared utilising publicly available information sources and information from Ramboll's previous Phase I assessment.

Table 2.1 Summary of Site Information

Item	Description
Site History	• The site was undeveloped in the 1860s, possibly in agricultural use until 1915 when a motor accessory works (Rotax Works) had been developed on the site. • By 1935, the motor accessories works was identified as an aircraft equipment works and a mattress factory had been developed in the south-east (extending off-site). • By 1975, the site had been redeveloped to a terrace of three industrial units in the south (identified as warehouses by the 1980s) and a terrace of two industrial units in the north (identified as 'works' by the 1990s).
Surrounds History	• The immediate surrounds were undeveloped in the 1860s, possibly in agricultural use. A railway line was present from approximately 150m east and, by 1871 a second railway line was present adjacent to the eastern site boundary. Industrial development including brick, tile and canvas works was located from approximately 200m north/north-west. • By 1915 an excavation associated with the brick and tile works had been extended to within 125m of the north-west of the site and a school had been developed approximately 125m south-west. Residential development was also evident within the immediate surrounds to the east and south-east and, a dye works was present 180m south. Chandos Road had been constructed along the south-western boundary of the site. • By 1935, further industrial development was evident in the surrounds including a mattress factory immediately south-east (extending onto the site); a cable works and a press cap works immediately to the west/south-west; a metal refinery immediately to the north-west; an engineering works to the north; and a vaseline (petroleum jelly) works immediately to the east. • By the 1950s, an engineering works and a motor accessories works were present immediately to the west/south-west of the site. Three electricity substations were located within 110m of the site. Tanks associated with the adjacent metal refinery were also mapped 30m north and 60m north-west and 30m east and 295 feet 90m east associated with the petroleum jelly works. By 1978, a parcel of land approximately 160m north-east vacant and was subsequently redeveloped to comprise a superstore in the 1980s. A power station was present 930m north of the site between the 1980s and mid -1990s.
Recent Use	Current on-site activities include: • administration/office activities; • music rehearsal studios and secure storage space; • manufacture and sales of commercial glass and glazing; and the operation of three electricity substations. Ancillary activities also include waste, fuel and oil storage and are likely to include small-scale internal chemical storage (i.e. cleaning chemicals, general maintenance chemicals/products as well as chemicals used). Ramboll was not able to inspect the units internally. An above ground storage tank containing diesel fuel and oil drums containing synthetic engine oil were observed externally. Current surrounding uses include: • North: green space, a travellers site (caravan site) and a site occupied by a precious metals refinery with further industrial and commercial uses beyond. • East: A railway line adjacent beyond which lies a cluster of industrial/commercial buildings and a bus depot, with residential development beyond to the east/south-east. • South: An office building beyond which lies Victoria Road, a car park and development of an industrial or commercial appearance.

	• West: Chandos Road beyond which lies an area of industrial/commercial development including properties occupied by Bestway Wholesale.
Environmental Setting	The British Geological Survey (BGS) Map for Park Royal, 1:50,000 scale, Sheet 256, North London indicates that the site is underlain by the London Clay Formation comprising 'blue-grey or grey-brown silt and clay' (approximate thickness 80m), underlain by the Lambeth Group (clay, silt and sand) (approximate thickness 20m) and the White Chalk Subgroup (chalk with flint) to depth. The Environment Agency classifies the strata as follows: • London Clay: - Unproductive Stratum. • The Lambeth Group (clay, sands and gravels) (Secondary A Aquifer) • Upper Chalk Formation (white chalk) (a Principal Aquifer). Given the site history, Made Ground may be present directly above the bedrock. A shallow widespread or continuous groundwater body is considered unlikely to be present underlying the site. The site is not within or near a groundwater Source Protection Zone (SPZ). The nearest surface watercourse is the Grand Union Cancel (Paddington Branch) located 280m north-east of the site, although this is noted to be concrete lined. There are no other named surface water courses within 1km of the site.
Other	According to Environment Agency information, the site lies in Flood Zone 1 (low probability). This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). According to the EA Flood Map for Surface Water which presents the theoretical potential for flooding from pluvial sources (i.e. flooding caused by rainwater exceeding capacity of drainage systems), the centre of the site (i.e. the access road) is located in an area of 'high' flooding probability. This zone comprises land assessed as having a 1 in 30 or greater annual probability of pluvial (rainwater) flooding (>3.3% in any year).

2.2 Unexploded Ordnance

According to a UXO Pre-Desk Study Assessment for the site obtained by Ramboll from Zetica UXO[3], during World War II (WWII), the site was located in the Municipal Borough of Acton, which officially recorded 347 High Explosive (HE) bombs with a bombing density of 149.7 bombs per 405 hectares (ha). Readily available records indicate that several HE bombs fell in close proximity to the site.

The following strategic targets were reportedly located in the vicinity of the site during WWII:

- Transport infrastructure and public utilities.
- Industries important to the war effort, including engineering works and aircraft factories.
- Military camps and training areas.
- Anti-invasion defences.

The Zetica report recommended the completion of a detailed desk study in advance of intrusive investigation to assess the Unexploded Ordnance (UXO) hazard level on the site.

The subsequent Zetica UXO Desk Study and Risk Assessment[4] indicated that no sources of UXO hazard are present on the site and no records have been identified to indicate that the site was bombed. Zetica concluded that the site has a low UXO hazard level.

[3] Further information can be found online at: https://zeticauxo.com/
[4] Zetica, Chandos Park Industrial Estate – UXO Desk Study and Risk Assessment, dated July 2020, Document Ref. P9762-20-R1

3. GEO-ENVIRONMENTAL SITE INVESTIGATION

3.1 Investigation Scope of Work

Geotechnical Engineering Limited (GEL) was engaged to carry out the ground investigation works under the technical supervision of Ramboll and acted in the capacity of Principal Contractor. Before proceeding with intrusive works, GEL confirmed the absence of underground services at each location, with boreholes located at least 1.5m away from identified services or known underground features.

The intrusive site investigation was undertaken between the 27th July and 11th August 2020 and was supervised by Charles Collins and Alex Craddock of Ramboll. Three rounds of ground gas monitoring were undertaken on 10th, 19th and 25th August 2020 and groundwater samples were obtained on 10th and 14th August 2020.

A summary of the investigation scope is presented in Table 3.1. Exploratory locations and borehole logs (including monitoring well details) have been provided within GEL's factual report included as Appendix 2.

Table 3.1 Summary of Intrusive Works

Item	No.	Comments
Service Location Survey	1	Utility plans were obtained and a specialist survey to locate below ground services
Windowless Sample Borehole Locations	7	Seven windowless sample boreholes were advanced to a maximum depth of 6.0m bgl. Five boreholes (WS01, WS02, WS05, WS06, WS07) were installed with monitoring wells for groundwater and ground gas monitoring to depths of 2.0-2.5m. In situ (SPT) testing was undertaken at each location.
Cable Percussion Boreholes	7	Seven cable percussion boreholes were drilled to a maximum depth of 25.0m bgl. Five of the boreholes (CP03, CP05, CP01, CP02, CP07) were installed with groundwater and ground gas monitoring wells to depths ranging from 2.0m to 25.0m bgl. In situ (SPT) testing was undertaken at each location.
In-situ resistivity testing	1	In-situ thermal resistivity testing was undertaken within the inspection pit of each windowless sample borehole (7No. total), using a hand-held probe with the needle sensor inserted into the side of the pit. In-situ electrical resistivity testing was undertaken, comprising 3No. arrays across the south-eastern half of the site and a variety of electrode spacing. The results are reported within GEL's factual report.
Headspace testing	87	Selected soil samples were tested on-site for the presence of VOCs using a photo-ionisation detector (PID), calibrated in accordance with Ramboll's Quality Management procedures. Each soil sample tested was placed into a sealed plastic bag and agitated. The PID was then inserted into the headspace and the total VOC reading recorded. The PID screens for a wide range of VOCs but does not indicate a specific compound; therefore, the results of the PID screening provide a semi-quantitative indication of the concentration of VOCs present in soil pore spaces.
Soil Sampling and Analysis	30 (env) 432 (geo)	Samples were collected in accordance with BS 10175:2011+A2:2017 and were stored within appropriate sample containers and forwarded to an independent Ramboll approved UKAS/MCERTS accredited analytical laboratories (Element Materials Technology) for environmental and (i2 Analytical Ltd) geotechnical testing. Up to three soil samples from each sampling location were submitted for laboratory analysis. Selected soil samples were analysed for a predetermined suite of contaminants, designed to be reflective of the site's historic uses.

Table 3.1 Summary of Intrusive Works		
Groundwater Sampling and Analysis	4	Samples were also sent to a Ramboll approved and appropriately accredited laboratory (i2 Analytical) for geotechnical analysis comprising classification , strength and geochemical tests. Groundwater samples were obtained from four monitoring wells in total. This comprised four wells installed by Ramboll that contained sufficient water to sample (CP01, CP02, CP03 and CP06). Following development of the wells, they were purged of more than three times their volume and groundwater was subsequently sampled. Purging and groundwater sampling was undertaken using dedicated clean disposable sampling equipment. Samples were stored within appropriate containers and forwarded to a UKAS accredited independent analytical laboratory (Element Materials Technology Ltd). The four samples were analysed for a suite of contaminants designed to be reflective of the site's historic uses.

3.2 Sample Location Rationale

The rationale for positioning the sampling locations is described in Table 3.4 below.

Table 3.4: Exploratory Hole Rationale

Exploratory Hole	Rationale	Depth achieved (m bgl)	Installed as Monitoring Well?
CP01, CP05	To determine soil and groundwater conditions in the north of the site.	25.0	Yes
CP02	To determine soil and groundwater conditions in the centre-west of the site.	20.5	Yes
CP03	To determine soil and groundwater conditions in the east of the site.	20.5	Yes
CP04	To determine ground conditions in the centre-west of the site.	20.45	No
CP05	To determine soil and groundwater conditions in the north-west of the site.	25.0	Yes
CP06	To determine ground conditions in the centre of the site.	25.0	No
CP07	To determine ground conditions in a storage area in the west of the site adjacent to an electricity substation.	25.0	Yes
WS01	To determine shallow soil and groundwater conditions adjacent to an above ground diesel storage tank and electricity substation.	4.45	Yes
WS02, WS03	To determine shallow soil and groundwater conditions in the east of the site in the vicinity of waste and materials storage areas.	4.45, 6.45	WS02 only.
WS04	To determine shallow soil and groundwater conditions in the south-east of the site.	0.6	No
WS05	To determine shallow soil and groundwater conditions in the centre of the site.	6.45	Yes
WS06, WS07	To determine shallow soil and groundwater conditions in landscaped areas in the west of the site.	6.45, 0.9	Yes

3.3 Chemical Analysis

Table 3.4 presents the analytical schedule for soil and groundwater samples.

Table 3.4: Analytical Strategy

Analytical Suite	Rationale	Number of soil samples submitted	Number of groundwater samples submitted
Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG) including benzene, toluene, ethylbenzene, xylene (BTEX)	Typically associated with fuels and oils that are generally associated with historical industrial uses identified on site and in the immediate surrounds.	22	4
Polycyclic Aromatic Hydrocarbons (PAH)	Typically associated with fuels and oils, and often found in made ground. Could be anticipated to be present given historical uses of the site.	22	4
Volatile Organic Compounds (VOCs)	Often associated with industrial processes and scheduled at locations where headspace testing recorded elevated readings.	16	4
Semi-Volatile Organic Compounds (SVOCs)	Often associated with industrial processes.	12	3
Polychlorinated Biphenyls (PCBs)	Often associated with oil filled electrical equipment such as substations and transformers.	4	1
Total Phenols & Cyanide	Often associated with industrial processes.	22	4
Metals	Often encountered in made ground, waste deposits and industrial facilities.	22	4
Asbestos (Quantification)	Commonly associated with made ground including demolition materials.	13 (2)	N/A

3.4 Ground Gas Monitoring

Three rounds of ground gas monitoring were undertaken on 10th, 19th and 25th August 2020. Ground gas monitoring was completed using a calibrated GFM430 Monitor with reference to CIRIA C665 and BS 8576:2013 Guidance on Investigations for Ground Gas. The following parameters were monitored:

- Methane (% vol);
- Carbon dioxide (% vol);
- Oxygen (% vol);
- Carbon Monoxide (ppm);
- Hydrogen Sulphide (ppm); and,
- Flow rate (l/hr).

Gas flow rates were measured at all monitoring boreholes and Ramboll recorded the range in flow rates until a steady state was reached. The results of the ground gas monitoring are discussed in Section 7.

3.5 Geotechnical Laboratory Testing

Samples collected from the exploratory holes were scheduled by Ramboll for geotechnical laboratory testing. The geotechnical testing was undertaken by i2 Analytical, a UKAS accredited laboratory. The laboratory testing is summarised in Table 3 and the results have been used to inform the Ground Model described in Section 5.

Table 3.1 Summary of Geotechnical Laboratory Testing

Laboratory Test	No. Tests	Comments
Moisture Content	12	-
Atterberg Limits	8	-
Particle Size Distribution (wet sieving)	12	-
Particle Size Distribution (pipette)	10	A combined wet sieve and pipette PSD test undertaken on selected samples
Quick Undrained Triaxial	6	Single stage using 100mm diameter samples
California Bearing Ratio (CBR)	1	Soaked test on remoulded sample
Thermal Resistivity Testing	5	-
BRE Full Suite D	13	-

3.6 Geotechnical Monitoring

Standpipe groundwater-monitoring installations were constructed within ten boreholes, with standpipe response zones installed at a variety of depths across the Made Ground and solid geology strata, with a view to characterising any shallow and deeper groundwater.

To date, three rounds of groundwater monitoring of the borehole installations have been completed. Results from the round of monitoring have been used to inform the Geotechnical Ground Model, described in Section 9.

3.7 Data Quality Assurance

The laboratory selected to perform the analysis is accredited by UKAS to ISO 17025 and MCerts standards. Internal quality assurance checks are carried out by the laboratory data prior to the laboratory certificates being issued.

4. GEO-ENVIRONMENTAL SITE INVESTIGATION FINDINGS

4.1 Ground Conditions

The ground conditions encountered during the site investigation are summarised in Table 4.1. A full lithological description is recorded on the logs included in Appendix 2.

Table 4.1 Summary of Ground Conditions

Strata	Description	Depth to Base (m bgl)	Typical Thickness (m)
Concrete/Asphalt	Hardstanding was present at all locations with the exception of WS06 and WS07, and typically comprised asphalt over concrete.	0 – >0.6m	0.2
Made Ground	Encountered at all locations (with the exception of WS04 where depth of concrete was not penetrated). Typically comprised brown and grey sand and gravel of red brick, flint and occasional concrete. Occasional soft to firm, brown, slightly sandy, slightly gravelly clay.	0.3 – 1.6	0.6
Bedrock Geology: London Clay Formation	Firm to stiff, brown becoming dark grey with depth, silty clay.	Not proven	Not Proven

The ground conditions encountered across the site are comparable to the geology described in the British Geological Survey (BGS) map of the area.

4.2 Groundwater

Groundwater was encountered at two locations during drilling, as described in Table 4.2.

Table 4.2 Summary of Groundwater Strikes

Location	Depth (m bgl)	Description
CP01	0.25	Perched water confined to granular Made Ground between the concrete floor surfacing and underlying re-worked clay encountered at 0.4m bgl.
CP03	0.3	Perched water confined to granular Made Ground between the concrete ground surfacing and re-worked clay at 0.65m bgl.

The following boreholes were installed with monitoring wells:

- CP01, CP02, CP03, CP05, CP07, WS01, WS02, WS04, WS05, WS06.

Groundwater levels are presented in Appendix 5, as recorded during groundwater monitoring undertaken on 10th, 14th, 19th and 25th August 2020. Recorded groundwater depths ranged from 0.0m (CP01 – well flooded to ground level) and 8.72m (CP07).

Groundwater well development and sampling was undertaken on 10th and 14th August 2020:

- Groundwater was encountered at eight locations during well development. Groundwater samples were obtained from monitoring wells CP01, CP02, CP03, CP05.

- Groundwater was not observed to recharge in monitoring wells CP07, WS01, WS02, WS05 and WS06 following initial development/purging and did not yield a sufficient quantity of water to obtain samples for analysis.

4.3 Field Evidence of Contamination

Observations of field evidence of contamination in soils and groundwater recorded during the investigation were limited to:

- CP01 – a hydrocarbon sheen and moderate hydrocarbon odour observed from perched water encountered from 0.25m to 0.4m.
- WS05 – clay was observed to be oily with a solvent type odour in the depth range 1.0-1.2m.

No other visual or olfactory evidence of contamination was recorded during the investigation. No field observations of suspected asbestos containing materials were recorded during drilling and sampling of the Made Ground[5].

Soil headspace screening for VOCs was undertaken using a PID for selected soil samples. Samples recorded VOC concentrations greater than 5ppm at two locations as follows:

- CP01 – samples obtained from 0.35m and 0.5m bgl recorded concentration of 23.5ppm and 10.3ppm respectively.
- WS05 – samples obtained from 1.0m and 2.0m bgl recorded concentrations of 38.9ppm and 8.9ppm respectively.

PID readings recorded in soil samples from other investigation locations did not exceed 0.2ppm.

[5] Asbestos was detected by subsequent laboratory testing in three samples (refer to section 5.3).

5. CHEMICAL RESULTS - HUMAN HEALTH ASSESSMENT

The soil and groundwater results have been screened against Ramboll generic assessment criteria (GAC) for a future commercial use.

The analytical certificates for soil and groundwater are presented in in Appendix 3 and screening tables are presented in Appendix 4. Exceedance of a Ramboll GAC does not infer that an unacceptable risk is present; the outcome of the screening is assessed further in the context of a qualitative source-pathway-receptor risk assessment presented in Section 8.

5.1 Soil Analytical Results

As indicated in Section 3, 30 soil samples were analysed in total; of these, 24 were samples of Made Ground.

5.1.1 Soil Results Below GAC

The majority of soil results were below the respective GAC and many results were below the laboratory detection limits (see Appendix 4):

- Inorganics and metals: all 22 results were below the GAC. Concentrations were generally low.
- PAHs: concentrations were below the GAC in all 22 samples tested. Total PAHs were recorded above the LOD at three locations only: CP04, WS03 and WS06 at concentrations of 1.6 mg/kg, 1.7 mg/kg and 1.7 mg/kg respectively.
- TPH and BTEX: concentrations were below the GAC in all 22 samples tested. Slightly elevated TPH concentrations were detected in Made Ground at two locations only: CP01 (1,433 mg/kg at 0.35-0.50m) and WS02 (2,667 mg/kg at 0.4-0.6m)
- VOCs: concentrations were below the respective GAC for 15 out of 16 soil samples tested (see further discussion of VOC results below).

5.1.2 Soil Results Above GAC - VOCs

One VOC result (out of 16 samples tested for VOCs) was above the GAC:

- A single exceedance was recorded for vinyl chloride (chloroethene) at CP01 at a depth of 0.35-0.50m (48µg/kg compared to the GAC of 38µg/kg).

Some other VOCs were detected in Made Ground (dichloroethenes, trichloroethenes and trimethylbenzenes), albeit the concentrations were below the relevant GAC.

5.1.3 Soil Results - Asbestos (No GAC)

Asbestos was identified by laboratory testing in three out of 13 samples tested:

- WS07 (0.3-0.5m) – Asbestos Insulating Board (amosite), quantified as 0.109% (marginally exceeding the hazardous waste threshold of 0.1%);
- CP01 (0.25-0.35m) – Asbestos Cement Debris (amosite/chrysotile), quantified as 0.058%; and
- CP06 (0.25m) – Asbestos Fibre Bundles (chrysotile), quantified as <0.001%.

5.2 Groundwater (Human Health)

Four groundwater samples were analysed and the results were screened against human health assessment criteria for a volatilisation pathway. All results including for inorganics, TPHs, PAHs, VOCs and SVOCs and mercury[6] were below respective screening criteria.

Groundwater analytical certificates are presented in Appendix 3.

[6] Metals other than mercury have not been screened as there are no groundwater (human health volatilisation) screening criteria for metals, because metals are not volatile.

6. WATER ENVIRONMENT ASSESSMENT

6.1 Assessment Approach

There are no relevant published water assessment criteria and therefore groundwater results have been compared to commonly accepted UK guidelines including the Water Supply (Water Quality) (England) Regulations 2000 (DWS) and the Environmental Quality Standards (EQS) defined in European legislation such as the Water Framework Directive (WFD) (2000/60/EC).

Exceedance of screening criteria does not infer that an unacceptable risk is present; the outcome of the screening is assessed further in the context of a qualitative source-pathway-receptor risk assessment presented in Section 8.

For those determinands included in the analytical suite which do not have a corresponding UK screening criteria derived from the above sources, reference has been made to a hierarchy of international guidance in accordance with Environment Agency guidance.

6.2 Analytical Results

Four groundwater samples were obtained (CP01, CP02, CP03, CP05) and the results were screened against relevant GACs for controlled waters:

- Groundwater encountered during drilling (at CP01 and CP03) was observed to comprise perched water confined between Made Ground and the upper horizon of the London Clay.
- Groundwater or potential water bearing strata were not encountered at CP02 or CP05 during drilling. Accumulation of water in these wells is assumed to represent infiltration of perched water from Made Ground and associated seepage from softer upper horizons of London Clay.

Groundwater analytical certificates are presented in Appendix 3 and the screening tables are given in Appendix 4.

6.3 Results Below GAC

The following determinands were below the relevant GAC in all four groundwater samples:

- heavy metals (arsenic, beryllium, cadmium, chromium, copper, copper, iron, lead, magnesium, mercury, vanadium and zinc);
- inorganic contaminants (ammoniacal nitrogen, sulphide and nitrate);
- total petroleum hydrocarbon fractions (TPH) with the exception of aliphatic fraction C6 – C8;
- volatile organic compounds (VOCs) except vinyl chloride, cis-1-2-dichloroethene, chloroform and trichloroethene (TCE);
- semi-volatile organic compounds (SVOC);
- BTEX compounds;
- phenols;
- methyl tert-butyl ether (MTBE); and
- pH.

6.4 Results Above GAC

There were exceedances of the GAC in all four groundwater samples as detailed below:

Table 6.1 Summary of Results Above GAC - Groundwater Analytical Results (Water Environment)

Determinand	Conc. Range (µg/l)	Location of Max. Conc.	Ramboll Controlled Waters GAC (µg/l)	No. and Location of Exceedances
Metals				
Boron	171 – 879	CP05	750 (B)	**1 (CP05)**
Nickel	6 – 24	CP05	15 (A)	**1 (CP05)**
Selenium	<LOD – 17	CP01	7.5 (B)	**1 (CP01)**
Sodium	142,000 – 575,400	CP05	150,000 (B)	**1 (CP05)**
Other Inorganic Compounds				
Ammoniacal nitrogen as N	70 – 1,320	CP05	290 (A)	**3 (CP01, CP03, CP05)**
Sulphate as SO4	488,300 – 4,265,700	CP05	188,000 (A)	**4 (CP01, CP02, CP03, CP05)**
Chloride	128,100 – 376,200	CP05	188,000(A)	**1 (CP05)**
Nitrite	<LOD – 8,340	CP03	500 (C)	**1 (CP03)**
Polycyclic Aromatic Hydrocarbons (PAHs)				
Fluoranthene	<LOD – 0.199	CP01	0.075 (A)	**1 (CP01)**
Benzo(a)pyrene	<LOD – 0.044	CP03	0.0075 (B)	**2 (CP01, CP03)**
Benzo(b)fluoranthene (1)	<LOD - 0.05	CP03	Sum of four compounds	N/A
Benzo(k)fluoranthene (2)	<LOD - 0.02	CP03	Sum of four compounds	N/A
Indeno(123cd)pyrene (3)	<LOD - 0.03	CP03	Sum of four compounds	N/A
Benzo(ghi)perylene (4)	<LOD - 0.022	CP03	Sum of four compounds	N/A
Sum of four above compounds (1-4)	<LOD – 0.122	CP03	0.1 (D)	**1 (CP03)**
Total Petroleum Hydrocarbons				
Aliphatic C6-C8	<LOD – 69	CP01	0.75 (A)	**1 (CP01)**
Volatile Organic Compounds				
Vinyl chloride	<LOD – 18.1	CP01	0.375 (A)	**1 (CP01)**

Table 6.1 Summary of Results Above GAC - Groundwater Analytical Results (Water Environment)

Cis-1-2-dichloroethene	<LOD - 224	CP01	50 (D)	**1 (CP01)**
Chloroform	<LOD - 4	CP02	0.1 (E)	**1 (CP02)**
Trichloroethene (TCE)	<LOD - 30	CP01	7.5 (A)	**1 (CP01)**

Notes:

LOD – Limit of Detection

N/A – Not applicable

A – WFD Threshold Values (TVs) for 'Good' Status. General Quality of Groundwater Body.

B – WFD Threshold Values (TVs) for 'Good' Status. Drinking Water Protection Area.

C – Scotland Resource Protection Values (Non-Hazardous Substances)

D – Scotland Resource Protection Value (Significant Pollution of Contaminated Land)

E – England and Wales Minimum Reporting Values for Hazardous Substances

6.5 Discussion of Results

Metals and Other Inorganic Contaminants

Boron, nickel and sodium were recorded at concentrations exceeding the assessment criteria at CP05 and a single selenium exceedance was reported at CP01. Other exceedances of inorganic contaminants included:

- ammoniacal nitrogen which exceeded the GAC of 0.29 mg/l at three locations: CP01, CP03 and CP05 at concentrations of 0.75, 0.88 and 0.32 mg/l respectively;
- sulphate which exceeded the GAC of 188 mg/l in all four groundwater samples at concentrations between 488.3 mg/l at CP03 and 4,265.7 mg/l at CP05;
- chloride which exceeded the GAC of 188 mg/l at CP05 at a concentration of 376.2 mg/l; and
- nitrite which exceeded the GAC of 0.5 mg/l at CP03 at a concentration of 8.34 mg/l.

The concentrations of inorganic contaminants detected are not considered significant in the context of the site's setting and the conservative assessment criteria for drinking water. In the absence of an obvious on-site source the concentrations detected are considered to be reflective of local background groundwater quality.

PAH

Exceedances of assessment criteria for PAH compounds were recorded as follows:

- benzo(a)pyrene exceeded the GAC of 0.075 µg/l at CP01 and CP03 at concentrations of 0.03 µg/l and 0.044 µg/l respectively;
- fluoranthene exceeded the GAC of 0.075 µg/l at a concentration of 0.199 µg/l; and
- the sum total of benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(123cd)pyrene and benzo(ghi)perylene exceeded the GAC of 0.1 µg/l at CP03 at a concentration of 0.122 µg/l.

The elevated concentrations of PAHs detected were limited to two locations only and are not considered significant in the context of the site's setting. The site is not in a drinking water protection area and as such the assessment criteria for benzo(a)pyrene is considered to be over-conservative for the site.

TPH

TPH concentrations exceeded the laboratory detection limit at one location: CP01, where only a single aliphatic hydrocarbon fraction (C6-C8) was detected at a concentration of 69 µg/l. This

concentration exceeded the GAC of 0.75 µg/l and was consistent with field observations of a hydrocarbon odour and sheen observed from shallow perched water at this location; this is not considered to be indicative of significant or widespread hydrocarbon contamination at the site.

VOCs

Exceedances of GAC for volatile organic compounds were limited to two locations as follows:

- vinyl chloride was detected at CP01 at a concentration of 18.1 µg/l, exceeding the GAC of 0.375 µg/l;
- cis-1-2-dichloroethene was detected at CP01 at a concentration of 224 µg/l, exceeding the GAC of 50 µg/l;
- trichloroethene (TCE) was detected at CP01 at a concentration of 30 µg/l, exceeding the GAC of 7.5 µg/l; and
- chloroform was detected at CP02 at a concentration of 4 µg/l, exceeding the GAC of 0.1 µg/l.

The VOC detections are consistent with visual and olfactory indicators of contamination observed during the intrusive works including odours and sheens observed from Made Ground and perched water encountered at CP01. The concentrations detected are not indicative of significant or widespread contamination albeit may reflect a possible current or historical on-site source. The site's low permeability geology and low sensitivity environmental setting reduce potential for migration of contaminants; therefore the potential for impact to controlled waters is considered to be low.

7. BUILT ENVIRONMENT

7.1 Ground Gases

7.1.1 Assessment Approach

In general terms, Ground gases can be produced as a result of the decomposition of organic materials and may also originate from natural sources, such as coal seams and organic-rich soils. The principal components of ground gas are methane and carbon dioxide, although other gases may be present in trace concentrations. Ground gas can present a hazard to site occupants and property as result of flammable/explosive hazards, physiological effects, odour and effects on vegetation.

Ramboll has applied a semi-quantitative method in line with current good practice guidance on risk assessment to assess ground gas risks. Further details of Ramboll's assessment methodology are presented in Appendix 5.

Based on desk-based information the site is not considered to have a significant gas generation potential. Ramboll's intrusive investigation identified made ground which was generally shallow in depth and did not record the presence of significant organic or putrescible material content. To date, three rounds of gas monitoring has been undertaken at the site.

7.1.2 Discussion of Results

Atmospheric Pressure

Monitoring was undertaken at varying atmospheric pressures between 993mb and 1013mb. The highest atmospheric pressure was recorded during monitoring round 1 and the lowest pressure was recorded during monitoring round 3.

Flow Rates

Steady state gas flow rates recorded during the monitoring rounds did not exceed the instrument detection level of (<0.1 l/hr) at any locations.

Carbon Dioxide

- Carbon dioxide concentrations ranged from <0.1 % to 5.8 % by volume. The highest concentration (5.8%) was recorded at WS01 during the first monitoring round. The highest concentrations recorded during the second and third monitoring rounds were 1.5%, 2.2%; both at CP07. Carbon dioxide concentrations exceeding 5% were only recorded on one occasion at one location and therefore it is not considered likely for there to be a need to consider measures to prevent gas ingress to the proposed development structures.

Methane

Detectable concentrations of methane were not recorded.

Oxygen

Oxygen concentrations ranged between 9.8% by volume in WS01 and 21.3% recorded in CP01, both recorded during the first monitoring round. Localised depleted oxygen levels of less than 18% by volume were recorded in a total of four monitoring wells in the north0east and west of the site (CP02, CP07, WS01 and WS02) indicating depleted oxygen concentrations beneath some areas in the north-east and west of the site. Oxygen levels below 13% were on recorded at one location (WS01) on one occasion.

Volatile Organic Compounds

VOC concentrations (measured with a PID in the monitoring wells) were recorded above the instrument detection limit of 0.1ppm/v at a number of locations with the highest reading recorded as 6.8ppm at CP02 during the first monitoring round. The highest VOC concentrations recorded during the second and third monitoring rounds were 4.1 ppm and 3.6ppm, both recorded in monitoring well CP07.

7.1.3 Site Gas Screening Value (SGSV)

Ramboll has used the Modified Wilson and Card method to define a characteristic situation for the site, by calculating a site Gas Screening Value (SGSV). The SGSV is calculated using a worst-case scenario (i.e. the maximum gas concentration and flow rates detected) across the entire site during the monitoring period. The SGSV is calculated for both methane and carbon dioxide, and the 'Characteristic Situation' is derived by comparison with a table relevant to each method. It is important to note that SGSVs are not absolute thresholds but guideline values.

The carbon dioxide SGSV for the site has been calculated as 0.0058 l/h by multiplying the maximum carbon dioxide concentration (5.8%, by volume) by the highest steady state flow rate (detection limit of <0.1l/hr). This corresponds to CIRIA C665 Characteristic Situation 1 (Very Low risk).

The calculated SGSV for methane (using the same method) has been calculated as 0.0001 l/h by multiplying the maximum methane concentration (detection limit of 0.1% by volume) by the highest steady state flow rate of <0.1l/hr. This corresponds to CIRIA C665 Characteristic Situation 1 (Very Low risk).

7.2 Water Supply Pipes

Buried water supply pipes can be at risk from permeation and accelerated deterioration from certain contaminants. An assessment of existing and future pipe materials is outside of the scope of this investigation. Architects and designers should liaise with the local water supply company and are directed to the following document for guidance:

- Guidance for the Selection of Water Supply Pipes to be used in Brownfield sites; UK Water Industry Research (UK WIR), 2010 (Ref. 10/WM/03/21)

7.3 Building Materials

There are a number of contaminants that may attack some building materials under certain conditions if present. This is discussed further in Section 10.

8. REVISED CONCEPTUAL SITE MODEL

Using information obtained during this site investigation, the preliminary Conceptual Site Model presented in Section 4 has been refined and is described in Table 8.1 below.

Table 8.1: Revised Conceptual Site Model

Sources of Contamination			
The following contaminants have been identified in soils and groundwater at elevated concentrations: **Soils:** Limited elevated concentrations of TPH and VOCs in Made Ground with only one exceedance of the GAC for vinyl chloride. Quantifiable asbestos recorded within the Made Ground. **Groundwater:** No contaminant concentrations exceeded the volatilisation assessment criteria for human health. Elevated concentrations of some metals (boron, nickel, selenium and sodium), other inorganics (ammoniacal nitrogen, sulphate, chloride and nitrite), elevated PAHs, VOCs, and one TPH fraction in groundwater exceed the GAC for controlled waters.			
Geology: The investigation encountered a layer of Made Ground encountered beneath hardstanding or topsoil across the site and present to a maximum depth of 1.6m. Natural deposits of brown to grey mottled clay underlie the Made Ground. This is interpreted as London Clay (likely to be weathered in the upper horizon). The thickness of London Clay was not proven, but published BGS mapping suggests a thickness of around 80m in the area of the site.			
Hydrogeology: The investigation did not encounter continuous perched or shallow groundwater bodies at the site. Where encountered, groundwater was observed to comprise perched water confined between Made Ground and the upper horizon of the London Clay (an unproductive strata). The thickness of the London Clay (anticipated to be around 80m) is considered to provide protection from site derived contaminants to the Chalk Principal Aquifer, present underlying the clay at depth.			
Hydrology: The site is in an area of low sensitivity with regards to surface water resources. The nearest surface water receptor is the Grand Union Canal located approximately 280m north-east of the site, although this is noted to be concrete lined. There are no other named surface watercourses within 1km of the site and given that widespread shallow groundwater has not been identified at the site a pathway for migration of contaminants from groundwater to surface water receptors has not been identified.			
Potential Contaminant Linkages The following potential pollutant linkages have been identified at the site and are considered further in the qualitative risk assessment:			**Potential Contaminant Linkage**
Human Health **(Future Commercial Users and construction workers)**	On-site	Dermal contact & ingestion	PCL1
		Inhalation – dust, asbestos fibres and volatilisation	PCL2
Water Environment	On-site	Leaching of contaminants from the unsaturated zone to groundwater	PCL3
	Off-site	Vertical migration of contaminants in groundwater to the deeper aquifers.	PCL4
	Off-site	Migration of contaminants off-site within groundwater, onto third party land and towards off-site surface water features	PCL5
Built Environment	On-site	Migration of ground gases into buildings and structures	PCL6

8.1 Qualitative Risk Assessment

The principal sources of contamination, receptors and potential pollutant linkages have been assessed using a qualitative source-pathway-receptor approach and are summarised in Table 8.2 below.

Table 8.2: Qualitative Risk Assessment: Commercial Site Use

Potential Contaminant Linkage	Contaminant	Pathways	Receptors	Discussion	Risk
PCL1	Asbestos, inorganics, metals, PAHs, TPH and VOCs in Made Ground.	Dermal Contact, Ingestion	Future site Users	**Future Commercial Users:** Contaminants were generally not identified in excess of the commercial use assessment criteria. One minor exceedance of the commercial GAC was recorded at CP01 (0.35-0.50m) where a VOC compound (vinyl chloride) was recorded at 48mg/kg which marginally exceeded the GAC of 38mg/kg. Asbestos was identified in Made Ground at two locations at quantifiable concentrations above 0.001%: amosite insulating board at WS07 at 0.109% and amosite/chrysotile cement debris at CP01 at 0.058%. The proposed development plan comprises a commercial data centre (i.e. building cover with areas of external hardstanding); this will cap the underlying contaminants and as such there is not considered to be a pathway between the contaminant and future site users. Soils for landscaped areas should be demonstrated to be suitable for use and not to provide a risk to future site users; soils should also comply with British Standard for Topsoil (BS3882:2015). **Construction Workers** The use of appropriate risk assessment and working procedures, such as basic personal protective equipment and good hygiene practices should be maintained. As would be expected on brownfield development sites.	**Low**, based on the presence of hardstanding across the site, as part of the proposed development. **Low**, assuming the use of appropriate control measures
PCL2		Inhalation - volatilisation or dust and asbestos fibres			
PCL3	Metals and other inorganics, PAHs, TPH and VOCs in Made Ground.	Leaching of contaminants from the unsaturated zone to groundwater.	Perched water	Elevated concentrations of contaminants were not identified in soils that may be a potential contaminative risk to controlled waters (e.g. mobile contamination or saturated soils). Concentrations of contaminants detected in samples of perched water were not significantly elevated. The site is not considered to be located within an area of sensitive groundwater and the investigation did not identify a continuous groundwater body at the site.	**Low**
PCL4	Metals, inorganics, TPH, PAH and VOCs identified in groundwater.	Vertical migration of contaminants in groundwater to the deeper aquifers.	Groundwater in deeper aquifers	The site is located in a low sensitivity setting in terms of groundwater resources. Perched groundwater was encountered at some locations during the investigation and was not found to be continuous across the site. A continuous groundwater body was not identified. Whilst exceedances of the GAC were recorded for some PAH and VOCs compounds, a single hydrocarbon fraction, metals and other inorganic compounds, the concentrations detected	**Low**

Table 8.2: Qualitative Risk Assessment: Commercial Site Use

Potential Contaminant Linkage	Contaminant	Pathways	Receptors	Discussion	Risk
				are reflective of background water quality in an area with an industrial history and are not considered to pose a significant risk to controlled waters. Although BGS records indicate that a chalk aquifer is present at significant depth beneath the site, this is isolated from impact from current or historical activities at the site by a significant thickness of low permeability London Clay. The risk to the deeper chalk aquifer from the concentrations of contaminants identified in shallow/perched groundwater is considered to be low.	
PCL5	Metals, inorganics, TPH, PAH and VOCs identified in groundwater.	Migration of contaminants off-site within groundwater, onto third party land and towards off-site surface water features.	Off-site third party land and its users. Off-site surface water features.	Given the site's historical setting and the fact that a continuous shallow groundwater body has not been identified at the site, the risk to adjacent off-site land from migration within perched shallow groundwater is considered to be low. There are no nearby sensitive surface water receptors.	**Low**
PCL6	Ground gases	Lateral and vertical migration	Future site Users and Built Environment	Ground gas monitoring and assessment has identified the site to have a Gas Screening Value of 0.0058 l/h: Characteristic Situation (CS) 1: Very Low Risk. Based on the concentrations of methane and carbon dioxide detected it is considered that the Characteristic Situation 1 classification is appropriate for the site and therefore, gas protection measures are not deemed necessary for the proposed development, albeit further confirmatory monitoring is recommended.	**Very Low**

9. GEOTECHNICAL GROUND MODEL

9.1 Stratigraphy

The site stratigraphy comprises Made Ground of up to 1.6 metres thickness, overlying London Clay, to a maximum proven 3depth of 25.0m bgl.

A summary of the succession of strata is presented in Table 4.1. The geological long-section for the site is presented within drawing 1620009986-RAM-XX-XX-DR-GE-0002, included within the Figures section of this report.

9.2 Made Ground

9.2.1 Distribution and Description

Made Ground was encountered across all exploratory holes and was typically described as either asphalt or concrete hardstanding overlying a brown to grey, fine to coarse slightly silty sandy gravel or gravelly sand material. The gravel material comprised various anthropogenic fragments of concrete, flint, brick and limestone.

Six exploratory holes across the site encountered fine-grained Made Ground underlying the typical sand and gravel material. This fine-grained material was described as soft to firm, yellowish brown clay and was observed at thicknesses between 0.15m and 1.05m. It is inferred that this material represents reworked material from the underlying London Clay Formation. Made Ground was also identified as a stiff clay material within exploratory hole WS07, undertaken within an area of soft landscaping along the south-west boundary of the site.

Within three exploratory holes (CP02, CP04 and WS04), obstructions were encountered within the Made Ground. Within exploratory holes CP02 and CP04 located at the entrance to the site along the south-west boundary, a 0.2m – 0.25m thick layer of concrete was encountered underneath the asphalt hardstanding. In the south-east of the site, WS04 was terminated upon a concrete obstruction at 0.5m bgl.

9.2.2 Classification

Six particle size distribution (PSD) tests were undertaken on samples of the Made Ground, the results of which are summarised in Table 9.1 and presented on Figure 1 in Appendix 6. The results confirm the field descriptions of the stratum, comprising both a sandy gravel and a slightly gravelly, slightly sandy, slightly silty clay material.

Table 9.1 Summary of PSD Testing in Made Ground

Grain-size	No. Tests	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
Fine-grained	4	3 – 19 (ave = 13)	5 – 11 (ave = 8)	31 – 34 (ave = 32)	39 – 57 (ave = 47)
Coarse-grained	2	67, 83	11, 15	2, 2	

9.2.3 Characteristic Parameters

Considering the inherent variability of Made Ground and its unlikely selection as a founding layer, no strength testing was undertaken on samples from the stratum. Nominal characteristic parameters for the Made Ground are presented in Table 9.2. Due to the predominant coarse-grained soil descriptions, parameters are presented for a coarse-grained material.

Table 9.2 Summary of PSD Testing in Made Ground

Soil Parameter	Unit	Characteristic Value	Justification
Bulk Unit Weight	kN/m^3	19	Soil descriptions and typical values from BS 8004:2015 (REF)
Peak effective angle of shearing resistance	Degrees	30	Soil descriptions and guidance from BS 8004:2015 (REF)

9.3 London Clay Formation

9.3.1 Distribution and Description

The London Clay Formation was observed to underlie the Made Ground in all of the exploratory holes, except WS04 which was terminated after encountering an obstruction and WS07 which terminated within soft landscaping material. As all exploratory holes terminated within the stratum or the overlying Made Ground, layer thicknesses for the London Clay Formation were not proven. A publicly available borehole record located approximately 500m to the west of the site, accessed via the BGS Online 'Geology of Britain viewer', indicates the base of the stratum is at 75m bgl.

At shallow depth, the stratum was typically described as soft to firm, brown silty clay. From approximately 6m bgl, the colour description typically changed to dark brown and grey, likely due to weathering of the stratum. The stratum was proven to a maximum depth of 25.0m bgl. The top elevation of the stratum showed some variation across the site, located at between 33.3mAOD and 30.5mAOD.

9.3.2 Classification

Six particle size distribution (PSD) tests were undertaken on samples of the London Clay Formation, the results of which are summarised in Table 9.3 and presented on Figure 2 in Appendix 6. The results confirm the field descriptions of a silty clay material.

Table 9.3 Summary of PSD Testing in London Clay Formation

No. Tests	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
6	0 – 2 (ave = 1)	1 – 7 (ave = 4)	35 – 47 (ave = 41)	51 – 59 (ave = 55)

Twenty-four moisture content and eight Atterberg limit tests were undertaken on London Clay Formation samples from 0.4m to 23.5m bgl (32.5mAOD and 9.0mAOD). The results, indicating a high to very plasticity clay material, are presented in Table 9.4 and plotted on Figure 3 in Appendix 6.

Eighty-two SPT tests were undertaken within the stratum at depths ranging from 1.0m to 24.5m bgl (32.7mAOD to 8.0mAOD). The corrected results are presented in Table 9.4 and in Figure 4 in Appendix 6.

Table 9.4 Summary of Plasticity Index & SPT Testing in London Clay Formation

Test Parameter	No. Tests	Unit	Range	Mean
Moisture Content	24	%	15 - 34	23
Liquid Limit	8	%	52 – 80	72
Plastic Limit	8	%	19 - 27	24
Plasticity Index	8	%	33 – 57	48
SPT N_{60} Value	82	-	4 - 51	24

9.3.3 Strength

Six unconsolidated undrained triaxial compression tests were undertaken to directly measure the undrained shear strength (c_u) of the London Clay Formation. The test results returned c_u values from 53kPa to 300kPa, increasing with depth.

In addition to laboratory testing, SPT tests undertaken within the stratum have been used to correlate to undrained shear strength using guidance presented in CIRIA 143. Corrected SPT values (N_{60}) and an f1 factor of 4.5 have been used, based on a characteristic (upper quartile) PI of 54%. This gives correlated undrained shear strength values of 17kPa to 229kPa. Figure 5 in Appendix 6 presents the recommended characteristic relationship between undrained shear strength (derived from both triaxial and SPT testing) and elevation for the stratum.

A characteristic value for constant volume effective angle of shearing resistance φ'_{cv} has been derived using the following relationship from BS 8004:2015, using the results of plasticity index testing:

$$\varphi'_{cv} = 42 - 12.5 \log PI$$

9.3.4 Stiffness

Considering the characteristic (upper-quartile) PI value of 54%, the likely over-consolidation ratio and a typical foundation design strain level of 0.1%, a relationship of $E_u/c_u=400$ (with E_u given in kPa) is deemed suitable for the London Clay Formation stratum (Jamiolkowski, 1979). Ramboll has adopted the relationship E’ = 0.8Eu to derive the drained Young’s Modulus values. The values of Eu and E’ (derived from Cu using the above relationships) are provided in Table 9.5 and shown in Figures 6 and 7 in Appendix 6.

Ramboll has estimated characteristic values for Poisson’s ratio from published values and foundation design experience.

9.3.5 Characteristic Parameters

The recommended characteristic parameters for the London Clay Formation are summarised in Table 9.5.

Table 9.5 Summary of Characteristic Parameters for London Clay Formation

Soil Parameter		Unit	Value	Justification
Bulk Unit Weight (γ_B)		kN/m^3	21	Laboratory testing and typical values from BS 8004:2015
Undrained Shear Strength (c_u)	31.5 – 26.5mAOD	kPa	25 + 15z	In-situ testing, laboratory testing and published correlations
	<26.5mAOD		100 + 5.3z	
Effective Angle of Shearing Resistance (φ'_{cv})		Degrees	21	Laboratory testing and published correlations
Undrained Young's Modulus (E_u)	31.5 – 26.5mAOD	MPa	10 + 6z	In-situ testing, laboratory testing and published correlations
	<26.5mAOD		40 + 4.2z	
Drained Young's Modulus (E')	31.5 – 26.5mAOD	MPa	8 + 4.8z	In-situ testing, laboratory testing and published correlations
	<26.5mAOD		32 + 3.4z	
Undrained Poisson's Ratio (v)		-	0.5	Published values (Tomlinson, 2001)
Drained Poisson's Ratio (v')		-	0.2	Published values (Tomlinson, 2001)

Note: z represents depth below top of London Clay, i.e. 31.5mAOD to 26.5mAOD or where encountered.

9.4 Groundwater

As described in Table 4.2, groundwater was encountered during drilling within two exploratory holes, CP01 and CP03. At depths of 0.25m and 0.3m, these water strikes are considered to represent perched water confined within the Made Ground stratum.

Standpipe groundwater-monitoring installations were constructed within ten boreholes, with standpipe response zones installed at a variety of depths across the Made Ground and London Clay Formation, with a view to characterising shallow and deeper groundwater (if any). To date, four rounds of groundwater monitoring of the borehole installations have been completed. The resultant monitored groundwater levels in installations varied from 0mbgl to 8.1mbgl. The shallow groundwater levels are considered to arise from perched groundwater within Made Ground, and potential flooding of installations (0mbgl in WS01). Deeper groundwater was monitored in other boreholes, to a maximum depth of 8.1mbgl in CP07. This installation had a response zone base depth of 9mbgl, so the groundwater encountered is considered to represent seepage from the low permeability London Clay Formation or the overlying Made Ground, as opposed to a phreatic surface.

10. PRELIMINARY GEOTECHNICAL ASSESSMENT

A preliminary geotechnical assessment of the proposed development has been undertaken, in the context of the ground model presented in Section 9 and wider site conditions. The findings are presented in full within the separate Geotechnical Advice Note, ref: 'M1620009986_Geotechnical Advice Note_01' prepared by Ramboll in October 2020.

10.1 Foundation Design

The anticipated loadings of the proposed structure were provided by Royal Haskoning DHV (RHDHV) structural engineers in June 2020. Considering the magnitude of the unfactored column loadings lie between 2,000 and 10,000kN per column, piled foundations are deemed to be the most appropriate foundation solution. In the absence of a proposed basement structure, the shallow ground conditions are unlikely to offer sufficient geotechnical resistance for a raft solution.

Preliminary calculations have been undertaken to inform geotechnical pile resistances. The results, along with the key assumptions and considerations, are presented within the separate Geotechnical Advice Note as series of capacity charts. The Contiguous Flight Auger (CFA) technique is likely to be the most cost-effective and suitable method for the ground conditions and likely depth range.

10.2 Structural Slab Design

To assist the structural engineer's option selection of the most appropriate floor slab solution(i.e. ground bearing or suspended), Ramboll has undertaken a preliminary settlement analysis to derive an initial modulus of subgrade reaction (k_s). A summary of the analysis, along with assumptions and considerations, is presented in the separate Geotechnical Advice Note.

10.3 Pavement Design

From a geotechnical perspective, the majority of the existing Made Ground may be left in place and used as a subgrade for road pavement construction. The granular Made Ground was not suitable for laboratory CBR testing, however a single laboratory CBR test was undertaken on firm clay from the Made Ground. The resultant CBR value of 1.8% suggests this material is unsuitable for a pavement formation in its current condition, in accordance with the Design Manual for Roads & Bridges (DMRB) CD622. Hence it is suggested that any clay identified in pavement formation layers is removed and backfilled with engineered fill material, as per a project-specific earthworks specification. The majority of the Made Ground encountered during the ground investigation was described as granular, hence it is likely that this stratum will achieve a minimum CBR of 2.5%.

It is recommended that confirmatory CBR or plate load tests are undertaken across the pavement formation to ensure a minimum CBR value of 2.5% and compliance with the pavement design.

10.4 Concrete Aggressivity

Concrete aggressivity testing, in accordance with BRE SD-1, was undertaken on thirteen samples (twelve from the London Clay Formation and one from the Made Ground). The results indicate a DS4 AC4 classification for the London Clay Formation, assuming the ground is exposed to an extent that pyrite contained within it will oxidise and the resultant sulfate ions can reach any structural concrete. It is likely that cast in-situ piling would reduce this exposure, which in turn may reduce this aggressivity classification (likely DS-2 AC-2) for piled foundations, although this should be confirmed with the eventual piling contractor.

10.5 Resistivity Testing

As described in Section 3.1, thermal and electrical resistivity testing was undertaken as part of the ground investigation. Thermal resistivity testing comprised both in-situ testing in window sample borehole locations, as well as laboratory testing on samples obtained from drilling. The electrical resistivity was undertaken in-situ, comprising a total of two probe arrays, located at the centre and north-west of the site. The full results of the testing are presented within the ground investigation factual report in Appendix 2. An interpretation of the test results has not been undertaken by Ramboll as part of this report; design development of the utilities and services associated with the development should consider the test data.

11. PRELIMINARY GEOTECHNICAL RISK REGISTER

A qualitative risk register, highlighting the key ground-based hazards to the proposed development, is provided below. This does not constitute an exhaustive list of all risk, but includes key *geotechnical* hazards relating to design and construction.

Table 11.1: Preliminary Geotechnical Risk Register

Subject	Hazard	Risk	Information to be communicated to Client / Contractor
Made Ground	Inherent variability of the stratum, namely thickness, composition and engineering properties. Risk of buried obstructions, such as concrete slab and other unidentified obstructions within CP02, CP04 and WS04	Unsuitable founding layer, with potential for ULS or SLS failure. Cost and programme implication associated with encountering and removing buried obstructions	Made Ground is not recommended as a founding stratum for any structural foundations (i.e. piles) associated with the proposed development. An initial subgrade modulus has been derived to assist the Structural Engineer in selected the most appropriate slab solutions (i.e. ground-bearing or suspended) Depth and properties of Made Ground have been investigated at each exploratory hole location, however due to its variable nature, composition and properties may differ elsewhere on site.
London Clay Formation	The stratum was observed to be variably weathered High plasticity clay material	Potential for encountering material of low shear strength in the upper zone of the stratum. Potential for heave within the stratum due to excavation.	Whilst excavations are likely to be limited as part of the development, heave potential within the stratum should be negligible. If design development results in significant excavations, heave potential shall be assessed.
Groundwater	Shallow groundwater was encountered within occasional exploratory holes Groundwater monitoring has not taken place during the wetter, winter months.	Localised groundwater control measures may be required when excavating to construct foundations within the Made Ground and Taplow Gravel Member. Groundwater levels could be higher during the winter months.	Groundwater control measures may be required during excavation and construction. Design development of the proposed geotechnical substructure should accommodate the groundwater conditions, whilst accounting for potential seasonal fluctuations.

Table 11.1: Preliminary Geotechnical Risk Register

Subject	Hazard	Risk	Information to be communicated to Client / Contractor
Aggressivity to Concrete	Potential for concrete aggressivity within the ground and groundwater	Impact on structural design of any concrete in contact with the ground	A concrete aggressivity assessment has resulted in Design Sulphate classes and Aggressive Chemical Environment for Concrete (ACEC) Classes of DS-4 AC-4 for any structural concrete located within the London Clay Formation. Depending on the piling technique, this classification may be reduced upon discussion with specialist piling contractors.
Pavement Design	The potential for encountering shallow groundwater and localised soft spots within the Made Ground	Ground conditions may result in inadequate subgrade strength for pavement construction Cost/programme implications if a more onerous pavement structure is required or if additional maintenance is required	Any pavement design should consider the CBR and groundwater monitoring data. Subgrade formations shall be proof rolled and inspected, and soft spots removed. Pavement surface shall be graded to allow surface water run-off, with any run-off water drained to avoid pooling of water.
Buried Obstructions & Utilities	Buried obstructions were encountered on site within three exploratory holes (CP02, CP04 and WS04) A variety of services were located across the site, notably around the central sub-station structure.	Potential for clash between obstructions/utilities and proposed geotechnical substructure (i.e. foundations) Programme and cost implication of encountering and removing any unforeseen obstructions.	Any structural foundation solution should penetrate into the London Clay Formation, bypassing any potential obstructions. This may require the breaking out and removal of obstructions at foundation locations. Any other obstructions across the site that are removed should be backfilled with suitably placed and compacted engineering fill Design development and any eventual contractor shall assess the existing and proposed utilities across the site and their impact upon the proposed structure, including the GPR survey undertaken. Suitable service clearance techniques (in accordance with HSG47) shall be employed prior to breaking ground.
Proximity to Railway	Live railway line runs along the north-east boundary of the site	Risk of piling rig toppling onto railway	The Network Rail guidance document 'Piling Adjacent to the Running Line' sets out the minimum standard and processes to be followed where piling equipment may fall within 3m of Network Rail Infrastructure. This includes restrictions on plant movements and the requirement to seek technical approval from Network Rail for any piling platform. It is recommended that Network Rail is engaged in dialogue as soon as is practicable.

12. RE-USE OF MATERIAL

12.1 Re-use Of Materials on Site

Where the re-use of soils at the site takes place this would need to be documented within a Materials Management Plan, following the CL:AIRE guidance "Definition of Waste: Development Industry Code of Practice". There is a four-point test for the re-use of material:

- Protection of human health and the environment - suitable risk assessments must be in place to demonstrate that the re-use of materials is acceptable.
- Suitability of use without further treatment - should the contaminated soils need treating then they may still be re-used if that treatment is carried out under appropriate authorisation.
- Certainty of use - there should be a justifiable reason for re-use rather than just avoiding waste disposal.
- Quantity of Materials - only the quantities required for the specific use should be used. Use of excessive material may be seen as waste disposal rather than justified re-use.

Assuming that these four points can be satisfied by providing suitable risk assessments and within the design of the development, it should be possible to reuse materials on site (if required). Ramboll considers this should be achievable for most of the soil that is present on-site.

From a geotechnical perspective, the predominantly coarse-grained Made Ground is likely to be re-useable as a Class 1 fill material, in accordance with the Highways England Specification for Highway Works. Any re-use shall be subject to a project-specific earthworks specification.

13. CONCLUSIONS AND RECOMMENDATIONS

13.1 Conclusions – Contamination

Ramboll's investigation has not identified significant contamination in relation to the proposed commercial development. However, it cannot be discounted that 'hot spots' of contamination may be present between sampling points and that 'unexpected finds' may be encountered during earthworks, which could require management during redevelopment (this is the case for any brownfield land).

This report and risk assessment is not an appraisal of risks to ground development workers, and the site should be treated as a brownfield site.

Soil

All soil results were below respective screening criteria in respect of metals, inorganics, TPH, BTEX, PAHs. Only a single marginal exceedance of the commercial GAC (for vinyl chloride in one sample) was recorded. The concentrations detected are not considered to pose a risk to a future commercial development and furthermore, the design of the proposed development is considered sufficient to mitigate exposure pathways (i.e. the soil will be capped with buildings and hardstanding mitigating the risk of exposure).

Asbestos was identified at three locations at levels quantified to between <0.001% and 0.109% (the latter marginally exceeded the hazardous waste threshold of <0.1%). Whilst this is not considered to represent a significant risk to future site users (since the site will be capped with buildings and hardstanding), does require consideration during the construction phase and will necessitate information being held on the site safety file or future maintenance events as outlined further in the recommendations below.

Groundwater

A significant risk of pollution to Controlled Waters was not identified. A continuous groundwater body was not encountered at the site and whilst some elevated contaminants were identified in discontinuous perched water encountered in Made Ground, the concentrations are not considered significant due to the absence of soil impact and the hydrogeological and hydrological sensitivity of the site. The concentrations are considered to be reflective of background water quality in an area with an industrial legacy.

Ground Gas

Gas monitoring was undertaken on three occasions and did not identify significantly elevated concentrations of methane, carbon dioxide or elevated gas flows. Assessment of ground gases has identified the site to have a Gas Screening Value of 0.0058 l/hr: Characteristic Situation (CS) 1: Very Low Risk. Therefore, gas protection measures are not deemed necessary for the proposed development based on the current gas results.

Overall

Overall, Ramboll does not consider that the ground investigation has identified significant soil or groundwater contamination that would require remediation to develop the site for commercial use. Ramboll does not consider that the site would be determined as contaminated land by the local authority in terms of Part 2A of the Environmental Protection Act 1990 if the local authority was consulted over the results.

Ramboll considers that further investigation work would need to be completed in areas not accessible during this phase of investigation (e.g. within the area of existing building footprints). Development considerations are discussed further in the next section.

13.2 Conclusions - Geotechnical

During the ground investigation, up to 1.6m of Made Ground was encountered. Ramboll considers that this stratum does not form a suitable founding stratum for any structural foundations (i.e. piles), due to its inherent variability in composition and distribution. An initial assessment of subgrade reaction modulus has been undertaken, and reported in the separate geotechnical advice note, to assist the structural engineer in the selection of the most appropriate slab solution.

The London Clay Formation that underlies the Made Ground was penetrated in the majority of exploratory holes and represents the deepest stratum encountered within the ground investigation. The stratum was proven to a maximum depth of 25.0m bgl, although a publicly available borehole nearby indicates the base of the stratum is approximately 75m bgl.

It is recommended that any structural foundations for the proposed development are founded within the London Clay. Considering the high anticipated loadings, piled foundations are considered to be the most appropriate solution. A preliminary assessment of geotechnical pile capacities has been undertaken, which is summarised in the separate Geotechnical Advice Note. The Contiguous Flight Auger (CFA) technique is likely to be the most cost-effective and suitable method for the ground conditions and likely depth range.

A summary of the geotechnical risks posed to the proposed development, relating to the ground and groundwater conditions encountered on site, is presented in the Geotechnical Risk Register in Section 11. Key risks include the potential for encountering buried obstructions, geochemical aggressivity of the ground and the potential for perched groundwater.

13.3 Recommendations – Contamination

The proposed development will need to consider typical precautions of redeveloping a brownfield site, including among other things appropriate health and safety management for construction workers, waste soil classification, and method statements for unexpected contamination:

1. The Local Authority may require an intrusive environmental investigation as a condition of planning. This report should be submitted to the Local Authority in that regard and agreement reached on the scope of further actions (as outlined below).
2. It is possible that as-yet unidentified sources of contamination may be present at the site. Further ground investigation should be undertaken for environmental purposes to characterise ground conditions in areas of the site that were not accessible during the current phase of investigation, for example underlying the footprint of existing buildings. This could take the form of a watching brief and trial pit investigation to be executed by a suitably qualified environmental consultant during the demolition and site clearance phase of the development works.
3. To date three gas monitoring visits have been undertaken. Three further confirmatory visits are recommended to increase the data set.
4. It cannot be discounted that 'unexpected finds' or 'hotspots' of contamination requiring management may be encountered during development. An 'unexpected contamination procedure' should be implemented to allow groundworkers to act appropriately upon encountering or suspecting the presence of previously unidentified ground contamination.
5. Appropriate health and safety management precautions should be followed prior to and during the construction phase. This report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in CLR11. In some cases, contaminants may also pose acute hazards to workers at a site and a worker's short exposure is not considered when deriving the GAC. Asbestos in soil is not considered by CLR11 and will need to be considered for the redevelopment works. The data generated by the investigation should therefore be considered in the appropriate pre-works

health and safety assessment, together with the appropriate shorter exposure times for construction workers and more direct contact with the ground. It is anticipated that these short-term risks can be appropriately addressed through the use of appropriate, health and safety plans, safe working procedures and the use of personal protective equipment (PPE), in line with relevant legislation and guidance. Groundworks undertaken by the contractor should be given to CAR 2012 (or CAR-SOIL guidance) when undertaking works at the site

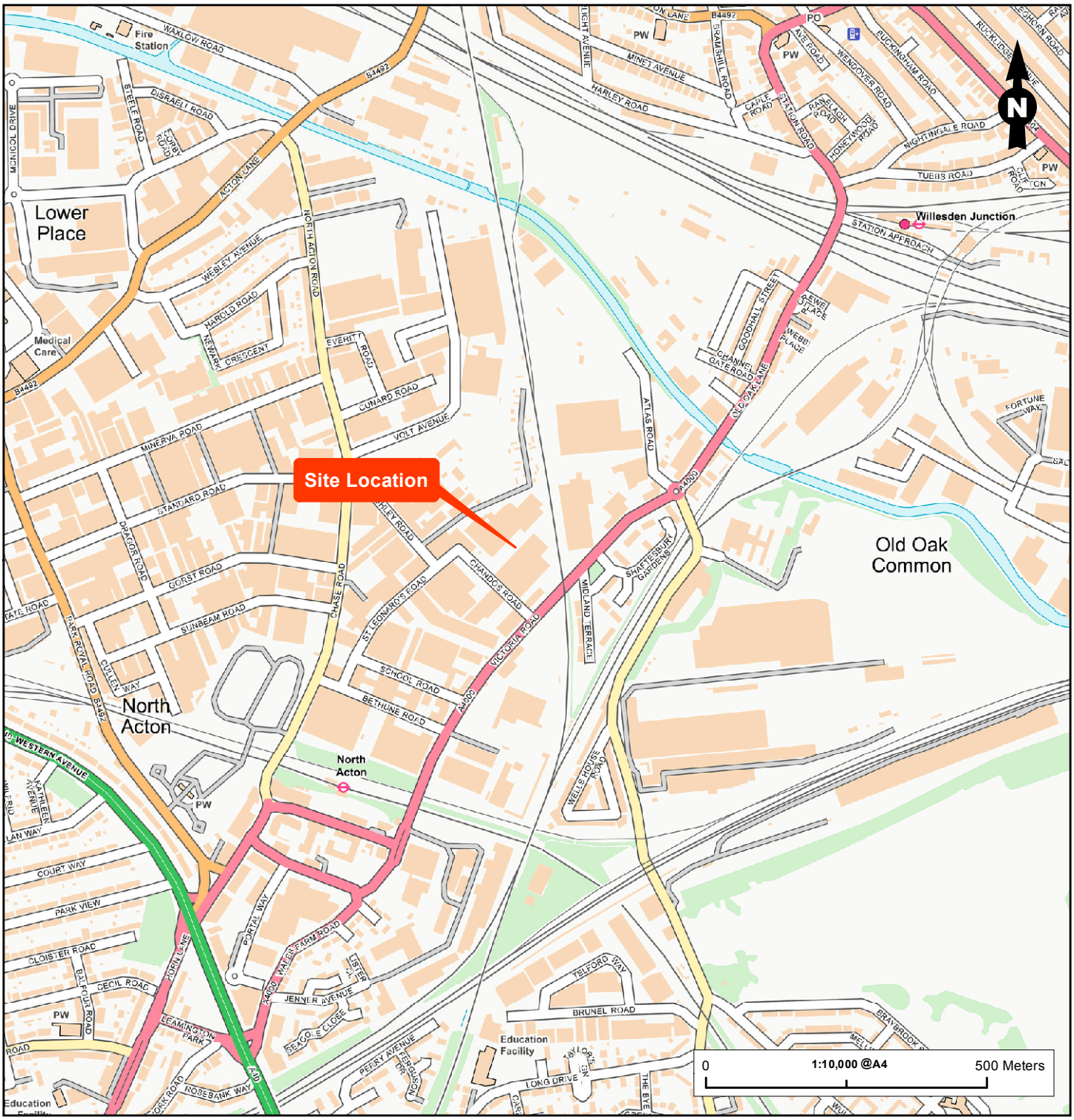
6. Material management plans should be prepared if, for example, excess material is to be retained or re-used on-site. Further testing may also be required to confirm the suitability of any material imported or re-used.
7. If landscaping is planned a separate assessment should be undertaken to confirm that soil in landscaped areas is suitable for use. Soils for landscaped areas should be demonstrated to be suitable for use and not to provide a risk to future site users; soils should also comply with British Standard for Topsoil (BS3882:2015).
8. Future water supply pipes should be selected based on appropriate material selection criteria given the brownfield nature of the site.

13.4 Recommendations – Geotechnical

The following recommendations are made for geotechnical design and aim to mitigate the identified risks associated with the ground and groundwater conditions:

1. The London Clay Formation is recommended as the founding layer for foundations supporting structural column loads for the proposed development. The preliminary pile capacity charts, presented in the separate geotechnical advice note, should be used to inform preliminary pile design. Similarly, the initial modulus of subgrade reaction should be used to inform the selection of the most appropriate structural floor slab solution.
2. A Geotechnical Design Report (GDR) should be produced for the project, compliant with requirements set out in Eurocode 7. The report shall include full details on the interpretation of design data and justification for foundation and earthworks design. Further information on re-use of site-won material and construction supervision or monitoring shall also be included.
3. Any re-use of site won material shall be in accordance with the Specification for Highway Works. Additional classification and/or compaction testing is also recommended to inform the re-use of any material.
4. Confirmatory CBR or plate load tests should be undertaken across the pavement formation to ensure a minimum CBR value of 2.5% and compliance with the pavement design.
5. Cast in-situ piling is recommended to reduce concrete exposure to sulphate attack. This may reduce the aggressivity classification from DS-4 AC-4 classification for the London Clay Formation (likely to DS-2 AC-2) for piled foundations, although this should be confirmed with the eventual piling contractor.
6. Ramboll has not undertaken any interpretation of the results of the thermal and electrical resistivity testing undertaken as part of this report. Design development of the utilities and services associated with the development should consider the test data.

APPENDIX 1
FIGURES



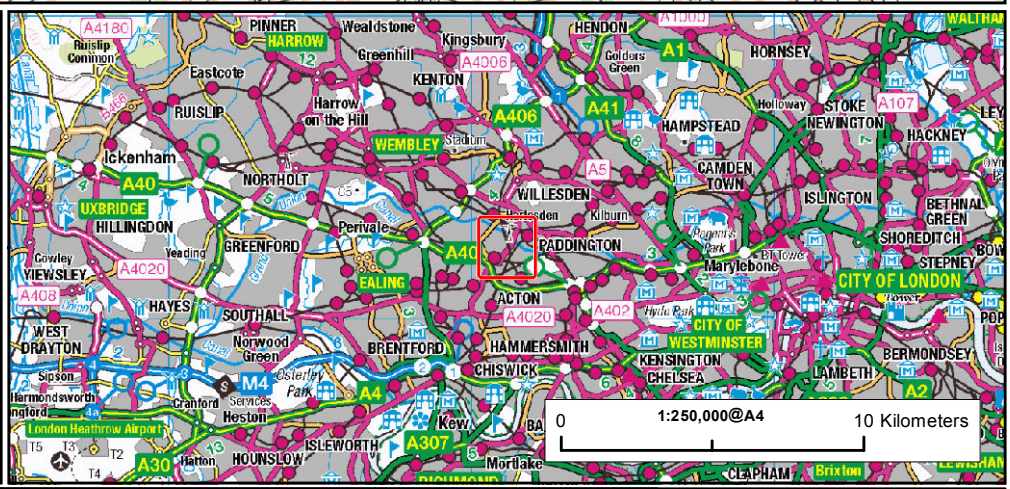


Figure Title: Figure 1: Site Location	Project Name: Chandos Park Industrial Estate, Chandos Road, Park Royal, Acton, NW10 6NF	Date: August 2020	RAMBOLL
		Scale: As shown	
Project Number: 1620009986	Client: Vantage Data Centers	Issue: 2	Prepared By: BVK

Coordinate System: British National Grid. Projection: Transverse Mercator. Datum: OSGB 1936.

N

Notes

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

KEY

WS03 — WINDOWLESS SAMPLE HOLE LOCATION

CP03 — CABLE PERCUSSION HOLE LOCATION

SECTION MARKER

SOIL RESISTIVITY PROFILE

Rev	Description	Date	By Chk	App
I01	FOR INFORMATION	13/10 2020	DH AC	SM

FOR INFORMATION

CHANDOS PARK
LONDON

RAMBOLL

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EXPLORATORY HOLE LOCATION PLAN

Scale:	Date:	Drawn:	Checked:
1.500	09/10/20	DH	AC

Drawing No.: 1620009986-RAM-XX-XX-DR-CE-0001

Rev: P01

SECTION A-A'
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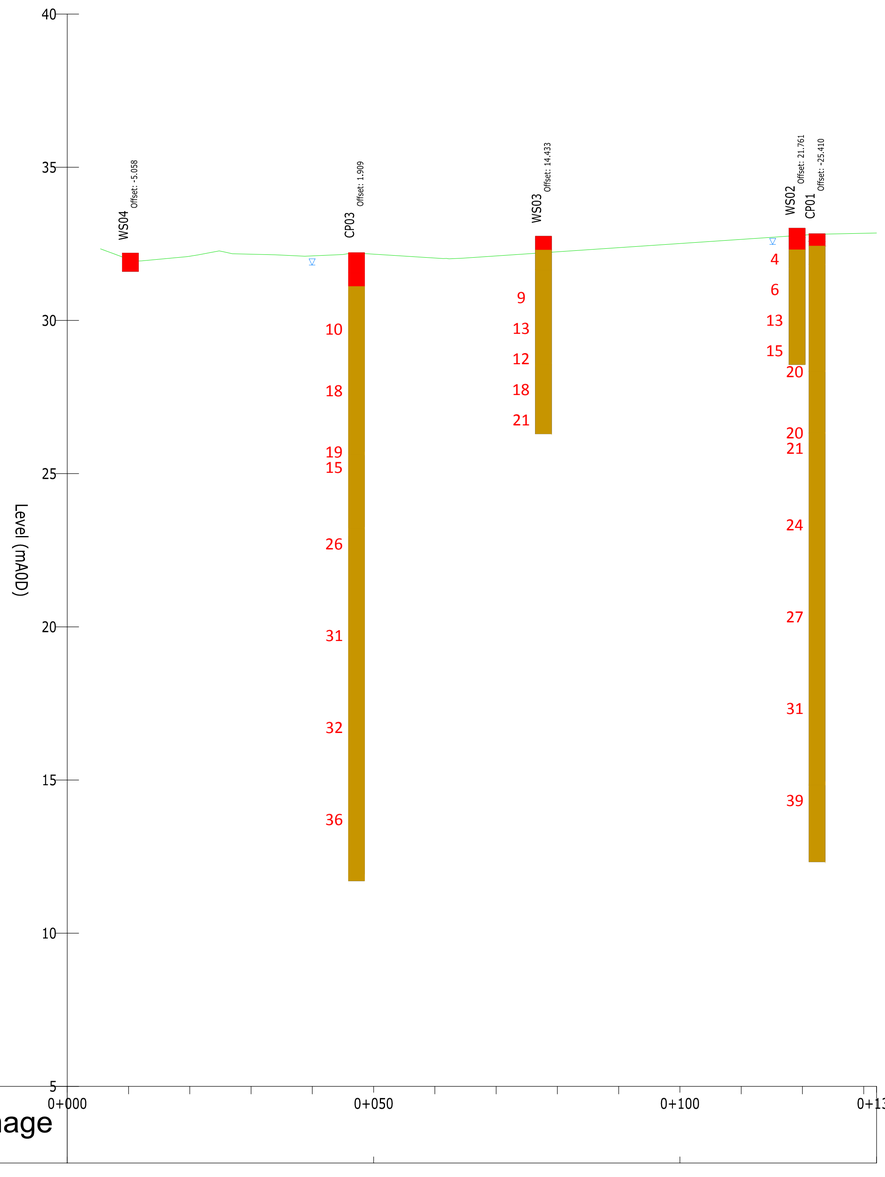

SECTION B-B'
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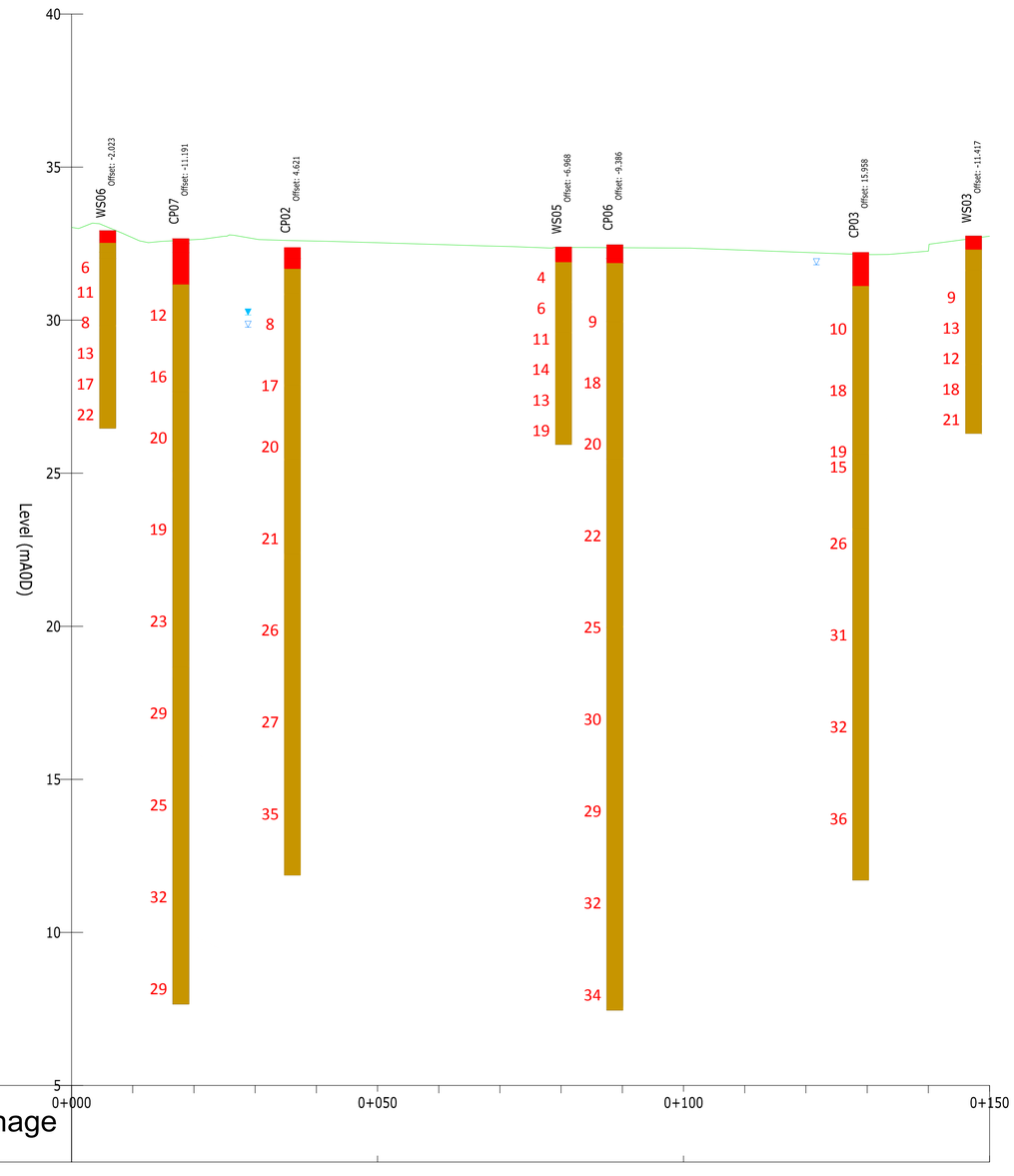

Notes

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4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

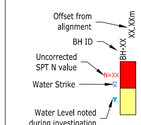
PROFILE KEY:

EXISTING GROUND

GEOLOGY KEY

	MADE GROUND
	LONDON CLAY FORMATION

BOREHOLE KEY:



Rev	Description	Date	By Chk	App
I01	FOR INFORMATION	13/10 2020	DH AC	SM

FOR INFORMATION

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GEOLOGICAL CROSS SECTIONS A-A' & B-B'

Scale:	Date:	Drawn:	Checked:
1.500	09/10/20	DH	AC

Drawing No.: 1620009986-RAM-XX-XX-DR-CE-0001

Rev: P01

APPENDIX 2
GEL FACTUAL REPORT AND BOREHOLE LOGS

CHANDOS PARK DATA CENTRE, LONDON

FACTUAL REPORT ON GROUND INVESTIGATION

Prepared for RAMBOLL UK LTD

Report Ref: 35978

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CHANDOS PARK DATA CENTRE, LONDON

FACTUAL REPORT ON GROUND INVESTIGATION

Prepared for RAMBOLL UK LTD

Report Ref: 35978

PROJECT: Proposed data centre

VOLUME - VERSION	STATUS	ORIGINATOR	CHECKER	APPROVED	DATE
1 of 1 – A	DRAFT	IS	EC	-	10/09/2020
1 of 1 - B	DRAFT	IS	CT	-	18/09/2020
1 of 1 - C	DRAFT	IS	CT	-	22/09/2020
1 of 1 - D	FINAL	IS	CT	EC	07/10/2020

ORIGINATOR	**APPROVER**
I Soley	
I SOLEY Engineering Geologist	E CRIMP Senior Geotechnical Engineer

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FIGURES **Nos.**

APPENDICES

1. INTRODUCTION

It is proposed to redevelop and construct a new data centre at Chandos Park Industrial Estate, London. Geotechnical Engineering Limited (GEL) was instructed by Ramboll UK Limited (the Client) to carry out an investigation to determine the ground conditions.

The scope of works and terms and conditions of appointment were specified by the Client and GEL correspondence reference T31410 dated 8th June 2020. The investigation was carried out under the direction and supervision of the Client.

This report describes the investigation and presents the findings.

2. SITE LOCATION AND GEOLOGY

The site is situated at the Chandos Park Industrial Estate, Chandos Road, Acton, London, NW10 6NF and may be located by its approximate National Grid co-ordinates TQ 211 824.

British Geological Survey (BGS) England and Wales (Sheet No. 256, North London, 1:50,000, 2006) and the BGS online geology (1:50,000) indicate the site is underlain by the London Clay Formation comprising clay, silt and sand. Superficial deposits are reportedly absent across the site. Made ground is identified adjacent to the northeast of the site.

Made ground associated with historical and current site use was anticipated at the site.

3. GROUND INVESTIGATION

3.1 Fieldwork

The fieldwork was carried out in general accordance with BS5930:2015 during the period 28th July 2020 to 10th August 2020 and comprised seven cable percussion boreholes and seven dynamic sampler boreholes.

The exploratory hole locations were selected by the Client and set out by this Company and are shown on Figure 1. The ground level and co-ordinates at each exploratory hole (excluding WS04) were established by this Company using GPS techniques.

Prior to commencing excavation or surface coring, each exploratory hole location was subject to a services survey which employed use of a Cable Avoidance Tool (CAT), signal generator and ground probing radar (GPR). The locations were then set out to avoid services or other identified features.

The boreholes, referenced CP01 to CP07 (Appendix A), were formed using a light cable percussion (shell and auger) rig utilising 150mm tools and casing. Initially, the surface hardstanding was rotary core drilled at 300mm diameter (CP02 and CP07) or removed by use of a hydraulic breaker (CP01, CP03, CP04, CP06). An inspection pit was then hand excavated at each borehole location to a maximum depth of 1.20m to check for buried services. The boreholes were then advanced using a clay cutter and bailer with the occasional use of a heavy chisel to assist boring.

Disturbed samples of the arisings were taken and retained in plastic bags and airtight containers. Undisturbed samples of 100mm nominal diameter were taken in suitable cohesive soils using a thin walled, open drive sampler (UT100). The UT samples were wax sealed on site to prevent moisture loss.

Standard penetration tests (SPT) were carried out in general accordance with BS EN ISO 22476-3:2005+A1:2011. A split barrel was used and the split barrel samples retained in airtight jars. The SPT N value was taken as the number of blows to penetrate the 300mm test drive following a 150mm seating drive.

Boreholes were monitored for groundwater ingress as boring proceeded. Upon encountering water, boring was temporarily stopped to allow the level to stabilise. Water levels were also recorded at the start and finish of each day's work and on completion of the borehole and are presented on the relevant log.

On completion, gas/water monitoring standpipes were installed in boreholes CP01, CP02, CP03, CP05 and CP07. Each installation consisted of a 50mm ID HDPE slotted tube set in a filter response zone of non-calcareous pea gravel. The installation was sealed above and below with a bentonite plug and accessed via a valve assembly. The installations were protected at the surface by a lockable stopcock cover set in concrete. Installation details are given on the relevant borehole log.

On completion, boreholes CP04 and CP07 were backfilled with bentonite and the surface was reinstated with concrete.

The boreholes, referenced WS01, WS02, WS03, WS05 and WS06 (Appendix A), were formed using a Terrier 2000 rig; WS04 and WS07 were terminated at shallow depth within the inspection pit. Initially, the surface hardstanding was removed by use of a hydraulic breaker (WS01, WS02, WS03, WS04, WS05). An inspection pit was hand excavated at each borehole location to a maximum depth of 1.20m to check for buried services. Disturbed samples were taken and retained in a combination of plastic tubs and bags. Dynamic sampling techniques were then employed to produce a continuous disturbed sample of 97mm and 83mm diameter reducing to 60mm as the borehole was advanced. The samples were recovered in semi-rigid plastic liner.

The samples were extracted horizontally from the sampler, labelled and caps placed each end to retain moisture.

A single undisturbed sample of 70mm nominal diameter was taken in suitable cohesive soil (borehole CP03) using an open drive sampler (U70). The sample was wax sealed and capped on site to prevent moisture loss.

Standard penetration tests (SPT) were carried out in general accordance with BS EN ISO 22476-3:2005+A1:2011. A split barrel was used and the split barrel samples retained in airtight jars. The SPT N value was taken as the number of blows to penetrate the 300mm test drive following a 150mm seating drive.

Boreholes were monitored for groundwater ingress as boring proceeded. Water levels were also recorded at the start and finish of each day's work and on completion of the borehole and are presented on the relevant log.

On completion gas/water monitoring standpipes were installed in boreholes WS01, WS02, WS05, WS06 and WS07. Each installation consisted of a 50mm ID HDPE slotted tube set in a filter response zone of non-calcareous pea gravel. The installation was sealed above with a bentonite plug and accessed via a valve assembly. The installations were protected at the surface by a lockable stopcock cover set in concrete. Installation details are given on the relevant borehole log.

Locations WS03 and WS04 were backfilled with bentonite and the surface reinstated with concrete.

In situ determinations of thermal resistivity were undertaken at locations using a Decagon Devices KD2 Pro Thermal Properties Analyser (sensor TR-1). The testing was carried out in

general accordance with ASTM D5334-14:2014 laboratory method. The results are tabulated in Appendix A.

In situ soil electrical resistivity surveys were carried out on behalf of this Company by SUMO Services Limited and their report is presented in Appendix B.

On completion of fieldwork, all samples were brought to this Company's laboratory for testing and storage.

3.2 Logging

The logging of soils and rocks was carried out by an Engineering Geologist in general accordance with BS5930:2015. A key to the exploratory hole logs is presented in Appendix A.

Detailed descriptions of the samples are given in the borehole logs, Appendix A, along with details of sampling, in situ testing, groundwater ingress, installations and relevant comments on drilling techniques.

Prior to logging, photographs of the dynamic samples were taken and are presented separately.

Soil sampling for environmental chemical analysis (ES) was undertaken by the Client during fieldwork. Additionally, these samples, plus other selected disturbed samples, were screened by the Client for the presence of volatile hydrocarbons using a photo-ionisation detector. Sample details (ES) and PID readings (Vo) have been provided by the Client and are presented on the relevant exploratory hole logs in Appendix A.

3.3 Laboratory Testing

A schedule of laboratory tests was prepared by the Client, the following tests being carried out in accordance with BS1377:1990, unless stated otherwise. The number in brackets refers to the test number given in that standard. The results are presented in Appendix B.

The natural water content was determined on twelve selected samples in accordance with BS EN ISO 17892-1:2014.

Liquid limit, plastic limit and plasticity index tests [Part 2:4.3, 5.3 and 5.4] were carried out on eight selected samples. An Atterberg line plot has also been presented.

Particle size distributions were determined in accordance with BS EN ISO 17892-4:2016 for twelve samples by wet sieving [5.2]. The fine fractions of ten of these samples were further analysed by sedimentation using the pipette method [5.4]. The results are presented as grading curves.

The California Bearing Ratio (CBR) test [Part 4:7] was carried out on one recompacted sample. The results are presented as a graph of force against penetration.

Unconsolidated undrained triaxial compression tests were carried out under a single cell pressure on six specimens prepared from full diameter UT100 samples [Part 7:8]. A cell pressure specified by the Consultant was used. Fully saturated, $\phi_u = 0$, conditions were assumed and the undrained cohesion, c_u was taken as half the deviator stress at failure.

Thermal resistivity values were determined on three undisturbed (UT100) samples and two lightly compacted samples in accordance with ASTM D5334-14 (2014). Testing was carried out using a KD2 Pro Thermal Properties Instrument and TR-1 probe on samples at as received moisture contents.

The BRE SD1 (2005) reduced suite; water soluble sulphate, total sulphate and total sulphur, together with pH were determined for thirteen samples by Chemtest Ltd using in-house methods.

GEOTECHNICAL ENGINEERING LIMITED

4. REFERENCES

American Society for Testing and Materials. (2014) Standard Test Method for Determination of Thermal Conductivity of Soil and Soft Rock by Thermal Needle Probe Procedure. ASTM D5334-14. ASTM (Philadelphia, Pa).

British Standards Institution (2015): Code of practice for ground investigations. BS 5930:2015.

British Standards Institution (2016): Methods of test for soils for civil engineering purposes – Part 1: General requirements and sample preparation. BS1377-1:2016.

British Standards Institution (1990): Methods of tests for soils for civil engineering purposes. BS 1377 Parts 2-9.

British Standards Institution (2012): Geotechnical investigation and testing. Field testing. Standard penetration test. BS EN ISO 22476-3:2005+A1:2011.

British Standards Institution (2014): Geotechnical investigation and testing – Laboratory testing of soil. Part 1: Determination of water content. BS EN ISO 17892-1:2014.

British Standards Institution (2016): Geotechnical investigation and testing – Laboratory testing of soil. Part 4: Determination of particle size distribution. BS EN ISO 17892-4:2016.

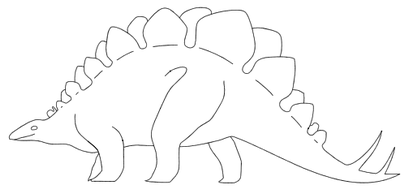
Building Research Establishment (2005): Concrete in aggressive ground. BRE Special Digest 1. Third Edition.

Key.

- Borehole Location
- Dynamic Sample Location
- Soil Resistivity Profile

Notes:

Drawing and coordinates supplied by the Consultant



geotechnical

Geotechnical Engineering Ltd

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Client:	RAMBOLL UK LTD
Consultants:	
Site:	CHANDOS PARK DATA CENTRE, LONDON
Title:	EXPLORATORY HOLE LOCATION PLAN

Drawn By:	Checked By:	Paper Size:
JB	EC	A3

Scale:	Date:
1:1,000	September 2020

Contract:	Figure:
35978	01

APPENDIX A

FIELDWORK DATA

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KEY TO EXPLORATORY HOLE LOGS

Sample type

D	Small disturbed	U	Undisturbed	L	Dynamic	ES	Environmental - soil	Cs	Core subsample (prepared)
B	Bulk disturbed	UT	Undisturbed thin wall	C	Core	EW	Environmental - water	Ls	Dynamic subsample (prepared)
LB	Large bulk disturbed	P	Piston	W	Water				

Test type

S SPT - Split spoon sampler followed by uncorrected SPT 'N' Value
C SPT - Solid cone followed by uncorrected SPT 'N' Value
(*250 - Where full test drive not completed, linearly extrapolated 'N' value reported, ** - Denotes no effective penetration)
H Hand vane - direct reading in kPa - not corrected for BS1377 (1990). Re* denotes refusal.
M Mackintosh probe - number of blows to achieve 100mm penetration
Mx Mexe cone - average reading of equivalent CBR value in %
PP Pocket penetrometer - calculated reading in kPa
Vo Headspace vapour reading, uncorrected peak values in ppm, using a PID (calibrated with isobutylene, using a 10.6eV bulb)

Sample/core range/I_f

Dynamic sample

Undisturbed sample - open drive including thin wall

x = Total Core Recovery (TCR) as percentage of core run

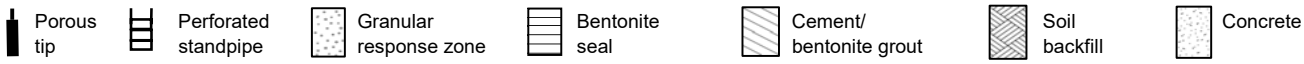
y = Solid Core Recovery (SCR) as percentage of core run. Assessment of core is based on full diameter

z = Rock Quality Designation (RQD). The amount of solid core greater then 100mm expressed as percentage of core run

Where SPT has been carried out at the beginning of core run, disturbed section of core excluded from SCR and RQD assessment

I_f - fracture spacing - the modal fracture spacing (mm) over the indicated length of core. Where spacing varies significantly, the minimum, mode and maximum values are given. NI = non-intact core NA = not applicable

Instrumentation



Stratum boundaries

Estimated boundary

Grading boundary

Logging

The logging of soils and rocks has been carried out in general accordance with BS 5930:2015

Chalk is logged in general accordance with Lord et al (2002) CIRIA C574. Where possible, dynamic samples in chalk have been logged in accordance with CIRIA C574; descriptions and gradings (if presented) should be treated with caution given the potential for sample disturbance.

For rocks the term fracture has been used to identify a mechanical break within the core. Where possible incipient and drilling induced fractures have been excluded from the assessment of fracture state. Where doubt exists, a note has been made in the descriptions. All fractures are considered to be continuous unless otherwise reported.

Made Ground is readily identifies when, within the natural make up, man made constituents are evident. Where Made Ground appears to be reworked natural material the differentiation between in situ natural deposits and Made Ground is much more difficult to ascertain. The interpretation of Made Ground within the logs should therefore be treated with caution.

The descriptors "topsoil" and "tarmacadam" are used as generic terms and do not imply conformation to any particular standard or composition.

Rootlets are defined as being less than 2mm in diameter, roots are defined as in excess of 2mm diameter.

General comments

The process of drilling and sampling will inevitably lead to sample disturbance, mixing or loss of material in some soil and rocks.

Indicated water levels ar ethose recorded during the process of drilling or excavating exploratory holes and may not represent standing water levels.

All depths are measured along the axis of the borehole and are related to ground level at the point of entry. All inclinations are measured normal to the axis of the core.

Where provided, the stratigraphical names/geological rock units are for guidance only and may not be wholly accurate.

Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP01

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 3

Start Date 04 August 2020 Easting 521141

Scale 1:50

End Date 05 August 2020 Northing 182459 Ground Level 32.83mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Greyish brown CONCRETE. (Made Ground)			
1B	0.25	0.35					▼ 0.25m			0.25	32.58	
1ES	0.25	0.35		Vo 23.5					Dark grey and black slightly silty slightly sandy angular and subangular fine to coarse concrete, flint and rare brick GRAVEL with medium concrete cobble content (up to 120mm). (Made Ground)	0.40	32.43	
2D	0.25	0.35		Vo 10.3					0.35m: Paving slab fragment (150 x 120 x 35mm) with hydrocarbon sheen and odour.			
2ES	0.35	0.50							0.35 - 0.40m: Clayey gravel.			
3B	0.50	0.80										
4D	0.50	0.80										
3ES	1.00	1.20		Vo 3.1						1.00	31.83	
5B	1.00	1.20										
6D	1.00	1.20										
7UT	1.50	1.95	1.50						Firm locally soft yellowish brown CLAY.			
									Firm becoming stiff brown mottled orangish brown and bluish grey CLAY with frequent selenite crystals (up to 3mm) and pockets (up to 35mm) of yellow and orangish brown sandy silt.			
8D	2.00			Vo 0.0								
9D	2.50	2.95	2.50	S 8								
10D	3.00			Vo 0.0								
11UT	3.50	3.95	2.50									
12D	4.00			Vo 0.0								
13D	4.50	4.95	2.50	S 20						4.50	28.33	
									Stiff brown locally mottled orangish brown silty CLAY with frequent selenite crystals (up to 15mm) and pockets (up to 30mm) of orangish brown silt.			
14D	5.00			Vo 0.0								
15UT	5.50	5.95	2.50									
16D	6.00											
17B	6.50	7.00	2.50	S 20						6.50	26.33	
									Stiff dark grey locally silty CLAY with frequent pockets (up to 50mm) of black and grey silt.			
18D	7.00	7.45	2.50	S 21								
									7.45m: Pyritised wood fragment (35 x 15 x 15mm).			
19D	8.00		2.50		-				Continued Next Page			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS
0.25	Nil	0.00	0	Seepage

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.30	Bentonite
0.30	2.00	Gravel
2.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
2.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
04-08-2020 11:10	0.00	Nil	Dry
04-08-2020 17:00	20.50	2.50	Dry
05-08-2020 08:00	0.00	Nil	Dry

REMARKS

Water seepage at 0.25m in inspection pit. Fitted with flush cover on completion.

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Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP01

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 3

Start Date 04 August 2020 Easting 521141

Scale 1:50

End Date 05 August 2020 Northing 182459 Ground Level 32.83mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45							Stiff dark grey locally silty CLAY with frequent pockets (up to 50mm) of black and grey silt.			
21D	8.50											
22D	9.00								9.00m: Pyritised wood fragment (20 x 10 x 5mm).			
23D	9.50	9.95	2.50	S 24								
24D	10.00											
25D	11.00		2.50									
26UT	11.00	11.45										
27D	11.50											
28D	12.00											
29D	12.50	12.95	2.50	S 27					12.50m: Becoming stiff to very stiff.			
30D	13.00											
31D	14.00		2.50									
32UT	14.00	14.45										
33D	14.50								14.60 - 14.80m: Driller notes claystone.			
34D	15.00											
35D	15.50	15.95	2.50	S 31								
36D	16.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.30	Bentonite
0.30	2.00	Gravel
2.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
2.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Water seepage at 0.25m in inspection pit. Fitted with flush cover on completion.

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BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP01

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 3

Start Date 04 August 2020 Easting 521141

Scale 1:50

End Date 05 August 2020 Northing 182459 Ground Level 32.83mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Stiff dark grey locally silty CLAY with frequent pockets (up to 50mm) of black and grey silt.			
37D	17.00		2.50									
38D	17.00	17.45							17.10 - 17.20m: Thin bed of weak claystone.			
39B	17.00	17.50							17.20 - 17.70m: Driller notes claystone.			
UT	17.00	17.45										
40D	18.00									18.00	14.83	
									Very stiff indistinctly fissured dark grey CLAY.			
41D	18.50	18.95	2.50	S 39								
42D	19.00											
43D	20.00		2.50									
44UT	20.00	20.45										
45D	20.50									20.50	12.33	
									Borehole Completed at 20.50m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.30	Bentonite
0.30	2.00	Gravel
2.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
2.00	Standpipe

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HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Water seepage at 0.25m in inspection pit. Fitted with flush cover on completion.

Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP02

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 3

Start Date 05 August 2020 Easting 521110

Scale 1:50

End Date 06 August 2020 Northing 182358 Ground Level 32.37mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Black TARMACADAM. (Made Ground)	0.10	32.27	
									Greyish brown CONCRETE. (Made Ground)	0.35	32.02	
1ES	0.35								Soft greenish brown and yellowish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse concrete, brick, limestone and flint. (Made Ground)	0.70	31.67	
1B	0.40 - 0.60			Vo 0.0								
2D	0.40 - 0.60											
2ES	0.40 - 0.60											
3B	0.70 - 0.90											
4D	0.70 - 0.90			Vo 0.1					Soft becoming firm brown CLAY with frequent pockets (up to 30mm) of orangish brown silt.			
5B	1.00 - 1.20											
6D	1.00 - 1.20											
7UT	1.50 - 1.95		1.50	Vo 0.0						1.50	30.87	
									Firm becoming stiff brown locally mottled orangish brown and bluish grey slightly sandy CLAY with frequent selenite crystals (up to 5mm) and pockets (up to 50mm) of orangish brown and yellowish brown silt. Rare rootlets.			
8D	2.00			Vo 0.0			2.10m					
9D	2.50 - 2.95		1.50	S 8			2.50m					
10D	3.00			Vo 0.0								
11UT	3.50 - 3.95		2.70									
12D	4.00			Vo 0.0								
13D	4.50 - 4.95		2.70	S 17						4.50	27.87	
									Stiff fissured brown locally orangish brown locally silty CLAY with frequent selenite crystals (up to 15mm). Fissures are subvertical and subhorizontal planar smooth frequently stained orangish brown.			
14D	5.00			Vo 0.0								
15UT	5.50 - 5.95		2.70									
16D	6.00											
17D	6.50 - 6.95		2.70	S 20								
										6.90	25.47	
18D	7.00								Stiff indistinctly fissured dark grey CLAY.			
19D	8.00		2.70		-							

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.35	Rotary Core	Bolt-down coring unit
0.35	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS
2.50	1.50	2.10	20	

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.70

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	5.00	Gravel
5.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
5.00	Standpipe

AGS

CONTRACT

35978

CHECKED

EC

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
05-08-2020 11:45	0.00	Nil	Dry
05-08-2020 16:45	16.00	2.70	Dry
06-08-2020 08:00	16.00	2.70	Dry
06-08-2020 09:10	20.50	2.70	Dry

REMARKS

Fitted with flush cover on completion.

Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP02

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 3

Start Date 05 August 2020 Easting 521110

Scale 1:50

End Date 06 August 2020 Northing 182358 Ground Level 32.37mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45										
21D	8.50											
22D	9.00											
23D	9.50	9.95	2.70	S 21								
24D	10.00			Vo 0.0					Stiff becoming very stiff fissured dark grey locally silty CLAY.	10.00	22.37	
25D	11.00		2.70									
26UT	11.00	11.45										
27D	11.50											
28D	12.00											
29D	12.50	12.95	2.70	S 26								
30D	13.00											
31D	14.00		2.70									
32UT	14.00	14.45										
33D	14.50								14.45 - 14.50m: Worm tube fossils (up to 7mm).			
34D	15.00											
35D	15.50	15.95	2.70	S 27								
36D	16.00								Continued Next Page			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.35	Rotary Core	Bolt-down coring unit
0.35	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.70

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	5.00	Gravel
5.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
5.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP02

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 3

Start Date 05 August 2020 Easting 521110

Scale 1:50

End Date 06 August 2020 Northing 182358 Ground Level 32.37mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Stiff becoming very stiff fissured dark grey locally silty CLAY.			
37D	17.00		2.70									
38UT	17.00	17.45										
39D	17.50								17.50m: Bivalve fossil (25 x 15mm).			
40D	18.00											
41D	18.50	18.95	2.70	S 35								
42D	19.00											
43D	20.00		2.70									
44UT	20.00	20.45										
45D	20.50									20.50	11.87	
									Borehole Completed at 20.50m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.35	Rotary Core	Bolt-down coring unit
0.35	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.70

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	5.00	Gravel
5.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
5.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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BOREHOLE LOG

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CP03

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 3

Start Date 29 July 2020 Easting 521194 Scale 1:50

End Date 29 July 2020 Northing 182399 Ground Level 32.21mOD Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
1B	0.10	0.30							Black TARMACADAM. (Made Ground)	0.05	32.16	
2D	0.10	0.30					▼ 0.30m		Brown sandy subangular and subrounded fine to coarse concrete, flint, sandstone, brick and limestone GRAVEL. (Made Ground)			
1ES	0.20	0.50		Vo 0.0					0.05 - 0.10m: Coarse gravel.	0.65	31.56	
3B	0.70	0.90							Firm greenish grey slightly sandy slightly gravelly CLAY. Gravel is saubangular and subrounded fine to coarse of brick, concrete, tarmacadam and limestone. (Made Ground)			
4D	0.70	0.90								1.10	31.11	
5B	1.00	1.20		Vo 0.0					Firm becoming stiff brown and orangish brown mottled bluish grey silty CLAY with selenite crystals (up to 15mm) and occasional pockets of yellowish brown silt (up to 25mm).			
6D	1.00	1.20										
3ES	1.20											
7UT	1.50	1.95	1.50									
8D	2.00			Vo 0.0								
9D	2.50	2.95	2.50	S 10								
10D	3.00			Vo 0.0								
11B	3.50	4.00	2.50						3.50 - 3.70m: Claystone band (200mm).			
UT	3.50	3.95										
12D	4.00			Vo 0.0								
13D	4.50	4.95	2.50	S 18								
14D	5.00			Vo 0.0								
15UT	5.50	5.95	2.50									
16D	6.00								6.00m: Selenite crystal (45x30x10mm).			
17B	6.50	7.00	2.50	S 19								
									Stiff dark brown CLAY with selenite crystals (up to 5mm).	6.60	25.61	
			2.50	S 15								
18B	7.50	8.00										
19D	8.00		2.50		-							

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS
0.30	Nil	0.00	0	Seepage

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.10	Bentonite
1.10	20.00	Gravel
20.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
20.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
29-07-2020 07:45	0.00	Nil	Dry
29-07-2020 15:20	20.50	2.50	Dry

REMARKS

Water seepage at 0.30m in inspection pit. Fitted with flush cover on completion.

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BOREHOLE LOG

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CP03

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 3

Start Date 29 July 2020 Easting 521194

Scale 1:50

End Date 29 July 2020 Northing 182399 Ground Level 32.21mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45										
21D	8.50											
22D	9.00									9.00	23.21	
23D	9.50	9.95	2.50	S 26					Stiff becoming very stiff fissured dark grey silty CLAY with occasional pockets of black silt (up to 60mm diam).			
24D	10.00			Vo 0.0								
25D	11.00											
26UT	11.00	11.45										
27D	11.50											
28D	12.00											
29D	12.50	12.95	2.50	S 31								
30D	13.00											
31D	14.00											
32UT	14.00	14.45										
33D	14.50											
34D	15.00											
35D	15.50	15.95	2.50	S 32								
36D	16.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.10	Bentonite
1.10	20.00	Gravel
20.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
20.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Water seepage at 0.30m in inspection pit. Fitted with flush cover on completion.

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SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 3

Start Date 29 July 2020 Easting 521194 Scale 1:50

End Date 29 July 2020 Northing 182399 Ground Level 32.21mOD Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
37D	17.00											
38UT	17.00	17.45										
39D	17.50											
40D	18.00											
41D	18.50	18.95	2.50	S 36								
42D	19.00											
43D	20.00											
44UT	20.00	20.45										
45D	20.50								Borehole Completed at 20.50m	20.50	11.71	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	20.50	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.10	Bentonite
1.10	20.00	Gravel
20.00	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
20.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Water seepage at 0.30m in inspection pit. Fitted with flush cover on completion.

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CP04

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 3

Start Date 06 August 2020 Easting 521103

Scale 1:50

End Date 07 August 2020 Northing 182339 Ground Level 32.10mOD Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Black TARMACADAM. (Made Ground)	0.10	32.00	
									Yellowish brown CONCRETE returned as sandy subangular and subrounded fine to coarse gravel. (Made Ground)	0.30	31.80	
1ES	0.40											
1B	0.50	0.60		Vo 0.0								
2D	0.50	0.60										
2ES	0.50											
				Vo 0.0					Dark grey gravelly fine to coarse SAND with a medium concrete and flint cobble content (up to 200mm). Gravel is angular to subrounded fine to coarse concrete and flint. (Made Ground)			
3D	1.50	1.95	1.50	S 9						1.60	30.50	
3ES	2.00			Vo 0.0					Firm becoming stiff brown locally mottled orangish brown and grey CLAY with frequent selenite crystals (up to 5mm) and pockets (up to 80mm) of yellowish brown and orangish brown sandy silt. Rare decaying roots (up to 30mm).			
4D	2.00											
5UT	2.50	2.95	1.50									
6D	3.00			Vo 0.0								
7D	3.50	3.95	2.50	S 16								
8D	4.00			Vo 0.0								
9UT	4.50	4.95	2.50							4.50	27.60	
									Stiff fissured brown mottled orangish brown CLAY with selenite crystals (up to 15mm).			
10D	5.00			Vo 0.0								
11D	5.50	5.95	2.50	S 20								
12D	6.00									6.00	26.10	
									Stiff to very stiff fissured dark grey locally silty CLAY with rare pyritised wood (up to 20mm). Fissures are subhorizontal and subvertical planar smooth. 6.00m: Fissures are stained orangish brown.			
13UT	6.50	6.95	2.50									
14D	7.00											
15D	8.00		2.50	S 26								

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.60	Inspection Pit	Breaker & Hand tools
0.60	20.45	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
06-08-2020 11:20	0.00	Nil	Dry
06-08-2020 16:50	16.00	2.50	Dry
07-08-2020 08:00	16.00	2.50	Dry
07-08-2020 16:30	20.50	2.50	Dry

REMARKS

Chisel used to advance hole through concrete obstructions 0.60-1.50m (30mins).

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BOREHOLE LOG

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CP04

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 3

Start Date 06 August 2020 Easting 521103

Scale 1:50

End Date 07 August 2020 Northing 182339 Ground Level 32.10mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
16D	8.00	8.45							Stiff to very stiff fissured dark grey locally silty CLAY with rare pyritised wood (up to 20mm). Fissures are subhorizontal and subvertical planar smooth. 8.00 - 8.45m: Pockets of black silt (up to 20mm).			
17D	9.00											
18UT	9.50	9.95	2.50									
19D	10.00											
20D	11.00		2.50	S 29								
21D	11.00	11.45										
22D	12.00											
23UT	12.50	12.95	2.50									
24D	13.00											
25D	14.00		2.50	S 32						14.00	18.10	
26D	14.00	14.45							Very stiff fissured dark grey CLAY with rare burrows (up to 15mm) infilled with grey silt.			
27D	15.00											
28UT	15.50	15.95	2.50									
29D	16.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.60	Inspection Pit	Breaker & Hand tools
0.60	20.45	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

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HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Chisel used to advance hole through concrete obstructions 0.60-1.50m (30mins).

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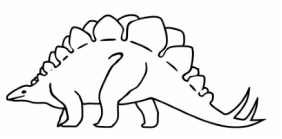
BOREHOLE LOG



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CP04

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 3

Start Date 06 August 2020 Easting 521103

Scale 1:50

End Date 07 August 2020 Northing 182339 Ground Level 32.10mOD

Depth 20.50 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
30D	17.00		2.50	S 35								
31D	17.00	17.45										
32D	18.00											
33UT	18.50	18.95	2.50									
34D	19.00											
35D	20.00		2.50	S 39								
36D	20.00	20.45										
									Borehole Completed at 20.50m	20.50	11.60	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.60	Inspection Pit	Breaker & Hand tools
0.60	20.45	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	20.50	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	20.50

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Chisel used to advance hole through concrete obstructions 0.60-1.50m (30mins).

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BOREHOLE LOG

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CP05

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 4

Start Date 03 August 2020 Easting 521085

Scale 1:50

End Date 03 August 2020 Northing 182438 Ground Level 32.77mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Cream and light grey CONCRETE. (Made Ground)	0.15	32.62	
1B	0.30	0.50							Brown slightly gravelly clayey fine to coarse SAND. Gravel is angular and subangular fine to coarse flint. (Made Ground)	0.25	32.52	
1ES	0.30	0.50		Vo 0.0								
2D	0.30	0.50										
3B	0.70	0.90							Soft brown locally mottled grey and orangish brown CLAY.	1.00	31.77	
4D	0.70	0.90										
2ES	1.00	1.20		Vo 0.0					Firm fissured brown and orangish brown locally mottled bluish grey silty CLAY with frequent selenite crystals (up to 10mm). 1.00 - 1.20m: Frequent rootlets. 1.10 - 1.20m: Frequent pockets (up to 50mm) of yellowish brown and orangish brown silt.			
5B	1.00	1.20										
6D	1.00	1.20										
7UT	1.50	1.95	1.50									
8D	2.00			Vo 0.0								
9D	2.50	2.95	2.50	S 9								
10D	3.00			Vo 0.0								
11UT	3.50	3.95	2.50									
12D	4.00			Vo 0.0								
3ES	4.00											
13D	4.50	4.95	2.50	S 19					4.50m: Becoming stiff.			
14D	5.00			Vo 0.0								
15UT	5.50	5.95	2.50									
16D	6.00			Vo 0.0								
17D	6.50	6.95	2.50	S 19								
18D	7.00											
19D	8.00		2.50						Continued Next Page	8.00	24.77	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.50	Bentonite
0.50	10.00	Gravel
10.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
10.00	Standpipe

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HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
03-08-2020 08:30	0.00	Nil	Dry
03-08-2020 15:30	25.00	2.50	Dry

REMARKS

Fitted with flush cover on completion.

Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP05

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 4

Start Date 03 August 2020 Easting 521085

Scale 1:50

End Date 03 August 2020 Northing 182438 Ground Level 32.77mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45							Stiff becoming very stiff fissured dark grey silty CLAY with rare pyrite nodules (up to 25mm).			
21D	8.50											
22D	9.00											
23D	9.50	9.95	2.50	S 24								
24D	10.00								9.95 - 10.00m: Band of clayey silt.			
25D	11.00		2.50									
26UT	11.00	11.45										
27D	11.50											
28D	12.00											
29D	12.50	12.95	2.50	S 26								
30D	13.00								13.00 - 13.05m: Band of clayey silt.			
31D	14.00		2.50									
32UT	14.00	14.45										
33D	14.50								14.50m: Frequent burrows (up to 4mm diam) infilled with grey silt.			
34D	15.00			Vo 0.0								
35D	15.50	15.95	2.50	S 30								
36D	16.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.50	Bentonite
0.50	10.00	Gravel
10.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
10.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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BOREHOLE LOG

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SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 4

Start Date 03 August 2020 Easting 521085

Scale 1:50

End Date 03 August 2020 Northing 182438 Ground Level 32.77mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Stiff becoming very stiff fissured dark grey silty CLAY with rare pyrite nodules (up to 25mm).			
37D	17.00		2.50									
38UT	17.00	17.45										
39D	17.50											
40D	18.00											
41D	18.50	18.95	2.50	S 32								
42D	19.00											
43D	20.00		2.50									
44UT	20.00	20.45										
45D	20.50											
46D	21.00											
47D	21.50	21.95	2.50	S 39					21.50 - 21.95m: Frequent burrows (up to 4mm diam) infilled with grey silt.			
48D	22.00											
49D	23.00		2.50									
50UT	23.00	23.45										
51D	23.50											
52D	24.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.50	Bentonite
0.50	10.00	Gravel
10.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
10.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

35978

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EC

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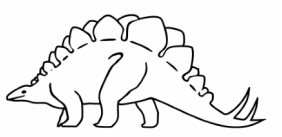
BOREHOLE LOG



CP05

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 4 of 4

Start Date 03 August 2020 Easting 521085 Scale 1:50

End Date 03 August 2020 Northing 182438 Ground Level 32.77mOD Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
53D	24.50	24.95	2.50	S 42								
54D	25.00								Borehole Completed at 25.00m	25.00	7.77	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	0.50	Bentonite
0.50	10.00	Gravel
10.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
10.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP06

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 4

Start Date 30 July 2020 Easting 521146 Scale 1:50

End Date 31 July 2020 Northing 182398 Ground Level 32.46mOD Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
1B	0.10	0.30							Black TARMACADAM (Made Ground)	0.10	32.36	
2D	0.10	0.30							Greyish brown sandy angular to subrounded fine to coarse quartzite, limestone, concrete, sandstone and crystalline GRAVEL with a low concrete cobble content (up to 95mm). (Made Ground)	0.45	32.01	
1ES	0.25									0.60	31.86	
2ES	0.40	0.60		Vo 0.5								
3B	0.45	0.60										
4D	0.45	0.60										
5B	1.00	1.20		Vo 0.0					Firm locally soft greenish grey and brownish grey locally mottled black slightly sandy slightly gravelly CLAY with rare decaying wood fragments (up to 20mm). Gravel is subangular and subrounded fine and medium limestone, quartzite and flint. (Made Ground)			
6D	1.00	1.20										
7UT	1.50	1.95	1.50									
8D	2.00			Vo 0.0					Soft and firm greyish brown mottled grey and brown CLAY.			
9D	2.50	2.95	1.50	S 9						2.50	29.96	
10D	3.00			Vo 0.0					Firm becoming stiff brown locally mottled grey and orangish brown CLAY with selenite crystals (up to 20mm) and frequent pockets of orangish brown silty fine sand (up to 40mm).			
11UT	3.50	3.95	2.50									
12D	4.00											
13D	4.50	4.95	2.50	S 18								
14D	5.00			Vo 0.0								
15UT	5.50	5.95	2.50									
16D	6.00											
17D	6.50	6.95	2.50	S 20								
18D	7.00								6.95m: Pyritised gastropod fossil (12mm diam). Stiff fissured dark grey silty CLAY with frequent selenite crystals (up to 5mm) and frequent pockets (up to 30mm) of black silt.	7.00	25.46	
19D	8.00		2.50									

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

AGS

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HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
30-07-2020 10:40	0.00	Nil	Dry
30-07-2020 17:10	15.00	2.50	Dry
31-07-2020 07:45	15.00	2.50	Dry
31-08-2020 10:40	25.00	2.50	Dry

REMARKS

Chiselling (30 mins) through claystone 14.10-14.70m.

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BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP06

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 4

Start Date 30 July 2020 Easting 521146

Scale 1:50

End Date 31 July 2020 Northing 182398 Ground Level 32.46mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45							Stiff fissured dark grey silty CLAY with frequent selenite crystals (up to 5mm) and frequent pockets (up to 30mm) of black silt.			
21D	8.50											
22D	9.00											
23D	9.50	9.95	2.50	S 22								
24D	10.00			Vo 0.0					10.00 - 10.10m: Dark grey and black clayey silt.			
25D	11.00		2.50									
26UT	11.00	11.45										
27D	11.50											
28D	12.00								12.00m: Frequent burrows (up to 5mm diam) infilled with grey silt..			
29D	12.50	12.95	2.50	S 25					Stiff becoming very stiff fissured dark grey locally silty CLAY.	12.50	19.96	
30D	13.00											
31D	14.00		2.50									
32B	14.00	14.50										
UT	14.00	14.45							14.10 - 14.70m: Driller notes claystone.			
33D	15.00											
34D	15.50	15.95	2.50	S 30								
35D	16.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

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HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Chiselling (30 mins) through claystone 14.10-14.70m.

Geotechnical Engineering Limited

BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP06

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 3 of 4

Start Date 30 July 2020 Easting 521146

Scale 1:50

End Date 31 July 2020 Northing 182398 Ground Level 32.46mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
36D	17.00		2.50									
37UT	17.00	17.45										
38D	17.50											
39D	18.00											
40D	18.50	18.95	2.50	S 29								
41D	19.00											
42D	20.00		2.50									
43UT	20.00	20.45										
44D	20.50											
45D	21.00											
46D	21.50	21.95	2.50	S 32								
47D	22.00											
48D	23.00		2.50									
49UT	23.00	23.45										
50D	23.50											
51D	24.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Chiselling (30 mins) through claystone 14.10-14.70m.

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BOREHOLE LOG

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CP06

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 4 of 4

Start Date 30 July 2020 Easting 521146

Scale 1:50

End Date 31 July 2020 Northing 182398 Ground Level 32.46mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
52D	24.50	24.95	2.50	S 34								
53D	25.00								Borehole Completed at 25.00m	25.00	7.46	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Chiselling (30 mins) through claystone 14.10-14.70m.

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BOREHOLE LOG

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CP07

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 4

Start Date 07 August 2020 Easting 521086

Scale 1:50

End Date 10 August 2020 Northing 182361 Ground Level 32.66mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Black TARMACADAM. (Made Ground) 0.07 - 0.15m: Tarmacadam and crystalline gravel.	0.15	32.51	
1B	0.20	0.30							Yellowish brown sandy subangular and subrounded fine to coarse concrete and limestone GRAVEL. (Made Ground)	0.45	32.21	
1ES	0.20	0.40										
2D	0.20	0.30		Vo 0.0								
3B	0.45	0.65										
4D	0.45	0.65										
2ES	0.50	0.60										
5B	1.00	1.20		Vo 0.0					Soft locally firm brown and greyish brown slightly gravelly CLAY. Gravel is subrounded fine limestone. (Made Ground)			
6D	1.00	1.20										
3ES	1.50	2.00	1.50							1.50	31.16	
7UT	1.50	1.95							Firm becoming stiff brown locally mottled orangish brown and bluish grey CLAY with frequent selenite crystals (up to 3mm) and pockets (up to 60mm) of orangish brown silt. Rare inclusions of yellow siltstone (up to 10mm).			
8D	2.00			Vo 0.0								
9D	2.50	2.95	1.50	S 12								
10D	3.00			Vo 0.0								
11UT	3.50	3.95	2.50									
12D	4.00			Vo 0.0								
13D	4.50	4.95	2.50	S 16								
14D	5.00			Vo 0.0						5.00	27.66	
15UT	5.50	5.95	2.50						Stiff fissured dark brown locally silty CLAY with frequent selenite crystals (up to 15mm) and rare pyritised wood fragments (up to 25mm).			
16D	6.00											
17D	6.50	6.95	2.50	S 20								
18D	7.00											
										7.60	25.06	
									Stiff fissured dark grey CLAY with frequent pockets (up to 90mm) of dark grey and black silt.			
19D	8.00		2.50									

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.15	Rotary Core	Bolt-down coring unit
0.15	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.50	Bentonite
1.50	9.00	Gravel
9.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
9.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
07-08-2020 10:30	0.00	Nil	Dry
07-08-2020 13:20	9.00	2.50	Dry
10-08-2020 08:00	9.00	2.50	Dry
10-08-2020 12:30	25.00	2.50	Dry

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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BOREHOLE LOG

CLIENT RAMBOLL UK LTD

CP07

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 2 of 4

Start Date 07 August 2020 Easting 521086

Scale 1:50

End Date 10 August 2020 Northing 182361 Ground Level 32.66mOD

Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
20UT	8.00	8.45							Stiff fissured dark grey CLAY with frequent pockets (up to 90mm) of dark grey and black silt.			
21D	8.50											
22D	9.00											
23D	9.50	9.95	2.50	S 19								
24D	10.50											
25UT	11.00	11.45	2.50									
26D	11.50											
27D	12.00											
28D	12.50	12.95	2.50	S 23					12.50 - 12.95m: Frequent burrows (up to 5mm) infilled with grey silt.			
29D	13.50											
30UT	14.00	14.45	2.50						Very stiff locally stiff fissured dark grey CLAY.	14.00	18.66	
31D	14.50											
32D	15.00			Vo 0.0								
33B	15.50	16.00	2.50	S 29								

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.15	Rotary Core	Bolt-down coring unit
0.15	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.50	Bentonite
1.50	9.00	Gravel
9.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
9.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT

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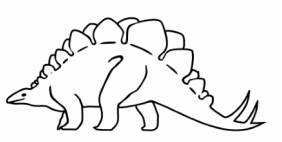
BOREHOLE LOG



CP07

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SITE CHANDOS PARK DATA CENTRE, LONDON — Sheet 3 of 4

Start Date 07 August 2020 — Easting 521086 — Scale 1:50

End Date 10 August 2020 — Northing 182361 — Ground Level 32.66mOD — Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
									Very stiff locally stiff fissured dark grey CLAY.			
34D	16.50											
35UT	17.00	17.45	2.50									
36D	17.50								17.50m: Frequent burrows (up to 15mm) infilled with grey silt.			
37D	18.00											
38D	18.50	18.95	2.50	S 25								
39D	19.50											
40UT	20.00	20.45	2.50									
41D	20.50											
42D	21.00								21.00m: Pyrite nodule (30 x 25 x 5mm).			
43D	21.50	21.95	2.50	S 32								
44D	22.50											
45UT	23.00	23.45	2.50									
46D	23.50								23.50m: Frequent pockets of black silt (up to 30mm).			
47D	24.00											

Continued Next Page

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.15	Rotary Core	Bolt-down coring unit
0.15	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.50	Bentonite
1.50	9.00	Gravel
9.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
9.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT **35978**

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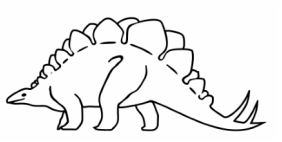
BOREHOLE LOG



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CP07

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 4 of 4

Start Date 07 August 2020 Easting 521086 Scale 1:50

End Date 10 August 2020 Northing 182361 Ground Level 32.66mOD Depth 25.00 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. range	chiselling details	water strike/ added	instru -ment	description	depth (m)	reduced level (m)	legend
48D	24.50	24.95	2.50	S 29								
									Borehole Completed at 25.00m	25.00	7.66	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.15	Rotary Core	Bolt-down coring unit
0.15	1.20	Inspection Pit	Hand tools
1.20	25.00	Cable Percussion	Dando 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
150	2.50

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	1.50	Bentonite
1.50	9.00	Gravel
9.00	25.00	Bentonite

INSTRUMENTATION

DEPTH (m)	INSTRUMENT
9.00	Standpipe

HOLE DIAMETER

DIAM (mm)	BASE (m)
150	25.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)

REMARKS

Fitted with flush cover on completion.

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Geotechnical Engineering Limited

BOREHOLE LOG

WS01

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON — Sheet 1 of 1

Start Date 29 July 2020 — Easting 521108 — Scale 1:50

End Date 29 July 2020 — Northing 182447 — Ground Level 23.71mOD — Depth 4.45 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
1ES	0.20								Grey CONCRETE with 10mm diam steel reinforcement. (MADE GROUND)	0.30	23.41	
2ES	0.20	0.40										
1L	0.40	1.00		Vo 0.0					Soft brown locally mottled dark bluish grey CLAY with rare relict rootlets.			
2D	0.70	0.80										
3D	1.00	1.45	1.00	S 6								
3ES	1.00			Vo 0.0						1.20	22.51	
4L	1.00	2.00										
5D	1.50	1.60		Vo 0.0					Firm fissured thinly laminated brown and orangish brown CLAY. Fissures are 75° stained bluish grey. Rare translucent selenite crystals (up to 15mm) and rare pockets (up to 15mm) of orangish brown fine sand.			
6D	2.00	2.45	2.00	S 10								
7L	2.00	3.00		Vo 0.0								
				Vo 0.0								
8D	2.60	2.70										
10L	3.00	4.00	2.00	S 15								
9D	3.00	3.45		Vo 0.0								
11D	3.50	3.65		Vo 0.0								
12D	4.00	4.45	2.00	S 14								
				Vo 0.0								
									Borehole Completed at 4.45m	4.45	19.26	

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.30	Inspection Pit	Hydraulic breaker
0.30	0.40	Inspection Pit	Hand tools
0.40	4.45	Windowless Sampler	Terrier 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
113	2.00

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.15	Concrete
0.15	0.30	Bentonite
0.30	2.00	Gravel
2.00	4.45	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE
2.00	Standpipe

AGS

BARREL DIAMETER

DIAM (mm)	BASE (m)
98	2.00
84	3.00
74	4.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
29-07-2020 13:30	0.00	Nil	Dry
29-07-2020 15:20	4.45	2.00	Dry

REMARKS

Fitted with flush cover on completion.

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

BOREHOLE LOG

WS02

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON — Sheet 1 of 1

Start Date 29 July 2020 — Easting 521186 — Scale 1:50

End Date 29 July 2020 — Northing 182473 — Ground Level 33.01mOD — Depth 4.45 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
1ES	0.20								Greyish brown CONCRETE with 10mm diam steel reinforcement. (MADE GROUND)	0.30	32.71	
1B	0.30	0.50										
2D	0.30	0.50	1.00	Vo 0.0					Angular concrete and brick COBBLES with some brown silty fine to coarse sand. (MADE GROUND)	0.70	32.31	
2ES	0.40	0.60										
3L	0.50	1.00							Soft brown locally mottled dark bluish grey CLAY.			
4D	1.00	1.45	1.00	S 4								
5L	1.00	2.00		Vo 0.0						1.30	31.71	
6D	1.50	1.60		Vo 0.0					Soft becoming firm fissured thinly laminated brown and orangish brown CLAY. Fissures are 70-80° stained bluish grey. Frequent translucent selenite crystals (up to 1mm) and rare pockets (up to 15mm) of orangish brown fine sand. 1.80 - 1.95m: Abundant translucent gypsum crystals (up to 1mm).			
3ES	2.00	2.20	2.00	S 6								
7D	2.00	2.45		Vo 0.0								
8L	2.00	3.00										
9D	2.40	2.50		Vo 0.0								
10D	3.00	3.45	2.00	S 13								
11L	3.00	4.00		Vo 0.0								
12D	3.50	3.60		Vo 0.0								
13D	4.00	4.45	2.00	S 15								
				Vo 0.0						4.45	28.56	
									Borehole Completed at 4.45m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.30	Inspection Pit	Hydraulic breaker
0.30	0.50	Inspection Pit	Hand tools
0.50	4.45	Windowless Sampler	Terrier 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
113	2.00

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.50	Bentonite
0.50	2.50	Gravel
2.50	4.45	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE
2.50	Standpipe

AGS

BARREL DIAMETER

DIAM (mm)	BASE (m)
98	1.00
84	2.00
74	4.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
29-07-2020 11:25	0.00	Nil	Dry
29-07-2020 13:15	4.45	2.00	Dry

REMARKS

Fitted with flush cover on completion.

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

BOREHOLE LOG

WS03

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON — Sheet 1 of 1

Start Date 28 July 2020 — Easting 521194 — Scale 1:50

End Date 28 July 2020 — Northing 182432 — Ground Level 32.75mOD — Depth 6.45 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
1ES	0.20								Greyish brown CONCRETE. (MADE GROUND)	0.10	32.65	
									Light orangish brown and light grey slightly gravelly medium and coarse SAND. Gravel is subangular and subrounded fine and medium crystalline. (MADE GROUND)	0.45	32.30	
1B	0.50 - 0.60			Vo 0.2								
2D	0.50 - 0.60											
2ES	0.50								Soft brownish grey and dark grey slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse flint.			
3B	0.80 - 0.90											
4D	0.80 - 0.90			Vo 0.1						1.10	31.65	
5B	1.10 - 1.20		2.00						Soft becoming firm fissured light brown mottled bluish grey CLAY with frequent selenite crystals (up to 2mm). Fissures are 80° stained light bluish grey.			
6D	1.10 - 1.20											
7U	1.20 - 1.65											
8L	1.20 - 2.00			Vo 0.0								
9D	1.70 - 1.80											
10D	2.00 - 2.45		2.00	S 9								
11L	2.00 - 3.00			Vo 0.0								
				Vo 0.0								
12D	3.00 - 3.45		2.00	S 13								
13L	3.00 - 4.00			Vo 0.0								
				Vo 0.0								
14D	3.70 - 3.80								3.60m: Pocket (7mm) of light grey silt.			
15D	4.00 - 4.45		2.00	S 12								
16L	4.00 - 5.00			Vo 0.0						4.20	28.55	
									Firm becoming stiff fissured light brown locally mottled bluish grey CLAY with frequent selenite crystals (up to 2mm). Fissures are 80° to subvertical stained light bluish grey.			
17D	4.70 - 4.80											
18D	5.00 - 5.45		2.00	S 18								
19L	5.00 - 6.00			Vo 0.0								
20D	5.70 - 5.80											
21D	6.00 - 6.45		2.00	S 21								
				Vo 0.0						6.45	26.30	
									Borehole Completed at 6.45m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	6.45	Windowless Sampler	Terrier 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
113	2.00

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.20	Concrete
0.20	6.45	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE

BARREL DIAMETER

DIAM (mm)	BASE (m)
113	2.00
98	4.00
84	5.00
74	6.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
28-07-2020 10:30	0.00	Nil	Dry
28-07-2020 16:30	6.45	2.00	Dry

REMARKS

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

BOREHOLE LOG

WS04

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

Start Date 29 July 2020

End Date 29 July 2020

Sheet 1 of 1

Scale 1:50

Depth 0.60 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
									Greyish brown CONCRETE. (MADE GROUND)			
										0.60		
									Borehole Completed at 0.60m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.60	Inspection Pit	Hydraulic breaker

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.10	Concrete
0.10	0.60	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE

BARREL DIAMETER

DIAM (mm)	BASE (m)

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
29-07-2020 10:30	0.00	Nil	Dry
29-07-2020 11:10	0.60	Nil	Dry

REMARKS

Borehole terminated due to presence of concrete obstruction.

CONTRACT

35978

CHECKED

EC

Geotechnical Engineering Limited

BOREHOLE LOG

WS05

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

Sheet 1 of 1

Start Date 30 July 2020 Easting 521141 Scale 1:50

End Date 30 July 2020 Northing 182392 Ground Level 32.39mOD Depth 6.45 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
									Black TARMACADAM. (MADE GROUND)	0.10	32.29	
1D	0.20	0.30							Light yellowish brown gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse crystalline. (MADE GROUND)	0.50	31.89	
1ES	0.20	0.40										
2B	0.20	0.30		Vo 2.7								
2ES	0.40	0.50										
3L	0.40	1.00										
4D	0.60	0.70										
5D	0.80	0.90	1.00	S 4					Soft greenish brown mottled bluish grey CLAY with rare relict rootlets.			
3ES	1.00		2.00	Vo 38.9					1.00 - 1.45m: Slightly oily with solvent odour.			
6D	1.00	1.45										
7L	1.00	2.00										
4ES	1.50	1.75		Vo 4.9								
8D	1.60	1.70										
										1.80	30.59	
10L	2.00	3.00	2.00	S 6					Soft becoming firm fissured thinly laminated brown and orangish brown CLAY. Fissures are 75° stained bluish grey. Rare translucent selenite crystals (up to 10mm) and rare pockets (up to 30mm) of orangish brown fine sand.			
9D	2.00	2.45		Vo 8.9								
11D	2.50	2.60										
										2.80	29.59	
12D	3.00	3.45	2.00	S 11					Firm becoming stiff fissured thinly laminated brown and orangish brown CLAY. Fissures are 75° stained bluish grey. Rare translucent selenite crystals (up to 10mm) and rare pockets (up to 30mm) of orangish brown fine sand.			
13L	3.00	4.00		Vo 0.0								
14D	3.60	3.70										
15D	4.00	4.45	2.00	S 14								
16L	4.00	5.00		Vo 0.0								
17D	4.60	4.70										
18D	5.00	5.45	2.00	S 13								
19L	5.00	6.00		Vo 0.0								
20D	5.60	5.70										
21D	6.00	6.45	2.00	S 19								
				Vo 0.0						6.45	25.94	
									Borehole Completed at 6.45m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.40	Inspection Pit	Hydraulic breaker
0.40	6.45	Windowless Sampler	Terrier 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
113	2.00

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.15	Concrete
0.15	0.50	Bentonite
0.50	3.00	Gravel
3.00	6.45	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE
3.00	Standpipe

BARREL DIAMETER

DIAM (mm)	BASE (m)
98	2.00
84	4.00
74	6.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
30-07-2020 10:00	0.00	Nil	Dry
30-07-2020 12:20	6.45	2.00	Dry

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

BOREHOLE LOG

WS06

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON — Sheet 1 of 1

Start Date 29 July 2020 — Easting 521081 — Scale 1:50

End Date 29 July 2020 — Northing 182347 — Ground Level 32.92mOD — Depth 6.45 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
1B	0.20	0.40							Grass over firm brown slightly gravelly clayey SILT with frequent rootlets. Gravel is subangular and subrounded fine flint. (MADE GROUND)	0.30	32.62	
1ES	0.20									0.40	32.52	
2D	0.20	0.40		Vo 0.0					Light brown sandy very silty angular and subangular fine to coarse flint, brick and concrete GRAVEL with rare fragments of foil (up to 75mm). (MADE GROUND)	0.70	32.22	
2ES	0.20	0.40							0.35 - 0.40m: Layer of brick cobbles (up to 160mm). Metal fragment (up to 110mm).	0.90	32.02	
3B	0.40	0.60							Soft brown CLAY with rare rootlets.			
4D	0.40	0.60							Firm fissured thinly laminated brown locally bluish grey CLAY with rare selenite crystals (up to 2mm). Rare pockets (up to 10mm) of orange medium sand.			
3ES	0.60	0.80		Vo 0.0								
5B	1.10	1.20										
6D	1.10	1.20	1.20	S 6								
7D	1.20	1.65										
8L	1.20	2.00		Vo 0.0								
4ES	1.50											
9D	1.90	2.00										
10D	2.00	2.45	2.00	S 11					Firm brown slightly sandy CLAY with frequent pockets (up to 20mm) of orangish brown silt.			
11L	2.00	3.00		Vo 0.0								
12D	2.50	2.65		Vo 0.0								
13D	3.00	3.45	2.00	S 8						3.10	29.82	
14L	3.00	4.00		Vo 0.0					Firm becoming stiff fissured thinly laminated brown locally bluish grey CLAY with rare selenite crystals (up to 2mm). Frequent pockets (up to 10mm) of orange medium sand.			
15D	3.50	3.60		Vo 0.0								
16D	4.00	4.45	2.00	S 13								
17L	4.00	5.00		Vo 0.0								
18D	4.60	4.75										
19D	5.00	5.45	2.00	S 17								
20L	5.00	6.00		Vo 0.0								
27D	5.60	5.70										
28D	6.00	6.45	2.00	S 22								
				Vo 0.0						6.45	26.47	
									Borehole Completed at 6.45m			

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	1.20	Inspection Pit	Hand tools
1.20	6.00	Windowless Sampler	Terrier 2000 rig

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)
128	2.00

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.15	Concrete
0.15	0.25	Bentonite
0.25	3.00	Gravel
3.00	6.45	Bentonite

INSTRUMENTATION

DEPTH (m)	TYPE
3.00	Standpipe

BARREL DIAMETER

DIAM (mm)	BASE (m)
113	2.00
98	4.00
84	5.00
74	6.00

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
29-07-2020 09:20	0.00	Nil	Dry
29-07-2020 11:00	6.45	2.00	Dry

REMARKS

Fitted with flush cover on completion.

AGS

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

BOREHOLE LOG

WS07

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON Sheet 1 of 1

Start Date 30 July 2020 Easting 521122 Scale 1:50

End Date 30 July 2020 Northing 182309 Ground Level 35.61mOD Depth 0.90 m

sample no & type	sample depth (m) from	to	casing depth (m)	test type & value	samp. /core range	If	water record depth (m)	instru -ment	description	depth (m)	reduced level (m)	legend
1D	0.30	0.50							Grass over very stiff brown slightly gravelly CLAY with a low subangular brick cobble content. Gravel is subangular and subrounded fine to coarse flint, brick and limestone. Frequent roots (up to 5mm diam) and rootlets. (MADE GROUND)			
1ES	0.30	0.50										
2B	0.30	0.50		Vo 0.0						0.60	35.01	
3D	0.30	0.50							Very stiff brown slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse flint, crystalline and concrete. (MADE GROUND)			
4D	0.30	0.50										
5D	0.30	0.50		Vo 0.0						0.90	34.71	
6D	0.30	0.50							Borehole Completed at 0.90m			
7B	0.50	0.70										
8D	0.50	0.70										

HOLE CONSTRUCTION

TOP (m)	BASE (m)	TYPE	PLANT USED
0.00	0.90	Inspection Pit	Hand tools

WATER STRIKE Groundwater not encountered

DEPTH (m)	CASING (m)	ROSE TO (m)	AFTER (min)	REMARKS

CASING DEPTH

DIAM (mm)	BASE (m)

BACKFILL

TOP (m)	BASE (m)	MATERIAL
0.00	0.15	Concrete
0.15	0.30	Bentonite
0.30	0.90	Gravel

INSTRUMENTATION

DEPTH (m)	TYPE
0.90	Standpipe

AGS

BARREL DIAMETER

DIAM (mm)	BASE (m)

HOLE PROGRESS

DATE TIME	DEPTH (m)	CASING (m)	WATER (m)
30-07-2020 13:00	0.00	Nil	Dry
30-07-2020 13:50	0.90	Nil	Dry

REMARKS

Position terminated due to hard ground at 0.90m.

CONTRACT **35978**

CHECKED **EC**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole no.	borehole depth (m)	s.w.p (mm)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows		seating drive pen (mm)		test drive blows				test drive pen (mm)				test type	N	energy ratio (%)
CP01	2.50		2.95	2.50	Dry	1	1	75	75	2	2	2	2	75	75	75	75	S	8	73
CP01	4.50		4.95	2.50	Dry	4	3	75	75	5	5	5	5	75	75	75	75	S	20	73
CP01	6.50		6.95	2.50	Dry	3	4	75	75	4	5	5	6	75	75	75	75	S	20	73
CP01	7.00		7.45	2.50	Dry	3	2	75	75	4	5	6	6	75	75	75	75	S	21	73
CP01	9.50		9.95	2.50	Dry	3	4	75	75	5	6	6	7	75	75	75	75	S	24	73
CP01	12.50		12.95	2.50	Dry	3	4	75	75	5	6	8	8	75	75	75	75	S	27	73
CP01	15.50		15.95	2.50	Dry	3	4	75	75	6	7	8	10	75	75	75	75	S	31	73
CP01	18.50		18.95	2.50	Dry	6	7	75	75	8	9	10	12	75	75	75	75	S	39	73
CP02	2.50		2.95	1.50	Dry	1	1	75	75	1	2	2	3	75	75	75	75	S	8	73
CP02	4.50		4.95	2.70	Dry	2	4	75	75	4	4	4	5	75	75	75	75	S	17	73
CP02	6.50		6.95	2.70	Dry	4	3	75	75	4	5	5	6	75	75	75	75	S	20	73
CP02	9.50		9.95	2.70	Dry	2	4	75	75	4	5	6	6	75	75	75	75	S	21	73
CP02	12.50		12.95	2.70	Dry	4	5	75	75	5	6	7	8	75	75	75	75	S	26	73
CP02	15.50		15.95	2.70	Dry	4	5	75	75	5	7	7	8	75	75	75	75	S	27	73
CP02	18.50		18.95	2.70	Dry	4	6	75	75	7	8	9	11	75	75	75	75	S	35	73
CP03	2.50		2.95	2.50	Dry	1	2	75	75	2	2	3	3	75	75	75	75	S	10	73
CP03	4.50		4.95	2.50	Dry	2	3	75	75	5	4	4	5	75	75	75	75	S	18	73
CP03	6.50		6.95	2.50	Dry	2	3	75	75	4	4	5	6	75	75	75	75	S	19	73
CP03	7.00		7.45	2.50	Dry	2	2	75	75	3	3	4	5	75	75	75	75	S	15	73
CP03	9.50		9.95	2.50	Dry	4	4	75	75	5	6	7	8	75	75	75	75	S	26	73
CP03	12.50		12.95	2.50	Dry	4	5	75	75	6	8	8	9	75	75	75	75	S	31	73
CP03	15.50		15.95	2.50	Dry	4	4	75	75	6	7	9	10	75	75	75	75	S	32	73
CP03	18.50		18.95	2.50	Dry	4	6	75	75	7	8	10	11	75	75	75	75	S	36	73
CP04	1.50		1.95	1.50	Dry	3	1	75	75	2	2	3	2	75	75	75	75	S	9	73

notes:
1. Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
2. s.w.p = self weight penetration.
3. N values have not been subjected to any correction.
4. Test carried out using split spoon S, solid cone C.
5. Where full test drive not completed, linearly extrapolated N value reported.
6. ** Denotes no effective penetration.

CONTRACT	CHECKED
35978	**EC**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole no.	borehole depth (m)	s.w.p (mm)	bottom depth (m)	casing depth (m)	water level (m)	seating drive				test drive								test type	N	energy ratio (%)
						blows		pen (mm)		blows				pen (mm)						
CP04	3.50		3.95	2.50	Dry	2	3	75	75	3	4	4	5	75	75	75	75	S	16	73
CP04	5.50		5.95	2.50	Dry	2	4	75	75	4	5	5	6	75	75	75	75	S	20	73
CP04	8.00		8.45	2.50	Dry	4	5	75	75	6	6	7	7	75	75	75	75	S	26	73
CP04	11.00		11.45	2.50	Dry	4	4	75	75	6	6	8	9	75	75	75	75	S	29	73
CP04	14.00		14.45	2.50	Dry	4	4	75	75	6	7	9	10	75	75	75	75	S	32	73
CP04	17.00		17.45	2.50	Dry	4	7	75	75	7	8	10	10	75	75	75	75	S	35	73
CP04	20.00		20.45	2.50	Dry	5	6	75	75	8	9	10	12	75	75	75	75	S	39	73
CP05	2.50		2.95	2.50	Dry	1	1	75	75	2	2	2	3	75	75	75	75	S	9	73
CP05	4.50		4.95	2.50	Dry	4	4	75	75	4	5	5	5	75	75	75	75	S	19	73
CP05	6.50		6.95	2.50	Dry	3	3	75	75	4	5	5	5	75	75	75	75	S	19	73
CP05	9.50		9.95	2.50	Dry	4	4	75	75	5	6	6	7	75	75	75	75	S	24	73
CP05	12.50		12.95	2.50	Dry	3	5	75	75	5	6	7	8	75	75	75	75	S	26	73
CP05	15.50		15.95	2.50	Dry	5	5	75	75	6	7	8	9	75	75	75	75	S	30	73
CP05	18.50		18.95	2.50	Dry	4	5	75	75	7	7	8	10	75	75	75	75	S	32	73
CP05	21.50		21.95	2.50	Dry	5	6	75	75	7	9	11	12	75	75	75	75	S	39	73
CP05	24.50		24.95	2.50	Dry	6	7	75	75	8	10	11	13	75	75	75	75	S	42	73
CP06	2.50		2.95	1.50	Dry	2	1	75	75	2	2	2	3	75	75	75	75	S	9	73
CP06	4.50		4.95	2.50	Dry	3	3	75	75	4	4	5	5	75	75	75	75	S	18	73
CP06	6.50		6.95	2.50	Dry	3	4	75	75	4	5	5	6	75	75	75	75	S	20	73
CP06	9.50		9.95	2.50	Dry	3	3	75	75	4	5	6	7	75	75	75	75	S	22	73
CP06	12.50		12.95	2.50	Dry	3	4	75	75	5	6	7	7	75	75	75	75	S	25	73
CP06	15.50		15.95	2.50	Dry	3	5	75	75	6	7	8	9	75	75	75	75	S	30	73
CP06	18.50		18.95	2.50	Dry	5	5	75	75	6	7	7	9	75	75	75	75	S	29	73
CP06	21.50		21.95	2.50	Dry	5	5	75	75	7	8	8	9	75	75	75	75	S	32	73

notes:
1. Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
2. s.w.p = self weight penetration.
3. N values have not been subjected to any correction.
4. Test carried out using split spoon S, solid cone C.
5. Where full test drive not completed, linearly extrapolated N value reported.
6. ** Denotes no effective penetration.

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Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole no.	borehole depth (m)	s.w.p (mm)	bottom depth (m)	casing depth (m)	water level (m)	seating drive				test drive								test type	N	energy ratio (%)
						blows		pen (mm)		blows				pen (mm)						
CP06	24.50		24.95	2.50	Dry	5	5	75	75	7	8	9	10	75	75	75	75	S	34	73
CP07	2.50		2.95	1.50	Dry	1	2	75	75	3	3	3	3	75	75	75	75	S	12	73
CP07	4.50		4.95	2.50	Dry	2	3	75	75	3	4	4	5	75	75	75	75	S	16	73
CP07	6.50		6.95	2.50	Dry	3	4	75	75	4	5	5	6	75	75	75	75	S	20	73
CP07	9.50		9.95	2.50	Dry	2	3	75	75	4	4	5	6	75	75	75	75	S	19	73
CP07	12.50		12.95	2.50	Dry	2	4	75	75	5	5	6	7	75	75	75	75	S	23	73
CP07	15.50		15.95	2.50	Dry	5	6	75	75	6	6	7	10	75	75	75	75	S	29	73
CP07	18.50		18.95	2.50	Dry	3	4	75	75	5	6	7	7	75	75	75	75	S	25	73
CP07	21.50		21.95	2.50	Dry	4	7	75	75	7	7	8	10	75	75	75	75	S	32	73
CP07	24.50		24.95	2.50	Dry	4	7	75	75	6	7	7	9	75	75	75	75	S	29	73
WS01	1.00		1.45	1.00	Dry	0	1	75	75	2	1	1	2	75	75	75	75	S	6	59
WS01	2.00		2.45	2.00	Dry	1	1	75	75	2	2	3	3	75	75	75	75	S	10	59
WS01	3.00		3.45	2.00	Dry	2	2	75	75	3	3	4	5	75	75	75	75	S	15	59
WS01	4.00		4.45	2.00	Dry	2	2	75	75	3	3	4	4	75	75	75	75	S	14	59
WS02	1.00		1.45	1.00	Dry	0	1	75	75	1	1	1	1	75	75	75	75	S	4	59
WS02	2.00		2.45	2.00	Dry	0	1	75	75	1	1	2	2	75	75	75	75	S	6	59
WS02	3.00		3.45	2.00	Dry	0	2	75	75	2	3	3	5	75	75	75	75	S	13	59
WS02	4.00		4.45	2.00	Dry	2	2	75	75	3	3	4	5	75	75	75	75	S	15	59
WS03	2.00		2.45	2.00	Dry	0	1	75	75	2	2	2	3	75	75	75	75	S	9	59
WS03	3.00		3.45	2.00	Dry	1	2	75	75	2	3	3	5	75	75	75	75	S	13	59
WS03	4.00		4.45	2.00	Dry	1	2	75	75	3	3	3	3	75	75	75	75	S	12	59
WS03	5.00		5.45	2.00	Dry	2	2	75	75	4	5	5	4	75	75	75	75	S	18	59
WS03	6.00		6.45	2.00	Dry	2	2	75	75	4	5	5	7	75	75	75	75	S	21	59
WS05	1.00		1.45	1.00	Dry	0	1	75	75	1	1	1	1	75	75	75	75	S	4	59

notes:
1. Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
2. s.w.p = self weight penetration.
3. N values have not been subjected to any correction.
4. Test carried out using split spoon S, solid cone C.
5. Where full test drive not completed, linearly extrapolated N value reported.
6. ** Denotes no effective penetration.

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Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole no.	borehole depth (m)	s.w.p (mm)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows		seating drive pen (mm)		test drive blows				test drive pen (mm)				test type	N	energy ratio (%)
WS05	2.00		2.45	2.00	Dry	0	1	75	75	1	2	1	2	75	75	75	75	S	6	59
WS05	3.00		3.45	2.00	Dry	1	1	75	75	2	3	2	4	75	75	75	75	S	11	59
WS05	4.00		4.45	2.00	Dry	2	2	75	75	3	3	4	4	75	75	75	75	S	14	59
WS05	5.00		5.45	2.00	Dry	1	2	75	75	2	3	4	4	75	75	75	75	S	13	59
WS05	6.00		6.45	2.00	Dry	2	8	75	75	6	4	5	4	75	75	75	75	S	19	59
WS06	1.20		1.65	1.20	Dry	0	1	75	75	1	2	2	1	75	75	75	75	S	6	59
WS06	2.00		2.45	2.00	Dry	0	1	75	75	2	2	2	5	75	75	75	75	S	11	59
WS06	3.00		3.45	2.00	Dry	1	1	75	75	1	2	2	3	75	75	75	75	S	8	59
WS06	4.00		4.45	2.00	Dry	1	2	75	75	2	3	4	4	75	75	75	75	S	13	59
WS06	5.00		5.45	2.00	Dry	2	2	75	75	3	3	5	6	75	75	75	75	S	17	59
WS06	6.00		6.45	2.00	Dry	2	3	75	75	4	5	6	7	75	75	75	75	S	22	59

notes:
1. Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
2. s.w.p = self weight penetration.
3. N values have not been subjected to any correction.
4. Test carried out using split spoon S, solid cone C.
5. Where full test drive not completed, linearly extrapolated N value reported.
6. ** Denotes no effective penetration.

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Geotechnical Engineering Limited

IN SITU THERMAL RESISTIVITY

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

Borehole/ Trial pit no.	Test Depth (m)	Date	Method of needle insertion	Heating Time (seconds)	Temp (°C)	Moisture Content * (%)	Thermal Conductivity (W/mK)	Thermal Resistivity (mK/W)	Description
WS01 (E)	0.60	29/07/2020	Pushed	30	18.72	32.7	1.285	0.778	Soft brown CLAY
WS01 (N)	0.60	29/07/2020	Pushed	30	18.65	32.7	1.321	0.757	Soft brown CLAY
WS01 (S)	0.60	29/07/2020	Pushed	30	19.45	32.7	1.258	0.795	Soft brown CLAY
WS01 (W)	0.60	29/07/2020	Pushed	30	19.55	32.7	1.362	0.734	Soft brown CLAY
WS03 (E)	0.65	28/07/2020	Pushed	30	20.35	29.7	1.246	0.803	Soft grey slightly gravelly CLAY
WS03 (N)	0.65	28/07/2020	Pushed	30	20.26	29.7	1.283	0.779	Soft grey slightly gravelly CLAY
WS03 (S)	0.65	28/07/2020	Pushed	30	19.95	29.7	1.351	0.740	Soft grey slightly gravelly CLAY
WS03 (W)	0.65	28/07/2020	Pushed	30	20.47	29.7	1.391	0.719	Soft grey slightly gravelly CLAY
WS06 (E)	0.60	29/07/2020	Pushed	30	18.57	20.5	1.445	0.692	Firm brown slightly gravelly CLAY
WS06 (N)	0.60	29/07/2020	Pushed	30	18.41	20.5	1.410	0.709	Firm brown slightly gravelly CLAY
WS06 (S)	0.60	29/07/2020	Pushed	30	18.89	20.5	1.334	0.750	Firm brown slightly gravelly CLAY
WS06 (W)	0.60	29/07/2020	Pushed	30	18.66	20.5	0.916	1.092	Firm brown slightly gravelly CLAY

REMARKS

Equipment: Decagon Devices KD2 Pro Thermal Properties Analyser. Sensor - TR-1, power mode HPM.

Test carried out in general accordance with ASTM D5334-14:2014 laboratory method.

* - moisture content determined from samples taken and tested to BS EN ISO 17892-1:2014

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APPENDIX B

SUBCONTRACTOR REPORTS

GEOPHYSICAL SURVEY REPORT

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Chandos Park, Park Royal, London

Client
Geotechnical Engineering Ltd

Survey Report
SOR17769

Date
September 2020

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GEOPHYSICAL SURVEY REPORT

Project name:
Chandos Park, Park Royal, London

SUMO Job reference:
SOR 17497

Client:
Geotechnical Engineering Ltd

Survey date:
11th & 12th August 2020

Report date:
15th September 2020

Field operator:
Marek R Wajzer BSc PhD FGS

Report written by:
Marek R Wajzer BSc PhD FGS

CAD illustrations by:
Marek R Wajzer BSc PhD FGS
Magdalena Udyrysz-Kraweć MSc

Project Manager:
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Report approved by:
Simon Haddrell BEng AMBCS PCIfA

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LIST OF FIGURES

1 EXECUTIVE SUMMARY

A programme of soil resistivity testing was carried out in the Chandos Park Industrial Estate, Park Royal, London for the construction of a new data centre.

Three expanding Wenner arrays (SR1 – SR3) were completed for the testing. Two arrays were located in areas of tarmac hardstanding and the third on a grass strip alongside a building on the south-west margin of the site. The test locations are shown Figure 2 and the soil resistivity data presented in Tables 1 - 3. The results broadly correlate with a series of window samples drilled on the site.

2 INTRODUCTION

2.1 Background

SUMO Geophysics were commissioned to undertake soil resistivity testing in Chandos Park Industrial Estate, Park Royal, London for a new data centre on the site. The soil resistivity data is required to produce a soil resistivity profile for assisting earthing design.

2.2 Site Details

Location	The site is located inside an industrial estate on Chandos Road, near the intersection of the A4000 Victoria Road with the A40 Western Avenue in the Park Royal district of London (Fig.1).
NGR / Postcode	TQ21108238 / NW10 6NF
Geology (BGS 2020)	Bedrock: Clay, silt and sand from the Palaeogene London Clay Superficial: None recorded
Soils (CU 2020)	Soilscape 18: Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
Survey Method	Soil resistivity testing

2.3 Aims and Objectives

The objective of the testing was to measure the soil resistivity at three locations specified by the Client for producing a soil resistivity profile.

3 SOIL RESISTIVITY METHOD

Soil resistivity is a geophysical method that measures variations in subsurface electrical properties, by applying small electrical currents across arrays of electrodes inserted into the ground.

Traditional resistivity surveys are carried out using four equally spaced electrodes, set out in a standard configuration Wenner Array as outlined in BS EN 50522. Readings are obtained by passing a low frequency electrical current across the two outer electrodes, with the potential difference measured across the inner two electrodes (Plate 1). The resistivity system automatically calculates the ground resistance by dividing the measured voltage by the current.

The Wenner model assumes measurements are made at a point on the surface, but this relationship can break down if the electrode is pushed too far into the ground. In optimum conditions the depth of the electrode should be less than 5% of the electrode spacing.

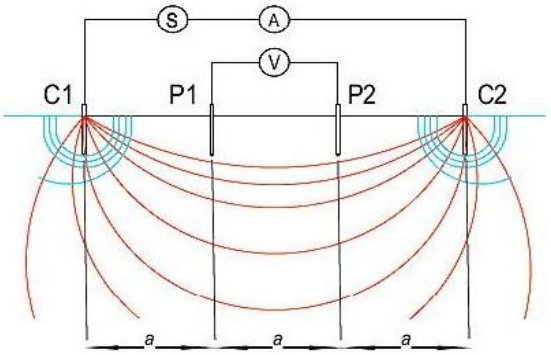


Plate 1 - Standard soil resistivity test with four-electrode Wenner array showing a schematic illustration of current flow lines

The resultant resistance readings are converted into apparent resistivity values (P_a) that represent the average ground resistivity between the electrodes. The geometric correction factor for converting the resistance readings into resistivity values depends on the configuration of electrodes used for the test measurement. The apparent resistivity for a Wenner configuration is given by the equation:

$$P_a = 2\Pi aR$$

P_a	=	Apparent resistivity in Ohm-metres
a	=	Electrode spacing in metres
R	=	Resistance in Ohms

Models of vertical variations in ground resistivity are obtained by using an expanding electrode array centred on the same reference point, known as an electrical sounding. The depth penetration increases directly in proportion to the spacing between the electrodes, provided the ground is reasonably homogenous. The apparent resistivity is measured at various electrode spacings, with the array centred on the same measurement point.

4 SITE TESTING PROCEDURE

The weather was hot, dry and sunny at the time of the testing, with maximum temperatures of 35^{o}C and 34^{o}C respectively on the 11th and 12th August 2020.

A Megger DET 2/2 Digital Earth Tester was used for the testing operations with the calibration certificate is attached in Appendix A. The system delivers a low frequency AC current to the electrodes. An operating frequency of 128 Hz was set to reduce interference from 50 Hz main electricity on a variable current setting. The testing was carried out in accordance with the specifications outlined in BS EN 50522, involving four equally spaced electrodes set out in a straight line expanding Wenner Array, centred on the test position.

The site was located inside an industrial estate. Nominal test locations were specified in advance of the testing by Ramboll UK, together with the array electrode spacings of 0.3, 0.5, 0.7 1.0, 1.5, 2, 3, 4, 5, 7, 10 and 15 metres.

Two of the three specified test locations (SR1 and SR2) were sited in areas of tarmac hardstanding. In accordance with the Client's instructions they could not be moved to more suitable test locations around the vicinity of the site. The third test location (SR3) was on a grass strip adjoining a building along the south-west margin of the site. The positions of all the test locations were agreed on site with the Client and an engineer from Ramboll. The positions were optimised with the assistance of utility detection personnel from Geotechnical Engineering, to try to avoid any nearby longitudinal services that could potentially adversely affect the data.

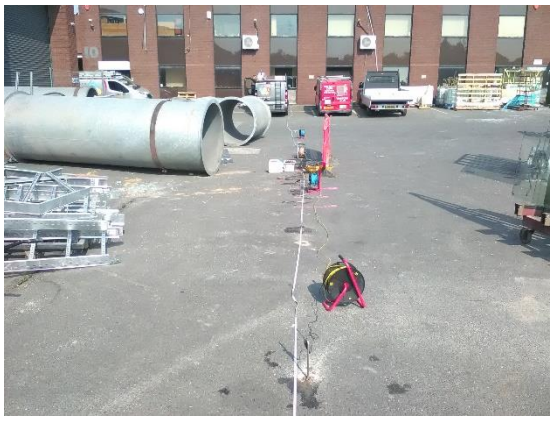


Plate 2 The SR2 Soil Resistivity Array

At the two hardstanding test locations (SR1 and SR2), narrow diameter 200 mm holes were drilled through the tarmac at each electrode position by drillers working for Geotechnical Engineering. The holes were drilled to an approximate depth of 0.15 metres then filled with bentonite clay, which was compacted and watered with brine to reduce contact resistance. The electrodes were then inserted directly into the bentonite. Due to time and cost considerations, the number of electrode holes to be drilled through hardstanding was specified to around 24 holes per test location.

Array SR1 had a NE/SW orientation and SR2 array was aligned NW/SE. Both arrays achieved the maximum specified electrode spacing of 15 metres. Due to the restricted number of drilled electrode holes, readings could only be taken at 8 electrode spacings for the SR1 and SR2 arrays. The cover page shows data acquisition in progress at location SR1 and Plate 2 shows the SR2 array.

Plate 3 Soil Resistivity Array at Location SR3

Where there was evidence of fluctuating, noisy data particularly on SR1 and SR2, as often the case in inner city urban environments where services are present, then time was allowed for the instrument to settle before taking repeated readings. Two representative resistance readings (R1 and R2) were recorded at each electrode spacing. All of the repeat readings from each location differed by far less than 3% of the mean value, well within the accepted tolerance range.

Array SR3 was located on an overgrown grass strip shown in Plate 3 and had a NW/SE orientation. The absence of hardstanding allowed readings to be taken at every specified electrode spacing.

5 SUMMARY OF RESULTS

5.1 Introduction

The results of the soil resistivity testing are presented in Tables 1 and 2, listing the array orientation, nominal testing depth and electrical resistance in ohms for each electrode spacing. The two resistance readings measured at each electrode spacing (R1 & R2) generally display good repeatability. The tables also present the average resistance and apparent resistivity (in ohm-metres) for each position.

It should be noted that the testing results are related to existing ground conditions at the time of site work. The results may not be valid if future remediation of the ground is carried out on the site. Ground resistivity can vary seasonally and may also be modified by the introduction of new fill material during any future construction operations.

5.3 Data Summary

The results from SR1 are presented in Table 1. After an initial moderately high reading of 166 ohm-metres at 0.5 metre electrode spacing, the resistivity rapidly falls to 38 ohm-metres at 1.0 metres spacing. A trend of progressively decreasing resistivity with depth continues to 7 ohm-metres at 5 metres electrode separation. From this point the resistivity very gradually increases at the two wider spacings up to 10 ohm-metres at the maximum electrode spacing of 15 metres.

Table 1 also presents the results for SR2, where a broadly similar pattern of resistivity to SR1 is evident, but falling within a slightly narrower range. An initial reading of 113 ohm-metres was taken at the narrowest 0.5 metres electrode spacing. A trend of progressively decreasing resistivity with depth continues to 3 metres electrode separation, where a reading of 7 ohm-metres was obtained. The resistivity increases very gradually for the three widest spacings to 10 ohm-metres at the maximum electrode spacing of 10 ohm-metres.

The results from SR3 are presented in Table 2. The resistivity falls within a wider range than SR1 and SR2 between 279 – 4 ohm-metres. An overall pattern of decreasing resistivity with depth is evident throughout the data set. The highest resistivity value of 279 ohm-metres obtained at the narrowest electrode spacing of 0.3 metre (which was not possible to take at SR1 and SR2) and the smallest resistivity value of 4 ohm-metres was taken at the widest electrode spacing of 15 metres.

The results from SR3 taken on the grass strip and SR1/SR2 on tarmac areas are broadly compatible. The main differences in resistivity were obtained for the intermediate electrode spacings of 1 – 4 metres where higher resistivity values were evident at SR3. Similarly consistent resistivity values were obtained from all three locations readings at electrode spacings of wider than 5 metres.

6 BOREHOLE DATA CORRELATION

A total of seven window samples were drilled by Geotechical Engineering on the site, although two of these were terminated at shallow depths of less than one metre (WS04 and WS07). In terms of proximity, WS05 is closest to SR1, WS03 is nearest to SR2 and WS07 to SR3.

The window samples show broadly consistent ground conditions of sandy made ground (0.3 – 0.7 metres) underlain by clay to depth. The much higher resistivity values obtained at the narrowest electrode spacings at all three test locations correlate to the sandy made ground, which has a thickness of 0.5 metres in WS05 for SR1 (166 Ohm-metres) and 0.45 metres in WS03 for SR2 (113 Ohm-metres). The higher resistivity values obtained for the first four readings at SR3 from 279 down to 71 Ohm-metres are also consistent with the thicker layer of made ground (0.9 metres) recorded at WS07.

The low resistivity values measured for electrode spacings wider than one metre at all three test locations are consistent with the presence of clay below a maximum of 0.7 metres bgl.

7 CONCLUSIONS

Three expanding Wenner arrays were measured on the Chandos Park site (SR1 – SR3). Two were located in areas of tarmac hardstanding and the third on a grass strip adjoining a building along the south-west site margin. The results broadly correlate with window sample data from the site. The greater number of readings taken at SR3, where no drilling was required for the electrode holes suggests the data from this array may be more representative of site conditions.

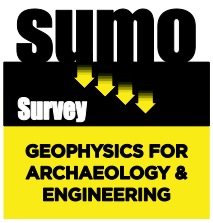
8 DATA TABLES

Table 1 Chandos Park, Park Royal, London - Soil Resistivity Testing Results on 11/08/2020

Location	Orientation	Electrode Separation 'a' (metres)	Nominal Test Depth (metres)	R1 (ohms)	R2 (ohms)	Rav (ohms)	Apparent Resistivity (ohm-metres)	Comment
SR1	NE/SW	0.5	0.5	53.0	53.2	53.10	166.82	All electrode holes drilled through tarmac hardstanding
SR1	NE/SW	1.0	1.0	6.19	6.21	6.20	38.96	
SR1	NE/SW	1.5	1.5	1.676	1.680	1.678	15.81	
SR1	NE/SW	2.0	2.0	1.016	1.014	1.015	12.75	
SR1	NE/SW	3.0	3.0	0.514	0.514	0.514	9.69	
SR1	NE/SW	5.0	5.0	0.228	0.230	0.229	7.19	
SR1	NE/SW	10.0	10.0	0.130	0.130	0.130	8.17	
SR1	NE/SW	15.0	15.0	0.108	0.111	0.110	10.32	
SR2	NW/SE	0.5	0.5	36.30	36.20	36.25	113.88	All electrode holes drilled through tarmac hardstanding
SR2	NW/SE	1.0	1.0	3.92	3.91	3.92	24.60	
SR2	NW/SE	1.5	1.5	1.132	1.136	1.134	10.69	
SR2	NW/SE	2.0	2.0	0.594	0.592	0.593	7.45	
SR2	NW/SE	3.0	3.0	0.373	0.374	0.374	7.04	
SR2	NW/SE	5.0	5.0	0.256	0.255	0.256	8.03	
SR2	NW/SE	10.0	10.0	0.150	0.152	0.151	9.49	
SR2	NW/SE	15.0	15.0	0.114	0.116	0.115	10.84	

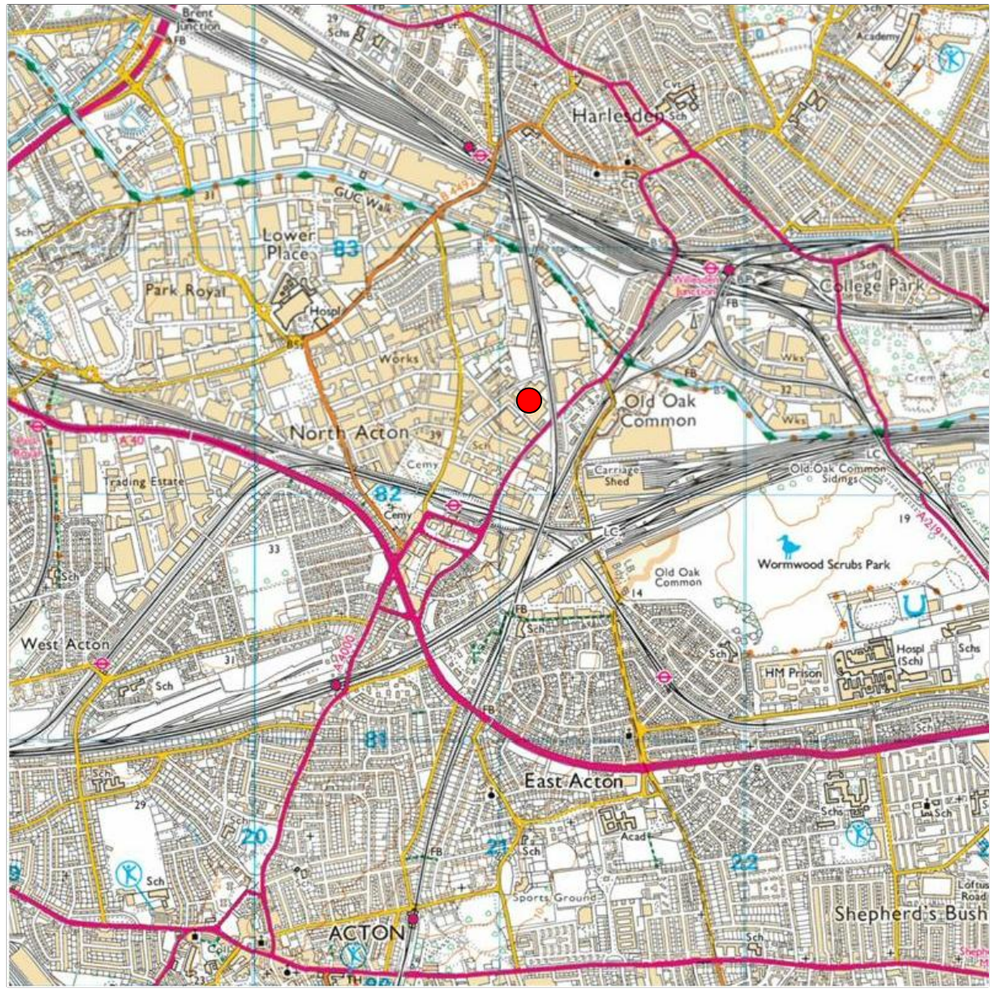
Table 2 - Chandos Park, Park Royal, London - Soil Resistivity Testing Results on 12/08/2020

Location	Orientation	Electrode Separation 'a' (metres)	Nominal Test Depth (metres)	R1 (ohms)	R2 (ohms)	Rav (ohms)	Apparent Resistivity (ohm-metres)	Comment
SR3	NW/SE	0.3	0.3	148.0	148.2	148.1	279.16	Array along narrow grass strip next to building
SR3	NW/SE	0.5	0.5	36.2	36.2	36.2	113.73	
SR3	NW/SE	0.7	0.7	19.70	19.72	19.71	86.69	
SR3	NW/SE	1.0	1.0	11.43	11.41	11.42	71.75	
SR3	NW/SE	1.5	1.5	5.20	5.18	5.19	48.91	
SR3	NW/SE	2.0	2.0	2.30	2.29	2.30	28.84	
SR3	NW/SE	3.0	3.0	1.371	1.372	1.372	25.85	
SR3	NW/SE	4.0	4.0	0.788	0.790	0.789	19.83	
SR3	NW/SE	5.0	5.0	0.364	0.364	0.364	11.44	
SR3	NW/SE	7.0	7.0	0.123	0.121	0.122	5.37	
SR3	NW/SE	10.0	10.0	0.050	0.049	0.050	3.11	
SR3	NW/SE	15.0	15.0	0.045	0.046	0.046	4.29	



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

SUMO Services Ltd, incorporated under the laws of England and Wales,
Company Registration No.4275993.
Registered Office Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL



N

Site Location

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Site Location Diagram

Client:
Geotechnical Engineering Ltd

Project:
17769 - Chandos Park, Park Royal, London

Scale:
0 metres 1000
1:25000 @ A3

Fig No:
01

N

Window Sample Location

Soil Resistivity Test Location

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Soil Resistivity Testing Location Plan

Client: Geotechnical Engineering Ltd

Project: 17769 - Chandos Park, Park Royal, London

Scale: 0 metres 35

1:700 @ A3

Fig No: 02

CERTIFICATE OF CALIBRATION

QC 20/F

BS EN ISO 9001:2015 Cert. No. FS 09953

Certificate Number
H1912801

QUASAR Tronics LTD

Quasartronics Ltd.
Watt House, Dudley Innovation Centre
Kingswinford,
West Midlands
DY6 7YD
Tel: 01384 401132 Fax: 01384 400754
e-mail: mail@quasartronics.com

CUSTOMER : SUMO GEOPHYSICS LTD
VINEYARD HOUSE, UPPER HOOK ROAD
UPTON ON SEVERN
WORCESTERSHIRE
WR8 0SA

Order No. : TBA 230919
Customer Ref. : None
Engineer
Location

Calibration Information

Instrument Type	:	Megger DET2/2 AUTO EARTH TESTER	Serial Number	:	1005M459920
System ID	:	WED680	Job Number	:	D291174-1
Ambient Conditions					
Temperature	:	21°C ± 2°C	Calibration Date	:	24/09/2019
Relative Humidity	:	50% ± 20%	Cal Due Date	:	24/09/2020

Calibrated Under a Quality Management System Assessed By The BSI to BS EN ISO 9001:2015. The equipment used is traceable to National Standards (N.P.L.). ISO10012 : 2003 is used for guidance.
This instrument has been tested to the tolerances specified in the Procedure Number : 1270

CONDITION PRIOR TO CALIBRATION A :- No Adjustment Required

Overall result after calibration : PASS
Calibration status : COMPLETED

THE CALIBRATION STATUS WILL SHOW:
TERMINATED - if the procedure was prematurely terminated;
COMPLETED - if the procedure was completed without abnormal conditions

STANDARDS USED FOR CALIBRATION

Instrument Description	Asset Number	Certificate Number	Cal. Date	Cal. Period
TIME 1040 (Q168)	Q168	U1906620	26/07/2019	52
Resistor Block (Q42)	Q42	H1908088	10/06/2019	52

Authorised Signatory : K Beardsmore K.Beardsmore

CERTIFIED THAT THE WHOLE CALIBRATION DETAILED HEREON HAVE BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE CONDITIONS AND REQUIREMENTS OF THE CONTRACT OR PURCHASE ORDER AND UNLESS OTHERWISE STATED CONFORM IN ALL RESPECTS TO THE SPECIFICATION(S) DRAWING(S) RELEVENT THERETO, AND THE MANUFACTURERS ORIGINAL STANDARDS WHERE AVAILABLE.

CERTIFICATE OF CALIBRATION

BS EN ISO 9001:2015 Cert. No. FS 09953

Calibration Date
24/09/2019

Certificate Number
H1912801

Test Title	Tolerance	Applied Value	Reading	Pass / Fail
EARTH RESISTANCE				
1 Ohm	7mR	1.000R	1.003R	PASS
10 Ohm	70mR	10.00R	10.02R	PASS
100 Ohm	700mR	100.0R	100.1R	PASS
500 Ohm	4.5R	0.500kR	0.500kR	PASS
1.0 KOhm	7R	1.000kR	1.000kR	PASS
5.0 Kohm	45R	5.00kR	5.00kR	PASS
10.0 Kohm	70R	10.00kR	9.98kR	PASS
15.0 Kohm	95R	15.00kR	15.01kR	PASS
19.0 Kohm	115R	19.00kR	18.99kR	PASS

Instrument was allowed to stabilise before calibration.

********** *END OF TEST DATA*

APPENDIX C

LABORATORY TESTING

2718

GEOTECHNICAL ENGINEERING LIMITED

Version No.	1
For the attention of Matthew Hollow / Ed Crimp	Page No. 1 of 23
	Date of Issue 01/10/2020

TEST REPORT

PROJECT/SITE	CHANDOS PARK DATA CENTRE, LONDON	Samples received	18/08/2020
GEL REPORT NUMBER	35978	Schedule received	18/08/2020
Your ref/PO:		Testing commenced	28/08/2020
Test report refers to	All schedules combined	Status	Final

SUMMARY OF RESULTS ATTACHED

TEST METHOD & DESCRIPTION	QUANTITY	ACCREDITED TEST
BS EN ISO 17892-1: 2014:5. Water Content	12	YES
BS1377: Part 2: 1990:4.2-4.4&5.2-5.4, Liquid & Plastic Limits	8	YES
BS EN ISO 17892-4: 2016: 5.2, Particle Size Distribution - Wet Sieve	12	YES
BS EN ISO 17892-4: 2016: 5.4, Particle Size Distribution - Pipette	10	YES
BS1377: Part 4: 1990:7, California Bearing Ratio (CBR)	1	YES
BS1377: Part 7: 1990:8&9, Undrained Triaxial Compression	6	YES
ASTM D5334-14: Thermal Conductivity	5	NO
BRE SD1 Reduced Suite: pH, Sulphate - water and acid soluble, sulphur (Subcontracted)	13	YES

Remarks

This report may not be partially reproduced without written permission from this laboratory.

The results reported relate to samples received in the laboratory

Approved Signatories:

T Best (Deputy Laboratory Manager) E Crimp (Senior Engineer)

J Hanson (Director) N Parry (Director)

Geotechnical Engineering Ltd
Centurion House
Olympus Park, Quedgeley
Gloucester GL2 4NF

www.geoeng.co.uk
geotech@geoeng.co.uk
TEL: 01452 527743
Fax: 01452 729314

Registered number: 00700739
VAT Number: 682 5857 89

Payments: Geotechnical Engineering Limited
Sort code: 16-22-11 **Bank account**: 11125135

Geotechnical Engineering Limited

LIQUID AND PLASTIC LIMITS

BS.1377 : PART 2 : 1990 : 4 and 5

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	natural water content (%)	specimen preparation and test method	fraction >0.425 mm (%)	liquid limit (%)	plastic limit (%)	plasticity index (%)	description and remarks
CP01	8D	2.00	2.00	33.1	BXE	2	80	23	57	Orangish brown mottled grey slightly gravelly slightly sandy CLAY with rare rootlets
CP02	5B	1.00	1.00	31.9	BXE	3	78	26	52	Orangish brown slightly sandy CLAY
CP02	12D	4.00	4.00	28.9	BXE	1	69	23	46	Dark orangish brown mottled blueish grey slightly sandy CLAY
CP03	8D	2.00	2.00	33.8	E					Brown mottled grey slightly sandy CLAY
CP03	34D	15.00	15.00	26.9	BXE	0	65	23	42	Dark greyish brown slightly sandy CLAY
CP04	12D	6.00	6.00	29.6	BXE	0	75	27	48	Brown mottled orange slightly sandy CLAY
CP05	5B	1.00	1.00	33.4	BXE	4	78	25	53	Brown slightly gravelly slightly sandy CLAY
CP06	5B	1.00	1.00	31.4	BXE	1	81	26	55	Brown slightly sandy CLAY
CP07	24D	10.50	10.50	22.8	BXE	0	52	19	33	Dark brown slightly sandy CLAY
WS01	2D	0.70	0.70	32.7	D					Brown slightly sandy slightly gravelly CLAY with rare gypsum
WS03	2D	0.50	0.50	29.7	E					Dark brown mottled dark grey slightly sandy slightly gravelly silty CLAY
WS06	7D	0.40	0.40	20.5	E					Brown slightly sandy gravelly silty CLAY

general remarks

natural water content determined in accordance with BS EN ISO 17892 - 1 : 2014 (unless specified)

NP denotes non plastic

# denotes sample tested is smaller than that which is recommended in accordance with BS1377 or BS EN ISO 17892

specimen preparation		test method	CONTRACT	CHECKED
A - as received	D - oven dried (60°C)	X - cone penetrometer (test 4.3)		
B - washed on 0.425mm sieve	E - oven dried (105°C)	Y - cone penetrometer (test 4.4)	**35978**	**TB**
C - air dried	F - not known	Z - casagrande apparatus (test 4.5)		

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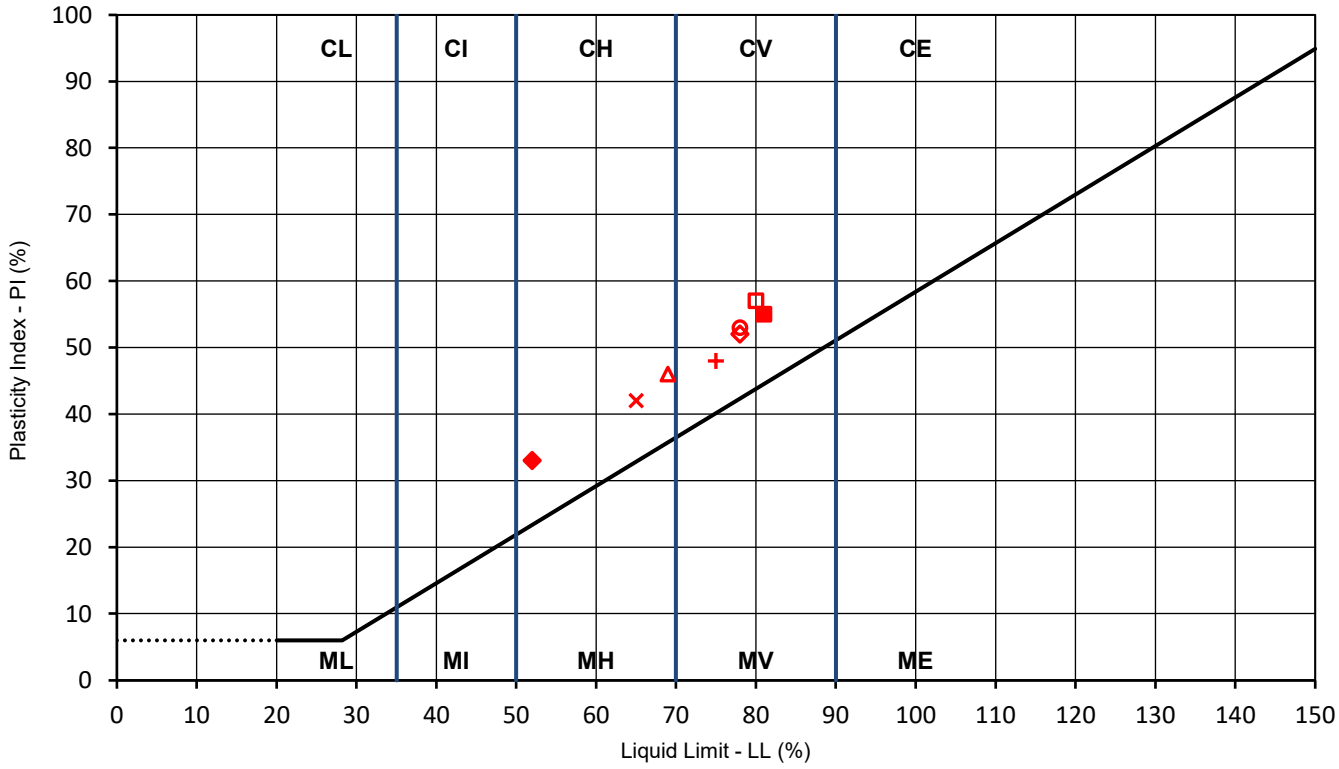
ATTERBERG LINE PLOT

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON



	BH/TP No.	depth (m)	LL	PL	PI	remarks
□	CP01	2.00	80	23	57	
◇	CP02	1.00	78	26	52	
△	CP02	4.00	69	23	46	
×	CP03	15.00	65	23	42	
+	CP04	6.00	75	27	48	
○	CP05	1.00	78	25	53	
■	CP06	1.00	81	26	55	
◆	CP07	10.50	52	19	33	

CONTRACT	CHECKED
35978	**TB**

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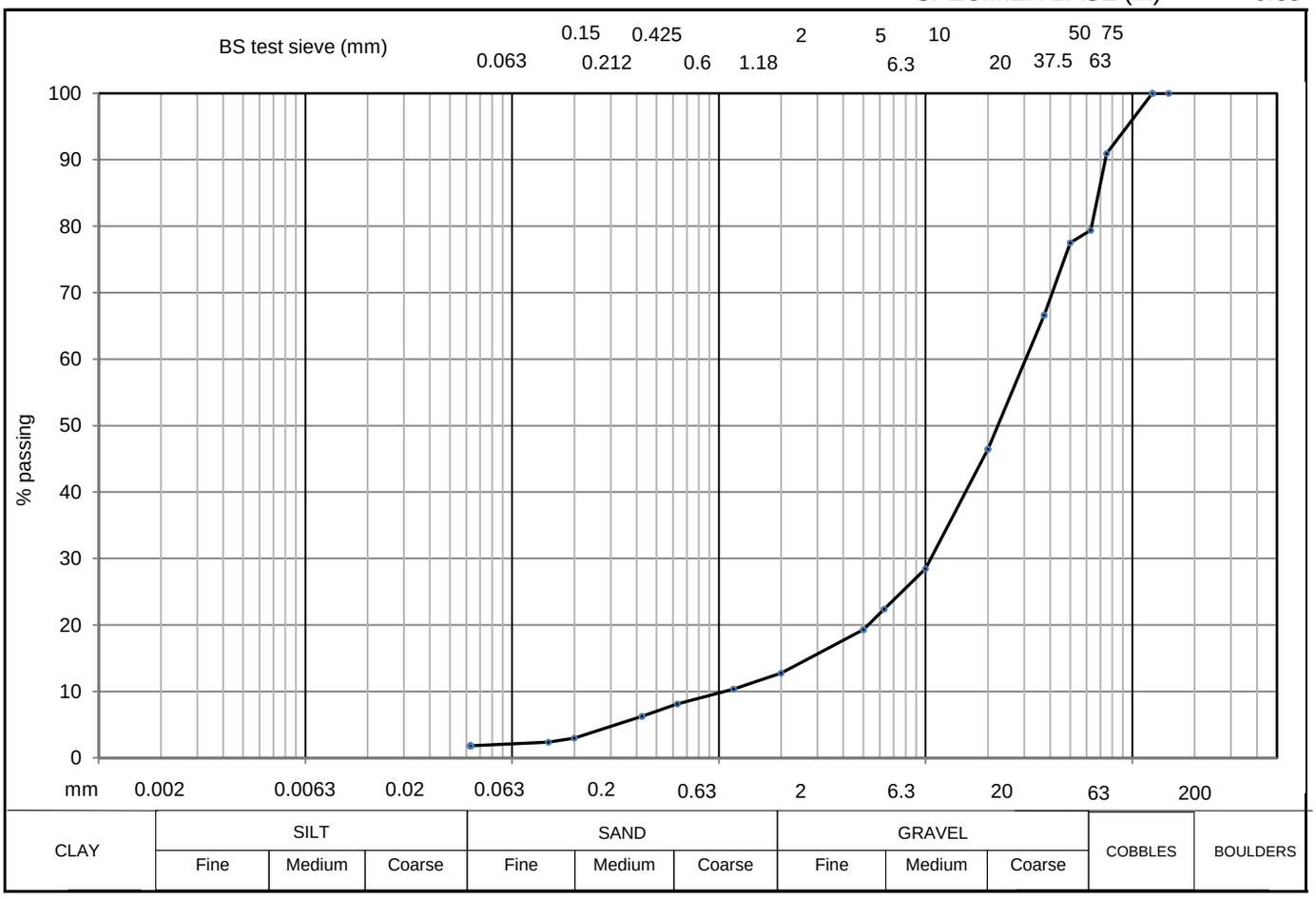
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP01
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	1B
		SAMPLE DEPTH (m)	0.25
DESCRIPTION	Dark brown slightly silty sandy GRAVEL with high cobble content	SPECIMEN TOP (m)	0.25
		SPECIMEN BASE (m)	0.35



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	2
SAND	11
GRAVEL	67
COBBLE & BOULDER	21

test method(s)	5.2

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150	100	5	19	20	
75	91	2	13	6	
63	79	1.18	10	2	
50	78	0.63	8		
37.5	67	0.425	6		
20	46	0.2	3		
10	28	0.15	2		
6.3	22	0.063	2		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
35978	**TB**

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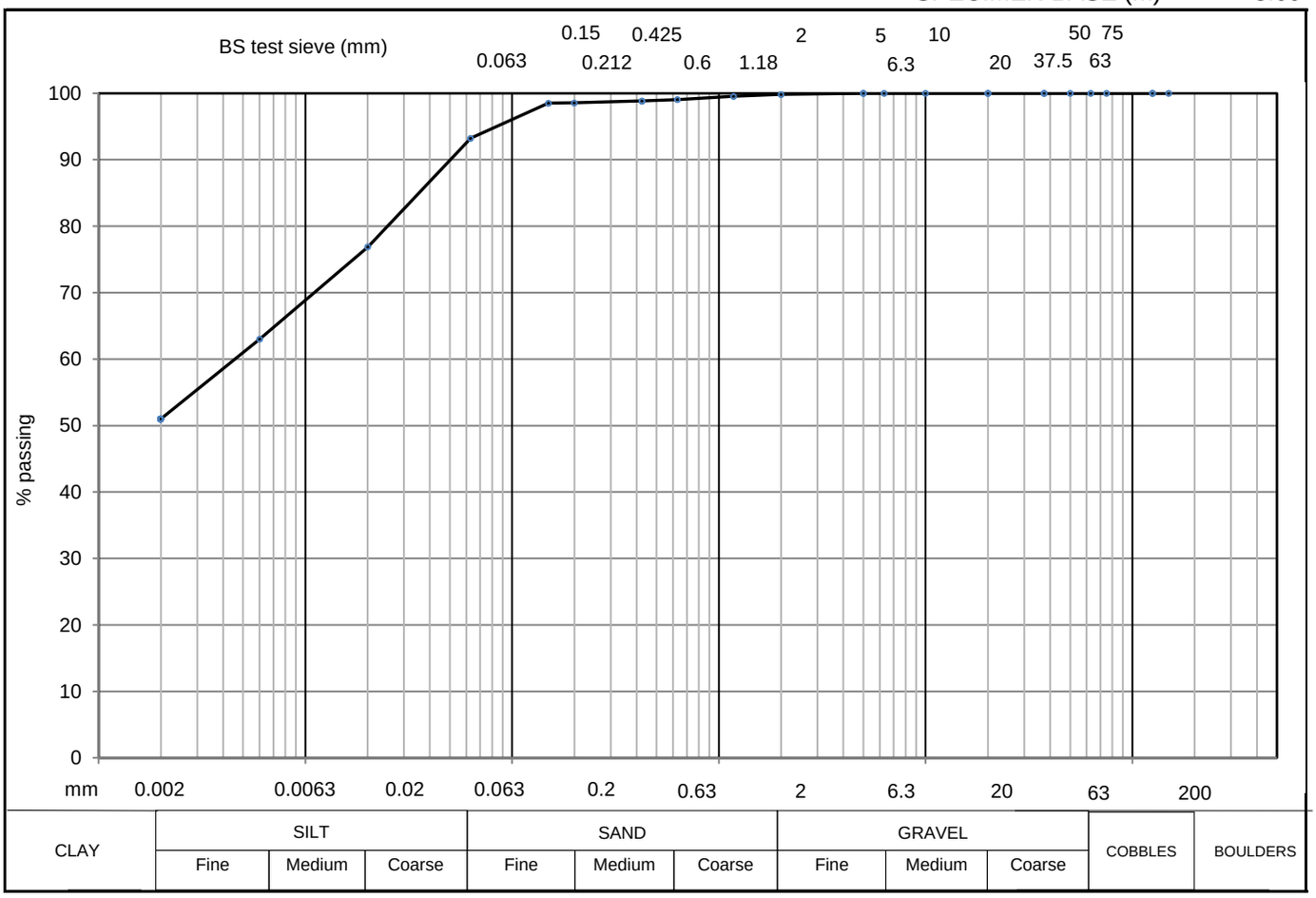
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP01
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	10D
		SAMPLE DEPTH (m)	3.00
DESCRIPTION	Orangish brown slightly sandy silty CLAY	SPECIMEN TOP (m)	3.00
		SPECIMEN BASE (m)	3.00



soil type	% fraction
CLAY	51
SILT	42
SILT & CLAY	93
SAND	7
GRAVEL	0
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	
6.3	

BS test sieve (mm)	% passing
5	100
2	100
1.18	100
0.63	99
0.425	99
0.2	99
0.15	99
0.063	93

BS test sieve (µm)	% finer
20	77
6	63
2	51

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

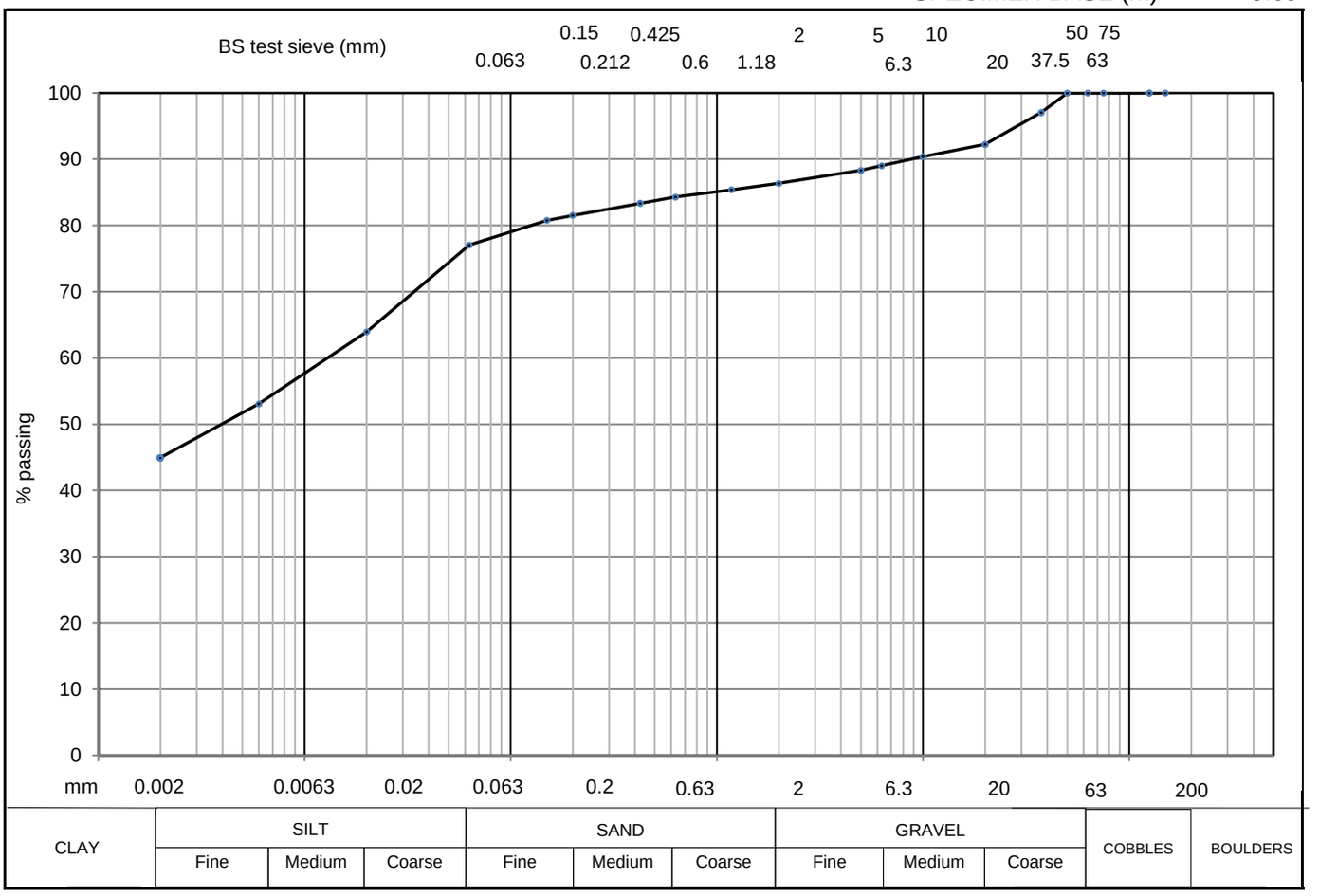
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP02
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	1B
		SAMPLE DEPTH (m)	0.40
DESCRIPTION	Orangish brown slightly sandy slightly gravelly silty CLAY	SPECIMEN TOP (m)	0.40
		SPECIMEN BASE (m)	0.60



soil type	% fraction
CLAY	45
SILT	32
SILT & CLAY	77
SAND	9
GRAVEL	14
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	88	20	64
75		2	86	6	53
63		1.18	85	2	45
50	100	0.63	84		
37.5	97	0.425	83		
20	92	0.2	82		
10	90	0.15	81		
6.3	89	0.063	77		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
35978	**TB**

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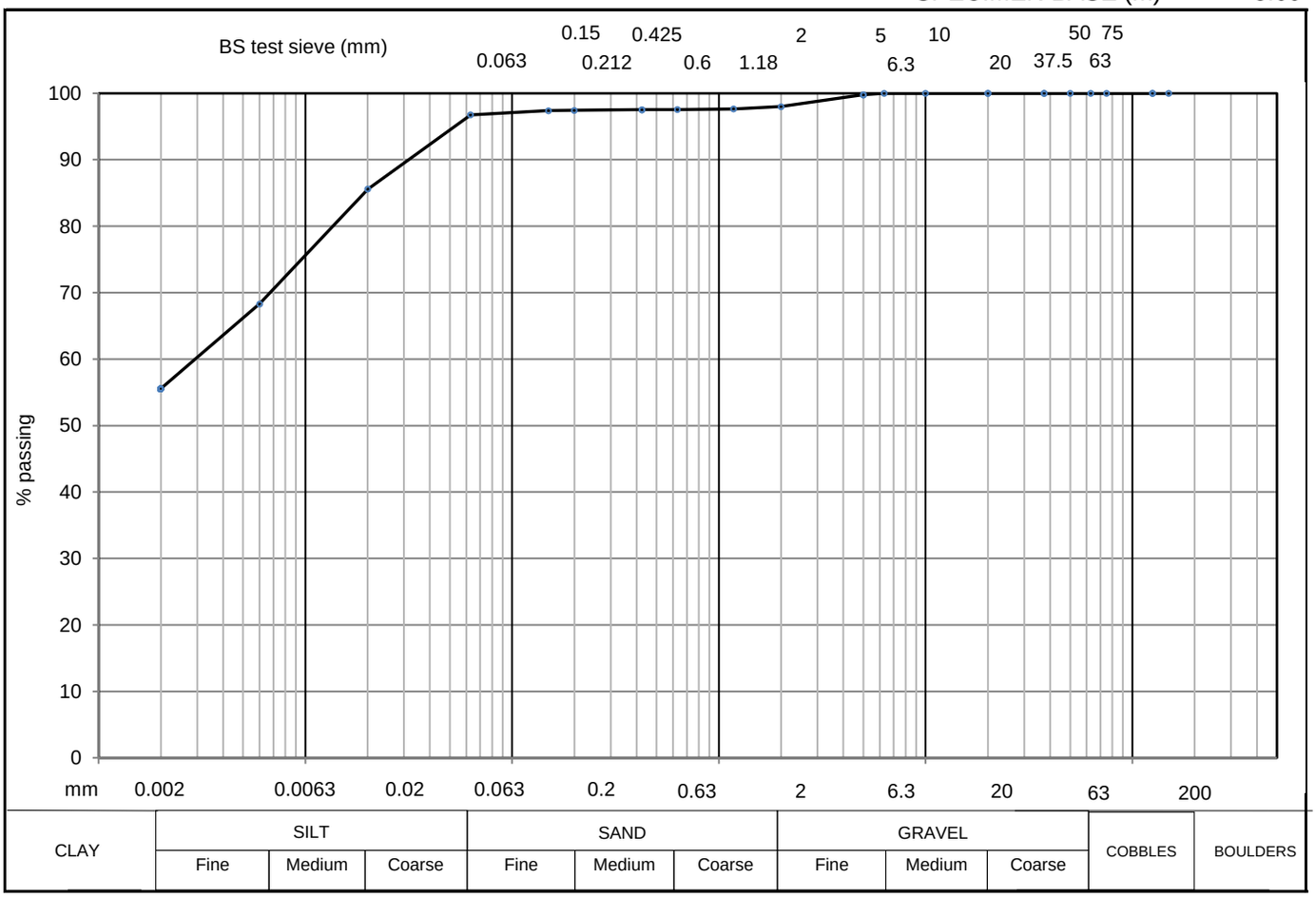
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP02
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	14D
		SAMPLE DEPTH (m)	5.00
DESCRIPTION	Brown slightly sandy slightly gravelly silty CLAY with rare gypsum	SPECIMEN TOP (m)	5.00
		SPECIMEN BASE (m)	5.00



soil type	% fraction
CLAY	56
SILT	41
SILT & CLAY	97
SAND	1
GRAVEL	2
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	
6.3	100

BS test sieve (mm)	% passing
5	100
2	98
1.18	98
0.63	98
0.425	98
0.2	97
0.15	97
0.063	97

BS test sieve (µm)	% finer
20	86
6	68
2	56

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

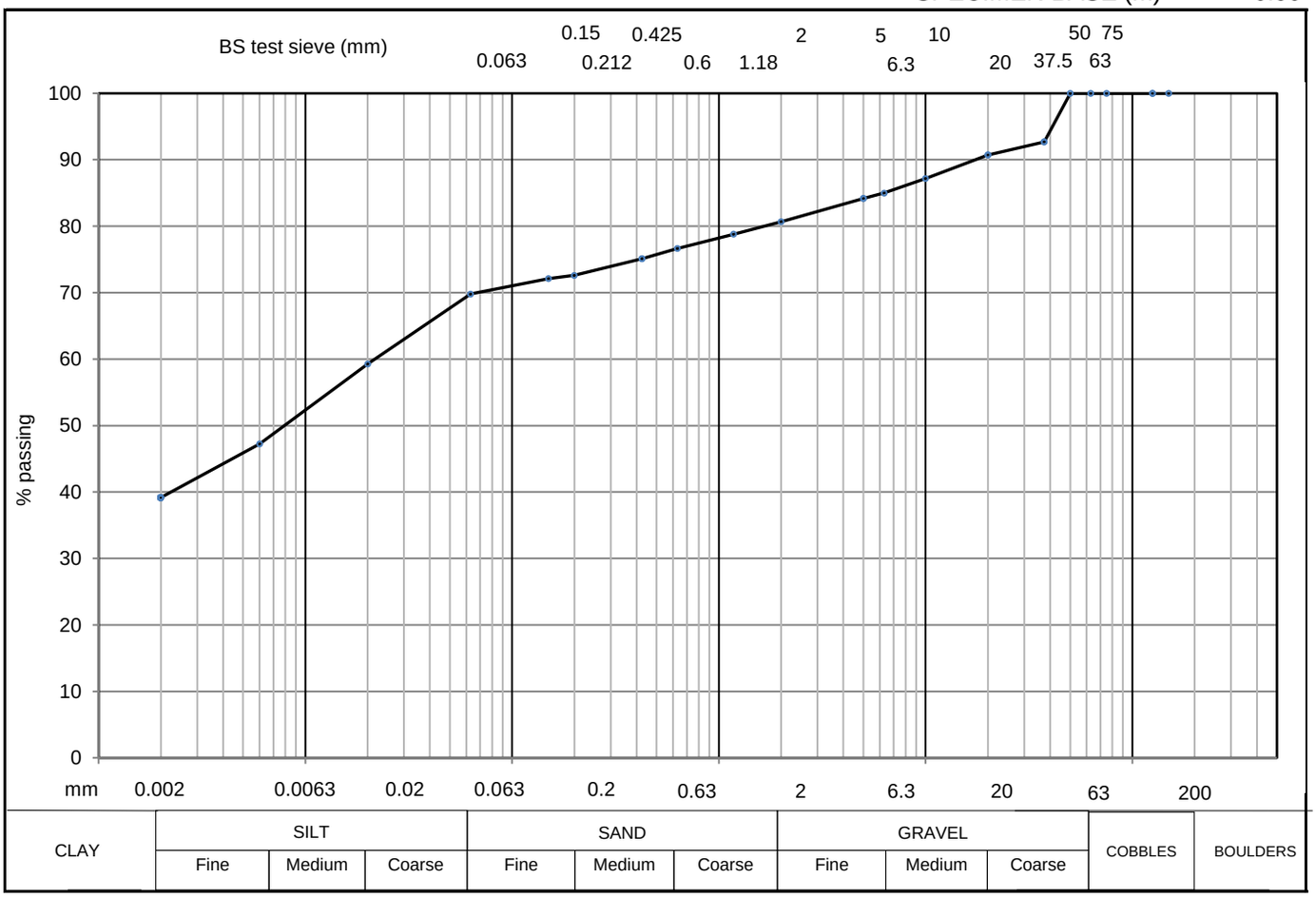
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP03
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	3B
		SAMPLE DEPTH (m)	0.70
DESCRIPTION	Brown slightly sandy slightly gravelly silty CLAY	SPECIMEN TOP (m)	0.70
		SPECIMEN BASE (m)	0.90



soil type	% fraction
CLAY	39
SILT	31
SILT & CLAY	70
SAND	11
GRAVEL	19
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	100
37.5	93
20	91
10	87
6.3	85

BS test sieve (mm)	% passing
5	84
2	81
1.18	79
0.63	77
0.425	75
0.2	73
0.15	72
0.063	70

BS test sieve (µm)	% finer
20	59
6	47
2	39

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

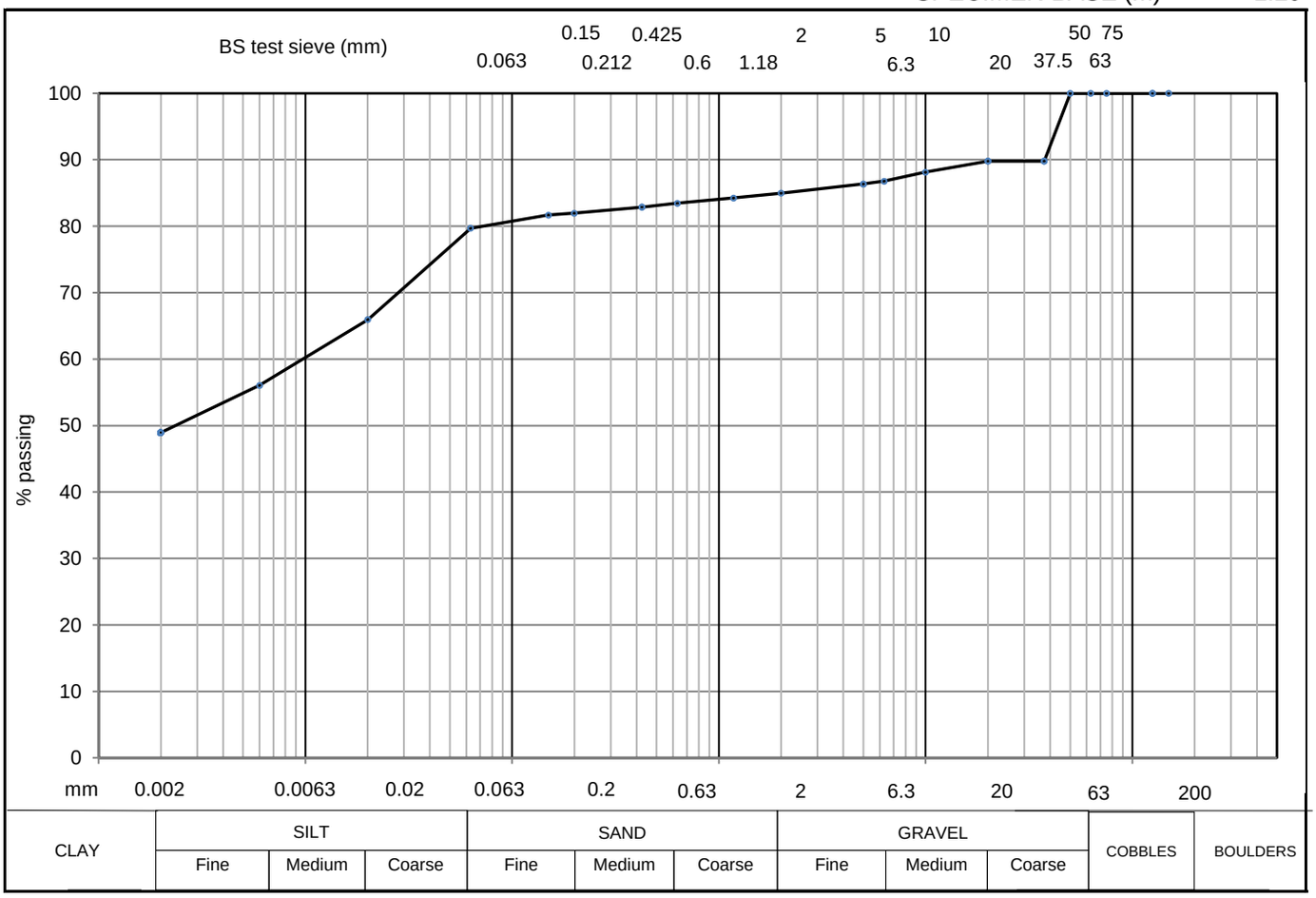
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP03
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	5B
		SAMPLE DEPTH (m)	1.00
DESCRIPTION	Brown slightly sandy slightly gravelly silty CLAY	SPECIMEN TOP (m)	1.00
		SPECIMEN BASE (m)	1.20



soil type	% fraction
CLAY	49
SILT	31
SILT & CLAY	80
SAND	5
GRAVEL	15
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	86	20	66
75		2	85	6	56
63		1.18	84	2	49
50	100	0.63	83		
37.5	90	0.425	83		
20	90	0.2	82		
10	88	0.15	82		
6.3	87	0.063	80		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

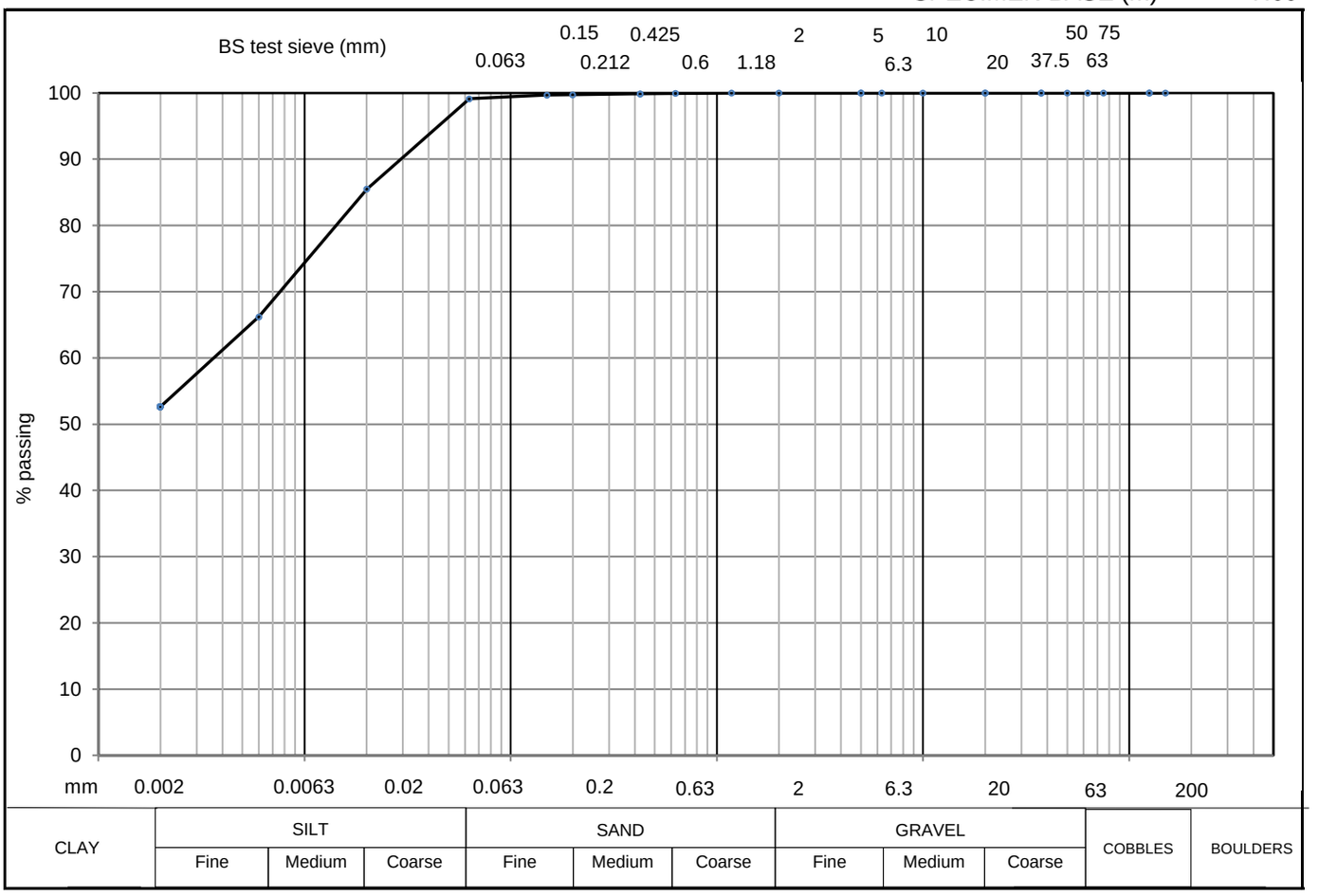
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP04
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	14D
		SAMPLE DEPTH (m)	7.00
DESCRIPTION	Dark brown slightly sandy silty CLAY	SPECIMEN TOP (m)	7.00
		SPECIMEN BASE (m)	7.00



soil type	% fraction
CLAY	53
SILT	47
SILT & CLAY	99
SAND	1
GRAVEL	0
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	
6.3	

BS test sieve (mm)	% passing
5	
2	
1.18	100
0.63	100
0.425	100
0.2	100
0.15	100
0.063	99

BS test sieve (µm)	% finer
20	85
6	66
2	53

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

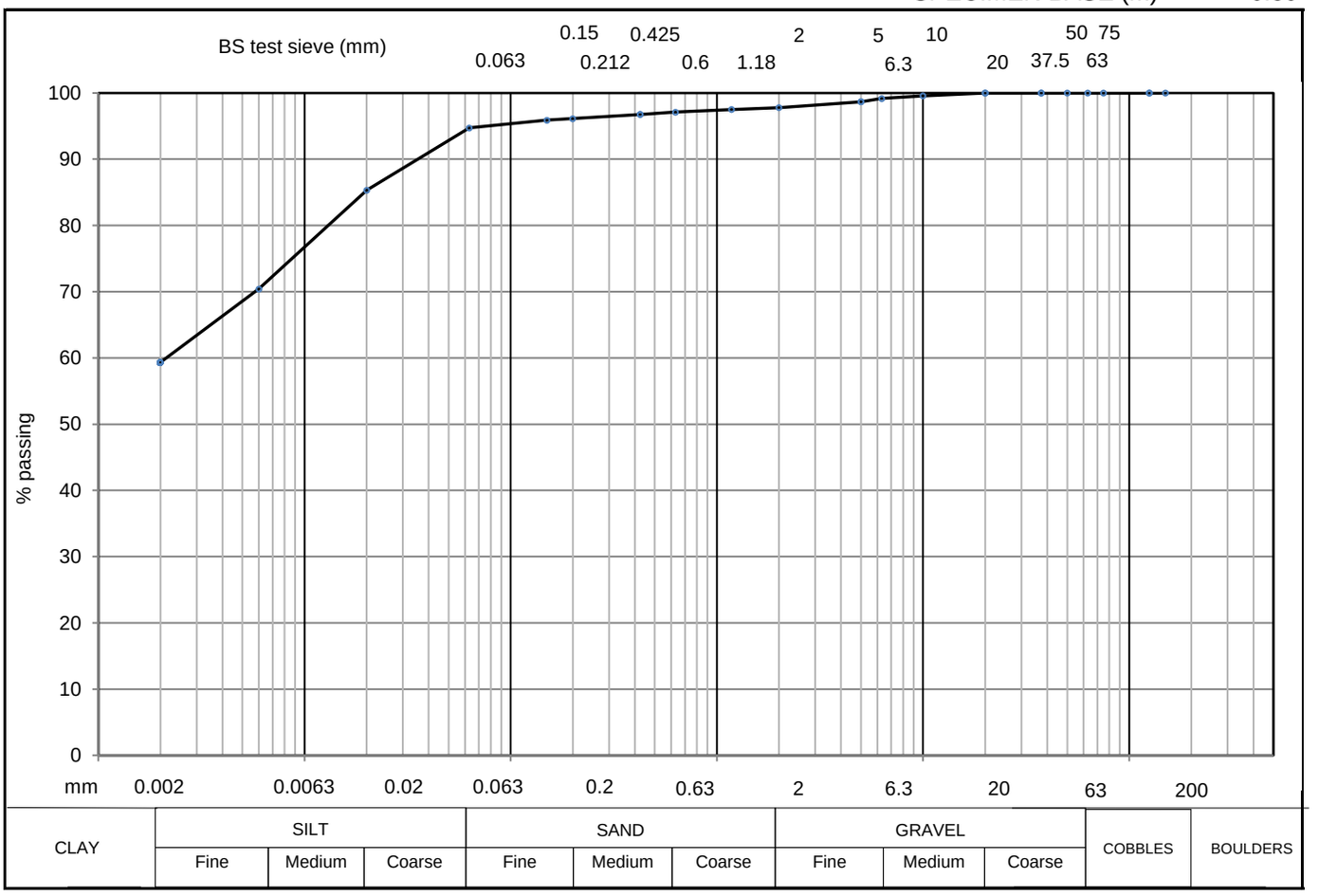
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP05
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	1B
		SAMPLE DEPTH (m)	0.30
DESCRIPTION	Light brown slightly gravelly slightly sandy silty CLAY	SPECIMEN TOP (m)	0.30
		SPECIMEN BASE (m)	0.50



soil type	% fraction
CLAY	59
SILT	35
SILT & CLAY	95
SAND	3
GRAVEL	2
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	100
10	100
6.3	99
5	99
2	98
1.18	98
0.63	97
0.425	97
0.2	96
0.15	96
0.063	95

BS test sieve (µm)	% finer
20	85
6	70
2	59

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

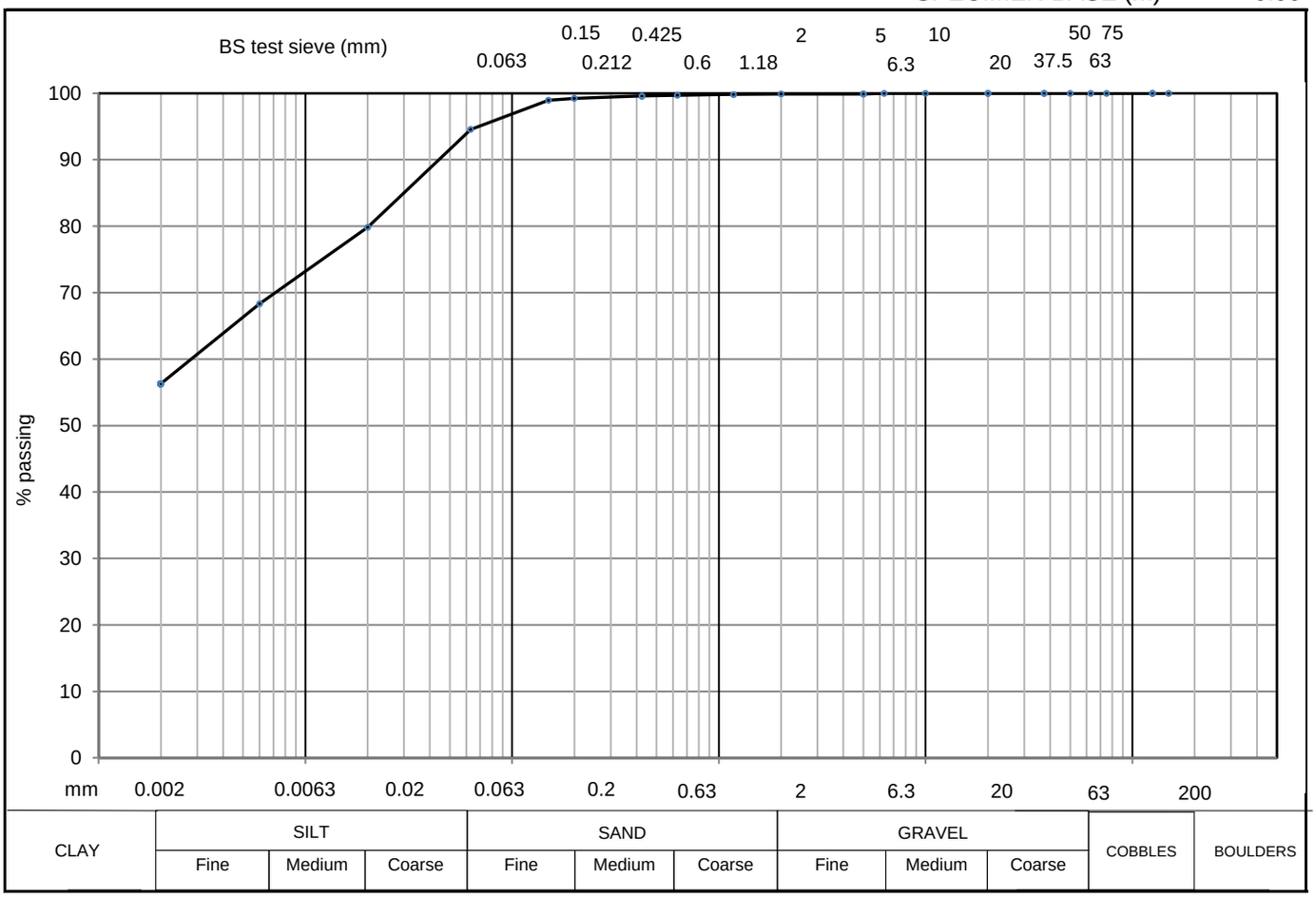
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP05
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	3B
		SAMPLE DEPTH (m)	0.70
DESCRIPTION	Orangish brown slightly sandy silty CLAY with rare gypsum	SPECIMEN TOP (m)	0.70
		SPECIMEN BASE (m)	0.90



soil type	% fraction
CLAY	56
SILT	38
SILT & CLAY	95
SAND	5
GRAVEL	0
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	100	20	80
75		2	100	6	68
63		1.18	100	2	56
50		0.63	100		
37.5		0.425	100		
20		0.2	99		
10		0.15	99		
6.3	100	0.063	95		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

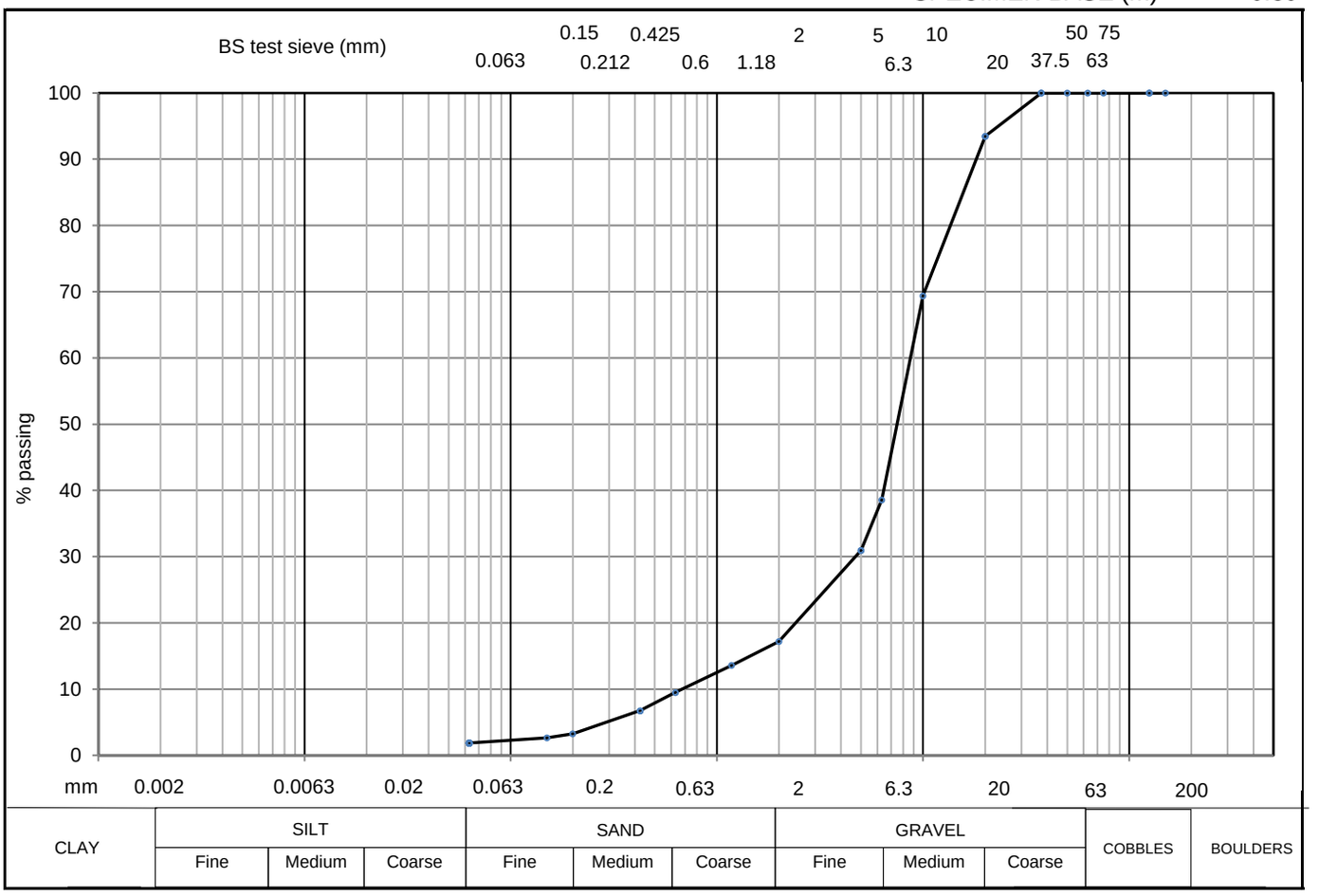
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP06
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	1B
		SAMPLE DEPTH (m)	0.10
DESCRIPTION	Grey slightly silty sandy GRAVEL	SPECIMEN TOP (m)	0.10
		SPECIMEN BASE (m)	0.30



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	2
SAND	15
GRAVEL	83
COBBLE & BOULDER	0
test method(s)	5.2

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	31	20	
75		2	17	6	
63		1.18	14	2	
50		0.63	10		
37.5	100	0.425	7		
20	93	0.2	3		
10	69	0.15	3		
6.3	39	0.063	2		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

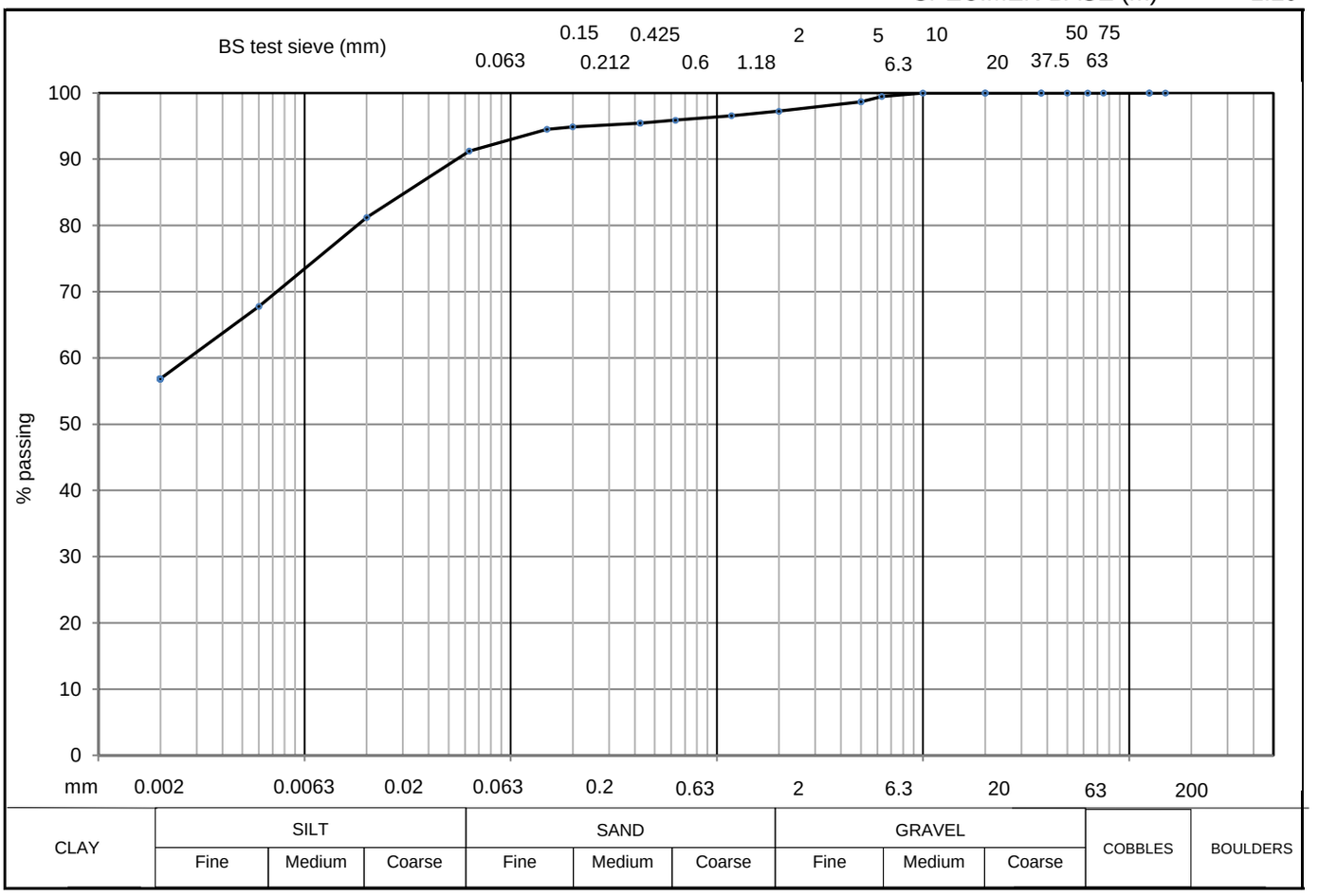
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP07
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	5B
		SAMPLE DEPTH (m)	1.00
DESCRIPTION	Brown slightly gravelly slightly sandy silty CLAY	SPECIMEN TOP (m)	1.00
		SPECIMEN BASE (m)	1.20



soil type	% fraction
CLAY	57
SILT	34
SILT & CLAY	91
SAND	6
GRAVEL	3
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	100
6.3	99

BS test sieve (mm)	% passing
5	99
2	97
1.18	97
0.63	96
0.425	95
0.2	95
0.15	95
0.063	91

BS test sieve (µm)	% finer
20	81
6	68
2	57

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

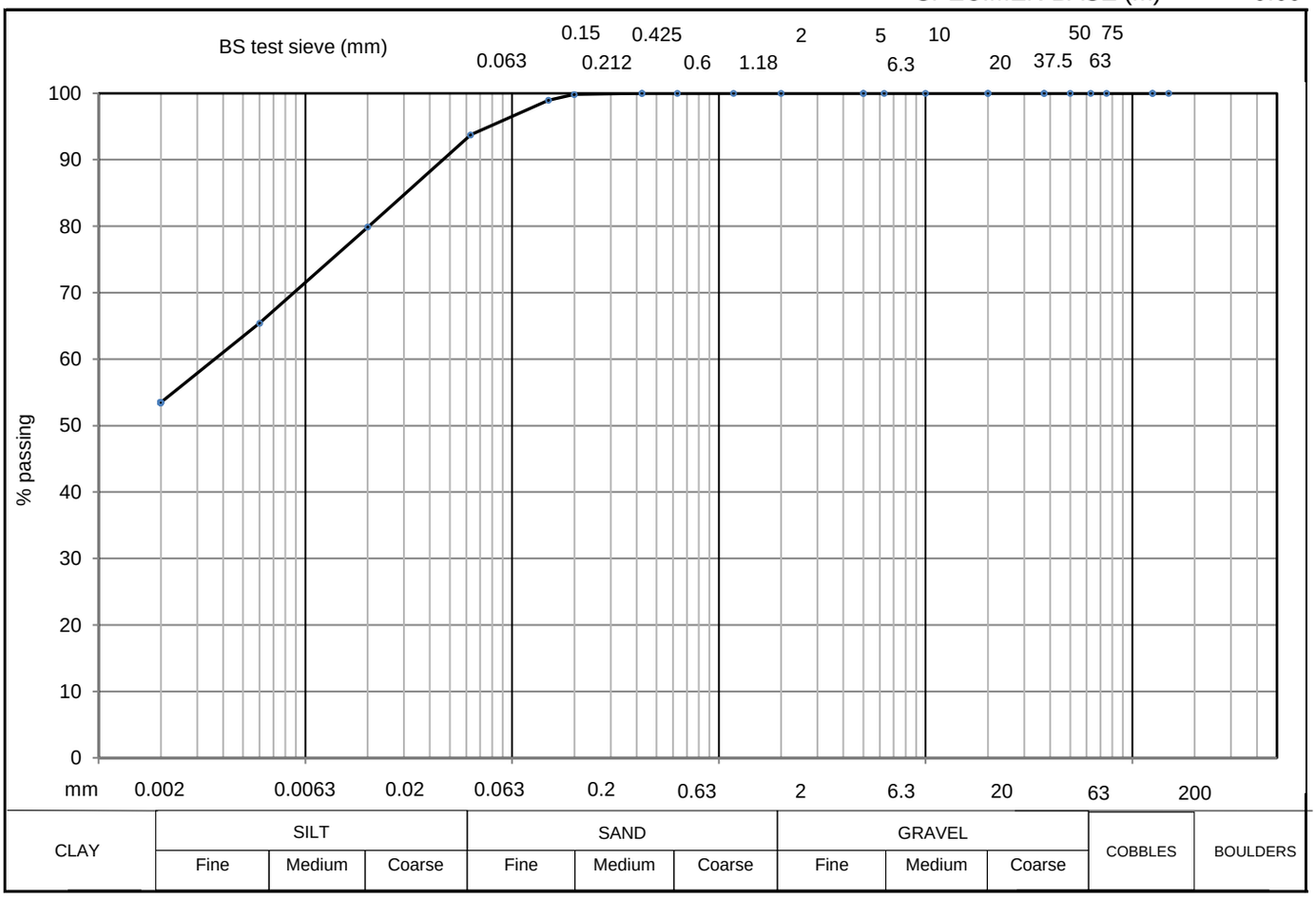
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP07
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	22D
		SAMPLE DEPTH (m)	9.00
DESCRIPTION	Dark greyish brown slightly sandy silty CLAY	SPECIMEN TOP (m)	9.00
		SPECIMEN BASE (m)	9.00



soil type	% fraction
CLAY	54
SILT	40
SILT & CLAY	94
SAND	6
GRAVEL	0
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	
6.3	

BS test sieve (mm)	% passing
5	
2	
1.18	
0.63	
0.425	100
0.2	100
0.15	99
0.063	94

BS test sieve (µm)	% finer
20	80
6	65
2	53

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

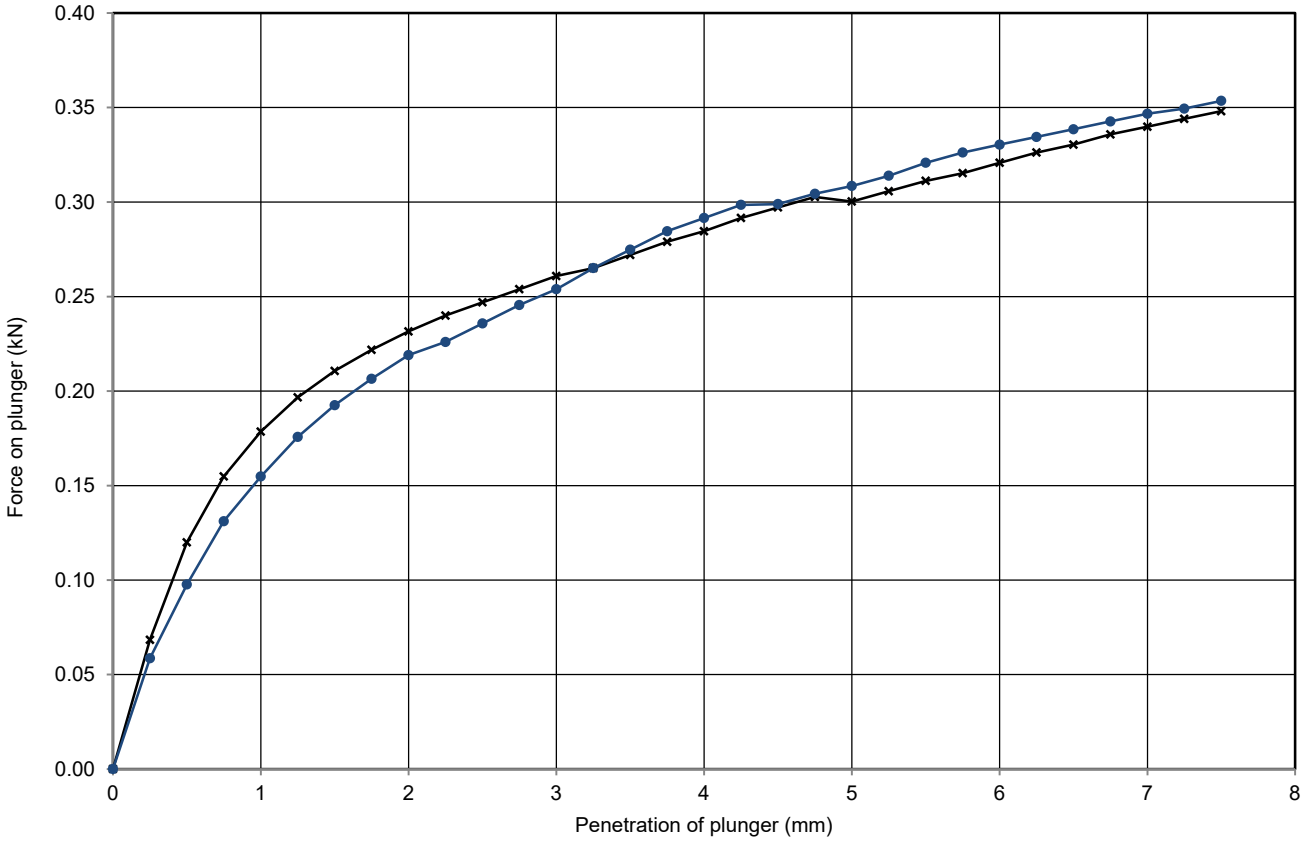
CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

CALIFORNIA BEARING RATIO

BS. 1377 : Part 4 : 1990 : 7

CLIENT	RAMBOLL UK LTD	BH/TP No.	CP01
SITE	CHANDOS PARK DATA CENTRE, LONDON	SAMPLE No./TYPE	3B
		SAMPLE DEPTH (m)	0.50
DESCRIPTION	Browwn slightly gravelly slightly sandy CLAY	SPECIMEN DEPTH (m)	0.50



sample preparation:	Dynamic compaction - 2.5kg rammer with specified effort		
proportion > 20mm removed (%)	0.0	sample condition	Soaked
surcharge mass (kg)	10	amount of swell (mm)	
INITIAL CONDITIONS		**FINAL CONDITIONS**	
moisture content (%)	37	moisture content top (%)	37
bulk density (Mg/m$^{3)}$	1.81	moisture content base (%)	38
dry density (Mg/m^3)	1.32		

remarks

No swelling under soaking, CBR undertaken as per client instruction.

results

CBR value top (%)	1.9
CBR value base (%)	1.8
average CBR value (%)	1.8

Top

Base

CONTRACT	CHECKED
35978	**TB**

Geotechnical Engineering Limited

UNDRAINED TRIAXIAL COMPRESSION

BS.1377 : PART 7 : 1990 : 8

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole /trial pit no.	sample		specimen depth (m)	code	moisture content		dimensions		density		cell pressure (kPa)	rate of strain (%/min)	deviator stress (kPa)	failure strain (%)	failure mode	shear strength* (kPa)	description and remarks
	no./type	depth (m)			initial (%)	final (%)	length (mm)	diameter (mm)	bulk (Mg/m^3)	dry (Mg/m^3)							
CP01	7UT	1.50	1.70	UU100	32.0	32.5	206	104	1.86	1.41	30	2.0	106	8.3	S	53	Brown mottled orange and grey CLAY with rare gypsum
CP03	15UT	5.50	5.52	UU100	31.5	31.4	158	104	1.89	1.44	110	2.0	181	3.2	S	90	Brown mottled orange CLAY
CP05	32UT	14.00	14.00	UU100	24.9	24.8	170	104	2.00	1.60	280	2.0	361	7.6	S	180	Brown CLAY
CP05	38UT	17.00	17.05	UU100	27.3	27.8	206	104	1.96	1.54	340	2.0	293	4.4	S	147	Brown slightly sandy CLAY
CP07	35UT	17.00	17.10	UU100	30.3	28.7	167	104	1.97	1.51	340	2.0	413	6.6	S	206	Brown slightly gravelly slightly sandy CLAY
CP07	45UT	23.00	23.20	UU100	24.4	26.3	187	104	1.98	1.59	460	2.0	608	3.7	S	304	Brown slightly sandy CLAY

general remarks:

* shear strength taken as half deviator stress at failure for each stage
membrane correction applied
sample taken vertically (unless otherwise specified)
strain rate 2%/min (unless otherwise specified)

code:

UU - unconsolidated undrained
M - multi stage
S - set of three
R - remoulded

failure mode:

B - barrel (plastic failure)
S - shear (brittle failure)
I - intermediate
O - other (see remarks)

membrane type/thickness:

latex membrane used (unless otherwise specified)
38 - 0.2mm
70 - 0.4mm
100 - 0.4mm

CONTRACT **35978**

CHECKED **TB**

Geotechnical Engineering Limited

THERMAL RESISTIVITY BY NEEDLE PROBE

ASTM D5334 - 14 : 2014

CLIENT RAMBOLL UK LTD

SITE CHANDOS PARK DATA CENTRE, LONDON

borehole /trial pit no.	sample		specimen depth	water content	specimen condition	density		dimensions		specimen mass	method of needle insertion	heating time	temperature	thermal conductivity	thermal resistivity	description and remarks
	no./type	depth (m)	(m)	(%)		bulk (Mg/m^3)	dry (Mg/m^3)	length (mm)	diameter (mm)	(g)		(s)	(^oC)	(W/mk)	(mk/W)	
CP02	7UT	1.50	1.60	33.67	UA	1.88	1.41	197.06	102.95	3086.90	PUSHED	60.0	23.91	1.38	0.73	Brown slightly sandy CLAY
CP03	3B	0.70	0.70	36.25	RA	1.73	1.27	253.86	103.05	3669.20	PUSHED	60.0	24.35	1.26	0.80	Brown slightly gravelly slightly sandy CLAY. Recompacted using 2.5kg rammer.
CP05	5B	1.00	1.00	33.37	RA	1.87	1.40	213.60	103.74	3368.20	PUSHED	60.0	24.83	1.37	0.73	Brown slightly gravelly slightly sandy CLAY. Recompacted using 2.5kg rammer
CP06	7UT	1.50	1.50	31.51	UA	1.92	1.46	227.93	103.27	3669.20	PUSHED	60.0	23.89	1.34	0.75	Brown slightly sandy CLAY
CP07	7UT	1.50	1.50	34.04	UA	1.77	1.32	224.95	103.04	3324.60	PUSHED	60.0	23.91	1.36	0.73	Brown slightly sandy CLAY

general remarks:

Decagon Devices KD2 Pro Thermal Conductivity Meter

Soil water content determined in general accordance with BS EN ISO 17892 - 1 : 2014

Rock water content determined in general accordance with ASTM D2216 - 10 : 2010

key

specimen condition

U denotes undisturbed A denotes as received D denotes dry

R denotes recompacted S denotes saturated

CONTRACT	CHECKED
35978	**TB**

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Amended Report

Report No.:	20-23087-2		
Initial Date of Issue:	03-Sep-2020	**Date of Re-Issue:**	14-Sep-2020
Client	Geotechnical Engineering Ltd		
Client Address:	Centurion House Olympus Park Quedgeley Gloucester Gloucestershire GL2 4NF		
Contact(s):	GEL Tom Best		
Project	35978 Chandos Park Data Centre, London		
Quotation No.:		**Date Received:**	01-Sep-2020
Order No.:	35978/TB	**Date Instructed:**	01-Sep-2020
No. of Samples:	13		
Turnaround (Wkdays):	5	**Results Due:**	07-Sep-2020
Date Approved:	03-Sep-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: 35978 Chandos Park Data Centre, London

Client: Geotechnical Engineering Ltd			**Chemtest Job No.:**		20-23087	20-23087	20-23087	20-23087	20-23087	20-23087	20-23087	20-23087
Quotation No.:			**Chemtest Sample ID.:**		1056507	1056508	1056509	1056510	1056511	1056512	1056513	1056514
Order No.: 35978/TB			Client Sample Ref.:		24	42	1	16	12	36	20	14
			Sample Location:		CP01	CP01	CP02	CP02	CP03	CP03	CP04	CP05
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		10.00	19.00	0.40	6.00	4.00	16.00	11.00	5.00
			Bottom Depth (m):				0.60					
			Date Sampled:		28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Moisture	N	2030	%	0.020	15	19	21	16	20	17	17	18
pH	U	2010		4.0	8.5	9.1	9.1	8.1	8.1	8.8	8.5	7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.60	0.16	0.12	1.1	1.4	0.49	0.67	1.2
Total Sulphur	U	2175	%	0.010	0.34	0.53	0.040	1.3	0.47	0.42	0.31	0.12
Sulphate (Acid Soluble)	U	2430	%	0.010	0.17	0.13	0.058	0.60	1.5	0.20	0.21	0.43

Results - Soil

Project: 35978 Chandos Park Data Centre, London

Client: Geotechnical Engineering Ltd			**Chemtest Job No.:**		20-23087	20-23087	20-23087	20-23087	20-23087
Quotation No.:			**Chemtest Sample ID.:**		1056515	1056516	1056517	1056518	1056519
Order No.: 35978/TB			Client Sample Ref.:		42	22	50	21	29
			Sample Location:		CP05	CP06	CP06	CP07	CP07
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		19.00	9.00	23.50	8.50	13.50
			Bottom Depth (m):						
			Date Sampled:		28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020	28-Aug-2020
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Moisture	N	2030	%	0.020	17	17	18	16	16
pH	U	2010		4.0	8.6	8.3	8.4	8.9	8.5
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.64	0.92	0.88	0.31	0.53
Total Sulphur	U	2175	%	0.010	0.67	0.51	0.35	0.41	0.43
Sulphate (Acid Soluble)	U	2430	%	0.010	0.30	0.39	0.27	0.21	0.21

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

APPENDIX 3
LABORATORY CERTIFICATES (ENVIRONMENTAL TESTING)

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ramboll
240 Blackfriars Rd
London
SE1 8NW

Attention :	Charles Collins
Date :	13th August, 2020
Your reference :	1620009986
Our reference :	Test Report 20/10361 Batch 1
Location :	Park Royal
Date samples received :	6th August, 2020
Status :	Final report
Issue :	1

Six samples were received for analysis on 6th August, 2020 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Lucas Halliwell
Project Co-ordinator

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10361

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-7	12-13	14-15							LOD/LOR	Units	Method No.
Sample ID	CP05	CP05	CP01	CP01									
Depth	0.30-0.50	1.00-1.20	0.35-0.50	1.00-1.20									
COC No / misc													
Containers	V J B	V J	V J	V J									
Sample Date	03/08/2020	03/08/2020	04/08/2020	04/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	06/08/2020	06/08/2020	06/08/2020	06/08/2020									
Arsenic #	17.3	22.2	16.5	22.5							<0.5	mg/kg	TM30/PM15
Beryllium	1.9	1.5	1.5	1.5							<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	1.9	<0.1							<0.1	mg/kg	TM30/PM15
Chromium #	75.3	63.9	87.3	64.9							<0.5	mg/kg	TM30/PM15
Copper #	30	28	197	28							<1	mg/kg	TM30/PM15
Lead #	19	15	109	13							<5	mg/kg	TM30/PM15
Mercury #	<0.1	0.2	0.3	0.1							<0.1	mg/kg	TM30/PM15
Nickel #	46.5	48.7	107.4	51.1							<0.7	mg/kg	TM30/PM15
Selenium #	1	2	1	2							<1	mg/kg	TM30/PM15
Vanadium	115	91	98	100							<1	mg/kg	TM30/PM15
Water Soluble Boron #	2.3	2.6	4.1	2.7							<0.1	mg/kg	TM74/PM32
Zinc #	95	88	242	88							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	0.11	<0.03							<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	0.09	<0.03							<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	0.13	<0.03							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06							<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	0.08	<0.02							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6							<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	103	98	99	94							<0	%	TM4/PM8
VOC TICs	ND	-	See Attached	ND								None	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	-	<2	<2							<2	ug/kg	TM15/PM10
Benzene #	<3	-	<3	<3							<3	ug/kg	TM15/PM10
Toluene #	<3	-	<3	<3							<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	-	<3	<3							<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	-	<5	<5							<5	ug/kg	TM15/PM10
o-Xylene #	<3	-	<3	<3							<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	97	-	88	97							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	-	82	98							<0	%	TM15/PM10

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10361

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-7	12-13	14-15							LOD/LOR	Units	Method No.
Sample ID	CP05	CP05	CP01	CP01									
Depth	0.30-0.50	1.00-1.20	0.35-0.50	1.00-1.20									
COC No / misc													
Containers	V J B	V J	V J	V J									
Sample Date	03/08/2020	03/08/2020	04/08/2020	04/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	06/08/2020	06/08/2020	06/08/2020	06/08/2020									
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	0.3	<0.1	0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	0.9	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	56.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	169	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	268	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	406	<7							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	900	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	15.9 SV	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	74 SV	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	144 SV	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	299 SV	<7							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	533	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	1433	<38							<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	-	<5	-	-							<5	ug/kg	TM36/PM12
Benzene #	-	<5	-	-							<5	ug/kg	TM36/PM12
Toluene #	-	<5	-	-							<5	ug/kg	TM36/PM12
Ethylbenzene #	-	<5	-	-							<5	ug/kg	TM36/PM12
m/p-Xylene #	-	<5	-	-							<5	ug/kg	TM36/PM12
o-Xylene #	-	<5	-	-							<5	ug/kg	TM36/PM12
PCB 28 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 52 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 101 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 118 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 138 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 153 #	<5	-	-	-							<5	ug/kg	TM17/PM8
PCB 180 #	<5	-	-	-							<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	-	-	-							<35	ug/kg	TM17/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15							<0.15	mg/kg	TM26/PM21
Natural Moisture Content	32.0	26.2	25.2	26.3							<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3							<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1836	2.6676	0.3216	2.7487							<0.0015	g/l	TM38/PM20
Chromium III	75.3	63.9	87.3	64.9							<0.5	mg/kg	NONE/NONE

All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10361

Report : Solid

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

EMT Sample No.	1-4	5-7	12-13	14-15							LOD/LOR	Units	Method No.
Sample ID	CP05	CP05	CP01	CP01									
Depth	0.30-0.50	1.00-1.20	0.35-0.50	1.00-1.20									
COC No / misc													
Containers	V J B	V J	V J	V J									
Sample Date	03/08/2020	03/08/2020	04/08/2020	04/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	06/08/2020	06/08/2020	06/08/2020	06/08/2020									
Total Cyanide #	<0.5	<0.5	<0.5	<0.5							<0.5	mg/kg	TM89/PM45
pH #	8.26	7.71	10.74	8.01							<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10361

SVOC Report : **Solid**

EMT Sample No.	1-4	12-13									LOD/LOR	Units	Method No.
Sample ID	CP05	CP01											
Depth	0.30-0.50	0.35-0.50											
COC No / misc													
Containers	V J B	V J											
Sample Date	03/08/2020	04/08/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	06/08/2020	06/08/2020											
SVOC MS													
Phenols													
2-Chlorophenol #	<10	<10									<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10									<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10									<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10	<10									<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10									<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10									<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10									<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10									<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10									<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10									<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10									<10	ug/kg	TM16/PM8
Phenol #	<10	30									<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10	<10									<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	<10	96									<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100									<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100									<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100									<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100									<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100									<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100	<100									<100	ug/kg	TM16/PM8
Other SVOCs													
1,2-Dichlorobenzene	<10	<10									<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10	<10									<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10									<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10									<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10									<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10									<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10									<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10									<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10	<10									<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10									<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10									<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10									<10	ug/kg	TM16/PM8
Azobenzene	<10	<10									<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10									<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10									<10	ug/kg	TM16/PM8
Carbazole	<10	<10									<10	ug/kg	TM16/PM8
Dibenzofuran #	<10	<10									<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10									<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10	<10									<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10									<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10									<10	ug/kg	TM16/PM8
Isophorone #	<10	<10									<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10	<10									<10	ug/kg	TM16/PM8
Nitrobenzene #	<10	<10									<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	101	106									<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	84	104									<0	%	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10361

VOC Report : **Solid**

EMT Sample No.	1-4	12-13	14-15									
Sample ID	CP05	CP01	CP01									
Depth	0.30-0.50	0.35-0.50	1.00-1.20									
COC No / misc												
Containers	V J B	V J	V J									
Sample Date	03/08/2020	04/08/2020	04/08/2020									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	06/08/2020	06/08/2020	06/08/2020									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<2								<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2								<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	48	4								<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1								<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2								<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2								<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6								<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30								<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	14	5								<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	44	296								<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4								<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3								<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4								<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3								<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	16	<3								<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6								<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4								<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3								<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3								<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	11	<3								<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3								<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	<5								<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3								<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3								<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3								<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3								<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3								<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2								<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4								<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3								<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	9	<3								<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3								<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5								<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	31	<6								<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4								<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7								<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4								<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27								<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7								<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	97	88	97								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	82	98								<0	%	TM15/PM10

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 20/10361
Sample number: 12
Sample identity: CP01
Sample depth: 0.35-0.50
Sample Type: Soil
Units: ug/kg

Method: VOC
Matrix: Solid

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
1120-21-4	Undecane	6.855	94	376
112-40-3	Dodecane	7.410	92	331
629-50-5	Tridecane	7.928	95	348

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

Note:

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

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

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

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/10361	1	CP05	0.30-0.50	4	07/08/2020	**General Description (Bulk Analysis)**	soil.stones
					07/08/2020	**Asbestos Fibres**	NAD
					07/08/2020	**Asbestos ACM**	NAD
					07/08/2020	**Asbestos Type**	NAD
					07/08/2020	**Asbestos Level Screen**	NAD
20/10361	1	CP01	0.25-0.35	11	07/08/2020	**General Description (Bulk Analysis)**	soil.stones
					07/08/2020	**Asbestos Fibres**	Fibre Bundles
					07/08/2020	**Asbestos Fibres (2)**	Fibre Bundles
					07/08/2020	**Asbestos ACM**	Asbestos Cement Debris
					07/08/2020	**Asbestos ACM (2)**	NAD
					07/08/2020	**Asbestos Type**	Chrysotile
					07/08/2020	**Asbestos Type (2)**	Amosite
					07/08/2020	**Asbestos Level Screen**	Asbestos level cannot be determined from Screen. Quantification required.
					12/08/2020	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					12/08/2020	**Total Detailed Gravimetric Quantification (% Asb)**	0.058 (mass %)
					12/08/2020	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	0.058 (mass %)
					12/08/2020	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					12/08/2020	**Asbestos Gravimetric & PCOM Total**	0.058 (mass %)

Client Name: Ramboll

Reference: 1620009986

Location: Park Royal

Contact: Charles Collins

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/10361	1	CP01	0.35-0.50	12-13	VOC	Analysis taken from a previously sampled container.
20/10361	1	CP01	1.00-1.20	14-15	VOC	Analysis taken from a previously sampled container.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/10361

SOILS

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

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

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

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

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/10361

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes

EMT Job No: 20/10361

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes

EMT Job No: 20/10361

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes

EMT Job No: 20/10361

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM131	Quantification of Asbestos Fibres and ACM based on HSG248 First edition:2006, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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Ramboll
240 Blackfriars Rd
London
SE1 8NW

Attention :	Charles Collins
Date :	18th August, 2020
Your reference :	1620009986
Our reference :	Test Report 20/10483 Batch 1
Location :	Park Royal
Date samples received :	8th August, 2020
Status :	Final report
Issue :	1

Eight samples were received for analysis on 8th August, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Lucas Halliwell
Project Co-ordinator

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10483

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	2-3	5-6	8-11	12-14							LOD/LOR	Units	Method No.
Sample ID	CP02	CP04	CP07	CP07									
Depth	0.40-0.60	0.50	0.20-0.40	0.50-0.60									
COC No / misc													
Containers	V J	V J	V J B	V J									
Sample Date	06/08/2020	06/08/2020	07/08/2020	07/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/08/2020	08/08/2020	08/08/2020	08/08/2020									
Arsenic #	17.9	4.0	3.1	9.8							<0.5	mg/kg	TM30/PM15
Beryllium	1.9	<0.5	<0.5	2.1							<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	0.5	0.8	<0.1							<0.1	mg/kg	TM30/PM15
Chromium #	72.2	58.4	27.3	77.7							<0.5	mg/kg	TM30/PM15
Copper #	23	13	30	22							<1	mg/kg	TM30/PM15
Lead #	25	30	30	28							<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM30/PM15
Nickel #	42.4	5.4	3.9	49.0							<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1							<1	mg/kg	TM30/PM15
Vanadium	101	20	15	112							<1	mg/kg	TM30/PM15
Water Soluble Boron #	1.9	1.9	8.6	2.8							<0.1	mg/kg	TM74/PM32
Zinc #	93	56	45	87							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.06	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	0.07	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	0.20	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	0.22	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.15	<0.06	<0.06							<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	0.15	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	0.29	<0.07	<0.07							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	0.18	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	0.13	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	0.16	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	1.6	<0.6	<0.6							<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	0.21	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.08	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	98	95	98	103							<0	%	TM4/PM8
VOC TICs	ND	ND	-	-								None	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	-	-							<2	ug/kg	TM15/PM10
Benzene #	<3	<3	-	-							<3	ug/kg	TM15/PM10
Toluene #	<3	<3	-	-							<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	-	-							<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5	-	-							<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	-	-							<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	104	92	-	-							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	81	-	-							<0	%	TM15/PM10

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10483

Report : Solid

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

EMT Sample No.	2-3	5-6	8-11	12-14							LOD/LOR	Units	Method No.
Sample ID	CP02	CP04	CP07	CP07									
Depth	0.40-0.60	0.50	0.20-0.40	0.50-0.60									
COC No / misc													
Containers	V J	V J	V J B	V J									
Sample Date	06/08/2020	06/08/2020	07/08/2020	07/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/08/2020	08/08/2020	08/08/2020	08/08/2020									
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	55	38	<7							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	55	38	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	9	<7	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	120	64	<7							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	129	64	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	184	102	<38							<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	-	-	<5	<5							<5	ug/kg	TM36/PM12
Benzene #	-	-	<5	<5							<5	ug/kg	TM36/PM12
Toluene #	-	-	<5	<5							<5	ug/kg	TM36/PM12
Ethylbenzene #	-	-	<5	<5							<5	ug/kg	TM36/PM12
m/p-Xylene #	-	-	<5	<5							<5	ug/kg	TM36/PM12
o-Xylene #	-	-	<5	<5							<5	ug/kg	TM36/PM12
PCB 28 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 52 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 101 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 118 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 138 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 153 #	-	-	-	<5							<5	ug/kg	TM17/PM8
PCB 180 #	-	-	-	<5							<5	ug/kg	TM17/PM8
Total 7 PCBs #	-	-	-	<35							<35	ug/kg	TM17/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15							<0.15	mg/kg	TM26/PM21
Natural Moisture Content	30.3	3.7	7.8	28.4							<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3							<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1370	0.1824	0.2348	0.2748							<0.0015	g/l	TM38/PM20
Chromium III	72.2	58.4	27.3	77.7							<0.5	mg/kg	NONE/NONE

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10483

Report : Solid

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

EMT Sample No.	2-3	5-6	8-11	12-14							LOD/LOR	Units	Method No.
Sample ID	CP02	CP04	CP07	CP07									
Depth	0.40-0.60	0.50	0.20-0.40	0.50-0.60									
COC No / misc													
Containers	V J	V J	V J B	V J									
Sample Date	06/08/2020	06/08/2020	07/08/2020	07/08/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/08/2020	08/08/2020	08/08/2020	08/08/2020									
Total Cyanide #	<0.5	<0.5	<0.5	<0.5							<0.5	mg/kg	TM89/PM45
pH #	8.40	11.32	10.63	8.53							<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10483

SVOC Report : **Solid**

EMT Sample No.	2-3												
Sample ID	CP02												
Depth	0.40-0.60										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J												
Sample Date	06/08/2020												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	08/08/2020										LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<10										<10	ug/kg	TM16/PM8
2-Methylphenol	<10										<10	ug/kg	TM16/PM8
2-Nitrophenol	<10										<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10										<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10										<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10										<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10										<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10										<10	ug/kg	TM16/PM8
4-Methylphenol	<10										<10	ug/kg	TM16/PM8
4-Nitrophenol	<10										<10	ug/kg	TM16/PM8
Pentachlorophenol	<10										<10	ug/kg	TM16/PM8
Phenol #	<10										<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10										<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	<10										<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100										<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100										<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100										<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100										<100	ug/kg	TM16/PM8
Diethyl phthalate	<100										<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100										<100	ug/kg	TM16/PM8
Other SVOCs													
1,2-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10										<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
2-Nitroaniline	<10										<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10										<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10										<10	ug/kg	TM16/PM8
3-Nitroaniline	<10										<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10										<10	ug/kg	TM16/PM8
4-Chloroaniline	<10										<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10										<10	ug/kg	TM16/PM8
4-Nitroaniline	<10										<10	ug/kg	TM16/PM8
Azobenzene	<10										<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10										<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10										<10	ug/kg	TM16/PM8
Carbazole	<10										<10	ug/kg	TM16/PM8
Dibenzofuran #	<10										<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10										<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10										<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10										<10	ug/kg	TM16/PM8
Hexachloroethane	<10										<10	ug/kg	TM16/PM8
Isophorone #	<10										<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10										<10	ug/kg	TM16/PM8
Nitrobenzene #	<10										<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	110										<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	101										<0	%	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10483

VOC Report : **Solid**

EMT Sample No.	2-3	5-6									LOD/LOR	Units	Method No.
Sample ID	CP02	CP04											
Depth	0.40-0.60	0.50											
COC No / misc													
Containers	V J	V J											
Sample Date	06/08/2020	06/08/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	08/08/2020	08/08/2020											
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2									<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3									<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2									<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1									<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2									<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2									<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6									<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30									<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4									<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3									<3	ug/kg	TM15/PM10
Chloroform #	<3	<3									<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4									<4	ug/kg	TM15/PM10
Benzene #	<3	<3									<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6									<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3									<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4									<4	ug/kg	TM15/PM10
Toluene #	<3	<3									<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3									<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	4	3									<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3									<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3									<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3									<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5									<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3									<3	ug/kg	TM15/PM10
Styrene	<3	<3									<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3									<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2									<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4									<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5									<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6									<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4									<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4									<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7									<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4									<4	ug/kg	TM15/PM10
Naphthalene	<27	<27									<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7									<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	104	92									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	81									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

Note:

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

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

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

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/10483	1	CP02	0.35	1	13/08/2020	**General Description (Bulk Analysis)**	soil.stones
					13/08/2020	**Asbestos Fibres**	NAD
					13/08/2020	**Asbestos ACM**	NAD
					13/08/2020	**Asbestos Type**	NAD
					13/08/2020	**Asbestos Level Screen**	NAD
20/10483	1	CP04	0.40	4	13/08/2020	**General Description (Bulk Analysis)**	soil.stones
					13/08/2020	**Asbestos Fibres**	NAD
					13/08/2020	**Asbestos ACM**	NAD
					13/08/2020	**Asbestos Type**	NAD
					13/08/2020	**Asbestos Level Screen**	NAD
20/10483	1	CP07	0.20-0.40	11	13/08/2020	**General Description (Bulk Analysis)**	Soil/Stones
					13/08/2020	**Asbestos Fibres**	NAD
					13/08/2020	**Asbestos ACM**	NAD
					13/08/2020	**Asbestos Type**	NAD
					13/08/2020	**Asbestos Level Screen**	NAD

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/10483						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/10483

SOILS

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

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

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

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

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/10483

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

EMT Job No: 20/10483

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

EMT Job No: 20/10483

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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Ramboll
240 Blackfriars Road
London
SE1 8NW

Attention :	Charles Collins
Date :	2nd September, 2020
Your reference :	1620009986
Our reference :	Test Report 20/10130 Batch 1 Schedule D
Location :	Park Royal
Date samples received :	31st July, 2020
Status :	Final report
Issue :	1

Twenty three samples were received for analysis on 31st July, 2020 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Simon Gomery BSc
Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, SW1W 0EN
Company Registration No: 11371415

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

Note:

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

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

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

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/10130	1	CP06	0.25	30	02/09/2020	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					02/09/2020	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					02/09/2020	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					02/09/2020	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					02/09/2020	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/10130						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/10130

SOILS

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

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

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

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

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/10130

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM131	Quantification of Asbestos Fibres and ACM based on HSG248 First edition:2006, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes

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Ramboll
240 Blackfriars Rd
London
SE1 8NW

Attention :	Charles Collins
Date :	17th August, 2020
Your reference :	1620009986
Our reference :	Test Report 20/10635 Batch 1
Location :	Park Royal
Date samples received :	12th August, 2020
Status :	Final report
Issue :	1

Three samples were received for analysis on 12th August, 2020 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Lucas Halliwell
Project Co-ordinator

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10635

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	3-9	10-16									LOD/LOR	Units	Method No.
Sample ID	CP01	CP02											
Depth													
COC No / misc													
Containers	V H HN N P G	V H HN N P G											
Sample Date	10/08/2020	10/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	12/08/2020	12/08/2020											
Dissolved Arsenic #	5.3	3.0									<2.5	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Boron	373	171									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	10	7									<2	ug/l	TM30/PM14
Dissolved Selenium #	17	<3									<3	ug/l	TM30/PM14
Dissolved Vanadium #	5.9	2.8									<1.5	ug/l	TM30/PM14
Dissolved Zinc #	5	3									<3	ug/l	TM30/PM14
Total Hardness Dissolved (as CaCO3)	1646_{AA}	1396_{AA}									<1	mg/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1									<0.1	ug/l	TM4/PM30
Acenaphthylene #	0.022	<0.013									<0.013	ug/l	TM4/PM30
Acenaphthene #	0.047	<0.013									<0.013	ug/l	TM4/PM30
Fluorene #	0.052	<0.014									<0.014	ug/l	TM4/PM30
Phenanthrene #	0.091	0.019									<0.011	ug/l	TM4/PM30
Anthracene #	0.021	<0.013									<0.013	ug/l	TM4/PM30
Fluoranthene #	0.199	0.036									<0.012	ug/l	TM4/PM30
Pyrene #	0.299	0.042									<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	0.050	<0.015									<0.015	ug/l	TM4/PM30
Chrysene #	0.092	<0.011									<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	0.073	<0.018									<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	0.030	<0.016									<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	0.015	<0.011									<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01									<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	0.014	<0.011									<0.011	ug/l	TM4/PM30
PAH 16 Total #	1.005	<0.195									<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	0.05	<0.01									<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	0.02	<0.01									<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	82	83									<0	%	TM4/PM30
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	93	93									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	92									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10635

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	3-9	10-16									LOD/LOR	Units	Method No.
Sample ID	CP01	CP02											
Depth													
COC No / misc													
Containers	V H HN N P G	V H HN N P G											
Sample Date	10/08/2020	10/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	12/08/2020	12/08/2020											
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	69	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	69	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	69	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total Phenols HPLC	<0.15	<0.15									<0.15	mg/l	TM26/PM0
Sulphate as SO4 #	1576.1	893.8									<0.5	mg/l	TM38/PM0
Total Cyanide #	0.02	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.75	0.07									<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6									<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6									<6	ug/l	TM0/PM0
pH #	7.75	7.71									<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10635

SVOC Report : **Liquid**

EMT Sample No.	3-9												
Sample ID	CP01												
Depth													
COC No / misc													
Containers	V H HN N P G												
Sample Date	10/08/2020												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	12/08/2020												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<1										<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5										<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5										<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5										<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1										<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5										<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1										<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5										<0.5	ug/l	TM16/PM30
4-Methylphenol	<1										<1	ug/l	TM16/PM30
4-Nitrophenol	<10										<10	ug/l	TM16/PM30
Pentachlorophenol	<1										<1	ug/l	TM16/PM30
Phenol	<1										<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1										<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1										<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5										<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1										<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5										<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1										<1	ug/l	TM16/PM30
Diethyl phthalate #	<1										<1	ug/l	TM16/PM30
Dimethyl phthalate	<1										<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
2-Nitroaniline	<1										<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5										<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1										<1	ug/l	TM16/PM30
3-Nitroaniline	<1										<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1										<1	ug/l	TM16/PM30
4-Chloroaniline	<1										<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1										<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5										<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5										<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5										<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1										<1	ug/l	TM16/PM30
Carbazole #	<0.5										<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5										<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1										<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1										<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1										<1	ug/l	TM16/PM30
Hexachloroethane #	<1										<1	ug/l	TM16/PM30
Isophorone #	<0.5										<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5										<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1										<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	110										<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	114										<0	%	TM16/PM30

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10635

VOC Report : **Liquid**

EMT Sample No.	3-9	10-16									LOD/LOR	Units	Method No.
Sample ID	CP01	CP02											
Depth													
COC No / misc													
Containers	V H HN N P G	V H HN N P G											
Sample Date	10/08/2020	10/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	12/08/2020	12/08/2020											
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	18.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	4	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	224	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	4									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	30	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	93	93									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	92									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/10635						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/10635

SOILS

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

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

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

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

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

EMT Job No: 20/10635

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				

EMT Job No: 20/10635

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			

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Ramboll
240 Blackfriars Rd
London
SE1 8NW

Attention :	Charles Collins
Date :	25th August, 2020
Your reference :	1620009986
Our reference :	Test Report 20/10939 Batch 1
Location :	Park Royal
Date samples received :	18th August, 2020
Status :	Final report
Issue :	1

Two samples were received for analysis on 18th August, 2020 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Lucas Halliwell
Project Co-ordinator

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10939

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14									LOD/LOR	Units	Method No.
Sample ID	CP05	CP03											
Depth													
COC No / misc													
Containers	V H HNUF N P G	V H HNUF N P G											
Sample Date	14/08/2020	14/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	18/08/2020	18/08/2020											
Dissolved Arsenic #	<2.5	4.2									<2.5	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Boron	879	335									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	604.9 AA	109.5									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	32									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	978.4 AA	58.6									<0.1	mg/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	24	6									<2	ug/l	TM30/PM14
Dissolved Potassium #	57.7	24.2									<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3									<3	ug/l	TM30/PM14
Dissolved Sodium #	575.4 AA	142.0									<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	3.5	4.5									<1.5	ug/l	TM30/PM14
Dissolved Zinc #	15	<3									<3	ug/l	TM30/PM14
Total Hardness Dissolved (as CaCO3)	5622	520									<1	mg/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1									<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Fluorene #	<0.014	<0.014									<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011	0.025									<0.011	ug/l	TM4/PM30
Anthracene #	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012	0.065									<0.012	ug/l	TM4/PM30
Pyrene #	0.020	0.074									<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	0.040									<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	0.044									<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	0.075									<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	0.044									<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	0.030									<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01									<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	0.022									<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195	0.419									<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	0.05									<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	0.02									<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	87	89									<0	%	TM4/PM30
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10939

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14									LOD/LOR	Units	Method No.
Sample ID	CP05	CP03											
Depth													
COC No / misc													
Containers	V H HNUF N P G	V H HNUF N P G											
Sample Date	14/08/2020	14/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	18/08/2020	18/08/2020											
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	101	100									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105	103									<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
PCB 28	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 52	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 101	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 118	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 138	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 153	<0.1	-									<0.1	ug/l	TM17/PM30
PCB 180	<0.1	-									<0.1	ug/l	TM17/PM30
Total 7 PCBs	<0.7	-									<0.7	ug/l	TM17/PM30
Total Phenols HPLC	<0.15	<0.15									<0.15	mg/l	TM26/PM0
Sulphate as SO4 #	4265.7	488.3									<0.5	mg/l	TM38/PM0
Chloride #	376.2	128.1									<0.3	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	8.34									<0.02	mg/l	TM38/PM0
Nitrate as N #	<0.05	0.22									<0.05	mg/l	TM38/PM0
Total Cyanide #	<0.01	0.01									<0.01	mg/l	TM89/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10939

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-7	8-14									LOD/LOR	Units	Method No.
Sample ID	CP05	CP03											
Depth													
COC No / misc													
Containers	V H HNUF N P G	V H HNUF N P G											
Sample Date	14/08/2020	14/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	18/08/2020	18/08/2020											
Ammoniacal Nitrogen as N #	1.32	0.88									<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6									<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6									<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3 #	538	74									<1	mg/l	TM75/PM0
Sulphide	<0.01	<0.01									<0.01	mg/l	TM107/PM0
pH #	7.39	7.17									<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10939

SVOC Report : **Liquid**

EMT Sample No.	1-7	8-14									LOD/LOR	Units	Method No.
Sample ID	CP05	CP03											
Depth													
COC No / misc													
Containers	V H HNUF N P G	V H HNUF N P G											
Sample Date	14/08/2020	14/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	18/08/2020	18/08/2020											
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	105	104									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	103	111									<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll
Reference: 1620009986
Location: Park Royal
Contact: Charles Collins
EMT Job No: 20/10939

VOC Report : **Liquid**

EMT Sample No.	1-7	8-14									LOD/LOR	Units	Method No.
Sample ID	CP05	CP03											
Depth													
COC No / misc													
Containers	V H HNUF N P G	V H HNUF N P G											
Sample Date	14/08/2020	14/08/2020											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	18/08/2020	18/08/2020											
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	101	100									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	105	103									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ramboll

Reference: 1620009986

Location: Park Royal

Contact: Charles Collins

Matrix : Liquid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/10939	1	CP05		1-7	VOC	Analysis taken from a previously sampled container.
20/10939	1	CP03		8-14	VOC	Analysis taken from a previously sampled container.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/10939

SOILS

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

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

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

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

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

EMT Job No: 20/10939

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

EMT Job No: 20/10939

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				

APPENDIX 4
GQRA SCREENING TABLES AND LEGISLATIVE BACKGROUND

1620009986 Soil Analytical Results																																
Sample Reference						CP01	CP01	CP01	CP02	CP02	CP03	CP03	CP04	CP04	CP05	CP05	CP06	CP06	CP07	CP07	WS01	WS01	WS01	WS02	WS02	WS02	WS03	WS03	WS05	WS05	WS05	WS06	WS06	WS06	WS07
Depth (m)					Number	0.25-0.35	0.35-0.50	1.00-1.20	0.35	0.40-0.60	0.20-0.50	1.20	0.40	0.50	0.30-0.50	1.00-1.20	0.25	0.40-0.60	0.20-0.40	0.50-0.60	0.20	0.20-0.40	1.00	0.20	0.40-0.60	2.00-2.20	0.20	0.50	0.20-0.40	0.40-0.50	1.00	0.20	0.20-0.40	0.60-0.80	0.30-0.50
Strata					Exceeding																													
Date Sampled				GAC	GAC	04/08/2020	04/08/2020	04/08/2020	06/08/2020	06/08/2020	29/07/2020	29/07/2020	06/08/2020	06/08/2020	03/08/2020	03/08/2020	30/07/2020	30/07/2020	07/08/2020	07/08/2020	29/07/2020	29/07/2020	29/07/2020	28/07/2020	29/07/2020	29/07/2020	28/07/2020	28/07/2020	30/07/2020	30/07/2020	30/07/2020	28/07/2020	29/07/2020	29/07/2020	30/07/2020
Analytical Parameter	**Units**	**Limit of Detection**	**Accreditation Status**																															
Inorganics																																		
Asbestos																																		
Asbestos Containing Material	None		TM65/PM42			Asbestos Cement Debris			NAD		NAD		NAD		NAD		NAD		NAD		NAD			NAD			NAD			NAD			Asbestos Insulating Board
Asbestos Containing Material (2)	None		TM65/PM42			NAD																												
Asbestos Fibres	None		TM65/PM42			Fibre Bundles			NAD		NAD		NAD		NAD		Fibre Bundles		NAD		NAD			NAD			NAD			NAD			Fibre Bundles
Asbestos Fibres (2)	None		TM65/PM42			Fibre Bundles																												
Asbestos Level Screen	None		TM65/PM42			Asbestos level cannot be determined from Scr			NAD		NAD		NAD		NAD		less than 0.1%		NAD		NAD			NAD			NAD			NAD			cannot be
Asbestos Type #	None		TM65/PM42			Chrysotile			NAD		NAD		NAD		NAD		Chrysotile		NAD		NAD			NAD			NAD			NAD			Amosite
Asbestos Type (2) #	None		TM65/PM42			Amosite																												
General Description (Bulk Analysis)	None		TM65/PM42			soil.stones			soil.stones		soil.stones		soil.stones		soil.stones		soil/stones		Soil/Stones		soil/stones			soil.stones			soil/stones			soil/stones			soil/stones
Asbestos Gravimetric & PCOM Total #	mass %	<0.001	TM131/PM42			0.058			0	0			0	0			<0.001		0	0													0.109
Asbestos PCOM Quantification (Fibres) #	mass %	<0.001	TM131/PM42			<0.001			0	0			0	0			<0.001		0	0													0.002
Total ACM Gravimetric Quantification (% Asb) #	mass %	<0.001	TM131/PM42			<0.001			0	0			0	0			<0.001		0	0													0.107
Total Detailed Gravimetric Quantification (% As	mass %	<0.001	TM131/PM42			0.058			0	0			0	0			<0.001		0	0													<0.001
Total Gravimetric Quantification (ACM + Detaile	mass %	<0.001	TM131/PM42			0.058			0	0			0	0			<0.001		0	0													0.107
Others																																		
Cyanide	mg/kg	<0.5	TM89/PM45	49	0		<0.5	<0.5		<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<0.5	<0.5		<0.5	<0.5		<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Fraction Organic Carbon	None	<0.001	TM21/PM24									0.002														0.001						0.012		
Moisture Content dry weight	%	<0.1	PM4/PM0				25.2	26.3		30.3	9.3	32.1		3.7	32	26.2		27	7.8	28.4		22.2	25.9		26.2	25.2	9.7	29.3		29	27		16.9	20.8	14.9
pH	pH units	<0.01	TM73/PM11				10.74	8.01		8.4	10.99	8.2		11.32	8.26	7.71		8.04	10.63	8.53		10.14	7.78		10.9	7.93	12.06	8.73		10.03	8		8.56	8.54	8.55
Sulphate (SO4)	g/l	<0.0015	TM38/PM20		0		0.3216	2.7487		0.137	0.3991	0.4292		0.1824	0.1836	2.6676		0.2151	0.2348	0.2748		0.0943	1.7192		0.5067	0.5584	0.1472	0.2735		0.1805	0.4095		0.0306	0.1055	
Sulphate (SO4)	g/l	<0.0015	TM38/PM60		0																													0.0215
Metals																																		
Arsenic	mg/kg	<0.5	TM30/PM15	640	0		16.5	22.5		17.9	5.1	17		4	17.3	22.2		20.9	3.1	9.8		20	15.4		16.2	15.7	3.9	13.7		14	17.7		15.3	13.3	
Arsenic	mg/kg	<0.5	TM30/PM62	640	0								0	0	0	0			0	0														14.5
Beryllium	mg/kg	<0.5	TM30/PM15	12	0		1.5	1.5		1.9	<0.5	1.8		<0.5	1.9	1.5		1.9	<0.5	2.1		1.9	1.9		1.8	2.4	<0.5	1.5		1.6	1.9		1.8	1.8	
Beryllium	mg/kg	<0.5	TM30/PM62	12	0								0	0	0	0			0	0														1.6
Boron	mg/kg	<0.1	TM74/PM32	240,000	0		4.1	2.7		1.9	3.8	2.2		1.9	2.3	2.6		2.8	8.6	2.8		1.5	2.5		2.8	2.5	1.5	3		2.7	2.8		1.7	2.2	
Boron	mg/kg	<0.1	TM74/PM61	240,000	0								0	0	0	0			0	0														1.5
Cadmium	mg/kg	<0.1	TM30/PM15	410	0		1.9	<0.1		<0.1	0.5	<0.1		0.5	<0.1	<0.1		<0.1	0.8	<0.1		0.2	<0.1		1.1	<0.1	0.3	0.1		<0.1	<0.1		<0.1	<0.1	
Cadmium	mg/kg	<0.1	TM30/PM62	410	0								0	0	0	0			0	0														0.2
Chromium (III)	mg/kg	<0.5	Cr	8,600	0		87.3	64.9		72.2	31.4	67.2		58.4	75.3	63.9		73.2	27.3	77.7		71.3	71		84.1	78.5	44.9	65		72.7	73		67.9	69.3	
Chromium (III)	mg/kg	<0.5	NONE/NONE	8,600	0																													54
Chromium (Total)	mg/kg	<0.5	TM30/PM15	8,600	0		87.3	64.9		72.2	31.4	67.2		58.4	75.3	63.9		73.2	27.3	77.7		71.3	71		84.1	78.5	44.9	65		72.7	73		67.9	69.3	
Chromium (Total)	mg/kg	<0.5	TM30/PM62	8,600	0								0	0	0	0			0	0														54
Chromium VI	mg/kg	<0.3	TM38/PM20	49	0		<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3		<0.3	<0.3	<0.3	<0.3		<0.3	<0.3		<0.3	<0.3	<0.3
Copper	mg/kg	<1	TM30/PM15	68,000	0		197	28		23	9	26		13	30	28		25	30	22		28	25		138	27	15	30		27	26		48	24	
Copper	mg/kg	<1	TM30/PM62	68,000	0								0	0	0	0			0	0														34
Lead	mg/kg	<5	TM30/PM15	2,300	0		109	13		25	36	24		30	19	15		16	30	28		25	14		437	14	27	29		24	14		176	14	
Lead	mg/kg	<5	TM30/PM62	2,300	0								0	0	0	0			0	0														57
Mercury	mg/kg	<0.1	TM30/PM15	1,100	0		0.3	0.1		<0.1	<0.1	<0.1		<0.1	<0.1	0.2		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	
Mercury	mg/kg	<0.1	TM30/PM62	1,100	0								0	0	0	0			0	0														<0.1
Nickel	mg/kg	<0.7	TM30/PM15	980	0		107.4	51.1		42.4	5.7	44.2		5.4	46.5	48.7		53.3	3.9	49		45.3	50.8		63.3	43.3	6.7	23.4		22.4	50.1		39.3	44.3	
Nickel	mg/kg	<0.7	TM30/PM62	980	0								0	0	0	0			0	0														32.4
Selenium	mg/kg	<1	TM30/PM15	12,000	0		1	2		<1	<1	<1		<1	1	2		<1	<1	<1		<1	<1		<1	1	<1	<1		<1	<1		<1	<1	
Selenium	mg/kg	<1	TM30/PM62	12,000	0								0	0	0	0			0	0														<1
Vanadium	mg/kg	<1	TM30/PM15	9,000	0		98	100		101	16	99		20	115	91		107	15	112		106	93		89	114	18	87		85	102		87	101	
Vanadium	mg/kg	<1	TM30/PM62	9,000	0								0	0	0	0			0	0														84
Zinc	mg/kg	<5	TM30/PM15	730,000	0		242	88		93	42	89		56	95	88		80	45	87		82	88		133	88	39	82		75	86		197	83	
Zinc	mg/kg	<5	TM30/PM62	730,000	0								0	0	0	0			0	0														133
Organics																																		
Polyaromatic Hydrocarbons (PAHs)																																		
Acenaphthene	mg/kg	<0.05	TM4/PM8	75,000	0		<0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.05
Acenaphthylene	mg/kg	<0.03	TM4/PM8	76,000	0		<0.03	<0.03		<0.03	<0.03	<0.03		0.06	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03	<0.03		<0.03	<0.03	<0.03	<0.03		<0.03	<0.03		<0.03	<0.03	<0.03
Anthracene	mg/kg	<0.04	TM4/PM8	520,000	0		<0.04	<0.04		<0.04	<0.04	<0.04		0.07	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	0.08		<0.04	<0.04		<0.04	<0.04	<0.04
Benz(a)anthracene [use BaP surrogate]	mg/kg	<0.06	TM4/PM8	170	0		<0.06	<0.06		<0.06	<0.06	<0.06		0.15	<0.06	<0.06		<0.06	<0.06	<0.06		<0.06	<0.06		<0.06	<0.06	<0.06	0.14		<0.06	<0.06		0.21	<0.06	<0.06
Benzo(a)pyrene	mg/kg	<0.04	TM4/PM8	76	0		<0.04	<0.04		<0.04	<0.04	<0.04		0.18	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	0.08		<0.04	<0.04		0.12	<0.04	<0.04
Benzo(b)fluoranthene [use BaP surrogate]	mg/kg	<0.05	TM4/PM8	45	0		<0.05	<0.05		<0.05	<0.05	<0.05		0.21	<0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.05	0.09		<0.05	<0.05		0.17	<0.05	<0.05
Benzo(bk)fluoranthene [use BaP surrogate]	mg/kg	<0.07	TM4/PM8	45	0		<0.07	<0.07		<0.07	<0.07	<0.07		0.29	<0.07	<0.07		<0.07	<0.07	<0.07		<0.07	<0.07		<0.07	<0.07	<0.07	0.13		<0.07	<0.07		0.23	<0.07	<0.07
Benzo(ghi)perylene [use BaP surrogate]	mg/kg	<0.04	TM4/PM8	3,900	0		<0.04	<0.04		<0.04	<0.04	<0.04		0.16	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		0.07	<0.04	<0.04
Benzo(k)fluoranthene [use BaP surrogate]	mg/kg	<0.02	TM4/PM8	1,200	0		<0.02	<0.02		<0.02	<0.02	<0.02		0.08	<0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02		<0.02	<0.02	<0.02	0.04		<0.02	<0.02		0.06	<0.02	<0.02
Chrysene [use BaP surrogate]	mg/kg	<0.02	TM4/PM8	350	0		0.08	<0.02		<0.02	0.02	<0.02		0.15	<0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02		0.05	<0.02	0.02	0.08		<0.02	<0.02		0.13	<0.02	0.03
Dibenz(ah)anthrancene [use BaP surrogate]	mg/kg	<0.04	TM4/PM8	3.5	0		<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04
Fluoranthene	mg/kg	<0.03	TM4/PM8	23,000	0		0.09	<0.03		<0.03	0.09	<0.03		0.2	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03	<0.03		0.05	<0.03	0.05	0.32		<0.03	<0.03		0.32	<0.03	0.05
Fluorene	mg/kg	<0.04	TM4/PM8	60,000	0		<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	0.06		<0.04	<0.04		<0.04	<0.04	<0.04
Indeno(123-cd)pyrene [use BaP surrogate]	mg/kg	<0.04	TM4/PM8	510	0		<0.04	<0.04		<0.04	<0.04	<0.04		0.13	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		0.08	<0.04	<0.04
Naphthalene	ug/kg	<27	TM15/PM10	110,000	0		<27	<27		<27	<27			<27	<27			<27				<27	<27		<27			63		<27	<27		<27	<27	<27
Naphthalene	mg/kg	<0.04	TM4/PM8	110	0		<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04	<0.04		0.08	<0.04	<0.04	0.12		<0.04	<0.04		<0.04	<0.04	<0.04
Phenanthrene	mg/kg	<0.03	TM4/PM8	22,000	0		0.11	<0.03		<0.03	<0.03	<0.03		0.03	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03	<0.03		0.09	<0.03	0.03	0.43		<0.03	<0.03		0.26	<0.03	<0.03
Pyrene	mg/kg	<0.03	TM4/PM8	54,000	0		0.13	<0.03		<0.03	0.07	<0.03		0.22	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03	<0.03		0.06	<0.03	0.05	0.27		<0.03	<0.03		0.25	<0.03	0.05
Total PAHs EPA16	mg/kg	<0.6	TM4/PM8		0		<0.6	<0.6		<0.6	<0.6	<0.6		1.6	<0.6	<0.6		<0.6	<0.6	<0.6		<0.6	<0.6		<0.6	<0.6	<0.6	1.7		<0.6	<0.6		1.7	<0.6	<0.6
PAH Surrogate % Recovery	%	<0	TM4/PM8		0		99	94		98	98	96		95	103	98		99	98	103		100	100		90	97	96	93		102	99		95	92	88
Phenols																																		
Total Phenols	mg/kg	<0.15	TM26/PM21	380	0		<0.15	<0.15		<0.15	<0.15	<0.15		<0.15	<0.15	<0.15		<0.15	<0.15	<0.15		<0.15	<0.15		<0.15	<0.15	<0.15	<0.15		<0.15	<0.15		<0.15	<0.15	<0.15
Methylphenol-2	ug/kg	<10	TM16/PM8	160,000,000	0		<10			<10	<10			<10				<10				<10			<10			<10		<10			<10	<10	<10
Methylphenol-4	ug/kg	<10	TM16/PM8	160,000,000	0		<10			<10	<10			<10				<10				<10			<10			<10		<10			<10	<10	<10
Pentachlorophenol	ug/kg	<10	TM16/PM8	400,000	0		<10			<10	<10			<10				<10				<10			<10			<10		<10			<10	<10	<10
Phenol	ug/kg	<10	TM16/PM8	380,000	0		30			<10	<10			<10				<10				<10			<10			<10		<10			<10	<10	<10
BTEX, MTBE																																		
Benzene (TPH Aromatic C5-7)	ug/kg	<5	BTEX	15,000	0							<5				<5			<5	<5						<5	<5								
Benzene (TPH Aromatic C5-7)	ug/kg	<3	TICs	15,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Benzene (TPH Aromatic C5-7)	ug/kg	<3	TM15/PM10	15,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Benzene (TPH Aromatic C5-7)	mg/kg	<0.1	TM36/PM12	15	0		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1
Ethylbenzene	ug/kg	<5	BTEX	3,200,000	0							<5				<5			<5	<5						<5	<5								
Ethylbenzene	ug/kg	<3	TICs	3,200,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Ethylbenzene	ug/kg	<3	TM15/PM10	3,200,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Methyl tert-butyl ether	ug/kg	<5	BTEX	3,800,000	0							<5				<5			<5	<5						<5	<5								
Methyl tert-butyl ether	ug/kg	<2	TICs	3,800,000	0		<2	<2		<2	<2			<2	<2			<2				<2	<2		<2			<2		<2	<2		<2	<2	<2
Methyl tert-butyl ether	ug/kg	<2	TM15/PM10	3,800,000	0		<2	<2		<2	<2			<2	<2			<2				<2	<2		<2			<2		<2	<2		<2	<2	<2
Toluene (TPH Aromatic C7-8)	ug/kg	<5	BTEX	33,000,000	0							<5				<5			<5	<5						<5	<5								
Toluene (TPH Aromatic C7-8)	ug/kg	<3	TICs	33,000,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Toluene (TPH Aromatic C7-8)	ug/kg	<3	TM15/PM10	33,000,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Toluene (TPH Aromatic C7-8)	mg/kg	<0.1	TM36/PM12	33,000	0		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1
Xylene, m & p -	ug/kg	<5	BTEX	3,300,000	0							<5				<5			<5	<5						<5	<5								
Xylene, m & p -	ug/kg	<5	TICs	3,300,000	0		<5	<5		<5	<5			<5	<5			<5				<5	<5		<5			<5		<5	<5		<5	<5	<5
Xylene, m & p -	ug/kg	<5	TM15/PM10	3,300,000	0		<5	<5		<5	<5			<5	<5			<5				<5	<5		<5			<5		<5	<5		<5	<5	<5
Xylene-o	ug/kg	<5	BTEX	3,700,000	0							<5				<5			<5	<5						<5	<5								
Xylene-o	ug/kg	<3	TICs	3,700,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Xylene-o	ug/kg	<3	TM15/PM10	3,700,000	0		<3	<3		<3	<3			<3	<3			<3				<3	<3		<3			<3		<3	<3		<3	<3	<3
Total Petroleum Hydrocarbons (TPH)																																		
TPH Aliphatic C05-06	mg/kg	<0.1	TM36/PM12	2,400	0		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1
TPH Aliphatic C06-08	mg/kg	<0.1	TM36/PM12	5,300	0		<0.1	0.1		<0.1	<0.1	<0.1		<0.1	<0.1	0.3		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1
TPH Aliphatic C08-10	mg/kg	<0.1	TM36/PM12	1,300	0		0.9	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	0.1	<0.1	<0.1		<0.1	1.1		<0.1	<0.1	<0.1

TPH Aliphatic C10-12	mg/kg	<0.2	TM5/PM8/PM16	6,100	0	56.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TPH Aliphatic C12-16	mg/kg	<4	TM5/PM8/PM16	43,000	0	169	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	13	<4	<4	6	<4	<4	<4	<4
TPH Aliphatic C16-21 [1] Check Sum Value	mg/kg	<7	TM5/PM8/PM16	1,000,000	0	268	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	367	<7	<7	26	<7	<7	12	<7	<7
TPH Aliphatic C21-35 [1] Check Sum Value	mg/kg	<7	TM5/PM8/PM16	1,000,000	0	406	<7	<7	<7	<7	55	<7	<7	<7	<7	38	<7	22	<7	1,153	<7	<7	52	<7	139	<7	<7
Total Aliphatic (C5-35)	mg/kg	<19	TM5/TM36/PM8/	NC		900	<19	<19	<19	<19	55	<19	<19	<19	38	<19	22	<19	1,533	<19	<19	84	<19	151	<19	<19	
TPH Aromatic C08-10	mg/kg	<0.1	TM36/PM12	2,200	0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aromatic C10-12	mg/kg	<0.2	TM5/PM8/PM16	11,000	0	15.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TPH Aromatic C12-16	mg/kg	<4	TM5/PM8/PM16	35,000	0	74	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
TPH Aromatic C16-21	mg/kg	<7	TM5/PM8/PM16	29,000	0	144	<7	<7	<7	<7	9	<7	<7	<7	<7	<7	<7	<7	<7	230	<7	<7	<7	<7	<7	<7	<7
TPH Aromatic C21-35	mg/kg	<7	TM5/PM8/PM16	29,000	0	299	<7	<7	<7	<7	120	<7	<7	<7	64	<7	<7	<7	<7	904	<7	<7	<7	<7	<7	<7	<7
Total Aromatic (C5-35)	mg/kg	<19	TM5/TM36/PM8/	NC		533	<19	<19	<19	<19	129	<19	<19	<19	64	<19	<19	<19	1,134	<19	<19	<19	<19	<19	<19	<19	
Total Aliphatic & Total Aromatic (C5-35)	mg/kg	<38	TM5/TM36/PM8/	NC		1,433	<38	<38	<38	<38	184	<38	<38	<38	102	<38	<38	<38	2,667	<38	<38	84	<38	151	<38	<38	
Volatile Organic Compounds (VOCs)																											
Bromobenzene	ug/kg	<2	TM15/PM10	51,000	0	<2	<2	<2	<2		<2	<2		<2			<2	<2	<2		<2	<2	<2	<2	<2	<2	
Bromodichloromethane	ug/kg	<3	TM15/PM10	1,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Bromoform	ug/kg	<3	TM15/PM10	390,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Bromomethane	ug/kg	<1	TM15/PM10			<1	<1	<1	<1		<1	<1		<1			<1	<1	<1		<1	<1	<1	<1	<1	<1	
Butylbenzene, n-	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Butylbenzene, sec-	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Butylbenzene, tert-	ug/kg	<5	TM15/PM10			<5	<5	<5	<5		<5	<5		<5			<5	<5	<5		<5	<5	<5	<5	<5	<5	
Chlorobenzene	ug/kg	<3	TM15/PM10	31,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Chlorobromomethane	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Chloroethane	ug/kg	<2	TM15/PM10	530,000	0	<2	<2	<2	<2		<2	<2		<2			<2	<2	<2		<2	<2	<2	<2	<2	<2	
Chloroethene (Vinyl Chloride)	ug/kg	<2	TM15_A/PM10	38	1	48	4	<2	<2		<2	<2		<2			<2	<2	<2		30	<2	<2	<2	<2	<2	
Chloromethane	ug/kg	<3	TM15/PM10	560	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Chlorotoluene, 2-	ug/kg	<3	TM15/PM10	3,200,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Chlorotoluene, 4-	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dibromo-3-chloropropane, 1,2- (DBCP)	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dibromochloromethane	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dibromoethane, 1,2-	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dibromomethane	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dichlorobenzene-1,2	ug/kg	<4	TM15/PM10	1,100,000	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichlorobenzene-1,2	ug/kg	<10	TM16/PM8	1,100,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Dichlorobenzene-1,3	ug/kg	<4	TM15/PM10	17,000	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichlorobenzene-1,3	ug/kg	<10	TM16/PM8	17,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Dichlorobenzene-1,4	ug/kg	<4	TM15/PM10	2,400,000	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichlorobenzene-1,4	ug/kg	<10	TM16/PM8	2,400,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Dichlorodifluoromethane	ug/kg	<2	TM15/PM10			<2	<2	<2	<2		<2	<2		<2			<2	<2	<2		<2	<2	<2	<2	<2	<2	
Dichloroethane-1,1	ug/kg	<3	TM15/PM10	140,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dichloroethane-1,2	ug/kg	<4	TM15/PM10	340	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichloroethene-1,1,	ug/kg	<6	TM15/PM10	14,000	0	<6	<6	<6	<6		<6	<6		<6			<6	<6	<6		<6	<6	<6	<6	<6	<6	
Dichloroethene-1,2-cis	ug/kg	<3	TM15/PM10	7,300	0	44	296	<3	<3		<3	<3		15			<3	<3	20		30	5	79	<3	<3	<3	
Dichloroethene-1,2-trans	ug/kg	<3	TM15/PM10	12,000	0	14	5	<3	<3		<3	<3		<3			<3	<3	<3		6	<3	<3	<3	<3	<3	
Dichloromethane	ug/kg	<30	TM15/PM10	130,000	0	<30	<30	<30	<30		<30	<30		<30			<30	<30	<30		<30	<30	<30	<30	<30	<30	
Dichloropropane, 1,2-	ug/kg	<6	TM15/PM10	1,600	0	<6	<6	<6	<6		<6	<6		<6			<6	<6	<6		<6	<6	<6	<6	<6	<6	
Dichloropropane, 1,3-	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dichloropropane, 2,2- (R220a)	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichloropropene, 1,1-	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Dichloropropene, 1,3-cis	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Dichloropropene, 1,3-trans	ug/kg	<3	TM15/PM10			<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Hexachloro-1,3-butadiene	ug/kg	<4	TM15/PM10	17,000	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Hexachloro-1,3-butadiene	ug/kg	<10	TM16/PM8	17,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Iso-propylbenzene	ug/kg	<3	TM15/PM10	710,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Isopropyltoluene, 4-	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Propylbenzene	ug/kg	<4	TM15/PM10	2,100,000	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Styrene	ug/kg	<3	TM15_A/PM10	1,900,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Tetrachloroethane-1,1,1,2	ug/kg	<3	TM15/PM10	59,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Tetrachloroethane-1,1,2,2	ug/kg	<3	TM15/PM10	150,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Tetrachloroethene	ug/kg	<3	TM15/PM10	10,000	0	<3	<3	4	<3		3	<3		42			<3	<3	<3		<3	6	<3	<3	<3	<3	
Tetrachloromethane (Carbon Tetrachloride)	ug/kg	<4	TM15/PM10	1,600	0	<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Trichlorobenzene-1,2,3	ug/kg	<7	TM15/PM10	55,000	0	<7	<7	<7	<7		<7	<7		<7			<7	<7	<7		<7	<7	<7	<7	<7	<7	
Trichlorobenzene-1,2,4	ug/kg	<7	TM15/PM10	120,000	0	<7	<7	<7	<7		<7	<7		<7			<7	<7	<7		<7	<7	<7	<7	<7	<7	
Trichlorobenzene-1,2,4	ug/kg	<10	TM16/PM8	120,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Trichloroethane-1,1,1	ug/kg	<3	TM15/PM10	370,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Trichloroethane-1,1,2	ug/kg	<3	TM15/PM10	48,000	0	11	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	100	<3	<3	<3	
Trichloroethene	ug/kg	<3	TM15/PM10	680	0	16	<3	<3	<3		<3	<3		70			5	<3	13		40	8	98	<3	<3	<3	
Trichlorofluoromethane	ug/kg	<2	TM15/PM10			<2	<2	<2	<2		<2	<2		<2			<2	<2	<2		<2	<2	<2	<2	<2	<2	
Trichloromethane (Chloroform)	ug/kg	<3	TM15/PM10	53,000	0	<3	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Trichloropropane, 1,2,3-	ug/kg	<4	TM15/PM10			<4	<4	<4	<4		<4	<4		<4			<4	<4	<4		<4	<4	<4	<4	<4	<4	
Trimethylbenzene-1,2,4	ug/kg	<6	TM15/PM10	22,000	0	31	<6	<6	<6		<6	<6		<6			<6	<6	<6		<6	<6	<6	<6	<6	<6	
Trimethylbenzene-1,3,5	ug/kg	<3	TM15/PM10	12,000	0	9	<3	<3	<3		<3	<3		<3			<3	<3	<3		<3	<3	<3	<3	<3	<3	
Surrogate Recovery 4-Bromofluorobenzene	%	<0	TM15/PM10			82	98	96	93		81	97		74			89	93	68		81	80	90	79	98	83	
Surrogate Recovery Toluene D8	%	<0	TM15/PM10			88	97	104	106		92	97		100			104	106	93		98	100	104	101	101	109	
Semi Volatile Organic Compounds (SVOCs)																											
Azobenzene	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Bis (2-chloroethoxy) methane	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Bis (2-chloro-ethyl) ether	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Bromophenyl phenylether, 4-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Butyl benzyl phthalate	ug/kg	<100	TM16/PM8	940,000,000	0	<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Carbazole	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		30		<10	<10	<10	<10	
Chloro-3-methylphenol, 4-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Chloroaniline, p-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Chloronaphthalene-2	ug/kg	<10	TM16/PM8	210,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Chlorophenol-2	ug/kg	<10	TM16/PM8	3,600,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Chlorophenyl phenylether, 4-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Di(2-ethylhexyl)phthalate (DEHP)	ug/kg	<100	TM16/PM8	85,000,000	0	<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Dibenzofuran	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		16		58		<10	<10	<10	<10	
Dichlorophenol-2,4	ug/kg	<10	TM16/PM8	3,500,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Diethyl Phthalate	ug/kg	<100	TM16/PM8	120,000,000	0	<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Dimethylphenol-2,4	ug/kg	<10	TM16/PM8	13,000,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Dimethylphthalate	ug/kg	<100	TM16/PM8			<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Di-n-butyl phthalate	ug/kg	<100	TM16/PM8	15,000,000	0	<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Dinitrotoluene-2,4	ug/kg	<10	TM16/PM8	3,700,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Dinitrotoluene-2,6	ug/kg	<10	TM16/PM8	1,900,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Di-n-octyl phthalate	ug/kg	<100	TM16/PM8	89,000,000	0	<100		<100	<100			<100		<100			<100		<100		<100		<100	<100	<100	<100	
Hexachlorobenzene	ug/kg	<10	TM16/PM8	91,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Hexachlorocyclopentadiene	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Hexachloroethane	ug/kg	<10	TM16/PM8	11,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Isophorone	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Methylnaphthalene, 2-	ug/kg	<10	TM16/PM8			96		<10	<10			<10		<10			<10		23		50		<10	<10	<10	<10	
Nitroaniline, 2-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitroaniline, 3-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitroaniline, 4-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitrobenzene	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitrophenol, 2-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitrophenol, 4-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Nitrosodi-n-propylamine, n-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Trichlorophenol, 2,4,5-	ug/kg	<10	TM16/PM8			<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Trichlorophenol-2,4,6	ug/kg	<10	TM16/PM8	4,000,000	0	<10		<10	<10			<10		<10			<10		<10		<10		<10	<10	<10	<10	
Surrogate Recovery 2-Fluorobiphenyl	%	<0	TM16/PM8			106		110	123			101		121			127		123		112		123	123	113	111	
Surrogate Recovery p-Terphenyl-d14	%	<0	TM16/PM8			104		101	119			84		119			118		125		113		121	120	101	109	
Tentatively Identified Compounds																											
1-Ethyl-4-methylcyclohexane	ug/kg	<100	TICs	NC															302								

1H-Indene, octahydro-, cis-	ug/kg	<100	TICs	NC														202			
cis-1-Ethyl-3-methyl-cyclohexane	ug/kg	<100	TICs	NC														367			
Dodecane	ug/kg	<100	TICs	NC	331																
Naphthalene, decahydro-	ug/kg	<100	TICs	NC														215			
Surrogate Recovery 4-Bromofluorobenzene	%	<0	TICs	NC	82	98	96	93	81	97	74		89	93	68	81	80	90	79	98	83
Surrogate Recovery Toluene D8	%	<0	TICs	NC	88	97	104	106	92	97	100		104	106	93	98	100	104	101	101	109
Tridecane	ug/kg	<100	TICs	NC	348																
Undecane	ug/kg	<100	TICs	NC	376																
VOC TICs	None		TICs	NC																	
PCB																					
PCB Congener 101	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 118	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 138	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 153	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 180	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 28	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
PCB Congener 52	ug/kg	<5	TM17/PM8							<5	<5	<5	<5								
Total 7 PCBs #	ug/kg	<35	TM17/PM8							<35	<35	<35	<35								

Risks to Controlled Waters

				Sample ID	CP01	CP02	CP03	CP05
Report:				Depth				
EMT Job No:				Sample Type	Ground Water	Ground Water	Ground Water	Ground Water
Client:				Sampled Date	10/08/2020	10/08/2020	14/08/2020	14/08/2020
Client ref:				Sample Received Date	12/08/2020	12/08/2020	18/08/2020	18/08/2020
Location:				EMT Sample No	3-9	10-16	8-14	1-7
Contact				Batch Number	1	1	1	1
Test	**Units**	**LOD**	**GAC**	**No. > GAC**				
Inorganics								
Metals								
Dissolved Arsenic #	ug/l	<2.5	7.5	0	5.3	3	4.2	<2.5
Dissolved Beryllium	ug/l	<0.5	4	0	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l	<12	750	1	373	171	335	879
Dissolved Cadmium #	ug/l	<0.5	3.75	0	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium #	mg/l	<0.2	NC	0	NA	NA	109.5	604.9
Total Dissolved Chromium #	ug/l	<1.5	37.5	0	<1.5	<1.5	<1.5	<1.5
Dissolved Copper #	ug/l	<7	1500	0	<7	<7	<7	<7
Total Dissolved Iron #	ug/l	<20	200	0	NA	NA	32	<20
Dissolved Lead #	ug/l	<5	7.5	0	<5	<5	<5	<5
Dissolved Magnesium #	mg/l	<0.1	NC	0	NA	NA	58.6	978.4
Dissolved Mercury #	ug/l	<1	0.75	0	<1	<1	<1	<1
Dissolved Nickel #	ug/l	<2	15	1	10	7	6	24
Dissolved Potassium #	mg/l	<0.1	NC	0	NA	NA	24.2	57.7
Dissolved Selenium #	ug/l	<3	7.5	1	17	<3	<3	<3
Dissolved Sodium #	mg/l	<0.1	150	1	NA	NA	142	575.4
Dissolved Vanadium #	ug/l	<1.5	60	0	5.9	2.8	4.5	3.5
Dissolved Zinc #	ug/l	<3	5000	0	5	3	<3	15
Total Hardness Dissolved (as CaCO	mg/l	<1	NC	0	1646	1396	520	5622
Sulphate as SO4 #	mg/l	<0.5	188	4	1576.1	893.8	488.3	4265.7
Chloride #	mg/l	<0.3	188	1	NA	NA	128.1	376.2
Nitrite as NO2 #	mg/l	<0.02	0.5	1	NA	NA	8.34	<0.02
Nitrate as N #	mg/l	<0.05	50	0	NA	NA	0.22	<0.05
Total Cyanide #	mg/l	<0.01	50	0	0.02	<0.01	0.01	<0.01
Ammoniacal Nitrogen as N #	mg/l	<0.03	0.29	3	0.75	0.07	0.88	1.32
Hexavalent Chromium	ug/l	<6	5	0	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l	<6	37.5	0	<6	<6	<6	<6
Total Alkalinity as CaCO3 #	mg/l	<1	NC	0	NA	NA	74	538
Sulphide	mg/l	<0.01	NC	0	NA	NA	<0.01	<0.01
pH #	pH units	<0.01	NC	0	7.75	7.71	7.17	7.39
Organics								
Total Phenols HPLC	mg/l	<0.15		0	<0.15	<0.15	<0.15	<0.15
PAHs								
Naphthalene #	ug/l	<0.1	0.075	0	<0.1	<0.1	<0.1	<0.1
Acenaphthylene #	ug/l	<0.013	NC	0	0.022	<0.013	<0.013	<0.013
Acenaphthene #	ug/l	<0.013	NC	0	0.047	<0.013	<0.013	<0.013
Fluorene #	ug/l	<0.014	NC	0	0.052	<0.014	<0.014	<0.014
Phenanthrene #	ug/l	<0.011	NC	0	0.091	0.019	0.025	<0.011
Anthracene #	ug/l	<0.013	0.05	0	0.021	<0.013	<0.013	<0.013
Fluoranthene #	ug/l	<0.012	0.075	1	0.199	0.036	0.065	<0.012
Pyrene #	ug/l	<0.013	NC	0	0.299	0.042	0.074	0.02
Benzo(a)anthracene #	ug/l	<0.015	NC	0	0.05	<0.015	0.04	<0.015
Chrysene #	ug/l	<0.011	NC	0	0.092	<0.011	0.044	<0.011
Benzo(a)pyrene #	ug/l	<0.016	0.0075	2	0.03	<0.016	0.044	<0.016
Benzo(b)fluoranthene	ug/l	<0.01		0	0.05	<0.01	0.05	<0.01
Benzo(k)fluoranthene	ug/l	<0.01	Sum of four	0	0.02	<0.01	0.02	<0.01
Indeno(123cd)pyrene #	ug/l	<0.011	compounds	0	0.015	<0.011	0.03	<0.011
Benzo(ghi)perylene #	ug/l	<0.011		0	0.014	<0.011	0.022	<0.011
			0.1	1	0.099	0	0.122	0
Benzo(bk)fluoranthene #	ug/l	<0.018	as above	0	0.073	<0.018	0.075	<0.018
Dibenzo(ah)anthracene #	ug/l	<0.01	NC	0	<0.01	<0.01	<0.01	<0.01
PAH 16 Total #	ug/l	<0.195	NC	0	1.005	<0.195	0.419	<0.195
PAH Surrogate % Recovery	%	<0	N/A	N/A	82	83	89	87
BTEX								
Benzene # (C5-07 Aromatic)	ug/l	<0.5	0.75	0	<0.5	<0.5	<0.5	<0.5
Toluene # (C7-C8 Aromatic)	ug/l	<5	700	0	<5	<5	<5	<5
Ethylbenzene #	ug/l	<1	300	0	<1	<1	<1	<1
m/p-Xylene #	ug/l	<2	500	0	<2	<2	<2	<2
o-Xylene #	ug/l	<1	500	0	<1	<1	<1	<1
Methyl Tertiary Butyl Ether #	ug/l	<0.1	15	0	<0.1	<0.1	<0.1	<0.1
TPH CWG								
Aliphatics								
>C5-C6 #	ug/l	<10		0	<10	<10	<10	<10
>C6-C8 #	ug/l	<10	0.75	1	69	<10	<10	<10
>C8-C10 #	ug/l	<10		0	<10	<10	<10	<10
>C10-C12 #	ug/l	<5		0	<5	<5	<5	<5
>C12-C16 #	ug/l	<10		0	<10	<10	<10	<10
>C16-C21 #	ug/l	<10		0	<10	<10	<10	<10
>C21-C35 #	ug/l	<10		0	<10	<10	<10	<10
Total aliphatics C5-35 #	ug/l	<10		N/A	69	<10	<10	<10
Aromatics								
>C5-EC7 #	ug/l	<10		0	<10	<10	<10	<10
>EC7-EC8 #	ug/l	<10		0	<10	<10	<10	<10
>EC8-EC10 #	ug/l	<10		0	<10	<10	<10	<10
>EC10-EC12 #	ug/l	<5		0	<5	<5	<5	<5
>EC12-EC16 #	ug/l	<10		0	<10	<10	<10	<10
>EC16-EC21 #	ug/l	<10		0	<10	<10	<10	<10
>EC21-EC35 #	ug/l	<10		0	<10	<10	<10	<10
Total aromatics C5-35 #	ug/l	<10		N/A	<10	<10	<10	<10
Total aliphatics and aromatics(C5-3	ug/l	<10		N/A	69	<10	<10	<10
VOCs								
Dichlorodifluoromethane	ug/l	<2		0	<2	<2	<2	<2
Chloromethane #	ug/l	<3		0	<3	<3	<3	<3
Vinyl Chloride #	ug/l	<0.1	0.375	1	18.1	<0.1	<0.1	<0.1
Bromomethane	ug/l	<1		0	<1	<1	<1	<1
Chloroethane #	ug/l	<3		0	<3	<3	<3	<3
Trichlorofluoromethane #	ug/l	<3		0	<3	<3	<3	<3
1,1-Dichloroethene (1,1 DCE) #	ug/l	<3		0	<3	<3	<3	<3
Dichloromethane (DCM) #	ug/l	<5		0	<5	<5	<5	<5
trans-1-2-Dichloroethene #	ug/l	<3	50	0	4	<3	<3	<3
1,1-Dichloroethane #	ug/l	<3		0	<3	<3	<3	<3
cis-1-2-Dichloroethene #	ug/l	<3	50	1	224	<3	<3	<3
2,2-Dichloropropane	ug/l	<1		0	<1	<1	<1	<1
Bromochloromethane #	ug/l	<2		0	<2	<2	<2	<2
Chloroform #	ug/l	<2	0.1	1	<2	4	<2	<2
1,1,1-Trichloroethane #	ug/l	<2		0	<2	<2	<2	<2
1,1-Dichloropropene #	ug/l	<3		0	<3	<3	<3	<3
Carbon tetrachloride #	ug/l	<2		0	<2	<2	<2	<2
1,2-Dichloroethane #	ug/l	<2		0	<2	<2	<2	<2
Trichloroethene (TCE) #	ug/l	<3	7.5	1	30	<3	<3	<3
1,2-Dichloropropane #	ug/l	<2		0	<2	<2	<2	<2
Dibromomethane #	ug/l	<3		0	<3	<3	<3	<3
Bromodichloromethane #	ug/l	<2		0	<2	<2	<2	<2
cis-1-3-Dichloropropene	ug/l	<2		0	<2	<2	<2	<2
trans-1-3-Dichloropropene	ug/l	<2		0	<2	<2	<2	<2
1,1,2-Trichloroethane #	ug/l	<2		0	<2	<2	<2	<2
Tetrachloroethene (PCE) #	ug/l	<3		0	<3	<3	<3	<3
1,3-Dichloropropane #	ug/l	<2		0	<2	<2	<2	<2
Dibromochloromethane #	ug/l	<2		0	<2	<2	<2	<2
1,2-Dibromoethane #	ug/l	<2		0	<2	<2	<2	<2
Chlorobenzene #	ug/l	<2		0	<2	<2	<2	<2
1,1,1,2-Tetrachloroethane #	ug/l	<2		0	<2	<2	<2	<2
Styrene	ug/l	<2		0	<2	<2	<2	<2
Bromoform #	ug/l	<2		0	<2	<2	<2	<2
Isopropylbenzene #	ug/l	<3		0	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	ug/l	<4		0	<4	<4	<4	<4
Bromobenzene #	ug/l	<2		0	<2	<2	<2	<2
1,2,3-Trichloropropane #	ug/l	<3		0	<3	<3	<3	<3
Propylbenzene #	ug/l	<3		0	<3	<3	<3	<3
2-Chlorotoluene #	ug/l	<3		0	<3	<3	<3	<3
1,3,5-Trimethylbenzene #	ug/l	<3		0	<3	<3	<3	<3
4-Chlorotoluene #	ug/l	<3		0	<3	<3	<3	<3
tert-Butylbenzene #	ug/l	<3		0	<3	<3	<3	<3
1,2,4-Trimethylbenzene #	ug/l	<3		0	<3	<3	<3	<3
sec-Butylbenzene #	ug/l	<3		0	<3	<3	<3	<3
4-Isopropyltoluene #	ug/l	<3		0	<3	<3	<3	<3
1,3-Dichlorobenzene #	ug/l	<3		0	<3	<3	<3	<3
1,4-Dichlorobenzene #	ug/l	<3		0	<3	<3	<3	<3
n-Butylbenzene #	ug/l	<3		0	<3	<3	<3	<3

WFD Threshold Values (TVs) for 'Good' Status. General Quality of Groundwater Body

WFD Threshold Values (TVs) for 'Good' Status. Drinking Water Protection Area

Scotland Resource Protection Values (Non-Hazardous Substances)

Scotland Resource Protection Value (Significant Pollution of Contaminated Land

Permitting Standards (England) Freshwater Annual Average EQS

Scotland Drinking Water Standards

UKTAG Technical Report on Groundwater Hazardous Substances Sept 2016. Concentration in Groundwater Below Which Danger of Deterioration in Receiving Groundwater is Avoided[1]

England and Wales Minimum Reporting Values for Hazardous Substances

WHO Drinking Water Guideline Values

1,2-Dichlorobenzene #	ug/l	<3		0	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	ug/l	<2		0	<2	<2	<2	<2
1,2,4-Trichlorobenzene	ug/l	<3		0	<3	<3	<3	<3
Hexachlorobutadiene	ug/l	<3		0	<3	<3	<3	<3
Naphthalene	ug/l	<2		0	<2	<2	<2	<2
1,2,3-Trichlorobenzene	ug/l	<3		0	<3	<3	<3	<3
Surrogate Recovery Toluene D8	%	<0	N/A	N/A	93	93	100	101
Surrogate Recovery 4-Bromofluorc	%	<0	N/A	N/A	94	92	103	105
VOC TICs	None	-		0	ND	ND	ND	ND
Methyl Tertiary Butyl Ether #	ug/l	<0.1		0	<0.1	<0.1	<0.1	<0.1
Benzene #	ug/l	<0.5		0	<0.5	<0.5	<0.5	<0.5
Toluene #	ug/l	<5		0	<5	<5	<5	<5
Ethylbenzene #	ug/l	<1		0	<1	<1	<1	<1
m/p-Xylene #	ug/l	<2		0	<2	<2	<2	<2
o-Xylene #	ug/l	<1		0	<1	<1	<1	<1
Surrogate Recovery Toluene D8	%	<0	N/A	N/A	93	93	100	101
Surrogate Recovery 4-Bromofluorc	%	<0	N/A	N/A	94	92	103	105
SVOC MS								
Phenols								
2-Chlorophenol #	ug/l	<1		0	<1	NA	<1	<1
2-Methylphenol #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
2-Nitrophenol	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
2,4-Dichlorophenol #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
2,4-Dimethylphenol	ug/l	<1		0	<1	NA	<1	<1
2,4,5-Trichlorophenol #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l	<1		0	<1	NA	<1	<1
4-Chloro-3-methylphenol #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
4-Methylphenol	ug/l	<1		0	<1	NA	<1	<1
4-Nitrophenol	ug/l	<10		0	<10	NA	<10	<10
Pentachlorophenol	ug/l	<1		0	<1	NA	<1	<1
Phenol	ug/l	<1		0	<1	NA	<1	<1
PAHs								
2-Chloronaphthalene #	ug/l	<1		0	<1	NA	<1	<1
2-Methylnaphthalene #	ug/l	<1		0	<1	NA	<1	<1
Phthalates								
Bis(2-ethylhexyl) phthalate	ug/l	<5		0	<5	NA	<5	<5
Butylbenzyl phthalate	ug/l	<1		0	<1	NA	<1	<1
Di-n-butyl phthalate #	ug/l	<1.5		0	<1.5	NA	<1.5	<1.5
Di-n-Octyl phthalate	ug/l	<1		0	<1	NA	<1	<1
Diethyl phthalate #	ug/l	<1		0	<1	NA	<1	<1
Dimethyl phthalate	ug/l	<1		0	<1	NA	<1	<1
Other SVOCs								
1,2-Dichlorobenzene #	ug/l	<1		0	<1	NA	<1	<1
1,2,4-Trichlorobenzene #	ug/l	<1		0	<1	NA	<1	<1
1,3-Dichlorobenzene #	ug/l	<1		0	<1	NA	<1	<1
1,4-Dichlorobenzene #	ug/l	<1		0	<1	NA	<1	<1
2-Nitroaniline	ug/l	<1		0	<1	NA	<1	<1
2,4-Dinitrotoluene #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
2,6-Dinitrotoluene	ug/l	<1		0	<1	NA	<1	<1
3-Nitroaniline	ug/l	<1		0	<1	NA	<1	<1
4-Bromophenylphenylether #	ug/l	<1		0	<1	NA	<1	<1
4-Chloroaniline	ug/l	<1		0	<1	NA	<1	<1
4-Chlorophenylphenylether #	ug/l	<1		0	<1	NA	<1	<1
4-Nitroaniline	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Azobenzene #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Bis(2-chloroethoxy)methane #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Bis(2-chloroethyl)ether #	ug/l	<1		0	<1	NA	<1	<1
Carbazole #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Dibenzofuran #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Hexachlorobenzene #	ug/l	<1		0	<1	NA	<1	<1
Hexachlorobutadiene #	ug/l	<1		0	<1	NA	<1	<1
Hexachlorocyclopentadiene	ug/l	<1		0	<1	NA	<1	<1
Hexachloroethane #	ug/l	<1		0	<1	NA	<1	<1
Isophorone #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
N-nitrosodi-n-propylamine #	ug/l	<0.5		0	<0.5	NA	<0.5	<0.5
Nitrobenzene #	ug/l	<1		0	<1	NA	<1	<1
Surrogate Recovery 2-Fluorobiphe	%	<0		N/A	110	NA	104	105
Surrogate Recovery p-Terphenyl-d	%	<0		N/A	114	NA	111	103
PCBs								
PCB 28	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 52	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 101	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 118	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 138	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 153	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
PCB 180	ug/l	<0.1	0.5	0	NA	NA	-	<0.1
Total 7 PCBs	ug/l	<0.7		0	NA	NA	-	<0.7

Risks to Human Health

Report:	**Liquid**
EMT Job No:	20/10939
Client:	Ramboll
Client ref:	1620009986
Location:	Park Royal
Contact	Charles Collins

Test	Method	Units	LOD	GAC	No. > GAC	**Sample ID**	**CP01**	**CP02**	**CP03**	**CP05**
						Depth				
						Sample Type	Ground Water	Ground Water	Ground Water	Ground Water
						Sampled Date	10/08/2020	10/08/2020	14/08/2020	14/08/2020
						Sample Received Date	12/08/2020	12/08/2020	18/08/2020	18/08/2020
						EMT Sample No	3-9	10-16	8-14	1-7
						Batch Number	1	1	1	1
Inorganics										
Metals										
Dissolved Arsenic #	TM30/PM14	ug/l	<2.5	NV	0		5.3	3	4.2	<2.5
Dissolved Beryllium	TM30/PM14	ug/l	<0.5	NV	0		<0.5	<0.5	<0.5	<0.5
Dissolved Boron	TM30/PM14	ug/l	<12	NV	0		373	171	335	879
Dissolved Cadmium #	TM30/PM14	ug/l	<0.5	NV	0		<0.5	<0.5	<0.5	<0.5
Dissolved Calcium #	TM30/PM14	mg/l	<0.2	NV	0		NA	NA	109.5	604.9
Total Dissolved Chromium #	TM30/PM14	ug/l	<1.5	NV	0		<1.5	<1.5	<1.5	<1.5
Dissolved Copper #	TM30/PM14	ug/l	<7	NV	0		<7	<7	<7	<7
Total Dissolved Iron #	TM30/PM14	ug/l	<20	NV	0		NA	NA	32	<20
Dissolved Lead #	TM30/PM14	ug/l	<5	NV	0		<5	<5	<5	<5
Dissolved Magnesium #	TM30/PM14	mg/l	<0.1	NV	0		NA	NA	58.6	978.4
Dissolved Mercury #	TM30/PM14	ug/l	<1	95	0		<1	<1	<1	<1
Dissolved Nickel #	TM30/PM14	ug/l	<2	NV	0		10	7	6	24
Dissolved Potassium #	TM30/PM14	mg/l	<0.1	NV	0		NA	NA	24.2	57.7
Dissolved Selenium #	TM30/PM14	ug/l	<3	NV	0		17	<3	<3	<3
Dissolved Sodium #	TM30/PM14	mg/l	<0.1	NV	0		NA	NA	142	575.4
Dissolved Vanadium #	TM30/PM14	ug/l	<1.5	NV	0		5.9	2.8	4.5	3.5
Dissolved Zinc #	TM30/PM14	ug/l	<3	NV	0		5	3	<3	15
Total Hardness Dissolved (as CaCO3	TM30/PM14	mg/l	<1	NV	0		1646	1396	520	5622
Sulphate as SO4 #	TM38/PM0	mg/l	<0.5	NV	0		1576.1	893.8	488.3	4265.7
Chloride #	TM38/PM0	mg/l	<0.3	NV	0		NA	NA	128.1	376.2
Nitrite as NO2 #	TM38/PM0	mg/l	<0.02	NV	0		NA	NA	8.34	<0.02
Nitrate as N #	TM38/PM0	mg/l	<0.05	NV	0		NA	NA	0.22	<0.05
Total Cyanide #	TM89/PM0	mg/l	<0.01	NV	0		0.02	<0.01	0.01	<0.01
Ammoniacal Nitrogen as N #	TM38/PM0	mg/l	<0.03	NV	0		0.75	0.07	0.88	1.32
Hexavalent Chromium	TM38/PM0	ug/l	<6	NV	0		<6	<6	<6	<6
Total Dissolved Chromium III	TM0/PM0	ug/l	<6	NV	0		<6	<6	<6	<6
Total Alkalinity as CaCO3 #	TM75/PM0	mg/l	<1	NV	0		NA	NA	74	538
Sulphide	TM107/PM0	mg/l	<0.01	NV	0		NA	NA	<0.01	<0.01
pH #	TM73/PM0	pH units	<0.01	NV	0		7.75	7.71	7.17	7.39
Organics										
Total Phenols HPLC	TM26/PM0	mg/l	<0.15	NV	0		<0.15	<0.15	<0.15	<0.15
PAHs										
Naphthalene #	TM4/PM30	ug/l	<0.1	23,000	0		<0.1	<0.1	<0.1	<0.1
Acenaphthylene #	TM4/PM30	ug/l	<0.013	20,000,000	0		0.022	<0.013	<0.013	<0.013
Acenaphthene #	TM4/PM30	ug/l	<0.013	15,000,000	0		0.047	<0.013	<0.013	<0.013
Fluorene #	TM4/PM30	ug/l	<0.014	18,000,000	0		0.052	<0.014	<0.014	<0.014
Phenanthrene #	TM4/PM30	ug/l	<0.011	NV	0		0.091	0.019	0.025	<0.011
Anthracene #	TM4/PM30	ug/l	<0.013	NV	0		0.021	<0.013	<0.013	<0.013
Fluoranthene #	TM4/PM30	ug/l	<0.012	NV	0		0.199	0.036	0.065	<0.012
Pyrene #	TM4/PM30	ug/l	<0.013	NV	0		0.299	0.042	0.074	0.02
Benzo(a)anthracene #	TM4/PM30	ug/l	<0.015	NV	0		0.05	<0.015	0.04	<0.015
Chrysene #	TM4/PM30	ug/l	<0.011	NV	0		0.092	<0.011	0.044	<0.011
Benzo(bk)fluoranthene #	TM4/PM30	ug/l	<0.018	NV	0		0.073	<0.018	0.075	<0.018
Benzo(a)pyrene #	TM4/PM30	ug/l	<0.016	NV	0		0.03	<0.016	0.044	<0.016
Indeno(123cd)pyrene #	TM4/PM30	ug/l	<0.011	NV	0		0.015	<0.011	0.03	<0.011
Dibenzo(ah)anthracene #	TM4/PM30	ug/l	<0.01	NV	0		<0.01	<0.01	<0.01	<0.01
Benzo(ghi)perylene #	TM4/PM30	ug/l	<0.011	NV	0		0.014	<0.011	0.022	<0.011
PAH 16 Total #	TM4/PM30	ug/l	<0.195	NV	0		1.005	<0.195	0.419	<0.195
Benzo(b)fluoranthene	TM4/PM30	ug/l	<0.01	NV	0		0.05	<0.01	0.05	<0.01
Benzo(k)fluoranthene	TM4/PM30	ug/l	<0.01	NV	0		0.02	<0.01	0.02	<0.01
PAH Surrogate % Recovery	TM4/PM30	%	<0	N/A	N/A		82	83	89	87
BTEX										
Benzene #	TM15/PM10	ug/l	<0.5	20,000	0		<0.5	<0.5	<0.5	<0.5
Toluene #	TM15/PM10	ug/l	<5	21,000,000	0		<5	<5	<5	<5
Ethylbenzene #	TM15/PM10	ug/l	<1	960,000	0		<1	<1	<1	<1
m/p-Xylene #	TM15/PM10	ug/l	<2	940,000	0		<2	<2	<2	<2
o-Xylene #	TM15/PM10	ug/l	<1	1,100,000	0		<1	<1	<1	<1
Methyl Tertiary Butyl Ether #	TM15/PM10	ug/l	<0.1	7,800,000	0		<0.1	<0.1	<0.1	<0.1
TPH CWG										
Aliphatics										
>C5-C6 #	TM36/PM12	ug/l	<10	190,000	0		<10	<10	<10	<10
>C6-C8 #	TM36/PM12	ug/l	<10	150,000	0		69	<10	<10	<10
>C8-C10 #	TM36/PM12	ug/l	<10	5,700	0		<10	<10	<10	<10
>C10-C12 #	TM5/PM16/PM30	ug/l	<5	3,600	0		<5	<5	<5	<5
>C12-C16 #	TM5/PM16/PM30	ug/l	<10	NV	0		<10	<10	<10	<10
>C16-C21 #	TM5/PM16/PM30	ug/l	<10	NV	0		<10	<10	<10	<10
>C21-C35 #	TM5/PM16/PM30	ug/l	<10	NV	0		<10	<10	<10	<10
Total aliphatics C5-35 #	TM5/TM36/PM12/PM16/PM30	ug/l	<10	N/A	N/A		69	<10	<10	<10
Aromatics										
>C5-EC7 #	TM36/PM12	ug/l	<10	20,000	0		<10	<10	<10	<10
>EC7-EC8 #	TM36/PM12	ug/l	<10	960,000	0		<10	<10	<10	<10
>EC8-EC10 #	TM36/PM12	ug/l	<10	190,000	0		<10	<10	<10	<10
>EC10-EC12 #	TM5/PM16/PM30	ug/l	<5	660,000	0		<5	<5	<5	<5
>EC12-EC16 #	TM5/PM16/PM30	ug/l	<10	3,700,000	0		<10	<10	<10	<10
>EC16-EC21 #	TM5/PM16/PM30	ug/l	<10	NV	0		<10	<10	<10	<10
>EC21-EC35 #	TM5/PM16/PM30	ug/l	<10	NV	0		<10	<10	<10	<10
Total aromatics C5-35 #	TM5/TM36/PM12/PM16/PM30	ug/l	<10	N/A	N/A		<10	<10	<10	<10

Total aliphatics and aromatics(C5-3	TM5/TM36/PM12/PM16/PM30	ug/l	<10	N/A	N/A	69	<10	<10	<10
VOCs									
Dichlorodifluoromethane	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
Chloromethane #	TM15/PM10	ug/l	<3	1,400	0	<3	<3	<3	<3
Vinyl Chloride #	TM15/PM10	ug/l	<0.1	63	0	18.1	<0.1	<0.1	<0.1
Bromomethane	TM15/PM10	ug/l	<1	NC	0	<1	<1	<1	<1
Chloroethane #	TM15/PM10	ug/l	<3	1,000,000	0	<3	<3	<3	<3
Trichlorofluoromethane #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
1,1-Dichloroethene (1,1 DCE) #	TM15/PM10	ug/l	<3	16,000	0	<3	<3	<3	<3
Dichloromethane (DCM) #	TM15/PM10	ug/l	<5	370,000	0	<5	<5	<5	<5
trans-1-2-Dichloroethene #	TM15/PM10	ug/l	<3	16,000	0	4	<3	<3	<3
1,1-Dichloroethane #	TM15/PM10	ug/l	<3	260,000	0	<3	<3	<3	<3
cis-1-2-Dichloroethene #	TM15/PM10	ug/l	<3	13,000	0	224	<3	<3	<3
2,2-Dichloropropane	TM15/PM10	ug/l	<1	NC	0	<1	<1	<1	<1
Bromochloromethane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
Chloroform #	TM15/PM10	ug/l	<2	85,000	0	<2	4	<2	<2
1,1,1-Trichloroethane #	TM15/PM10	ug/l	<2	290,000	0	<2	<2	<2	<2
1,1-Dichloropropene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
Carbon tetrachloride #	TM15/PM10	ug/l	<2	770	0	<2	<2	<2	<2
1,2-Dichloroethane #	TM15/PM10	ug/l	<2	850	0	<2	<2	<2	<2
Trichloroethene (TCE) #	TM15/PM10	ug/l	<3	530	0	30	<3	<3	<3
1,2-Dichloropropane #	TM15/PM10	ug/l	<2	2,600	0	<2	<2	<2	<2
Dibromomethane #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
Bromodichloromethane #	TM15/PM10	ug/l	<2	1,600	0	<2	<2	<2	<2
cis-1-3-Dichloropropene	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
trans-1-3-Dichloropropene	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
1,1,2-Trichloroethane #	TM15/PM10	ug/l	<2	49,000	0	<2	<2	<2	<2
Tetrachloroethene (PCE) #	TM15/PM10	ug/l	<3	4,600	0	<3	<3	<3	<3
1,3-Dichloropropane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
Dibromochloromethane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
1,3-Dichloropropane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
Dibromochloromethane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
1,2-Dibromoethane #	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
Chlorobenzene #	TM15/PM10	ug/l	<2	15,000	0	<2	<2	<2	<2
1,1,1,2-Tetrachloroethane #	TM15/PM10	ug/l	<2	22,000	0	<2	<2	<2	<2
Styrene	TM15/PM10	ug/l	<2	810,000	0	<2	<2	<2	<2
Bromoform #	TM15/PM10	ug/l	<2	400,000	0	<2	<2	<2	<2
Isopropylbenzene #	TM15/PM10	ug/l	<3	86,000	0	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	TM15/PM10	ug/l	<4	150,000	0	<4	<4	<4	<4
Bromobenzene #	TM15/PM10	ug/l	<2	20,000	0	<2	<2	<2	<2
1,2,3-Trichloropropane #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
Propylbenzene #	TM15/PM10	ug/l	<3	240,000	0	<3	<3	<3	<3
2-Chlorotoluene #	TM15/PM10	ug/l	<3	640,000	0	<3	<3	<3	<3
1,3,5-Trimethylbenzene #	TM15/PM10	ug/l	<3	2,200	0	<3	<3	<3	<3
4-Chlorotoluene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
tert-Butylbenzene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
1,2,4-Trimethylbenzene #	TM15/PM10	ug/l	<3	2,200	0	<3	<3	<3	<3
sec-Butylbenzene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
4-Isopropyltoluene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
1,3-Dichlorobenzene #	TM15/PM10	ug/l	<3	2,800	0	<3	<3	<3	<3
1,4-Dichlorobenzene #	TM15/PM10	ug/l	<3	460,000	0	<3	<3	<3	<3
n-Butylbenzene #	TM15/PM10	ug/l	<3	NC	0	<3	<3	<3	<3
1,2-Dichlorobenzene #	TM15/PM10	ug/l	<3	220,000	0	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	TM15/PM10	ug/l	<2	NC	0	<2	<2	<2	<2
1,2,4-Trichlorobenzene	TM15/PM10	ug/l	<3	7,200	0	<3	<3	<3	<3
Hexachlorobutadiene	TM15/PM10	ug/l	<3	230	0	<3	<3	<3	<3
Naphthalene	TM15/PM10	ug/l	<2	23,000	0	<2	<2	<2	<2
1,2,3-Trichlorobenzene	TM15/PM10	ug/l	<3	3,100	0	<3	<3	<3	<3
Surrogate Recovery Toluene D8	TM15/PM10	%	<0	N/A	N/A	93	93	100	101
Surrogate Recovery 4-Bromofluoro	TM15/PM10	%	<0	N/A	N/A	94	92	103	105
VOC TICs	TM15/PM10	None	-	-	0	ND	ND	ND	ND
Methyl Tertiary Butyl Ether #	TM15/PM10	ug/l	<0.1	7,800,000	0	<0.1	<0.1	<0.1	<0.1
Benzene #	TM15/PM10	ug/l	<0.5	20,000	0	<0.5	<0.5	<0.5	<0.5
Toluene #	TM15/PM10	ug/l	<5	21,000,000	0	<5	<5	<5	<5
Ethylbenzene #	TM15/PM10	ug/l	<1	960,000	0	<1	<1	<1	<1
m/p-Xylene #	TM15/PM10	ug/l	<2	940,000	0	<2	<2	<2	<2
o-Xylene #	TM15/PM10	ug/l	<1	1,100,000	0	<1	<1	<1	<1
Surrogate Recovery Toluene D8	TM15/PM10	%	<0	N/A	N/A	93	93	100	101
Surrogate Recovery 4-Bromofluoro	TM15/PM10	%	<0	N/A	N/A	94	92	103	105
SVOC MS									
Phenols									
2-Chlorophenol #	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
2-Methylphenol #	TM16/PM30	ug/l	<0.5	NV	0	<0.5	NA	<0.5	<0.5
2-Nitrophenol	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
2,4-Dichlorophenol #	TM16/PM30	ug/l	<0.5	NV	0	<0.5	NA	<0.5	<0.5
2,4-Dimethylphenol	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
2,4,5-Trichlorophenol #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
2,4,6-Trichlorophenol	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
4-Chloro-3-methylphenol #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
4-Methylphenol	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
4-Nitrophenol	TM16/PM30	ug/l	<10	NC	0	<10	NA	<10	<10
Pentachlorophenol	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
Phenol	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
PAHs									
2-Chloronaphthalene #	TM16/PM30	ug/l	<1	14,000	0	<1	NA	<1	<1
2-Methylnaphthalene #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Phthalates									
Bis(2-ethylhexyl) phthalate	TM16/PM30	ug/l	<5	NC	0	<5	NA	<5	<5
Butylbenzyl phthalate	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Di-n-butyl phthalate #	TM16/PM30	ug/l	<1.5	NC	0	<1.5	NA	<1.5	<1.5
Di-n-Octyl phthalate	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Diethyl phthalate #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1

Dimethyl phthalate	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Other SVOCs									
1,2-Dichlorobenzene #	TM16/PM30	ug/l	<1	220,000	0	<1	NA	<1	<1
1,2,4-Trichlorobenzene #	TM16/PM30	ug/l	<1	7,200	0	<1	NA	<1	<1
1,3-Dichlorobenzene #	TM16/PM30	ug/l	<1	2,800	0	<1	NA	<1	<1
1,4-Dichlorobenzene #	TM16/PM30	ug/l	<1	460,000	0	<1	NA	<1	<1
2-Nitroaniline	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
2,4-Dinitrotoluene #	TM16/PM30	ug/l	<0.5	NV	0	<0.5	NA	<0.5	<0.5
2,6-Dinitrotoluene	TM16/PM30	ug/l	<1	NV	0	<1	NA	<1	<1
3-Nitroaniline	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
4-Bromophenylphenylether #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
4-Chloroaniline	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
4-Chlorophenylphenylether #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
4-Nitroaniline	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Azobenzene #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Bis(2-chloroethoxy)methane #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Bis(2-chloroethyl)ether #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Carbazole #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Dibenzofuran #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Hexachlorobenzene #	TM16/PM30	ug/l	<1	1,400	0	<1	NA	<1	<1
Hexachlorobutadiene #	TM16/PM30	ug/l	<1	230	0	<1	NA	<1	<1
Hexachlorocyclopentadiene	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Hexachloroethane #	TM16/PM30	ug/l	<1	740	0	<1	NA	<1	<1
Isophorone #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
N-nitrosodi-n-propylamine #	TM16/PM30	ug/l	<0.5	NC	0	<0.5	NA	<0.5	<0.5
Nitrobenzene #	TM16/PM30	ug/l	<1	NC	0	<1	NA	<1	<1
Surrogate Recovery 2-Fluorobipher	TM16/PM30	%	<0	N/A	N/A	110	NA	104	105
Surrogate Recovery p-Terphenyl-d1	TM16/PM30	%	<0	N/A	N/A	114	NA	111	103
PCBs									
PCB 28	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 52	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 101	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 118	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 138	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 153	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
PCB 180	TM17/PM30	ug/l	<0.1	NC	0	NA	NA	-	<0.1
Total 7 PCBs	TM17/PM30	ug/l	<0.7	NC	0	NA	NA	-	<0.7

LEGISLATIVE BACKGROUND

England

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently revoked with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380) (as amended), which came into force in August 2006, and consolidated the previous regulations and amendments. Revised statutory guidance ("the Guidance") for local authorities on how to implement the regime, including the decision-making process on whether land is contaminated land in the legal sense, has been published by Defra and entered into force in April 2012.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears… to be in such a condition, by reason of substances in, on or under the land, that –

a) significant harm is being caused or there is a significant possibility of such harm being caused[7]; or

b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused".

"Significant harm" is defined in the Guidance on risk-based criteria and must be the result of one or more relevant 'contaminant linkages' relating to the land. The presence of a contaminant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. Under the Guidance, a 'significant contaminant linkage' is one which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. Should the authority consider that there is an unacceptably high probability, supported by robust science-based evidence that significant harm would occur if no action is taken to stop it, the land should be deemed a Category 1: Human Health. Land should be placed into Category 2 if the authority concludes, on the basis that there is a strong case for considering that the risks from the land are of sufficient concern, that the land poses a significant possibility of significant harm. Both Category 1 and Category 2 cases would be capable of being determined as contaminated land under Part 2A on the grounds of significant possibility of significant harm to human health. If the legal test for significant possibility of significant harm is not met, the authority should place the land into Category 3. If the local authority considers that there is no risk or that the level of risk posed is low, the land should be placed into Category 4.

For six common contaminants (benzo(a)pyrene, cadmium, arsenic, benzene, hexavalent chromium and lead), a set of screening values have been developed and endorsed for use by Defra[8] (the Category 4 Screening Levels, or C4SLs) that describe a level of risk just below the Category 3/4 boundary set in the Statutory Guidance, i.e. where concentrations are below the C4SL, there is no risk or the level of risk is acceptably low.

The pollution of controlled waters is defined in Section 78A(9) of the Act as "the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter". The new Guidance stresses that the Part 2A regime is designed to identify and deal with 'significant pollution' and not lesser levels of pollution. As with human health risk, Categories 1 and 2 comprise land where the local authority considers that a significant possibility of significant pollution of controlled waters exists and Categories 3 and 4 comprises cases where the authority considers that a significant possibility of such pollution does not exist. The local authority should be satisfied that a substance is continuing to enter controlled waters or is likely to enter controlled waters.

[7] Water Act 2003 (Commencement No. 11) Order 2012
[8] SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document, Defra, revised December 2014

APPENDIX 5
GAS AND GROUNDWATER MONITORING RECORDS

Appendix 5: Gas and Groundwater Monitoring Records

1620009986 Chandos Road, Park Royal

BH Ref.	Atmospheric Pressure (mbar)	Flow (L/hr)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	PID Reading (ppm/v)	Depth to water column (m bgl)	Comments
Round 1 Gas Monitoring – 10/08/2020								
CP01	1010	<0.1	<0.1	0.1	21.3	<0.1	0.17	Gas monitoring interrupted due to water being drawn from gas bung. Slight hydrocarbon odour from groundwater.
CP02	1010	<0.1	<0.1	0.5	17.3	6.2	1.78	No odour or sheen. Probe clean.
CP03	1000	<0.1	<0.1	0.1	19.8	1.5	0.39	No odour or sheen. Probe clean.
CP05	998	<0.1	<0.1	0.1	20.1	4.7	0.79	Slight sulphurous type odour from groundwater.
WS01	1012	<0.1	<0.1	5.8	9.8	3.4	1.94	Less than 1 litre groundwater purged. No recharge.
WS02	1012	<0.1	<0.1	<0.1	16.5	1.5	0.61	Monitoring well purged dry (approx. 4 litres groundwater recovered).
WS06	1009	<0.1	<0.1	0.5	20.9	0.2	-	Monitoring well dry. Probe clean.

1620009986 Chandos Road, Park Royal

BH Ref.	Atmospheric Pressure (mbar)	Flow (l/hr)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	PID Reading (ppm/v)	Depth to water column (m bgl)	Comments

Appendix 5: Gas and Groundwater Monitoring Records

Round 2 Gas and Groundwater Monitoring – 19/08/2020

CP01	998	<0.1	<0.1	<0.1	20.6	-	0.06	Unable to take PID reading due water in well. No odour, clean probe.
CP02	1000	<0.1	<0.1	0.5	17.9	5.1	1.80	No odour or sheen. Probe clean.
CP03	1000	<0.1	<0.1	<0.1	19.1	0.6	0.43	No odour or sheen. Probe clean.
CP05	998	<0.1	<0.1	0.1	19.8	1.3	0.49	No odour or sheen. Probe clean.
CP07	1000	<0.1	<0.1	1.5	15.3	4.1	8.72	No odour or sheen. Probe clean.
WS01	998	<0.1	<0.1	0.1	19.0	0.6	0.43	No odour or sheen. Probe clean.
WS02	998	<0.1	<0.1	0.1	17.4	1.8	0.53	Possible slight hydrocarbon odour (very faint), probe clean.
WS06	1000	<0.1	<0.1	0.8	20.2	0.1	-	Well dry. Probe clean.

Appendix 5: Gas and Groundwater Monitoring Records

1620009986 Chandos Road, Park Royal

BH Ref.	Atmospheric Pressure (mbar)	Flow (l/hr)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	PID Reading (ppm/v)	Depth to water column (m bgl)	Comments
Round 3 Gas Monitoring – 25/08/2020								
CP01	-	-	-	-	-	-	0.00	Well flooded to ground level. Unable to undertake gas monitoring. Slight sulphurous odour from water upon opening well cover.
CP02	993	<0.1	<0.1	0.5	19.0	0.5	1.79	No odour or sheen. Probe clean.
CP03	993	<0.1	<0.1	<0.1	20.8	0.1	0.28	No odour or sheen. Probe clean.
CP05	993	<0.1	<0.1	0.2	19.5	1	0.46	No odour or sheen. Probe clean.
CP07	995	<0.1	<0.1	2.2	14.3	3.6	8.13	No odour or sheen. Probe clean.
WS01	-	-	-	-	-	-	0.16	Well flooded. Groundwater level above tap level. Unable to undertake gas monitoring. No odour.
WS02	994	<0.1	<0.1	0.7	15.3	0.9	0.46	Slight possible hydrocarbon odour (very faint). Probe clean.
WS06	996	<0.1	<0.1	0.7	20.2	<0.1	3.00	Well dry. Probe clean.
WS07	994	<0.1	<0.1	0.1	20.7	0.2	-	Well dry. Probe clean.

GROUND GAS ASSESSMENT

Ground gases can be produced as a result of the decomposition of organic materials and may also originate from natural sources, such as coal seams and organic-rich soils. The principal components of ground gas are methane and carbon dioxide, although other gases may be present in trace concentrations. Ground gas can present a hazard to site occupants and property as result of flammable/explosive hazards, physiological effects, odour and effects on vegetation.

There is no single specific guidance document relating to ground gas measurement methods, risk assessment, and gas protection measures. Several documents have been published since the early 1990s to provide guidance for new developments, some of which have been more recently revised.

The following guidance documents were used in this assessment:

Ground Gas	**Reference Documents**
Methane and Carbon Dioxide	• Assessing Risks Posed by Hazardous Ground Gases to Buildings. Report C665, Construction Industry Research and Information Association (CIRIA), 2007. • Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BS 8485:2015. • The Building Regulations, Approved Document C: site preparation and resistance to contaminants and moisture, (2004 as amended) • Guidance on Evaluation of Development Proposals on sites where Methane and Carbon Dioxide are Present. Report Edition No. 4, NHBC, March 2007.
Oxygen	• Waste Management Paper 27 – Guidelines for Building Houses near Landfill sites. Department of the Environment 1991.

It is recommended in CIRIA C665 that six rounds of ground gas monitoring are conducted over a period of three months in order to sufficiently understand a site's ground gas regime.

Methane and Carbon Dioxide

Guidance on undertaking ground gas risk assessment is provided in CIRIA Report C665 "Assessing Risks Posed by Hazardous Ground Gases to Buildings" (2007). The guidance consolidates the requirement for good practice in site investigation, collection of relevant data and monitoring programmes in the context of a risk-based approach to gas contaminated ground.

Two semi-quantitative methods are set out in the guidance for the assessment of ground gas risk; one method for low rise housing with gardens (the NHBC "traffic light" system) and the other for all remaining development types, including commercial/industrial development (the "Modified Wilson and Card System").

With the exception of low-rise housing, the method applicable for all developments is the Modified Wilson and Card Classification. This makes no assumption that an underfloor void is present within the development. The method by Wilson and Card was developed based on the method proposed in CIRIA publication R149 (1995).

This method uses gas concentrations and borehole flow rates to define a characteristic situation for the site, by calculating a site Gas Screening Value (SGSV). The SGSV is calculated using a worst-case scenario (i.e. the maximum gas concentration and flow rates detected) across the entire site during the monitoring period. The SGSV is calculated for both methane and carbon dioxide, and the 'Characteristic Situation' is derived by comparison with a table relevant to each method. It is important to note that SGSVs are not absolute thresholds but guideline values.

The NHBC traffic light system described in Guidance on Evaluation of Development Proposals on sites where Methane and Carbon Dioxide are Present (NHBC, March 2007). The guidance defines a series of

'Traffic Light' scenarios specific to a low-rise housing development with a clear ventilated sub floor void. The Traffic Lights include 'Typical Maximum Concentrations' which are provided for screening purposes and risk-based Gas Screening Values (GSVs) for consideration for situations where the Typical Maximum Concentrations are exceeded.

It is important to note that GSVs are not absolute thresholds but guideline values. The method makes a number of assumptions regarding the proposed structures and designers should ensure the design is appropriate to the ground gas condition identified.

The Building Regulations, Approved Document C (2004) states that where methane concentrations do not exceed 1% and that the floor of the building to be constructed is suspended and ventilated, no further protection needs to be provided. Above 1% by volume there is a need to consider possible measures to prevent gas ingress into new buildings.

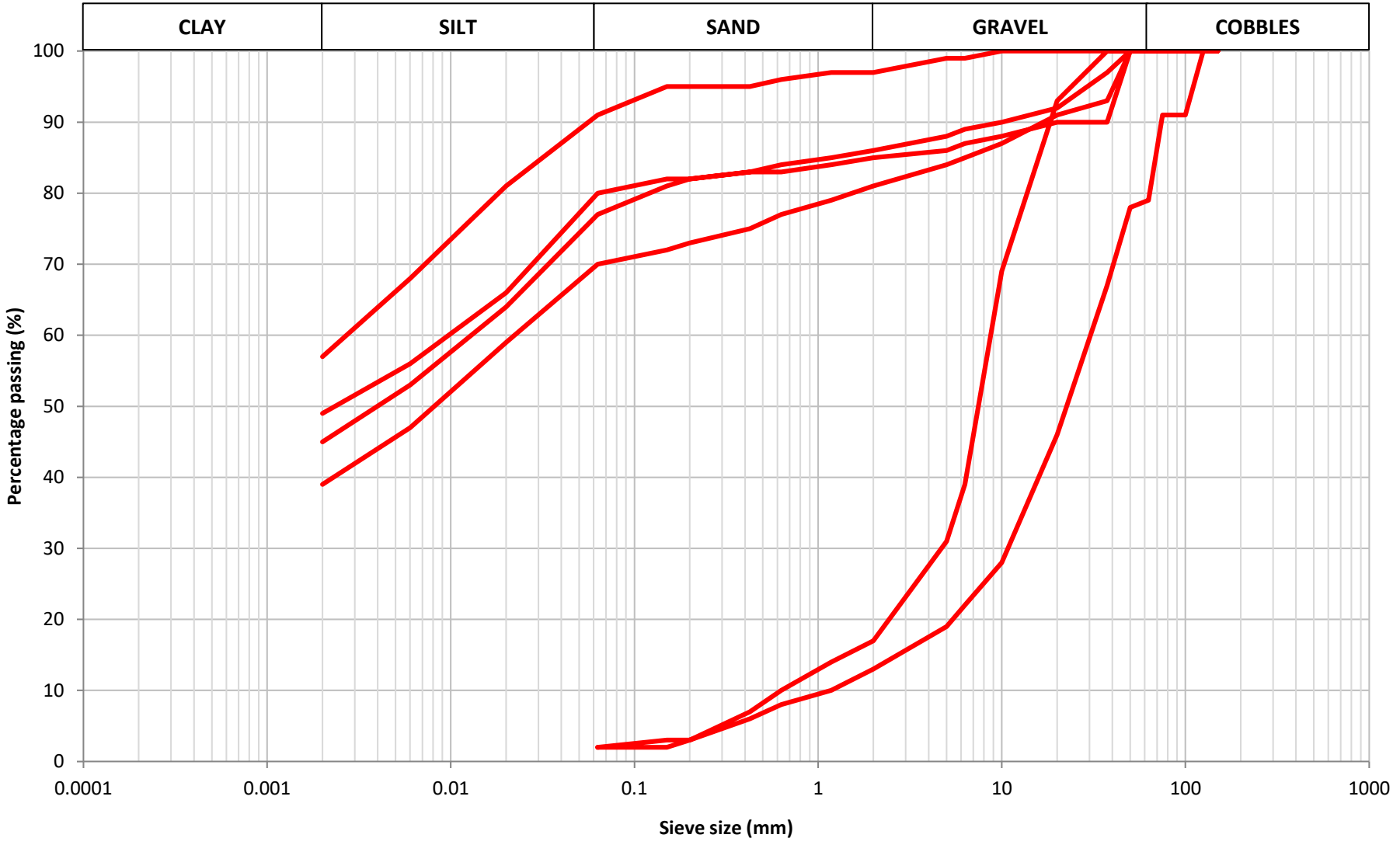
Approved Document C also states that there is a need to consider possible measures to prevent gas ingress into new buildings if concentrations of carbon dioxide above 1.5% are detected in the ground, and that measures are definitely required at concentrations above 5%.

Oxygen

Waste Management Paper 27 (WMP27) states that a minimum concentration of 18% oxygen is required to prevent asphyxiation.

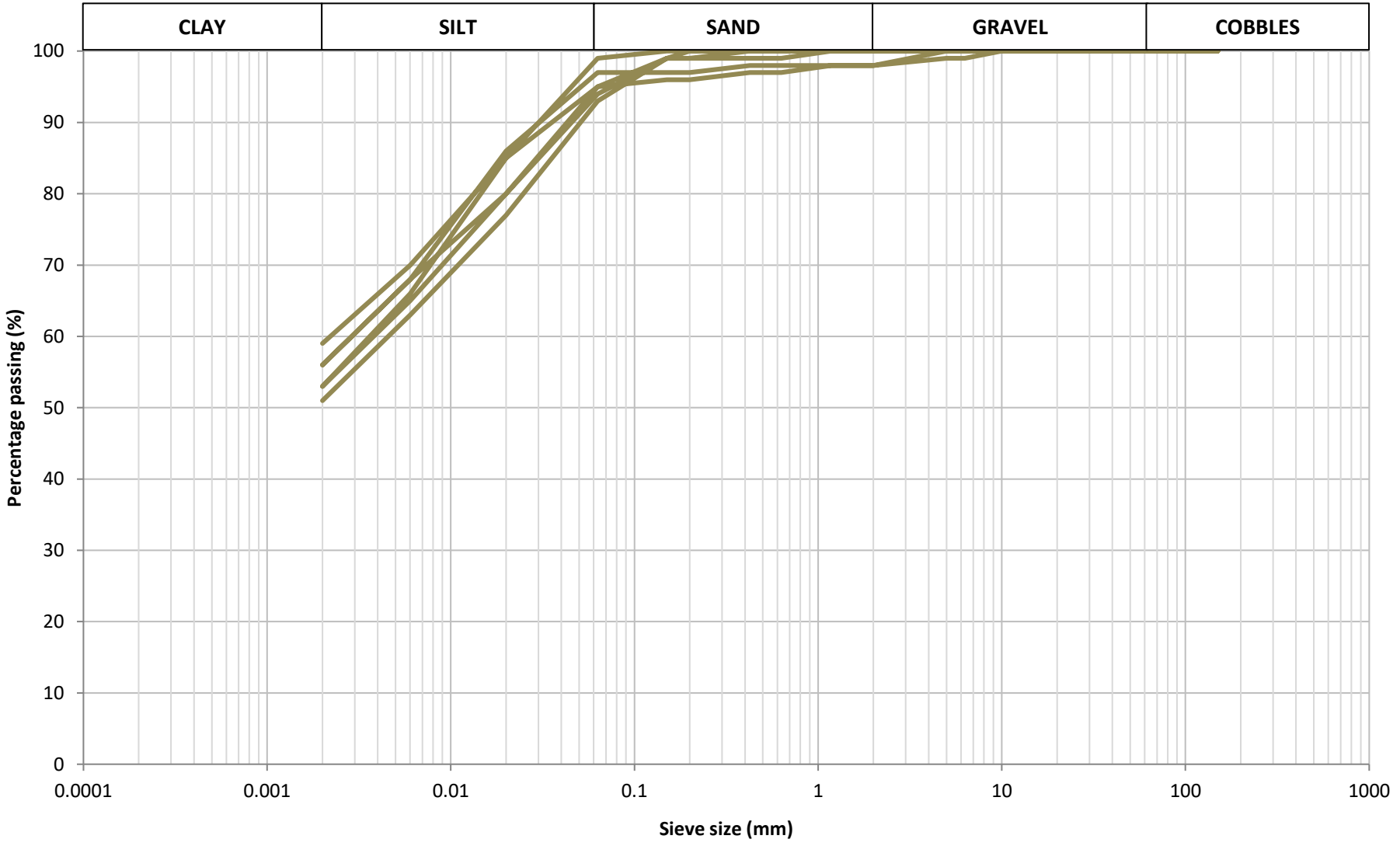
APPENDIX 6
GEOTECHNICAL GROUND INVESTIGATION DATA PLOTS

RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



Title: Particle size distribution (PSD) for Made Ground	**Figure No:** 1	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
			Checked: IB	**Date:** 14/10/2020

RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



Title: Particle size distribution (PSD) for London Clay Formation	**Figure No:** 2	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
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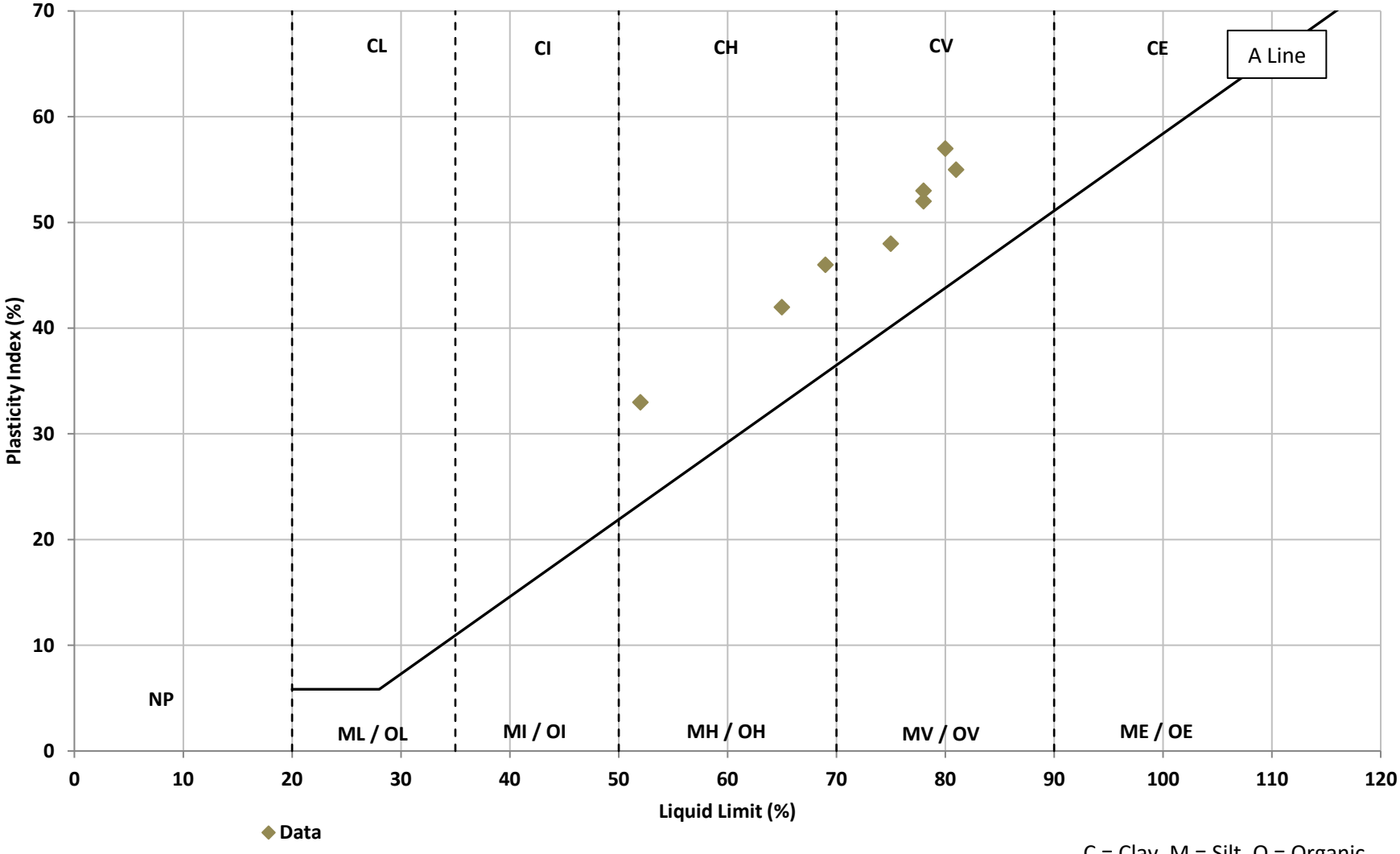
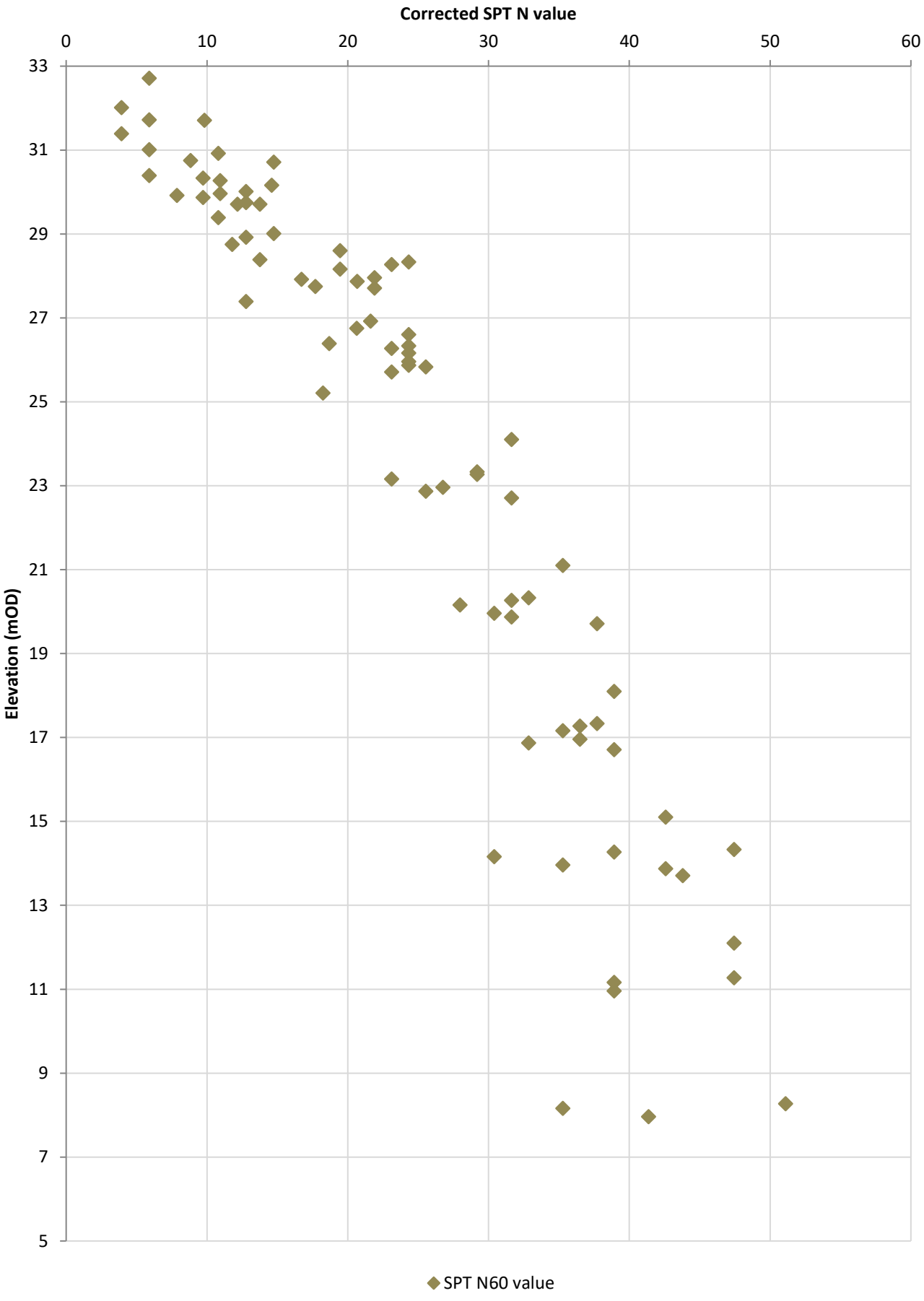
RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



C = Clay, M = Silt, O = Organic

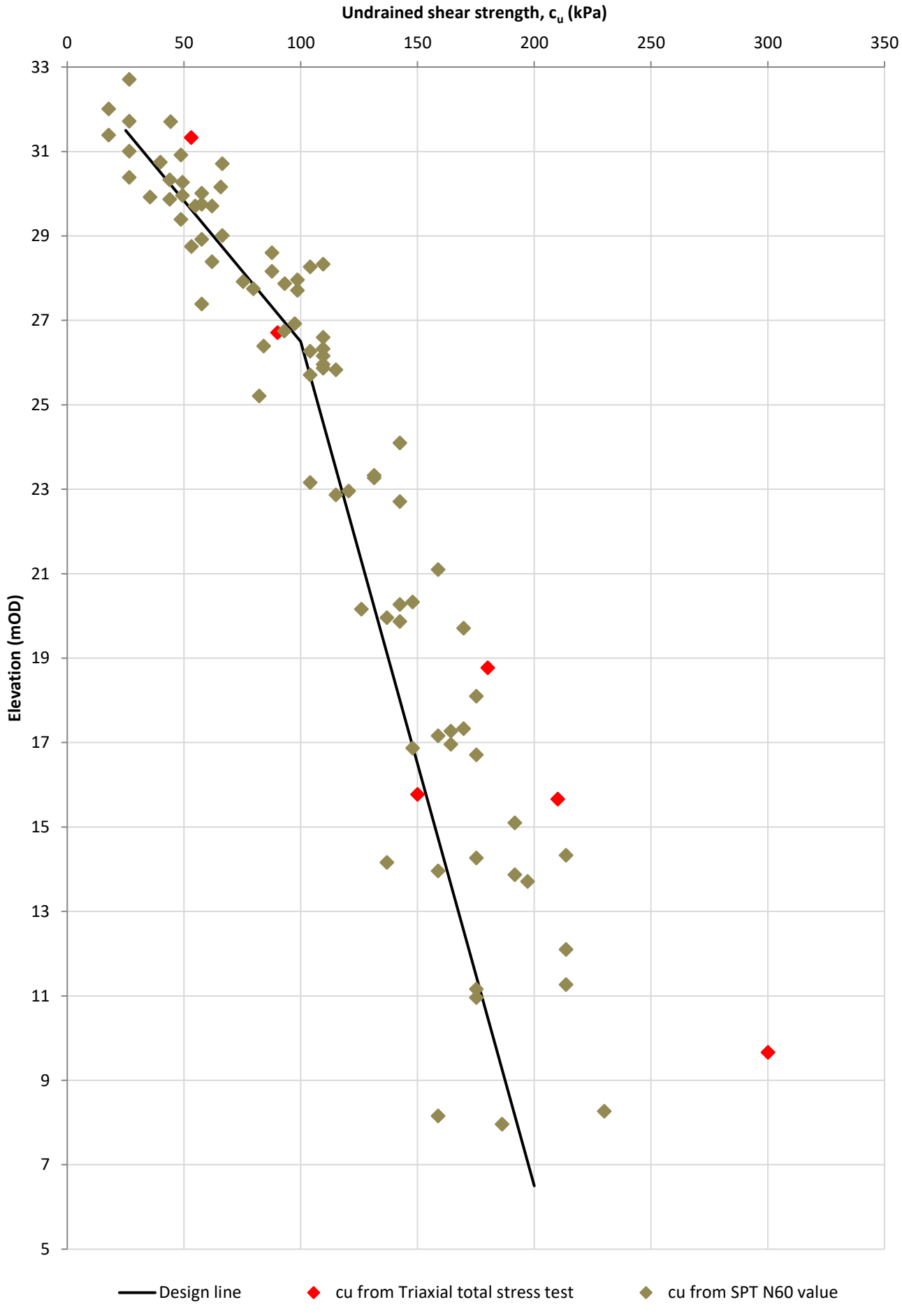
Title: Plasticity Chart for London Clay Formation	**Figure No:** 3	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
			Checked: IB	**Date:** 14/10/2020

RAMBOLL	**Project:** Chandos Park	**Job No:**	1620009986
	Location: Acton, London	**Client:**	Vantage Data Centers



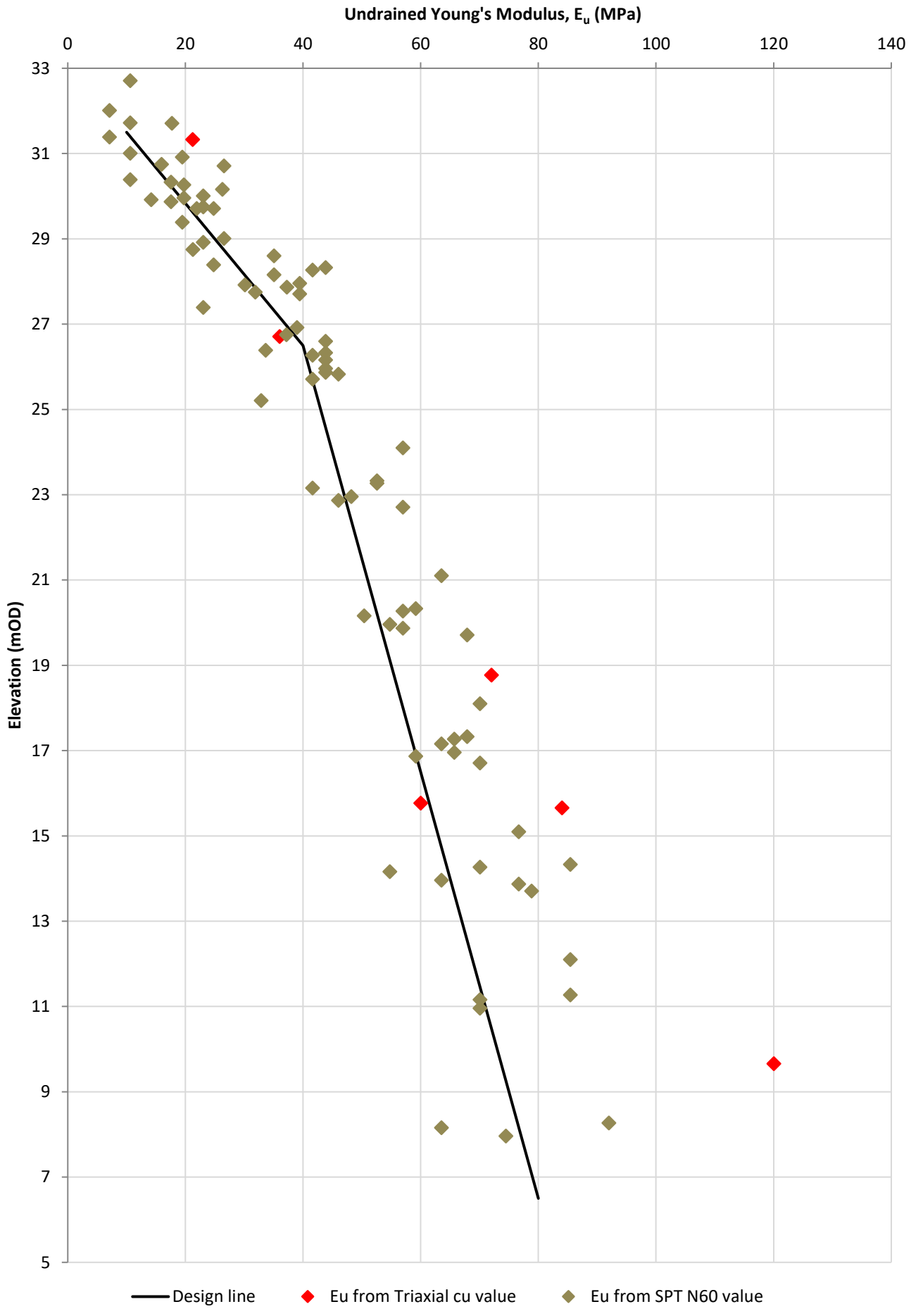
Title:	Corrected SPT N value by Elevation for London Clay Formation	**Figure No:**	4	**Drawn:**	AC	**Date:**	14/10/2020
		Status:	Rev 0	**Checked:**	IB	**Date:**	14/10/2020

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



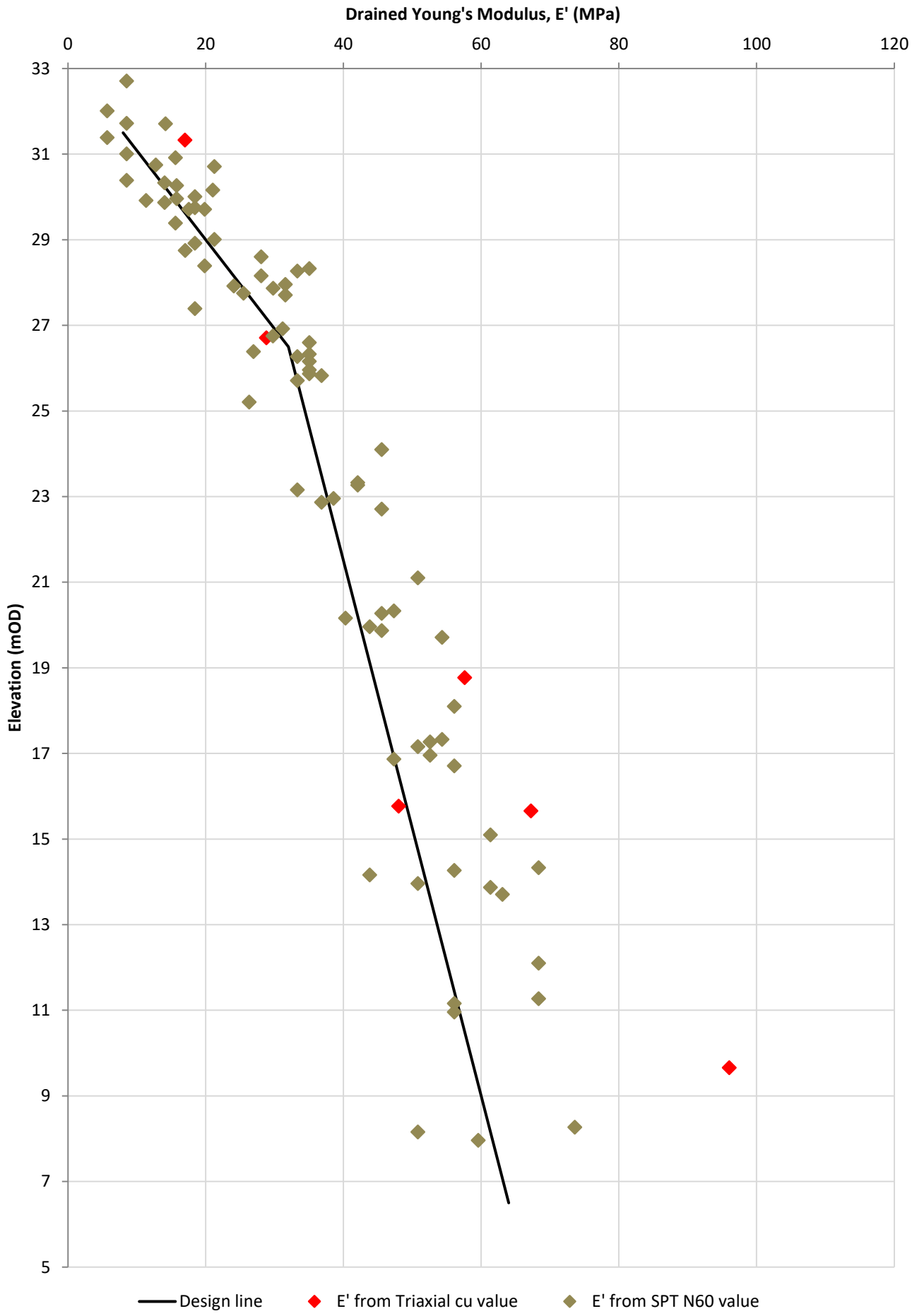
Title:	Undrained shear strength by Elevation for London Clay Formation	Figure No:	5	Drawn:	AC	Date:	14/10/2020
		Status:	Rev 0	Checked:	IB	Date:	14/10/2020

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



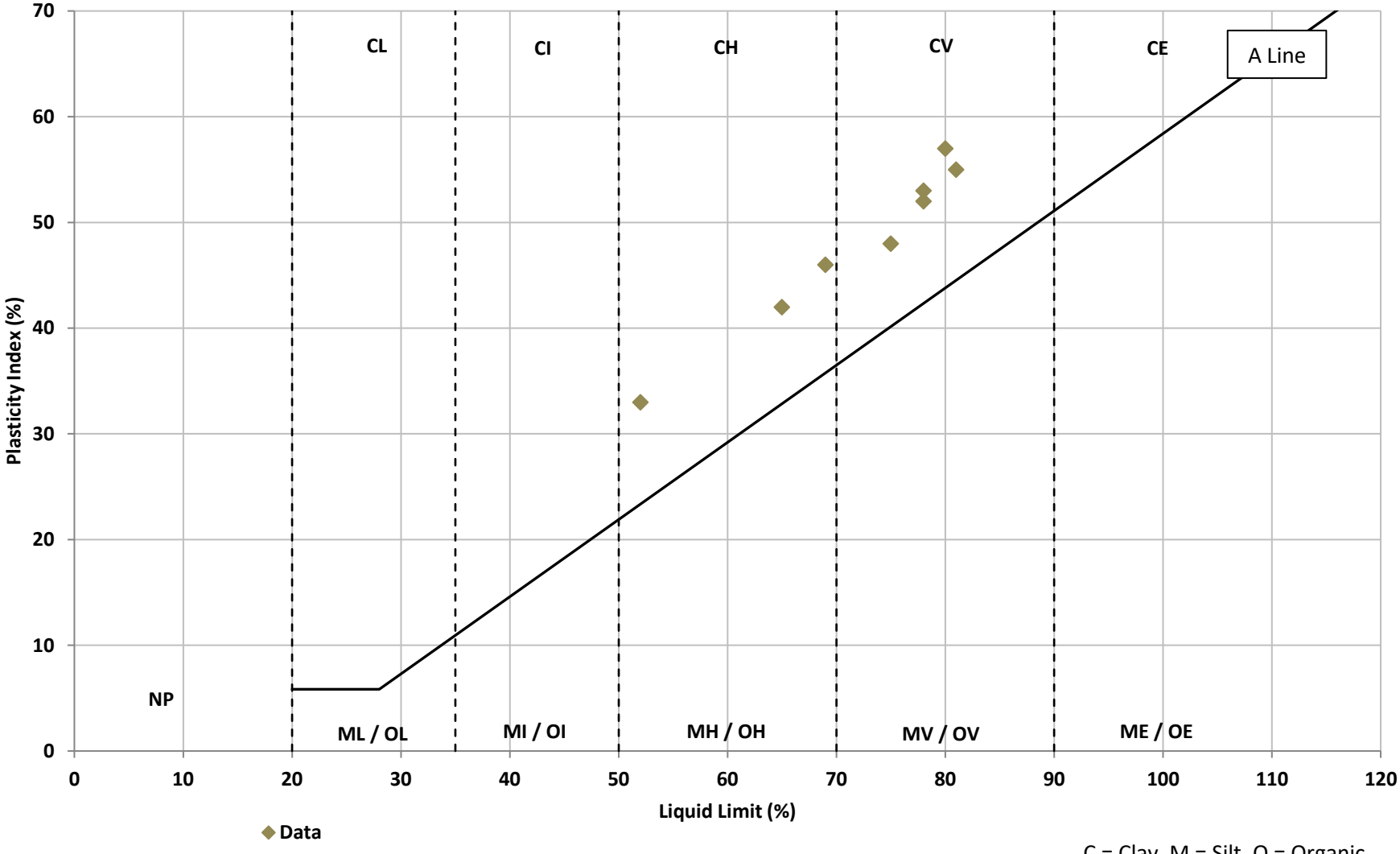
Title:	Undrained Young's Modulus by Elevation for London Clay Formation	Figure No:	6	Drawn:	AC	Date:	14/10/2020
		Status:	Rev 0	Checked:	IB	Date:	14/10/2020

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



Title:	Drained Young's Modulus by Elevation for London Clay Formation	Figure No:	7	Drawn:	AC	Date:	14/10/2020
		Status:	Rev 0	Checked:	IB	Date:	14/10/2020

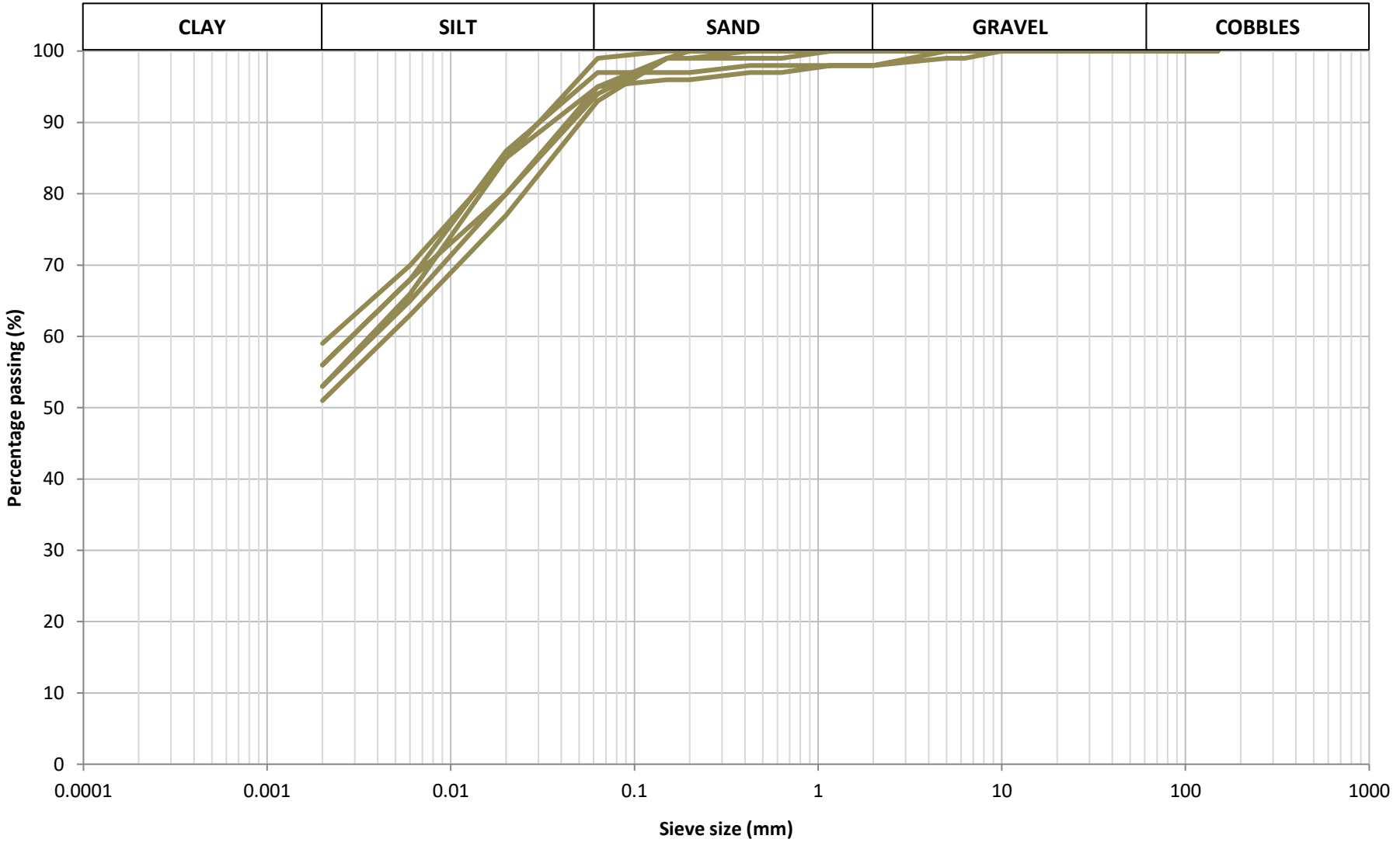
RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



C = Clay, M = Silt, O = Organic

Title: Plasticity Chart for London Clay Formation	**Figure No:** 3	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
			Checked: IB	**Date:** 14/10/2020

RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



Title: Particle size distribution (PSD) for London Clay Formation	**Figure No:** 2	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
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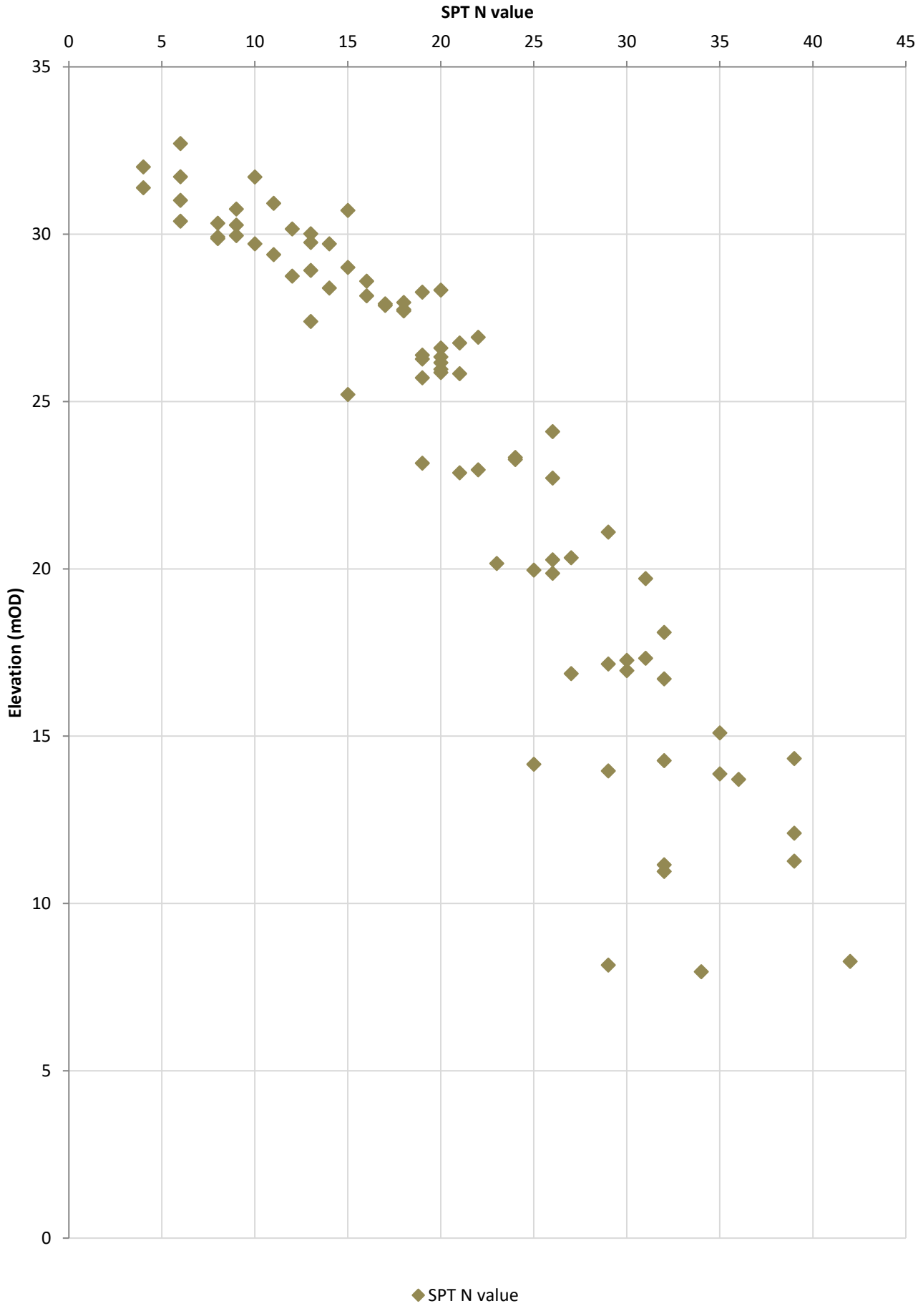
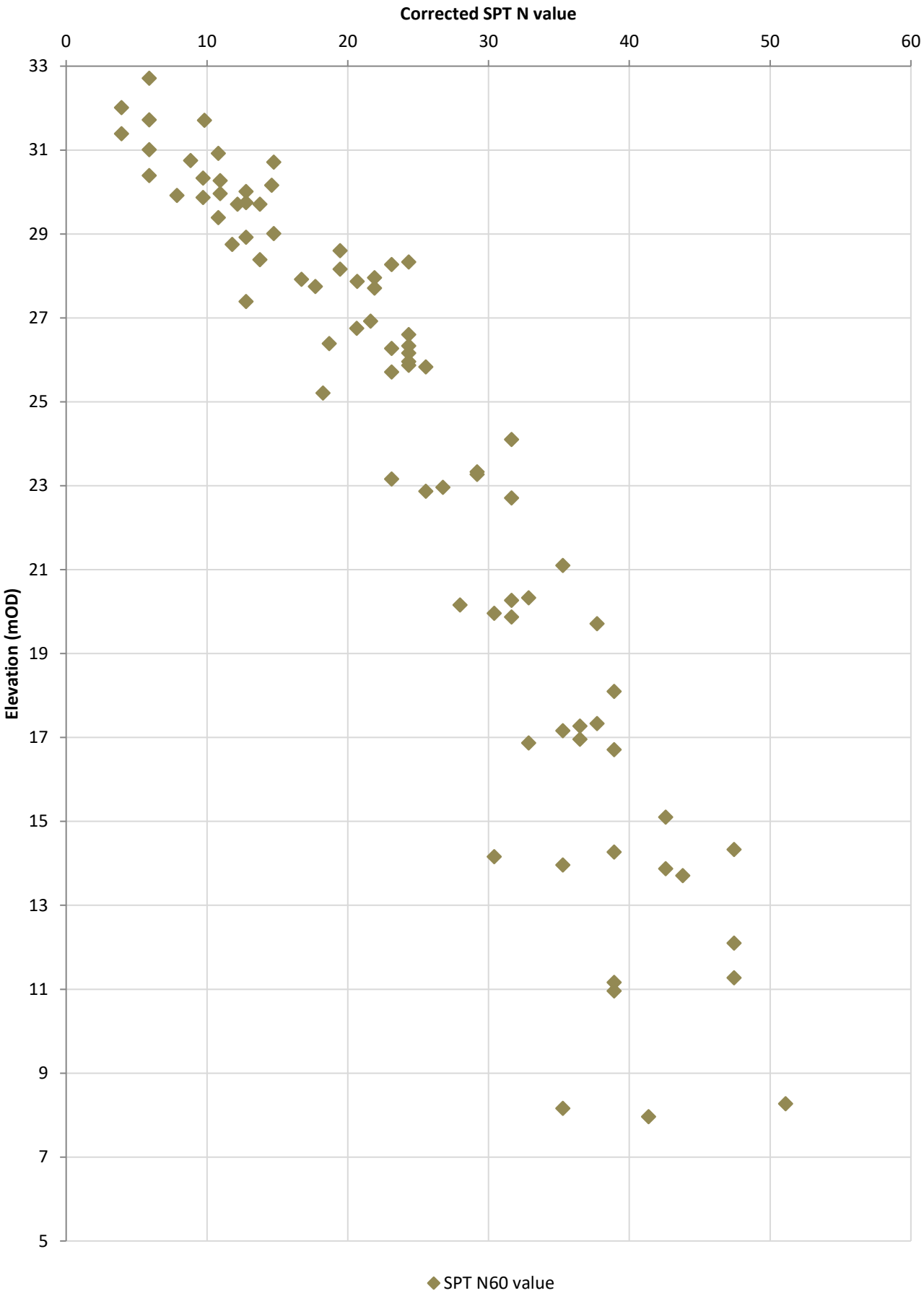
RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



Title:	Uncorrected SPT N value by Elevation for London Clay Formation	Figure No:	Drawn:	Date:
		Status:	Checked:	Date:

RAMBOLL	**Project:** Chandos Park	**Job No:**	1620009986
	Location: Acton, London	**Client:**	Vantage Data Centers



Title:	Corrected SPT N value by Elevation for London Clay Formation	**Figure No:**	4	**Drawn:**	AC	**Date:**	14/10/2020
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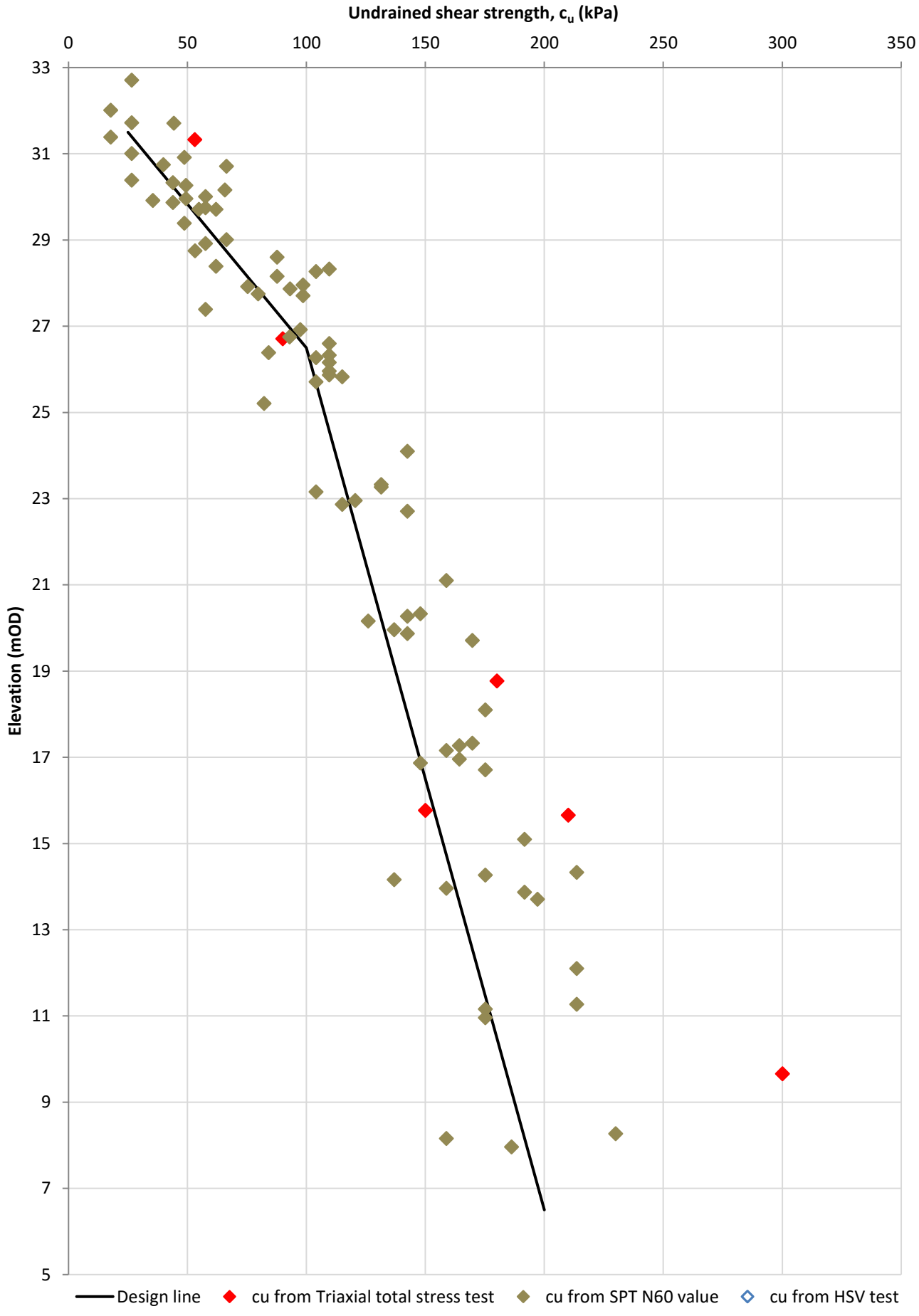
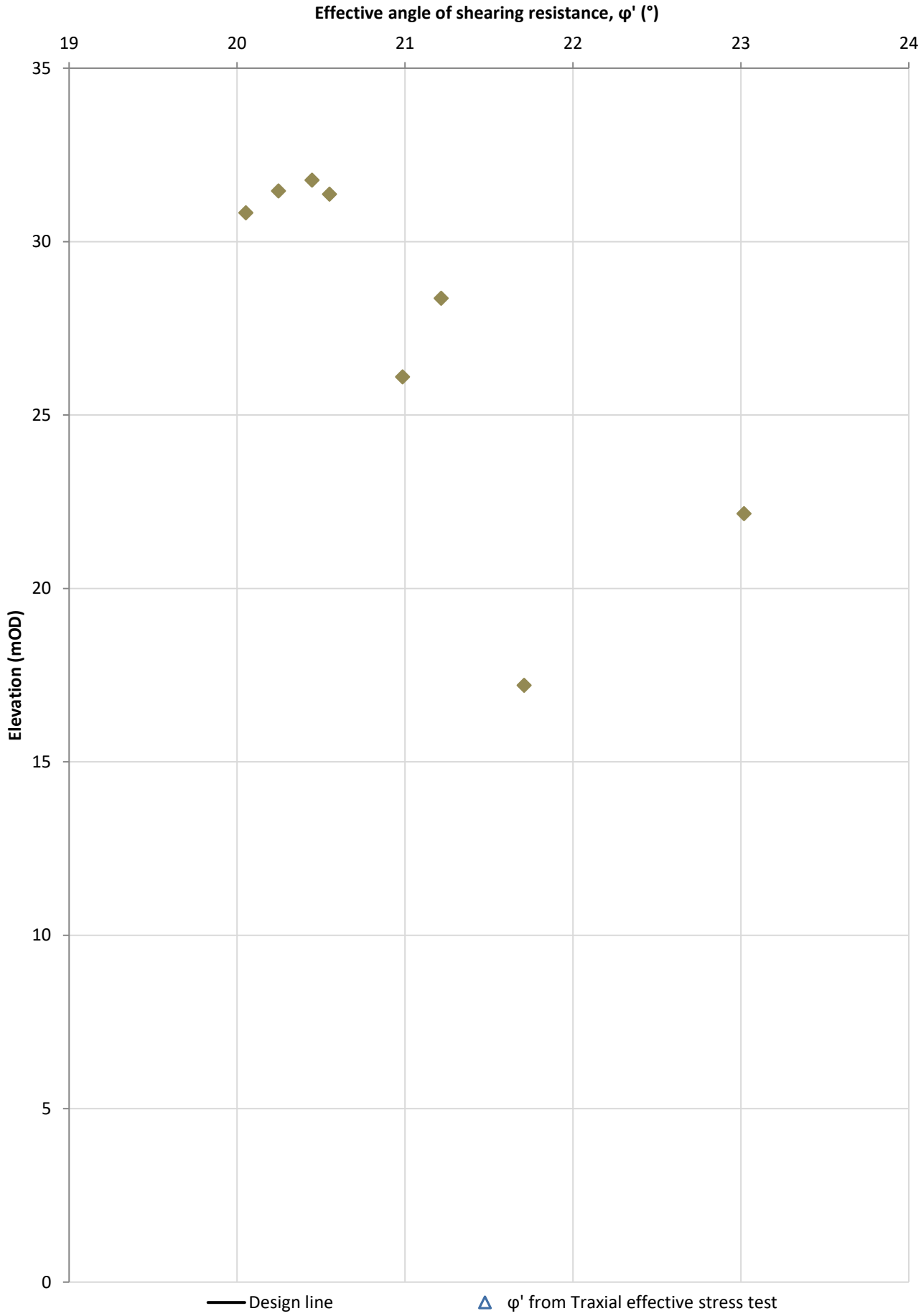
RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



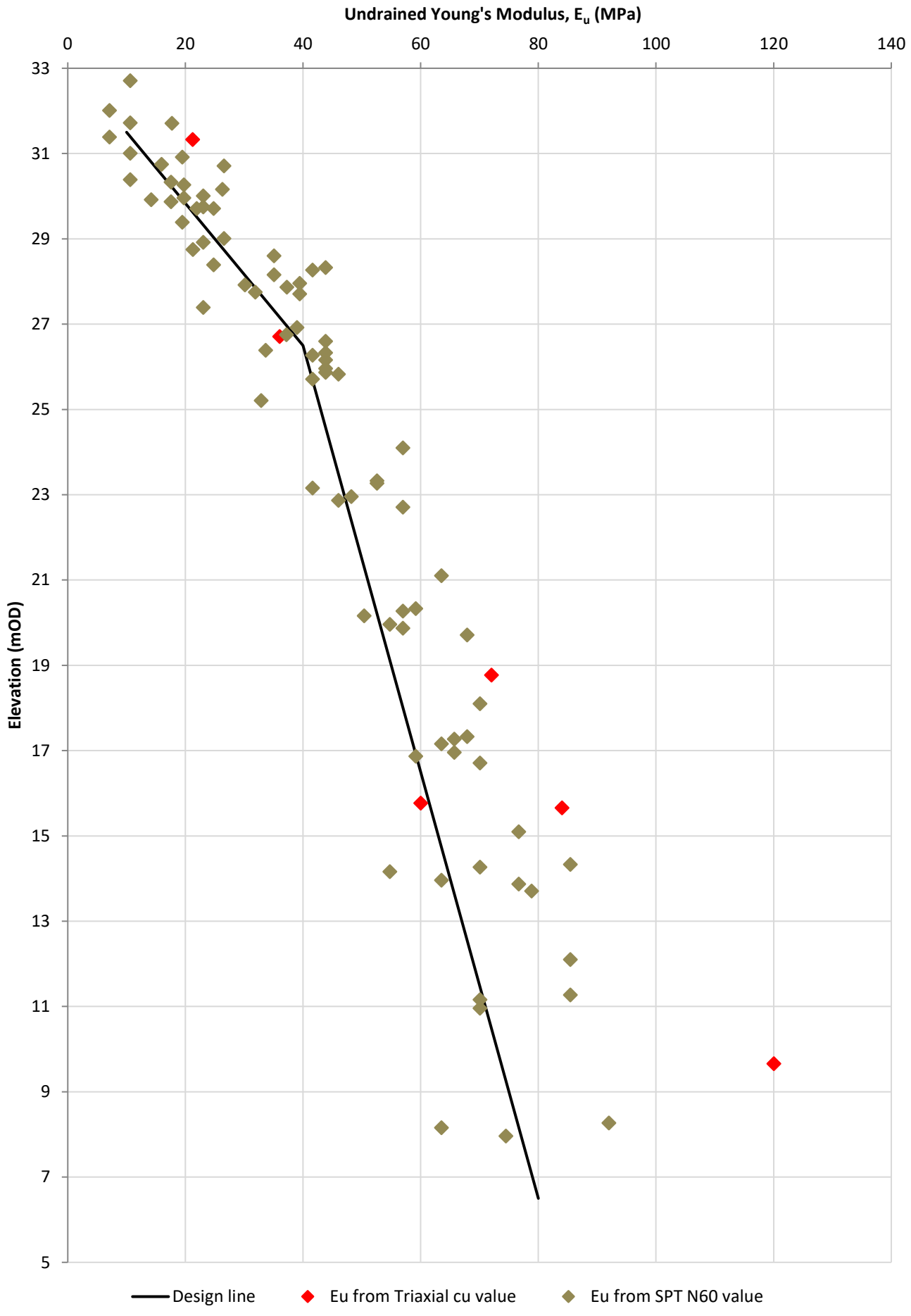
Title:	Undrained shear strength by Elevation for London Clay Formation	Figure No:	5	Drawn:	AC	Date:	14/10/2020
		Status:	Rev 0	Checked:	IB	Date:	14-Oct

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



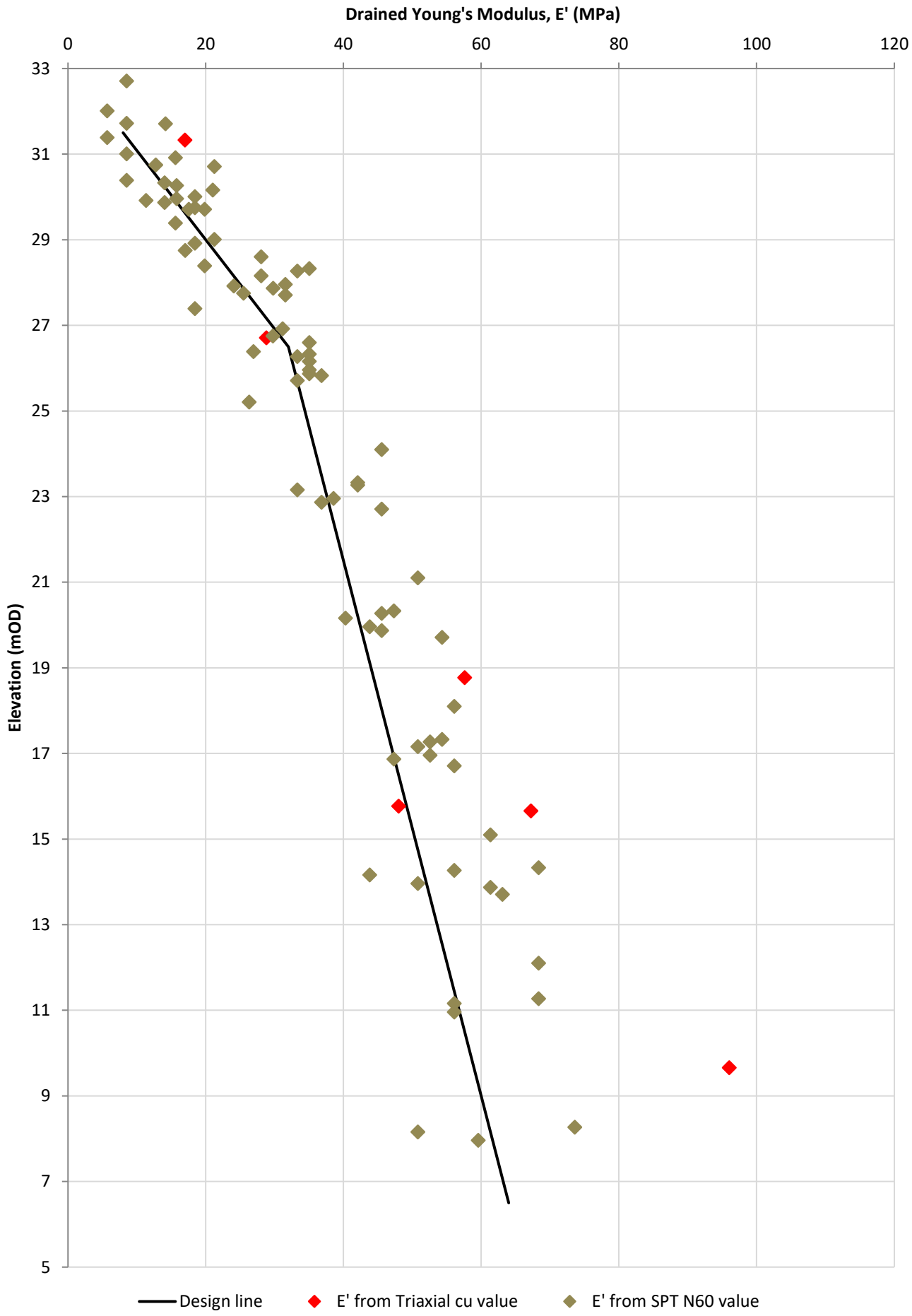
Title:	Effective angle of shearing resistance by Elevation for London Clay Formation	Figure No:	Drawn:	Date:
		Status:	Checked:	Date:

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



Title:	Undrained Young's Modulus by Elevation for London Clay Formation	Figure No:	6	Drawn:	AC	Date:	14/10/2020
		Status:	Rev 0	Checked:	IB	Date:	14/10/2020

RAMBOLL	Project: Chandos Park	Job No: 1620009986
	Location: Acton, London	Client: Vantage Data Centers



Title:	Drained Young's Modulus by Elevation for London Clay Formation	Figure No:	7	Drawn:	AC	Date:	14/10/2020
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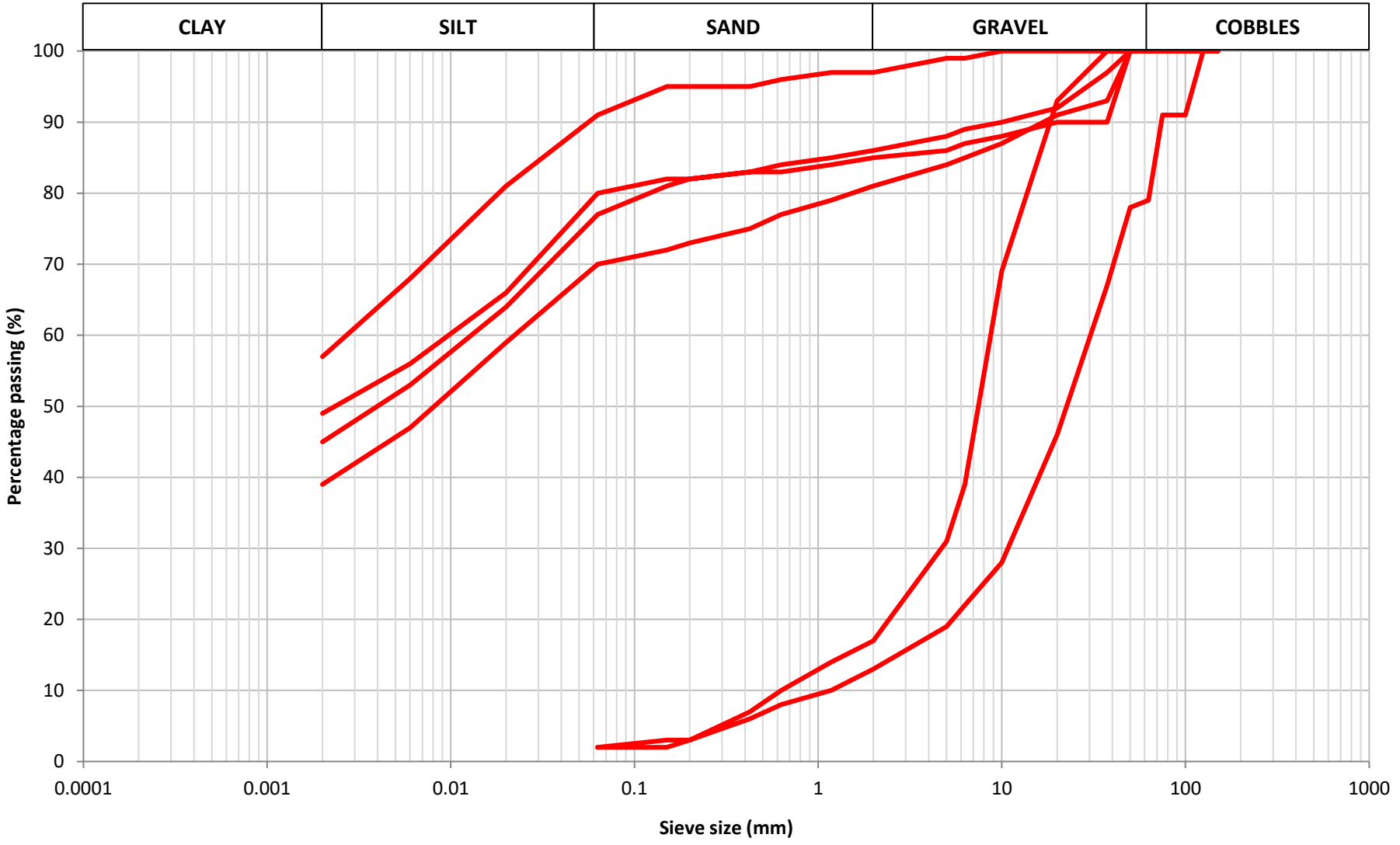
RAMBOLL	**Project:** Chandos Park	**Job No:** 1620009986	
	Location: Acton, London	**Client:** Vantage Data Centers	



Title: Particle size distribution (PSD) for Made Ground	**Figure No:** 1	**Status:** Rev 0	**Drawn:** AC	**Date:** 14/10/2020
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