MCDONALDS MD, HAVERHILL

Phase 2 Geo-Environmental Assessment

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1.0 INTRODUCTION

Brief

1.1 Create Consulting Engineers Ltd (CCE) was instructed by McDonalds Restaurants Ltd (the 'Client') to undertake a Phase 2 Geo-Environmental Investigation for a parcel of land located off Helions Bumpstead Road, Haverhill (the 'Site') for commercial end-use.

Project Context

1.2 The proposed development is for a new single storey restaurant with areas of soft landscaping, hardstanding for access and parking as well as infrastructure.

1.3 A plan detailing the proposed development layout is presented as Figure 1.1, below:

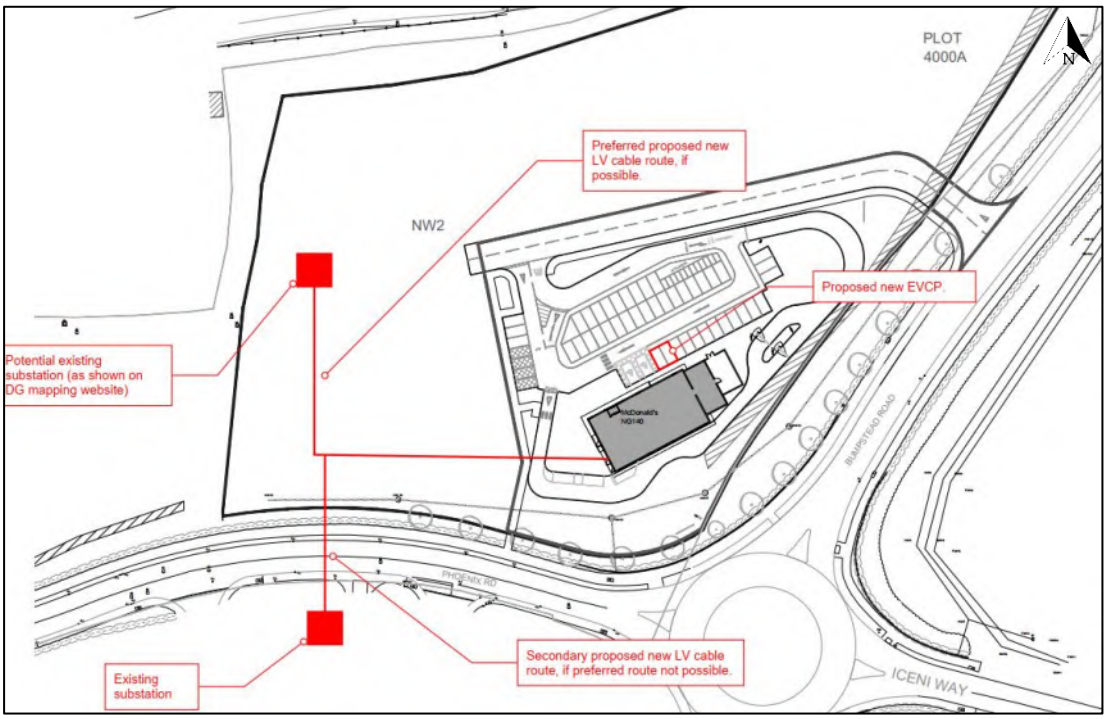

Figure 1.1: Proposed Development Plan View (architects plan)

1.4 A Phase 1 Contamination Land Assessment was carried by others in 2022 (Ref: Southern Testing Report JN1660) which indicated the potential for contamination at the Site which could impact upon future Site users.

Objectives

1.5 The objectives of the site investigation were as follows:

- To further assess the potential source-receptor pollutant pathways identified in the Phase 1 Contaminated Land Assessment report by others;
- provide geotechnical parameters for the proposed development of the Site; and
- Assess the viability of using soakaways for surface water disposal.

1.6 The geo-environmental investigation works were carried out in accordance with best practice and planning guidance such as that set out in the National Planning Policy Framework (2019), Environment Agency's Land Contamination Risk Management guidance (2020), BS5930:2015+A1:2020 - Code of practice for ground investigations, Eurocode 7: Geotechnical design and NHBC Standards 2011 Chapter 4.1: Land quality – managing ground conditions.

Scope of Work

1.7 The scope of works proposed for this assessment was as follows:

<u>Geo-Environmental Site Investigation</u>

- Drilling of 2No. rotary auger boreholes to a maximum depths of 6.45m below ground level (or refusal) with hand-dug excavation pits to 1.0m for each borehole;
- Excavation of 4No. machine-excavated trial pits to assess underlying Site soils for sustainable drainage (SuDS);
- During drilling of the boreholes, *in situ* (SPT) testing and disturbed sampling undertaken for laboratory analysis;
- Standpipes to be installed in both boreholes to allow subsequent groundwater level and gas monitoring;
- Soil samples submitted to UKAS accredited testing laboratory for classification and aggressiveness to concrete tests;
- Soil samples collected and submitted to an M-CERTS accredited testing laboratory for chemical testing for a standard suite or organic and inorganic parameters;
- Ground Gas and groundwater level monitoring to be undertaken on completion of the site works on 3No. occasions; and
- A summary interpretative report prepared on completion of the works and subsequent laboratory testing.

Constraints and Limitations

1.8 The copyright of this report is vested in Create Consulting Engineers Limited and the Client, McDonalds Restaurants Ltd. The Client, or their appointed representatives, may copy the

report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Limited or the Client.

1.9 Create Consulting Engineers Limited accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

1.10 Create Consulting Engineers Limited has endeavoured to assess all information provided to them during this appraisal. Should additional information become available which may affect the opinions expressed in this report, Create Consulting reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.

1.11 The report summarises information from a number of external sources and is unable to offer any guarantees or warranties for the completeness or accuracy of information relied upon. Information from third parties has not been verified by Create Consulting Engineers Limited unless otherwise stated in this report.

1.12 The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

2.0 SITE LOCATION AND DESCRIPTION

Site Location

2.1 Information for Sections 2 and 3 of this report has been obtained from the Phase 1 Desk Study carried out by others.

2.2 The Site located approximately 1.2km to the south east of Haverhill town centre in Suffolk and can be centred at National Grid reference TL 67630 44265 and the nearest postcode is CB9 7AE.

2.3 A plan detailing the Site location is presented as Figure 2.1, below:

Figure 2.1: Site Location Plan (Geoindex, 2022)

Site Description

2.4 The Site is approximately 0.49Ha in plan area, situated within part of a larger field.

2.5 Access to the Site during fieldwork was gained via a gate off Helions Bumpstead Road to the north, with an incline leading up to the level area the Site forms a part of.

2.6 The Site was level, with the southern and eastern boundaries delineated by embankments that led to Phoenix Road and Bumpstead Road respectively. The tops of these embankments were also delineated by hedgerows.

2.7 The Site level was at approximately 76.5m aOD, with the embankment to the south at 80.35m aOD and the embankment to the east reducing to the north (source: Glanville Drawing Ref: 4220178/4101).

2.8 A series of manholes were adjacent to the southern boundary of the Site and situated within the embankment, indicating the presence of buried services around the perimeter of the Site

2.9 No visual or olfactory evidence of contamination was observed on the Site.

3.0 ENVIRONMENTAL SETTING

Geology

3.1 The Report by Southern testing states that the geology underlying the Site consists of Lowestoft Formation (Sand & Gravel over Till), underlain by Lewes Nodular Chalk.

3.2 The report provides no geological borehole records that confirm the underlying geology.

Hydrogeology

3.3 The Lowestoft Formation underlying the Site is classified as a Secondary A Aquifer, with the bedrock geology classified a Principal Aquifer.

3.4 The Site falls within a Zone III – Total catchment source protection zone.

3.5 There are 2No. groundwater abstraction records, 86m and 91m respectively, to the north of the Site.

3.6 There are no potable water abstractions within 1km of the Site.

Hydrology

3.7 The Phase 1 Report states that there is a small stream mapped following the southern and eastern boundaries of the Site however this was not seen during the Site Investigation.

Sensitivity

3.8 The groundwater vulnerability has been classed as being of **medium** vulnerability due to the Secondary A aquifer status of the underlying geology.

4.0 REVIEW OF EXISTING INFORMATION

Southern Testing Phase 1 Contaminated Land Assessment (Ref: JN1660), dated March 2022

4.1 A Phase 1 Contaminated Land Assessment was carried out by Southern Testing to support a planning proposal for a new McDonalds Restaurant at the Site.

4.2 The Report stated that '*The Site has been undeveloped although some Made Ground appears to have been placed on Site*'.

4.3 Analysis of historical map records indicated the Site comprised fields until sometime between 2006 and 2010, when earth stockpiles were recorded within the Site boundary.

4.4 A number of potential pollutant linkages were identified with respect to the proposed end-use. The key potential contamination sources identified in the Conceptual Site Model were:

- Potential for contaminated Made Ground underlying the Site;
- Potential for land gas to be present; and
- Potential for contaminated perched groundwater.

4.5 In order to manage the uncertainty associated with these potential ground contamination sources, a site investigation was recommended to include any Made Ground and shallow soils, sampling of perched water (if present) and ground gas monitoring.

4.6 To help address any geotechnical uncertainty, the ground investigation was to include: logging of recovered soils; *in situ* strength testing (standard penetration testing - SPTs); and laboratory testing for soil classification purposes.

Planning Portal Documentation

4.7 A review of Planning Portal documentation was undertaken once the Site investigation had concluded due to extensive Made Ground (<3.50m) being recorded during the investigation.

4.8 The Planning Application relating to the Site was DC/15/2424/OUT, for "*Development of up to 46,000 sq m of floor space for uses within B1,B2 and B8 of the Use Classes Order, road side uses (petrol filling station and restaurant/s, Use Class (A3/A5), car dealerships (sui generis), builders merchants (sui generis), ancillary lorry park for Business Park occupiers, together with landscaping, car and HGV parking and associated works and facilities including access*."

4.9 This planning application incorporates the Site within the larger development area and included an '*Environmental and Earthworks Material Suitability Assessment Report*' referenced 15-0210.02 V2, undertaken by Delta Simons in 2015.

4.10 A borehole and trial pit plan and relevant records within the report indicate that ground level at the Site, prior to earthworkings, was approximately 73m aOD. The Glanville Drawing Ref: 4220178/4101, undertaken in March 2022, indicates current ground level is 76.5m aOD.

4.11 This would indicate that ground level at the Site has been increased by approximately 3.5m, in line of the findings of the ground investigation outlined in Section 6 of this Report.

4.12 CCE was unable to locate any documentation with regards to the earthworks carried out at the proposed development Site specifically.

4.13 2No. exploratory hole records (RA04 and TP138) from the Delta Simons intrusive works were located within the Site boundary, confirming the geological sequence of Made Ground, underlain by the Lowestoft Formation, underlain by structureless Chalk.

5.0 GROUND INVESTIGATION

5.1 Ground investigation works were undertaken at the Site between the 9 and 10 April 2022, with a second phase of investigation undertaken on 27 April 2022.

Description of Fieldwork

5.2 The scope of works comprised:

- Drilling of 2No. rotary auger boreholes (BH01 and BH02) to a maximum depth of 6.45m bgl to determine ground and groundwater conditions, provide *in situ* soil strength information (SPTs), enable the collection of soils samples for chemical and geotechnical testing and the installation of groundwater and ground gas monitoring standpipes (both locations);
- 6No. Dynamic cone penetration tests (DCPs) to help determine pavement design parameters;
- 7No. machine excavated trial pits (TP01 – TP04 and TP11 – TP13) to determine ground conditions and to test underlying Site soils for sustainable drainage (SuDS);
- 6No. hand dug trial pits at DCP locations to determine ground conditions;
- Chemical laboratory testing of Made Ground and natural soils;
- Geotechnical laboratory testing of soil samples ; and
- Ground gas and groundwater monitoring on 3No. occasions (using an infrared gas analyser GA5000) to assess for the presence of ground gas and determine groundwater levels at the Site.

5.3 Due to the presence of extensive Made Ground (reworked natural soils) not identified by the Phase 1 Contaminated Land Assessment, a subsequent ground investigation was carried out to provide confidence in the foundation solution at the Site. This investigation comprised:

- Drilling of 11No. windowless sample boreholes (WS101 to WS111) to a maximum depth of 4.45m bgl to determine ground and groundwater conditions and provide *in situ* soil strength information (SPTs);
- Collection of perched groundwater at the Site within previously installed standpipes for laboratory analysis; and
- Geotechnical laboratory testing of soil samples.

5.4 An Exploratory Hole Location Plan is provided in Appendix A.

5.5 The soil arisings from each borehole and trial pit were logged by a suitably qualified Engineer, in line with the relevant British Standard (BS 5930 and Eurocode 7). The exploratory hole logs are included within Appendix B.

5.6 All works were undertaken in accordance with the CCE Health and Safety Policy and within the framework of a Health and Safety plan.

Geo-Environmental Laboratory Testing

5.7 Soil samples were collected from the Made Ground at various locations and depths across the site and submitted for chemical testing at a UKAS/MCERTS accredited laboratory.

5.8 Samples for contamination analysis were collected in suitable amber glass 250ml jars and 60ml vials and 1ltr plastic tubs using clean nitrile gloves to avoid any cross-contamination between samples.

5.9 All samples were transported under chain of custody documentation and tested for a range of inorganic and organic compounds. Cool boxes were kept cool (<4°C) with ice packs during sample collection and subsequent transportation by courier to the testing laboratory.

5.10 The chemical testing comprised a range of organic and inorganic parameters including asbestos, metals, speciated total petroleum hydrocarbons (TPH CWG) and speciated polyaromatic hydrocarbons (PAHs).

5.11 Groundwater samples were collected using dedicated disposable Teflon bailers and rope following the removal of at least five well volumes of groundwater to develop and purge the well. The samples were collected in 1 litre plastic and amber glass jars and amber (volatile organic sample) vials.

5.12 The chemical laboratory test certificates are included as Appendix C.

Geotechnical Laboratory Testing

5.13 Selected soil samples were subjected to testing within a UKAS accredited geotechnical laboratory. The geotechnical laboratory certificates are included as Appendix D. Testing included:

- Multi-stage triaxial testing;
- California Bearing Ratio (CBR);
- Particle Size Distribution (PSD), wet sieving;
- Moisture content; and
- Plasticity index.

Ground Gas Monitoring

5.14 On completion of the fieldwork, 6No. ground gas monitoring visit were undertaken. The purpose of the ground gas monitoring was to determine the presence of ground gas at the Site and to assess whether the Made Ground or off-site sources are impacting upon the Site.

5.15 Measurements of methane, carbon dioxide, oxygen as well as gas flow were taken from each monitoring well using a GA5000 infra-red gas analyser with flow pod. A photo-ionisation detector (PID) was then used to measure for the presence of volatile vapours.

5.16 Following measurement of ground gas concentration, standing groundwater levels and the total depth of monitoring wells were recorded using a dipmeter.

5.17 The ground gas monitoring and groundwater level measurements are presented in Appendix F and discussed in Section 7 of this report.

6.0 GROUND CONDITIONS

6.1 The encountered ground conditions are summarised below and provided in detail within the exploratory hole logs (Appendix B), laboratory geotechnical test results (Appendix D) and geotechnical plots (Appendix E).

General

6.2 The ground investigation comprised a total of 26No. exploratory holes (BH01, BH02, TP01 to TP13 and WS101 to WS111). were formed in accessible locations across the Site and targeting the proposed development.

6.3 An Exploratory Hole Location Plan is provided within Appendix A.

6.4 The ground investigation was designed to provide a general indication of ground conditions across the Site, collect samples for laboratory geotechnical and chemical testing and install monitoring standpipes to enable ground gas and groundwater monitoring (BH01 and BH02).

6.5 The following paragraphs provide a summary of ground conditions encountered during the ground investigation.

Made Ground and fill material

6.6 Made Ground comprising reworked natural soils of the Lowestoft Formation, was recorded within all exploratory holes, the base of which was recorded at depths of between 3.10m and 3.70m bgl. The Made Ground was generally described as a '*firm to stiff silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint*'.

6.7 Anthropogenic material within the Made Ground comprised fragments of brick, metal and occasional fragments of organic material.

6.8 A total of 33No. SPT tests were undertaken within the Made Ground, with corrected SPT N-values in the range of N_{60} = 5 to N_{60} = 24 and were seen to generally increase in value with depth, as detailed in the SPT depth plot, Appendix E.

6.9 A soft spot was identified within the vicinity of WS108, WS109 and WS111. At these locations, SPT N-values at 1.00m bgl were in the range of N_{60} = 5 to N_{60} = 8, corresponding to borehole descriptions of 'soft' to 'soft to firm'. The geotechnical constraints drawing (Exploratory Hole Location Plan, Appendix A) details the soft spot in relation to the proposed development.

6.10 Laboratory geotechnical test results of Site won Made Ground are summarised in Table 6.1, below, with laboratory test certificates presented in Appendix D.

Laboratory test	No. of Tests	Result Range
Moisture content	8	19 – 23%
Plasticity index	1	8 (CL)
CBR	3	3.9 – 5.7%
Consolidated undrained muti-stage Triaxial	1	103kPa
pH	6	7.6 – 8.3
SO_4	6	72 – 1700mg/l

Table 6.1: Summary of Made Ground Geotechnical Test Results

6.11 The laboratory geotechnical test results of the Made Ground (reworked diamicton) indicate the material is of low plasticity (see Plasticity Chart, Appendix E) and, therefore, of low volume change potential.

Superficial Geology – Lowestoft Formation

6.12 The Made Ground was underlain by soils considered to represent cohesive deposits of the Lowestoft Formation, which were recorded to the maximum extent of the boreholes (6.45m bgl).

6.13 These deposits were recorded to depths of between 4.40m and 4.60m bgl before becoming a sandy clay. The initial cohesive layer was generally described as a '*very stiff light brown silty gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk and occasional subrounded fine to medium flint*'.

6.14 The sandy cohesive deposits were recorded across two distinct layers: the first being 4.40m to 4.60m at BH01 (72.12m aOD to 71.92m aOD) and 4.60m to 5.00m at BH02 (71.87m aOD to 71.47m aOD). The second layer was encountered to the extent of the boreholes (6.45m bgl) from 5.65m bgl (70.87 aOD) at BH01 and from 5.50m bgl (70.97 aOD) at BH02.

6.15 The first sandy cohesive band was described as a '*Stiff very sandy CLAY*' and the second horizon as a '*very stiff orange brown sandy CLAY'*.

6.16 A total of 14No. SPT tests were undertaken within the cohesive Lowestoft Formation, with corrected SPT N-values in the range of N_{60} = 10 to N_{60} = R (refusal) and were seen to increase in value with depth, as detailed in the SPT depth plot, Appendix E.

6.17 Laboratory geotechnical test results of Site won Lowestoft Formation are summarised in Table 6.2, below, with laboratory test certificates presented in Appendix D.

Laboratory test	No. of Tests	Result Range
Moisture Content	5	10% – 26%
Plasticity Index	3	18 – 29% (CL – CI)

Laboratory test	No. of Tests	Result Range		
Muti-stage Triaxial	1	266kPa		
Corrected SPT $(N_1)_{60}$-Values	2	$(N_1)_{60}$ = 46 to $(N_1)_{60}$ = r (refusal)		
Corrected SPT N_{60}-Values	14	N_{60} = 10 to N_{60} = 48	Range	C_u
Particle Size Distribution (PSD)	3	Cobbles (>60mm)	0%	6*
		Gravel (2mm-60mm)	0% – 5%	
		Sand (0.06mm-2mm)	58% – 80%	
		Silt & Clay (<0.06mm)	19% – 42%	

Table 6.2 Summary of Lowestoft Formation Geotechnical Test Results

***All tests were unable to establish a C_u value due to high fines content**

6.18 The laboratory geotechnical test results of the Lowestoft Formation indicate the material is of low to intermediate plasticity (see Plasticity Chart, Appendix E) and, therefore, of moderate volume change potential.

6.19 A possible inclusion of reworked Chalk bedrock was recorded from BH01 at between 4.60m and 4.90m bgl, described as '*Structureless CHALK recovered as firm white to cream mottled SILT with ferruginous staining*'.

Groundwater

6.20 During exploratory hole formation, shallow perched groundwater was encountered at single location (TP104) at a depth of 0.30m bgl. Subsequent monitoring of installed standpipes recorded groundwater at a depths of ±1.0m bgl at BH02 although the installation at BH01 remained dry. These groundwater levels are interpreted as perched groundwater held between layers of recompacted material.

Visual and Olfactory Observations of Contamination

6.21 During the Site investigation works, no visual or olfactory evidence of contamination was noted.

7.0 CONTAMINATION ASSESSMENT

Soil Contamination

7.1 The soil characteristics have been assessed with reference to Land Quality Management (LQM)/Chartered Institute of Environmental Health (CIEH) 'Suitable 4 Use Levels' (S4ULs) for human health risk assessment 2015). In the case of lead a DEFRA Category 4 Screening Level has been adopted.

7.2 A Tier 1 (semi-quantitative) risk assessment has been undertaken comparing soil chemical testing results against current and appropriate published guidelines for commercial end-use, using the minimum soil organic matter (SOM) result (minimum recorded value from across the Site was 1.0%) for quantifying the assessment criteria for organic components. In the case of heavy metals, the 6.0% SOM criteria has been utilised. This assessment, along with the laboratory test certificates, are provided in Appendix C.

Tier 1 Assessment

7.3 All of the contaminants of concern underlying the Site were confirmed as being less than the assessment criteria (SSAC) for commercial end-use in the samples collected and tested, with the exception of:

- Lead at BH01 (2500mg/kg) exceeding the SSAC of 2330mg/kg.

7.4 Concentrations of lead recorded within the near surface soils across the remining samples were between 9.5mg/kg and 84mg/kg, significantly lower than the sample from BH01. It is considered that this sample is an anomalous result and that concentrations of lead are significantly lower than this sample suggests. In addition, BH01 is located within the footprint of the proposed development and as such, the source-receptor pathway is broken by the building.

7.5 Trace levels of petroleum hydrocarbons predominantly in the C10-C16 range (aromatic) were recorded within the shallow soils (TP03 at 0.30m bgl) and deep Made Ground (BH02 at 2.80m bgl), although not exceeding the SSACs for the proposed residential with gardens end use.

7.6 Trace concentrations of polyaromatic hydrocarbons (PAHs) were identified within Site soils at the laboratory limit of detection (0.03mg/kg), although not exceeding the SSACs for the proposed end-use.

7.7 None of the samples collected and tested recorded the presence of asbestos fibres.

Perched Water Assessment

7.8 A sample of perched water was recovered from borehole BH02 on 26 April for laboratory chemical testing. An initial bail was undertaken and the well monitored for an hour to infer a rate of recharge. A recharge rate of 2cm per hour was observed and, due to the minimal recharge rate, the well was unable to be purged in line with standard practice prior to collecting the sample.

7.9 The laboratory results of the sample collected and submitted were compared with drinking water standards. No exceedances of the SSAC were identified from the laboratory chemical testing, with generally low levels of dissolved metals and an EPH concentration of 120µ/l.

Ground Gas Monitoring

7.10 The Conceptual Site Model prepared in the Phase 1 Assessment assessed the potential ground gas risk to future residents as moderate/low. Due to the extent and composition of Made Ground recorded across the proposed footprint of the building, a programme of ground gas monitoring was required, with a total of 6No. visits carried out over an 8-week period.

7.11 The monitoring visits were undertaken on 30 March, 12 April, 27 April and 13, 20 and 23 May 2022, with 3No. visits carried out during both low and falling atmospheric pressure (<1005mbar) which are conditions most conducive to ground gas generation. The monitoring recording the following:

- Methane (CH_4) recorded at concentrations between 0.0% and 6.7% by volume;
- Carbon dioxide (CO_2) recorded at concentrations between 0.5% and 9.7% by volume;
- Oxygen (O_2) recorded at concentrations between 3.0% and 20.7% by volume;
- Volatile vapours were recorded at 0.0%; and
- Gas flows recorded from 0.1 to 0.2l/hr.

7.12 Monitoring undertaken during low-pressure systems generally recorded higher levels of methane and carbon dioxide, which may be expected as these are conditions which are more conducive to ground gas generation. However, the gas flows measured remained very low and appear unaffected by changes in pressure.

7.13 During monitoring, groundwater water was not encountered in borehole BH01. In borehole BH02, groundwater was initially encountered at a depth of c. 1m bgl which would be at / above the top of the response zone for this monitoring well and this can affect the results during ground gas monitoring. However, standing groundwater levels in this monitoring well for the remaining monitoring visits showed a constant lowering reduction of the standing water level from 3.75m bgl to 5.80m bgl.

7.14 The results of the ground gas monitoring visits are provided in Appendix F.

Ground Gas Risk Assessment

7.15 The assessment of gas risk follows the methodology detailed in BS 8485: 2015+A1:2019, using the gas concentrations and measured flow rate to derive a gas screening value (GSV). This GSV can then be used to determine a Characteristic Situation (CS) for the gas regime at the Site.

7.16 The measurements of methane on the Site were variable and ranged between 0% and 6.7% by volume with peak measurements occurring in both boreholes and during different monitoring visits. The highest concentrations of methane were generally measured during low and falling atmospheric pressure (0.3 to 6.7% by volume) with far lower concentrations measured during higher pressure conditions (0 to 0.6% by volume). The average concentration of methane measured across the period of monitoring was 1.5 and 1.8% by volume for BH01 and BH02 respectively.

7.17 The measurements of carbon dioxide on the Site were also variable and ranged between 0.5% and 9.7% by volume with peak measurements occurring in both boreholes and during different monitoring visits. The highest concentrations of carbon dioxide were generally measured during low and falling atmospheric pressure (3.0 to 9.7% by volume) with generally lower concentrations measured during higher pressure conditions (0.5 to 4.2% by volume). The average concentration of carbon dioxide measured across the period of monitoring was 4.4 and 4.9% by volume for BH01 and BH02 respectively.

7.18 The ground gas flow measurements from each of the boreholes throughout the monitoring period ranged between 0.1 and 0.2 litres per hour, which is very low.

7.19 For the purposes of this assessment, a worst case GSVs have been determined using the highest gas concentrations detected and the highest gas flow measured (0.2l/hr) at the site using the monitoring results and the worst case GSVs are:

- Methane (6.7%) x gas flow (0.2 l/hr) gives a GSV of 0.0134
- Carbon Dioxide (9.7%) x gas flow (0.2 l/hr) gives a GSV of 0.0194.

7.20 The GSVs, which are considered to represent the worst-case ground gas risk on the Site, classify the site as a Characteristic Situation 1 (CS1) risk (very low) as detailed in Table 2, Section 6.4 of BS 8485: 2015+A1:2019.

7.21 CS1 rating is typical for sites with methane concentrations <1% and carbon dioxide <5%, with concentrations exceeding this being considered in the risk assessment to elevate the characteristic situation. It should be noted that the 1% trigger for methane was exceeded on 5 of the 12 readings taken and always during low atmospheric pressure. Similarly, the 5% trigger for carbon dioxide 4 of the 12 readings taken and always during low atmospheric pressure.

7.22 The source of the ground gas on the Site is believed to be the infilled, locally derived natural soils (firm to stiff grey brown gravelly clay with occasional fragments of organic materials and brick) which forms Made Ground across the Site to a maximum proven depth of 3.4m. This is considered to represent a low risk source of ground gas. In addition, very low/negligible gas flow measurements have been confirmed across the Site throughout the monitoring period.

7.23 On the basis of these findings, it is considered that the ground gas risk posed to end-users for this commercial end use is negligible and ground gas protection measures are not required for the proposed development.

Updated Conceptual Site Model

7.24 Based on the intrusive investigation and subsequent contamination sampling and ground gas monitoring undertaken at the Site, the Conceptual Site Model from the Phase 1 Contaminated Land Assessment can be updated with proven pollutant linkages, as per Table 7.1, below:

Source / Location	Risk / Pollutant	Pathway / Potential Consequence	Receptor	Likelihood of Occurrence	Consequence (severity)	Potential Risk	Possible Mitigation Measures	Further Action
Reworked Made Ground	Asbestos, Metals, PAHs	Direct exposure, inhalation or ingestion of potential contamination in underlying made ground/soils in soft landscaped areas	Future Site occupants	Low Likelihood	Mild	Low	Marginal exceedance of lead at one location however this result is considered an outlier and not representative of shallow Made Ground across the Site. Also, the development comprised hardstanding/ building at this location which breaks the source-receptor pathway. No further action required.	No
		Direct contact, inhalation and ingestion of potential contamination in made ground/soils during construction works.	Construction/ground workers	Unlikely	Mild	Very Low	Use of Personal Protective Equipment (PPE) during ground works will readily any mitigate potential risks.	-
		Leaching from the made ground/shallow soils into groundwater	Controlled Waters (Principal Aquifer at depth)	Unlikely	Mild	Very Low	Sample of perched water recorded no contaminants of concern although assessment should be updated when full results available.	-
		Horizontal migration of contaminants through groundwater to surface water bodies (or run-off).	Controlled Waters (surface water courses)	Unlikely	Minor	Very Low	No action necessary.	-
		Permeation of organic compounds through water supply pipes	Water Supply pipes (occupants)	Unlikely	Mild	Very Low	No action necessary.	-
	Ground gas (methane and carbon dioxide)	Possible lateral migration of ground gas contaminants onto Site and inhalation of harmful (asphyxiant) ground gases or accumulation of explosive gases.	Future Site occupants	Unlikely	Medium	Low	Elevated levels of both carbon dioxide and methane recorded during monitoring undertaken however minimal flow recorded and GSV level is CS1, with no requirement for ground gas protection measures.	No
			Construction, demolition and ground workers	Unlikely	Mild	Low	No action necessary.	-
Off-Site sources (historical/ current industrial land uses)	Metals, petroleum hydrocarbons and polyaromatic hydrocarbons	Lateral migration of mobile contaminants and vapour exposure	Future Site occupants	Low Likelihood	Mild	Low	No action necessary.	-
		Permeation of organic compounds through water supply pipes	Construction/ground workers	Low Likelihood	Mild	Low		-
	Ground gas (carbon dioxide and methane)	Asphyxiation or explosion related to ground gas present underground from made ground and natural sources (degradation of Chalk)	Future Site occupants	Low Likelihood	Mild	Low	No off-site sources of ground gas identified	-
			Construction/ground workers	Low Likelihood	Mild	Low		-

Table 7.1: Updated Conceptual Site Model

8.0 GEOTECHNICAL APPRAISAL

General

8.1 This section of the report should be read in conjunction with Section 6.0 (Ground Conditions), which indicates the Site was underlain by Made Ground soils to depths of between 3.10m and 3.70m bgl (73.4m to 72.8m aOD). The Made Ground was underlain by firm to stiff strata of the Lowestoft Formation to the maximum extent of the boreholes (6.45m bgl).

8.2 Slight groundwater strikes were recorded within 7No. of the 24No. Exploratory holes formed across the Site at depths of between 0.60m and 2.30m bgl. Monitored groundwater levels within installed standpipes were at approximately 1.0m bgl. The groundwater strikes and monitored levels were all recorded within the Made Ground and are interpreted as perched groundwater and not representative of groundwater levels.

8.3 The Site has been subject to a filling exercise, with ground levels raised by approximately 3.50m to 76.5m aOD. However, documentation regarding fill levels, method of compaction or a verification report have not been viewed by CCE. Nonetheless, the initial intrusive investigations undertaken by Create proved good bearing pressures within the Made Ground (fill) soils. Therefore, to provide confidence in this initial assessment, a supplementary ground investigation comprising 11No. windowless sample boreholes (WS101 to WS111), formed in a grid pattern and targeting the proposed building location was undertaken.

8.4 It is understood the proposed development will comprise a McDonalds drive-through and restaurant, with hardstanding for access and parking.

Ground Model

8.5 The below ground model is based on the material descriptions, *in situ* strength test results and geotechnical laboratory test results, with design parameters used for geotechnical analysis presented in Table 8.1, below:

Material	Depth to base (m bgl)	Thickness (m)	Υ (kN/m^3)	I_p (%)	Design N-value	Φ (°)	c' (kN/m^2)
Made Ground / fill	3.50	3.5	20.4	8	N_{60}=11	8	60
Lowestoft	>6.50	>3.0	20.5	17	N_{60}=17 to N_{60}=45	8	110
Groundwater	>4.50m bgl						

Table 8.1: Geotechnical design parameters

Shallow Strip Foundations

8.6 Cohesive near surface soils were found to be of moderate strength, with a design corrected SPT N_{60} value of N_{60} = 11. The allowable bearing capacity of such material is calculated as:

$$q_a = c.N_c + \sigma_0.N_q + ½.B.y.N_\gamma$$

where:

N_c, N_q and N_γ are bearing capacity factors
s_c, s_q and s_γ are shape factors
c' is the cohesive strength of the soil (kN/m^2)
B is the width of the foundation (m)
ϒ is the unit weight of the soil (kN/m^3)
σ_0 is the overburden pressure

Partial factors used for the soil properties were:

- tan ø 1.25
- c' 1.6
- c_u 1.4
- q_a 1.4

8.7 Based on the laboratory and in-situ test results, the following allowable bearing pressures are calculated:

Foundation Depth (m)	Foundation Width (m)	Allowable Bearing Capacity (kN/m^2)
0.80m	0.60	**170**
1.00m	0.60	**175**

Table 8.2: Summary of shallow foundation design options

8.8 Notwithstanding, formation level should be proof-rolled and any identified soft spots should be excavated out and backfilled to a suitable earthworks specification.

8.9 Foundations constructed on this basis would limit settlements to approximately 25mm.

Floor Slabs

8.10 Floor slabs should be suspended. However, were a ground bearing slab desired, some form of ground improvement would be required, with any soft spots at formation level excavated out and backfilled with engineered granular fill

Pavements

8.11 To help facilitate pavement design, a total of 6No. dynamic cone penetration (DCP) tests (DCP01 to DCP06), were undertaken as part of the ground investigation works. The results of the DCP tests are illustrated in Appendix G.

8.12 The DCP tests were carried out according to the methodology set out in the Design Manual for Roads and Bridges (2008), where a CBR value for the soil profile is calculated by:

$$CBR\ (\%) = 10^{(2.48-1.057\times Log_{10}P)}$$

Where:

P = The penetration rate in mm per blow (average)

8.13 The subgrade surface modulus is calculated by:

$$E = 17.6(CBR)^{0.64}$$

8.14 Where calculated CBR values are below 10%, the accuracy of this relationship is reduced. The interpreted DCP results are provided in Appendix G. A summary of the *in situ* DCP are provided in Table 8.3, below:

DCP Location	Laboratory Test Result (0.50 – 1.00)		DCP Test Result (0.10-1.00m)	
	CBR (%)	Subgrade Surface Modulus (MPa)	CBR (%)	Subgrade Surface Modulus (MPa)
DCP01 (TP01)	-	-	5.4	52
DCP02 (TP02)	-	-	4.2	44
DCP03 (TP03)	-	-	4.4	45
DCP04 (TP04)	-	-	5.9	55
DCP05 (TP05)	-	-	5.4	52
DCP06 (TP06)	5.7	54	4.2	44
TP07	3.9	42		
TP10	4.1	43		
AVERAGE:	**4.6**	**47**	**4.9**	**49**

Table 8.3: *In situ* and Laboratory DCP Results

8.15 The *in situ* DCP results were in the range of 4.2%to 5.9%, corresponding to a subgrade surface modulus (MPa) of between 44MPa and 55MPa, with an average of 49MPa. Laboratory soaked CBR test results were in the range of 3.9% to 5.7%, corresponding to a subgrade surface modulus (MPa) of between 42MPa and 54MPa, with an average of 47MPa.

8.16 Pavement design was undertaken following the guidance of CD 225 Design for new pavement foundations, Revision 1 (April 2020).

8.17 A Foundation Class 2 (max 1.48mm deflection), for under a standard wheel load (40kN over a 151mm radius load area) and restricted design approach has been used to determine pavement thicknesses. With an average subgrade surface modulus of 47MPa, the capping and sub-base required for new pavements at the Site are:

- 420mm (MCHW1 613) of capping, as per Figure 3.17; and
- 300mm (MCHW1 803, 804, 806 or 807) of sub-base, as per Figure 3.18

8.18 Notwithstanding, formation level should be inspected and proof-rolled prior to capping placement. Any identified soft-spots are to be excavated out and backfilled with suitable engineered fill to an appropriate earthworks specification.

Soft Spot and Shallow Excavations

8.19 During the supplementary ground investigation works, a soft-spot was identified within the vicinity of WS108, WS109 and WS111, with N-values of N=6, N=5 and N=5 recorded at 1.0m bgl. The soft-spot does not extend beyond WS106 or WS105, with an indicative extent indicated on drawing No.2590_02_001 (Exploratory Hole Location Plan).

8.20 It is recommended that foundations located within the vicinity of the soft-spot are extended down to more competent strata at 2.0m bgl. Alternatively, the soft-spot could be excavated out and backfilled to an appropriate earthworks specification.

8.21 In general, shallow cohesive soils should remain freestanding over the short to medium term. Granular soils are not anticipated but if encountered, shoring should be used. There is the possibility of shallow perched water ingress to excavations and dewatering of excavations may be required during site works.

Buried Concrete

8.22 Design/mix of buried concrete should be undertaken in accordance with the appropriate ACEC classification, of BRE Special Digest 1: 2005 (Concrete in Aggressive Ground). On this basis the Site is deemed to classify as “greenfield” and on the basis of the Site history, the geological setting, and observations during the formation of exploratory holes, the Site is considered to be one that is unlikely to contain pyrite (i.e. sulphide).

8.23 A total of 6No. samples from the Made Ground were subject to pH and SO_4 analysis. Results indicate soluble sulphate concentrations in soil samples in the range of 55mg/l to 2600mg/l, with the average of the two highest results 2150mg/l On the basis of these chemical test results, the Design Sulphate Class for the Site is considered to be “DS-3”.

8.24 Based on the Site geology, the groundwater conditions can be described as ‘static’. Recorded soil pH values were in the range of 7.6 to 11.2. On this basis, the “Aggressive Chemical

Environment for Concrete (ACEC)" class for concrete in the ground is indicated to be AC-2s. Design/mix of buried concrete should be undertaken in accordance with these classifications.

9.0 INFILTRATION ASSESSMENT

9.1 A total of 4No. trial pits were undertaken to establish the potential for using soakaways for surface water drainage, with 2No. deeper infiltration tests (TP08 and TP09) and 2No. shallow soakage tests (TP10 and TP11), in accordance with the guidance laid out in BRE365.

9.2 The soakage test results are presented in full in Appendix H and the Trial Pit logs are provided in Appendix B. The results of the soakage testing are summarised in Table 9.1, below:

Loc.	Pass / Fail	Lithology	Test Range (depth, m)	Soil infiltration rate (ms^{-1})
TP08	Fail	MADE GROUND (Silty gravelly clay)	1.00 – 2.00	N/A
TP09	Fail	MADE GROUND (Silty gravelly clay)	1.00 – 2.00	N/A
TP10	Fail	MADE GROUND (Silty gravelly clay)	0.40 – 0.80	N/A
TP11	Fail	MADE GROUND (Silty gravelly clay)	0.50 – 1.00	N/A

Table 9.1: Summary of infiltration test results

9.3 A general requirement for soakaway/infiltration testing is that the excavation should drain half the volume over a period of 24 hours for three complete tests. None of the locations were able to achieve this within the first test.

10.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

10.1 A Phase 2 Geo-Environmental Assessment for a parcel of land adjacent to Bumpstead Road and Phoenix Road in Haverhill was undertaken for a proposed commercial development (McDonald's restaurant and drive through.

10.2 Intrusive investigation works were undertaken in two phases. The initial investigation works of 2No. rotary auger boreholes (BH01 and BH02), 6No. DCPs (DCP101 to DCP106) with associated trial pits (TP01 to TP06) and additional 5No trial pits (TP07 to TP11), recorded unexpected deep Made Ground/fill. However, the material was found to be relatively competent and potentially suitable for shallow spread foundations. Therefore, a supplementary site investigation comprising 11No. windowless sample boreholes (WS101 to WS111) formed in a grid pattern within the footprint of the proposed building was undertaken.

10.3 Made Ground/fill was recorded to depths of between 3.10m and 3.70m bgl, underlain by cohesive Lowestoft Formation to the maximum extent of the boreholes at 6.45m bgl.

10.4 During exploratory hole formation, perched water strikes were recorded at a depths of between 0.60m and 2.30m. Subsequent monitoring of installed standpipes recorded groundwater at a single location (BH02) at levels of between 0.98m and 3.75m bgl at BH02, indicating variable perched water levels across the Site.

10.5 Chemical testing did not identify any elevated concentrations of determinants with respect to the site specific assessment criteria (commercial) with the exception of lead at one location (BH01). However, due to the location of this exceedance within the footprint of the proposed development and the result of the source-receptor pathway being broken, no further action is considered necessary. No asbestos was detected within Site soils.

10.6 A sample of the perched water at the site recorded no significant concentration of dissolved metals and an EPH concentration of 120µg/l..

10.7 The ground gas monitoring to date has recorded elevated methane and carbon dioxide concentrations at the site during period of low atmospheric pressure, although with negligible gas flow rates. On the basis of the extended ground gas monitoring undertaken and subsequent risk assessment, no ground gas protection measures are considered necessary for the proposed end use.

10.8 Shallow foundations will be suitable for the proposed development. For a 0.60m wide foundation at 0.80m bgl, a bearing capacity of 170kN/m^2.is calculated. Any soft spots

identified during foundation excavations should be removed to competent material (2.0m bgl).

10.9 Floor slabs should be suspended. However, were a ground bearing slab desired, some form of ground improvement would be required, with any soft spots at formation level excavated out and backfilled with engineered granular fill.

10.10 Buried concrete should be classified as DS-3, with an ACEC classification of AC-2s.

10.11 New pavements at the Site should be constructed using a single capping layer of 420mm and a sub-base of 300mm.

10.12 Shallow excavations within cohesive soils may offer short to medium-term stability, though there is the potential for perched water ingress at the Site.

Recommendations

10.13 Based on the findings of the site investigation works undertaken, no remedial action is required for the proposed end-use.

10.14 Foundations located within the vicinity of the soft-spot should be extended to more competent strata at 2.0m bgl. Alternatively, the soft spot could be excavated out backfilled to a suitable earthworks specification.

11.0 REFERENCES

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APPENDICES

APPENDIX A

EXPLORATORY HOLE LOCATION PLANS AND CONSTRAINTS DRAWING

N
Indicative
CREATE

PLOT
4000A

TP01
TP02
TP03
TP04
TP05
TP06
TP07
TP08
TP09
TP10
TP11
BH01
BH02
WS101
WS102
WS103
WS104
WS105
WS106
WS107
WS108
WS109
WS110
WS111

Pedestrian Access
Banner
Existing Trees
McDelivery Parking
McDelivery Shelter
Entrance
Exit
Corral
Grill Bays
Totem
Play
Lane
BUMPSTEAD RD

NOTES

1. THIS DRAWING IS BASED ON LAYOUT DRAWING 8342-SA-XXXX-SK04 ENTITLED SITE LAYOUT PLAN BY SCURR ARCHITECTS DATED 12/2021 AND TOPOGRAPHIC SURVEY 4220178-4101 BY GLANVILLE GROUP DATED 03/2022

KEY

TRIAL PITS — TP01
ROTARY AUGER BOREHOLES — BH02
WINDOWLESS SAMPLE BOREHOLE — WS01
APPLICATION SITE REDLINE BOUNDARY
DELINEATED SOFT SPOT

REV	DATE	AMENDMENT DETAILS	DRAWN	APPROVED

PROJECT: MCDONALDS, HAVERHILL	DATE: 03.05.22	DRAWING STATUS: INFORMATION	
	SCALE(S): 1:250	DESIGNED: TB / DRAWN: GB	
DRAWING TITLE: EXPLORATORY HOLE LOCATION PLAN		CHECKED: TB / APPROVED: TB	
	JOB No: 2590		
CLIENT: MCDONALDS RESTAURANTS LTD.	DRAWING No: 10/001A	REVISION:	

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DO NOT SCALE — ORIGINAL SHEET SIZE - A1 Portrait

APPENDIX B

EXPLORATORY HOLE LOGS

KEY SHEET

SAMPLING

D	**Small disturbed sample**
B	**Bulk disturbed sample**
ES	**Environmental sample***
HVR	**Hand Shear Vane Test (KPa)**

TESTING

N=*x*	**SPT blow count 'N' given as the sum of the blows required to drive the sampler across the test length (300mm)**
(*x,x/y,y,y,y*)	**Blows per increment during the standard penetration test (SPT). The initial two readings, '*x*' relate to the seating drive (150mm of test) whilst the remaining blows, '*y*', relate to the number of blows per 75mm increment of the test length (total of 300mm)**
***x* (*x,x for z*)**	**Incomplete SPT test where seating drive blow count (x) totals 50 for length of seating drive (*z*) (penetration in mm)**
***x* (*x,x/y for z*)**	**Incomplete SPT test where seating drive was completed but full test length could not be achieved (*z*) (penetration in mm).**

All measurements are given in metres (m), unless otherwise specified

* Sample comprises: 1ltr plastic tub, 250ml amber glass vial and 60ml amber glass vial

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Borehole Log

Borehole No. **BH01**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567641.04 N244276.04	Hole Type BH
Location: Haverhill		Level: 76.52m aOD	Scale 1:50
Client: McDonald's Restaurants Ltd		Date: 28/03/2022	Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES		0.15	76.37		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
		0.80	D					Firm becoming firm to stiff grey brown silty gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and subangular fine to coarse flint. With occasional fragments of brick and organic material. MADE GROUND.
		1.00	SPT	N=11 (1,1/2,2,3,4)				
		1.20	D					*1.20m - ...becoming gravelly to very gravelly*
		1.60 - 2.00	U					
		2.00	SPT	N=8 (2,1/2,2,2,2)				*2.00m - ...becoming soft to firm and light brown grey*
		2.40	D					
		2.60	ES					*2.70m - ...becoming firm to stiff*
		3.00 - 3.45	D					*3.00m - ...becoming dark brown*
		3.00	SPT	N=23 (3,4/6,5,6,6)				
		3.60 - 3.85	U		3.40	73.12		Very stiff light brown to brown silty gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk and occasional subrounded fine to medium flint. LOWESTOFT FORMATION.
		4.00 - 4.40	D					
		4.00	SPT	N=38 (3,6/8,10,11,9)				
		4.50	D		4.40	72.12		Stiff very sandy CLAY. LOWESTOFT FORMATION.
					4.60	71.92		Structureless CHALK recovered as firm white to cream mottled SILT with ferruginous staining. POSSIBLE INCLUSION OF UNDIFFERENTIATED CHALK.
		5.00 - 5.45	D		4.90	71.62		
		5.00	SPT	N=39 (3,6/8,10,10,11)				Very stiff orange brown sandy CLAY. LOWESTOFT FORMATION.
		5.65 - 6.00	D		5.65	70.87		Stiff very sandy CLAY. With rare subrounded medium flint gravel. LOWESTOFT FORMATION.
		6.00	SPT	50 (18,16/50 for 150mm)				
					6.30	70.22		End of Borehole at 6.30m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. BH01 terminated at 6.30m, SPT refusal
2. No groundwater encountered
3. Standpipe installed to 6.00m

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Borehole Log

Borehole No. **BH02**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567641.30 N244267.74	Hole Type BH
Location: Haverhill		Level: 76.47m aOD	Scale 1:50
Client: McDonald's Restaurants Ltd		Date: 28/03/2022	Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	76.42		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
	▼	0.50	ES					Firm grey to grey brown silty gravelly clay. With occasional organic fragments and fragments of brick. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. MADE GROUND.
		1.00 - 1.45	D					*0.90m - ...becoming dark grey*
		1.00	SPT	N=13 (1,2/3,3,3,4)				
		1.70	D					*1.60m - ...becoming brown mottled grey brown*
		2.00 - 2.45	D					*2.00m - ...becoming grey to dark grey*
	▼	2.00	SPT	N=8 (1,2/2,2,1,3)				*2.40m - ...becoming light brown mottled brown*
		2.80	ES					*2.60m - ...becoming dark grey mottled black. Chalk gravel absent*
		3.00	SPT	N=23 (2,2/5,6,6,6)				*2.95m - ...fragment of metal*
		3.10 - 3.45	D		3.10	73.37		Stiff light brown to brown silty gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk and occasional subrounded fine to medium flint. LOWESTOFT FORMATION.
		3.60 - 4.00	U					
		4.00 - 4.30	D		3.90	72.57		Firm to stiff orange to orange brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint.
		4.00	SPT	N=12 (2,2/3,2,3,4)				
		4.60 - 5.00	D		4.60	71.87		Orange slightly clayey very sandy SILT. LOWESTOFT FORMATION.
		5.00	SPT	N=26 (4,6/6,6,6,8)	5.00	71.47		Stiff orange mottled light brown sandy CLAY. With rare carbonaceous specs. LOWESTOFT FORMATION.
					5.50	70.97		Stiff slightly gravelly very sandy CLAY. Gravel is angular to subrounded fine to coarse flint. LOWESTOFT FORMATION.
		5.70 - 5.90	D					
		6.00	SPT	N=46 (10,20/24,6,6,10)				
					6.45	70.02		End of Borehole at 6.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. BH02 halted at 6.45m, target depth
2. Groundwater seepages at 0.70m and 2.30m
3. Standpipe installed to 6.00m

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Borehole Log

Borehole No. **WS101**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567615.92 N244273.12	Hole Type WS
Location: Haverhill		Level: 76.52m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Soft to firm grey-brown slightly gravelly silty clay. Gravel is fine to medium subangular to subrounded chalk and flint. MADE GROUND.
		1.00	SPT	N=20 (2,3/6,4,3,7)				
					1.30	75.22		Brown slightly clayey fine to medium subangular to subrounded flint gravel. MADE GROUND.
					1.50	75.02		Firm brown clay. MADE GROUND.
					1.60	74.92		Brown fine to medium subangular to subrounded flint gravel. MADE GROUND.
					1.65	74.87		Firm to stiff brown grey black white slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded flint and chalk. MADE GROUND.
		2.00	SPT	N=15 (2,2/3,4,4,4)				
					2.60	73.92		Firm dark brown clayey silt / silty clay. Trace medium subrounded flint gravel. MADE GROUND.
		3.00	SPT	N=22 (4,4/4,5,6,7)				*3.00m - 3.0m thin peat layer.*
					3.15	73.37		Firm earthy brown slightly clayey silt. MADE GROUND.
					3.25	73.27		Firm to stiff buff-brown white slightly clayey gravelly SILT. Gravel is fine to medium subangular to subrounded chalk and flint. Trace cobble of flint. LOWESTOFT FORMATION. *3.60m - flint cobble.*
					4.00	72.52		End of Borehole at 4.00m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS101 halted at 4.00m, target depth.
2. Very slight groundwater at 1.30m.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567626.90 N244277.00	Hole Type WS
Location: Haverhill		Level: 76.51m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Firm brown grey black slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded flint and chalk. Locally very soft. MADE GROUND.
		1.00	SPT	N=14 (2,2/2,3,3,6)				
					1.10	75.41		Firm brown slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded flint and chalk. MADE GROUND.
					1.40	75.11		Stiff grey white slightly gravelly silt. Gravel is fine to medium subrounded chalk. MADE GROUND.
					1.90	74.61		Firm brown grey black slightly slightly gravelly silty clay. Gravel is fine to medium subangular to subrounded chalk and flint. MADE GROUND.
		2.00	SPT	N=11 (5,3/2,2,3,4)				*2.20m - Band of fine to medium clinker gravel.*
								2.88m - Band of fine to medium clinker gravel.
		3.00	SPT	N=18 (3,3/3,5,5,5)				
					3.20	73.31		Firm dark brown grey silty clay. Trace fine to medium subangular flint gravel. MADE GROUND.
					3.45	73.06		Firm earthy brown slightly gravelly slightly clayey silt. Gravel is fine to coarse subangular to subrounded chalk and flint. MADE GROUND.
					3.70	72.81		Firm buff-brown white slightly clayey gravelly SILT. Gravel is fine to medium subangular to subrounded chalk and flint. LOWESTOFT FORMATION.
		4.00	SPT	N=22 (2,3/4,6,6,6)				
					4.45	72.06		End of Borehole at 4.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS102 halted at 4.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567634.87 N244280.80	Hole Type WS
Location: Haverhill		Level: 76.52m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.00	SPT	N=12 (2,2/3,3,3,3)				Firm brown grey black slightly slightly gravelly silty clay. Gravel is fine to medium subangular to subrounded chalk and flint. Locally soft. MADE GROUND.
		2.00	SPT	N=12 (2,2/2,3,3,4)				
		3.00	SPT	N=19 (2,3/4,4,5,6)	2.10	74.42		Firm to stiff buff-brown white slightly clayey gravelly SILT. Gravel is fine to medium subangular to subrounded chalk and flint. MADE GROUND.
					3.30	73.22		Stiff earth-brown slightly clayey silt. Trace medium subrounded flint gravel. MADE GROUND.
					3.45	73.07		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS103 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS104**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567641.17 N244283.36	Hole Type WS
Location: Haverhill		Level: 76.52m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		1.00	SPT	N=10 (1,2/2,2,3,3)				Soft brown grey slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded flint. With pockets of very soft black organic silty clay. MADE GROUND.
		2.00	SPT	N=16 (3,2/3,4,4,5)				
		3.00	SPT	N=15 (2,2/2,3,4,6)				
					3.15	73.37		Firm earth-brown slightly gravelly slightly clayey silt. Gravel is fine to medium subangular to subrounded flint and chalk. MADE GROUND.
					3.50	73.02		Stiff buff-brown slightly sandy gravelly SILT. Gravel is fine to medium subangular to subrounded chalk and flint. LOWESTOFT FORMATION.
		4.00	SPT	N=33 (3,4/7,8,9,9)				
					4.45	72.07		End of Borehole at 4.45m

1 2 3 4 5

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS104 halted at 4.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567629.79 N244271.77	Hole Type WS
Location: Haverhill		Level: 76.52m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Firm brown black white slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded chalk and flint. Trace chalk cobble. With pocets of very soft black organic silty clay. MADE GROUND.
					0.80	75.72		
		1.00	SPT	N=11 (2,2/2,3,3,3)				Firm brown grey white gravelly clay. Gravel is fine to medium subangular to subrounded chalk and flint. MADE GROUND.
		2.00	SPT	N=15 (4,4/3,4,4,4)				
					2.85	73.67		
		3.00	SPT	N=22 (5,3/5,5,6,6)				Firm grey slightly clayey silt. Trace medium angular flint gravel. MADE GROUND.
					3.35	73.17		Firm earth-brown silty clay. MADE GROUND.
					3.45	73.07		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS105 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS106**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567620.90 N244269.39	Hole Type WS
Location: Haverhill		Level: 76.50m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.00	SPT	N=12 (2,2/2,3,3,4)				Firm grey-brown white slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded chalk flint and brick. Locally soft. MADE GROUND.
					1.15	75.35		Firm brown white grey slightly silty gravelly clay. Gravel is fine to medium subangular to subrounded flint and chalk. Trace black organic material. MADE GROUND.
		2.00	SPT	N=13 (3,3/3,3,3,4)				
					2.70	73.80		Firm dark brown grey silt. Trace medium subangular flint gravel. MADE GROUND.
		3.00	SPT	N=23 (7,6/5,5,6,7)	2.95	73.55		Firm buff-brown white slightly silty gravelly CLAY. Gravel is fine to medium subangular to subrounded chalk and flint. LOWESTOFT FORMATION.
								3.25m - 3.25m-3.30m soft.
					3.40	73.10		Stiff cream-brown white slightly gravelly SILT. Gravel is fine to medium subangular to subrounded chalk and flint. LOWESTOFT FORMATION.
					3.45	73.05		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS106 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS107**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567616.36 N244256.90	Hole Type WS
Location: Haverhill		Level: 76.49m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.00	SPT	N=11 (2,2/2,3,3,3)				Firm brown grey gravelly clay. Gravel is fine to medium subangular to subrounded flint and chalk. MADE GROUND.
		2.00	SPT	N=24 (3,4/5,6,6,7)	2.00	74.49		Firm dark brown slightly clayey silt. Trace fine to medium subangular to subrounded siltstone. With pockets of soft black organic silty clay. MADE GROUND.
					2.40	74.09		Firm buff-brown cream and white gravelly clayey silt. Gravel is fine to medium subangular to subrounded chalk and flint. Trace sandstone gravel. Trace flint cobble. MADE GROUND.
		3.00	SPT	N=25 (4,4/5,6,7,7)				
					3.45	73.04		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS107 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS108**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567625.19 N244259.80	Hole Type WS
Location: Haverhill		Level: 76.49m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Firm brown grey silty clay. Trace fine to medium subangular to subrounded chalk and flint gravel. Orange stained in part. MADE GROUND.
		1.00	SPT	N=6 (1,1/1,1,2,2)	0.90	75.59		Soft brown slightly gravelly silty clay. Gravel is fine to medium subrounded to rounded chalk gravel. MADE GROUND.
					1.50	74.99		Very soft grey black slightly gravelly silty clay. Gravel is fine to medium subrounded chalk. MADE GROUND.
		2.00	SPT	N=17 (3,3/4,4,4,5)	1.80	74.69		Stiff grey white slightly gravelly slightly silty clay. Gravel is fine to medium subrounded flint and brick. MADE GROUND.
					2.15	74.34		Firm dark brown clayey silt. Trace fine subangular to subrounded flint gravel. MADE GROUND.
		3.00	SPT	N=24 (4,4/5,6,6,7)	2.45	74.04		Stiff buff-brown white slightly gravelly clayey SILT. Gravel is fine to medium subangular to subrounded chalk and flint. LOWESTOFT FORMATION.
					3.45	73.04		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS108 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS109**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567632.84 N244262.64	Hole Type WS
Location: Haverhill		Level: 76.50m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Firm grey brown slightly silty gravelly clay. Gravel is fine to medium subangular to subrounded flint and chalk gravel. MADE GROUND.
		1.00	SPT	N=5 (1,1/1,1,1,2)	1.10	75.40		
								Very soft to soft brown grey gravelly clay. Gravel is fine to medium subangular to subrounded chalk and flint. MADE GROUND.
		2.00	SPT	N=13 (3,3/3,3,3,4)	2.10	74.40		
								Firm brown grey black slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded flint and chalk. MADE GROUND.
					2.40	74.10		Firm earthy brown silty clay. MADE GROUND.
		3.00	SPT	N=20 (3,3/4,5,5,6)	2.95	73.55		Firm brown white gravelly clay. Gravel is fine to medium subangular to subrounded flint and chalk.Locally soft. LOWESTOFT FORMATION.
					3.45	73.05		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS109 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS110**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567640.10 N244265.22	Hole Type WS
Location: Haverhill		Level: 76.52m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown silt. Trace fine to medium subangular to subrounded flint gravel. MADE GROUND.
					0.45	76.07		
								Firm grey-brown white slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded chalk flint. Locally soft. MADE GROUND.
		1.00	SPT	N=8 (1,1/1,1,2,4)				
		2.00	SPT	N=14 (7,5/5,3,3,3)				
					2.20	74.32		Brown silt. Trace fine to medium subangular to subrounded flint gravel. MADE GROUND.
					2.70	73.82		Soft to firm dark brown silty clay. Trace fine to medium subangular to subrounded flint gravel. MADE GROUND.
		3.00	SPT	N=19 (2,3/4,5,5,5)				*2.75m - 2.75m white plastic - possible asbestos tile. Painted green on the upside.*
					3.20	73.32		Soft to firm buff-brown slightly gravelly silty CLAY. Gravel is fine to medium subrounded chalk. LOWESTOFT FORMATION.
					3.45	73.07		End of Borehole at 3.45m

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS110 halted at 3.45m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Borehole Log

Borehole No. **WS111**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567624.52 N244263.35	Hole Type WS
Location: Haverhill		Level: 76.24m aOD	Scale 1:40
Client: McDonald's Restaurants Ltd		Date: 28/04/2022	Logged AW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		1.00	SPT	N=5 (1,1/1,1,1,2)				Firm brown black white slightly gravelly slightly silty clay. Gravel is fine to medium subangular to subrounded chalk and flint. With pocets of very soft black organic silty clay. MADE GROUND.
		2.00	SPT	N=20 (3,4/4,5,5,6)				
					2.30	73.94		Firm dark brown clayey silt. Trace fine to medium subangular to subrounded flint gravel. MADE GROUND.
								2.50m - 2.50m layer of fine to medium clinker.
					2.70	73.54		Firm orange brown slightly gravelly clayey silt. Gravel is fine to medium subangular to subrounded flint. MADE GROUND.
					3.00	73.24		End of Borehole at 3.00m

1 2 3 4 5

Borehole Diameter		Casing Diameter		Chiselling		
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration

Remarks

1. WS111 halted at 3.00m, target depth.
2. No groundwater encountered.
3. Exploratory hole backfilled with arisings to surface.

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Trial Pit Log

Trial Pit No. **TP01**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567615.87 N244292.90 Level: 76.53m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 0.30 Depth: 1.00 (0.30)	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.15	76.53		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
	▼				1.00	76.38		Firm becoming firm to stiff grey brown silty gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and subangular fine to coarse flint. With occasional fragments of brick and organic material. MADE GROUND.
								End of Trial Pit at 1.00m

1

2

Remarks
1. TP01 halted at 1.00m. Target depth
2. Perched groundwater at 0.95m
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP02**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567592.92 N244302.07 Level: 76.52m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 0.30 Depth: 1.00 (0.30)	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	76.52		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
		0.30	ES					Firm becoming firm to stiff grey brown silty gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and subangular fine to coarse flint. MADE GROUND.
					1.00	76.42		End of Trial Pit at 1.00m

1

2

Remarks
1. TP02 halted at 1.00m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP03**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567616.12 N244308.46 Level: 76.51m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 0.30 Depth: 1.00 (0.30)	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10	76.51		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
		0.20	ES					Firm becoming firm to stiff grey brown silty gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and subangular fine to coarse flint. With occasional fragments of brick. MADE GROUND.
	▼				1.00	76.41		End of Trial Pit at 1.00m

1

2

Remarks
1. TP03 halted at 1.00m. Target depth
2. Perched groundwater at 0.95m
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No.
TP04
Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567666.76 N244309.71 Level: 75.80m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 0.30 Depth: 1.00 0.30	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
	▼				0.05	75.80		Soft becoming firm brown grey to grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
		0.40	ES					Firm becoming firm to stiff grey brown silty gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and subangular fine to coarse flint. With rare fragments of brick. MADE GROUND.
	▽				1.00	75.75		End of Trial Pit at 1.00m

1
2

Remarks
1. TP04 halted at 1.00m. Target depth
2. Perched groundwater at 0.80m, rising to 0.10m in 24 hours
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP05**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567643.46 N244270.61 Level: 76.54m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 1.50 (0.45)	Logged TB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05	76.54		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
								Firm grey brown silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk with occasional subrounded fine to coarse flint. MADE GROUND.
								0.40m - ...becoming grey to dark grey
					1.50	76.49		End of Trial Pit at 1.50m

1

2

Remarks
1. TP05 halted at 1.50m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP06**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567622.00 N244252.52 Level: 76.53m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50 Depth: 1.90 0.45	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With rootlets. MADE GROUND.
					0.15	76.53		Firm grey brown silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk with occasional subrounded fine to coarse flint. MADE GROUND.
								0.40m - ...becoming grey to dark grey
		0.50 - 1.00	B					
								1.30m - ...with organic fragments
								1.60m - ...becoming brown grey. Organic fragments absent
					1.90	76.38		End of Trial Pit at 1.90m

1

2

Remarks
1. TP06 halted at 1.90m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with arisings to surface

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP07**

Sheet 1 of 2

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567641.77 N244319.04 Level: 76.30m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 2.40 / 0.45	Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	76.30		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With traces of brick and rootlets. MADE GROUND.
		0.50 - 1.00	B					Firm dark grey to grey brown silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With traces of brick and organic material. MADE GROUND.
	▼							
	▼							

1

2

Remarks
1. TP07 halted at 2.40m, target depth
2. Perched groundwater seepages at 1.50m and 1.70m
3. Trial pit backfilled with arisings upon completion

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP07**

Sheet 2 of 2

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567641.77 N244319.04 Level: 76.30m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 2.40 / 0.45	Logged TB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Firm dark grey to grey brown silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With traces of brick and organic material. MADE GROUND.
					2.40	76.20		End of Trial Pit at 2.40m

3

4

Remarks
1. TP07 halted at 2.40m, target depth
2. Perched groundwater seepages at 1.50m and 1.70m
3. Trial pit backfilled with arisings upon completion

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP08**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567613.70 N244280.90 Level: 76.53m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 2.00 / 0.45	Logged TB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05	76.53		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With traces of brick and rootlets. MADE GROUND.
								Firm dark grey to grey brown silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With traces of brick and organic material. MADE GROUND.
								0.40m - ...with occasional subrounded flint and chalk cobbles
								1.20m - ...becoming grey mottled dark grey
								1.60m - ...becoming grey brown
					2.00	76.48		End of Trial Pit at 2.00m

1

2

Remarks
1. TP08 halted at 2.00m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with gravel to 1.00m and arisings to surface
4. Infiltration testing carried out between 1.00m and 2.00m

Stability : Stable

AGS

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Trial Pit Log

Trial Pit No. **TP09**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567644.00 N244283.05 Level: 76.52m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.50	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 2.00 / 0.45	Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	76.52		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With traces of brick and rootlets. MADE GROUND.
								Firm brown grey silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With traces of brick and organic material. MADE GROUND.
								0.30m - ...becoming grey to grey brown
		0.50 - 1.00	B					
								0.70m - ...becoming light grey brown
								1.40m - ...with occasional dark grey mottling
					2.00	76.47		End of Trial Pit at 2.00m

1

2

Remarks
1. TP09 halted at 2.00m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with gravel to 1.00m and arisings to surface
4. Infiltration testing carried out between 1.00m and 2.00m

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP10**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567616.63 N244299.89 Level: 76.53m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.40 Depth: 0.80 / 0.45	Scale 1:10
Client: McDonald's Restaurants Ltd			Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	76.53		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With traces of brick and rootlets. MADE GROUND.
		0.40 - 0.80	B					Firm brown grey silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With traces of brick and organic material. MADE GROUND.
	▼				0.80	76.48		End of Trial Pit at 0.80m

1

2

Remarks
1. TP10 halted at 0.80m. Target depth
2. Perched groundwater at 0.80m
3. Trial pit backfilled with gravel to 0.40m and arisings to surface
4. Infiltration testing carried out between 0.40m and 0.80m

Stability : Stable

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Trial Pit Log

Trial Pit No. **TP11**

Sheet 1 of 1

Project: McDonalds MD	Project No: P22-2590	Co-ords: E567649.24 N244305.43 Level: 76.24m AoD	Date 29/03/2022
Location: Haverhill		Dimensions (m): 1.40	Scale 1:10
Client: McDonald's Restaurants Ltd		Depth: 1.00 / 0.45	Logged TB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	76.24		Soft brown grey slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse flint and chalk. With traces of brick and rootlets. MADE GROUND.
								Firm brown grey silty gravelly clay. Gravel is angular to subrounded fine to coarse chalk and subrounded fine to coarse flint. With occasional fragments of brick and organic material. MADE GROUND.
					1.00	76.19		End of Trial Pit at 1.00m

1

2

Remarks
1. TP11 halted at 1.00m. Target depth
2. No groundwater encountered
3. Trial pit backfilled with gravel to 0.50m and arisings to surface
4. Infiltration testing carried out between 0.50m and 1.00m

Stability : Stable

AGS

APPENDIX C

CHEMICAL LABORATORY TEST CERTIFICATES

& Comparison Against SSAC

Certificate of Analysis

Certificate Number 22-06153 *Issued:* 05-Apr-22

Client Create Consulting Engineers LTD
15 Princess Street
Norwich
NR3 1AF

Our Reference 22-06153

Client Reference P22-2590

Order No (not supplied)

Contract Title (not supplied)

Description 7 Soil samples.

Date Received 30-Mar-22

Date Started 30-Mar-22

Date Completed 05-Apr-22

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

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

Approved By

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis

Soil Samples

Our Ref 22-06153
Client Ref P22-2590
Contract Title

	Lab No	1989072	1989073	1989074	1989075	1989076	1989077	1989078
	.Sample ID	BH01	BH01	BH02	BH02	TP02	TP03	TP04
	Depth	0.10	2.60	0.50	2.80	0.30	0.20	0.40
	Other ID	1	2	1	2	1	1	1
	Sample Type	ES	ES	ES	ES	ES	ES	ES
	Sampling Date	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Metals								
Arsenic	DETSC 2301#	0.2	mg/kg	73	15	9.6	11	6.9	10	7.2
Barium	DETSC 2301#	1.5	mg/kg	420	59	44	41	33	34	31
Beryllium	DETSC 2301#	0.2	mg/kg	0.3	0.9	0.4	0.5	0.4	0.5	0.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	3.6	1.0	1.1	1.1	0.7	0.5	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	13	0.4	0.6	0.3	0.2	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	65	28	14	17	13	15	14
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	840	43	37	14	19	20	14
Lead	DETSC 2301#	0.3	mg/kg	2500	34	84	16	15	10	9.5
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	26	29	17	16	16	20	17
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	23	49	23	33	22	30	25
Zinc	DETSC 2301#	1	mg/kg	2900	78	110	48	42	45	38
Inorganics										
pH	DETSC 2008#		pH	11.2	8.3	8.3	7.6	8.0	8.1	7.8
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	1.4	1.4	0.9	2.1	1.1	1.0	1.0
Organic matter	DETSC 2002#	0.1	%	1.6	1.6	1.5	2.8	1.5	1.1	1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	2600	72	1700	55	1500	490	1500
Sulphide	DETSC 2024*	10	mg/kg	80	< 10	44	24	52	< 10	20
Sulphate as SO4, Total	DETSC 2321#	0.01	%	2.2	0.08	1.3	0.08	0.57	0.67	0.81
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	2.1	1.7	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.2	1.4	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	0.7	2.1	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4

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

Summary of Chemical Analysis

Soil Samples

Our Ref 22-06153
Client Ref P22-2590
Contract Title

			Lab No	1989072	1989073	1989074	1989075	1989076	1989077	1989078
			.Sample ID	BH01	BH01	BH02	BH02	TP02	TP03	TP04
			Depth	0.10	2.60	0.50	2.80	0.30	0.20	0.40
			Other ID	1	2	1	2	1	1	1
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.03	< 0.03	< 0.03	0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

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

Summary of Asbestos Analysis

Soil Samples

Our Ref 22-06153
Client Ref P22-2590
Contract Title

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1989072	BH01 1 0.10	SOIL	NAD	none	Lee Kerridge
1989073	BH01 2 2.60	SOIL	NAD	none	Lee Kerridge
1989074	BH02 1 0.50	SOIL	NAD	none	Lee Kerridge
1989075	BH02 2 2.80	SOIL	NAD	none	Lee Kerridge
1989076	TP02 1 0.30	SOIL	NAD	none	Lee Kerridge
1989077	TP03 1 0.20	SOIL	NAD	none	Lee Kerridge
1989078	TP04 1 0.40	SOIL	NAD	none	Lee Kerridge

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

Information in Support of the Analytical Results

Our Ref 22-06153
Client Ref P22-2590
Contract

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1989072	BH01 0.10 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989073	BH01 2.60 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989074	BH02 0.50 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989075	BH02 2.80 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989076	TP02 0.30 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989077	TP03 0.20 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		
1989078	TP04 0.40 SOIL	28/03/22	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

Certificate of Analysis

Certificate Number 22-08244 *Issued:* 09-May-22

Client Create Consulting Engineers LTD
15 Princess Street
Norwich
NR3 1AF

Our Reference 22-08244

Client Reference P22-2590

Order No PO4540

Contract Title Haverhill

Description One Water sample.

Date Received 29-Apr-22

Date Started 29-Apr-22

Date Completed 09-May-22

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

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

Approved By

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Water Samples

Our Ref 22-08244
Client Ref P22-2590
Contract Title Haverhill

Lab No	2003212
.Sample ID	BH02
Depth	
Other ID	
Sample Type	W
Sampling Date	27/04/2022
Sampling Time	1100

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.2
Barium, Dissolved	DETSC 2306	0.26	ug/l	64
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	71
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.07
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.2
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	15
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.77
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	< 0.6
Zinc, Dissolved	DETSC 2306	1.3	ug/l	3.2
Inorganics				
pH	DETSC 2008		pH	7.3
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	18
Sulphide	DETSC 2208	10	ug/l	54
Total Organic Carbon	DETSC 2085	1	mg/l	8.1
Petroleum Hydrocarbons				
EPH (C10-C35)	DETSC 3311	10	ug/l	120
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01
Fluorene	DETSC 3304	0.01	ug/l	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.03
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.01
Pyrene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20
Phenols				
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100

Key: * -not accredited.

Information in Support of the Analytical Results

Our Ref 22-08244
Client Ref P22-2590
Contract Haverhill

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2003212	BH02 WATER	27/04/22	GB 1L, GV, PB 1L	pH/Cond/TDS (1 days)	

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

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

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

McDonalds MD Haverhill

Comparison of Samples vs Site Specific Assessment Criteria

Scenario: Commercial (1% SOM)

LoD	Metals (Based on 6% SOM)	SSAC	Sample ID	BH01	BH01	BH02	BH02	TP02	TP03	TP04
			Depth	0.10	2.60	0.50	2.80	0.30	0.20	0.40
0.2mg/kg	Arsenic	**640**		73	15	9.6	11	6.9	10	7.2
1.5mg/kg	Barium	-		420	59	44	41	33	34	31
0.2mg/kg	Beryllium	**12**		0.30	0.90	0.40	0.50	0.40	0.50	0.50
0.2mg/kg	Boron, Water Soluble	**240000**		3.6	1.0	1.1	1.1	0.70	0.50	0.70
0.1mg/kg	Cadmium	**190**		13	0.40	0.60	0.30	0.20	0.20	0.20
0.15mg/kg	Chromium	**8600**		65	28	14	17	13	15	14
1mg/kg	Chromium, Hexavalent	**33**		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
0.2mg/kg	Copper	**68000**		840	43	37	14	19	20	14
0.3mg/kg	Lead	**2330**		**2500**	34	84	16	15	10	9.5
0.05mg/kg	Mercury	**1100**		< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1mg/kg	Nickel	**980**		*26*	*29*	*17*	*16*	*16*	*20*	*17*
0.5mg/kg	Selenium	**12000**		< 0.5	< 0.5	0.50	< 0.5	< 0.5	< 0.5	< 0.5
0.8mg/kg	Vanadium	**9000**		23	49	23	33	22	30	25
1mg/kg	Zinc	**730000**		2900	78	110	48	42	45	38
	Inorganics									
	pH	-		11	8.3	8.3	7.6	8.0	8.1	7.8
0.1mg/kg	Cyanide, Total	-		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1mg/kg	Cyanide, Free*	**373**		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.50%	Total Organic Carbon	-		1.4	1.4	0.90	2.1	1.1	1.0	1.0
0.10%	Organic matter	-		1.6	1.6	1.5	2.8	1.5	1.1	1.0
10mg/l	Sulphate Aqueous Extract as SO4	-		2600	72	1700	55	1500	490	1500
10mg/kg	Sulphide	-		80	< 10	44	24	52	< 10	20
0.01%	Sulphate as SO4, Total	-		2.2	0.08	1.3	0.08	0.57	0.67	0.81
	Petroleum Hydrocarbons									
0.01mg/kg	Aliphatic C5-C6	**3200**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01mg/kg	Aliphatic C6-C8	**7800**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01mg/kg	Aliphatic C8-C10	**2000**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1.5mg/kg	Aliphatic C10-C12	**9700**		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
1.2mg/kg	Aliphatic C12-C16	**59000**		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
1.5mg/kg	Aliphatic C16-C21	**1600000**		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
3.4mg/kg	Aliphatic C21-C35	**1600000**		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
10mg/kg	Aliphatic C5-C35	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10
0.01mg/kg	Aromatic C5-C7	**26000**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01mg/kg	Aromatic C7-C8	**56000**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01mg/kg	Aromatic C8-C10	**3500**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.9mg/kg	Aromatic C10-C12	**16000**		< 0.9	< 0.9	< 0.9	2.1	1.7	< 0.9	< 0.9
0.5mg/kg	Aromatic C12-C16	**36000**		< 0.5	< 0.5	< 0.5	1.2	1.4	< 0.5	< 0.5
0.6mg/kg	Aromatic C16-C21	**28000**		< 0.6	< 0.6	< 0.6	0.70	2.1	< 0.6	< 0.6
1.4mg/kg	Aromatic C21-C35	**28000**		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
10mg/kg	Aromatic C5-C35	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10
10mg/kg	TPH Ali/Aro Total	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10
10mg/kg	EPH (C10-C35)	-		-	-	-	-	-	-	-
10mg/kg	TPH (C10-C40)	-		-	-	-	-	-	-	-
	PAHs									
0.03mg/kg	Naphthalene	**190**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Acenaphthylene	**83000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Acenaphthene	**84000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Fluorene	**63000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Phenanthrene	**22000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Anthracene	**520000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Fluoranthene	**23000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Pyrene	**54000**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Benzo(a)anthracene	**170**		< 0.03	0.03	0.03	< 0.03	< 0.03	0.03	< 0.03
0.03mg/kg	Chrysene	**350**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
0.03mg/kg	Benzo(b)fluoranthene	**44**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Benzo(k)fluoranthene	**1200**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Benzo(a)pyrene	**35**		< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	**500**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Dibenzo(a,h)anthracene	**3.5**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Benzo(g,h,i)perylene	**3900**		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.10mg/kg	PAH - USEPA 16, Total	**855393**		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
	Phenols									
0.3mg/kg	Phenol - Monohydric	**3200**		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Key

xx	At or exceeding the SSAC (Site Specific Assessment Criteria)
xx	Within 90th percentile of SSAC contaminant value
LoD	Laboratory 'Limit of Detection'
*	Based on ATKINS AtRisk Value, 2017

McDonalds MD Haverhill

Comparison of Samples vs Site Specific Assessment Criteria

Scenario: Commercial (1% SOM)

LoD	Metals (Based on 6% SOM)	SSAC	Sample ID Depth
0.2mg/kg	Arsenic	**640**	
1.5mg/kg	Barium	-	
0.2mg/kg	Beryllium	**12**	
0.2mg/kg	Boron, Water Soluble	**240000**	
0.1mg/kg	Cadmium	**190**	
0.15mg/kg	Chromium	**8600**	
1mg/kg	Chromium, Hexavalent	**33**	
0.2mg/kg	Copper	**68000**	
0.3mg/kg	Lead	**2330**	
0.05mg/kg	Mercury	**1100**	
1mg/kg	Nickel	**980**	
0.5mg/kg	Selenium	**12000**	
0.8mg/kg	Vanadium	**9000**	
1mg/kg	Zinc	**730000**	
	Inorganics		
	pH	-	
0.1mg/kg	Cyanide, Total	-	
0.1mg/kg	Cyanide, Free*	**373**	
0.50%	Total Organic Carbon	-	
0.10%	Organic matter	-	
10mg/l	Sulphate Aqueous Extract as SO4	-	
10mg/kg	Sulphide	-	
0.01%	Sulphate as SO4, Total	-	
	Petroleum Hydrocarbons		
0.01mg/kg	Aliphatic C5-C6	**3200**	
0.01mg/kg	Aliphatic C6-C8	**7800**	
0.01mg/kg	Aliphatic C8-C10	**2000**	
1.5mg/kg	Aliphatic C10-C12	**9700**	
1.2mg/kg	Aliphatic C12-C16	**59000**	
1.5mg/kg	Aliphatic C16-C21	**1600000**	
3.4mg/kg	Aliphatic C21-C35	**1600000**	
10mg/kg	Aliphatic C5-C35	-	
0.01mg/kg	Aromatic C5-C7	**26000**	
0.01mg/kg	Aromatic C7-C8	**56000**	
0.01mg/kg	Aromatic C8-C10	**3500**	
0.9mg/kg	Aromatic C10-C12	**16000**	
0.5mg/kg	Aromatic C12-C16	**36000**	
0.6mg/kg	Aromatic C16-C21	**28000**	
1.4mg/kg	Aromatic C21-C35	**28000**	
10mg/kg	Aromatic C5-C35	-	
10mg/kg	TPH Ali/Aro Total	-	
10mg/kg	EPH (C10-C35)	-	
10mg/kg	TPH (C10-C40)	-	
	PAHs		
0.03mg/kg	Naphthalene	**190**	
0.03mg/kg	Acenaphthylene	**83000**	
0.03mg/kg	Acenaphthene	**84000**	
0.03mg/kg	Fluorene	**63000**	
0.03mg/kg	Phenanthrene	**22000**	
0.03mg/kg	Anthracene	**520000**	
0.03mg/kg	Fluoranthene	**23000**	
0.03mg/kg	Pyrene	**54000**	
0.03mg/kg	Benzo(a)anthracene	**170**	
0.03mg/kg	Chrysene	**350**	
0.03mg/kg	Benzo(b)fluoranthene	**44**	
0.03mg/kg	Benzo(k)fluoranthene	**1200**	
0.03mg/kg	Benzo(a)pyrene	**35**	
0.03mg/kg	Indeno(1,2,3-c,d)pyrene	**500**	
0.03mg/kg	Dibenzo(a,h)anthracene	**3.5**	
0.03mg/kg	Benzo(g,h,i)perylene	**3900**	
0.10mg/kg	PAH - USEPA 16, Total	**855393**	
	Phenols		
0.3mg/kg	Phenol - Monohydric	**3200**	

Key

xx	At or exceeding the SSAC (Site Specific Assessment Criteria)
xx	Within 90th percentile of SSAC contaminant value
LoD	Laboratory 'Limit of Detection'
*	Based on ATKINS AtRisk Value, 2017

MD HAVERHILL

Comparison of Samples vs Site Specific Assessment Criteria

Criteria: Water Supply (Water Quality) Regulations, 2000

			Sample ID	BH102
LoD	**Metals**	**SSAC**	**Depth**	-
0.16ug/l	Arsenic, Dissolved	**10**		1.2
0.26ug/l	Barium, Dissolved	-		64
0.1ug/l	Beryllium, Dissolved	-		< 0.1
100ug/l	Boron	**1000**		71
0.03ug/l	Cadmium, Dissolved	**5**		0.07
0.25ug/l	Chromium, Dissolved	**50**		< 0.25
0.007ug/l	Chromium, Hexavalent	-		< 0.007
0.4ug/l	Copper, Dissolved	**2000**		1.2
0.09ug/l	Lead, Dissolved	**10**		< 0.09
0.01ug/l	Mercury, Dissolved	**1**		< 0.01
0.5ug/l	Nickel, Dissolved	**20**		*15*
0.25ug/l	Selenium, Dissolved	**10**		0.77
0.6ug/l	Vanadium, Dissolved	-		< 0.6
1.3ug/l	Zinc, Dissolved	**5000**		3.2
	Inorganics			
	pH	**10**		7.3
40ug/l	Cyanide, Total	**50**		< 40
20ug/l	Cyanide, Free	**50**		< 20
40ug/l	Cyanide, Complex	-		-
0.1mg/l	Sulphate as SO4	**250000**		18
10ug/l	Sulphide	-		54
1mg/l	Total Organic Carbon	-		8.1
	Petroleum Hydrocarbons			
0.1ug/l	Aliphatic C5-C6	-		-
0.1ug/l	Aliphatic C6-C8	-		-
0.1ug/l	Aliphatic C8-C10	-		-
1ug/l	Aliphatic C10-C12	-		-
1ug/l	Aliphatic C12-C16	-		-
1ug/l	Aliphatic C16-C21	-		-
1ug/l	Aliphatic C21-C35	-		-
10ug/l	Aliphatic C5-C35			-
0.1ug/l	Aromatic C5-C7	-		-
0.1ug/l	Aromatic C7-C8	-		-
0.1ug/l	Aromatic C8-C10	-		-
1ug/l	Aromatic C10-C12	-		-
1ug/l	Aromatic C12-C16	-		-
1ug/l	Aromatic C16-C21	-		-
1ug/l	Aromatic C21-C35	-		-
10ug/l	Aromatic C5-C35			-
10ug/l	TPH Ali/Aro Total	**300**		-
10ug/l	EPH (C10-C35)	-		120
1ug/l	Benzene	**1**		-
1ug/l	Toluene	-		-
1ug/l	Ethylbenzene	-		-
1ug/l	Xylene	-		-
	PAHs	-		
0.05ug/l	Naphthalene	-		< 0.05
0.01ug/l	Acenaphthylene	-		< 0.01
0.01ug/l	Acenaphthene	-		0.01
0.01ug/l	Fluorene	-		0.01
0.01ug/l	Phenanthrene	-		0.03
0.01ug/l	Anthracene	-		< 0.01
0.01ug/l	Fluoranthene	-		0.01
0.01ug/l	Pyrene	-		0.02
0.01ug/l	Benzo(a)anthracene	-		< 0.01
0.01ug/l	Chrysene	-		< 0.01
0.01ug/l	Benzo(b)fluoranthene	**0.1**		< 0.01
0.01ug/l	Benzo(k)fluoranthene	**0.1**		< 0.01
0.01ug/l	Benzo(a)pyrene	**0.01**		< 0.01
0.01ug/l	Indeno(1,2,3-c,d)pyrene	**0.1**		< 0.01
0.01ug/l	Dibenzo(a,h)anthracene	-		< 0.01
0.01ug/l	Benzo(g,h,i)perylene	**0.1**		0.01
0.2ug/l	PAH, Total	-		< 0.20
	Phenols			
100ug/l	Phenol - Monohydric	**0.5**		< 100

Key

xx	At or exceeding the SSAC (Site Specific Assessment Criteria)
xx	Within 90th percentile of SSAC contaminant value
LoD	Laboratory 'Limit of Detection'
WSR	Water Supply (Water Quality) Regulations
PoCW	Protection of Controlled Waters

APPENDIX D

GEOTECHNICAL LABORATORY TEST CERTIFICATES

Norfolk Partnership Laboratory
Part of the Norse Group

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Create Consulting Engineers Ltd
FAO Tom Bennett
15 Princes Street
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NR3 1AF

Our Project No. 103016

Our Report No. NCCL 14 to 14-602

Your Order No. PO4543

Date Report Issued 12 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of Moisture Content to BS1377 : Part 2 : 1990 : Section 3.2

Scheme Haverhill Materials Testing April '22

Report No.	Hole ID	Specimen Depth (m)	Sample Type	Sample Ref.	Drying Temp	Natural MC %	Sample description
NNPL2022 04014	BH01	0.8	D	1	105	19	Grey motled bluish grey CLAY.
NNPL2022 04017	BH01	2.4	D	3	105	21	Light brown mottled brown CLAY.
NNPL2022 040115	BH02	1.7	D	2	105	21	Light brown mottled brown CLAY.
NNPL2022 040119	BH02	4.3	D	5	105	26	Orangish brown sandy CLAY.

Remarks
Not all of the information required by the Standard or ISO IEC 17025, is shown on this report but is available on request.
All samples prepared in accordance with BS 1377:Part 1:1990.

Test Code = 602

UKAS TESTING 0920

Jim Elliot (Lead Technical Support Tech.)…….....

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Our reference No. NNPL202204012-
Our Project No 103016
Your Sample Ref B1
Your Project or Order No. PO4543
Date Report Issued 27 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of Liquid Limit to BS1377-2:1990 Cl 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 Cl 5

Scheme	Haverhill Materials Testing April '22		
Location	TP09	**Depth**	0.5m
Date sampled	31 Mar 2022	**Date received**	31 Mar 2022
Sampled by	Client	**Date tested**	12 Apr 2022
Sample type	Bulk Disturbed	**Sample Mass (g)**	567.5

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil
Description	Firm to stiff, grey gravelly CLAY. Gravel is rounded to sub-angular, fine and medium chalk and flint.
Supplier	CREATE
Source	Ex site

	Test Specimen
Location	Not applicable
Orientation	Not applicable

	Preparation Details	
Method of Division	Whole sample	
Preparation Method	Wet sieving	Air Drying
Retained 425µm (%)	9.8	
Natural MC (%)	20	
Liquid Limit (%)	18	
Plastic Limit (%)	10	
Plasticity Index (%)	8	
Modified PI *(%)	8	*BRE Digest 240:1993.
		This calculation is outside the scope of UKAS accreditation.
BS Soil Classification	CL	

Remarks NHBC Volume change potential classification is N/A

Test Code =605

UKAS TESTING

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Our reference No. NNPL2022040112-
Our Project No 103016
Your Sample Ref D7
Your Project or Order No. PO4543
Date Report Issued 27 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of Liquid Limit to BS1377-2:1990 Cl 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 Cl 5

Scheme	Haverhill Materials Testing April '22		
Location	BH01	**Depth**	5m
Date sampled	31 Mar 2022	**Date received**	31 Mar 2022
Sampled by	Client	**Date tested**	12 Apr 2022
Sample type	Small disturbed sample	**Sample Mass (g)**	495.5

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil
Description	Firm, brown, slightly gravelly CLAY. Gravel is rounded to sub-angular, fine and medium flint.
Supplier	CREATE
Source	Ex site

Test Specimen

Location	Not applicable
Orientation	Not applicable

Preparation Details

Method of Division	Whole sample	
Preparation Method	Wet sieving	Air Drying
Retained 425µm (%)	5.0	
Natural MC (%)	10	
Liquid Limit (%)	41	
Plastic Limit (%)	11	
Plasticity Index (%)	30	
Modified PI *(%)	29	*BRE Digest 240:1993.

This calculation is outside the scope of UKAS accreditation.

BS Soil Classification C I

Remarks NHBC Volume change potential classification is medium.

Test Code =605

UKAS TESTING

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Our reference No. NNPL2022040117-
Our Project No 103016
Your Sample Ref D4
Your Project or Order No. PO4543
Date Report Issued 27 Apr 2022

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Determination of Liquid Limit to BS1377-2:1990 Cl 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 Cl 5

Scheme	Haverhill Materials Testing April '22		
Location	BH02	**Depth**	3.1m
Date sampled	31 Mar 2022	**Date received**	31 Mar 2022
Sampled by	Client	**Date tested**	12 Apr 2022
Sample type	Small disturbed sample	**Sample Mass (g)**	322.7

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil
Description	Brown and light brown, gravelly CLAY. Gravel is sub-angular to rounded, fine and medium chalk.
Supplier	CREATE
Source	Ex site

Test Specimen

Location	Not applicable
Orientation	Not applicable

Preparation Details

Method of Division	Whole sample	
Preparation Method	Wet sieving	Air Drying
Retained 425µm (%)	5.8	
Natural MC (%)	15	
Liquid Limit (%)	38	
Plastic Limit (%)	16	
Plasticity Index (%)	22	
Modified PI *(%)	21	*BRE Digest 240:1993.

This calculation is outside the scope of UKAS accreditation.

BS Soil Classification C I

Remarks NHBC Volume change potential classification is medium.

Test Code =605

UKAS TESTING

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Our reference No. NNPL202204019-
Our Project No 103016
Your Sample Ref U2
Your Project or Order No. PO4543
Date Report Issued 27 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of Liquid Limit to BS1377-2:1990 Cl 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 Cl 5

Scheme	Haverhill Materials Testing April '22		
Location	BH01	**Depth**	3.6m
Date sampled	31 Mar 2022	**Date received**	31 Mar 2022
Sampled by	Client	**Date tested**	13 Apr 2022
Sample type	Undisturbed Sample	**Sample Mass (g)**	513

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil
Description	Brown and light brown, slightly gravelly CLAY. Gravel is sub-angular to rounded chalk and rare flint.
Supplier	CREATE
Source	Ex site

	Test Specimen	
Location	Not applicable	
Orientation	Not applicable	
	Preparation Details	
Method of Division	Whole sample	
Preparation Method	Wet sieving	Air Drying
Retained 425µm (%)	4.2	
Natural MC (%)	19	
Liquid Limit (%)	34	
Plastic Limit (%)	16	
Plasticity Index (%)	18	
Modified PI *(%)	18	*BRE Digest 240:1993.
		This calculation is outside the scope of UKAS accreditation.
BS Soil Classification	CL	

Remarks NHBC Volume change potential classification is low.

Test Code =605

UKAS TESTING

Jim Elliott (Lead Technical Support Tech.)

Norfolk Partnership Laboratory
Part of the Norse Group

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Email: civil.laboratory@norsegroup.co.uk

Create Consulting Engineers Ltd
FAO Tom Bennett
15 Princes Street
NORWICH
NR3 1AF

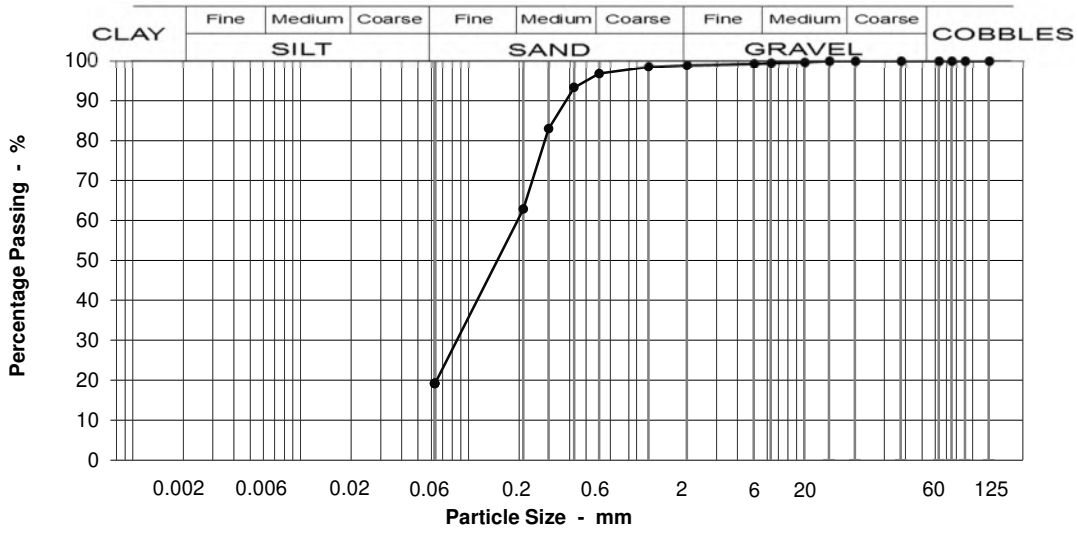
Our reference No. NNPL2022040113-612
Our Project No. 103016
Your Sample Ref. 8
Your Order No. PO4543
Date Tested 20/04/2022
Date Report Issued 27 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Particle Size Distribution to BS 1377 : Part 2 :1990 Section 9

Scheme: Haverhill Materials Testing April '22
Location and orientation within sample not applicable

Location: BH01 @ 5.65 - 6m
Disturbed sample



If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Sieving

Particle Size mm	% Passing
125	100
90	100
75	100
63	100
37.5	100
20	100
14	100
10	100
6.3	99
5	99
2	99
1.18	99
0.600	97
0.425	93
0.300	83
0.212	63
0.063	19

Specification for Highway Works Classification

Table 6/2

This material complies with the following material classes 2A/2B, 2A/2B.

Please be aware that we only report compliance with specifications using 'simple acceptance' as a guide as the specifications for the material as well as the methodology for testing are well established and take into account uncertainty in their formulation.

Moisture content % 7.9
(BS1377-Part 2, 1990)

Sample Proportions	
BOULDERS	0
COBBLES	0
Coarse GRAVEL	0
Medium GRAVEL	1
Fine GRAVEL	1
Coarse SAND	2
Medium SAND	34
Fine SAND	44
Silt & Clay	19

Grading Analysis	
D100	10
D60	0.20
D10	0.03
Uniformity Coefficient[!]	6 *

Description
Brown slightly gravelly very sandy CLAY.

* Uniformity coefficient extrapolated

! UC to Spec. For Highway Works, table 6/1 footnote 5

Test Code = 612

UKAS TESTING 0920

Jim Elliott (Lead Technical Support Tech.)

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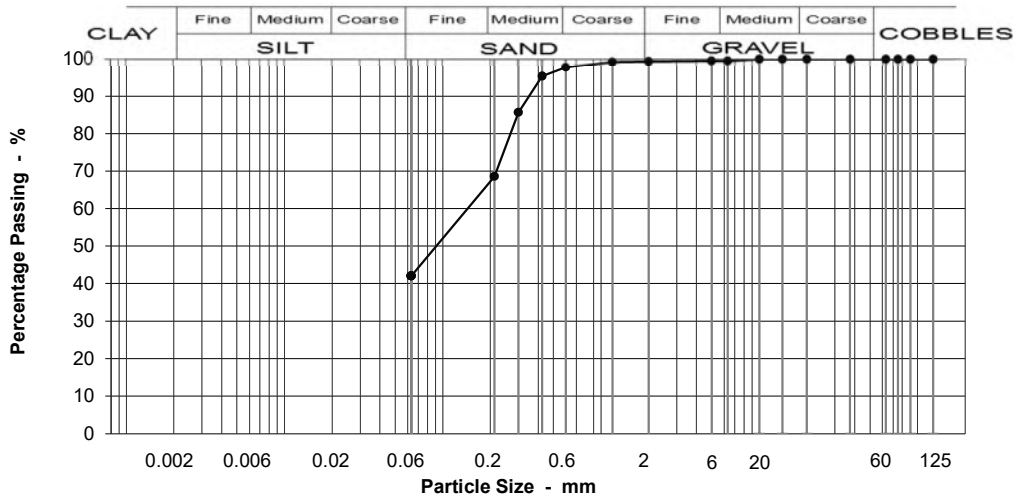
Our reference No. NNPL2022040120-612
Our Project No. 103016
Your Sample Ref. 6
Your Order No. PO4543
Date Tested 20/04/2022
Date Report Issued 26 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Particle Size Distribution to BS 1377 : Part 2 :1990 Section 9

Scheme: Haverhill Materials Testing April '22
Location and orientation within sample not applicable

Location: BH02 @ 4.6 - 5m
Disturbed sample



If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Sieving

Particle Size mm	% Passing
125	100
90	100
75	100
63	100
37.5	100
20	100
14	100
10	100
6.3	100
5	100
2	99
1.18	99
0.600	98
0.425	95
0.300	86
0.212	69
0.063	42

Specification for Highway Works Classification

Table 6/2

This material complies with the following material classes 2A/2B.

Please be aware that we only report compliance with specifications using 'simple acceptance' as a guide as the specifications for the material as well as the methodology for testing are well established and take into account uncertainty in their formulation.

Moisture content % 13
(BS1377-Part 2, 1990)

Sample Proportions	
BOULDERS	0
COBBLES	0
Coarse GRAVEL	0
Medium GRAVEL	0
Fine GRAVEL	0
Coarse SAND	2
Medium SAND	29
Fine SAND	27
Silt & Clay	42

Grading Analysis	
D100	6
D60	0.16
D10	0.03
Uniformity Coefficient[!]	6 *

Description
Brown clayey very sandy SILT.

* Uniformity coefficient extrapolated

! UC to Spec. For Highway Works, table 6/1 footnote 5

Test Code = 612

UKAS TESTING 0920

Simon Holden (Operations Manager)

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NR3 1AF

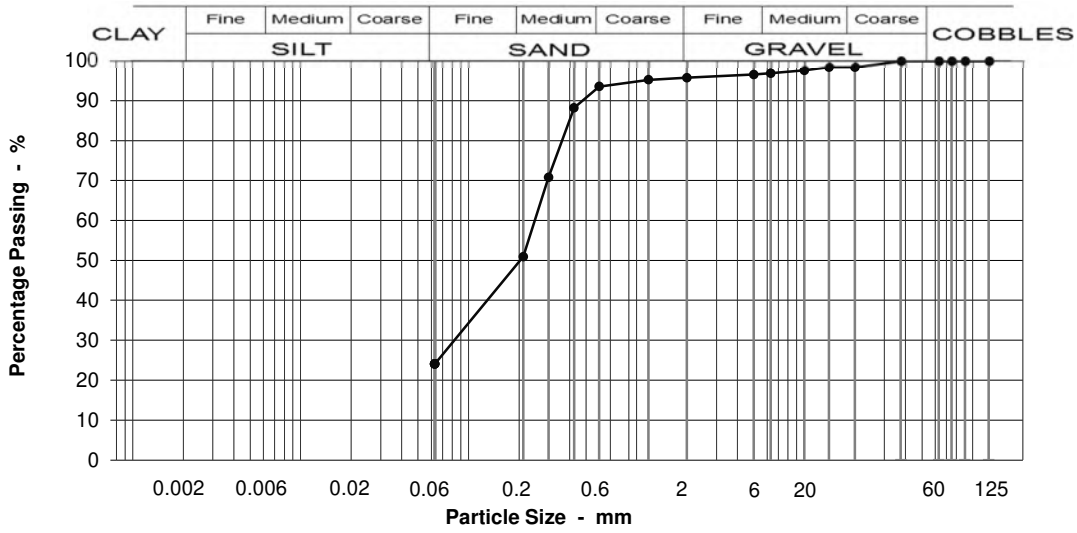
Our reference No. NNPL2022040121-612
Our Project No. 103016
Your Sample Ref. 7
Your Order No. PO4543
Date Tested 20/04/2022
Date Report Issued 27 Apr 2022

Tom.Bennett@createconsultingengineers.co.uk

Particle Size Distribution to BS 1377 : Part 2 :1990 Section 9

Scheme: Haverhill Materials Testing April '22
Location and orientation within sample not applicable

Location: BH02 @ 5.7 - 5.9m
Disturbed sample



If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Sieving

Particle Size mm	% Passing
125	100
90	100
75	100
63	100
37.5	100
20	98
14	98
10	98
6.3	97
5	97
2	96
1.18	95
0.600	94
0.425	88
0.300	71
0.212	51
0.063	24

Specification for Highway Works Classification

Table 6/2

This material complies with the following material classes 2A/2B, 2A/2B.

Please be aware that we only report compliance with specifications using 'simple acceptance' as a guide as the specifications for the material as well as the methodology for testing are well established and take into account uncertainty in their formulation.

Moisture content % 10
(BS1377-Part 2, 1990)

Sample Proportions	
BOULDERS	0
COBBLES	0
Coarse GRAVEL	2
Medium GRAVEL	2
Fine GRAVEL	1
Coarse SAND	2
Medium SAND	43
Fine SAND	27
Silt & Clay	24

Grading Analysis	
D100	20
D60	0.25
D10	0.04
Uniformity Coefficient[!]	6 *

Description
Light orangish brown slightly gravelly very sandy CLAY.

* Uniformity coefficient extrapolated

! UC to Spec. For Highway Works, table 6/1 footnote 5

Test Code = 612

UKAS TESTING 0920

Jim Elliott (Lead Technical Support Tech.)

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Our Project No	103016
Our Report and sample No	NNPL202204010-
Your Sample Ref	B1
Your Project or Order No	PO4543
Date Report Issued	27 April 2022
Date Tested	21 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of the California Bearing Ratio to BS 1377 : PART 4 : 1990

Scheme	Haverhill Materials Testing April '22		
Location	TP06 @ 0.5m Specimen: 1		
Date sampled	31 March 2022	**Date received**	31 March 2022
Sampled by	Client	**Sample Mass**	12.16kg

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil	**Sample type**	Bulk Disturbed
Description	Firm to stiff, grey gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint and chalk.		
Supplier	CREATE	**Source**	Ex site

Test Specimen Preparation details

Location	Not applicable	**Method of Division**	Quartering
Orientation	Not applicable	**Preparation Method**	Sieving, Natural Moisture Content
Retained 37.5mm	0.0 **%**	**Retained 20mm**	2.7 **%**
BS Method	3.4, 2.5kg Rammer	**Bulk Density**	2.02 Mg/m³
Number of layers	3	**Dry Density**	1.67 Mg/m³
Blows per layer	62 Blows	**Init. Moisture Content**	19 **%**
Condition	Soaked		

Test Results

	CBR Value	Surface Modulus $
	%	Mpa
Top	**3.6**	40
Bottom	**5.7**	54

$ The calculation of Surface Modulus is not covered by UKAS accreditation

Moisture Content Method		Oven dried @ 105-110°C			
Moisture Content Top	%	**21**	**Moisture Cont. Bottom**	%	**11**

Remarks

Test Code =644

UKAS TESTING 0920

Jim Elliott (Lead Technical Support Tech.)

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NORWICH
NR3 1AF

Our Project No	103016
Our Report and sample No	NNPL202204011-
Your Sample Ref	B1
Your Project or Order No	PO4543
Date Report Issued	27 April 2022
Date Tested	05 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of the California Bearing Ratio to BS 1377 : PART 4 : 1990

Scheme	Haverhill Materials Testing April '22		
Location	TP07 @ 0.5m Specimen: 1		
Date sampled	31 March 2022	**Date received**	31 March 2022
Sampled by	Client	**Sample Mass**	15.295kg

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil	**Sample type**	Bulk Disturbed
Description	Greyish-black, slightly silty, gravelly CLAY. Gravel is rounded to sub-angular, fine to coarse chalk.		
Supplier	CREATE	**Source**	Ex site

Test Specimen Preparation details

Location	Not applicable	**Method of Division**	Quartering
Orientation	Not applicable	**Preparation Method**	Sieving, Natural Moisture Content
Retained 37.5mm	0.0 **%**	**Retained 20mm**	1.4 **%**
BS Method	3.4, 2.5kg Rammer	**Bulk Density**	1.98 Mg/m³
Number of layers	3	**Dry Density**	1.62 Mg/m³
Blows per layer	62 Blows	**Init. Moisture Content**	22 **%**
Condition	Soaked		

Test Results

	CBR Value	Surface Modulus $
	%	Mpa
Top	**1.9**	27
Bottom	**3.9**	42

$ The calculation of Surface Modulus is not covered by UKAS accreditation

Moisture Content Method		Oven dried @ 105-110°C			
Moisture Content Top	%	**22**	**Moisture Cont. Bottom**	%	**22**

Remarks

Test Code =644

UKAS TESTING 0920

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NORWICH
NR3 1AF

Our Project No	103016
Our Report and sample No	NNPL202204013-
Your Sample Ref	B1
Your Project or Order No	PO4543
Date Report Issued	27 April 2022
Date Tested	21 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Determination of the California Bearing Ratio to BS 1377 : PART 4 : 1990

Scheme	Haverhill Materials Testing April '22		
Location	TP10 @ 0.4m Specimen: 1		
Date sampled	31 March 2022	**Date received**	31 March 2022
Sampled by	Client	**Sample Mass**	13.46kg

If a sample certificate was provided, it is available for inspection. The accuracy of any information provided by third parties cannot be guaranteed. These results only relate to the sample tested. Samples submitted by clients are tested 'as received'

Material	Soil	**Sample type**	Bulk Disturbed
Description	Soft to firm, mottled dark brown and grey, slightly silty, slightly sandy, gravelly CLAY. Gravel is sub-angular to rounded, fine to coarse chalk and flint.		
Supplier	CREATE	**Source**	Ex site

Test Specimen Preparation details

Location	Not applicable	**Method of Division**	Quartering
Orientation	Not applicable	**Preparation Method**	Sieving, Natural Moisture Content
Retained 37.5mm	0.0 **%**	**Retained 20mm**	2.2 **%**
BS Method	3.4, 2.5kg Rammer	**Bulk Density**	2.02 Mg/m³
Number of layers	3	**Dry Density**	1.66 Mg/m³
Blows per layer	62 Blows	**Init. Moisture Content**	23 **%**
Condition	Soaked		

Test Results

	CBR Value	Surface Modulus $	
	%	Mpa	
Top	**3.9**	42	$ The calculation of Surface Modulus is not covered by UKAS accreditation
Bottom	**4.3**	45	
Mean Value	**4.1**	43	

Moisture Content Method		Oven dried @ 105-110°C			
Moisture Content Top	%	**22**	**Moisture Cont. Bottom**	%	**22**

Remarks

Test Code =644

UKAS TESTING 0920

Jim Elliott (Lead Technical Support Tech.)

TERRA TEK
SITE INVESTIGATION & LABORATORY SERVICES

Norfolk Partnership Laboratory
County Hall
Martineau Lane
Norwich
Norfolk
NR1 2SG
For the attention of Mr. Simon Holden

Report No: C7630
Issue No 01

LABORATORY TEST REPORT

Project Name	**HAVERHILL**		
Project Number	**C7630**	Date samples received	06/04/2022
Your Ref		Date written instructions received	05/04/2022
Purchase Order	PN05037162	Date testing commenced	16/04/2022

Please find enclosed the results as summarised below

Item No	Test Quantity	Description	ISO 17025 Accredited
8.12	2	Multistage consolidated undrained triaxial	Yes

Remarks :

Issued by : R Norris Date of Issue : 20/04/2022

Approved Signatories : R.J.Norris

J.Hopkins (Laboratory Coordinator), M D Brown (Senior Quality Manager), R Norris (Supervisor)

Key to symbols used in this report
S/C : Testing was sub-contracted

Unless we are notified to the contrary, samples will be disposed after a period of one month from this date.
The results reported relate to samples received in the laboratory only.
All results contained in this report are provisional unless signed by an approved signatory
This report should not be reproduced except in full without the written approval of the laboratory.
Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory.
Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation.
Feedback on the this report may be left via our website terratek.co.uk/feedback

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Tel: 01494 810136
astonclinton@terratek.co.uk
www.terratek.co.uk

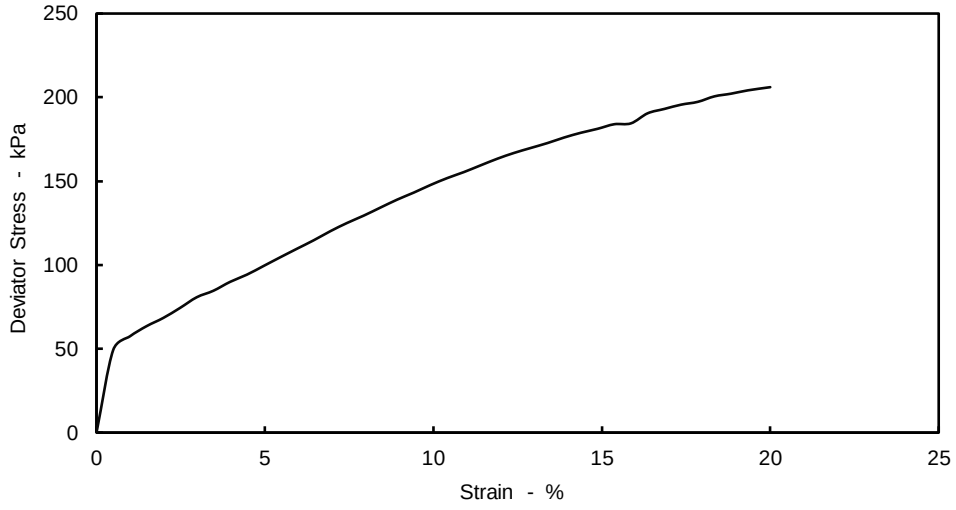
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

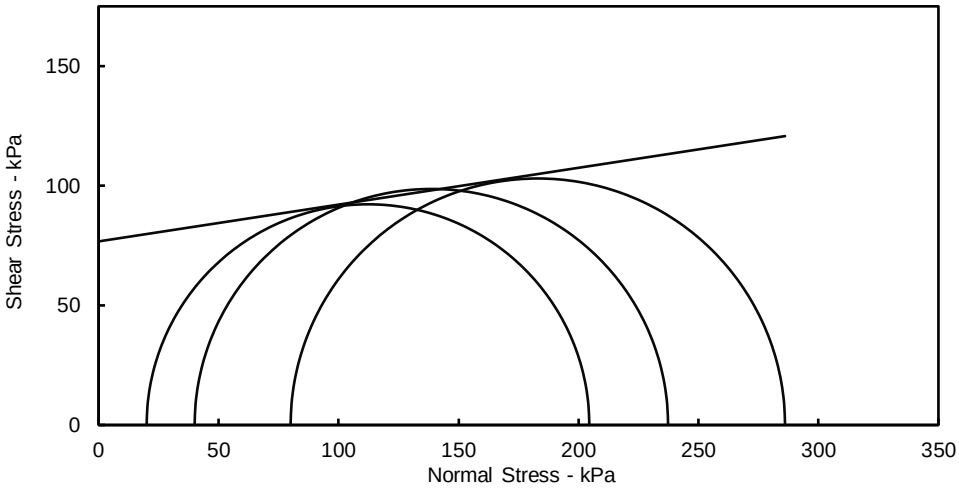
Site	HAVERHILL	**Contract No.**	**C7630**
Client	Norfolk Partnership Laboratory	Hole	BH01
Engineer	-	Depth (m)	1.60-2.00
		Sample Type	U

Sample Details				
Sample Condition		Undisturbed		
Height	mm	201.7		
Diameter	mm	107.8		
Moisture Content	%	20		
Bulk Density	Mg/m³	2.08		
Dry Density	Mg/m³	1.74		
Test Details	**Stage**	**1**	**2**	**3**
Membrane Thickness	mm	0.30	0.30	0.30
Membrane Correction	kPa	0.89	0.98	1.06
Rate of Axial Displacement	%/min	2.01	2.01	2.01
Cell Pressure	kPa	20	40	80
Strain at Failure	%	15.9	17.8	20.0
Maximum Deviator Stress	kPa	184	197	206
Shear Strength	kPa	92	99	103
Mode of Failure		Plastic		
Non Engineering Description		Firm intact light brown mottled dark grey slightly sandy CLAY with occasional fine to coarse chalk.		

Comments
Undisturbed specimen taken 50mm below top of tube

Shear Strength Parameters		
C	77	kPa
Phi	8.7	°



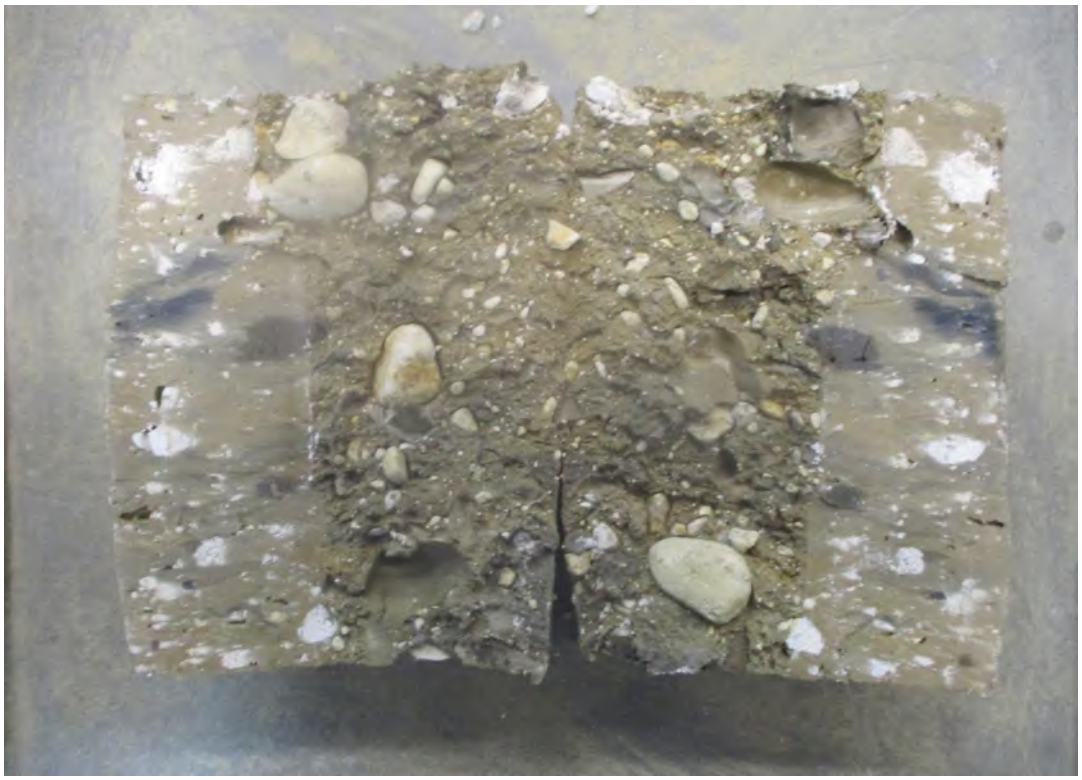


Originator	Checked & Approved
AM	R.J.N. 20/04/2022

UNCONSOLIDATED UNDRAINED MULTISTAGE TRIAXIAL COMPRESSION
BS 1377 : Part 7 : 1990 Clause 9

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

Site	HAVERHILL	**Contract No**	**C7630**
		Hole	BH01
Client	Norfolk Partnership Laboratory	Depth (m)	1.60-2.00
Engineer	-	Sample Type	U



Originator	Checked & Approved
AM	R.J.N. 20/04/2022

Please note that these photographs are intended to show the failure mode, and do not necessarily show accurately the colouration of the soil.

Unit 2 Springfield Road, Chesham, Bucks, HP51PW
Lab Project No C7630

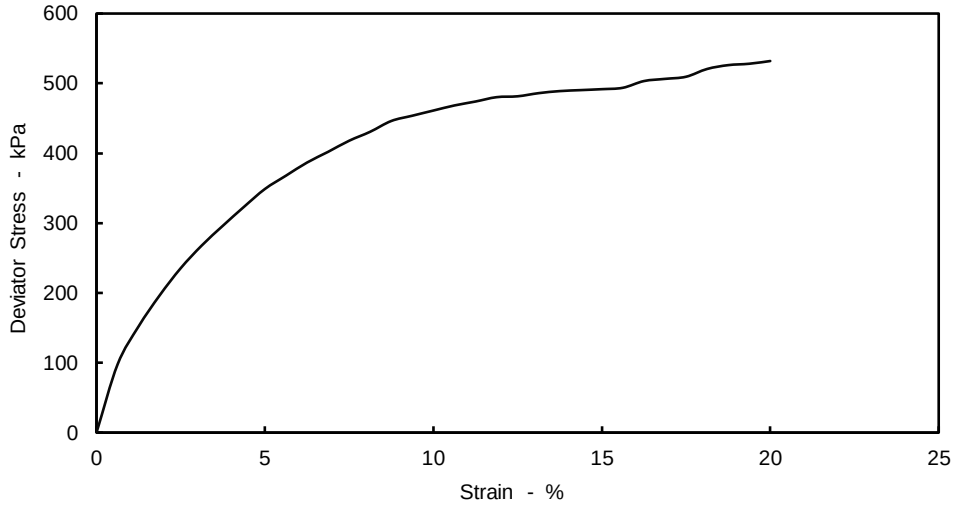
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES

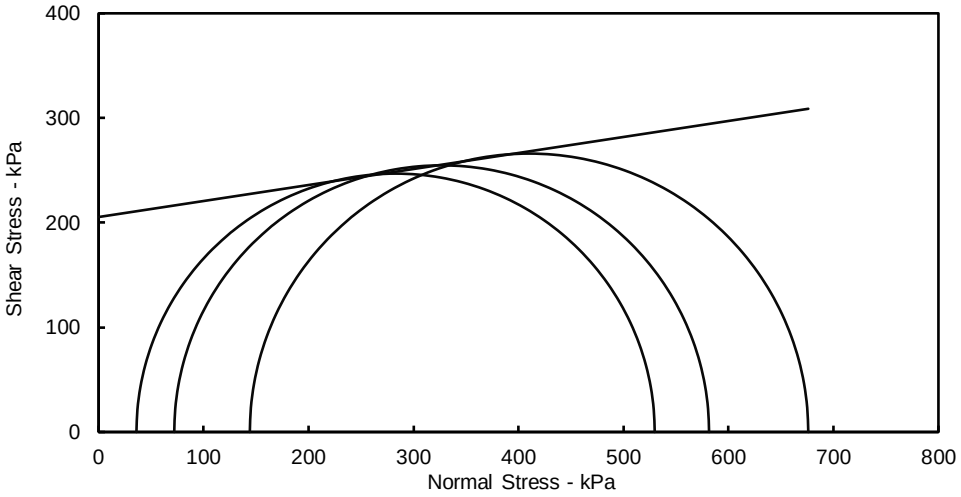
Site	HAVERHILL	**Contract No.**	**C7630**
		Hole	BH02
Client	Norfolk Partnership Laboratory	Depth (m)	3.60-4.00
Engineer	-	Sample Type	U

Sample Details				
Sample Condition		Undisturbed		
Height	mm	160.0		
Diameter	mm	83.2		
Moisture Content	%	17		
Bulk Density	Mg/m³	2.09		
Dry Density	Mg/m³	1.79		
Test Details	**Stage**	**1**	**2**	**3**
Membrane Thickness	mm	0.30	0.30	0.30
Membrane Correction	kPa	1.14	1.25	1.37
Rate of Axial Displacement	%/min	2.54	2.54	2.54
Cell Pressure	kPa	36	72	144
Strain at Failure	%	15.6	17.5	20.0
Maximum Deviator Stress	kPa	494	510	532
Shear Strength	kPa	247	255	266
Mode of Failure		Plastic		
Non Engineering Description		Very stiff intact light brown slightly sandy CLAY with occasional fine to medium chalk.		

Comments
Undisturbed specimen taken 10mm below top of tube

Shear Strength Parameters		
C	205	kPa
Phi	8.7	°





Originator	Checked & Approved
AM	R.J.N. 20/04/2022

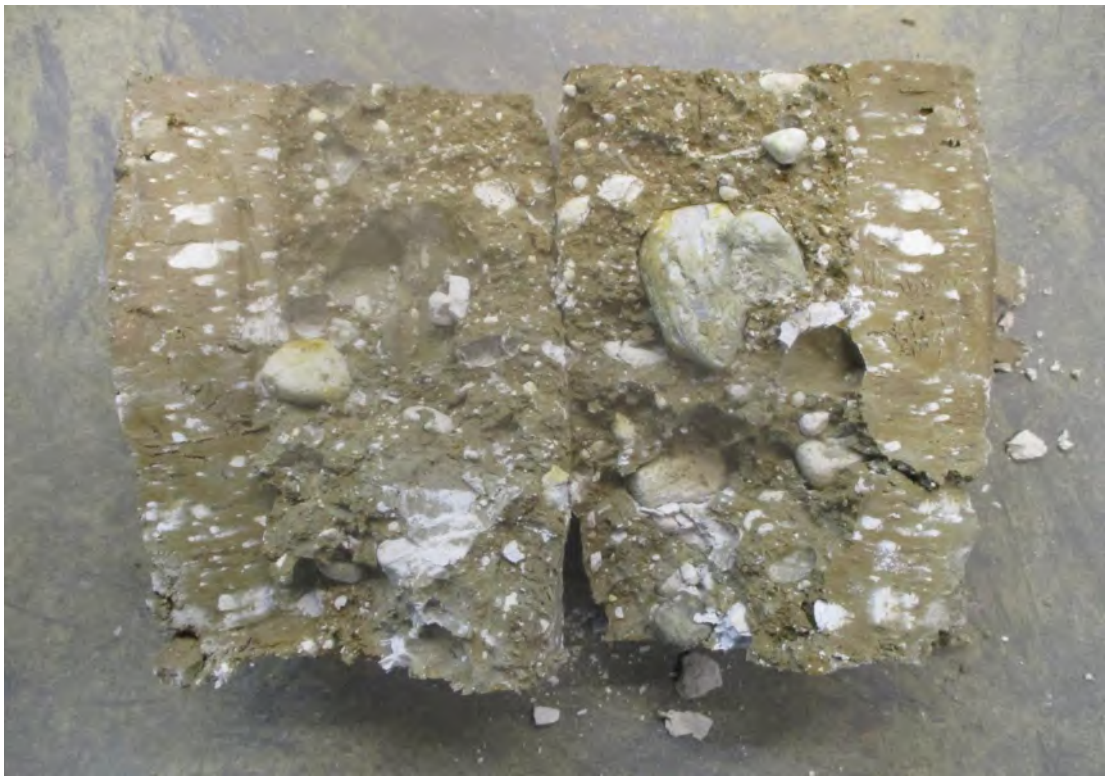
UNCONSOLIDATED UNDRAINED MULTISTAGE TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 9

#REF!

1730 - UUTXL BH02 03.60 U - C7630-361675.xls

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES	Site	HAVERHILL	Contract No	C7630
			Hole	BH02
	Client	Norfolk Partnership Laboratory	Depth (m)	3.60-4.00
	Engineer	-	Sample Type	U



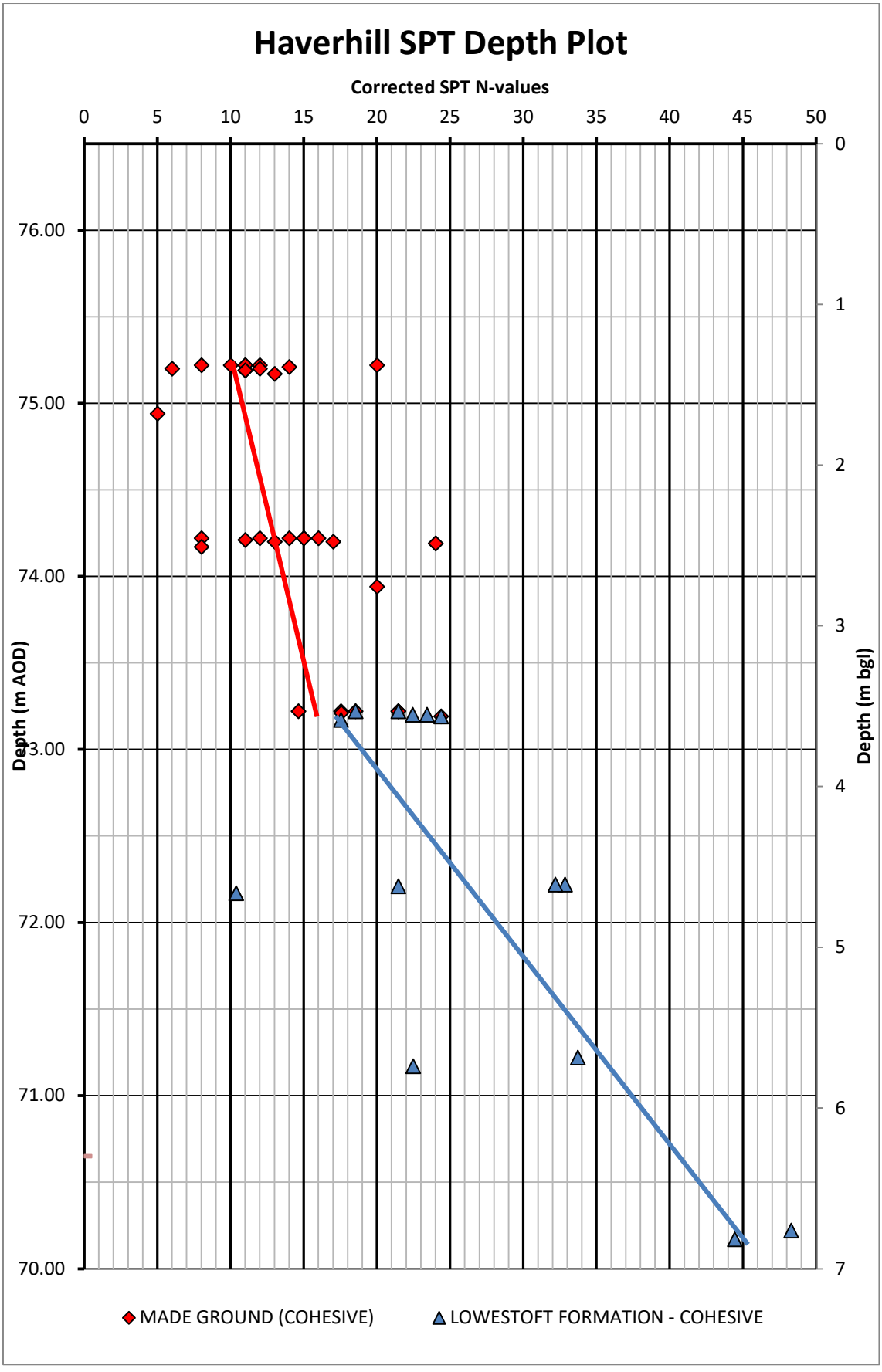
Originator	Checked & Approved	Please note that these photographs are intended to show the failure mode, and do not necessarily show accurately the colouration of the soil.	Tk
AM	R.J.N. 20/04/2022		Sheet 2 of 2

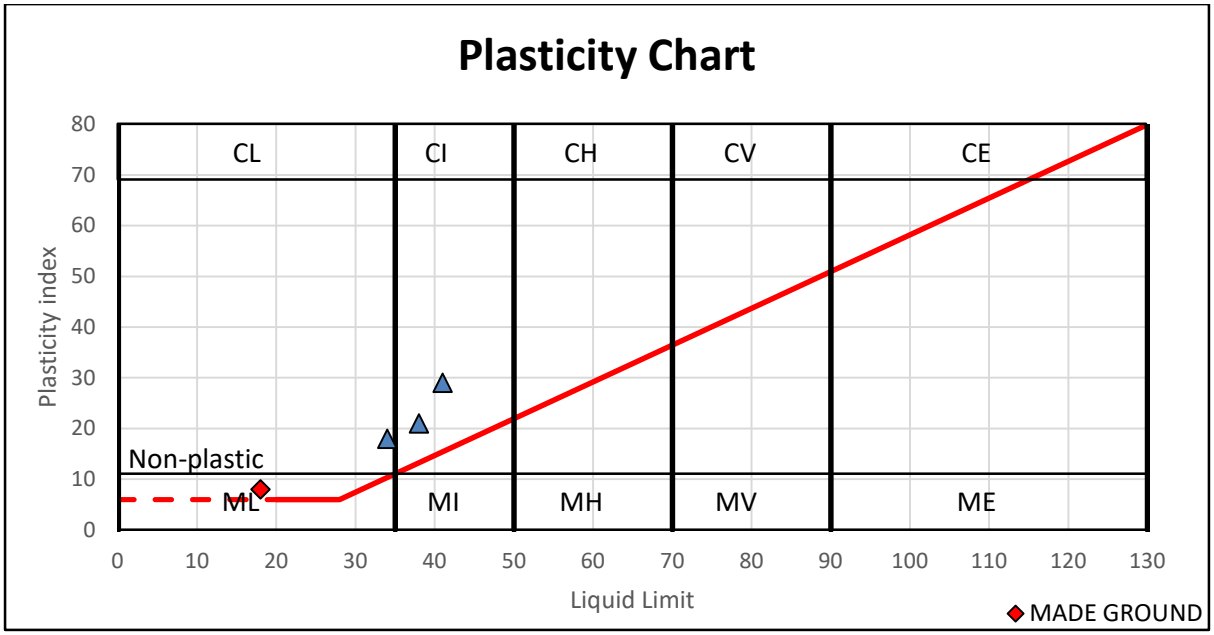
Unit 2 Springfield Road, Chesham, Bucks, HP51PW

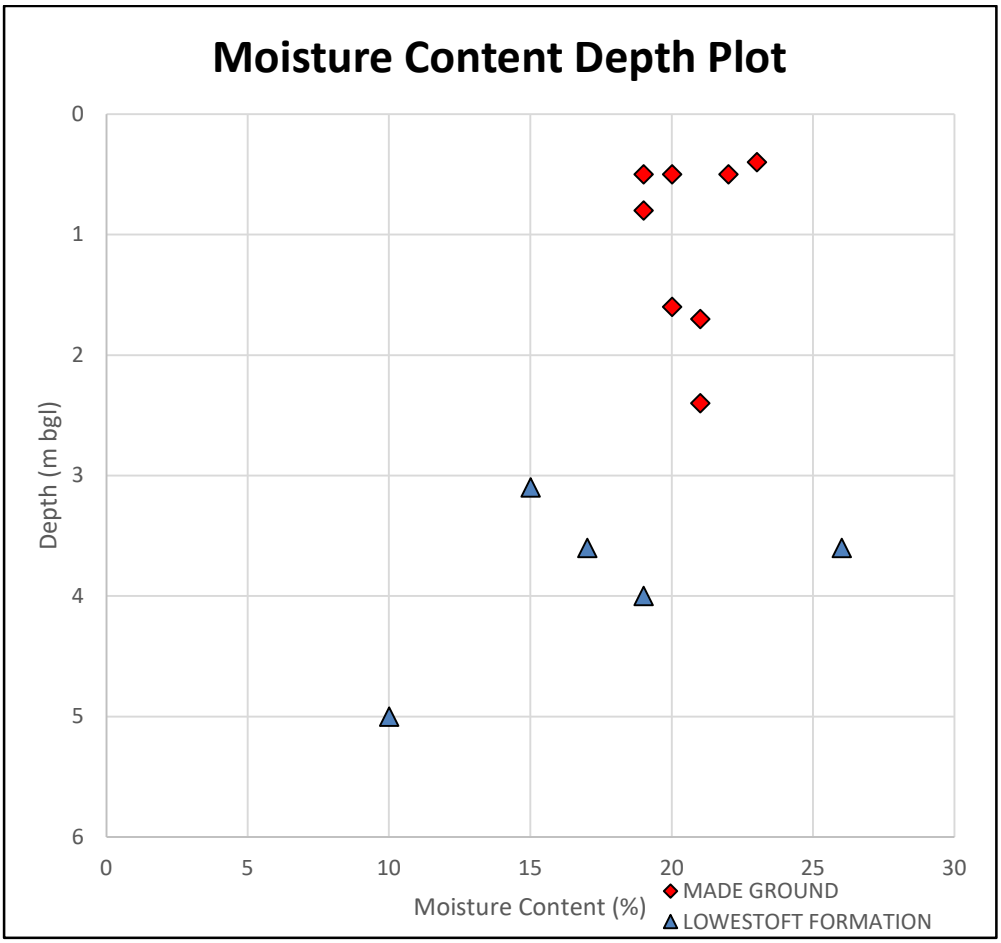
Lab Project No C7630

APPENDIX E

GEOTECHNICAL PLOTS


Haverhill SPT Depth Plot
Corrected SPT N-values
0
5
10
15
20
25
30
35
40
45
50
76.00
75.00
74.00
73.00
72.00
71.00
70.00
Depth (m AOD)
0
1
2
3
4
5
6
7
Depth (m bgl)
MADE GROUND (COHESIVE)
LOWESTOFT FORMATION - COHESIVE


Plasticity Chart
CL
CI
CH
CV
CE
Non-plastic
ML
MI
MH
MV
ME
Plasticity index
Liquid Limit
MADE GROUND


Moisture Content Depth Plot
Depth (m bgl)
Moisture Content (%)
MADE GROUND
LOWESTOFT FORMATION

APPENDIX F

GROUND GAS MONITORING

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	1 **of** 6	
Date:	30/03/2022		**Operator:**	TB	

Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	10:15	4.9	4.8		9.7		3.2				0.1			DRY	6.00	
BH02	10:45		2.6		6.1		14.2				0.1			0.98	6.00	
Max		**4.9**	**4.8**	**NA**	**9.7**	**NA**	**14.2**	**NA**	**NA**	**NA**	**0.1**	**NA**	**NA**	**0.98**	**6.00**	
Min		**4.9**	**2.6**	**NA**	**6.1**	**NA**	**3.2**	**NA**	**NA**	**NA**	**0.1**	**NA**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	X	Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			10:00	Start			11:00	End		
Barometric pressure (mbar):			999	Start			998	End		
Pressure trend (Daily):			X	Falling		Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			10	Before			11	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	2 **of** 6	
Date:	12/04/2022		**Operator:**	TB	

create CONSULTING ENGINEERS LTD

Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	13:40		1.4		4.9		10.0				0.1	0.0		DRY	6.00	
BH02	13:50	0.3	0.0	8.6	8.3		16.7				0.2	0.0		1.00	6.00	
Max		**0.3**	**1.4**	**8.6**	**8.3**	**NA**	**16.7**	**NA**	**NA**	**NA**	**0.2**	**0.0**	**NA**	**1.00**	**6.00**	
Min		**0.3**	**0.0**	**8.6**	**4.9**	**NA**	**10.0**	**NA**	**NA**	**NA**	**0.1**	**0.0**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None	X	Slight		Cloudy		Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			13:35	Start			14:10	End		
Barometric pressure (mbar):			997	Start			997	End		
Pressure trend (Daily):			X	Falling		Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			20	Before			20	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	3 **of** 6	
Date:	27/04/2022		**Operator:**	TB	

create CONSULTING ENGINEERS LTD

Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	09:00		0.0		0.5		20.7				0.1	0.0		DRY	6.00	
BH02	00:20		0.0		4.2		19.0				0.1	0.0		3.75	6.00	
Max		**NA**	**0.0**	**NA**	**4.2**	**NA**	**20.7**	**NA**	**NA**	**NA**	**0.1**	**0.0**	**NA**	**3.75**	**6.00**	
Min		**NA**	**0.0**	**NA**	**0.5**	**NA**	**19.0**	**NA**	**NA**	**NA**	**0.1**	**0.0**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	X	Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			08:45	Start			09:45	End		
Barometric pressure (mbar):			1020	Start			1020	End		
Pressure trend (Daily):			X	Falling	X	Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			10	Before			10	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	4 **of** 6	
Date:	13/05/2022		**Operator:**	TB	

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Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	14:30		0.1		1.6		19.6				0.1			DRY	6.00	
BH02	14:45		0.6		3.8		14.2				0.2			5.38	6.00	
Max		**NA**	**0.6**	**NA**	**3.8**	**NA**	**19.6**	**NA**	**NA**	**NA**	**0.2**	**NA**	**NA**	**5.38**	**6.00**	
Min		**NA**	**0.1**	**NA**	**1.6**	**NA**	**14.2**	**NA**	**NA**	**NA**	**0.1**	**NA**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None	X	Slight		Cloudy		Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			14:15	Start			15:00	End		
Barometric pressure (mbar):			1010	Start			1010	End		
Pressure trend (Daily):				Falling	X	Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			12	Before			12	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	5 **of** 6	
Date:	20/05/2022		**Operator:**	TB	

Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	10:35		0.1		1.1		19.7				0.2			DRY	6.00	
BH02	10:45		0.6		3.8		13.5				0.2			5.77	6.00	
Max		**NA**	**0.6**	**NA**	**3.8**	**NA**	**19.7**	**NA**	**NA**	**NA**	**0.2**	**NA**	**NA**	**5.77**	**6.00**	
Min		**NA**	**0.1**	**NA**	**1.1**	**NA**	**13.5**	**NA**	**NA**	**NA**	**0.2**	**NA**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:		Dry		Moist	X	Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	X	Overcast		
Precipitation:		None		Slight	X	Moderate		Heavy		
Time monitoring performed:			10:25	Start			11:00	End		
Barometric pressure (mbar):			1010	Start			1010	End		
Pressure trend (Daily):				Falling	X	Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			11	Before			11	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Site:	P22-2590 McDonalds Haverhill		**Visit No:**	6 **of** 6	
Date:	23/05/2022		**Operator:**	TB	

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Monitoring Point	Time	GAS CONCENTRATIONS								FLOW DATA		VOLATILES		WELL AND WATER DATA		COMMENTS
		Methane (%v/v)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		%LEL		Flow rate (l/hr)		PID Peak (ppm)	Product thickness (mm)	Water level (mbgl)	Well Depth (m)	
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady					
BH01	15:00		2.6		8.7		5.0				0.2			DRY	6.00	
BH02	15:20		6.7		6.0		3.0				0.2			5.80	6.00	
Max		**NA**	**6.7**	**NA**	**8.7**	**NA**	**5.0**	**NA**	**NA**	**NA**	**0.2**	**NA**	**NA**	**5.80**	**6.00**	
Min		**NA**	**2.6**	**NA**	**6.0**	**NA**	**3.0**	**NA**	**NA**	**NA**	**0.2**	**NA**	**NA**	**DRY**	**6.00**	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

State of ground:		Dry		Moist	X	Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy	X	Overcast		
Precipitation:		None	X	Slight		Moderate		Heavy		
Time monitoring performed:			14:50	Start			15:35	End		
Barometric pressure (mbar):			993	Start			993	End		
Pressure trend (Daily):			X	Falling		Steady		Rising		
Source:	GA5000									
Air Temperature (Deg. C):			16	Before			16	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

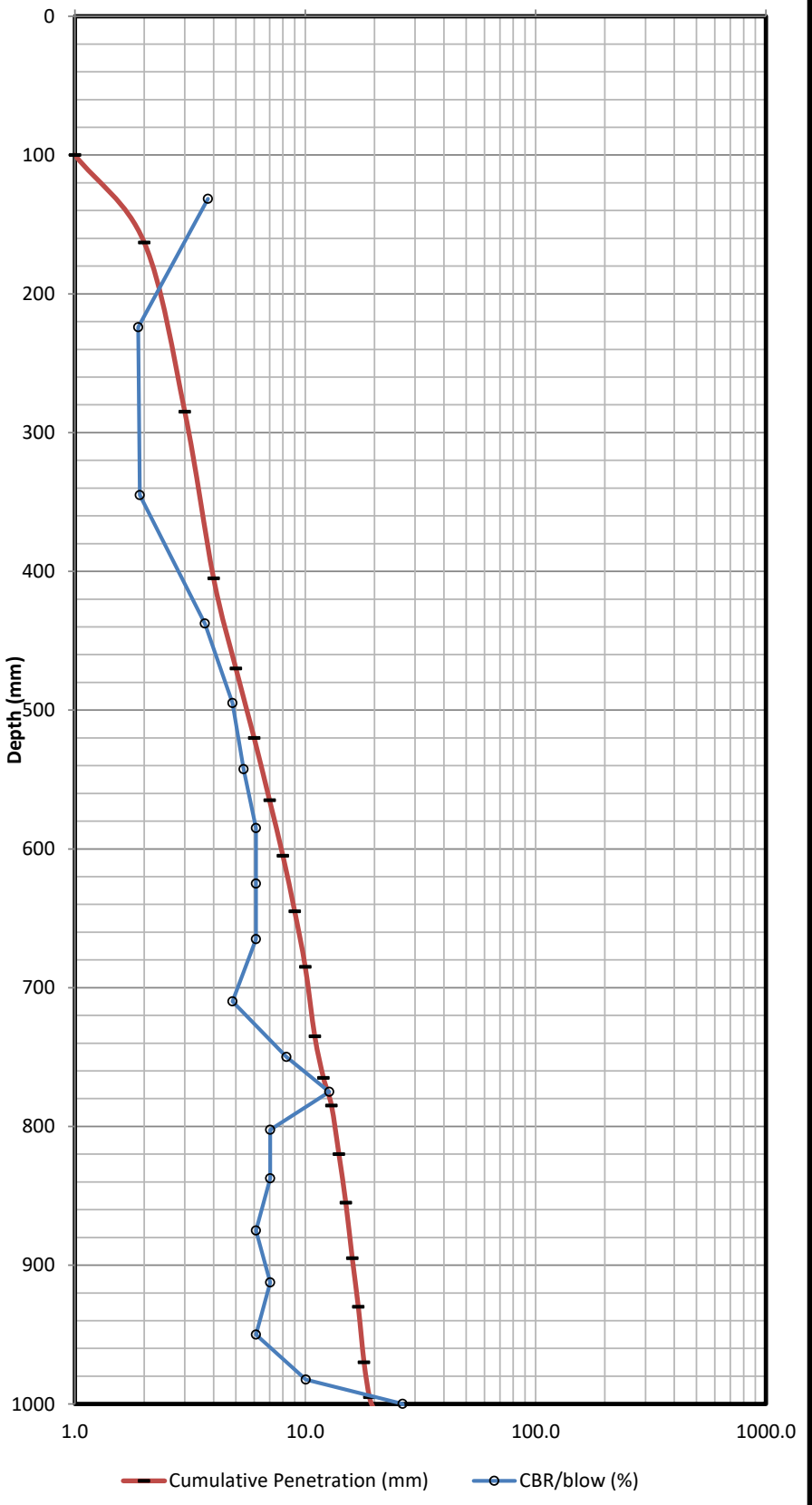
Ambient air check: **CH_4** 0.0 **CO_2** 0.1 **O_2** 20.9

APPENDIX G

DYNAMIC CONE PENETRATION RESULTS

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP01
	DCP01

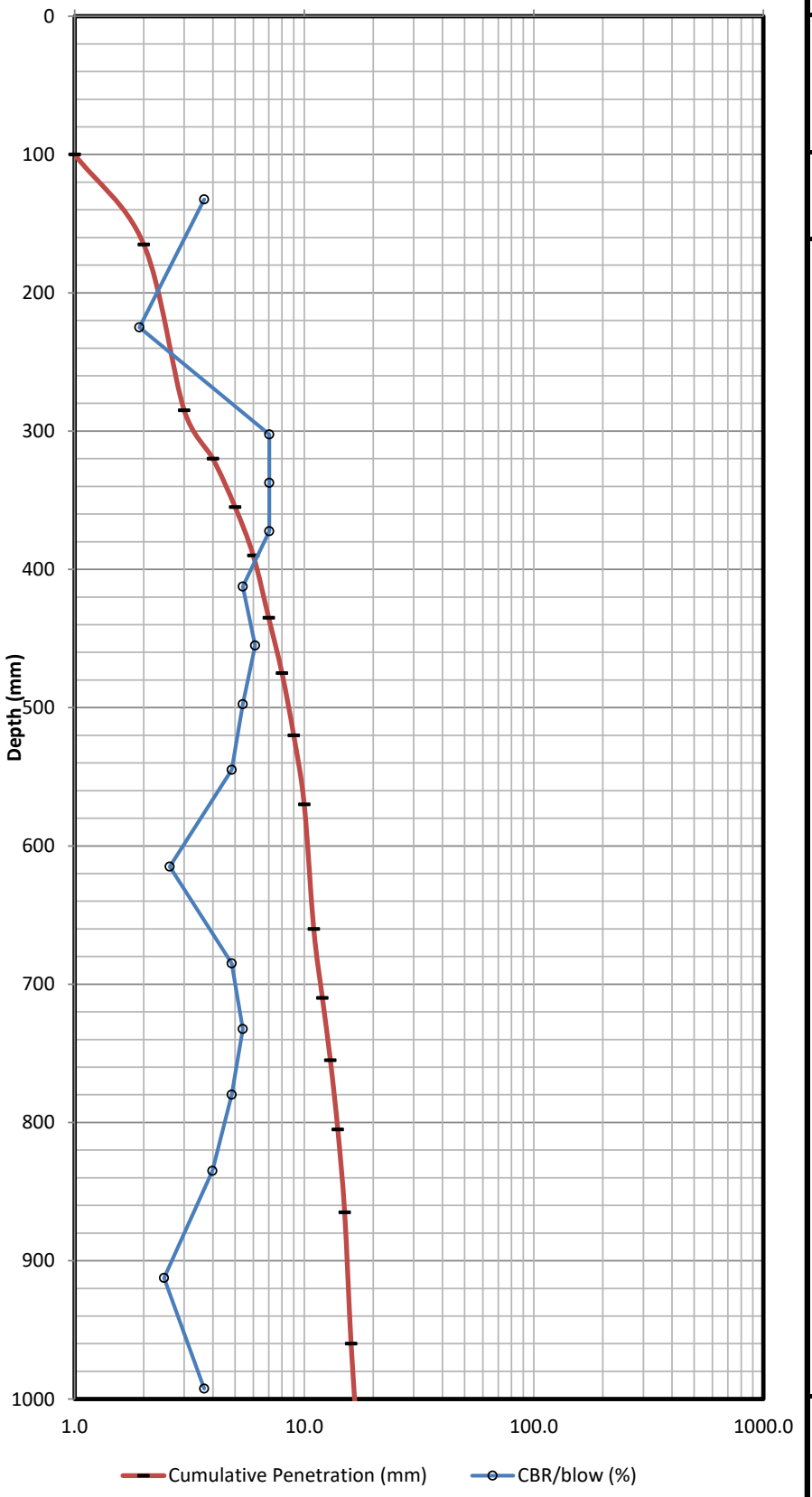


Interpreted CBR Value
100mm Made Ground removed
Start of Test
Initial Penetration
5.4
End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP02
	DCP02



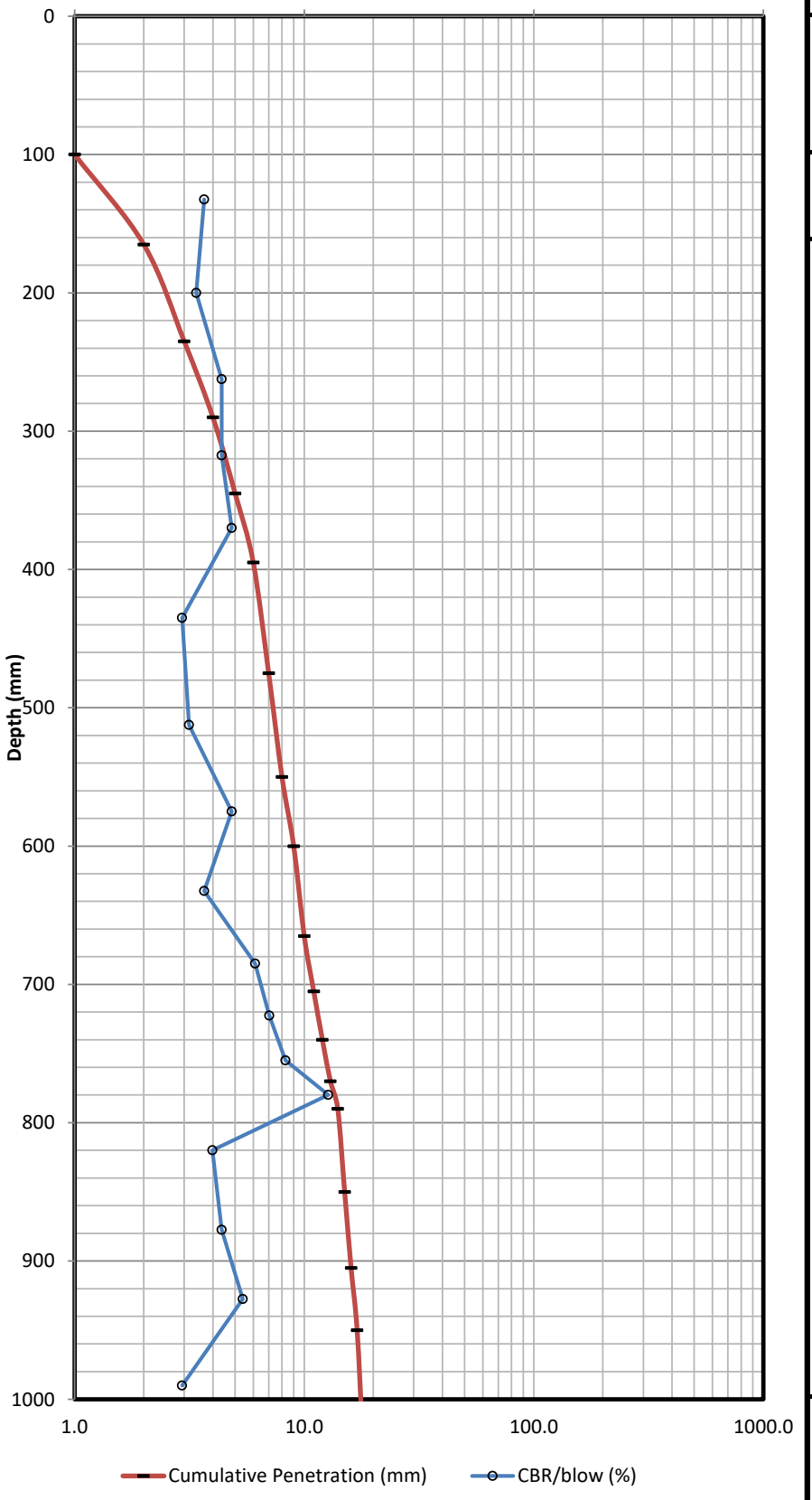
Interpreted CBR Value
100mm Made Ground removed
Start of Test
Initial Penetration
4.2
End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

create
CONSULTING ENGINEERS LTD

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP03
	DCP03



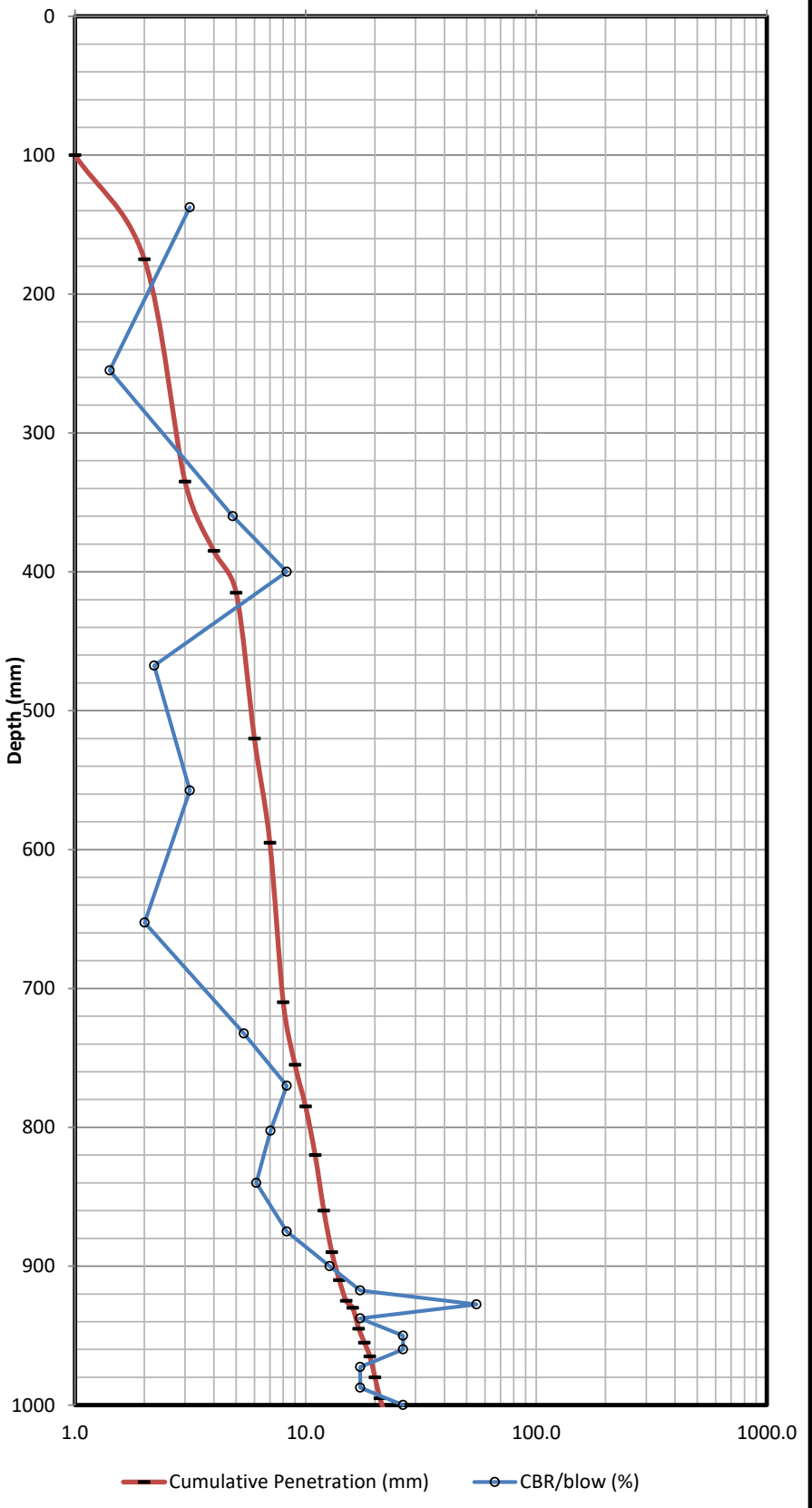
Interpreted CBR Value
100mm Made Ground removed
Start of Test
Initial Penetration
4.4
End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

create
CONSULTING ENGINEERS LTD

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP04
	DCP04



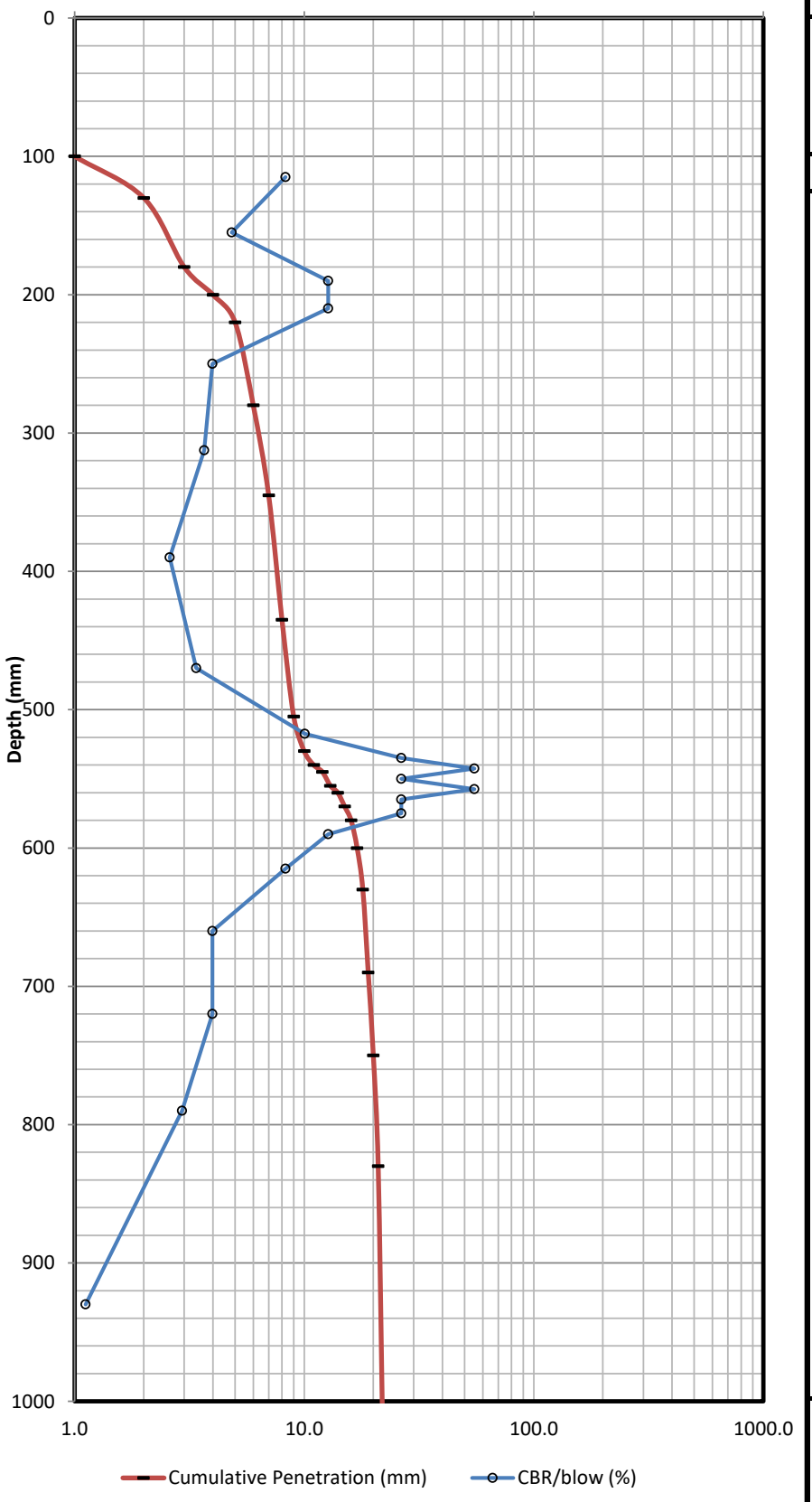
Interpreted CBR Value
100mm Made Ground removed
Start of Test
Initial Penetration
5.9
End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

create
CONSULTING ENGINEERS LTD

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP05
	DCP05



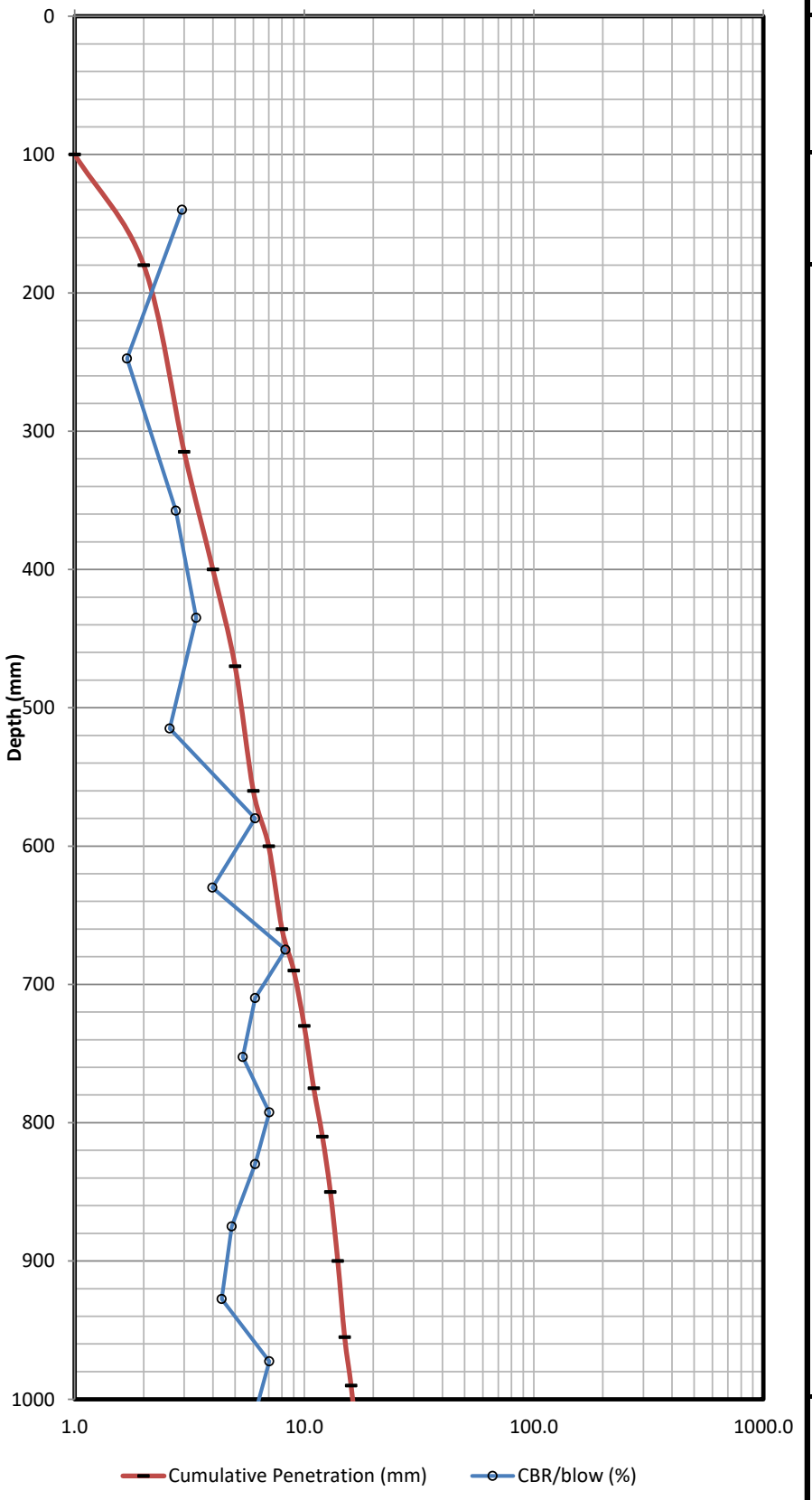
Interpreted CBR Value
100mm Made Ground removed
Start of Test
Initial Penetration
5.4
End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

create
CONSULTING ENGINEERS LTD

Date	28/03/2022
Job Number	P22-2590
Site	MD Haverhill
Engineer	TB

Location	
	TP06
	DCP06



Interpreted CBR Value

100mm Made Ground removed

Start of Test

Initial Penetration

4.2

End of test

1. 100mm Made Ground removed prior to starting test
2. Test carried out to a maximum depth of 1000mm
3. Soils logged once instrument removed from ground

APPENDIX H

INFILTRATION TEST DATA SHEETS

create
CONSULTING ENGINEERS LTD

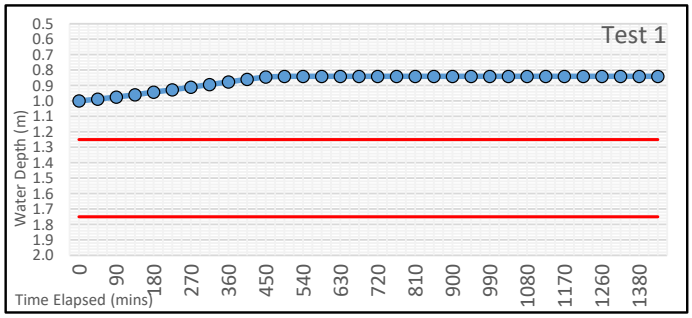
Location	TP08

Site:	Haverhill MD
Client:	McDonald's Restaurants Ltd
Job No:	P22-2590

Co-ordinates	567613.7 E 244280.9 N
Elevation	76.53 m
Date	29/03/2022

Trial Pit Dimensions (m)	
Length	1.50
Width	0.45
Depth	2.00
Test volume (m^3)	0.68
Effective Depth	1.00

Soil type at test level	MADE GROUND (Silty gravelly CLAY)		
Groundwater	No	**Stone Filled?**	Yes
Sidewall stability	Stable, vertical	**Voids Ratio (%)**	0.41



V_{p75-25} (m³)	0.14
A_{S50} (m²)	2.63
t_{p75-25} (mins)	N/A
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	**TEST FAIL**

Time (mins)	Test 1	Test 2	Test 3
0	1.00	-	-
45	0.99	-	-
90	0.98	-	-
135	0.96	-	-
180	0.94	-	-
225	0.93	-	-
270	0.91	-	-
315	0.89	-	-
360	0.88	-	-
405	0.86	-	-
450	0.84	-	-
495	0.84	-	-
540	0.84	-	-
585	0.84	-	-
630	0.84	-	-
675	0.84	-	-
720	0.84	-	-
765	0.84	-	-
810	0.84	-	-
855	0.84	-	-
900	0.84	-	-
945	0.84	-	-
990	0.84	-	-
1035	0.84	-	-
1080	0.84	-	-
1125	0.84	-	-
1170	0.84	-	-
1215	0.84	-	-
1260	0.84	-	-
1320	0.84	-	-
1380	0.84	-	-
1440	0.84	-	-

Remarks

1 Soakage testing carried out between 1.0m and 2.0m
2 Datalogger number 825023
3 Test 1 carried out on 29/03/2022
4 Test failed due to insufficient drainage in 24 hour period

Analysis by:	TB
Checked by:	AW

create
CONSULTING ENGINEERS LTD

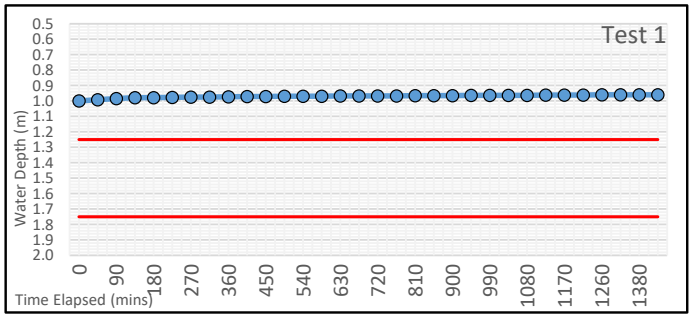
Location	TP09

Site:	Haverhill MD
Client:	McDonald's Restaurants Ltd
Job No:	P22-2590

Co-ordinates	567644.0 E 244283.0 N
Elevation	76.52 m
Date	29/03/2022

Trial Pit Dimensions (m)	
Length	1.50
Width	0.45
Depth	2.00
Test volume (m^3)	0.68
Effective Depth	1.00

Soil type at test level	MADE GROUND (Silty gravelly CLAY)		
Groundwater	No	**Stone Filled?**	Yes
Sidewall stability	Stable, vertical	**Voids Ratio (%)**	0.41



V_{p75-25} **(m^3)**	0.14
A_{S50} **(m^2)**	2.63
t_{p75-25} **(mins)**	**N/A**
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	**TEST FAIL**

Time (mins)	Test 1	Test 2	Test 3
0	1.00	-	-
45	0.99	-	-
90	0.98	-	-
135	0.98	-	-
180	0.98	-	-
225	0.98	-	-
270	0.98	-	-
315	0.97	-	-
360	0.97	-	-
405	0.97	-	-
450	0.97	-	-
495	0.97	-	-
540	0.97	-	-
585	0.97	-	-
630	0.97	-	-
675	0.97	-	-
720	0.97	-	-
765	0.97	-	-
810	0.97	-	-
855	0.97	-	-
900	0.96	-	-
945	0.96	-	-
990	0.96	-	-
1035	0.96	-	-
1080	0.96	-	-
1125	0.96	-	-
1170	0.96	-	-
1215	0.96	-	-
1260	0.96	-	-
1320	0.96	-	-
1380	0.96	-	-
1440	0.96	-	-

Remarks

1 Soakage testing carried out between 1.0m and 2.0m
2 Datalogger number 823575
3 Test 1 carried out on 29/03/2022
4 Test failed due to insufficient drainage in 24 hour period

Analysis by:	TB
Checked by:	AW

create
CONSULTING ENGINEERS LTD

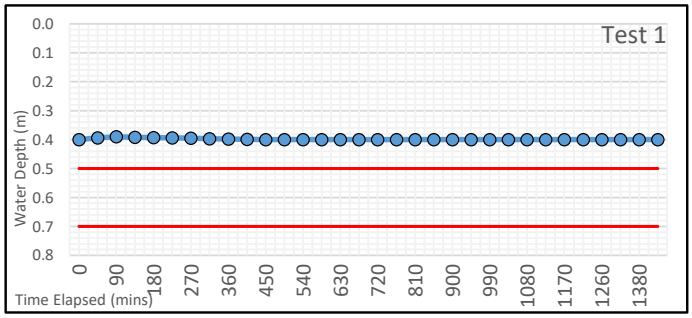
Location	TP10

Site:	Haverhill MD
Client:	McDonald's Restaurants Ltd
Job No:	P22-2590

Co-ordinates	567616.6 E 244299.9 N
Elevation	76.53 m
Date	29/03/2022

Trial Pit Dimensions (m)	
Length	1.40
Width	0.45
Depth	0.80
Test volume (m^3)	0.25
Effective Depth	0.40

Soil type at test level	MADE GROUND (Silty gravelly CLAY)		
Groundwater	Perched groundwater at 0.80m	**Stone Filled?**	Yes
Sidewall stability	Stable, vertical	**Voids Ratio (%)**	0.41



V_{p75-25} (m^3)	0.05
A_{S50} (m^2)	1.37
t_{p75-25} (mins)	N/A
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	**TEST FAIL**

Time (mins)	Test 1	Test 2	Test 3
0	0.40	-	-
45	0.39	-	-
90	0.39	-	-
135	0.39	-	-
180	0.39	-	-
225	0.39	-	-
270	0.40	-	-
315	0.40	-	-
360	0.40	-	-
405	0.40	-	-
450	0.40	-	-
495	0.40	-	-
540	0.40	-	-
585	0.40	-	-
630	0.40	-	-
675	0.40	-	-
720	0.40	-	-
765	0.40	-	-
810	0.40	-	-
855	0.40	-	-
900	0.40	-	-
945	0.40	-	-
990	0.40	-	-
1035	0.40	-	-
1080	0.40	-	-
1125	0.40	-	-
1170	0.40	-	-
1215	0.40	-	-
1260	0.40	-	-
1320	0.40	-	-
1380	0.40	-	-
1440	0.40	-	-

Remarks

1 Soakage testing carried out between 0.4m and 0.8m
2 Datalogger number 823254
3 Test 1 carried out on 29/03/2022
4 Test failed due to insufficient drainage in 24 hour period

Analysis by:	TB
Checked by:	AW

create
CONSULTING ENGINEERS LTD

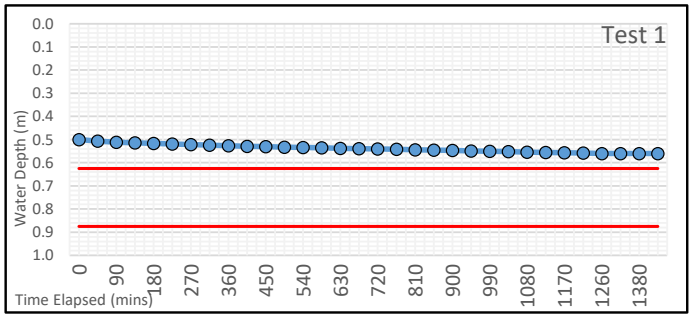
Location	TP11

Site:	Haverhill MD
Client:	McDonald's Restaurants Ltd
Job No:	P22-2590

Co-ordinates	567649.2 E 244305.4 N
Elevation	76.24 m
Date	29/03/2022

Trial Pit Dimensions (m)	
Length	1.40
Width	0.45
Depth	1.00
Test volume (m^3)	0.32
Effective Depth	0.50

Soil type at test level	MADE GROUND (Silty gravelly CLAY)		
Groundwater	No	**Stone Filled?**	Yes
Sidewall stability	Stable, vertical	**Voids Ratio (%)**	0.41



V_{p75-25} **(m^3)**	0.06
A_{S50} **(m^2)**	1.56
t_{p75-25} **(mins)**	**N/A**
Soil infiltration rate $f = \frac{V_{p75-25}}{a_{S50} \times t_{p75-25}}$	**TEST FAIL**

Time (mins)	Test 1	Test 2	Test 3
0	0.50	-	-
45	0.51	-	-
90	0.51	-	-
135	0.51	-	-
180	0.52	-	-
225	0.52	-	-
270	0.52	-	-
315	0.52	-	-
360	0.53	-	-
405	0.53	-	-
450	0.53	-	-
495	0.53	-	-
540	0.53	-	-
585	0.54	-	-
630	0.54	-	-
675	0.54	-	-
720	0.54	-	-
765	0.54	-	-
810	0.54	-	-
855	0.55	-	-
900	0.55	-	-
945	0.55	-	-
990	0.55	-	-
1035	0.55	-	-
1080	0.55	-	-
1125	0.56	-	-
1170	0.56	-	-
1215	0.56	-	-
1260	0.56	-	-
1320	0.56	-	-
1380	0.56	-	-
1440	0.56	-	-

Remarks

1 Soakage testing carried out between 0.5m and 1.0m
2 Datalogger number 823254
3 Test 1 carried out on 29/03/2022
4 Test failed due to insufficient drainage in 24 hour period

Analysis by:	TB
Checked by:	AW